

final report



June 2005

Regional Solid Waste Characterization Study
HOUSTON-GALVESTON AREA COUNCIL



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REGIONAL SOLID WASTE CHARACTERIZATION STUDY

JUNE 2005

PREPARED FOR:

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This study was funded through a solid waste management grant provided by the Texas Commission on Environmental Quality through the Houston-Galveston Area Council. This funding does not necessarily indicate endorsement or support of the study's findings and recommendations.

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June 6, 2005

Via Federal Express



Cheryl Mergo
Solid Waste Program Manager
Houston-Galveston Area Council
3555 Timmons, Suite 120
Houston, TX 77027

CC: Waste Characterization Work Group

Subject: Final Report for the Regional Solid Waste Characterization Study

Dear Ms. Mergo:

R. W. Beck, Inc. is pleased to present the final report for the Regional Solid Waste Characterization Study (Study) to the Houston-Galveston Area Council (H-GAC) and members of the Waste Characterization Work Group (Group).

R. W. Beck was retained by H-GAC to conduct this Study with the purpose of providing H-GAC with a valuable tool to aid in its effort to provide regional solid waste disposal capacity planning for the region.

R. W. Beck would like to express its appreciation to the many people throughout the H-GAC region who contributed to the development of this Study. We appreciate the time and effort taken by these individuals to provide valuable information. R. W. Beck would also like to thank staff at H-GAC and members of the Group, who provided significant input, data and coordination efforts for the project.

Please contact myself or Mr. Seth Cunningham at (512) 450-0991 with any questions regarding this report.

Sincerely,

A handwritten signature in black ink, appearing to read 'Dave Yanke'.

Dave Yanke
Principal and Client Services Director
R. W. Beck, Inc.

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REGIONAL SOLID WASTE CHARACTERIZATION STUDY

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This report has been prepared for the use of the client for the specific purposes identified in the report. The conclusions, observations and recommendations contained herein attributed to R. W. Beck, Inc. (R. W. Beck) constitute the opinions of R. W. Beck. To the extent that statements, information and opinions provided by the client or others have been used in the preparation of this report, R. W. Beck has relied upon the same to be accurate, and for which no assurances are intended and no representations or warranties are made. R. W. Beck makes no certification and gives no assurances except as explicitly set forth in this report.

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Abbreviations and Definitions

Brush	Tree limbs, bushes, other clean woody debris.
Bulky	Couches, chairs, mattresses, etc.
C&D	Construction and Demolition debris.
Commercial MSW	MSW produced by commercial businesses.
Green Building	Usually refers to re-using building materials in new construction or constructing new structures so that the materials are more easily recoverable during deconstruction.
H-GAC	Houston-Galveston Area Council.
Landfill	Refers to active landfills, inactive landfills that have never accepted waste, and inactive landfills that have previously accepted waste.
MRF	Material Recovery Facility.
MSW	Municipal Solid Waste.
Putrescible Waste	Waste that contains organic material and typically decomposes with time.
Residential MSW	MSW produced by single-family and multi-family residences.
R. W. Beck	R. W. Beck, Inc.
TCEQ	Texas Commission on Environmental Quality.
TSDC	Texas State Data Center .
TWC	Texas Workforce Commission.
Type 1 Landfill	Landfills that take both putrescible and non-putrescible MSW.
Type 4 Landfill	Landfills that only take non-putrescible, or inert, waste such as C&D.

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EXECUTIVE SUMMARY

Project Background

The Houston-Galveston Area Council (H-GAC) is the state-designated regional planning agency responsible for solid waste management planning for a 13-county area which includes the Houston/Galveston Metropolitan Area. Understanding the disposal and capacity needs of the region is an important aspect of the planning activities for H-GAC. In order to analyze the long-term disposal capacity for the H-GAC region, it is important to understand the source of the municipal solid waste (MSW) stream and how the population and employment will change in the region over the next 20 years.

H-GAC retained R. W. Beck, Inc. (R. W. Beck) to conduct a Regional Solid Waste Characterization Study (Study) to analyze the drivers for waste disposal in the region and establish an understanding of the long-term MSW disposal capacity needs for the 13-county area.

Project Purpose

The purpose of the Study is to provide H-GAC with a valuable tool to aid in its effort to provide regional solid waste disposal capacity planning for the region. The Study provides MSW disposal and capacity projections for the region from 2005-2025. As part of the Study, R. W. Beck:

- Conducted Waste Generation Analysis by Source Sector¹ and by Geographic Subregion.²
- Calculated Per Capita Single-Family and Multi-Family Residential Disposal Rates.
- Calculated Per Employee Commercial Disposal Rates.
- Projected Future MSW Generation and Disposal Capacity.

¹ Source sectors for this study included: single-family residential, multi-family residential, and commercial

² H-GAC divides the region into eight subregions.

Data Sources

R. W. Beck relied on several data sources for this Study. Table 1 summarizes this information provided by each of these sources.

Table 1
Data Source Summary

Data Source	Data Provided
H-GAC	Population estimates ¹ and projections ² , single-family and multi-family housing data, employment estimates ³ and projections ⁴
Texas State Data Center (TSDC)	Population estimates and projections
United States Census Bureau	Single-family and multi-family housing data
Texas Workforce Commission (TWC)	Employment estimates
City Governments	MSW tonnage, customer counts
Private Collection and Disposal Companies	Planned landfill expansions
Landfill Operators	Planned landfill expansions
Texas Commission on Environmental Quality (TCEQ)	2003 MSW tonnage data, remaining landfill capacity

(1) Population estimates refers to population for 2003.

(2) Population projections refers to population forecasts for 2005 to 2025.

(3) Employment estimates refers to employment for 2003.

(4) Employment projections refers to employment forecasts for 2005 to 2025.

Disposal Capacity

The stated purpose of this study is to provide a capacity planning tool for the H-GAC region. In order to understand the capacity available in the region from 2005 to 2025, it is important to consider two elements of the region's MSW:

- Landfill capacity, both existing and planned through 2025.
- MSW generation from 2005 through 2025 (annual, as well as cumulative).

The TCEQ requires all permitted MSW facilities to complete an annual survey and compiles this information into an annual report. The latest annual report available for this Study was Fiscal Year 2003 (September 1, 2002 – August 31, 2003). From this landfill report, R. W. Beck obtained two important pieces of information:

- Tonnage disposed in H-GAC landfills in FY 2003.
- Remaining capacity of H-GAC landfills at the end of FY 2003.

It is also important to understand any expansions that may be permitted or planned in the H-GAC region during the 2005-2025 timeframe. To account for these landfill expansions, R. W. Beck conducted interviews with the four largest private landfill operators in the region. These landfill operators were:

- Browning-Ferris Industries (BFI)

- Republic Waste Services
- Waste Management, Inc.
- WCA Waste Corporation

Additionally, R. W. Beck developed a landfill survey and distributed it to the landfill operators in the region. The information in Table 2 summarizes the landfill capacity information collected from the TCEQ and the landfill operators (Please refer to Section 5 of the Study for a more detailed analysis of disposal capacity).

Table 2
Current Landfill Capacity and Proposed Expansions

Permit	Type	County	Permittee / Registrant	Current 2003 Capacity (tons)	Expansion (tons)	Year of Expansion	2003 Capacity with Expansion (tons)
1539A	1	BRAZORIA	REPUBLIC/SEABREEZE LF	28,287,180			28,287,180
1897	1	BRAZORIA	WM B & D LANDFILL	438,895			438,895
1502	1	CHAMBERS	CHAMBERS COUNTY LF	365,236			365,236
1535B	1	CHAMBERS	SANIFILL/BAYTOWN	8,634,243			8,634,243
203	1	COLORADO	SAFETY KLEEN ALTAIR	2,586			2,586
1505	1	FORT BEND	BFI BLUE RIDGE LF	10,886,223	100,980,000	2020	111,866,223
2270	1	FORT BEND	LONG POINT PARTNERS	-	28,560,000	2005	28,560,000
1149A	1	GALVESTON	BFI GALVESTON CO LF	5,250,152	37,150,000	2008	42,400,152
1721A	1	GALVESTON	WM COASTAL PLAINS	12,760,529			12,760,529
261A	1	HARRIS	BFI MCCARTY ROAD LF	5,785,090	19,140,000	2005	24,925,090
1193	1	HARRIS	BFI WHISPERING PINES	8,047,714			8,047,714
1307B	1	HARRIS	WM ATASCOCITA RDF	3,747,484	18,750,000		22,497,484
1765	1	HARRIS	CITY OF LA PORTE	-			-
1752B	1	MONTGOMERY	WM SECURITY LF	1,440,665	10,740,000	2004	12,180,665
2215A	1	WALKER	DARRELL DICKEY INC LF	3,122,400			3,122,400
TYPE 1 SUBTOTAL				88,768,397	215,320,000		304,088,397
1708	4	BRAZORIA	DIXIE FARM ROAD LF	1,393,258			1,393,258
1797A	4	FORT BEND	SPRINT FORT BEND COUNTY	10,517,721			10,517,721
1849A	4	GALVESTON	REPUBLIC NORTH COUNTY LF	598,282	800,000	2007	1,398,282
1301	4	HARRIS	ADDICKS FAIRBANKS LF	995,730			995,730
1389A	4	HARRIS	WM RED BLUFF/GREEN BELT	-			-
1403	4	HARRIS	CASCO LANDFILL	1,307,821			1,307,821
1540A	4	HARRIS	WM GREENSHADOW	2,170,053			2,170,053
1565A	4	HARRIS	FAIRBANKS LANDFILL	973,143			973,143
1586A	4	HARRIS	GREENBELT LANDFILL	5,634,933			5,634,933
1599A	4	HARRIS	G.O. WEISS GREENHOUSE RD LF	2,846,497			2,846,497
1921A	4	HARRIS	COUGAR DISPOSAL INC	1,647,012			1,647,012
2185	4	HARRIS	WM HAWTHORN PARK LF	1,713,586			1,713,586
2240	4	HARRIS	RALSTON ROAD LANDFILL	1,076,697			1,076,697
2276	4	HARRIS	APPLEROCK DISPOSAL	5,250,000			5,250,000
2304	4	HARRIS	TALL PINES LANDFILL	234,824	4,667,300	2004	4,902,124
2324	4	MONTGOMERY	MONTGOMERY LF SOLUTIONS	-			-
TYPE 4 SUBTOTAL				36,359,557	5,467,300		41,826,857
TOTAL				125,127,954	220,787,300		345,915,254

Disposal Projections

Stating the available capacity for the region has little meaning without an understanding of the projected MSW generation for the region as well. Table 3 provides the MSW annual disposal projections at the county level while Figure 1 provides a comparison of cumulative solid waste disposed of versus available capacity from 2005 to 2025.

EXECUTIVE SUMMARY

Table 3
Total MSW Projections (Tons)

County	2005	2010	2015	2020	2025
Austin	34,107	36,463	39,005	41,445	43,441
Brazoria	352,697	377,022	399,230	429,982	456,995
Chambers	32,895	34,072	35,653	38,482	41,006
Colorado	26,942	28,315	29,822	31,149	32,212
Fort Bend	484,327	558,563	625,914	717,410	803,734
Galveston	373,399	410,034	445,925	488,675	525,876
Harris	5,475,485	5,958,327	6,497,775	7,256,589	7,946,321
Liberty	92,469	101,591	112,252	125,069	136,490
Matagorda	48,245	51,028	53,876	56,461	58,509
Montgomery	460,535	543,287	619,253	705,509	781,957
Walker	80,949	86,813	92,436	97,859	102,037
Waller	48,801	56,444	64,513	72,703	79,933
Wharton	55,457	58,497	61,664	64,638	67,032
Total	7,566,309	8,300,455	9,077,319	10,125,970	11,075,542

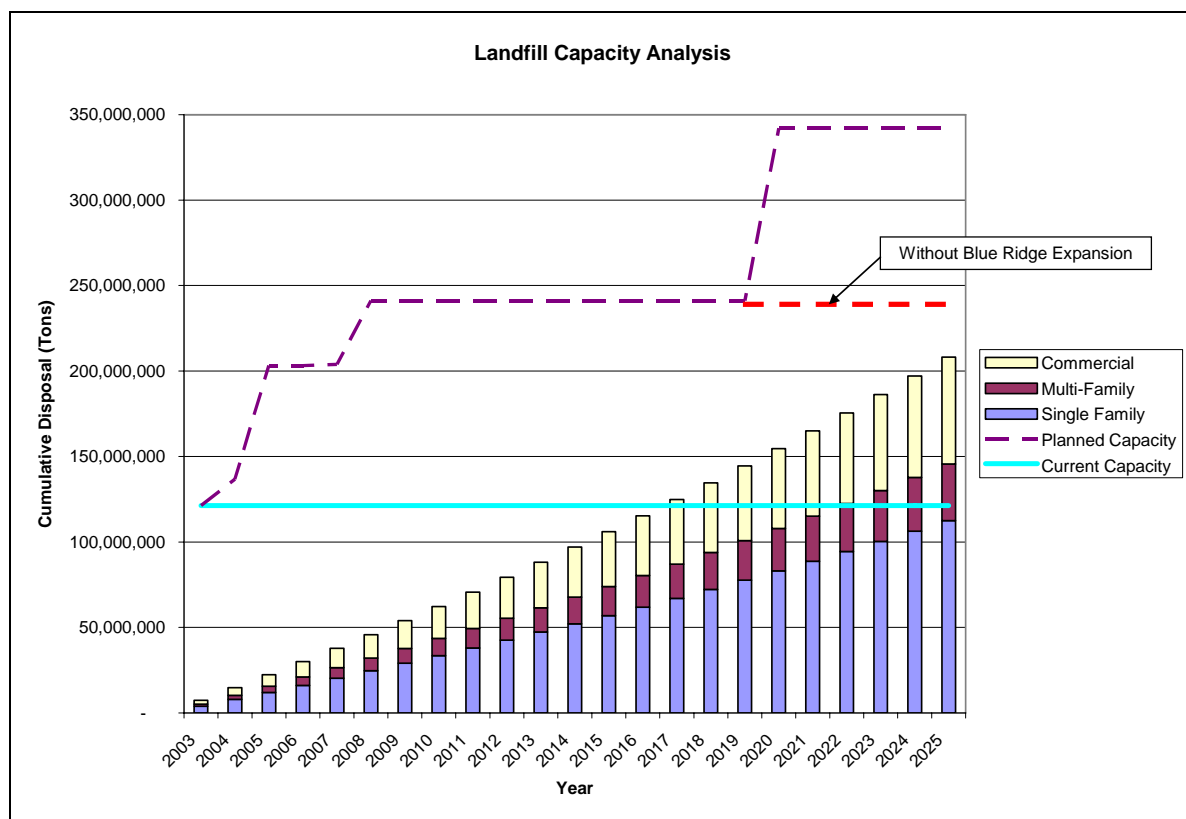


Figure 1: MSW Generation and Disposal Capacity in the H-GAC Region

Based on this analysis, there are several key points about landfill capacity:

- *If none of the proposed expansions occur, then the landfills in the H-GAC planning region will reach capacity between 2017 and 2018.*

- *If all proposed expansions occur, then the landfills in the H-GAC planning region will have sufficient capacity until approximately 2036.*
- *If all proposed expansions occur except the one at the Blue Ridge Landfill, then the landfills in the H-GAC planning region will have sufficient capacity through approximately 2028.*

Per Capita Methodology

In order to project MSW generation from 2005 to 2025, R. W. Beck first had to develop disposal rates for the three primary sources of MSW in the region:

- Single-Family Residences
- Multi-Family Residences
- Commercial Businesses³

In order to determine the commercial MSW disposal rate, it is necessary to know the total tonnage disposed in the region. Thus, disposal rates were first calculated for 2003, the latest year for which landfill data was available from the TCEQ.

R. W. Beck surveyed 41 city governments in the H-GAC region, which represents all cities in the region with a population greater than 10,000 and those cities that were the largest in their county, regardless of size. Along with other important information, the surveys asked each city to report the following tonnages for each of the sources listed below:

- Garbage
- Brush
- Bulky
- C&D (only that which is commercially generated)
- Industrial non-hazardous

Ten cities reported tonnages for single-family residences. These ten cities represent approximately 46% of the total population of the H-GAC region. By dividing the MSW tonnage collected from single-family homes by the single-family population in each of these ten cities, R. W. Beck was able to determine an average single-family per capita rate for the region. Table 4 contains the single-family per capita rate for the H-GAC region.

³ Residential (single and multi-family) disposal rate were based on a “per capita” factor, while commercial disposal rates are based on a “per employee” factor.

Table 4
Single-Family Per Capita MSW Disposal Rate of Surveyed Cities (Annual)

Single-Family Population ¹	1,303,100	
		Per Capita (Tons per Person)
Single-Family Garbage	Tonnage 999,037	0.7667
Single-Family Brush	156,165	0.1198
Single-Family Bulky	295,834	0.1078 ²
Single-Family Total	1,451,036	0.9943 ³

(1) Single-Family population for those cities returning surveys.

(2) Weighted average of survey data and data from the Dallas/Ft. Worth Metroplex Study.

(3) 0.9943 tons/person X 2000 lbs/ton = 1989 pounds per person per year, living in a single-family residence

The single-family MSW tonnage for cities not returning surveys was estimated to be the single-family population of the city multiplied by the single-family per capita MSW disposal rate (0.9943 tons per person per year). This same disposal rate was applied to the single-family population projections from 2005 to 2025 to determine the single-family waste projections for 2005 to 2025.

Only one city provided information on multi-family residential collected MSW. Therefore, R. W. Beck derived the multi-family per capita rate based on a similar approach to how the single-family per capita rate was developed. Based on prior experience in the solid waste industry, R. W. Beck estimated that the multi-family MSW stream was similar to the single-family MSW stream, with the exception that multi-family residences tend to generate less brush than single-family residences. As such, R. W. Beck determined the multi-family per capita rate to be the “Single-Family Garbage” rate plus the “Single-Family Bulky” rate.

Multi-Family Annual Per Capita Disposal Rate: **0.8745 tons**

The multi-family MSW tonnage for each city was estimated to be the multi-family population of the city multiplied by the multi-family per capita MSW disposal rate (0.8745 tons per person per year). This multi-family disposal rate was applied to the multi-family population projections from 2005 to 2025 to determine the multi-family waste projections for 2005 to 2025.

The last component of the MSW stream is commercial MSW. The total commercial MSW generated in the H-GAC region in 2003 was determined by subtracting the total single-family and multi-family MSW tonnage for the region in 2003 from the total tonnage disposed in the region’s landfills in 2003. This total commercial MSW tonnage was then allocated based on the number of employees. The breakdown of the total MSW disposed in the H-HAC region is shown in Figure 2.

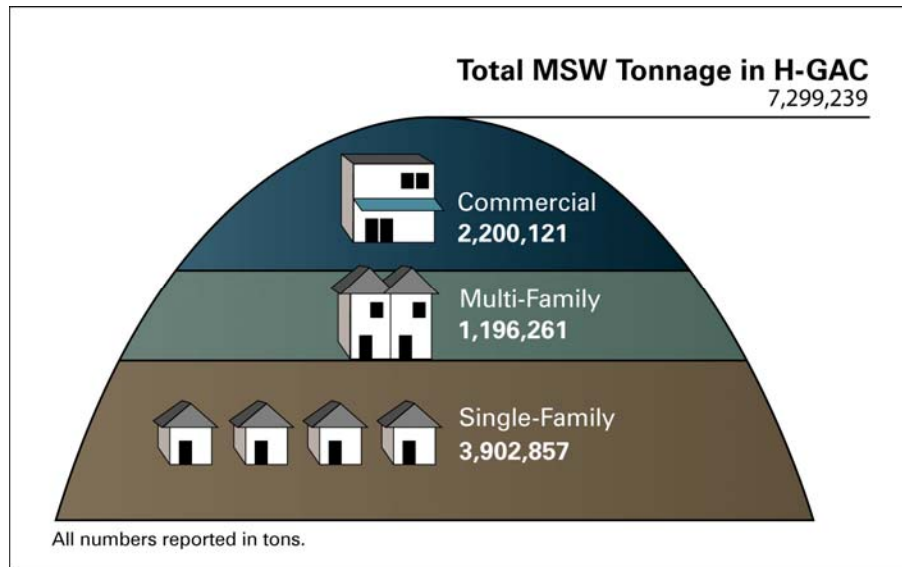


Figure 2: MSW Breakdown in H-GAC Region (2003)

R. W. Beck developed the commercial MSW tonnage projections for 2005 to 2025 by growing the 2003 commercial MSW tonnage at the same rate as employment growth.

Comparative Measures

To provide some reference to the per capita rates developed by R. W. Beck during the analysis for this Study, the project team examined data from a variety of other industry resources. Table 5 summarizes this comparable data.

Table 5
Comparable Per Capita Measures

Measure	Units	Comparable	R W. Beck
H-GAC Mgmt. Plan	Lbs. of MSW/person/day	7.09 – 8.94	7.78
TCEQ Residential Data	Tons of Residential MSW/person/year	0.44	0.9943
Household Disposal Rate	Tons of Residential MSW/household/year	0.8083 – 0.9238	0.9943
Apartment Sample	Tons of multi-family MSW/person/year	0.2287 – 1.7260	0.8745

H-GAC Management Plan

R. W. Beck reviewed two versions of the H-GAC Management Plan for this comparison:

- 1999-2000 Update to the H-GAC Solid Waste Management Plan.
- Draft Amendment to the H-GAC Solid Waste Management Plan, dated October 2003.

The 7.78 lbs. per person per day rate developed by R. W. Beck is within the 7.09 – 8.94 lbs. per person per day per capita rate reported in the H-GAC management plans.

TCEQ Residential Data

In addition to reporting overall MSW tonnages to the TCEQ during the annual reporting process, each landfill also attempts to classify the waste into 23 categories, as defined by the TCEQ. Because classification of MSW is sometimes subjective, the data may not represent a completely accurate account of waste characterization. However, the annual reports provide some overview of the MSW types being disposed in Texas landfills. According to the landfills in the H-GAC region reporting data for the FY 2003 annual report, approximately 2,236,537 tons were classified as residential waste. However, there are several questions with regard to the TCEQ residential tonnage figure. First, it is difficult to distinguish multi-family MSW from commercial MSW because of the similar collection vehicles used in the collection of each type of waste. Secondly, there are 23 categories of MSW in the TCEQ annual reports. For the purposes of this study, R. W. Beck classified all waste as either: single-family residential, multi-family residential, or commercial.

While the per capita rate calculated using the TCEQ data differs from the one developed by R. W. Beck, the differences in the way waste is classified make the values difficult to compare.

Household Disposal Rate

Disposal rates are sometimes reported on a per household basis rather than a per person basis. The reason for this is that an entity providing solid waste services can more easily report a disposal rate that is based on the number of accounts (or households) rather than estimating the number of people those accounts present. In the City Surveys discussed earlier in this section, the project team also asked each city to report the number of single-family, multi-family, and commercial accounts. By using the number of single-family accounts reported in the surveys and the single-family tonnage reported, R. W. Beck was able to compare this figure to the disposal rate calculated using population.

The single-family per capita rate developed in the Study is near the range of values calculated in this comparison.

Apartment Sample

One of the private collection companies interviewed as a part of this Study provided some data on 17 apartment complexes located in a particular area of the City of Houston. While not representative of the entire region, the data does give another reference point for per capita analysis. For each apartment, the private collection company provided the number of containers at the complex, the size of the containers in cubic yards, the weekly pick-up frequency, and the number of units in the complex. Calculating a per capita rate from this information requires several assumptions, particularly the number of pounds per cubic yard and the average number of residents per unit.

Although this analysis provides a wide range of values, the multi-family per capita rate developed in the Study is within the range of values in this analysis of apartment units.

Population Estimates and Projections

As discussed earlier in the Disposal Projections section, the single-family and multi-family MSW projections were driven by the single-family and multi-family population from 2005 to 2025.

Population Estimates (2003)

H-GAC provided population data for years 2000 and 2007. Texas State Data Center (TSDC) provided population data for years 2000 and 2005. Using linear interpolation, R. W. Beck utilized this data to estimate the 2003 population for each city, county, and unincorporated area in the region.

H-GAC and the U. S. Census Bureau provided single-family and multi-family housing information for the cities, counties, and unincorporated areas, expressed as a percentage of the total population.

Together, this information allowed R. W. Beck to determine the single-family and multi-family population for each city, county, and unincorporated area in the H-GAC region. As mentioned earlier in this summary, R. W. Beck used this data to calculate per capita MSW disposal rates for single and multi-family residences.

Population Projections (2005 – 2025)

H-GAC provided population data for years 2000, 2007, 2015, 2022, and 2025 for 8 counties and 36 cities. Through linear interpolation, R. W. Beck estimated the population for 2005 to 2025 for these counties.

TSDC provides population projections in five-year increments for counties in Texas, but does not publish city-level population projections. R. W. Beck developed population projections for the remaining five counties and cities based on the county population projections provided by TSDC.

These population projections, in combination with the single-family and multi-family housing data, provided the single-family and multi-family population projections for each county, city, and unincorporated area in the region, which then drove the single-family and multi-family MSW disposal projections.

Employment Estimates (2003)

The employment estimates for 2003 were used to allocate the commercial MSW to the cities and unincorporated areas in the H-GAC region. H-GAC provided employment data for years 2000 and 2007. The TWC provided data for 2000 and 2004. Using linear interpolation, R. W. Beck estimated the 2003 employment for each city, county, and unincorporated area in the 13-county region.

Employment Projection (2005-2025)

Commercial MSW projections for the region were determined by growing the 2003 commercial MSW tonnage for each city and unincorporated area at the same rate as growth in employment for those regions.

EXECUTIVE SUMMARY

H-GAC provided employment data for years 2000, 2007, 2015, 2022, and 2025 for 8 counties and 36 cities. Through linear interpolation, R. W. Beck estimated the employment for 2005 to 2025.

TWC does not publish employment projections. For the five remaining counties, R. W. Beck assumed the proportion of employees in these counties to the total H-GAC employment for 2003 would remain constant from 2005 to 2025. By making this assumption, R. W. Beck was able to forecast employment growth for these five remaining counties through 2025.

Subregional Analysis

H-GAC divides its 13 county region into 8 subregions, as listed in Table 6.

Table 6
H-GAC Subregions

Subregion	Counties
Subregion 1	Montgomery, Walker
Subregion 2	Chambers, Liberty
Subregion 3	Galveston
Subregion 4	Brazoria
Subregion 5	Colorado, Matagorda, Wharton
Subregion 6	Austin, Waller
Subregion 7	Fort Bend
Subregion 8	Harris

Table 7 shows the disposal and capacity by subregion. Note that some subregions have excess capacity while others do not. For example, the cumulative MSW generated in Subregion 1 reaches 16,046,404 tons in 2025. This amount exceeds the 15,303,065 tons of available capacity, meaning Subregion 1 becomes a net exporter of MSW. This highlights the importance of transfer stations within the various subregions.

Table 7
Cumulative Subregional Disposal and Capacity

Subregion	Cumulative MSW Generation by Subregion (Tons)					2003 Capacity with Expansions, by Subregion (Tons)
	2005	2010	2015	2020	2025	
Subregion 1	1,565,299	4,548,226	7,943,491	11,776,971	16,046,404	15,303,065
Subregion 2	371,666	1,026,466	1,741,504	2,527,966	3,389,259	8,999,479
Subregion 3	1,097,548	3,075,564	5,233,406	7,591,280	10,151,808	56,558,963
Subregion 4	1,041,591	2,881,225	4,832,958	6,921,364	9,156,051	30,119,333
Subregion 5	387,939	1,062,296	1,774,062	2,521,529	3,300,080	2,586
Subregion 6	244,340	688,088	1,184,457	1,733,936	2,333,577	-
Subregion 7	1,402,242	4,056,913	7,051,782	10,455,841	14,307,033	150,943,944
Subregion 8	16,187,696	44,928,739	76,338,719	111,104,036	149,525,257	83,987,884
Total	22,298,321	62,267,516	106,100,379	154,632,922	208,209,467	345,915,254

Construction and Demolition Waste

Construction and Demolition (C&D) debris is primarily inert material from construction and demolition projects that can be disposed in Type 1 landfills, but are the primary constituent of Type 4 landfills. In 2003, there were 15 active and inactive Type 1 landfills in the region and 15 active and inactive Type 4 landfills.

R. W. Beck's analysis shows that there is a significant portion of the Type 1 landfills in the H-GAC region that might potentially be better utilized for putrescible waste rather than C&D waste.⁴ However, R. W. Beck would emphasize that the numbers reported by TCEQ are not necessarily a completely accurate measure of the C&D material entering the region's Type 1 landfills. The data provided to the TCEQ is often gathered in a manner that may not provide an accurate indication of the actual amount disposed, by type of material (C&D, putrescible, etc.). For instance, MSW in roll-off containers may be classified as commercial waste by the landfill operator when in fact it is C&D waste. Therefore it is important to realize that although C&D material is going into Type 1 landfills, the exact magnitude is more difficult to determine and the figures reported by TCEQ should not be accepted as 100% accurate. Nevertheless, this analysis does show that there may be a potential opportunity to cost-effectively divert some C&D waste from Type 1 landfills to Type 4 landfills.

Options for diverting C&D material from Type 1 and Type 4 landfills also includes on-site grinding at construction sites, reuse of building materials in new construction projects, and material recovery facilities that accept C&D waste.⁵

Key Findings and Recommendations

R. W. Beck developed several recommendations based on the analysis performed for this Study.

Construction and Demolition (C&D) Debris

Construction and demolition debris represents a significant portion of the MSW stream in the H-GAC region. C&D debris is disposed in both Type 1 landfills, which accept both putrescible and non-putrescible waste, and Type 4 landfills, which accept only non-putrescible waste.

According to the data reported in the FY 2003⁶ Texas Commission on Environmental Quality (TCEQ) annual report, over 15% of all MSW that is disposed in Type 1 landfills is C&D. Additionally, over 95% of the 1,396,954 tons disposed in Type 4 landfills is C&D. Together over 30% of the total waste stream in the region is C&D

⁴ This assumes the transfer costs for hauling C&D waste are not prohibitive and Type 4 landfills are conveniently located near the sites where C&D is being generated.

⁵ Again, these options are only realistic alternatives to landfilling if they can be done in a cost-effective manner.

⁶ Fiscal year 2003 is defined as September 1, 2002 – August 31, 2003.

debris. As a result, there are several opportunities H-GAC could investigate to help divert this portion of the MSW stream from the region's landfills, including:⁷

- C&D Material Recovery Facility (MRF)
- On-site C&D Processing
- Green Building

Recommendation: R. W. Beck would recommend H-GAC explore whether there are economically viable options to minimize C&D material going to Type 1 landfills and potentially a way to cost-effectively divert some of the C&D waste stream from Type 4 landfills. This will extend the life of both Type 1 and Type 4 landfills in the region.

Registered Transfer Stations

Despite playing an important role in the management of MSW in the H-GAC planning region, little information is gathered or tracked with regard to registered transfer stations. For instance, no landfills or transfer stations are located in subregion 6 of H-GAC, which represents Austin County and Waller County. The MSW generated in these counties is being disposed of somewhere. In contrast, the TCEQ requires all permitted transfer stations to respond to an annual MSW survey. Having better information on registered transfer stations and where the waste going to these transfer stations is coming from will help H-GAC better understand the flow of ALL waste in the H-GAC region.

As mentioned, this lack of information is partly due to the TCEQ's policy in the past to not require registered transfers stations, only permitted transfer stations, to respond to the annual TCEQ survey. However, this problem should be alleviated some when the TCEQ requires registered transfer stations to respond to the annual survey, which is reportedly the case for the FY 2004 annual report.

The Texas Administrative Code, Title 20, Part 1, Chapter 3003, Subchapter A, sets forth the requirements for permitting a MSW transfer station.⁸

Recommendation: R. W. Beck would recommend H-GAC track the flow of waste within the region (including from registered transfer stations) to enable better monitoring of trends in the waste stream.⁹

⁷ For these options to be viable for consideration, they would need to be cost effective.

⁸ A Permit is not required for a MSW transfer station facility that is used in the transfer of MSW to a solid waste processing or disposal facility from: (1) a municipality with a population of less than 50,000; (2) a county with a population of less than 85,000; (3) a facility used in the transfer of MSW that transfers or will transfer 125 tons per day or less; or (4) a transfer station located within the permitted boundaries of an MSW Type 1, Type 2, Type 3, or Type 4 facility.

⁹ R. W. Beck is not recommending a detailed, time consuming and cumbersome tracking process be implemented by H-GAC. Rather we are simply recommending that general trends with regard to the movement of waste be monitored within the H-GAC region.

Other Landfill Alternatives

According to the 1999-2000 Update to the H-GAC Solid Waste Management Plan, the per capita rate for total MSW (residential and commercial) was 7.09 lbs/person/day. R. W. Beck calculated a rate of 7.78¹⁰ lbs/person/day and a draft Amendment of H-GAC's Solid Waste Management Plan, dated October 2003, reported a rate of 8.94 lbs/person/day.¹¹ Despite H-GAC recognition that landfill diversion is an important aspect of solid waste management planning, the per capita rate appears to be increasing.

Recommendation: R. W. Beck would recommend that H-GAC should further investigate the extent to which cost-effective recycling and diversion options are being effectively implemented throughout the region. Examples include, but are not limited too:

- **Bioreactors**
- **Electronic Waste**
- **Yard Waste Diversion and Composting**
- **Public Education Programs**
- **Variable Rate Structures**

¹⁰ (7,299,239 tons per year/5,137,974 people) * (2000 lbs/ton) / (365 days/year) = 7.78 lbs/person/day

¹¹ Calculated using FY 2000 Data Summary and Analysis from TCEQ's Annual Reporting Program for Permitted MSW Facilities.

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1.1 Project Background

The Houston-Galveston Area Council is the state-designated regional planning agency responsible for solid waste management planning for a 13-county area which includes the Houston/Galveston Metropolitan Area. Understanding the disposal and capacity needs of the region is an important aspect of the planning activities for H-GAC. In order to analyze the long-term disposal capacity for the H-GAC region, it is important to understand the source of the municipal solid waste stream and how the population and employment will change in the region over the next 20 years.

H-GAC retained R. W. Beck, Inc. to conduct a Regional Solid Waste Characterization Study to analyze the drivers for waste disposal in the region and establish an understanding of the long-term MSW disposal capacity needs for the 13-county area.

1.2 Project Purpose

The purpose of the Study is to provide H-GAC with a valuable tool to aid in its effort to provide regional solid waste disposal capacity planning for the region. The Study provides MSW disposal and capacity projections for the region from 2005-2025. As part of the Study, R. W. Beck:

- Conducted Waste Generation Analysis by Source Sector¹ and by Geographic Subregion.²
- Calculated Per Capita Single-Family and Multi-Family Residential Disposal Rates.
- Calculated Per Employee Commercial Disposal Rates.
- Projected Future MSW Generation and Disposal Capacity.

1.3 Data Sources

To complete the analysis for this Study, R. W. Beck relied on several data sources. The combination of these sources provided the necessary population, employment,

¹ Source sectors for this study included: single-family residential, multi-family residential, and commercial

² H-GAC divides the region into eight subregions.

and residential housing information needed to forecast MSW disposal and capacity projections for 2005 to 2025.

1.3.1 City Governments

Cities governments, particularly the ones responsible for providing solid waste services, played an important role in the Study. R. W. Beck surveyed cities in the H-GAC region to determine their MSW disposal tonnage, along with other important information.

1.3.2 Houston-Galveston Area Council

The H-GAC transportation department focuses its planning efforts on the consolidated metropolitan statistical area (CMSA), as defined by the federal Office of Management and Budget. As part of its planning activities, H-GAC collects detailed population and employment data for the eight counties in the CMSA. These eight counties are:

- Brazoria
- Chambers
- Fort Bend
- Galveston
- Harris
- Liberty
- Montgomery
- Waller

H-GAC provided information from its proprietary database for this Study. For these eight counties, H-GAC provided population data, current single-family and multi-family housing data, and employment data from 2000 to 2025. This data was ultimately used in the per capita analysis and the residential and commercial MSW tonnage projections.

1.3.3 Texas State Data Center (TSDC)

As mentioned, H-GAC actively collects data for eight counties in the region. For the remaining five counties, R. W. Beck obtained population data for years 2000 through 2025 from the TSDC.

- Austin
- Colorado
- Matagorda
- Walker
- Wharton

The population data obtained from the TSDC was instrumental in developing the residential MSW tonnage projections for these five counties.

1.3.4 United States Census Bureau

R. W. Beck obtained data from the 2000 U. S. Census to estimate the single-family and multi-family housing ratios for cities in the five counties listed above in Section 1.3.3. R. W. Beck also used the data to assist in determining the housing ratios for the smaller cities and unincorporated areas of all 13 counties. These housing ratios were

used to develop the single-family and multi-family population projections for the region, which generated the residential MSW disposal tonnage projections.

1.3.5 Texas Workforce Commission

H-GAC provided employment data for the eight counties it tracks within its database. For the other five counties, R. W. Beck used employment data from the Texas Workforce Commission (TWC). Data was available for 2000 and 2004 and was used to establish an allocation for commercial MSW tonnages in those five counties.

1.3.6 Private Collection and Disposal Companies

R. W. Beck conducted in-person interviews with the four largest private collection and disposal companies in the region. These companies were able to provide information on disposal capacity in the region, as well as insight on the collection services provided to the region. The companies interviewed were:

- Browning-Ferris Industries (BFI).
- Republic Waste Services.
- Waste Management, Inc.
- WCA Waste Corporation.

1.3.7 Landfill Operators

There are nearly 30 Type 1 and Type 4 landfills in the H-GAC region.³ The four companies mentioned in Section 1.3.6 operate 21 of those landfills. R. W. Beck sent surveys to the remaining landfill operators in the region to gain a better understanding of the landfill capacity in the region, including planned or permitted expansions.

³ This includes permitted landfills that are active, currently inactive, or have not yet accepted waste. Landfills that have closed and will no longer accept waste were excluded from this Study.

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Section 2

POPULATION ESTIMATES AND PROJECTIONS

2.1 Introduction

The purpose of the Study is to provide H-GAC with a valuable tool to aid in its effort to provide regional solid waste disposal capacity planning for the region. A component of this planning tool is an analysis of the H-GAC region's landfill capacity, either existing or planned, and whether it is sufficient relative to the MSW generation in the region from 2005 to 2025. The first step in completing this analysis was to determine the disposal rate for each source sector (single-family residences, multi-family residences and commercial businesses) for the region from September 1, 2002 to August 31, 2003. R. W. Beck chose September 1, 2002 to August 31, 2003 because that is the TCEQ's FY 2003, which is the most recent year landfill tonnage data was available from the TCEQ. This landfill data was needed to determine the waste stream tonnages for single-family residences, multi-family residences, and commercial businesses.

R. W. Beck obtained detailed population data for all cities in the region that met the following criteria:

1. Cities with a population greater than 10,000.
2. Cities that were the largest in their respective county, regardless of size.

Throughout the Study, these cities are referred as the "larger" cities. R. W. Beck did not collect data for cities with a population less than 10,000 (with the exception of those just mentioned). These cities are referred to as the "smaller" cities throughout the Study. Populations of these smaller cities and unincorporated areas were aggregated and referred to as the "smaller cities and unincorporated areas."

R. W. Beck obtained population data for 2003 from two sources: H-GAC and TSDC. H-GAC provided data for 2000 and 2007, and TSDC for 2000 and 2005. Since R. W. Beck had to interpolate the 2003 data from these sources, the term "population estimates" is used to describe the 2003 population data.

It was necessary for R. W. Beck to allocate the population of each city into two categories: single-family and multi-family. The project team was able to accomplish this task using a methodology discussed later in this section based on housing data which was provided from H-GAC and the U. S. Census Bureau.

The next step was to develop population projections for the region for 2005 to 2025. H-GAC provided county and city population projections for the eight counties contained in their database for years 2000, 2007, 2015, 2022, and 2025. TSDC provided population projections for the remaining five counties and R. W. Beck

developed projections for the remaining cities within these five counties. The population projections for the 13-county region were a critical component in determining the MSW disposal tonnage projections discussed in Section 4 of the Study.

2.2 Population Estimates (2003)

In order to calculate the per capita single-family and multi-family residential MSW disposal rates, the project team had to determine the 2003 population for the H-GAC region, since this was the latest year tonnage data was available from TCEQ. Specifically, population data was gathered for all cities in the region based on the criteria discussed in Section 2.1. A complete list of the cities is provided in Appendix A, along with the source of the data for each city. R. W. Beck collected the data from H-GAC and TSDC to develop the 2003 population estimate.

2.2.1 Data Provided by H-GAC

H-GAC has developed a database that tracks demographic and employment statistics for eight of the thirteen counties in the H-GAC region. As mentioned in Section 1.3.2, these are the eight counties in the Houston-Galveston area CMSA. H-GAC was able to provide population data for years 2000, 2007, 2015, 2022, and 2025 for the eight counties in Table 2-1.

In addition, H-GAC provided population data for the cities in Table 2-1. R. W. Beck used the data for 2000 and 2007 and applied linear interpolation to estimate the population of the cities and counties for 2003.

Table 2-3 summarizes the population estimates for 2003 and Appendix B provides the detailed estimates for the H-GAC planning region.

Table 2-1
City and County Data Provided by H-GAC

County	Cities
Brazoria	Alvin, Angleton, Clute, Freeport, Lake Jackson, Pearland
Chambers	Anahuac
Fort Bend	Missouri City, Richmond, Rosenberg, Stafford, Sugar Land
Galveston	Dickinson, Friendswood, Galveston, La Marque, League City, Texas City, Santa Fe
Harris	Baytown, Bellaire, Deer Park, Galena Park, Houston, Humble, Jacinto City, Katy, La Porte, Pasadena, Seabrook, South Houston, Tomball, West University Place
Liberty	Liberty
Montgomery	Conroe
Waller	Hempstead

2.2.2 Data Collected from TSDC

Of the 13 counties in the region, H-GAC does not track population for five counties. The population data for these five counties, listed in Table 2-2, was available from the TSDC in five-year increments beginning with the year 2000. R. W. Beck used linear interpolation to determine the populations for each county in 2003. The latest population data available for the cities in Table 2-2 was for year 2000.

Table 2-2
City and County Data Provided by TSDC

County	City
Austin	Sealy
Colorado	Columbus
Matagorda	Bay City
Walker	Huntsville
Wharton	El Campo

Since TSDC provided county population for 2000 and 2005, R. W. Beck was able to determine population projections for these five cities based on the county population projections provided by TSDC.

Table 2-3 summarizes the population estimates for 2003 and Appendix B provides the detailed estimates for the H-GAC planning region.

2.2.3 Data for Smaller Cities and Unincorporated Areas

The population of cities with a population less than 10,000⁴ and the unincorporated areas of each county were determined by subtracting the populations of the larger cities in each county from the total population of the county. For instance, the population of Matagorda County was 38,500 in 2003. Bay City, the only city in Matagorda County with a population greater than 10,000, had a population of 18,892. Thus, the total population of all the smaller cities and unincorporated areas in Matagorda County was 19,608.

2.3 Population Projections (2005 – 2025)

The purpose of the Study was to examine residential and commercial disposal requirements and available capacity from 2005 to 2025. In order to develop MSW disposal projections over this time period, R. W. Beck needed to determine the population projections for this same time period. As mentioned earlier, the basis for the population projections was provided by H-GAC and TSDC.

⁴ With the exception of those that met R. W. Beck’s criteria for data collection purposes as defined on page 2-1.

2.3.1 Data Provided by H-GAC

H-GAC provided population data for the counties and cities listed in Table 2-1. Since H-GAC provided data for years 2000, 2007, 2015, 2022, and 2025, R. W. Beck used linear interpolation to forecast the population for 2005 to 2025.

2.3.2 Data Collected from TSDC

TSDC does not publish population projections for individual cities, however they do publish projections at the county level. R. W. Beck was able to determine population projections for the five cities in Table 2-2 based on the county population projections provided by TSDC.

Similar to the method described in the 2003 population estimates for these cities, the first step was to examine the historical population of each city in proportion to the total county population. R. W. Beck collected city and county population data from 1986 to 2000 from the TSDC to complete this step. The next step was to establish a linear relationship between city and county population. The final step was to use this linear equation to calculate the city population projections from 2005 to 2025 based on the county population projections provided by TSDC.

2.3.3 Data for Smaller Cities and Unincorporated Areas

As with the 2003 population estimates (see Section 2.2.3), the population projections from 2005 to 2025 for the smaller cities and unincorporated areas were determined by subtracting the populations of the larger cities in each county from the total population of the county for each year through 2025.

Table 2-4 shows the population projections and Appendix C contains the detailed population projections for the H-GAC region, including for all 13 counties.

2.4 Single-Family and Multi-Family Population Estimates (2003)

In order to develop the single-family and multi-family residential waste projections for 2005 to 2025, R. W. Beck needed to determine the single-family and multi-family housing estimates for the cities, counties, and unincorporated areas in the region.

2.4.1 Data Provided by H-GAC

H-GAC provided the single-family and multi-family residential housing estimates, expressed as percentages, for all the cities listed in Table 2-1, with the exception of Anahuac, Liberty, and Hempstead.⁵ H-GAC did not provide single-family and multi-family housing estimates at the county level. The percentages provided by H-GAC were multiplied by the 2003 population estimates to determine the single-family and

⁵ The data for these three cities was not available in the H-GAC database.

POPULATION ESTIMATES AND PROJECTIONS

multi-family population estimates for 2003. For instance, H-GAC reported that approximately 73.6% of the residents in Rosenberg live in single-family housing. By multiplying this percentage by 24,213, the 2003 population estimate for Rosenberg, R. W. Beck determined that the single-family population of Rosenberg was 17,826 in 2003.

**Table 2-3
Residential Population Estimates (2003)**

City	County	Total	Single-Family		Multi-Family	
			Population	Ratio	Population	Ratio
Alvin	Brazoria	22,643	13,242	58.5%	9,401	41.5%
Anahuac	Chambers	2,139	2,030	94.9%	109	5.1%
Angleton	Brazoria	18,451	13,657	74.0%	4,793	26.0%
Bay City	Matagorda	18,892	15,067	79.8%	3,825	20.2%
Baytown	Harris	70,543	42,095	59.7%	28,448	40.3%
Bellaire	Harris	17,054	16,412	96.2%	642	3.8%
Clute	Brazoria	9,773	5,206	53.3%	4,567	46.7%
Columbus	Colorado	3,933	3,359	85.4%	573	14.6%
Conroe	Montgomery	35,252	24,887	70.6%	10,365	29.4%
Deer Park	Harris	29,281	24,925	85.1%	4,355	14.9%
Dickinson	Galveston	16,804	13,923	82.9%	2,882	17.1%
El Campo	Wharton	11,094	10,256	92.4%	838	7.6%
Freeport	Brazoria	12,352	8,740	70.8%	3,612	29.2%
Friendswood	Galveston	30,421	26,180	86.1%	4,242	13.9%
Galena Park	Harris	10,072	9,080	90.1%	993	9.9%
Galveston	Galveston	53,940	36,279	67.3%	17,661	32.7%
Hempstead	Waller	5,129	4,696	91.6%	432	8.4%
Houston	Harris	1,886,512	971,289	51.5%	915,223	48.5%
Humble	Harris	14,824	5,916	39.9%	8,908	60.1%
Huntsville	Walker	37,047	26,525	71.6%	10,522	28.4%
Jacinto City	Harris	9,006	7,729	85.8%	1,278	14.2%
Katy	Harris	11,760	8,882	75.5%	2,878	24.5%
La Marque	Galveston	14,170	12,842	90.6%	1,328	9.4%
La Porte	Harris	34,027	28,011	82.3%	6,015	17.7%
Lake Jackson	Brazoria	26,958	19,794	73.4%	7,164	26.6%
League City	Galveston	45,820	38,913	84.9%	6,906	15.1%
Liberty	Liberty	7,660	6,947	90.7%	713	9.3%
Missouri City	Fort Bend	56,173	54,770	97.5%	1,403	2.5%
Pasadena	Harris	133,277	80,278	60.2%	52,998	39.8%
Pearland	Brazoria	40,841	32,363	79.2%	8,479	20.8%
Richmond	Fort Bend	11,249	7,848	69.8%	3,401	30.2%
Rosenberg	Fort Bend	24,213	17,826	73.6%	6,387	26.4%
Santa Fe	Galveston	9,991	9,335	93.4%	656	6.6%
Seabrook	Harris	13,636	7,524	55.2%	6,112	44.8%
Sealy	Austin	5,773	4,525	78.4%	1,248	21.6%
South Houston	Harris	14,335	10,046	70.1%	4,289	29.9%
Stafford	Fort Bend	14,699	10,151	69.1%	4,548	30.9%
Sugar Land	Fort Bend	66,756	61,095	91.5%	5,661	8.5%
Texas City	Galveston	40,680	31,467	77.4%	9,212	22.6%
Tomball	Harris	9,278	5,131	55.3%	4,147	44.7%
West University Place	Harris	14,063	13,868	98.6%	195	1.4%
Smaller Cities & Unincorp. ¹	Austin	19,292	18,503	95.9%	789	4.1%
Smaller Cities & Unincorp. ¹	Brazoria	123,328	119,492	96.9%	3,836	3.1%
Smaller Cities & Unincorp. ¹	Chambers	24,007	23,283	97.0%	724	3.0%
Smaller Cities & Unincorp. ¹	Colorado	17,013	16,795	98.7%	218	1.3%
Smaller Cities & Unincorp. ¹	Fort Bend	231,141	224,981	97.3%	6,160	2.7%
Smaller Cities & Unincorp. ¹	Galveston	49,078	47,364	96.5%	1,714	3.5%
Smaller Cities & Unincorp. ¹	Harris	1,284,820	1,117,836	87.0%	166,984	13.0%
Smaller Cities & Unincorp. ¹	Liberty	65,419	62,805	96.0%	2,614	4.0%
Smaller Cities & Unincorp. ¹	Matagorda	19,607	18,955	96.7%	653	3.3%
Smaller Cities & Unincorp. ¹	Montgomery	305,019	291,663	95.6%	13,356	4.4%
Smaller Cities & Unincorp. ¹	Walker	27,058	26,375	97.5%	683	2.5%
Smaller Cities & Unincorp. ¹	Waller	30,600	28,578	93.4%	2,022	6.6%
Smaller Cities & Unincorp. ¹	Wharton	31,069	29,191	94.0%	1,878	6.0%
H-GAC TOTAL		5,137,974	3,768,932	73.4%	1,369,042	26.6%

(1) "Smaller Cities & Unincorp." is the combination of cities with a population less than 10,000 and the unincorporated areas of each county. If cities were less than 10,000, but the largest in their county, they are listed individually in the table.

**Table 2-4
Total Residential Population Projections**

City	County	2005	2010	2015	2020	2025
Alvin	Brazoria	23,464	24,964	26,098	27,390	28,567
Anahuac	Chambers	2,222	2,355	2,441	2,525	2,616
Angleton	Brazoria	18,972	19,535	19,603	19,612	19,619
Bay City	Matagorda	19,452	20,387	21,309	22,116	22,785
Baytown	Harris	74,156	78,940	80,892	85,490	90,810
Bellaire	Harris	17,501	20,312	24,253	27,801	30,228
Clute	Brazoria	10,027	10,321	10,387	10,423	10,451
Columbus	Colorado	3,914	3,982	4,059	4,102	4,125
Conroe	Montgomery	37,511	40,586	41,946	43,503	44,177
Deer Park	Harris	30,012	31,442	32,604	35,171	37,977
Dickinson	Galveston	17,293	18,287	19,131	20,119	21,058
El Campo	Wharton	11,226	11,661	12,093	12,485	12,820
Freeport	Brazoria	12,712	13,106	13,160	13,200	13,237
Friendswood	Galveston	31,468	33,889	36,179	39,744	43,071
Galena Park	Harris	10,325	10,930	11,517	12,780	14,254
Galveston	Galveston	55,349	57,815	59,579	61,652	63,429
Hempstead	Waller	5,230	5,590	5,885	6,159	6,422
Houston	Harris	1,935,835	2,101,401	2,295,139	2,534,731	2,746,860
Humble	Harris	15,245	16,267	17,269	19,143	21,225
Huntsville	Walker	37,760	39,273	40,304	41,232	41,885
Jacinto City	Harris	9,235	9,762	10,259	11,615	13,059
Katy	Harris	12,266	13,446	14,570	16,011	17,410
La Marque	Galveston	14,572	15,303	15,851	16,651	17,386
La Porte	Harris	35,767	38,613	40,455	43,899	47,864
Lake Jackson	Brazoria	27,721	28,554	28,669	28,738	28,805
League City	Galveston	47,751	52,325	56,727	62,876	68,585
Liberty	Liberty	7,805	8,359	9,041	9,808	10,494
Missouri City	Fort Bend	59,817	67,575	74,431	82,588	90,182
Pasadena	Harris	136,320	142,783	148,484	158,911	170,274
Pearland	Brazoria	43,012	47,419	51,146	56,351	61,156
Richmond	Fort Bend	11,702	12,456	12,957	13,584	14,216
Rosenberg	Fort Bend	25,205	27,132	28,691	30,611	32,276
Santa Fe	Galveston	10,253	10,826	11,343	12,102	12,796
Seabrook	Harris	15,208	17,020	17,421	18,471	19,979
Sealy	Austin	5,688	5,914	6,151	6,362	6,525
South Houston	Harris	14,712	15,500	16,185	17,462	18,788
Stafford	Fort Bend	15,588	17,193	18,385	19,520	20,501
Sugar Land	Fort Bend	70,803	78,500	84,581	91,266	97,472
Texas City	Galveston	41,843	43,979	45,600	47,577	49,333
Tomball	Harris	9,623	10,333	10,942	11,801	12,645
West University Place	Harris	14,462	16,801	20,034	21,021	21,738
Smaller Cities & Unincorp. ¹	Austin	19,145	20,272	21,476	22,630	23,651
Smaller Cities & Unincorp. ¹	Brazoria	126,820	135,446	144,002	161,013	176,843
Smaller Cities & Unincorp. ¹	Chambers	24,004	24,676	25,803	28,187	30,351
Smaller Cities & Unincorp. ¹	Colorado	17,068	17,726	18,446	19,036	19,551
Smaller Cities & Unincorp. ¹	Fort Bend	254,250	306,456	354,951	426,072	493,941
Smaller Cities & Unincorp. ¹	Galveston	49,544	51,849	54,916	62,392	69,207
Smaller Cities & Unincorp. ¹	Harris	1,323,043	1,432,106	1,550,175	1,831,821	2,121,938
Smaller Cities & Unincorp. ¹	Liberty	67,209	73,743	81,651	91,752	100,906
Smaller Cities & Unincorp. ¹	Matagorda	20,157	21,046	21,914	22,657	23,255
Smaller Cities & Unincorp. ¹	Montgomery	333,757	397,888	456,874	528,105	593,479
Smaller Cities & Unincorp. ¹	Walker	27,748	29,306	30,538	31,722	32,718
Smaller Cities & Unincorp. ¹	Waller	32,545	37,959	43,877	50,252	55,941
Smaller Cities & Unincorp. ¹	Wharton	31,436	32,648	33,852	34,940	35,870
H-GAC TOTAL		5,325,755	5,821,958	6,334,246	7,127,185	7,884,751

(1) "Smaller Cities & Unincorp." is the combination of cities with a population less than 10,000 and the unincorporated areas of each county. If cities were less than 10,000, but the largest in their county, they are listed individually in the table.

2.4.2 Data Collected from U. S. Census

2.4.2.1 Cities

To determine the single-family and multi-family housing allocation for the five counties and the cities listed in Table 2-2 (which are not captured in H-GAC’s database), R. W. Beck used year 2000 data from the U. S. Census Bureau. Table 2-5 shows the format in which the data was provided by the U. S. Census. Total population is broken out by housing type, for both owners and renters of property. For instance, “2” refers to housing with two units and “50 or more” refers to housing with 50 or more units.

Table 2-5
Population in Occupied Housing Units

Owner occupied:	Renter occupied:
1, detached	1, detached
1, attached	1, attached
2	2
3 or 4	3 or 4
5 to 9	5 to 9
10 to 19	10 to 19
20 to 49	20 to 49
50 or more	50 or more
Mobile home	Mobile home
Boat, RV, van, etc.	Boat, RV, van, etc.

For each city, the populations in 1-unit residences, 2-unit residences, and mobile homes were categorized as single-family. The single-family and multi-family ratios were then calculated by dividing the appropriate sub-population by the total population of the city. Once each ratio was determined, it was applied to the 2003 population estimate to find the 2003 single-family and multi-family population, similar to the Rosenberg example.

While some mobile homes in the region may be part of a mobile home community, with similarities to a multi-family unit, many of the mobile homes in the region are located in the unincorporated areas and are more similar to single-family homes. Additionally, the housing split data provided by H-GAC classified mobile homes as single family residences.⁶

2.4.2.2 Smaller Cities and Unincorporated Areas

R. W. Beck calculated the single-family and multi-family housing allocations similarly for the smaller cities and unincorporated areas of each county. However, information in Table 2-5 was not provided directly by the U. S. Census. Therefore, the project team used the data available for the larger cities and the counties to determine the single-family and multi-family ratios for these smaller cities and

⁶ According to correspondence with demographers at H-GAC.

unincorporated areas. Once the project team determined the ratios, the single-family and multi-family populations were determined by multiplying the appropriate ratio by the population.

2.4.2.3 Counties

The single-family population for each county was determined by summing the single-family population of each of the larger cities with the single-family population of the smaller cities and unincorporated areas. The same methodology was used to determine the multi-family population for each county.

The summaries for single-family and multi-family population estimates for 2003 are contained in Table 2-3.

2.5 Single-Family and Multi-Family Population Projections (2005-2025)

2.5.1 Cities and Unincorporated Areas

R. W. Beck calculated all single-family and multi-family population projections for cities and unincorporated areas using the same methodology, regardless of the original source of the data. To project the single-family and multi-family populations from 2005 to 2025, the ratios provided by H-GAC or collected through the U. S. Census Bureau were multiplied by the total population projections discussed in Section 2.3. For instance, the 2007 population projection for Angleton was 19,494. Approximately 74% of the population in Angleton lives in single-family residences. R. W. Beck determined the single-family population for Angleton in 2007 to be 14,429. Similarly, the project team applied the ratios for the smaller cities and unincorporated areas to obtain the projections for these areas. Tables 2-6 and 2-7 summarize the single-family and multi-family residential population, respectively, for the H-GAC region. Appendix C contains the detailed projections.

2.5.2 Counties

As with the single-family and multi-family county-level population estimates for 2003, R. W. Beck summed the single-family and multi-family population projections of the cities and unincorporated areas to determine the single-family and multi-family population projections for each county from 2005 to 2025.

POPULATION ESTIMATES AND PROJECTIONS

**Table 2-6
Single-Family Population Projections**

City	County	2005	2010	2015	2020	2025
Alvin	Brazoria	13,722	14,600	15,263	16,018	16,707
Anahuac	Chambers	2,108	2,235	2,316	2,396	2,482
Angleton	Brazoria	14,043	14,460	14,510	14,517	14,522
Bay City	Matagorda	15,513	16,259	16,995	17,638	18,172
Baytown	Harris	44,251	47,106	48,271	51,014	54,189
Bellaire	Harris	16,842	19,547	23,339	26,754	29,089
Clute	Brazoria	5,341	5,498	5,533	5,552	5,567
Columbus	Colorado	3,343	3,402	3,467	3,504	3,524
Conroe	Montgomery	26,482	28,653	29,613	30,712	31,188
Deer Park	Harris	25,548	26,765	27,755	29,940	32,328
Dickinson	Galveston	14,327	15,151	15,850	16,669	17,447
El Campo	Wharton	10,378	10,780	11,180	11,542	11,852
Freeport	Brazoria	8,995	9,273	9,312	9,340	9,366
Friendswood	Galveston	27,081	29,164	31,135	34,203	37,066
Galena Park	Harris	9,308	9,853	10,382	11,520	12,849
Galveston	Galveston	37,226	38,885	40,072	41,466	42,661
Hempstead	Waller	4,789	5,118	5,389	5,640	5,881
Houston	Harris	996,684	1,081,927	1,181,675	1,305,031	1,414,248
Humble	Harris	6,084	6,492	6,892	7,640	8,470
Huntsville	Walker	27,035	28,119	28,857	29,521	29,989
Jacinto City	Harris	7,924	8,376	8,803	9,967	11,206
Katy	Harris	9,264	10,156	11,004	12,093	13,149
La Marque	Galveston	13,207	13,869	14,366	15,091	15,757
La Porte	Harris	29,444	31,787	33,303	36,138	39,402
Lake Jackson	Brazoria	20,354	20,966	21,050	21,101	21,150
League City	Galveston	40,554	44,438	48,177	53,399	58,247
Liberty	Liberty	7,078	7,581	8,199	8,895	9,517
Missouri City	Fort Bend	58,323	65,887	72,572	80,525	87,929
Pasadena	Harris	82,111	86,004	89,438	95,719	102,563
Pearland	Brazoria	34,082	37,574	40,528	44,653	48,460
Richmond	Fort Bend	8,164	8,690	9,040	9,477	9,918
Rosenberg	Fort Bend	18,556	19,975	21,123	22,536	23,762
Santa Fe	Galveston	9,580	10,115	10,598	11,307	11,956
Seabrook	Harris	8,392	9,392	9,613	10,192	11,024
Sealy	Austin	4,458	4,635	4,821	4,987	5,115
South Houston	Harris	10,311	10,863	11,343	12,238	13,167
Stafford	Fort Bend	10,766	11,874	12,697	13,481	14,158
Sugar Land	Fort Bend	64,799	71,843	77,409	83,527	89,207
Texas City	Galveston	32,367	34,020	35,273	36,803	38,161
Tomball	Harris	5,322	5,715	6,051	6,526	6,993
West University Place	Harris	14,261	16,568	19,756	20,730	21,437
Smaller Cities & Unincorp. ¹	Austin	18,362	19,443	20,597	21,704	22,683
Smaller Cities & Unincorp. ¹	Brazoria	122,876	131,234	139,523	156,005	171,343
Smaller Cities & Unincorp. ¹	Chambers	23,279	23,932	25,024	27,336	29,435
Smaller Cities & Unincorp. ¹	Colorado	16,850	17,499	18,210	18,792	19,301
Smaller Cities & Unincorp. ¹	Fort Bend	247,474	298,288	345,491	414,717	480,776
Smaller Cities & Unincorp. ¹	Galveston	47,813	50,038	52,998	60,213	66,790
Smaller Cities & Unincorp. ¹	Harris	1,151,091	1,245,979	1,348,703	1,593,744	1,846,156
Smaller Cities & Unincorp. ¹	Liberty	64,523	70,796	78,388	88,086	96,873
Smaller Cities & Unincorp. ¹	Matagorda	19,486	20,345	21,185	21,903	22,481
Smaller Cities & Unincorp. ¹	Montgomery	319,143	380,466	436,869	504,982	567,493
Smaller Cities & Unincorp. ¹	Walker	27,048	28,567	29,768	30,922	31,893
Smaller Cities & Unincorp. ¹	Waller	30,394	35,451	40,977	46,931	52,244
Smaller Cities & Unincorp. ¹	Wharton	29,536	30,674	31,805	32,828	33,702
H-GAC TOTAL		3,916,296	4,296,326	4,682,508	5,298,164	5,891,045

(1) "Smaller Cities & Unincorp." is the combination of cities with a population less than 10,000 and the unincorporated areas of each county. If cities were less than 10,000, but the largest in their county, they are listed individually in the table.

Section 2

Table 2-7
Multi-Family Population Projections

City	County	2005	2010	2015	2020	2025
Alvin	Brazoria	9,742	10,365	10,835	11,372	11,860
Anahuac	Chambers	113	120	125	129	134
Angleton	Brazoria	4,929	5,075	5,093	5,095	5,097
Bay City	Matagorda	3,938	4,128	4,314	4,478	4,613
Baytown	Harris	29,905	31,834	32,621	34,475	36,621
Bellaire	Harris	659	765	914	1,047	1,139
Clute	Brazoria	4,686	4,823	4,854	4,871	4,884
Columbus	Colorado	571	581	592	598	602
Conroe	Montgomery	11,029	11,933	12,333	12,791	12,989
Deer Park	Harris	4,464	4,676	4,849	5,231	5,649
Dickinson	Galveston	2,965	3,136	3,281	3,450	3,611
El Campo	Wharton	848	881	913	943	968
Freeport	Brazoria	3,717	3,832	3,848	3,860	3,871
Friendswood	Galveston	4,388	4,725	5,044	5,541	6,005
Galena Park	Harris	1,018	1,077	1,135	1,260	1,405
Galveston	Galveston	18,122	18,930	19,507	20,186	20,768
Hempstead	Waller	441	471	496	519	541
Houston	Harris	939,151	1,019,474	1,113,464	1,229,700	1,332,612
Humble	Harris	9,161	9,775	10,377	11,504	12,755
Huntsville	Walker	10,724	11,154	11,447	11,711	11,896
Jacinto City	Harris	1,310	1,385	1,456	1,648	1,853
Katy	Harris	3,002	3,291	3,566	3,918	4,261
La Marque	Galveston	1,365	1,434	1,485	1,560	1,629
La Porte	Harris	6,323	6,826	7,152	7,761	8,462
Lake Jackson	Brazoria	7,367	7,588	7,619	7,637	7,655
League City	Galveston	7,197	7,887	8,550	9,477	10,338
Liberty	Liberty	727	778	842	913	977
Missouri City	Fort Bend	1,494	1,688	1,859	2,063	2,253
Pasadena	Harris	54,209	56,779	59,046	63,192	67,711
Pearland	Brazoria	8,929	9,844	10,618	11,698	12,696
Richmond	Fort Bend	3,538	3,766	3,917	4,107	4,298
Rosenberg	Fort Bend	6,649	7,157	7,568	8,075	8,514
Santa Fe	Galveston	673	711	745	795	840
Seabrook	Harris	6,816	7,629	7,808	8,279	8,955
Sealy	Austin	1,230	1,279	1,330	1,376	1,411
South Houston	Harris	4,402	4,637	4,842	5,224	5,621
Stafford	Fort Bend	4,823	5,319	5,688	6,039	6,343
Sugar Land	Fort Bend	6,004	6,657	7,172	7,739	8,265
Texas City	Galveston	9,476	9,960	10,327	10,774	11,172
Tomball	Harris	4,301	4,619	4,891	5,275	5,652
West University Place	Harris	201	233	278	291	301
Smaller Cities & Unincorp. ¹	Austin	783	829	879	926	968
Smaller Cities & Unincorp. ¹	Brazoria	3,944	4,213	4,479	5,008	5,500
Smaller Cities & Unincorp. ¹	Chambers	724	745	779	851	916
Smaller Cities & Unincorp. ¹	Colorado	218	227	236	243	250
Smaller Cities & Unincorp. ¹	Fort Bend	6,776	8,168	9,460	11,356	13,165
Smaller Cities & Unincorp. ¹	Galveston	1,730	1,811	1,918	2,179	2,417
Smaller Cities & Unincorp. ¹	Harris	171,952	186,127	201,472	238,077	275,782
Smaller Cities & Unincorp. ¹	Liberty	2,686	2,947	3,263	3,667	4,033
Smaller Cities & Unincorp. ¹	Matagorda	671	701	730	754	774
Smaller Cities & Unincorp. ¹	Montgomery	14,614	17,422	20,005	23,124	25,986
Smaller Cities & Unincorp. ¹	Walker	700	739	770	800	825
Smaller Cities & Unincorp. ¹	Waller	2,151	2,509	2,900	3,321	3,697
Smaller Cities & Unincorp. ¹	Wharton	1,900	1,974	2,046	2,112	2,169
H-GAC TOTAL		1,409,459	1,525,632	1,651,738	1,829,021	1,993,706

(1) "Smaller Cities & Unincorp." is the combination of cities with a population less than 10,000 and the unincorporated areas of each county. If cities were less than 10,000, but the largest in their county, they are listed individually in the table.

Section 3

EMPLOYMENT ESTIMATES AND PROJECTIONS

3.1 Introduction

Along with single-family residential and multi-family residential MSW, commercial MSW is one of the three primary components of the MSW waste stream within H-GAC. To allocate the commercial MSW to the cities and unincorporated areas in the region, the project team needed the 2003 employment data. The commercial MSW projections were based on the 2003 commercial MSW generation tonnages, and then grown at the same rate as employment. As such, it was important for R. W. Beck to obtain employment projections for the years 2005 through 2025. R. W. Beck obtained employment data from both H-GAC and TSDC for the Study.

3.2 Employment Estimates (2003)

3.2.1 Data Provided by H-GAC

As mentioned in Section 2, H-GAC collects data for eight counties in the H-GAC planning region. This H-GAC database was the source of employment data for all counties and cities listed in Table 2-1. Employment data was provided for years 2000, 2007, 2015, 2022, and 2025. To calculate the employment estimates for 2003, R. W. Beck applied linear interpolation to the data available for the years 2000 and 2007.

3.2.2 Data Provided by Texas Workforce Commission

For the cities and counties not included in H-GAC's database (listed in Table 2-2), employment data was available from the Texas Workforce Commission (TWC) for years 2000 and 2004. R. W. Beck used this data to calculate employment for 2003.

3.2.3 Smaller Cities and Unincorporated Areas

Once R. W. Beck determined the employment for the larger cities (as defined in Section 2.1) and counties, the project team calculated the employment for the smaller cities and unincorporated areas in the region. For each county, the employment in the larger cities was subtracted from the total county employment to arrive at the employment associated with the smaller cities and unincorporated areas of each county.

Table 3-1 lists the employment estimates for all cities and unincorporated areas within the H-GAC planning region for 2003. Appendix D provides additional detail regarding R. W. Beck's employment analysis.

3.3 Employment Projections (2005 – 2025)

3.3.1 Data Provided by H-GAC

H-GAC provided employment projections for the eight counties listed in Table 2-1. Since these projections were provided for years 2007, 2015, 2022, and 2025, R. W. Beck applied linear interpolation to determine the employment projections for the intermediate years.

3.3.2 Remaining Counties and Cities

The 2003 employment estimates for the five counties and cities in Table 2-2, which were not a part of H-GAC's database, were calculated using employment data available for years 2000 and 2004 from the TWC. Since employment projections are not published TWC, R. W. Beck had to develop its own projections for these five counties and cities for 2005 to 2025.

In order to determine the employment projections of these five counties and cities, R. W. Beck determined the ratio of employees for each county and city versus the employment of the entire region for 2003. By applying this ratio to future years, R. W. Beck was able to project employment for these remaining cities and counties. For instance, the employment for the City of Sealy was estimated at 2,777 in 2003, representing 0.0893% of the region's total employment of 3,110,042. In 2015, R. W. Beck was able to iteratively determine that the total employment for the region was 3,942,958 and the employment for the City of Sealy was 0.0893% of the total, or 3,521.

3.3.3 Smaller Cities and Unincorporated Areas

Similar to the residential population projections from 2005 to 2025, R. W. Beck determined the employment projections for the smaller cities and unincorporated areas by subtracting the employment of the larger cities in each county from the county employment.

Table 3-2 summarizes these projections for all cities and unincorporated areas in the region. Appendix E provides detail for 2005 to 2025, including county-level employment projections.

EMPLOYMENT ESTIMATES AND PROJECTIONS

Table 3-1
2003 Employment Estimates

City	County	2003
Alvin	Brazoria	11,614
Anahuac	Chambers	1,004
Angleton	Brazoria	9,436
Bay City	Matagorda	6,600
Baytown	Harris	24,041
Bellaire	Harris	10,326
Clute	Brazoria	5,007
Columbus	Colorado	1,502
Conroe	Montgomery	27,707
Deer Park	Harris	13,592
Dickinson	Galveston	3,982
El Campo	Wharton	4,744
Freeport	Brazoria	5,523
Friendswood	Galveston	6,208
Galena Park	Harris	3,780
Galveston	Galveston	31,687
Hempstead	Waller	2,990
Houston	Harris	1,420,939
Humble	Harris	17,063
Huntsville	Walker	12,388
Jacinto City	Harris	1,491
Katy	Harris	5,435
La Marque	Galveston	6,183
La Porte	Harris	11,165
Lake Jackson	Brazoria	8,892
League City	Galveston	10,463
Liberty	Liberty	6,012
Missouri City	Fort Bend	7,657
Pasadena	Harris	46,057
Pearland	Brazoria	10,602
Richmond	Fort Bend	8,126
Rosenberg	Fort Bend	11,525
Santa Fe	Galveston	2,342
Seabrook	Harris	3,004
Sealy	Austin	2,777
South Houston	Harris	8,196
Stafford	Fort Bend	21,446
Sugar Land	Fort Bend	32,797
Texas City	Galveston	20,682
Tomball	Harris	7,088
West University Place	Harris	2,740
Smaller Cities & Unincorp. ¹	Austin	10,664
Smaller Cities & Unincorp. ¹	Brazoria	55,572
Smaller Cities & Unincorp. ¹	Chambers	8,772
Smaller Cities & Unincorp. ¹	Colorado	7,091
Smaller Cities & Unincorp. ¹	Fort Bend	43,362
Smaller Cities & Unincorp. ¹	Galveston	64,962
Smaller Cities & Unincorp. ¹	Harris	902,791
Smaller Cities & Unincorp. ¹	Liberty	19,230
Smaller Cities & Unincorp. ¹	Matagorda	6,502
Smaller Cities & Unincorp. ¹	Montgomery	99,185
Smaller Cities & Unincorp. ¹	Walker	10,677
Smaller Cities & Unincorp. ¹	Waller	12,559
Smaller Cities & Unincorp. ¹	Wharton	13,863
H-GAC TOTAL		3,110,042

(1) "Smaller Cities & Unincorp." is the combination of cities with a population less than 10,000 and the unincorporated areas of each county. If cities were less than 10,000, but the largest in their county, they are listed individually in the table.

Section 3

**Table 3-2
2005 – 2025 Employment Projections for the H-GAC Region**

City	County	2005	2010	2015	2020	2025
Alvin	Brazoria	12,037	13,956	16,452	17,061	17,486
Anahuac	Chambers	1,004	1,025	1,062	1,089	1,100
Angleton	Brazoria	10,535	11,843	12,192	12,536	12,770
Bay City	Matagorda	6,848	7,572	8,368	9,143	9,730
Baytown	Harris	24,923	28,008	31,682	35,845	38,969
Bellaire	Harris	10,501	11,303	12,347	13,366	14,089
Clute	Brazoria	5,150	5,472	5,770	6,058	6,242
Columbus	Colorado	1,558	1,723	1,904	2,080	2,214
Conroe	Montgomery	29,852	33,845	36,923	38,264	39,075
Deer Park	Harris	13,927	15,801	18,363	21,065	23,046
Dickinson	Galveston	4,176	4,568	4,899	5,252	5,529
El Campo	Wharton	4,921	5,442	6,014	6,571	6,993
Freeport	Brazoria	6,530	7,731	8,054	8,374	8,593
Friendswood	Galveston	6,548	7,561	8,682	9,953	11,005
Galena Park	Harris	3,893	4,364	4,958	5,531	5,948
Galveston	Galveston	33,049	35,200	36,517	37,588	38,463
Hempstead	Waller	3,083	3,295	3,493	3,633	3,741
Houston	Harris	1,472,923	1,596,678	1,716,297	1,825,329	1,902,617
Humble	Harris	18,892	21,515	22,837	24,321	25,429
Huntsville	Walker	12,852	14,212	15,705	17,161	18,263
Jacinto City	Harris	1,602	1,976	2,415	2,836	3,122
Katy	Harris	5,994	7,340	8,653	9,929	10,979
La Marque	Galveston	6,707	7,484	7,906	8,278	8,581
La Porte	Harris	11,625	13,885	16,884	19,553	21,595
Lake Jackson	Brazoria	9,054	9,445	9,828	10,154	10,382
League City	Galveston	11,106	12,637	14,116	15,627	17,016
Liberty	Liberty	6,337	6,807	7,051	7,229	7,362
Missouri City	Fort Bend	8,490	10,612	12,759	14,871	16,572
Pasadena	Harris	48,616	55,481	62,657	69,993	75,376
Pearland	Brazoria	10,892	11,711	12,592	13,714	14,538
Richmond	Fort Bend	8,583	9,454	10,144	10,536	10,847
Rosenberg	Fort Bend	12,658	14,955	16,895	18,169	19,083
Santa Fe	Galveston	2,505	2,842	3,133	3,445	3,748
Seabrook	Harris	3,139	3,665	4,318	5,030	5,606
Sealy	Austin	2,881	3,186	3,521	3,847	4,094
South Houston	Harris	8,407	9,136	9,999	10,715	11,257
Stafford	Fort Bend	22,120	23,804	25,486	26,544	27,336
Sugar Land	Fort Bend	33,979	37,322	40,921	43,730	45,836
Texas City	Galveston	21,455	22,910	24,047	25,061	25,902
Tomball	Harris	7,299	7,938	8,654	9,407	10,046
West University Place	Harris	2,825	3,342	4,061	4,949	5,559
Smaller Cities & Unincorp. ¹	Austin	11,063	12,234	13,519	14,772	15,721
Smaller Cities & Unincorp. ¹	Brazoria	55,636	58,739	63,803	69,093	72,962
Smaller Cities & Unincorp. ¹	Chambers	8,989	9,513	10,025	10,554	10,962
Smaller Cities & Unincorp. ¹	Colorado	7,357	8,136	8,990	9,824	10,454
Smaller Cities & Unincorp. ¹	Fort Bend	43,680	43,629	43,012	44,425	46,534
Smaller Cities & Unincorp. ¹	Galveston	72,002	92,529	115,005	135,686	152,475
Smaller Cities & Unincorp. ¹	Harris	925,947	1,035,563	1,179,660	1,331,780	1,449,156
Smaller Cities & Unincorp. ¹	Liberty	20,078	22,655	25,538	28,346	30,651
Smaller Cities & Unincorp. ¹	Matagorda	6,746	7,460	8,244	9,008	9,586
Smaller Cities & Unincorp. ¹	Montgomery	106,542	126,194	146,685	166,007	181,288
Smaller Cities & Unincorp. ¹	Walker	11,077	12,250	13,537	14,791	15,741
Smaller Cities & Unincorp. ¹	Waller	13,599	16,201	18,805	21,021	22,877
Smaller Cities & Unincorp. ¹	Wharton	14,382	15,905	17,576	19,204	20,438
H-GAC TOTAL		3,226,575	3,568,052	3,942,958	4,308,348	4,584,984

(1) "Smaller Cities & Unincorp." is the combination of cities with a population less than 10,000 and the unincorporated areas of each county. If cities were less than 10,000, but the largest in their county, they are listed individually in the table.

Section 4

MSW WASTE DISPOSAL ESTIMATES AND PROJECTIONS

4.1 Introduction

To project the MSW generation for the region from 2005 to 2025, it is important to understand several key pieces of information.

- Disposal rates for single-family residences, multi-family residences, and commercial businesses for fiscal year (FY) 2003.
- Single-family population, multi-family population, and employment from 2005 to 2025.

R. W. Beck determined disposal rates for FY 2003⁷ since this is the most current year that landfill disposal data is available from the TCEQ. This landfill data is required to calculate the commercial MSW disposal rate for the region.

R. W. Beck developed a survey for city governments to collect MSW tonnage data, along with other important information. R. W. Beck used the tonnage data reported in these surveys, in combination with the 2003 population estimates, to develop residential MSW disposal rates.

Once R. W. Beck developed the single-family and multi-family residential per capita disposal rates, the project team applied the rates to the population projections from 2005 to 2025 to determine the single-family and multi-family MSW projections for 2005 to 2025.

For 2003, the commercial MSW tonnage was calculated as the difference between the total tonnage disposed in the H-GAC region's landfills in 2003 and total single-family and multi-family MSW generated in 2003. R. W. Beck then allocated this total commercial MSW to the cities and unincorporated areas based on employment. The project team projected commercial MSW from 2005 to 2025 by growing the 2003 commercial MSW for each city and unincorporated area at the same rate as employment.

4.2 City Surveys

A survey was sent to all the cities in Tables 2-1 and 2-2, which represents all cities with a population exceeding 10,000 and those that were the largest in their county,

⁷ Fiscal year 2003 was from September 1, 2002 to August 31, 2003.

regardless of size. A copy of the “City Survey” is included in Appendix G. The most crucial information in the survey was the single-family, multi-family, and commercial tonnage information. Of the 41 cities that were sent the survey, a total of 19 cities responded. However, several of the responders were not able to provide data to a sufficient level of detail to allow the project team to distinguish between single-family, multi-family, and commercial sources. For instance, the City of Columbus reported the overall tonnage collected in the city, but had no way of determining whether it was single-family, multi-family, or commercial. R. W. Beck used the responses of ten cities in its analysis. The population of these cities, listed below in Table 4-1, represents approximately 46% of the total population in the H-GAC region.

Table 4-1
Cities Used in Analysis

Baytown	Pasadena
Clute	Pearland
Houston	Sugar Land
Huntsville	Texas City
League City	West University

4.3 Residential Waste Disposal Estimates (2003)

4.3.1 Single-Family Per Capita

4.3.1.1 Surveyed Cities

The cities in Table 4-1 all provided limited information regarding the disposal of three categories of single-family MSW, whether collected by the City or by a private collection company:

- Garbage
- Brush
- Bulky Items

R. W. Beck summed the tonnage of all ten cities, by category, and then divided by the total single-family population of the ten cities. There are two exceptions to this methodology.

1. The City of Houston provided tonnage for its combined brush and bulky collection. In order to allocate this combined amount between the two categories, R. W. Beck used a per capita single-family Brush disposal rate from a similar study conducted for the Dallas/Fort Worth Metroplex (Metroplex Study)⁸ to

⁸ In 2003 R. W. Beck conducted a study for a five-county subregion of the North Central Texas Council of Governments, entitled “Metroplex Area Sub-Regional Solid Waste Study.”

allocate a portion of the tonnage to Brush. The remaining tonnage was classified as Bulky.

2. The Bulky tonnage was driven primarily by the City of Houston. Once the brush tonnage was removed from the combined tonnage data provided by the City, the per capita rate for Houston was approximately 0.23 tons per person, per year, living in single-family residences. Compared to the Metroplex Study per capita rate of approximately 0.065 tons per person, R. W. Beck felt this figure appeared higher than normal. R. W. Beck used actual data for those cities reporting bulky tonnage. However, the project team calculated the per capita rate for single-family bulky waste in the remaining cities as a weighted average of the data obtained from the surveys compiled during the course of this Study and the bulky per capita rate from the Metroplex Study.

Table 4-2 lists the tonnages and per capita rates that R. W. Beck determined for single-family MSW disposal in the H-GAC region. Note the per capita rate for Bulky is not simply the tonnage divided by the applicable population, because of the second exception discussed above.

**Table 4-2
Single-Family Per Capita (Annual)**

Single-Family Population ¹	1,303,100	
	Tonnage	Per Capita (Tons per Person)
Single-Family Garbage	999,037	0.7667 ²
Single-Family Brush	156,165	0.1198
Single-Family Bulky	295,834	0.1078 ³
Single-Family Total	1,451,036	0.9943

(1) Single-Family population for the ten cities returning surveys.

(2) Single-Family Garbage per capita = 999,037 / 1,303,100 = 0.7667

(3) Weighted average of survey data and data from the Dallas/Ft. Worth Metroplex Study.

4.3.1.2 Remaining Cities, Unincorporated Areas, and Counties

For the cities that did not return a survey and for the smaller cities and unincorporated areas, R. W. Beck multiplied the per capita rate shown in Table 4-2 by the single-family population for each city or unincorporated area to get the projected single-family tonnage for 2003.

The project team determined the single-family tonnage at the county level by adding together the data for the cities and unincorporated areas. For instance, El Campo was the only city in Wharton County with a population over 10,000 in 2003. The single-family population for El Campo was 10,256 in 2003 and thus the single-family MSW tonnage for 2003 was 10,198.⁹ The combined single-family population of the smaller and unincorporated areas was 29,191. The combined tonnage of single-family MSW

⁹ Single-family tonnage = 10,256 single-family residents x 0.9943 tons per resident = 10,198 tons

for the smaller and unincorporated areas was 29,025.¹⁰ Thus, R. W. Beck determined the single-family solid waste disposal for 2003 in Wharton County to be 39,223 tons.

4.3.2 Multi-Family Per Capita

Only one city, Texas City, provided any data regarding multi-family collection. Texas City responded that 60 tons of bulky material was collected for FY 2003 from multi-family residences. R. W. Beck calculated the multi-family tonnage for Texas City by multiplying the multi-family population for 2003 by the multi-family per capita garbage rate, and then adding the 60 tons of bulky material.¹¹

With limited multi-family survey data available, R. W. Beck made an assumption regarding multi-family waste disposal. The project team assumed the per capita rate for multi-family residents to be equal to the “Single-Family Garbage” rate plus the “Single-Family Bulky” rate. Stated another way, the multi-family rate was the same as the “Single-Family Total” less “Single-Family Brush.” R. W. Beck assumed that brush and yard waste at a majority of multi-family units would be disposed of by professional landscapers and would not be picked up at multi-family residences.

Multi-Family Annual Per Capita Disposal Rate: *0.8745 tons*

4.3.3 Comparative Measures

4.3.3.1 H-GAC Management Plan

According to the 1999-2000 Update to the H-GAC Solid Waste Management Plan, the per capita waste disposal rate for the region was 7.09 pounds per person per day. That figure includes all waste disposed in the region (residential **and** commercial), not just residential waste. Additionally, in a draft amendment to the management plan, dated October 2003, the per capita rate is listed as 8.94 pounds per person per day.¹²

As a comparison, the per capita rate for 2003 calculated for this Study using the total MSW generated in the region (residential **and** commercial), was 7.78¹³ tons per person per day. This number is within the 7.09 – 8.94 pounds/day per capita rate reported in the H-GAC management plans.

4.3.3.2 TCEQ Residential Disposal

In addition to reporting overall MSW tonnages to the TCEQ during the annual reporting process, each landfill also attempts to classify the waste into 23 categories, as defined by the TCEQ. Because classification of MSW is sometimes subjective, the data may not represent a completely accurate account of waste characterization.

¹⁰ Single-family tonnage = 29,191 single-family residents x 0.9943 tons per resident = 29,025 tons

¹¹ Texas City multi-family tonnage = (9,212 multi-family residents) x (0.7667) + 60 = 7,123 tons

¹² Calculated using FY 2000 Data Summary and Analysis from TCEQ’s Annual Reporting Program for Permitted MSW Facilities.

¹³ The total MSW per capita rate = (7,299,239 tons / 5,137,974 people) * (2000 lbs per tons) / (365 days per year) = 7.78 lbs/day/person

However, the annual reports provide some overview of the MSW types being disposed in Texas landfills.

According to the landfills in the H-GAC region reporting data for the FY 2003 annual report, approximately 2,236,537 tons were classified as residential waste. Applied to the population of 5,137,974 for the H-GAC region in 2003, the per capita rate is 0.44 tons of residential MSW per person per year. This is noticeably lower than the 0.9943 tons per person per year calculated by R. W. Beck. However, there are several questions with regard to the TCEQ residential tonnage figure. First, most of the major private companies interviewed as a part of this study acknowledge that multi-family MSW is difficult to distinguish from commercial MSW because of the collection vehicles used in the collection of each type of waste. As such, multi-family MSW, which should be classified as residential, is often classified as commercial MSW.

Secondly, there are 23 categories of MSW in the TCEQ annual reports. For the purposes of this study, R. W. Beck classified all waste as either: single-family residential, multi-family residential, or commercial. In all likelihood some of the waste included in these 22 categories (excluding the residential waste category) should be included in residential waste, and as a result the “true” amount of residential waste as recorded on the TCEQ annual reports is being underreported.

4.3.3.3 Per Household Disposal

Disposal rates are sometimes reported on a per household basis rather than a per person basis. The reason for this is that an entity providing solid waste services can more easily report a disposal rate that is based on the number of accounts (or households) rather than estimating the number of people those accounts present. In the City Surveys discussed earlier in this section, the project team also asked each city to report the number of single-family, multi-family, and commercial accounts. By using the number of single-family accounts reported in the surveys and the single-family tonnage reported, R. W. Beck was able to compare this figure to the disposal rate calculated using a per capita figure. Based on the survey data provided by cities in the region the weighted average single-family tonnage disposed per household in 2003 was 2.54.¹⁴ Table 4-3 provides a sensitivity analysis for per capita rate (single-family tons per person per year) for a range of persons per household.

**Table 4-3
Per Household Single-Family MSW Comparison**

Household Disposal Rate (tons)	Persons per Household	Per Capita (tons/person/year)
2.54	2.8	0.9086
2.54	2.9	0.8773
2.54	3.0	0.8481
2.54	3.1	0.8207
2.54	3.2	0.7951

The single-family per capita rate developed in the Study is near the range of values calculated in this analysis.

¹⁴ Tons per household = 1,472,867 tons / 578,918 single-family households = 2.54 tons / household.

4.3.3.4 Houston-Area Apartment Sample

One of the private collection companies interviewed as a part of this Study provided limited data on 17 apartment complexes located in a particular area of the City of Houston. While not representative of the entire region, the data does give another reference point for per capita analysis. For each apartment complex, the private collection company provided the number of containers at the complex, the size of the containers in cubic yards, the weekly pick-up frequency, and the number of units in the complex. Calculating a per capita rate from this information requires several assumptions, particularly the number of pounds per cubic yard and the average number of residents per unit.

According to data published by the Solid Waste Association of North America in 1994, the average weight of uncompacted residential waste is between 150-300 pounds per cubic yard. Table 4-4 provides a sensitivity analysis of per capita rates based on adjusting two inputs (density of garbage and number of people per multi-family household). The 0.8745 tons per multi-family residential rate calculated by R. W. Beck and used in this analysis is within the range of values in this sensitivity analysis.

**Table 4-4
Sensitivity Analysis of Apartment Data**

Persons per Multi-Family Unit	Multi-Family Residential Per Capita Rate (tons/person/year)						
	75 lbs/CY	100 lbs/CY	125 lbs/CY	150 lbs/CY	175 lbs/CY	200 lbs/CY	225 lbs/CY
1.5	0.5753	0.7671	0.9589	1.1507	1.3424	1.5342	1.7260
2.0	0.4315	0.5753	0.7192	0.8630	1.0068	1.1507	1.2945
2.5	0.3452	0.4603	0.5753	0.6904	0.8055	0.9205	1.0356
3.0	0.2877	0.3836	0.4794	0.5753	0.6712	0.7671	0.8630

Although this analysis provides a wide range of values, the multi-family per capita rate developed for this Study is within the range of values in this sensitivity analysis.

4.4 Residential Waste Disposal Projections

4.4.1 Single-Family Projections

Once R. W. Beck established the single family-family per capita rate, the project team was able to apply this rate to the single-family population projections to determine the single-family waste disposal projections from 2005 to 2025. The project team assumed the per capita rate would remain constant from 2005 to 2025. Table 4-5 summarizes the estimates and projections for single-family residential waste disposal in the region and Appendix F contains the projections on an annual basis.

4.4.2 Multi-Family Projections

Similar to single-family residential, R. W. Beck was able to apply the established multi-family per capita rate to the multi-family population projections to determine the

WASTE DISPOSAL ESTIMATES AND PROJECTIONS

multi-family waste projections from 2005 to 2025. Table 4-6 summarizes the estimates and projections for multi-family residential waste disposal in the region and Appendix F contains the projections on an annual basis.

Table 4-5
Single-Family Residential Waste Disposal Estimates and Projections (Tons)

City	County	2003	2005	2010	2015	2020	2025
Alvin	Brazoria	13,167	13,644	14,517	15,176	15,927	16,612
Anahuac	Chambers	2,019	2,096	2,222	2,303	2,383	2,468
Angleton	Brazoria	13,579	13,963	14,378	14,428	14,434	14,439
Bay City	Matagorda	14,981	15,426	16,167	16,898	17,538	18,069
Baytown	Harris	29,264	30,763	32,747	33,557	35,464	37,671
Bellaire	Harris	16,319	16,746	19,436	23,207	26,602	28,924
Clute	Brazoria	3,478	3,568	3,673	3,696	3,709	3,719
Columbus	Colorado	3,340	3,324	3,382	3,447	3,484	3,503
Conroe	Montgomery	24,746	26,332	28,490	29,445	30,538	31,011
Deer Park	Harris	24,784	25,403	26,613	27,597	29,770	32,145
Dickinson	Galveston	13,844	14,246	15,065	15,760	16,574	17,348
El Campo	Wharton	10,198	10,319	10,719	11,116	11,477	11,785
Freeport	Brazoria	8,690	8,944	9,221	9,259	9,287	9,313
Friendswood	Galveston	26,031	26,927	28,998	30,958	34,008	36,855
Galena Park	Harris	9,028	9,255	9,797	10,323	11,455	12,776
Galveston	Galveston	36,073	37,015	38,664	39,844	41,230	42,419
Hempstead	Waller	4,670	4,762	5,090	5,358	5,608	5,847
Houston	Harris	1,186,856	1,217,887	1,322,049	1,443,935	1,594,669	1,728,125
Humble	Harris	5,882	6,049	6,455	6,852	7,596	8,422
Huntsville	Walker	10,747	10,954	11,393	11,692	11,961	12,151
Jacinto City	Harris	7,685	7,879	8,329	8,753	9,911	11,142
Katy	Harris	8,832	9,212	10,098	10,942	12,024	13,075
La Marque	Galveston	12,769	13,132	13,790	14,284	15,005	15,667
La Porte	Harris	27,852	29,277	31,606	33,114	35,933	39,178
Lake Jackson	Brazoria	19,681	20,239	20,847	20,931	20,981	21,030
League City	Galveston	33,800	35,225	38,599	41,846	46,382	50,594
Liberty	Liberty	6,907	7,038	7,538	8,153	8,844	9,463
Missouri City	Fort Bend	54,459	57,991	65,512	72,159	80,068	87,430
Pasadena	Harris	90,536	92,603	96,994	100,866	107,950	115,669
Pearland	Brazoria	33,410	35,185	38,790	41,840	46,097	50,028
Richmond	Fort Bend	7,804	8,118	8,640	8,988	9,423	9,862
Rosenberg	Fort Bend	17,725	18,451	19,862	21,003	22,408	23,627
Santa Fe	Galveston	9,282	9,525	10,057	10,538	11,243	11,888
Seabrook	Harris	7,481	8,344	9,338	9,558	10,134	10,961
Sealy	Austin	4,499	4,433	4,609	4,794	4,958	5,085
South Houston	Harris	9,989	10,252	10,801	11,278	12,168	13,092
Stafford	Fort Bend	10,093	10,704	11,806	12,625	13,404	14,078
Sugar Land	Fort Bend	26,120	27,704	30,715	33,095	35,710	38,139
Texas City	Galveston	29,750	30,601	32,163	33,348	34,794	36,078
Tomball	Harris	5,102	5,291	5,682	6,017	6,489	6,953
West University Place	Harris	7,075	7,276	8,453	10,079	10,576	10,937
Smaller Cities & Unincorp. ¹	Austin	18,398	18,257	19,332	20,480	21,581	22,554
Smaller Cities & Unincorp. ¹	Brazoria	118,813	122,178	130,488	138,730	155,118	170,369
Smaller Cities & Unincorp. ¹	Chambers	23,151	23,147	23,796	24,882	27,181	29,268
Smaller Cities & Unincorp. ¹	Colorado	16,699	16,754	17,400	18,107	18,686	19,191
Smaller Cities & Unincorp. ¹	Fort Bend	223,702	246,067	296,593	343,527	412,360	478,044
Smaller Cities & Unincorp. ¹	Galveston	47,095	47,542	49,754	52,697	59,870	66,410
Smaller Cities & Unincorp. ¹	Harris	1,111,484	1,144,550	1,238,899	1,341,039	1,584,688	1,835,665
Smaller Cities & Unincorp. ¹	Liberty	62,448	64,156	70,393	77,942	87,585	96,323
Smaller Cities & Unincorp. ¹	Matagorda	18,848	19,375	20,230	21,064	21,778	22,353
Smaller Cities & Unincorp. ¹	Montgomery	290,006	317,330	378,304	434,387	502,112	564,268
Smaller Cities & Unincorp. ¹	Walker	26,226	26,894	28,404	29,599	30,746	31,711
Smaller Cities & Unincorp. ¹	Waller	28,415	30,221	35,249	40,744	46,665	51,947
Smaller Cities & Unincorp. ¹	Wharton	29,025	29,368	30,500	31,625	32,641	33,510
H-GAC TOTAL		3,902,857	4,051,943	4,442,648	4,843,887	5,479,230	6,089,192

(1) "Smaller Cities & Unincorp." is the combination of cities with a population less than 10,000 and the unincorporated areas of each county. If cities were less than 10,000, but the largest in their county, they are listed individually in the table.

Section 4

**Table 4-6
Multi-Family Residential Waste Disposal Estimates and Projections (Tons)**

City	County	2003	2005	2010	2015	2020	2025
Alvin	Brazoria	8,221	8,519	9,064	9,475	9,944	10,372
Anahuac	Chambers	96	99	105	109	113	117
Angleton	Brazoria	4,192	4,310	4,438	4,454	4,456	4,457
Bay City	Matagorda	3,345	3,444	3,610	3,773	3,916	4,034
Baytown	Harris	24,877	26,151	27,838	28,526	30,148	32,024
Bellaire	Harris	562	576	669	799	916	996
Clute	Brazoria	3,994	4,098	4,218	4,245	4,260	4,271
Columbus	Colorado	502	499	508	518	523	526
Conroe	Montgomery	9,064	9,645	10,435	10,785	11,185	11,358
Deer Park	Harris	3,808	3,904	4,089	4,241	4,575	4,940
Dickinson	Galveston	2,520	2,593	2,742	2,869	3,017	3,158
El Campo	Wharton	733	741	770	799	824	847
Freeport	Brazoria	3,158	3,251	3,351	3,365	3,375	3,385
Friendswood	Galveston	3,709	3,837	4,132	4,411	4,846	5,251
Galena Park	Harris	868	890	942	993	1,101	1,228
Galveston	Galveston	15,444	15,848	16,554	17,059	17,652	18,161
Hempstead	Waller	378	385	412	434	454	473
Houston	Harris	800,340	821,265	891,506	973,698	1,075,343	1,165,337
Humble	Harris	7,790	8,011	8,548	9,075	10,060	11,154
Huntsville	Walker	9,201	9,378	9,754	10,010	10,241	10,403
Jacinto City	Harris	1,118	1,146	1,211	1,273	1,441	1,620
Katy	Harris	2,517	2,625	2,878	3,118	3,426	3,726
La Marque	Galveston	1,161	1,194	1,254	1,299	1,364	1,425
La Porte	Harris	5,260	5,529	5,969	6,254	6,786	7,400
Lake Jackson	Brazoria	6,265	6,442	6,636	6,662	6,678	6,694
League City	Galveston	6,039	6,294	6,897	7,477	8,288	9,040
Liberty	Liberty	624	635	681	736	799	854
Missouri City	Fort Bend	1,227	1,307	1,476	1,626	1,804	1,970
Pasadena	Harris	46,346	47,404	49,652	51,634	55,260	59,211
Pearland	Brazoria	7,414	7,808	8,608	9,285	10,230	11,102
Richmond	Fort Bend	2,974	3,094	3,293	3,426	3,592	3,759
Rosenberg	Fort Bend	5,585	5,814	6,259	6,618	7,061	7,445
Santa Fe	Galveston	574	589	622	651	695	735
Seabrook	Harris	5,345	5,961	6,671	6,828	7,240	7,831
Sealy	Austin	1,092	1,075	1,118	1,163	1,203	1,234
South Houston	Harris	3,751	3,849	4,055	4,234	4,569	4,915
Stafford	Fort Bend	3,977	4,217	4,652	4,974	5,281	5,547
Sugar Land	Fort Bend	4,950	5,250	5,821	6,272	6,768	7,228
Texas City	Galveston	7,123	7,326	7,700	7,984	8,330	8,638
Tomball	Harris	3,626	3,761	4,039	4,277	4,613	4,943
West University Place	Harris	170	175	204	243	255	264
Smaller Cities & Unincorp. ¹	Austin	690	685	725	768	810	846
Smaller Cities & Unincorp. ¹	Brazoria	3,354	3,449	3,684	3,917	4,379	4,810
Smaller Cities & Unincorp. ¹	Chambers	633	633	651	681	744	801
Smaller Cities & Unincorp. ¹	Colorado	190	191	198	206	213	219
Smaller Cities & Unincorp. ¹	Fort Bend	5,387	5,926	7,143	8,273	9,930	11,512
Smaller Cities & Unincorp. ¹	Galveston	1,499	1,513	1,584	1,677	1,906	2,114
Smaller Cities & Unincorp. ¹	Harris	146,024	150,368	162,763	176,182	208,192	241,165
Smaller Cities & Unincorp. ¹	Liberty	2,286	2,349	2,577	2,854	3,207	3,526
Smaller Cities & Unincorp. ¹	Matagorda	571	587	613	638	660	677
Smaller Cities & Unincorp. ¹	Montgomery	11,679	12,780	15,235	17,494	20,221	22,724
Smaller Cities & Unincorp. ¹	Walker	597	612	646	674	700	722
Smaller Cities & Unincorp. ¹	Waller	1,768	1,881	2,194	2,536	2,904	3,233
Smaller Cities & Unincorp. ¹	Wharton	1,642	1,662	1,726	1,790	1,847	1,896
H-GAC TOTAL		1,196,261	1,231,578	1,333,120	1,443,359	1,598,344	1,742,316

(1) "Smaller Cities & Unincorp." is the combination of cities with a population less than 10,000 and the unincorporated areas of each county. If cities were less than 10,000, but the largest in their county, they are listed individually in the table.

4.5 Commercial MSW Disposal Estimates (2003)

4.5.1 Survey Data

The City Survey also asked city officials to list the annual tonnage of commercial MSW collected within the city, whether collected by the city or by a private collection company. Not all cities collect commercial waste and therefore may not have access to the tonnage data for the city. Of the 41 cities that were surveyed, four cities provided information about commercial collection. These cities were:

- Clute
- Pearland
- Texas City
- Huntsville

The total commercial waste reported for these cities was 87,460 tons. Additionally, R. W. Beck created and sent a survey to private collection companies in the H-GAC planning region. The survey was sent to approximately 90 companies in the region. Aside from the four largest private waste companies in the H-GAC planning region, who R. W. Beck interviewed one-on-one, only one company responded to the survey. However, the response did not provide enough detail to be considered useful in the analysis. A sample copy of the survey is provided in Appendix H.

4.5.2 Allocation of Remaining Waste

4.5.2.1 TCEQ Annual Reports

Each year municipal solid waste facilities are required to complete a survey for the TCEQ. R. W. Beck collected these annual reports for all MSW facilities in the H-GAC region. Through the TCEQ annual reports, the project team was able to determine the total tonnage disposed in Type 1 and Type 4 landfills in the region. Table 4-7 lists the tonnages for each landfill.

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**Table 4-7
2003 Landfill Disposal Tonnage**

Permit	Status	Type	County	Permittee / Registrant	2003 Tonnage
1539A	A	1	BRAZORIA	REPUBLIC/SEABREEZE LANDFILL	1,020,582
1897	IP	1	BRAZORIA	WM B & D LANDFILL	-
1502	A	1	CHAMBERS	CHAMBERS COUNTY LANDFILL	15,334
1535B	A	1	CHAMBERS	SANIFILL/BAYTOWN	259,336
203	A	1	COLORADO	SAFETY KLEEN ALTAIR	30,267
1505	A	1	FORT BEND	BFI BLUE RIDGE LANDFILL	581,057
2270	IN	1	FORT BEND	LONG POINT PARTNERS	-
1149A	A	1	GALVESTON	BFI GALVESTON CO LANDFILL	357,723
1721A	A	1	GALVESTON	WM COASTAL PLAINS	685,083
261A	A	1	HARRIS	BFI MCCARTY ROAD LANDFILL	1,638,282
1193	A	1	HARRIS	BFI WHISPERING PINES	81,506
1307B	A	1	HARRIS	WM ATASCOCITA RDF	911,262
1765	IN	1	HARRIS	CITY OF LA PORTE	-
1752B	A	1	MONTGOMERY	WM SECURITY LANDFILL	321,853
2215A	IN	1	WALKER	DARRELL DICKEY INC LANDFILL	-
TYPE 1 SUBTOTAL					5,902,285
1708	A	4	BRAZORIA	DIXIE FARM ROAD LF	33,267
1797A	A	4	FORT BEND	SPRINT FORT BEND COUNTY	151,874
1849A	A	4	GALVESTON	REPUBLIC NORTH COUNTY LANDFILL	58,557
1301	A	4	HARRIS	ADDICKS FAIRBANKS LANDFILL	50
1389A	IP	4	HARRIS	WM RED BLUFF/GREEN BELT	-
1403	A	4	HARRIS	CASCO LANDFILL	-
1540A	A	4	HARRIS	WM GREENSHADOW	380
1565A	A	4	HARRIS	FAIRBANKS LANDFILL	320,741
1586A	A	4	HARRIS	GREENBELT LANDFILL	254,190
1599A	A	4	HARRIS	G.O. WEISS GREENHOUSE RD LF	72,747
1921A	A	4	HARRIS	COUGAR DISPOSAL INC	165,661
2185	A	4	HARRIS	WM HAWTHORN PARK LANDFILL	2,545
2240	A	4	HARRIS	RALSTON ROAD LANDFILL	117,347
2276	IN	4	HARRIS	APPLEROCK DISPOSAL FACILITY	-
2304	A	4	HARRIS	TALL PINES LANDFILL	219,595
TYPE 4 SUBTOTAL					1,396,954
TOTAL					7,299,239

A- Active; IN – Inactive, never accepted waste; IP – Inactive, previously accepted waste

The total commercial MSW generated in the H-GAC planning region for 2003 was determined to be total MSW disposed in the region for 2003 minus the single-family and multi-family MSW generated in 2003. By subtracting 5,099,118 tons, the total single and multi-family residential tonnage, from 7,299,239 tons, the total disposed in H-GAC landfills, R. W. Beck determined the commercial MSW disposed in 2003 to be 2,200,121 tons. Figure 4-1 provides the breakdown of waste disposal in the H-GAC region.

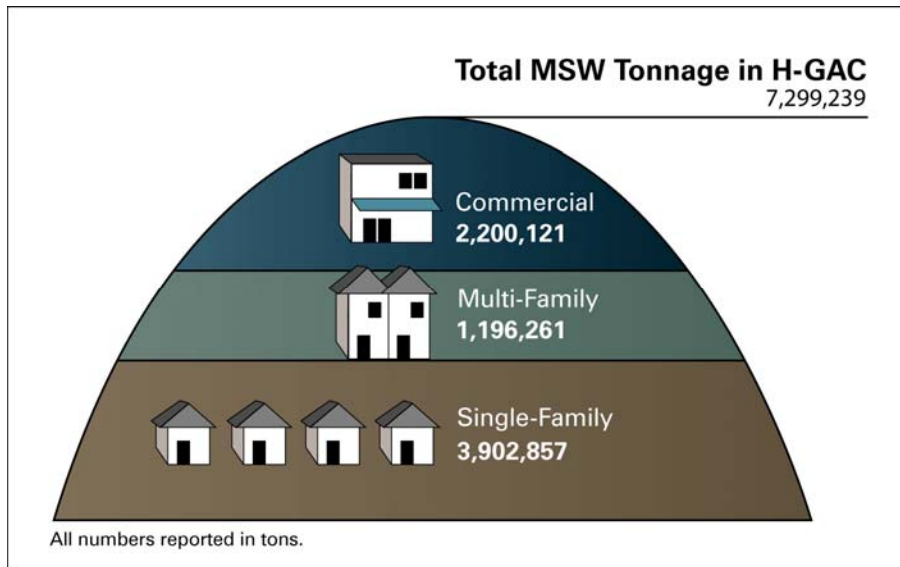


Figure 4-1: MSW Breakdown in H-GAC Region (2003)

4.5.2.2 Cities and Unincorporated Areas

R. W. Beck used actual tonnage data for those cities that provided commercial MSW collection data in the surveys. R. W. Beck subtracted the sum of this reported data from the total commercial MSW tonnage, and then allocated the remainder commercial MSW based on employment. This methodology was used since there is typically a strong correlation between the number of employees in a region and the amount of commercial MSW generated in that region. Table 4-8 provides an example of this methodology for the City of Conroe in Montgomery County. The methodology was the same for the 41 larger cities and the small cities and unincorporated areas.

Table 4-8
Commercial Waste Allocation

Conroe Employment	27,707
Remaining H-GAC Region Employment ⁽¹⁾	3,061,363
Percentage of Total	0.91%
Commercial MSW Tonnage to be Allocated	2,112,661
Commercial MSW Tonnage Allocated to Conroe	19,1860

(1) Total H-GAC employment minus employment for those cities returning commercial MSW collection data.

Table 4-9 summarizes the commercial MSW disposal projections for all cities and unincorporated areas in the H-GAC region. The projections listed for each year are contained in Appendix F.

4.5.2.3 Counties

R. W. Beck determined the commercial MSW for each county by summing the commercial MSW estimates for the respective cities and unincorporated areas. Appendix F shows commercial MSW at the county level.

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**Table 4-9
Commercial Waste Disposal Estimates and Projections (Tons)**

City	County	2003	2005	2010	2015	2020	2025
Alvin	Brazoria	8,043	8,335	9,664	11,393	11,814	12,109
Anahuac	Chambers	695	695	710	735	754	762
Angleton	Brazoria	6,534	7,295	8,201	8,443	8,681	8,843
Bay City	Matagorda	4,570	4,742	5,244	5,795	6,332	6,738
Baytown	Harris	16,648	17,258	19,395	21,939	24,822	26,985
Bellaire	Harris	7,150	7,272	7,827	8,550	9,255	9,756
Clute	Brazoria	7,842	8,065	8,569	9,036	9,487	9,775
Columbus	Colorado	1,040	1,079	1,193	1,318	1,441	1,533
Conroe	Montgomery	19,186	20,672	23,437	25,568	26,497	27,058
Deer Park	Harris	9,412	9,644	10,941	12,716	14,587	15,959
Dickinson	Galveston	2,758	2,891	3,163	3,392	3,637	3,829
El Campo	Wharton	3,285	3,408	3,768	4,164	4,550	4,843
Freeport	Brazoria	3,824	4,522	5,353	5,577	5,799	5,950
Friendswood	Galveston	4,299	4,535	5,236	6,012	6,892	7,621
Galena Park	Harris	2,617	2,696	3,022	3,433	3,830	4,119
Galveston	Galveston	21,942	22,885	24,375	25,287	26,028	26,635
Hempstead	Waller	2,070	2,135	2,282	2,419	2,516	2,591
Houston	Harris	983,960	1,019,957	1,105,654	1,188,487	1,263,988	1,317,508
Humble	Harris	11,815	13,082	14,899	15,814	16,842	17,609
Huntsville	Walker	24,521	25,440	28,132	31,088	33,969	36,150
Jacinto City	Harris	1,033	1,109	1,368	1,672	1,964	2,162
Katy	Harris	3,764	4,150	5,083	5,992	6,876	7,603
La Marque	Galveston	4,282	4,644	5,183	5,475	5,732	5,942
La Porte	Harris	7,731	8,050	9,615	11,692	13,540	14,954
Lake Jackson	Brazoria	6,158	6,269	6,540	6,806	7,031	7,189
League City	Galveston	17,160	18,215	20,725	23,152	25,631	27,908
Liberty	Liberty	4,163	4,388	4,714	4,883	5,006	5,098
Missouri City	Fort Bend	5,302	5,879	7,349	8,835	10,298	11,476
Pasadena	Harris	31,893	33,665	38,419	43,388	48,468	52,196
Pearland	Brazoria	23,397	24,038	25,846	27,789	30,265	32,084
Richmond	Fort Bend	5,627	5,943	6,547	7,024	7,296	7,511
Rosenberg	Fort Bend	7,981	8,765	10,356	11,699	12,581	13,214
Santa Fe	Galveston	1,622	1,735	1,968	2,170	2,386	2,595
Seabrook	Harris	2,080	2,173	2,538	2,990	3,483	3,882
Sealy	Austin	1,923	1,995	2,206	2,438	2,664	2,835
South Houston	Harris	5,675	5,822	6,326	6,924	7,420	7,795
Stafford	Fort Bend	14,851	15,318	16,484	17,648	18,381	18,929
Sugar Land	Fort Bend	22,711	23,530	25,844	28,337	30,281	31,740
Texas City	Galveston	14,540	15,083	16,106	16,905	17,618	18,209
Tomball	Harris	4,909	5,054	5,497	5,993	6,514	6,957
West University Place	Harris	1,897	1,956	2,314	2,812	3,427	3,849
Smaller Cities & Unincorp. ¹	Austin	7,384	7,661	8,472	9,362	10,229	10,886
Smaller Cities & Unincorp. ¹	Brazoria	38,482	38,572	40,936	44,725	48,027	50,443
Smaller Cities & Unincorp. ¹	Chambers	6,074	6,225	6,588	6,942	7,308	7,591
Smaller Cities & Unincorp. ¹	Colorado	4,910	5,094	5,634	6,226	6,803	7,239
Smaller Cities & Unincorp. ¹	Fort Bend	30,027	30,247	30,212	29,785	30,763	32,223
Smaller Cities & Unincorp. ¹	Galveston	44,984	50,005	64,703	80,829	95,546	107,357
Smaller Cities & Unincorp. ¹	Harris	625,157	641,192	717,097	816,881	922,220	1,003,499
Smaller Cities & Unincorp. ¹	Liberty	13,316	13,903	15,688	17,684	19,629	21,225
Smaller Cities & Unincorp. ¹	Matagorda	4,503	4,671	5,166	5,708	6,237	6,638
Smaller Cities & Unincorp. ¹	Montgomery	68,682	73,777	87,386	101,575	114,955	125,537
Smaller Cities & Unincorp. ¹	Walker	7,394	7,671	8,483	9,374	10,242	10,900
Smaller Cities & Unincorp. ¹	Waller	8,697	9,417	11,218	13,022	14,556	15,842
Smaller Cities & Unincorp. ¹	Wharton	9,600	9,959	11,013	12,171	13,299	14,152
H-GAC TOTAL		2,200,121	2,282,788	2,524,687	2,790,073	3,048,397	3,244,033

(1) "Smaller Cities & Unincorp." is the combination of cities with a population less than 10,000 and the unincorporated areas of each county. If cities were less than 10,000, but the largest in their county, they are listed individually in the table.

4.6 Commercial MSW Disposal Projections (2005 - 2025)

R. W. Beck assumed that the commercial MSW disposal would grow proportionally to the employment for each city and the unincorporated areas.

4.6.1 Cities and Unincorporated Areas

For the cities and unincorporated areas, R. W. Beck grew the 2003 MSW tonnages at the same annual rate as employment for each city or unincorporated area to determine commercial MSW from 2005 to 2025.

4.6.2 Counties

R. W. Beck determined the commercial waste projections for the counties in the region by summing the MSW projections of the cities and unincorporated areas.

4.7 Total Waste Disposal Projections

The total MSW waste disposal projections, summarized in Table 4-10, are the sum of single-family residential, multi-family residential, and commercial waste for the H-GAC region. See Appendix F regarding the comprehensive results. Figure 4-2 also provides a graphical illustration of the total MSW waste projections.

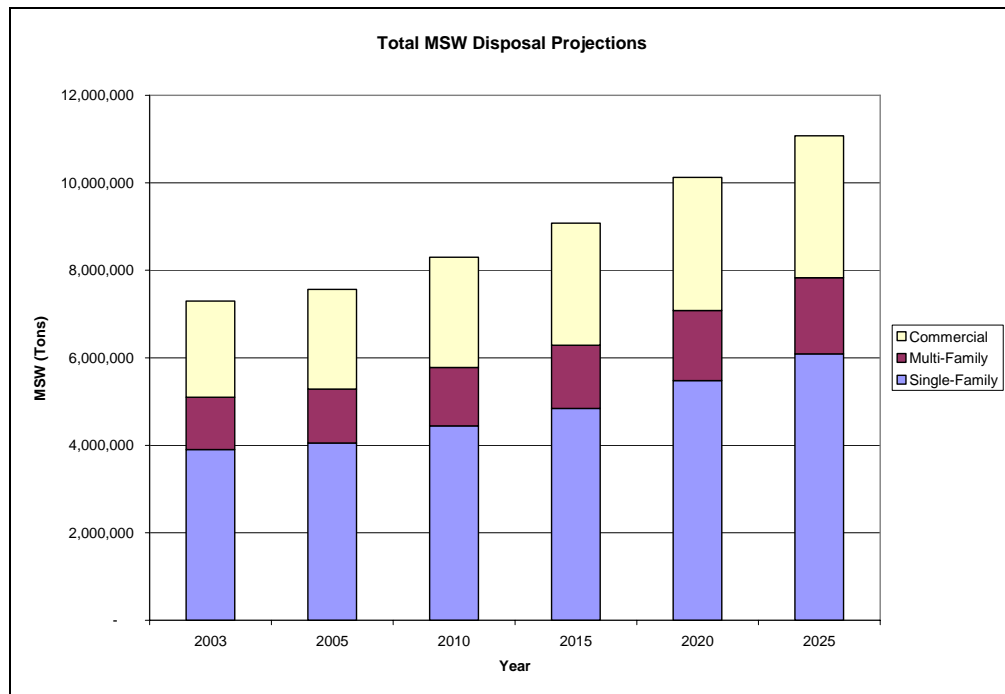


Figure 4-2: Total MSW Projections

Section 4

**Table 4-10
Total Waste Disposal Estimates and Projections (Tons)**

City	County	2003	2005	2010	2015	2020	2025
Alvin	Brazoria	29,431	30,498	33,245	36,044	37,686	39,092
Anahuac	Chambers	2,810	2,890	3,037	3,148	3,250	3,347
Angleton	Brazoria	24,306	25,569	27,017	27,324	27,571	27,740
Bay City	Matagorda	22,897	23,611	25,020	26,465	27,785	28,841
Baytown	Harris	70,789	74,172	79,980	84,022	90,434	96,680
Bellaire	Harris	24,031	24,595	27,932	32,556	36,773	39,676
Clute	Brazoria	15,313	15,732	16,460	16,977	17,456	17,765
Columbus	Colorado	4,882	4,902	5,083	5,283	5,448	5,563
Conroe	Montgomery	52,996	56,648	62,362	65,798	68,220	69,428
Deer Park	Harris	38,004	38,951	41,644	44,553	48,931	53,043
Dickinson	Galveston	19,121	19,731	20,971	22,022	23,228	24,334
El Campo	Wharton	14,215	14,468	15,258	16,079	16,851	17,474
Freeport	Brazoria	15,673	16,716	17,925	18,201	18,461	18,648
Friendswood	Galveston	34,039	35,298	38,366	41,381	45,746	49,727
Galena Park	Harris	12,513	12,841	13,761	14,749	16,386	18,123
Galveston	Galveston	73,460	75,748	79,593	82,190	84,911	87,214
Hempstead	Waller	7,118	7,282	7,783	8,211	8,578	8,911
Houston	Harris	2,971,156	3,059,109	3,319,208	3,606,119	3,934,000	4,210,970
Humble	Harris	25,488	27,143	29,902	31,741	34,498	37,185
Huntsville	Walker	44,469	45,772	49,279	52,790	56,171	58,704
Jacinto City	Harris	9,835	10,134	10,908	11,699	13,316	14,925
Katy	Harris	15,112	15,987	18,058	20,052	22,327	24,403
La Marque	Galveston	18,212	18,970	20,227	21,058	22,102	23,034
La Porte	Harris	40,844	42,857	47,191	51,060	56,259	61,532
Lake Jackson	Brazoria	32,103	32,950	34,023	34,399	34,691	34,913
League City	Galveston	56,999	59,734	66,221	72,475	80,301	87,542
Liberty	Liberty	11,694	12,061	12,932	13,771	14,649	15,415
Missouri City	Fort Bend	60,988	65,177	74,337	82,620	92,169	100,875
Pasadena	Harris	168,775	173,673	185,065	195,889	211,678	227,076
Pearland	Brazoria	64,221	67,032	73,244	78,914	86,593	93,214
Richmond	Fort Bend	16,405	17,155	18,480	19,438	20,311	21,131
Rosenberg	Fort Bend	31,291	33,030	36,476	39,320	42,051	44,287
Santa Fe	Galveston	11,478	11,849	12,647	13,359	14,323	15,218
Seabrook	Harris	14,907	16,478	18,547	19,376	20,857	22,674
Sealy	Austin	7,514	7,504	7,934	8,395	8,825	9,154
South Houston	Harris	19,415	19,923	21,183	22,437	24,157	25,803
Stafford	Fort Bend	28,921	30,240	32,942	35,247	37,066	38,554
Sugar Land	Fort Bend	53,781	56,484	62,380	67,703	72,760	77,107
Texas City	Galveston	51,413	53,010	55,969	58,238	60,743	62,926
Tomball	Harris	13,637	14,107	15,218	16,286	17,616	18,852
West University Place	Harris	9,143	9,408	10,971	13,134	14,258	15,050
Smaller Cities & Unincorp. ¹	Austin	26,473	26,603	28,529	30,610	32,620	34,287
Smaller Cities & Unincorp. ¹	Brazoria	160,649	164,200	175,108	187,371	207,524	225,622
Smaller Cities & Unincorp. ¹	Chambers	29,858	30,005	31,034	32,505	35,233	37,660
Smaller Cities & Unincorp. ¹	Colorado	21,800	22,039	23,232	24,538	25,701	26,649
Smaller Cities & Unincorp. ¹	Fort Bend	259,116	282,241	333,947	381,585	453,053	521,780
Smaller Cities & Unincorp. ¹	Galveston	93,578	99,060	116,040	135,203	157,322	175,881
Smaller Cities & Unincorp. ¹	Harris	1,882,665	1,936,110	2,118,760	2,334,102	2,715,100	3,080,329
Smaller Cities & Unincorp. ¹	Liberty	78,050	80,408	88,659	98,480	110,420	121,074
Smaller Cities & Unincorp. ¹	Matagorda	23,921	24,633	26,008	27,411	28,675	29,668
Smaller Cities & Unincorp. ¹	Montgomery	370,368	403,887	480,925	553,456	637,289	712,529
Smaller Cities & Unincorp. ¹	Walker	34,216	35,177	37,533	39,646	41,688	43,333
Smaller Cities & Unincorp. ¹	Waller	38,881	41,519	48,661	56,302	64,125	71,022
Smaller Cities & Unincorp. ¹	Wharton	40,267	40,989	43,239	45,585	47,787	49,559
H-GAC TOTAL		7,299,239	7,566,309	8,300,455	9,077,319	10,125,970	11,075,542

(1) "Smaller Cities & Unincorp." is the combination of cities with a population less than 10,000 and the unincorporated areas of each county. If cities were less than 10,000, but the largest in their county, they are listed individually in the table.

5.1 Introduction

In order to gain a full understanding of the regional solid waste disposal needs in the H-GAC region, R. W. Beck analyzed the available landfill capacity of the region for the next 20 years. By comparing the landfill disposal capacity over the next 20 years with the projected MSW disposal, R. W. Beck can provide valuable information to H-GAC for solid waste management planning.

5.2 Current Disposal Capacity

5.2.1 TCEQ Landfill Reports

As mentioned in Section 4, the TCEQ requires landfills in Texas to complete an annual questionnaire that TCEQ compiles into an annual report. Table 5-1 lists the landfills in the region and the remaining capacity at the end of FY 2003.¹⁵

5.3 Planned Landfill Expansions

In order to better understand the available capacity through 2025, it was necessary for R. W. Beck to collect all available information on planned landfill expansions. This was accomplished two ways: through a landfill survey developed by R. W. Beck and by conducting in-person interviews with several landfill operators.

5.3.1 Landfill Survey

R. W. Beck created a landfill survey and sent it to the operators of Type 1 and Type 4 landfills in the H-GAC region. Among other information, the survey asked operators the following:

- Verification of FY 2003 tonnage and remaining capacity data presented in TCEQ annual report.
- Known expansion plans – amount and approximate timeline.
- Waste received from outside the region or state.

¹⁵ This is the most recent landfill data from the TCEQ. Fiscal year 2003 is defined as September 1, 2002 through August 31, 2003.

Section 5

Appendix I contains a sample of the landfill survey.

**Table 5-1
2003 Landfill Disposal Tonnage**

Permit	Status	Type	County	Permittee / Registrant	2003 Remaining Capacity	
					Cubic Yards	Tons
1539A	A	1	BRAZORIA	REPUBLIC\SEABREEZE LANDFILL	38,590,969	28,287,180
1897	IP	1	BRAZORIA	WM B & D LANDFILL	731,491	438,895
1502	A	1	CHAMBERS	CHAMBERS COUNTY LANDFILL	757,435	365,236
1535B	A	1	CHAMBERS	SANIFILL/BAYTOWN	15,353,000	8,634,243
203	A	1	COLORADO	SAFETY KLEEN ALTAIR	77,497	2,586
1505	A	1	FORT BEND	BFI BLUE RIDGE LANDFILL	17,762,600	10,886,223
2270	IN	1	FORT BEND	LONG POINT PARTNERS	-	-
1149A	A	1	GALVESTON	BFI GALVESTON CO LANDFILL	7,610,257	5,250,152
1721A	A	1	GALVESTON	WM COASTAL PLAINS	22,837,000	12,760,529
261A	A	1	HARRIS	BFI MCCARTY ROAD LANDFILL	6,649,343	5,785,090
1193	A	1	HARRIS	BFI WHISPERING PINES	11,894,554	8,047,714
1307B	A	1	HARRIS	WM ATASCOCITA RDF	7,870,000	3,747,484
1765	IN	1	HARRIS	CITY OF LA PORTE	-	-
1752B	A	1	MONTGOMERY	WM SECURITY LANDFILL	3,162,000	1,440,665
2215A	IN	1	WALKER	DARRELL DICKEY INC LANDFILL	5,204,000	3,122,400
TYPE 1 SUBTOTAL					138,500,146	88,768,397
1708	A	4	BRAZORIA	DIXIE FARM ROAD LF	3,242,103	1,393,258
1797A	A	4	FORT BEND	SPRINT FORT BEND COUNTY	21,035,442	10,517,721
1849A	A	4	GALVESTON	REPUBLIC NORTH COUNTY LF	1,642,097	598,282
1301	A	4	HARRIS	ADDICKS FAIRBANKS LANDFILL	1,991,516	995,730
1389A	IP	4	HARRIS	WM RED BLUFF/GREEN BELT	-	-
1403	A	4	HARRIS	CASCO LANDFILL	2,906,268	1,307,821
1540A	A	4	HARRIS	WM GREENSHADOW	4,340,528	2,170,053
1565A	A	4	HARRIS	FAIRBANKS LANDFILL	2,446,000	973,143
1586A	A	4	HARRIS	GREENBELT LANDFILL	10,245,333	5,634,933
1599A	A	4	HARRIS	G.O. WEISS GREENHOUSE RD LF	7,298,111	2,846,497
1921A	A	4	HARRIS	COUGAR DISPOSAL INC	3,672,000	1,647,012
2185	A	4	HARRIS	WM HAWTHORN PARK LANDFILL	3,430,000	1,713,586
2240	A	4	HARRIS	RALSTON ROAD LANDFILL	2,388,088	1,076,697
2276	IN	4	HARRIS	APPLEROCK DISPOSAL FACILITY	8,750,000	5,250,000
2304	A	4	HARRIS	TALL PINES LANDFILL	733,541	234,824
TYPE 4 SUBTOTAL					74,121,027	36,359,557
TOTAL					212,621,173	125,127,954

A- Active; IN – Inactive, never accepted waste; IP – Inactive, previously accepted waste

5.3.2 Interviews with Landfill Operators

Members of the project team visited with representatives from Waste Management, Browning-Ferris Industries, WCA Waste Corporation, and Republic Waste Services to discuss the landfills that each operates in the region. Through these meetings and follow-up conversations, R. W. Beck was able to collect additional information about landfill expansion plans.

5.4 Disposal Capacity through 2025

Based on this research, R. W. Beck was able to examine the disposal capacity for the region from 2005 to 2025, inclusive of approved or planned landfill expansions. Table 5-2 provides the data resulting from this effort. Figure 5-1 provides a graphic representation of MSW disposal projections versus capacity in H-GAC through 2025.

This Study contains data concerning long-term MSW disposal capacity in the H-GAC region. Inclusion of this data does not indicate an opinion of H-GAC on any existing or future MSW permit applications in the region.

**Table 5-2
Proposed Landfill Expansions**

Permit	Status	Type	County	Permittee / Registrant	Cubic Yards	Tons	Year	2003 Remaining Capacity with Expansions (Tons) ¹
1539A	A	1	BRAZORIA	REPUBLIC\SEABREEZE LF				28,287,180
1897	IP	1	BRAZORIA	WM B & D LANDFILL				438,895
1502	A	1	CHAMBERS	CHAMBERS COUNTY LF				365,236
1535B	A	1	CHAMBERS	SANIFILL/BAYTOWN				8,634,243
203	A	1	COLORADO	SAFETY KLEEN ALTAIR				2,586
1505	A	1	FORT BEND	BFI BLUE RIDGE LF	170,000,000	100,980,000	2020	111,866,223
2270	IN	1	FORT BEND	LONG POINT PARTNERS	47,600,000	28,560,000	2005	28,560,000
1149A	A	1	GALVESTON	BFI GALVESTON CO LF	50,000,000	37,150,000	2008	42,400,152
1721A	A	1	GALVESTON	WM COASTAL PLAINS				12,760,529
261A	A	1	HARRIS	BFI MCCARTY ROAD LF	22,000,000	19,140,000	2005	24,925,090
1193	A	1	HARRIS	BFI WHISPERING PINES				8,047,714
1307B	A	1	HARRIS	WM ATASCOCITA RDF	31,250,000	18,750,000	2005	22,497,484
1765	IN	1	HARRIS	CITY OF LA PORTE				-
1752B	A	1	MONTGOMERY	WM SECURITY LF	17,900,000	10,740,000	2004	12,180,665
2215A	IN	1	WALKER	DARRELL DICKEY INC LF				3,122,400
TYPE 1 SUBTOTAL					338,750,000	215,320,000		304,088,397
1708	A	4	BRAZORIA	DIXIE FARM ROAD LF				1,393,258
1797A	A	4	FORT BEND	SPRINT FORT BEND COUNTY				10,517,721
1849A	A	4	GALVESTON	REPUBLIC NORTH COUNTY LF	2,000,000	800,000	2007	1,398,282
1301	A	4	HARRIS	ADDICKS FAIRBANKS LF				995,730
1389A	IP	4	HARRIS	WM RED BLUFF/GREEN BELT				-
1403	A	4	HARRIS	CASCO LANDFILL				1,307,821
1540A	A	4	HARRIS	WM GREENSHADOW				2,170,053
1565A	A	4	HARRIS	FAIRBANKS LANDFILL				973,143
1586A	A	4	HARRIS	GREENBELT LANDFILL				5,634,933
1599A	A	4	HARRIS	G.O. WEISS GREENHOUSE RD LF				2,846,497
1921A	A	4	HARRIS	COUGAR DISPOSAL INC				1,647,012
2185	A	4	HARRIS	WM HAWTHORN PARK LF				1,713,586
2240	A	4	HARRIS	RALSTON ROAD LANDFILL				1,076,697
2276	IN	4	HARRIS	APPLEROCK DISPOSAL FACILITY				5,250,000
2304	A	4	HARRIS	TALL PINES LANDFILL	8,486,000	4,667,300	2004	4,902,124
2324	AP	4	MONTGOMERY	MONTGOMERY LF SOLUTIONS				-
TYPE 4 SUBTOTAL					10,486,000	5,467,300		41,826,857
TOTAL					349,236,000	220,787,300		345,915,254

(1) This column shows capacity (**existing and proposed**) as of 2003, assuming all expansions occur.

A- Active; AP – Permit application; IN – Inactive, never accepted waste; IP – Inactive, previously accepted waste

There are several noteworthy comments about this landfill expansion list.

- **Permit 1505** – The Blue Ridge Landfill reported plans for large expansion in 2020. If this landfill is expanded as planned, it will add significant capacity to the H-GAC region.
- **Permit Application 2324** – The Montgomery Landfill Solutions Landfill has not yet been approved and the planned capacity has not been determined to a level of certainty worth reporting at this time.
- **Permit 2215-A** – Darrell Dickey Landfill, near Huntsville, has never accepted waste. Currently, waste from Huntsville is taken to a landfill in Polk County, which is outside the H-GAC planning region. Because of political and

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operational challenges, it is not known when, or if, this landfill will accept waste in the future.

- **Permit 1765** – The City of La Porte Landfill is inactive and has never accepted waste. Although the permit has existed for many years, it is unlikely that this landfill will ever accept waste.¹⁶

Assuming that all 220,787,300 additional tons of landfill capacity becomes available, H-GAC should have sufficient landfill capacity beyond 2025.

Based on this analysis, there are several key points about landfill capacity:

- *If none of the proposed expansions occur, then the landfills in the H-GAC planning region will reach capacity between 2017 and 2018.*
- *If all proposed expansions occur, then the landfills in the H-GAC planning region will have sufficient capacity until approximately 2036.*
- *If all proposed expansions occur except the one at the Permit 1505 Blue Ridge Landfill, then the landfills in the H-GAC planning region will have sufficient capacity through approximately 2028.*

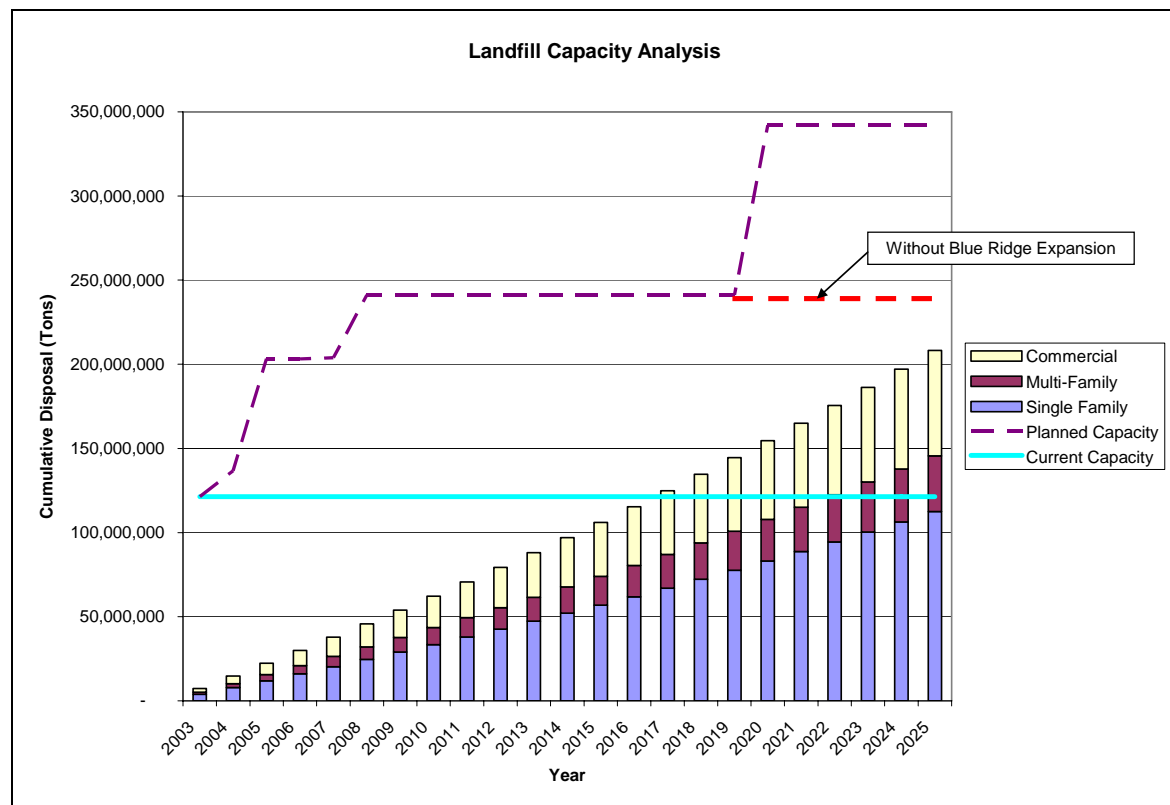


Figure 5-1: MSW Generation versus Disposal Capacity in the H-GAC Region

¹⁶ According to the City of La Porte Public Works Department, it is probable this landfill will never open.

5.5 Disposal Capacity by Subregion

5.5.1.1 Subregions

H-GAC divides its 13-county region into 8 subregions. These subregions are listed in Table 5-3.

Table 5-3
H-GAC Subregions

Subregion	Counties
Subregion 1	Montgomery, Walker
Subregion 2	Chambers, Liberty
Subregion 3	Galveston
Subregion 4	Brazoria
Subregion 5	Colorado, Matagorda, Wharton
Subregion 6	Austin, Waller
Subregion 7	Fort Bend
Subregion 8	Harris

5.5.1.2 Disposal and Capacity

Table 5-4 shows the cumulative amount of MSW generated versus capacity by subregion. Note that some subregions have excess capacity while others do not. For example, the cumulative MSW generated in Subregion 1 reaches 16,046,404 tons in 2025. This amount exceeds the 15,303,065 tons of available capacity, meaning Subregion 1 will become a net exporter of MSW shortly before 2025. This highlights the importance of transfer stations within the H-GAC region. Appendix J provides subregional demand versus capacity graphs in a format similar to Figure 5-1.

Table 5-4
Cumulative Subregional Disposal and Capacity

Subregion	Cumulative MSW Generation by Subregion (tons)					2003 Capacity with Expansions, by Subregion (tons)
	2005	2010	2015	2020	2025	
Subregion 1	1,565,299	4,548,226	7,943,491	11,776,971	16,046,404	15,303,065
Subregion 2	371,666	1,026,466	1,741,504	2,527,966	3,389,259	8,999,479
Subregion 3	1,097,548	3,075,564	5,233,406	7,591,280	10,151,808	56,558,963
Subregion 4	1,041,591	2,881,225	4,832,958	6,921,364	9,156,051	30,119,333
Subregion 5	387,939	1,062,296	1,774,062	2,521,529	3,300,080	2,586
Subregion 6	244,340	688,088	1,184,457	1,733,936	2,333,577	-
Subregion 7	1,402,242	4,056,913	7,051,782	10,455,841	14,307,033	150,943,944
Subregion 8	16,187,696	44,928,739	76,338,719	111,104,036	149,525,257	83,987,884
Total	22,298,321	62,267,516	106,100,379	154,632,922	208,209,467	345,915,254

Figures 5-2 through 5-5 show the MSW facilities (Type 1 and Type 4 landfills, permitted transfer stations, and register transfer stations) in the H-GAC region. Note that in Subregion 8 (Harris County), where disposal needs outweigh capacity, there a larger number of transfer stations to allow for the transfer of waste outside the county.

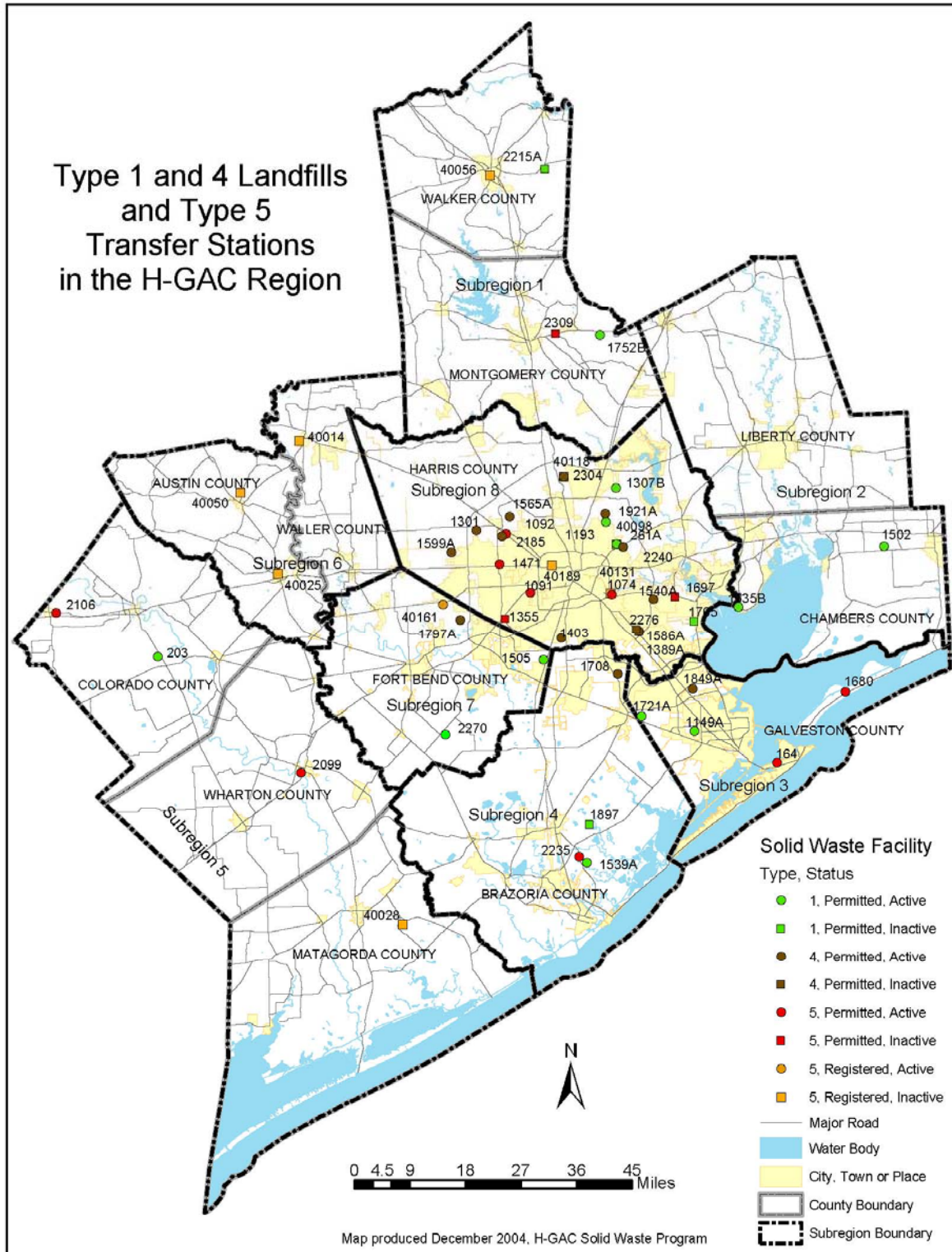


Figure 5-2: MSW Facilities in the H-GAC Region

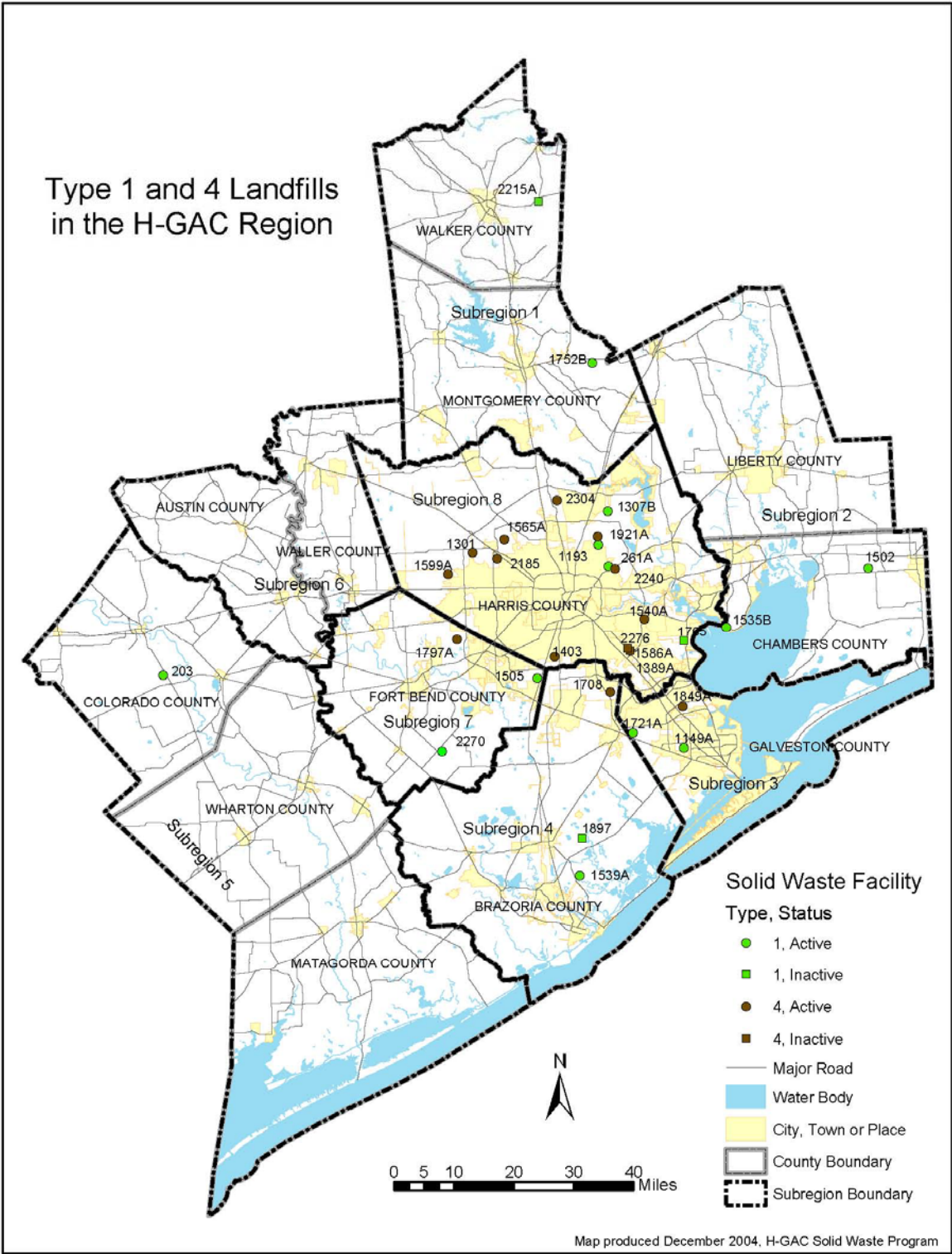


Figure 5-3: MSW Landfills in the H-GAC Region

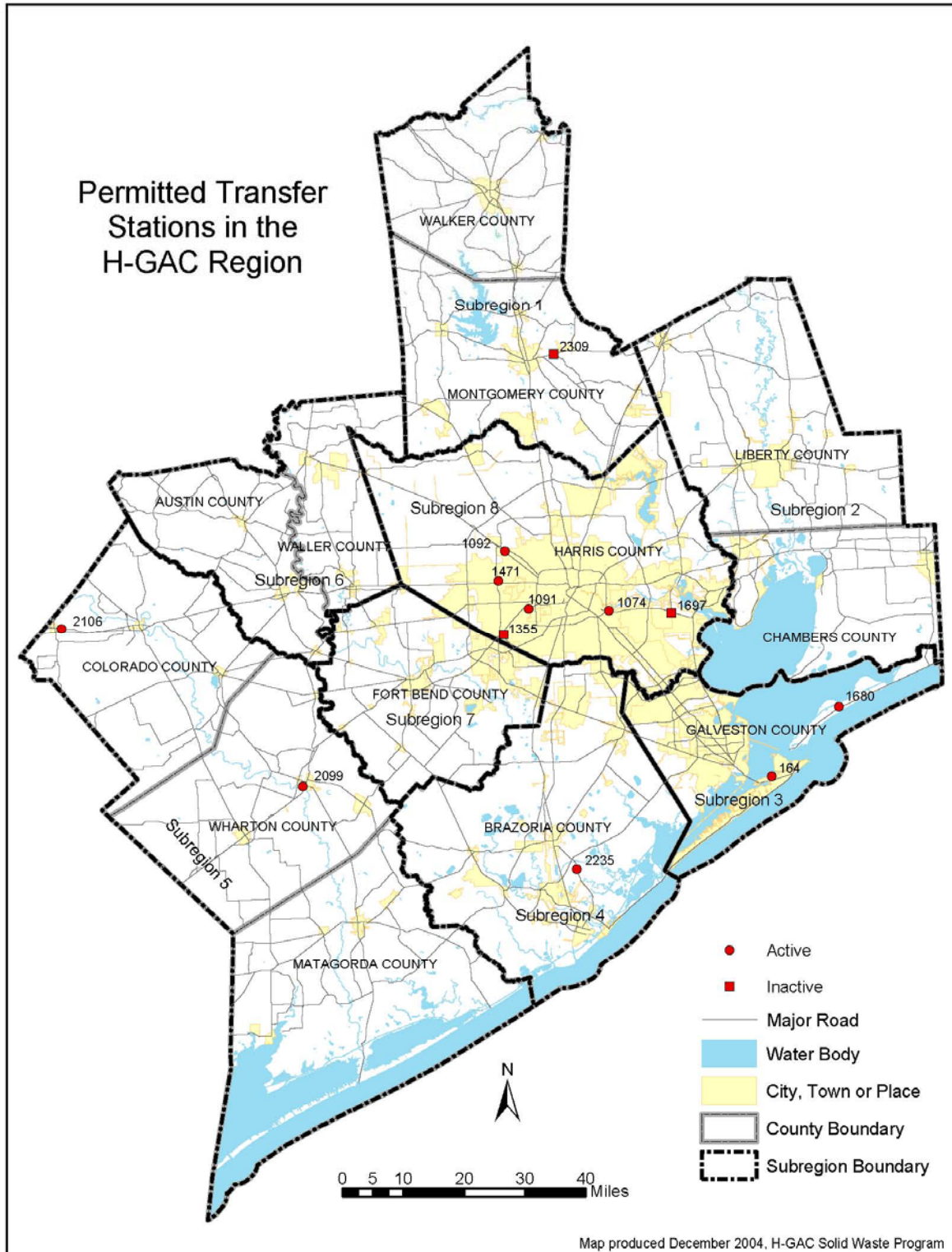


Figure 5-4: Permitted MSW Transfer Stations in the H-GAC Region

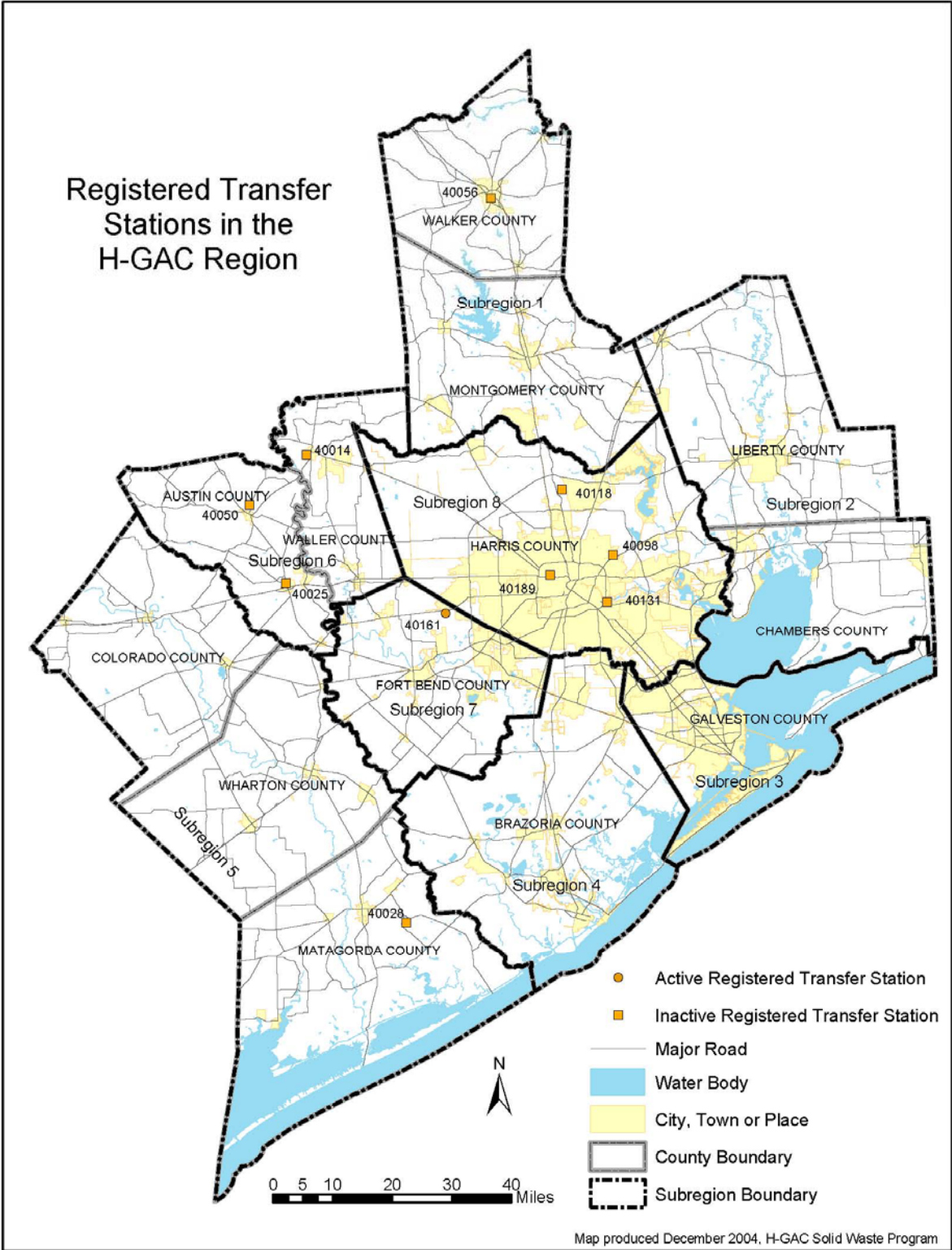


Figure 5-5: Registered MSW Transfer Stations in the H-GAC Region

5.6 C&D in Type 1 Landfills

Construction and Demolition (C&D) debris is inert material from construction and demolition projects that can be disposed in Type 1 landfills, but are the primary component of the waste stream for Type 4 landfills. In 2003, there were 15 active and inactive Type 1 landfills in the H-GAC region and 15 active and inactive Type 4 landfills.

5.6.1 Regional Analysis

According to the FY 2003 TCEQ annual reports, of the 7,299,239 tons disposed in all the Type 1 and Type 4 landfills in the region, approximately 30% was C&D material. For Type 1 landfills within H-GAC region, C&D waste comprises approximately 15% of the waste stream. Table 5-5 summarizes this information. Note that Type 4 landfills accept small amounts of brush and other material, which explains why the Type 4 landfills in Table 5-5 are not being filled 100% with C&D.

Table 5-5
C&D in H-GAC Landfills (Tons)

Permit	Status	Type	County	Permittee / Registrant	C&D	Total	Percent C&D
1539A	A	1	BRAZORIA	REPUBLIC SEABREEZE LANDFILL	202,228	1,020,582	19.8%
1897	IP	1	BRAZORIA	WM B & D LANDFILL	-	-	0.0%
1502	A	1	CHAMBERS	CHAMBERS COUNTY LANDFILL	65	15,334	0.4%
1535B	A	1	CHAMBERS	SANIFILL/BAYTOWN	126,991	259,336	49.0%
203	A	1	COLORADO	SAFETY KLEEN ALTAIR	-	30,267	0.0%
1505	A	1	FORT BEND	BFI BLUE RIDGE LANDFILL	4,530	581,057	0.8%
2270	IN	1	FORT BEND	LONG POINT PARTNERS	-	-	0.0%
1149A	A	1	GALVESTON	BFI GALVESTON CO LANDFILL	2,848	357,723	0.8%
1721A	A	1	GALVESTON	WM COASTAL PLAINS	145,038	685,083	21.2%
261A	A	1	HARRIS	BFI MCCARTY ROAD LANDFILL	30,192	1,638,282	1.8%
1193	A	1	HARRIS	BFI WHISPERING PINES	259	81,506	0.3%
1307B	A	1	HARRIS	WM ATASCOCITA RDF	312,660	911,262	34.3%
1765	IN	1	HARRIS	CITY OF LA PORTE	-	-	0.0%
1752B	A	1	MONTGOMERY	WM SECURITY LANDFILL	64,371	321,853	20.0%
2215A	IN	1	WALKER	DARRELL DICKEY INC LANDFILL	-	-	0.0%
TYPE 1 SUBTOTAL					889,182	5,902,285	15.1%
1708	A	4	BRAZORIA	DIXIE FARM ROAD LF	33,267	33,267	100.0%
1797A	A	4	FORT BEND	SPRINT FORT BEND COUNTY	148,516	151,874	97.8%
1849A	A	4	GALVESTON	REPUBLIC NORTH COUNTY LF	58,557	58,557	100.0%
1301	A	4	HARRIS	ADDICKS FAIRBANKS LANDFILL	50	50	100.0%
1389A	IP	4	HARRIS	WM RED BLUFF/GREEN BELT	-	-	0.0%
1403	A	4	HARRIS	CASCO LANDFILL	-	-	0.0%
1540A	A	4	HARRIS	WM GREENSHADOW	380	380	100.0%
1565A	A	4	HARRIS	FAIRBANKS LANDFILL	288,667	320,741	90.0%
1586A	A	4	HARRIS	GREENBELT LANDFILL	254,190	254,190	100.0%
1599A	A	4	HARRIS	G.O. WEISS GREENHOUSE RD LF	65,472	72,747	90.0%
1921A	A	4	HARRIS	COUGAR DISPOSAL INC	149,095	165,661	90.0%
2185	A	4	HARRIS	WM HAWTHORN PARK LANDFILL	2,545	2,545	100.0%
2240	A	4	HARRIS	RALSTON ROAD LANDFILL	117,347	117,347	100.0%
2276	IN	4	HARRIS	APPLEROCK DISPOSAL FACILITY	-	-	0.0%
2304	A	4	HARRIS	TALL PINES LANDFILL	219,595	219,595	100.0%
TYPE 4 SUBTOTAL					1,337,681	1,396,954	95.8%
TOTAL					2,226,863	7,299,239	30.5%

A- Active; IN – Inactive, never accepted waste; IP – Inactive, previously accepted waste

This information indicates that there is a significant portion of the Type 1 landfills in the H-GAC region that might potentially be better utilized for putrescible waste rather than C&D waste¹⁷. However, R. W. Beck would emphasize that the numbers reported by TCEQ are not necessarily a completely accurate measure of the C&D material entering the region's Type 1 landfills. The data provided to the TCEQ is often gathered in a manner that may not provide an accurate indication of the actual amount disposed, by type of material (C&D, putrescible, etc.). For instance, MSW in roll-off containers may be classified as commercial waste by the landfill operator when in fact it is C&D waste. Therefore it is important to realize that although C&D material is going into Type 1 landfills, the exact magnitude is more difficult to determine and the figures reported by TCEQ should not be accepted as 100% accurate. Nevertheless, this analysis does show that there may be a potential opportunity to cost-effectively divert some C&D waste from Type 1 to Type 4 landfills.

Options for diverting C&D material from Type 1 and Type 4 landfills also includes on-site grinding at construction sites, reuse of building materials in new construction projects, and material recovery facilities that accept C&D waste.¹⁸

5.6.2 Subregional Analysis

Table 5-6 displays the information in Table 5-5 by subregions.

Table 5-6
C&D in H-GAC Landfills by Subregion (Tons)

Subregion	C&D	Total	Percent C&D
Subregion 1	64,371	321,853	20.0%
Subregion 2	127,056	274,670	46.3%
Subregion 3	206,443	1,101,363	18.7%
Subregion 4	235,495	1,053,849	22.3%
Subregion 5	-	30,267	0.0%
Subregion 6	-	-	0.0%
Subregion 7	153,046	732,931	20.9%
Subregion 8	1,440,452	3,784,306	38.1%
Total	2,226,863	7,299,239	30.5%

¹⁷ This assumes the transfer costs for hauling C&D waste are not prohibitive and Type 4 landfills are conveniently located near the sites where C&D is being generated.

¹⁸ Again, these options are only realistic alternatives to landfilling if they can be done in a cost-effective manner.

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Appendix A

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Appendix A – List of Cities, Counties, and Data Sources

Data Source Key:

C – U. S. Census **H** – H-GAC **T** – Texas State Data Center (TSDC) **TW** – Texas Workforce Commission
R – Determined by R. W. Beck through interpolation, addition, or other method

Example #1: For Chamber County, H-GAC provided the population projections at the county-level and for Anahuac. However, R. W. Beck had to calculate the population projections for the smaller cities and unincorporated areas, in aggregate, based on the data provided by H-GAC.

Example #2: For Austin County, TSDC provided the population projections for Austin. However, R. W. Beck had to determine the population projections Sealy based on the data provided by TSDC.

	Population Estimate	Population Projection	SF/MF Housing Split Estimate	Employment Estimate	Employment Projection
Austin County	T	T	R	TW	R
Sealy	T	R	C	TW	R
Smaller Cities and Unincorp. ¹	R	R	C	R	R
Brazoria County	H	H	R	H	H
Alvin	H	H	H	H	H
Angleton	H	H	H	H	H
Clute	H	H	H	H	H
Freeport	H	H	H	H	H
Lake Jackson	H	H	H	H	H
Pearland	H	H	H	H	H
Smaller Cities and Unincorp. ¹	R	R	C	R	R
Chambers County	H	H	R	H	H
Anahuac	H	H	H	H	H
Smaller Cities and Unincorp. ¹	R	R	C	R	R
Colorado County	T	T	R	TW	R
Columbus	T	R	C	TW	R
Smaller Cities and Unincorp. ¹	R	R	C	R	R
Fort Bend County	H	H	R	H	H
Missouri City	H	H	H	H	H
Richmond	H	H	H	H	H
Rosenberg	H	H	H	H	H
Stafford	H	H	H	H	H
Sugar Land	H	H	H	H	H
Smaller Cities and Unincorp. ¹	R	R	C	R	R
Galveston County	H	H	R	H	H
Dickinson	H	H	H	H	H
Friendswood	H	H	H	H	H
Galveston	H	H	H	H	H
La Marque	H	H	H	H	H

Appendix A – List of Cities, Counties, and Data Sources

	Population Estimate	Population Projection	SF/MF Housing Split Estimate	Employment Estimate	Employment Projection
League City	H	H	H	H	H
Texas City	H	H	H	H	H
Santa Fe	H	H	H	H	H
Smaller Cities and Unincorp. ¹	R	R	C	R	R
Harris County	H	H	R	H	H
Baytown	H	H	H	H	H
Bellaire	H	H	H	H	H
Deer Park	H	H	H	H	H
Galena Park	H	H	H	H	H
Houston	H	H	H	H	H
Humble	H	H	H	H	H
Jacinto City	H	H	H	H	H
Katy	H	H	H	H	H
La Porte	H	H	H	H	H
Pasadena	H	H	H	H	H
Seabrook	H	H	H	H	H
South Houston	H	H	H	H	H
Tomball	H	H	H	H	H
West University Place	H	H	H	H	H
Smaller Cities and Unincorp. ¹	R	R	C	R	R
Liberty County	H	H	R	H	H
Liberty	H	H	H	H	H
Smaller Cities and Unincorp. ¹	R	R	C	R	R
Matagorda County	T	T	R	TW	R
Bay City	T	R	C	TW	R
Smaller Cities and Unincorp. ¹	R	R	C	R	R
Montgomery County	H	H	R	H	H
Conroe	H	H	H	H	H
Smaller Cities and Unincorp. ¹	R	R	C	R	R
Walker County	T	T	R	TW	R
Huntsville	T	R	C	TW	R
Smaller Cities and Unincorp. ¹	R	R	C	R	R
Waller County	H	H	R	H	H
Hempstead	H	H	H	H	H
Smaller Cities and Unincorp. ¹	R	R	C	R	R
Wharton County	T	T	R	TW	R
El Campo	T	R	C	TW	R
Smaller Cities and Unincorp. ¹	R	R	C	R	R

(1) "Smaller Cities & Unincorp." is the combination of cities with a population less than 10,000 and the unincorporated areas of each county. If cities were less than 10,000, but the largest in their county, they are listed individually in the table.

Appendix B

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Appendix B – Population Estimates (2003)

	Total Population	Single Family Ratio	Single Family Population	Multi Family Ratio	Multi Family Population
Austin County	25,066		23,028		2,038
Sealy	5,773	78.4%	4,525	21.6%	1,248
Smaller Cities and Unincorp. ¹	19,292	95.9%	18,503	4.1%	789
Brazoria County	254,346		212,494		41,852
Alvin	22,643	58.5%	13,242	41.5%	9,401
Angleton	18,451	74.0%	13,657	26.0%	4,793
Clute	9,773	53.3%	5,206	46.7%	4,567
Freeport	12,352	70.8%	8,740	29.2%	3,612
Lake Jackson	26,958	73.4%	19,794	26.6%	7,164
Pearland	40,841	79.2%	32,363	20.8%	8,479
Smaller Cities and Unincorp. ¹	123,328	96.9%	119,492	3.1%	3,836
Chambers County	26,147		25,313		834
Anahuac	2,139	94.9%	2,030	5.1%	109
Smaller Cities and Unincorp. ¹	24,007	97.0%	23,283	3.0%	724
Colorado County	20,945		20,154		791
Columbus	3,933	85.4%	3,359	14.6%	573
Smaller Cities and Unincorp. ¹	17,013	98.7%	16,795	1.3%	218
Fort Bend County	404,231		376,671		27,560
Missouri City	56,173	97.5%	54,770	2.5%	1,403
Richmond	11,249	69.8%	7,848	30.2%	3,401
Rosenberg	24,213	73.6%	17,826	26.4%	6,387
Stafford	14,699	69.1%	10,151	30.9%	4,548
Sugar Land	66,756	91.5%	61,095	8.5%	5,661
Smaller Cities and Unincorp. ¹	231,141	97.3%	224,981	2.7%	6,160
Galveston County	260,904		216,304		44,601
Dickinson	16,804	82.9%	13,923	17.1%	2,882
Friendswood	30,421	86.1%	26,180	13.9%	4,242
Galveston	53,940	67.3%	36,279	32.7%	17,661
La Marque	14,170	90.6%	12,842	9.4%	1,328
League City	45,820	84.9%	38,913	15.1%	6,906
Texas City	40,680	77.4%	31,467	22.6%	9,212
Santa Fe	9,991	93.4%	9,335	6.6%	656
Smaller Cities and Unincorp. ¹	49,078	96.5%	47,364	3.5%	1,714

Appendix B – Population Estimates (2003)

	Total Population	Single Family Ratio	Single Family Population	Multi Family Ratio	Multi Family Population
Harris County	3,552,489		2,349,023		1,203,466
Baytown	70,543	59.7%	42,095	40.3%	28,448
Bellaire	17,054	96.2%	16,412	3.8%	642
Deer Park	29,281	85.1%	24,925	14.9%	4,355
Galena Park	10,072	90.1%	9,080	9.9%	993
Houston	1,886,512	51.5%	971,289	48.5%	915,223
Humble	14,824	39.9%	5,916	60.1%	8,908
Jacinto City	9,006	85.8%	7,729	14.2%	1,278
Katy	11,760	75.5%	8,882	24.5%	2,878
La Porte	34,027	82.3%	28,011	17.7%	6,015
Pasadena	133,277	60.2%	80,278	39.8%	52,998
Seabrook	13,636	55.2%	7,524	44.8%	6,112
South Houston	14,335	70.1%	10,046	29.9%	4,289
Tomball	9,278	55.3%	5,131	44.7%	4,147
West University Place	14,063	98.6%	13,868	1.4%	195
Smaller Cities and Unincorp. ¹	1,284,820	87.0%	1,117,836	13.0%	166,984
Liberty County	73,079		69,751		3,328
Liberty	7,660	90.7%	6,947	9.3%	713
Smaller Cities and Unincorp. ¹	65,419	96.0%	62,805	4.0%	2,614
Matagorda County	38,500		34,022		4,478
Bay City	18,892	79.8%	15,067	20.2%	3,825
Smaller Cities and Unincorp. ¹	19,607	96.7%	18,955	3.3%	653
Montgomery County	340,271		316,551		23,721
Conroe	35,252	70.6%	24,887	29.4%	10,365
Smaller Cities and Unincorp. ¹	305,019	95.6%	291,663	4.4%	13,356
Walker County	64,105		52,900		11,204
Huntsville	37,047	71.6%	26,525	28.4%	10,522
Smaller Cities and Unincorp. ¹	27,058	97.5%	26,375	2.5%	683
Waller County	35,729		33,274		2,455
Hempstead	5,129	91.6%	4,696	8.4%	432
Smaller Cities and Unincorp. ¹	30,600	93.4%	28,578	6.6%	2,022
Wharton County	42,163		39,447		2,716
El Campo	11,094	92.4%	10,256	7.6%	838
Smaller Cities and Unincorp. ¹	31,069	94.0%	29,191	6.0%	1,878
H-GAC TOTAL	5,137,974	73.4%	3,768,932	26.6%	1,369,042

(1) "Smaller Cities & Unincorp." is the combination of cities with a population less than 10,000 and the unincorporated areas of each county. If cities were less than 10,000, but the largest in their county, they are listed individually in the table.

Appendix C

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Appendix C – Population Projections (2005-2025)

Total Population

TOTAL POPULATION	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
Austin County	24,833	25,104	25,374	25,645	25,915	26,186	26,474	26,762	27,051	27,339	27,627	27,900	28,173	28,446	28,719	28,992	29,229	29,466	29,702	29,939	30,176	
Seely	5,688	5,734	5,779	5,825	5,869	5,914	5,962	6,010	6,057	6,104	6,151	6,194	6,237	6,279	6,321	6,362	6,396	6,428	6,461	6,493	6,525	
Small and Unincorporated	19,145	19,370	19,595	19,820	20,046	20,272	20,512	20,752	20,993	21,234	21,476	21,706	21,936	22,167	22,398	22,630	22,833	23,037	23,241	23,446	23,651	
Brazoria County	262,729	266,921	271,113	273,857	276,601	279,345	282,089	284,833	287,577	290,321	293,065	295,809	298,553	301,297	304,041	306,785	309,529	312,273	315,017	317,761	320,505	323,249
Alvin	24,464	24,511	24,558	24,605	24,652	24,699	24,746	24,793	24,840	24,887	24,934	24,981	25,028	25,075	25,122	25,169	25,216	25,263	25,310	25,357	25,404	25,451
Bayport	16,333	16,333	16,333	16,333	16,333	16,333	16,333	16,333	16,333	16,333	16,333	16,333	16,333	16,333	16,333	16,333	16,333	16,333	16,333	16,333	16,333	16,333
Baytown	10,077	10,077	10,077	10,077	10,077	10,077	10,077	10,077	10,077	10,077	10,077	10,077	10,077	10,077	10,077	10,077	10,077	10,077	10,077	10,077	10,077	10,077
Freeport	12,712	12,712	12,712	12,712	12,712	12,712	12,712	12,712	12,712	12,712	12,712	12,712	12,712	12,712	12,712	12,712	12,712	12,712	12,712	12,712	12,712	12,712
Lake Jackson	27,721	28,103	28,485	28,868	29,250	29,632	30,014	30,396	30,778	31,160	31,542	31,924	32,306	32,688	33,070	33,452	33,834	34,216	34,598	34,980	35,362	35,744
Pearland	43,012	44,097	45,182	46,267	47,352	48,437	49,522	50,607	51,692	52,777	53,862	54,947	56,032	57,117	58,202	59,287	60,372	61,457	62,542	63,627	64,712	65,797
Small and Unincorporated	128,820	130,313	131,806	133,299	134,792	136,285	137,778	139,271	140,764	142,257	143,750	145,243	146,736	148,229	149,722	151,215	152,708	154,201	155,694	157,187	158,680	160,173
Chambers County	26,225	26,265	26,304	26,343	26,382	26,421	26,460	26,499	26,538	26,577	26,616	26,655	26,694	26,733	26,772	26,811	26,850	26,889	26,928	26,967	27,006	27,045
Anahuac	2,222	2,263	2,304	2,321	2,338	2,355	2,373	2,390	2,407	2,424	2,441	2,458	2,475	2,492	2,508	2,525	2,542	2,559	2,576	2,593	2,610	2,627
Small and Unincorporated	24,003	24,002	24,000	24,025	24,051	24,076	24,102	24,127	24,152	24,177	24,202	24,227	24,252	24,277	24,302	24,327	24,352	24,377	24,402	24,427	24,452	24,477
Colorado County	20,982	21,127	21,272	21,418	21,563	21,708	21,854	21,999	22,144	22,289	22,434	22,579	22,724	22,869	23,014	23,159	23,304	23,449	23,594	23,739	23,884	24,029
Columbus	3,914	3,926	3,942	3,958	3,974	3,990	3,998	4,014	4,029	4,044	4,059	4,074	4,089	4,104	4,119	4,134	4,149	4,164	4,179	4,194	4,209	4,224
Small and Unincorporated	17,068	17,199	17,331	17,462	17,594	17,726	17,858	18,013	18,167	18,301	18,446	18,591	18,736	18,881	19,026	19,171	19,316	19,461	19,606	19,751	19,896	20,041
Fort Bend County	437,366	453,933	470,501	483,438	496,375	509,312	522,249	535,186	548,122	561,059	573,996	586,933	600,870	614,807	628,744	642,681	656,618	670,555	684,492	698,429	712,366	726,303
Missouri City	59,817	61,639	63,461	64,832	66,203	67,574	68,945	70,316	71,687	73,058	74,429	75,800	77,171	78,542	79,913	81,284	82,655	84,026	85,397	86,768	88,139	89,510
Richmond	11,702	11,929	12,155	12,382	12,608	12,835	13,062	13,289	13,516	13,743	13,970	14,197	14,424	14,651	14,878	15,105	15,332	15,559	15,786	16,013	16,240	16,467
Rosenberg	25,205	25,701	26,197	26,693	27,189	27,685	28,181	28,677	29,173	29,669	30,165	30,661	31,157	31,653	32,149	32,645	33,141	33,637	34,133	34,629	35,125	35,621
Stafford	15,588	16,033	16,478	16,923	17,368	17,813	18,258	18,703	19,148	19,593	20,038	20,483	20,928	21,373	21,818	22,263	22,708	23,153	23,598	24,043	24,488	24,933
Sugar Land	70,803	72,827	74,851	76,875	78,899	80,923	82,947	84,971	86,995	89,019	91,043	93,067	95,091	97,115	99,139	101,163	103,187	105,211	107,235	109,259	111,283	113,307
Small and Unincorporated	254,260	265,805	277,350	288,895	300,440	311,985	323,530	335,075	346,620	358,165	369,710	381,255	392,800	404,345	415,890	427,435	438,980	450,525	462,070	473,615	485,160	496,705
Galveston County	268,073	271,657	275,241	278,825	281,262	284,273	287,284	290,294	293,305	296,315	299,326	302,337	305,347	308,358	311,368	314,379	317,389	320,399	323,409	326,419	329,429	332,439
Dickinson	17,483	17,537	17,591	17,645	17,699	17,753	17,807	17,861	17,915	17,969	18,023	18,077	18,131	18,185	18,239	18,293	18,347	18,401	18,455	18,509	18,563	18,617
Friendswood	31,488	31,992	32,496	32,973	33,450	33,927	34,404	34,881	35,358	35,835	36,312	36,789	37,266	37,743	38,220	38,697	39,174	39,651	40,128	40,605	41,082	41,559
Galveston	14,572	14,715	14,858	14,999	15,140	15,281	15,422	15,563	15,704	15,845	15,986	16,127	16,268	16,409	16,550	16,691	16,832	16,973	17,114	17,255	17,396	17,537
League City	47,751	48,712	49,673	50,634	51,595	52,556	53,517	54,478	55,439	56,400	57,361	58,322	59,283	60,244	61,205	62,166	63,127	64,088	65,049	66,010	66,971	67,932
League City	48,712	49,673	50,634	51,595	52,556	53,517	54,478	55,439	56,400	57,361	58,322	59,283	60,244	61,205	62,166	63,127	64,088	65,049	66,010	66,971	67,932	
League City	48,712	49,673	50,634	51,595	52,556	53,517	54,478	55,439	56,400	57,361	58,322	59,283	60,244	61,205	62,166	63,127	64,088	65,049	66,010	66,971	67,932	
League City	48,712	49,673	50,634	51,595	52,556	53,517	54,478	55,439	56,400	57,361	58,322	59,283	60,244	61,205	62,166	63,127	64,088	65,049	66,010	66,971	67,932	
League City	48,712	49,673	50,634	51,595	52,556	53,517	54,478	55,439	56,400	57,361	58,322	59,283	60,244	61,205	62,166	63,127	64,088	65,049	66,010	66,971	67,932	
League City	48,712	49,673	50,634	51,595	52,556	53,517	54,478	55,439	56,400	57,361	58,322	59,283	60,244	61,205	62,166	63,127	64,088	65,049	66,010	66,971	67,932	
League City	48,712	49,673	50,634	51,595	52,556	53,517	54,478	55,439	56,400	57,361	58,322	59,283	60,244	61,205	62,166	63,127	64,088	65,049	66,010	66,971	67,932	
League City	48,712	49,673	50,634	51,595	52,556	53,517	54,478	55,439	56,400	57,361	58,322	59,283	60,244	61,205	62,166	63,127	64,088	65,049	66,010	66,971	67,932	
League City	48,712	49,673	50,634	51,595	52,556	53,517	54,478	55,439	56,400	57,361	58,322	59,283	60,244	61,205	62,166	63,127	64,088	65,049	66,010	66,971	67,932	
League City	48,712	49,673	50,634	51,595	52,556	53,517	54,478	55,439	56,400	57,361	58,322	59,283	60,244	61,205	62,166	63,127	64,088	65,049	66,010	66,971	67,932	
League City	48,712	49,673	50,634	51,595	52,556	53,517	54,478	55,439	56,400	57,361	58,322	59,283	60,244	61,205	62,166	63,127	64,088	65,049	66,010	66,971	67,932	
League City	48,712	49,673	50,634	51,595	52,556	53,517	54,478	55,439	56,400	57,361	58,322	59,283	60,244	61,205	62,166	63,127	64,088	65,049	66,010	66,971	67,932	
League City	48,712	49,673	50,634	51,595	52,556	53,517	54,478	55,439	56,400	57,361	58,322	59,283	60,244	61,205	62,166	63,127	64,088	65,049	66,010	66,971	67,932	
League City	48,712	49,673	50,634	51,595	52,556	53,517	54,478	55,439	56,400	57,361	58,322	59,283	60,244	61,205	62,166	63,127	64,088	65,049	66,010	66,971	67,932	
League City	48,712	49,673	50,634	51,595	52,556	53,517	54,478	55,439	56,400	57,361	58,322	59,283	60,244	61,205	62,166	63,127	64,088	65,049	66,010	66,971	67,932	
League City	48,712	49,673	50,634	51,595	52,556	53,517	54,478	55,439	56,400													

Appendix C – Population Projections (2005-2025)

Single-Family Residential Population

SF POPULATION	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
AUSTIN COUNTY	22,820	23,071	23,323	23,574	23,826	24,078	24,346	24,614	24,882	25,150	25,418	25,677	25,927	26,181	26,436	26,691	26,945	27,133	27,355	27,576	27,797	
Sealy	4,468	4,494	4,530	4,565	4,600	4,635	4,673	4,711	4,748	4,785	4,821	4,855	4,888	4,921	4,954	4,987	5,013	5,038	5,066	5,089	5,115	
Small and Unincorporated	18,362	18,577	18,793	19,009	19,226	19,443	19,673	19,903	20,134	20,366	20,597	20,818	21,039	21,260	21,482	21,699	21,899	22,098	22,294	22,487	22,683	
Brazoria County	218,415	222,875	228,336	233,797	239,258	244,719	250,180	255,641	261,102	266,563	272,024	277,485	282,946	288,407	293,868	299,329	304,790	310,251	315,712	321,173	326,634	332,095
Alvin	13,322	13,966	14,610	15,254	15,900	16,546	17,192	17,838	18,484	19,130	19,776	20,422	21,068	21,714	22,360	23,006	23,652	24,298	24,944	25,590	26,236	26,882
Angleton	14,043	14,236	14,429	14,622	14,815	15,008	15,201	15,394	15,587	15,780	15,973	16,166	16,359	16,552	16,745	16,938	17,131	17,324	17,517	17,710	17,903	18,096
Clute	5,336	5,319	5,302	5,285	5,268	5,251	5,234	5,217	5,200	5,183	5,166	5,149	5,132	5,115	5,098	5,081	5,064	5,047	5,030	5,013	4,996	4,979
East	30,354	30,635	30,916	31,197	31,478	31,759	32,040	32,321	32,602	32,883	33,164	33,445	33,726	34,007	34,288	34,569	34,850	35,131	35,412	35,693	35,974	36,255
Lake Jackson	20,354	20,635	20,916	21,197	21,478	21,759	22,040	22,321	22,602	22,883	23,164	23,445	23,726	24,007	24,288	24,569	24,850	25,131	25,412	25,693	25,974	26,255
Pearland	34,942	35,802	36,662	37,522	38,382	39,242	40,102	40,962	41,822	42,682	43,542	44,402	45,262	46,122	46,982	47,842	48,702	49,562	50,422	51,282	52,142	53,002
Small and Unincorporated	122,876	124,568	126,260	127,952	129,644	131,336	133,028	134,720	136,412	138,104	139,796	141,488	143,180	144,872	146,564	148,256	149,948	151,640	153,332	155,024	156,716	158,408
Chambers County	25,388	25,425	25,462	25,499	25,536	25,573	25,610	25,647	25,684	25,721	25,758	25,795	25,832	25,869	25,906	25,943	25,980	26,017	26,054	26,091	26,128	26,165
Anahuac	2,108	2,147	2,186	2,225	2,264	2,303	2,342	2,381	2,420	2,459	2,498	2,537	2,576	2,615	2,654	2,693	2,732	2,771	2,810	2,849	2,888	2,927
Small and Unincorporated	23,279	23,278	23,276	23,275	23,274	23,273	23,272	23,271	23,270	23,269	23,268	23,267	23,266	23,265	23,264	23,263	23,262	23,261	23,260	23,259	23,258	23,257
Colorado County	20,193	20,334	20,476	20,617	20,759	20,901	21,042	21,183	21,324	21,465	21,606	21,747	21,888	22,029	22,170	22,311	22,452	22,593	22,734	22,875	23,016	23,157
Columbus	3,343	3,355	3,367	3,379	3,390	3,402	3,414	3,426	3,438	3,450	3,462	3,474	3,486	3,498	3,510	3,522	3,534	3,546	3,558	3,570	3,582	3,594
Small and Unincorporated	16,850	16,979	17,107	17,235	17,363	17,491	17,619	17,747	17,875	18,003	18,131	18,259	18,387	18,515	18,643	18,771	18,899	19,027	19,155	19,283	19,411	19,539
Fort Bend County	408,082	423,787	439,493	455,199	470,905	486,611	502,317	518,023	533,729	549,435	565,141	580,847	596,553	612,259	627,965	643,671	659,377	675,083	690,789	706,495	722,201	737,907
Missouri City	59,323	60,099	60,876	61,652	62,428	63,204	63,980	64,756	65,532	66,308	67,084	67,860	68,636	69,412	70,188	70,964	71,740	72,516	73,292	74,068	74,844	75,620
Ridgeland	18,568	18,922	19,276	19,630	19,984	20,338	20,692	21,046	21,400	21,754	22,108	22,462	22,816	23,170	23,524	23,878	24,232	24,586	24,940	25,294	25,648	26,002
Stafford	10,766	11,075	11,384	11,693	12,002	12,311	12,620	12,929	13,238	13,547	13,856	14,165	14,474	14,783	15,092	15,401	15,710	16,019	16,328	16,637	16,946	17,255
Sugar Land	64,799	66,652	68,505	70,358	72,211	74,064	75,917	77,770	79,623	81,476	83,329	85,182	87,035	88,888	90,741	92,594	94,447	96,300	98,153	100,006	101,859	103,712
Small and Unincorporated	247,474	258,720	269,967	281,213	292,459	303,705	314,951	326,197	337,443	348,689	359,935	371,181	382,427	393,673	404,919	416,165	427,411	438,657	449,903	461,149	472,395	483,641
Galveston County	22,155	22,081	22,007	21,933	21,859	21,785	21,711	21,637	21,563	21,489	21,415	21,341	21,267	21,193	21,119	21,045	20,971	20,897	20,823	20,749	20,675	20,601
Dickinson	14,327	14,530	14,732	14,934	15,136	15,338	15,540	15,742	15,944	16,146	16,348	16,550	16,752	16,954	17,156	17,358	17,560	17,762	17,964	18,166	18,368	18,570
Friendswood	27,081	27,531	27,982	28,433	28,884	29,335	29,786	30,237	30,688	31,139	31,590	32,041	32,492	32,943	33,394	33,845	34,296	34,747	35,198	35,649	36,100	36,551
Galveston	37,226	37,700	38,174	38,648	39,122	39,596	40,070	40,544	41,018	41,492	41,966	42,440	42,914	43,388	43,862	44,336	44,810	45,284	45,758	46,232	46,706	47,180
La Marque	13,207	13,389	13,571	13,753	13,935	14,117	14,299	14,481	14,663	14,845	15,027	15,209	15,391	15,573	15,755	15,937	16,119	16,301	16,483	16,665	16,847	17,029
League City	43,564	44,174	44,784	45,394	46,004	46,614	47,224	47,834	48,444	49,054	49,664	50,274	50,884	51,494	52,104	52,714	53,324	53,934	54,544	55,154	55,764	56,374
Texas City	32,867	32,818	32,769	32,720	32,671	32,622	32,573	32,524	32,475	32,426	32,377	32,328	32,279	32,230	32,181	32,132	32,083	32,034	31,985	31,936	31,887	31,838
Santa Fe	9,580	9,702	9,825	9,948	10,071	10,194	10,317	10,440	10,563	10,686	10,809	10,932	11,055	11,178	11,301	11,424	11,547	11,670	11,793	11,916	12,039	12,162
Small and Unincorporated	47,813	48,038	48,263	48,488	48,713	48,938	49,163	49,388	49,613	49,838	50,063	50,288	50,513	50,738	50,963	51,188	51,413	51,638	51,863	52,088	52,313	52,538
Harris County	2,418,937	2,460,743	2,502,549	2,544,355	2,586,161	2,627,967	2,669,773	2,711,579	2,753,385	2,795,191	2,836,997	2,878,803	2,920,609	2,962,415	3,004,221	3,046,027	3,087,833	3,129,639	3,171,445	3,213,251	3,255,057	3,296,863
Baytown	48,261	49,529	50,797	52,065	53,333	54,601	55,869	57,137	58,405	59,673	60,941	62,209	63,477	64,745	66,013	67,281	68,549	69,817	71,085	72,353	73,621	74,889
Bellevue	18,217	18,572	18,927	19,282	19,637	19,992	20,347	20,702	21,057	21,412	21,767	22,122	22,477	22,832	23,187	23,542	23,897	24,252	24,607	24,962	25,317	25,672
Deer Park	25,548	25,860	26,172	26,484	26,796	27,108	27,420	27,732	28,044	28,356	28,668	28,980	29,292	29,604	29,916	30,228	30,540	30,852	31,164	31,476	31,788	32,100
Galena Park	9,308	9,422	9,536	9,650	9,764	9,878	9,992	10,106	10,220	10,334	10,448	10,562	10,676	10,790	10,904	11,018	11,132	11,246	11,360	11,474	11,588	11,702
Humble	99,684	1,009,381	1,020,078	1,030,775	1,041,472	1,052,169	1,062,866	1,073,563	1,084,260	1,094,957	1,105,654	1,116,351	1,127,048	1,137,745	1,148,442	1,159,139	1,169,836	1,180,533	1,191,230	1,201,927	1,212,624	
Houston	6,084	6,168	6,252	6,336	6,420	6,504	6,588	6,672	6,756	6,840	6,924	7,008	7,092	7,176	7,260	7,344	7,428	7,512	7,596	7,680	7,764	7,848
Jacinto City	7,924	8,022	8,120	8,218	8,316	8,414	8,512	8,610	8,708	8,806	8,904	9,002	9,100	9,198	9,296	9,394	9,492	9,590	9,688	9,786	9,884	9,982
Katy	9,264	9,456	9,648	9,840	10,032	10,224	10,416	10,608	10,800	10,992	11,184	11,376	11,568	11,760	11,952	12,144	12,336	12,528	12,720	12,912	13,104	13,296
La Porte	29,444	30,161	30,878	31,595	32,312	33,029	33,746	34,463	35,180	35,897	36,614	37,331	38,048	38,765	39,482	40,199	40,916	41,633	42,350	43,067	43,784	44,501
Pasadena	82,111	83,028	83,944	84,861	85,777	86,694	87,610	88,527	89,443	90,360	91,276	92,193	93,110	94,026	94,943	95,860	96,7					

Appendix C – Population Projections (2005-2025)

Multi-Family Residential Population

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
MF POPULATION																						
Austin County	2,013	2,032	2,051	2,070	2,089	2,108	2,128	2,149	2,169	2,189	2,209	2,227	2,246	2,265	2,283	2,301	2,317	2,332	2,348	2,363	2,379	
Sealy	21.6%	1,230	1,240	1,250	1,269	1,279	1,289	1,299	1,310	1,320	1,330	1,339	1,348	1,358	1,367	1,376	1,383	1,390	1,397	1,404	1,411	
Small and Unincorporated	4.1%	783	793	802	811	820	829	839	849	859	869	879	889	907	916	926	934	943	951	959	968	
Brazoria County	43,314	44,046	44,777	45,508	46,239	46,970	47,701	48,433	49,164	49,895	50,626	51,357	52,088	52,819	53,550	54,281	55,012	55,743	56,474	57,205	57,936	
Alyn	41.5%	9,742	9,912	10,082	10,252	10,422	10,592	10,762	10,932	11,102	11,272	11,442	11,612	11,782	11,952	12,122	12,292	12,462	12,632	12,802	12,972	13,142
Angleton	26.0%	4,929	4,997	5,065	5,133	5,201	5,269	5,337	5,405	5,473	5,541	5,609	5,677	5,745	5,813	5,881	5,949	6,017	6,085	6,153	6,221	6,289
Cute	46.7%	3,643	3,706	3,769	3,832	3,895	3,958	4,021	4,084	4,147	4,210	4,273	4,336	4,399	4,462	4,525	4,588	4,651	4,714	4,777	4,840	4,903
Georgetown	28.6%	7,367	7,488	7,609	7,730	7,851	7,972	8,093	8,214	8,335	8,456	8,577	8,698	8,819	8,940	9,061	9,182	9,303	9,424	9,545	9,666	9,787
Lubbock	28.6%	7,367	7,488	7,609	7,730	7,851	7,972	8,093	8,214	8,335	8,456	8,577	8,698	8,819	8,940	9,061	9,182	9,303	9,424	9,545	9,666	9,787
Peard	20.8%	8,929	9,165	9,380	9,595	9,810	10,025	10,240	10,455	10,670	10,885	11,100	11,315	11,530	11,745	11,960	12,175	12,390	12,605	12,820	13,035	13,250
Small and Unincorporated	3.1%	3,944	3,989	4,034	4,106	4,160	4,226	4,311	4,372	4,426	4,479	4,555	4,630	4,706	4,802	4,902	5,008	5,114	5,220	5,313	5,407	5,500
Chambers County	838	840	842	850	857	865	873	880	888	896	903	919	934	949	964	980	995	1,010	1,023	1,036	1,049	
Anahuac	5.1%	113	116	119	122	125	128	131	134	137	140	143	146	149	152	155	158	161	164	167	170	
Small and Unincorporated	3.0%	724	724	724	733	745	751	758	765	772	779	793	807	822	836	851	865	879	891	904	916	
Colorado County	789	793	796	800	804	807	812	816	820	824	828	831	833	836	839	842	844	846	848	850	852	
Columbus	14.6%	571	573	575	579	581	583	585	588	590	592	593	595	596	598	599	600	600	600	601	602	
Small and Unincorporated	1.3%	218	220	222	223	225	227	229	230	232	234	236	237	239	240	242	243	245	246	247	249	
Fort Bend County	29,284	30,146	31,008	31,870	32,732	33,594	34,456	35,318	36,180	37,042	37,904	38,766	39,628	40,490	41,352	42,214	43,076	43,940	44,804	45,668	46,532	
Missouri City	2.5%	1,494	1,540	1,585	1,619	1,654	1,688	1,722	1,757	1,791	1,825	1,859	1,900	1,941	1,982	2,022	2,063	2,104	2,145	2,181	2,223	
Richmond	30.2%	3,538	3,607	3,675	3,705	3,736	3,766	3,796	3,827	3,857	3,887	3,917	3,947	3,977	4,007	4,037	4,067	4,097	4,127	4,157	4,187	
Rosenberg	26.9%	4,893	4,979	5,010	5,040	5,070	5,100	5,130	5,160	5,190	5,220	5,250	5,280	5,310	5,340	5,370	5,400	5,430	5,460	5,490	5,520	
Sugar Land	8.5%	6,004	6,176	6,347	6,519	6,691	6,863	7,035	7,207	7,379	7,551	7,723	7,895	8,067	8,239	8,411	8,583	8,755	8,927	9,099	9,271	
Small and Unincorporated	2.7%	6,776	7,084	7,392	7,700	8,008	8,316	8,624	8,932	9,240	9,548	9,856	10,164	10,472	10,780	11,088	11,396	11,704	12,012	12,320	12,628	
Galveston County	45,917	46,576	47,234	47,893	48,551	49,209	49,867	50,525	51,183	51,841	52,499	53,157	53,815	54,473	55,131	55,789	56,447	57,105	57,763	58,421	59,079	
Dickinson	17.1%	2,965	3,007	3,049	3,078	3,107	3,136	3,165	3,194	3,223	3,252	3,281	3,310	3,339	3,368	3,397	3,426	3,455	3,484	3,513	3,542	
Friendswood	13.9%	4,388	4,461	4,533	4,597	4,661	4,725	4,789	4,853	4,917	4,981	5,045	5,109	5,173	5,237	5,301	5,365	5,429	5,493	5,557	5,621	
Galveston	32.7%	18,122	18,353	18,583	18,813	19,043	19,273	19,503	19,733	19,963	20,193	20,423	20,653	20,883	21,113	21,343	21,573	21,803	22,033	22,263	22,493	
La Marque	9.4%	1,365	1,384	1,403	1,423	1,442	1,461	1,480	1,500	1,519	1,538	1,557	1,576	1,595	1,614	1,633	1,652	1,671	1,690	1,709	1,728	
League City	15.1%	7,197	7,343	7,489	7,621	7,754	7,887	8,019	8,152	8,285	8,418	8,550	8,683	8,816	8,949	9,082	9,215	9,348	9,481	9,614	9,747	
Texas City	22.6%	9,476	9,608	9,739	9,871	9,986	10,101	10,216	10,331	10,446	10,561	10,676	10,791	10,906	11,021	11,136	11,251	11,366	11,481	11,596	11,711	
Santa Fe	6.6%	673	682	690	697	711	718	724	731	738	745	752	759	766	773	780	787	794	801	808	815	
Small and Unincorporated	3.5%	1,730	1,739	1,747	1,789	1,811	1,832	1,854	1,875	1,897	1,918	1,940	1,961	1,983	2,004	2,025	2,047	2,068	2,089	2,110	2,131	
Harris County	1,236,874	1,258,578	1,270,282	1,293,230	1,316,179	1,339,127	1,362,076	1,385,025	1,407,973	1,430,922	1,453,871	1,476,820	1,499,769	1,522,718	1,545,667	1,568,616	1,591,565	1,614,514	1,637,463	1,660,412	1,683,361	
Baytown	40.3%	29,954	30,653	31,352	32,051	32,750	33,449	34,148	34,847	35,546	36,245	36,944	37,643	38,342	39,041	39,740	40,439	41,138	41,837	42,536	43,235	
Bayport	1.9%	1,404	1,418	1,432	1,446	1,460	1,474	1,488	1,502	1,516	1,530	1,544	1,558	1,572	1,586	1,600	1,614	1,628	1,642	1,656	1,670	
Deer Park	14.9%	4,454	4,518	4,579	4,639	4,699	4,759	4,819	4,879	4,939	4,999	5,059	5,119	5,179	5,239	5,299	5,359	5,419	5,479	5,539	5,599	
Galena Park	1.0%	1,018	1,030	1,042	1,054	1,066	1,078	1,090	1,102	1,114	1,126	1,138	1,150	1,162	1,174	1,186	1,198	1,210	1,222	1,234	1,246	
Houston	48.5%	939,151	951,115	963,080	975,044	987,008	998,972	1,010,936	1,022,900	1,034,864	1,046,828	1,058,792	1,070,756	1,082,720	1,094,684	1,106,648	1,118,612	1,130,576	1,142,540	1,154,504	1,166,468	
Humble	60.1%	9,161	9,288	9,414	9,539	9,665	9,791	9,916	10,042	10,167	10,293	10,418	10,543	10,668	10,793	10,918	11,043	11,168	11,293	11,418	11,543	
Jacinto City	14.2%	3,107	3,127	3,147	3,167	3,187	3,207	3,227	3,247	3,267	3,287	3,307	3,327	3,347	3,367	3,387	3,407	3,427	3,447	3,467	3,487	
Katy	24.5%	3,002	3,064	3,126	3,187	3,249	3,311	3,372	3,434	3,495	3,557	3,618	3,679	3,740	3,801	3,862	3,923	3,984	4,045	4,106	4,167	
La Porte	17.7%	6,323	6,477	6,631	6,785	6,939	7,093	7,247	7,401	7,555	7,709	7,863	8,017	8,171	8,325	8,479	8,633	8,787	8,941	9,095	9,249	
Pasadena	39.8%	54,209	54,814	55,419	56,024	56,629	57,234	57,839	58,444	59,049	59,654	60,259	60,864	61,469	62,074	62,679	63,284	63,889	64,494	65,099	65,704	
Seabrook	44.8%	6,816	7,169	7,521	7,873	8,225	8,577	8,929	9,281	9,633	9,985	10,337	10,689	11,041	11,393	11,745	12,097	12,449	12,801	13,153	13,505	
South Houston	29.8%	4,402	4,469	4,536	4,603	4,670	4,737	4,804	4,871	4,938	5,005	5,072	5,139	5,206	5,273	5,340	5,407	5,474	5,541	5,608	5,675	
Tomball	44.7%	4,301	4,378	4,455	4,532	4,609	4,686	4,763	4,840	4,917	4,994	5,071	5,148	5,225	5,302	5,379	5,456	5,533	5,610	5,687	5,764	
West University Place	1.4%	201	203	205	207	209	211	213	215	217	219	221	223	225	227	229	231	233	235	237	239	
Small and Unincorporated	13.0%	171,952	174,436	176,920	179,404	181,888	184,372	186,856	189,340	191,824	194,308	196,792	199,276	201,760	204,244	206,728	209,212	211,				

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Appendix D

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Appendix D – Employment Estimates (2003)

	2003 Employment Estimate
Austin County	13,441
Sealy	2,777
Smaller Cities and Unincorp. ¹	10,664
Brazoria County	106,647
Alvin	11,614
Angleton	9,436
Clute	5,007
Freeport	5,523
Lake Jackson	8,892
Pearland	10,602
Smaller Cities and Unincorp. ¹	55,572
Chambers County	9,776
Anahuac	1,004
Smaller Cities and Unincorp. ¹	8,772
Colorado County	8,593
Columbus	1,502
Smaller Cities and Unincorp. ¹	7,091
Fort Bend County	124,912
Missouri City	7,657
Richmond	8,126
Rosenberg	11,525
Stafford	21,446
Sugar Land	32,797
Smaller Cities and Unincorp. ¹	43,362
Galveston County	146,509
Dickinson	3,982
Friendswood	6,208
Galveston	31,687
La Marque	6,183
League City	10,463
Texas City	20,682
Santa Fe	2,342
Smaller Cities and Unincorp. ¹	64,962

Appendix D – Employment Estimates (2003)

	2003 Employment Estimate
Harris County	2,477,708
Baytown	24,041
Bellaire	10,326
Deer Park	13,592
Galena Park	3,780
Houston	1,420,939
Humble	17,063
Jacinto City	1,491
Katy	5,435
La Porte	11,165
Pasadena	46,057
Seabrook	3,004
South Houston	8,196
Tomball	7,088
West University Place	2,740
Smaller Cities and Unincorp. ¹	902,791
Liberty County	25,243
Liberty	6,012
Smaller Cities and Unincorp. ¹	19,230
Matagorda County	13,103
Bay City	6,600
Smaller Cities and Unincorp. ¹	6,502
Montgomery County	126,891
Conroe	27,707
Smaller Cities and Unincorp. ¹	99,185
Walker County	23,065
Huntsville	12,388
Smaller Cities and Unincorp. ¹	10,677
Waller County	15,549
Hempstead	2,990
Smaller Cities and Unincorp. ¹	12,559
Wharton County	18,607
El Campo	4,744
Smaller Cities and Unincorp. ¹	13,863
H-GAC TOTAL	3,110,042

(1) "Smaller Cities & Unincorp." is the combination of cities with a population less than 10,000 and the unincorporated areas of each county. If cities were less than 10,000, but the largest in their county, they are listed individually in the table.

Appendix E

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Appendix E – Employment Projections (2005 – 2025)

H-GAC Employment

TOTAL EMPLOYMENT	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
Atchafalaya County	13,944	14,196	14,448	14,772	15,096	15,420	15,744	16,068	16,392	16,716	17,040	17,364	17,688	18,012	18,336	18,660	18,984	19,308	19,632	19,956	20,280	
Sealy	2,881	2,933	2,985	3,037	3,089	3,141	3,193	3,245	3,297	3,349	3,401	3,453	3,505	3,557	3,609	3,661	3,713	3,765	3,817	3,869	3,921	
Small and Unincorporated	11,063	11,263	11,463	11,720	12,007	12,279	12,551	12,823	13,095	13,367	13,639	13,911	14,183	14,455	14,727	15,000	15,272	15,544	15,816	16,088	16,360	
Brazoria County	109,834	111,428	113,022	114,616	116,210	117,804	119,398	120,992	122,586	124,180	125,774	127,368	128,962	130,556	132,150	133,744	135,338	136,932	138,526	140,120	141,714	143,308
Alvin	12,037	12,469	12,901	13,333	13,765	14,197	14,629	15,061	15,493	15,925	16,357	16,789	17,221	17,653	18,085	18,517	18,949	19,381	19,813	20,245	20,677	21,109
Angleton	10,535	11,065	11,595	12,125	12,655	13,185	13,715	14,245	14,775	15,305	15,835	16,365	16,895	17,425	17,955	18,485	19,015	19,545	20,075	20,605	21,135	21,665
Clute	5,150	5,222	5,293	5,364	5,435	5,506	5,577	5,648	5,719	5,790	5,861	5,932	6,003	6,074	6,145	6,216	6,287	6,358	6,429	6,500	6,571	6,642
Freeport	6,530	7,033	7,536	8,039	8,542	9,045	9,548	10,051	10,554	11,057	11,560	12,063	12,566	13,069	13,572	14,075	14,578	15,081	15,584	16,087	16,590	17,093
Lake Jackson	9,054	9,134	9,215	9,292	9,368	9,445	9,522	9,599	9,675	9,752	9,829	9,906	9,983	10,060	10,137	10,214	10,291	10,368	10,445	10,522	10,599	10,676
Pearland	10,892	11,038	11,184	11,329	11,475	11,621	11,767	11,913	12,059	12,205	12,351	12,497	12,643	12,789	12,935	13,081	13,227	13,373	13,519	13,665	13,811	13,957
Small and Unincorporated	55,636	55,989	56,342	56,695	57,048	57,401	57,754	58,107	58,460	58,813	59,166	59,519	59,872	60,225	60,578	60,931	61,284	61,637	61,990	62,343	62,696	63,049
Chambers County	9,892	10,101	10,309	10,517	10,725	10,933	11,141	11,349	11,557	11,765	11,973	12,181	12,389	12,597	12,805	13,013	13,221	13,429	13,637	13,845	14,053	14,261
Bay City	1,004	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003
Small and Unincorporated	8,888	9,098	9,306	9,514	9,722	9,930	10,138	10,346	10,554	10,762	10,970	11,178	11,386	11,594	11,802	12,010	12,218	12,426	12,634	12,842	13,050	13,258
Colorado County	8,915	9,076	9,237	9,444	9,651	9,858	10,065	10,272	10,480	10,687	10,894	11,101	11,308	11,515	11,722	11,929	12,136	12,343	12,550	12,757	12,964	13,171
Columbus	1,558	1,586	1,614	1,650	1,687	1,723	1,759	1,795	1,832	1,868	1,904	1,939	1,975	2,010	2,045	2,080	2,116	2,151	2,187	2,222	2,257	2,292
Small and Unincorporated	7,357	7,490	7,623	7,794	7,965	8,136	8,307	8,477	8,648	8,819	8,990	9,161	9,332	9,503	9,674	9,845	10,016	10,187	10,358	10,529	10,700	10,871
Fort Bend County	129,512	131,811	134,111	136,411	138,711	141,011	143,311	145,611	147,911	150,211	152,511	154,811	157,111	159,411	161,711	164,011	166,311	168,611	170,911	173,211	175,511	177,811
Missouri City	8,490	8,507	8,524	8,541	8,558	8,575	8,592	8,609	8,626	8,643	8,660	8,677	8,694	8,711	8,728	8,745	8,762	8,779	8,796	8,813	8,830	8,847
Richmond	8,583	8,811	9,040	9,270	9,500	9,730	9,960	10,190	10,420	10,650	10,880	11,110	11,340	11,570	11,800	12,030	12,260	12,490	12,720	12,950	13,180	13,410
Rosenberg	12,658	13,225	13,791	14,357	14,923	15,489	16,055	16,621	17,187	17,753	18,319	18,885	19,451	20,017	20,583	21,149	21,715	22,281	22,847	23,413	23,979	24,545
Stafford	22,120	22,458	22,795	23,131	23,468	23,804	24,141	24,477	24,813	25,150	25,486	25,823	26,159	26,495	26,832	27,168	27,505	27,841	28,178	28,514	28,851	29,187
Sugar Land	33,979	34,571	35,162	35,753	36,344	36,935	37,526	38,117	38,708	39,299	39,890	40,481	41,072	41,663	42,254	42,845	43,436	44,027	44,618	45,209	45,800	46,391
Small and Unincorporated	43,680	43,940	44,200	44,460	44,720	44,980	45,240	45,500	45,760	46,020	46,280	46,540	46,800	47,060	47,320	47,580	47,840	48,100	48,360	48,620	48,880	49,140
Gaveston County	157,548	163,067	168,586	174,105	179,624	185,143	190,662	196,181	201,700	207,219	212,738	218,257	223,776	229,295	234,814	240,333	245,852	251,371	256,890	262,409	267,928	273,447
Baytown	24,923	25,383	25,843	26,303	26,763	27,223	27,683	28,143	28,603	29,063	29,523	29,983	30,443	30,903	31,363	31,823	32,283	32,743	33,203	33,663	34,123	34,583
Houston	133,049	137,684	142,319	146,954	151,589	156,224	160,859	165,494	170,129	174,764	179,400	184,035	188,670	193,305	197,940	202,575	207,210	211,845	216,480	221,115	225,750	230,385
Small and Unincorporated	13,576	13,699	13,822	13,945	14,068	14,191	14,314	14,437	14,560	14,683	14,806	14,929	15,052	15,175	15,298	15,421	15,544	15,667	15,790	15,913	16,036	16,159
Harris County	2,580,513	2,601,916	2,623,319	2,644,722	2,666,125	2,687,528	2,708,931	2,730,334	2,751,737	2,773,140	2,794,543	2,815,946	2,837,349	2,858,752	2,880,155	2,901,558	2,922,961	2,944,364	2,965,767	2,987,170	3,008,573	3,029,976
Baytown	24,923	25,383	25,843	26,303	26,763	27,223	27,683	28,143	28,603	29,063	29,523	29,983	30,443	30,903	31,363	31,823	32,283	32,743	33,203	33,663	34,123	34,583
Bellevue	10,501	10,589	10,677	10,765	10,853	10,941	11,029	11,117	11,205	11,293	11,381	11,469	11,557	11,645	11,733	11,821	11,909	12,000	12,088	12,176	12,264	12,352
Dear Park	13,927	14,085	14,243	14,401	14,559	14,717	14,875	15,033	15,191	15,349	15,507	15,665	15,823	15,981	16,139	16,297	16,455	16,613	16,771	16,929	17,087	17,245
Galena Park	3,893	3,950	4,007	4,126	4,245	4,364	4,483	4,602	4,721	4,840	4,959	5,078	5,197	5,316	5,435	5,554	5,673	5,792	5,911	6,030	6,149	6,268
Houston	1,472,923	1,498,914	1,524,905	1,550,896	1,576,887	1,602,878	1,628,869	1,654,860	1,680,851	1,706,842	1,732,833	1,758,824	1,784,815	1,810,806	1,836,797	1,862,788	1,888,779	1,914,770	1,940,761	1,966,752	1,992,743	2,018,734
Humble	16,882	16,907	16,932	16,957	16,982	17,007	17,032	17,057	17,082	17,107	17,132	17,157	17,182	17,207	17,232	17,257	17,282	17,307	17,332	17,357	17,382	17,407
Houston	5,602	5,697	5,792	5,887	5,982	6,077	6,172	6,267	6,362	6,457	6,552	6,647	6,742	6,837	6,932	7,027	7,122	7,217	7,312	7,407	7,502	7,597
Houston	11,625	11,866	12,107	12,348	12,589	12,830	13,071	13,312	13,553	13,794	14,035	14,276	14,517	14,758	15,000	15,241	15,482	15,723	15,964	16,205	16,446	16,687
Pasadena	48,616	49,896	51,175	52,455	53,734	55,013	56,292	57,571	58,850	60,129	61,408	62,687	63,966	65,245	66,524	67,803	69,082	70,361	71,640	72,919	74,198	75,477
Seabrook	3,139	3,206	3,273	3,340	3,407	3,474	3,541	3,608	3,675	3,742	3,809	3,876	3,943	4,010	4,077	4,144	4,211	4,278	4,345	4,412	4,479	4,546
South Houston	8,407	8,512	8,617	8,722	8,827	8,932	9,037	9,142	9,247	9,352	9,457	9,562	9,667	9,772	9,877	9,982	10,087	10,192	10,297	10,402	10,507	10,612
Tomball	7,299	7,404	7,509	7,614	7,719	7,824	7,929	8,034	8,139	8,244	8,349	8,454	8,559	8,664	8,769	8,874	8,979	9,084	9,189	9,294	9,399	9,504
West University Place	2,825	2,868	2,911	2,954	2,997	3,040	3,083	3,126	3,169	3,212	3,255	3,298	3,341	3,384	3,427	3,470	3,513	3,556	3,599	3,642	3,685	3,728
Small and Unincorporated	925,947	937,526	949,104	960,682	972,260	983,838	995,416	1,006,994	1,018,572	1,030,150	1,041,728	1,053,306	1,064,884	1,076,462	1,088,040	1,099,618	1,111,196	1,12				

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Appendix F

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Appendix F – Municipal Solid Waste Projections (2005 – 2025)

Total Municipal Solid Waste (Tons)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Total MSW	34,107	34,548	34,989	35,430	35,871	36,312	36,753	37,194	37,635	38,076	38,517	38,958	39,399	39,840	40,281	40,722	41,163	41,604	42,045	42,486	42,927
Austin County	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754
Shelby	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754
Small and Unincorporated	26,663	26,864	27,235	27,686	28,127	28,568	29,009	29,450	29,891	30,332	30,773	31,214	31,655	32,096	32,537	32,978	33,419	33,860	34,301	34,742	35,183
Brazoria County	352,697	358,197	363,697	369,197	374,697	380,197	385,697	391,197	396,697	402,197	407,697	413,197	418,697	424,197	429,697	435,197	440,697	446,197	451,697	457,197	462,697
Alvin	30,488	31,032	31,576	32,120	32,664	33,208	33,752	34,296	34,840	35,384	35,928	36,472	37,016	37,560	38,104	38,648	39,192	39,736	40,280	40,824	41,368
Angleton	25,569	26,201	26,833	27,465	28,097	28,729	29,361	29,993	30,625	31,257	31,889	32,521	33,153	33,785	34,417	35,049	35,681	36,313	36,945	37,577	38,209
Clute	15,732	16,150	16,568	16,986	17,404	17,822	18,240	18,658	19,076	19,494	19,912	20,330	20,748	21,166	21,584	22,002	22,420	22,838	23,256	23,674	24,092
Freeport	16,716	17,238	17,760	18,282	18,804	19,326	19,848	20,370	20,892	21,414	21,936	22,458	22,980	23,502	24,024	24,546	25,068	25,590	26,112	26,634	27,156
Lake Jackson	26,950	27,572	28,194	28,816	29,438	30,060	30,682	31,304	31,926	32,548	33,170	33,792	34,414	35,036	35,658	36,280	36,902	37,524	38,146	38,768	39,390
Port Neches	33,974	34,796	35,618	36,440	37,262	38,084	38,906	39,728	40,550	41,372	42,194	43,016	43,838	44,660	45,482	46,304	47,126	47,948	48,770	49,592	50,414
Small and Unincorporated	164,200	165,975	167,750	169,525	171,300	173,075	174,850	176,625	178,400	180,175	181,950	183,725	185,500	187,275	189,050	190,825	192,600	194,375	196,150	197,925	199,700
Chambers County	32,895	33,009	33,123	33,237	33,351	33,465	33,579	33,693	33,807	33,921	34,035	34,149	34,263	34,377	34,491	34,605	34,719	34,833	34,947	35,061	35,175
Anahuac	2,890	2,931	2,972	3,013	3,054	3,095	3,136	3,177	3,218	3,259	3,300	3,341	3,382	3,423	3,464	3,505	3,546	3,587	3,628	3,669	3,710
Small and Unincorporated	30,005	30,078	30,151	30,224	30,297	30,370	30,443	30,516	30,589	30,662	30,735	30,808	30,881	30,954	31,027	31,100	31,173	31,246	31,319	31,392	31,465
Colorado County	26,942	27,197	27,452	27,707	27,962	28,217	28,472	28,727	28,982	29,237	29,492	29,747	30,002	30,257	30,512	30,767	31,022	31,277	31,532	31,787	32,042
Chambers	26,942	27,197	27,452	27,707	27,962	28,217	28,472	28,727	28,982	29,237	29,492	29,747	30,002	30,257	30,512	30,767	31,022	31,277	31,532	31,787	32,042
Small and Unincorporated	22,039	22,261	22,483	22,704	22,926	23,147	23,368	23,589	23,810	24,031	24,252	24,473	24,694	24,915	25,136	25,357	25,578	25,799	26,020	26,241	26,462
Fort Bend County	484,327	501,240	518,153	535,066	551,979	568,892	585,805	602,718	619,631	636,544	653,457	670,370	687,283	704,196	721,109	738,022	754,935	771,848	788,761	805,674	822,587
Missouri City	66,177	67,272	68,367	69,462	70,557	71,652	72,747	73,842	74,937	76,032	77,127	78,222	79,317	80,412	81,507	82,602	83,697	84,792	85,887	86,982	88,077
Rosenberg	33,030	33,900	34,770	35,640	36,510	37,380	38,250	39,120	39,990	40,860	41,730	42,600	43,470	44,340	45,210	46,080	46,950	47,820	48,690	49,560	50,430
Stanhoff	30,240	30,869	31,498	32,127	32,756	33,385	34,014	34,643	35,272	35,901	36,530	37,159	37,788	38,417	39,046	39,675	40,304	40,933	41,562	42,191	42,820
Sugar Land	282,241	293,633	305,025	316,417	327,809	339,201	350,593	361,985	373,377	384,769	396,161	407,553	418,945	430,337	441,729	453,121	464,513	475,905	487,297	498,689	510,081
Small and Unincorporated	373,399	380,949	388,499	396,049	403,599	411,149	418,699	426,249	433,799	441,349	448,899	456,449	463,999	471,549	479,099	486,649	494,199	501,749	509,299	516,849	524,399
Galveston County	19,731	20,035	20,340	20,644	20,948	21,252	21,556	21,860	22,164	22,468	22,772	23,076	23,380	23,684	23,988	24,292	24,596	24,900	25,204	25,508	25,812
Dickinson	35,298	35,928	36,558	37,188	37,818	38,448	39,078	39,708	40,338	40,968	41,598	42,228	42,858	43,488	44,118	44,748	45,378	46,008	46,638	47,268	47,898
Friendswood	75,748	76,891	78,034	79,177	80,320	81,463	82,606	83,749	84,892	86,035	87,178	88,321	89,464	90,607	91,750	92,893	94,036	95,179	96,322	97,465	98,608
La Marque	19,970	19,949	19,928	19,907	19,886	19,865	19,844	19,823	19,802	19,781	19,760	19,739	19,718	19,697	19,676	19,655	19,634	19,613	19,592	19,571	19,550
League City	59,734	61,101	62,468	63,835	65,202	66,569	67,936	69,303	70,670	72,037	73,404	74,771	76,138	77,505	78,872	80,239	81,606	82,973	84,340	85,707	87,074
Texas City	11,849	12,034	12,219	12,404	12,589	12,774	12,959	13,144	13,329	13,514	13,699	13,884	14,069	14,254	14,439	14,624	14,809	14,994	15,179	15,364	15,549
Santa Fe	11,849	12,034	12,219	12,404	12,589	12,774	12,959	13,144	13,329	13,514	13,699	13,884	14,069	14,254	14,439	14,624	14,809	14,994	15,179	15,364	15,549
Small and Unincorporated	98,060	101,801	105,542	109,283	113,024	116,765	120,506	124,247	127,988	131,729	135,470	139,211	142,952	146,693	150,434	154,175	157,916	161,657	165,398	169,139	172,880
Harris County	5,474,485	5,555,072	5,635,659	5,716,246	5,796,833	5,877,420	5,958,007	6,038,594	6,119,181	6,199,768	6,280,355	6,360,942	6,441,529	6,522,116	6,602,703	6,683,290	6,763,877	6,844,464	6,925,051	7,005,638	7,086,225
Baytown	74,172	75,864	77,556	79,248	80,940	82,632	84,324	86,016	87,708	89,400	91,092	92,784	94,476	96,168	97,860	99,552	101,244	102,936	104,628	106,320	108,012
Bellevue	24,995	24,877	24,759	24,641	24,523	24,405	24,287	24,169	24,051	23,933	23,815	23,697	23,579	23,461	23,343	23,225	23,107	22,989	22,871	22,753	22,635
Deer Park	39,951	39,425	38,899	38,373	37,847	37,321	36,795	36,269	35,743	35,217	34,691	34,165	33,639	33,113	32,587	32,061	31,535	31,009	30,483	29,957	29,431
Houston	3,059,190	3,103,965	3,148,740	3,193,515	3,238,290	3,283,065	3,327,840	3,372,615	3,417,390	3,462,165	3,506,940	3,551,715	3,596,490	3,641,265	3,686,040	3,730,815	3,775,590	3,820,365	3,865,140	3,909,915	3,954,690
Humble	27,143	27,971	28,800	29,629	30,458	31,287	32,116	32,945	33,774	34,603	35,432	36,261	37,090	37,919	38,748	39,577	40,406	41,235	42,064	42,893	43,722
Jacinto City	10,134	10,284	10,434	10,584	10,734	10,884	11,034	11,184	11,334	11,484	11,634	11,784	11,934	12,084	12,234	12,384	12,534	12,684	12,834	12,984	13,134
Katy	15,987	16,424	16,861	17,298	17,735	18,172	18,609	19,046	19,483	19,920	20,357	20,794	21,231	21,668	22,105	22,542	22,979	23,416	23,853	24,290	24,727
La Porte	42,857	43,853	44,849	45,845	46,841	47,837	48,833	49,829	50,825	51,821	52,817	53,813	54,809	55,805	56,801	57,797	58,793	59,789	60,785	61,781	62,777
Pasadena	173,673	176,121	178,570	181,019	183,468	185,917	188,366	190,815	193,264	195,713	198,162	200,611	203,060	205,509	207,958	210,407	212,856	215,305	217,754	220,203	222,652
Seabrook	16,478	17,264	18,050	18,836	19,622	20,408	21,194	21,980	22,766	23,552	24,338	25,124	25,910	26,696	27,482	28,268	29,054	29,840	30,626	31,412	32,198
South Houston	14,953	15,140	15,327	15,514	15,701	15,888	16,075	16,262	16,449	16,636	16,823	17,010	17,197	17,							

Appendix F – Municipal Solid Waste Projections (2005 – 2025)

Single-Family Residential Solid Waste (Tons)

Single-Family Waste	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Austin County	22,890	22,941	23,190	23,441	23,690	23,941	24,191	24,441	24,691	24,941	25,191	25,441	25,691	25,941	26,191	26,441	26,691	26,941	27,191	27,441	27,691
Brazoria County	217,722	221,173	224,625	228,076	231,527	234,978	238,429	241,880	245,331	248,782	252,233	255,684	259,135	262,586	266,037	269,488	272,939	276,390	279,841	283,292	286,743
Chambers County	25,243	25,280	25,317	25,354	25,391	25,428	25,465	25,502	25,539	25,576	25,613	25,650	25,687	25,724	25,761	25,798	25,835	25,872	25,909	25,946	25,983
Colorado County	20,078	20,219	20,360	20,501	20,642	20,783	20,924	21,065	21,206	21,347	21,488	21,629	21,770	21,911	22,052	22,193	22,334	22,475	22,616	22,757	22,898
Dallas County	22,890	22,941	23,190	23,441	23,690	23,941	24,191	24,441	24,691	24,941	25,191	25,441	25,691	25,941	26,191	26,441	26,691	26,941	27,191	27,441	27,691
Deer Park	25,403	25,713	26,023	26,333	26,643	26,953	27,263	27,573	27,883	28,193	28,503	28,813	29,123	29,433	29,743	30,053	30,363	30,673	30,983	31,293	31,603
Galena Park	9,255	9,368	9,481	9,594	9,707	9,820	9,933	10,046	10,159	10,272	10,385	10,498	10,611	10,724	10,837	10,950	11,063	11,176	11,289	11,402	11,515
Houston	1,217,881	1,233,402	1,248,923	1,264,444	1,279,965	1,295,486	1,311,007	1,326,528	1,342,049	1,357,570	1,373,091	1,388,612	1,404,133	1,419,654	1,435,175	1,450,696	1,466,217	1,481,738	1,497,259	1,512,780	1,528,301
Liberty County	71,164	72,113	73,062	74,011	74,960	75,909	76,858	77,807	78,756	79,705	80,654	81,603	82,552	83,501	84,450	85,399	86,348	87,297	88,246	89,195	90,144
Matagorda County	34,801	35,120	35,440	35,760	36,080	36,400	36,720	37,040	37,360	37,680	38,000	38,320	38,640	38,960	39,280	39,600	39,920	40,240	40,560	40,880	41,200
Montgomery County	343,662	355,116	372,571	385,026	402,481	419,936	437,391	454,846	472,301	489,756	507,211	524,666	542,121	559,576	577,031	594,486	611,941	629,396	646,851	664,306	681,761
Waller County	34,963	35,562	36,161	36,760	37,359	37,958	38,557	39,156	39,755	40,354	40,953	41,552	42,151	42,750	43,349	43,948	44,547	45,146	45,745	46,344	46,943
Wharton County	39,687	39,993	40,300	40,606	40,913	41,219	41,526	41,832	42,139	42,445	42,752	43,058	43,365	43,671	43,978	44,284	44,591	44,897	45,204	45,510	45,817
H-GAC TOTAL	4,051,943	4,126,819	4,201,695	4,282,013	4,362,330	4,442,648	4,522,965	4,603,283	4,683,601	4,763,919	4,844,237	4,924,555	5,004,873	5,085,191	5,165,509	5,245,827	5,326,145	5,406,463	5,486,781	5,567,099	5,647,417

Appendix F – Municipal Solid Waste Projections (2005 – 2025)

Multi-Family Residential Solid Waste (Tons)

Multi-Family Waste	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Alaska	1,075	1,084	1,093	1,101	1,110	1,118	1,127	1,136	1,145	1,154	1,163	1,171	1,179	1,187	1,195	1,203	1,210	1,215	1,222	1,228	1,234
Arizona	37,877	38,517	39,156	39,795	40,434	41,073	41,712	42,351	42,990	43,629	44,268	44,907	45,546	46,185	46,824	47,463	48,102	48,741	49,380	50,019	50,658
Arkansas	8,519	8,668	8,817	8,966	9,115	9,264	9,413	9,562	9,711	9,860	10,009	10,158	10,307	10,456	10,605	10,754	10,903	11,052	11,201	11,350	11,499
California	4,310	4,370	4,429	4,488	4,547	4,606	4,665	4,724	4,783	4,842	4,901	4,960	5,019	5,078	5,137	5,196	5,255	5,314	5,373	5,432	5,491
Colorado	4,083	4,150	4,217	4,284	4,351	4,418	4,485	4,552	4,619	4,686	4,753	4,820	4,887	4,954	5,021	5,088	5,155	5,222	5,289	5,356	5,423
Connecticut	5,614	5,682	5,750	5,818	5,886	5,954	6,022	6,090	6,158	6,226	6,294	6,362	6,430	6,498	6,566	6,634	6,702	6,770	6,838	6,906	6,974
Delaware	6,427	6,488	6,549	6,610	6,671	6,732	6,793	6,854	6,915	6,976	7,037	7,098	7,159	7,220	7,281	7,342	7,403	7,464	7,525	7,586	7,647
District of Columbia	7,908	8,005	8,202	8,398	8,594	8,790	8,986	9,182	9,378	9,574	9,770	9,966	10,162	10,358	10,554	10,750	10,946	11,142	11,338	11,534	11,730
Florida	3,449	3,497	3,544	3,591	3,637	3,684	3,730	3,777	3,824	3,870	3,917	3,963	4,009	4,056	4,102	4,149	4,195	4,242	4,288	4,335	4,381
Georgia	733	734	736	743	750	756	763	770	776	783	790	797	803	810	817	824	831	838	845	852	859
Hawaii	99	101	103	104	104	105	106	107	108	109	110	111	111	112	113	114	115	116	117	118	119
Idaho	633	633	633	639	645	651	657	663	669	675	681	687	693	700	707	714	721	728	735	742	749
Illinois	680	683	687	690	693	696	700	703	707	710	713	717	720	723	727	730	733	737	740	743	746
Indiana	489	501	513	524	536	548	560	572	584	596	608	620	632	644	656	668	680	692	704	716	728
Iowa	181	182	184	185	187	188	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204
Kansas	25,008	26,362	27,716	29,070	30,424	31,778	33,132	34,486	35,840	37,194	38,548	39,902	41,256	42,610	43,964	45,318	46,672	48,026	49,380	50,734	52,088
Kentucky	1,307	1,346	1,386	1,426	1,466	1,506	1,546	1,586	1,626	1,666	1,706	1,746	1,786	1,826	1,866	1,906	1,946	1,986	2,026	2,066	2,106
Louisiana	3,084	3,154	3,224	3,294	3,364	3,434	3,504	3,574	3,644	3,714	3,784	3,854	3,924	3,994	4,064	4,134	4,204	4,274	4,344	4,414	4,484
Maine	5,614	5,682	5,750	5,818	5,886	5,954	6,022	6,090	6,158	6,226	6,294	6,362	6,430	6,498	6,566	6,634	6,702	6,770	6,838	6,906	6,974
Maryland	4,217	4,338	4,458	4,578	4,698	4,818	4,938	5,058	5,178	5,298	5,418	5,538	5,658	5,778	5,898	6,018	6,138	6,258	6,378	6,498	6,618
Massachusetts	5,626	5,195	5,464	5,690	5,917	6,143	6,369	6,595	6,821	7,047	7,273	7,499	7,725	7,951	8,177	8,403	8,629	8,855	9,081	9,307	9,533
Michigan	39,194	39,756	40,318	40,707	41,096	41,484	41,873	42,262	42,650	43,039	43,427	43,816	44,205	44,594	44,983	45,372	45,761	46,150	46,539	46,928	47,317
Minnesota	2,893	2,830	2,666	2,692	2,718	2,744	2,770	2,796	2,822	2,848	2,874	2,900	2,926	2,952	2,978	3,004	3,030	3,056	3,082	3,108	3,134
Mississippi	3,837	3,801	3,864	4,020	4,076	4,132	4,188	4,244	4,299	4,355	4,411	4,467	4,523	4,579	4,635	4,691	4,747	4,803	4,859	4,915	4,971
Missouri	15,848	16,049	16,251	16,532	16,813	17,094	17,375	17,656	17,937	18,218	18,500	18,781	19,062	19,343	19,624	19,905	20,186	20,467	20,748	21,029	21,310
Montana	1,194	1,210	1,227	1,244	1,261	1,278	1,295	1,312	1,329	1,346	1,363	1,380	1,397	1,414	1,431	1,448	1,465	1,482	1,499	1,516	1,533
Nebraska	6,294	6,421	6,548	6,675	6,802	6,929	7,056	7,183	7,310	7,437	7,564	7,691	7,818	7,945	8,072	8,199	8,326	8,453	8,580	8,707	8,834
Nevada	5,614	5,682	5,750	5,818	5,886	5,954	6,022	6,090	6,158	6,226	6,294	6,362	6,430	6,498	6,566	6,634	6,702	6,770	6,838	6,906	6,974
New Hampshire	5,614	5,682	5,750	5,818	5,886	5,954	6,022	6,090	6,158	6,226	6,294	6,362	6,430	6,498	6,566	6,634	6,702	6,770	6,838	6,906	6,974
New Jersey	1,513	1,520	1,527	1,548	1,565	1,584	1,602	1,621	1,640	1,659	1,677	1,696	1,715	1,734	1,753	1,772	1,791	1,810	1,829	1,848	1,867
New Mexico	1,061,616	1,096,224	1,130,899	1,165,574	1,200,249	1,234,924	1,269,599	1,304,274	1,338,949	1,373,624	1,408,299	1,442,974	1,477,649	1,512,324	1,546,999	1,581,674	1,616,349	1,651,024	1,685,699	1,720,374	1,755,049
New York	26,151	26,788	27,425	28,062	28,699	29,336	29,973	30,610	31,247	31,884	32,521	33,158	33,795	34,432	35,069	35,706	36,343	36,980	37,617	38,254	38,891
North Carolina	3,704	3,854	3,999	4,099	4,199	4,299	4,399	4,499	4,599	4,699	4,799	4,899	4,999	5,099	5,199	5,299	5,399	5,499	5,599	5,699	5,799
North Dakota	821,866	831,720	842,574	852,428	862,282	872,136	881,990	891,844	901,698	911,552	921,406	931,260	941,114	950,968	960,822	970,676	980,530	990,384	1,000,238	1,010,092	1,019,946
Ohio	8,011	8,122	8,233	8,344	8,455	8,566	8,677	8,788	8,899	9,010	9,121	9,232	9,343	9,454	9,565	9,676	9,787	9,898	10,009	10,120	10,231
Oklahoma	1,146	1,160	1,174	1,187	1,199	1,211	1,224	1,236	1,248	1,261	1,273	1,285	1,297	1,309	1,321	1,333	1,345	1,357	1,369	1,381	1,393
Oregon	2,625	2,679	2,733	2,787	2,841	2,895	2,949	3,003	3,057	3,111	3,165	3,219	3,273	3,327	3,381	3,435	3,489	3,543	3,597	3,651	3,705
Pennsylvania	5,529	5,664	5,799	5,855	5,912	5,969	6,026	6,083	6,140	6,197	6,254	6,311	6,368	6,425	6,482	6,539	6,596	6,653	6,710	6,767	6,824
Rhode Island	47,004	47,833	48,662	49,491	50,320	51,149	51,978	52,807	53,636	54,465	55,294	56,123	56,952	57,781	58,610	59,439	60,268	61,097	61,926	62,755	63,584
South Carolina	5,861	6,269	6,677	7,085	7,493	7,901	8,309	8,717	9,125	9,533	9,941	10,349	10,757	11,165	11,573	11,981	12,389	12,797	13,205	13,613	14,021
South Dakota	3,849	3,898	3,948	3,998	4,048	4,098	4,148	4,198	4,248	4,298	4,348	4,398	4,448	4,498	4,548	4,598	4,648	4,698	4,748	4,798	4,848
Tennessee	3,171	3,218	3,265	3,312	3,359	3,406	3,453	3,500	3,547	3,594	3,641	3,688	3,735	3,782	3,829	3,876	3,923	3,970	4,017	4,064	4,111
Texas	150,368	152,540	154,712	157,396	160,080	162,764	165,447	168,131	170,815	173,499	176,182	178,866	181,550	184,234	186,918	189,602	192,286	194,970	197,654	200,338	203,022
Utah	2,984	3,021	3,059	3,125	3,258	3,324	3,390	3,456	3,522	3,588	3,654	3,720	3,786	3,852	3,918	3,984	4,050	4,116	4,182	4,248	4,314
Vermont	635	641	647	658	669	681	692	703	714	725	736	747	758	769	780	791	802	813	824	835	846
Virginia	2,349	2,380	2,411	2,467	2,522	2,577	2,632	2,687	2,742	2,797	2,852	2,907	2,962	3,017	3,072	3,127	3,182	3,237	3,292	3,347	3,402
Washington	4,031	4,069	4,107	4,145	4,184	4,222	4,260	4,298	4,336	4,374	4,412	4,450	4,488	4,526	4,564	4,602	4,640	4,678	4,716	4,754	4,792
West Virginia	3,474	3,577	3,680	3,783	3,886	3,989	4,092	4,195	4,298	4,401	4,504	4,607	4,710	4,813	4,916	5,019	5,122	5,225	5,328	5,431	

Appendix F – Municipal Solid Waste Projections (2005 – 2025)

Commercial Solid Waste (Tons)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Commercial Waste	9,656	9,830	10,005	10,229	10,454	10,678	10,902	11,127	11,351	11,576	11,800	12,019	12,237	12,455	12,673	12,891	13,109	13,327	13,545	13,763	13,981
Austin County	1,995	2,031	2,067	2,103	2,140	2,176	2,213	2,250	2,287	2,324	2,361	2,398	2,435	2,472	2,509	2,546	2,583	2,620	2,657	2,694	2,731
Small and Unincorporated	7,661	7,799	7,938	8,116	8,294	8,472	8,650	8,828	9,006	9,184	9,362	9,540	9,718	9,896	10,074	10,252	10,430	10,608	10,786	10,964	11,142
Brazoria County	97,097	98,977	100,857	102,737	104,617	106,497	108,377	110,257	112,137	114,017	115,897	117,777	119,657	121,537	123,417	125,297	127,177	129,057	130,937	132,817	134,697
Avon	8,335	8,481	8,628	8,775	8,922	9,069	9,216	9,363	9,510	9,657	9,804	9,951	10,098	10,245	10,392	10,539	10,686	10,833	10,980	11,127	11,274
Angleton	7,295	7,676	8,056	8,436	8,816	9,196	9,576	9,956	10,336	10,716	11,096	11,476	11,856	12,236	12,616	12,996	13,376	13,756	14,136	14,516	14,896
Clute	8,085	8,177	8,269	8,361	8,453	8,545	8,637	8,729	8,821	8,913	9,005	9,097	9,189	9,281	9,373	9,465	9,557	9,649	9,741	9,833	9,925
Freeport	4,522	4,870	5,219	5,568	5,917	6,266	6,615	6,964	7,313	7,662	8,011	8,360	8,709	9,058	9,407	9,756	10,105	10,454	10,803	11,152	11,501
Like Jackson	6,289	6,325	6,361	6,397	6,433	6,469	6,505	6,541	6,577	6,613	6,649	6,685	6,721	6,757	6,793	6,829	6,865	6,901	6,937	6,973	7,009
Pearland	24,038	24,359	24,680	25,001	25,322	25,643	25,964	26,285	26,606	26,927	27,248	27,569	27,890	28,211	28,532	28,853	29,174	29,495	29,816	30,137	30,458
Small and Unincorporated	30,247	30,958	31,669	32,380	33,091	33,802	34,513	35,224	35,935	36,646	37,357	38,068	38,779	39,490	40,201	40,912	41,623	42,334	43,045	43,756	44,467
Chambers County	6,919	6,984	7,069	7,145	7,221	7,297	7,373	7,449	7,525	7,601	7,677	7,753	7,829	7,905	7,981	8,057	8,133	8,209	8,285	8,361	8,437
Amarillo	695	695	700	705	710	715	720	725	730	735	740	745	750	755	760	765	770	775	780	785	790
Small and Unincorporated	6,225	6,300	6,375	6,446	6,517	6,588	6,659	6,729	6,800	6,871	6,942	7,013	7,084	7,155	7,226	7,297	7,368	7,439	7,510	7,581	7,652
Colorado County	6,173	6,285	6,396	6,507	6,618	6,729	6,840	6,951	7,062	7,173	7,284	7,395	7,506	7,617	7,728	7,839	7,950	8,061	8,172	8,283	8,394
Columbus	1,079	1,098	1,118	1,138	1,158	1,178	1,198	1,218	1,238	1,258	1,278	1,298	1,318	1,338	1,358	1,378	1,398	1,418	1,438	1,458	1,478
Small and Unincorporated	5,094	5,186	5,278	5,369	5,461	5,552	5,644	5,735	5,827	5,918	6,009	6,100	6,191	6,282	6,373	6,464	6,555	6,646	6,737	6,828	6,919
Fort Bend County	89,683	91,276	92,869	94,462	96,055	97,648	99,241	100,834	102,427	104,020	105,613	107,206	108,799	110,392	111,985	113,578	115,171	116,764	118,357	119,950	121,543
Missouri City	8,679	8,168	7,657	7,146	6,635	6,124	5,613	5,102	4,591	4,080	3,569	3,058	2,547	2,036	1,525	1,014	503	92	92	92	92
Richmond	5,943	6,102	6,260	6,419	6,578	6,737	6,896	7,055	7,214	7,373	7,532	7,691	7,850	8,009	8,168	8,327	8,486	8,645	8,804	8,963	9,122
Rosenberg	8,765	9,158	9,551	9,944	10,337	10,730	11,123	11,516	11,909	12,302	12,695	13,088	13,481	13,874	14,267	14,660	15,053	15,446	15,839	16,232	16,625
Stafford	15,318	15,551	15,784	16,017	16,250	16,483	16,716	16,949	17,182	17,415	17,648	17,881	18,114	18,347	18,580	18,813	19,046	19,279	19,512	19,745	19,978
Texas City	23,530	23,939	24,348	24,757	25,166	25,575	25,984	26,393	26,802	27,211	27,620	28,029	28,438	28,847	29,256	29,665	30,074	30,483	30,892	31,301	31,710
Small and Unincorporated	30,247	30,958	31,669	32,380	33,091	33,802	34,513	35,224	35,935	36,646	37,357	38,068	38,779	39,490	40,201	40,912	41,623	42,334	43,045	43,756	44,467
Galveston County	119,984	124,197	128,410	132,623	136,836	141,049	145,262	149,475	153,688	157,901	162,114	166,327	170,540	174,753	178,966	183,179	187,392	191,605	195,818	200,031	204,244
Dickinson	2,891	2,968	3,045	3,122	3,199	3,276	3,353	3,430	3,507	3,584	3,661	3,738	3,815	3,892	3,969	4,046	4,123	4,200	4,277	4,354	4,431
Friendswood	4,535	4,653	4,770	4,926	5,081	5,236	5,391	5,546	5,701	5,856	6,011	6,166	6,321	6,476	6,631	6,786	6,941	7,096	7,251	7,406	7,561
Galveston	22,885	23,357	23,828	24,300	24,771	25,243	25,714	26,185	26,656	27,127	27,598	28,069	28,540	29,011	29,482	29,953	30,424	30,895	31,366	31,837	32,308
La Marque	4,644	4,826	5,007	5,188	5,369	5,550	5,731	5,912	6,093	6,274	6,455	6,636	6,817	6,998	7,179	7,360	7,541	7,722	7,903	8,084	8,265
League City	18,215	18,742	19,270	19,797	20,324	20,851	21,378	21,905	22,432	22,959	23,486	24,013	24,540	25,067	25,594	26,121	26,648	27,175	27,702	28,229	28,756
Texas City	15,983	15,954	15,925	15,896	15,867	15,838	15,809	15,780	15,751	15,722	15,693	15,664	15,635	15,606	15,577	15,548	15,519	15,490	15,461	15,432	15,403
Small and Unincorporated	17,356	17,911	18,466	19,021	19,576	20,131	20,686	21,241	21,796	22,351	22,906	23,461	24,016	24,571	25,126	25,681	26,236	26,791	27,346	27,901	28,456
Harris County	50,865	52,516	54,167	55,818	57,469	59,120	60,771	62,422	64,073	65,724	67,375	69,026	70,677	72,328	73,979	75,630	77,281	78,932	80,583	82,234	83,885
Harris County	1,772,082	1,801,753	1,830,424	1,860,095	1,889,766	1,919,437	1,949,108	1,978,779	2,008,450	2,038,121	2,067,792	2,097,463	2,127,134	2,156,805	2,186,476	2,216,147	2,245,818	2,275,489	2,305,160	2,334,831	2,364,502
Baytown	17,258	17,563	17,868	18,173	18,478	18,783	19,088	19,393	19,698	20,003	20,308	20,613	20,918	21,223	21,528	21,833	22,138	22,443	22,748	23,053	23,358
Bellaire	7,272	7,333	7,394	7,455	7,516	7,577	7,638	7,699	7,760	7,821	7,882	7,943	8,004	8,065	8,126	8,187	8,248	8,309	8,370	8,431	8,492
Deer Park	9,644	9,760	9,876	10,020	10,164	10,308	10,452	10,596	10,740	10,884	11,028	11,172	11,316	11,460	11,604	11,748	11,892	12,036	12,180	12,324	12,468
Galena Park	2,696	2,735	2,774	2,813	2,852	2,891	2,930	2,969	3,008	3,047	3,086	3,125	3,164	3,203	3,242	3,281	3,320	3,359	3,398	3,437	3,476
Houston	1,019,987	1,037,955	1,055,923	1,073,891	1,091,859	1,109,827	1,127,795	1,145,763	1,163,731	1,181,699	1,200,667	1,218,635	1,236,603	1,254,571	1,272,539	1,290,507	1,308,475	1,326,443	1,344,411	1,362,379	1,380,347
Small and Unincorporated	1,109	1,147	1,186	1,224	1,263	1,301	1,340	1,378	1,417	1,455	1,494	1,532	1,571	1,609	1,648	1,686	1,725	1,763	1,802	1,840	1,879
Katy	4,150	4,344	4,537	4,719	4,901	5,083	5,265	5,447	5,629	5,811	5,993	6,175	6,357	6,539	6,721	6,903	7,085	7,267	7,449	7,631	7,813
La Porte	8,050	8,210	8,369	8,528	8,687	8,846	9,005	9,164	9,323	9,482	9,641	9,800	9,959	10,118	10,277	10,436	10,595	10,754	10,913	11,072	11,231
Pasadena	33,665	34,551	35,437	36,323	37,209	38,095	38,981	39,867	40,753	41,639	42,525	43,411	44,297	45,183	46,069	46,955	47,841	48,727	49,613	50,500	51,386
Seabrook	2,173	2,220	2,266	2,312	2,358	2,404	2,450	2,496	2,542	2,588	2,634	2,680	2,726	2,772	2,818	2,864	2,910	2,956	3,002	3,048	3,094
South Houston	5,822	5,995	6,168	6,341	6,514	6,687	6,860	7,033	7,206	7,379	7,552	7,725	7,898	8,071	8,244	8,417	8,590	8,763	8,936	9,109	9,282
Tomball	5,054	5,127	5,200	5,273	5,346	5,419	5,492	5,565	5,638	5,711	5,784	5,857									

Appendix G

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City Name: _____
 Contact Name: _____
 Phone Number: _____
 E-mail Address: _____

A. GENERAL INFORMATION

Where the survey asks for tonnage data, please provide for FY 2003 (Sept 1, 2002 – Aug 31, 2003). If data for that year is not available, please provide data for the most recent year available and indicate the year.

- Data provided for FY 2003.
- In place of FY 2003, data was provided for _____ (fill in time frame).

A1. Please indicate who provides the following services (check all that apply).

Service	City	Private	N/A
Single-Family Garbage Collection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Single-Family Recycling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Multi-Family Garbage Collection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Multi-Family Recycling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Commercial Garbage Collection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Commercial Recycling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Landfill	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transfer Station	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Citizens' Collection Stations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A2. How many customers do you have (those served by the City and those served by private contractors)?

Garbage Collection Customers	Number Served by City	Number Served by Private Contractors
Single-Family Collection		
Multi-Family Collection		
Commercial Collection		

Recycling Customers	Number Served by City	Number Served by Private Contractors
Single-Family Recycling		
Multi-Family Recycling		
Commercial Recycling		

B. DISPOSAL

B1. For garbage **collection** services provided by the **City** (contracted services addressed in question B2), please estimate the **tonnage disposed** of for each of the following customer types and services. Please **do not** include tonnage diverted from the landfill, as this is addressed in Section C.

Service	Single-Family	Multi-Family	Commercial
Garbage			
Yard Waste			
Bulky			
C & D			
Industrial Non-Hazardous			
Check here if not applicable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

B2. For garbage **collection** performed by **private contractors** within the City, please estimate the **tonnage disposed** of for each of the following customer types and services, if data is available. Please **do not** include tonnage diverted from the landfill, as this is addressed in Section C.

Service	Single-Family	Multi-Family	Commercial
Garbage			
Yard Waste			
Bulky			
C & D			
Industrial Non-Hazardous			
Check here if not applicable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If available, please list the names of the private contractors that provide garbage **collection** services and indicate which services they provide for the City.

Service	Name(s) of Private Contractor
Single-Family	
Garbage	
Yard Waste	
Bulky	
Multi-Family	
Garbage	
Bulky	
Commercial	
Garbage	
Yard Waste	
Bulky	
C & D	
Industrial Non-Hazardous	

B3. Does the tonnage in questions B1 and B2 represent all garbage, yard waste/brush, bulky items, C&D, and industrial non-hazardous solid waste collected in the City?

Yes No

If no, please explain and list additional tonnage collected, if necessary.

B4. Please list the **tonnage disposed** of directly by self-haulers (e.g. residents, small businesses) at the following facilities, whether operated by the **City or a private contractor**.

Service	Landfills	Transfer Stations	Citizens' Collection Stations
Garbage			
Yard Waste			
Bulky			
C & D			
Industrial Non-Hazardous			
Check here if not applicable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C. RECYCLING/DIVERSION

C1. Where **curbside recycling** services are provided by the **City** (contracted services addressed in question C2), please indicate the **tonnage received**. Materials received at recycling drop-off centers are addressed in question C3.

Service	Single-Family	Multi-Family	Commercial
Plastics			
Glass			
Paper			
Steel cans			
Aluminum cans			
Cardboard			
Yard waste/brush			
Bulky			
Other			
Check here if not applicable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- C2. Where **curbside recycling** is provided by a **private contractor**, please indicate the **tonnage received** if data is available. Materials received at recycling drop-off centers are addressed in question C4.

Service	Single-Family	Multi-Family	Commercial
Plastics			
Glass			
Paper			
Steel cans			
Aluminum cans			
Cardboard			
Yard waste/brush			
Bulky			
Other			
Check here if not applicable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If available, please list the names of the private contractors that provide **curbside recycling** services and indicate which type of customers they serve on behalf of the City.

Customer Type	Name(s) of Private Contractor
Single-Family	
Multi-Family	
Commercial	

- C3. Where **recycling drop-off centers** are operated by the **City** (contracted services addressed in question C4), please indicate the **tonnage received**.

Service	Tonnage Received
Plastics	
Glass	
Paper	
Steel cans	
Aluminum cans	
Cardboard	
Yard waste/brush	
Bulky	
Other	
Check here if not applicable	<input type="checkbox"/>

- C4. Where **recycling drop-off centers** are operated by a **private contractor**, please indicate the **tonnage received** if data is available.

Service	Tonnage Received
Plastics	
Glass	
Paper	
Steel cans	
Aluminum cans	
Cardboard	
Yard waste/brush	
Bulky	
Other	
Check here if not applicable	<input type="checkbox"/>

If available, please list the names of the private contractors that own and/or operate the **recycling drop-off centers**.

D. SOLID WASTE FACILITIES

Please provide information on the solid waste facilities that the City uses. Space for additional facilities is provided in question D8 should you need it.

The following definitions apply to this section of the survey:

Own - City owned, privately operated

Own/Operate - City owned and operated

Use - City uses a landfill that it neither owns nor operates

D1. Please provide information about the **landfills** used by the City.

Check here if this question does not apply:

Name	Location	Owner	City's Role:		
			Own	Own/Operate	Use
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

D2. Does the City anticipate needing to develop a landfill (new or additional) in the future?

Yes No

If yes, estimate the year when the landfill would be needed and the estimate of additional capacity.

Year: _____

Addition: _____

D3. Are there any special issues that the City faces if additional landfill capacity is sought?

D4. Please provide information about the **material recovery facilities (MRF)** used by the City.
 Check here if this question does not apply:

Name	Location	Owner	City's Role:		
			Own	Own/Operate	Use
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

D5. Please provide information about the **transfer stations** used by the City.
 Check here if this question does not apply:

Name	Location	Owner	City's Role:		
			Own	Own/Operate	Use
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

D6. Does the City anticipate needing to develop a transfer station (new or additional) in the future?
 Yes No

If yes, estimate the year when the transfer station would be needed: _____

D7. Please provide information about the **citizens' collection stations** used by the City.
 Check here if this question does not apply:

Name	Location	Owner	City's Role:		
			Own	Own/Operate	Use
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

D8. If necessary, please list additional facilities used by the City in the space provided:

Appendix H

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INSTRUCTIONS

1. In the **General Information** section of the survey, please indicate the entities your company services. For the purposes of this survey, an entity is defined as any party with whom you have a contract to provide service; a city, a county, a utility district, etc. If services are provided on an individual basis, please aggregate data to the appropriate entity (city, county, etc.)
2. The **Solid Waste Facilities** section will provide a better understanding of the facilities your company may use or operate in the region and any capacity expansion initiatives that may be in the planning stages.

The following definitions apply to this section of the survey:

Own - City owned, privately operated

Own/Operate - City owned and operated

Use - City uses a landfill that it neither owns nor operates

3. The **Collection and Diversion** section (Section C) is meant to be completed for each entity that your company serves.

For instance, if you provide curbside recycling for City A and residential garbage collection for City B, you would fill out Section C twice. If you provide both curbside recycling and residential garbage collection service for City A, you would only complete Section C once.

Six copies of Section C have been included with this survey. Should this number of copies be insufficient, this section may be photocopied as required for use in this survey.

Company Name: _____
 Contact Number: _____
 Phone Number: _____
 E-mail Address: _____

A. GENERAL INFORMATION

Please indicate the entities (**city**, county, utility districts, etc.) for which you provide solid waste services. For those entities for which you provide services to all available customers, please check the “100%” column. If less than 100% are served, please estimate the approximate percentage of the entity that your company serves. In either case, please list the number of customers served.

Entity	Single-Family			Multi-Family			Commercial		
	100%	Partial (%)	Customers	100%	Partial (%)	Customers	100%	Partial (%)	Customers
	<input type="checkbox"/>			<input type="checkbox"/>			<input type="checkbox"/>		
	<input type="checkbox"/>			<input type="checkbox"/>			<input type="checkbox"/>		
	<input type="checkbox"/>			<input type="checkbox"/>			<input type="checkbox"/>		
	<input type="checkbox"/>			<input type="checkbox"/>			<input type="checkbox"/>		
	<input type="checkbox"/>			<input type="checkbox"/>			<input type="checkbox"/>		
	<input type="checkbox"/>			<input type="checkbox"/>			<input type="checkbox"/>		
	<input type="checkbox"/>			<input type="checkbox"/>			<input type="checkbox"/>		

B. SOLID WASTE FACILITIES

B1. Please provide information about the **landfills** used by your company.

Name	Location	Owner	Company's Role		
			Own	Own/Operate	Use
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> My company does not use landfills (for example, only recycling services provided).					

B2. Does your company anticipate needing to develop a **landfill** (new or additional) in the future?

Yes No Question does not apply

If yes, estimate the year when the landfill would be needed and the estimate of additional capacity:

Year: _____ Additional Capacity: _____

B3. Are there any special issues that your company faces if additional landfill capacity is sought?

B4. Please provide information about the **material recovery facilities (MRF)** used by your company:

Name	Location	Owner	Company's Role		
			Own	Own/Operate	Use
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> My company does not use material recovery facilities					

B5. Does your company anticipate needing to develop a **MRF** (new or additional) in the future?

- Yes No Question does not apply

If yes, estimate the year when the MRF would be needed: _____

B6. Please provide information about the **transfer stations** used by your company:

Name	Location	Owner	Company's Role		
			Own	Own/Operate	Use
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> My company does not use transfer stations					

B7. Does your company anticipate needing to develop a **transfer station** (new or additional) in the future?

- Yes No Question does not apply

If yes, estimate the year when the transfer station would be needed: _____

Entity: _____

CONFIDENTIAL

C. COLLECTION AND DIVERSION – To be filled out for each entity served

C1. Please estimate **tonnage disposed** of through your garbage **collection** services.

Service	Single-Family	Multi-Family	Commercial
Garbage			
Yard Waste ¹			
Bulky			
C & D			
Industrial Non-Hazardous			
Check here if not applicable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C2. Please estimate **tonnage disposed** of **directly** by self-haulers (e.g. residents, small businesses) at your solid waste facilities.

Service	Landfills	Transfer Stations	Citizens' Collection Stations
Garbage			
Yard Waste			
Bulky			
C & D			
Industrial Non-Hazardous			
Check here if not applicable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C3. Please estimate **tonnage received** through your **curbside recycling** services.

Service	Single-Family	Multi-Family	Commercial
Plastics			
Glass			
Paper			
Steel cans			
Aluminum cans			
Cardboard			
Yard waste/brush			
Bulky			
Other			
Check here if not applicable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C4. Please estimate **tonnage received** through your **recycling drop-off centers**.

Service	Tonnage Received
Plastics	
Glass	
Paper	
Steel cans	
Aluminum cans	
Cardboard	
Yard waste/brush	
Bulky	
Other	
Check here if not applicable	<input type="checkbox"/>

1. If yard waste is collected separately but ultimately **disposed** of in a landfill, please list in question C1. If it is **diverted** please quantify in question C3.

Appendix I

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LANDFILL SURVEY

Landfill Name: _____
Permit Number: _____
Location: _____
Contact Name: _____
Phone Number: _____
E-mail Address: _____

1. Based on the FY2003 Annual Report submitted to the Texas Commission on Environmental Quality (TCEQ), 77497 cubic yards of constructed landfill space and 2586 tons of permitted capacity was remaining at the end of FY 2003 (August 31, 2003). What is the schedule (by year) for constructing the remaining undeveloped landfill cells that have been permitted?

2. How likely are you to pursue a permit amendment to expand landfill capacity beyond the current permitted limit?

- Very Likely
 Somewhat Likely
 Unknown
 Not Likely

If the answer was **Very Likely** OR **Somewhat Likely**, estimate the capacity and year of the proposed expansion:

Capacity (specify tons or cubic yards) _____

Year Capacity Available _____

3. Do you anticipate any public opposition for a permit amendment for expansion that would result in failure to obtain a permit amendment for expansion?

- Yes No

If yes, please comment:

LANDFILL SURVEY

4. Based on the FY2003 Annual Report submitted to the TCEQ, 30267 tons of waste were received for disposal in FY2003 (September 1, 2002 – August 31, 2003). Does the amount reported for FY2003 represent the amount received at the landfill in a typical year?

- Yes No

If no, what adjustments would you recommend to the data to reflect the quantity of waste received at the landfill in a typical year?

5. Did you receive waste from any counties **NOT** listed below?

- | | | |
|-------------|-------------|--------------|
| • Austin | • Galveston | • Montgomery |
| • Brazoria | • Harris | • Walker |
| • Chambers | • Liberty | • Waller |
| • Colorado | • Matagorda | • Wharton |
| • Fort Bend | | |

- Yes No

If yes, please indicate the approximate quantity received in FY2003.

Quantity Received (specify tons or cubic yards): _____

6. Please indicate whether the waste received in question 5 is from one-time occurrences (not typical) or from ongoing shipment practices (typical). The amounts provided below should add up to the answer given in question 5.

- Not applicable (did not receive waste from outside the county)

Amount from one-time occurrences: _____

Amount from ongoing shipment practices: _____

LANDFILL SURVEY

7. Did you receive any waste from out of state?

- Yes No

If yes, please indicate the approximate quantity received in FY2003.

Quantity Received (specify tons or cubic yards): _____

8. Please indicate whether the waste received in question 7 is from one-time occurrences (not typical) or from ongoing shipment practices (typical). The amounts provided below should add up to the answer given in question 7.

- Not applicable (did not receive waste from outside the state)

Amount from one-time occurrences: _____

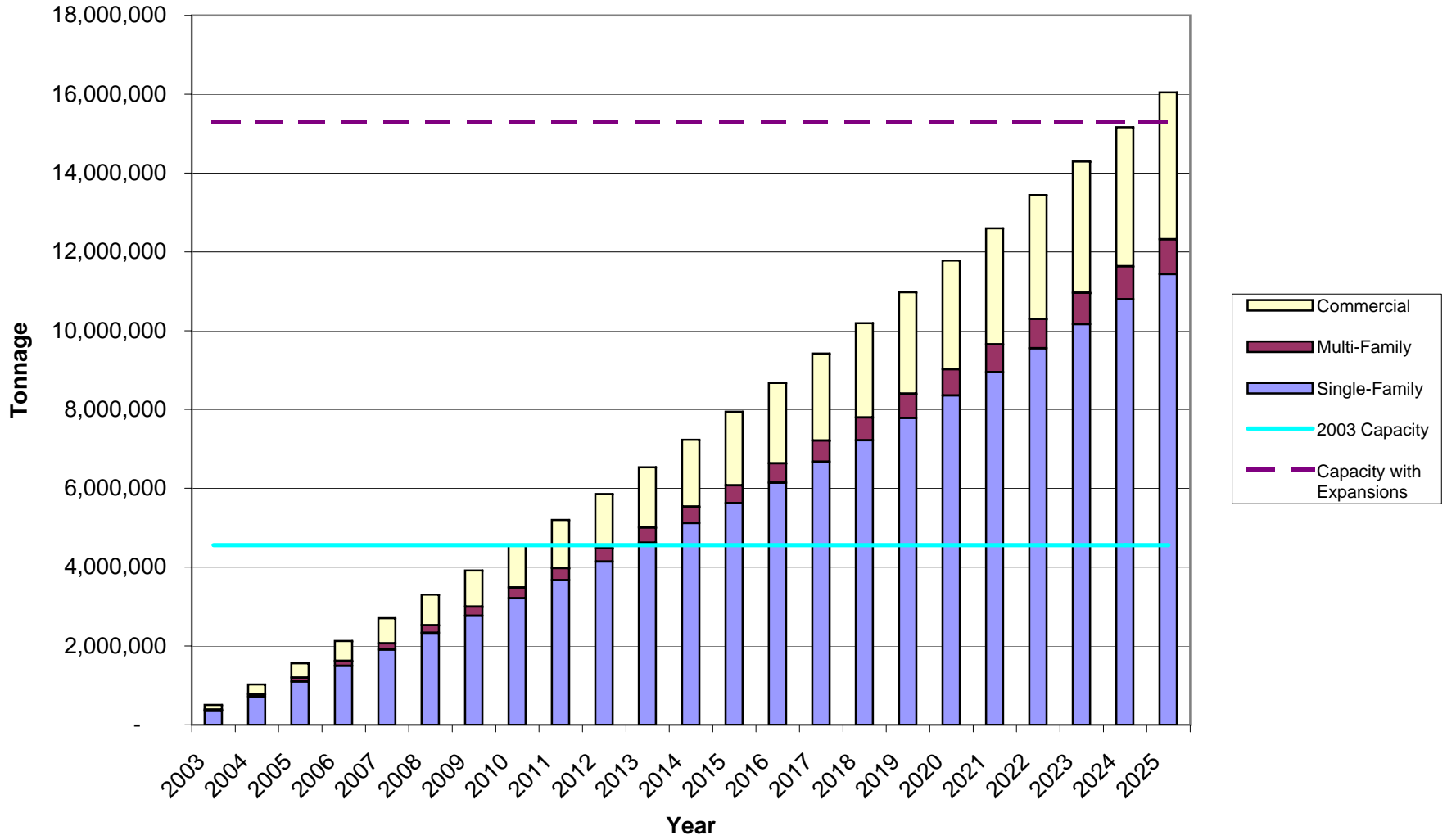
Amount from ongoing shipment practices: _____

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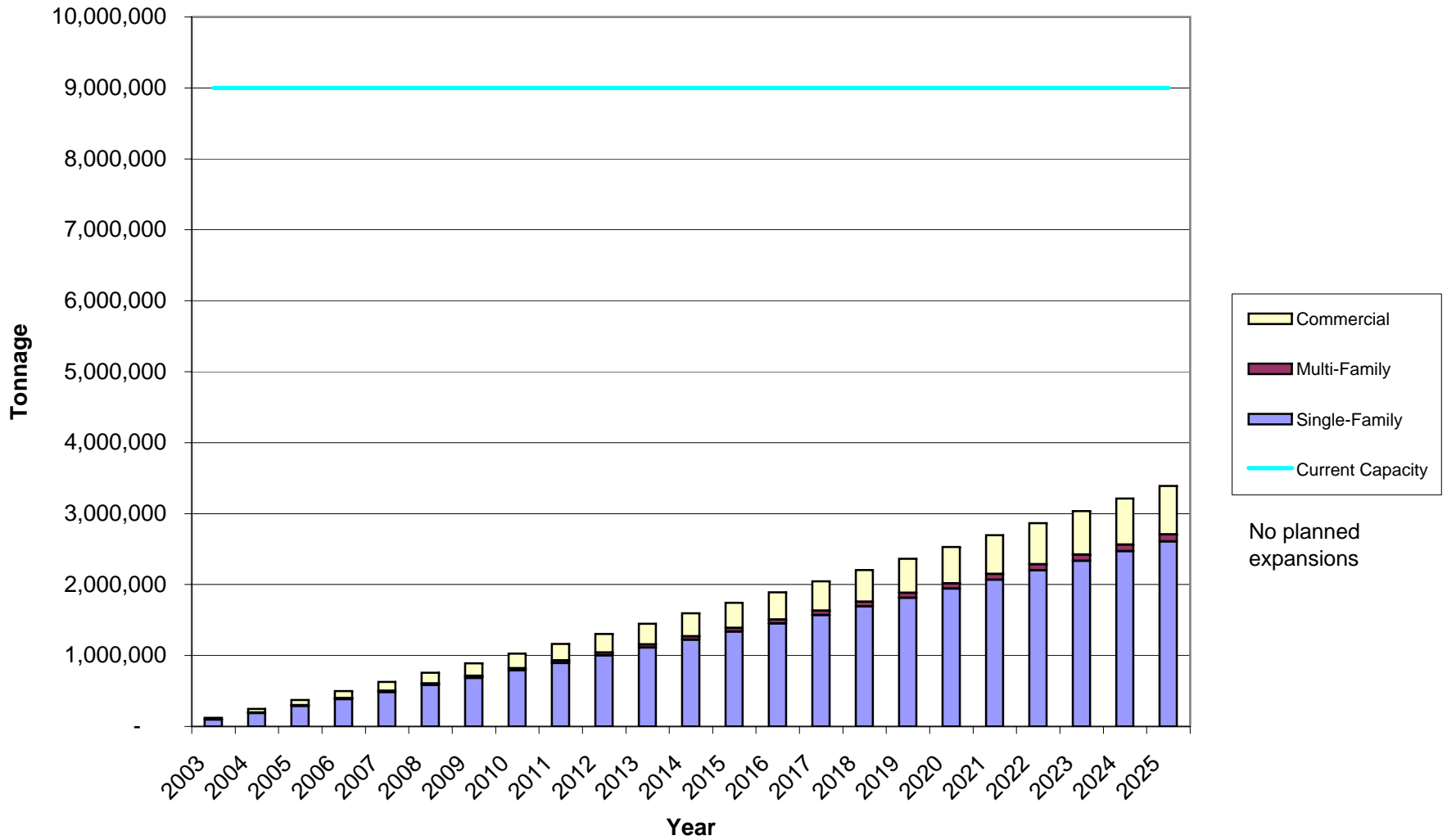
Appendix J

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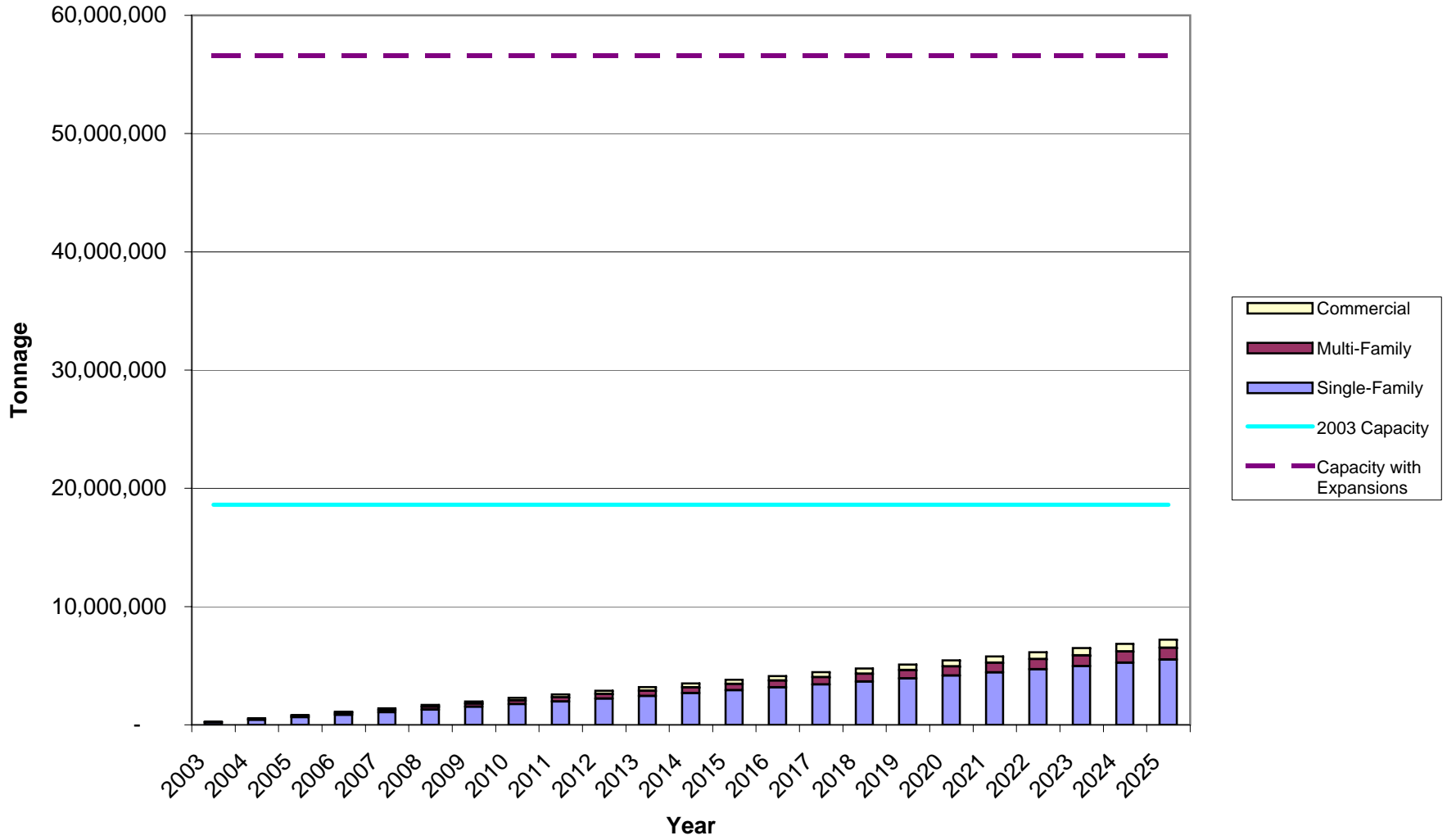
Disposal Demand vs. Capacity Subregion 1 (Montgomery, Walker Counties)



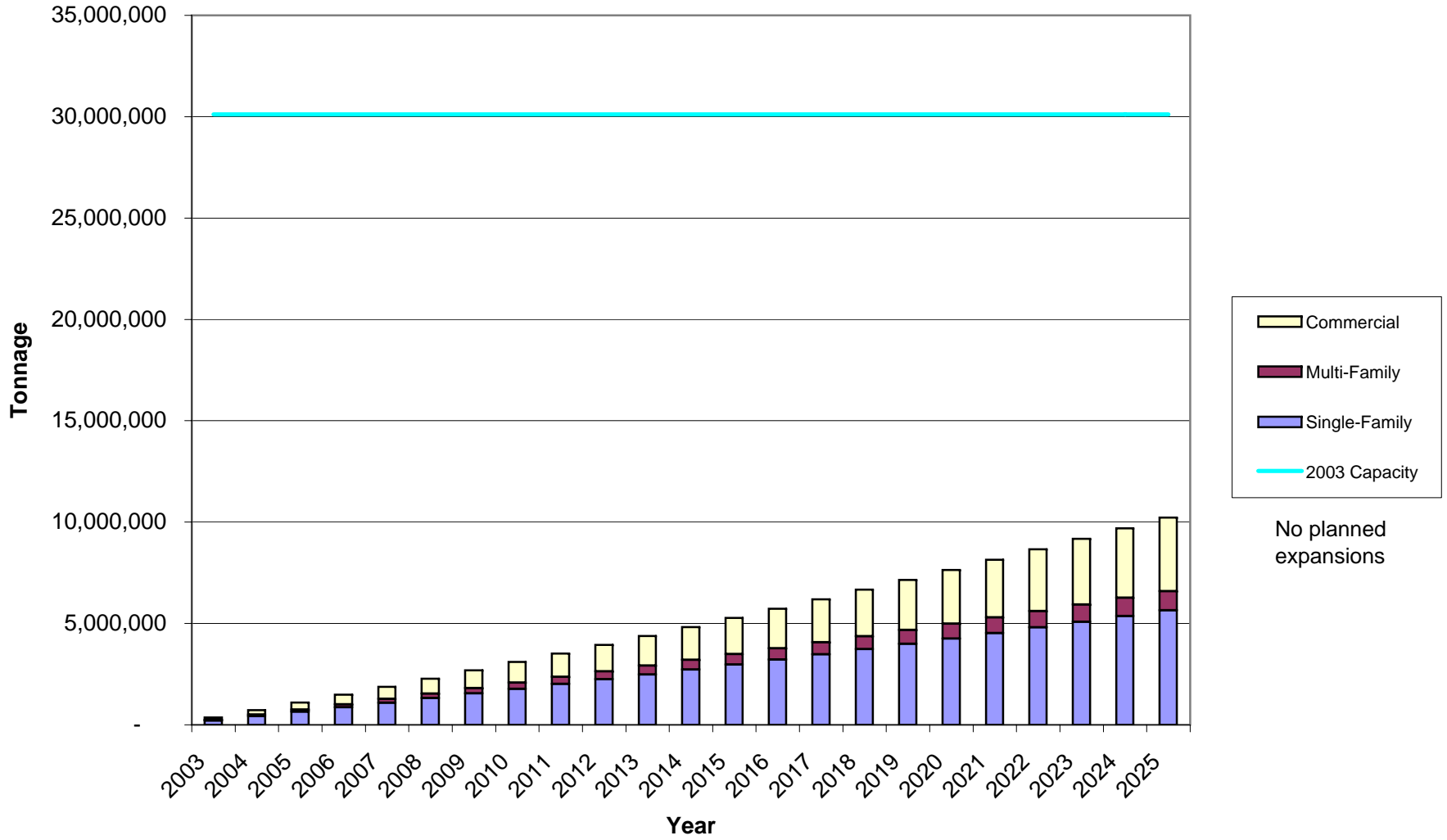
Disposal Demand vs. Capacity Subregion 2 (Chambers, Liberty Counties)



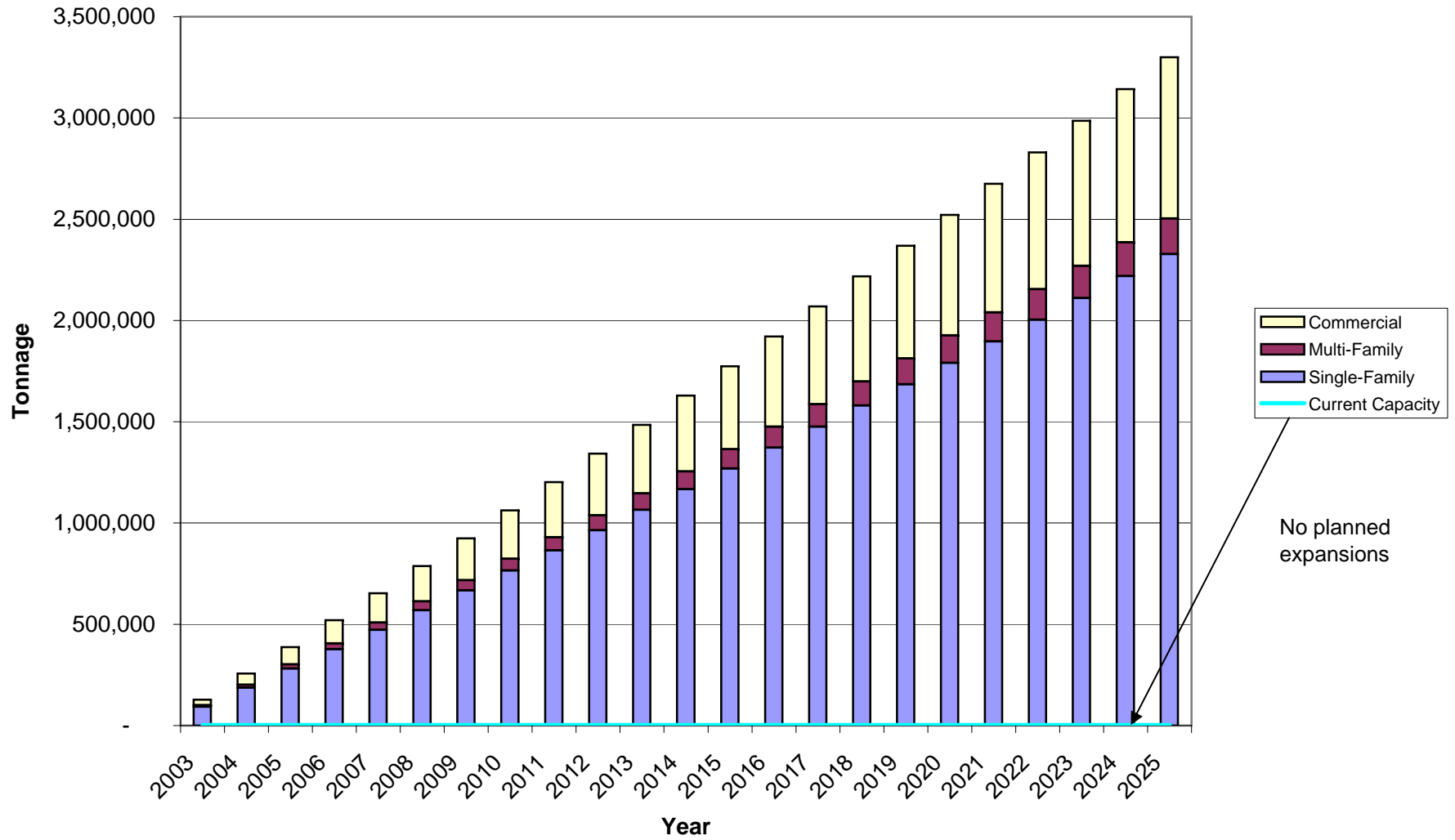
Disposal Demand vs. Capacity Subregion 3 (Galveston County)



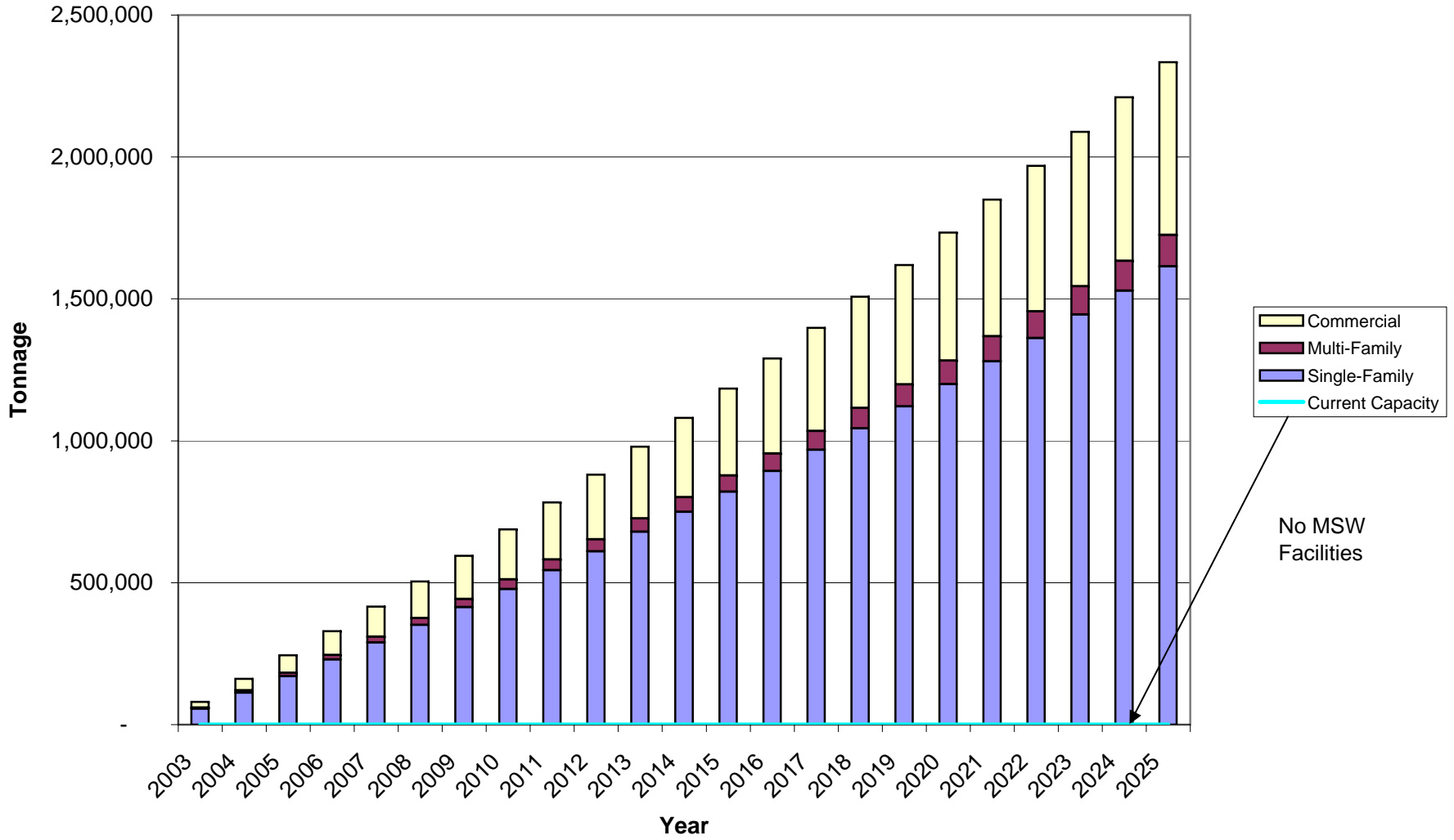
Disposal Demand vs. Capacity Subregion 4 (Brazoria County)



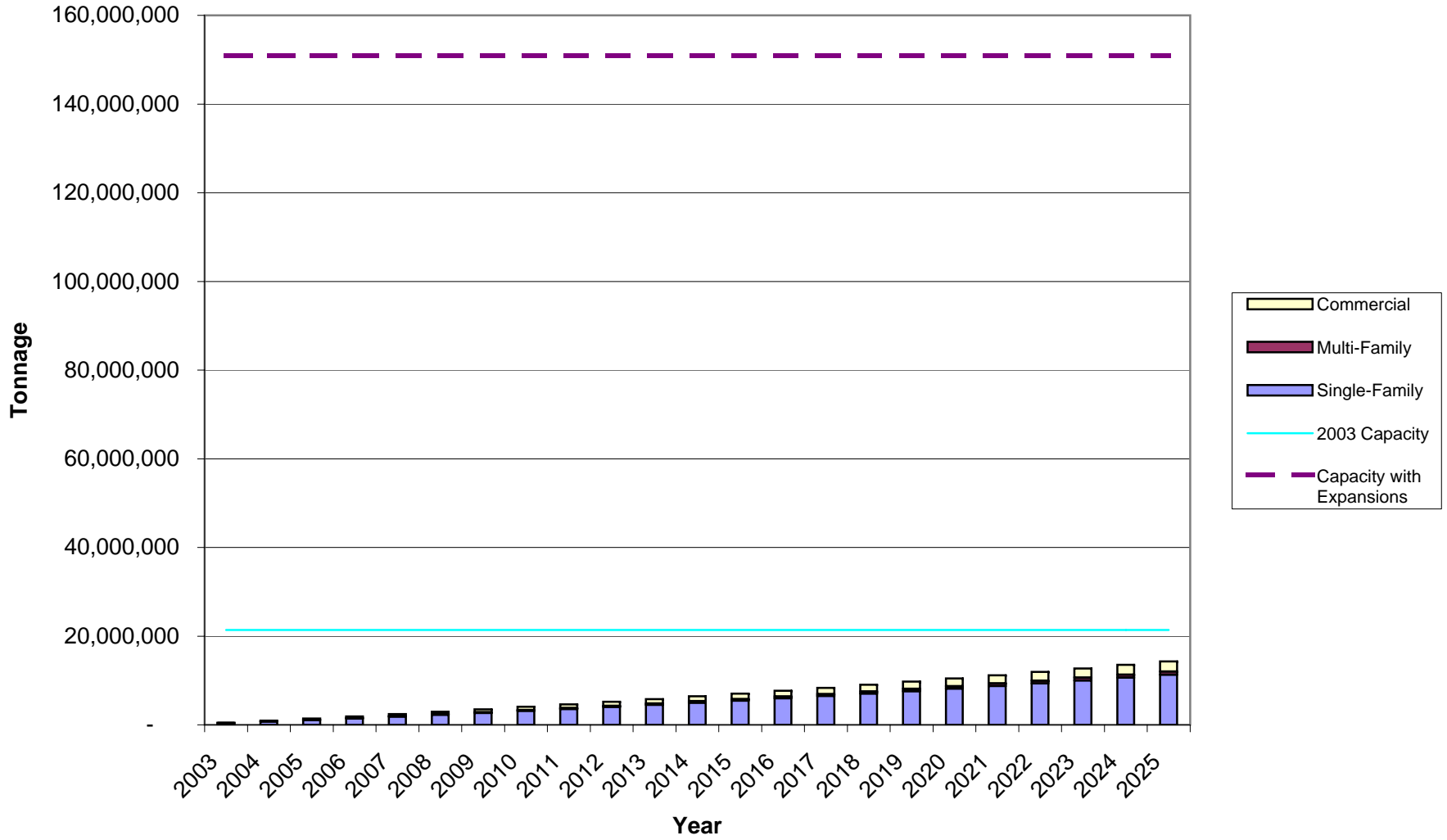
Disposal Demand vs. Capacity Subregion 5 (Colorado, Matagorda, Wharton Counties)



Disposal Demand vs. Capacity Subregion 6 (Austin, Waller Counties)



Disposal Demand vs. Capacity Subregion 7 (Fort Bend County)



Disposal Demand vs. Capacity Subregion 8 (Harris County)

