

## **APPENDIX C LOCAL DEBRIS MANAGEMENT PLAN STRATEGY**

**The City of Virginia Beach, VA, developed this local Debris Management Plan Strategy**

### **The Virginia Beach Plan for Hurricane Response Preparedness and Pre-positioned Contracts for Disaster Response and Recovery**

#### **Introduction**

The City of Virginia Beach, Virginia, is a mid-Atlantic coastal community located within the Atlantic storm track. As such, the City faces the potentially devastating effects of severe nor'easters and hurricanes as its most likely natural disaster event. The City covers 250 square miles of urban, suburban and rural land located along the southeastern shore of Virginia at the mouth of the Chesapeake Bay. The City is home to 430,000 citizens.

The City of Virginia Beach has experienced only one storm event in the past 20 years that has generated any measure of debris. Hurricane Gloria passed by Virginia Beach in 1985 with wind speeds of 85 miles per hour. The eye of the storm did not make landfall in the City, staying 60 miles offshore. Rainfall averaged 5 to 6 inches across the region. The resultant debris generated consisted almost entirely of unprocessed tree canopy and shrub vegetation or clean woody debris. This debris was located throughout the City with concentrations in heavily wooded neighborhoods, as expected. There was little, if any, damage to structures.

The City responded by assigning employees and equipment from several departments to remove and dispose of debris. Approximately 350 employees and their normally used equipment were able to remove approximately 28,000 cubic yards of debris that citizens brought to the edge of the right-of-way in front of their homes. Debris removal operations were completed within ten days following the storm. The normally assigned duties of these crews were suspended during cleanup operations. All debris was disposed of at the City landfill.

The Department of Public Works has now developed a debris management program for the volumes and types of debris expected to be generated by natural disasters, such as hurricanes and severe Nor'easter. In addition to managing the removal of storm generated debris, the Department must also be prepared to conduct debris estimation and damage assessments, with particular emphasis on rapid response, and to make those temporary repairs and permanent restoration of the infrastructure that provide lifeline support. Contracts to support these needs are included in the program as well. This program is founded upon the concept of strategic pre-positioning of resources necessary for the conduct of timely and coordinated actions as are expected to be required.

This plan is purposely written in general terms in recognition of each possible event's individual type, location, and severity of damage. It is designed for response to minor storm events as well as the all-hands-required major hurricane.

Hurricanes begin to generate large volumes of debris when wind speeds exceed local building code requirements. This is generally in the range of 100 to 110 miles per hour (mph). This coincides with the wind speed recognized as the point of demarcation (110 mph) between Category 2 and Category 3 (Saffir-Simpson Scale) hurricanes. Wind speeds below 110 mph generally cause damage primarily to shrubbery and tree foliage, with some trees blown down. Unanchored mobile homes and poorly constructed signs are

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damaged. No major damage is caused to buildings. Minor volumes (relatively speaking) of debris are generated.

When wind speeds exceed 110 mph, foliage is torn from trees, large trees are blown down, and structural damage to virtually every building in the path of the storm begins to be seen. Further destruction of buildings continues as wind speeds escalate. Large volumes of debris, of every type, are generated.

For Department of Public Works response and recovery operations planning purposes, nor=eastern, unless severe, and Category 1 and minor to moderate Category 2 hurricanes are deemed to be minor storm events and expected only to generate minor volumes of clean woody debris. Major storm events that are expected to generate large volumes of debris include severe nor=eastern and strong Category 2 and above hurricanes. Presented herein are the pre-storm postures, and post-storm response actions, which the Department will execute for minor storm events and major storm events.

### Hurricane Generated Debris Volume Estimates

For the sole purpose of design reference for the disaster debris management program, the U.S. Army Corps of Engineers Storm Generated Debris Model was utilized to approximate volumes of debris associated with the various categories of hurricane and their associated wind speeds. The results of the model shown below assume each storm strikes the City with equal intensity and severity of damage across the entire geographic boundary.

	Total Debris Volume	Clean Woody (30%)	Burnable C&D (30%)	Soil (2%)	Metals (10%)	Landfill (28%)
Category 1 74 - 95 MPH						
Dry	0.52					
Wet	0.67					
Category 2 96 - 110 MPH						
Dry	2.06					
Wet	2.68					
Category 3 111 - 130 MPH						
Dry	6.71	2.01	2.01	0.14	0.67	1.88
Wet	8.72	2.62	2.62	0.17	0.87	2.44
Category 4 131 - 155 MPH						
Dry	12.90	3.87	3.87	0.26	1.29	3.61
Wet	16.77	5.03	5.03	0.33	1.68	4.70
Category 5 greater than 155 MPH						
Dry	20.64	6.19	6.19	0.42	2.06	5.78
Wet	26.83	8.05	8.05	0.54	2.68	7.51

**All debris volume approximations are in millions of cubic yards.**

The percentages of the total debris volume that each type of debris listed is expected to comprise are historical in nature and taken directly from the U. S. Army Corps of Engineers Storm Generated Debris

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Model. This model is noted to have plus or minus 30% accuracy. There is no breakdown of quantities estimated for total debris volumes for Category 1 and Category 2 hurricanes. These storms historically only generate clean woody debris. These debris volume approximations are provided for general reference only and are not intended to obligate the City in any way.

#### **Design Storm**

For the sole purpose of design reference for the disaster debris management program, the Department of Public Works / Operations Group has selected a Category 4 AWet hurricane as the design storm. The volume of debris expected to be generated by this storm making landfall with equal intensity all across the City is 16.77 million cubic yards. This estimated debris volume was selected only for use in determining the land area requirements for Temporary Debris Storage and Reduction (TDSR) sites, explained in more detail later.

#### **Minor Storm Events**

Nor'easters, Category 1 and Minor to Moderate Category 2 Hurricanes  
Wind Speeds to 100 - 110 mph

For those Nor'easters and Category 1 and minor to moderate Category 2 hurricanes with wind speeds forecast between 74 and approximately 100-110 miles per hour, significant damage is limited to trees and vegetation and mobile homes. Most structures will have only minor door and window damage. No major damage to buildings is expected with wind speeds in this range. Some streets will be blocked with fallen trees and canopy vegetation.

The City will respond to these minor storm events by assigning as many as 600 employees and their normally used equipment from several departments to the task. Normally assigned duties of these crews will be suspended during cleanup operations. It is expected that City crews can remove and dispose of approximately 50,000 cubic yards of clean woody debris within a two to three week period. Crews will be placed on alert and be prepared to respond as planned immediately following the event. The Department of Public Works / Operations Group will coordinate debris removal operations, with assistance from the Department of Public Utilities Operations and Maintenance Division and the Department of General Services Landscape Services Division. Disposal of debris will be at the City landfill. Public Works will contract with a local tree service or clearing and grubbing firm to reduce this debris through chipping, grinding, or mulching at sites to be selected, dependent upon local volume concentrations. Mulch will be made available for free pick up by citizens to reduce the impact of disposal on the City landfill.

City crews will respond from their normal place of work during daylight hours. Debris removal operations will be confined to normal workdays, with Saturday collection as local conditions may dictate. Citizens will be advised of the collection schedules via pre-arranged public service announcements made through local newspaper, television, and radio media. Temporary drop-off sites for citizen delivery of clean woody debris will be established at appropriate sites across the City for several weeks following the event. These sites will operate with evening and weekend hours in support of citizen cleanup and delivery.

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For volumes of debris estimated between 50,000 cubic yards and approximately 500,000 cubic yards, the assistance of contractors engaged by Public Works in the annual maintenance and construction of the infrastructure would be called upon (herein after referred to as Annual Maintenance Construction Contracts). The Department of Public Works currently operates approximately fifteen such contracts each year. These contracts are designed for annual infrastructure maintenance activities and include specific provisions for the suspension of currently assigned work and for the contractor resources to be brought to the aid of the City in time of emergency or disaster response. Nearly all of these contractors are locally based. Reduction and disposal operations, similar to those noted above, will take place.

It is envisioned that as much as 500,000 cubic yards of debris may be effectively managed by City crews and Annual Maintenance Construction Contract resources. Cleanup operations may take one month to six weeks to complete, with citizens advised to bring debris to the edge of the right-of-way in front of their homes for collection.

### **Major Storm Events**

Severe Nor'easters, and strong Category 2 and above Hurricanes  
Wind speeds above 100 - 110 mph

As a strong Category 2 or greater hurricane, with wind speeds forecast in excess of 100 mph, approaches the City, the benefits of strategic pre-positioning of City crews and equipment and implementation of disaster response contracts will be realized.

City crews will move to pre-position in each Hurricane Damage Control Zone at neighborhood recreation centers, the basement of the judicial center, and the Public Works / Operations Group command center beginning at least 24 hours in advance of landfall of the storm. City crews will be allowed time to secure their homes, make all necessary preparations for their families (to include moving them to City shelters close to the pre-positioning sites) and report to their respective pre-positioning site with all personal supplies necessary for three to five days time. Each pre-positioning site is designed to become an independent operation engaged in the emergency clearing of debris from primary highways immediately following the storm. City disaster response personnel will be fed at a school nearby each pre-positioning site, through advance coordination with the Virginia Beach Public Schools.

The City of Virginia Beach has been divided into four (4) distinct Hurricane Damage Control Zones. Zone boundaries are marked by readily identifiable geographic features, such as waterways and six and eight lane highways, that are expected to survive even the Category 4 hurricane design storm conditions. Each Damage Control Zone has two Zone Captains assigned to facilitate 24 hour per day, 7 day per week clearing operations. Each Zone Captain will be independently responsible for all assignments within his/her Zone. Each Zone is subdivided into Sections for debris removal operations performance monitoring purposes.

These crews will immediately begin to clear a minimum of one lane of traffic in each direction on all primary roadways in the City. The first priority of roads to be cleared are those primary streets and highways that provide for evacuation and/or access to hospitals, shelters, police, fire and rescue stations, and other facilities providing vital public services. The second priority of streets and highways to be cleared of debris are those that provide access to components of the public and private utility systems that are vital to the restoration of essential utility services, such as electrical power stations and substations, municipal potable water and sanitary sewer pumping stations, and communications stations and towers. The third priority of roadways to be cleared is collector streets and other major highways. Next in order of priority are all residential streets and access ways.

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No debris is intended to be removed during these initial emergency road-clearing operations. Rather, debris is to be pushed to the side of the roadway that will allow for a minimum of one lane of traffic in each direction and not create conflict with future utility restoration efforts by others.

In addition to the pre-positioned City crews and equipment, the Department of Public Works will issue notices to proceed to each of the Time and Material Contracts for Debris Clearing that it holds with local area contractors for disaster response. These contracts are executed and in place and bring the full complement, as available, of each of these contractors to the emergency road clearing operations.

Each of these contractors engaged via the Time and Material Contracts for Debris Clearing has been given an initial route for clearing and is directed to respond with all due haste and personnel and equipment available. This pre-positioning of initial assignments is designed for immediate response upon mobilization by the contractor, without need for further coordination following the disaster event, a time during which normal lines of communication are expected to be severely disrupted. Department of Public Works contract inspection staff have also been made aware of these initial route assignments for performance monitoring purposes. This ability to respond rapidly is an acknowledgment of the life safety mission involved at this stage of disaster response. Each contractor has been directed to report to a particular Damage Control Zone Captain at a specific City pre-positioning site upon completion of the initial assignment for further tasking as directed. These contractor resources will continue to support City crews in the emergency clearing of debris from the roadways for a period of 100 hours, or until released from duty by the City.

Each local contractor holding the Time and Material Contract for Debris Clearing will also serve as a general contractor, or hiring hall, for all those other contractors that will come to assist the City in this effort. This will help to ensure that City staff will have only a manageable number of contracts to administer throughout the disaster response period. This contract is re-issued each spring to the same group of contractors, allowing for updating of numbers of equipment and personnel and unit costs.

The resources available to the City via the Public Works Annual Maintenance Construction Contracts may also be called upon to support emergency road clearing operations. No attempt to schedule assignments for these contract resources has been made at this time.

Also pre-positioning at the selected sites across the City will be Damage Assessment Teams comprised of the engineering division staff from the Departments of Public Works, Planning and Public Utilities. These staffs have been trained in conducting debris estimation and damage assessments and will be equipped with all-necessary maps and forms. Rapid assessment of the damage is critical to supporting requests for disaster declarations from both the Governor and the President of the United States, as is expected to occur when responding to major storm events.

Additional damage assessment and debris estimating teams are available from the local architect/engineering community via the Engineering and Related Services Agreement for Emergency Operations Damage and Repair Assessment, and Emergency Recovery Engineering Services, explained in more detail later. The Department of Public Works is responsible for damage assessment and debris estimation training and for distributing all necessary maps and forms to these firms.

As lines of communication are restored during response actions, coordination of all field activities will be managed by the Public Works command center and relayed to the City Emergency Operations Center (EOC).

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As the major storm event approaches the City, the Department of Public Works will be in contact with the contractor firm holding the executed and in-place Disaster Debris Removal, Reduction, Recycling and Disposal Contract to advise them of impending conditions. This contract is designed to remove and lawfully dispose of all natural disaster generated debris, except hazardous and industrial materials. Debris removal will be limited to City streets, roads and other rights-of-way, all City of Virginia Beach municipal and public school properties, and any other municipal facility or site as may be directed, and includes all private residence and property debris brought to the edge of the right-of-way by citizens. The contractor is responsible for determining the method and manner of all debris removal and lawful disposal operations. Disposal of debris shall be in any lawful site neither owned nor operated by the City of Virginia Beach nor the regional waste authority, Southeastern Public Service Authority. The contractor is also responsible for the lawful disposal of all debris reduction by-products that their operations may generate. Upon notice to proceed, the contractor shall mobilize such personnel and equipment as necessary to conduct all debris removal, reduction, recycling, and lawful disposal operations as were presented to and reviewed by the Department of Public Works at the time of contractor selection. This contract has a base period of five years with annual recertification. Five, one-year extensions to the base period of the contract are available.

The general concept of disaster debris removal operations developed by the City includes multiple, scheduled passes of each site, location or right-of-way directed. This manner of debris removal allows citizens the opportunity to return to their properties and subsequently bring all debris to the edge of the right-of-way for City contractor removal, as property restoration progresses.

In researching disaster debris management programs, the economy of clean woody debris disposal afforded through local temporary storage and reduction was noted. In recognition of this economy, the City has pre-designated five sites totaling 209 acres for the sole purpose of the temporary storage and reduction of clean woody debris (this does not include the reduction of the 30% of total debris volume expected to be burnable construction and demolition materials). These sites are known as Temporary Debris Storage and Reduction (TDSR) sites. No other debris operations are authorized on these sites. Should the debris removal contractor choose to establish and operate these sites, they will be made available at no cost. Should the debris removal contractor select to operate any debris removal operation sites other than those pre-designated by the City, the contractor shall make all arrangements.

Two of the five TDSRS are located on property owned by the Federal Government at the Naval Air Station Oceana. Clean woody debris reduction operations are restricted to chipping, grinding, or mulching on these sites. No burning of debris is authorized. Should the Disaster Debris Removal, Reduction, Recycling and Disposal contractor choose to operate these sites, all that clean woody debris originating on the Air Station property and delivered to the TDSRS by the Navy will be accepted for processing and disposal. A Memorandum of Understanding (MOU) and a Real Estate License Agreement have been negotiated and executed between the Naval Air Station and the City of Virginia Beach for this purpose.

Two additional City-owned sites are also located in close proximity to the Air Station and have similar restrictions on reduction operations authorized. The fifth site is an abandoned airfield in the rural southern section of the City. Burning operations are authorized on this site.

As these sites were identified and investigated for disaster debris operational use, block diagrams of expected use configuration were prepared. These plans, along with the overall debris management program, were presented to and reviewed by the Commonwealth of Virginia Department of Environmental Quality. As a result of this advance coordination, all of the environmental concerns were identified and addressed and permit requirements established. This will ensure continuous operation, without interruption, upon site activation. Established baseline and closure environmental testing requirements and a general operation

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plan for the TDSRS are included in the Disaster Debris Removal, Reduction, Recycling and Disposal Contract.

If established and operated, the pre-designated TDSRS will be open to City contractor vehicles and private citizen delivery of clean woody debris only.

The City encourages the recycling of any and all disaster debris possible. The debris removal contractor is responsible for establishing any such arrangements. Any monies that may be generated from any disaster debris recycling activities or other lawful disposal operations remain with the contractor.

Any hazardous and industrial materials encountered by the debris removal contractor are to be set aside at the point of collection for removal and disposal by the Hazardous and Industrial Materials Cleanup and Disposal Contract. This is an annual services agreement, currently with a base period of four years, which is executed and in place for daily operation, and contains specific provisions for natural disaster response and recovery operations. This contract provides for the conduct of multiple, scheduled passes of every City street, road, and other rights-of-way, all City of Virginia Beach municipal and public school properties, any other municipal facility or site as may be directed, and includes all private residence and property debris which may be hazardous or industrial in nature and is brought to the edge of the right-of-way by citizens. The schedule of passes conducted under this contract will be coordinated with the schedule of passes established under the Disaster Debris Removal, Reduction, Recycling and Disposal Contract. In addition, should the debris removal contractor choose to establish and operate the pre-designated TDSRS, the Hazardous and Industrial Materials Cleanup and Disposal Contract will provide daily collection of any materials incidentally delivered during debris removal operations.

The final contract package developed by the Department of Public Works in support of natural disaster response and recovery operations is the Engineering and Related Services Agreement for Emergency Operations Damage and Repair Assessment, and Emergency Recovery Engineering Services. This contract, offered to and accepted from all firms in the local architectural/engineering community, contains two parts. Part I of the contract is designed to provide a trained cadre of additional personnel and equipment, beyond those of City staff, to assist in the conduct of initial, preliminary, and joint damage inspections and repair assessments. The principal purpose for this contract being executed and in place prior to the disaster event is the need for rapid collection of damage assessment information and restoration cost estimates. The information gathered will be used to support City requests for Gubernatorial and Presidential disaster declarations. With review of the contracts submitted, particular firms can be pre-assigned to inspect that part of the infrastructure where the firm's specialty lies. Again, the advantage of pre-positioning this contract is the immediate response, upon mobilization, of all available resources without need for further coordination nor communication following the disaster event. Part I of this contract is designed for 100 hours use, or until released by the City.

Part II of the engineering services contract is the standard annual services agreement utilized by the Department of Public Works. It is designed to immediately bring the full range of professional and non-professional services of each architectural/engineering firm to the aid of the City in the preparation of Project Worksheets (as required by the Federal Emergency Management Agency), the mitigation study, design, specification and plan preparation of the temporary repairs to, and permanent restoration of all elements of the infrastructure. These services may also include the management and inspection of the Time and Material Contract for Debris Clearing, the Debris Removal, Reduction, Recycling and Disposal Contract, the Hazardous and Industrial Materials Cleanup and Disposal Contract, and the Annual Maintenance Construction Contracts.

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This disaster response and recovery program is designed to provide those resources known to be necessary for timely and coordinated response and recovery actions following a natural disaster event which generates large volumes of debris and creates damage to the infrastructure. In addition, Federal regulations governing the reimbursement of disaster response and recovery costs were investigated for compliance. It is through this program, and the five (5) contract packages noted, that the City of Virginia Beach Department of Public Works plans to execute a timely and coordinated response and recovery.

Rapid and coordinated responses to natural disaster events are critical to the restoration of lifeline systems serving any community. Pre-positioned staff and contract resources stand in direct support of this mission. This plan presents general concepts of operations, with details included only where available. It is extremely important for both the City and its contractors to recognize the contingencies of planning necessary in any natural disaster response and recovery program. Ongoing dialogue with contract resources aids in this awareness.

The Department of Public Works is not normally viewed as a first response unit to emergencies. However, when conditions escalate to disaster proportions, it is the mobility of the responding units that differentiates between success and failure, and saves lives. It is at this point in time that Public Works does in fact become the first responder to the needs of its citizens.

The Department of Public Works stands ready to serve the citizens of the City of Virginia Beach.