Houston-Galveston Area Council

REGIONAL STORM DEBRIS MANAGEMENT ASSESSMENT

Prepared By

Dewberry
In association with Reed, Stowe & Yanke LLC

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF TABS

EXECUTIVE SUMMARY

1. FINDINGS

a. Background: The Project Team of Dewberry & Davis LLC (Dewberry) and Reed, Stowe & Yanke LLC was contracted by the Houston-Galveston Area Council (H-GAC) to conduct a Regional Storm Debris Management Assessment in response to an increased awareness nationwide regarding disaster preparedness and local experiences following Tropical Storm Allison.

The Regional Storm Debris Management Assessment was designed to obtain information by reviewing current plans and through on-site interviews. The purpose of the reviews and interviews was to determine if the counties and municipalities were prepared to respond to a major debris-generating event.

b. Threat: A hurricane poses the greatest threat to the H-GAC Region. Therefore, a Category 4 Hurricane (winds up to 155mph) was selected as the basis for estimating debris quantities and the impact on the region. However, due to the geographic nature of the region, the Project Team decided to divide the region into three sub-regional zones for debris estimating purposes and to assign a specific hurricane category to each since the magnitude of the hurricane diminishes as it moves inland.

The three sub-regional zones are identified as:

- Coastal Counties - Matagorda, Brazoria, Galveston, Chambers
  Category 4 Hurricane (Winds 155mph) will generate approximately 10,005,285 cubic yards of debris.
- Inland Counties - Wharton, Fort Bend, Harris, Liberty
  Category 3 Hurricane (Winds 130mph) will generate approximately 34,776,908 cubic yards of debris.
- Upland Counties - Colorado, Austin, Waller, Montgomery, Walker
  Category 2 Hurricane (Winds 110mph) will generate approximately 1,229,459 cubic yards of debris.

The total estimated quantity for a hurricane impacting on the entire H-GAC region is 46,011,654 cubic yards of debris. Details are contained in Tables 6 and 7.

c. Debris Management Questionnaire and Documentation: This project was divided into two phases.

Phase 1: The Project Team conducted an extensive outreach campaign for this project. The purpose of this outreach campaign was 1) to increase awareness among local governments in the H-GAC region, and 2) to encourage participation by local governments in the needs assessment portion of this project.

The Project Team conducted outreach meetings on August 21, 2002 in Fort Bend County and at H-GAC headquarters in Houston. The purpose of these meetings was to present information on disaster related-impacts and how proper disaster debris planning can minimize impacts at the local level by reducing response/recovery time and speeding up the disaster funding cycle. The Project Team also provided information pertaining to the assessment and to set the tone for the follow-up on-site inventory and existing plan evaluations.

Phase 2: The Project Team reviewed a sampling of existing county and city Emergency Response Plans, specifically Annex K (Public Works & Engineering) to determine if adequate emphasis was being placed on debris-management planning. The Project Team also conducted on-site meetings in each county to ascertain the degree of debris management planning at the city level through the use of detailed questionnaires.

2. RECOMMENDATIONS

The following recommendations are based on provided documents, questionnaires, and interviews. The recommendations are designed to assist H-GAC member municipalities to either update or develop coordinated Debris Management Plans. See Table 17 on page 37 for a detailed description of all recommendations.

Organization and Coordination Recommendations:

- Municipalities should either update or develop coordinated Debris Management Plans
- Municipalities need to designate a "Debris Manager" as the single point of contact on all debris management matters
- Municipalities need to create a Debris Management Center (DMC) outside of the current Emergency Operations Center (EOC) location.
- Municipalities need to assign a Public Information Officer to the DMC.
- Municipalities need to develop Right-of-Entry and Hold Harmless agreements

Resource Recommendations:

- Municipalities need to identify staff for a DMC operation.
- Municipalities need to develop pre-event debris clearing, removal and disposal contracts.
- Municipalities need to identify suitable temporary debris management sites.
- Municipalities need to conduct baseline studies on each temporary debris management site.
- Municipalities need to identify and train debris contract monitors

Training Recommendations:

- Municipalities need to conduct training workshops for their debris management staff to include:
  - FEMA Public Assistance Program Overview Workshop (8 hrs)
  - Debris Management Plan Development Workshop (3 days)
  - Debris Contract Monitoring Workshops (8 hrs)
  - Financial Workshop (8 hrs)

Technology Recommendations:

- Municipalities should develop a GIS-based Debris Management Application capable of forecasting and estimating debris quantities and tracking debris removal activities similar to the application developed for the City of Houston, TX.

NEEDS ASSESSMENT OVERVIEW

This H-GAC Regional Storm Debris Management Assessment identifies a basic framework and many underlying resources necessary to support the development and implementation of coordinated Debris Management Plans for either counties or cities. With minor organizational changes and development of a dedicated and focused coordinated debris management approach, existing disaster response plans can readily be expanded to cover debris management. Addressing the shortfalls identified herein will allow the development of an effective plan that allows the counties and cities within the H-GAC Region to rapidly respond to natural and man-made debris-generating events.

Where Are We Now? This section of the report identifies the current state of debris management planning within the H-GAC region. The Project Team reviewed a sampling of existing county and city Emergency Response Plans, specifically Annex K (Public Works & Engineering) to determine if adequate emphasis was being placed on debris-management planning. The Project Team also conducted on-site meetings in each county to ascertain the degree of debris management planning at the city level through the use of detailed questionnaires. The results of these efforts revealed that there is a need for counties and cities to either review and update their current plans or develop new ones based on recommendations contained in this report.

What is the Impact of a Major Debris Generating Event on the Region? This section of the report identified the potential impact of a major debris-generating event (Hurricane) hitting the entire region. The region was divided into three sub-regional zones for calculation purposes – Coastal Zone (Category 4 Hurricane); Inland Zone (Category 3 Hurricane); Upland Zone (Category 2 Hurricane). The U.S. Army Corps of Engineers' (USACE's) Debris Estimating Model was used to calculate estimated debris quantities. Those quantities were then used to evaluate the impact on existing landfill capacities. The short-term (5-10 years) planning perspective indicated that there is sufficient current capacity within the region. However, from a long-term planning perspective (greater that 10 years), a hurricane would have a significant negative impact on the remaining disposal capacity in the region.

The Project Team also identified a major shortage of identified temporary debris management sites throughout the region. These sites are required to reduce the impact on existing landfill sites since they are usually used to reduce debris volumes through burning, grinding, or recycling.

What Do We Do Now? This section of the report identifies specific shortfalls in local debris management planning efforts and makes specific recommendations designed to address landfill and debris management plan improvements. Specific examples are provided in the accompanying TABs to the report.

Where Do We Go From Here? The final section of the report identifies actions that can be taken by either H-GAC or individual counties or cities. These include available training opportunities that can either be sponsored by H-GAC or individual communities. For communities that desire outside consulting services, a Request for Qualifications is provided to assist them in going forward with competitive bidding for services to assist in the development and/or review of a comprehensive Debris Management Plan.

The Project Team is available to assist H-GAC and member counties and cities in reviewing or developing coordinated Debris Management Plans based on the report's recommendations.

HOUSTON-GALVESTON AREA COUNCIL
REGIONAL STORM DEBRIS MANAGEMENT ASSESSMENT REPORT

I. GENERAL

The team of Dewberry & Davis LLC (Dewberry) and Reed, Stowe & Yanke LLC (Project Team) was contracted by the Houston-Galveston Area Council (H-GAC) to conduct a Regional Storm Debris Management Assessment in response to an increased awareness nationwide regarding disaster preparedness and local experiences following Tropical Storm Allison.

The Regional Storm Debris Management Assessment is designed to obtain information by reviewing current plans and through on-site interviews. The purpose of the reviews and interviews is to determine if the counties and cities are prepared to respond to a major debris-generating event.

II. PROJECT APPROACH

The Project Team was requested to focus on identifying major disaster debris-generating removal and disposal issues. The following goals were established to guide the Project Team in the assessment process:

- Increase awareness among the 13-county members regarding the potential impacts of a major debris-generating event to the normal operation of the governments, and specifically of the impacts to the operation/capacity of the existing solid waste operations.
- Conduct an independent assessment of the abilities of H-GAC member communities and regions to prepare for, respond to, and recover from a major debris-generating event.
- Provide implementable debris management recommendations that will preserve landfill capacity through preparedness planning, sharing of resources, and piggybacking of contract efforts.

To accomplish these goals, the Project Team divided the project into two phases for ease of coordination and to follow a logical progression of work tasks to allow H-GAC and participating counties and cities reasonable time to assess interim deliverables and provide input toward the end product. These phases and associated tasks are as follows:

Phase I – Needs Assessment, Outreach and Recommendations

- Task 1. Kickoff Meeting
- Task 2. Coordination and Data Collection
- Task 3. Outreach
- Task 4. Inventory & Existing Plan(s) Evaluation
- Task 5. Needs Assessment
- Task 6. Recommendations and Preliminary Report
- Task 7. Additional Training

Phase II – Regional Debris Management Capabilities

- Task 1. Debris Prediction (Quantification of Storm Impacts
- Task 2. Debris Management Site Availability
- Task 3. Landfill Site Availability
- Task 4. Agreements & Contracts
- Task 5. Final Report

III. OUTREACH AND TRAINING

The Project Team conducted an extensive outreach campaign for this project. The purpose of this outreach campaign was 1) to increase awareness among local governments in the H-GAC region, and 2) to encourage participation by local governments in the needs assessment portion of this project.

The Project Team conducted outreach meetings on August 21, 2002 in Fort Bend County and at H-GAC headquarters in Houston. The purpose of these meetings was to present information on disaster related-impacts and how proper disaster debris planning can minimize impacts at the local level by reducing response/recovery time and speeding up the disaster funding cycle. The Project Team also provided information pertaining to the assessment and to set the tone for the follow-up on-site inventory and existing plan evaluations.

The Project Team coordinated with each of the 13 County Emergency Management Coordinators in the H-GAC region to set-up assessment meetings for county and city officials and staff. The Project Team also received input from the County Emergency Management Coordinators concerning which local governments should participate in the meetings, and who should attend the meetings.

To encourage participation in the assessment meetings, the Project Team implemented an extensive outreach campaign to notify local governments about the meetings. This information was provided through a series of telephone calls, faxes (TAB A), and e-mails.

The Project Team developed a questionnaire (TAB B) that was forwarded to each County Emergency Management Coordinator and local government in the H-GAC region. The questionnaire was to be completed by each local government prior to the in-county meetings. Local governments that could not attend the meetings were requested to forward a completed copy of the questionnaire to the Project Team. The County Emergency Management Coordinators were extremely helpful in coordinating the on-site meetings conducted during the period September 30 through October 10, 2002.

The Project Team also conducted a one-day FEMA Public Assistance Program Overview Workshop on October 21, 2002 at H-GAC headquarters. The purpose of the workshop was to provide H-GAC, county, and city personnel with information on FEMA's Public Assistance Program with emphasis on the documentation required for reimbursement following a major-debris generating event. This workshop focused on the following topics:

- The Declaration Process
- Public Assistance Program and Eligibility
- Categories of Work
- Special Considerations
- Project Formulation
- Project Closeout and Audits
- Mitigation Funding and Debris Planning

IV. WHERE ARE WE NOW?

A. Needs Assessment

The first step taken by the Project Team was to review a sampling of existing county and city Emergency Response Plans, specifically Annex K (Public Works & Engineering). H-GAC provided the Project Team with 15 representative Annex Ks for review.

The second step taken by the Project Team was to conduct on-site meetings in each county to learn first hand about the readiness and ability to respond to a major debris-generating event. The meetings provided the Project Team with an opportunity to inventory the existing storm debris management plans within each county through interviews with the emergency responders. The Project Team gathered information and obtained clarification on existing debris management plans, procedures, mutual aid agreements, and contracts or contracting mechanisms. Each participant was requested to complete a questionnaire and submit it to the Project Team. Participating counties and cities are shown in Table 1.

Table 1: Participating Counties and Cities

County/City	Annex K	Questionnaire	County/City	Annex K	Questionnaire
AUSTIN COUNTY	X		**HARRIS COUNTY**		X
City of Sealy	X		Precinct 1		X
BRAZORIA COUNTY			Precinct 2		X
City of Clute		X	City of Baytown	X	X
City of Pearland		X	City of Deer Park	X	X
Jones Creek		X	City of Humble		X
Village of Surfside Beach		X	City of Jersey Village	X	X
CHAMBERS COUNTY	X	X	City of Pasadena	X	
COLORADO COUNTY			City of Webster	X	X
City of Weimar		X	**LIBERTY COUNTY**		X
FORT BEND COUNTY			City of Liberty	X	X
City of Meadows Place			**MATAGORDA COUNTY**	X	X
City of Missouri City		X	City of Palacios		X
City of Stafford		X	**MONTGOMERY COUNTY**		X
City of Sugarland	X	X	City of Conroe		X
GALVESTON COUNTY	X	X	**WALKER COUNTY**		X
City of Friendswood	X		City of Huntsville		X
City of Hitchcock		X	**WALLER COUNTY**		
City of Jamaica Beach		X	City of Hempstead		X
City of League City	X		City of Waller	X	X
Texas City		X	Pine Island		X
			WHARTON COUNTY		X
			City of Wharton		X

Note: X = Information provided by participating counties and municipalities. Blank boxes indicate that data was not available or not provided to the Project Team.

B. Annex K (Public Works & Engineering) Review and Recommendations

Table 2 below is a summary of the Project Team's findings based on a review of existing county and city Emergency Response Plan, Annex K (Public Works & Engineering) provided by H-GAC. The Annex K developed by Galveston County, Matagorda County, and City of Sugar Land are examples that contain excellent guidance and need only minor revisions to meet current debris management operational objectives. Additional Annex K (Public Works & Engineering) review comments are at TAB C.

Table 2: Annex K (Public Works & Engineering) Recommendations

County / City	Minor Update Recommended	Major Update Recommended	Debris Management Plan Appendix	Recommendations	Identify Responsible Departments and Personnel	Define Responsibilities	Update Local, State and Federal References	Provide Guidance for all Debris Management Operations	Designate a "Debris Manager" by Name or Position
Austin County	X		Y		X	X	X	X	X
Baytown	X		N		X	X	X	X	X
Chambers County	X		Y		X	X	X	X	X
Deer Park		X	N		X	X	X	X	X
Friendswood	X		Y		X	X	X	X	X
Galveston County	X		Y		X	X	X	X	X
Jersey Village		X	N		X	X	X	X	X
League City		X	N		X	X	X	X	X
Liberty		X	N		X	X	X	X	X
Matagorda County	X		Y		X	X	X	X	X
Pasadena		X	N		X	X	X	X	X
Sealy		X	N		X	X	X	X	X
Sugar Land	X		Y		X	X	X	X	X
Waller		X	N		X	X	X	X	X
Webster		X	N		X	X	X	X	X

The Project Team strongly recommends that all counties and cities review their Annex K and update them to include the following provisions:

- Identify responsible department/personnel and define their responsibilities and tasks for:
  - Clearing debris from rights-of-way in an emergency.
  - Preparing and maintaining a resource list that identifies source locations and availability of contractor equipment that could be used to support debris clearing, removal, and disposal operations.
- Reference current federal, state, and local authorities that establish the legal basis for planning and carrying out emergency responsibilities.
- Include a purpose or mission statement that describes the reason for the plan.
- Provide a situational statement that describes potential hazardous considerations.
- Include planning assumptions.
- Include a concept of operations that describe how emergency operational activities will be carried out.
- Describe the organization and identify responsibilities for each agency.
- Develop organizational chart and notification procedures.
- Designate a representative to be the "Debris Manager" for the county/city.
- Develop a direction and control section to provide specific guidance on command and coordination of all debris management operations.

Detailed Debris Management Plan development guidance is contained in Table 17 (page 40) and TAB F.

C. On-Site Meetings and Questionnaires

The information gathered through the on-site interviews and questionnaires has been compiled into a needs assessment that evaluates the adequacy of the H-GAC Region's debris management planning efforts and its ability to respond, collect, stage, reduce, and dispose of storm-generated debris.

Tables 3 and 4 provide a summary of the Project Team's findings based on a compilation of the information extracted from the debris management inventory questionnaires (TAB B) that were returned by each county and city that attended the meetings.

Table 3: Organization and Coordination Questions

Austin																	
	Sealy	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	N	N
Brazoria																	
	City of Brazoria	Y	Y	Y	Y	N	N	Y	Y	N	Y	Y	N	N	N	N	N
	Clute	Y	N	Y	Y	Y	N	N	N	N	Y	Y	N	N	N	N	Y
	Jones Creek	Y	N	Y	N	Y	Y	UKN	N	UKN	UKN	N	N	N	N	N	Y
	Lake Jackson	Y	N	N	Y	Y	N	N	N	N	UKN	Y	N	N	N	N	Y
	Pearland	Y	N	Y	Y	Y	N	N	N	N	Y	N	N	N	Y	N	Y
	Richwood	Y	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	Y
	Surfside	Y	N	Y	Y	N	N	N	N	N	Y	Y	N	N	N	N	Y
Chambers		Y	N	Y	Y	Y	UKN	N	N	N	Y	Y	N	Y	N	N	Y
Colorado																	
	Weimar	N	N	N	Y	N	N	N	N	N	Y	N	N	N	N	Y	N
Fort Bend																	
	Meadows Place	N	Y	Y	N	Y	N	N	N	N	N	Y	N	Y	N	N	N
	Missouri City	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N
	Rosenberg	Y	N	Y	N	N	N	N	N	N	Y	N	N	N	N	N	N
	Stafford	N	N	Y	Y	N	N	N	N	N	UKN	N	N	N	N	N	N
	Sugar Land	N	N	N	N	Y	Y	N	N	N	Y	Y	N	N	N	N	N
Galveston		N	Y	Y	Y	Y	Y	N	Y	N	Y	Y	N	UKN	Y	N	Y
	Hitchcock	N	Y	Y	Y	Y	Y	N	N	N	UKN	UKN	N	Y	N	N	N
	Jamaica Beach	Y	Y	Y	Y	Y	N	N	Y	N	Y	Y	N	Y	N	N	N
	Texas City	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N	N	N	Y
Harris																	
	Baytown	Y	N	Y	Y	Y	Y	N	Y	N	N	Y	N	UKN	N	N	Y
	Houston	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	Y	N	Y
	Humble	Y	Y	Y	Y	N	Y	N	N	N	N	Y	N	N	N	N	N
	Jersey Village	Y	N	N	Y	N	N	N	N	N	UKN	N	N	N	N	N	N
	Precinct 1	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	Y	Y	N	Y
	Precinct 2	Y	Y	N	Y	Y	Y	N	N	N	N	Y	N	N	N	Y	N
	Seabrook	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N	N	N	Y	N
	Webster	N	N	N	Y	N	Y	N	N	N	N	N	N	N	N	N	N
Liberty		Y	Y	Y	Y	Y	Y	Y	N	N	Y	N	N	Y	N	Y	Y
	Liberty	Y	N	N	Y	Y	Y	N	N	N	N	Y	N	Y	N	Y	N
Matagorda		N	Y	N	Y	Y	Y	Y	N	N	N	Y	N	N	N	Y	N
	Palacios	N	Y	Y	Y	Y	N	N	N	N	Y	N	N	N	N	N	N
Montgomery																	
	Conroe	Y	N	N	Y	Y	Y	N	N	N	N	Y	N	N	N	N	N
Walker		Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Y
	Huntsville	Y	N	N	Y	Y	N	N	N	N	N	Y	N	N	N	N	N
Waller		N	N	N	Y	Y	Y	N	N	N	N	N	N	N	N	Y	N
	Hempstead	N	N	N	Y	N	N	N	Y	N	Y	Y	N	N	N	N	N
	Pine Island	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	Waller	N	N	N	Y	Y	Y	N	N	N	Y	N	N	Y	N	N	N
Wharton		Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
% YES (Y)		61	37	57	77	65	49	20	20	5	40	51	3	20	6	20	20
% NO (N)		39	63	43	23	35	48	77	80	91	45	46	97	74	94	80	80
% Unknown (UKN)							3	3		3	15	3		6			

Note: There were 39 responses to Organization and Coordination Questions. Blank boxes indicate that data was not available or not provided to the Project Team. Boxes with UKN indicate that the respondent did not give a response to the question.

Table 4: Resources and Training Questions

H-GAC Regional Storm Debris Management Assessment

County	City	Do you have preprinted load tickets?	Do you have preprinted Right of Entry/Hold Harmless Agreements?	Do you have an organization chart?	Have you attended a Debris Monitoring Workshop?	Have you attended a FEMA Documentation Workshop?	Would you or your staff participate in the aforementioned workshops?	Where should the training take place - County or H-GAC?	Who should sponsor the training?
Austin									
	Sealy	N	N	Y	N	N	Y	C	H-GAC
Brazoria									
	City of Brazoria	N	N	N	N	N	Y	C	H-GAC
	Clute	N	Y	Y	N	N	Y	C	H-GAC
	Jones Creek	N	N	N	N	Y	Y	C	C
	Lake Jackson	N	N	Y	N	N	Y	C	H-GAC
	Pearland	N	N	N	Y	N	N	C	H-GAC
	Richwood	N	N	N	N	N	N	C	H-GAC
	Surfside Beach	N	N	N	N	N	Y	C	H-GAC
Chambers		N	N	Y	N	Y	Y	C	H-GAC
Colorado									
	Weimar	N	N	Y	N	N	Y	C	H-GAC
Fort Bend									
	Meadows Place	N	N	N	N	N	Y	C	C
	Missouri City	N	N	Y	N	N	Y	C	H-GAC
	Rosenberg	N	N	N	N	N	Y	C	C
	Stafford	N	N	N	N	N	Y	C	H-GAC
	Sugar Land	N	Y	Y	N	N	Y	C	C
Galveston		N	N	N	N	N	Y	C	H-GAC
	Hitchcock	N	N	Y	N	N	Y	C	C
	Jamaica Beach	N	N	N	N	N	Y	C	C
	Texas City	N	Y	Y	N	N	Y	C	H-GAC
Harris									
	Baytown	N	Y	Y	Y	Y	Y	C	H-GAC
	Humble	N	N	N	N	N	Y	C	H-GAC
	Jersey Village	N	N	N	N	N	Y	C	H-GAC
	Precinct 1	Y	N	N	Y	Y	Y	C	H-GAC
	Precinct 2	N	Y	N	N	Y	Y	C	H-GAC
	Seabrook	N	N	Y	Y	N	Y	C	H-GAC
	Webster	N	N	N	N	N	Y	C	H-GAC
Liberty		N	N	Y	Y	N	Y	C	H-GAC
	Liberty	N	N	Y	Y	N	Y	C	H-GAC
Matagorda		N	N	Y	N	N	Y	C	H-GAC
	Palacios	N	N	Y	N	Y	Y	C	C
Montgomery									
	Conroe	N	N	Y	N	N	Y	C	H-GAC
Walker		N	N	Y	N	N	Y	C	H-GAC
	Huntsville	N	N	N	N	N	Y	C	H-GAC
Waller		N	N	Y	N	N	Y	C	H-GAC
	Hempstead	N	N	N	N	N	Y	C	C
	Pine Island	N	N	N	N	N	Y	C	H-GAC
	Waller	N	N	Y	N	N	Y	C	H-GAC
Wharton		N	Y	Y	N	N	Y	C	H-GAC
	% YES	3	17	60	14	14	97		
	% NO	97	83	40	86	86	3		
	% COUNTY							100	23
	% H-GAC								77

D. Inventory and Existing Plan Questionnaire Results

The following are responses provided by respondents to the questions pertaining to Debris Management Organization and Coordination. The Project Team used the resulting percentages to identify shortfalls and to develop the recommendations contained in Section VI.

Organization and Coordination

- Have you had a major debris-generating event in the past 4 years? **57% YES – 43% NO**
  Examples: Ice Storm, Tornado, Tropical Storm Winds, Flood
  Further Information: Total of 854,000 cubic yards of debris reported. Note that 800,000 cubic yards of debris was generated in the City of Houston by Tropical Storm Allison.

- Do you have a coordinated Debris Management Plan? **37% YES – 63% NO**
  Examples: Some cities reported that they are consolidated into their County Plan: These included cities in Harris, Galveston, and Chambers Counties.

- Do you have a single person designated as the Debris Manager? **57% YES – 43% NO**
  Examples: Precinct Foreman, Public Works Director, County Engineer, Road and Bridge Administrator, Sanitary Supervisor, Mayor, Commissioner.

- Do you have a location that would function as a Debris Management Center? **77% YES – 23% NO**
  Examples: Public Works Department, City Warehouse, Public Works Service Center, Precinct Barn, City Hall, City Service Center, Resource & Recycling Center, Precinct Office.

- Have specific key personnel been identified at each department with a support or primary debris mission? **65% YES – 35% NO**
  Examples: Public Works Director/Supertendent, Sanitation Supervisor/Foreman, Street Drainage Foreman, Parks Superintendent, Road Department, and County Judge

- Do you have a Public Information Officer as part of the Debris Management organization? **49% YES – 48% NO – 3% UKN**

- Do you have current Standard Operating Procedures that define debris clearance, removal, and disposal actions to include personnel and equipment? **20% YES – 77% NO – 3% UKN**

- Do you have current standby contracts with local contractors to perform debris clearing, removal and disposal missions? **20% YES – 80% NO**
  Examples: ENVIROTEX, Recovery Contractors Inc, and Brad Steel.
  Galveston County has a Request for Qualification for Disaster and Debris Management Services being developed.

- Do you have current standby contracts with regional or national contractors to perform debris removal and disposal missions? **6% YES – 91% NO – 3%UKN**
  Examples: The City of Houston has 4 contracts in place with regional/national contractors. Three were used during the cleanup following Tropical Storm Allison.

- Do you plan to use your current garbage haulers to remove and dispose of debris?
  40% YES – 45% NO – 15% UKN

- Do you have temporary debris management sites identified? **51% YES – 46% NO – 3% UKN**

- Have you conducted baseline studies on the proposed temporary debris management sites? Have you developed site sketches of potential layout? **3% YES – 97% NO**

- Do you have municipal or privately owned landfills?
  The following public and private landfills were identified:
  Texas Disposal System
  BFI
  Sprint Landfill
  Bryan-College Station
  BFI (Type 1)
  WMX (Type 1)
  Republic (Type IV)
  Tri City Beach
  Sanifill
  Waste Management

- Do you have mutual aid agreements with other cities or counties with respect to debris clearing, removal and disposal operations? **20% YES – 74% NO – 6% UKN**

- Have you identified roving, loading site and disposal site contract monitors? **6% YES – 94% NO**
  Examples: The City of Houston has identified Neighborhood Protection personnel to be their debris contract monitors. They receive one day of training each year prior to the start of hurricane season.

- Do you have a list or map that identifies Federal Aid Roads? **20% YES – 80% NO**

- Do you have the County/City divided into identifiable debris management zones?
  20% YES – 80% NO
  Examples: Normal brush pickup zones, sanitary pick up area, and Precinct areas

Resources and Training

- What equipment do you have for debris clearance, removal and disposal operations?
  Regional totals provided by responding cities:

Equipment	Quantity	Equipment	Quantity
Front Loaders	*34*	*20 CY Dump Truck*	*7*
Back Hoes	*71*	*22 CY Dump Truck*	*2*
Gradall	*9*	*Dump Trucks*	*9*
Bull Dozer	*14*	*Chipper*	*9*
6 CY Dump Truck	*31*	*Bucket Truck*	*6*
8 CY Dump Truck	*51*	*Motor Graders*	*33*
10 CY Dump Truck	*13*	*Excavators*	*10*
12 CY Dump Truck	*28*	*Street Sweeper*	*5*
14 CY Dump Truck	*13*	*Chain Saws*	*125*
18 CY Dump Truck	*1*	*Grapple Trucks*	*3*

- Do you have preprinted debris load tickets? **3% YES – 97% NO**
  Examples: The City of Houston used preprinted load tickets to track all contractor debris hauling operations following Tropical Storm Allison. One respondent indicated that they have a new scale program (Wasteworks) that they intend to use to track debris hauling.

- Do you have preprinted Right of Entry/Hold Harmless Agreements? **17% YES – 83% NO**

- Do you have an organization chart? **60% YES – 40% NO**

- Have you or your staff attended a Debris Contract Monitoring Workshop? **14 % YES – 86% NO**

- Have you or your staff attended a FEMA Documentation Workshop? **14% YES – 86% NO**

- Would you or your staff participate in these workshops if offered in the near future?
  97% YES – 3% NO

- Where should the training take place and who should sponsor? **77% would prefer that H-GAC sponsor the training. 23% would prefer that the county sponsor the training.**
  All respondents indicated that the training should be sponsored by H-GAC. However, they requested that the training be presented at a location within the County to allow for greater attendance.

- Who should attend the training?
  Recommendations included:
  - *Parks Supervisor/Foremen, City Administrator, County Commissioners*
  - *City Department Heads, Emergency Management Coordinators*
  - *Public Works Director, Sanitation Supervisor*
  - *Drainage District Supervisor, Solid Waste Manager*
  - *Foremen at Public Works Department*

Technology

- Do you have Geographic Information System (GIS) capabilities? **19% YES – 81% NO**
  Examples: Six respondents indicated that they have various degrees of GIS capabilities.

V. WHAT IS THE IMPACT OF A MAJOR DEBRIS GENERATING EVENT ON THE REGION?

A. General

Each county and city should have an Emergency Response Plan that is designed to be applicable to any public emergency, disaster, catastrophe, or emergency situation where the health, safety, or welfare of persons within the H-GAC Region is threatened by actual or imminent conditions. The identification of planning debris management recommendations are based upon consideration of the events and debris types shown in Table 5 below.

Table 5: Catalog of Debris-Generating Events

Event	Hazard	Primary Debris Types	Debris Location
Hurricane	Cat 1 -74-96mph Cat 2 - 96-110mph Cat 3 - 11-130mph Cat 4 - 131-155mph Cat 5 - 155+mph Storm surge Flooding	Trees Construction materials Personal property Sediment Vehicles	Primarily along shoreline, but natural and manmade debris can be distributed far inland
Tornado	Rotating winds	Trees Construction materials Personal property Vehicles	A long narrow path up to ½ mile wide and from 100 yards to several miles long
Floods	Inundation High water velocity	Sediment Wreckage Personal belongings Hazardous materials Construction materials Vehicles	Throughout impacted area
Urban Fire	Fire/Explosion	Construction materials Vehicles Personal property Ash and charred waste Hazardous materials	Throughout impacted area
Winter storms	Ice and snow loads	Woody debris Tree limbs and branches	Throughout impacted area
Technological Hazards	Chemical exposure Radiation exposure Biological hazard exposure	Exposed materials Personnel protection and response equipment Containers and packaging	Throughout impacted area, and spread by meteorological conditions

B. Quantification of Debris-Generating Impacts on the H-GAC Region

A hurricane poses the greatest threat to the H-GAC Region. Therefore, a Category 4 Hurricane (winds up to 155mph) was selected as the basis for estimating debris quantities and the impact on the region for the following reasons as identified on the Saffir-Simpson Hurricane Intensity Scale:

- Storm surge between 13-18 feet
- Inland flooding as far as 6 miles from the beach
- Shrubs and trees would be blown down
- All signs would be destroyed
- Extensive damage would occur to roofing materials, windows and doors
- Complete failure of roofs on many small residences
- Almost total destruction to mobile homes

However, due to the geographic nature of the region, the Project Team decided to divide the region into three sub-regional zones for debris estimating purposes and to assign a specific hurricane category to each since the magnitude of the hurricane diminishes as it moves inland.

The three sub-regional zones are identified as – Coastal Counties, Inland Counties, and Upland Counties. The hurricane category assigned to each county and city within the zones is based on maximum wind speeds as shown in Table 6 and Table 7.

Table 6: County Hurricane Generated Debris Estimates in Cubic Yards

Coastal Counties	CAT 4 (155 mph)	Inland Counties	CAT 3 (130 mph)	Upland Counties	CAT 2 (110 mph)
Matagorda	685,335	Wharton	382,460	Colorado	62,126
Brazoria	4,179,483	Fort Bend	2,861,579	Austin	68,915
Galveston	4,690,463	Harris	30,897,725	Waller	91,316
Chambers	450,004	Liberty	635,144	Montgomery	809,679
				Walker	197,423
Total/Zone	**10,005,285 CY**	**Total/Zone**	**34,776,908 CY**	**Total/Zone**	**1,229,459 CY**
Total Debris For H-GAC Region: 46,011,654 CY					

Table 7: City Hurricane Generated Debris Estimates in Cubic Yards

Coastal Cities	CAT 4 (155 mph)	Inland Cities	CAT 3 (130 mph)	Upland Cities	CAT 2 (110 mph)
Matagorda		**Wharton**		**Colorado**	
Bay City	341,111	El Campo	101,261	Columbus	12,727
Palacios	81,561	Wharton	93,290	Eagle Lake	10,280
Brazoria		**Fort Bend**		Weimar	6,603
Alvin	385,197	Meadows Place	41,396	**Austin**	
Angleton	321,395	Missouri City	434,092	Bellville	11,743
Clute	182,140	Rosenberg	203,163	Sealy	14,885
Freeport	166,613	Stafford	148,881	**Waller**	
Jones Creek	37,622	Sugar Land	524,629	Brookshire	8,881
Lake Jackson	469,459	**Harris**		Hempstead	13,403
Pearland	646,109	Baytown	601,429	Pine Island	2,299
Galveston		Bellaire	153,692	Prairie View	14,214
Dickinson	301,914	Deer Park	246,752	Waller	5,999
Friendswood	496,686	Galena Park	77,380	**Montgomery**	
Galveston	1,213,388	Houston	18,548,519	Conroe	105,174
Hitchcock	118,823	Humble	141,060	**Walker**	
Jamaica Beach	23,501	Jacinto City	75,697	Huntsville	118,445
La Marque	258,526	Jersey Village	72,069		
League City	796,905	Katy	99,499		
Texas City	772,576	La Porte	278,675		
Chambers		Pasadena	1,201,149		
Anahuac	40,051	Seabrook	103,628		
Mont Belvieu	39,339	South Houston	116,338		
		Webster	107,595		
		Liberty			
		Cleveland	73,303		
		Dayton	54,407		
		Liberty	76,844		

C. Detailed County and City Debris Estimating Tables

TAB D contains debris estimating tables for the 13 counties and designated cities within the H-GAC Region for Hurricane Categories 1 through 5. The tables also identify requirements for temporary storage, estimates for disposal quantities, and estimated days to remove the debris for a given hurricane category. The tables are based on the U.S. Army Corps of Engineers (USACE) Hurricane Debris Estimating Model. It has an accuracy of + or – 30%.

D. Temporary Debris Management Site Availability

Table 8 below identifies the minimum and maximum temporary debris management site requirements in acres and the size of available sites identified for each county and city. The Project Team recommends that the counties and cities review the Debris Estimating Tables at TAB D to determine if they have identified temporary debris management sites large enough to handle the estimated quantity of debris predicted by the USACE model. Table 9 provides a listing by location of available county and city temporary debris management sites.

Table 8: Temporary Debris Management Site Requirements and Available Site Size (Acres)

Coastal Counties & Cities	Min & Max Site Size	Available Site Size	Inland Counties & Cities	Min & Max Site Size	Available Site Size	Upland Counties & Cities	Min & Max Site Size	Available Site Size
Matagorda	**42/70**		**Wharton**	**24/39**		**Colorado**	**4/6**	
Bay City	21/35		El Campo	6/10		Columbus	1/1	
Palacios	5/8		Wharton	6/10		Eagle Lake	1/1	
Brazoria	**259/430**		**Fort Bend**	**177/294**	8 sites size unknown	Weimar	1/1	
Alvin	24/40		Meadows Place	3/4	4.55	**Austin**	**4/7**	
Angleton	20/33		Missouri City	27/45		Bellville	1/1	
Clute	11/19	10	Rosenberg	13/21		Sealy	1/2	50
Freeport	10/17		Stafford	9/15		**Waller**	**6/9**	
Jones Creek	2/4		Sugar Land	32/54		Brookshire	1/1	
Lake Jackson	29/48	30	**Harris**	**1,914/3,176**	100	Hempstead	1/1	3
Pearland	40/66		Baytown	37/62	30	Pine Island	1/1	
Galveston	**290/482**	1 site size unknown	Bellaire	10/16		Prairie View	1/1	
Dickinson	19/31		Deer Park	15/25		Waller	1/1	
Friendswood	31/51	2 sites size unknown	Galena Park	5/8		**Montgomery**	**50/83**	
Galveston	75/125		Houston	1,149/1,907		Conroe	7/11	25
Hitchcock	7/12		Humble	9/15	10	**Walker**	**12/20**	
Jamaica Beach	1/2	1	Jacinto City	5/8		Huntsville	7/12	400
La Marque	16/27		Jersey Village	4/7				
League City	49/82		Katy	6/10				
Texas City	28/79	50	La Porte	17/29				
Chambers	**28/46**	8 sites size unknown	Pasadena	74/123				
Anahuac	2/4		Seabrook	6/11				
Mont Belvieu	2/4		South Houston	7/12				
			Webster	7/11				
			Liberty	**39/65**				
			Cleveland	5/8				
			Dayton	3/6				
			Liberty	5/8	24			

Identification of temporary debris management sites prior to an event will expedite recovery operations and protect the health and safety of the local population. All potential debris management sites should be identified in the coordinated Debris Management Plan to include such information as site accessibility, baseline data information, sketches of possible site layouts, and location maps. A temporary Debris Management Site Investigation Form and Site Baseline Data Checklist are at TAB E.

Table 9 identifies examples of current temporary debris management sites identified by respondents to the questionnaire.

Table 9: Current Temporary Debris Management Sites

County/City	Location	Size	County/City	Location	Size
Texas City	Public Park	50 acres	Baytown	Bayway-Bayway Dr	10 acres
Clute	Highland Park Road	10 acres	City of Liberty	City Park	20 acres
Lake Jackson	Closed City Landfill	30 acres	City of Liberty	Drill Field	4 acres
Fort Bend County	FBC Fairgrounds	Unknown	Conroe	Service Center	25 acres
Fort Bend County	Riverside	Unknown	Harris County Precinct 2	FM 1942 @ N. Main Crosby	100 acres
Fort Bend County	Harlem Rd	Unknown	Surfside Beach	SH 332 & CR 257	Unknown
Fort Bend County	Pardon Rd	Unknown	Surfside Beach	1304 Monument	Unknown
Fort Bend County	Thompson Ferry	Unknown	Friendswood	Centennial Park	Unknown
Fort Bend County	Fresno	Unknown	Friendswood	Friendswood Sports Park	Unknown
Fort Bend County	TXI	Unknown	Humble	Civic Arena	10 acres
Fort Bend County	HLP	Unknown	Sealy	2 sites	50 acres
Meadows	City Property	4.55 acres	Chambers County	8 sites	Unknown
Jamaica Beach	City Park	1 acre	Huntsville	Old Landfill	400 acres
Galveston County	Jack Brooks County Park	Unknown	Hempstead	Sewer Plant	3 acres
Baytown	East District- Hayes Rd	10 acres			
Baytown	BAWA- Thompson Rd	10 acres			

E. Landfill Site Availability

The Project Team evaluated the impacts that a worst-case hurricane scenario would pose to counties in the H-GAC region from a disposal perspective. The purpose of this analysis was to determine the capacities and availability/suitability of existing landfills in the H-GAC region to accept material for disposal from a significant debris-generating event such as a hurricane. The typical composition of storm debris is detailed in Table 10. The percentages were developed by the U.S. Army Corps of Engineers and are useful in determining impact on existing landfill space and determining volume reduction requirements, i.e. number of grinders, pit burners, metal bailing machines, etc.

Table 10: Typical Composition of Storm Debris

Material	Percentage
Mulched/Composted	30.0%
Burnable	29.4%
Soil	3.5%
Metals	10.5%
Landfill	26.6%
Total	**100%**

Table 11a summarizes the total amount of debris that could be generated from a worst-case hurricane scenario for each county in the H-GAC region (source USACE Debris Estimating Model). While this represents the projected amount of total debris generation, it is not equal to the amount of material that would be disposed of in a landfill. Instead, a significant amount of material should be diverted from landfills through volume reduction activities such as mulching/composting, recycling and burning as described in paragraph H below. Table 11b identifies the typical composition of debris for a worst case hurricane impacting on the entire H-GAC region.

Table 12 summarizes the amount of material that would be expected to be landfilled following a worst-case hurricane in each county in the H-GAC region. The amount projected to be disposed is equal to 26.6 percent of the total amount generated. The Project Team has converted the disposal projection from cubic yards to tons based on the rate of four cubic yards per ton.[1]

[1] This rate was based on the City of Houston's rate of disposal after Tropical Storm Allison in 2001.

Table 11a: Summary of Total Debris Projections by County for Worst Case Hurricane Scenario

County and Hurricane Category	Debris Projection	
Coastal Counties (Category 4)	**Tons**	**Cubic Yards**
Brazoria	1,044,871	4,179,483
Chambers	112,501	450,004
Galveston	1,172,616	4,690,463
Matagorda	171,334	685,335
Subtotal	**2,501,321**	**10,005,284**
Inland Counties (Category 3)		
Fort Bend	715,395	2,861,579
Harris	7,724,431	30,897,725
Liberty	158,786	635,144
Wharton	95,615	382,460
Subtotal	**8,694,227**	**34,776,908**
Upland Counties (Category 2)		
Austin	17,229	68,915
Colorado	15,531	62,126
Montgomery	202,420	809,679
Walker	49,356	197,423
Waller	22,829	91,316
Subtotal	**307,365**	**1,229,458**
Total Estimated Debris	**11,502,913**	**46,011,650**

Table 11b: Typical Composition of Storm Debris for Worst Case Hurricane Scenario

Material	Percentage	Total Cubic Yards
Mulched/Composted	30.0%	13,803,495
Burnable	29.4%	13,527,425
Soil	3.5%	1,610,407
Metals	10.5%	4,831,223
**Landfill	26.6%	12,239,098
Total	**100%**	**46,011,650**

** See Table 12

Table 12: Summary of Disposal Projections by County for Worst-Case Hurricane Scenario

County and Hurricane Category	Disposal Projection	
Coastal Counties (Category 4)	**Tons**	**Cubic Yards**
Brazoria	277,936	1,111,742
Chambers	29,925	119,701
Galveston	311,916	1,247,663
Matagorda	45,575	182,299
Subtotal	**665,351**	**2,661,406**
Inland Counties (Category 3)		
Fort Bend	190,295	761,180
Harris	2,054,699	8,218,795
Liberty	42,237	168,948
Wharton	25,434	101,734
Subtotal	**2,312,664**	**9,250,658**
Upland Counties (Category 2)		
Austin	4,583	18,331
Colorado	4,131	16,525
Montgomery	53,844	215,375
Walker	13,129	52,515
Waller	6,073	24,290
Subtotal	**81,759**	**327,036**
Total Estimated Debris	**3,059,775**	**12,239,098**

The estimated remaining capacity of each landfill in the H-GAC region by county is included in Table 13. Remaining capacity is based on year 2000 data, as provided from data in the H-GAC database on landfills in the region.

Table 13: Assessment of Remaining Capacity of Landfill Storage per County

County Name	Type	Status	Full Permittee Name	Remaining Capacity (tons)
Coastal Counties				
Brazoria				
Hill Sand Company, Inc.	IV	A	Dixie Farm Road Landfill	1,378,682
Republic Services, Inc.	I	A	Brazoria County Landfill	3,200,040
			Subtotal	**4,578,722**
Chambers				
Chambers County	I	A	Chambers County Landfill	433,174
Waste Management of Texas, Inc.	I	A	Baytown Landfill	10,060,320
			Subtotal	**10,493,494**
Galveston				
Republic Waste Services	IV	A	North County Landfill	825,374
BFI Waste Systems of North America Inc.	I	A	BFI Galveston County Landfill	5,841,948
Waste Management of Texas, Inc.	I	A	Coastal Plains Recycling and Disposal Facility	15,096,360
			Subtotal	**21,763,682**
Matagorda				
No Landfills Currently Open/Operational				0
			Subtotal	**0**
			Sub-Regional Subtotal	**36,835,898**
Inland Counties				
Fort Bend				
Sprint Industries, Inc.	IV	A	Sprint Landfill	102,400
Sprint Industries, Inc.	IV	A	Fort Bend County Reclamation Landfill	1,908,058
BFI Waste Systems of North America Inc.	I	A	Blueridge Landfill	20,191,070
			Subtotal	**22,201,528**
Harris				
Casco Hauling and Excavation	IV	A	Casco Hauling and Excavation Landfill	1,021,504
Waste Corporation of America	IV	A	Greenbelt Landfill	426,187
Waste Management of Texas, Inc.	IV	A	Fairbanks Landfill	1,697,950
G.O. Weiss, Inc.	IV	A	Greenhouse Road Landfill	2,945,624
Waste Management of Texas, Inc.	IV	A	Cougar Landfill	2,346,200
Browning-Ferris, Inc.	I	A	McCarty Road Landfill	8,592,219
BFI Waste Systems of North America Inc.	I	A	Whispering Pines Landfill	7,165,300
Waste Management of Texas, Inc.	I	A	Atascocita Landfill	6,598,260
			Subtotal	**30,793,244**

Table 13 (Continued): Assessment of Remaining Capacity of Landfill Storage per County

County Name	Type	Status	Full Permittee Name	Remaining Capacity (tons)
Liberty				
No Landfills Currently Open/Operational				0
			Subtotal	**0**
Wharton				
No Landfills Currently Open/Operational				0
			Subtotal	**0**
			Sub-Regional Subtotal	**52,994,772**
Upland Counties				
Austin				
No Landfills Currently Open/Operational				0
			Subtotal	**0**
Colorado				
Safety-Kleen (Altair), Inc.	I	A	Altair Landfill	29,659
			Subtotal	**29,659**
Montgomery				
Waste Management of Texas, Inc.	I	A	Security Recycling and Disposal	2,306,095
			Subtotal	**2,306,095**
Walker				
No Landfills Currently Open/Operational				0
			Subtotal	**0**
Waller				
No Landfills Currently Open/Operational				0
			Subtotal	**0**
			Sub-Regional Subtotal	**2,335,754**
			Total Remaining Landfill Capacity	**92,166,424**

Based on the remaining capacity in each landfill and the projected amount of material that would need to be landfilled following a worst case hurricane scenario, the Project Team evaluated the impact from such a hurricane on landfills in the H-GAC region. Tables14a through 14c detail the impacts that a hurricane would have within the region on landfill capacities. This analysis assumes that a hurricane would strike the entire region during the same event. While the probability of a hurricane striking the entire region at the same time is low, the Project Team conducted the analysis in this manner in order to demonstrate the worst case scenario. Table 14d identifies the total regional landfill capacities after a hurricane for the entire H-GAC region. The Project Team would like to note that the amount of debris that would be generated from a hurricane in counties without landfills have been quantified in Tables 14a through 14c. However, the Project Team did not decrease the landfill capacity in any other landfills due to debris from these counties since it is unknown exactly how there counties would dispose of this debris.

Table 14a: Landfill Capacities after Hurricane for Coastal Counties

Coastal Counties	Capacity	Hurricane Category 4
Brazoria	Landfill Capacity (tons)	4,578,722
	Debris Generated for Landfill (tons)	(277,936)
	Remaining Capacity (tons)	**4,300,786**
	Percentage Change in Capacity	**6.07%**
Chambers	Landfill Capacity (tons)	10,493,494
	Debris Generated for Landfill (tons)	(29,925)
	Remaining Capacity (tons)	**10,463,569**
	Percentage Change in Capacity	**0.29%**
Galveston	Landfill Capacity (tons)	21,763,682
	Debris Generated for Landfill (tons)	(311,916)
	Remaining Capacity (tons)	**21,451,766**
	Percentage Change in Capacity	**1.43%**
Matagorda[1]	Landfill Capacity (tons)	0
	Debris Generated for Landfill (tons)	(45,575)
	Remaining Capacity (tons)	**0**
	Percentage Change in Capacity	**0.00%**
Subtotal	Remaining Capacity (tons)	**36,835,898**
	Debris Generated for landfill (tons)	**(665,351)**
	Remaining Capacity (tons)	**36,170,547**
	Percentage Change in Capacity	**1.81%**

[1]Currently does not have a landfill located within county borders.

Table 14b: Landfill Capacities after Hurricane for Inland Counties

Inland Counties	Capacity	Hurricane Category 3
Fort Bend	Landfill Capacity (tons)	22,201,528
	Debris Generated for Landfill (tons)	(190,295)
	Remaining Capacity (tons)	**22,011,233**
	Percentage Change in Capacity	**0.86%**
Harris	Landfill Capacity (tons)	30,793,244
	Debris Generated for Landfill (tons)	(2,054,699)
	Remaining Capacity (tons)	**28,738,545**
	Percentage Change in Capacity	**6.67%**
Liberty[1]	Landfill Capacity (tons)	0
	Debris Generated for Landfill (tons)	(42,237)
	Remaining Capacity (tons)	**0**
	Percentage Change in Capacity	**0.00%**
Wharton[1]	Landfill Capacity (tons)	0
	Debris Generated for Landfill (tons)	(25,434)
	Remaining Capacity (tons)	**0**
	Percentage Change in Capacity	**0.00%**
Subtotal	**Landfill Capacity (tons)**	**52,994,772**
	Debris Generated for landfill (tons)	**(2,312,664)**
	Remaining Capacity (tons)	**50,749,778**
	Percentage Change in Capacity	**4.36%**

[1]Currently does not have a landfill located within county borders.

Table 14c: Landfill Capacities after Hurricane for Upland Counties

Upland Counties	Capacity	Hurricane Category 2
Austin[1]	Landfill Capacity (tons)	0
	Debris Generated for Landfill (tons)	(4,583)
	Remaining Capacity (tons)	**0**
	Percentage Change in Capacity	**0.00%**
Colorado	Landfill Capacity (tons)	29,659
	Debris Generated for Landfill (tons)	(4,131)
	Remaining Capacity (tons)	**25,528**
	Percentage Change in Capacity	**13.93%**
Montgomery	Landfill Capacity (tons)	2,306,095
	Debris Generated for Landfill (tons)	(53,844)
	Remaining Capacity (tons)	**2,292,634**
	Percentage Change in Capacity	**2.33%**
Walker[1]	Landfill Capacity (tons)	0
	Debris Generated for Landfill (tons)	(13,129)
	Remaining Capacity (tons)	**0**
	Percentage Change in Capacity	**0.00%**
Waller[1]	Landfill Capacity (tons)	0
	Debris Generated for Landfill (tons)	(6,073)
	Remaining Capacity (tons)	**0**
	Percentage Change in Capacity	**0.00%**
Subtotal	**Landfill Capacity (tons)**	**2,335,754**
	Debris Generated for Landfill (tons)	**(81,759)**
	Remaining Capacity (tons)	**2,318,162**
	Percentage Change in Capacity	**3.50%**

[1]Currently does not have a landfill located within county borders.

Table 14d: Total Regional Landfill Capacities after Hurricane for the H-GAC Region

Total	**Total Landfill Capacity (tons)**	**92,166,424**
	Total Debris Sent to Landfill (tons)	**(3,059,775)**
	Total Remaining Capacity (tons)	**89,106,649**
	Percentage Change in Capacity	**3.32%**

The Project Team evaluated the impact that storm debris would have on the remaining landfill capacities over the next 12 years, which represents the remaining disposal capacity in the H-GAC region. The following is the Project Team's analysis at the regional, sub-regional and county levels.

Regional Analysis

From a short-term (5 to 10 years) planning perspective, the H-GAC region currently has sufficient capacity at the regional level to dispose of the debris that would be generated from a hurricane that would strike the entire region. However, from a long-term (more than 10 years) planning perspective, a hurricane would have a significant negative impact on the remaining disposal capacity in the region. Based on its remaining capacity and current disposal rates, in 2002, the H-GAC region has approximately 12 years of remaining disposal capacity within the region, as provided from data in the H-GAC database on landfills in the region. From a long-term planning perspective, 12 years is not generally considered a significant length of time, considering the costs and time requirements to develop new or expand landfills. For example, the State of Texas, through the Texas Commission on Environmental Quality, has stated that each Municipal Solid Waste (MSW) planning region needs to "ensure that areas with less than 10 years of remaining capacity develop plans to meet their disposal needs."[2]

As a worst case scenario, a hurricane across the entire region is projected to generate approximately three million tons of debris for disposal, which is equal to approximately 4.5 months of disposal capacity. Table 15 summarizes the impact that **one** hurricane striking the region in 2003 would have on remaining disposal for the next 10 years. In 2003, the remaining disposal capacity is projected to be 10.5 years, based on the quantity of solid waste expected to be disposed of in 2002.

Table 15: Comparison of Disposal Projections in the H-GAC Region: 2003-2013

	Landfill Capacity without Hurricane		Landfill Capacity Following a Single Hurricane Event in 2003		Impact on Landfill Capacity	
	Remaining Capacity		Remaining Capacity		Remaining Capacity	
Year	Tons	Years	Tons	Years	Tons	Years
2003	84,156,575	10.5	81,096,800	10.1	-3,059,775	0.4
2008	44,107,329	5.5	41,047,555	5.1	-3,059,775	0.4
2013	4,058,084	0.5	998,309	0.1	-3,059,775	0.4

Coastal Counties Analysis

For the Coastal counties, the Project Team assumed that a Category 4 Hurricane would strike. On a sub-regional level, disposal capacity among these counties would be reduced by 619,777 tons from 36,835,898 to 36,170,547 tons, based on data in the H-GAC database on landfills in the region. This would represent a decrease of 1.8 percent.

Of the counties in this sub-region, Brazoria, Chambers, and Galveston counties have landfills with sufficient capacity levels to handle the amount of material that could be generated. Matagorda County,

[2] Source: Texas Commission on Environmental Quality, *Solid Waste Management in Texas: Strategic Plan 2001 – 2005*, Report to the Texas Legislature, December 2000.

however, does not have a landfill, but does own a transfer station, which is operated by Waste Management. In the event of a significant debris generating event, some material could be processed for disposal at the transfer station. However, there are limitations to the amount of material that could be processed due to the daily processing capacity of the transfer station. As a result, Matagorda County could not rely on the transfer station for the processing of significant amounts of material. Matagorda County could expect to incur significant costs related to the transportation of storm debris to another landfill.

Inland Counties Analysis

For the Inland counties, the Project Team assumed that a Category 3 Hurricane would strike. Primarily due to the population of Harris and Fort Bend Counties, this area would experience the highest amount of storm debris following a hurricane. On a sub-regional level, disposal capacity among these counties would be reduced by 2,312,664 tons from 52,994,772 to 50,749,778 tons, based on data in the H-GAC database on landfills in the region. This would represent a decrease of 4.4 percent.

It would be expected that landfills in Fort Bend and Harris Counties would be the destination for a significant amount of storm debris that would be generated in these two counties, as well from other areas in the region. This is the case as landfills in these two counties account for approximately 57 percent of the remaining disposal capacity in the H-GAC region. Specifically, several counties that do not have landfills within their counties could be expected to send material to landfills located within Harris and Fort Bend Counties. Based on disposal flows following Tropical Storm Allison, it could also be expected that some material generated within Harris County could be disposed of in Fort Bend County.

The two other inland counties, Liberty and Wharton, do not have any landfills. They do have access, however, to other landfills located outside of their counties. Liberty County has used the Waste Management Atascocita Landfill, which would have sufficient capacity to accept material from Liberty County in the future. Wharton County would send material to either the Sprint Landfill in Fort Bend County or to the Waste Management Landfill in Alvin. Since Wharton County has disposal contracts with these landfills, Wharton County does have viable disposal options. Wharton County, however, could expect to incur significant costs related to the transportation of storm debris to another landfill.

Upland Counties Analysis

For the Upland counties, the Project Team assumed that a Category 2 Hurricane would strike. On a sub-regional level, disposal capacity among these counties would be reduced by 81,759 tons from 2,335,754 to 2,318,162 tons, based on data in the H-GAC database on landfills in the region. This would represent a decrease of 3.50 percent.

Of the counties in this sub-region, only Montgomery and Colorado Counties have landfills. The Waste Management Security Landfill in Montgomery County would have sufficient capacity to accept material that would be generated after a storm event in Montgomery County. The landfill in Colorado County, which was recently purchased by Clean Harbors, only has one year of remaining disposal capacity. Clean Harbors is currently evaluating whether the company would have an interest in expanding the landfill. If this landfill closes, Colorado County would not have a disposal option within the county. Austin County would also be affected by the closing of the landfill in Colorado County, as this is where their county would plan to take material following a storm event. Should the landfill in Altair close, both Austin and Colorado Counties would need to identify alternative disposal facilities. Austin and Colorado Counties could expect to incur significant costs related to the transportation of storm debris to another landfill.

Neither Waller nor Walker Counties has a landfill in its county. Communities in these counties currently use the Brazos Valley Solid Waste Management Authority (BVSWMA) Landfill in College Station for their disposal needs. This landfill currently has several years of remaining disposal capacity, but BVSWMA is currently planning to develop a new landfill in Grimes County. Communities in Waller and Walker Counties could expect to incur significant costs related to the transportation of storm debris to another landfill.

F. Financial Impact from Disposal Costs

The Project Team analyzed the financial impact that could occur if a significant debris generating event would strike the H-GAC region. While local communities could be eligible for cost reimbursement from FEMA for approximately 75 percent of the cost for disposal, local communities would still need to pay for approximately 25 percent of the disposal costs. To estimate projected disposal costs from a worst case hurricane scenario, the Project Team multiplied the projected disposal tonnage included in Table 11 by the estimated disposal costs on a per ton basis. The average tipping fee for landfills in the H-GAC region is approximately $23.00 per ton.[3] The tipping fee was determined based on the average cost incurred by the City of Houston for contracts with landfills in the H-GAC region. In addition, the cost of $23.00 per ton is consistent with the results of a statewide municipal solid waste survey[4] completed in 2002. Tables 16a through 16c detail the projected disposal costs for each county in the H-GAC region. Table 16d identifies the total regional fiscal impact of storm debris deposited in the existing landfills.

[3] This rate was based on the City of Houston's rate of disposal after Tropical Storm Allison in 2001.
[4] Reed, Stowe & Yanke, LLC conducted a survey of Texas cities in 2002 regarding multiple municipal solid waste issues. As a part of this survey, RS&Y generated detailed information regarding tipping fees for landfills in Texas.

Table 16a: Fiscal Impact of Storm Debris Deposited in Landfills for Coastal Counties

Coastal Counties	Storm Debris Impact	Hurricane Category 4
Brazoria	Debris sent to Landfill (tons)	277,936 Tons
	Cost of Disposal (/ton)	$23.00
	Total Cost of Disposal	$6,392,519
	County Expense (25%)	$1,598,130
	FEMA Expense (75%)	$4,794,389
Chambers	Debris sent to Landfill (tons)	29,925 Tons
	Cost of Disposal (/ton)	$23.00
	Total Cost of Disposal	$688,281
	County Expense (25%)	$172,070
	FEMA Expense (75%)	$516,211
Galveston	Debris sent to Landfill (tons)	311,916 Tons
	Cost of Disposal (/ton)	$23.00
	Total Cost of Disposal	$7,174,062
	County Expense (25%)	$1,793,516
	FEMA Expense (75%)	$5,380,547
Matagorda	Debris sent to Landfill (tons)	45,575 Tons
	Cost of Disposal (/ton)	$23.00
	Total Cost of Disposal	$1,048,219
	County Expense (25%)	$262,055
	FEMA Expense (75%)	$786,165
Subtotal	**Debris Sent to Landfill (tons)**	**665,351 Tons**
	Cost of Disposal (/ton)	**$23.00**
	Total Cost of Disposal	**$15,303,082**
	County Expense (25%)	**$3,825,770**
	FEMA Expense (75%)	**$11,477,311**

Table 16b: Fiscal Impact of Storm Debris Deposited in Landfills for Inland Counties

Inland Counties	Storm Debris Impact	Hurricane Category 3
Fort Bend	Debris sent to Landfill (tons)	190,295 Tons
	Cost of Disposal (/ton)	$23.00
	Total Cost of Disposal	$4,376,785
	County Expense (25%)	$1,094,196
	FEMA Expense (75%)	$3,282,589
Harris	Debris sent to Landfill (tons)	2,054,699Tons
	Cost of Disposal (/ton)	$23.00
	Total Cost of Disposal	$47,258,070
	County Expense (25%)	$11,814,518
	FEMA Expense (75%)	$35,443,553
Liberty	Debris sent to Landfill (tons)	42,237 Tons
	Cost of Disposal (/ton)	$23.00
	Total Cost of Disposal	$971,453
	County Expense (25%)	$242,863
	FEMA Expense (75%)	$728,590
Wharton	Debris sent to Landfill (tons)	25,434 Tons
	Cost of Disposal (/ton)	$23.00
	Total Cost of Disposal	$584,973
	County Expense (25%)	$146,243
	FEMA Expense (75%)	$438,729
Subtotal	**Debris sent to Landfill (tons)**	**2,312,664 Tons**
	Cost of Disposal (/ton)	**$23.00**
	Total Cost of Disposal	**$ 53,191,281**
	County Expense (25%)	**$13,297,820**
	FEMA Expense (75%)	**$39,893,461**

Table 16c: Fiscal Impact of Storm Debris Deposited in Landfills for Upland Counties

Upland Counties	Storm Debris Impact	Hurricane Category 2
Austin	Debris sent to Landfill (tons)	4,583 Tons
	Cost of Disposal (/ton)	$23.00
	Total Cost of Disposal	$105,405
	County Expense (25%)	$26,351
	FEMA Expense (75%)	$79,054
Colorado	Debris sent to Landfill (tons)	4,131 Tons
	Cost of Disposal (/ton)	$23.00
	Total Cost of Disposal	$95,021
	County Expense (25%)	$23,755
	FEMA Expense (75%)	$71,266
Montgomery	Debris sent to Landfill (tons)	53,844 Tons
	Cost of Disposal (/ton)	$23.00
	Total Cost of Disposal	$1,238,403
	County Expense (25%)	$309,601
	FEMA Expense (75%)	$928,803
Walker	Debris sent to Landfill (tons)	13,129 Tons
	Cost of Disposal (/ton)	$23.00
	Total Cost of Disposal	$301,959
	County Expense (25%)	$75,490
	FEMA Expense (75%)	$226,469
Waller	Debris sent to Landfill (tons)	6,073 Tons
	Cost of Disposal (/ton)	$23.00
	Total Cost of Disposal	$139,668
	County Expense (25%)	$34,917
	FEMA Expense (75%)	$104,751
Subtotal	**Debris sent to Landfill (tons)**	**81,759 Tons**
	Cost of Disposal (/ton)	**$23.00**
	Total Cost of Disposal	**$1,880,456**
	County Expense (25%)	**$470,114**
	FEMA Expense (75%)	**$1,410,342**

Table 16d: Total Regional Fiscal Impact of Storm Debris Deposited in Landfills

Total Debris sent to Landfill (tons)	**3,059,775 Tons**
Cost of Disposal (/ton)	**$23.00**
Total Cost	**$70,374,819**
County Expense (25%)	**$17,593,705**
FEMA Expense (75%)	**$52,781,114**

The Project Team would like to note that some local communities, especially those in rural areas, will likely incur higher disposal costs due to the transportation distances between these communities and the closest landfill. For these communities located in rural areas, there is a specific need for them to prepare for the impacts that could occur if an event would strike their community. These communities will need to determine the most effective and efficient approach to transfer material from their community to landfills that may be 50 – 100 miles away. These communities will also need to ensure that they have disposal contracts and reserve funds in place to prepare for such an event.

G. Landfill Agreements and Contracts

During the in-county interviews conducted for this project, the Project Team questioned local communities regarding their use of landfill agreements and contracts. Several cities and counties stated that they have disposal contracts in place for the disposal of their solid waste. These contracts will also allow for the disposal of material from a storm event at the standard rate for other solid waste. Also, these communities do not have any restrictions regarding a minimum or maximum amount of material that they could dispose of over a certain period of time. Based on the Project Team's experience, these communities should be relatively-well positioned to manage the disposal needs that would arise from a significant debris-generating event.

There are, however, multiple local governments in the H-GAC region that do not have any type of disposal contract in place. Several cities and counties stated that they do not have contracts in place for several reasons. For example, several counties do not have disposal contracts because they do not provide any on-going solid waste collection services. Several cities have contracted with a private collection company for their solid waste collection services, and do not believe that there is a need for a separate disposal contract. While it depends on the language of each contract, the Project Team has found that these collection contracts may allow for disposal options, but this option may come at a higher price. Other contracts may not include any provisions for disposal. Based on the Project Team's experience, it would be in the best interest of all local communities to procure pre-positioned disposal contracts in order to plan for debris that would be generated from a potential storm event in the future. As long as local governments are not subject to any minimum or maximum disposal amounts for a certain period of time, a local government would only incur expenses when and if it disposes of material due to an actual storm event.

H. Volume Reduction Methods

In order to reduce the amount of storm debris being landfilled, there will be a need for local communities to employ various volume reduction methods. The following represents various strategies that local communities could implement concerning volume reduction methods.

Volume Reduction by Burning

There are several volume reduction methods available including uncontrolled open burning, controlled open burning, trench burning and air curtain destructors. The Debris Manager should consider each burning method before selection and implementation as part of the overall volume reduction strategy. In all cases, consult TNRCC (TCEQ) publication RG-49 (Revised) November 2000, *Outdoor Burning in Texas*. This publication is available on the internet at www.tnrcc.state.tx.us/admn/topdoc/rg/049.pdf.

- **Uncontrolled Open Burning:** Uncontrolled open burning is the least desirable method of volume reduction because it lacks environmental control. However, in the haste to make progress, TCEQ may issue waivers to allow this method of reduction early in a disaster.
- **Controlled Open Burning:** Controlled open burning is a cost-effective method for reducing clean woody debris in rural areas. This option must be terminated if mixed debris (treated lumber, poles, nails, bolts, tin, aluminum sheeting, etc.) enters the waste flow. Clean woody tree debris presents little environmental damage, and the resulting ash can be used as a soil additive by the local agricultural community. Department of Agriculture and County extension agents should be consulted to determine if and how the resulting ash can be recycled as a soil additive.
- **Trench Burning:** Trench burning offers an effective means to expedite the volume reduction process by substantially reducing the environmental concerns caused by open burning. Specifications and statements of work should be developed to expedite the proper use of the systems, because experience has shown that many contractors and subcontractors are not fully knowledgeable of the system operating parameters.
- **Air Curtain Destructors:** Pre-manufactured air curtain destructors are an alternative to trench burning. The units can be erected on site in a minimal amount of time. Some are portable and others must be built in-place. The units are especially suited for locations with high water tables, sandy soil, or where materials are not available to build aboveground pits. The engineered features designed into the units allow for a reduction rate of approximately 95 % with a minimum of air pollution. The air curtain traps smoke and small particles and recirculates them to enhance combustion that reaches over 2,500 degrees Fahrenheit. Manufacturers claim that combustion rates of about 25 tons per hour are achievable while still meeting emission standards.

Volume Reduction by Grinding and Chipping

Hurricanes and tornadoes may present the opportunity to employ large-scale grinding and chipping operations as part of the overall debris volume reduction strategy. Hurricanes can blow away scarce topsoil in the agricultural areas and cause extensive tree damage and blow-down. This two-fold loss, combined with local climatic conditions, may present an excellent opportunity to reduce clean woody debris into suitable mulch that can be used to replenish the topsoil and retain soil moisture.

Grinding and chipping woody debris is a viable reduction method and is more environmentally friendly. In some locations the mulch will be a desirable product because of shallow topsoil conditions. In other locations it may become a landfill product.

Grinding and chipping woody debris reduces the large amounts of tree blow-down. Chipping operations are suitable in urban areas where streets are narrow or in groves of trees where it is cheaper to reduce the woody vegetation to mulch than to move it to a central grinding site and then returning it to the affected area. This reduces the costs associated with double handling.

There are numerous makes and models of grinders and chippers on the market. When contracting, the most important item to specify is the size of the mulch. If the grinding operation is strictly for volume reduction, size is not important. However, mulch to be used for agricultural purposes must be of a certain size and be virtually free of paper, plastic, dirt, etc.

Volume Reduction by Recycling

Recycling reduces mixed debris volume before it is hauled to a landfill. Recycling is attractive because there may be an economic value to the recovered material if it can be sorted and sold. Metals, wood, and soils are prime candidates for recycling. The major drawback is the potential environmental impact of the recycling operation. In areas where there is a large usage of chemical agricultural fertilizer, the recovered soil may be too contaminated for use on residential or existing agricultural land.

Hurricanes may present opportunities to contract out large-scale recycling operations and to achieve an economic return from some of the prime contractors who exercise their initiative to segregate and recycle debris as it arrives at the staging and reduction sites. Recycling has significant drawbacks if contracts are not properly written and closely monitored.

Specialized contractors should be available to bid on disposal of debris by recycling, if it is well sorted. Contracts and monitoring procedures should be developed to ensure that the recyclers comply with local, State, and Federal environmental regulations.

Recycling should be considered early in the debris removal and disposal operation because it may present an opportunity to reduce the overall cost of the operation. The following materials are suitable for recycling.

- **Metals:** Hurricanes and tornadoes may cause extensive damage to mobile homes, sun porches, and green houses. Most of the metals are non-ferrous and suitable for recycling. Trailer frames and other ferrous metals are also suitable for recycling. Metals can be separated using an electromagnet. Metals that have been processed for recycling can be sold to metal recycling firms.
- **Soil:** Cleanup operations using large pieces of equipment pick up large amounts of soil. The soil is transported to the staging and reduction sites where it is combined with other organic materials that will decompose over time. Large amounts of soil can be recovered if the material is put through some type of screen or shaker system. This procedure can produce significant amounts of soil that can either be sold or recycled back into the agricultural community. This soil could also be used at landfills for cover. It is more expensive to transport and pay tipping fees at local landfills than to sort out the heavy dirt before moving the material. Monitoring and testing of the soil may be necessary to ensure that it is not contaminated with chemicals.
- **Wood:** Woody debris can be either ground or chipped into mulch. (See Volume Reduction by Grinding and Chipping)
- **Construction Material:** Concrete block and other building materials can be ground and used for other purposes if there is a ready market. Construction materials and wood can also be shred to reduce volume. This construction material could also be used at landfills for cover.

Residue Material

Residue material that cannot be recycled, such as cloth, rugs, and trash, can be sent to a landfill for final disposal.

I. Debris Removal and Disposal Contracting Procedures

When communities do not comply with proper contracting procedures or enter into inappropriate contracts, severe financial consequences may result. Communities may be obligated to pay a contractor for work that was not intended to be performed but that may have inadvertently become part of the contract.

The period of performance may become excessive such that the work is not completed in a timely manner to meet the needs of the community. Lawsuits may result by the community (residents), the contractor, or both. If there is a Presidential declaration the community may not be reimbursed for all costs incurred, even if payment must be made to the contractor or there may be delays in funding pending the results of audits, collection of documentation, justification of costs, etc.

Contracting for labor and equipment may be necessary if the magnitude of the emergency debris operation is beyond the capabilities of local force account resources, State resources, mutual aid agreements, and volunteer labor and equipment.

Debris management planning efforts are not an eligible cost for FEMA in that they are performed prior to the disaster event.

The following are general requirements to be carefully considered and included in debris-related bid documents and final contracts:

- Use competitive bidding. Identify criteria for the work, including criteria for responding – time, scope of response, and how long between award and time to mobilize.
- The scope of work must be well defined and each intended task specifically addressed. It must be comprehensive, but concise and without specific language for each task, the contractor may perform work that was not originally intended, or fail to perform work that must be redefined often at additional cost. Example Contract Scopes of Work are at TAB G.
- For Presidentially declared disasters, eligible work must be clearly defined.

Documentation is a critical component in supporting contractor invoices and in justifying FEMA reimbursement. Records should be auditable. Lack of proper documentation can jeopardize or delay FEMA funding. Include a termination for convenience clause – this will provide the community the option to cancel the contract for any reason.

Define a reasonable period of performance. Determine when the work needs to be complete – otherwise, the work may not be performed in a timely manner to meet the needs of the community. Include penalties if the work is not completed within the specified period of performance. Base the contract on an estimate of debris as prepared by the community staff. Do not rely on contractor estimates. Communities should:

- Ensure the process is fully documented, including bid advertisement, responses, contract award, etc., when FEMA funding is involved or expected.
- Ensure the costs are reasonable, and include a justification of costs. FEMA will only reimburse for reasonable costs.
- Ensure the activities are well-monitored and the process of monitoring is documented.
- Ensure that all activities included in the contract are required for debris removal and are eligible for reimbursement.

- Ensure that load tickets (Figure 1) are used to document the volume of debris transported by both contractor and force account vehicles.

J. Load Ticket Disposition

The Project Team recommends that each city that plans to use contractors to remove and dispose of debris develop their own debris Load Tickets.

The Load Ticket is a 5-part form (Figure 1). The following is the disposition of each ticket part:

- **Part 1** – (White) Load Site Monitor (Turned in daily to the Debris Management Center)
- **Part 2** – (Green) Disposal Site Monitor (Turned in daily to the Debris Management Center)
- **Part 3** – (Canary) Driver or Contractor's on-site representative (Contractors Copy)
- **Part 4** – (Pink) Driver or Contractor's on-site representative (Contractor Copy)
- **Part 5** – (Gold) Driver or Contractor's on-site representative (Driver/Subcontractor Copy)

The Load Site Monitor will fill out all items in Section 1 of the Load Ticket. The Load Site Monitor will retain Part 1 (White Copy). The remaining copies (4) will be given to the truck driver. At the disposal site the truck driver will give all 4 copies to the Disposal Site Monitor. The Disposal Site Monitor will complete Section 2 of the Load Ticket and retain Part 2 (Green). Parts 3, 4, and 5 will be given either to the contractor's on-site representative or to the truck driver.

The Contractor will be paid based on the number of cubic yards of eligible debris hauled per truckload. Payment for hauling debris will only be approved upon presentation of Part 4 (Pink) with the Contractor's invoice.

K. Debris Field Monitoring Responsibilities

The Project Team recommends that all cities should use force account employees as debris monitors to account for all contractor debris removal and disposal operations. It is critical that the monitors be trained prior to a debris-generating event. The size of the monitoring staff will depend on the operation. The most efficient method is to have debris pickup site monitors placed at strategic locations to monitor debris pickup from several sites. These locations must be coordinated daily with the contractor to ensure that all trucks hauling debris pass the monitors position to obtain a valid load ticket. A disposal site monitor must be placed at every temporary or permanent disposal site to verify quantities of debris being deposited at the site.

Staffing may be provided by local force account labor or temporary hires. Reimbursement for use of force account personnel will be limited to overtime hours. Therefore, it may be advantageous to hire an independent contractor not associated with the debris removal and disposal contractor. Engineering firms usually have staff with construction experience that could provide the monitoring functions (these do not need to be professional engineers).

It is the primary responsibility of the city to independently monitor all debris activities, whether performed by their own force account labor or contract. City monitors are responsible for observing and documenting the work being done at two locations, point of collection and point of disposal (temporary site and/or landfill). They should observe operations to ensure ineligible debris is not picked up. Monitors should have a good understanding of eligible debris (especially from private property) and any time limits imposed on pickup of specific types of debris. Examples include sweeping areas for abandoned cars and white goods, cleaning up illegal dump sites, removing cut trees from subdivisions under development, and removing/cutting trees from the right-of-way in rural areas.

Figure 1 Example Load Ticket

EXAMPLE **LOAD TICKET**	
Section 1 Ticket Number:	000001
Prime Contractor:	
Sub-Contractor:	
Date:	Departure Time:
Driver's Name:	
Truck License Number:	
Measured Inside Bed Capacity (cu yds):	
Debris Pickup Site Location: (must be a street address or intersection)	
Debris Type: (check one) Vegetation ☐ C&D ☐ Mixed ☐ Other ☐	
Loading Site Monitor: Print Name Signature	
Remarks:	
Section 2 Debris Disposal Site Location:	
Arrival Time:	
Estimated Debris Quantity (cu yds)	
Disposal Site Monitor: Print Name Signature	
White – Load Site Monitor Green – Disposal Site Monitor Canary, Pink, Gold – On site Contractor's Representative or Driver Remarks:	

VI. WHAT DO WE DO NOW?

A. General

The Project Team has developed the following recommendations based on provided documents, questionnaires, and the on-site interviews. The first set of recommendations pertains to landfill site availability, financial impact from disposal costs, and landfill agreements and contracts.

The second set of recommendations is arranged according to the major elements of a Debris Management Plan - Organization and Coordination, Resources, Training, and Technology. Specific examples or references necessary to comply with the recommendations are identified at the end of each recommendation.

B. Landfill Site Availability, Financial Impact from Disposal Costs, and Landfill Agreements and Contracts Recommendations

The following recommendations are provided to assist H-GAC member counties and cities in addressing potential problems with landfill site availability, financial impacts, and the need for current landfill agreements and contracts.

1. H-GAC, local governments, and private disposal companies should recognize that there is a need to increase the disposal capacity within the H-GAC region. These entities should coordinate efforts to increase the disposal capacity within the region.
2. H-GAC, local governments, and private disposal companies should also develop and implement plans and practices that would direct as much storm debris as practicable from being landfilled. Waste minimization activities should include but not be limited to mulching/composting, recycling, and burning.
3. All local governments should take steps to minimize the financial impact for disposal costs due to a future storm event. These steps should include procuring pre-positioned disposal contracts, building levels of reserve funding, and dedicating reserve funds in enterprise funds.
4. Local governments in rural areas should better plan for the potential impact that would occur related to potential disposal costs. This could be accomplished through the procurement of pre-positioned hauling and disposal contracts.
5. Rural communities need guidance focused on the rural aspects of how to plan for a storm debris event, which can be very different from how a more urban area would manage a storm debris event. For example, the process in which material is collected, transferred, and disposed of in rural areas is very different compared to urban areas.

C. Debris Management Plan Development Recommendations

Table 18 (page 40) is a Debris Management Plan Format that may assist in the updating or development of a coordinated Debris Management Plan. Detailed Debris Management Plan Development Guidance is at TAB F. Figure 2 (page 41) is a typical organization chart that identifies the various operating elements of a Debris Management Center.

Table 17 contains detailed recommendations to assist H-GAC member counties and cities to either update or develop a coordinated Debris Management Plan as an Appendix to Annex K (Public Works and Engineering).

Table 17: Debris Management Plan Development Recommendations

Organization and Coordination Recommendations	References
1. Develop a coordinated Debris Management Plan as a separate Appendix to existing Annex K.	• TAB F Debris Management Plan Development Guidance • FEMA 325, Debris Management Guide (www.fema.gov/rrr/pa/dmgtoc.shtm)
2. Designate a single point of contact "Debris Manager" to: • Provide a single voice on all debris matters; • Serve as a single point of contact with all supporting Federal, State, County/Municipal, and contractor response and recovery organizations; • Supervise the Debris Management Center; and • Provide information to all levels of government based on sound and proven debris management practices and procedures.	• Figure 2 on page 41
3. Create a Debris Management Center (DMC) located outside of the Emergency Operations Center (EOC).	• Figure 2 on page 41
4. Staff the DMC with representatives from appropriate departments to provide oversight and coordination of debris clearing, removal, and disposal operations.	• FEMA 325, Debris Management Guide
5. Assign a Public Information Officer (PIO) to the Debris Management Center staff to insure that the local citizens and other agencies are kept apprised of ongoing and planned debris removal and disposal operations.	• FEMA 325, Debris Management Guide
6. Develop emergency response priorities based on the recommendations of the Debris Manager.	• FEMA 325, Debris Management Guide
8. Develop Standing Operating Procedures for each department that has a debris removal and disposal mission. Identify how personnel and equipment will be notified, staged, and deployed.	• Local Plans
9. Develop Mutual Aid Agreements.	• TAB H
10. Develop maps and lists that identify Federal Aid Roads within the county or city limits.	• TAB I
11. Develop Rights-of-Entry Permit forms.	• TAB J

Table 17 (Continued): Debris Management Plan Development Recommendations

Resource Recommendations	References
1. Identify positions, personnel, and equipment to operate a Debris Management Center.	• Figure 2 on page 41
2. Develop the debris removal and disposal contract scope of work portion of a request for proposal for pre-positioned debris removal and disposal contracts. These will be stand-by contracts to be activated if the debris-generating event exceeds local resources.	• TAB G
3. Conduct preliminary baseline studies and develop sketches of potential site layouts for existing and potential temporary debris management sites.	• TAB E
4. Identify local debris removal and disposal contractors. *The Society of Military Engineers Operation Fast Start Disaster Preparedness Plan has a listing of local contractors*	• Peter L. Borsack, Cobb, Fendley & Associates 5300 Hollister, Suite 400 Houston, TX 77040
5. Develop provisions to create a Field Monitoring Section within the Debris Management Center. The purpose of this element is to oversee all contractor operations and to provide on-site monitors. The Field Monitoring Section leader should have an understanding of FEMA contracting and monitoring requirements. The personnel assigned to do the actual monitoring should be provided by other designated departments based on availability. Code enforcement personnel could be used to develop a core cadre supplemented by temporary hires based on the magnitude of the disaster.	• Figure 2 on Page 41
6. The Field Monitoring Section will need to field three different monitoring teams. Each team will require training, communications, and transportation. • *Roving Monitors:* Responsible for a given debris zone. Act as the "eyes and ears" in the field for the Debris Manager. Resolve problems at loading sites and/or disposal sites between site monitors and contractors. Prepare daily reports supplemented by photographs of questionable operations. • *Loading Site Monitors:* Responsible for initiating all load tickets that verify that eligible debris is being loaded. Loading site monitors should be located at a "choke point" to reduce the number of monitors required. • *Disposal Site Monitors:* Responsible for estimating the quantity of debris delivered to either the temporary debris management sites or landfills, in cubic yards.	• Figure 2 on page 41 • TAB K
7. Develop a list of available debris clearance and disposal equipment assets.	• Update Current Equipment Lists
8. Develop a list of available temporary debris management sites to include site sketches and location maps.	• TAB E

Table 17 (Continued): Debris Management Plan Development Recommendations

Training Recommendations	References
The Project Team recommends that training workshops be developed and presented throughout the H-GAC region. Preparedness for effective disaster response will require training in FEMA procedures, organizational structure, financial planning, and documentation.	• TAB K
Technology Recommendations	**References**
The Project Team recommends the development of a GIS-based Debris Management Application capable of forecasting and estimating debris quantities and tracking debris removal activities for those communities that have existing parcel data bases available. The Debris Management application should be developed using Visual Basic and ESRI's MapObjects software, or an equivalent platform that is compatible with local systems. This is an area that H-GAC resources may be available to coordinate the development of a regional GIS system that would be available to all H-GAC members.	• Contact Mr. Chris Buckner, City of Houston Public Works and Engineering, 713-374-2800 or • Mr. Daniel Gutierrez, Department of Solid Waste Management, 713-837-9214 if interested in a demonstration.
The City of Houston has a Debris Management Application that is GIS based and able to forecast debris quantities before an event, estimate quantities after an event and track at street level debris removal operations. The application should be designed to be distributed and installed on many different machines for use by various counties and cities within the H-GAC region. In this regard, the following recommendations are provided:	• TAB M • H-GAC GIS Coordinator • Debris Management Consultant
1. When the data acquisition process begins for the software application, it would be beneficial to have one contact person from H-GAC to assist in obtaining the GIS data from the various counties or cities.	• H-GAC GIS Coordinator • Debris Management Consultant
2. Several county or city employees should be selected to be responsible for implementing the software system during an event. These employees would receive hands-on training with the Debris Management GIS Application, provide comments on the beta version of the application, run the system for forecasting during the planning process, and actually run the application during an event.	• H-GAC GIS Coordinator • Debris Management Consultant
3. Develop or procure a routable network capability for integration into the Debris Management GIS Application.	• H-GAC GIS Coordinator • Debris Management Consultant
4. Establish security procedures that allow integration of other datasets for accurate prediction of debris quantities and seamless management of debris response efforts.	• H-GAC GIS Coordinator • Debris Management Consultant

E. Debris Management Plan Format

The Project Team recommends that the Debris Management Plan format shown in Table 18 be used in the development of a Coordinated Debris Management Plan Appendix to Annex K. County or local emergency managers should be responsible for developing a debris management plan tailored to potential disasters. External participation should be encouraged during the development of the plan.

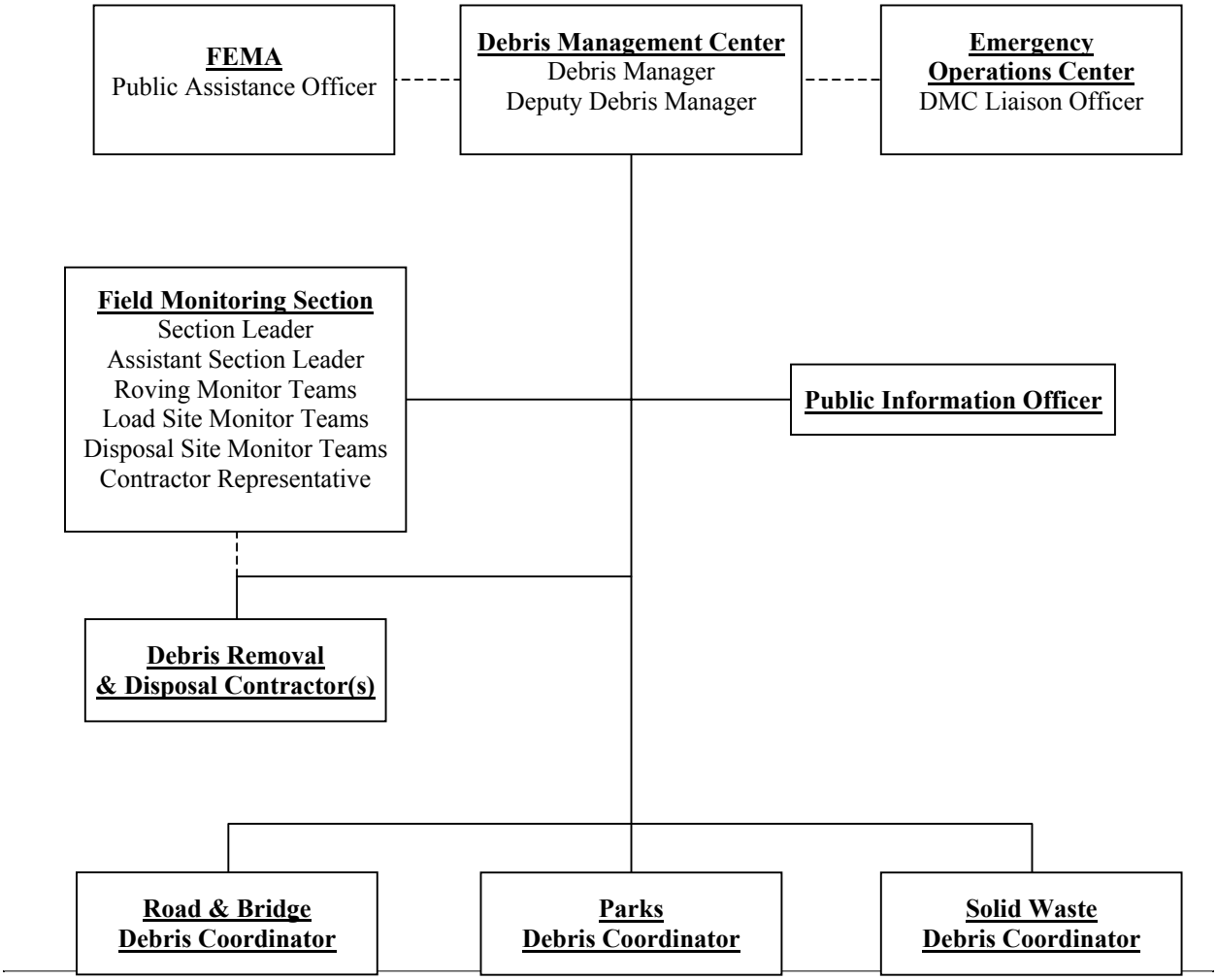
Some of the advantages of decentralizing the planning process are:

- Diversity of strategy innovations will be increased, therefore enriching the plan;
- The planning process will promote active cooperation of agencies and/or departments during a disaster;
- Points of view will be based on local experience, capabilities, and limitations; and
- The planning process will promote information transfer between students resulting in closer cooperation.

Table 18: Debris Management Plan Format

Mission	Identify how debris management activities will be facilitated and coordinated. Include local situations and assumptions.
Organization	Define who has the overall responsibility for managing the debris removal and disposal operations and supporting agencies/staff.
Concept of Operations	Detail how the responsible agency/designated individual will manage and coordinate the debris removal and disposal operation. Include the following: • Contracts and cooperative agreements • Temporary and permanent site selection criteria • Debris removal priorities • Debris classification
Responsibilities	Specify responsibilities for each department involved with debris removal and disposal operations. • Environmental Quality • Emergency Services • Forestry/Natural Resources, • Public Works • Solid Waste Management • Parks and Recreation
Appendices	• Debris Classification • Location and Status of Temporary Storage Sites • Locations and Status of Landfills • Maps Showing Locations of Removal Sectors and Sites

Figure 2: Typical Debris Management Center Organization



VII. WHERE DO WE GO FROM HERE?

A. General

This report has identified the need for H-GAC member counties and cities to either update or develop coordinated Debris Management Plans. H-GAC and the Project Team are prepared to assist in this endeavor as necessary to ensure that the region is prepared to respond to future major debris-generating events.

B. Proposed H-GAC Actions

1. Coordinate a meeting between the 13-County Emergency Management Coordinators and the Project Team to answer any question pertaining to the findings and recommendations contained in this report.

2. Coordinate the presentation of the following Debris Management Workshops (TAB K):

   - FEMA Public Assistance Program Overview Workshop (8 hrs)
   - Debris Management Plan Development Workshop (3 days)
   - Debris Contract Monitoring Workshops (8 hrs)
   - Financial Workshop (8 hrs)

3. Coordinate with the City of Houston for a demonstration of their GIS based Debris Management application. This application allows the city to estimate debris quantities generated either before or after a hurricane. Cleanup operations can also be tracked at street level to monitor debris contractor operations. PowerPoint slides showing the features of the GIS based Debris Management applications are at TAB M.

C. Proposed County or City Contracting Options

1. Counties or cities that desire to have pre-positioned debris removal and disposal contracts in place may use the sample scopes of work at TAB G to develop competitive bid packages. These samples are taken from several existing contracts and meet current requirements identified by the Federal Acquisition Regulation.

2. Counties or cities that desire to have a qualified consulting engineer firm assist in the development or review of a comprehensive Debris Management Plan may use the sample Request for Qualifications at TAB L to develop competitive bid packages.

VIII. DEBRIS MANAGEMENT TERMS

Annex K – This is the title of the Public Works and Engineering annex that is normally part of an Emergency Response Plan.

Burning – Reduction of woody debris by controlled burning. Woody debris can be reduced in volume by approximately 95% through burning. Air curtain burners are recommended because they can be operated in a manner to comply with clean-air standards.

Chipping or Mulching - Reducing wood-related material by mechanical means into smaller pieces to be used as mulch or fuel. Woody debris can be reduced in volume by approximately 75%, based on data obtained during reduction operations. The terms "chipping" and "mulching" are often used interchangeably.

Debris - Scattered items and materials that were broken, destroyed, or displaced by a natural disaster. Examples include trees, construction and demolition material, or personal property.

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

Debris Management Site - A location where debris is temporarily stored until it is sorted, processed, and reduced in volume and/or taken to a permanent landfill. Similar to a Temporary Debris Storage and Reduction Site (TDSR).

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

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

Department of Solid Waste Management (SWM) - Department typically responsible for managing and overseeing the collection and disposal of garbage, trash, construction debris, and disaster-related debris.

Federal Response Plan – A plan that describes the mechanism and structure by which the Federal Government mobilizes resources and conducts activities to address the consequences of any major disaster or emergency that overwhelms the capabilities of State and local governments.

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

Force Account Labor - In this context**,** State, Tribal, or local government employees engaged in debris removal activities within their own jurisdiction.

Garbage - Waste that is normally picked up by a designated department (such as the Department of Solid Waste Management, or a contractor). Examples include food, plastics, wrapping, or paper.

Hazardous Waste - Material and products from institutional, commercial, recreational, industrial and agricultural sources that contain certain chemicals 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 chemicals 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 hazardous waste include small quantities of normal household cleaning and maintenance products, latex and oil based paint, cleaning solvents, gasoline, oils, swimming pool chemicals, pesticides, and propane gas cylinders.

Hot Spots - Illegal dumpsites that may pose health and safety threats.

Monitoring - Actions taken to ensure that a contractor complies with the contracted scope of work.

Mutual Aid Agreement – In this context, a written understanding between communities or between States delineating the process of providing assistance during a disaster or emergency. (See Response and Recovery Directorate Policy Number 9523.6, "Mutual Aid Agreements for Public Assistance", dated August 17, 1999).

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 facilities, such as highways, railroads, or power lines are built. Includes land on both sides of the highway up to the private property line.

Scale/Weigh Station - A scale used to weigh trucks as they enter and leave a landfill. The difference in weight determines the tonnage dumped and a tipping fee may be charged accordingly. Also may be used to determine the quantity of debris picked-up and hauled.

Sweeps - The number of times a contractor passes through a community to collect all disaster-related debris from the rights-of-way. Usually limited to three passes through the community.

Temporary Debris Storage and Reduction (TDSR) Site – See Debris Management Site.

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. The fee also may include amounts to cover the cost of closing the current facility and/or opening a new facility.

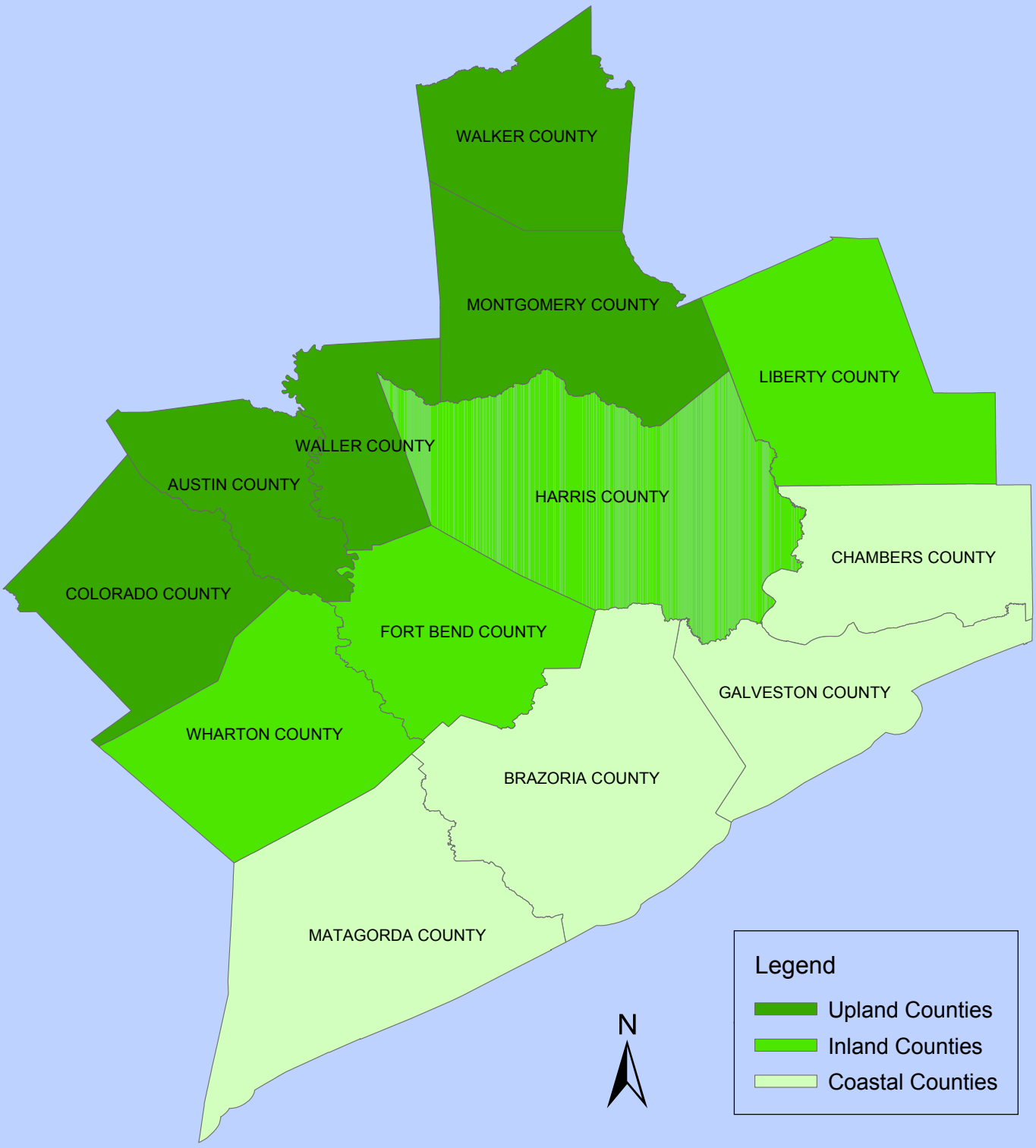
Trash - Non-disaster related yard waste, white goods, or household furnishings placed on the curbside for pickup by local solid waste management personnel. Not synonymous with garbage.

U.S. Army Corps of Engineers (USACE) - The primary missions of the USACE are the design and management of construction projects for the Army and Air Force, and to oversee various flood control and navigation projects. The USACE may be tasked by FEMA to direct various aspects of debris operations when direct Federal assistance, issued through a mission assignment, is needed.

Volume-Reduction Operations - Any of several processes used to reduce the volume of debris brought to a temporary debris storage and reduction site. It includes chipping and mulching of woody debris, shredding and baling of metals, air curtain burning, etc.

White Goods - Household appliances.

H-GAC Regional Storm Debris Zones



H-GAC's Solid Waste Management Program, 2003

TAB A

COUNTYWIDE STORM DEBRIS MANAGEMENT ASSESSMENT MEETING FAX

COUNTYWIDE STORM DEBRIS MANAGEMENT ASSESSMENT MEETING

Responding to an increased awareness nationwide regarding disaster preparedness and local experiences following Tropical Storm Allison, the Houston-Galveston Area Council (H-GAC) is evaluating the adequacy of storm preparedness within the region's 13 counties. H-GAC has contracted with Dewberry & Davis LLC and Reed, Stowe & Yanke LLC to perform an assessment of the region's ability to respond to the storm debris that would be generated by a natural disaster, such as a hurricane, tornado, or flood. A meeting will be held in your County to provide an opportunity for the project team to learn about your jurisdiction's readiness and ability to respond to an event.

WHAT IS THE PURPOSE OF THE MEETING?

The meeting will provide the project team with an opportunity to inventory the existing storm debris management plans within each County through interviews with the emergency responders. The project team members will be gathering information and obtaining clarification on existing debris management plans, procedures, mutual aid agreements, and contracts or contracting mechanisms. The information gathered through the interviews will be compiled into a needs assessment that evaluates the adequacy of the region's debris management plans and ability to respond, collect, stage, reduce, and dispose of storm-generated debris. The final project will include recommendations to implement on both a regional and a County level.

WHAT WILL THIS MEETING NOT ADDRESS?

This meeting is not a general information sharing meeting or workshop about storm debris issues. Additionally, other emergency management issues and plans will not be discussed (i.e. terrorism). The purpose of the meeting is to specifically gather information about the County's and city's storm debris management plans and preparedness.

WHO SHOULD ATTEND?

The project team will need to understand how the various departments plan to implement their disaster debris management responsibilities under their existing plan. Therefore, city and County emergency responders should attend the meeting. This includes:

- Public Works Director/Assistant Director
- Parks Director/Assistant Director
- Solid Waste Management Director/Assistant Director
- Other representatives from city/County with debris removal responsibilities

DO I NEED TO RSVP THAT I WILL ATTEND THE MEETING?

Yes, please contact Ms. Keeling to confirm your attendance at the meeting.
Ms. Kristin Keeling at (512) 450-0991, or e-mail: kkeeling@rsyllc.com

WHAT INFORMATION DOES THE PROJECT TEAM NEED?

Please provide a copy of relevant documents to Ms. Kristin Keeling by Wednesday, September 18th at Reed, Stowe & Yanke LLC 5806 Mesa Drive, Suite 310 Austin, Texas 78731 Attn: Ms. Kristin Keeling

TAB B

H-GAC INVENTORY QUESTIONS

H-GAC Storm Debris Management Assessment Meeting
Inventory Questions

Inventory and Existing Plan Evaluations: The Dewberry team will field at least two, two-person teams to meet with representatives of each of the 13 participating counties to gather information and obtain clarification on:

- Existing solid waste practices;
- Existing emergency management and debris management plans, procedure, mutual aid agreements, and contracts or contracting mechanisms;
- Public Works/ Solid Waste equipment and resources available to respond to disaster events;
- GIS platforms, software, and available databases **(See Attachment 1)**; and
- Plans and procedures for dealing with the federal disaster assistance program and private insurers.

County or City Name: _____

Point of Contact:
Name _____
Department _____
Address _____
_____
Phone # _____

Point of Contact:
Name _____
Department _____
Address _____
_____
Phone # _____

I. Organization & Coordination

1. Have you had a major debris-generating event in the past 4 years? (If yes, when, what type and quantity of debris removed and where disposed? {private or municipal landfill})

_____

2. Do you have a coordinated Debris Management Plan? (If yes – please provide a copy.)

_____

3. Do you have a single person designated as the Debris Manager? (If yes - who?)

_____

4. Do you have a location that would function as a Debris Management Center? (A debris management center is where all departments with debris missions would coordinate the entire cleanup operation.)

_____

5. Have specific key personnel been identified at each department with a support or primary debris mission? (If yes – please provide their names and positions.)

_____

6. Do you have a Public Information Officer as part of the Debris Management organization? (If yes – please provide their name and phone number.)

_____

7. Do you have current Standard Operating Procedures that define debris clearance, removal, and disposal actions to include personnel and equipment? (If yes – please provide a copy.)

_____

8. Do you have current standby contracts with local contractors to perform debris clearing, removal, and disposal missions? (If yes – please provide the name, point of contact, and a copy of the contract.).

_____

9. Do you have current standby contracts with regional or national contractors to perform debris removal and disposal missions? (If yes – please provide the name, point of contact, and a copy of the contract.).

_____

10. Do you plan to use your current garbage haulers to remove and dispose of debris? (If yes -why?) (Please provide a copy of the contract)

_____

11. Do you have temporary debris management sites identified? (If yes - how many, size and location)

_____

12. Do you have municipal or privately owned landfills? (Please provide the location(s), cost of tipping fees, type of landfill, etc)

_____

13. What is the existing availability and suitability of this landfill to accept debris that would be generated from a storm event?

_____

14. Have you conducted baseline studies on the proposed temporary debris management sites? Have you developed site sketches of potential layout? (If yes – please provide a copy)

_____

15. Do you have mutual aid agreements with other cities or counties with respect to debris clearing, removal and disposal operations? (If yes – please provide name, point of contact, and a copy of the agreement.)

_____

16. Have you identified roving, loading site, and disposal site contract monitors?

- Roving Monitors: Responsible for a given debris zone. Act as the "eyes and ears" in the field for the City Debris Manager. Resolve problems at loading sites and/or disposal sites between site monitors and contractors. Prepare daily reports supplemented by photographs of questionable operations.
- Loading Site Monitors: Responsible for initiating all load tickets that verify that eligible debris is being loaded. Loading site monitors should be located at a "choke point" to reduce the number of monitors required.
- Disposal Site Monitors: Responsible for estimating the quantity of debris delivered to either the temporary debris management sites or landfills, in cubic yards.

_____

17. Do you have a list or map that identifies Federal Aid Roads? (If yes – please provide a copy of list and/or map)

18. Do you have the County/City divided into identifiable debris management zones? (If yes – please provide a map of zones.)

II. Resources

1. What equipment do you have for debris clearance, removal and disposal operations? (Please provide a list of all available equipment to include – number of trucks and capacity in cubic yards, number of front loaders and size, number of chainsaws, number of backhoes, number of graders or trucks with plows to push debris from rights-of-way.)

2. Do you have preprinted debris load tickets? (If yes – please provide a copy.)

3. Do you have preprinted Right of Entry/Hold Harmless Agreements? (If yes – please provide a copy.)

4. Do you have an organization chart? (If yes – please provide a copy.)

III. Technology

IV. Do you have Geographic Information System (GIS) capabilities? If yes, then give them the GIS Questionnaire (Attachment 1) to be complete.

IV. Training

1. Have you or your staff received any of the following training?

- Debris Contract Monitoring Workshop: This training will be developed and presented to selected City department personnel identified to monitor debris removal and disposal contractors. The purpose of the training will be to ensure that contractors hired to provide debris-clearing, removal, and disposal operations following a major disaster are properly monitored to ensure compliance with the contract documentation and to meet Federal guidelines for possible reimbursement. Training should take approximately 8 hours and class size should be limited to 30 students.
- FEMA Documentation Workshop: This training will be developed and presented to selected City department financial resource personnel responsible for the collection and documentation of force account labor and equipment usage following a major debris generating event. The purpose of the training will be to ensure that students are knowledgeable on FEMA eligibility requirements and how to properly document and complete FEMA forms to ensure compliance with the Federal guidelines for possible reimbursement. Emphasis will be placed on eligibility and backup documentation needed to develop Project Worksheets. Training should take approximately 8 hours and class size should be limited to 15 to 20 students.

2. Would you or your staff participate in these workshops if offered in the near future?

3. Where should the training take place; who should attend, and who should sponsor?
   - County sponsor _____
   - HGAC sponsor _____

_____

Attachment 1
Geographic Information System (GIS) Questionnaire

The following information is required for Dewberry to determine what actions will be required to develop the GIS Debris Management Application.

1. What is the availability of a GIS database and county parcel maps maintained by the Property Appraiser's Office?

_____

2. Do you have demographic information to determine the number of single-family homes and mobile homes within the county?

_____

3. Do you have copies of digital maps depicting the county road network, parcel data, locations of critical facilities, etc?

_____

4. What (Metadata) information about the GIS data such as the projection, datum, source, process of capture, etc. do you have available?

_____

5. What is the GIS software package used?

_____

6. Do you have Oracle and/or Oracle Spatial?

_____

7. What is the projection and datum of the data?

_____

8. Is there a data catalog? If so, provide.

_____

9. Does the data catalog contain source and accuracy information? Is the data tiled or are there countywide coverages available?

_____

10. Where and how are the GIS data stored?

_____

11. What is the update frequency of the GIS files?

_____

12. Is there a parcel GIS file? If so, provide.

_____

13. What database do you use to store parcel information?

_____

14. Is there a way to separate out single family homes from business, mobile homes, and condos in the parcel GIS file?

_____

15. Does a critical facility file exist? If so, provide.

_____

16. Is it up-to-date with accurate locations?

_____

17. Are the locations of the landfills mapped?

_____

18. Is there countywide road coverage with annotation road names?

_____

19. Are there any web-based mapping capabilities? If so, describe.

_____

20. What is the web-based software?

_____

21. How do they plan to serve maps to the web?

_____

22. Do you have SDE? If so, provide.

_____

23. What is the implementation plan for SDE?

_____

24. If there is a map web-based application, what is the development environment? (Such as html, ASP, JAVA)

_____

25. What is the Intranet server running? (Apache, IIS)

_____

26. What is the operating system? (NT, Windows 2000 server, UNIX)

_____

Additional Remarks:

TAB C

ANNEX K (PUBLIC WORKS & ENGINEERING)
REVIEW COMMENTS

Annex K — Public Works & Engineering Review Comments

Austin County - Annex K, Road & Bridge & Public Works.

General: This annex was prepared by the Austin County Office of Emergency Management. It is well written and contains a Debris Management Appendix.

The Debris Management Appendix provides general guidance on debris management responsibilities. The Debris Estimating guidance is an excellent spread-sheet method to determine estimated quantities, debris removal time, volume reduction, and size of temporary debris management sites.

City of Sealy, Austin County - Annex K, Public Works/Engineering, June 1997.

General: This annex was prepared by the City of Sealy Office of Emergency Management. The plan provides very general guidance with respect to debris clearance and removal responsibilities. It should be revised to include a Coordinated Debris Management Plan as an appendix.

Chambers County - Annex K, Public Works & Engineering.

General: This annex was prepared by the Chambers County Office of Emergency Management. It is well written and contains a Debris Management Appendix. The Debris Management Appendix provides general guidance on debris management responsibilities. It is well written and contains a Debris Management Appendix. However, the Debris Management Appendix should be reviewed to be more specific in identifying responsible departments/personnel. It needs to be more directive in nature. Tabs A through E in the plan are excellent.

City of Sugar Land, Fort Bend County – Annex K, Public Works & Engineering

General: This is a well written annex that contains both general and specific guidance with respect to debris management responsibilities and operations. ***The Debris Management Appendix could be used as a model for other municipalities if desired.***

Galveston County - Debris Management Plan for Galveston County, May 1999

General: This plan provides general and detailed guidance that could be implemented by other counties and cities.

City of Friendswood, Galveston County – Annex K, Public Works & Engineering

General: Appendix 2 to Annex K provides very general guidance with respect to debris clearance and removal responsibilities. It should be revised to be more specific in identifying responsible departments/personnel. It needs to be more directive in nature. Taps A through E-Estimating Debris Quantity Worksheets are excellent.

City of League City, Galveston County – Annex K, Public Works/Engineering

General: The annex provides very general guidance with respect to debris clearance and removal responsibilities. It should be revised to include a Coordinated Debris Management Plan as an appendix.

City of Baytown, Harris County – Annex K, Baytown Emergency Management Public Works/Engineering

General: The annex provides very general guidance with respect to debris clearance and removal responsibilities. It should be revised to include a Coordinated Debris Management Plan as an appendix.

City of Pasadena, Harris County – Annex K, Public Works, Mar 98

General: The annex provides very general guidance with respect to debris clearance and removal responsibilities. It should be revised to include a Coordinated Debris Management Plan as an appendix.

City of Webster, Harris County – Annex K, Public Works

General: The annex provides very general guidance with respect to debris clearance and removal responsibilities. It should be revised to include a Coordinated Debris Management Plan as an appendix.

City of Jersey Village, Harris County – Annex K, Public Works/Engineering

General: The annex provides very general guidance with respect to debris clearance and removal responsibilities. It should be revised to include a Coordinated Debris Management Plan as an appendix.

City of Deer Park, Harris County – Annex K, Public Works

General: The annex provides very general guidance with respect to debris clearance and removal responsibilities. It should be revised to include a Coordinated Debris Management Plan as an appendix.

City of Liberty, Liberty County – Annex K, Public Works & Engineering

General: The annex provides very general guidance with respect to debris clearance and removal responsibilities. It should be revised to include a Coordinated Debris Management Plan as an appendix.

Matagorda County Annex K, Road & Bridge & Public Works, May 2002.

General: This annex was prepared by the Matagorda County Office of Emergency Management. It is well written, but only contains general information necessary to conduct debris management operations. The Debris Management Appendix should be reviewed to be more specific in identifying responsible departments/personnel. It needs to be more directive in nature. Tabs A through E in the plan are excellent.

City of Waller, Waller County – Annex K, Public Works

General: The annex provides very general guidance with respect to debris clearance and removal responsibilities. A major update is recommended to include a Coordinated Debris Management Plan as an appendix.

TAB D

DETAILED COUNTY AND CITY DEBRIS ESTIMATING TABLES

ESTIMATED DEBRIS QUANTITIES

Austin County,TX

Category 1	74-95 MPH Winds
Category 2	**96-110 MPH Winds**
Category 3	111-130 MPH Winds
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	23,590						
(Single Family Homes = Population divided by persons/household)			Category 1	**Category 2**	Category 3	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	**8**	26	50	80
Single Family Homes Affected	8,835	50%	4,418	**4,418**	4,418	4,418	4,418
Estimated Debris for Cat 2 Hurricane		Cubic Yds	17,229	**68,915**	223,972	430,716	689,146
Debris Management Site Requirements							
Minimum Acres Required		Acres	1	**4**	14	27	43
Acres Required with Roads & Buffers		Acres	2	**7**	23	44	71
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	5,169	**20,674**	67,192	129,215	206,744
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	12,060	**48,240**	156,781	301,501	482,402
Burnable	42%	Cubic Yds	5,065	**20,261**	65,848	126,631	202,609
Soil	5.00%	Cubic Yds	603	**2,412**	7,839	15,075	24,120
Metals	15%	Cubic Yds	1,809	**7,236**	23,517	45,225	72,360
Land Filled	38%	Cubic Yds	4,583	**18,331**	59,577	114,571	183,313
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			1	**4**	12	24	38

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Bellville
Austin County,TX

Category 1	74-95 MPH Winds
Category 2	**96-110 MPH Winds**
Category 3	111-130 MPH Winds
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	3,794						
(Single Family Homes = Population divided by persons/household)			Category 1	**Category 2**	Category 3	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	**8**	26	50	80
Single Family Homes Affected	1,506	50%	753	**753**	753	753	753
Estimated Debris for Cat 2 Hurricane		Cubic Yds	2,936	**11,743**	38,166	73,396	117,433
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	**1**	2	5	7
Acres Required with Roads & Buffers		Acres	0	**1**	4	8	12
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	881	**3,523**	11,450	22,019	35,230
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	2,055	**8,220**	26,716	51,377	82,203
Burnable	42%	Cubic Yds	863	**3,453**	11,221	21,578	34,525
Soil	5.00%	Cubic Yds	103	**411**	1,336	2,569	4,110
Metals	15%	Cubic Yds	308	**1,233**	4,007	7,707	12,331
Land Filled	38%	Cubic Yds	781	**3,124**	10,152	19,523	31,237
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	**1**	2	4	7

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Sealy
Austin County, TX

Category 1	74-95 MPH Winds
Category 2	**96-110 MPH Winds**
Category 3	111-130 MPH Winds
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	5,248						
(Single Family Homes = Population divided by persons/household)			Category 1	**Category 2**	Category 3	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	**8**	26	50	80
Single Family Homes Affected	1,908	50%	954	**954**	954	954	954
Estimated Debris for Cat 2 Hurricane		Cubic Yds	3,721	**14,885**	48,377	93,033	148,852
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	**1**	3	6	9
Acres Required with Roads & Buffers		Acres	0	**2**	5	10	15
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	1,116	**4,466**	14,513	27,910	44,656
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	2,605	**10,420**	33,864	65,123	104,197
Burnable	42%	Cubic Yds	1,094	**4,376**	14,223	27,352	43,763
Soil	5.00%	Cubic Yds	130	**521**	1,693	3,256	5,210
Metals	15%	Cubic Yds	391	**1,563**	5,080	9,768	15,629
Land Filled	38%	Cubic Yds	990	**3,959**	12,868	24,747	39,595
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	**1**	3	5	8

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Brazoria County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	111-130 MPH Winds
Category 4	**131 - 155 MPH Winds**
Category 5	155+ MPH Winds

Population (2000 Census)	241,767

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	Category 3	**Category 4**	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	26	**50**	80
Single Family Homes Affected 85,733		50%	42,866	42,866	42,866	**42,866**	42,866
Estimated Debris for Cat 2 Hurricane		Cubic Yds	167,179	668,717	2,173,331	**4,179,483**	6,687,172
Debris Management Site Requirements							
Minimum Acres Required		Acres	10	41	135	**259**	414
Acres Required with Roads & Buffers		Acres	17	69	223	**430**	687
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	50,154	200,615	651,999	**1,253,845**	2,006,152
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	117,026	468,102	1,521,332	**2,925,638**	4,681,021
Burnable	42%	Cubic Yds	49,151	196,603	638,959	**1,228,768**	1,966,029
Soil	5.00%	Cubic Yds	5,851	23,405	76,067	**146,282**	234,051
Metals	15%	Cubic Yds	17,554	70,215	228,200	**438,846**	702,153
Land Filled	38%	Cubic Yds	44,470	177,879	578,106	**1,111,742**	1,778,788
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			9	**37**	121	**232**	372

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Alvin
Brazoria County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	111-130 MPH Winds
Category 4	**131 - 155 MPH Winds**
Category 5	155+ MPH Winds

Population (2000 Census)	21,413						
(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	Category 3	**Category 4**	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	26	**50**	80
Single Family Homes Affected	7,901	50%	3,951	3,951	3,951	**3,951**	3,951
Estimated Debris for Cat 2 Hurricane		Cubic Yds	15,408	61,632	200,302	**385,197**	616,315
Debris Management Site Requirements							
Minimum Acres Required		Acres	1	4	12	**24**	38
Acres Required with Roads & Buffers		Acres	2	6	21	**40**	63
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	4,622	18,489	60,091	**115,559**	184,895
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	10,786	43,142	140,212	**269,638**	431,421
Burnable	42%	Cubic Yds	4,530	18,120	58,889	**113,248**	181,197
Soil	5.00%	Cubic Yds	539	2,157	7,011	**13,482**	21,571
Metals	15%	Cubic Yds	1,618	6,471	21,032	**40,446**	64,713
Land Filled	38%	Cubic Yds	4,098	16,394	53,280	**102,462**	163,940
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			1	**3**	11	**21**	34

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Angleton
Brazoria County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	111-130 MPH Winds
Category 4	**131 - 155 MPH Winds**
Category 5	155+ MPH Winds

Population (2000 Census)	18,130						
(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	Category 3	**Category 4**	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	26	**50**	80
Single Family Homes Affected	6,593	50%	3,296	3,296	3,296	**3,296**	3,296
Estimated Debris for Cat 2 Hurricane		Cubic Yds	12,856	51,423	167,126	**321,395**	514,233
Debris Management Site Requirements							
Minimum Acres Required		Acres	1	3	10	**20**	32
Acres Required with Roads & Buffers		Acres	1	5	17	**33**	53
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	3,857	15,427	50,138	**96,419**	154,270
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	8,999	35,996	116,988	**224,977**	359,963
Burnable	42%	Cubic Yds	3,780	15,118	49,135	**94,490**	151,184
Soil	5.00%	Cubic Yds	450	1,800	5,849	**11,249**	17,998
Metals	15%	Cubic Yds	1,350	5,399	17,548	**33,747**	53,994
Land Filled	38%	Cubic Yds	3,420	13,679	44,455	**85,491**	136,786
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			1	3	9	**18**	29

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Clute
Brazoria County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	111-130 MPH Winds
Category 4	**131 - 155 MPH Winds**
Category 5	155+ MPH Winds

Population (2000 Census)	10,424

(Single Family Homes = Population divided by persons/household)
(Debris estimated based on 50% of single family homes)

			Category 1	Category 2	Category 3	**Category 4**	Category 5
		CY/House	2	8	26	**50**	80
Single Family Homes Affected 3,736		50%	1,868	1,868	1,868	**1,868**	1,868
Estimated Debris for Cat 2 Hurricane		Cubic Yds	7,286	29,142	94,713	**182,140**	291,424
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	2	6	**11**	18
Acres Required with Roads & Buffers		Acres	1	3	10	**19**	30
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	2,186	8,743	28,414	**54,642**	87,427
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	5,100	20,400	66,299	**127,498**	203,997
Burnable	42%	Cubic Yds	2,142	8,568	27,846	**53,549**	85,679
Soil	5.00%	Cubic Yds	255	1,020	3,315	**6,375**	10,200
Metals	15%	Cubic Yds	765	3,060	9,945	**19,125**	30,599
Land Filled	38%	Cubic Yds	1,938	7,752	25,194	**48,449**	77,519
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	2	5	**10**	16

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Freeport
Brazoria County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	111-130 MPH Winds
Category 4	**131 - 155 MPH Winds**
Category 5	155+ MPH Winds

Population (2000 Census)	10,424

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	Category 3	**Category 4**	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	26	**50**	80
Single Family Homes Affected 3,418		50%	1,709	1,709	1,709	**1,709**	1,709
Estimated Debris for Cat 2 Hurricane		Cubic Yds	6,665	26,658	86,639	**166,613**	266,581
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	2	5	**10**	17
Acres Required with Roads & Buffers		Acres	1	3	9	**17**	27
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	1,999	7,997	25,992	**49,984**	79,974
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	4,665	18,661	60,647	**116,629**	186,607
Burnable	42%	Cubic Yds	1,959	7,837	25,472	**48,984**	78,375
Soil	5.00%	Cubic Yds	233	933	3,032	**5,831**	9,330
Metals	15%	Cubic Yds	700	2,799	9,097	**17,494**	27,991
Land Filled	38%	Cubic Yds	1,773	7,091	23,046	**44,319**	70,911
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	1	5	**9**	15

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Jones Creek
Brazoria County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	111-130 MPH Winds
Category 4	**131 - 155 MPH Winds**
Category 5	155+ MPH Winds

Population (2000 Census)	2,130

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	Category 3	**Category 4**	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	26	**50**	80
Single Family Homes Affected 772		50%	386	386	386	**386**	386
Estimated Debris for Cat 2 Hurricane		Cubic Yds	1,505	6,020	19,564	**37,622**	60,196
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	0	1	**2**	4
Acres Required with Roads & Buffers		Acres	0	1	2	**4**	6
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	451	1,806	5,869	**11,287**	18,059
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	1,053	4,214	13,695	**26,336**	42,137
Burnable	42%	Cubic Yds	442	1,770	5,752	**11,061**	17,698
Soil	5.00%	Cubic Yds	53	211	685	**1,317**	2,107
Metals	15%	Cubic Yds	158	632	2,054	**3,950**	6,321
Land Filled	38%	Cubic Yds	400	1,601	5,204	**10,008**	16,012
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	0	1	**2**	3

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Lake Jackson
Brazoria County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	111-130 MPH Winds
Category 4	**131 - 155 MPH Winds**
Category 5	155+ MPH Winds

Population (2000 Census)	26,386

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	Category 3	**Category 4**	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	26	**50**	80
Single Family Homes Affected 9,630		50%	4,815	4,815	4,815	**4,815**	4,815
Estimated Debris for Cat 2 Hurricane		Cubic Yds	18,778	75,113	244,119	**469,459**	751,134
Debris Management Site Requirements							
Minimum Acres Required		Acres	1	5	15	**29**	47
Acres Required with Roads & Buffers		Acres	2	8	25	**48**	77
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	5,634	22,534	73,236	**140,838**	225,340
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	13,145	52,579	170,883	**328,621**	525,794
Burnable	42%	Cubic Yds	5,521	22,083	71,771	**138,021**	220,833
Soil	5.00%	Cubic Yds	657	2,629	8,544	**16,431**	26,290
Metals	15%	Cubic Yds	1,972	7,887	25,632	**49,293**	78,869
Land Filled	38%	Cubic Yds	4,995	19,980	64,936	**124,876**	199,802
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			1	4	14	**26**	42

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Pearland
Brazoria County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	111-130 MPH Winds
Category 4	**131 - 155 MPH Winds**
Category 5	155+ MPH Winds

Population (2000 Census)	37,640

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	Category 3	**Category 4**	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	26	**50**	80
Single Family Homes Affected 13,254		50%	6,627	6,627	6,627	**6,627**	6,627
Estimated Debris for Cat 2 Hurricane		Cubic Yds	25,844	103,377	335,977	**646,109**	1,033,775
Debris Management Site Requirements							
Minimum Acres Required		Acres	2	6	21	**40**	64
Acres Required with Roads & Buffers		Acres	3	11	35	**66**	106
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	7,753	31,013	100,793	**193,833**	310,132
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	18,091	72,364	235,184	**452,276**	723,642
Burnable	42%	Cubic Yds	7,598	30,393	98,777	**189,956**	303,930
Soil	5.00%	Cubic Yds	905	3,618	11,759	**22,614**	36,182
Metals	15%	Cubic Yds	2,714	10,855	35,278	**67,841**	108,546
Land Filled	38%	Cubic Yds	6,875	27,498	89,370	**171,865**	274,984
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			1	6	19	**36**	57

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Chambers County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	111-130 MPH Winds
Category 4	**131 - 155 MPH Winds**
Category 5	155+ MPH Winds

Population (2000 Census)	26,031

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	Category 3	**Category 4**	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	26	**50**	80
Single Family Homes Affected 9,231		50%	4,615	4,615	4,615	**4,615**	4,615
Estimated Debris for Hurricane		Cubic Yds	18,000	72,001	234,002	**450,004**	720,006
Debris Management Site Requirements							
Minimum Acres Required		Acres	1	4	14	**28**	45
Acres Required with Roads & Buffers		Acres	2	7	24	**46**	74
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	5,400	21,600	70,201	**135,001**	216,002
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	12,600	50,400	163,801	**315,003**	504,004
Burnable	42%	Cubic Yds	5,292	21,168	68,797	**132,301**	211,682
Soil	5.00%	Cubic Yds	630	2,520	8,190	**15,750**	25,200
Metals	15%	Cubic Yds	1,890	7,560	24,570	**47,250**	75,601
Land Filled	38%	Cubic Yds	4,788	19,152	62,245	**119,701**	191,522
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			1	4	13	**25**	40

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Anahuac
Chambers County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	111-130 MPH Winds
Category 4	**131 - 155 MPH Winds**
Category 5	155+ MPH Winds

Population (2000 Census)	2,210

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	Category 3	**Category 4**	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	26	**50**	80
Single Family Homes Affected 822		50%	411	411	411	**411**	411
Estimated Debris for Hurricane		Cubic Yds	1,602	6,408	20,827	**40,051**	64,082
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	0	1	**2**	4
Acres Required with Roads & Buffers		Acres	0	1	2	**4**	7
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	481	1,922	6,248	**12,015**	19,225
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	1,121	4,486	14,579	**28,036**	44,857
Burnable	42%	Cubic Yds	471	1,884	6,123	**11,775**	18,840
Soil	5.00%	Cubic Yds	56	224	729	**1,402**	2,243
Metals	15%	Cubic Yds	168	673	2,187	**4,205**	6,729
Land Filled	38%	Cubic Yds	426	1,705	5,540	**10,654**	17,046
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	0	1	**2**	4

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Mont Belvieu
Chambers County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	111-130 MPH Winds
Category 4	**131 - 155 MPH Winds**
Category 5	155+ MPH Winds

Population (2000 Census)	2,324

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	Category 3	**Category 4**	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	26	**50**	80
Single Family Homes Affected 807		50%	403	403	403	**403**	403
Estimated Debris for Hurricane		Cubic Yds	1,574	6,294	20,456	**39,339**	62,942
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	0	1	**2**	4
Acres Required with Roads & Buffers		Acres	0	1	2	**4**	6
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	472	1,888	6,137	**11,802**	18,883
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	1,101	4,406	14,319	**27,537**	44,059
Burnable	42%	Cubic Yds	463	1,850	6,014	**11,566**	18,505
Soil	5.00%	Cubic Yds	55	220	716	**1,377**	2,203
Metals	15%	Cubic Yds	165	661	2,148	**4,131**	6,609
Land Filled	38%	Cubic Yds	419	1,674	5,441	**10,464**	16,742
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	0	1	**2**	3

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Colorado County, TX

Category 1	74-95 MPH Winds
Category 2	**96-110 MPH Winds**
Category 3	111-130 MPH Winds
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	20,390						
(Single Family Homes = Population divided by persons/household)			Category 1	**Category 2**	Category 3	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	**8**	26	50	80
Single Family Homes Affected	7,965	50%	3,982	**3,982**	3,982	3,982	3,982
Estimated Debris for Cat 2 Hurricane		Cubic Yds	15,531	**62,126**	201,909	388,286	621,258
Debris Management Site Requirements							
Minimum Acres Required		Acres	1	**4**	13	24	38
Acres Required with Roads & Buffers		Acres	2	**6**	21	40	64
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	4,659	**18,638**	60,573	116,486	186,377
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	10,872	**43,488**	141,336	271,800	434,880
Burnable	42%	Cubic Yds	4,566	**18,265**	59,361	114,156	182,650
Soil	5.00%	Cubic Yds	544	**2,174**	7,067	13,590	21,744
Metals	15%	Cubic Yds	1,631	**6,523**	21,200	40,770	65,232
Land Filled	38%	Cubic Yds	4,131	**16,525**	53,708	103,284	165,255
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			1	**3**	11	22	35

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Columbus
Colorado County, TX

Category 1	74-95 MPH Winds
Category 2	**96-110 MPH Winds**
Category 3	111-130 MPH Winds
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	3,916						
(Single Family Homes = Population divided by persons/household)			Category 1	**Category 2**	Category 3	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	**8**	26	50	80
Single Family Homes Affected	1,632	50%	816	**816**	816	816	816
Estimated Debris for Cat 2 Hurricane		Cubic Yds	3,182	**12,727**	41,363	79,544	127,270
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	**1**	3	5	8
Acres Required with Roads & Buffers		Acres	0	**1**	4	8	13
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	955	**3,818**	12,409	23,863	38,181
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	2,227	**8,909**	28,954	55,681	89,089
Burnable	42%	Cubic Yds	935	**3,742**	12,161	23,386	37,417
Soil	5.00%	Cubic Yds	111	**445**	1,448	2,784	4,454
Metals	15%	Cubic Yds	334	**1,336**	4,343	8,352	13,363
Land Filled	38%	Cubic Yds	846	**3,385**	11,002	21,159	33,854
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	**1**	2	4	7

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Eagle Lake
Colorado County, TX

Category 1	74-95 MPH Winds
Category 2	**96-110 MPH Winds**
Category 3	111-130 MPH Winds
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	3,664						
(Single Family Homes = Population divided by persons/household)			Category 1	**Category 2**	Category 3	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	**8**	26	50	80
Single Family Homes Affected	1,318	50%	659	**659**	659	659	659
Estimated Debris for Cat 2 Hurricane		Cubic Yds	2,570	**10,280**	33,411	64,252	102,803
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	**1**	2	4	6
Acres Required with Roads & Buffers		Acres	0	**1**	3	7	11
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	771	**3,084**	10,023	19,276	30,841
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	1,799	**7,196**	23,388	44,976	71,962
Burnable	42%	Cubic Yds	756	**3,022**	9,823	18,890	30,224
Soil	5.00%	Cubic Yds	90	**360**	1,169	2,249	3,598
Metals	15%	Cubic Yds	270	**1,079**	3,508	6,746	10,794
Land Filled	38%	Cubic Yds	684	**2,735**	8,887	17,091	27,346
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	**1**	2	4	6

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Weimar
Colorado County, TX

Category 1	74-95 MPH Winds
Category 2	**96-110 MPH Winds**
Category 3	111-130 MPH Winds
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	1,981						
(Single Family Homes = Population divided by persons/household)			Category 1	**Category 2**	Category 3	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	**8**	26	50	80
Single Family Homes Affected	847	50%	423	**423**	423	423	423
Estimated Debris for Cat 2 Hurricane		Cubic Yds	1,651	**6,603**	21,461	41,271	66,033
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	**0**	1	3	4
Acres Required with Roads & Buffers		Acres	0	**1**	2	4	7
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	495	**1,981**	6,438	12,381	19,810
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	1,156	**4,622**	15,023	28,890	46,223
Burnable	42%	Cubic Yds	485	**1,941**	6,309	12,134	19,414
Soil	5.00%	Cubic Yds	58	**231**	751	1,444	2,311
Metals	15%	Cubic Yds	173	**693**	2,253	4,333	6,934
Land Filled	38%	Cubic Yds	439	**1,756**	5,709	10,978	17,565
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	**0**	1	2	4

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Fort Bend County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	354,452

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected 112,883		50%	56,441	56,441	**56,441**	56,441	56,441
Estimated Debris for Cat 3 Hurricane		Cubic Yds	220,121	880,486	**2,861,579**	5,503,037	8,804,859
Debris Management Site Requirements							
Minimum Acres Required		Acres	14	55	**177**	341	545
Acres Required with Roads & Buffers		Acres	23	91	**294**	566	905
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	66,036	264,146	**858,474**	1,650,911	2,641,458
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	154,085	616,340	**2,003,105**	3,852,126	6,163,401
Burnable	42%	Cubic Yds	64,716	258,863	**841,304**	1,617,893	2,588,628
Soil	5.00%	Cubic Yds	7,704	30,817	**100,155**	192,606	308,170
Metals	15%	Cubic Yds	23,113	92,451	**300,466**	577,819	924,510
Land Filled	38%	Cubic Yds	58,552	234,209	**761,180**	1,463,808	2,342,092
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			12	49	**159**	306	489

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Meadows Place
Fort Bend County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	4,912

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected	1,632	50%	816	816	**816**	816	816
Estimated Debris for Cat 3 Hurricane		Cubic Yds	3,182	12,729	**41,369**	79,555	127,288
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	1	**3**	5	8
Acres Required with Roads & Buffers		Acres	0	1	**4**	8	13
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	955	3,819	**12,411**	23,866	38,186
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	2,228	8,910	**28,958**	55,688	89,101
Burnable	42%	Cubic Yds	936	3,742	**12,162**	23,389	37,423
Soil	5.00%	Cubic Yds	111	446	**1,448**	2,784	4,455
Metals	15%	Cubic Yds	334	1,337	**4,344**	8,353	13,365
Land Filled	38%	Cubic Yds	846	3,386	**11,004**	21,162	33,859
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	1	**2**	4	7

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Missouri City
Fort Bend County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	52,913

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected	17,124	50%	8,562	8,562	**8,562**	8,562	8,562
Estimated Debris for Cat 3 Hurricane		Cubic Yds	33,392	133,567	**434,092**	834,792	1,335,668
Debris Management Site Requirements							
Minimum Acres Required		Acres	2	8	**27**	52	83
Acres Required with Roads & Buffers		Acres	3	14	**45**	86	137
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	10,018	40,070	**130,228**	250,438	400,700
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	23,374	93,497	**303,864**	584,355	934,968
Burnable	42%	Cubic Yds	9,817	39,269	**127,623**	245,429	392,686
Soil	5.00%	Cubic Yds	1,169	4,675	**15,193**	29,218	46,748
Metals	15%	Cubic Yds	3,506	14,025	**45,580**	87,653	140,245
Land Filled	38%	Cubic Yds	8,882	35,529	**115,468**	222,055	355,288
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			2	7	**24**	46	74

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Richmond					Category 1	74-95 MPH Winds		
Fort Bend County, TX					Category 2	96-110 MPH Winds		
					Category 3	**111-130 MPH Winds**		
					Category 4	131 - 155 MPH Winds		
Population (2000 Census)	11,081				Category 5	155+ MPH Winds		
(Single Family Homes = Population divided by persons/household)				Category 1	Category 2	**Category 3**	Category 4	Categor
(Debris estimated based on 50% of single family homes)			CY/House	2	8	**26**	50	80
Single Family Homes Affected	3,507		50%	1,753	1,753	**1,753**	1,753	1,753
Estimated Debris for Cat 3 Hurricane			Cubic Yds	6,838	27,352	**88,893**	170,949	273,51
Debris Management Site Requirements								
Minimum Acres Required			Acres	0	2	**6**	11	17
Acres Required with Roads & Buffers			Acres	1	3	**9**	18	28
Debris Classification								
Clean Woody Debris		30%	Cubic Yds	2,051	8,206	**26,668**	51,285	82,05
Mixed Construction & Demolition Debris (C&D)		70%	Cubic Yds	4,787	19,146	**62,225**	119,664	191,46
Burnable		42%	Cubic Yds	2,010	8,041	**26,135**	50,259	80,41
Soil		5.00%	Cubic Yds	239	957	**3,111**	5,983	9,573
Metals		15%	Cubic Yds	718	2,872	**9,334**	17,950	28,71
Land Filled		38%	Cubic Yds	1,819	7,276	**23,646**	45,472	72,75
Days Required for Cleanup								
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day								
Days required for cleanup @ 18,000cy/day				0	2	**5**	9	15
This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.								
It has an accuracy of + or - 30%								

ESTIMATED DEBRIS QUANTITIES

Rosenberg					Category 1	74-95 MPH Winds		
Fort Bend County, TX					Category 2	96-110 MPH Winds		
					Category 3	**111-130 MPH Winds**		
					Category 4	131 - 155 MPH Winds		
Population (2000 Census)	24,043				Category 5	155+ MPH Winds		
(Single Family Homes = Population divided by persons/household)				Category 1	Category 2	**Category 3**	Category 4	Categor
(Debris estimated based on 50% of single family homes)			CY/House	2	8	**26**	50	80
Single Family Homes Affected	8,014		50%	4,007	4,007	**4,007**	4,007	4,007
Estimated Debris for Cat 3 Hurricane			Cubic Yds	15,628	62,512	**203,163**	390,699	625,11
Debris Management Site Requirements								
Minimum Acres Required			Acres	1	4	**13**	24	39
Acres Required with Roads & Buffers			Acres	2	6	**21**	40	64
Debris Classification								
Clean Woody Debris		30%	Cubic Yds	4,688	18,754	**60,949**	117,210	187,53
Mixed Construction & Demolition Debris (C&D)		70%	Cubic Yds	10,940	43,758	**142,214**	273,489	437,58
Burnable		42%	Cubic Yds	4,595	18,378	**59,730**	114,865	183,78
Soil		5.00%	Cubic Yds	547	2,188	**7,111**	13,674	21,87
Metals		15%	Cubic Yds	1,641	6,564	**21,332**	41,023	65,63
Land Filled		38%	Cubic Yds	4,157	16,628	**54,041**	103,926	166,28
Days Required for Cleanup								
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day								
Days required for cleanup @ 18,000cy/day				1	3	**11**	22	35
This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.								
It has an accuracy of + or - 30%								

ESTIMATED DEBRIS QUANTITIES

Stafford
Fort Bend County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	15,681						
(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected	5,873	50%	2,937	2,937	**2,937**	2,937	2,937
Estimated Debris for Cat 3 Hurricane		Cubic Yds	11,452	45,810	**148,881**	286,310	458,097
Debris Management Site Requirements							
Minimum Acres Required		Acres	1	3	**9**	18	28
Acres Required with Roads & Buffers		Acres	1	5	**15**	29	47
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	3,436	13,743	**44,664**	85,893	137,429
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	8,017	32,067	**104,217**	200,417	320,668
Burnable	42%	Cubic Yds	3,367	13,468	**43,771**	84,175	134,680
Soil	5.00%	Cubic Yds	401	1,603	**5,211**	10,021	16,033
Metals	15%	Cubic Yds	1,203	4,810	**15,633**	30,063	48,100
Land Filled	38%	Cubic Yds	3,046	12,185	**39,602**	76,159	121,854
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			1	3	**8**	16	25

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Sugar Land
Fort Bend County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	63,328

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected 20,695		50%	10,348	10,348	**10,348**	10,348	10,348
Estimated Debris for Cat 3 Hurricane		Cubic Yds	40,356	161,424	**524,629**	1,008,902	1,614,243
Debris Management Site Requirements							
Minimum Acres Required		Acres	2	10	**32**	62	100
Acres Required with Roads & Buffers		Acres	4	17	**54**	104	166
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	12,107	48,427	**157,389**	302,671	484,273
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	28,249	112,997	**367,240**	706,231	1,129,970
Burnable	42%	Cubic Yds	11,865	47,459	**154,241**	296,617	474,587
Soil	5.00%	Cubic Yds	1,412	5,650	**18,362**	35,312	56,499
Metals	15%	Cubic Yds	4,237	16,950	**55,086**	105,935	169,496
Land Filled	38%	Cubic Yds	10,735	42,939	**139,551**	268,368	429,389
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			2	9	**29**	56	90

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

					Category 1	74-95 MPH Winds		
Galveston County, TX					Category 2	96-110 MPH Winds		
					Category 3	111-130 MPH Winds		
					Category 4	**131 - 155 MPH Winds**		
Population (2000 Census)	250,158				Category 5	155+ MPH Winds		
(Single Family Homes = Population divided by persons/household)				Category 1	Category 2	Category 3	**Category 4**	Categor
(Debris estimated based on 50% of single family homes)			CY/House	2	8	26	**50**	80
Single Family Homes Affected	96,215		50%	48,107	48,107	48,107	**48,107**	48,10
Estimated Debris for Hurricane			Cubic Yds	187,619	750,474	2,439,041	**4,690,463**	7,504,7
Debris Management Site Requirements								
Minimum Acres Required			Acres	12	46	151	**290**	465
Acres Required with Roads & Buffers			Acres	19	77	251	**482**	772
Debris Classification								
Clean Woody Debris		30%	Cubic Yds	56,286	225,142	731,712	**1,407,139**	2,251,4
Mixed Construction & Demolition Debris (C&D)		70%	Cubic Yds	131,333	525,332	1,707,328	**3,283,324**	5,253,3
Burnable		42%	Cubic Yds	55,160	220,639	717,078	**1,378,996**	2,206,3
Soil		5.00%	Cubic Yds	6,567	26,267	85,366	**164,166**	262,66
Metals		15%	Cubic Yds	19,700	78,800	256,099	**492,499**	787,99
Land Filled		38%	Cubic Yds	49,907	199,626	648,785	**1,247,663**	1,996,2
Days Required for Cleanup								
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day								
Days required for cleanup @ 18,000cy/day				10	42	136	**261**	417
This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.								
It has an accuracy of + or - 30%								

ESTIMATED DEBRIS QUANTITIES

Dickinson
Galveston County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	111-130 MPH Winds
Category 4	**131 - 155 MPH Winds**
Category 5	155+ MPH Winds

Population (2000 Census)	17,093

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	Category 3	**Category 4**	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	26	**50**	80
Single Family Homes Affected 6,193		50%	3,097	3,097	3,097	**3,097**	3,097
Estimated Debris for Hurricane		Cubic Yds	12,077	48,306	156,995	**301,914**	483,063
Debris Management Site Requirements							
Minimum Acres Required		Acres	1	3	10	**19**	30
Acres Required with Roads & Buffers		Acres	1	5	16	**31**	50
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	3,623	14,492	47,099	**90,574**	144,919
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	8,454	33,814	109,897	**211,340**	338,144
Burnable	42%	Cubic Yds	3,551	14,202	46,157	**88,763**	142,021
Soil	5.00%	Cubic Yds	423	1,691	5,495	**10,567**	16,907
Metals	15%	Cubic Yds	1,268	5,072	16,485	**31,701**	50,722
Land Filled	38%	Cubic Yds	3,212	12,849	41,761	**80,309**	128,495
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			1	3	9	**17**	27

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Friendswood
Galveston County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	111-130 MPH Winds
Category 4	**131 - 155 MPH Winds**
Category 5	155+ MPH Winds

Population (2000 Census)	29,037

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	Category 3	**Category 4**	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	26	**50**	80
Single Family Homes Affected 10,188		50%	5,094	5,094	5,094	**5,094**	5,094
Estimated Debris for Hurricane		Cubic Yds	19,867	79,470	258,276	**496,686**	794,697
Debris Management Site Requirements							
Minimum Acres Required		Acres	1	5	16	**31**	49
Acres Required with Roads & Buffers		Acres	2	8	27	**51**	82
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	5,960	23,841	77,483	**149,006**	238,409
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	13,907	55,629	180,794	**347,680**	556,288
Burnable	42%	Cubic Yds	5,841	23,364	75,933	**146,026**	233,641
Soil	5.00%	Cubic Yds	695	2,781	9,040	**17,384**	27,814
Metals	15%	Cubic Yds	2,086	8,344	27,119	**52,152**	83,443
Land Filled	38%	Cubic Yds	5,285	21,139	68,702	**132,118**	211,389
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			1	4	14	**28**	44

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Galveston
Galveston County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	111-130 MPH Winds
Category 4	**131 - 155 MPH Winds**
Category 5	155+ MPH Winds

Population (2000 Census)	57,247

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	Category 3	**Category 4**	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	26	**50**	80
Single Family Homes Affected 24,890		50%	12,445	12,445	12,445	**12,445**	12,445
Estimated Debris for Hurricane		Cubic Yds	48,536	194,142	630,962	**1,213,388**	1,941,420
Debris Management Site Requirements							
Minimum Acres Required		Acres	3	12	39	**75**	120
Acres Required with Roads & Buffers		Acres	5	20	65	**125**	200
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	14,561	58,243	189,288	**364,016**	582,426
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	33,975	135,899	441,673	**849,371**	1,358,994
Burnable	42%	Cubic Yds	14,269	57,078	185,503	**356,736**	570,777
Soil	5.00%	Cubic Yds	1,699	6,795	22,084	**42,469**	67,950
Metals	15%	Cubic Yds	5,096	20,385	66,251	**127,406**	203,849
Land Filled	38%	Cubic Yds	12,910	51,642	167,836	**322,761**	516,418
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			3	11	35	**67**	108

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Hitchcock
Galveston County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	111-130 MPH Winds
Category 4	**131 - 155 MPH Winds**
Category 5	155+ MPH Winds

Population (2000 Census)	6,386						
(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	Category 3	**Category 4**	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	26	**50**	80
Single Family Homes Affected	2,437	50%	1,219	1,219	1,219	**1,219**	1,219
Estimated Debris for Hurricane		Cubic Yds	4,753	19,012	61,788	**118,823**	190,118
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	1	4	**7**	12
Acres Required with Roads & Buffers		Acres	0	2	6	**12**	20
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	1,426	5,704	18,536	**35,647**	57,035
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	3,327	13,308	43,252	**83,176**	133,082
Burnable	42%	Cubic Yds	1,397	5,589	18,166	**34,934**	55,895
Soil	5.00%	Cubic Yds	166	665	2,163	**4,159**	6,654
Metals	15%	Cubic Yds	499	1,996	6,488	**12,476**	19,962
Land Filled	38%	Cubic Yds	1,264	5,057	16,436	**31,607**	50,571
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	1	3	**7**	11

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Jamaica Beach
Galveston County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	111-130 MPH Winds
Category 4	**131 - 155 MPH Winds**
Category 5	155+ MPH Winds

Population (2000 Census)	1,075

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	Category 3	**Category 4**	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	26	**50**	80
Single Family Homes Affected 482		50%	241	241	241	**241**	241
Estimated Debris for Hurricane		Cubic Yds	940	3,760	12,220	**23,501**	37,601
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	0	1	**1**	2
Acres Required with Roads & Buffers		Acres	0	0	1	**2**	4
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	282	1,128	3,666	**7,050**	11,280
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	658	2,632	8,554	**16,450**	26,321
Burnable	42%	Cubic Yds	276	1,105	3,593	**6,909**	11,055
Soil	5.00%	Cubic Yds	33	132	428	**823**	1,316
Metals	15%	Cubic Yds	99	395	1,283	**2,468**	3,948
Land Filled	38%	Cubic Yds	250	1,000	3,251	**6,251**	10,002
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	0	1	**1**	2

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

La Marque
Galveston County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	111-130 MPH Winds
Category 4	**131 - 155 MPH Winds**
Category 5	155+ MPH Winds

Population (2000 Census)	13,682

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	Category 3	**Category 4**	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	26	**50**	80
Single Family Homes Affected 5,303		50%	2,652	2,652	2,652	**2,652**	2,652
Estimated Debris for Hurricane		Cubic Yds	10,341	41,364	134,434	**258,526**	413,642
Debris Management Site Requirements							
Minimum Acres Required		Acres	1	3	8	**16**	26
Acres Required with Roads & Buffers		Acres	1	4	14	**27**	43
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	3,102	12,409	40,330	**77,558**	124,093
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	7,239	28,955	94,104	**180,968**	289,549
Burnable	42%	Cubic Yds	3,040	12,161	39,523	**76,007**	121,611
Soil	5.00%	Cubic Yds	362	1,448	4,705	**9,048**	14,477
Metals	15%	Cubic Yds	1,086	4,343	14,116	**27,145**	43,432
Land Filled	38%	Cubic Yds	2,751	11,003	35,759	**68,768**	110,029
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			1	2	7	**14**	23

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

League City
Galveston County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	111-130 MPH Winds
Category 4	**131 - 155 MPH Winds**
Category 5	155+ MPH Winds

Population (2000 Census)	45,444

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	Category 3	**Category 4**	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	26	**50**	80
Single Family Homes Affected 16,347		50%	8,173	8,173	8,173	**8,173**	8,173
Estimated Debris for Hurricane		Cubic Yds	31,876	127,505	414,390	**796,905**	1,275,047
Debris Management Site Requirements							
Minimum Acres Required		Acres	2	8	26	**49**	79
Acres Required with Roads & Buffers		Acres	3	13	43	**82**	131
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	9,563	38,251	124,317	**239,071**	382,514
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	22,313	89,253	290,073	**557,833**	892,533
Burnable	42%	Cubic Yds	9,372	37,486	121,831	**234,290**	374,864
Soil	5.00%	Cubic Yds	1,116	4,463	14,504	**27,892**	44,627
Metals	15%	Cubic Yds	3,347	13,388	43,511	**83,675**	133,880
Land Filled	38%	Cubic Yds	8,479	33,916	110,228	**211,977**	339,163
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			2	7	23	**44**	71

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Texas City					Category 1	74-95 MPH Winds		
Galveston County, TX					Category 2	96-110 MPH Winds		
					Category 3	111-130 MPH Winds		
					Category 4	**131 - 155 MPH Winds**		
Population (2000 Census)	41,521				Category 5	155+ MPH Winds		
(Single Family Homes = Population divided by persons/household)				Category 1	Category 2	Category 3	**Category 4**	Categor
(Debris estimated based on 50% of single family homes)			CY/House	2	8	26	**50**	80
Single Family Homes Affected	15,848		50%	7,924	7,924	7,924	**7,924**	7,924
Estimated Debris for Hurricane			Cubic Yds	30,903	123,612	401,739	**772,576**	1,236,1
Debris Management Site Requirements								
Minimum Acres Required			Acres	2	8	25	**48**	77
Acres Required with Roads & Buffers			Acres	3	13	41	**79**	127
Debris Classification								
Clean Woody Debris		30%	Cubic Yds	9,271	37,084	120,522	**231,773**	370,83
Mixed Construction & Demolition Debris (C&D)		70%	Cubic Yds	21,632	86,528	281,218	**540,803**	865,28
Burnable		42%	Cubic Yds	9,085	36,342	118,111	**227,137**	363,42
Soil		5.00%	Cubic Yds	1,082	4,326	14,061	**27,040**	43,26
Metals		15%	Cubic Yds	3,245	12,979	42,183	**81,120**	129,79
Land Filled		38%	Cubic Yds	8,220	32,881	106,863	**205,505**	328,80
Days Required for Cleanup								
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day								
Days required for cleanup @ 18,000cy/day				2	7	22	**43**	69
This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.								
It has an accuracy of + or - 30%								

ESTIMATED DEBRIS QUANTITIES

					Category 1	74-95 MPH Winds		
Harris County, TX					Category 2	96-110 MPH Winds		
					Category 3	**111-130 MPH Winds**		
					Category 4	131 - 155 MPH Winds		
Population (2000 Census)	3,400,578				Category 5	155+ MPH Winds		
(Single Family Homes = Population divided by persons/household)				Category 1	Category 2	**Category 3**	Category 4	Categor
(Debris estimated based on 50% of single family homes)			CY/House	2	8	**26**	50	80
Single Family Homes Affected	1,218,845		50%	609,423	609,423	**609,423**	609,423	609,42
Estimated Debris for Cat 3 Hurricane			Cubic Yds	2,376,748	9,506,992	**30,897,725**	59,418,702	95,069,9
Debris Management Site Requirements								
Minimum Acres Required			Acres	147	589	**1,914**	3,680	5,888
Acres Required with Roads & Buffers			Acres	244	977	**3,176**	6,109	9,774
Debris Classification								
Clean Woody Debris		30%	Cubic Yds	713,024	2,852,098	**9,269,317**	17,825,610	28,520,9
Mixed Construction & Demolition Debris (C&D)		70%	Cubic Yds	1,663,724	6,654,895	**21,628,407**	41,593,091	66,548,9
Burnable		42%	Cubic Yds	698,764	2,795,056	**9,083,931**	17,469,098	27,950,5
Soil		5.00%	Cubic Yds	83,186	332,745	**1,081,420**	2,079,655	3,327,4
Metals		15%	Cubic Yds	249,559	998,234	**3,244,261**	6,238,964	9,982,3
Land Filled		38%	Cubic Yds	632,215	2,528,860	**8,218,795**	15,805,375	25,288,5
Days Required for Cleanup								
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day								
Days required for cleanup @ 18,000cy/day				132	528	**1,717**	3,301	5,282
This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.								
It has an accuracy of + or - 30%								

ESTIMATED DEBRIS QUANTITIES

Baytown
Harris County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	66,430

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected 23,725		50%	11,863	11,863	**11,863**	11,863	11,863
Estimated Debris for Cat 3 Hurricane		Cubic Yds	46,264	185,055	**601,429**	1,156,594	1,850,550
Debris Management Site Requirements							
Minimum Acres Required		Acres	3	11	**37**	72	115
Acres Required with Roads & Buffers		Acres	5	19	**62**	119	190
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	13,879	55,517	**180,429**	346,978	555,165
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	32,385	129,539	**421,000**	809,616	1,295,385
Burnable	42%	Cubic Yds	13,602	54,406	**176,820**	340,039	544,062
Soil	5.00%	Cubic Yds	1,619	6,477	**21,050**	40,481	64,769
Metals	15%	Cubic Yds	4,858	19,431	**63,150**	121,442	194,308
Land Filled	38%	Cubic Yds	12,306	49,225	**159,980**	307,654	492,246
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			3	10	**33**	64	103

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Bellaire
Harris County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	15,642						
(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected	6,063	50%	3,031	3,031	**3,031**	3,031	3,031
Estimated Debris for Cat 3 Hurricane		Cubic Yds	11,822	47,290	**153,692**	295,561	472,898
Debris Management Site Requirements							
Minimum Acres Required		Acres	1	3	**10**	18	29
Acres Required with Roads & Buffers		Acres	1	5	**16**	30	49
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	3,547	14,187	**46,108**	88,668	141,869
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	8,276	33,103	**107,584**	206,893	331,028
Burnable	42%	Cubic Yds	3,476	13,903	**45,185**	86,895	139,032
Soil	5.00%	Cubic Yds	414	1,655	**5,379**	10,345	16,551
Metals	15%	Cubic Yds	1,241	4,965	**16,138**	31,034	49,654
Land Filled	38%	Cubic Yds	3,145	12,579	**40,882**	78,619	125,791
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			1	3	**9**	16	26

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Deer Park
Harris County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	28,520						
(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected	9,734	50%	4,867	4,867	**4,867**	4,867	4,867
Estimated Debris for Cat 3 Hurricane		Cubic Yds	18,981	75,924	**246,752**	474,522	759,235
Debris Management Site Requirements							
Minimum Acres Required		Acres	1	5	**15**	29	47
Acres Required with Roads & Buffers		Acres	2	8	**25**	49	78
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	5,694	22,777	**74,025**	142,357	227,771
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	13,287	53,146	**172,726**	332,166	531,465
Burnable	42%	Cubic Yds	5,580	22,322	**72,545**	139,510	223,215
Soil	5.00%	Cubic Yds	664	2,657	**8,636**	16,608	26,573
Metals	15%	Cubic Yds	1,993	7,972	**25,909**	49,825	79,720
Land Filled	38%	Cubic Yds	5,049	20,196	**65,636**	126,223	201,957
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			1	4	**14**	26	42

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Galena Park
Harris County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	10,592

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected	3,052	50%	1,526	1,526	**1,526**	1,526	1,526
Estimated Debris for Cat 3 Hurricane		Cubic Yds	5,952	23,809	**77,380**	148,807	238,091
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	1	**5**	9	15
Acres Required with Roads & Buffers		Acres	1	2	**8**	15	24
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	1,786	7,143	**23,214**	44,642	71,427
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	4,167	16,666	**54,166**	104,165	166,664
Burnable	42%	Cubic Yds	1,750	7,000	**22,750**	43,749	69,999
Soil	5.00%	Cubic Yds	208	833	**2,708**	5,208	8,333
Metals	15%	Cubic Yds	625	2,500	**8,125**	15,625	25,000
Land Filled	38%	Cubic Yds	1,583	6,333	**20,583**	39,583	63,332
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	1	**4**	8	13

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Houston
Harris County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	1,953,631						
(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected	731,697	50%	365,849	365,849	**365,849**	365,849	365,849
Estimated Debris for Cat 3 Hurricane		Cubic Yds	1,426,809	5,707,237	**18,548,519**	35,670,229	57,072,366
Debris Management Site Requirements							
Minimum Acres Required		Acres	88	353	**1,149**	2,209	3,535
Acres Required with Roads & Buffers		Acres	147	587	**1,907**	3,667	5,867
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	428,043	1,712,171	**5,564,556**	10,701,069	17,121,710
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	998,766	3,995,066	**12,983,963**	24,969,160	39,950,656
Burnable	42%	Cubic Yds	419,482	1,677,928	**5,453,265**	10,487,047	16,779,276
Soil	5.00%	Cubic Yds	49,938	199,753	**649,198**	1,248,458	1,997,533
Metals	15%	Cubic Yds	149,815	599,260	**1,947,594**	3,745,374	5,992,598
Land Filled	38%	Cubic Yds	379,531	1,518,125	**4,933,906**	9,488,281	15,181,249
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			79	317	**1,030**	1,982	3,171

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Humble
Harris County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	14,579						
(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected	5,565	50%	2,782	2,782	**2,782**	2,782	2,782
Estimated Debris for Cat 3 Hurricane		Cubic Yds	10,851	43,403	**141,060**	271,270	434,031
Debris Management Site Requirements							
Minimum Acres Required		Acres	1	3	**9**	17	27
Acres Required with Roads & Buffers		Acres	1	4	**15**	28	45
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	3,255	13,021	**42,318**	81,381	130,209
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	7,596	30,382	**98,742**	189,889	303,822
Burnable	42%	Cubic Yds	3,190	12,761	**41,472**	79,753	127,605
Soil	5.00%	Cubic Yds	380	1,519	**4,937**	9,494	15,191
Metals	15%	Cubic Yds	1,139	4,557	**14,811**	28,483	45,573
Land Filled	38%	Cubic Yds	2,886	11,545	**37,522**	72,158	115,452
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			1	2	**8**	15	24

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Jacinto City
Harris County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	10,302

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected 2,986		50%	1,493	1,493	**1,493**	1,493	1,493
Estimated Debris for Cat 3 Hurricane		Cubic Yds	5,823	23,291	**75,697**	145,572	232,915
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	1	**5**	9	14
Acres Required with Roads & Buffers		Acres	1	2	**8**	15	24
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	1,747	6,987	**22,709**	43,672	69,874
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	4,076	16,304	**52,988**	101,900	163,040
Burnable	42%	Cubic Yds	1,712	6,848	**22,255**	42,798	68,477
Soil	5.00%	Cubic Yds	204	815	**2,649**	5,095	8,152
Metals	15%	Cubic Yds	611	2,446	**7,948**	15,285	24,456
Land Filled	38%	Cubic Yds	1,549	6,196	**20,135**	38,722	61,955
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	1	**4**	8	13

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Jersey Village
Harris County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	6,880						
(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected	2,843	50%	1,421	1,421	**1,421**	1,421	1,421
Estimated Debris for Cat 3 Hurricane		Cubic Yds	5,544	22,175	**72,069**	138,595	221,752
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	1	**4**	9	14
Acres Required with Roads & Buffers		Acres	1	2	**7**	14	23
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	1,663	6,653	**21,621**	41,579	66,526
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	3,881	15,523	**50,449**	97,017	155,226
Burnable	42%	Cubic Yds	1,630	6,520	**21,188**	40,747	65,195
Soil	5.00%	Cubic Yds	194	776	**2,522**	4,851	7,761
Metals	15%	Cubic Yds	582	2,328	**7,567**	14,552	23,284
Land Filled	38%	Cubic Yds	1,475	5,899	**19,170**	36,866	58,986
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	1	**4**	8	12

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Katy
Harris County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	11,775						
(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected	3,925	50%	1,963	1,963	**1,963**	1,963	1,963
Estimated Debris for Cat 3 Hurricane		Cubic Yds	7,654	30,615	**99,499**	191,344	306,150
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	2	**6**	12	19
Acres Required with Roads & Buffers		Acres	1	3	**10**	20	31
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	2,296	9,185	**29,850**	57,403	91,845
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	5,358	21,431	**69,649**	133,941	214,305
Burnable	42%	Cubic Yds	2,250	9,001	**29,253**	56,255	90,008
Soil	5.00%	Cubic Yds	268	1,072	**3,482**	6,697	10,715
Metals	15%	Cubic Yds	804	3,215	**10,447**	20,091	32,146
Land Filled	38%	Cubic Yds	2,036	8,144	**26,467**	50,897	81,436
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	2	**6**	11	17

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

La Porte
Harris County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	31,880						
(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected	10,993	50%	5,497	5,497	**5,497**	5,497	5,497
Estimated Debris for Cat 3 Hurricane		Cubic Yds	21,437	85,746	**278,675**	535,914	857,462
Debris Management Site Requirements							
Minimum Acres Required		Acres	1	5	**17**	33	53
Acres Required with Roads & Buffers		Acres	2	9	**29**	55	88
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	6,431	25,724	**83,603**	160,774	257,239
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	15,006	60,022	**195,073**	375,140	600,223
Burnable	42%	Cubic Yds	6,302	25,209	**81,931**	157,559	252,094
Soil	5.00%	Cubic Yds	750	3,001	**9,754**	18,757	30,011
Metals	15%	Cubic Yds	2,251	9,003	**29,261**	56,271	90,034
Land Filled	38%	Cubic Yds	5,702	22,808	**74,128**	142,553	228,085
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			1	5	**15**	30	48

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Pasadena
Harris County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	141,674						
(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected	47,383	50%	23,691	23,691	**23,691**	23,691	23,691
Estimated Debris for Cat 3 Hurricane		Cubic Yds	92,396	369,584	**1,201,149**	2,309,902	3,695,843
Debris Management Site Requirements							
Minimum Acres Required		Acres	6	23	**74**	143	229
Acres Required with Roads & Buffers		Acres	9	38	**123**	237	380
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	27,719	110,875	**360,345**	692,971	1,108,753
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	64,677	258,709	**840,804**	1,616,932	2,587,090
Burnable	42%	Cubic Yds	27,164	108,658	**353,138**	679,111	1,086,578
Soil	5.00%	Cubic Yds	3,234	12,935	**42,040**	80,847	129,355
Metals	15%	Cubic Yds	9,702	38,806	**126,121**	242,540	388,064
Land Filled	38%	Cubic Yds	24,577	98,309	**319,506**	614,434	983,094
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			5	21	**67**	128	205

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Seabrook
Harris County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	9,443						
(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected	4,088	50%	2,044	2,044	**2,044**	2,044	2,044
Estimated Debris for Cat 3 Hurricane		Cubic Yds	7,971	31,885	**103,628**	199,284	318,855
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	2	**6**	12	20
Acres Required with Roads & Buffers		Acres	1	3	**11**	20	33
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	2,391	9,566	**31,088**	59,785	95,656
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	5,580	22,320	**72,539**	139,499	223,198
Burnable	42%	Cubic Yds	2,344	9,374	**30,467**	58,590	93,743
Soil	5.00%	Cubic Yds	279	1,116	**3,627**	6,975	11,160
Metals	15%	Cubic Yds	837	3,348	**10,881**	20,925	33,480
Land Filled	38%	Cubic Yds	2,120	8,482	**27,565**	53,010	84,815
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	2	**6**	11	18

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

South Houston
Harris County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	15,833

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected 4,589		50%	2,295	2,295	**2,295**	2,295	2,295
Estimated Debris for Cat 3 Hurricane		Cubic Yds	8,949	35,796	**116,338**	223,727	357,963
Debris Management Site Requirements							
Minimum Acres Required		Acres	1	2	**7**	14	22
Acres Required with Roads & Buffers		Acres	1	4	**12**	23	37
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	2,685	10,739	**34,901**	67,118	107,389
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	6,264	25,057	**81,437**	156,609	250,574
Burnable	42%	Cubic Yds	2,631	10,524	**34,203**	65,776	105,241
Soil	5.00%	Cubic Yds	313	1,253	**4,072**	7,830	12,529
Metals	15%	Cubic Yds	940	3,759	**12,216**	23,491	37,586
Land Filled	38%	Cubic Yds	2,380	9,522	**30,946**	59,511	95,218
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	2	**6**	12	20

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Webster
Harris County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	9,083						
(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected	4,244	50%	2,122	2,122	**2,122**	2,122	2,122
Estimated Debris for Cat 3 Hurricane		Cubic Yds	8,277	33,106	**107,595**	206,914	331,063
Debris Management Site Requirements							
Minimum Acres Required		Acres	1	2	**7**	13	21
Acres Required with Roads & Buffers		Acres	1	3	**11**	21	34
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	2,483	9,932	**32,279**	62,074	99,319
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	5,794	23,174	**75,317**	144,840	231,744
Burnable	42%	Cubic Yds	2,433	9,733	**31,633**	60,833	97,332
Soil	5.00%	Cubic Yds	290	1,159	**3,766**	7,242	11,587
Metals	15%	Cubic Yds	869	3,476	**11,298**	21,726	34,762
Land Filled	38%	Cubic Yds	2,202	8,806	**28,620**	55,039	88,063
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	2	**6**	11	18

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Liberty County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	70,154						
(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected	25,055	50%	12,528	12,528	**12,528**	12,528	12,528
Estimated Debris for Cat 3 Hurricane		Cubic Yds	48,857	195,429	**635,144**	1,221,431	1,954,290
Debris Management Site Requirements							
Minimum Acres Required		Acres	3	12	**39**	76	121
Acres Required with Roads & Buffers		Acres	5	20	**65**	126	201
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	14,657	58,629	**190,543**	366,429	586,287
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	34,200	136,800	**444,601**	855,002	1,368,003
Burnable	42%	Cubic Yds	14,364	57,456	**186,732**	359,101	574,561
Soil	5.00%	Cubic Yds	1,710	6,840	**22,230**	42,750	68,400
Metals	15%	Cubic Yds	5,130	20,520	**66,690**	128,250	205,200
Land Filled	38%	Cubic Yds	12,996	51,984	**168,948**	324,901	519,841
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			3	11	**35**	68	109

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Cleveland
Liberty County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	7,605						
(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected	2,892	50%	1,446	1,446	**1,446**	1,446	1,446
Estimated Debris for Cat 3 Hurricane		Cubic Yds	5,639	22,555	**73,303**	140,967	225,548
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	1	**5**	9	14
Acres Required with Roads & Buffers		Acres	1	2	**8**	14	23
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	1,692	6,766	**21,991**	42,290	67,664
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	3,947	15,788	**51,312**	98,677	157,883
Burnable	42%	Cubic Yds	1,658	6,631	**21,551**	41,444	66,311
Soil	5.00%	Cubic Yds	197	789	**2,566**	4,934	7,894
Metals	15%	Cubic Yds	592	2,368	**7,697**	14,802	23,682
Land Filled	38%	Cubic Yds	1,500	6,000	**19,499**	37,497	59,996
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	1	**4**	8	13

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Dayton
Liberty County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	5,709						
(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected	2,146	50%	1,073	1,073	**1,073**	1,073	1,073
Estimated Debris for Cat 3 Hurricane		Cubic Yds	4,185	16,741	**54,407**	104,629	167,407
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	1	**3**	6	10
Acres Required with Roads & Buffers		Acres	0	2	**6**	11	17
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	1,256	5,022	**16,322**	31,389	50,222
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	2,930	11,718	**38,085**	73,240	117,185
Burnable	42%	Cubic Yds	1,230	4,922	**15,996**	30,761	49,218
Soil	5.00%	Cubic Yds	146	586	**1,904**	3,662	5,859
Metals	15%	Cubic Yds	439	1,758	**5,713**	10,986	17,578
Land Filled	38%	Cubic Yds	1,113	4,453	**14,472**	27,831	44,530
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	1	**3**	6	9

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Liberty
Liberty County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	8,033						
(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected	3,031	50%	1,516	1,516	**1,516**	1,516	1,516
Estimated Debris for Cat 3 Hurricane		Cubic Yds	5,911	23,644	**76,844**	147,777	236,443
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	1	**5**	9	15
Acres Required with Roads & Buffers		Acres	1	2	**8**	15	24
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	1,773	7,093	**23,053**	44,333	70,933
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	4,138	16,551	**53,791**	103,444	165,510
Burnable	42%	Cubic Yds	1,738	6,951	**22,592**	43,446	69,514
Soil	5.00%	Cubic Yds	207	828	**2,690**	5,172	8,276
Metals	15%	Cubic Yds	621	2,483	**8,069**	15,517	24,827
Land Filled	38%	Cubic Yds	1,572	6,289	**20,440**	39,309	62,894
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	1	**4**	8	13

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Matagorda County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	111-130 MPH Winds
Category 4	**131 - 155 MPH Winds**
Category 5	155+ MPH Winds

Population (2000 Census)	37,957

(Single Family Homes = Population divided by persons/household)
(Debris estimated based on 50% of single family homes)

			Category 1	Category 2	Category 3	**Category 4**	Category 5
		CY/House	2	8	26	**50**	80
Single Family Homes Affected	14,058	50%	7,029	7,029	7,029	**7,029**	7,029
Estimated Debris for Hurricane		Cubic Yds	27,413	109,654	356,374	**685,335**	1,096,536
Debris Management Site Requirements							
Minimum Acres Required		Acres	2	7	22	**42**	68
Acres Required with Roads & Buffers		Acres	3	11	37	**70**	113
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	8,224	32,896	106,912	**205,600**	328,961
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	19,189	76,757	249,462	**479,734**	767,575
Burnable	42%	Cubic Yds	8,060	32,238	104,774	**201,488**	322,381
Soil	5.00%	Cubic Yds	959	3,838	12,473	**23,987**	38,379
Metals	15%	Cubic Yds	2,878	11,514	37,419	**71,960**	115,136
Land Filled	38%	Cubic Yds	7,292	29,168	94,795	**182,299**	291,678
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			2	6	20	**38**	61

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Bay City
Matagorda County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	111-130 MPH Winds
Category 4	**131 - 155 MPH Winds**
Category 5	155+ MPH Winds

Population (2000 Census)	18,667

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	Category 3	**Category 4**	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	26	**50**	80
Single Family Homes Affected 7,018		50%	3,509	3,509	3,509	**3,509**	3,509
Estimated Debris for Hurricane		Cubic Yds	13,684	54,738	177,898	**342,111**	547,378
Debris Management Site Requirements							
Minimum Acres Required		Acres	1	3	11	**21**	34
Acres Required with Roads & Buffers		Acres	1	6	18	**35**	56
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	4,105	16,421	53,369	**102,633**	164,213
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	9,579	38,316	124,529	**239,478**	383,165
Burnable	42%	Cubic Yds	4,023	16,093	52,302	**100,581**	160,929
Soil	5.00%	Cubic Yds	479	1,916	6,226	**11,974**	19,158
Metals	15%	Cubic Yds	1,437	5,747	18,679	**35,922**	57,475
Land Filled	38%	Cubic Yds	3,640	14,560	47,321	**91,002**	145,603
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			1	3	10	**19**	30

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Palacios
Matagorda County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	111-130 MPH Winds
Category 4	**131 - 155 MPH Winds**
Category 5	155+ MPH Winds

Population (2000 Census)	5,153

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	Category 3	**Category 4**	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	26	**50**	80
Single Family Homes Affected 1,673		50%	837	837	837	**837**	837
Estimated Debris for Hurricane		Cubic Yds	3,262	13,050	42,412	**81,561**	130,498
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	1	3	**5**	8
Acres Required with Roads & Buffers		Acres	0	1	4	**8**	13
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	979	3,915	12,724	**24,468**	39,149
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	2,284	9,135	29,688	**57,093**	91,349
Burnable	42%	Cubic Yds	959	3,837	12,469	**23,979**	38,366
Soil	5.00%	Cubic Yds	114	457	1,484	**2,855**	4,567
Metals	15%	Cubic Yds	343	1,370	4,453	**8,564**	13,702
Land Filled	38%	Cubic Yds	868	3,471	11,282	**21,695**	34,712
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	1	2	**5**	7

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Montgomery County, TX

Category 1	74-95 MPH Winds
Category 2	**96-110 MPH Winds**
Category 3	111-130 MPH Winds
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	293,768

			Category 1	**Category 2**	Category 3	Category 4	Category 5
(Single Family Homes = Population divided by persons/household)							
(Debris estimated based on 50% of single family homes)		CY/House	2	**8**	26	50	80
Single Family Homes Affected 103,805		50%	51,902	**51,902**	51,902	51,902	51,902
Estimated Debris for Cat 2 Hurricane		Cubic Yds	202,420	**809,679**	2,631,455	5,060,491	8,096,786
Debris Management Site Requirements							
Minimum Acres Required		Acres	13	**50**	163	313	501
Acres Required with Roads & Buffers		Acres	21	**83**	271	520	832
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	60,726	**242,904**	789,437	1,518,147	2,429,036
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	141,694	**566,775**	1,842,019	3,542,344	5,667,750
Burnable	42%	Cubic Yds	59,511	**238,046**	773,648	1,487,784	2,380,455
Soil	5.00%	Cubic Yds	7,085	**28,339**	92,101	177,117	283,388
Metals	15%	Cubic Yds	21,254	**85,016**	276,303	531,352	850,163
Land Filled	38%	Cubic Yds	53,844	**215,375**	699,967	1,346,091	2,153,745
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			11	**45**	146	281	450

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Conroe					Category 1	74-95 MPH Winds		
Montgomery County, TX					**Category 2**	**96-110 MPH Winds**		
					Category 3	111-130 MPH Winds		
					Category 4	131 - 155 MPH Winds		
Population (2000 Census)	36,811				Category 5	155+ MPH Winds		
(Single Family Homes = Population divided by persons/household)				Category 1	**Category 2**	Category 3	Category 4	Category 5
(Debris estimated based on 50% of single family homes)			CY/House	2	**8**	26	50	80
Single Family Homes Affected	13,484		50%	6,742	**6,742**	6,742	6,742	6,742
Estimated Debris for Cat 2 Hurricane			Cubic Yds	26,294	**105,174**	341,816	657,339	1,051,743
Debris Management Site Requirements								
Minimum Acres Required			Acres	2	**7**	21	41	65
Acres Required with Roads & Buffers			Acres	3	**11**	35	68	108
Debris Classification								
Clean Woody Debris		30%	Cubic Yds	7,888	**31,552**	102,545	197,202	315,523
Mixed Construction & Demolition Debris (C&D)		70%	Cubic Yds	18,406	**73,622**	239,272	460,138	736,220
Burnable		42%	Cubic Yds	7,730	**30,921**	100,494	193,258	309,212
Soil		5.00%	Cubic Yds	920	**3,681**	11,964	23,007	36,811
Metals		15%	Cubic Yds	2,761	**11,043**	35,891	69,021	110,433
Land Filled		38%	Cubic Yds	6,994	**27,976**	90,923	174,852	279,764
Days Required for Cleanup								
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day								
Days required for cleanup @ 18,000cy/day				1	**6**	19	37	58

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Walker County, TX

Category 1	74-95 MPH Winds
Category 2	**96-110 MPH Winds**
Category 3	111-130 MPH Winds
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	61,758

(Single Family Homes = Population divided by persons/household)			Category 1	**Category 2**	Category 3	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	**8**	26	50	80
Single Family Homes Affected 25,311		50%	12,655	**12,655**	12,655	12,655	12,655
Estimated Debris for Cat 2 Hurricane		Cubic Yds	49,356	**197,423**	641,625	1,233,894	1,974,231
Debris Management Site Requirements							
Minimum Acres Required		Acres	3	**12**	40	76	122
Acres Required with Roads & Buffers		Acres	5	**20**	66	127	203
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	14,807	**59,227**	192,488	370,168	592,269
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	34,549	**138,196**	449,138	863,726	1,381,962
Burnable	42%	Cubic Yds	14,511	**58,042**	188,638	362,765	580,424
Soil	5.00%	Cubic Yds	1,727	**6,910**	22,457	43,186	69,098
Metals	15%	Cubic Yds	5,182	**20,729**	67,371	129,559	207,294
Land Filled	38%	Cubic Yds	13,129	**52,515**	170,672	328,216	525,145
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			3	**11**	36	69	110

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Huntsville
Walker County, TX

Category 1	74-95 MPH Winds
Category 2	**96-110 MPH Winds**
Category 3	111-130 MPH Winds
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	35,078						
(Single Family Homes = Population divided by persons/household)			Category 1	**Category 2**	Category 3	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	**8**	26	50	80
Single Family Homes Affected	15,185	50%	7,593	**7,593**	7,593	7,593	7,593
Estimated Debris for Cat 2 Hurricane		Cubic Yds	29,611	**118,445**	384,947	740,282	1,184,452
Debris Management Site Requirements							
Minimum Acres Required		Acres	2	**7**	24	46	73
Acres Required with Roads & Buffers		Acres	3	**12**	40	76	122
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	8,883	**35,534**	115,484	222,085	355,336
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	20,728	**82,912**	269,463	518,198	829,116
Burnable	42%	Cubic Yds	8,706	**34,823**	113,174	217,643	348,229
Soil	5.00%	Cubic Yds	1,036	**4,146**	13,473	25,910	41,456
Metals	15%	Cubic Yds	3,109	**12,437**	40,419	77,730	124,367
Land Filled	38%	Cubic Yds	7,877	**31,506**	102,396	196,915	315,064
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			2	**7**	21	41	66

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Waller County, TX

Category 1	74-95 MPH Winds
Category 2	**96-110 MPH Winds**
Category 3	111-130 MPH Winds
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	32,663						
(Single Family Homes = Population divided by persons/household)			Category 1	**Category 2**	Category 3	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	**8**	26	50	80
Single Family Homes Affected	11,707	50%	5,854	**5,854**	5,854	5,854	5,854
Estimated Debris for Cat 2 Hurricane		Cubic Yds	22,829	**91,316**	296,777	570,724	913,159
Debris Management Site Requirements							
Minimum Acres Required		Acres	1	**6**	18	35	57
Acres Required with Roads & Buffers		Acres	2	**9**	31	59	94
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	6,849	**27,395**	89,033	171,217	273,948
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	15,980	**63,921**	207,744	399,507	639,211
Burnable	42%	Cubic Yds	6,712	**26,847**	87,252	167,793	268,469
Soil	5.00%	Cubic Yds	799	**3,196**	10,387	19,975	31,961
Metals	15%	Cubic Yds	2,397	**9,588**	31,162	59,926	95,882
Land Filled	38%	Cubic Yds	6,073	**24,290**	78,943	151,813	242,900
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			1	**5**	16	32	51

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Brookshire
Waller County, TX

Category 1	74-95 MPH Winds
Category 2	**96-110 MPH Winds**
Category 3	111-130 MPH Winds
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	3,450

			Category 1	**Category 2**	Category 3	Category 4	Category 5
(Single Family Homes = Population divided by persons/household)							
(Debris estimated based on 50% of single family homes)		CY/House	2	**8**	26	50	80
Single Family Homes Affected 1,139		50%	569	**569**	569	569	569
Estimated Debris for Cat 2 Hurricane		Cubic Yds	2,220	**8,881**	28,864	55,507	88,812
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	**1**	2	3	6
Acres Required with Roads & Buffers		Acres	0	**1**	3	6	9
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	666	**2,664**	8,659	16,652	26,644
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	1,554	**6,217**	20,205	38,855	62,168
Burnable	42%	Cubic Yds	653	**2,611**	8,486	16,319	26,111
Soil	5.00%	Cubic Yds	78	**311**	1,010	1,943	3,108
Metals	15%	Cubic Yds	233	**933**	3,031	5,828	9,325
Land Filled	38%	Cubic Yds	591	**2,362**	7,678	14,765	23,624
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	**0**	2	3	5

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Hempstead
Waller County, TX

Category 1	74-95 MPH Winds
Category 2	**96-110 MPH Winds**
Category 3	111-130 MPH Winds
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	4,691

(Single Family Homes = Population divided by persons/household)			Category 1	**Category 2**	Category 3	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	**8**	26	50	80
Single Family Homes Affected 1,718		50%	859	**859**	859	859	859
Estimated Debris for Cat 2 Hurricane		Cubic Yds	3,351	**13,403**	43,559	83,768	134,029
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	**1**	3	5	8
Acres Required with Roads & Buffers		Acres	0	**1**	4	9	14
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	1,005	**4,021**	13,068	25,130	40,209
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	2,346	**9,382**	30,492	58,638	93,820
Burnable	42%	Cubic Yds	985	**3,940**	12,806	24,628	39,404
Soil	5.00%	Cubic Yds	117	**469**	1,525	2,932	4,691
Metals	15%	Cubic Yds	352	**1,407**	4,574	8,796	14,073
Land Filled	38%	Cubic Yds	891	**3,565**	11,587	22,282	35,652
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	**1**	2	5	7

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Pine Island
Waller County, TX

Category 1	74-95 MPH Winds
Category 2	**96-110 MPH Winds**
Category 3	111-130 MPH Winds
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	849						
(Single Family Homes = Population divided by persons/household)			Category 1	**Category 2**	Category 3	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	**8**	26	50	80
Single Family Homes Affected	295	50%	147	**147**	147	147	147
Estimated Debris for Cat 2 Hurricane		Cubic Yds	575	**2,299**	7,473	14,371	22,994
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	**0**	0	1	1
Acres Required with Roads & Buffers		Acres	0	**0**	1	1	2
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	172	**690**	2,242	4,311	6,898
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	402	**1,610**	5,231	10,060	16,096
Burnable	42%	Cubic Yds	169	**676**	2,197	4,225	6,760
Soil	5.00%	Cubic Yds	20	**80**	262	503	805
Metals	15%	Cubic Yds	60	**241**	785	1,509	2,414
Land Filled	38%	Cubic Yds	153	**612**	1,988	3,823	6,116
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	**0**	0	1	1

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Prairie View
Waller County, TX

Category 1	74-95 MPH Winds
Category 2	**96-110 MPH Winds**
Category 3	111-130 MPH Winds
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	4,410

			Category 1	**Category 2**	Category 3	Category 4	Category 5
(Single Family Homes = Population divided by persons/household)							
(Debris estimated based on 50% of single family homes)		CY/House	2	**8**	26	50	80
Single Family Homes Affected 1,822		50%	911	**911**	911	911	911
Estimated Debris for Cat 2 Hurricane		Cubic Yds	3,554	**14,214**	46,196	88,838	142,140
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	**1**	3	6	9
Acres Required with Roads & Buffers		Acres	0	**1**	5	9	15
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	1,066	**4,264**	13,859	26,651	42,642
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	2,487	**9,950**	32,337	62,186	99,498
Burnable	42%	Cubic Yds	1,045	**4,179**	13,582	26,118	41,789
Soil	5.00%	Cubic Yds	124	**497**	1,617	3,109	4,975
Metals	15%	Cubic Yds	373	**1,492**	4,851	9,328	14,925
Land Filled	38%	Cubic Yds	945	**3,781**	12,288	23,631	37,809
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	**1**	3	5	8

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Waller
Waller County, TX

Category 1	74-95 MPH Winds
Category 2	**96-110 MPH Winds**
Category 3	111-130 MPH Winds
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	2,092						
(Single Family Homes = Population divided by persons/household)			Category 1	**Category 2**	Category 3	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	**8**	26	50	80
Single Family Homes Affected	769	50%	385	**385**	385	385	385
Estimated Debris for Cat 2 Hurricane		Cubic Yds	1,500	**5,999**	19,497	37,494	59,991
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	**0**	1	2	4
Acres Required with Roads & Buffers		Acres	0	**1**	2	4	6
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	450	**1,800**	5,849	11,248	17,997
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	1,050	**4,199**	13,648	26,246	41,994
Burnable	42%	Cubic Yds	441	**1,764**	5,732	11,023	17,637
Soil	5.00%	Cubic Yds	52	**210**	682	1,312	2,100
Metals	15%	Cubic Yds	157	**630**	2,047	3,937	6,299
Land Filled	38%	Cubic Yds	399	**1,596**	5,186	9,974	15,958
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	**0**	1	2	3

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Wharton County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	41,188

(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected 15,087		50%	7,544	7,544	**7,544**	7,544	7,544
Estimated Debris for Cat 3 Hurricane		Cubic Yds	29,420	117,680	**382,460**	735,500	1,176,800
Debris Management Site Requirements							
Minimum Acres Required		Acres	2	7	**24**	46	73
Acres Required with Roads & Buffers		Acres	3	12	**39**	76	121
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	8,826	35,304	**114,738**	220,650	353,040
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	20,594	82,376	**267,722**	514,850	823,760
Burnable	42%	Cubic Yds	8,649	34,598	**112,443**	216,237	345,979
Soil	5.00%	Cubic Yds	1,030	4,119	**13,386**	25,743	41,188
Metals	15%	Cubic Yds	3,089	12,356	**40,158**	77,228	123,564
Land Filled	38%	Cubic Yds	7,826	31,303	**101,734**	195,643	313,029
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			2	7	**21**	41	65

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

El Campo
Wharton County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	10,945						
(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected	3,995	50%	1,997	1,997	**1,997**	1,997	1,997
Estimated Debris for Cat 3 Hurricane		Cubic Yds	7,789	31,157	**101,261**	194,733	311,573
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	2	**6**	12	19
Acres Required with Roads & Buffers		Acres	1	3	**10**	20	32
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	2,337	9,347	**30,378**	58,420	93,472
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	5,453	21,810	**70,883**	136,313	218,101
Burnable	42%	Cubic Yds	2,290	9,160	**29,771**	57,252	91,602
Soil	5.00%	Cubic Yds	273	1,091	**3,544**	6,816	10,905
Metals	15%	Cubic Yds	818	3,272	**10,632**	20,447	32,715
Land Filled	38%	Cubic Yds	2,072	8,288	**26,935**	51,799	82,878
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	2	**6**	11	17

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

ESTIMATED DEBRIS QUANTITIES

Wharton
Wharton County, TX

Category 1	74-95 MPH Winds
Category 2	96-110 MPH Winds
Category 3	**111-130 MPH Winds**
Category 4	131 - 155 MPH Winds
Category 5	155+ MPH Winds

Population (2000 Census)	9,237						
(Single Family Homes = Population divided by persons/household)			Category 1	Category 2	**Category 3**	Category 4	Category 5
(Debris estimated based on 50% of single family homes)		CY/House	2	8	**26**	50	80
Single Family Homes Affected	3,680	50%	1,840	1,840	**1,840**	1,840	1,840
Estimated Debris for Cat 3 Hurricane		Cubic Yds	7,176	28,705	**93,290**	179,404	287,046
Debris Management Site Requirements							
Minimum Acres Required		Acres	0	2	**6**	11	18
Acres Required with Roads & Buffers		Acres	1	3	**10**	18	30
Debris Classification							
Clean Woody Debris	30%	Cubic Yds	2,153	8,611	**27,987**	53,821	86,114
Mixed Construction & Demolition Debris (C&D)	70%	Cubic Yds	5,023	20,093	**65,303**	125,583	200,932
Burnable	42%	Cubic Yds	2,110	8,439	**27,427**	52,745	84,392
Soil	5.00%	Cubic Yds	251	1,005	**3,265**	6,279	10,047
Metals	15%	Cubic Yds	753	3,014	**9,795**	18,837	30,140
Land Filled	38%	Cubic Yds	1,909	7,635	**24,815**	47,721	76,354
Days Required for Cleanup							
100 trucks/day x 18cy/truck x 10 trips/day = 18,000 cy/day							
Days required for cleanup @ 18,000cy/day			0	2	**5**	10	16

This Table is based on the U.S. Army Corps of Engineers Hurricane Debris Estimating Model.
It has an accuracy of + or - 30%

TAB E

INITIAL TEMPORARY DEBRIS MANAGEMENT SITE INVESTIGATION FORM AND TEMPORARY DEBRIS MANAGEMENT SITE BASELINE DATA CHECKLIST

Initial Temporary Debris Management Site Investigation Form

Date: _____ **Overall Potential:** _____

Debris Management Zone: _____ **Map /Grid** _____

Street Address or Closest Intersection: _____

_____

Inspector: _____

LOCATION Place specific comments in Remarks below	**Yes–Y** **No–N**	**CONDITION** Place specific comments in Remarks below	**Good-G** **Fair-F** **Poor-P** **Yes–Y** **No-N**
On public property?		What is condition of surface drainage?	
On private property?		Noise acceptability?	
In 100-year floodplain?		Smoke acceptability?	
<50 Acres (enter size _____)		Is there suitable ingress/egress?	
50-100 Acres (enter size _____)		Is site suitable in wet weather?	
>100 Acres (enter size _____)		Is site capable of handling large number of vehicles/queuing?	
Close to Schools, Hospitals, Churches Residential Communities?		What is proximity to major roadway? (comments on distance, problems in remarks)	
Obvious environmental concerns?		Does site lend itself to easy preparation?	
Mostly Open/Clear?		Are there any posted phone numbers?	
Wetlands, creeks, ponds on property?		What is the approximate distance to closest landfill?	
Property developed?		What type of vegetative cover is on the site?	
Brownfield?		If private site, give name, address, and phone number, if available.	
Paved surfaces on property?			
Is site fenced? (comment on length and type of fence)			
Is site adjacent to an airfield?			
Are there any on-site utilities? (comment on type in remarks)			
Remarks:			

PLACE SKETCH OF SITE ON BACK OF FORM.
ATTACH DEBRIS MANAGEMENT SITE BASE LINE DATA CHECKLIST

Debris Management Site Baseline Data Checklist

Date: _____ Site Name: _____

Debris Management Zone: _____ Map /Grid _____

Street Address or Closest Intersection: _____

_____

Inspector: _____

Indicate actions taken in the Remarks Section.

Before activities begin:

- ☐ Take ground or aerial video/photographs.
- ☐ Note important features, such as structures, fences, culverts and landscaping.
- ☐ Check with the State Historic Preservation Officer to determine if any structures identified are listed on or eligible for the National Register of Historic Places.
- ☐ Take random soil samples.
- ☐ Take water samples from existing wells.
- ☐ Check the site for volatile organic compounds.

After activities begin:

- ☐ Establish groundwater monitoring wells.
- ☐ Take groundwater samples.
- ☐ Take spot soil samples at household hazardous waste, ash and fuel storage areas.

Progressive updates*:*

- ☐ Update videos and photographs.
- ☐ Update maps and sketches of site layout.
- ☐ Update quality assurance reports and fuel spill reports.

Remarks:

_____
_____
_____
_____
_____
_____
_____
_____
_____

PLACE SKETCH OF SITE ON BACK OF FORM.
ATTACH INITIAL TEMPORARY DEBRIS MANAGEMENT SITE INVESTIGATION FORM

TAB F

DEBRIS MANAGEMENT PLAN DEVELOPMENT GUIDANCE

DEBRIS MANAGEMENT PLAN DEVELOPMENT GUIDANCE

APPENDIX ___

DEBRIS REMOVAL & DISPOSAL

PURPOSE

- To provide policies and guidance to _____ for the removal and disposition of debris caused by a major disaster.
- To facilitate and coordinate the management of debris following a disaster in order to mitigate against any potential threat to the health, safety, and welfare of the impacted citizens, expedite recovery efforts in the impacted area, and address any threat of significant damage to improved public or private property.

SITUATION AND ASSUMPTIONS

SITUATIONS:

- Natural and man-made disasters precipitate a variety of debris that include, but are not limited to, trees, sand, gravel, building/construction material, vehicles, personal property, etc.
- The quantity and type of debris generated from any particular disaster will be a function of the location and kind of event experienced, as well as its magnitude, duration, and intensity.
- The quantity and type of debris generated, its location, and the size of the area over which it is dispersed will have a direct impact on the type of collection and disposal methods utilized to address the debris problem, associated costs incurred, and how quickly the problem can be addressed.
- In a major or catastrophic disaster, many state agencies and local governments will have difficulty in locating staff, equipment, and funds to devote to debris removal, in the short- as well as long-term.

ASSUMPTIONS:

- A natural disaster that requires the removal of debris from public or private lands and waters could occur at any time.
- The amount of debris resulting from an event or disaster could exceed the local government's or County's ability to dispose of it.
- If the natural disaster requires, the Governor would declare a state of emergency that authorizes the use of State resources to assist in the removal and disposal of debris. In the event Federal resources are required, the Governor would request a Presidential Disaster Declaration through FEMA.
- Private contractors will play a significant role in the debris removal, collection, reduction, and disposal process.
- The debris management program implemented by the local governments will be based on the waste management approach of reduction, reuse, reclamation, resource recovery, incineration, and land filling.

CONCEPT OF OPERATIONS

Debris Management Center Activation:

- Define how the County Emergency Manager will activate the Debris Management Center.
- Define who will be the Debris Manager and activate the Debris Management Center (DMC) staff.
- The EOC Director or his designated representative in conjunction with the Debris Manager will determine the extent of damage and resulting debris and issue appropriate directives to implement this annex
- Create an appendix that contains a listing of key points of contact.

Estimating the Type and Amount of Debris

- Designate public works department personnel to determine the estimated amount of debris generated as soon as possible.
- Define the estimating methods to be used. One method to estimate debris is to conduct a drive-through "windshield" damage assessment and estimate the amount of debris visually. Another method is an aerial assessment by flying over the area using State Police and/or National Guard helicopters, and Civil Air Patrol reconnaissance flights. The damaged area can be assessed either visually or using aerial photography. Once the area has been assessed, actions can be taken to implement Phase I debris clearing procedures and institute requests for additional State or Federal assistance.

Site Selection Priorities:

- Determine is the number of temporary debris management (TDM) sites and location of these sites for the collection and processing of debris.
- Prioritize which sites will be opened based on the amount of debris has been estimated

First Priority:	Pre-determined TDM sites
Second Priority:	Public property within the damaged area
Last Priority:	Private property

Pre-Designated TDM Sites:

- Pre-identified TDM sites should be identified on County maps
- Detailed information pertaining to each of these sites should be maintained by either Solid Waste Authority or Public Works. Designate which agency has responsibility
- Detailed information should include exact location, size, available ingress and egress routes, results of an environmental assessment, initial data samples, etc.
- Baseline data should include videotapes, photographs, documentation of physical features, and soil and water samplings.
- The list of TDM sites should be reviewed annually and updated as necessary as part of the normal plan maintenance.

TDM Site Preparation:

- Identify the preparatory actions that need to be accomplished after a pre-designated TDM site has been selected.
- Develop a Memorandum of Understanding (MOU) or a Memorandum of Agreement (MOA) if required.
- Identify who would be responsible for updating the initial base line data and develop an operation layout to include ingress and egress routes.

Existing Landfills:
- Identify location of County and private landfills.
- Identify any restrictions, limitations, tipping fees, etc.

DEBRIS REMOVAL

General:
- Hurricanes and other natural disasters can generate unprecedented amounts of debris in a few hours or a few minutes. The debris may be equally heavy in both urban and rural areas depending on the magnitude of the tree blow-down and associated structural damage such as homes, businesses, utilities, signs, etc. This section provides guidelines on debris removal issues, including emergency roadway clearance, public rights-of-way removal, mobile home park removal, private property removal, navigation hazard removal, and household hazardous waste (HHW) removal.
- Debris removal, regardless of source, becomes a high priority following a disaster. Debris management strategy for a large-scale debris removal operation divides the operation into two phases:
  1. Phase I consists of the clearance of the debris that hinders immediate life-saving actions being taken within the disaster area and the clearance of that debris which poses an immediate threat to public health and safety.
  2. Phase II operations consist of the removal and disposal of that debris which is determined necessary to ensure the orderly recovery of the community and to eliminate less immediate threats to health and safety.

Emergency Roadway Debris Removal (Phase I):
- Identify critical routes that are essential to emergency operations.
- Define how efforts will be prioritized between local agencies.
- Identifying areas that State and Federal assistance can target.
- Define what actions take place during Phase I.
- Example: Roadway debris removal involves the opening of arterial roads and collector streets by moving debris to the shoulders of the road. There is no attempt to physically remove or dispose of the debris, only to clear key access routes to expedite the following: 1) Movement of emergency vehicles; 2) Law enforcement; 3) Resumption of critical services; and 4) Assessment of damage to key public facilities and utilities such as schools, hospitals, government buildings, and municipal owned utilities.
- Define the type of debris that may be encountered such as tree blow-down and broken limbs; yard trash such as outdoor furniture, trash cans, utility poles, power, telephone and cable TV lines, transformers and other electrical devices; building debris such as reefs, sheds and signs; and personal property such as clothing, appliances, boats, cars, trucks and trailers.
- Define the priority to open access to other critical community facilities, such as municipal buildings, water treatment plants, wastewater treatment plants, power generation units, and airports.
- The requirement for government services will be increased drastically following a major natural disaster. Develop procedures to determine the damage done to utility systems. Activities involving these facilities should be closely coordinated with their owners and/or operators

Local, State, Federal Assistance:
- Identify local, State and Federal government assets that may be available such as:

Municipal workers/equipment	Local contractors
Local/State DOT workers/equipment	U.S. Department of Agriculture (USDA) Forest
National Guard	Service chain saw crews

Local U.S. Army Corps of Engineers (USACE) workers and equipment

Supervision and Special Considerations:

- Immediate debris clearing (Phase I) actions should be supervised by local public works or DOT personnel using all available resources. Requests for additional assistance and resources should be made to the State EOC. Requests for Federal assistance will be requested through the State Coordinating Officer (SCO) to the FEMA Federal Coordinating Officer (FCO).
- Special crews equipped with chain saws may be required to cut up downed trees. This activity is hazardous, and common sense safety considerations are necessary to reduce the chance of injury and possible loss of life. When live electric lines are involved, work crews should coordinate with local utility companies to have power lines deenergized for safety reason.
- Front-end loaders and dozers should be equipped with protective cabs. Driveway cutouts, fire hydrants, valves, and stormwater inlets should be left unobstructed. All personnel should wear protective gear, such as hard hats, gloves, goggles, and safety shoes.
- The USDA Forest Service and other State and Federal land management agencies are equipped for fast responses to tornadoes, and hurricanes. Assistance would be requested through the State EOC/SCO to the FCO according to standard procedures.

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

- Debris is simply pushed to the shoulders of the roadway during the emergency opening (Phase I) of key routes. There is little time or concern for sorting debris at that time. The objective is to provide for the safe movement of emergency and support vehicles into and out of the disaster area. As removal operations progress, the initial roadside piles of debris become the dumping location for additional yard waste and other storm-generated debris, such as construction material, personal property, trash, white goods (refrigerators, washers, dryers, hot water heaters, etc.), roofing, and even household, commercial, and agricultural chemicals.
- Define how the Debris Manager will coordinate debris removal operations.
- Define how local and State government force account employees will transition from Phase I to Phase II operations.
- Determine if Mutual Aid agreements exist.
- Determine if local contractors will be needed to assist in Phase II operations.
- Determine if additional State and/or Federal assistance will be required.
- Develop local field inspection teams. The teams become the “eyes and ears” for the Debris Manager.
- Coordinate through local agencies to establish a contracted work force capable of expeditious removal of the debris.
- Develop an independent team using the local and State personnel to monitor the removal activities. This team becomes the debris manager’s “eyes and ears” in the field.
- Conduct daily update briefings with key debris managers. Ensure that all major debris removal and disposal actions are reviewed and approved by the local debris manager.
- Ensure that a representative of the Debris Manager attends all briefings to resolve any coordination problems between State and Federal debris removal efforts and local debris removal and disposal efforts
- Coordinate with local and State DOT and law enforcement authorities to ensure that traffic control measures expedite debris removal activities.
- Establish a proactive information management plan. Emphasis should be placed on actions that the public can perform to expedite the cleanup process, such as separating burnable and nonburnable debris; segregating HHW; placing debris at the curbside; keeping debris piles away from fire

hydrants, valves, etc; reporting locations of illegal dump sites or incidents of illegal dumping; and segregating recyclable materials.

- The public should be kept informed of debris pick-up schedules, disposal methods and ongoing actions to comply with State and Federal Environmental Protection Agency (EPA) environmental regulations, disposal procedures for self-help and independent contractors, and restrictions and penalties for creating illegal dumps. The PIO should be prepared to respond to questions pertaining to debris removal from the press and local residents. The following questions are likely to be asked:
    - *What is the pick-up system?*
    - *When will the contractor be in my area?*
    - *Who are the contractors and how can I contact them?*
    - *Should I separate the different debris materials and how?*
    - *How do I handle HHW?*
    - *What if I cannot pay?*
    - *What if I am elderly?*

Private Property Debris Removal:

- Dangerous structures should be the responsibility of the owner or local government to demolish to protect the health and safety of adjacent residents. However, experience has shown that unsafe structures will remain because of the lack of insurance, absentee landlords, or under-staffed and under-equipped local governments. Consequently, demolition of these structures may become the responsibility of the Debris Manager.
- Develop procedures to issue complete cooperation with numerous local and State government officials to include the following: real estate offices, local law and/or code enforcement agencies, State historic preservation office, qualified contractors to remove HHW, asbestos, and lead-based paint, and field teams to photograph the sites before and after demolition.
- Include a copy of a Demolition of Private Property checklist
- Include copies of sample ordinances that can be activated when a "state of emergency" is implemented, eliminating any unnecessary waiting period.
- The most significant building demolition problem will be that local governments do not have proper ordinances in effect to handle emergency condemnation procedures. Moreover, structures will be misidentified or have people or belongings in them when the demolition crews arrive. Buildings may be occupied by drug users or homeless people who will necessitate removal by local law enforcement. Close coordination is essential, and it is recommended that at least one FEMA staff person be on site to work directly with the local government staff to ensure that all required legal actions are taken.

Household Hazardous Wastes Removal:

- HHW may be generated as a result of a major natural disaster. HHW may consist of common household chemicals, propane tanks, oxygen bottles, batteries, and industrial and agricultural chemicals. These items will be mixed into the debris stream and will require close attention throughout the debris removal and disposal process.
- Consider HHW response teams to be assigned and respond ahead of any removal efforts. Consider preparing draft emergency contracts with generic scopes of work. Coordinate with regulatory agencies concerning possible regulatory waivers and other emergency response requirements.
- Arrange for salvageable hazardous materials to be collected and segregated based on their intended use. Removal of hazardous waste should be accomplished by properly trained personnel or emergency response HHW contractors. Coordinate with regulatory agencies to ensure cleanup actions meet local, State, and Federal regulations.

- Complete HHW identification and segregation before building demolition begins. HHW debris should be removed by qualified contractors. Uncontaminated debris can be removed by regular demolition contractors.
- A separate staging area for HHW materials, contaminated soils, and contaminated debris should be established at each TDM site. The staging area should be lined with an impermeable material and bermed to prevent contamination of the groundwater and surrounding area. Materials should be removed and disposed of using qualified HHW personnel/contractors in accordance with local, State, and Federal regulations.

TEMPORARY DEBRIS MANAGEMENT SITES

- Once the debris is removed from the damaged area, it will be taken to TDM sites.
- Removal and disposal actions should be handled at the lowest level possible based on the magnitude of the event. It follows the normal chain of responsibility, i.e., local level, County level, State level, and when resources are exceeded at each level of responsibility, Federal assistance may be requested according to established procedures. Because of the limited debris removal and reduction resources, the establishment and operation of TDM sites are generally accomplished by contracts.
- Emphasis is placed on local government responsibilities for developing debris disposal contracts. Local/County and/or State governments may be responsible for developing and implementing these contracts for debris removal and disposal under most disaster conditions.
- The Debris Manager should review all debris disposal contracts. There should be a formal means to monitor contractor performance to ensure that funds are being used wisely.
- **Site Preparation.** The topography and soil conditions should be evaluated to determine best site layout. Consider ways to make remediation and restoration easier when planning site preparation.
- **Site Operations.** Site preparation and operation are usually left up to the contractor, but guidance can help avoid problems with the ultimate closeout.
- Establish lined temporary storage areas for ash, HHW, fuels, and other materials that can contaminate soils and groundwater. Set up plastic liners, when possible, under stationary equipment such as generators and mobile lighting plants. Include this as a requirement of the contract scope of work.
- If the site is also an equipment staging area, monitor fueling and equipment repair to prevent and mitigate spills of petroleum products, hydraulic fluids, etc. Include clauses in contract scope of work to require immediate cleanup by the contractor.
- Be aware of and mitigate things that will irritate the neighbors such as:
  Smoke - proper construction and operation of incineration pits. Don't overload air curtains.
  Dust - employ water trucks.
  Noise - construct perimeter berms.
  Traffic - proper layout of ingress and egress procedures to help traffic flow.

DEBRIS REDUCTION METHODS

Volume Reduction by Incineration:

- There are several incineration methods available including **uncontrolled open incineration, controlled open incineration, air curtain pit incineration, and refractor lined pit incineration.** The Debris Manager should consider each incineration method before selection and implementation as part of the overall volume reduction strategy.
- **Uncontrolled Open Incineration:** Uncontrolled open incineration is the least desirable method of volume reduction because it lacks environmental control. However, in the haste to make progress, DNREC may issue waivers to allow this method of reduction early in a disaster.

- **Controlled Open Incineration:** Controlled open incineration is a cost-effective method for reducing clean woody debris in rural areas. This option must be terminated if mixed debris (treated lumber, poles, nails, bolts, tin, aluminum sheeting, etc.) enters the waste flow. Clean woody tree debris presents little environmental damage, and the resulting ash can be used as a soil additive by the local agricultural community. Department of Agriculture and County agricultural extension personnel should be consulted to determine if and how the resulting ash can be recycled as a soil additive. Responsible agencies and telephone numbers should be provided.
- **Air Curtain Pit Incineration:** Air curtain pit incineration offers an effective means to expedite the volume reduction process by substantially reducing the environmental concerns caused by open incineration. Specifications and statements of work should be developed to expedite the proper use of the systems, because experience has shown that many contractors and subcontractors are not fully knowledgeable of the system operating parameters
- **Refractor Lined Pit Incineration:** Pre-manufactured refractory lined pit burners are an alternative to air curtain open pit incineration. The units can be erected on site in a minimal amount of time. Some are portable and others must be built in-place. The units are especially suited for locations with high water tables, sandy soil, or where materials are not available to build aboveground pits. The engineered features designed into the units allow for a reduction rate of approximately 95% with a minimum of air pollution. The air curtain traps smoke and small particles and recirculates them to enhance combustion that reaches over 2,500 degrees Fahrenheit. Manufacturers claim that combustion rates of about 25 tons per hour are achievable while still meeting emission standards.
- Local officials, environmental groups, and local citizens should be thoroughly briefed on the type of incineration method being used, how the systems work, environmental standards, health issues, and the risk associated with each type of incineration. PIOs should take the initiative to keep the public informed. A proactive public information strategy to include press releases, media broadcasts, etc. should be included in any operation that envisions incineration as a primary means of volume reduction.

Environmental Controls:

Environmental controls are essential for all incineration methods, and the following should be considered:

- A setback of at least 1,000 feet should be maintained between the debris piles and the incineration area. Keep at least 1,000 feet between the incineration area and the nearest building. Contractors should use fencing and warning signs to keep the public away from the incineration area.
- The fire should be extinguished approximately two hours before anticipated removal of the ash mound. The ash mound should be removed when it reaches 2 feet below the lip of the incineration pit.
- The incineration area should be placed in an above ground or below ground pit that is no wider than 8 feet and between 9 and 14 feet deep.
- The incineration pits should be constructed with limestone and reinforced with earth anchors or wire mesh to support the weight of the loaders. There should be a 1 foot impervious layer of clay or limestone on the bottom of the pit to seal the ash from the aquifer.
- The ends of the pits should be sealed with dirt or ash to a height of 4 feet.
- A 12 inch dirt seal should be placed on the lip of the incineration pit area to seal the blower nozzle. The nozzle should be 3 to 6 inches from the end of the pit.
- There should be a 1 foot high, unburnable warning stops along the edge of the pit's length to prevent the loader from damaging the lip of the incineration pit.
- Hazardous or contaminated ignitable material should not be placed in the pit. This is to prevent contained explosions.

- The airflow should hit the wall of the pit about 2 feet below the top edge of the pit, and the debris should not break the path of the airflow except during dumping.
- The pit should be no longer than the length of the blower system, and the pit should be loaded uniformly along the length.

Volume Reduction by Grinding and Chipping:

- Hurricanes and tornadoes may present the opportunity to employ large-scale grinding and chipping operations as part of the overall debris volume reduction strategy. Hurricanes can blow away scarce topsoil in the agricultural areas and cause extensive tree damage and blow-down. This two-fold loss, combined with local climatic conditions, may present an excellent opportunity to reduce clean woody debris into suitable mulch that can be used to replenish the topsoil and retain soil moisture.
- Grinding and chipping woody debris is a viable reduction method. Although more expensive than incineration, grinding and chipping is more environmentally friendly, and the resulting product, mulch, can be recycled. In some locations the mulch will be a desirable product because of shallow topsoil conditions. In other locations it may become a landfill product.
- Grinding and chipping woody debris reduces the large amounts of tree blow-down. Chipping operations are suitable in urban areas where streets are narrow or in groves of trees where it is cheaper to reduce the woody vegetation to mulch than to move it to a central grinding site and then returning it to the affected area. This reduces the costs associated with double handling.
- The Debris Manager should work closely with local environmental and agricultural groups to determine if there is a market for mulch. Another source for disposal of ground woody debris may be as an alternative fuel for industrial heating or for use in a cogeneration plant.
- There are numerous makes and models of grinders and chippers on the market. When contracting, the most important item to specify is the size of the mulch. If the grinding operation is strictly for volume reduction, size is not important. However, mulch to be used for agricultural purposes must be of a certain size and be virtually free of paper, plastic, dirt, etc.
- The average size of wood chips produced should not exceed 4 inches in length and ½ inch in diameter. Production output should average 100 to 150 cubic yards per hour when debris is moderately contaminated, which slows feeding operations, and 200 to 250 cubic yards per hour for relatively clean debris. Note, this is not machine capability; this is contractor output or performance capabilities.
- Contaminants are all materials other than wood products and should be held to 10% or less for the mulch to be acceptable. Plastics are a big problem and should be eliminated completely. To help eliminate contaminants, root rake loaders should be used to feed or crowd materials to the grapplers. Bucket-loaders tend to scoop up earth, which is a contaminant and causes excessive wear on the grinder or chipper. Hand laborers should remove contaminants prior to feeding the grinders. Shaker screens should be used when processing stumps with root balls or when large amounts of soil are present in the woody debris.
- Chippers are ideal for use in residential areas, orchards, or groves. The number of damaged and uprooted trees presents significant problems if they are pushed to the rights-of-way for eventual pick-up and transport to staging and reduction sites. The costs associated with chipping are reasonable because the material does not need to be transported twice.
- Grinders are ideal for use at debris staging and reduction sites because of their high volume reduction capacity. Locating the grinders is critical from a noise and safety point-of-view. Moreover, there is a need for a large area to hold the woody debris and an area to hold the resulting mulch. Ingress and egress to the site is also an important consideration.

Volume Reduction by Recycling:

- Recycling reduces mixed debris volume before it is hauled to a landfill. Recycling is attractive and strongly supported by _____ because there may be an economic value to the recovered material if it can be sorted and sold. A portable Materials Recovery Facility (MRF) could be set up at the site. Metals, wood, and soils are prime candidates for recycling. The major drawback is the potential environmental impact of the recycling operation. In areas where there is a large usage of chemical agricultural fertilizer, the recovered soil may be too contaminated for use on residential or existing agricultural land.
- Hurricanes may present opportunities to contract out large-scale recycling operations and to achieve an economic return from some of the prime contractors who exercise their initiative to segregate and recycle debris as it arrives at the staging and reduction sites. Recycling has significant drawbacks if contracts are not properly written and closely monitored.
- Specialized contractors should be available to bid on disposal of debris by recycling, if it is well sorted. Contracts and monitoring procedures should be developed to ensure that the recyclers comply with local, State, and Federal environmental regulations.
- Recycling should be considered early in the debris removal and disposal operation because it may present an opportunity to reduce the overall cost of the operation. The following materials are suitable for recycling:

  Metals. Hurricanes and tornadoes may cause extensive damage to mobile homes, sun porches, and green houses. Most of the metals are non-ferrous and suitable for recycling. Trailer frames and other ferrous metals are also suitable for recycling. Metals can be separated using an electromagnet. Metals that have been processed for recycling can be sold to metal recycling firms.

  Soil. Cleanup operations using large pieces of equipment pick up large amounts of soil. The soil is transported to the staging and reduction sites where it is combined with other organic materials that will decompose over time. Large amounts of soil can be recovered if the material is put through some type of screen or shaker system. This procedure can produce significant amounts of soil that can either be sold or recycled back into the agricultural community. This soil could also be used at DSWA landfills for cover. It is more expensive to transport and pay tipping fees at local landfills than to sort out the heavy dirt before moving the material. Monitoring and testing of the soil may be necessary to ensure that it is not contaminated with chemicals.

  Wood. Woody debris can be either ground or chipped into mulch. (See Volume Reduction by Grinding and Chipping)

  Construction Material. Concrete block and other building materials can be ground and used for other purposes if there is a ready market. Construction materials and wood can also be shred to reduce volume. This construction material could also be used at landfills for cover.

  Residue Material. Residue material that cannot be recycled, such as cloth, rugs, and trash, can be sent to a landfill for final disposal.

TDM SITE CLOSE-OUT PROCEDURES

- Each TDM site will eventually be emptied of all material and be restored to its previous condition and use. The Contractor should be required to remove and dispose of all mixed debris, construction and demolition (C&D) debris, and debris residue to approved landfills. Quality Assurance (QA) inspectors should monitor all closeout and disposal activities to ensure that contractors complied with contract specifications. Additional measures will be necessary to meet local, State, and Federal environmental requirement because of the nature of the staging and reduction operation.

- The Debris Manager must be assured by the contractor that all sites are properly remediated. There will be significant costs associated with this operation as well as close scrutiny by the local press and environmental groups. Site remediation will go smoothly if baseline data collection and site operation procedures are followed.
- The basic close-out steps are to remove all debris from the site; conduct an environmental audit/assessment; develop a remediation/restoration plan, approved by the appropriate environmental agency; execute the plan; get acceptance from the landowner; and terminate lease payments, if applicable. The key to timely closeout of the mission is the efficient scheduling of the above activities for multiple sites. Therefore, critical path scheduling of all the activities as far in advance as possible will minimize down time between steps.

Environmental Restoration:

- Stockpiled debris will be a mix of woody vegetation, construction material, household items, and yard waste. HHW and medical wastes should be segregated and removed prior to stockpiling. Activities at the debris disposal sites will include anyone, or a combination of the following activities: stockpiling, sorting, recycling, incineration, grinding, and chipping. Incineration is done in air curtain pits and generally only woody debris is incineration; however, the efficiency of the incineration and the quality of incineration material is highly variable. Contamination may occur from petroleum spills at staging and reduction sites or runoff from the debris piles, incineration sites, and ash piles.

Site Remediation:

- During the debris removal process and after the material has been removed from each of the debris sites, environmental monitoring will be needed to close each of the sites. This is to ensure that no long-term environmental contamination is left on the site. The monitoring should be done on three different media: ash, soil, and groundwater.
- The monitoring of the ash should consist of chemical testing to determine the suitability of the material for land filling.
- Monitoring of the soils should be by portable methods to determine if any of the soils are contaminated by volatile hydrocarbons. This may be done by the contractors if it is determined that hazardous material, such as oil or diesel fuel was spilled on the site. This phase of the monitoring should be done after the stockpiles are removed from the site.
- The monitoring of the groundwater should be done on selected sites to determine the probable effects of rainfall leaching through either the ash areas or the stockpile areas.
- Consider the following requirements to closeout a temporary staging and reduction site(s).
- Coordinate with local and State officials responsible for construction, real estate, contracting, project management, and legal counsel regarding requirements and support for implementation of a site remediation plan.
- Establish a testing and monitoring program. The contractor should be responsible for environmental restoration of both public and leased sites. Contractors will also be required to remove all debris from sites for final disposal at landfills prior to closure.
- Reference appropriate and applicable environmental regulations.
- Prioritize site closures.
- Schedule closeout activities.
- Determine separate protocols for air, water, and soil testing.
- Develop cost estimates.
- Develop decision criteria for certifying satisfactory closure based on limited baseline information.
- Develop administrative procedures and contractual arrangements for closure phase.

- Inform local and State environmental agencies regarding acceptability of program and established requirements.
- Designate approving authority to review and evaluate contractor closure activities and progress.
- Retain staff during closure phase to develop site-specific remediation for sites, as needed, based on information obtained from the closure checklist.

ORGANIZATION AND RESPONSIBILITIES

Local Government Agencies and Departments:
- Identify each government agency or department that has debris clearing, removal, or disposal actions.
- Define their responsibilities in detail.

Supporting Agencies:
- Identify each government agency or department that has debris clearing, removal, or disposal actions.
- Define their responsibilities in detail.

ADMINISTRATION AND LOGISTICS

- All agencies will document personnel and material resources used to comply with this annex. Documentation will be used to support any Federal assistance that may be requested or required.
- Requests for support and/or assistance will be up-channeled from the local level to the County level EOC and then to the State EOC. Requests for Federal assistance will be made by the State EOC through established procedures, as outlined in the Federal Response Plan.
- All agencies will ensure 24-hour staffing capability during implementation of this annex if the emergency or disaster requires.
- Define who will be responsible to initiate an annual update of this annex. It will be the responsibility of each tasked agency to update its respective portion of the annex and ensure any limitations and shortfalls are identified and documented, and work-around procedures developed, if necessary.

AUTHORITIES AND REFERENCES

- Develop a listing of authorities and references identified in this annex.

APPENDICES

Develop a listing of appropriate appendices that support this annex.

TAB G

SAMPLE DEBRIS MANAGEMENT CONTRACT SCOPES OF WORK

Table of Contents

SPECIFICATIONS FOR TREE REMOVAL SERVICES

BID SPECIFICATION #_____

CONTRACT SPECIFICATIONS

SCOPE OF WORK FOR TREE REMOVAL

1 GENERAL

0.1 The purpose of this contract is to provide necessary tree removal response assistance to the _____ as a result of the _____.

0.2 Scope of Services: To provide all necessary transportation, supervision, labor, licenses, tools, equipment, services and expertise required to perform tree removal work on _____owned property in the _____ as directed and specified herein.

0.3 It is anticipated that a total of _____ tree removal crews are needed that would be used as directed by _____to perform tree removal work involving storm damaged trees throughout the defined work area. Distribution, location, and number of crews may change at any time depending upon actual needs and work needing to be done as determined by the _____.

0.4 No Guarantee of minimum number or size of trees to be removed is implied or expressed and payment for services will only be made for actual work performed as required by the _____.

0.5 Qualification of Bidders: Bidding on this contract shall be limited to qualified individuals, partnerships, and corporations actively engaged in the field of arborculture. Bidders shall derive all or a majority of their income from arborculture work. No day-labor or temporary part-time workers/employees shall be used in the performance of this contract. Only qualified permanent full-time/part-time employees trained and experienced in doing the required arborcultural work of this contract shall be used under the direct supervision of qualified personnel during the entire duration of time worked under this contract.

0.6 Bidders shall be qualified Contractors who are both currently certified and licensed arborists according to _____ and/or have similar acceptable credentials (i.e. ISA Certified Arborists, National Arborist Association trained arborists, etc.)

0.7 Bidders shall demonstrate competence, experience, necessary qualifications and financial capability to carry out the terms of this contract. The _____ may require proof of these qualifications.

0.8 All bidders must have in their possession or available to them by formal agreement at the time of bidding all necessary equipment, devices, tools, materials and supplies necessary to perform the work specified herein.

0.9 The Contractor shall provide crews made up of a combination of equipment and personnel, as specified in the bidding schedule and contract specifications. The Contractor shall specify the number of crews it can provide on the bid schedule submitted. The total number of actual hours worked by each crew will be according to the needs of _____. It is estimated that 40 hours of work will be performed by each crew per week. At the option of the _____, there may be additional crew hours worked when needed, estimated at not more than 8 hours per crew per week in addition to the 40 hours worked per week. No guarantee of minimum hours is implied or expressed. Services required under this contract will be determined by actual need and by the _____.

0.10 The normal working hours shall consist of 40 productive hours between _____ A.M. and _____ P.M., Monday through Friday. The actual schedule will be determined by the Contractor and the _____ and is subject to approval and/or change by the _____. Work in excess of 40 hours per week shall not be performed unless authorized by _____. Work on Saturday or Sunday to make up time lost to inclement weather shall be done only when authorized by the _____.

2 WORK AREA

0.1 The work area includes various locations throughout the _____. The _____will be divided into _____ established work areas.

0.2 Work location and assignments of all contractual crews shall be determined daily by the _____. Contractor shall report at the start of each work day to the _____, to receive work location assignments from the _____ and designated crew leaders.

3 PERFORMANCE SCHEDULE

0.1 The Contractor shall commence work within twenty-four (24) hours immediately after contract has been signed in work area(s) that has been assigned by the _____.

4 SAFETY STANDARDS

0.1 All equipment to be used and all work to be performed must be in full compliance with the most current revision of the American National Standards Institute Standard Z-133.1 (Safety Requirements for Tree Care Operations - Pruning, Trimming, Repairing, Maintaining, Removing Trees and Cutting Brush). These standards are made part of this contract by this reference. (See Attachment A)

0.2 The Contractor shall be solely responsible for pedestrian and vehicular safety and control within the assigned worksite and shall provide the necessary warning devices, barricades and ground personnel needed to give safety, warning, and protection to persons and vehicular traffic within the work area.

0.3 Closure or blocking of public streets and other rights-of-way shall not be permitted unless prior arrangements have been made with the _____ and is coordinated with appropriate _____ departments. Traffic control is the responsibility of the Contractor and shall be accomplished in conformance with State, County and local traffic codes.

5 EQUIPMENT USE

0.1 The Contractor shall provide all equipment necessary for the performance of this contract. All equipment repairs and operating costs shall be the responsibility of the Contractor.

0.2 All equipment must be in compliance with bid specifications and all applicable Federal, State, and local rules and regulations.

0.3 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 designated work areas during the duration of this contract. Under no circumstances will the Contractor mix tree debris hauled or processed for others with tree debris hauled or processed under this contract.

6 SCOPE OF THE REMOVAL WORK

0.1 Contractor shall remove designated standing, suspended, fallen trees, and/or trees topped for removal which are located on _____ owned property as directed by the _____.

0.2 Only storm damaged trees on _____ owned property marked for removal by _____ personnel shall be removed by the Contractor. Trees shall be removed in accordance with accepted industry standards and procedures (i.e. ANSI Z133.1-1994 standards for removing trees).

0.3 All tree removal debris (limbs, branches, foliage, etc.) will be collected and hauled away from work areas by the Contractor immediately following completion of tree removal work.

0.4 No debris will be allowed to accumulate or be stored on adjacent private property at any time.

0.5 Firewood generated from _____ tree removals (i.e. logs not chipped or trunks) may be made available free to the public on a first come, first serve basis to reduce impact on landfill. Paper signs (See Attachment B) will be provided by the _____to the Contractor to post on such wood when cut and stacked on _____Property. Such wood will be cut into typical firewood lengths of 12 - 18 inches long by the Contractor. Locations where such wood is posted by the Contractor shall be immediately given to the _____, so the public can be kept informed of where such firewood is located. Any such wood not taken within five days from the time it is posted with such signs will be picked up and disposed of properly by the Contractor as directed by the _____.

0.6 Extreme care shall be taken by the Contractor when felling trees so as to prevent limbs, branches, leaders, and trunks from falling and creating damage to adjacent homes, driveways, sidewalks, streets, vehicles, and other property, both public and private. Any such damage done by Contractor shall be immediately reported to the _____.

0.7 Stumps shall not be left higher than three inches above ground level. All cut stumps shall be spray painted by the Contractor with paint provided by the _____ for stump removal purposes.

7 REPORTING

0.1 The Contractor shall submit a separate report (See Attachment C) for each of his/her crews at the end of each work day to a designated _____ representative. Each report shall contain at a minimum, the following information.

A) Contractor's Name
B) Contract Specification Number
C) Number of the various pieces of major equipment used (i.e. Trucks, Log Loaders, Etc.)
D) Name of personnel who worked
E) Daily cumulative totals of hours each person worked and each piece of equipment that was used by crew (list type and equipment number).
F) Daily cumulative totals of trees removed per day by location (i.e. street addresses, parks, golf courses, etc.)
G) Any problems encountered (i.e. equipment breakdowns, inclement weather, property damage, worker injuries, etc.) while doing work for the _____. Such problems shall also be reported immediately to the _____crew foreman and/or _____.

8 CONTRACT AWARD

0.1 The _____ reserves the rights to award one or more contracts based upon the amount of anticipated work needing to be done in the paragraph 2 entitled Work Area. Awards under this solicitation will be made to responsive, qualified, and responsible bidders, based on the best value for the _____, giving consideration to bid price, expertise/experience of personnel comprising crew(s), type of equipment used, number of crews available from each bidder and administration costs to the _____.

0.2 Determination for the purposes of award shall be made on the basis of the lowest total unit price for all line items.

0.3 Prior to award, bidders 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 designated by the Contractor to be available for this contract.

9 OTHER CONSIDERATIONS

0.1 No debris shall be allowed to accumulate or be stored on _____ property or private property at any time without proper authorization from the _____. Under no circumstances shall the accumulation of brush, limbs, cut trunks/logs or other debris be allowed on a public right-of-way in such a manner as to result in a hazard to the public.

0.2 The selected Contractor(s) is legally responsible for damage to public and/or private property while performing the duties outlined in these specifications (See _____ Insurance Requirements).

0.3 Any damage to _____ and/or private property shall be reported to the _____ immediately following its occurrence.

0.4 The selected Contractor(s) shall erect proper barricades, signs and warning devices as necessary, for sidewalk and traffic closure/control when doing tree work for the _____.

0.5 Specifications for traffic control shall be followed by the selected Contractor(s) as described in the _____- Traffic Control Manual. This manual will be provided to selected Contractor(s) by the _____ at the time when contractual tree work is first started.

0.6 The _____ shall have the right to require the selected Contractor(s) to redo any tree work that is not done satisfactorily and in accordance with the specifications and/or standards stated.

0.7 Such work needing to be redone shall be performed promptly and at no additional cost to the _____, either during or after the expiration of the resulting agreement.

0.8 The selected Contractor(s) shall promptly report to the _____ any structural weakness, disease conditions, decayed trunks or branches, split crotches or branches that may be observed while doing tree work for the _____.

0.9 All such tree work done by the selected Contractor(s) shall be conducted in a manner as to cause the least possible interference with or annoyance to individuals and the general public.

0.10 Any use of tools or equipment in an unsafe condition or manner or application of techniques or methods defined to be unsafe to life or property is strictly forbidden.

0.11 The selected Contractor(s) is responsible for the preservation of all public and private property including turf, landscaping, sidewalks, curbs, fences, driveways, sprinkler heads and valves. If any direct or indirect damage occurs to public or private property, on account of any act, omission, neglect or misconduct in the execution of the work on the part of the selected Contractor(s), such property shall be restored by the Contractor(s) at his expense to a condition similar or equal to that existing before such damage or injury, or he/she shall repair such damage in a manner acceptable to the _____.

0.12 Inadequately or improperly trained personnel shall not be utilized by the selected Contractor(s) in doing any tree work for the _____. Personnel shall not perform tree work beyond their known capacity, training or ability to do so.

0.13 Unless the work area is totally barricaded or otherwise kept safe, at least one (1) representative of the selected Contractor's crew(s) shall serve to coordinate safe operations on the ground at all times while _____ tree work is in progress.

0.14 Whenever large tree sections are being cut in a tree top which may endanger persons or property, such materials shall be secured by ropes and lowered safely to the ground in a controlled manner.

0.15 Whenever electric or telephone lines, gas lines, water lines or any other improvement, public or private, may be jeopardized by any authorized _____ tree work done by the selected Contractor(s), the proper authorities of the utilities involved, or property owner involved, shall be consulted by the selected Contractor(s) prior to performing any tree work activity and all requested reasonable precautions by any such authority or persons shall be complied with.

0.16 The selected Contractor(s) shall contact _____ to determine the location of underground utilities (i.e. gas, electric, telephone, cable television) that may be impacted 48 hours before removing _____ trees and/or stumps.

0.17 All motor vehicles and other major equipment used by the selected Contractor(s) to do tree work shall be clearly identified with the name of their company.

0.18 The _____ shall be contacted to obtain prior approval of street or traffic lane closures and/or posting of no parking signs when necessary in order to do _____ tree work.

0.19 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.

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

10 PAYMENT

0.1 Payment to the Contractor for tree removal work completed will be made based upon the Unit price per tree type times the number of actual trees removed as specified in the biding schedule

0.2 Contract payments shall be made by the _____ to the Contractor upon submitting of a billing statement for actual work done by Contractor to the _____. All billing statements or invoices submitted for payment shall be original and should be sent to: _____.

0.3 Billing statement or invoice should include company name and address, locations of where completed tree removal work has been done, including number of trees by type removed by crew(s).

0.4 Partial billings are acceptable on a weekly or bi-weekly basis. Payment is made according to actual number of tree removals by type.

0.5 Any _____ tree work by the selected Contractor(s) that is **not** done satisfactorily and in accordance with the specifications or standards stated herein shall be redone at no additional cost to the _____. Tree work redone must be completed within seven (7) working days from the date of notification to do such work.

11 ADDITIONAL INFORMATION

0.1 See "Instruction to Bidders" concerning additional information regarding these specifications and bid.

0.2 The _____ shall have the right to terminate a contract or a part thereof before the work is completed in the event:

1. Previous unknown circumstances arise making it desirable in the public interest to void the contract.
2. The contractor is not adequately complying with the specifications.

3. Proper arboricultural techniques are not being followed after warning notification by the _____ or its authorized representatives.
4. The contractor refuses, neglects, or fails to supply properly trained or skilled supervisory personnel and/or workers or proper equipment of the specified quality and quantity.
5. The contractor in the judgement of the _____ is unnecessarily or willfully delaying the performance and completion of the work.
6. The contractor refuses to proceed with work when and as directed by the _____.
7. The contractor abandons the work.

BID PROPOSAL-Tree Removal **Company Name _____**

SPECIFICATION NO. _____

As a minimum, each REMOVAL CREW shall consist of the following personnel and equipment:

ITEM #	CLASSIFICATION/REMOVAL CREW	QTY.	UNIT
1	Experienced Arborist - Operate Log Loader, Fell Large Trunks/Entire Trees with Chainsaws	1	EA.
2	Ground person - Experienced in Loading Trucks, Cutting Limbs/Trunks on Ground, Operating Log Loader/Chainsaws, Operating Haul Trucks, Raking, and Cleaning Area	1	EA.
3	Truck Mounted Hydraulic Knuckle Boom with Grapple and Ability to Winch with 15 yd. Minimum Dump Box (Equivalent to or above Prentice Series F90 Log Loader)	1	EA.
4	15 yd. Minimum Steel Side Dump Truck (If Log Loader Has No Dump Box)	1	EA.
	TOTALS		

OTHER NECESSARY EQUIPMENT:

12 ea	42" Tall Traffic Cones	2 ea	Type 2 barricades or 2 street closed signs
2 ea	Stihl 066 Chainsaws or equivalent	2 ea	Stihl 084 Chainsaws or equivalent
2 ea	Leaf rakes	2 ea	Cob forks
2 ea	Scoop shovels	2 ea	Lowering ropes

All necessary personal protective equipment for all crew members (traffic safety vests, hardhats, safety glasses, hearing protection, gloves, safety lanyards/harness, first-aid kit, etc.)

Adequate spare equipment and tools shall be readily available to ensure that contract crews are not delayed in performing the required work. The hourly unit price per crew shall be all-inclusive for all labor and equipment listed in bidding schedule including fuels, lubricants, maintenance, hand and power tools, but not limited to only these items.

SCHEDULE OF BID PRICES - TREE REMOVAL SERVICES			
ITEM #	**DESCRIPTION**	**Tree Diameter**	**Unit cost per tree**
1	Provide services for tree removal in accordance with the specifications and scope of work under this contract.	8 to 18 inches	$
2	Provide services for tree removal in accordance with the specifications and scope of work under this contract.	19 to 36 inches	$
3	Provide services for tree removal in accordance with the specifications and scope of work under this contract.	Above 37 inches	$

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

_____

Costs associated with Contractor supervision for such activity as coordinating work of his/her contractual crew(s) is to be included in the Unit Rate shown on the Bidding Schedule. No extra costs will be authorized for added supervision, additional coordination or labor/equipment that is not included in the Unit Rate shown on bidding schedule. If rented/other equipment is used, this will be at Contractor's discretion and recognized as to his/her benefit and no extra cost will be allowed for such equipment.

BID PROPOSAL SIGNATURE

_____, hereby proposes to furnish all labor, supervision, transportation, tools, equipment, services and expertise required to perform TREE REMOVAL work on _____ owned property in the _____ as specified by bid specification #_____ and the contract specifications.

NOTE:

RETURN 2 COMPLETE COPIES OF PROPOSAL AND SUPPORTING MATERIAL.

MARK OUTSIDE OF BID ENVELOPE AS FOLLOWS:

SEALED BID FOR SPEC. _____

_____ _____
Company Name By (Signature)

_____ _____
Street Address or P.O. Box (Print Name)

_____ _____
City, State Zip Code (Title)

_____ _____
Telephone (Date)

_____
Employer's Federal I.D. Number
or Social Security Number

Bids may be inspected in the purchasing division offices during normal business hours, **after** tabulation by the purchasing agent. If you desire a copy of the bid tabulation by the purchasing agent or if you desire a copy of the bid tabulation to be mailed to you, you must enclose a self-addressed stamped envelope with your bidding documents.

Specification No._____ CONTRACTOR QUESTIONNAIRE

Company Name _____

The following necessary information must be submitted with the bid proposal and will be considered when bids are evaluated.

1. Company name, address, name of contact person and telephone number:

2. Name, employment status and number of personnel who would be used to do designated tree work for _____:

PERSON	_____ ARBORIST LICENSE #, ISA CERTIFIED, NAA TRAINED, CDL	EMPLOYMENT STATUS (PERMANENT FULL-TIME/PART-TIME)	YEARS/ MONTHS EMPLOYED

Continued on next page

Specification No._____ CONTRACTOR QUESTIONNAIRE (cont'd)

Company Name _____

3. Name of insurance company and current policy #'s for liability and workers comp. coverage:

4. Equipment owned and/or leased by company to do TREE REMOVALS:

EQUIPMENT	LIST MANUFACTURER AND MODEL	SIZE	#'(S)
Front-end Loader/Log Loader w/ Dump Box			
Trucks to Haul Large Trunks/Limbs			
Chainsaws to do Tree Removals			

SPECIFICATIONS FOR COLLECTING BRUSH FROM RIGHTS-OF-WAY

Purpose of the contract:

The _____, hereinafter _____, experienced a _____storm that resulted in severe damage to trees. _____ is soliciting bids for Contractor(s) to provide clean up service for brush and tree parts placed in the right-of-way. To help make this task more manageable, _____ has identified segments of roads within specified areas that will be offered for bidding separately or in combination. _____ makes no guarantees as to the quantity (cubic yards) of material in any area, now or at the time the contract begins, it is the bidder's responsibility to inspect the condition of each road segment within each area.

Special Provisions:

I. Scope

1. It is the intent of this contract that the successful bidder(s), herein after Contractor(s), shall provide all labor, services, equipment, materials and supplies necessary to collect all brush and tree parts from the right-of-way as required by the following provisions.

2. For the purpose of this contract and the activities generated by this contract: the term "right-of-way" shall mean the street surface and the surface area immediately adjacent (left and right) to and up to _____ (___) feet from the curb of all identified streets within the specified areas identified in Exhibit 1; and the term "brush and tree parts" shall mean, all the portions of trees that have been placed in the "right-of-way" as defined above.

3. Phase one work shall consist of the initial complete collection within each area wherein all of the material set out is collected.

4. Phase two (Optional) work will include collection of any areas missed in phase one and collection of any additional material set out after the phase one activities have been completed in specific areas. The _____ will determine what areas will require phase two work.

II. Start-up, Schedule, and Termination

1. The selected Contractor(s) shall begin full collection activities within 72 hours of notice to proceed, which is scheduled for _____. The term of this contract shall be a period of _____ days for phase one, beginning on or about _____. Execution of phase two work will be determined by the _____. When phase two is authorized, work will beginning immediately after completion of phase one work.

2. The Contractor(s)' performance shall be monitored by _____ or designee and the Contractor(s) shall be notified immediately of any deficiencies. After ____ days of operation, this contract may be terminated by _____ upon failure of the Contractor(s) to cure any default after 48 hours of written notice from _____ to correct any and all deficiencies in performance as specified by _____. Therefore, _____ payment responsibility to the Contractor(s) shall be limited to work performed by the Contractor(s)

as specified herein, no payment shall be made for work not performed, there are no mobilization fees authorized or minimum guarantees of work available.

III. Termination Appeal Procedure

In the event that the Contractor(s) disagrees with the termination notice, the Contractor(s) shall have the right to appeal such to a higher authority. Such appeal shall be in writing and be submitted to the following in the order listed: _____. The decision of the _____ shall be final, subject to judicial appeal.

IV. Specific Requirements

1. The Contractor(s) shall collect brush and tree parts from the right-of-way of designated roads as specified on the map identified as Exhibit 1.

2. The Contractor(s) shall exercise care so as not to generate litter during the removal. The Contractor(s) shall clean up loose material in the immediate vicinity of the right-of-way. Special attention shall be provided to all street storm sewer inlets.

3. The Contractor(s) shall transport the brush and tree parts to approved location(s) as designated on Exhibit 1. _____ . The Contractor(s) shall jointly number and determine the volume of each truck or other vehicle that shall be used in the performance of this contract. The Contractor(s) shall provide proof, in the form of signed copies of load tickets, of proper delivery to the designated location(s). Such tickets shall be checked against the log of deliveries complied by _____ or designee and shall be the basis for payment.

4. The Contractor(s) shall notify the specified _____ representative, of any significant damage to public or private property or major problems, such as equipment failure or loss of qualified labor, daily on the forms supplied by _____.

5. The _____ or representative shall determine when weather conditions are such that the collection may be delayed and the schedule modified. Such notice shall be in the form of a telephone call from a representative of the _____ to the Contractor(s) by 6:00 A.M.

6. Collection of brush and tree parts shall not begin prior to ____ A.M. on any day; collection of brush and tree parts shall cease by ____ P.M. on any day.

V. Bids and Payment

1. Each bidder shall submit a per cubic yard bid price to perform all the collection activities specified in Exhibit 1.

2. The Contractor(s) shall submit an invoice to _____based on the per cubic yard bid price and the number of cubic yards hauled. The Contractor(s) shall submit all load tickets along with the invoice for payment.

3. _____ shall provide payment to the Contractor(s) thirty (30) working days after the invoice and all supporting documentation have been submitted to _____.

VI. Insurance and Bonds

1. The Contractor(s) shall carry Worker's Compensation Insurance in accordance with the law of the State of _____ to protect itself and the _____, under the Contract, against liability under the Worker's Compensation and Occupational Disease statutes of the State of _____.

2. The Contractor(s) shall carry in its name, with _____ listed as additionally insured, a policy or policies under a comprehensive form to insure contractual and automobile liability as well as operations other than automobile with coverage of not less than:

   $ _____ each person

   $ _____ each accident for bodily injury accident

   $ _____ each accident for property damage

3. *(Optional)* A Proposal Guarantee, in an amount equal to _____ percent (__%) of the Total Estimated Annual Bid Price, but not less than $_____ shall accompany each bidder's proposal. Said Proposal Guarantee shall be a certified check or a cashier's check drawn on a national bank or bank chartered under the laws of the state payable to the _____ or a United States Government Bond (negotiable), or a bidder's bond by a corporate surety authorized to do business in _____ which may be forfeited to _____ in the event that a bidder fails to enter into a valid contract in full accordance with its bid proposal.

4. As security for the performance of this Contract and in order to assure _____ continued clean up service, the Contractor(s) shall supply within 10 days of award of the contract a "Performance Bond" written on a minimum of an annual basis, on forms required by _____, in an amount equal to _____ (__) percent of the Estimated Total Annual Bid Price, but not less than $_____. Said Performance Bond to be used as security for the performance of the contract. Said Performance Bond shall be maintained or renewed for the entire term of this Contract. The surety on the "Performance Bond" shall be a duly authorized surety company, licensed to do business in the State of _____, satisfactory to _____.

5. No surety company will be acceptable as a bondsman that does not have a permanent agent or representative in _____, upon whom notices may be served; service of said agent or representative in the _____ shall be equal to service of said notice on the president or other such officer as may be concerned. Should the surety company acting as bondsman remove its permanent agent or representative from the area, the Contractor(s) shall then furnish _____ with a new surety bond conforming to the above described requirements.

6. In lieu of a corporate surety bond, an irrevocable letter of credit drawn on any _____ bank or any national bank, payable to the _____, may be substituted; as may any negotiable United States Government Bond, Treasury Bill or Certificate of Deposit payable to the _____ or to the bearer.

7. As further security for the performance of the contract and in order to assure _____ continued processing service, it is provided herein that in the event the Contractor(s) shall fail to collect brush and tree parts as required within these special provisions for any seven consecutive days, _____may then, employ such means as it may deem advisable and appropriate to continue work; and the cost of labor, materials and equipment necessary for such work shall be paid by _____out of any money then due or to become due the Contractor(s) under and by virtue of the Contract for the work and services herein specified, and the Contractor(s) shall be liable for any other costs and expenses incurred by _____.

8. Should _____ costs for continuing the operation, or obtaining a substitute Contractor(s), exceed the amount due the Contractor(s), then _____ shall have the right to collect the amount due, either from the Contractor(s) or surety company or both.

9. All vehicles and equipment used in the performance of the contract shall be owned or leased by the Contractor(s).

10. The Contractor(s) shall not transfer, sell, assign, lease, surrender, abandon, or permit to lapse its title or right of possession in and to any real property, equipment or vehicles used by it in the performance of the contract without the approval of the _____.

VII. EVALUATION OF BIDS

All bids will be evaluated on the basis of the lowest and best total bid price and other pertinent information.

INDIVIDUAL AREA BIDS

BIDDERS ARE REQUIRED TO SUBMIT A PER CUBIC YARD BID PRICE FOR EACH AREA.

In addition to providing a per cubic yard bid price for each area, the bidders shall supply a listing of all equipment proposed to be used in performance of each area or combination. Additionally, proposed staffing levels must be submitted and specifications given as to the source of the labor force, (i.e. How may of the proposed workers are employees of the bidder and how may are contracted?).

Collection of area 1 according to the map in Exhibit 1; per cubic yard collected bid

- Per Cubic Yard Bid Price = $_____ per cubic yard collected

Collection of area 2 according to the map in Exhibit 1; per cubic yard collected bid

- Per Cubic Yard Bid Price = $_____ per cubic yard collected

Collection of area 3 according to the map in Exhibit 1; per cubic yard collected bid

- Per Cubic Yard Bid Price = $_____ per cubic yard collected

Collection of area 4 according to the map in Exhibit 1; per cubic yard collected bid

- Per Cubic Yard Bid Price = $_____ per cubic yard collected

USE THIS SECTION TO BID MORE THAN ONE AREA IN COMBINATION. COMBINATION BIDS MAY INCLUDE TWO, THREE OR ALL FOUR AREAS.

Collection of areas _____ (write in combinations or areas) according to the map in Exhibit 1; per cubic yard collected bid

- Per Cubic Yard Bid Price = $_____ per cubic yard collected

SIGNATURE OF BIDDER:

(a) If an individual, doing business as: _____

(b) If a Partnership:
Member of Firm: _____

Member of Firm: _____

(c) If a Corporation:
Name of Corporation: _____

Officer: _____

Title: _____

Witness: _____

ATTEST: _____

Business Address: _____
_____

"CERTIFICATE"

A Corporate Contractor(s), in submitting this Proposal, hereby represents that the Corporation has complied with all _____ Statutory requirements, which are prerequisite to its being qualified to do business in the State of _____, or that it will take all steps necessary to so qualify, if a successful bidder.

Name of Corporation: _____

Officer: _____

Title: _____

If Foreign Corporation:
_____ Resident Agent: _____

SPECIFICATIONS FOR GRINDING BRUSH

Purpose of the Contract:

The _____, hereinafter called _____, experienced an ice/snow storm that resulted in severe damage to trees within _____. _____ is soliciting bids for Contractor(s) to provide grinding service for brush and tree parts collected from the right-of-way and delivered to _____ (__) specific sites. To help make this task more manageable _____ has divided the area into ____ geographical areas, each area with its own delivery location that will be offered for bidding separately or in combination. _____ estimates that there are approximately _____ to _____ cubic yards in each of the areas established for this contract. _____reserves the right to grind brush and tree parts in any area with its forces or State employees. _____ makes no guarantees as to the quantity (cubic yards) of material in any area, now or at the time the contract begins, it is the bidder's responsibility to inspect the condition of each site and return it to like condition at the end of the contract period.

Special Provisions:

I. Scope

1. It is the intent of this contract that the successful bidder(s), herein after called Contractor(s), shall provide all labor, services, equipment, materials and supplies necessary to load and grind all brush and tree parts collected from the right-of-way and delivered to each grinding site as required by the following provisions.

2. For the purpose of this contract and the activities generated by this contract: the term brush and tree parts shall mean all the portions of trees that have been collected from the right-of-way.

II. Start-up, Schedule, and Termination

1. The selected Contractor(s) shall begin full grinding activities within seventy-two (72) hours of notice to proceed, which is scheduled for _____. This contract shall begin on or about _____ and continuing until all brush and tree parts delivered to the grinding sites are ground.

2. The Contractor(s) performance shall be monitored by _____ or designee and the Contractor(s) shall be notified immediately of any deficiencies. The Contractor(s) shall grind at a rate such that a minimum of 1,500 cubic yards of ground material is produced each day (if sufficient unground material is present). Ground material shall be sized such that 95% of the ground material will pass through a number three (3) screen. Should the Contractor fail to achieve or maintain the specified grinding rate, _____ reserves the right to cancel the contract or to hire additional Contractor(s) to assist in grinding to achieve the desired production.

3. After 14 days of operation, this contract may be terminated by _____ upon failure of the Contractor(s) to cure any default after 48 hours of written notice from _____ to correct any and all deficiencies in performance as specified by _____.

III. Termination Appeal Procedure

In the event that the Contractor(s) disagrees with the termination notice, the Contractor(s) shall have the right to appeal such to a higher authority. Such appeal shall be in writing and be submitted to the following in the order listed: _____. The decision of the _____ shall be final, subject to judicial appeal.

IV. Specific Requirements

1. The Contractor(s) shall grind brush and tree parts collected from the right-of-way from the regions as specified on the map identified as Exhibit 1 and delivered to the assigned specific grinding site.

2. The Contractor(s) shall exercise care so as not to generate litter during the grinding. The Contractor(s) shall clean up loose material in the immediate vicinity of the grinding site as required for safety. Special attention shall be made to insure that the safety of passing motorists and/or pedestrians is not compromised.

3. _____ and the Contractor(s) shall jointly determine the volume of ground material currently existing at each grinding site. The additional volume of material ground by the Contractor(s) shall be determined through the use of signed copies of tickets, of proper delivery to the designated location(s). Such tickets shall be checked against the log of deliveries complied by _____ or designee and shall be the basis for payment.

4. The Contractor(s) shall notify the specified _____ representative, of any significant damage to public or private property or major problems, such as equipment failure or loss of qualified labor, or failure of brush collection contractor to provide sufficient material daily in writing and by fax to _____.

5. The _____ or representative shall determine when weather conditions are such that the collection may be delayed and the schedule modified. Such notice shall be in the form of a telephone call from a representative of the _____ to the Contractor(s) by 6:00 A.M.

6. Grinding of brush and tree parts shall not begin prior to _____ A.M. on any day; grinding of brush and tree parts shall cease by _____ P.M. on any day, unless authorized in writing by _____. Thanksgiving and Christmas Days are mandatory non-working days.

7. The Contractor(s) shall provide all traffic control in the area of their grinder(s). The Contractor(s) shall also provide all required ancillary equipment to insure efficient operation, including but not limited to loaders and grapples as required to feed the grinder(s), stockpile ground material, and push up in-coming material into storage piles.

8. The contractor(s) shall provide a mobile phone communication for their employees to facilitate efficient operations and a means for _____ to relay information.

9. _____ reserves the right to change the location of any grinder, the effected Contractor(s) shall receive $_____ for every such change of location.

V. Bids and Payment

1. Each bidder shall submit a per cubic yard bid price to perform all the grinding activities specified. _____ payment responsibility to the Contractor(s) shall be limited to work performed by the Contractor(s) as specified herein, no payment shall be made for work not performed, there are no mobilization fees authorized or minimum guarantees of work available, except as provided in paragraph IV.9 above. The Contractor(s) are responsible for all payments due their employees, suppliers, and any and all sub-contractors.

2. The Contractor(s) shall submit an invoice to _____ based on the per cubic yard bid price and the number of cubic yards ground.

3. _____shall pay the Contractor(s) $_____ per hour per grinder site for stand-by time solely due to the "brush collection contractor's" failure to maintain minimum delivery volumes (_____ cy/day) and no stockpile exists. Such payments (if any) shall be limited to four (4) hours per day per site.

4. _____ shall provide payment to the Contractor(s) within thirty (30) working days after the invoice and all supporting documentation have been submitted to _____. Invoices may not be submitted more frequently than one time per week.

VI. Insurance and Bonds

1. The Contractor(s) shall carry Worker's Compensation Insurance in accordance with the law of the State of _____ to protect itself and _____, under the Contract, against liability under the Worker's Compensation and Occupational Disease statutes of the State of _____.

2. The Contractor(s) shall carry in its name, with _____ listed as additionally insured, a policy or policies under a comprehensive form to insure contractual and automobile liability as well as operations other than automobile with coverage of not less than:

   $_____ each person

   $_____ each accident for bodily injury accident

   $_____ each accident for property damage

3. *(Optional)* A Proposal Guarantee, in an amount equal to $_____ shall accompany each bidder's proposal. Said Proposal Guarantee shall be a certified check or a cashier's check drawn on a national bank or bank chartered under the laws of the state payable to _____ or a United States Government Bond (negotiable), or a bidder's bond by a corporate surety authorized to do business in _____ which may be forfeited to _____ in the event that a bidder fails to enter into a valid contract in full accordance with its bid proposal.

4. As security for the performance of this Contract and in order to assure _____ continued grinding service, the Contractor(s) shall supply, prior to beginning work, a "Performance, Payment and Guarantee Bond" written on forms required by _____, in an amount of $ _____ per grinding site or $ _____ for combination bids. Said Performance Bond to be used as security for the performance of the contract. Said Performance Bond shall be maintained or renewed for the entire term of this Contract. The surety on the "Performance Bond" shall be a duly authorized surety company, licensed to do business in the State of _____, satisfactory to _____.

5. No surety company will be acceptable as a bondsman that does not have a permanent agent or representative in _____, upon whom notices may be served; service of said agent or representative in _____ shall be equal to service of said notice on the president or other such officer as may be concerned. Should the surety company acting as bondsman remove its permanent agent or representative from the metropolitan area, the Contractor(s) shall then furnish _____ with a new surety bond conforming to the above described requirements.

6. In lieu of a corporate surety bond, an irrevocable letter of credit drawn on any _____ bank or any national bank, payable to _____, may be substituted; as may any negotiable United States Government Bond, Treasury Bill or Certificate of Deposit payable to _____ or to the bearer.

7. As further security for the performance of the contract and in order to assure _____ continued grinding service, it is provided herein that in the event the Contractor(s) shall fail to grind brush and tree parts as required within these special provisions for any five (5) consecutive days, _____ may then, employ such means as it may deem advisable and appropriate to continue work; and the cost of labor, materials and equipment necessary for such work shall be paid by _____ out of any money then due or to become due the Contractor(s) under and by virtue of the Contract for the work and services herein specified, and the Contractor(s) shall be liable for any other costs and expenses incurred by _____.

8. Should _____ costs for continuing the operation, or obtaining a substitute Contractor(s), exceed the amount due the Contractor(s), then _____ shall have the right to collect the amount due, either from the Contractor(s) or surety company or both.

VI. EVALUATION OF BIDS

All bids will be evaluated on the basis of the lowest and best bid price and other pertinent information. Bidders shall submit at least three (3) references for similar work with the bid. Such references shall include the name and telephone number of the most pertinent contacts. Contractor(s) shall submit a proposed operation plan that includes at minimum the following: 1) number of grinders per site; 2) descriptions of the equipment and labor components of each grinder including the volumes, in cubic yards, that each grinder can routinely attain and maintain; and 3) the ancillary equipment for loading the grinder(s) and or moving ground wood chips away from the grinder(s) and number of personnel to be utilized at each grinding site.

INDIVIDUAL SITE BIDS

BIDDERS ARE REQUIRED TO SUBMIT A PER CUBIC YARD BID PRICE FOR EACH SITE.

Grinding for site 1 according to the map in Exhibit 1; per cubic yard ground bid

- Per Cubic Yard Bid Price = $_____

Grinding for site 2 according to the map in Exhibit 1; per cubic yard ground bid

- Per Cubic Yard Bid Price = $_____

Grinding for site 3 according to the map in Exhibit 1; per cubic yard ground bid

- Per Cubic Yard Bid Price = $_____

Grinding for site 4 according to the map in Exhibit 1; per cubic yard ground bid

- Per Cubic Yard Bid Price = $_____

USE THIS SECTION TO BID MORE THAN ONE SITE IN COMBINATION. COMBINATION BIDS MAY INCLUDE TWO, THREE, OR ALL FOUR SITES.

Grinding for sites _____ (write in combinations of sites) according to the map in Exhibit 1; per cubic yard ground bid:

- Per Cubic Yard Bid Price = $_____

SIGNATURE OF BIDDER:

(a) If an individual, doing business as: _____

(b) If a Partnership:
Member of Firm: _____

Member of Firm: _____

(c) If a Corporation:
Name of Corporation: _____

Officer: _____

Title: _____

Witness: _____

ATTEST: _____

Business Address: _____
_____

"CERTIFICATE"

A Corporate Contractor(s), in submitting this Proposal, hereby represents that the Corporation has complied with all _____ Statutory requirements, which are prerequisite to its being qualified to do business in the State of _____, or that it will take all steps necessary to so qualify, if a successful bidder.

Name of Corporation: _____

Officer: _____

Title: _____

If Foreign Corporation:

_____ Resident Agent: _____

SPECIFICATIONS FOR DEBRIS CLEARING AND REMOVAL
City of Corpus Christi, TX
May 2003

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope of Work: Work under this section consists of Post-Hurricane/Disaster Debris Clearing and Removal within City limits. This project is divided into two phases. Potential Contractors will be required to bid on each phase. Phase 1 will be performed on a time and materials basis, and Phase 2 is to be performed on a unit price basis.

- Phase 1. Emergency Roadway Debris Clearing, consisting of clearing roadway debris to the side of the road to open key access routes into devastated areas.
- Phase 2: Public Rights-of-Way Debris Removal, consisting of the removal and transport of eligible disaster-generated debris from designated street or highway rights-of-way or public property to a designated Temporary Debris Storage and Reduction (TDSR) site or approved landfill. The City will pay tipping fees at the approved landfill.

B. Preparedness: Key personnel, proposed by the Contractor under the pre-qualification process, must participate in the City's annual hurricane preparedness training activities, a maximum of two days each year at the Contractor's expense.

C. Prepositioning: Upon activation of the contract, Contractor must provide a two-person management team on-site to participate in advance recovery preparations. Expected time frame is 24-36 hours prior to projected hurricane landfall. The purpose is to initiate actions necessary to ensure that Contractor resources will be able to begin debris clearing operations within 12 hours of receiving the Notice to Proceed from the City.

D. Inspection of Debris: As soon as possible after the hurricane/disaster event has subsided, the Contractor must make a detailed and thorough on-site inspection with a representative from Engineering Services of debris to be cleared and removed, and consider:

- Amounts and types of debris;
- Working conditions such as traffic, street/road width, and land use;
- Means to ingress and egress work areas; and
- All other factors affecting the work.

E. Coordination: Debris Clearing and Removal is limited to that which is determined by the City Engineer to be in the interest of public safety and that which is considered essential to the economic recovery of the affected area. The Contract Management Center (CMC) established by the City for the hurricane/disaster event will determine priorities for Clearing under Phase 1 and Removal under Phase 2. The Contractor must coordinate with other contractors and other public and private entities also performing recovery operations. Appendix I, C "Coordination Chart", lists those with whom coordination is required.

F. City Limits: Work is limited to areas within the City of Corpus Christi. Appendix II, "City Map", defines the City limits.

G. Quality Assurance: Work will be closely monitored by City personnel and/or designated representatives of the Federal Emergency Management Agency (FEMA). The Contractor must cooperate with all monitors representing the City and FEMA.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 PHASE 1: EMERGENCY ROADWAY DEBRIS CLEARING

A. General: The goal of Phase 1 Clearing is to move roadway debris to the side of the road to open key access routes into devastated areas and allow for the movement of emergency vehicles, law enforcement, resumption of critical services, and damage assessment of critical public facilities and utilities. At least one lane must be cleared on each arterial, major, and secondary road after the hurricane/disaster event has subsided within the specified timeframe.

B. First Clearing Priorities: First Clearing Priorities are to provide ingress and egress to/from the following facilities:

- Police Department
- Fire Stations
- Corpus Christi International Airport
- Constable Offices
- Hospitals

C. Secondary Clearing Priorities: Secondary Clearing Priorities are to provide ingress and egress to/from the following facilities:

- City Hall
- City Service Center
- County Courthouse
- Elliott Landfill
- Maintenance Services
- Water Filtration Plants
- Wastewater/Sewage Treatment Plants
- Other Facilities so designated by the CMC

Clearing is required at each facility listed above, as well as the roadways leading to the facility. Clear connecting roadways and provide access from arterial roadways. Specific facilities are listed under Appendix III, "Clearing Priorities".

Clearing priorities above may be adjusted by the City Engineer or CMC representative at any time during recovery operations.

Phase 1 Clearing will be limited to no more than 70 hours under the Time and Materials portion of this contract. Phase 1 Clearing operations will not continue unless specifically approved in writing by the City Engineer and by the FEMA Public Assistance Officer.

D. Equipment: The types and sizes of equipment to be used must be listed in the Contractor's Price Proposal. This is intended to be a general listing at this time. Prior to beginning work, the Contractor will be required to more fully identify each item of equipment by type, size and equipment number; the equipment number and the Contractor's name or initials must be permanently marked on each side of the vehicle at that time. Minimum letter size shall be 3 inches in height. Rates for equipment not listed in the Price Proposal must be established with the City Engineer before such equipment may begin working.

3.02 PHASE 2: PUBLIC RIGHTS-OF-WAY DEBRIS REMOVAL

A. General: The goal of Phase 2 Debris Removal is to load and haul debris from the public rights-of-way to assigned TDSR sites and/or approved landfills. In general, but not exclusively, this phase consists of curbside debris removal on City property only. Types of debris materials include, but are not limited to, trees, woody debris, brush, sand, gravel, building wreckage, construction and demolition (C&D), personal property, and household furnishings deposited at the curb. Appendix IV, "Debris Classification", describes the types of debris that may be encountered.

B. Vehicle Measuring /Marking: Prior to commencing any debris removal work, all the beds of the Contractor's hauling vehicles must be measured, and a certified (by Contractor) listing of all vehicle bed sizes with measurements must be submitted to the City Engineer or CMC representative and updated whenever a new truck/trailer is added by the Contractor. All hauling vehicles must have the Contractor's name, vehicle number, and the measured capacity of the bed clearly visible on both sides of the vehicle. Minimum letter size shall be 3 inches in height.

C. Hazardous Materials: *Hazardous and toxic wastes are excluded from this work.* The City will execute a separate Hazardous Materials Removal and Disposal contract; however, collection schedules may not necessarily coincide with the debris removal work. Hazardous materials include chemicals, petroleum products, paint products, asbestos, power transformers, oxygen bottles, propane tanks, batteries, industrial and agricultural chemicals, cleaning agents and similar hazardous, dangerous or toxic materials.

Some preliminary curbside separation will be attempted, but the Contractor must be aware that hazardous materials might be commingled with debris. The Contractor shall take every precaution to avoid loading and hauling hazardous materials. Notwithstanding, the Contractor's labor forces must be aware of the appropriate safety precautions. Further, the Contractor will be responsible for safe and proper handling of any hazardous materials inadvertently loaded by Contractor labor forces. The Contractor's labor forces must notify the City Engineer or CMC representative of locations where hazardous materials are encountered.

D. Other Non-Collection Items: The following items must <u>not</u> be removed or hauled to the designated disposal sites:

- Household comestible garbage;
- Central Power and Light (CP&L) company transformers, poles and other equipment and materials;

- Southwestern Bell (SWB) telephone transformers, poles and other equipment and materials;
- Traffic signs, signals, and appurtenances;
- Debris on private property; and
- Privately Owned Vehicles/Boats/Trailers.

Curbside collection of household comestible garbage will be handled by the usual public and private haulers. Household garbage must not be mixed with storm debris. All CP&L and SWB equipment, traffic signs and signals that are encountered must be moved to a visible, accessible location at or near curbside for disposition by utility companies or the City.

Debris on private property may not be removed without written authorization from the City Engineer and the FEMA Public Assistance Officer. Vehicles that are in the way of debris removal operations may not be moved. Instead, the Contractor shall report the locations of such vehicles to the City Engineer or CMC representative.

E. Debris Removal: Appendix VI, "Removal Zones", identifies areas within the City where debris removal is required, as well as the locations of TDSR sites assigned to each zone. During debris removal operations, extreme caution must be exercised by the Contractor to ensure that no damage is done to public or private properties. All crawler or tracked vehicles operated on public streets must have pads to prevent damage to hard-surfaced streets. The Contractor will be responsible for repair/replacement of any damage caused by negligence to public or private property.

F. Loading: All loose debris, such as tree limbs, must be reasonably compacted on the hauling vehicles during loading. All debris extending beyond the vehicle in any horizontal direction must be cut off or otherwise removed.

G. Hauling: All vehicles utilized in hauling debris must be equipped with adequate means for containing the load, including tailgates and canvas covering while transporting the debris to the TDSR sites and/or approved landfills.

- Covering must effectively prevent debris from being blown or bounced off the vehicles.
- Sideboards or other extensions to the bed will be permitted provided they meet state and local requirements, do not extend above the tailgate, and are substantially constructed. Sideboards must be constructed of 2" by 6" boards or greater and may not extend more than 2 feet above the metal bedsides. Plywood extensions are not permitted.
- Vehicles must be equipped with a tailgate or other devices that will effectively contain the debris on the vehicle while hauling, and also permit the vehicle to be loaded to capacity.

H. Dumping: All debris must be hauled to assigned TDSR sites and/or approved landfills. The Contractor must make every effort possible to separate trees, woody debris, and brush from other types of debris at curbside. All trees, woody debris, and brush will be accepted at TDSR sites and may be accepted at other sites specifically approved by the City Engineer or CMC representative. Construction and demolition debris must be similarly segregated and transported directly to the Elliott Landfill. Refer to Standard Specification Section 01997.

I. Equipment Storage: The Contractor is responsible for locating areas where his/her equipment may be stored, serviced and repaired. Such areas must not be located within rights-of-way or in any areas that would impact traffic flow or produce a safety hazard. This

does not preclude parking equipment for short periods of time, including overnight, in rights-of-way areas where work is in progress. On-site refueling and operating checks including daily maintenance will be allowed; properly prepared areas within the TDSR sites may be used for this purpose.

3.03 SCHEDULE

A. Phase 1 Clearing Operations: Rights-of-way clearing operations must commence as soon as possible after the hurricane/disaster event has subsided, but no later than 12 hours from the time that Notice to Proceed is issued by the City Engineer. The duration of the clearing operations will be limited to a total of 70 hours. The Contractor must provide sufficient equipment and labor to accomplish clearing of first priority sites within 24 hours and secondary priority sites within 36 hours and all other sites within 70 hours of receiving Notice to Proceed. The City Engineer reserves the right to discontinue the clearing operations as he deems necessary. Extension of the clearing operations past the 70 hours must be approved in writing by the City Engineer and FEMA Public Assistance Officer.

B. Removal Operations: The Contractor must begin debris removal operations within 24 hours of receiving the Notice-to-Proceed and be underway in all zones within 5 days. Schedules for all other roads/streets will be determined in concert with the City Engineer and the CMC representative. These operations are to be fully integrated with the TDSR site operations. Removal may begin earlier and, if approved by the City Engineer or CMC representative, may be combined with Rights-of-Way clearing operations, provided the equipment so used will be billed on a unit cost basis rather than on a time and materials basis. The City Engineer reserves the right to increase or decrease the scope of the removal activity as he deems necessary to ensure effective management of the overall debris removal/disposal operations.

C. Working Hours: Unless otherwise permitted by the City Engineer or CMC representative, working hours for removal operations shall be limited to daylight hours. The Contractor is responsible for coordinating with the City Engineer or CMC representative in the event weather conditions delay or modify the proposed daily schedule.

3.04 EXTRA WORK

At the City Engineer's option, the scope of work for Phase 2, Removal, may be expanded to include public parks, other recreational areas, drainage structures and channels, and reservoirs. Provisions for Extra Work are covered by the City's policies in Section B, General Provisions and Requirements, B-8-5.

PART 4 - MEASUREMENT AND PAYMENT

4.01 PHASE 1 COMPENSATION - TIME AND MATERIALS BASIS

A. Phase 1: Compensation for Phase 1 Debris Clearing will be measured and paid for based on an hourly rate only when equipment is actively operating and documented by equipment logs and operator timesheets. The hourly rate for each type of equipment must include all subsidiary costs including mobilization and demobilization, fuel, maintenance, and an operator. The Contractor must provide, as part of the Price Proposal, a list of basic equipment to be used for clearing operations and the hourly rate to be charged for each.

4.02 PHASE 2 COMPENSATION - UNIT PRICE PER CUBIC YARD BASIS

A. Phase 2: Debris removal will be paid for on the basis of a unit price per cubic yard for all debris loaded, hauled, and dumped at assigned TDSR sites or approved landfills. The unit price per cubic yard must include all subsidiary costs, including mobilization and demobilization, labor, equipment, fuel, and maintenance. Compensation will be based solely on the volume of debris hauled as documented by completed load tickets (see Figure 1) administered and validated by City loading site and disposal site monitors.

The Contractor shall include a signed load ticket with his/her invoice as proof that the quantity claimed on the invoice was eligible debris and was delivered to an approved disposal site. Such load tickets shall be checked against the disposal site monitor's log of deliveries, which shall be the basis for payment.

B. Load Tickets: Each load of eligible debris will be tracked using a multi-page load ticket similar to the one shown in Figure 1 below.

Example Load Ticket

CITY OF CORPUS CHRISTI LOAD TICKET
Section 1 Ticket Number: 000001
Prime Contractor:
Sub-Contractor:
Date: Departure Time:
Driver's Name:
Truck License Number:
Measured Inside Bed Capacity (cu yds):
Debris Pickup Site Location: (must be a street address or intersection)
Debris Type: (check one) Vegetation ☐ C&D ☐ Mixed ☐ Other ☐
Loading Site Monitor: Print Name Signature
Remarks:
Section 2 Debris Disposal Site Location:
Arrival Time:
Estimated Debris Quantity (cu yds)
Disposal Site Monitor: Print Name Signature
White – Load Site Monitor Green – Disposal Site Monitor Canary, Pink, Gold – On site Contractor's Representative or Driver Remarks:

FIGURE 1

- **Load Ticket Section 1:** The debris loading site monitor will be responsible for completing the information shown in Section 1 of Figure 1 above. The load site monitor will retain one copy of the load ticket and give the remaining copies to the truck driver.

- **Load Ticket Section 2:** The debris disposal site monitor (TDSR or landfill site) will verify that Section 1 is complete. The disposal site monitor will be stationed in a tower at either the TDSR or landfill site and will make an estimate of the quantity of debris contained in the truck or trailer in cubic yards. Each truck or trailer will have the measured hauling capacity in cubic yards recorded on the side of the truck or trailer. That number should be validated with the quantity stated in Section 1.
- The disposal site monitor will indicate the name of the debris reduction site, arrival time of the truck, and estimate the quantity of material contained within the bed of the truck or trailer. The estimated quantity will be recorded on the load ticket in the Estimated Debris Quantity block and then have the monitor print and sign his/her name in the designated block.
- The loading site monitor and disposal site monitor will retain one copy of the load ticket and give the remaining copies to the truck driver. The loading site and disposal site monitor's copy will be turned into the City Engineer or CMC representative at the end of each day. These are controlled forms and cannot be lost since they will be used to verify the amount of money paid to the Debris reduction site Contractor and to the debris hauling Contractor.

C. Conversion Factors: The following conversion factors will be used to convert from tons to cubic yards or from cubic yards to tons:

- **Construction and Demolition Debris**
  - Cubic yards divided by 2 = tons
  - Tons multiplied by 2 = cubic yards
- **Woody Debris**
  - Cubic yards divided by 6 = tons
  - Tons multiplied by 6 = cubic yards

D. Meetings:

- The Contractor's representative must coordinate daily with the City Engineer or CMC representative. The Contractor's representative must have the authority to act on behalf of the Contractor to address and resolve issues that may arise during the course of this work.
- The Contractor shall notify the City Engineer or CMC representative of any significant damage to public or private property or major problems, such as equipment failure or loss of qualified labor, on a daily basis.

E. Monitoring: The City will monitor all Contractor operations. Payment will be based on validated load tickets (see Figure 1).

- **Urban Areas:**
  - The City will have load site monitors stationed at designated "Choke Points" chosen by the Contractor and coordinated with the City's representative the day before. The "Choke Points" must be kept to a minimum and located at a safe site along the primary haul road to the designated disposal site.

- City load site monitors will be stationed at the "Choke Points," and each truck driver will be given a load ticket that validates where the material originated. The load ticket must contain either a street address or the nearest intersection to be valid. The quantity of debris hauled will be estimated at the disposal site by the City's disposal site monitor. The estimated quantity will be recorded on the load ticket and a copy of the load ticket given to the truck driver.

- **Rural Areas:**
    - The City will have load site monitors stationed at each rural loading site. Rural area loading sites must be identified by the Contractor and coordinated with the CMC representative the day before. City load site monitors will be stationed at the loading site and will give each truck driver a load ticket that validates where the material originated.
    - The load ticket must contain either a street address or the nearest intersection to be valid. The quantity of debris hauled will be estimated at the disposal site by the City. The estimated quantity will be recorded on the load ticket and a copy of the load ticket given to the truck driver.
- **Roving Monitors:**
    - The City and FEMA will also have roving monitors who will observe operations to ensure that eligible debris is only removed from locations specified by the City Engineer or CMC representative. Trucks that are observed picking up ineligible debris outside of the designated road rights-of-way will have all loads hauled that day deducted from their totals, and the load tickets will be invalidated.

F. Payment Retainage: The City Engineer will withhold from the Contractor's compensation any amounts in connection with deviation from acceptable procedures, negligence resulting in damage to public or private property, unreasonable rates, inadequate record keeping, invoices for work not accomplished or equipment not used, fraudulent claims, or any devious or illegal practice.

END OF SECTION

SPECIFICATIONS FOR TEMPORARY DEBRIS STORAGE AND REDUCTION (TDSR) SITE OPERTIONS/DEBRIS DISPOSAL
City of Corpus Christi, TX
May 2003

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Work under this section consists of preparation, operation, and closure of Temporary Debris Storage and Reduction (TDSR) sites designated by the City Engineer for the project. At these sites the Contractor must accept, temporarily store, segregate, reduce, recycle as appropriate, and dispose of debris generated by the hurricane/disaster event and brought to the site by trucks under Contractor's control or by other carriers specifically designated by the City Engineer.

Three TDSR sites are designated by the City Engineer (i.e., U.S. Navy Waldron Field, U.S. Navy Cabaniss Field, and Corpus Christi International Airport). Appendix V, "Location and Status of TDSR sites and Landfills," identifies the location and particulars of each site. Appendix VI, "Removal Zones," proportions the City into sectors and assigns each of them to the nearest TDSR site.

At each TDSR site the Contractor must be fully prepared to:

- Accept materials collected during debris removal operations;
- Segregate materials into waste streams that can either be recycled, picked up by other Contractors (as in the case of HAZMAT waste), treated in a common manner (i.e. mechanical reduction) or taken to a common disposal point such as an approved landfill;
- Reduce materials through mechanical reduction (chipping, grinding), incineration (if specifically authorized by the City Engineer or his representative), recycling on site or post-collection resale for recycling or other purposes;
- Conduct on-site air curtain burning of certain materials as may be directed by the City Engineer. Contractor should identify equipment and operator resources; however, no burning may take place without specific direction from the City Engineer; and
- Dispose of segregated or reduced debris through resale of materials or deposition of processing wastes in a properly permitted landfill or other disposal site.

B. City Limits: The source of debris is limited to areas within the City of Corpus Christi. Appendix II, "City Map", defines the City limits.

C. Preparedness: A representative of the Contractor or Subcontractor who will operate the TDSR site must participate in the City's annual hurricane exercise as described in Exhibit B at no cost to the City.

D. Prepositioning: In order to expedite the implementation of TDSR site operations, the Contractor must provide personnel on-site prior to a projected hurricane/disaster event to carry out any activities necessary to assure that the TDSR sites will be ready when needed.

Actual preparation of the TDSR sites must begin within 24 hours of receipt of the Notice-to Proceed and the sites must be fully operational not more than 5 days thereafter.

E. Existing Conditions: The Contractor must, upon entering each site designated as a TDSR site, photo-document the site conditions using both a video camera and still photographs. The Contractor should keep one copy of the videotape and photographs for their records. The Contractor must provide one copy of the videotape and the still photographs to the City Engineer or CMC representative.

F. Environmental Compliance: The City has selected TDSR sites that are generally free of significant environmental constraints. Additionally, it has coordinated the TDSR site selection with the Texas Commission on Environmental Quality (TCEQ) on issues concerning air, water and solid and hazardous waste. Air Curtain Burner operators licensed by the TCEQ are already individually permitted; the City will secure any additional necessary permits for the operation of the TDSR sites. The City will handle all contact with TCEQ or other State and Federal agencies. The Contractor will refer any contact by these agencies to the City Engineer or CMC representative.

Nonetheless, the Contractor must be aware of, and abide by, the conditions of any permits under which he/she must operate the site. The Contractor is responsible for knowing the applicability and requirements of all applicable environmental laws and regulations that could pertain to the operation of TDSR sites.

The Contractor shall be responsible for paying any and all costs associated with violations of law or regulation relative to his/her activities. Such costs might include but are not limited to: site cleanup and/or remediation; fines, administrative or civil penalties; third party claims imposed on the City by any regulatory agency or by any third party as a result of noncompliance with Federal, State, or Local environmental laws and regulations or nuisance statutes by Contractor, his/her Subcontractors, or any other persons, corporations or legal entities retained by the Contractor under this contract.

G. Meetings: The Contractor must attend any and all meetings required by the City Engineer or CMC representative to evaluate the operations of the TDSR sites.

H. Quality Assurance: The work will be closely monitored by City monitors and/or designated representatives of FEMA. The Contractor shall cooperate with all monitors.

1.02 CITY RESPONSIBILITIES

A. Designation of Sites: The City will, at its sole discretion, designate TDSR sites for development and operation by the Contractor.

B. Access: The City will provide access and authorization to the Contractor to operate on any or all of the designated TDSR sites including all information in its possession regarding these sites that is necessary for the successful operation of TDSR sites.

C. Permits and Approvals: The City will secure and provide to the Contractor the necessary permits from the TCEQ and appropriate Federal agencies for the operation of all TDSR sites. The City will also waive or provide all local permits and approvals for the operation of the TDSR sites.

D. Services Not Provided: The City will not provide the Contractor with potable water, sewage treatment, fuel, electricity, or other personnel, materials or equipment deemed necessary to operate the TDSR sites.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 TDSR SITE PREPARATION

A. Site Setup: Unless specifically directed otherwise by the City Engineer or CMC representative, site setup must commence as soon as possible after the hurricane/disaster event has subsided, but no later than 24 hours from the time that the Notice-to-Proceed is issued by the City Engineer. All TDSR sites must be fully operational within 5 days of the Notice-to-Proceed.

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

- Access to site
- Site management, to include point-of-contact, organizational chart, etc.
- Traffic control procedures
- Site security
- Site safety
- Site layout/segregation plan
- Hazardous materials storage plan
- Environmental mitigation plan, including considerations for smoke, dust, noise, traffic, buffer zones, and storm water runoff as appropriate.

C. Site Preparation: The Contractor shall be responsible for preparing the site(s) to accept the debris. This preparation shall include clearing, erosion control, grading, and 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 City.

D. Site Security: The Contractor shall be responsible for installing site security measures and maintaining security for operations at the site.

E. Fire Protection: The Contractor shall manage the site to minimize the risk of fire.

F. 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.

G. 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"by 8" joists, 16" O.C. with ¾" plywood supported by four 6" by 6" posts. The perimeter of the floor area shall be protected by a 4-foot-high wall constructed of 2" by 4" studs and ½" 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. Access shall be provided by wooden steps with a hand rail.

The Contractor shall make provisions for portable sanitary facilities to be provided and maintained at the inspection tower.

H. 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. As a minimum, one flag person shall be posted at each entrance to direct traffic at the site.

I. Debris Ownership and Disposal: The Contractor must remove or arrange for the removal and final disposal of all debris brought to the debris reduction site. Options include, but are not limited to, sending the material to an authorized and properly permitted disposal area, recycling facility, or resale entity. The Contractor must maintain records for all materials, including processed debris, residue, and hazardous materials, being transported from the debris reduction site to disposal or recycling facilities. The Contractor must secure an EPA Identification Number prior to the lawful disposal of any ash determined to be hazardous based on analytical results. Copies of this documentation must be provided to the City Engineer for his/her review. The Contractor shall be considered the owner of all debris brought to the debris reduction site.

The Contractor must assume possession of all processed debris and may dispose of such debris in a manner that creates income for the Contractor. Reduction and disposal of the debris is the sole responsibility of the Contractor.

J. Site Closure: The Contractor shall be responsible for the closure of the debris site within 30 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 hazardous waste debris is not the responsibility of the Contractor under this contract. The Contractor shall receive approval from the City Engineer as to the final acceptance of a site closure. Final payment shall be released to the Contractor upon acceptance of the site by the City Engineer.

K. Baseline Sampling and Testing: The Contractor must collect and test soil and groundwater samples at each TDSR site in areas designated for storm water retention, ash storage, vehicle maintenance, fuel dispensing operations and any areas where hazardous substances and petroleum products are or might be generated, stored or used. Sample locations must be coordinated with the City Engineer or CMC representative prior to acquisition. Samples must be tested for Total Petroleum Hydrocarbons (TPH) and Resource Conservation and Recovery Act (RCRA) metals. The Contractor must secure independent laboratory analytical tests for the referenced substances tested and provide the results to the City Engineer or CMC representative prior to the commencement of operations at the TDSR sites.

L. Protection: Within the limits of or adjacent to the TDSR site, there may existing underground electric, telephone and television cables and conduits, gas, water and sewer utility lines that cannot be located from existing data. It is the responsibility of the Contractor to determine their exact location and to carry out his/her work carefully and skillfully so as to avoid damage to them. The City may elect to provide this information to the Contractor in

advance. In any case, the Contractor shall ensure the locations of such utility installations are adequately marked.

M. Temporary Utilities: All temporary utilities, including sewage disposal and potable water, must be provided by the Contractor.

N. Signage: The Contractor must provide signs at each of the TDSR sites in accordance with City specifications that contain the following information:

- Contractor's superintendent name, address and local 24-hour telephone number;
- Name of the TDSR site facility; and
- Name, address and telephone number of the City representative to contact in case of an emergency.

O. Plans: The Contractor must develop and provide to the City Engineer the following materials prior to start-up:

- Site layout plan
- Proposed operating procedures
- Site/operations safety plan

P. Startup: When all TDSR site preparations are completed, the Contractor must notify the City Engineer or CMC representative, who will inspect the site and approve the site for commencement of TDSR site operations.

3.02 TDSR SITE OPERATIONS

A. General Operations: The Contractor will operate each TDSR site in an effective and efficient manner for such time as the City Engineer deems necessary. TDSR sites may operate on a 24-hour, 7-day basis unless otherwise directed by the City Engineer or CMC representative to prevent undue impact on nearby residents.

The Contractor must operate such equipment as is necessary to efficiently reduce by mechanical means or incineration all materials deposited at the TDSR site. The Contractor must segregate all debris in accordance with the method of processing and potential for recycling and its ultimate disposal.

The Contractor must separate and contain all hazardous wastes for pick up and disposal by the City's hazardous waste Contractor. Comestible garbage shall be separated and contained for pick-up by the City's designated hauler. The Contractor must staff the TDSR sites with sufficient personnel to ensure the waste stream segregation and processing operation does not reduce the capacity to remove debris from City streets in a timely manner. The operation of each TDSR site must conform to these specifications and any permits issued for the TDSR site. The Contractor is responsible for all site and worker safety issues.

B. Control of Material: The Contractor must make every effort to control the nature of the material allowed into the TDSR site, with the objective being to have only C&D materials, clean woody debris, household debris (other than HAZMAT and garbage) and similar materials brought to and deposited in the TDSR site. To the extent practicable the Contractor must prevent hazardous materials and comestible garbage from being brought onto the TDSR sites. Contractor must segregate hazardous materials and comestible garbage, when discovered, for pick-up and disposal by the City's designated haulers. All materials brought

to the TDSR site by vehicles under Contractor's control but not accepted at the TDSR site must be disposed of by the Contractor at an approved landfill or by other legal means of disposal at the Contractor's expense.

C. Environmental Controls: The Contractor is responsible for monitoring the temperature of stockpiled mulch at least twice daily to detect hot spots resulting from natural microbial decomposition. Upon finding a hot spot the Contractor must mechanically mix the affected mulch to cool it down and avoid creating a fire hazard.

The Contractor must secure the services of an independent laboratory to sample and test any ash generated from burning prior to its lawful disposal. Copies of all documents pertaining to the disposition of the ash (e.g., analytical results, shipping manifests, certificates of destruction) must be submitted to the City Engineer or CMC representative.

The Contractor must, to the extent practicable, separate hazardous waste and asbestos from all woody and structural debris that is to be further processed, reduced, recycled or burned. Segregation of asbestos from curbside debris planned for direct disposal at a landfill will not be required.

D. Control of Rodents, Vermin, Insects, Birds and Wildlife: The Contractor must operate the TDSR Sites in such a manner as to minimize the possibility of infestation by rodents, other vermin and insects and to minimize the potential for attracting birds and wildlife. The Contractor will be responsible for proper and safe application of rodenticide and insecticide as a precautionary tactic to minimize the potential for infestation. Additional applications of such materials shall be made as necessary to eradicate infestations. All sites and work areas will be subject to inspection and monitoring by City health and safety personnel.

E. Debris Ownership and Disposal: The Contractor must remove or arrange for the removal and final disposal of all debris brought to the TDSR sites. Options include but are not limited to sending the material to an authorized and properly permitted disposal area, recycling facility or resale entity. The Contractor must maintain records for all materials, including processed debris, residue, and hazardous materials, being transported from the TDSR sites to disposal or recycling facilities. The Contractor must secure an EPA Identification Number prior to the lawful disposal of any ash determined to be hazardous based on analytical results. Copies of this documentation must be provided to the City Engineer or CMC representative for his/her review. The Contractor shall be considered the owner of all debris brought to a TDSR site.

The Contractor must assume possession of all processed debris and may dispose of such debris in a manner that creates income for the Contractor. Reduction and disposal of the debris is the sole responsibility of the Contractor.

3.03 TDSR SITE CLOSURE

A. Restoration: The Contractor must restore all TDSR sites to their original condition to the extent feasible or to the satisfaction of the City Engineer or CMC representative. Unless otherwise directed by the City Engineer, all improvements (e.g., fencing, haul roads, trailers) must be removed. The Contractor must reestablish grades (i.e., roads, and ditches) throughout each TDSR site. The Contractor must request and participate in site inspections by the City Engineer or CMC representative for final approval of all site closure and restoration activities.

B. Sampling and Testing: The Contractor must complete soil and groundwater closure sampling and testing in the areas described in the baseline sampling information. The same tests must be completed as were performed prior to commencing with TDSR site operations (TPH and RCRA Metals). The analytical results must be provided to the City Engineer or CMC representative prior to closure of each TDSR site. Areas found to be contaminated above the baseline values must be remediated by the Contractor. The Contractor is regarded as the generator of such contaminants for the purposes of Federal environmental statutes.

PART 4 - MEASUREMENT AND PAYMENT

4.01 COMPENSATION

A. Preparation: TDSR site preparation will be paid for on a lump sum basis. This amount includes, but is not limited to, setup of up to three sites, baseline sampling and testing at all sites, signage, and any other preparations necessary to accept debris from the designated removal zones. If the Contractor and City Engineer mutually agree that all three designated TDSR sites are not required, the lump sum amount stated in the Price Proposal will be proportionally reduced to reflect the number of TDSR sites actually prepared for operation.

B. Operations and Disposal: TDSR site operations will be measured and paid for based on a unit price per cubic yard of debris that is accepted at TDSR sites for processing and disposal. The unit price per cubic yard must include all subsidiary costs including, but not limited to, labor, equipment, fuel, environmental controls, maintenance, general administration and disposal. Compensation will be based on completed load tickets administered and validated by City disposal site monitors only.

C. Closure: TDSR Site closure will be paid for on a lump sum basis. This amount includes, but is not limited to, restoration of all sites, sampling and testing at all sites, and any other activities necessary to convert the sites back to their original condition and usage. If the Contractor and City Engineer mutually agreed not to open all three designated TDSR sites, the lump sum amount stated in the Price Proposal will be proportionally reduced to reflect the number of TDSR sites actually opened for operation.

D. Payment Retainage: The City Engineer will withhold from the Contractor's compensation any amounts in connection with deviation from acceptable procedures, negligence resulting in damage to public or private property, unreasonable rates, inadequate record keeping, invoices for work not accomplished or equipment not used, fraudulent claims, or any devious or illegal practice.

END OF SECTION

APPENDICES

I. Coordination Chart

II. City Map

III. Clearing Priorities

IV. Debris Classification

V. Location and Status of Temporary Debris Storage and Reduction (TDSR) Sites and Landfills.

VI. Removal Zones

PRICE PROPOSAL FORM

DEBRIS CLEARING, REMOVAL, AND DISPOSAL SERVICES
POST-HURRICANE/DISASTER RECOVERY OPERATIONS

BID SUMMARY

Bid Item/Description					
Phase 1 - Emergency Roadway Debris Clearing (first 70 hours)					
Foot Note 1	**Quantity**	**Unit**	**Typical Crew Price**	**No. of Crews**	**Total Phase 1**
	70	HRS			
Phase 2 - Public Rights-of Way Debris Removal					
Foot Note 2	**Quantity**	**Unit**	**Unit Price/CY**		**Total Phase 2**
	5,000,000	CY			
Phase 3 - Site A - TDSR Site Operations/Debris Disposal					
	Quantity	**Unit**	**Unit Price**	**Subtotal**	**Total Phase 3-A**
Preparation	1	LS			
Operations	1,667,000	CY			
Closure	1	LS			
Foot Note 3……			**Phase 3 -Site A Total**		
Phase 3 - Site B - TDSR Site Operations/Debris Disposal					
	Quantity	**Unit**	**Unit Price**	**Subtotal**	**Total Phase 3-B**
Preparation	1	LS			
Operations	1,667,000	CY			
Closure	1	LS			
Foot Note 3……			**Phase 3 -Site B Total**		
Phase 3 - Site C - TDSR Site Operations/Debris Disposal					
	Quantity	**Unit**	**Unit Price**	**Subtotal**	**Total Phase 3-C**
Preparation	1	LS			
Operations	1,667,000	CY			
Closure	1	LS			
Foot Note 3……			**Phase 3 -Site C Total**		
PHASE 1 + PHASE 2 + PHASE 3 A,B,C =TOTAL BASE BID					

Foot Notes:

1. Unit Price will be total of typical crew based on hourly equipment rate from Bid Breakdown Part 1 to include mobilization/demobilization for each piece of equipment.

Typical Debris Clearing Crew:

- 1 each 4 CY Front-end Loader with Operator
- 1 each Knuckleboom, 10,000 lb lifting capacity with Operator
- 3 each Trucks, Dump 16-20 CY capacity with Operators

- Laborers with chainsaws, 16" min. bar, traffic flags, and misc. small tools (axes, shovels, safety equipment
- Crew foreman with Truck, Pickup and cellular phone.

Phase 1 -70 Hours x Typical Crew Price x Estimated Number of Crews to Clear 200,000 CY of debris from arterial, feeder and secondary roads within City limits = Subtotal Bid $.

2. Volume of Estimated debris to be removed from rights-of-way (5,000,000 CY) and processed at the TDSR sites (1,667,000 CY at each TDSR site)

3. Subtotal of TDSR site preparation, operation, and closure.

Phase 1 + Phase 2 + Phase 3 = TOTAL BID. .

NOTE: Bidders may assume the debris quantities are composed of equal parts of construction and demolition (C&D) debris and vegetative debris.

PART 1
PHASE 1 DEBRIS CLEARING BID BREAKDOWN

ITEM	DESCRIPTION	QTY. EST.	U/I	U/P	AMOUNT
001	Mobilize equipment/demobilize equipment Travel estimated at 500 miles/round trip				
001aa	Truck, dump; 16-20 CY capacity (est. _____ea.)	500	miles		
001ab	Loader, front-end, 4CY capacity (est. _____ea.)	500	miles		
001ac	Knuckleboom, 10,000 lb capacity (est. _____ea.)	500	miles		
001ad	Truck, pickup, .5ton (est. _____ea)	500	miles		
002	Truck, dump; 16-20 CY W/Operator (est. _____ea.)	70	hrs		
003	Loader, front-end, 4CY W/Operator (est. _____ea.)	70	hrs		
004	Knuckleboom, 10,000 lb W/Operator (est. _____ea.)	70	hrs		
005	Truck, pickup, .5ton W/Operator (est. _____ea)	70	hrs		
006	Laborers with chainsaws, 16" min bar, traffic flags, and misc. small tools (axes, shovels, safety equipment) (est. _____ea	70	hrs		
00	Crew foreman with cellular phone (est. _____ea)	70	hrs		
	TOTAL PER TYPICAL CREW				

Estimated number of crews required to clear 200,000 CY of debris from arterial, feeder and secondary roads.	_____Crews

PART 2
PHASE 2 DEBRIS REMOVAL BID BREAKDOWN

ITEM	DESCRIPTION	QTY. EST.	U/I	U/P	AMOUNT
001	Mobilize equipment/demobilize equipment Travel estimated at 1000 miles/round trip				
001aa	Truck, dump; 16-20 CY capacity (est. _____ea.)	1000	miles		
001ab	Loader, front-end, 4CY capacity (est. _____ea.)	1000	miles		
001ac	Knuckleboom, 10,000 lb capacity (est. _____ea.)	1000	miles		
001ad	Truck, pickup, .5ton (est. _____ea)	1000	miles		
001 ae	Truck, dump, 21-30 CY capacity (est. _____ ea)	1000	miles		
002	Truck, dump; 16-20 CY W/Operator (est. _____ea.)		hrs		
003	Truck, dump, 21-30 CY W/Operator (est. _____ea)		hrs		
004	Loader, front-end, 4CY W/Operator (est. _____ea.)		hrs		
005	Knuckleboom, 10,000 lb W/Operator (est. _____ea.)		hrs		
006	Truck, pickup, .5ton W/Operator (est. _____ea)		hrs		
007	Laborers with chainsaws, 16" min bar, traffic flags, and misc. small tools (axes, shovels, safety equipment) (est. _____ea		hrs		
008	Crew foreman with cellular phone (est. _____ea)		hrs		
	Mobilization +Unit Price/Hour for Phase 2 =				
	TOTAL FOR PHASE 2 Unit price/hour divided by 5,000,000 CY=				**/CY**

PART III - A
TDSR SITE OPERATIONS/DEBRIS DISPOSAL - PHASE 3
SITE A - WALDRON FIELD
BID BREAKDOWN

ITEM	DESCRIPTION	QTY EST.	U/I	U/P	AMOUNT
001	Mobilize Equipment/ Demobilize Equipment Travel to and from site (estimate 1000 miles round trip) 001aa thru 001ak)				
001aa	Air Curtain Burner (Qty. Est. ___)	1,000	Mile		
001ab	Backhoe, with loader. 1.5cy capacity, with thumb attachment (Qty. Est. ___)	1,000	Mile		
001ac	Dozer, tracked 2-3 cy blade capacity (Qty. Est. ___)	1,000	Mile		
001ad	Dozer, tracked with root rake blade, D-7 or equivalent (Qty. Est. ___)	1,000	Mile		
001ae	Water Truck – minimum 3000 gals. with operator (Qty. Est. ___)	1,000	Mile		
001af	Grader, Motor, 12 foot blade, 130-140 net Hp (Qty. Est. 1-3)	1,000	Mile		
001ag	Chipper, width 12 inch minimum (Qty. Est. ___)	1,000	Mile		
001ah	Tub Grinder 800-1000 Hp. (Qty. Est.1-3)	1,000	Mile		
001ai	Tub Grinder 300-400 Hp. 8 foot diameter (Qty. Est. ___)	1,000	Mile		
001aj	Truck, Pickup, 0.5 Ton capacity with operator (Qty. Est. ___)	1,000	Mile		
001ak	Lowbed trailer with tractor with operator (Qty. Est. ___)	1,000	Mile		
002	Debris Management Site Operations (Items 2aa thru 2aq)				
002aa	Construction of Inspection Tower , treated wood	1 NOTE 3	EA		
002ab	Construction of Household Hazardous Waste Containment Area	1 NOTE 3	EA		
002ac	Nighttime Site Operation Generator and Lighting (Qty. Est. ___)	1800	HRS		
002ad	Site Management Foreman (Qty. Est. ___)	1800	HRS		
002ae	Site Management Night Foreman (Qty. Est. ___)	1800	HRS		

SITE -A BID BREAKDOWN (CONTINUED)

ITEM	DESCRIPTION	QTY EST.	U/I	U/P	AMOUNT
002af	Laborer with misc. small hand tools, hand saw, hammer, shovel, Day Duty (Qty. Est. ___)	1800	HRS		
002ag	Chipper, width 12 inch minimum with operator (Qty. Est. ___)	1800	HRS		
002ah	Tub Grinder 800-1000 Hp. with operator (Qty. Est. ___)	1800	HRS		
002ai	Tub Grinder 300-400 Hp. 8 foot diameter with operator (Qty. Est. ___)	1800	HRS		
002aj	Backhoe, with loader, 1.5 CY capacity with thumb attachment with operator (Qty. Est. ___)	1800	HRS		
002ak	Dozer, tracked 2-3 CY blade capacity with operator (Qty. Est. ___)	1800	HRS		
002al	Dozer, tracked with root rake blade with operator (Qty. Est. ___)	1800	HRS		
002am	Water Truck with operator (Qty. Est. ___)	1800	HRS		
002an	Lowbed trailer with tractor with operator (Qty. Est. ___)	1800	HRS		
002ao	Truck, Pickup, 0.5 Ton capacity with operator (Qty. Est. ___)	1800	HRS		
002ap	Grader, Motor, 12 foot blade, 130-140 net Hp with operator (Qty. Est. ___)	1800	HRS		
002aq	Air curtain burner, self-contained system incl. power plant, hydraulic drive system blower fan with a minimum 15,500 cfm centrifugal fan, air output approx. 165 mph at man; 35 ft. length; must meet or exceed air quality standards applicable to US-EPA regulation (Qty. Est. ___)	1800	HRS		
SUBTOTAL DIVIDED by 1,667,000 CY'PRICE =_____ /CY				**SUBTOTAL**	
100	Site Preparation - Site A	1	LS		
200	Site Closure - Site A	1	LS		
IV.				**TOTAL**	
SUBTOTAL + LS =TOTAL FOR SITE A					

NOTES:

1. List may be expanded to reflect specific equipment and labor needs.
2. Total must equal subtotal amount for Site A in the Bid Summary
3. Provide detailed cost data for construction of inspection tower and construction of hazardous and toxic waste containment area. Submit breakdown of labor and materials on a separate sheet and attach.

PART III - B
TDSR SITE OPERATIONS/DEBRIS DISPOSAL - PHASE 3
SITE B - CABANISS FIELD
BID BREAKDOWN

ITEM	DESCRIPTION	QTY EST.	U/I	U/P	AMOUNT
001	Mobilize Equipment/ Demobilize Equipment Travel to and from site (estimate 1000 miles round trip) 001aa thru 001ak)				
001aa	Air Curtain Burner (Qty. Est. ___)	1,000	Mile		
001ab	Backhoe, with loader. 1.5cy capacity, with thumb attachment (Qty. Est. ___)	1,000	Mile		
001ac	Dozer, tracked 2-3 cy blade capacity (Qty. Est. ___)	1,000	Mile		
001ad	Dozer, tracked with root rake blade, D-7 or equivalent (Qty. Est. ___)	1,000	Mile		
001ae	Water Truck – minimum 3000 gals. with operator (Qty. Est. ___)	1,000	Mile		
001af	Grader, Motor, 12 foot blade, 130-140 net Hp (Qty. Est. 1-3)	1,000	Mile		
001ag	Chipper, width 12 inch minimum (Qty. Est. ___)	1,000	Mile		
001ah	Tub Grinder 800-1000 Hp. (Qty. Est.1-3)	1,000	Mile		
001ai	Tub Grinder 300-400 Hp. 8 foot diameter (Qty. Est. ___)	1,000	Mile		
001aj	Truck, Pickup, 0.5 Ton capacity with operator (Qty. Est. ___)	1,000	Mile		
001ak	Lowbed trailer with tractor with operator (Qty. Est. ___)	1,000	Mile		
002	Debris Management Site Operations (Items 2aa thru 2aq)				
002aa	Construction of Inspection Tower , treated wood	1 NOTE 3	EA		
002ab	Construction of Household Hazardous Waste Containment Area	1 NOTE 3	EA		
002ac	Nighttime Site Operation Generator and Lighting (Qty. Est. ___)	1800	HRS		
002ad	Site Management Foreman (Qty. Est. ___)	1800	HRS		
002ae	Site Management Night Foreman (Qty. Est. ___)	1800	HRS		

SITE -B BID BREAKDOWN (CONTINUED)

ITEM	DESCRIPTION	QTY EST.	U/I	U/P	AMOUNT
002af	Laborer with misc. small hand tools, hand saw, hammer, shovel, Day Duty (Qty. Est. ___)	1800	HRS		
002ag	Chipper, width 12 inch minimum with operator (Qty. Est. ___)	1800	HRS		
002ah	Tub Grinder 800-1000 Hp. with operator (Qty. Est. ___)	1800	HRS		
002ai	Tub Grinder 300-400 Hp. 8 foot diameter with operator (Qty. Est. ___)	1800	HRS		
002aj	Backhoe, with loader, 1.5 CY capacity with thumb attachment with operator (Qty. Est. ___)	1800	HRS		
002ak	Dozer, tracked 2-3 CY blade capacity with operator (Qty. Est. ___)	1800	HRS		
002al	Dozer, tracked with root rake blade with operator (Qty. Est. ___)	1800	HRS		
002am	Water Truck with operator (Qty. Est. ___)	1800	HRS		
002an	Lowbed trailer with tractor with operator (Qty. Est. ___)	1800	HRS		
002ao	Truck, Pickup, 0.5 Ton capacity with operator (Qty. Est. ___)	1800	HRS		
002ap	Grader, Motor, 12 foot blade, 130-140 net Hp with operator (Qty. Est. ___)	1800	HRS		
002aq	Air curtain burner, self-contained system incl. power plant, hydraulic drive system blower fan with a minimum 15,500 cfm centrifugal fan, air output approx. 165 mph at man; 35 ft. length; must meet or exceed air quality standards applicable to US-EPA regulation (Qty. Est. ___)	1800	HRS		
SUBTOTAL DIVIDED by 1,667,000 CY'PRICE =_____/CY				**SUBTOTAL**	
100	Site Preparation - Site B	1	LS		
200	Site Closure - Site B	1	LS		
V.				**TOTAL**	

SUBTOTAL + LS =TOTAL FOR SITE B

NOTES:

1. List may be expanded to reflect specific equipment and labor needs.
2. Total must equal subtotal amount for Site B in the Bid Summary
3. Provide detailed cost data for construction of inspection tower and construction of hazardous and toxic waste containment area. Submit breakdown of labor and materials on a separate sheet and attach.

PART III - C
TDSR SITE OPERATIONS/DEBRIS DISPOSAL - PHASE 3
SITE C - CORPUS CHRISTI INTERNATIONAL AIRPORT
BID BREAKDOWN

ITEM	DESCRIPTION	QTY EST.	U/I	U/P	AMOUNT
001	Mobilize Equipment/ Demobilize Equipment Travel to and from site (estimate 1000 miles round trip) 001aa thru 001ak)				
001aa	Air Curtain Burner (Qty. Est. ___)	1,000	Mile		
001ab	Backhoe, with loader. 1.5cy capacity, with thumb attachment (Qty. Est. ___)	1,000	Mile		
001ac	Dozer, tracked 2-3 cy blade capacity (Qty. Est. ___)	1,000	Mile		
001ad	Dozer, tracked with root rake blade, D-7 or equivalent (Qty. Est. ___)	1,000	Mile		
001ae	Water Truck – minimum 3000 gals. with operator (Qty. Est. ___)	1,000	Mile		
001af	Grader, Motor, 12 foot blade, 130-140 net Hp (Qty. Est. 1-3)	1,000	Mile		
001ag	Chipper, width 12 inch minimum (Qty. Est. ___)	1,000	Mile		
001ah	Tub Grinder 800-1000 Hp. (Qty. Est.1-3)	1,000	Mile		
001ai	Tub Grinder 300-400 Hp. 8 foot diameter (Qty. Est. ___)	1,000	Mile		
001aj	Truck, Pickup, 0.5 Ton capacity with operator (Qty. Est. ___)	1,000	Mile		
001ak	Lowbed trailer with tractor with operator (Qty. Est. ___)	1,000	Mile		
002	Debris Management Site Operations (Items 2aa thru 2aq)				
002aa	Construction of Inspection Tower , treated wood	1 NOTE 3	EA		
002ab	Construction of Household Hazardous Waste Containment Area	1 NOTE 3	EA		
002ac	Nighttime Site Operation Generator and Lighting (Qty. Est. ___)	1800	HRS		
002ad	Site Management Foreman (Qty. Est. ___)	1800	HRS		
002ae	Site Management Night Foreman (Qty. Est. ___)	1800	HRS		

SITE -C BID BREAKDOWN (CONTINUED)

ITEM	DESCRIPTION	QTY EST.	U/I	U/P	AMOUNT
002af	Laborer with misc. small hand tools, hand saw, hammer, shovel, Day Duty (Qty. Est. ___)	1800	HRS		
002ag	Chipper, width 12 inch minimum with operator (Qty. Est. ___)	1800	HRS		
002ah	Tub Grinder 800-1000 Hp. with operator (Qty. Est. ___)	1800	HRS		
002ai	Tub Grinder 300-400 Hp. 8 foot diameter with operator (Qty. Est. ___)	1800	HRS		
002aj	Backhoe, with loader, 1.5 CY capacity with thumb attachment with operator (Qty. Est. ___)	1800	HRS		
002ak	Dozer, tracked 2-3 CY blade capacity with operator (Qty. Est. ___)	1800	HRS		
002al	Dozer, tracked with root rake blade with operator (Qty. Est. ___)	1800	HRS		
002am	Water Truck with operator (Qty. Est. ___)	1800	HRS		
002an	Lowbed trailer with tractor with operator (Qty. Est. ___)	1800	HRS		
002ao	Truck, Pickup, 0.5 Ton capacity with operator (Qty. Est. ___)	1800	HRS		
002ap	Grader, Motor, 12 foot blade, 130-140 net Hp with operator (Qty. Est. ___)	1800	HRS		
002aq	Air curtain burner, self-contained system incl. power plant, hydraulic drive system blower fan with a minimum 15,500 cfm centrifugal fan, air output approx. 165 mph at man; 35 ft. length; must meet or exceed air quality standards applicable to US-EPA regulation (Qty. Est. ___)	1800	HRS		
SUBTOTAL DIVIDED by 1,667,000 CY'PRICE =_____/CY				**SUBTOTAL**	
100	Site Preparation - Site C	1	LS		
200	Site Closure - Site C	1	LS		
VI.				**TOTAL**	

SUBTOTAL + LS =TOTAL FOR SITE C

NOTES:

1. List may be expanded to reflect specific equipment and labor needs.
2. Total must equal subtotal amount for Site C in the Bid Summary
3. Provide detailed cost data for construction of inspection tower and construction of hazardous and toxic waste containment area. Submit breakdown of labor and materials on a separate sheet and attach.

SPECIFICATIONS FOR COLLECTION, CHARACTERIZATION, PACKAGING, TRANSPORTATION AND DISPOSAL OF HAZARDOUS WASTE DURING POST-HURRICANE/DISASTER RECOVERY OPERATIONS

1.0 GENERAL

Work performed under these specifications shall meet or exceed the applicable State regulations and the applicable provisions of the Code of Federal Regulations (CFR) concerning HTRW as contained in Appendix II.

Disposal sites utilized by the Contractor shall be licensed, as required by law, by the Environmental Protection Agency (EPA) and/or State of Texas. Proposers must specify those disposal sites that they intend to use and provide key information regarding the site such as location and permit numbers.

The Contractor shall maintain a current EPA identification number and current Texas Commission on Environmental Quality (TCEQ) registration throughout the term of the contract.

The Contractor shall maintain all required insurance coverages, and any Federal and State permits required for transportation and disposal of all HTRW. Additionally, the Contractor will keep all inspection plans and records evidencing compliance with applicable Federal, State, and local regulations throughout the term of the contract.

The Contractor may subcontract, at no charge to the City, services related to the recycling, reuse, collection, transportation or disposal of the HTRW collected, where appropriate.

2.0 SCOPE OF WORK

2.1 Objectives

Work under this section consists of post-hurricane/disaster operations to collect, characterize, pack, transport and dispose of HTRW. This project is divided into two Categories. Potential Contractors will be required to bid on each Category. Categories HHW and ICHW are to be performed on a unit price basis.

HTRW operations will be divided into the following Categories:

- **Household Hazardous Waste (HHW) -** Used or leftover contents of consumer products that contain chemicals 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 hazardous waste include small quantities of normal household cleaning and maintenance products, latex and oil based paint, cleaning solvents, gasoline, oils, swimming pool chemicals, pesticides, propane gas cylinders, etc.

The City Engineer will identify specific pickup locations or areas for HHW collection. The Contractor will not have to sort through rights-of-way debris piles looking for potential HHW materials. Residents will be instructed to place their HHW items in separate piles that will be easily identifiable or to take HHW materials to designated drop-off locations. This will allow citizens to return to their properties and bring debris and HHW to the rights-of-way as recovery progresses. The City Engineer will prescribe the specific procedures to be used after ascertaining the scope and nature of the disaster's impacts.

The general concept of HHW collection from TDSR sites will only be once a day for approximately 3 weeks or as directed by the City Engineer. The TDSR sites are located at U.S. Navy Waldron Field, U.S. Navy Cabaniss Field, and Corpus Christi International Airport.

- **Industrial/Commercial Hazardous Waste (ICHW) -** Material and products from institutional, commercial, recreational, industrial and agricultural sources that contain certain chemicals 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.

  The City Engineer will identify the location of certain commercial and industrial hazardous and toxic waste, low-level radiological wastes, biological, medical (including possibly infectious wastes) and animal carcass wastes, and petroleum and other wastes, including spills discovered upon City rights-of-way or City property. Once identified, the Contractor will be responsible for collection, characterization, packaging, transportation and disposal actions. All activities will be coordinated with the City Engineer before work begins.

Definitions for the waste types detailed above may be found within the regulatory citations detailed in the contract package. This includes materials, whose source may be non-residential or unidentified, which may come to rest on City property. This scope of work does not include explosives. The Contractor's responsibility will include disaster related spill response in the City rights-of-way or on City property.

2.2 Preparedness

Key personnel, proposed by the Contractor under the pre-qualification process, must participate in the City's annual hurricane preparedness training activities, a maximum of two days each year at the Contractor's expense.

2.3 Prepositioning

Upon activation of the contract, Contractor must provide a two-person management team on-site to participate in advance recovery preparations. Expected time frame for activation is approximately 48 hours prior to projected hurricane landfall. The purpose is to initiate actions necessary to ensure that Contractor resources will be able to begin HHW/ICHW operations within 24 hours of receiving the Notice to Proceed from the City.

2.4 Inspection of HHW/ICHW Debris

As soon as possible after the hurricane/disaster event has subsided, the Contractor must make a detailed and thorough on-site inspection with a representative from Engineering Services of areas from which HHW/ICHW is to be removed. Contractor should consider:

- Amounts and types of HHW/ICHW;
- Working conditions such as traffic, street/road width, and land use;
- Means to ingress and egress work areas; and
- All other factors affecting the work.

2.5 Coordination

HHW / ICHW clearing and removal is limited to that which is determined by the City Engineer to be in the interest of public safety and that which is considered essential to the economic recovery of the affected area. The Contract Management Center (CMC) established by the City for the hurricane/disaster event will determine priorities for HHW / ICHW Clearing and Removal. The Contractor must coordinate with other contractors and other public and private entities also performing recovery operations. Appendix I, C "Coordination Chart", lists those with whom coordination is required.

2.6 City Limits

Work is limited to areas within the City of Corpus Christi. Appendix II, "City Map", defines the City limits.

2.7 Quality Assurance

Work will be closely monitored by City personnel and/or designated representatives of the Federal Emergency Management Agency (FEMA). The Contractor must cooperate with all monitors representing the City and FEMA.

3.0 COLLECTION, CHARACTERIZATION, PACKAGING, TRANSPORTATION AND DISPOSAL OF HHW.

3.1 General

The goal of Category 1 is to remove HHW debris from the rights-of way and City property to allow for the movement of emergency vehicles, law enforcement, resumption of critical services, and damage assessment of critical public facilities and utilities

3.2 First Collection Priorities

First collection priorities are to remove HHC from the following facilities:

- Police Department
- Fire Stations
- Corpus Christi International Airport
- Constable Offices
- Hospitals

3.3 Secondary Collection Priorities

Secondary collection priorities are to remove HHW from the following facilities:

- City Hall
- City Service Center

- County Courthouse
- Elliott Landfill
- Maintenance Services
- Water Filtration Plants
- Wastewater/Sewage Treatment Plants
- Other Facilities so designated by the CMC

HHW removal priorities above may be adjusted by the City Engineer or CMC representative at anytime during recovery operations.

3.4 Pickup Locations

The City Engineer will identify specific pickup locations or areas for HHW collection. The Contractor will not have to sort through rights-of-way debris piles looking for potential HHW materials. Residents will be instructed to place their HHW items in separate piles that will be easily identifiable or to take HHW materials to designated drop-off locations. This will allow citizens to return to their properties and bring debris and HHW to the rights-of-way as recovery progresses. The City Engineer will prescribe the specific procedures to be used after ascertaining the scope and nature of the disaster's impacts.

3.5 Equipment

The types and sizes of equipment to be used must be listed in the Contractor's Price Proposal. This is intended to be a general listing at this time. Prior to beginning work, the Contractor will be required to more fully identify each item of equipment by type, size and equipment number; the equipment number and the Contractor's name or initials must be permanently marked on each side of the vehicle at that time. Minimum letter size shall be 3 inches in height. Rates for equipment not listed in the Price Proposal must be established with the City Engineer before such equipment may begin working.

4.0 COLLECTION, CHARACTERIZATION, PACKAGING, TRANSPORTATION AND DISPOSAL OF ICHW

4.1 General

The goal of Category 2 is to remove ICHW debris from the rights-of way and City property to allow resumption of critical services and access to critical public facilities and utilities.

4.2 Pickup Locations

Citizens and the debris removal and disposal Contractor will advised to notify the City Engineer when items identified as ICHW have been found. Residents and Contractors will be instructed to identify the item, but not to attempt to remove. Only ICHW items approved by the City Engineer will be removed. ICHW items on private property will not be removed by the City's Contractor unless specifically approved in writing by the City Engineer and FEMA Public Assistance Officer. The City Engineer will prescribe the specific procedures to be used after ascertaining the scope and nature of the disaster's impacts.

4.3 Equipment

The types and sizes of equipment to be used must be listed in the Contractor's Price Proposal. This is intended to be a general listing at this time. Prior to beginning work, the Contractor will be required to more fully identify each item of equipment by type, size and equipment number; the equipment number and the Contractor's name or initials must be permanently marked on each side of the vehicle at that time. Minimum letter size shall be 3 inches in height. Rates for equipment not listed in the Price Proposal must be established with the City Engineer before such equipment may begin working.

5.0 COLLECTION, CHARACTERIZATION, PACKAGING, TRANSPORTATION AND DISPOSAL OF HHW/ICHW.

5.1 HHW/ICHW Removal

Appendix VI, "Removal Zones", identifies areas within the City where HHW/ICHW removal is required, as well as the locations of TDSR sites assigned to each zone. During HHW/ICHW removal operations, extreme caution must be exercised by the Contractor to ensure that no damage is done to public or private properties. The Contractor will be responsible for repair/replacement of any damage caused by negligence to public or private property.

5.2 Loading/Hauling

All vehicles utilized in hauling HHW/ICHW must be equipped with adequate means for containing the load, including tailgate and canvas covering while transporting the material.

- Covering must effectively prevent HHW/ICHW from being blown or bounced off the vehicles.
- Sideboards or other extensions to the bed will be permitted provided they meet state and local requirements, do not extend above the tailgate, and are substantially constructed. Sideboards must be constructed of 2" by 6" boards or greater and may not extend more than 2 feet above the metal bed sides. Plywood extensions are not permitted.
- Vehicles must be equipped with a tailgate that will effectively contain the HHW/ICHW on the vehicle while hauling, and also permit the vehicle to be loaded to capacity.

5.3 Disposal

All HHW/ICHW must be disposed of according to current local, State, and Federal regulations at approved landfills.

5.4 Equipment Storage

The Contractor is responsible for locating areas where his/her equipment may be stored, serviced and repaired. Such areas must not be located within rights-of-way or in any areas that would impact traffic flow or produce a safety hazard. This does not preclude parking equipment for short periods of time, including overnight, in rights-of-way areas where work is in progress. On-site refueling and operating checks including daily maintenance will be allowed only at properly prepared areas.

5.5 Safety/Health

The Contractor will be responsible for ensuring that HHW/ICHW is properly handled, packaged, and disposed of in a lawful manner and in a manner so as to prevent health and safety hazards created by the improper combination of wastes.

The Contractor is responsible for ensuring that all contractor and subcontractor personnel involved with HTRW operations are appropriately trained, qualified, outfitted, equipped and monitored in accordance with all applicable federal and state of Texas occupational health and safety requirements, including but not limited to current OSHA regulations for hazardous waste operations.

6.0 CONTRCTOR RESPONSIBILITIES

Provide the services described in the Contract upon receipt of a Notice to Proceed from the City Engineer immediately following a hurricane or other disaster.

Furnish all equipment, material, and labor required to collect, categorize, transport, and properly dispose of all HHW/ICHW.

Assume all liability and responsibility for collected HHW/ICHW waste from the time the work begins until final disposition, including but not limited to handling and transportation to an approved disposal site.

Be responsible for all costs incurred in the handling of collected HHW/ICHW including categorization, packaging, transporting, disposal, and marketing of recyclables if appropriate.

All collected HHW/ICHW is subject to regulations and restrictions imposed by the EPA and the Texas Commission on Environmental Quality (TCEQ) or its successor agency.

Keep all records that may be required by law or by the City under this contract for the purpose of payments to the Contractor or reimbursement to the City for disaster related expenses.

Mobilize to the site provided by the City at Elliott Landfill and commence with site set-up activities to facilitate the timely receipt of HHW/ICHW.

7.0 GENERAL SERVICES, COVERED WASTE AND GENERAL CONCEPT OF OPERATONS

7.1 General Services

The Contractor shall mobilize to the City of Corpus Christi, TX and establish an HHW/ICHW processing facility at the Elliott Landfill and collect, characterize, package, transport, and dispose of HHW/ICHW (as defined herein) and the costs associated with providing these services.

7.2 Covered Waste

- **Household Hazardous Waste (HHW) -** Used or leftover contents of consumer products that contain chemicals 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 hazardous waste include small quantities of normal household cleaning and maintenance products, latex and oil

based paint, cleaning solvents, gasoline, oils, swimming pool chemicals, pesticides, propane gas cylinders, etc.

The City Engineer will identify specific pickup locations or areas for HHW collection. The Contractor will not have to sort through rights-of-way debris piles looking for potential HHW materials. Residents will be instructed to place their HHW items in separate piles that will be easily identifiable or to take HHW materials to designated drop-off locations. This will allow citizens to return to their properties and bring debris and HHW to the rights-of-way as recovery progresses. The City Engineer will prescribe the specific procedures to be used after ascertaining the scope and nature of the disaster's impacts.

The general concept of HHW collection from TDSR sites will only be once a day for approximately 3 weeks or as directed by the City Engineer. The TDSR sites are located at U.S. Navy Waldron Field, U.S. Navy Cabaniss Field, and Corpus Christi International Airport.

- **Industrial/Commercial Hazardous Waste (ICHW) -** Material and products from institutional, commercial, recreational, industrial and agricultural sources that contain certain chemicals 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.

  The City Engineer will identify the location of certain commercial and industrial hazardous and toxic waste, low-level radiological wastes, biological, medical (including possibly infectious wastes) and animal carcass wastes, and petroleum and other wastes, including spills discovered upon City rights-of-way or City property. Once identified, the Contractor will be responsible for collection, characterization, packaging, transportation and disposal actions. All activities will be coordinated with the City Engineer before work begins.

7.3 General Concept of Operations

The City has developed the following general concept of operations for the Contractor. This concept may be modified upon an evaluation of the post-natural disaster situation.

The Contractor shall provide a two person management team on-site within 24 hours following Notice to Proceed to participate in recovery evaluation planning. The purpose is to initiate actions necessary to ensure that Contractor resources match the anticipated work load.

Contractor will establish a HTRW processing site at Elliott Landfill to be fully operational within 7 days from Notice to Proceed The processing site will be setup at the current HHW drop off site at Elliott Landfill. Contractor will coordinate with the City and Elliott Landfill personnel before setup commences. Elliott Landfill will be the only approved site for the Contractor to receive and process HTRW.

The City will implement a program of public information designed to assist the Contractor. The program will inform the public of the need to separate and place HHW at designated points (i.e., curbside and Elliott Landfill). The City will coordinate the public information program with the Contractor to facilitate the efficient segregation, marking, placement, and pick-up of the material to the maximum extend practical.

Collection priorities will be coordinated by the City Engineer. Emphasis will be placed on those materials posing an imminent threat to public health and safety.

The Contractor shall establish and implement a curbside collection program in consultation with the City Engineer as soon as public rights-of-way are cleared for traffic. Curbside collection shall occur at prescribed intervals as specified by the City Engineer.

The Contractor shall also establish and implement periodic collection of HTRW at the designated TDSR sites in coordination with the TDSR site Contractor and City Engineer.

The Contractor shall receive HHW brought to the Elliott Landfill site by private citizens.

The Contractor shall allow the City or FEMA monitors to oversee and assess the collection, characterization, packaging, transportation, and disposal of HTRW through monitoring and spot inspection of records and field activities.

The Contractor shall respond to spills and the release of other hazardous materials (ICHW) in public rights-of-way or other public property. Spill response will include the prevention of movement of materials into waterways or public rights-of-way, clean-up of spills and other releases, and the identification and notification to the City Engineer of spills which are beyond the response capabilities of the Contractor.

The Contractor may conduct such recycling of materials as may be agreed to between the City Engineer and the Contractor following a natural disaster, or such recycling as the Contractor feels it may be capable of accomplishing provided that the recycling effort does not retard the expeditious collection and disposal of HTRW from public rights-of-way and public property.

The Contractor shall maintain such records as to demonstrate lawful disposal of all materials as are required by law and specified herein. The Contractor shall also provide all such cost accounting information as may be required by the City to satisfy cost documentation for FEMA.

The Contractor shall cooperate with the clearing, hauling, and TDSR site Contractors in an efficient manner to facilitate the timely removal of HTRW from all City property and TDSR sites.

7.4 Mobilization and Crew Configurations

- **Mobilization and Initial Set Up:** Contractor shall mobilize with appropriate equipment and personnel to the current HHW drop off site at Elliott Landfill, Corpus Christi, TX within 24 hours of Notice to Proceed. The Elliott Landfill will be the primary facility for accepting, sorting, processing and recycling all HHW / ICHW materials. The site must be fully operational within 7 days of Notice to Proceed. Contractor must coordinate with the City Engineer prior to mobilization and setting up operations.

Administrative Crew: Administrative Crew shall include the following personnel and resources:

- Office trailer with communications and generator
- Two pickup trucks
- Four passenger cars
- Project Coordinator
- Field Project Manager,

- Administrative Assistant

The Administrative Crew shall be mobilized immediately following the notice to proceed and shall remain in place throughout the project. The Administrative Crew shall direct and coordinate the actions of the individual crew and task area managers.

- **Collection Site Management Crew:** The Collection Site Management Crew shall include the following personnel and resources:
  - Chemist
  - Field Project Supervisor
  - Health and Safety Specialist
  - Administrative Assistant
  - Office Trailer with communications and generator
  - Two pickup trucks
  - One passenger car

The Collection Site Management Crew will require personnel PPE. HHW recovery normally requires Level D protection, which includes breathable oversuit, eye protection, safety shoes, hardhat, and hand protection.

The Collection Site Management Crew shall coordinate and direct the activities of each of the HHW / ICHW Separation, Pickup and Packaging Crews.

- **Waste Separation Crew:** The HHW / ICHW Separation Crew shall include the following personnel and equipment:
  - Two Field HM Technicians
  - One pickup truck with communications

The Waste Separation Crew will require personnel PPE. HHW recovery normally requires Level D protection, which includes breathable oversuit, eye protection, safety shoes, hardhat, and hand protection.

The Waste Separation Crews will be responsible for initial identification of HHW / ICHW material deposited at the curb-side or on City property. They will not be required to dig through debris piles since citizens will be instructed to place their HHW in separate piles. Waste Separation Crews shall consolidate the items from individual homes at curbside locations on plastic and or in plastic bins to await pickup. The objective is for these crews to proceed through the areas of concern in order to stage a sufficient amount ofHHW to improve the efficiently of the HHW Pick-up Crews.

- **Waste Pick-up Crew:** The HHW / ICHW Pick-up Crew shall include the following personnel and equipment:
  - One pick-up truck with communications
  - One Field HM Technician

The Waste Pick-up Crew will require personnel PPE. HHW recovery normally requires Level D protection, which includes breathable oversuit, eye protection, safety shoes, hardhat, and hand protection. The Contractor's Safety Officer shall determine if P100 Dust Masks are required during collection operations.

The Waste Pick-up Crews shall pick-up the consolidated and prepackaged HHW and transport these items to the Elliott Landfill for segregation by hazardous class. The Waste Pick-up Crews shall be in communications with the HHW Separation Crew to allow for the coordination of the pick-up of full bins and re-supply of empty bins.

- **Waste Segregation Crew:** The Waste Segregation Crew shall include the following personnel and equipment:
  - Six Containment Area Technicians with communications

The Waste Segregation Crew will require personnel PPE. HHW recovery normally requires Level D protection, which includes breathable oversuit, eye protection, safety shoes, hardhat, and hand protection.

The Waste Segregation Crew shall segregate the HHW into hazardous classes as it is received from the Waste Pick-up Crews.

HTRW shall include, but is not limited to household hazardous waste (HHW) and certain industrial and commercial hazardous and toxic waste (ICHW) within the City rights-of way and property. Other HTRW may include biological, medical wastes (including potentially infectious wastes), animal carcass waste, and petroleum and other waste.

Based on the characterization of the waste, the waste shall be packaged following Federal, State, and USDOT requirements and applicable OSHA standards to protect personnel during packaging and handling operations. Any material requiring containerization shall be repackaged as necessary. The Waste Segregation Crew shall also insure that materials temporarily staged next to one another are compatible and shall not pose a health and safety hazard.

8.0 IMPLEMENTATION

8.1 Training and Qualifications of Personnel

Contractor will ensure that all personnel involved with this program are trained for the level of expertise required for the proper performance of task, in particular, in the areas of chemical incompatibility, spills, and general first aid procedures in accordance with 29CFR 1910.120.

The Contractor will provide personnel with both handling and personal protective equipment appropriate to ensure the safe handling of HTRW.

The Contractor shall be trained in the proper procedures for identifying and managing hazardous, biological, medical, and radiological wastes in accordance with applicable Federal and State regulations.

The Contractor will provide a two person management team to participate in an annual disaster preparedness training program of not more than two days at the Contractor's expense.

8.2 Safety and Spill Contingency Plans

- **Safety:** The Contractor is responsible for maintaining the appropriate safety requirements, depending upon the associated hazards, volume of traffic and weather conditions. All operations must be performed in a safe manner in accordance with State and Federal regulations. Contractor shall operate all vehicles and equipment in a safe and effective manner. Special attention must be paid to the operation of collection trucks in residential areas following a natural disaster to preclude injury to pedestrians, particularly children.

  The Contractor shall follow basic protection guidelines, which include but are not limited to the following:

  - Wearing of work uniform, safety glasses/chemical splash goggles and safety shoes.
  - Wearing of chemical resistant gloves; Tyvek coveralls/apron will be required when handling waste materials.
  - Lab packaging of HTRW will require the appropriate level of protective gear, with the addition of a protective over suit.
  - Ensuring that an individual air-purifying respirator, equipped with organic vapor/acid gas/high efficiency combination cartridges, is available within reach of al personnel who are opening any containers.
  - Segregation and packaging of liquid waste will require Tyvek coveralls/apron, chemical resistant gloves and boots. Additionally, respirator protection and chemical goggles/face shield (if not using a full-face respirator) may be required.
  - Development, adherence to, enforcement of, and maintenance of a site safety plan consistent with current OSHA requirements in 29CFR.
  - Ensuring that all personnel involved in HTRW operations are properly trained (HAZWOPER, etc.) and certified consistent with current OSHA requirements in 29CFR.

- **Spill Contingency Plan During Collection Operations:** The Contractor is responsible for coordination of collection activities with emergency services and fire departments. A list of these agencies and service will be maintained at the facility and will consist of, but not be limited to the following:

  - Phone number and address of TCEQ
  - Ambulance and rescue services
  - Fire and police departments
  - Directions to the appropriate hospital

- **Emergency response guidelines include, but are not limited to the following**:

  Worker Related Emergency:

  - The Contractor shall render minor first aid in situations of injury and exposure.
  - The Contractor shall maintain a first aid kit with sufficient supplies to care for minor injuries and exposure.

- The Contractor shall provide an on-site personal eyewash station.
- In situation of inhalation of toxic compound, the individual(s) must be removed to fresh air and transported to an emergency medical facility. Other personnel will be evacuated as necessary. If transportation/evacuation by the Contractor is not feasible, personnel will continue first aid treatment until medical personnel arrive.
- The Contractor shall have the equipment necessary to evaluate potentially radioactive materials.

Waste Related Safety:

- Waste related incidents include, but are not limited to: splashes, spills, fires, explosions, chemical reactions or releases of toxic gases or vapors, and radiation.
- In a waste related emergency situation, the Contractor is responsible for assessing the situation and will initiate the appropriate action.
- The Contractor shall maintain on-site emergency spill response equipment including Class AFC dry chemical fire extinguishers, absorbent and shovels.
- Where appropriate, the Contractor shall restrict public access to the collection areas as deemed necessary.
- Collection areas shall be designated non-smoking and shall be posted with "No-Smoking" signs.
- Notification of State and local emergency agencies is the responsibility of the Contractor.

8.3 Generator Status and Acceptance of Disposal

The City will be deemed to be the "generator' for the purposes of Texas and Federal laws, rules, and regulations. The Contractor will be responsible for complying with all applicable local, State, and Federal laws, rules, and regulations form the time the materials are picked up or accepted from others by the Contractor until the materials are accepted at the final disposal site(s).

The Contractor shall ensure that all materials accepted for disposal are accepted at the final disposal site(s).

The Contractor shall provide evidence of the lawful disposal of all materials in accordance with Federal and State regulations.

8.4 Indemnification and Hold Harmless

The Contractor shall indemnify, hold harmless, and defend the City, its officers, employees, and agents (Indemnities) against any and all claims and causes of action of whatever character which may arise out of the performance of the Contract, including, but not limited to such claims and causes of action which may be alleged on the account of the Indemnities negligence or the negligence of the Indemnities employees, agents or servants.

8.5 General Rules Governing personnel Handling HTRW

Eating, drinking and smoking are strictly prohibited at active work locations.

All atmosphere supplied respiratory devices must meet at least the requirements of the specifications for Grade D breathing air as described in the Compressed Gas Association Commodity Specification G-7.1-1966.

If evacuation is necessary, the Contractor shall ensure that:

- All on-site personnel and program customers are alerted.
- All personnel, volunteers and customers are evacuated to a pre-designated area.
- A count will be made of all personnel.

No person may be assigned to a task that requires the use of respiratory protection, until they are trained and determined to be physically capable of using such devices. This determination will be made by a physician.

Beards, facial hair and sideburns (which may interfere with respirator sealing) are prohibited for all personnel using respiratory protection, including Contractor, City staff, visitors, volunteers, State and Federal representatives.

Parking of non-essential vehicles outside of the designated parking area at Elliott Landfill is prohibited.

The Contractor will have the authority to remove anyone form the collection site and prohibit their re-entry if the Contractor determined that the person threatens site safety and/or security.

Materials shall be identified to the degree necessary to prevent the mixing of substances that would create a health or safety problem due to ignition, fumes or explosion.

All personnel shall observe the City's (and Contractor's) drug and alcohol policies.

8.6 Site and Operational Security

Elliott Landfill will be the primary facility for accepting, storing, processing, and recycling of HTRW. This facility shall be secured daily at closing by locking all samples, packaged chemicals, site materials, emergency equipment, etc., in the appropriate storage buildings.

Any storage building or transport trailer containing collected wastes must be appropriately marked to discourage tampering.

8.7 Identification, Testing and Processing Procedures

- **Waste Determination and Identification:**
    - The Contractor shall work in conjunction with the City Engineer in assessing the volumes, types, and locations of HTRW located within the City following a hurricane or other natural disaster.
    - The Contractor shall, where possible, adequately classify and segregate waste for proper packaging, transportation, and disposal.
    - The Contractor shall test waste or have it tested to the extent necessary or practical for packaging and transport according to United Stated Department of Transportation (USDOT) hazard classes and disposal requirements. The Contractor will provide equipment for use on-site that will be used to identify or categorize waste for disposal.

8.8 Collection

- **General Collection Procedures:**
  - The Contractor shall be responsible for responding to the collection requirements based on priorities established by the City Engineer.
  - The Contractor shall be responsible for collection debris from the curbside, City rights-of-way, and all TDSR sites. HTRW will only be removed from private property when there is a significant threat to human health and safety and the Contractor is notified in writing by the City Engineer and or his representative.
  - The Contractor shall complete interim measures to contain and abate HTRW that may spread and cause additional hazards for the City.
  - The Contractor shall collect HTRW only during daylight hours.
  - The Contractor shall make a minimum of three passes over the City in conjunction with the debris hauling Contractor to be completed at the following intervals unless directed otherwise by the City Engineer.

    Initial Pass: Within 72 hours of being notified by the City Engineer that a street, block or section of the city is cleared.

    Second Pass: Not more than one week later or as directed by the City Engineer.

    Third Pass: Not more than three weeks after the second pass or as directed by the City Engineer.

    TDSR Sites: The Contractor shall make daily passes to each of the designated TDSR sites for collection of HTRW or as directed by the City Engineer.
  - Prior to deployment, all vehicles are to be equipped with the proper operation and safety equipment as specified in the U.S. Army Corps of Engineers (ASA) Safety and Health Requirements Manual (October 1992)
  - The Contractor shall provide for communications with all vehicles during daily operations.
  - The Contractor's services shall also include emergency spill response.
  - During curbside pick-up of HHW, the Contractor shall consolidate packages without opening into lab packs or over-packs. Bulking or mixing of materials will not be allowed at curbside.

- **Provision for Shipping Containers**

The Contractor shall provide containers and packaging for shipping hazardous wastes that meet transportation and disposal requirements and applicable State and Federal requirement. Shipping containers shall, to the maximum extend possible, conform to the container sizes listed in the pricing portion of this contract.

- **Other Pre-shipment Tasks**

The Contractor shall utilize an inventory control system that ensures proper record keeping and manifesting of hazardous waste shipments. Preparation of waste for shipment must be in accordance with applicable USDOT regulations regarding packaging, labeling, marking, and display of placards.

8.9 Transportation to Temporary Site

The City will provide a location at Elliott Landfill for the temporary storage, segregation, and recycling of HTRW.

The Contractor shall establish procedures for the transportation to and from the Elliott Landfill in accordance with all applicable Federal requirements concerning the transportation of HTRW. Such procedures shall be designed to ensure that prevention of loss of material and the efficient movement of material to the temporary site.

8.10 Additional Testing

The Contractor shall conduct additional testing of materials only at Elliott Landfill for appropriately classifying, segregation, packaging, transporting, and disposing of HTRW. Such additional testing shall be designed to ensure that incompatible materials are not commingled, ensure the efficient packaging of similar materials, and provide information necessary to select appropriate disposal site.

8.11 Batch Processing

Batch processing of materials will be allowed by the Contractor in the interest of time and cost-effectiveness. As a matter of public safety, batch processing will be allowed only at Elliott Landfill. Batch processing at any other location is prohibited. In cases where batch processing is undertaken, the Contractor will characterize the materials, record the nature of the materials, and segregate by grouping materials of the same hazard characteristics.

8.12 Preparation of Material for Transport

The Contractor shall supply all necessary technical personnel, labor, equipment, and materials to properly collect, categorize, package, mark, label, and load for transport all HTRW located.

The Contractor shall, to the extent practical, segregate HTRW. Following receipt of the waste, the Contractor's chemist will check each container for proper labeling and identification. If the container is properly identified, the material will be segregated according to hazard class and prepared for packaging.

Once chemicals are properly identified, the Contractor shall recheck the chemicals for compatibility, list the contents on the drum container sheets, and pack the chemicals into drums or other appropriate containers.

All drums and other containers will be packed by the Contractor according to EPA and USDOT guidelines for proper transportation, storage, and disposal of hazardous waste. All bottles, bags, or boxes received must be closed and placed in a drum bound with a steel band and bolt or placed in a drum or other acceptable container that is sealed. The drum or container must be filled with light weight, inert absorbent, sufficient to contain the entire volume of waste. USDOT shipping information, hazard labels, EPA codes, and a packing slip will be placed on the drum. The drums will then be given a specific Contractor code number.

The Contractor shall place the properly packaged, labeled and manifested drums in a trailer, or other sealed container, for storage prior to transportation to a licensed storage facility. The load will be transported in fully permitted trucks, rail cars or other authorized vehicles. The ultimate disposal of the hazardous waste will take place at

federally permitted hazardous waste sites previously identified to, and approved by, the City Engineer.

8.13 Disposal

All HTRW materials shall be transported in EPA-compliant vessels or vehicles.

All HTRW materials shall be transported in accordance with applicable TXDOT and USDOT regulations.

All HTRW materials shall be disposed of lawfully in a Federal/State permitted facility.

All HTRW materials shall be disposed of in accordance with applicable Federal and State regulations.

The Contractor shall provide the City Engineer with the name, location, and facility permit number of all disposal facilities prior to the shipment of any HTRW.

8.14 Manifests and Destruction Documentation Record Keeping

The Contractor shall provide certificates of disposal showing container numbers for all waste and methods of disposal. Copies of all manifests must be provided to the City Engineer.

Copies of certificates of destruction for all wastes taken from within the City under this contract will be provided to the City Engineer in a timely manner.

8.15 Contractor Created Spill Control and Response

The Contractor is completely responsible for the clean-up and any associated costs of any spill as a result of its activities as the pick-up site, at Elliott Landfill, during transportation or at the disposal facility. Provisions will be made according to the requirements of the Contractor Spill Contingency Plan as specified in paragraph 6B above. The Contractor will clean-up spills in accordance with State and Federal regulations and verify that the clean-up meets applicable standards. The City reserves the right to verify costs and quantity of such clean-up required of the Contractor in performing tasks under the terms and conditions of this Contract.

9.0 ACCEPTANCE OF WORK

The Contractor shall comply with State and Federal regulations concerning HTRW collection programs.

The Contractor's representative must attend a daily coordination meeting with the City Engineer or designated representative.

The Contractor's representative must have the authority to act on behalf of the Contractor to address and resolve issues that may arise during the course of this work.

In order to track progress in removing storm generated HTRW, the Contractor shall submit a daily report in writing to the City detailing progress in collecting and disposing of HTRW. Report shall be submitted at the daily coordination meeting and include the following information:

- Areas of the City where HTRW has been collected
- To the maximum extent practical, an itemized list of total waste quantities collected, transported, and disposed. This list will be separated by category (HHW or ICHW).

- A description of any areas of concern or potential difficulties in performing such programs in the future including recommendations for modification to the collection procedures.
- Letters or Certificates of Disposal demonstrating proper disposal of hazardous waste.

The Contractor(s) shall also notify the City Engineer of any significant damage to public or private property or major problems, such as equipment failure or loss of qualified labor.

10.0 ADDITIONAL REQUIREMENTS

The Contractor shall allow the City staff and/or its agent to visit and inspect the collection activities, storage, processing site (i.e., Elliott Landfill) and all disposal facilities at any time.

The Contractor shall state its compliance with all applicable rules and regulations of Federal, State, and local governing entities.

The Contractor shall submit a report detailing the breakdown of costs of supplies, collection, transportation and disposal. The report shall be filed within thirty (30) days of completing the disposal process for any and all wastes accepted during the collection event. The Contractor shall submit all cost accounting data which may be required by the City and FEMA related to this contract.

11.0 FEES AND PAYMENT

Invoices shall be submitted in accordance with the unit prices and disposal requirements specified in the Contract. Any special requirements generating the need for additional fees must be approved by the City Engineer prior to such expenditure.

Ten percent (10%) of the total Contract amount for any given collection event will be retained by the City until the satisfactory completion of all waste disposal activities, including the receipt by the City Engineer of the reports specified above. The Contractor shall provide all documents pertaining to the disposition of all HTRW including but not limited to shipping manifests, bills of lading, disposal certificates, certificates of destruction, certificates of recycling, land ban forms and waste characterization forms. Within thirty (30) days of receipt of this information, the City will pay the full retained amount for the given collection event. If, however, any questions arise as to the disposition of any waste, the City will withhold payment until the questions are resolved as specified in the proposal.

12.0 CONTRACTOR PERFORMANCE REVIES

During the course of a post-natural disaster emergency response, the City will periodically review the performance of the Contractor with regard to timeliness, efficiency, effectiveness of reporting and daily communications, safety, billing, and overall performance. A final performance review will take place between thirty (3) and sixty (60) days following the end of the contract term.

Both parties will be given the opportunity to address specification conformance, market conditions, and other factors affecting HTRW collection and disposal

END OF SECTION

PRICE PROPOSAL FORM

COLLECTION, CHARACTERIZATION, PACKAGING, TRANSPORTATION AND DISPOSAL OF HAZARDOUS WASTE DURING POST-HURRICANE/DISASTER RECOVERY OPERATIONS

BID SUMMARY

HOUSEHOLD HAZARDOUS WASTE AND INDUSTRIAL/COMMERCIAL HAZARDOUS WASTE MOBILIZATION AND CREW REQUIREMENTS BID SCHEDULE			
Bid Item	**Description**	**Unit of Issue**	**Unit Price**
01	**Mobilization and Initial Set Up** *See Footnote 1.*	**One Time Cost**	
02	**Administrative Crew** *See Footnote 2*	**Per Day Per Crew**	
03	**Collection Site Management Crew** *See Footnote 3*	**Per Day Per Crew**	
04	**HHW / ICHW Separation Crew** *See Footnote 4*	**Per Day Per Crew**	
05	**HHW / ICHW Pick-up Crew** *See Footnote 5*	**Per Day Per Crew**	
06	**HHW / ICHW Segregation Crew** *See Footnote 6*	**Per Day Per Crew**	
		SUB TOTAL	

HOUSEHOLD HAZARDOUS WASTE AND INDUSTRIAL/COMMERCIAL HAZARDOUS LIQUID AND DRY HAZARDOUS WASTES BID SCHEDULE				
Bid Item	**Description**	**Disposal Method**	**Unit of Issue**	**Unit Price**
07	**55- Gallon Drum**	**Incineration**	**each**	
08	**55- Gallon Drum**	**Injection**	**each**	
09	**85- Gallon Drum**	**Incineration**	**each**	
010	**85-Gallon Drum**	**Injection**	**each**	
011	**Vacuum Truck (2,800 Gallon Capacity)**	**Injection**	**each**	
012	**Vacuum Truck (2,800 Gallon Capacity)**	**Recycle Oil**	**each**	
013	**Vacuum Truck (2,800 Gallon Capacity)**	**Incineration**	**each**	
014	**20 CY Roll Off Box (10,000 lbs/box)**	**Landfill**	**each**	
	See Footnote 7			
	See Footnote 9		**SUB TOTAL**	

HOUSEHOLD HAZARDOUS WASTE AND INDUSTRIAL/COMMERCIAL HAZARDOUS WASTE CLEANUP MATERIALS BID SCHEDULE

Bid Item	Description	Unit of Issue	Unit Price
015	5" x 10' Absorbent Boom - Petroleum	each	
016	8" x 10' Absorbent Boom - Petroleum	each	
017	3" x 12' Absorbent Boom - Universal	each	
018	Absorbent Pads Bundle - Petroleum	each	
019	Absorbent Pads Bundle - Universal	each	
020	Absorbent Clay Bag	bag	
021	Oil Dry	bag	
022	Peat Moss	bag	
023	Vermiculite	bag	
024	Soda Ash Bag	bag	
025	4 Mil 20 x 100 Polyethylene	roll	
026	6 Mil 20 x 100 Polyethylene	roll	
027	Duct Tape	roll	
028	55- Gallon Drums	each	
029	55- Gallon Drum Liners 10 Mil	each	
030	Fiber Drums	each	
031	30- Gallon Overpack	each	
032	95- Gallon Poly Overpack	each	
033	DOT Hazardous Waste Labels	each	
034	Fire Extinguisher	each	
035	Caution/Hazard Tape	roll	
036	Respirator Wipes	box	
037	Kappler Tape	roll	
	See Footnote 8		
	See Footnote 9	SUB TOTAL	

COLLECTION, CHARACTERIZATION, PACKAGING, TRANSPORTATION AND DISPOSAL OF HAZARDOUS WASTE DURING POST-HURRICANE/DISASTER RECOVERY OPERATIONS

	SUB TOTAL UNIT PRICE
Mobilization and Crew Requirements Bid Schedule	
Hazardous Liquid and Dry Hazardous Wastes Bid Schedule	
Hazardous Waste Cleanup Materials Bid Schedule	
BID GRAND TOTAL	

FOOTNOTES:

1. **Mobilization and Initial Set Up:** Contractor shall mobilize with appropriate equipment and personnel to the current HHW drop off site at Elliott Landfill, Corpus Christi, TX within 24

hours of Notice to Proceed. The Elliott Landfill will be the primary facility for accepting, sorting, processing and recycling all HHW / ICHW materials. The site must be fully operational within 7 days of Notice to Proceed. Contractor must coordinate with the City Engineer prior to mobilization and setting up operations.

2. **Administrative Crew:** Administrative Crew shall include the following personnel and resources:
    - Office trailer with communications and generator
    - Two pickup trucks
    - Four passenger cars
    - Project Coordinator
    - Field Project Manager,
    - Administrative Assistant

    The Administrative Crew shall be mobilized immediately following the notice to proceed and shall remain in place throughout the project. The Administrative Crew shall direct and coordinate the actions of the individual crew and task area managers.

3. **Collection Site Management Crew:** The Collection Site Management Crew shall include the following personnel and resources:
    - Chemist
    - Field Project Supervisor
    - Health and Safety Specialist
    - Administrative Assistant
    - Office Trailer with communications and generator
    - Two pickup trucks
    - One passenger car

    The Collection Site Management Crew will require personnel PPE. HHW recovery normally requires Level D protection, which includes breathable oversuit, eye protection, safety shoes, hardhat, and hand protection.

    The Collection Site Management Crew shall coordinate and direct the activities of each of the HHW / ICHW Separation, Pickup and Packaging Crews.

4. **Waste Separation Crew:** The HHW / ICHW Separation Crew shall include the following personnel and equipment:
    - Two Field HM Technicians
    - One pickup truck with communications

    The Waste Separation Crew will require personnel PPE. HHW recovery normally requires Level D protection, which includes breathable oversuit, eye protection, safety shoes, hardhat, and hand protection.

    The Waste Separation Crews will be responsible for initial identification of HHW / ICHW material deposited at the curb-side or on City property. They will not be required to dig through debris piles since citizens will be instructed to place their HHW in separate piles. Waste Separation Crews shall consolidate the items from individual homes at curbside locations on plastic and or in plastic bins to await pickup. The objective is for

these crews to proceed through the areas of concern in order to stage a sufficient amount o HHW to improve the efficiently of the HHW Pick-up Crews.

5. **Waste Pick-up Crew:** The HHW / ICHW Pick-up Crew shall include the following personnel and equipment:
    - One pick-up truck with communications
    - One Field HM Technician

    The Waste Pick-up Crew will require personnel PPE. HHW recovery normally requires Level D protection, which includes breathable oversuit, eye protection, safety shoes, hardhat, and hand protection. The Contractor's Safety Officer shall determine if P100 Dust Masks are required during collection operations.

    The Waste Pick-up Crews shall pick-up the consolidated and prepackaged HHW and transport these items to the Elliott Landfill for segregation by hazardous class. The Waste Pick-up Crews shall be in communications with the HHW Separation Crew to allow for the coordination of the pick-up of full bins and re-supply of empty bins.

6. **Waste Segregation Crew:** The Waste Segregation Crew shall include the following personnel and equipment:
    - Six Contain Area Technicians with communications

    The Waste Segregation Crew will require personnel PPE. HHW recovery normally requires Level D protection, which includes breathable oversuit, eye protection, safety shoes, hardhat, and hand protection.

    The Waste Segregation Crew shall segregate the HHW into hazardous classes as it is received from the Waste Pick-up Crews.

    HTRW shall include, but is not limited to household hazardous waste (HHS) and certain industrial and commercial hazardous and toxic waste (ICHW) within the City rights-of way and property. Other HTRW may include biological, medical wastes (including potentially infectious wastes), animal carcass waste, and petroleum and other waste.

    Based on the characterization of the waste, the waste shall be packaged following Federal, State, and USDOT requirements and applicable OSHA standards to protect personnel during packaging and handling operations. Any material requiring containerization shall be repackaged as necessary. The Waste Segregation Crew shall also insure that materials temporarily staged next to one another are compatible and shall not pose a health and safety hazard.

7. **Capacities:** Vacuum truck capacity is defined as approximately 2,800 gallons or 50 barrels. Roll off box capacity is defined as approximately 10,000 pounds or 20 cubic yards.

8. **Packaging Materials:** Size and quantity of containers for packaging HHW / ICHW shall depend on the size and quantity required to package the waste collected and shall be charged at the rate as described in the Cleanup Material Bid Schedule

9. **Other Services:** The Contractor may add other line items in any block for services he/she feels should be identified individually but those prices are not to be extended into the Bid Grand Total column, and will not be considered for bid evaluation purposes. Submit on a separate sheet.

The undersigned hereby declares that he/she has visited the site and has carefully examined the Contract Provisions, Specifications, and Forms of Contracts and Bonds (Exhibit G) and contract documents relating to the work covered by his/her bid or bids, that he/she agrees to do the work, and that no representations made by the County are in any sense a warranty but are mere estimates for the guidance of the Contractor.

Upon notification of award of contract, we will execute the formal contract within ten (10) calendar days. Upon receipt of written work order (Notice to Proceed), we will submit performance and payment bonds within 72 hours. The bid bond attached, in the amount of 5% of the highest amount bid, is to become the property of the City of Corpus Christi in the event the contract and bonds are not executed within the time set forth as liquidated damages for the delay and additional work caused thereby.

Minority/Minority Business Enterprise Participation: The apparent low bidder shall, within 2 days (5 days for Contractors outside Nueces County) of receipt of bids, submit to the City Engineer, in writing, the names and addresses of MBE firms participating in the contract and a description of the work to be performed and its dollar value for bid evaluation purposes.

Number of Signed Sets of Documents: The contract and all bonds will be prepared in one (1) original and four (4) counterpart (original signed) sets.

Time of Completion: The undersigned agrees to complete the work within 180 days from the date designated by a work order (Notice to Proceed).

The undersigned further declares that he/she will provide all necessary labor, personnel, tools and apparatus, do all the work and furnish all materials and do every thing required to carry out the above mentioned work covered by this proposal, in strict accordance with the contract documents and the requirements pertaining thereto, for the sum or sums above set forth.

Receipt of the following addenda is acknowledged (addenda number) _____

Respectfully submitted:

Name:_____

By:_____

SEAL
(If Bidder is a Corporation)

Address:_____

_____

Telephone:_____

NOTE: Do not detach bid from other papers.
Fill in all items and submit completed form with attached papers.

TAB H

MUTUAL AID AGREEMENTS

MUTUAL AID AGREEMENTS

The Project Team recommends that the counties and cities review FEMA Policy Number 9523.6 Mutual Aid Agreements for Public Assistance before entering into any mutual aid agreements. An extract of the policy is shown below. The complete policy may be reviewed at the FEMA web site: **http://www.fema.gov/rrr/pa/9523_6.shtm**.

FEMA Response and Recovery Policy Number: 9523.6

Title: Mutual Aid Agreements for Public Assistance

Purpose: This policy specifies criteria by which the Federal Emergency Management Agency (FEMA) will recognize the eligibility of costs under the Public Assistance Program incurred through mutual aid agreements between applicants and other entities.

Scope and Audience: This policy is applicable to all major disasters and emergencies declared on or after the publication date of this policy. This policy is intended for personnel involved in the administration of the Public Assistance Program. This policy applies to emergency work authorized under Sections 403, 407, and 502 of the Stafford Act.

Background: Many State and local governments and Private Nonprofit organizations formulate mutual aid agreements to provide emergency assistance to each other in the event of disasters or other crises. The conditions of the agreements may be to provide reciprocal services or to receive direct payment through specific labor and equipment rates outlined in the agreements. These agreements usually are written but, occasionally, are by understanding or are arranged after a disaster occurs. This policy addresses both written and unwritten mutual aid agreements.

Policy:

Written Mutual Aid Agreements. FEMA will reimburse mutual aid agreement costs associated with emergency assistance provided all of the following conditions are met:

- The assistance requested by the applicant is directly related to the disaster and is eligible for FEMA assistance.
- The mutual aid agreement is in written form and signed by authorized officials of the agreeing parties prior to the disaster.
- The mutual aid agreement applies uniformly in emergency situations. The agreement must not be contingent upon a declaration of a major disaster or emergency by the Federal government or on receiving Federal funds.
- The providing entity may not request or receive grant funds directly. Only the eligible applicant receiving the aid may request grant assistance.
- Upon request, the applicant must be able to provide FEMA with documentation that the services were requested.
- Upon request, the applicant must be able to provide FEMA with documentation of services received and costs incurred.

Reimbursement under Provisions of Written Mutual Aid Agreements:

The agreement is treated as a contract; therefore, the labor and equipment rates outlined in the agreement are acceptable provided they are reasonable in terms and costs.

The labor force of the providing entity is considered contract labor. Therefore, straight time for the force account labor of the providing entity is an eligible expense. Straight time for the force account labor of the receiving entity is not an eligible expense and remains limited by 44 CFR 206.228(a) (4).

If the providing entity is staffed with volunteer labor, the value of the volunteer labor may be credited to the non-Federal cost share in accordance with the provisions of the Donated Resources policy (#9525.2).

If the agreement provides for an initial period of unpaid assistance before the receiving entity reimburses the providing entity, assistance during that period may be credited to the non-Federal cost share under the provisions of the Donated Resources policy (#9525.2).

If the agreement states that there is no cost to the applicant receiving the emergency assistance, assistance may be credited to the non-Federal cost share under the provisions of the Donated Resources policy (#9525.2).

Reimbursement without an Existing Written Mutual Aid Agreement. There are no provisions for reimbursement for mutual aid when there is no formal written agreement.

Permanent Work. Long-term use of these agreements is not expected. Temporary modification of the terms in the agreement to increase rate costs for work beyond emergency assistance, such as permanent repairs, will not be recognized by FEMA. Applicants must advertise and award competitive bid contracts for permanent repairs.

Additional Requirements and Exceptions:

FEMA recognizes only mutual aid agreements that are between governments or PNPs in separate areas. FEMA does not recognize "mutual aid agreements" between agencies, departments, or entities of the same town, county or State government. For example, a Public Works Department cannot arrange to be reimbursed for force account regular time in an emergency by developing a "mutual aid agreement" with the Water Department.

When there is a jurisdictional overlap, such as a county and city, with a long-standing practice that each entity helps the other without reimbursement, limitations on eligibility of force account labor under 44 CFR 206.228(a)(4) applies to both entities. Normal procedures prevail.

There may be times when a providing entity is also an eligible applicant in its own right. When this occurs, there may be differences in eligible costs in the two capacities. For example, provisions governing mutual aid agreements are different from the Public Assistance Program reimbursement provisions for eligible applicants using their own

resources to meet emergencies in their own jurisdictions. Appropriate records would be needed to support any claims made.

Participants in mutual aid agreements may not mutually redirect their forces to assist other political entities in such a way as to circumvent the limitations of 44 CFR 206.228(a)(4).

H-GAC also has an Attorney General's Regional Mutual Aid Agreement template that is being reviewed by the County Emergency Management Coordinators. Point of contact at H-GAC headquarters is Sanita Alrey, Public Services, Phone 713-933-2462, e-mail: salrey@hgac.cog.tx.us.

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Policy:

Written Mutual Aid Agreements. FEMA will reimburse mutual aid agreement costs associated with emergency assistance provided all of the following conditions are met:

- The assistance requested by the applicant is directly related to the disaster and is eligible for FEMA assistance.
- The mutual aid agreement is in written form and signed by authorized officials of the agreeing parties prior to the disaster.
- The mutual aid agreement applies uniformly in emergency situations. The agreement must not be contingent upon a declaration of a major disaster or emergency by the Federal government or on receiving Federal funds.
- The providing entity may not request or receive grant funds directly. Only the eligible applicant receiving the aid may request grant assistance.
- Upon request, the applicant must be able to provide FEMA with documentation that the services were requested.
- Upon request, the applicant must be able to provide FEMA with documentation of services received and costs incurred.

Reimbursement under Provisions of Written Mutual Aid Agreements:

The agreement is treated as a contract; therefore, the labor and equipment rates outlined in the agreement are acceptable provided they are reasonable in terms and costs.

The labor force of the providing entity is considered contract labor. Therefore, straight time for the force account labor of the providing entity is an eligible expense. Straight time for the force account labor of the receiving entity is not an eligible expense and remains limited by 44 CFR 206.228(a) (4).

If the providing entity is staffed with volunteer labor, the value of the volunteer labor may be credited to the non-Federal cost share in accordance with the provisions of the Donated Resources policy (#9525.2).

If the agreement provides for an initial period of unpaid assistance before the receiving entity reimburses the providing entity, assistance during that period may be credited to the non-Federal cost share under the provisions of the Donated Resources policy (#9525.2).

If the agreement states that there is no cost to the applicant receiving the emergency assistance, assistance may be credited to the non-Federal cost share under the provisions of the Donated Resources policy (#9525.2).

Reimbursement without an Existing Written Mutual Aid Agreement. There are no provisions for reimbursement for mutual aid when there is no formal written agreement.

Permanent Work. Long-term use of these agreements is not expected. Temporary modification of the terms in the agreement to increase rate costs for work beyond emergency assistance, such as permanent repairs, will not be recognized by FEMA. Applicants must advertise and award competitive bid contracts for permanent repairs.

Additional Requirements and Exceptions:

FEMA recognizes only mutual aid agreements that are between governments or PNPs in separate areas. FEMA does not recognize "mutual aid agreements" between agencies, departments, or entities of the same town, county or State government. For example, a Public Works Department cannot arrange to be reimbursed for force account regular time in an emergency by developing a "mutual aid agreement" with the Water Department.

When there is a jurisdictional overlap, such as a county and city, with a long-standing practice that each entity helps the other without reimbursement, limitations on eligibility of force account labor under 44 CFR 206.228(a)(4) applies to both entities. Normal procedures prevail.

There may be times when a providing entity is also an eligible applicant in its own right. When this occurs, there may be differences in eligible costs in the two capacities. For example, provisions governing mutual aid agreements are different from the Public Assistance Program reimbursement provisions for eligible applicants using their own

resources to meet emergencies in their own jurisdictions. Appropriate records would be needed to support any claims made.

Participants in mutual aid agreements may not mutually redirect their forces to assist other political entities in such a way as to circumvent the limitations of 44 CFR 206.228(a)(4).

H-GAC also has an Attorney General's Regional Mutual Aid Agreement template that is being reviewed by the County Emergency Management Coordinators. Point of contact at H-GAC headquarters is Sanita Alrey, Public Services, Phone 713-933-2462, e-mail: salrey@hgac.cog.tx.us.

TAB I

FEDERAL AID HIGHWAYS

FEDERAL AID HIGHWAYS

The Project Team recommends that each county and city identify those roads that are identified on the Federal Aid System. The costs associated with debris clearing, removal, and disposal from Federal Aid System roads may not be reimbursable under the FEMA Public Assistance Program if the Federal Highway Administration activates its Emergency Relief Program.

The Federal Highway Administration (FHWA) can initiate its Emergency Relief Program after a disaster that covers the following:

- When damages to Federal Aid System roads exceed $500,000, FHWA can provide up to $100 million per State, per event.
- Funding can also be provided to roads on Federal facilities.
- Emergency work (including debris removal) can begin immediately after the event and does not require pre-approval of FHWA.
- Funding goes to State DOT, not to local governments; therefore, check with the State DOT to determine if funding has been provided.
- FHWA may provide funding for damage to Federal Aid System roads as a result of emergency operations, which includes debris hauling.

For further information, look at the Emergency Relief Manual for Federal-Aid Roads, which can be downloaded from: www.fhwa.dot.gov/reports/erm/index.htm.

TAB J

RIGHT-OF-ENTRY PERMIT

RIGHT-OF-ENTRY PERMIT

The Project Team recommends that each county and city develop Right-of-Entry Permits. The form shown below is a sample that also includes a hold-harmless and an insurance clause if Federal funds are used for debris removal from private property. Have your legal department review the permit and clauses to ensure compliance with local laws.

SAMPLE RIGHT-OF-ENTRY PERMIT (INCLUDES HOLD HARMLESS AND INSURANCE CLAUSES)

Right-of-Entry Permit Number: _____

_____

Property Address/Description

_____

City Name (Owner or Tenant)

_____

County Date

Right of Entry

I certify that I am the owner, or an owner's authorized agent, of the property described above. I grant, freely and without coercion, the right of access and entry to said property to the (eligible applicant), its agents, contractors, and subcontractors, for the purpose of demolishing, removing and/or clearing any or all storm-generated debris of whatever nature from the above-described property.

Hold Harmless

I understand that this permit is not an obligation upon the government to perform debris removal. I agree to hold harmless the United States Government, the Federal Emergency Management Agency (FEMA), the State of (_____), and any of their agencies, agents, contractors, and subcontractors, for damages of any type whatsoever, either to the above-described property or to persons situated thereon. I release, discharge, and waive any action, either legal or equitable, that might arise by reason of any action of the above entities, while removing storm-generated debris from the property. I will mark any sewer lines, septic tanks, water lines, and utilities located on the described property.

Duplication of Benefits

Most homeowner's insurance policies have coverage to pay for removal of storm-generated debris. I understand that Federal law (42 United States Code 5155 et seq.) requires me to reimburse (eligible applicant) the cost of removing the storm-generated debris to the extent covered in my insurance policy. I also understand that I must provide a copy of the proof/statement of loss from my insurance company to (eligible applicant). If I have received payment, or when I receive payment, for debris removal from my insurance company, or any other source, I agree to notify and send payment and proof/statement of loss to (eligible applicant). I understand that all disaster-related funding, including that for debris removal from private property, is subject to audit.

Sworn and attested: **Witnessed**:

All owners must sign below.

Print Name_____ Print Name_____

Signature _____ Signature _____

Name of Insurance Company_____ Policy Number: _____

Please do not remove the following items: _____

TAB K

DEBRIS MANAGEMENT WORKSHOPS

DEBRIS MANAGEMENT WORKSHOPS

The Project Team recommends that the following training workshops be developed and presented throughout the H-GAC region. Preparedness for effective disaster response will require training in procedures, organizational structure, and documentation. Training should include the following:

- *Debris Contract Monitoring Workshop:* This training will be developed and presented to selected City department personnel identified to monitor debris removal and disposal contractors. The purpose of the training will be to ensure that contractors hired to provide debris-clearing, removal, and disposal operations following a major disaster are properly monitored to ensure compliance with the contract documentation and to meet Federal guidelines for possible reimbursement. Training should take approximately 8 hours, and class size should be limited to 30 students.

- *FEMA Documentation Workshop:* This training will be developed and presented to selected City department financial resource personnel responsible for the collection and documentation of force account labor and equipment usage following a major debris generating event. The purpose of the training will be to ensure that students are knowledgeable on FEMA eligibility requirements and how to properly document and complete FEMA forms to ensure compliance with the Federal guidelines for possible reimbursement. Training should take approximately 8 hours, and class size should be limited to 30 students.

- *Financial Workshop*: This training will be developed and presented to city and county staff to discuss information that is critical to minimizing the financial impact to a local community due to a storm event. This training will include discussions regarding the procurement of propositioned contracts for collection, transportation, and disposal. The training will also include information regarding other steps that can be taken from a financial planning perspective, such as the savings of reserve funding and development of enterprise funds. Training should take approximately 8 hours, and class size should be limited to 30 students.

- *Debris Management Plan Development Workshop:* This training will be developed and presented to selected county and city personnel responsible for developing a coordinated Debris Management Plan. This is a modification of the FEMA Debris Management Course that is offered by FEMA at the Emergency Management Institute, Emmitsburg, MD. Training will take 3 days and should be offered at H-GAC headquarters; class size should be limited to 30 students. This workshop requires two instructors. The workshop agenda is shown on the following pages.

Debris Management Plan Development Workshop Agenda

Day 1	
8:00 – 8:30 a.m.	Workshop Introduction
8:00 – 10:00 a.m.	Unit 1: Overview and Introduction to Debris Management • Introduction • Characteristics of Disaster Type • Debris Types and Issues • Critical Debris Management Issues • Activity 1.1: Debris Issue Assessment • Activity 1.1: *continued – Class Review*
10:00 – 10:15 a.m.	**BREAK**
10:15 – 11:45 a.m.	Unit 2: Managing Debris Activities • Introduction • Debris Management Cycle • Debris Management Plan Development • Activity 2.1: Issue Evaluation for Debris Management planning • Activity A: Initiate Debris Management Plan Development Aid
12:00 – 1:00 p.m.	**LUNCH**
1:00 – 3:00 p.m.	Unit 4: FEMA Eligibility and Reasonable Costs • Introduction • Laws, Regulations and Resources • Eligibility Criteria and Issues
3:00 – 3:15 p.m.	**BREAK**
3:15 – 4:45 p.m.	Unit 4: FEMA Eligibility and Reasonable Costs (Continued) • Reasonable Cost Criteria and Issues • Activity 4.1: Debris Eligibility Scenarios • Activity A: Update Debris Management Plan Development Aid

Debris Management Plan Development Workshop Agenda

Day 2	
8:00 – 10:00 a.m.	Unit 5: Debris Forecasting and Estimating Techniques • Introduction • Debris Forecasting Techniques • Activity 5.1: Debris Forecasting • Debris Estimating Techniques • Activity 5.2: Debris Estimating • Activity A: Update Debris Management Plan Development Aid
10:00 – 10:15 a.m.	**BREAK**
10:15 – 11:45 a.m.	Unit 6: Debris Contracting Procedures • Introduction • Debris Contracting Issues and Responsibilities • Types of Contracts • Activity 6.1: Debris Contract Evaluation • Activity A: Debris Management Plan Development Aid
12:00 – 1:00 p.m.	**LUNCH**
1:00 – 3:00 p.m.	Unit 7: Debris Management Site Evaluation and Operation • Introduction • Site Planning and Evaluation • Site Operations and Closure
3:00 – 3:15 p.m.	**BREAK**
3:15 – 4:45 p.m.	Unit 7: Debris Management Site Evaluation and Operation (Continued) • Volume Reduction and Recycling • Activity 7.1: Debris Management Site Evaluation • Activity A: Debris Management Plan Development Aid

Debris Management Plan Development Workshop Agenda

Day 3	
8:00 – 10:00 a.m.	Unit 8: Debris Monitoring • Introduction • Debris Monitoring Responsibilities • Debris Monitoring Observations
10:00 – 10:15 a.m.	**BREAK**
10:15 – 11:45 a.m.	Unit 8: Debris Monitoring (Continued) • Activity 8.1: Monitoring Plan Assessment • Activity 8.1 *continued* • Activity A: Update Debris Management Plan Development Aid
12:00 – 1:00 p.m.	**LUNCH**
1:00 – 3:00 p.m.	Unit 9: Supplemental Assistance • Introduction • Mission Assignments • Other Federal, State and local Assistance • Activity 9.1: Supplemental Assistance • Activity A: Update Debris Management Plan Development Aid
3:00 – 3:15 p.m.	**BREAK**
3:15 – 4:45 p.m.	Unit 10: Environmental and Historic Preservation Considerations (Optional) • Introduction • Activity 10.1: Self-Test – Federal Environmental and Historic Preservation Laws, Regulations and Executive Orders • Application to Debris Activities Activity • Environmental and Historic Preservation Scenario Review • Activity A: Update Debris Management Plan Development Aid

TAB L

REQUEST FOR QUALIFICATIONS TO PROVIDE DEBRIS MANAGEMENT CONSULTING SERVICES

Professional Services Contract
For Disaster Debris Management Consulting Services

DESCRIPTION OF SERVICES:

The _____ is soliciting Statements of Qualifications (SOQs) from Architect and Engineering firms who have extensive experience developing debris management plans and procedures based on their in depth knowledge of emergency management operations, planning, preparedness, damage assessment, and debris management issues related to response and recovery operations.

Disaster Debris Management Consulting Services:

1. **Disaster Debris Management Plan.** The scope of services, that may be required, include, but may not be limited to:
   - Development of a coordinated Disaster Debris Management Plan;
   - Development of a Geographic Information System (GIS) Based Debris Estimating Model capable of estimating the volume of disaster debris generated by a hurricane, flood, or tornado;
   - Development of criteria to identify temporary debris storage sites;
   - Creation of an inventory of potential debris management sites;
   - Identification of permitting needs for debris management sites;
   - Development of site-specific operations plans for each debris management site; and
   - Coordination with other County agencies and municipalities.

2. **Debris Removal and Disposal Contract Administration Services.** The scope of services that may be required, include, but may not be limited to:
   - Development of pre-event debris removal and disposal contracts scope of work;
   - Development of a Debris Contract Administrative Team to oversee contract administration functions to properly manage the debris clearing, removal, and disposal contract(s); and
   - Development of procedures to receive, process, and track debris load tickets; making recommendations on work priorities; reporting on progress, preparing status briefings and providing information for public consumption.

3. **Training.** The scope of services that may be required, include, but may not be limited to:
   - Development of training materials and presentation of pre-disaster training on Debris Contract Monitoring; and
   - Development of training materials and presentation of pre-disaster training on FEMA Documentation.

QUALIFICATION REQUIREMENTS:

The successful firm must have specialized experience in the field of disaster planning and preparedness, response, damage assessment, recovery for emergency operations, and contract administrative services. Preference will be given to those firm(s) who have provided services to a local municipal government and actually participated in the response assessment and/or recovery phases after a natural disaster; i.e., hurricane or major storm event. The firm must be able to demonstrate an ability and capability to

function in the region after a major natural disaster. Additionally, the successful firm will demonstrate an ability to provide the temporary staffing needed for the duration of the recovery operation.

The objective of the Disaster Debris Management Plan is to ensure the safety of the public by managing disaster debris in an efficient, orderly manner subsequent to a disaster. The plan will include strategies to maximize economic benefit from reimbursement through federal funds, if such funds are available.

Interested firms shall submit Statements of Qualification which include:

1. The name of the firm or person, the principal place of business, and location of all of its offices.
2. A description/narrative of the firm and statements of qualifications and experience of the principals and staff members, including any municipal disaster debris management plans or programs developed.
3. The age of the firm and its average number of employees over the past five years.
4. A list of disaster debris management plans undertaken and completed within the past five years including:
   - Owners of the projects;
   - Address and phone numbers;
   - Dates of project;
   - The total amount of the projects;
   - The scope of services performed; and
   - The amount and scope of services the firm was responsible for, if the firm was not responsible for the total project.
5. The names of five clients who may be contacted, including at least two for whom service were rendered during the preceding year, preferably for projects similar to this project.
6. A statement of the firm's qualifications as they specifically apply to this project.
7. The proposed approach to conduct the work.
8. The proposed staffing and description of the roles of the staff.
9. Any other pertinent data, including promotional and descriptive literature that should be considered in the evaluation of the firm's qualifications.

Selection Criteria:

A selection committee will review and evaluate the SOQ using the following criteria:

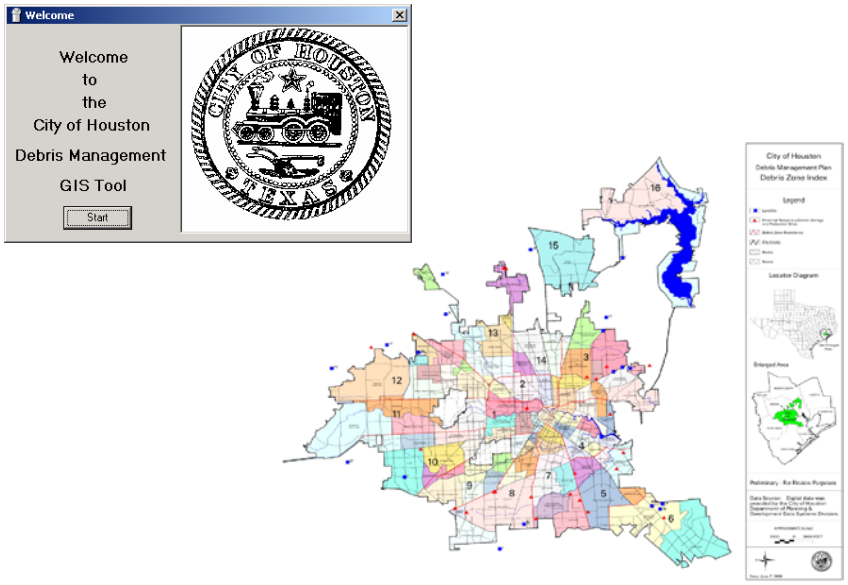
1. Company experience and qualifications (10%)
2. Proposed project staff's qualifications and experience (20%)
3. Previous relevant experience (20%)
4. Understanding of the project requirements and project approach (30%)
5. References (10%)
6. Availability to commit adequate resources to provide timely response (10%)

The _____ reserves the right to accept or reject any or all SOQ and to select the consultant whom it feels is in the best interest of the County.

The SOQ should be limited to 25 pages, not including attachments (resumes, photographs, charts, etc., if desired). Interested parties must submit one original and ____ copies no later than _____ to _____. All questions should be directed to _____.

TAB M

CITY OF HOUSTON
DEBRIS MANAGEMENT GIS APPLICATION SLIDES



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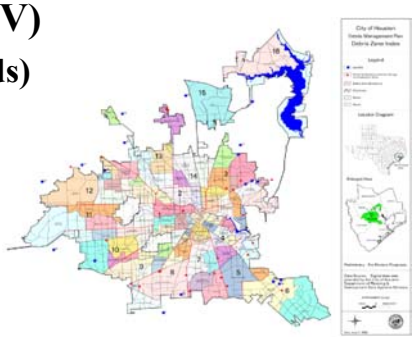
GIS Debris Prediction Model

- Utilizes existing GIS platform information
- Incorporates USACE and FEMA guidelines
- Volume predictions for a range of events
- Hurricane (Category I-IV)
  - ✓ Flood (10-500 year floods)
  - ✓ Ice and Winter Storm
  - ✓ Tornado
  - ✓ Terrorism



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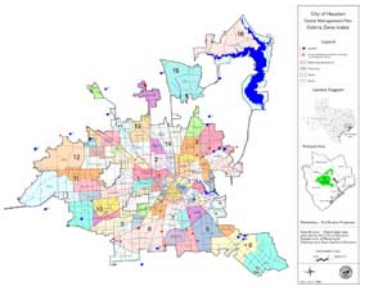
GIS Prediction Model (Cont'd

- **Volume Predictions by Debris Types:**
  - ✓ **Woody materials**
  - ✓ **Construction materials**
- **Interactive Features**
- **Customized Queries**



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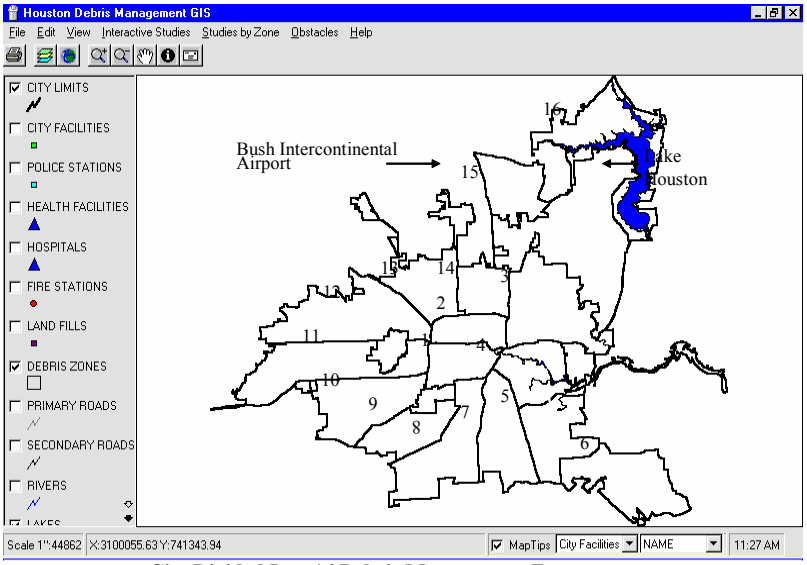

City Divided Into 16 Debris Management Zones

To match debris loads with transportation routes and staging sites/disposal areas

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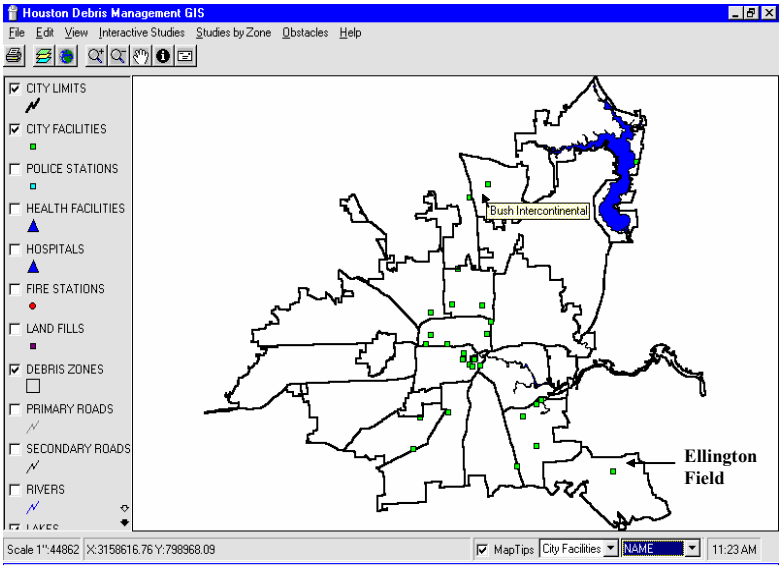

Locations of Critical City Facilities
Identified for priority clearing

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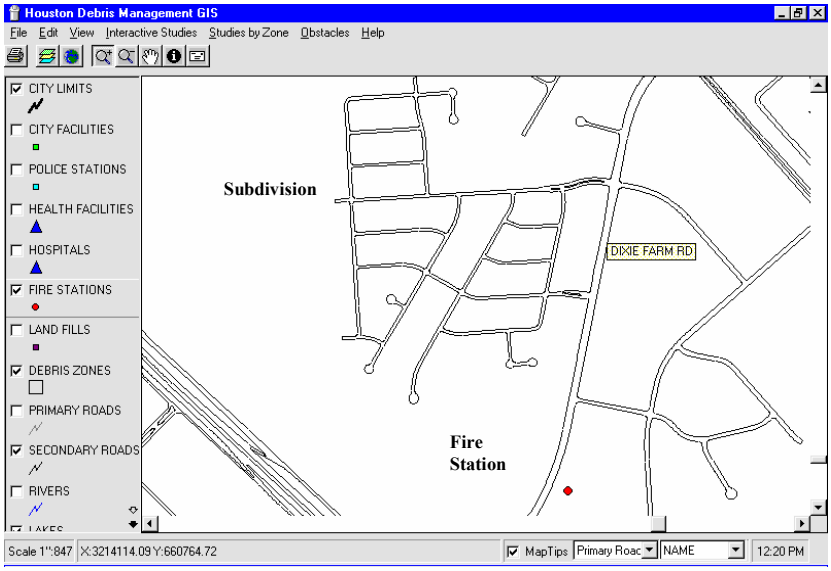

Primary and Secondary Road Network
To establish haul routes and set clearing priorities

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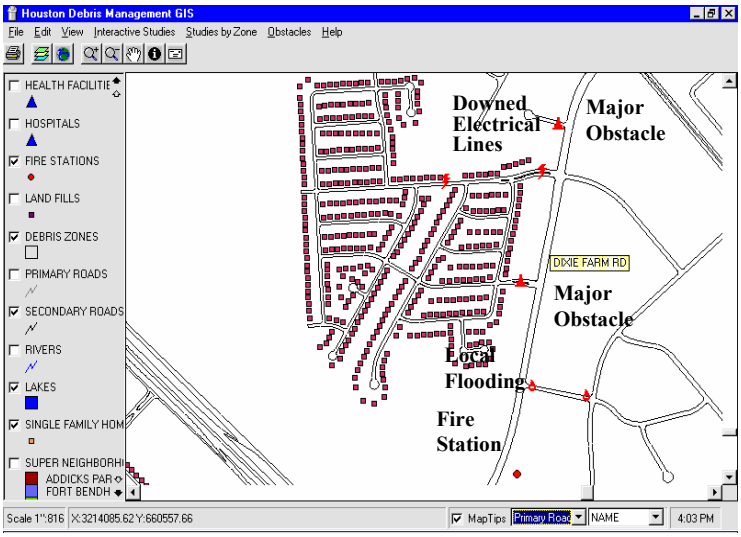

Location of Major Obstacles
Identified to establish effective coordination among response teams and coordinate priorities with local utilities

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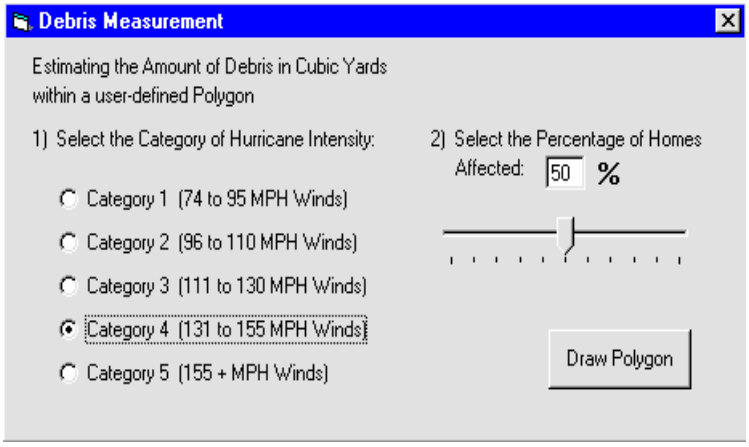

- **Select impacted area**
- **Identify type of event**
- **Determine parameters for debris volume prediction**

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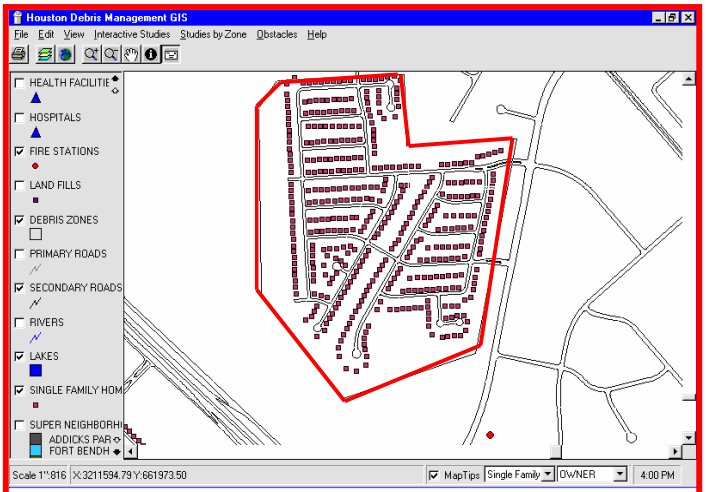

Polygon Drawn Around a Subdivision

- **Subdivision selected**
- **Category IV storm impacting 50% homes is the basis of this query**

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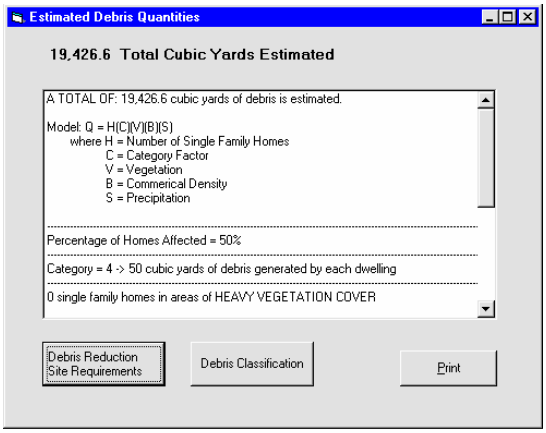

Total Estimated Debris for the Subdivision

- **Estimate Debris Reduction Site Requirements**
- **Review Debris Classification**
- **Print Reports**

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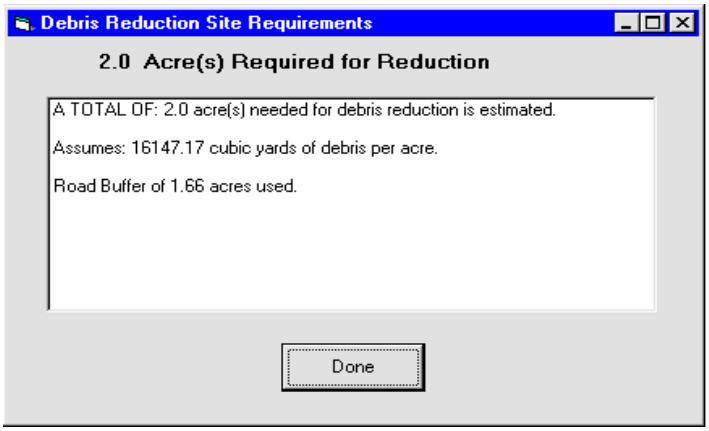

Planning Parameters for Debris Reduction Site Requirements

- **2 Acre Temporary Storage and Reduction Site Required for this subdivision**

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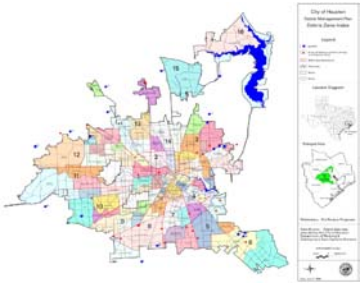
Debris Operations Management Tool

- **Utilizes existing GIS information**
- **Manages Debris Clearing Activities by providing status of:**
  - ✓ **Roads and neighborhoods cleared**
  - ✓ **Contractor operations**
  - ✓ **New areas**
- **Documenting Quantities**
- **Managing paperwork**
- **Supporting Coordination and communication**



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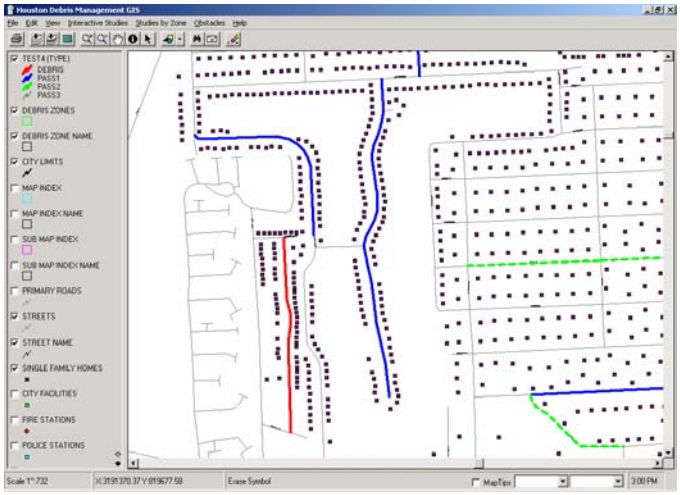

Roadway Debris Removal Tracking by Pass

- **Daily updates on debris operations progress**
- **Effective management of contractors**
- **Identification of new areas to be cleared**

RED =DEBRIS
BLUE = 1ST PASS
GREEN = 2ND PASS

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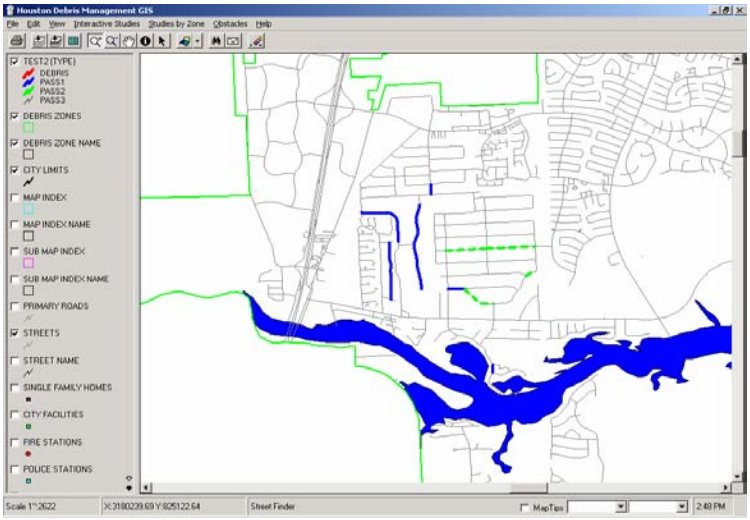

Debris Removal Underway

- **Document quantities by truck, contractor or geography**
- **Manage paperwork and documentation of daily operations**

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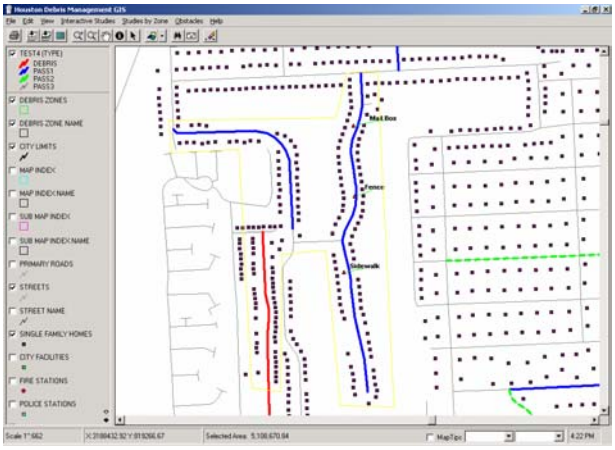

Debris Quantity Estimate After the Event

- **Calibrate Prediction Model**
- **Crosscheck on Load Tickets**

Dewberry & Davis

FOR ADDITIONAL INFORMATION PLEASE CONTACT :

Robert C. Swan
Senior Debris Management Consultant
(407) 249-3020
bswan@dewberry.com
or
Ted Van Kirk, P.E.
Senior Associate
(703) 849-0529
tvankirk@dewberry.com

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