

# Analysis of State Disaster Debris Management Plans By Donald Hall



# **Analysis of State Disaster Debris Management Plans**

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## **ACRONYMS USED IN THIS DOCUMENT**

<b>C &amp; D</b>	Construction and Demolition
<b>DMTF</b>	Debris Management Task Force
<b>DOT</b>	Department of Transportation <sup>1</sup>
<b>DPW</b>	Department of Public Works
<b>EOC</b>	Emergency Operations Center
<b>EPA</b>	Environmental Protection Agency
<b>FEMA</b>	Federal Emergency Management Agency
<b>FHWA</b>	Federal Highway Administration
<b>FRP</b>	Federal Response Plan
<b>GIS</b>	Geographic Information System
<b>HHW</b>	Household Hazardous Waste
<b>SWM</b>	Solid Waste Management
<b>TDSR</b>	Temporary Debris Storage and Reduction
<b>USAFE</b>	U.S. Army Corps of Engineers

(FEMA 1999, iii)

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<sup>1</sup> This Acronym is used in reference to the US Department of Transportation unless it is identified as been at a different level. Example: TXDOT (Texas Department of Transportation) is responsible for debris removal.



## TERMS USED IN THIS DOCUMENT

**Chipping.** Reducing wood related material by mechanical means into small pieces to be used as mulch or fuel. Chipping and mulching are often used interchangeably.

**Debris.** Scattered items and materials either broken, destroyed, or displaced by a natural disaster. Example: trees, construction and demolition material, personal property, etc.

**Debris Clearance.** Clearing the major road arteries by pushing debris to the roadside to accommodate emergency traffic.

**Debris Removal.** Picking up debris and taking it to a temporary storage site or permanent landfill.

**Debris Disposal.** Placing mixed debris and/or residue from volume reduction operations into an approved landfill.

**Department of Public Works (DPW).** Department typically responsible for clearing debris from the roads and right-of-way.

**Department of Solid Waste Management.** Department responsible for managing and overseeing the collection and disposal of garbage, trash and disaster related debris.

**Garbage.** Waste that is regularly picked up by the Department of Solid Waste Management. Example: food, plastics, wrapping, papers, etc.

**Hazardous Waste.** Material and products from institutional, commercial, recreational, industrial and agricultural sources that contain certain chemical with one or more of the following characteristics, as defined by the Environmental Protection Agency: 1. Toxic, 2. Flammable, 3. Corrosive, and/or 4. Reactive.

**Household Hazardous Waste (HHW).** Used or leftover contents of consumer products that contain chemical with one or more of the following characteristics, as defined by the Environmental Protection Agency: 1. Toxic, 2. Flammable, 3. Corrosive, and/or 4. Reactive. Examples of household waste include small quantities of normal household cleaning and maintenance products, latex and oil based paints, cleaning solvents, gasoline, oils, swimming pool chemicals, pesticides, propane gas cylinders, etc.

**Mutual Aid Agreements.** An understanding between communities and States obligating assistance during a disaster.

**Recycling.** The recovery and reuse of metals, soils and construction materials that may have a residual monetary value.

**Rights-of-Way.** The portions of land over which a facility, such as highways, railroads, or power lines are built. Includes land on both sides of the highway up to the private property line.

**Storage Site.** A location where debris is temporary stored until it is reduced in volume and or taken to a permanent landfill.

**Tipping Fee.** A fee based on weight or volume of debris dumped that is charged by landfills or other waste management facilities to cover their operating and maintenance costs.

**Trash.** Non-disaster related yard waste, white metals, or household furnishings placed on the curbside for pick up by local solid waste management personnel. A resident must call for pick-up. Not synonymous with garbage.

**United States Army Corps of Engineers (USACE).** A component of the U.S. Army that is responsible for constructing and maintaining all military bases and other government-owned and controlled entities. The USACE may be used by FEMA when direct Federal assistance, issued through a mission assignment, is needed.

(FEMA 1999, iv)

## **ABSTRACT**

The heart of Emergency Management and Solid Waste Management is the protection of public life, health, welfare and the environment. This is at the very core of Public Administration. Disaster Debris Management is the combination of essential elements of these two disciplines. Disasters generate tremendous amounts of debris that need to be managed in order to protect the public.

Prior to Solid Waste and Hazardous Waste legislation in the mid-1990's most communities either burned or buried the enormous amount of debris left behind after a disaster. In the 90's both the Environmental Protection Agency (EPA) and the Federal Emergency Management Agency (FEMA) took a different look at disaster debris. Each agency developed a guide for dealing with disaster debris.

The purpose of the research is three-fold:

- 1) to describe the need for planning and management of disaster debris;
- 2) to describe the ideal characteristics of an effective disaster debris management plan as established by the Federal Emergency Management Environmental Agency;
- 3) to gauge the Emergency/Debris Management Plans of states against the standards established by FEMA.

Content analysis is the research method employed for this project. Babbie (1998, 308) defines content analysis as a researcher's examination of a class of social artifacts, typically written documents. Content analysis is an appropriate data source for this

research because the Federal Emergency Management Agency's Debris Management Guide, 1999, establishes a "practical ideal type" for all Debris Management Plans. The technique of content analysis will also allow for expediency and accuracy in exploring current status of State Debris Management Plans.

The results of this research project show that state Disaster Debris Management Plans fall well short of the "practical ideal type" established by FEMA. The lack of adequate debris management plans indicates that state officials are still depending on the resource wasteful methods of burning and burying to handle disaster generated debris.

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## CHAPTER ONE

### Introduction

Hurricane Andrew in 1992 left 250,000 Florida residents homeless and generated

18 million tons of disaster debris (See

Table 2.3) in Metro-Dade County

alone (Steuteville 1992, 30). The

Midwest floods of 1993 (See Figure

1.1) inundated 75 towns and more than

20 million acres of land in nine states.

These floods damaged or destroyed an

estimated 50,000 homes. In Lincoln

County, Missouri the floodwaters

generated approximately 50,000 tons

of household debris, in addition to

millions of tons of sediment, green

waste, demolition debris, etc., (EPA



**Figure 1. 1 Midwest Flood 1993, Missouri.**  
**Photograph provided by FEMA**

1995, 14).

Year after year, our communities are put at risk by natural disasters<sup>1</sup> such as fires, earthquakes, floods, hurricanes and tornadoes. In the last 20 years alone the President has declared over 700 federal disasters (FEMA 1999, i). These disasters cause loss of life, destruction of homes, business, and general destruction to our lives. How do local and state governments charged with protecting public health, safety, and welfare deal with these disasters? “Normally the process for disaster planning usually begins as a ‘knee-jerk reaction’, this type of hasty response is brought on by political pressure or public outcry after a failure of a given government (inadequate) plan” (Davis 1993, 546).

### ***Emergency Plans***

When a natural disaster strikes local and state emergency management plans are placed into action. These plans address the activation of emergency operations including emergency medical, fire, and communication operations. Additionally, the purpose of emergency plans, along with the focus of current emergency management, is to reduce the risk to human life and safety (Petak, 1995, 3).

Traditionally, emergency management plans dealt with the problem of debris management by addressing the removal of debris from obstructed roads, or disabled power and communication lines (See Figure 1.2). Debris disposal if addressed at all was

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<sup>1</sup> Disasters are natural hazards that effect vulnerable people (Cannon 1993, 4) and can be classified as either ‘natural’ (e.g. hurricanes, floods, tornadoes, etc.) or ‘man-made’ (e.g. oil/chemical spills/releases, terrorist acts, etc.) We will only look at natural disasters for the purpose of this report.



addressed only in the context of either burning<sup>1</sup> or burying<sup>2</sup> the debris (EPA 1995,1).

With recent environmental concerns and passage of strict landfill regulations like the Resource Conservation and Recovery Act, landfilling and incineration are becoming less desirable alternatives for handling debris. Emergency and Solid Waste Management need to come together to protect the public's health, safety and welfare, through effective Disaster Debris Management. Protection of the public's health, safety and welfare is at the very core of Public Administration.



Currituck, NC (Currituck County) High winds in this NE corner of the state felled many trees, including these three that fell across this Bells Island neighborhood. Hurricane Bonnie cut power lines and caused similar home damage in several Currituck County communities. FEMA Photo by Dave Gatley

**Figure 1.2. Hurricane Bonnie 1998. Photograph provided by FEMA.**

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<sup>1</sup> The term incineration and burning are interchangeable for this report.

<sup>2</sup> The term burying and landfilling for the purpose of this report are interchangeable.



## **Disaster Debris Management in the Public Administration Context**

To handle the tremendous amount of debris generated by disasters, the principles of Emergency and Solid Waste Management are combined. Disaster Debris Management in the context of Emergency and Solid Waste Management is relevant to public administration research and practice, in part because it is a major public problem. A disaster causes public suffering at large and the public looks to the government for relief. Considerations of inter-jurisdictional, inter-organizational and intergovernmental relations exist prior to, during, and following the onset of a disaster. Public Administration is also widely concerned with issues of policy development and implementation. Here, too, debris management provides many challenges.

William J. Petak (1985, 3) asserts that public administration has generally been limited to crisis-reactive management approaches. This project is an attempt to prevent Petak's "crisis-reactive management" in the area of debris management by planning for disasters. In addition, state plans are compared to a "practical ideal" type established by the Federal Emergency Management Agency.

## **Research Question and Purpose**

The research question and purpose is three-fold: 1) to describe the need for planning the management of disaster debris; 2) to describe the ideal characteristics of an effective Disaster Debris Management Plan as established by the Federal Emergency

Management Environmental Agency (FEMA); 3) to gauge the States' Debris Management Plans. State plans are gauged against the ideal standards established by FEMA. Examining<sup>4</sup> disaster debris management plans in this way gives public administrators, policy makers and their stakeholders the information needed to determine if their plans are effective in the area of debris management. State emergency management coordinators can use this information to determine what areas their plan may need additional emphasis to become more effective.

## **Organization of the Report**

This report is organized in the following manner. Chapter two reviews the literature that forms the foundation of this project. The third Chapter examines Environmental Protection Agency's (EPA) and the Federal Emergency Management Agency's legislative history and guides for disaster debris management. The research methodology and conceptual framework are discussed in Chapter four, along with the research technique employed. Chapter five addresses the results of this study, and recommendations are made in Chapter Six.

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<sup>4</sup> Examining for this report is a content analysis of state plans.

## CHAPTER TWO

### Literature Review

#### Introduction

The purpose of this chapter is to review disaster debris literature. Very little was written about disasters until the 1970's. Author Russell R. Dynes notes when he wrote *Organized Behavior in Disaster*, he had to rely on disaster literature maintained at the Disaster Research Center Library.<sup>5</sup> Since the 1970's, there has been a lot of literature written about disasters and their effects. Disaster literature<sup>6</sup>, in relationship to Emergency Management-related topics, dealt primarily with response, recovery, mitigation, etc. Until the mid-1990's little was written on the subject of disaster debris management,<sup>7</sup> the basis for this report.

The modern idea of debris management started with the nation's first federal solid waste management<sup>8</sup> law, the Solid Waste Disposal Act (SWDA). In 1965, the SWDA authorized research and provided for state grants. In the 1970's when the Resource Conservation and Recovery Act (RCRA) amended the SWDA, this is when the federal

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<sup>5</sup> The Disaster Research Center at the time was located at Ohio State University. However, it has since moved to the University of Delaware.

<sup>6</sup> See Foster 1980, Petak 1985, Clary 1985, Merriman 1993, as examples.

<sup>7</sup> See EPA 1994 and 1999 FEMA for additional information including an example for state and local governments to use for preparing a plan for Disaster Debris Management.

<sup>8</sup> "Solid Waste Management" in the terms of this paper refers to all phases of nonhazardous waste removal and hauling. This includes collection, transportation, sorting, processing, recycling, reduction, combustion and landfilling.

government started to issue waste disposal guidelines. In 1992, Subtitle D of RCRA was passed which established the minimum criteria for landfills<sup>9</sup> (Aquino, 1999, 6).

Until Subtitle D was passed, waste<sup>10</sup>, hazardous waste, debris from disasters, etc., were simply buried in a garbage dump or burned (EPA 1995, 1). Disaster debris<sup>11</sup> management really started to come to light in the mid-1990's when the high costs associated with RCRA's closure and post-closure requirements, financial assurance, ground water monitoring, etc. were realized. These new and expensive requirements established by Subtitle D caused thousands of landfills to be closed by 1996 (Aquino 1999, 6). This in-turn caused local, state and federal governments to become concerned with the disposal of waste and/or debris, and the capacity of the remaining landfills to handle everyday waste. In an effort to prevent violation of environmental law<sup>12</sup>, local and state governments wrote extensive Solid Waste Management Plans to deal with the collection, transportation, disposal, etc., of waste. These Solid Waste Management Plans generally dealt with municipal solid waste and did not address what to do in an emergency when local governments are faced with an overwhelming amount of debris from a disaster.

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<sup>9</sup> "Landfill" for this report is a sited disposal site that meets the criteria of the Subtitle D of RCRA.

<sup>10</sup> "Waste" for this report is municipal solid waste (residential, household hazardous waste, commercial, and industrial). It does not include disaster debris or hazardous waste,

<sup>11</sup> "Debris" for the purpose of this report is green waste (shrubs, leaves, grass, tree material), construction (wood, stone, block, metal, etc.), household waste (household hazardous waste, foodstuff, etc.), etc., generated by a disaster.

<sup>12</sup> Environmental Laws include Clean Air Act, Clean Water Act, Solid Waste Disposal Act, Resource Conservation and Recovery Act, etc.



Debris chokes the streets of Augusta, Kansas as residents begin cleaning up after the flood of October 31st.

**Figure 2. 1. 1998 Kansas Floods. Photograph provided by FEMA.**

Tremendous amounts of waste are generated by natural disasters, sometimes equal in volume to years, if not decades, of normal waste production (See Figure 2.1) (Solis 1995, 3). Capacities of landfills can be quickly overwhelmed; hazardous waste can become mixed with non-hazardous waste, etc. Given the serious problems of what to do with these immense amounts of mixed debris, management of disaster debris needs to be taken as a serious issue in Emergency Management (Solis 1995, 3). When Hurricane Hugo struck in 1989, the debris Hugo generated overwhelmed Charlotte, North Carolina

with over 300,000 tons of wood and yard waste alone. In Charleston, South Carolina, public officials decided to bury the debris generated by Hugo. The disaster debris used up approximately 14 years of Charleston's remaining landfill space (Steuteville 1992, 30). Other examples of the tremendous amount of debris that can be generated by a disaster are given in **Table 2.1** below.

**Table 2.1. Disaster Debris Volume Examples**

Community	Disaster	Volume of Debris	Year
Metro-Dade County, Fl	Hurricane Andrew	43 million cubic yards of debris in the Metro-Dade area alone	1992
Los Angeles, CA	Northridge Earthquake	This earthquake generated over 7 million cubic yards of disaster debris	1994
Mecklenburg, NC	Hurricane Hugo	Green waste accounted for over 2 million cubic yards of disaster debris	1989
Lincoln County, MO	Midwest Floods	Generated approximately 50,000 tons of just household debris alone	1993

Source: US Environmental Protection Agency. *Planning for Disaster Debris*. Solid Waste and Emergency Response. 1995. Pages 8-22.

The Environmental Protection Agency (1995, 8) consulted several communities (which had experienced a recent disaster), who expressed the need to add long-term debris management to Emergency Management Plans (EMP)<sup>13</sup>. This chapter first

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<sup>13</sup> Emergency Management Plans in this context includes Disaster Preparedness Plans.

discusses the need for a Disaster Debris Management Plan.<sup>14</sup> Then, it examines the topics that the Federal Emergency Management Agency finds are necessary to be in an “ideal” debris management plan.

## **Need for Disaster Debris Management**

In 1995, the Environmental Protection Agency (EPA) looked at lessons learned from communities that had recently experienced a major disaster. The EPA (1995,1) determined that any state that has communities at risk of significant damage from a disaster should develop a Disaster Debris Management Plan. **Table 2.2** shows some of the lesson learned, disasters, and cases studied by the EPA (EPA 1995, 8-21).

The Emergency Management Office in Mecklenburg County, North Carolina in 1989 was well prepared to handle the variety of medical, housing, and communication needs presented by Hurricane Hugo. In contrast the Emergency Management Office was in no way prepared to handle the immense amount of debris generated by the storm. If local officials would have landfilled the 400,000 tons of storm generated green waste, these officials would have used up two years of the remaining two and half years of landfill capacity. Additionally, the local government would still have to deal with several thousand tons of other debris. Another option considered by the local government was burning as much of the debris as possible. With all the pollution problems associated with

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<sup>14</sup> “Disaster Debris Management Plan” in this report will also be called “the plan”.



burning, this option was not considered viable (EPA 1995, 3, 18). In Sandusky, Ohio the lack of planning for storm generated debris delayed for two months the clean up and removal of just 600 tons of green waste (EPA 1995, 3-4).

**Table 2.2 Lessons Learned from Disaster Case Studies**

<b>Lessons learned</b>	<b>Type of Disaster</b>	<b>Location and Year of the disaster</b>	<b>Case Studies</b>
<b>LONG-TERM DEBRIS MANAGEMENT PLAN</b>  <b>RECYCLING PROGRAMS</b>  <b>ADMINISTRATION AND LOGISTICS</b>  <b>ESTIMATING THE TYPE AND AMOUNT OF DEBRIS</b>  <b>PRIVATE PROPERTY DEBRIS REMOVAL</b>	Earthquake	Northridge, California, 1994	<p>Management of Disaster debris needs to be addressed through a long-term plan. (Clean-up 7 million cubic yards of debris took over 2 years.)</p> <p>Recycling programs need to be in place prior to a disaster. This increases significantly the amount of material diverted from a landfill. (4 million cubic yards of the debris was recycled) With the program in place FEMA funded the recycling.</p> <p>Plans will have to be flexible, reviewed and updated. (CIWMB n.d., 9)</p> <p>Identify types and locations of debris this allows for consolidation of similar types, reducing transportation and disposal cost and recycling cost. (CIWBM n.d., 10)</p> <p>Curbside collection of only source separated material for free. Mixed material would be tag and if not removed by the owner a fee would be collected. This aided in cost reduction because, separated material could go to source separated processing facilities. (CIWMB n.d., 11)</p>

**Table 2.2 Lessons Learned from Disaster Case Studies (continued)**

<b>CURRENT PLANS</b>	Tornado	Sandusky, Ohio 1992	Lack of planning delayed clean up and removal of debris. (Over 2 months to remove 600 tons.) Need for effective communications of instructions to residents.
<b>RECYCLING PROGRAMS</b>			Need to separate green waste <sup>15</sup> to maximize mulching efficiency.
<b>RECYCLING PROGRAMS</b>	Hurricane	Mecklenburg, North Carolina 1989  Metro-Dade County, Florida, 1992	Recycling green waste can save valuable landfill space. Hugo generated over 400,000 tons of mostly green waste, which would have taken up two years of landfill capacity when only six months capacity remained. Grinding green waste into mulch to be used for landscaping, fuel, etc., to saved precious landfill space. Use drop-off sites and curbside service for collection of nearly 43 million cubic yards of debris.  Need for temporary local staging areas. Existing drop-off and recycling centers were overwhelmed.  Problems of burning of debris: led to public complaints and protest. Commingled debris did not burn efficiently, remaining ash was tested for hazardous waste.
<b>SELECT COLLECTION &amp; STORAGE SITES</b>			
<b>DEBRIS REDUCTION METHODS</b>			

<sup>15</sup> "Green Waste" for this report is shrubs, leaves, grass, tree material, etc.

**Table 2.2 Lessons Learned from Disaster Case Studies (continued)**

<b>RECYCLING PROGRAMS</b>	Flood	Lincoln County, Missouri 1993	<p>Recycled sediments by giving the mud and sand (deposited on roads) to farmers for topsoil.</p> <p>Demolition debris was sold, given away, or salvaged. Any remaining was burned or landfilled.</p> <p>Drop off point needed to be manned 24 hours a day (residents are more likely to drop off at night).</p>
<b>ORGANIZATION</b>		Sioux Falls, South Dakota 1969	<p>Local government learned, that a plan which clearly identifies agency and individual responsibilities, that there were no doubts as to who was in charge or who had the authority. (Foster 1980, 224)</p>

Source: US Environmental Protection Agency. *Solid Waste and Emergency Response. Planning for Disaster Debris*. 1999. Pages 8-22, unless otherwise noted.

Pre-planning for a disaster can help a community identify debris collection, recycling and disposal options. Cleaning up the debris from a disaster can take a long time, even years. “Careful planning will prevent costly mistakes, speed recovery, and avoid creation of more waste. A plan can save money by identifying cost-effective debris management options and sources of help, increasing control over debris management, and improving administrative efficiency” (EPA 1995, 7).

The lack of planning for a major disaster can delay response and recovery time, which could, in turn, have a significant impact on the environment and impede the government’s ability for protecting the public (Solis 1995, 3). In 1994, an evaluation was preformed by the Office of the Inspector General of the Federal Emergency Management Agency (FEMA), to determine if effective planning and preparedness could make disaster debris removal more cost-effective. The evaluation found that there was a lack of awareness of the significance of debris removal as an emergency management issue (IG 1994, 1). The report also found that there is a lack of an incentive for states to keep the cost of debris removal in line when the federal government is carrying the brunt of the cost. With no incentive for the states to keep the cost of debris removal in line, the IG reported, contributes directly to the high cost of removal, transportation and disposal of disaster debris (IG 1994, 1-2).

In 1999, the Federal Emergency Management Agency published the “Debris Management Guide”, a guide for “leaders in planning, mobilizing, organizing and

controlling a large-scale debris clearance, removal and disposal operation” (FEMA 1999, i). The damage and debris caused by these disasters requires a comprehensive Debris Management Plan to efficiently and effectively control the removal, clearance and disposal operation (FEMA 1999, i). Studies have found that pre-disaster planning can save lives and injuries, limit property damage, and minimize disruptions, enabling communities to recover more quickly (Mileti 1999, 10). State Emergency and/or Debris Management Plans are evaluated in the following eight main areas (FEMA 1999, B-1-13);

- mission statement,
- organizational responsibilities,
- concepts of operations,
- debris removal,
- temporary debris storage and reduction sites (TDSR),
- debris reduction methods,
- TDSR site close-out procedures
- administrative and logistics.

## **Mission**

The purpose of the plan is to provide policies and guidance for the removal and disposition of disaster debris as well as to expedite and coordinate the management of debris in order to lessen the potential threat to the lives, health, safety and welfare of the

citizens (FEMA 1999, B-1). Disaster Plans cannot be effective if the plans do not have “strong support of senior members of the government” as well as enabling legislation (Foster 1980, 213-215). Disaster Debris Management Plans need to include all possible disaster situations for planning purposes.

### ***Situation***

In order for a disaster plan to be effective, the plan must identify the hazards that face the community (Foster 1980, 217). Disaster plans need to address actions that state agencies and local governments must take as a result of major catastrophic disasters. State and local agencies and governments “will have difficulty in locating staff, equipment, and funds to devote to debris removal, in the short-term as well as long-term” (FEMA 1999, B-1). Disasters precipitate a wide variety of debris as depicted in **Table 2.3** below. The collection, storage, and the disposal of debris depend on the “type and quantity generated, its location, and the size of the area over which it is dispensed” (FEMA 1999, B-1).

**Table 2.3 Major Categories of Disaster Debris**

<b>TYPE OF DISASTER</b>	<b>DAMAGED BUILDINGS</b>	<b>SEDIMENTS</b>	<b>GREEN WASTE</b>	<b>PERSONAL PROPERTY</b>	<b>ASH AND CHARRED WOOD</b>
<b>Hurricanes</b>	✓	✓	✓	✓	
<b>Earthquakes</b>	✓	✓	✓	✓	✓
<b>Tornadoes</b>	✓		✓	✓	
<b>Floods</b>	✓	✓	✓	✓	
<b>Fires</b>	✓			✓	✓

Source: US Environmental Protection Agency. *Planning for Disaster Debris*. Solid Waste and Emergency Response. 1995.



### ***Assumptions***

Natural disasters can occur at any time, which will require removal of debris. The amount of debris generated by a disaster could exceed local and state governments' ability to collect, remove, or dispose of debris. Other assumptions, which need to be addressed, are that private contractors will play a significant role in debris collection, removal and disposal. Also, the management program implemented should be based on a waste management approach of reduction, reuse, reclamation, resource recovery, incineration and then landfilling (FEMA 1999, B-1). Clearly defining waste management roles will help ensure that an effective waste management approach is followed.

### **Organization**

The Disaster Plan (including debris management) should define roles, responsibilities, and describe the circumstances which agencies and individuals are called upon for assistance (Foster 1980, 224). Sioux Falls, South Dakota officials learned in the flood of 1969 that a plan, which clearly identifies agency and individual responsibilities, leaves no doubt who is responsible and has the authority to make decisions. (Foster 1980, 224). The Debris Management Plan should define overall responsibility for managing disaster debris including contracts and/or cooperative agreements, temporary and/or permanent site selection criteria, debris removal priorities, and debris classification

(FEMA 1999, 13). The plan should also include “what information is needed for prompt and effective response; where it is; who should be contacted; what will happen if the response information is lost during a disaster” (Solis 1995, 5).

## **Concept of Operations**

Concept of operations is where the responsibilities for managing and coordinating the disaster debris clearance, removal, and disposal operations are detailed (FEMA 1999, B-1). Identification of when, and under what circumstances, the Emergency Operations Center should be activated is essential to the operation of the plan.

### ***Emergency Operations Center Activation***

Rapid activation of the Emergency Operations Center (EOC) is the best way to avoid “deficiencies of interorganizational coordination” (Foster 1980, 223). The Debris Management Plan should define how and who will activate EOC. The Emergency Operations Center Director or their designate representative along with the Debris Management Task Force (DMTF) will determine the extent of damage and resulting debris and issue appropriate directives to implement this plan (FEMA 1999, B-2). The functions of Administration, Contracting, Procurement, Legal, Operations, and Public Information should be a part of the Debris Management Staff (FEMA 1999, 15). Key emergency personnel, points of contacts (including their alternates), their address and phone numbers should be listed in an annex to the plan (Foster 1980, 224). In addition, to

procedures on determining the extent of damage, procedures for estimating the amount and type of debris should be included in the plan.

### ***Estimating the Type and Amount of Debris***

The task of estimating the type and amount of debris should be accomplished as soon as possible. The Federal Emergency Management Agency (1999, B-2) recommends that local or State Public Works Department be designated to accomplish the task of estimating the type and amount of debris. Additionally, as part of the Organization of the plan, a method for damage estimating (drive-through “windshield”, aerial assessment “fly over”, etc.) should be included (FEMA 1999, B-2). The number of Temporary Debris Storage and Reduction Sites can be determined based on the amount of estimated debris.

### ***Temporary Debris Storage and Reduction Sites***

Metro-Dade County, Florida officials relied on existing drop-off and recycling centers to handle the enormous amount of debris generated by Hurricane Andrew. Soon Florida officials found that these sites were overwhelmed, causing the county to locate and open temporary staging areas in local neighborhoods (EPA 1995, 16-17). Temporary Debris Storage and Reduction (TDSR) Sites can be used for debris separation, chipping or mulching green waste, distribution of the mulch back to the community, etc. Local sites should be convenient, this will allow collection crews to reduce travel time to sites and result in faster street clearing (EPA 1995,9). Sites should be selected based on the activities planned for that site whether the activity is staging, collecting, storage, sorting,

recycling, landfilling, burning, etc. (FEMA 1999, 9). “All activities associated with massive debris clearance, removal and ultimate disposal operations depends upon the availability of suitable temporary debris storage and reduction sites” (FEMA 1999, 9). Identifying TDSR sites before disasters can expedite the removal, reduction, and the disposal of disaster debris (FEMA 1999, 9).

### ***Pre-Designated TDSR Sites***

One of the most common suggestions received by the Environmental Protection Agency during surveys of communities that had experienced natural disasters is to pre-select temporary collection and storage sites (EPA 1995, 9). Careful consideration should be given to site selection, because each activity (burning, disposal, recycling, etc.) requires different criteria to be sited.<sup>16</sup> Pre-selecting the site can help avoid many of the problems associated with disposal sites, such as heavy equipment access, impact on environmentally sensitive areas, convenience, collection routes, etc. Also, if these sites are pre-selected, location maps can be pre-prepared, thereby allowing these maps to be used by both contractors and residents for debris drop-off. Pre-selection can also help determine if there may be other possible problems, like impact from noise on the local neighborhood, attraction of rodents, etc., that need to be addressed (EPA 1995, 9).

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<sup>16</sup> “Sited” when used in connection with landfills, TDSR, etc. means meeting the requirements of the EPA and other regulations allowing the storing, collecting, or the dispose of waste.

***Existing Landfills***

Existing open and closed landfills should make good TDSR sites with little, if any, modification. Landfills should have easy access for large and heavy equipment, these landfills should not be in environmentally sensitive areas, should have access to major roads, etc. Before site selection, consider any restrictions, limitations, tipping fees, etc. All existing landfills should be identified as TDSR sites prior to a disaster (FEMA 1999, B-3). Although landfills may be ideal to be used as a TDSR, these sites will still need to be evaluated for possible problems, like those identified in the paragraph above.

**Debris Removal**

Debris removal should be looked at as a two-phase operation. Phase One should involve the movement of storm debris to the side (shoulder) of essential roadways to allow access by emergency vehicles for rescue and recovery. Phase Two is where debris is collected, transported, separated, recycled, and disposed.

***Emergency Roadway Debris Removal (Phase I)***

Essential emergency operations routes should be identified in advance. The DMTF should be aware of local and state emergency roadway debris clearance capabilities (See Figure 2.2). The Department of Public Works (DPW) should be responsible for debris clearance because this department has the necessary personnel, equipment, and contracting experience (FEMA 1999, 21).

Debris removal is necessary to reopen vital transportation routes (USACE n.d., 5). Phase I is implemented to clear the major arterial roads, including collector roads leading to health care and other emergency facilities. These roadways are a top priority for debris removal. During this phase, roadway debris is moved to the side of the road to allow access by emergency personnel. There is no attempt made to remove or dispose of the debris during Phase I (FEMA 1999, 21).

### ***Supervision and Special Consideration***

Supervision of immediate debris clearing (Phase I) should be conducted by either the public works or the Department of Transportation (DOT) (FEMA 1999, B-4). Supervision of contractors should be done by those who have been trained in debris removal and in solid waste contracts. Supervising personnel who have not been trained are less likely to spot incidents of contractor fraud and abuse (IG 1994, 1).

Disasters can overwhelm local assistance very quickly. Requests for additional assistance can be made through the State Emergency Operations Center or through the State Coordinating Officer (SCO) to the Federal Coordinating Officer (FCO) for federal assistance (FEMA 1999, B-4). In addition to financial assistance from the federal government, when the disaster exceeds capabilities of local and state governments, the US Army Corps of Engineers can provide assistance with debris removal (USACE n.d, 2).



Bound Brook, NJ. Debris removal continues in Bound Brook, NJ.

Photo by Andrea Booher/**FEMA News Photo**

**Figure 2. 2 1998 Hurricane Bonnie debris removal. Photograph provided by FEMA.**

### ***Public Rights-of-Way Debris Removal and Disposal (Phase II)***

The Department of Solid Waste Management (SWM) should be responsible for coordinating all debris removal and disposal activities to include reinstating of normal waste collection. Close coordination between SWM with the supervising agency (public works or DOT) will ensure a smooth transition. Solid Waste Management should issue and monitor local government debris disposal contracts to ensure public funds are properly accounted for and that contractors perform according to contract requirements. Additionally, the public should be kept informed of debris pick-up schedules, disposal



methods, etc., (FEMA 1999, B-5-6). Public involvement in removal and/or disposal of debris is key to a community's return to normal operations.

### ***Private Property Debris Removal***

Dangerous structures on private property should be the responsibility of the owner or local government. Many times demolition of these structures become the responsibility of the Debris Management Task Force due to lack of insurance, missing owner, etc. The most significant problem encountered with building demolition is that the local government does not have proper ordinances in effect to handle emergency condemnation procedures (FEMA 1999, B-6).

When planing debris management consideration should be given to the private property owner's right to recover their possessions and other personal property. Include an access-to-debris policy, that prioritize access from the property owner to salvagers, as part of the plan (Solis 1995, 8).

### ***Household Hazardous Waste<sup>17</sup> (HHW) Removal***

As a result of a major disaster, HHW can become mixed into the debris stream and will require close attention during debris collection, processing, etc. to ensure that these items are removed. Consideration should be given to sending HHW response teams

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<sup>17</sup> "Household Hazardous Waste" can consist of common household chemicals, propane tanks, oxygen bottles, batteries, and industrial and agricultural chemicals.

in ahead of any removal efforts, so that Household Hazardous Waste can be identified and removed (FEMA 1999, B-6, 7). By identifying the location of hazardous materials (prior to the disaster), plotting the location on maps, and by storing this information electronically, potential and actual problems may be diverted (Swartz 1999, 44). Failure to efficiently plan for a disaster can have serious repercussions, such as risk to public health, serious injury, or even death when dealing with hazardous material (Foster 1980, 212). Salvageable hazardous waste material should be collected, separated and disposed of in accordance with current regulatory regulations. The Federal Emergency Management Agency (1999, B6-7) recommends that a separate HHW staging and storage area be established at each TDSR site.

### **Temporary Debris Storage and Reduction Site**

Site selection should be based on planned activities, i.e., collection, storing, recycling, burning, etc. of debris, for that TDSR (EPA 1995, 9). Once the debris is removed from the damaged area, the debris will be taken to a temporary debris storage and reduction site. Because of the limited debris removal and reduction resources, the establishment and operations of TDSR sites are generally accomplished through contracts (FEMA 1999, B-7).

### ***Site Preparation***

The topography of the land and soil conditions should be evaluated to help determine the best site layout. When planning the site preparation, the site selection team should consider ways to make redemption and restoration easier (FEMA 1999, B-7). Pre-selection of TDSR sites allows for site evaluation including soil testing and photographic recording of pre-disaster conditions. This will give the agency responsible (for restoring the site) documentation for easy restoration to pre-disaster conditions (EPA 1995, 9,10).

### ***Site Operations***

Site operations and preparation are generally left up to the contractor, but guidance can help avoid problems with the ultimate closeout. Care should be exercised to protect groundwater, soil, etc., from HHW, fuels, and other materials that can contaminate. Protection can be accomplished by lining the temporary storage area where these contaminants are to be temporary stored. Be aware of possible problems, e.g., neighbors irritated by smoke, dust, noise, traffic, etc. The site operators should take positive action to help reduce or eliminate these types of problems (FEMA 1999, B-7).

### **Debris Reduction Methods**

There are several debris reduction methods that can be employed to help manage the exorbitant amount of storm-generated debris. Each method, incineration, grinding and/or chipping, recycling, etc., of reduction has both a positive and a negative side. In

recent years, with the passage of laws and regulations like RCRA, recycling has started to become the preferred method for reduction.

### ***Grinding and Chipping***

As seen in **Tables 2.1** and **2.3**, hurricanes and tornadoes can produce an enormous amount of debris, especially green waste. Chipping and grinding (See Figure 2.3) are equal in cost to incineration. In the terms of volume reduction, chipping and grinding only reduce the volume by 75 percent (FEMA 1999, 47). The 25 percent left over can be used as mulch, fuel, etc., potentially leaving little to nothing to be landfilled, whereas incineration leaves an ash, which must be tested for hazardous waste before landfilling. North Carolina used grinding and chipping successfully after Hurricane Hugo. Faced with enormous amounts of green waste, officials decided to turn the green waste into mulch. The mulch was given away to residents and contractors alike, and was used for everything from ground cover for erosion prevention to being burned as fuel. By not burying the debris North Carolina save the equivalent of 10 years of landfill space (EPA 1995, 12). This method of debris reduction is considered a form of recycling.

### ***Recycling***

To help reduce the tremendous impact on air quality (open burning) and landfill space, disaster debris should be recycled as much as possible. Recycling should be considered early in the debris removal and disposal operations. Recycling presents an opportunity to not only reduce the volume, but also the cost, of debris disposal. Metals

can be salvaged as scrap; soil can be used as topsoil or mixed with compost to provide a soil enhancer. Construction and demolition debris can be recycled several ways. Debris like concrete, asphalt, bricks, etc., can be used in rebuilding of roads as roadbase.

Individuals, for minor home repair, security, etc. can use salvaged wood. Clean wood can also be ground or chipped along with green waste (FEMA 1999, 48-49). Recycling disaster debris is much easier if the community has a recycling program already in place. Thereby, issues of “permitting, enforcement, collection, processing, and market issues have already been largely resolved ...Also, the expansion of existing capacities and markets is much easier than trying to develop them in the wake of a disaster” (EPA 1995, 8).



Taken at Potters Road, 1 of 4 debris sites in Va Beach receiving tree debris by truck, running it through chipers and then piling it up in mulch piles.

Photo by Curt Nellis, VDES

**Figure 2. 3. Tree debris being chipped after Hurricane Bonnie struck in 1998. Photograph provided by FEMA.**

***Incineration***

Although there are several incineration methods available for volume reduction, careful consideration should be given before using the method of incineration (FEMA 1999, 44). Florida's Department of Environmental Regulation (DER) learned after Hurricane Andrew that incineration might not always be the best way. Florida's DER allowed burning under an emergency 30-day order to help reduce the volume of debris left after Hurricane Andrew (EPA 1995, 6). The burning of storm debris led to numerous public complaints. The emergency order had to be revoked and all burning ceased after only three weeks (EPA 1995, 16).

One of the main reasons that DER, or any government agency, uses incineration (burning) as a volume reduction method is that this method reduces the volume of most debris by 95 percent. Volume reduction can be accomplished through several methods of incineration, uncontrolled and controlled open-air (without environmental controls), pit and portable air curtain (fans blow the smoke back into the fire, thereby, reducing the amount of pollutants) incineration (FEMA 1999, 45). When using burning as a volume reduction method, there are several environmental considerations (example, air quality, and location of the burn to stored debris, etc.) that must be taken in account before incineration can be used (FEMA 1999, 46).

## **TDSR Site Closeout Procedures**

Each TDSR will eventually need to be closed, emptied of all material and restored to the sites previous pre-disaster condition and use. Site restoration can go smoothly if baseline data (soil testing, photographic records, etc.) were properly collected and site operation procedures were followed (FEMA 1999, 52). Soil, ash, and groundwater must be tested for hazardous material prior to closing of a TDSR site to ensure that the environment of the site is restored (FEMA 1999, 53).

## **Administration and Logistics**

Local and State agencies are required to document all personnel and material used in disaster recovery. This documentation must be submitted in support of any Federal assistance that may be requested or required. The Disaster Debris Management Plan should have a listing of all authorities, references, and appropriate appendices in support of FEMA's 1999 "*Disaster Management Guide*". In addition, this plan should designate a responsible agency to initiate or update the plan annually and each tasked agency should be required to update its respective portion of the plan (FEMA 1999, B-13).

Chapter three examines the EPA's and FEMA's Federal Guidelines including a brief history of Solid Waste Management and Emergency Management. The fourth chapter discusses the conceptual framework and the methodology used for this research



project. Chapter five shows the results of the analysis of State Disaster Debris Management Plans. The last chapter will summarize the results of the analysis and make recommendations for disaster debris management.

## CHAPTER THREE

### Federal Guidelines

#### Introduction

Hurricane Andrew generated enough debris to equal approximately thirty years of landfill capacity for Dade County, Florida (Dewberry 1993, 1). Every year, our nation faces numerous disasters that challenge our local, state, and federal governments. These disasters generate large amounts of debris that cause debris disposal challenges for local public officials (EPA 1995, 1).



Figure 3.1. Debris generated by the 1994 Northridge, California Earthquake. Photograph provided by FEMA.

Two major federal agencies, the Environmental Protection Agency<sup>18</sup> and the Federal Emergency Management<sup>19</sup> Agency recently became more involved in Disaster Debris Management. Effective management of debris is needed in order to protect the public's health, safety, and welfare by stabilizing economic resources, return the community to some sort of normalcy, and make every effort to protect the environment. A brief legislative background is presented in this chapter on Emergency and Solid Waste Management. The chapter concludes by examining EPA's 1995 "*Planning for Disaster Debris*" and FEMA's 1999 "*Debris Management Guide*" both written to give state and local governments assistance in developing proactive procedures to deal with disaster debris.

## **Emergency Management Legislation Background**

Congress passed the first piece of disaster legislation in 1803 (Clary 1985, 20). The purpose of the first piece of legislation and other legislation passed by Congress until the 1930's, was to provide assistance for individual disasters. In 1934, the Bureau of Public Roads was given authority to provide funding for repairs of highways and bridges damaged by a disaster (FEMA n.d., 1). Today's system of disaster policy started with the passage of the 1936 Flood Control Act. The Flood Control Act was an attempt to control natural

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<sup>18</sup> "Environmental Protection Agency" is responsible for establishing the rules and regulations that deal with waste management. These rules and regulations also apply to the collection, transportation, processing, recycling, , incineration and landfilling of disaster debris.

hazards through the U.S. Army Corps of Engineers by giving them greater authority to implement flood control projects (FEMA n.d., 1). Flood control projects were done using the latest science, engineering and planning methods to prevent or lessen the impact of disasters (Clary 1983, 20).

Until the 1950's, the Red Cross, operating under federal charter, was the primary disaster relief agency. The first comprehensive, nationwide system of disaster response and relief was set in motion with the passage of the 1950 Disaster Relief Act (Clary 1983, 20). The 1960s and 1970's saw 'Mega-Disasters' like Hurricane Carla, which struck in 1962, Betsy in 1965, Camille in 1969, Agnes in 1972, and earthquakes that hit Alaska in 1964 and California in 1971 (FEMA n.d., 2). These disasters required major federal response and recovery, and brought about increased legislation like the 1968 National Flood Insurance Act, and the 1974 Disaster Relief Act. The federal response was spread among many agencies and remained very fragmented.

In 1979, the Carter Administration merged many of these fragments agencies into the Federal Emergency Management Agency (FEMA n.d., 2). After the end of the Cold War, FEMA began turning their attention to disaster relief, recovery and mitigation programs (FEMA n.d., 2). FEMA's transformation was promulgated with their response to the 1993 Midwest Floods and 1994 California Earthquake. The Federal Emergency Management Agency's (n.d.,3) accomplishments were recognized by President Clinton in his 1995 State

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<sup>19</sup> "Federal Emergency Management Agency is the federal agency responsible for governmental response and

of the Union. Nonetheless, there was still room for improvement in the area of managing disaster debris. Before improvement can begin FEMA and EPA must determine where and how debris management fits into the framework of the different emergency management stages.

## **The Stages of Emergency Management**

There are variations in the stages or phases of emergency management. Most disaster researchers and practitioners generally agree that there are four stages<sup>20</sup>. These stages are (1) mitigation or prevention (2) preparedness (3) response (4) recovery. Generally speaking, prevention and preparedness are pre-disaster activities, while response and recovery take place post-disaster. Prevention programs like FEMA's Project Impact fall under the first stage of emergency management. Planning for disaster debris lies in the stage of preparedness while removal and disposal of debris occur during the response and recovery stage of emergency management. The following is a closer look at emergency and debris management in the stages of prevention, preparedness, response and recovery.

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assistance for major disasters

<sup>20</sup> Originally proposed by the National Governors Association in 1979.

***Mitigation or Prevention Stage***

Mitigation is normally associated with attempts to reduce the intensity of a disaster (Cannon 1993, 101). Prevention programs, like FEMA's Project Impact, help "communities protect themselves from the devastating effects of natural disasters" (FEMA 2000, 1). FEMA through programs like Project Impact is helping states prevent major destruction, thereby reducing potential debris. FEMA helps local governments to purchase land in earthquake zones, along coastlines, etc. thereby, helping to reduce the rapid density growth and build up of our environment (homes, offices, transportation structures, etc.) in areas that are subject to natural disasters (Mileti 1998, 3). The build up in these environmental areas emphasizes the need to be prepared for potential disasters and the enormous amounts of debris they generate through effective debris management.

***Preparedness Stage***

Preparedness is made up of many activities designed to lessen the disruption following a disaster. Some of these activities are early warning, response plans, mutual aid agreements, education, training, conducting exercises, stock piling of equipment and supplies, etc.. "Studies have found that pre-disaster planning (preparedness) can save lives and injuries, limit property damage, and minimize disruptions, enabling communities to recover more quickly" (Mileti 1998, 10). Lack of preparedness for managing debris can cause a major delay in debris removal. The lesson of not being prepared was a lesson learned the hard way by local officials in Sandusky, Ohio when a tornado struck their town in 1992. The

tornado generated only 600 tons (mostly green waste) of debris. However, because of the lack of planning, removal and disposal of debris took officials over two months to complete (EPA 1995, 3,4). When disasters do strike, those communities that are prepared can recover more quickly than communities without a response plan (EPA 1995, 11).

### ***Response Stage***

The response stage begins with the onset of, or immediately after, a disaster strikes (Clary 1985, 20). In the response stage, emergency teams provide “emergency aid and assistance, reducing the probability of secondary damage, and minimizing problems for recovery operations” (Petak 1985,3). Disaster debris removal is an important priority in emergency response for protecting the health and safety of the public. During the response phase,<sup>21</sup> debris removal generally involves moving debris to the side of the road thus allowing road access for emergency vehicles, vital supplies, and repair equipment. Debris clearing helps improve general sanitation, and signals the commencement of the recovery stage (See Figure 3.2).

### ***Recovery Stage***

The most costly (See Table 3.1) emergency phase is the recovery phase and, oftentimes the recovery stage is the most controversial phase of emergency management. The recovery phase is made up of short and long-term response activities, as well as

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<sup>21</sup> Phase I of FEMA’s Debris Removal in their 1999 “*Debris Management Guide*.”



**Figure 3.2. Beginning the recovery phase after the 1993 Midwest Floods. Photograph provided by FEMA.**



rebuilding and reconstruction. Clary (1985, 20) sees the recovery phase as the “long-term reconstruction of a community,” which can last up to 10 years. Planning for long-term debris management is part of community reconstruction and, therefore, needs to be part of emergency management (EPA 1995, 8). Debris management as part of the recovery phase involves the tasks of collecting, hauling and disposing of materials that can produce environmental impacts or public opinion liabilities. Debris management also involves a large portion of the federal government’s disaster recovery expenditures. In the past, there was a heavy reliance on burning and landfilling of debris, which wastes resources, damages the environment, and provokes the public. Today, debris management must utilize the principles of municipal solid waste disposal. Federal, state, and local governments must follow the hierarchy of solid waste management through reuse or recycling, then incinerate all remaining burnable items and only use landfilling for anything that remains.

## **Solid Waste Management History**

We can trace the roots of modern solid waste management back to 500 BC. During 500 BC. Athens, Greece organized the first municipal landfill in the western world. In 1388 AD, England’s Parliament banned waste disposal in public waterways, and then in 1885 the first incinerator in the U.S. was built on Governor’s Island, New York. During the same time, New York City created a solid waste management plan that ended ocean dumping, instituted mandatory household separation of wastes, and began the city’s first municipal recycling program” (Aquino 1999, 4). It wasn’t until the environmental igniting of

American in the 1960's and 1970's, that the nation's first federal solid waste management laws went into effect. One of the first laws was the Solid Waste Disposal Act (SWDA) in 1965, which authorized and funded research. Unfortunately, SWDA and the creation of the Environmental Protection Agency in 1971 did little to help manage waste until 1976, when the Resource Conservation and Recovery Act (RCRA) amended the Solid Waste Disposal Act. RCRA's primary goals are to protect the public's health and the environment from the hazards of waste disposal, to conserve natural resources, to reduce the amount of waste generated, and to ensure that waste are managed in an environmentally sound manner. Little was done to manage municipal or other waste until Subtitle D to RCRA came about in 1992. Subtitle D establishes the "minimum criteria for landfills, including locations standards, facility design and operations, closure and postclosure care requirements, financial assurance standards, groundwater monitoring, and corrective action standards" (Aquino 1999, 5-6). The Environmental Protection Agency is responsible for enforcing waste management laws and regulations. Through *"Planning for Disaster Debris"* the EPA brings its experience in solid waste management into the emergency management arena.

**Table 3.1 Top Ten Major Disasters Ranked by FEMA Relief Cost<sup>22</sup> 1989-1999**

<b>Event</b>	<b>Location</b>	<b>Year</b>	<b>FEMA Funding</b>
Northridge Earthquake	CA	1994	\$6.828 billion
Hurricane Georges	AL, FL, LA, MS, PR <sup>23</sup> , VI	1998	\$2.436 billion
Hurricane Andrew	FL, LA	1992	\$1.844 billion
Hurricane Hugo	NC, SC, PR, VI	1989	\$1.334 billion
Midwest Floods	IL, IA, KS, MN, MO, ND, SD, WI	1993	\$1.170 billion
Loma Prieta Earthquake	CA	1989	\$864.1 million
Red River Valley Floods	MN, ND, SD	1997	\$709.9 million
Hurricane Fran	MD, NC, PA, SC, VA, W.Va.	1996	\$602.3 million
Tropical Storm Alberto	AL, FL, GA	1994	\$521.9 million
Hurricane Marilyn	PR, VI	1995	\$513.6 million

**Source: FEMA's Library. *Disaster Facts*. n.d.**

<sup>22</sup> Amount obligated from the President's Disaster Relief Fund for FEMA's assistance programs, hazard mitigation grants, federal mission assignments, contractual services and administrative cost as of July 31, 1998. Figures do not include funding provided by other participating federal agencies, such as the disaster loan programs of the Small Business Administration and the Agriculture Department's Farm Service Agency (FEMA n.d., 1).

<sup>23</sup> PR is the US possession of Porto Rico; VI is the US Virgin Islands.

## **EPA's, "*Planning for Disaster Debris*"**

The Environmental Protection Agency's (1995, ii) guide for disaster debris planning is based on experiences of communities who had recently encountered a major disaster. Information to help communities prepare and recover quickly from a sudden and tremendous increase in debris generated by natural disasters is contained within this guide (EPA 1995, i). The "*Planning for Disaster Debris*" guide provides good fundamental guidelines for helping communities plan for a disaster. The chapter on lessons learned furnishes community planners' invaluable information and assistance for handling the tremendous amounts of debris created by natural disaster.

After a disaster strikes, communities soon realize that their day to day standard waste disposal options cannot begin to handle the monumental amount of debris left behind (EPA 1995, 1). Faced with an excessive amount of debris in the past, local officials simply burned or buried the debris. The burning and burying method of handling debris may not always be the best or the most acceptable means of waste management. Several communities found that citizens do not want to inhale smoke from burning, risk local water supply contamination, or deplete the remaining capacity in their local landfill (EPA 1995, 1). If local governments cannot burn or bury these large amounts of debris, what other options are there available?

In normal day to day solid waste operations much of the waste a community generates is recycled and only the waste that cannot be recycled is incinerated or placed in a

landfill (EPA 1995, 1). Recycling can be an option for disaster debris when a waste management approach<sup>24</sup> is applied. Using a waste management approach for disaster debris will minimize the amount of debris burned or buried while maximizing the materials available for recycling or rebuilding. To effectively utilize the waste management approach for handling disaster debris, a state and local governments must plan for disasters.

All states and communities are subject to natural disasters, therefore, they should develop a debris management plan. According to the EPA's "*Planning for Disaster Debris*" (1995, 1) guide, advance planning can save money, speed recovery, and avoid creation of additional waste. EPA (1995, 1) suggests "To facilitate coordination, this plan could be a specific task under the community's general emergency plan." The EPA also suggests some helpful planning considerations, and steps that communities can take to speed their recovery (EPA 1995,1). Also, the guide gives steps a community can take to help reduce the burden a disaster places on their municipal solid waste program (EPA 1995, i). EPA's planning guide was developed to be a tool for planners to begin the planning process to handle debris when a disaster strikes (EPA 1995, 1).

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<sup>24</sup> "Waste Management approach" for the purpose of this report is to reduce, reuse, and recycle before placing debris or waste in an incinerator or a landfill.

## **FEMA's Authority for Disaster Debris Removal and Disposal**

When natural disaster strikes, and state resources prove to be insufficient to protect public lives, property, health, and safety the Governor will ask the President to declare a major disaster<sup>25</sup> or emergency<sup>26</sup>. The declaration of a Presidential declared disaster area will activate the Stafford Act<sup>27</sup>, the core of the federal emergency management system for disaster preparedness, administration, and assistance for emergencies and major disasters (Holdridge 1995, 12). Under Stafford Act, the President can specify the general level of assistance ranging from advisory support for the state's efforts, to directing federal agencies to provide essential assistance (Holdridge 1995, 13). The President has the authority, "whenever he determines to be in the public interest, is authorized . . . use of Federal departments, agencies . . . clear debris . . . resulting from a major disaster from publicly and privately owned lands and waters . . . make grants to any State or local government . . . for . . . removing debris . . . resulting from a major disaster . . ." (Congress 1988, Sec. 5173).

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<sup>25</sup> Major Disaster as described in US Code; Title 42, Sec 5122. Any natural catastrophe (including any hurricane...snowstorm or drought) or, regardless of cause, any fire, flood, or explosion...determination of the President causes damage...warrant major disaster assistance...supplement...resources of States, local governments, and disaster relief organizations...suffering caused thereby.

<sup>26</sup> Emergency as described in US Code; Title 42, Sec 5122. Any occasion or instance...determination of the President, Federal assistance...to protect property and public health and safety...any part of the US.

<sup>27</sup> The Stafford Act is part of Public Law 93-288, United States Code; Title 42 under Chapter 68.

## FEMA's, "*Debris Management Guide*"

"Major natural disasters can generate enormous volumes of debris in short periods of time" (FEMA 1999, 11). In order to protect public health and safety, debris clearance removal and disposal must be put into action quickly (FEMA 1999, 11). Extent of planning by local, State Emergency Managers directly affects the speed of initial clearance, removal, and disposal operations (FEMA 1999, 11).

In 1999, in the spirit of EPA's 1995 "*Planning for Disaster Debris*," the Federal Emergency Management Agency developed a "*Debris Management Guide*." FEMA's guide was also developed "to provide guidance to community leaders in planning, mobilizing, organizing, and controlling a large-scale debris clearance, removal and disposal operations" (FEMA 1999, i). The Federal Emergency Management Agency's (1999, i) guide was written to address large-scale operations. Parts of each chapter however, can be adapted to be used to handle smaller scale debris clearance, removal, and disposal.

Debris from a natural disaster, in some cases can be cleared, removed and disposed of quickly by using community and/or state resources. Nevertheless, in many cases, when a natural disaster strikes, local community officials realize that their resources, even when augmented by state resources, are not sufficient to handle the excessive amount of debris generated. When damage and debris are this extensive, a "comprehensive debris clearance, removal and disposal management plan is required to efficiently and effectively control the operations" (FEMA 1999, i).

FEMA's 1999 "*Debris Management Guide*" covers in detail procedures for disaster response action, pre-disaster planning, developing a debris management strategy, contracting procedures, TDSR site operations, volume reduction methods, and environmental consideration. FEMA's guide also includes examples of Debris Management Plan, Mutual Aid Agreement, Right of Entry Agreement, etc. The Federal Emergency Management's guide is a excellent tool for development of State and Local Debris Management Plans. The guide also details the procedures for receiving Federal assistance for debris clearance, removal and disposal.

### **Available Resources**

When a community is devastated by a natural disaster, the state and/or local debris staff should initiate actions to assess the availability of resources . . . to provide immediate and long-term assistance (FEMA 1999, 2). According to FEMA (1992, 2) experience has shown resources will not be effectively used unless total authority and responsibility for debris cleanup operations are controlled by the designated debris manager. The following are some of the resources available for cleanup activities.

### **State and Local Resources**

State and local governments are the first source of assistance, which includes resources for disaster debris management, when natural disasters strike (EPA 1995, 6). The State National Guard, Department of Transportation and the state equivalent to the EPA are



just a few of the state agencies that are available for assistance (FEMA 1999, 2). When disasters strike communities, they become eligible for local and state assistance regardless of whether they receive a federal disaster declaration (EPA 1995, 6). The state emergency management agency also plays a specific role as local government's liaison and representative to FEMA during a disaster and cleanup (EPA 1995,7). In preparing for a disaster, the state emergency management agency can also provide information for emergency planning (EPA 1995, 7). The state's waste management agency can make special accommodations for unusual waste management needs brought on by a natural disaster (EPA 1995, 7). During the planning stage of preparing for a disaster, the state waste management agency can provide expertise and guidance. There are other state and local agencies<sup>28</sup>, which can provide specialized assistance.

### **Federal Resources**

When the President declares an area a natural disaster, that area affected by the disaster then becomes eligible for federal assistance including debris removal through the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The Stafford Act authorized FEMA to respond to disasters and emergencies to help protect and save lives and protect public health, safety, and property (EPA 1995, 5). FEMA is authorized to generally reimburse local governments for debris removal, transportation, volume reduction at staging

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<sup>28</sup> Parks and Recreation, Coastal or Harbor Authorities, Special (water, utility, etc.) Districts, Forest Authority, are examples of State Agencies that can provide specialized assistance.

areas, and ultimate disposal. They may also reimburse local governments for recycling debris if a recycling program is in place prior to the disaster or if the government officials can “demonstrate that recycling is a cost-effective debris management option” (EPA 1995, 5). In addition to the Federal Emergency Management Agency the following two agencies also play major roles in disaster, response “in hazardous and nonhazardous waste management” area (EPA 1995, 5).

The Department of Defense (DOD) has been designated the responsible agency for emergency support relating to public works and engineering. DOD appointed the Army’s Corp of Engineers (USACE) to be the operating agent for emergency support. USACE is responsible for providing technical advise, engineering services, construction management, emergency repair of wastewater facilities, solid waste facilities, etc. (EPA 1995, 5, 6). The Federal Highway Administration may provide grants to states for debris removal, cleanup, and repair of roads that are on the designated Federal Aid System (FEMA 1999, 3).

When dealing with hazardous materials (HAZMAT) debris, the Environmental Protection Agency (EPA) has primary responsibility for emergency support (EPA 1995, 6). The EPA is also responsible for responding to accidental releases of hazardous materials during a disaster. The EPA (1995, 6) is also responsible for providing technical assistance for environmental monitoring. Additionally, regional EPA offices can provide technical assistance on solid waste issues.

### **Other Government Assistance**

Other government assistance may be available through mutual aid agreements among neighboring states and/or communities (FEMA 1999, 3). Mutual aid agreements can provide for a loan of experienced personnel or specialized equipment during a disaster (EPA 1995, 7). Mutual Aid agreements can help reduce the financial impact as a result of a disaster. These agreements need to be in place prior to a disaster. A major source of reducing the cost of disaster cleanup is help through volunteer organizations.

### **Volunteer Resources**

Volunteer organizations can assist homeowners in removing debris from their property or they can provide financial assistance for debris removal (FEMA 1999, 3). Historically, volunteers have played a significant role in large-scale debris removal operations (FEMA 1999, 3). According to FEMA (1999, 3) community organizations have proven to be a tremendous community resource in past disasters. To provide maximum utilization community leaders should be prepared to organize volunteer groups and coordinate activities with the debris management staff (FEMA 1999, 3). Through pre-disaster planning and coordination with these different organizations the debris management staff receives contact information, capabilities of the organization, etc.

## **Summary**

The two major federal agencies involved with Disaster Debris Management have provided state and local governments with printed guidance for debris management. They also have identified many different levels of resources available for assistance with debris removal, disposal, etc. after a disaster. However, these guides are meant to be a planning tool for plan preparation, state and local governments still must do the planning for a disaster including debris removal. The next chapter addresses the applied research project's conceptual framework and the methodology.

## **CHAPTER FOUR**

### **Conceptual Framework and Methodology**

#### **Statement of Purpose**

The chapter summarizes the conceptual framework and describes the selected research tool and methodology that link the conceptual framework to the research purpose. The chapter also identifies the literature that links content analysis to the conceptual framework to the elements on the survey instrument (coding sheet). The survey instrument is the tool (data collection instrument) of survey research and the coding sheet is the tool used in this content analysis to collect data.

#### **Conceptual Framework**

The conceptual framework is a tool that gives the researcher the overall picture of the research. In addition the framework gives the researcher direction and allows the content of the research to be fine-tuned. Conceptual frameworks can be classified by the purpose of the research being conducted, and can be tied to certain types of research questions (Shields, 1998). The conceptual framework for the research project is the “practical ideal type” and the research purpose is “gauging.” The purpose of the research is three-fold:

- 1) to describe the need for planning and management of disaster debris;

- 2) to describe the ideal characteristics of an effective disaster debris management plan as established by the Federal Emergency Management Environmental Agency;
- 3) to gauge the Emergency/Debris Management Plans of states against the standards established by FEMA.

FEMA's Debris Management Plan Outline Example (1999, B1-13) is used as the standard for gauging state plans. Although states are not required to have a Debris Management Plan, the fact that every state is subject to one or more natural disasters suggests that state's should have a plan to handle the tremendous amounts of debris that can be generated by these disasters. State plans should contain the following eight main areas (FEMA 1999, B1-13);

- mission statement,
- organizational responsibilities,
- concept of operations,
- debris removal,
- procedures for temporary debris storage and reduction sites (TDSR),
- debris reduction methods,
- TDSR site close-out procedures,
- administrative and logistics

The criteria for the eight main areas listed above are discussed in detail in chapter two.

The third part of the research purpose is to assess whether (or how well) State Emergency Management Plans are addressing debris management as part of an effective plan dealing with emergencies. This assessment uses content analysis of state plans for disaster debris management, by using a survey instrument (coding sheet) derived from FEMA's 1999 *Debris Management Guide*. This table summarizes the third part of the research. **Table 4.1** links the literature, the conceptual framework, and the data collection instrument (coding sheet).

As the Environmental Protection Agency (EPA) found in there 1995 study of recent major disasters, those communities and states that had an effective detailed debris management plan were able to handle enormous amounts of debris more efficiently and effectively. Planning for a disaster is not just a local government's responsibility, planning for disaster debris should also be done at the state and federal level. Natural disasters can overwhelm a local government's ability to handle debris in a matter of minutes, and then state, and sometimes-federal, government's assistance is needed to recover from a disaster (EPA 1995, 7).

## Methodology

Content analysis is the research method employed. Babbie (1998, 308) defines content analysis as a researcher's examination of a class of social artifacts, typically written documents. Content analysis combines quantitative and qualitative techniques and can serve many different purposes. These include:

- comparison of media or levels of communication
- coding open-ended questions in surveys
- describing attitudinal/behavioral responses to communications
- revealing the focus of individuals, groups, institutions, or societies
- reflecting cultural patterns of groups, institutions or societies

Content analysis is an appropriate data source for this research because the Federal Emergency Management Agency's Debris Management Guide, 1999, establishes a "practical ideal type" for all Debris Management Plans. The technique of content analysis will also allow for expediency and accuracy in exploring current status of State Debris Management Plans<sup>28</sup>. An ordinal level of data is used to determine how close the individual state plans come to the practical ideal type.

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<sup>28</sup> "State Debris Management Plans" for the purpose of this report means stand alone plans, appendixes and annexes to other plans. (example; State Emergency Management Plans)



**Table 4.1. Conceptual Framework Sources for a Practical Ideal Type**

<b>SOURCE</b>	<b>CATEGORY "IDEAL"</b>	<b>CODE</b>
FEMA 1999 Foster 1980	<b>Mission Statement</b>	1
FEMA 1999 Solis 1995 Foster 1990	<b>Organization</b>	2
FEMA 1999 EPA 1995 Foster 1980	<b>Concept of Operations</b> Emergency Operations Center Activation, Estimating the type and amount of debris, Temporary Debris Storage and Reduction (TDSR) Site Selection	3-15
FEMA 1999 USACE n.d. Swartz 1999 Solis 1995	<b>Debris Removal</b> Phase I-Emergency roadway debris removal, Local, State, Federal available assets, Supervision and special considerations, Phase II-Public right-of-way debris removal, Private property debris removal, Household hazardous waste removal	16-38
FEMA 1999	<b>Temporary Debris Storage and Reduction sites (TDSR),</b> Site preparation, Site operations	39,40
FEMA 1999 USACE 1999 Solis 1995 IG 1994 Foster 1980	<b>Debris reduction methods</b> Volume reduction by incineration, Environmental controls, Volume reduction by grinding and chipping, Volume reduction by recycling	41-44
FEMA 1999	<b>TDSR site close-out procedures,</b> Environmental Restoration, Site Remediation	45,46
FEMA 1999 EPA 1995 Solis 1995	<b>Administrative and Logistics,</b> Authorities, References, Appendixes	47

Source for the "Ideal" category: FEMA. *Debris Management Guide*. 1999.

## Coding Sheet

The content analysis mode of operations, according to Babbie (1998, 312-313) is an operation of coding in which communications are coded and classified in terms of the conceptual framework. In other words, content analysis is a research method that is suited to descriptive categories. Consequently, a coding sheet organized by the research questions was developed from FEMA's Debris Management Plan Outline Example for use in this research project. The coding sheet is a near one to one correspondence with the conceptional framework categories described in **Table 4.1**. (An example of the coding sheet is provided in Appendix A.)

State Emergency/Debris Management Plans are analyzed to determine whether state plans meet the criteria for the practical ideal type established by FEMA. Table 4.1 shows how the categories are operationalized into measurable categories. Separate code sheets are used to analysis each State's Debris Management Plan. The scale for gauging the state plans against the "practical ideal type" is shown in **Table 4.2**.

**Table: 4.2 Measurement of Debris Management Plans to the "ideal type"**

<b>LEVEL OF MEASUREMENT</b>	<b>CATEGORY</b>
0	Not included
1	Included – does not include all of FEMA's "ideal" type
2	Included – meets or exceeds FEMA's "ideal" type

**Population**

The population for the research project is the forty-eight states, which have Emergency Management Agencies. The State Emergency Management Agency will serve as the focal point for information for each state. From the population of forty-eight agencies contacted, 14 plans were received or located on the Internet and evaluated, three states do not have formal plans, 31 agencies did not respond and/or their plans could not be located on the Internet. Content analysis is an ideal method for this applied research project. Nonetheless, as with any research method content analysis has both strengths and weaknesses. (See Appendix B for the list of state plans assessed.)

**Strengths and Weaknesses of Selected Research Method**

Sampling is one weakness of the content analysis research method selected. The sampling includes only plans that the Emergency Management Agencies took the time to forward for research, or could be accessed on the Internet. According to Babbie (1998, 318) another weaknesses of content analysis is that it is limited recorded communication.

There are several strengths associated with content analysis as a research method. Some of the strengths identified in Babbie's 1998 *The Practice of Social Research* are ease of use, unobtrusiveness, studies can be replicated, and content analysis allows for historical studies. The greatest advantage of content analysis according to Babbie is "economy in terms of both time and money" (Babbie 1998, 318). The strengths that apply

to the research project are, the "practical ideal type" that has been developed by FEMA, and the States Emergency/Debris Management Plans, are in written form.

## **Summary**

The population selected for research consists of State Emergency Management Offices identified on the Internet. The empirical portion of the study is organized around the need for planning and management of disaster debris, establishing ideal characteristics of an effective Disaster Debris Management Plan, and gauging or assessing State's Emergency/Debris Management Plans against these ideal characteristics. Content analysis is the methodology selected to collect the empirical evidence, and the coding sheet is organized according to descriptive categories established by FEMA. These categories are mission statement, organizational responsibilities, concepts of operations, debris removal, temporary debris storage and reduction sites (TDSR), debris reduction methods, TDSR site close-out procedures, and administrative and logistics (FEMA 1999, B1-13).

The following chapters present the research results (Chapter 5), summarize the research results, and makes recommendations for improvements (Chapter 6).

## CHAPTER FIVE

### Results

#### Introduction

The purpose of the chapter on results is to organize and review findings from the analysis of State Debris Management Plans. The results are based on a population of 17 plans that were assessed using a practical ideal type, taken directly from FEMA's *"Debris Management Guide,"* through the use of a coding sheet. The results of the analysis are shown in summary tables for the descriptive categories of Concept of Operations, Debris Removal, TDSR sites and Closeout Procedures, and Debris Reduction Methods (FEMA 1999, B1-13). The descriptive categories Mission Statement, Organization, Administrative and Logistics are in descriptive form and not in a summary table. The findings are based on whether or not a plan included all, included some, but, not all of the ideal type, or did not include the ideal type as established by the Federal Emergency Management Agency and presented in this research project.

#### Mission

A mission statement which identifies how debris management activities are facilitated and coordinated and includes local situations and assumptions is key for planning actions associated with a disaster. A true mission statement is virtually non-

existent in state debris management plans. Only 2 of the 17 plans evaluated included both debris management activities and local situations and assumptions. On the other hand, four of the plans contained situations and assumptions, but not debris management activities. In order for these plans to be effective, they must define overall responsibility for actions associated with debris removal, clearance and disposal operations.

## **Organization**

The organization section of the plan should identify which agency and/or individual has overall responsibility for managing debris clearance, removal, and disposal operations. The section on organization should also identify all support agencies along with their responsibilities. The evaluation of the organization section of state plans shows a sharp contrast to the mission section. Well over half (12 out of 17) of the state plans identify an agency or individual with responsibility for debris removal. In addition 4 of the 12 included support agencies along with their responsibilities.

## **Concept of Operations**

Concept of operations is where the responsibilities for managing and coordinating disaster debris clearance, removal, and disposal operations should be detailed. Additionally, procedures for Emergency Operations Center activation, estimating the type and amounts of debris and selection of TDSR sites should be contained in the Concept of

Operations section. The data in **Table 5.1** reveal that very few (3) of the state plans define the overall responsibility for managing debris clearance, removal, disposal operations, and supporting staff and/or agencies. Less than 1/3 (5) of the plans identify an agency responsible for managing and coordinating overall disaster debris clearance, removal and disposal.

One of the plans that stood out in the Concept of Operations section is the Commonwealth of Massachusetts Disaster Debris Management Plan.<sup>29</sup> Not only does the plan identify the responsible agency and supporting staff, the plan also has a Disaster Debris Plan Organizational Chart. The organizational chart helps give clarity to what activities fall under Massachusetts' debris management agencies and how these agencies fit into the "big picture". The use of a organizational chart helped propell this section of the Massachusetts plan into the category of exceeds the "ideal" type. Unfortunately, the subcategories of this section did not fair as well.

The subcategories "Procedures for Estimating the Type and Amount of Debris, and for Temporary Debris Storage and Reduction Site Selection" reveal that less than one in four plans include some procedures for estimating the amount of debris or selection of temporary debris storage sites. The data also reveal a definite lack of planning in the

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<sup>29</sup> See Appendix "C"

areas of EOC Activation, Estimating the Type and Amount of Debris, and TDSR Site Selection. The Concept of Operations section is key to helping keep the cost of debris removal, collection, and disposal down.

**Table 5.1. Concept of Operations Results**

Element	“Ideal” not included	Included –does not meet “Ideal”	Included meets or exceeds “Ideal”
Concept of Operations-Code 3	9	5	3
Procedures for Emergency Operations Center Activation. Codes 4-7	10	7	0
Procedures for Estimating the type and amounts of debris. Codes 8-9	14	3	0
Procedures for TDSR <sup>30</sup> Selection. Code 10-15.	13	3	1

(N=17)

## Debris Removal

Disaster debris removal is a two-phase operation. Phase I is the immediate movement of debris to the shoulder of roadways to allow access for emergency vehicles. The second phase of debris removal involves the removal, collection, and disposal of

<sup>30</sup> Temporary Debris Storage and Reduction Site (TDSR)



Phase I and/or Phase II of debris removal. The data in **Table 5.2** indicate that none of the plans meet the practical ideal type. The ideal type includes identifying critical routes, procedures for removing debris, defining type of debris, procedures for Mutual Aid agreements, development of local field inspection teams, private property debris removal, Household Hazardous Waste removal, etc. All of the Phase I and Phase II debris removal “ideal type” areas have a direct impact on protecting public health, safety, and/or cost of disaster debris management.

**Table 5.2. Debris Removal Results**

Element	“Ideal” not included	Included –does not meet “Ideal”	Included meets or exceeds “Ideal”
Procedures for Emergency Roadway Debris Removal, Phase I. Codes 16-30.	10	7	0
Procedures for public Rights-of-Way Debris Removal and Disposal, Phase II. Codes 31-38	11	6	0
(N=17)			

## Temporary Debris Storage and Reduction (TDSR) Site

Whenever a disaster strikes, TDSR sites are used to temporarily store, recycle, and burn the debris collected. **Table 5.3** reveals there are, in essence, no plans that even address the issue of TDSR sites. Temporary Debris Storage and Reduction sites help control cost by reducing or eliminating the possibility of HHW contamination of the soil, water supply, etc. TDSR are also essential for protecting public health in the areas of rodent control, contamination of ground and/or water by household hazardous waste, etc. TDSR sites also are essential to controlling the cost of returning a temporary site to the pre-disaster condition.

**Table 5.3. Procedures for TDSR Sites and Closeout Procedures**

Element	"Ideal" not included	Included –does not meet "Ideal"	Included meets or exceeds "Ideal"
Site Preparation. Code 39.	17	0	0
Site Operations. Code 40.	14	2	1
Environmental Restoration. Code 45.	16	1	0
Site Remediation. Code 46.	17	0	0

(N=17) Note: TDSR Site (Codes 39-40) procedures and TDSR Closeout procedures (Codes 45-46) are combined for use in the above table.

## Debris Reduction Method

There are several ways to reduce the amount of debris left after a natural disaster. The most common, it seems, is incineration, which is given a pretense of high preference by FEMA's guide and by state plans. In FEMA's guide and in state plans incineration is mentioned first as a method of reduction. Additionally, there seems to be more information addressing burning verses other methods of dealing with debris for example grinding and/or chipping. One reason state officials find incineration desirable is that burning reduces the volume of burnable debris by 95 percent. Nonetheless, volume reduction by incineration has many environmental drawbacks that are leading government officials to consider alternate reduction methods. The data in **Table 5.4** reflects that essentially no state plans (14 out of 17) address the issue of debris reduction. The conclusion from the information gathered is that the decision about which debris reduction and/or disposal method is employed is made immediately after a disaster strikes. This means that the decision of debris reduction and disposal method is made during the time when the community and the community leaders are more concerned with other pressing issues of shelter, food, water, etc., for local citizens. Decisions made under these circumstances tend to be what is quickest and the easiest. Generally, burning or landfill are the methods chosen.

**Table 5.4. Debris Reduction Methods Results**

Element	“Ideal” not included	Included –does not meet “Ideal”	Included meets or exceeds “Ideal”
Procedures for Volume reduction through incineration. Codes 41-42	14	2	1
Procedures for Volume reduction by Grinding and Chipping “green waste.” Code 43.	15	1	1
Procedures for Volume reduction through recycling. Code 44.	15	1	1
(N=17)			

### Administration and Logistics

The results of the analysis of state plans in reference to the practical ideal type of Administration and Logistics shows that this area is virtually ignored in 14 out of the 17 state plans evaluated. The plans that address Administration at all only addressed the issue of documenting in order to receive Federal assistance. The key area of Administration and Logistic needs to be addressed because agency responsibility is assigned as to which agency initiates the debris management plan as well as who will complete an annual update, etc.

The last chapter provides a summary of the results, conclusions from the findings, and recommendations for overall program improvements.

## CHAPTER SIX

### Conclusion

#### Introduction

This chapter is intended to summarize the findings of the research and to present recommendations that address the findings. The purpose of the research was:

- 1) to describe the need for planning and management of disaster debris:
- 2) to describe the ideal characteristics of an effective disaster debris management plan as established by the Federal Emergency Management Environmental Agency:
- 3) to gauge the Emergency/Debris Management Plans of states against the “practical ideal” standards established by FEMA.

#### Summary of Findings

The research was intended to understand or gauge the status of State Debris Management Plans compared to the practical ideal type. The results of the research seemed to indicate that a majority of the information contained in FEMA’s “ideal” type did not appear in state plans. **Table 6.1** reflects how each of the eight main descriptive categories rated.

**Table 6.1. Summary of Finding.**

<b>Ideal Elements</b>	<b>Overall Adherence to “ideal”</b>	<b>Strengths</b>	<b>Weakness</b>
<b>Mission</b>	Fair	-Situations Assumptions	-Identifying how DM <sup>31</sup> will be facilitated and coordinated
<b>Organization</b>	Good	-Identify agency responsible for debris removal	-Detail how responsible agency will manage debris clearance/removal/disposal operations/supporting agencies
<b>Concept of Operations</b>	Poor	-Public Works designated for debris estimating	-EOC activation procedures -Estimating debris procedures -TDSR Site Selection procedures
<b>Debris Removal</b>	Poor	-Identification of possible debris	-Emergency roadway debris removal -Identify supervision & special considerations -Public Right-of Way debris removal -Private property removal
<b>TDSR Site procedures</b>	Poor	-None	-TDSR site preparation -TDSR site operations
<b>Debris Reduction Methods</b>	Poor	-None	-Volume reduction through incineration -Environmental controls procedures -Volume reduction through grinding and chipping -Volume reduction through recycling

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<sup>31</sup> “Disaster Debris Management

<b>TDSR Site Closeout</b>	<b>Non- existent</b>	<b>-None</b>	<b>-Environmental restoration -Site Remediation</b>
<b>Administration &amp; Logistics</b>	<b>Poor</b>	<b>-Identification of responsible agency for initial plan</b>	<b>-Responsibilities for annual update -Authority for the plan -References and appendices</b>

The Commonwealth of Massachusetts Disaster Debris Management Plan stands out as one of the best plans reviewed. Concept of Operations is one of the outstanding sections of the Massachusetts plan. In addition to detailing the responsibilities<sup>32</sup> for managing and coordinating debris clearance, etc., the plan includes an organizational chart that adds clarity to the different responsibilities and command and control of each agency. The Debris Reduction Method section also stands out better than the majority of the plans reviewed. Debris reduction addresses the methods of incineration, chipping and grinding, etc. Even though this section is one of the better sections it does have some problems. Debris reduction is addressed in sample contracts, not in the main section of the plan and the section does not address recycling.

## Recommendations

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<sup>32</sup> See Appendix "C" Command and Control section on page 6, paragraph 3.1.

Disaster generated debris poses a real threat to the public's health, safety and welfare. Therefore, the recommendation, is made, that states give immediate attention to creating or improving their debris management plan is made. Due to the extreme complexity and variability of major disaster operations, no amount of advance planning can cover the numerous uncertain and unpredictable factors that are involved with a disaster response and recovery. Effective debris planning nonetheless seeks to reduce the environmental impact, social liabilities, costs and the duration within the context of the larger disaster response and recovery missions.

Disaster debris management is only one small part of the area of emergency management functions and therefore, planning for debris management suffers from many barriers. Without an incentive to create debris management plans states have become very reluctant to spend time or money to update and/or develop plans, choosing instead to react to the debris generated by a disaster. This lack of action will continue as long as the federal government picks up the tab. The lack of planning becomes apparent when reviewing recommended improvements.

### ***Recommended Improvements for State Plans***

- A Mission statement that includes identifying how debris management activities are facilitated and coordinated



- *Organization section that details how the responsible agency will manage debris clearance, removal, and disposal operations and includes a listing of supporting agencies*
- *Under the Concept of Operations section include procedures for EOC activation, estimating type and amount of debris*
- *Debris removal must include procedures for debris removal on emergency roadways (Phase I), removal and disposal of debris from public right-of-ways (Phase II) and private property*
- *Include a TDSR site procedures section in debris management plans that includes site selection preparation, operations and closeout*
- *Debris reduction selection must be included with all available methods of reduction*
- *To establish who is responsible for the initial plan, regular update (bi-annual, annual, etc.) the Administration and Logistics section must be in the plan*

### ***Overall Recommendations***

- *All states must have a debris management plan*
- *States need to become aware of the significance of debris removal as an emergency management issue and to take a proactive role in disaster debris management*
- *States need to develop procedures to help minimize the cost (dollar and environmental) of recovery from a disaster (including debris management)*

- State debris management plans should detail when, how and who will take over responsibilities from the local governments when they become overwhelmed by disaster debris
- FEMA and State Emergency Management Offices must work with Federal and State Solid Waste Management Offices to create an acceptable and workable debris management plan
- FEMA needs to provide an incentive (monetary value) for state and local governments to develop and follow a disaster debris management plan (example: Increase or decrease states and/or local governments debris clean up cost by one or two percent.)

Although state plans rated very poor, local government plans may rate higher. It is recommend further research be conducted on local disaster debris management plans to help determine the government's ability to respond and recover from a disaster at the local level.

## **Conclusion**

The research gauged how well State Debris Management Plans dealt with disaster debris. What was revealed is that for the most part, the state plans did a poor job. A recommendation is made that FEMA tie a dollar value to state and local plans in hopes that this will encourage State Emergency Managers and State Solid Waste Managers to

come together to develop an effective Debris Management Plan. It is not being said that this will solve the problems associated with the high cost (dollar and environmental) of debris clearance, removal and disposal operations. Nonetheless, the problem of high cost of disaster debris management will never come in line without an effective plan.

The federal government through FEMA has taken the first steps to developing an effective plan for state and local governments. The next step is up to the states to develop a state plan and provide guidance to local governments.

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APPENDIX A  
CODING SHEET

<b>Debris Management Plan Coding Sheet</b>		
State Plan Evaluated:		
<b>Code</b>	<b>Categories and Characters</b>	<b>Included</b>
<b>1</b>	<b>I. MISSION</b> - identify how debris management activities will be facilitated and coordinated including local situations and assumptions	
<b>2</b>	<b>II. ORGANIZATION</b> - define overall responsibility for managing debris clearance, removal, disposal operations, and supporting agencies/staff	
<b>3</b>	<b>III. CONCEPT OF OPERATIONS</b> - Detailed how responsible agency/designated individual will managing and coordinate debris clearance, removal, and disposal operations	
	<b>a. Procedures for Emergency Operations Center Activation -</b>	
<b>4</b>	Define Debris Management Task Force (DMTF) make up, duties, and responsibilities	
<b>5</b>	Procedures for determining extent of damage and resulting debris (EOC Director/designated representative and DMTF)	
<b>6</b>	Procedures implementing the Debris Management Plan	
<b>7</b>	A Listing of key points of contact	
	<b>b. Procedures for Estimating the Type and Amounts of Debris</b>	
<b>8</b>	Personnel designated (public works department)	
<b>9</b>	Define the estimating method(s) to be used (example; Drive-through "windshield" method, Fly-over visually or aerial photography method)	
	<b>c. Procedures for Temporary Debris Storage and Reduction (TDSR) Site Selection</b>	
<b>10</b>	Procedures for determining the number and location of TDSR sites	
<b>11</b>	Procedures for establishing site opening priorities	
<b>12</b>	Procedures for pre-designating TDSR sites	
<b>13</b>	<b>1. Identify Pre-Designated TDSR sites</b> - on maps, agency of responsibility, exact location, size, available ingress and egress routes.	
<b>14</b>	Identify base-line data (document physical, biological features, soil and water samplings, etc.	
<b>15</b>	<b>2. Identify Existing Landfills</b> - locations of all landfills (open and closed) including any restrictions, limitations of tipping fees	
	<b>IV. Debris Removal</b> - identify emergency and non-emergency debris removal procedures	
<b>16</b>	<b>a. Procedures for Emergency Roadway Debris Removal Phase I</b> - define what actions take place during Phase I (example; removal of roadway debris hindering immediate life-saving actions)	

## APPENDIX A

## CODING SHEET

<b>Debris Management Plan Coding Sheet (continued)</b>		
17	Procedures for identifying critical (emergency operations) routes	
18	Define how to prioritize efforts between agencies (local, state)	
19	Procedures for identify areas needing State/Federal assistance	
20	Procedures for moving debris to the shoulder - to open arterial roads and collector streets to expedite movement of emergency vehicles, etc.	
21	Define types of debris which maybe encountered " green waste, building debris, personal property, etc.	
22	Identify the priority for open access to critical facilities " municipal buildings, water/waste-water treatment plants, utility systems, etc.	
23	Procedures to determine the damage to utility systems	
28	Identify Local, State and Federal available assets	
	<b>1. Identify Supervision and Special Considerations</b>	
29	Phase I clearing supervised by local Public Works or DOT	
30	Request for additional assistance " State Emergency Operations Center (EOC) " Federal through State Coordination Officer (SCO) to FEMA Federal Coordinating Officer (FCO)	
	<b>b. Procedures for public Rights-of-Way debris removal and disposal (Phase II)</b>	
31	Define how DMTF will coordinate removal operations and how employees will transition from Phase I to Phase II operations	
32	Procedures to determine if Mutual Aid agreements exist, if local contractors are needed, if additional assistance (State/Federal) is required	
33	Procedures for development of local field inspection teams, independent team for monitoring removal activities	
34	Procedures for daily update briefings	
35	Procedures for establishing a proactive information management plan to keep the public informed	
	<b>1. Private property debris removal</b>	
36	Procedures for ensuing complete cooperation between every level of government officials (i.e., law and code enforcement, HHW contractors, field teams, etc.)	
	<b>2. Household Hazardous Wastes (HHW) removal</b>	
37	Consider using HHW response teams to respond ahead of removal efforts	



APPENDIX A  
CODING SHEET

<b>Debris Management Plan Coding Sheet (continued)</b>		
<b>38</b>	Procedures for HHW being collected, identified, segregated, and a separate staging area	
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<sup>30</sup> ESF = Emergency Support Function

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### STATE PLANS

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## **APPENDIX C**

### **COMMONWEALTH OF MASSACHUSETTS DISASTER DEBRIS MANAGEMENT PLAN**

# **COMMONWEALTH OF MASSACHUSETTS DISASTER DEBRIS MANAGEMENT PLAN**

Appendix to the State Comprehensive Emergency Management Plan

Massachusetts Emergency Management Agency

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Title	Page	Revision	Date
Title Page	i	0	10/99
List of Effective Pages	ii, iii	0	10/99
Table of Contents	iv, v	0	10/99
List of Figures and Tables	vi	0	10/99
1.0 Introduction	1	0	10/99
2.0 Situation and Assumptions	3	0	10/99
3.0 Concept of Operations	6	0	10/99
4.0 Emergency Organizations and Responsibilities	11	0	10/99
5.0 Sequence of Operations	12	0	10/99
6.0 Pre-Disaster Planning and Maintenance	14	0	10/99
Debris Plan Acronyms	17	0	10/99
7.0 Appendices	18	0	10/99
A. Sample Contract Information	A-1 through A-44	0	10/99
B. Sample Mutual Aid Agreement	B-1 through B-2	0	10/99
C. Sample Right of Entry Agreement	C-1	0	10/99
D. Sources of Information on Contractors	D-1	0	10/99
E. Debris Staging Sites	E-1 through E-2	0	10/99

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F. Sample Public Announcements – PA/Flyers	F-1	0	10/99
G. GIS Staging Site Criteria Map(s) of Commonwealth of MA	G-1	0	10/99

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## **1.0 INTRODUCTION**

A significant percentage of Federal Emergency Management Agency (FEMA) disaster relief funds are spent on disaster debris related activities. Beyond the high cost of cleaning up debris after a major disaster, large amounts of debris: threaten public health and safety by harboring rodents and disease; pose fire hazards; and block road access for emergency vehicles, vital supply vehicles, and repair equipment. Commencement of clean-up operations improves general sanitation and signals the beginning of recovery and the restoration of public order.

The Disaster Debris Management Plan is an appendix to the Massachusetts Comprehensive Emergency Management Plan that addresses the details of clean-up operations. This appendix provides a framework for organizing the rapid, safe, and cost effective removal, collection, recycling and disposal of disaster related debris, and minimization of debris-related threats to public health, safety, and potential environmental impact following a major disaster.

The Disaster Debris Management Plan would be coordinated by the Massachusetts Emergency Management Agency (MEMA) utilizing State agencies working in Emergency Support Functions as outlined in the Massachusetts Comprehensive Emergency Management Plan.

The Debris Plan also seeks to provide guidance to local communities to better manage disaster debris removal and disposal, in conjunction with the efforts of State agencies.

### **1.1 Purpose**

A major hurricane, flood, tornado, nor'easter, or earthquake would generate vast quantities of debris posing an immediate threat to public safety, and health from fire, disease, and reduced access by emergency personnel and vehicles. Equally as important, as debris is cleared, the volume of debris will strain the ability of municipal and State agencies to store, process and dispose of various types of debris materials in a safe and environmentally sound manner.

The Disaster Debris Management Plan is designed for situations where municipal or regional resources are unable to adequately manage disaster-related debris. In such instances, MEMA would initiate the Disaster Debris Management Plan in part or total, to task State resources and identify debris storage and processing facilities and systems.

### **1.2 Authority**

The Massachusetts Emergency Management Agency is responsible for coordinating all aspects of disaster and emergency management as outlined in the Massachusetts Civil Defense Act, Chapter 639 of the Acts of 1950, Codified, Appendix 33. Additionally, Massachusetts Executive Order 144, September 27, 1978 directs State agencies to provide personnel and resources at MEMA's volition to enhance coordinated response.

The Massachusetts Department of Environmental Protection (DEP) is responsible for determining necessary waste disposal capacity as set out in the Solid Waste Act of 1987, M.G.L. Chapter 16, Section 21. DEP's 1990 Solid Waste Master Plan and subsequent updates provide a hierarchy of waste management alternatives that maximize recycling and minimize land filling of waste in order to protect the public health, safety and the environment. The 1997 update of the plan specifically acknowledges the problem that disaster debris poses to the solid waste management system.

## **2.0 SITUATION AND ASSUMPTIONS**

The Disaster Debris Management Plan assumes a major disaster could overload existing waste management capacity and that the Commonwealth, through DEP's Solid Waste Master Plan, will continue to restrict the amount of landfill disposal capacity. Managing the sheer volume of debris will require: separation of debris into various component parts, an array of management methods (recycling, burning, land filling), and both public and private resources.

Initial emergency response emphasizes the importance of life saving operations and the clearing of access ways for emergency personnel and equipment by pushing debris to the edge of rights-of-way. The Debris Plan's primary focus is on the clean up that follows. This section describes the various kinds of natural disasters, which comprise the most likely disaster debris generating events, and the types of debris generated by each. The section continues with a set of debris separations based on the type of disaster event and concludes with methods for managing each debris type.

### **2.1 Natural Disasters**

The quantity and type of debris generated is a function of the kind of disaster event, its location, as well as the event's magnitude, duration, and intensity.

#### **2.1.0 Hurricanes**

The damaging forces of hurricanes and tropical storms include high velocity winds (up to 150 miles per hour or higher in gusts), storm surge, and wave action. The most severe damage frequently occurs along the coast. Hurricane debris consists primarily of vegetation, sediments, trees, personal property and building contents. The effects of a hurricane often extend far inland, with significant tree and structural damage. Hurricanes are rated from categories 1 through 5. Tornadoes may be spawned from hurricanes causing severe localized damage.

##### **2.1.1 Tornadoes**

Damage from tornadoes is caused by high velocity rotating winds. Like hurricanes, tornadoes are rated on a numerical scale based on the severity and other characteristics. The amount of damage depends on the size, velocity of winds, and duration of funnel contact with the earth. Contact paths may range from a mile or less in width and from 100 yards to several miles in length. Tornadoes may skip across a wide area with several touchdowns. Damage consists of trees, structures, and personal property.

##### **2.1.2 Floods**

Flooding causes damage to property due to inundation and erosion. Flooding is often confined to discernible floodplain areas, but may also occur as a result of a dam failure or flash flood in areas down stream of higher elevation streams, ponds and rivers. Debris consists of sediments deposited in public and private property, and water damaged materials. Soil, gravel, rock and construction materials may also be eroded by floodwaters.

### **2.1.3 Earthquakes**

Earthquakes cause damage by shock waves and earth movement along fault lines and over some distance from the center of the quake. Secondary damage from fires can be substantial. Debris consists of building materials, personal property, and a host of utility and transportation infrastructures.

### **2.1.4 Ice/Winter Storms**

Ice and winter storms cause damage to trees, utility lines/infrastructure, and wide span roofs. Coastal nor'easters may flood developed areas, and erode near shore areas. Debris consists of trees, utility lines, wires, poles/towers, and building debris from damaged roofs and structures. Disposal of possibly contaminated snow and ice from roadways is also a consideration.

## **2.2 Debris Separation and Disaster Types**

The preceding disaster types can be grouped into two classes based on the kinds of waste that each generate. Hurricanes, Floods and Tornadoes largely generate green waste while Earthquakes result in more asphalt, brick, and concrete. The Earthquake and Hurricane classes both have three subgroups of material in descending order of relative volume. For the purpose of managing debris the following separations should be made when ever possible:

### Hurricane/Flood/Tornado

Green Waste - trees, stumps, limbs, brush, and leaves

Large Metals - white goods (washers, dyers, and stoves), gutter pipes, corrugated metal, etc

Building & Bulky Debris - all other debris from damaged buildings such as dimensional lumber, roofing materials, wallboard, furniture, mattresses, rugs and textiles

### Earthquake

ABC - asphalt, brick, concrete, concrete with metal reinforcement & cinder block,

Large Metals - white goods (washers, dyers, and stoves), gutter pipes, corrugated metal, etc.

Building & Bulky Debris - all other debris from damaged buildings such as dimensional lumber, roofing materials, wallboard, furniture, mattresses, rugs and textiles.

The separation of disaster debris into three basic groups specifically excludes Household Hazardous Waste (2.3 below) and commercial and household trash normally handled by solid waste haulers. Normal trash service should be resumed as soon as possible, while HHW resulting from the disaster should be managed separately from the all other disaster debris.

### **2.3 Household Hazardous Waste**

The Debris Plan focuses on the large volume of non-hazardous waste generated by a major disaster. Although MAESF-10 Hazardous Materials addresses hazardous waste response related to industrial hazardous waste, it does not specifically address the relatively small amounts of hazardous waste that are generated by households following a disaster. Household Hazardous Waste (HHW) should be managed separately to avoid contaminating the non-hazardous debris. HHW collection should be carried out by special collection dedicated specifically to HHW.

### **2.4 Debris Disposal Capacity**

The Debris Plan assumes that the Commonwealth, through the Solid Waste Master Plan, will continue to restrict the amount landfill disposal capacity. The 1997 Master Plan Update estimated that 2.8 million tons of waste was land-filled in 1996 and that less than 400,000 tons of landfill capacity will remain for the year 2000. Due to this sharp decline in landfill capacity, the Debris Plan cannot rely exclusively on in-state land filling to manage debris from a major disaster.

### **2.5 Debris Management Methodologies**

The Debris Plan seeks to provide a framework for organizing rapid, safe, and cost effective debris management while minimizing debris-related threats to public health, safety, and potential environmental impacts. Given these criteria, the Debris Plan must also function within the constraint of limited landfill space in Massachusetts.

The key to meeting these strenuous criteria is effective debris separation. The Debris Plan is the foundation for a rapid implementation of debris separation as close to the source as possible beginning at the start of Phase II Debris Removal. The debris types defined in Section 2.2 correspond to various methods of recycling or volume reduction. Green Waste can be chipped or burned, Asphalt Brick & Concrete can be crushed and screened, Large Metals can be recycled, while most Building & Bulky Debris will have to be land-filled. Mixed debris cannot be managed easily except by land filling. Separating mixed debris is extremely difficult and expensive.

Given the importance of separating debris at its origin, public education, collection contracts, waste management facility contracts, and debris staging site operations should all reinforce debris separation for maximal efficiency. These operations are all discussed under Concept of Operations below.

### **3.0 CONCEPT OF OPERATIONS**

Immediately following a major disaster, disaster assessment teams will be active in the impacted area(s) to estimate the quantity and type of debris, and assist in prioritizing debris removal activities. The debris management task can be divided into two major phases that overlap with general emergency planning phases.

#### **Phase I Debris Clearance**

During the first 24 to 72 hours after the disaster, debris activities emphasize clearing key roads for emergency access by pushing debris to the edge of the right of way. This phase is generally concurrent with the Response phase of emergency planning. Although Phase I is not the primary focus of the Debris Plan, it is a crucial time for organizing the majority of the tasks outlined in the plan. Debris clearance and utility restoration coordination will expedite clearance of utility impacted debris and restoration of services. Without close coordination, debris clearance and utility restoration may work at cross-purpose, adversely affecting both functions. Good coordination will also yield improved damage and debris assessments and more accurate work scheduling.

#### **Phase II Debris Removal**

This phase entails the actual management of accumulated debris. Phase II may last up to a year or longer and may involve reassessment of debris quantities, operations of debris staging areas, public education, and debris collection, storage, recycling, and disposal activities. Debris Removal may begin during the emergency planning Response phase and will constitute a major part of the Recovery phase.

The Disaster Debris Plan provides an organizational structure and general principles for managing debris operations at the State level for both phases of the cleanup. This section describes the relationship between the Debris Plan and the Comprehensive Emergency Management Plan (CEMP), and basic elements of the Debris Plan. These elements include: sample contracts and public service announcements; lists of potential contractors and waste handling facilities; and criteria for selecting debris-staging sites.

### **3.1 Command and Control**

The Debris Plan would be initiated as part of the State's Comprehensive Emergency Management Plan (CEMP) as coordinated through MEMA. The CEMP organizes State and private disaster relief agencies into functional groups called Massachusetts Emergency Support Functions (MAESF). The Public Works and Engineering function, MAESF-3, is responsible for coordinating and directing public works response activities including debris clearance and removal.

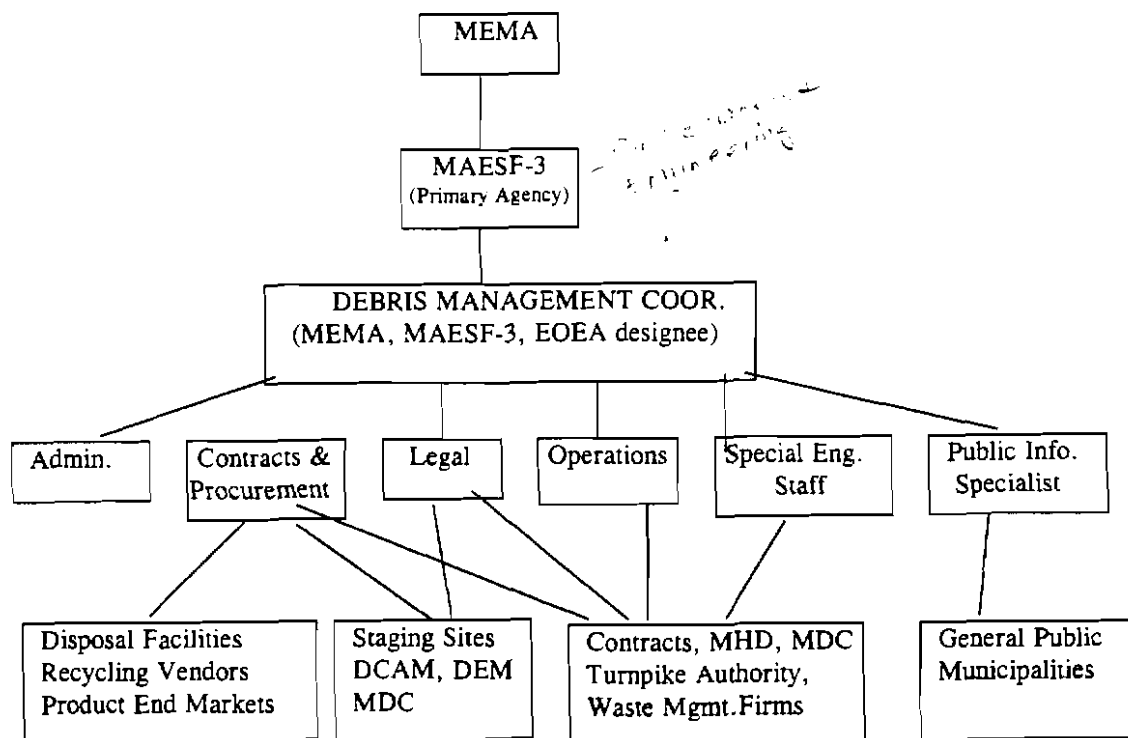
MEMA will activate the State CEMP and notify MAESF personnel to report to the State Emergency Operations Center (SEOC) as outlined in the CEMP. Primary and support agencies for MAESF-3 would report to the SEOC and manage MAESF-3 operations under the management of the MEMA Director and Operations Officer respectively. Phase I Debris Clearance activities will commence immediately under MAESF-3.



MEMA, the MAESF-3 primary agency, and the Executive Office of Environmental Affairs (EOEA) will evaluate initial damage assessment reports to determine if activation of the Debris Plan is warranted. Upon activation of the Debris Plan, MEMA, the MAESF-3 primary agency, and EOEA will appoint a Debris Management Coordinator (DMC) consistent with the job description in section 3.3. The DMC, in consultation with the MAESF-3 primary agency, will begin preparations for Phase II Debris Removal.

**FIGURE 1.0**

**DISASTER DEBRIS PLAN**  
*Organizational Chart*



## **3.2 Debris Management Organization**

The organization of the Debris Plan under a Debris Management Coordinator (DMC) seeks to provide early implementation and continuity to the clean-up operation. The specific roles and responsibilities of MEMA, the DMC, and the MAESF-3 change as the disaster event passes from Response into Recovery.

MEMA has a broad and continuous role in managing debris from activation of the CEMP through to completion of clean-up operations and facilitating any federal reimbursement of costs. During the Response phase, MEMA oversees the Phase I Debris Clearance activity of MAESF-3 and the initial estimates of debris quantities; and participates in the decision to activate the debris plan and appoint the DMC. MEMA also ensures that all MAESFs, including MAESF-1 Transportation and MAESF-10 Hazardous Materials, are available to provide appropriate support to debris activities.

Once the DMC implements the plan and begins Phase II Debris Removal (either at the end of the Response or the beginning of the Recovery phase) and the Recovery phase has begun, state agencies involved in the CEMP will return to normal operations and the MAESFs will provide support upon request only. MEMA will coordinate this transition in order to maintain the continuity of the clean-up operation, the DMC and staff. After the transition, the DMC will report directly to MEMA. MEMA will also coordinate resource needs and federal requirements with the Federal Emergency Management Agency throughout the post-disaster period.

Following the selection of the DMC, early in Phase I Debris Removal, the DMC will begin preparations for implementing the Debris Plan. The DMC will assemble staff from the MAESF-3 agencies into an organizational structure along the lines of Figure 1, monitor Phase I operations, and begin adapting the Debris Plan to the current circumstances. The DMC will report to the MAESF-3 lead agency until the MAESF disbands, at which time the DMC will report directly to MEMA. The DMC and staff will manage the clean up through to its conclusion.

## **3.3 Debris Management Coordinator**

The individual selected to act as the Debris Management Coordinator will be responsible for managing a workforce engaged in the following types of activities:

1. Administrative - Housekeeping, supplies, equipment, etc.
2. Contracting and Procurement - Contract development, procurement.
3. Legal - Contract review, permits and liability issues.
4. Operations - Overall project management and supervision of government and contact resources.
5. Special Engineering tasks - Detailed damage assessment, developing scopes of work, developing plans and specifications.

In addition to possessing sufficient technical expertise to successfully motivate, direct and evaluate the performance of staff engaged in the above activities, the coordinator must have:

- The experience and ability to work with and influence decision makers at the highest level of government;
- A thorough knowledge of Massachusetts environmental regulations;
- Thorough knowledge of recycling techniques and landfill operations;
- The ability to simultaneously manage multiple issues associated with a large scale construction project;
- Thorough knowledge of the organization and processes of Massachusetts state government
- The ability to work with and coordinate activities of multiple agencies at different levels of government;
- Knowledge of state procurement practices, use of Debarred Bidders' List, Competitive Bidding/Emergency Procurement requirements of State/Local Governments.

### **3.4 Debris Staging Sites**

A Debris Staging Site is a temporary location for storing, and/or processing (including recycling and volume reduction) of disaster debris. Following a major disaster, Debris Staging Sites are likely to be an important and necessary debris management tool. Activation of sites would be coordinated by MEMA upon request of the Debris Management Coordinator. Debris sites will be identified and evaluated by an inter-agency site selection team(s) comprised of agencies familiar with debris management requirements and the geographic area. Team composition will include appropriate technical, local, State, and Federal representation.

Locating effective Debris Staging Sites requires evaluating a wide range of factors including parcel size, topography, and ownership, in addition to past uses of the land and its proximity to residences, water supplies and wetlands. Poorly sited Staging Sites can quickly fill with debris and/or lead to nuisance conditions, contamination of water supplies, and damage to other resources. The site selection team will draw on post-disaster aerial photography and support materials in Appendix E including a detailed list of siting criteria and a state-wide GIS (Geographic Information System) Site Selection Map depicting major infrastructure and important natural resource areas.

Operationally, Debris Staging Sites provide a location for trucks to haul to or the public to self-haul disaster debris where it can be stored pending transportation to recycling or disposal facilities, or it can be chipped, crushed, or burned on site, or some combination of these activities. The combination of activities that may occur at a given site will be a function of the type of debris managed (2.2) and the characteristics of the site. The sites should be operated in such a way to maintain separation of pre-sort debris, control access to the site, and minimize nuisance conditions (noise, smoke, and odor) and other environmental impacts. Sites may be managed directly by a public agency or privately under contract (3.6).

### **3.5 Public Education**

The public education component of the Debris Plan addresses notifying the general public about the details of the debris collection program. Public Service Announcements (PSAs) should specify where residents should bring their debris or the schedule for curbside pick-up. In either case, the PSAs should explain how to separate debris into the appropriate piles as described in Section 2.2. Also see sample PSA in Appendix F.

In the event that Staging Sites are utilized, public education will also provide details about the siting process and the nature of operations at these sites.

### **3.6 Contracts**

Managing a large quantity of debris will require contracting with the private sector. The Debris Plan focuses on contracts let during Phase II Removal of the clean up as opposed to Phase I Clearance. These contracts may be for debris collection and hauling, Debris Staging Site operations, solid waste landfills and recycling facilities, or engineering oversight of a major part of the clean-up (master contract).

Contracts let during Phase II Removal should complement and reinforce the separation of debris as outlined in Section 2.2.

Separating debris as close to the source of debris generation as possible will greatly facilitate later handling for recycling or burning. PSAs need to instruct households to separate debris for collection. Collection and hauling contracts need to include terms that encourage debris separation and would penalize contractors for mixing debris. For instance, contractors should be rewarded for delivering separated debris to recycling facilities over landfills (Appendix A).

Contracts for debris site operations should also reinforce debris separation. Provisions may require that debris delivered separated is placed in separate piles and/or that the site can reward or penalize a hauler for delivering separated or mixed debris.

Solid waste recycling facility contracts may allow for the rejection of mixed loads; landfill contracts would allow for the rejection of separated loads. Variable tipping fees may also be used to reflect properly separating loads from more costly to manage mixed loads.

Any master contract for a single firm to oversee multiple aspects of the clean up and various sub-contractors should contain performance language relative to debris separation. Along the same lines, tasks assigned to government agencies during Phase II should emphasize debris separation.

## **4.0 EMERGENCY ORGANIZATIONS AND RESPONSIBILITIES**

This sections describes the responsibilities of key organizations at the State, Municipal, and Federal levels of government.

### **4.1 State**

Massachusetts Emergency Management Agency (MEMA) - is responsible for coordinating emergency response during major disasters including the management and direction of State resources. State Agencies are organized in the Massachusetts Comprehensive Emergency Management Plan (CEMP) into Emergency Support Function (MAESF) groups. The MEMA Director would utilize the CEMP resources and structure in responding to a disaster in the Commonwealth. The Governor may declare a State of Emergency if conditions merit State resources to protect lives and public safety.

Metropolitan District Commission (MDC) – operates and maintains a regional park, roadway, and recreational system in the Boston metropolitan area. and watershed areas at Quabbin and Wachusett Reservoirs. The Commission will coordinate with MAESF-3 agencies in committing resources, as needed, in support of public works and engineering response efforts.

Massachusetts Bay Transportation Authority (MBTA) – will coordinate the emergency use, and if required, the repair and restoration of its operation buses, trolleys, trackless trolleys, and rapid transit in the 78 cities and towns of the MBTA district

Massachusetts Highway Department (MHD) - has responsibility for the building and maintenance of all state highways and bridges and, as such, will coordinate with MAESF-3 to support emergency response efforts related to public works and engineering.

Massachusetts Port Authority (MPA) – is responsible for the operation and maintenance of commercial aviation facilities at Logan International Airport, Hanscom Field, the maritime facilities in the Port of Boston, and for the Tobin Bridge. The MPA will support MAESF-3 as needed.

Department of Environmental Management (DEM), Division of Forests and Parks – manages the state forests and will utilize its equipment and personnel resources to assist in removing debris from the public right-of-way and in maintaining emergency communications, as needed.

Division of Capital Asset Management (DCAM) is responsible for planning, design, property management, facilities maintenance, and supervision acquisition, renovation and demolition of public buildings of the state. The Division shall provide construction expertise in support of MAESF-3.

Department of Environmental Protection (DEP) – regulates hazardous and solid waste management in the Commonwealth. DEP will coordinate with other MAESF-3 agencies, as needed, in committing resources in support of public works and engineering response efforts.

Massachusetts Water Resources Authority (MWRA) – operates the sewer and water delivery systems for the Boston metropolitan area, and has the authority to rebuild sewage treatment facilities and water supply pipelines. The MWRA will coordinate with MAESF-3 in the repair and restoration of impacted water and waste water treatment systems.

## **4.2 Municipalities**

Local government is responsible for emergency response within their Jurisdiction. Response efforts will first be directed to protect lives and property such as evacuation, sheltering, fire fighting, search and rescue, utility restoration, and clearing debris from key roads. Municipal personnel, equipment and resources would be augmented by contractors, volunteers and mutual aid from neighboring communities. A local State of Emergency may be declared when resources are inadequate to cope with an emergency. MEMA may provide support if requested under such circumstances.

## **4.3 Federal Government**

The Federal Response Plan outlines the process under which Federal support may be provided. MEMA is the State contact for Federal emergency assistance. The Governor may request a Presidential Disaster Declaration when local and State response and recovery efforts are unable to adequately cope with the situation. MEMA assembles the data for such a request working through the MEMA Area offices and their respective communities.

If an emergency or major disaster declaration is made under the authority of the Disaster Relief Act (Public Law 93-288) as amended by the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 101-7-7), assistance is usually provided in the form of financial reimbursement of a portion of the disaster-related costs for approved projects. Debris removal costs incurred by municipalities and the State would be evaluated and if determined eligible would be reimbursed on a cost sharing basis (normally 75% federal and 25% split evenly by local and State).

The Federal Emergency Management Agency (FEMA) may provide support to State and local governments during and after emergency events. In catastrophic disasters, FEMA can also provide direct Federal assistance to support municipalities and the Commonwealth in performing some debris removal activities. The response capability must clearly exceed the resources of local and State efforts. FEMA may also direct other Federal agencies to provide debris removal technical assistance to municipalities and the State. Technical assistance may be provided in contract preparation, bid solicitation, contract management, and debris disposal activities. Municipalities and the State remain responsible for all debris removal activities and are reimbursed for their eligible costs.

## **5.0 SEQUENCE OF OPERATIONS**

The effective execution and maintenance of the Debris Plan relies on careful timing and a progression of various tasks and decisions. Chronologically, the sequence of operations begins with

Normal Operations, followed by Increased Readiness, Initial Disaster Assessment, Phase I Debris Clearance, and finally Phase II Debris Removal.

### **5.1 Normal Operations**

Normal Operations encompasses key activities to enhancing the plan; keeping it and its supporting information up-to-date; and to building and maintaining staff readiness to implement the plan. The details of these activities are listed in Section 6.0 Pre-Disaster Planning and Maintenance.

### **5.2 Increased Readiness**

- Review Debris Plan, attachments and appendices.
- Check for updates to supporting materials such as Site Selection Map for Debris Staging Sites, and lists of contractors and solid waste management facilities.
- Draft a short-list of candidates for Debris Management Coordinator.
- Draft a list of potential Debris Staging Sites using the Site Selection Map and Siting Criteria (Appendix E).

### **5.3 Initial Disaster Assessment**

- Initial damage assessment.
- Estimation of debris quantities.
- Identifying debris affected area(s).
- Establish Phase I Debris Clearance priorities.
- Determine if debris quantity warrants activation of some or all of the Debris Plan.
- If Plan is activated:
  - Select the Debris Management Coordinator (3.3).
  - DMC begins to assemble staff to carry out Phase II Debris Removal.

### **5.4 Phase I Debris Clearance**

The debris clearance process must be initiated promptly and effectively to protect public safety and health. Phase I emphasizes clearing key roads for emergency access by pushing debris to the edge of the right of way. Phase I also includes activities that lay the groundwork for the long-term clean up during Phase II.

- Clear key emergency access routes.
- Prioritize route and critical facility clearance.
- If Debris Plan is activated, DMC and staff will:
  - Begin dividing disaster area into manageable clean-up zones.
  - Begin selecting Debris Sites, if necessary (3.4 & Appendix X).
  - Begin contracting procedures for Phase II (3.6).
  - Finalize appropriate debris separations (2.2).

## **5.5 Phase II Debris Removal**

Phase II Debris Removal is the most critical phase in the Debris Plan. This is the longest phase, running into months or years, where immediate threats to public health and safety have been addressed, but costs sky-rocket. Advance planning and timely actions during the Initial Disaster Assessment and Phase I, can lay the groundwork for rapid implementation of Phase II. The following activities should occur during the Debris Removal Phase:

- Eliminate any remaining immediate threats to public health and safety.
- DMC assembles and organizes staff (3.2 & Fig 1.0).
- Begin documenting all actions & costs.
- Establish and maintain lines of communication among responsible agencies (4.0).
- Update and revise damage assessment.
- Divide the disaster area into manageable clean-up zones.
- Assess existing waste disposal capacity (2.4).
- Apply appropriate debris separations to contracts and public service announcements (2.2).
- Locate and establish any necessary debris sites (3.4 & Appendix X).
- Establish contracts for debris collection, recycling/volume reduction, land filling, debris site operation (if necessary), and hauling from debris staging sites (if necessary) (3.6).
- Inform public of clean-up schedules, separations, and other major parts of the operation (3.5).
- Develop inspection teams to monitor clean-up progress and contractor performance.
- Periodically evaluate clean-up performance and any threats to public health and safety.
- Establish and enforce deadlines at the State and local level for the collection and removal of disaster-related debris.
- Monitor deadlines once established. Monitor progress of affected communities' debris removal operations.

## **6.0 PRE-DISASTER PLANNING AND MAINTENANCE**

The Debris Plan is an important outline for carrying out a major clean up and to some extent remains a work in progress. Pre-Disaster Planning provides specific areas where additional work would reinforce the Debris Plan. Moreover, the Debris Plan requires on-going validation to ensure coordination with other emergency plans and regulations; regular training to familiarize emergency staff; and routine maintenance reviews and updates.

### **6.1 Pre-Disaster Planning**

The Debris Management Coordinator and MAESF-3 shall develop or review existing capabilities to support implementation of the Disaster Debris Management Plan. These efforts should include:

#### **A. Debris Staging Sites**

An interagency team, similar to that described in Section 3.4, should review and develop the following items:



- Select 12 or more State owned sites for regional and Statewide coverage using the siting criteria in Appendix E and the GIS Site Selection Map (Appendix G).
- Revise siting criteria or Site Selection Map if necessary.
- Develop procedures to document site conditions before use as a debris site.
- Develop conceptual site layout plans.
- Establish interagency Letters of Agreement as needed.
- Provide site selection criteria to municipalities.
- Develop boilerplate lease agreements for debris sites.

#### **B. Letters of Agreement (LOA)**

- Review the need for Letters of Agreement (LOA) to support the Debris Plan.
- Provide guidance to municipalities such as checklists for debris management planning and operations.
- Identify contract sources and enter into LOAs.

#### **C. Volunteer Groups**

- Identify volunteer groups such as MAESF- 15 (VOAD).
- Identify tasks appropriate for volunteer groups.
- Prepare sample public information for volunteers.

#### **D. Debris Forecasting**

- Stay informed about the latest debris forecasting methods.
- Develop Massachusetts's debris scenarios.

#### **E. Household Hazardous Waste (HHW)**

- Provide sample contracts for HHW collection.
- Review the coordination between MAESF-3 and MAESF-10.

### **6.2 Plan Validation**

The plan should be checked periodically for conformity to applicable State and Federal regulatory requirements, etc. A method to accomplish this task is conducting a tabletop exercise including all tasked organizations. This offers an opportunity to train personnel, but also discuss aspects of the plan that could be subject to change. Identified issues and changes may be acted upon as a plan change.

### **6.3 Training**

Training should be offered to all key participants to maintain awareness, train new personnel on plan concepts and responsibilities, and identify changes that may have occurred. MEMA conducts a variety of training for State agencies as part of the Massachusetts Emergency Management Team concept. Specialized training on technical functions or operation of facilities identified in this plan

should be developed by the agencies responsible for those SOPs or functions. For purposes of training, the DEP representative to MEMA will serve as the DMC.

#### **6.4 Plan Maintenance**

This plan should be reviewed annually by the Debris Management Coordinator or designee, in conjunction with MAESF-3 primary agencies and MEMA. Required updates identified during the annual update or due to a significant development should be directed to MEMA. Changes made to the plan will be distributed through MEMA Document Control to recorded holders of plan copies.

**Table 1.0**

**DEBRIS PLAN ACRONYMS**

ABC	Asphalt, Brick, and Concrete rubble
DCAM	Division of Capital Asset Management
DEP	Department of Environmental Protection
DMC	Debris Management Coordinator
EOEA	Executive Office of Environmental Affairs
EOTC	Executive Office of Transportation and Construction
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
GIS	Geographic Information Systems
HHW	Household Hazardous Waste
LOA	Letter of Agreement
MAA	Mutual Aid Agreement
MAESF	Massachusetts Emergency Support Function
MDC	Metropolitan District Commission
MEMA	Massachusetts Emergency Management Agency
MHD	Massachusetts Highway Department
MOU	Memorandum of Understanding
MSW	Municipal Solid Waste
NVOAD	National Volunteers Active in Disaster
PA	Public Announcement
PIO	Public Information Officer
ROW	Right of Way
SEOC	State Emergency Operations Center
VOAD	Volunteers Active in Disaster

## **7.0 APPENDICES**

### **A. Sample Contract Information**

(While this plan includes samples of Federally awarded contracts, State/Local governments should adapt the selected format to their own bidding process, and not attempt to use this boilerplate without change)

### **B. Sample Mutual Aid Agreement**

### **C. Sample Right of Entry Agreement**

### **D. Sources of Information on Contractors and Waste Facilities/Services**

### **E. Debris Staging Sites**

### **F. Sample Public Announcements – PA/Flyers**

### **G. GIS Staging Site Criteria Map(s) of Commonwealth of MA**

(Hard copy map sets are stored at MEMA, SEOC; Department of Environmental Protection GIS maintains electronic copy)

*Note: The new FEMA 325 Debris Management Guide, Section 5 deals with contracts. It can be ordered directly from FEMA, by mail at: FEMA Publications Office, P.O. Box 2012, Jessup, MD 20794; by FAX at: 301-362-5335; or by phone at: 1-800-480-2520.*

## **APPENDIX A**

This section provides sample contract information from the Army Corps of Engineers Debris Management Course.

Handout

Debris Management Course

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## Unit 7

# SAMPLES

## US Army Corps of Engineer

Contract Scopes of Work

Emergency Management Institute

National Emergency Training Center

Aug-97

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SCOPE OF WORK  
FOR  
LETTER CONTRACT FOR DEBRIS REMOVAL  
RELATED TO  
[NAME/NATURE OF DISASTER]  
AT, IN, OR NEAR  
[LOCATION OF RECOVERY EFFORTS]

TASK (1,2,3,)

**1.0 GENERAL**

**1.1** The Contractor shall provide all labor, plant equipment, machines, and tools necessary to perform debris removal. Removal shall consist of loading [Hurricane Andrew, EVENT NAME], generated debris, as well as, hauling and dumping the loaded debris in the respective designated locations. Establish burning sites for road debris and coordinate with [Dade County, CITY ECT.]. Establish staging and waste reduction sites for construction and demolition debris in compliance with all applicable State and local ordinances and laws. The Contracting Officer must approve all debris reduction sites. Then, begin removal of road trash. Burnable road debris consists predominately of trees and vegetation in the public right-of-way. Burnable road debris will be hauled to a designated burning site and burned. Burnable road trash does not include construction and demolition debris. Construction and demolition debris will be hauled separately to different locations. Construction and demolition debris will be separated into burnable and non-burnable according to instruction by the Contracting Officer's Representative (COR).

**1.2** The Contracting Officer has the right to increase or reduce the contractors area of operation.

**2.0 IMOBILIZATION**

**2.1** Contractor is to immediately mobilize personnel and equipment for this task and shall be fully mobilized in 7 days within work area \_\_\_\_\_. Work within this area will be prioritized. Upon receipt of this task, the contractor will execute entire scope within [30] calendar days.



### **3.0 SCHEDULE**

**3.1** Contractor is to provide an interim schedule within 48 hours and final plan within 5 days. This plan should include a plan for subcontracting activities and a safety plan.

**3.2** Daily reporting is required with updates on the scheduled activities. This reporting shall include the following: name of the Contractor, contract number, number of trucks in use, number of front end loaders, and number of personnel working. The report should include daily and cumulative-to-date statistics on the number of truckloads and the number of cubic yards of debris hauled off. Each piece of operating equipment must be clearly identified.

### **4.0 SCOPE**

**4.1** Work within this area will be prioritized. The Contractor shall be prepared to respond within the framework of the established schedule to priorities as the Government establishes them.

**4.2** Many Government agencies will be working in the area, however, all coordination and direction shall be made through the COR.

**4.3** The Contractor shall provide all labor, plant, equipment, machines and tools necessary to clear and remove burnable debris from roadways. Equipment should be in good working condition, and if equipment becomes inoperable, it shall be repaired within 4 hours or replaced in kind within 24 hours.

**4.4** The Contractor shall use only rubber-tired equipment in the performance of this contract. The Contractor shall not use equipment authorized for debris removal under this contract for private work during the working hours designated under this contract. Also, the Contractor's personnel shall not solicit work from private citizens or others with manpower and equipment designated under this contract. The Contractor shall be responsible for filling to grade with like material all surface damage, such as rutting and cracks, caused by the Contractor's equipment during debris removal. The Contractor shall repair all damage to existing grade, road shoulders, trees, shrubs, and grassed areas caused by the Contractor's equipment or personnel. The Contractor shall preserve and protect all existing vegetation such as trees, shrubs, and grass on or adjacent to the area of work. The contract duration will be established during the definitization process.

**4.5** After being loaded in the work area, trucks shall have their loads trimmed so that no debris extends horizontally beyond the bed in any direction. All loose debris such as tree limbs, shall be reasonably compacted on the hauling vehicle by use of the loading equipment. All debris shall be adequately secured while being transported to the designated reduction locations and any equipment hauling debris to the designated reduction site shall be capable of rapidly dumping its load without assistance from other equipment. Sideboards or other extensions to the bed are allowable provided they meet all applicable rules and regulations, cover the front and both sides, and are constructed in

a manner to withstand severe operating conditions. The sideboards are to be constructed of 2" by 6" boards or greater and are not to extend more than two feet above the metal bedsides. All extensions are subject to acceptance or rejection by the Contracting Officer's representative. All trucks utilized in hauling debris will be provided with a tailgate that will effectively contain the debris on the vehicle while hauling and also permit the vehicle to be loaded to capacity.

**4.6** The Contractor is responsible for coordinating delivery of debris and access to the reduction locations. The Contractor shall coordinate with [Dade County, CITY, AREA] and set-up of the appropriate burning debris reduction locations. The Contractor will be required to coordinate with [Dade County, CITY, and AREA] in obtaining all applicable permits. The Contractor shall provide a burn management plan for review by the COR. The plan shall include a strategy for controlling and monitoring burning operations. The plan shall also include a fire-fighting capabilities design.

**4.7** The Contractor shall remove all eligible debris from the designated areas and shall not move debris from one designated work area to another work area prior to receiving authorization from the COR.

**4.8** Material will be separated into burnable, non-burnable and ineligible debris. Except as directed by COR. Ineligible debris, including hazardous waste, hazardous substance and toxics will be separated from burnable and non-burnable debris and left in place. Except those items directed by COR.

#### **4.9 Definitions:**

**4.9.1** Burnable debris: Burnable debris will be of two types with separate burn locations. Separate hauling of debris will be required.

**4.9.1.1** Burnable debris includes, but is not limited to, damaged and disturbed trees; bushes and shrubs; broken, partially broken and severed tree limbs and bushes. Burnable road debris consists predominately of trees and vegetation in the public right-of-way. Burnable road debris will be hauled to a designated burning site and burned. Burnable road trash does not include construction and demolition debris.

**4.9.1.2** Burnable construction and demolition debris consisting of non-creosote structural timber, wood products, and other materials designated by the COR.

**4.9.2** Non-burnable Debris: Non-burnable construction and demolition debris includes, but is not limited to, creosote timber; plastic; glass; rubber and metal products; sheet-rock; and other building materials as may be designated by the COR.

**4.9.3** Stumps: Tree remnants exceeding 24 inches in diameter, but no taller than 18 inches above grade, to include the stump ball. Any questionable stumps shall be referred to the designated COR for determination of its disposition.

**4.9.4 Ineligible Debris:** Ineligible debris is to remain in place. This includes, but is not limited to, chemicals, petroleum products, and paint products, asbestos and power transformers.

**4.10** Any material that is found to be classified as hazardous or toxic waste (HTW), as listed under ineligible debris above, shall be reported immediately to the designated COR.

**4.11** Inoperable automobiles, trucks, trailers, boats and boat trailers that obstruct or impede debris removal shall be removed by acceptable and approved towing methods. Removal shall be accomplished without causing further damage to item. Items shall be stored on site as directed by the designated COR. The Contractor is to notify the COR and receive approval prior to removal of any personal property.

**4.12** Standing broken utility poles; damaged and downed utility poles and appurtenances; transformers and other electrical material will be reported to COR.

**4.13** The Contractor is to notify the COR of any situation that poses a health or safety risk to workers on site.

## **5.0 Demobilization**

**5.1** The Contractor shall provide a plan for demobilization upon completing 75% of designated task.

**5.2** All equipment and staff will be removed from the zone within 7 days of completion of the work.

**SCOPE OF WORK  
FOR  
UNIT PRICE CONTRACT FOR DEBRIS REMOVAL  
RELATED TO  
[NAME/NATURE OF DISASTER]  
AT, IN, OR NEAR  
[LOCATION OF RECOVERY EFFORTS]**

**1.0 GENERAL**

**1.1** The purpose of this contract is to provide debris clearing and removal response assistance to [LOCATION; I.E. "North Carolina counties" or "Mobile and Baldwin Counties in Alabama"] which have been declared disaster areas by the President because of the effects of [NAME OF DISASTER].

**2.0 SERVICES**

**2.1** The Contractor shall provide for debris removal from the area(s) outlined on the attached maps, and described as: [DESCRIPTION OF WORK AREA].

**2.2** The debris shall be taken to the dumpsite(s) indicated on the attached maps, located at [LOCATION(S) OF DUMPSITE(S)].

**2.3** The total amount of debris to be removed under this contract is estimated to be [QUANTITY].

**2.4** The work shall consist of clearing and removing any and all "eligible" debris (see section 4.0 for a definition of eligible debris) primarily from the public right-of-way (ROW) of streets and roads, as directed by the Contracting Officer's Representative (COR). Work will include 1) examining debris to determine whether or not debris is eligible, burnable or non burnable, 2) loading the debris, 3) hauling the debris to an approved dumpsite or landfill, and 4) dumping the debris at the dumpsite or landfill. Ineligible debris will not be loaded, hauled, or dumped under this contract. Burnable debris will be loaded separately from non-burnable debris. Mixed loading of burnable and non-burnable will be kept to a minimum. The COR will determine the appropriate dumpsite for mixed loads.

**2.5** Debris removal shall include all eligible debris found on the ROW within the area designated by the COR. The COR may specify any eligible debris within the ROW which should not be removed, or which should be removed at a later time. The Contractor shall make as many passes through the

designated area as required by the COR. The Contractor shall not move from one designated work area to another designated work area without prior approval from the COR. Any eligible debris, such as fallen trees, which extends onto the ROW from private property shall be cut at the point where it enters the ROW, and that part of the debris which lies within the ROW shall be removed. The Contractor shall not enter onto private property during the performance of this contract.

**2.6** The Contractor shall conduct the work so as not to interfere with the disaster response and recovery activities of federal, state, and local governments or agencies, or of any public utilities.

**2.7** All work shall be accomplished in a safe manner in accordance with EM 385-1-1.

### **3.0 LOAD TICKETS**

**3.1** "Load tickets" will be used for recording volumes of debris removal.

**3.2** Each ticket will contain the following information:

1. Ticket Number
2. Contract Number
3. Date
4. Contractor Name
5. Site Departure Time
6. Dump Arrival Time
7. Debris Classification
8. Debris Quantity

### **3.3 [SELECT ONLY ONE OF THE FOLLOWING PARAGRAPHS, AND DELETE THE OTHERS]**

Load tickets will be issued by a COR prior to departure from the loading site. The COR will keep one copy of the ticket, and give three copies to the vehicle operator. Upon arrival at the dumpsite, the vehicle operator will give the three copies to the COR at the dumpsite, the COR will validate, retain one copy and give two copies to driver for the Contractor's records, (one copy for the sub-contractor and one copy for the primary contractor).

Load tickets will be issued by a COR prior to departure from the loading site. The COR will keep one copy of the ticket, and give two copies to the vehicle operator for the Contractor's records.

Load tickets will be issued by a COR to a vehicle operator upon arrival at the dumpsite. The COR will keep one copy of the ticket, and give two copies to the vehicle operator for the Contractor's records.

## **4.0 DEBRIS CLASSIFICATION**

**4.1 Eligible Debris.** Debris that is within the scope of this contract falls under three possible classifications Burnable, Non-Burnable, and Recyclable. Debris that is classified Hazardous or Toxic is not to be transported by this contract.

**4.2 Burnable Debris.** Burnable debris includes all biodegradable matter except that included in the following definitions of other categories of debris. It includes, but is not limited to, damaged and disturbed trees; bushes and shrubs; broken, partially broken and severed tree limbs; untreated structural timber; untreated wood products; and brush.

**4.3 Non-Burnable Debris.** Non-burnable debris includes, but is not limited to, treated timber; plastic; glass; rubber products; metal products; sheet rock; cloth items; non wood building materials; metal products (i.e. Mobile Trailer parts, Household appliances (White Metal), and similar items), or uncontaminated soil; roofing materials; and carpeting.

**4.4 Hazardous Toxic Waste (HTW).** Hazardous or toxic materials or waste such as petroleum products, paint products, asbestos, electrical transformers, and known or suspected hazardous materials shall be removed by others. Coordination for hazardous debris removal is the responsibility of the Government.

**4.5 Stumps.** Tree stumps located within the ROW with one-half or more of the root ball exposed will be removed. Tree stumps with base cut diameter measurements less than or equal to 24 inches (measured 24 inches up from where the tree originally exited the ground) will be considered to be burnable debris and removed with the same methods used for other burnable debris. Tree stumps larger than 24 inches in diameter will be removed as burnable debris and paid for in accordance to the MEASUREMENT and PAYMENT paragraphs in this contract.

## **5.0 DUMPSITES**

**5.1** The Contractor shall use only debris dumpsites designated in Section 2.2, unless otherwise approved by the COR. The Contractor shall haul non-burnable debris to the site designated for non-burnable debris and burnable debris to the burn site designated.

**5.2** The dumpsite operator shall direct all dumping operations. The Contractor shall cooperate with the dumpsite operator to facilitate effective dumping operations.

**5.3** The Government makes no representations regarding the turn-around time at the Dumpsites.

## **6.0 PERFORMAINCE SCHEDULE**

**6.1** The Contractor shall commence performance on [DATE].

**6.2** The Contractor shall, with the CORs direction, provide a work plan showing where operations will begin and which streets/roads will be cleared on a 2, 7, 14 day projection. The plan will be updated every two days.

**6.3** Maximum allowable time for completion will be [ENTER] calendar days, unless the Government initiates additions or deletions to the contract by written change orders. Both parties pursuant to applicable state and federal law will equitably negotiate subsequent changes in completion time. Liquidated damages shall be assessed at \$[AMOUNT] per calendar day for any time over the maximum allowable time established by the contract.

## **7.0 EQUIPMENT**

**7.1** All trucks and other equipment must be in compliance with all applicable federal, state, and local rules and regulations. Any truck used to haul debris must be capable of rapidly dumping its load without the assistance of other equipment; be equipped with a tailgate that will effectively contain the debris during transport and permit the truck to be filled to capacity; and measured and marked for its load capacity. Sideboards or other extensions to the bed are allowable provided they meet all applicable rules and regulations, cover the front and both sides, and are constructed in a manner to withstand severe operating conditions. The sideboards are to be constructed of 2" by 6" boards or greater and not to extend more than two feet above the metal bedsides. All extensions are subject to acceptance or rejection by the COR. All equipment will be inspected by the Contractor prior to use by using the applicable Corps of Engineers Forms. The Forms will be provided to the Government after completion.

**7.2** Trucks and other heavy equipment designated for use under this contract shall be equipped with two signs, one attached to each side. The Army Corps of Engineers will furnish these signs to the Contractor. The signs remain the property of the United States Government, and will be returned to the Corps of Engineers at the conclusion of the contract.

**7.3** Prior to commencing debris removal operations, the Contractor shall present to the Government's representative all trucks or trailers that will be used for hauling debris, for the purpose of determining hauling capacity. The hauling capacity will be based on the interior dimensions of the truck's metal dump bed. Hauling capacity, in cubic yards, will be recorded and marked on each truck or trailer with permanent markings. Each truck or trailer will also be numbered for identification with a permanent marking.

**7.4** Trucks or equipment designated for use under this contract shall not be used for any other work during the working hours of this contract. The Contractor shall not solicit work from private citizens or others to be performed in the designated work area during the period of this contract. Under no circumstances will the Contractor mix debris hauled for others with debris hauled under this contract.

**7.5** Equipment used under this contract shall be rubber tired and sized properly to fit loading conditions. Excessive size equipment (6 CY and up) and non-rubber tired equipment must be approved by the COR.

## **8.0 REPORTING**

**8.2** The Contractor shall submit a report to the COR during each day for the term of the contract. Each report shall contain, at a minimum, the following information:

1. Contractor's Name
2. Contract Number
3. Crew
4. Location of work
5. Day of Report
6. Daily and cumulative totals of debris removed, by category

**8.3** Discrepancies between the daily report and the corresponding load tickets will be reconciled no later than the following day.

## **9.0 OTHER CONSIDERATIONS**

**9.1** The Contractor shall supervise and direct the work, using skillful labor and proper equipment for all tasks. Safety of the Contractor's personnel and equipment is the responsibility of the Contractor. Additionally, the Contractor shall pay for all materials, personnel, and taxes, and fees necessary to perform under the terms of this contract.

**9.2** The Contractor must be duly licensed in accordance with the State's statutory requirements to perform the work. The Contractor shall obtain all permits necessary to complete the work. The Contractor shall be responsible for determining what permits are necessary to perform under the contract. Copies of all permits shall be submitted to the COR.

**9.3** The Contractor shall be responsible for taking corrective action in response to any notices of violations issued as a result of the Contractor's or any subcontractors actions or operations during the performance of this contract. Corrections for any such violations shall be at no additional cost to the Government.

**9.4** The Contractor shall be responsible for control of pedestrian and vehicular traffic in the work area. The Contractor shall provide all flag persons, signs, equipment, and other devices necessary to



meet federal, state, and local requirements. The traffic control personnel and equipment shall be in addition to the personnel and equipment required in other parts of this contract. At a minimum, one flag person should be posted at each approach to the work area. Work shall be accomplished in a safe manner in accordance with EM 385-1-1.

## **10.0 MEASUREMEENT**

**10.1** Measurement for burnable debris removed will be by the cubic yard as predetermined through truck bed measurement. Trucks with less than full capacities will be adjusted down by visual inspection by the COR. Measurement will be documented by Load tickets.

**10.2** Measurement for non-burnable debris removed will be by the cubic yard as predetermined through truck bed measurement. Trucks with less than full capacities will be adjusted down by visual inspection by the COR. Measurement will be documented by Load tickets

**10.3** Measurement for payment of stumps removed with 25 to 36 inch diameters base cuts (measured 24 inches up from where the tree originally exited the ground) shall be per stump.

**10.4** Measurement for payment of stumps removed with 37 to 48 inch diameters base cuts (measured 24 inches up from where the tree originally exited the ground) shall be per stump.

**10.5** Measurement for payment of stumps removed with 49 inch and larger diameters base cuts (measured 24 inches up from where the tree originally exited the ground) shall be per stump.

**10.6** Measurement for mobilization and demobilization will be by the job.

## **11.0 PAYMENT**

**11.1** Payment for the removal of burnable debris (including stumps 24 inches and smaller) to include all costs associated with loading, hauling and dumping will be paid for under the contract bid item for **Burnable Debris**.

**11.2** Payment for the removal of non-burnable debris to include all cost associated with loading, hauling and dumping will be paid for under the contract bid item for **Non-burnable Debris**.

**11.3** Payment for the removal of stumps, 25 inches and larger, to include all cost associated with loading, hauling and dumping will be paid for under the contract bid item for the appropriate size category for **Stumps**.

**11.4** Payment for mobilization and demobilization will be paid for under the contract bid item for **Mobilization and Demobilization**.

**11.5** Payment for work completed may be invoiced on a bi-weekly basis. Invoices will

be based on verified quantities from the daily operational reports.

**11.6** The Contractor will be entitled to invoice for 60% of the mobilization and demobilization line item after all equipment is delivered to the designated work site. The remaining 40% will be due after all equipment is removed from the work site, all vehicle signs have been returned to the government, and receipt of a proper invoice.

**11.7** All payments made under this contract will be in accordance with PAYMENTS clauses located in other sections of this contract.

## **12.0 OTHER CONTRACTS**

**12.1** Other contracts may have been issued.

**12.2** The Government reserves right to issue other contracts or direct other contractors to work within the area included in this contract.

## **13.0 ENCLOSURES/ATTACHMENTS**

**13.1** Bid Schedule

**13.2** Daily Report

**CONTRACT NO.** \_\_\_\_\_

<b>BIDDING SCHEDULE</b>					
<b>ITEM</b>	<b>MIN. QTY.</b>	<b>DESCRIPTION</b>	<b>UNITS</b>	<b>UNIT PRICE</b>	<b>AMOUNT</b>
<b>001.</b>	1	Mobilization and Demobilization	Lump Sum		
<b>002.</b>	XXXXX	Removal of Burnable Debris	Cubic Yard		
<b>003.</b>	XXXXX	Removal of Non-Burnable Debris	Cubic Yard		
<b>004.</b>	XXX	Removal of Stumps – 26 to 36 inch	Each		
<b>005.</b>	XXX	Removal of Stumps – 37 to 48 inch	Each		
<b>006.</b>	XXX	Removal of Stumps	Each		

CONTRACT NO. \_\_\_\_\_

DAILY REPORT						
CONTRACTOR: CONTRACTOR NO.:					DATE OF REPORT:	
	Truck No.	Capacity	Burn site trips	C.Y. Totals	Landfill Trips	C.Y. Totals
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CONTRACT NO. \_\_\_\_\_

DAILY REPORT				
CONTRACTOR:			DATE OF REPORT:	
Processing Site	Stumps 26-36 in.	Stumps 36-48 in.	Stumps > 49"	
1				
2				
3				
4				
5				
6				
7				
8				
9				
	<b>DAILY TOTALS</b>			

**SCOPE OF WORK  
FOR  
TREE REMOVAL  
RELATED TO  
[NAME/NATURE OF DISASTERS]  
AT, IN, OR NEAR  
[LOCATION OF RECOVERY EFFORTS]**

**1.0 GENERAL**

1.1 The purpose of this contract is to provide tree removal response assistance generated as a result of [NAME OF DISASTER] in [DISASTER LOCATION] I.E. "North Carolina counties" or "Mobile and Baldwin Counties in Alabama", which have been declared disaster areas by the President because of the effects of [NAME OF DISASTER].

1.2 The contractor should provide crews made up of a combination of equipment, operators and laborers as defined in the solicitation request. The total number of hours worked by each crew will be according to the needs of the Government. It is estimated that [SPECIFY NO. OF HOURS] hours of work will be performed by each crew. At the option of the Government, there may be additional crew hours, estimated at not more than [SPECIFY NO.OF HOURS] hours per crew, added to this contract.

1.3 The Contractor shall offer at least [SPECIFY NO. OF CREWS] crews, and may offer any greater number of crew.

1.4 The Contractor shall conduct the work so as not to interfere with the response and recovery activities of state and local governments, or of public utilities.

**2.0 WORK AREA**

2.1 The work area includes [SPECIFY DISASTER LOCATION; I.E. "North Carolina counties" or "Mobile and Baldwin Counties in Alabama7"] which have been declared disaster areas due to the effects of [SPECIFY NAME OF DISASTER]. These counties are generally located in the [SPECIFY LOCATIONS] portions of the state. The Contractor may be required to work in any of these counties.

2.2 After contract awards, the Contractor shall commence work in an area at a location to be directed by the Contracting Officer's Representative (COR).

2.3 All work shall be performed in a safe manner in accordance with EM 385-1-1, Section31, Tree Maintenance and Removal, in particular.

### **3.0 PERFORMANCE SCHEDULE**

3.1 The Contractor shall commence performance within twenty-four (24) hours, immediately after contract award and designation of work areas by the COR.

{DELETE THE FOLLOWING SECTION IF NOT APPLICABLE}

3.2 Consistent with curfew restrictions, the Contractor shall work during the daylight hours, not to exceed ten (10) hours per day, seven (7) days per week.

### **4.0 EQUIPMENT USE**

4.1 The Contractor shall provide all equipment necessary for the performance of this contract.

4.2 All equipment must be in compliance with all applicable federal, state, and local rules and regulations. Equipment and Operator qualifications shall be in compliance with EM 385-1-1. Equipment will be inspected prior to its use by the Contractor using the applicable Corps of Engineers Forms. The Forms will be provided to the Government after completion.

4.3 Equipment which is designated for use under this contract shall not be used for any other work during the working hours of this contract. The Contractor shall not solicit work from private citizens or others to be performed in the designated work area during the period of this contract. Under no circumstances will the Contractor mix debris hauled or processed for others with debris hauled or processed under this contract.

### **5.0 TREE REMOVAL**

Trees that have fallen on homes or are threatening to fall on homes as a result of (Disaster) shall be removed under this contract. However, Public Assistance does not include the trimming and pruning of trees. Trees removed under this contract shall be placed adjacent to streets adjoining the property and within the right-of-way of said adjacent street but not infringing upon the travel way of the street. The Contractor shall not move from one designated area to another designated work area prior to receiving authorization from the COR. The Contractor shall not enter onto private property during performance of this contract prior to receipt of an executed right-of-way entry that will be obtained by a Government Real Estate Specialist that will be accompanying or preceding the Contractor in the same area that the Contractor is working. The Contractor should maintain records of trees that have fallen on private homes since it is probable that Homeowners' Insurance will pay for the removal of the tree from the residence. In such cases, the eligible applicant is required to seek recovery from the insurance company and reimburse FEMA. Also, prior to awarding contracts to work on private property, the FEMA Public Assistance Officer must be consulted. If approved, the applicant must provide the Unrestricted Right of Entry/Hold Harmless to FEMA.

## **6.0 TRAFFIC CONTROL**

The Contractor shall be responsible for control of pedestrian and vehicular traffic in the work area. The Contractor shall provide all flag persons, signs, equipment, and other devices necessary to meet federal, state, and local requirements. The traffic control personnel and equipment shall be in addition to the personnel and equipment required in other parts of this contract. At a minimum, one flag person shall be posted at each entrance to direct traffic to the site.

## **7.0 REPORTING**

The Contractor shall submit a report to the Contracting Officer's Representative no later than [SPECIFY TIME] each day. Each report shall contain at a minimum, the following information:

- a) Contractor's Name.
- b) Contract Number.
- c) Number of the various pieces of equipment in use.
- d) Number of personnel working on the contract.
- e) Daily and cumulative totals of hours each person and each piece of equipment worked.
- f) Daily and cumulative totals of trees removed per hour under the contract.
- g) Any problems encountered or anticipated.

## **8.0 CONTRACT AWARD**

**8.1** The Government reserves the rights to award additional contracts within the counties referred to in the paragraph entitled "WORK AREA". Awards under this solicitation will be made to responsive, responsible offerors, based on the lowest cost to the Government, considering the price and number of crews offered by the next lowest offeror, and continuing sequentially to the offer(s) of the subsequently next lower offer(s) until the Government's needs are met.

**8.2** Prior to award, offerors may be required to provide evidence of responsibility and ability to timely perform the contract work. This may include the requirement to provide written documentation of ownership or confirmed rental or other immediate access to the offered equipment and personnel within the work area.

## **9. OTHER CONSIDERATIONS**

**9.1** The Contractor shall supervise and direct the work, using skillful labor and proper equipment for all tasks. Safety of the Contractor's personnel and equipment is the responsibility of the Contractor. Additionally, the Contractor shall pay for all materials, personnel, taxes, and fees necessary to perform under the terms of this contract.

**9.2** The Contractor must be duly licensed to perform the work in the state per statutory requirements. The Contractor shall obtain all permits necessary to complete the work. The Contractor shall be responsible for determining what permits are necessary to perform under the contract. Copies of all permits shall be submitted to the Contracting Officer's Representative.

**9.3** The Contractor shall be responsible for correcting any notices of violations issued as a result of the Contractor's or any subcontractors actions or operations during the performance of this contract. Corrections for any such violations shall be at no additional cost to the Government.

## **10.0 PAYMENT**

**10.1** Payment for all trees removed will be made at the unit price per crew hours based on the contract bid price as specified in the bidding schedule.

**10.2** Payment for managing and operating the sites, furnishing plant, material, labor, tools and equipment necessary to remove the trees, and providing for traffic control and safety measures, are all incorporated in the bidder's unit prices.



# EXAMPLE

CONTRACT NO. \_\_\_\_\_

## BIDDING SCHEDULE

ITEM	DESCRIPTION	QUANTITY	U/I	U/P	AMOUNT
1	Provide services for tree removal in accordance within the scope of work under this contract.	_____	CREW HOURS	\$ _____	\$ _____

As a minimum, each crew shall consist of:

2 Labors  
10 personnel with tree climbing capabilities  
1 knuckle boom (or equivalent) or lift truck  
2 chain saws  
Misc. ropes, facale and small tools

The Contractor shall state the number of crews available for this contract, (2-crew minimum second crew shall be available within 36 hours after contract award.)

Hours are estimated. Payment will be made for actual crew hours worked

The Contractor shall specify the number of crews available for this contract.

\_\_\_\_\_  
(no. of crews available)

Note: each crew is estimated to work 1000 hours

SCOPE OF WORK  
FOR  
SITE MANAGEMEMENT FOR DEBRIS REDUCTION  
RELATED TO  
[NAME/NATURE OF DISASTER]  
AT, IN, OR NEAR  
. [LOCATION OF RECOVERY EFFORTS]

## **1.0 GENERAL**

**1.1** The purpose of this contract is to provide site management and reduction of debris generated as a result of [NAME OF DISASTER] in [DISASTER LOCATION; I.E. "North Carolina counties" or "Mobile and Baldwin Counties in Alabama"] which have been declared disaster areas by the President because of the effects of [NAME OF DISASTER].

**1.2** The Contractor shall manage and operate the debris reduction site located at [SITE LOCATION]. The site is approximately [SIZE] acres in total area. An outline of the site location is shown in the attached map.

**1.3** Contractor shall provide all management, supervision, labor, machines, tools, and equipment necessary to accept, process, reduce, incinerate, and dispose of disaster related debris. The debris to be processed consists primarily of burnable debris, with variable amounts of non-burnable included. Segregation of debris into various categories will be required.

**1.4** Reduction of burnable debris shall be through air-curtain incineration. [INCLUDE OR DELETE NEXT TWO SENTENCES] Reduction of burnable debris may also be accomplished through chipping/grinding. Reduction by this means however, must: 1) be at the same rate as indicated for incineration, and 2) disposal of the chips/mulch would be the responsibility of the Contractor, and 3) shall be done at no increased cost to the Government.

## **2.0 SERVICES**

**2.1** Contractor will establish lined temporary storage areas for ash, hazardous and toxic waste, fuels, and other materials that can contaminate soils, runoff, or groundwater. Contractor shall set up plastic liners under stationary equipment such as generators and mobile lighting plants unless otherwise directed by the Contracting Officer's Representative (COR).

**2.2** Contractor shall be responsible for establishing site layout.

**2.3** Contractor will be responsible for traffic control, dust control, erosion control, fire protection, on-site roadway maintenance, and safety measures. The Contractor shall comply with EM 385-1-1.

**2.4** Contractor shall manage the site to accept debris collected under other contracts. Contractor shall direct traffic entering and leaving the site, and shall direct dumping operations at the site.

**2.5** Contractor shall be responsible for sorting and stockpiling of debris at the site. Debris shall be segregated into 1) burnable debris, 2) non-burnable debris, 3) hazardous and toxic waste, and 4) ash residue. Further segregation of non-burnable debris, such as recyclable material or durable goods may be necessary. Debris classifications are defined in Section 3.0.

**2.6** Contractor shall be responsible for disposal of non-burnable debris and ash residue. Non burnable debris and ash shall be hauled to [NAME OF SITE OR LANDFILL, *NOTE: =SITE MUST HAVE SCALES.*] for disposal. [SELECT ONE OF THE FOLLOWING SENTENCES] Tipping fees will be [ PRICE PER TON] and will be the responsibility of the contractor for payment. [OR] Tipping fees will be the responsibility of the government. Removal of hazardous and toxic waste from the reduction site, including loading of hazardous and toxic waste at the site, will be performed under a separate contract.

**2.7** Upon completion of the debris reduction process, the Contractor will clear the site of all debris (excluding hazardous and toxic waste) and restore the site to the satisfaction of the COR.

**2.8** The Contractor shall conduct the work so as not to interfere with the disaster response and recovery activities of federal, state, and local governments or agencies, or of any public utilities.

### **3.0 DEBRIS CLASSIFICATION**

**3.1 Eligible Debris.** Debris that is within the scope of this contract falls under three possible classifications Burnable, Non-Burnable, and Hazardous toxic waste.

**3.2 Burnable Debris.** Burnable debris includes all biodegradable matter except that included in the following definitions of other categories of debris. It includes, but is not limited to, damaged and disturbed trees; bushes and shrubs; broken, partially broken and severed tree limbs; untreated structural timber and untreated wood products.

**3.3 Non-Burnable Debris.** Non-burnable debris includes, but is not limited to, treated timber; plastic; glass; rubber products; metal products; sheet rock; cloth items; non-wood building materials; and carpeting. Some non-burnable debris is recyclable. Recyclable debris includes metal products (i.e. Mobile Trailer parts, Household appliances (White Metal, and similar items), or uncontaminated soil.

**3.4 Hazardous Toxic Waste (HTW).** Hazardous or toxic materials or waste such as petroleum products, paint products, asbestos, electrical transformers, and known or suspected hazardous materials shall be removed by others. Coordination for hazardous debris removal is the responsibility of the Government.

**3.5 Stumps.** Tree stumps with base cut measurements less than two (2) feet in diameter will be disposed of with the same methods used for other burnable debris. Tree stumps larger than two (2) feet in diameter will be disposed of by either splitting and burning, or chipping/grinding. The method will be at the discretion of the Contractor.

**3.6 Ash.** Ash is the residue produced by incineration of the burnable debris. When handling ash, it will be required to "wet down" the ash to prevent dust problems.

**3.7 Chips/Mulch.** Chips and mulch are the end product of chipping or grinding wood products. Proper disposal of chips and mulch is to determine an environmentally friendly (non-landfill disposal) use for the material.

**3.8 Hazardous Toxic Waste (HTW) Debris.** Hazardous or toxic materials or waste such as petroleum products, paint products, asbestos, electrical transformers, and known or suspected hazardous materials that mistakenly enter the waste stream shall be placed in an appropriate storage area for removal by others.

#### **4.0 PERFORMANCE SCHEDULE**

**4.1** Immediately following Bid Opening, the apparent low bidder will meet with the COR to discuss matters of judgement, safety, quality control, coordination, payment, record keeping, and reporting.

**4.2 Schedule.** The Contractor shall begin preparation for mobilization immediately after Notice to Proceed and be fully operational within [HOURS] hours after Notice to Proceed.

**4.3 Production.** The Contractor is required to process a minimum of [RATE] [ *NOTE: MOST INCENERATORS BURN 150 TO 180 CY PER HOUR, ALLOW 4 HOURS DOWN TIME FOR SERVICE/ASH REMOVAL PER 24 HOURS*] cubic yards of debris per calendar day. The minimum required reduction/disposal rate shall be achieved no later than the second calendar day after receipt of Notice to Proceed. This minimum production rate is increased to [INCREASED RATE] in the event that the Government exercises the option for additional reduction capacity. Liquidated damages shall be assessed at \$[AMOUNT] per calendar day for any day in which the minimum processing rate is not met, unless non-compliance is due to insufficient debris amounts being delivered to the site.

**4.4 Completion.** All work, including site restoration prior to close-out, shall be completed within [DAYS] calendar days after receiving notice from the COR that the last load of debris has been delivered, unless the Government initiates additions or deletions to the contract by written change orders. Both parties pursuant to applicable state and federal law will equitably negotiate subsequent changes in completion time.

Liquidated damages shall be assessed at \$[AMOUNT] per calendar day for any time over the maximum allowable time established above.

## **5.0 EQUIPMENT**

**5.1** The Contractor shall provide all equipment necessary to prepare the site, stockpile the debris, feed the air-curtain incinerator(s), remove ash from the incinerator(s), load and haul for disposal all non-burnable debris and ash residue, and any other equipment which may be necessary for the performance of this contract. The Contractor shall comply with EM 385-1-1.

**5.2** All equipment must be in compliance with all applicable federal, state, and local rules and regulations. All equipment and operator qualifications will meet the requirements of EM 385-1-1. Equipment will be inspected prior to its use by the Contractor using the applicable Corps of Engineers Forms (i.e. SAD Form 1666R). The completed forms will be provided to the Government.

**5.3** Prior to commencing debris reduction and disposal operations, the Contractor shall present to the Contracting Officer or his representative, the COR, for approval, a detailed description of all equipment to be used for debris handling, sorting, processing, incinerating, loading, and hauling, stating brand name, model and horsepower, (including all air-curtain incinerators).

**5.4** Equipment that is designated for use under this contract shall not be used for any other work during the working hours of this contract. The Contractor shall not solicit work from private citizens or others to be performed in the designated work area during the period of this contract. Under no circumstances will the Contractor mix debris hauled or processed for others with debris hauled or processed under this contract.

**5.5** Reduction of burnable debris may be by either air-curtain pit burning or portable-air curtain incinerators. Section 6.0 specifies requirements for air-curtain pit burning. Section 7.0 specifies requirements for portable air-curtain incinerators.

[DELETE NEXT SECTION IF CHIPPING/GRINDING/MULCHING NOT ALLOWED IN CONTRACT]

**5.6** Chipping and grinding may also accomplish reduction of burnable wood debris, provided the processing rate given in Section 4.3 can be maintained. Section 8.0 specifies requirements for chipping and grinding procedures.

## **6.0 AIR-CURTAIN PIT BURNING**

[SELECT ONE OF THE NEXT TWO PARAGRAPHS AND DELETE THE OTHER, DEPENDENT UPON WHETHER THE PIT IS TO BE CONSTRUCTED ABOVE GROUND OR DUG DOWN, BASED ON WATER TABLE]

**[BELOW-GRADE PIT; LOW WATER TABLE]**

**6.1** The air-curtain pit burning method incorporates an earthen pit, constructed by digging below grade, and a blower. The blower and pit make up an engineered system that must be precisely configured to properly function. The blower must have adequate air velocity to provide a "curtain effect" to hold smoke in and to feed air to the fire below. The pit configuration must have a precise width, depth and length to compliment the blower.

**OR**

**[ABOVE-GRADE PIT; HIGH WATER TABLE]**

**6.1** The air-curtain pit burning method incorporates an earthen pit, constructed by building above grade, and a blower. The blower and pit make up an engineered system, which must be precisely configured, to properly function. The blower must have adequate air velocity to provide a "curtain effect" to hold smoke in and to feed air to the fire below. The pit configuration must have a precise width, depth and length to compliment the blower.

**6.2** Minimum required air velocity measured at the nozzle is 8,800 ft/min (100 mph). Minimum airflow rate measured at the nozzle is 900 cubic feet per min per linear foot of pit length. (As an example, a 20-ft long pit would require a blower with a nozzle velocity of 8,800 ft/min and nozzle output rate of 18,000 cfm. This example is intended for explanation purposes only, and does not imply a recommended pit length for actual operations.)

**6.3** The pit should be a maximum of 8 feet wide, and should be from 12 to 20 feet deep. The actual pit dimensions should be such that the system functions properly.

**6.4** Pits must be constructed out of a highly compact-able material that will hold its shape and support the weight of the loading equipment. There shall be an impervious layer of clay or limestone on the bottom of the pit to provide a barrier for ground water protection. This layer shall be a minimum of one (1) foot thick and be repaired as necessary after each ash removal operation.

**6.5** There is to be a minimum distance of 100 feet between the burn area and the nearest debris piles. There is to be a minimum distance of 1000 feet between the burn area and the nearest building. Contractors are responsible for assuring that the public and workers are kept a safe distance from the burn site.

**6.6** The burn will be extinguished at least two hours before removal of the ash mound. Wetting of the ash will be necessary to reduce dust while removing ash.

**6.7** The burn pits must be made of limestone or other highly compactable material and be capable of supporting the wheel weight of the loading equipment. There should be an

impervious layer of clay or limestone on the bottom of the pit to attempt to seal the ash from the aquifer. This impervious layer should be at least one foot thick, and should be repaired or replaced if scraped by bulldozers, excavators, or other equipment.

**6.8** The ends of the pits must be sealed with dirt ash or other material to a height of four feet.

**6.9** A twelve-inch dirt seal must be placed on the lip of the burn pit area to seal the blower nozzle. The nozzle should be three-to-six inches from the edge of the pit.

**6.10** There should be one-foot high warning stops running the length of the pits to alert equipment operators when they are close to the pit. The warning stops should be constructed of fireproof material.

**6.11** No hazardous or contained-ignitable material is to be dumped into the pit.

**6.12** The airflow should hit the wall of the pit at about two feet below the edge of the pit and the debris should not break the path of the airflow, except during dumping.

**6.13** The length of the pit should be no longer than the length of the blower system, and the pit should be loaded uniformly along the length.

**6.14** The contractor is responsible for ensuring that the public is protected from the burn operation. Signs, fences, and other measures can be used depending on site conditions.

**6.15** Emissions must meet state and federal standards for burning operations.

**6.16** The Contractor shall be responsible for dust control while handling ash materials.

## **7.0 PORTABLE AIR CURTAIN INCINERATORS**

**7.1** Portable incinerators use the same principles as air-curtain pit systems. The primary difference being portable incinerators utilize a pre-manufactured pit in lieu of an on-site constructed earth or limestone pit. The pits are engineered to precise dimensions to compliment the blower systems

**7.2** Minimum required air velocity measured at the nozzle is 8,800 ft/min (100 mph). Minimum airflow rate measured at the nozzle is 900 cubic feet per min. per linear foot of pit length. (As an example, a 20-ft long pit would require a blower with a nozzle velocity of 8,800 ft/min and nozzle output rate of 18,000 cfm. This example is intended for explanation purposes only, and does not imply a recommended pit length for actual operations.)

**7.3** There is to be a minimum distance of 100 feet between the portable incinerator and the nearest debris piles. There is to be a minimum distance of 1000 feet between the portable incinerator and

the nearest building. Contractors must assure that the public and workers are kept a safe distance from the incinerator.

**7.4** The burn will be extinguished at least two hours before removal of the ash.

**7.5** There should be one-foot high warning stops running the length of the pits to alert equipment operators when they are close to the pit. The warning stops should be constructed of fireproof material.

**7.6** No hazardous or contained-ignitable material is to be dumped into the pit.

**7.7** The contractor is responsible for ensuring that the public is protected from the burn operation. Signs, fences, and other measures can be used depending on site conditions.

**7.8** Emissions must meet state and federal standards for burning operations.

**7.9** The Contractor shall be responsible for dust control while handling ash materials.

[DELETE ENTIRE NEXT SECTION IF CHIPPING/GRINDING NOT ALLOWED; IF TIES SECTION IS DELETED, REMAINING SECTION NEEDS TO BE RE-NUMMERED]

## **8.0 CHIPPING AND GRINDING**

**8.1** If the Contractor chooses to use chipping/grinding as a method of debris reduction, it is the Contractor's responsibility to acceptably dispose of the chips or mulch, at no additional cost to the Government. Because the volume reduction achieved by chipping/grinding is not as great as the volume reduction achieved by incineration, disposal of the chips or mulch in a landfill is not an acceptable means of disposal. For disposal, the chips or mulch must be put to some benefit or use. The Contractor may provide or sell the chips or mulch to be recycled for use in agricultural mulch, fuel, or wood products.

**8.2** The average chip size produced will be dependent on the needs of the end user, but typically should not exceed 4 inches in length and ½ inch in diameter.

**8.3** Contamination: Contaminates are all materials other than wood products. Contaminates must be held to 10.0% or less for the chips or mulch to be acceptable. Plastics should be eliminated completely. To help eliminate contaminants, root rake loaders should be used to feed or crowd material to the chipper/grinder. Bucket loaders tend to scoop up earth, which is a contaminate. The use of hand laborers must be utilized to pull out contaminants prior to feeding the chipper/grinders. The more contaminants the more numerous the laborers. Shaker screens are required when processing stumps with root balls or when large amounts of soil are present in the vegetative debris.



**8.4 Storage:** Chips/mulch should be stored in piles no higher than 15 feet, and meet all State and Local laws.

## **9.0 REPORTING**

**9.1** The Contractor shall submit a report to the COR no later than [TIME] each day. Each report shall contain, at a minimum, the following information:

- a) Contractor's Name.
- b) Contract Number.
- c) Daily and cumulative totals of debris processed, to include method(s) of processing and disposal location(s).
- d) Daily estimate of HTW debris segregated, and cumulative amount of HTW placed in the designated holding area.
- e) Any problems encountered or anticipated.

## **10.0 SITE CONSIDERATIONS**

**10.1 Site Plan.** The Contractor will provide a site operations plan for review and approval by the COR prior to beginning work. At a minimum, the plan will address the following:

- a) Access to site.
- b) Site management, to include point-of-contact, organizational chart, etc.
- c) Traffic control procedures.
- d) Site security.
- e) Site safety.
- f) Site layout/segregation plan.
- g) HTW materials plan.
- h) Environmental mitigation plan, including considerations for smoke, dust, noise, traffic, buffer zones, and storm water runoff as appropriate.

**10.2 Site Preparation.** The Contractor shall be responsible for preparing the site(s) to accept the debris. This preparation shall include clearing, erosion control, grading, construction and maintenance of haul roads and entrances. The Contractor shall provide utility clearances and sanitation facilities, if needed. The Contractor shall protect existing structures at the sites and repair any damage caused by his operations at no additional cost to the Government.

**10.3 Site Security.** The Contractor shall be responsible for installing site security measures and maintaining security for his operations at the site.

**10.4 Fire Protection.** The Contractor shall manage the site to minimize the risk of fire.

**10.5 Ash Containment Area.** The Contractor shall be responsible for the storage, removal, and containment of ash from all burning operations. The containment area will be "wetted down" periodically under this contract to prevent particles from becoming airborne.

**10.6 Inspection Tower.** The contractor shall construct an inspection tower. The tower shall be constructed using pressure treated wood. The floor elevation of the tower shall be 10 feet above the existing ground elevation. The floor area shall be 8' by 8', constructed of 2"x 8" joists, 16" O.C. with 3/4" plywood supported by four 6" x 6" posts. The perimeter of the floor area shall be protected by a 4 foot high wall constructed of 2" x 4" studs and 1/2" inch plywood. The floor area shall be covered with a corrugated tin roof. The roof shall provide a minimum of 6'-6" of head room below the support beams. Wooden steps shall provide access with a hand rail.

**10.7 Traffic Control.** The Contractor shall be responsible for control of pedestrian and vehicular traffic in the work area. Contractor shall provide all flag persons, signs, equipment, and other devices necessary to meet federal, state, and local requirements. The traffic control personnel and equipment shall be in addition to the personnel and equipment required in other parts of this contract. As a minimum, one flag person shall be posted at each entrance to direct traffic to the site.

**10.8 Site Closure.** The Contractor shall be responsible for the closure of the debris site within [INSERT] calendar days of receiving the last load of disaster-related debris. This closure shall include removal of site equipment, debris, and all remnants from the processing operation (such as temporary toilets, observation towers, security fence, etc.), and grading the site, and restoring the site to pre-work conditions. The site will be restored in accordance with all State and Local requirements. The Contractor is responsible for the proper disposal of non-burnable debris, ash, and wood chips. Disposal of the HTW debris is not the responsibility of the Contractor under this contract. The Contractor shall receive approval from the COR as to the final acceptance of a site closure. The Contracting Officer shall release final payment to the Contractor upon acceptance.

## **11.0 HAZARDOUS OR TOXIC WASTE ISSUES**

**11.1** The Contractor will be required to construct a containment area at the reduction site. This containment area will consist of an earthen berm with a non permeable soil liner. The HTW containment area must be covered at all times with a non permeable cover.

**11.2** Any material which is found to be classified as HTW shall be reported immediately to the designated COR. This material shall be segregated from the remaining debris using a method that will allow the remaining non-HTW debris to be processed. All HTW debris will be moved and placed in the designated HTW containment area.

**11.3** Disposal of the HTW debris will be by separate contract.

## **12.0 CONTRACTOR HTW SPILLS**

**12.1** The Contractor shall be responsible for reporting to the COR and cleaning up all hazardous materials or waste spills caused by the Contractor's operations at no additional cost to the Government.

**12.2** Immediate containment actions shall be taken as necessary to minimize effect of any spill or leak. Cleanup shall be in accordance with applicable federal, state, and local laws and regulations.

**12.3** Spills other than at the site shall be reported to the National Response Center, and the Contracting Officer immediately following discovery. A written follow-up shall be submitted to the COR not later than 7 days after the initial report. The written report shall be in narrative form, and as a minimum shall include the following:

- a. Description of the material spilled (including identity, quantity, and manifest number, etc.).
- b. Determination as to whether or not the amount spilled is EPA/State reportable, and when and to whom it was reported.
- c. Exact time and location of spill, including description of the area involved.
- d. Receiving stream or waters.
- e. Cause of incident and equipment and personnel involved.
- f. Injuries or property damage.
- g. Duration of discharge.
- h. Containment procedures initiated.

i. Summary of all communications the Contractor has had with press, agencies, or Government officials other than COR.

j. Description of cleanup procedures employed or to be employed at the site, including disposal location of spill residue.

### **13.0 OTHER CONSIDERATIONS**

**13.1** The Contractor shall supervise and direct the work, using qualified labor and proper equipment for all tasks. Safety of the Contractor's personnel and equipment is the responsibility of the contractor. Additionally, the Contractor shall pay for all materials, personnel, taxes, and fees necessary to perform under the terms of this contract.

**13.2** The Contractor must be duly licensed in accordance with the state's statutory and regulatory requirements to perform the work. The Contractor shall obtain all permits necessary to complete the work. The Contractor shall be responsible for determining what permits are necessary to perform under the contract. Copies of all permits shall be submitted to the COR.

**13.3** The Contractor shall be responsible for correcting any notices of violations issued as a result of the Contractor's or any subcontractor's actions or operations during the performance of this contract. Corrections for any such violations shall be at no additional cost to the Government.

### **14.0 MEASUREMENTS**

**14.1** Measurements of debris processed is based upon Cubic Yard measurements debris delivered to the site.

**14.2** Measurement of non-burnable debris and ash is based upon Ton measurements measured at the landfill or final disposal site.

**14.3** All efforts required in mobilization, site set-up, site close-out, and demobilization shall be considered as a total Job.

### **15.0 PAYMENT**

**15.1** Payment for all debris sorted, segregated, processed, reduced, and disposed by burning will be made at the unit price per cubic yard.

**15.2** Payment for managing and operating the debris sites, furnishing plant, material, labor, tools and equipment necessary to process/reduce/dispose of debris; and providing for traffic control, dust control, erosion control, inspection tower, lighting, ash containment, fire protection, permits,

environmental monitoring, and safety measures; are all incorporated in the bidder's unit price for burning.

**15.3** Payment for loading and hauling non-burnable debris to the final disposal site will be by the Ton.

**15.4** The Contractor will be entitled to invoice for mobilization after all equipment is delivered to the work site and is operational. Demobilization cost will be due after all equipment is removed from the work site. Payment for mobilization and demobilization will be per job.

**15.5** Payment for site preparation and site closure will be per job.

**CONTRACT NO.** \_\_\_\_\_

### BIDDING SCHEDULE

ITEM	DESCRIPTION	QUANTITY	UNIT OF ISSUE	UNIT PRICE	AMOUNT
1.	Mobilization	1	Job	XXX	\$
2.	Reduction of Burnable Debris through the Air Curtain Incineration		Cu. Yd.	\$	\$
3.	Disposal of Non- Burnable Debris and Ash		Ton	\$	\$
4.	Site Preparation and Site Closure	1	Job	XXX	\$
5.	Reduction of Burnable Debris by Chipping and Grinding		Cu. Yd.	\$	\$
6.	Reduction of Stumps greater than 24" in diameter, but less than 36" in diameter		Stump	\$	\$
7.	Reduction of Stumps 36" in diameter, but less than 48" in diameter		Stump	\$	\$
8.	Reduction of Stumps 48" in diameter or greater		Stump	\$	\$
9.	Demobilization	1	Job	XXX	\$

## TASK I

The Contractor shall establish a general office in close proximity of the U.S. Army Corps of Engineers (USACE) office within the debris zone. The Contractor's office shall be staffed with sufficient man power to perform work during working hours. Contractor shall be prepared to work 7 days per week, unless restricted by curfew or other limits imposed within the area of operation. The Contractor's office shall be supplied with water, sewage and electrical power capabilities. The Contractor will provide 1500 square feet of USACE office space with basic furnishings, water, sewage and electrical power capabilities.

Communication shall be established between the contractor's general office, USACE office and key field offices. The Contractor's office shall be staffed with personnel having authority to obligate the company for additional assigned tasks as requested. Contractor's office, haul trucks, and equipment are to have signs of either magnetic or cardboard, as they see fit, with the following wording:

EMERGENCY RECOVERY MISSION  
UNDER CONTRACT TO

{USACE CASTLE PICTURE}

U.S. ARMY CORPS OF ENGINEERS  
IN COORDINATION WITH  
FEDERAL EMERGENCY MANAGEMENT AGENCY

SCOPE OF WORK  
FOR  
EQUIPMENT LEASING FOR CLEARING OF DEBRIS  
RELATED TO  
[NAME/NATURE OF DISASTER]  
AT, IN, OR NEAR  
[LOCATION OF RECOVERY EFFORTS]

## **1. GENERAL**

The purpose of this contract is to provide debris clearing and removal response assistance to [LOCATION; I.E. "North Carolina counties" or "Mobile and Baldwin Counties in Alabama"] that have been declared disaster areas by the President because of the effects of [NAME OF DISASTER].

## **2. SERVICES.**

**2.1** The Contractor shall provide specified equipment with operators and laborers for debris removal. The contractor shall provide all labor and materials necessary to fully operate and maintain (including fuel, oil, grease and repairs) the following:

INSERT QUANTITY AND DESCRIPTION FROM EQUIPMENT LIST]

**2.2** The Contractor shall provide the crews for [INITIAL TIME; "two weeks"] with a Government option to extend for up to an additional [EXTENSION TIME; I.E. "one week"].

**2.3** All hourly equipment rates include the cost of the operator, supervision, maintenance, fuel, repairs, overhead, profit, insurance, and any other costs associated with the equipment and personnel.

**2.4** All hourly manpower rates include the cost of protective clothing (to include hard-hats and steel toed boots), fringe benefits, hand tools, supervision, transportation and any other costs.

**2.5** The work shall consist of clearing and removing any and all "eligible" debris (see section 3.0 for a definition of eligible debris) as directed by the Contracting Officer's Representative (COR). Work will include: 1) loading the debris, 2 ) hauling the debris to an approved dumpsite, and 3) dumping the debris at the dumpsite. Ineligible debris will not be loaded, hauled, or dumped under this contract. This work will involve primarily clearing the right-of-way (ROW) of streets and roads.

**2.6** The Contractor shall not move from one designated work area to another designated work area without prior approval from the COR.

**2.7** The Contractor shall conduct the work so as not to interfere with the disaster response and recovery activities of Federal, State, and local governments or agencies, or of any public utilities.

**2.8** The Contractor shall comply with EM 385-1-1.

### **3.0 DEBRIS CLASSIFICATION**

**3.1 Eligible Debris.** Debris that is within the scope of this contract falls under three possible classifications: Burnable, Non-Burnable, and Recyclable. Debris that is classified Hazardous or Toxic is not to be transported by this contract.

**3.2 Burnable Debris.** Burnable debris includes all biodegradable matter except that included in the following definitions of other categories of debris. It includes, but is not limited to, damaged and disturbed trees; bushes and shrubs; broken, partially broken and severed tree limbs; tree stumps with base cut measurements less than two (2) feet; untreated structural timber; untreated wood products; and brush.

**3.3 Non-Burnable Debris.** Non-burnable debris includes, but is not limited to, treated timber; plastic; glass; rubber products; metal products; sheet rock; cloth, items; non wood building materials; and carpeting; recyclable debris including metal products (i.e. Mobile Trailer parts, Household appliances (White Metal), and similar items), or uncontaminated soil.

**3.4 Hazardous Toxic Waste (HTW).** Hazardous or toxic materials or waste such as petroleum products, paint products, asbestos, electrical transformers, and known or suspected hazardous materials shall be removed by others. Coordination for hazardous debris removal is the responsibility of the Government.

### **4.0 DUMPSITES**

**4.1** The Contractor shall use only debris dumpsites designated and approved by the COR.

**4.2** All dumping operations shall be directed by the dumpsite operator. The Contractor shall cooperate with the dumpsite operator to facilitate effective dumping operations.

### **5.0 PERFORMANCE SCHEDULE**

**5.1** The Contractor shall commence mobilization immediately upon award of the contract and designation of work areas by the COR and will commence debris removal operations within 24 hours of Notice to Proceed.



**5.2** The Contractor shall work during daylight hours for [INSERT] hours per day, [INSERT] days per week.

## **6.0 EQUIPMENT**

**6.1** All trucks and other equipment must be in compliance with all applicable federal, state, and local rules and regulations. Any truck used to haul debris must be capable of rapidly dumping its load without the assistance of other equipment; be equipped with a tailgate that will effectively contain the debris during transport and permit the truck to be filled to capacity; and measured and marked for its load capacity. Sideboards or other extensions to the bed are allowable provided they meet all applicable rules and regulations, cover the front and both sides, and are constructed in a manner to withstand severe operating conditions. The sideboards are to be constructed of 2" by 6" boards (or greater) and are not to extend more than two feet above the metal bed sides. All extensions are subject to acceptance or rejection by the Contracting Officer's representative. Equipment will be inspected prior to its use by the Contractor using applicable Corps of Engineers Forms. The Forms will be provided to the Government after completion.

**6.2** Trucks and other heavy equipment designated for use under this contract shall be equipped with two signs, one attached to each side. A total of [QUANTITY] signs will be provided by the Government and are to be returned to the Government prior to issuance of final payment. A fee of \$(AMOUNT) will be assessed against the final payment for each lost sign.

**6.3** Prior to commencing debris removal operations, the Contractor shall present to the Government's representative all trucks or trailers that will be used for hauling debris for the purpose of determining hauling capacity. Hauling capacity, in cubic yards, will be recorded and marked on each truck or trailer. Each truck or trailer will also be numbered for identification. The government reserves the right to re-measure trucks and trailers at any time during the contract and to use re-measurements as the basis for calculating loads for payment purposes.

**6.4** Trucks or equipment which are designated for use under this contract shall not be used for any other work during the working hours of this contract. The Contractor shall not solicit work from private citizens or others to be performed in the designated work area during the period of this contract. Under no circumstances will the Contractor mix debris hauled for others with debris hauled under this contract.

## **7.0 REPORTING**

**7.1** The Contractor shall submit a report to the COR by close of business each day of the term of the contract. Each report shall contain, at a minimum, the following information:

Contractor's Name

Contract Number

Debris Plan

A-37

10/99 REV.0

Daily and cumulative hours for each piece of equipment

Daily and cumulative hours for personnel, by position

## **8.0 OTHER CONSIDERATIONS**

**8.1** The Contractor shall supervise and direct the work, using qualified labor and proper equipment for all tasks. Safety of the Contractor's personnel and equipment is the responsibility of the Contractor. Additionally, the Contractor shall pay for all materials, personnel, taxes, and fees necessary to perform under the terms of this contract.

**8.2** The Contractor must be duly licensed in accordance with the state's statutory requirements to perform the work. The Contractor shall obtain all permits necessary to complete the work. The Contractor shall be responsible for determining what permits are necessary to perform under the contract. Copies of all permits shall be submitted to the COR prior to issuance of a notice to proceed.

**8.3** The Contractor shall be responsible for taking corrective action for any notices of violations issued as a result of the Contractors or any subcontractors actions or operations during the performance of this contract. Corrections for any such violations shall be at no additional cost to the Government.

**8.4** The Contractor shall be responsible for control of pedestrian and vehicular traffic in the work area. The Contractor shall provide all flag persons, signs, equipment, and other devices necessary to meet federal, state, and local requirements. The traffic control personnel and equipment shall be in addition to the personnel and equipment required in other parts of this contract. At a minimum, one flag person should be posted at each approach to the work area.

## **9.0 PAYMENT**

**9.1** The Contractor will be entitled to invoice for 60% of the mobilization and demobilization line item after all equipment is delivered to the designated work site. The remaining 40% will be due after all equipment is removed from the work site, all vehicle signs have been returned to the government, and the contractor has submitted a proper invoice.

**9.2** Payment for work completed will be based on verified hours worked from the daily operational report. Equipment down time resulting from equipment failure, routine maintenance and fueling that exceeds fifteen (15) minutes of a work hour will be considered unacceptable work and non-payment for one half of that hour and the number of work hours will be reduced to exclude the down time (the minimum reduction shall be one-half hour).

**9.3** All payments made under this contract will be in accordance with PAYMENTS clauses located in other sections of this contract.

## **10.0 OPTIONS**

**10.1** The option items listed in Schedule B (the bid Schedule) are for the purpose of extending this contract for seven (7) days at a time. These options will be exercised at the discretion of the Government in accordance with the OPTION TO EXTEND SERVICES clause located elsewhere in this contract.

## **11.0 ATTACHMENTS**

**11.1** Daily Report Format

**11.2** Sample Bidding Schedule

**11.3** Operations Report

# DAILY REPORT

CONTRACTOR: CONTRACTOR NO.:					DATE OF REPORT:	
	Truck No.	Capacity	Burn Site Trips	C.Y. Totals	Landfill Trips	C.Y. Totals
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
DAILY GRAND TOTALS				C.Y.		C.Y.

## BIDDING SCHEDULE

ITEM	DESCRIPTION	HOURS	U/I	U/P	AMOUNT
001	Mobilize Equipment/Demobilize Equipment		JOB		
002	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	140.00			
003	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	140.00			
004	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	140.00			
005	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	140.00			
006	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	140.00			
007	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	140.00			
008	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	140.00			
009	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	140.00			
010	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	140.00			
011	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	140.00			
012	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	140.00			
013	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	140.00			
014	One (1) Loader, Front-end 3-5 yd <sup>3</sup> capacity, with Operator	140.00			
015	One (1) Loader, Front-end, 3-5 yd <sup>3</sup> capacity, with Operator	140.00			
016	one (1) Knuckleboom, 10 ton lifting capacity with Operator	140.00			
017	Four (4) Laborers with Chainsaws, 16" min bar, traffic flags, and misc. small tools (axes, shovels, safety equip.)	140.00			
018	One (1) Truck Pickup, 1/2-1 Ton, with crew foreman, and cellular phone.	140.00			
019	One (1) Track Hoe, 2-3 yd <sup>3</sup> bucket with operator	100.00			
020	One (1) Low Bed Equipment Trailer 20 Ton capacity, and Tractor Truck with operator	70.00			

CONTRACT NO. \_\_\_\_\_

**BIDDING SCHEDULE**

ITEM	DESCRIPTION	HOURS	U/I	U/P	AMOUNT
021	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	70.00			_____
022	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	70.00			_____
023	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	70.00			_____
024	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	70.00			_____
025	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	70.00			_____
026	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	70.00			_____
027	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	70.00			_____
028	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	70.00			_____
029	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	70.00			_____
030	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	70.00			_____
031	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	70.00			_____
032	One (1) Truck, Dump, 16-20 yd <sup>3</sup> Capacity, with Operator	70.00			_____
033	One (1) Loader, Front-end 3-5 yd <sup>3</sup> capacity, with Operator	70.00			_____
034	One (1) Loader, Front-end, 3-5 yd <sup>3</sup> capacity, with Operator	70.00			_____
035	one (1) Knuckleboom, 10 ton lifting capacity with Operator	70.00			_____
036	Four (4) Laborers with Chainsaws, 16" min bar, traffic flags, and misc. small tools (axes, shovels, safety equip.)	70.00			_____
037	One (1) Truck Pickup, 1/2-1 Ton, with crew foreman, and cellular phone.	70.00			_____
038	One (1) Track Hoe, 2-3 yd <sup>3</sup> bucket with operator	50.00			_____
039	One (1) Low Bed Equipment Trailer 20 Ton capacity, and Tractor Truck with operator	35.00			_____

**CONTRACT NO.** \_\_\_\_\_

**OPERATIONAL REPORT**

<b>EQUIPMENT</b>	<b>TOTAL HOURS WORKED THIS DAY</b>	<b>TOTAL HOURS IDLE THIS DAY</b>
DUMP TRUCK #		
DUMP TRUCK #		
DUMP TRUCK #		
DUMP TRUCK #		
DUMP TRUCK #		
DUMP TRUCK #		
DUMP TRUCK #		
DUMP TRUCK #		
DUMP TRUCK #		
DUMP TRUCK #		
F.E. LOADER #		
F.E. LOADER #		
DOZER #		
TRACK HOE #		
KNUCKLEBOOM #		
KNUCKLEBOOM #		
KNUCKLEBOOM #		
PICKUP TRUCK #		
LABOR CREW #		

**CONTRACTOR** \_\_\_\_\_

**GOV'T INSPECTOR CERTIFICATION** \_\_\_\_\_

# EQUIPMENT PICK LIST

EQUIPMENT PICK LIST			



## Appendix B

### EMERGENCY MUTUAL AID AGREEMENT (EXAMPLE) TYPE: INTERGOVERNMENTAL

(Insert community names as appropriate in agreement below)

This agreement made and entered in to and by the \_\_\_\_\_ and \_\_\_\_\_.

WHEREAS, local governments may contract with each other to provide services to prevent And combat the effects of emergency and disasters as defined in Chapter 639, Acts of 1950, as amended and codified under Chapter 33 appendix and other relevant State and local laws and policies.

WHEREAS, Chapter 639, Acts of 1950 as amended, section 13 empowers communities to make necessary agreements, and funding arrangements "in the light of the exigencies of the extreme emergency situation"

WHEREAS, \_\_\_\_\_ considers entering into mutual aid agreement with other local governments within the region, and commonwealth to be prudent.

NOW, THEREFORE, in consideration of the above recitals and the covenants contained herein, the parties hereto agree as follows:

1. The \_\_\_\_\_ hereby agrees to provide such mutual aid as may be requested by the participants in this emergency situation as defined in Chapter 639, Acts of 1950 as amended. Such aid will be rendered at the discretion of participants in consideration of health and public safety requirements of each party.
2. Personnel and equipment dispatched to aid another jurisdiction shall remain employees of their respective jurisdiction, but shall work under the overall discretion of the requesting jurisdiction.
3. Hourly rates, equipment costs, and hours worked by those providing mutual aid will be provided to the requesting jurisdiction for all actual costs. The requesting jurisdiction agrees to promptly process and pay actual costs to the jurisdiction providing mutual aid based on customary and good practices not withstanding potential reimbursements from State or Federal emergency relief programs.
4. The \_\_\_\_\_ will maintain workers compensation coverage for its employees and liability coverage for its vehicles and equipment. Any uninsured or extraordinary expenses may be part of a claim for reimbursement. The requesting jurisdiction agrees to maintain adequate liability insurance and to hold harmless and indemnify the \_\_\_\_\_ for any and all claims occurring while its personnel and equipment are working under the direction of the requesting jurisdiction. These

indemnities shall include legal fees and costs that may arise from providing aid pursuant to this agreement.

5. The purpose of these recitals is to insure that the \_\_\_\_\_ is reimbursed all specified and reasonable costs and assumes no additional liabilities as a result of this agreement. The jurisdiction providing mutual aid and its designee shall determine the manner and degree which such mutual aid is utilized.
6. IN WITNESS WHEREOF, this Agreement has been duly executed by the parties subscribed below and is binding upon the \_\_\_\_\_ and the requesting jurisdiction.

Date signed \_\_\_\_\_

(Name of Jurisdiction)

By: \_\_\_\_\_ (Name & Title)

Date signed \_\_\_\_\_

(Name of Jurisdiction)

By: \_\_\_\_\_ (Name & Title)

*Note: In order to be eligible for FEMA Public Assistance, present FEMA policy requires that any Mutual Aid Agreement (MAA) must be in writing, in effect prior to the event (not the disaster declaration), and not be contingent upon a Presidential Disaster declaration.*

## Appendix C

### EXAMPLE RIGHT OF ENTRY AGREEMENT

I/We \_\_\_\_\_, the owner(s) of the property commonly identified as \_\_\_\_\_ (street) \_\_\_\_\_

\_\_\_\_\_ (city/town/state)(includes U.S. Government [FEMA] in the event of a Public Assistance Disaster) do hereby grant and give freely and without coercion, the right of access and entry to said property to (city or town) \_\_\_\_\_, its agencies, contractors, and subcontractors there of, for the purpose of removing and clearing any or all disaster generated debris of whatever nature from the above described property.

It is fully understood that this permit is not an obligation to perform debris clearance. The undersigned agrees and warrants to hold harmless the City/Town/State (includes U.S. Government [FEMA] in the event of a Public Assistance Disaster) of \_\_\_\_\_, its agencies, contractors and subcontractors, for damage of any type whatsoever, either to the above described property or person situated thereon and hereby release, discharge, and waive any action, either legal or equitable that might arise out of any activities on the above described property. The property owner(s) will mark any disaster damaged sewer lines, water lines, and other utility lines located on the described property.

I/We (have \_\_\_\_\_, have not \_\_\_\_\_)(will \_\_\_\_\_, will not \_\_\_\_\_) receive any compensation for debris removal from any other source including SBA, ASCS, private insurance, individual and family grant program or any other public assistance program. I will report for this property any insurance settlements to me or my family for debris removal that has been performed at government expense. I am fully aware that an individual who fraudulently or willingly misstates any fact in connection with this agreement shall be subject to prosecution of a fine of not more than \$10,000 or imprisoned for not more than a year or both. For the considerations and purposes set forth herein, I hereby set my hand this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_.

\_\_\_\_\_  
Witness

\_\_\_\_\_  
Owner

\_\_\_\_\_  
Owner

\_\_\_\_\_  
Telephone No. and Address

## Appendix D

### Sources of Information on Contractors and Waste Facilities/Services

<i>Document Name</i>	<i>State Agency</i>	<i>Topic</i>
Construction Contractors	MHD	Contractors for debris Collection, Hauling, Debris Site Operations
Licensed Woodcutters	DEM	Contractors to cut & clear downed trees
Active Ash Landfills	DEP	Debris Disposal
Active MSW & Demolition Landfills	DEP	Debris Disposal
Recycling Services Directory & Markets Guide	DEP	Recycling companies handling metals, C&D waste, wood, yard waste, and end use markets

## **Appendix E**

### **Debris Staging Sites**

#### **Definitions**

**Debris Staging Site** - a parcel of land used for the handling storage, transfer, processing or treatment of disaster debris including all land, structures and improvements that are directly related to disaster debris activities.

**Debris Handling Area** - an area used for the transfer, storage, processing or treatment of disaster debris, excluding weigh stations or access roads.

#### **Staging Site Criteria**

##### **Features to Look For**

1. Sufficient Area, 50-100 acres
2. Open flat topography
3. Close to disaster area
4. Publicly owned land (if possible)
5. Good transport arteries
6. Good site ingress/egress

##### **Features to Avoid**

1. <500 ft Upgrading of a surface drinking water supply
2. w/in 250 ft Existing private water supply
3. w/in Interim Wellhead Protection Area or Zone II
4. w/in 250 ft residential dwelling
5. w/in 100 ft of Wetlands
6. impact on Endangered Species or Historic Sites
7. ACEC
8. <100 ft Lake or River

##### **Other Considerations**

- use of Inactive or Capped Landfills as debris sites eliminates the burn option due to explosion potential from methane in landfill gas.
- baseline testing

## Sources

16.00 - 310 CMR 16 Site Assignment Regulations (for Solid Waste Facilities)

19.00 - 310 CMR 19 Solid Waste Facility Regulations

CA Plan - California Disaster Debris Plan

COE - US Army Corps of Engineers, Debris Removal

FEMA Consultant - Dewberry & Davis Inc, Hurricane Andrew: After Action Report

## GIS Site Selection Map

### GIS Analysis for Potential Debris Staging Sites

- buffer out all Avoid Features
- elements to show on a single large wall map
  - exclusion areas (Avoid Features)
  - moon boundaries
  - Major roads, rail & utilities
  - Solid waste facilities
  - open space (specify publicly owned if possible)

**Appendix F**  
**Sample Public Announcements – PA/Flyers**

**SPECIAL NOTICE**

**To:** The Residents of Anytown, Massachusetts

**From:** The Commonwealth of Massachusetts and the Mayor/Board of Selectmen of Anytown, MA

As you are well aware, Anytown, Massachusetts has experienced a major and devastating disaster. The Commonwealth of Massachusetts and your Mayor/Board of Selectmen are going to need your assistance in the clean up. On the dates noted below, authorized personnel and trucks will be conducting a “SPECIAL PICK UP” of “DISASTER DEBRIS” in Anytown. As a resident, the Commonwealth and the MAYOR/SELECTMEN are asking that “DISASTER DEBRIS” from your property be placed at the curb in THREE separate and distinct piles as follows:

[for a Hurricane, Flood or Tornado (Sec 2.2)]

**PILE #1** Green Waste - trees, stumps, limbs, brush, and leaves

**PILE #2** Large Metals - white goods (washers, dyers, and stoves), gutter pipes, corrugated metal, etc

**PILE #3** Building & Bulky Debris - all other debris from damaged buildings such as dimensional lumber, roofing materials, wallboard, furniture, mattresses, rugs and textiles

[for an Earthquake (Sec 2.2)]

**PILE #1** ABC - asphalt, brick, concrete, concrete with metal reinforcement & cinder block

**PILE #2** Large Metals - white goods (washers, dyers, and stoves), gutter pipes, corrugated metal, etc

**PILE #3** Building & Bulky Debris - all other debris from damaged buildings such as dimensional lumber, roofing materials, wallboard, furniture, mattresses, rugs and textiles

**THIS IS A SPECIAL PICK UP of DISASTER DEBRIS ONLY.** Do not place regular household trash or household hazardous waste (HHW) at the curb, or mix in with your debris piles. Household trash collection will resume on schedule and HHW will be picked up in a separate collection. Debris placed at the curb after the specified date(s) of the special pick ups will be the responsibility of the property owner and handled under local ordinances.

**AREA OF SPECIAL PICK UP:**

**DATE OF SPECIAL PICK UP:**

**AREA OF SPECIAL PICK UP:**

**DATE OF SPECIAL PICK UP:**

## **APPENDIX G**

### **GIS STAGING SITE CRITERIA MAP OF COMMONWEALTH OF MASSACHUSETTS**

(Hard copy map sets are stored at MEMA, SEOC; Department of Environmental Protection GIS maintains electronic copy)