Fuel Economy in Harris County-2007

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Reason for Study

- H-GAC contacted by City of Houston to do a regional fuel economy study for 2007
- Aim is to determine how much fuel is consumed daily and how the mayor's plan of reducing fuel usage 5% by 2010 can become feasible.

Calculation Methodology- Inputs

- 2006 Harris county registration distribution (TxDOT)- An array of 16 composite vehicle (aggregated diesel and gasoline) for a 25 year period.
- 2006 regional diesel fractions (TxDOT)- represent the fraction of diesel in a composite vehicle category.
- 2007 VMT mix data (TTI)- fraction of VMT per road type and per 16 vehicle types.
- Fuel economy table for MOBILE6 vehicle type (EPA)- per 28 vehicle type and model year.
- 2007 VMT per hour, per vehicle type (H-GAC)
- 2007 VMT per link (H-GAC)

Relation between 16 composite and 28 disaggregated vehicle classes

Composite MOBILE6 Vehicle Classes	Disaggregated MOBILE6 Vehicle Classes
LDV	LDGV, LDDV
LDT1	LDGT1, LDDT1
LDT2	LDGT2, LDDT2
LDT3	LDGT3, LDDT3
LDT4	LDGT4, LDDT4
HDV2b	HDGV2b, HDDV2b
HDV3	HDGV3, HDDV3
HDV4	HDGV4, HDDV4
HDV5	HDGV5, HDDV5
HDV6	HDGV6, HDDV6
HDV7	HDGV7, HDDV7
HDV8a	HDGV8a, HDDV8a
HDV8b	HDGV8b, HDDV8b
HDBS	HDGBS, HDDBS
HDBT	HDBT
MC	MC

Methodology

- **Split of composite vehicle categories:**
- **Reg_Dist LDGV = Reg_Dist LDV x (1 – Diesel_Fraction LDV)**

- **Reg_Dist LDDV = Reg_ Dist LDV x Diesel_Fraction LDV**

Methodology

$$\underset{(25\times28)}{\{\text{Reg. Dist}\}} \times \underset{(28\times15)}{\{\text{VMX}\}|_{am,md,pm,ov}} = \underset{(25\times15)}{\{C\}|_{am,\,md,\,pm.ov}}$$

$$\underset{(15\times25)}{\{C\}^{t}|_{am,\,md,\,pm.ov}} \times \underset{(25\times28)}{\{\text{MPG}\}} = \underset{(15\times28)}{\{E\}|_{am,\,md,\,pm.ov}}$$

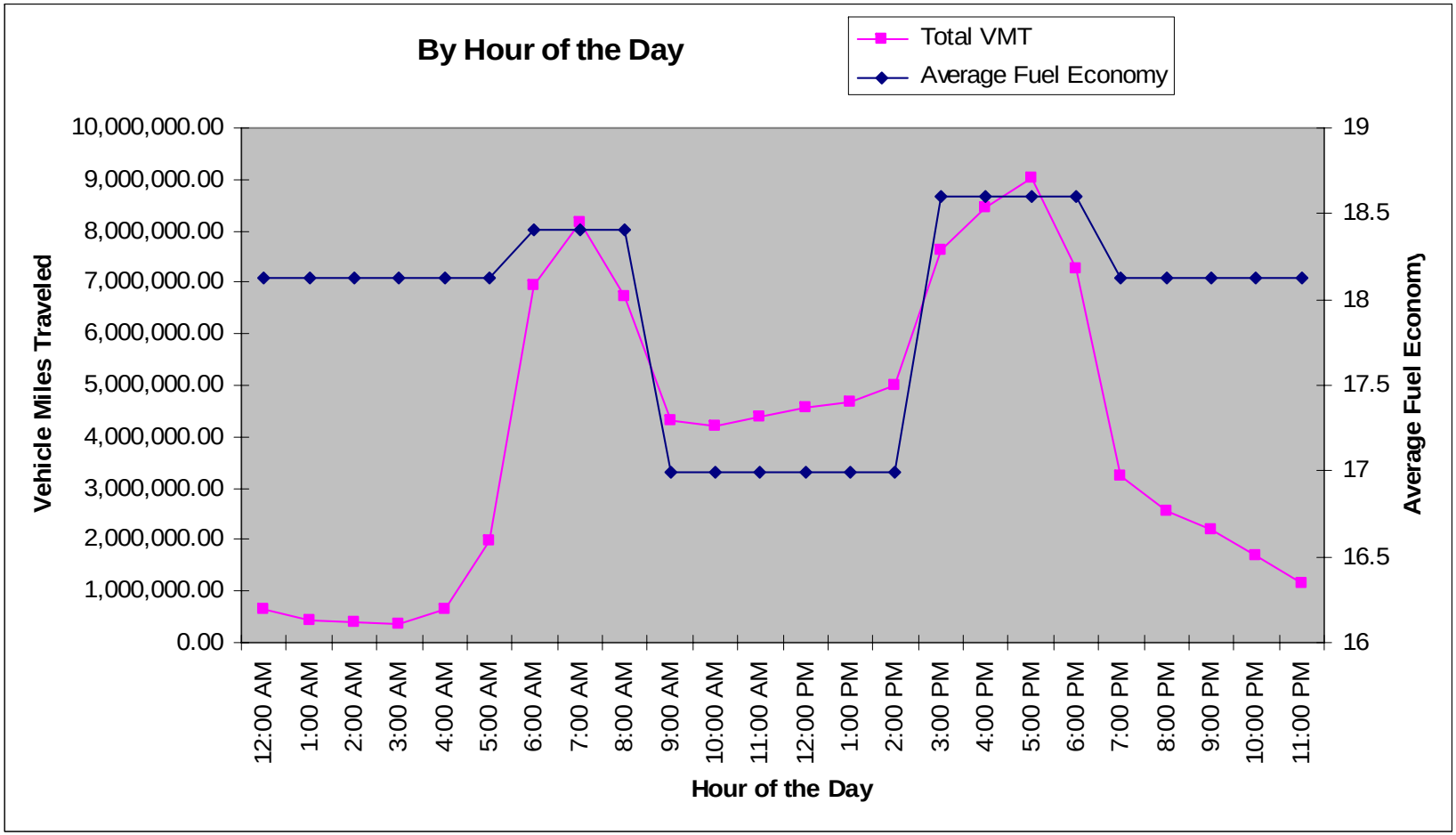
The {VMX} matrix represents the percentage of 28 different vehicle types on the 15 types of roads (urban interstate, urban other freeway, toll roads, ramps, urban principal arterial, urban other arterial, urban collector, local-centroid connector, rural interstate, rural other freeway, rural principal arterial, rural other arterial, rural major collector, rural collector, and local intrazonal)

Methodology

- $\{E\}|_{\mathbf{am,\ md,\ pm,ov}}$ = represents the fuel economy weighting average over the 25 years distribution for the 28 vehicle types on the 15 facility types.

- Each element of this matrix was then inverted to get gallons/mile and multiplied by the hourly VMT (output from IMPSUM program) to get the total fuel consumption for each vehicle category, road type and hour of the day.

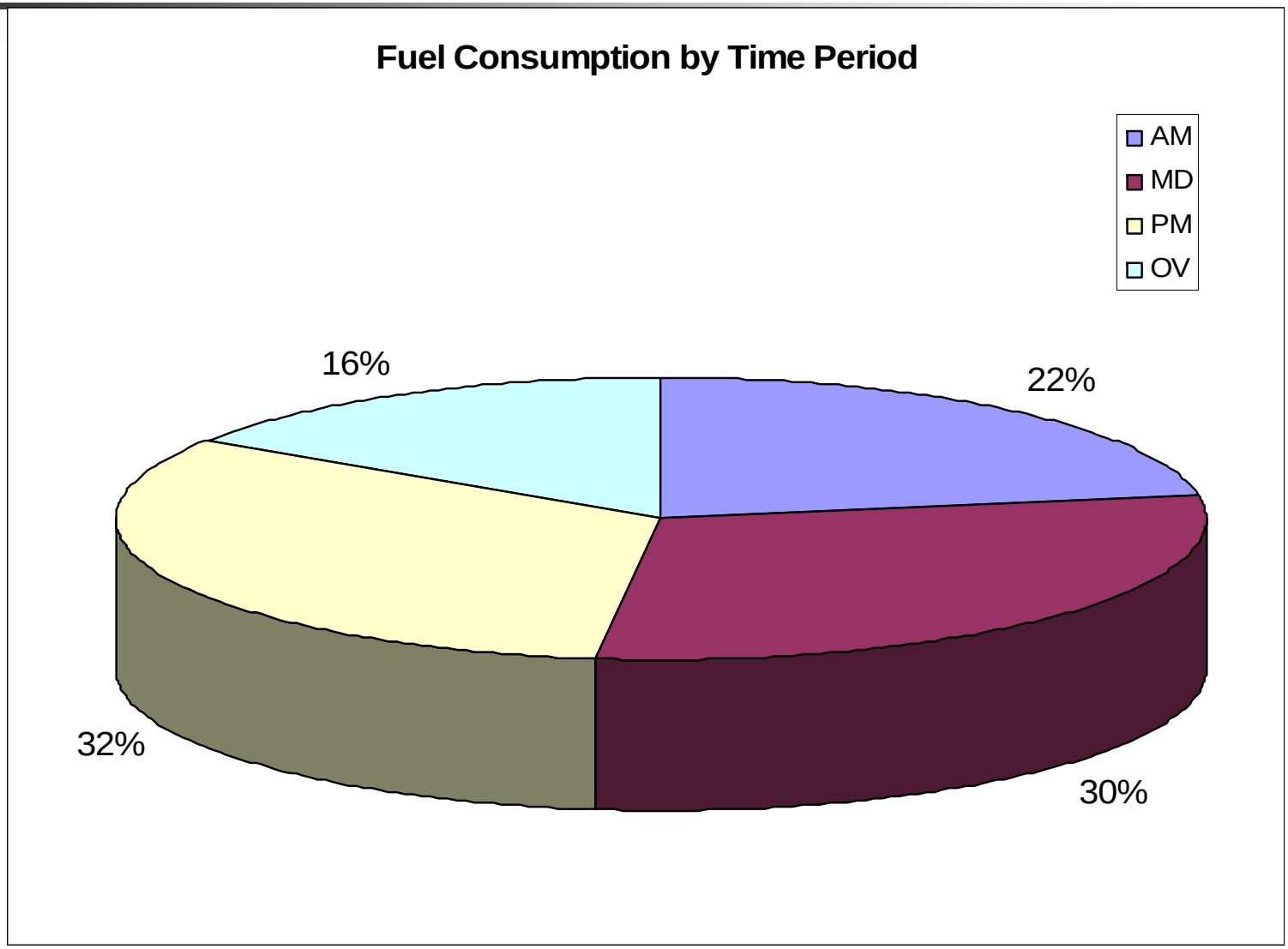
Hourly VMT and Fuel Economy



Fuel Consumption and Fuel Economy for the four time periods

	VMT(miles)	Gas (gallons)	Diesel (gallons)	Total Fuel (gallons)	Fuel Economy (miles/gallon)
AM	21,838,219	993,682	192,977	1,186,659	18.40
MD	27,184,364	1,206,852	392,762	1,599,614	16.99
PM	32,333,615	1,478,568	259,744	1,738,311	18.60
OV	15,242,478	683,910	157,059	840,970	18.12
daily	96,598,678	4,363,012	1,002,542	5,365,554	18

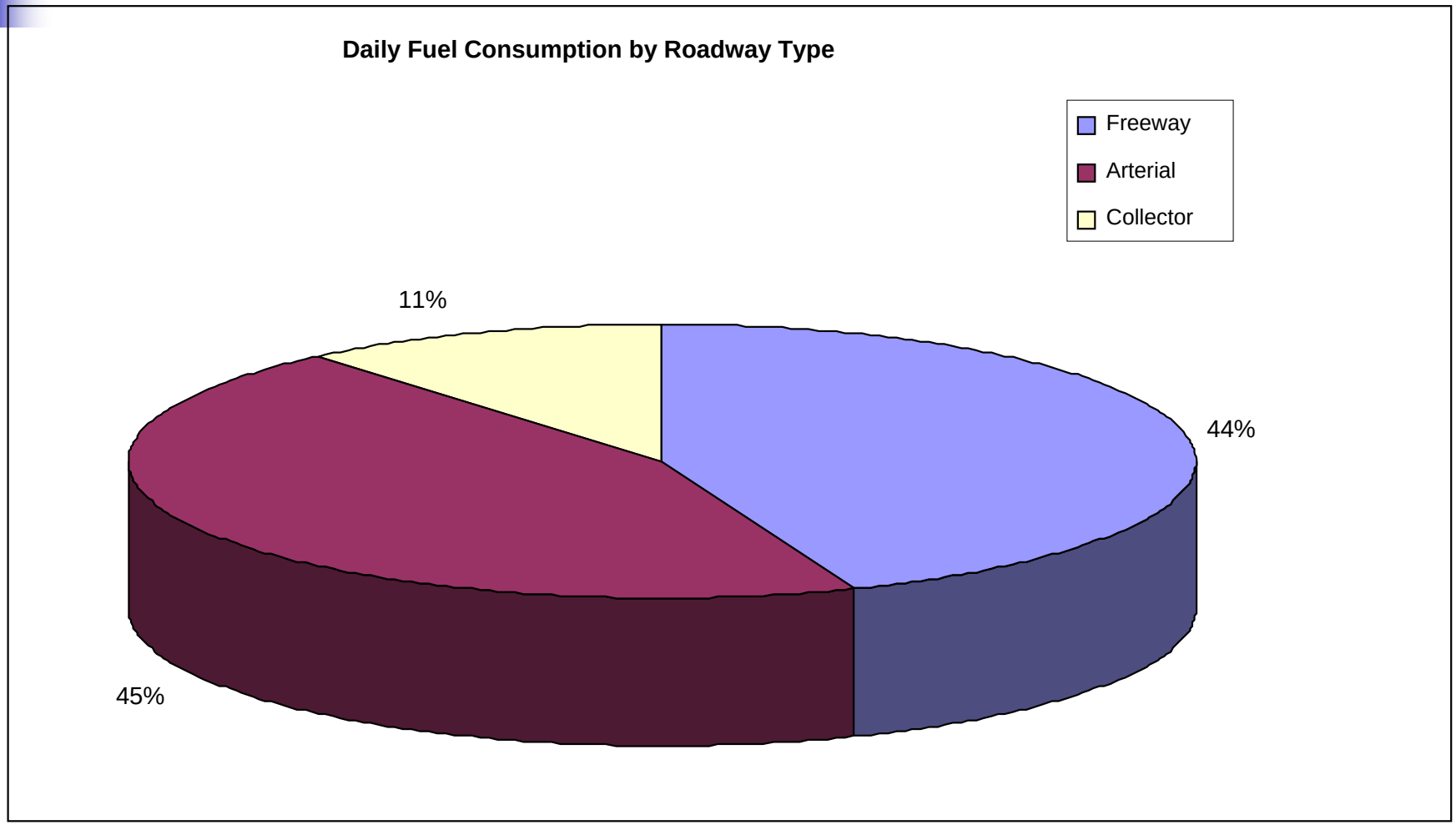
Daily Fuel Consumption by Time Period



Daily Fuel Consumption and Fuel Economy for each of the aggregated roadway types

	VMT (miles)	Gas (gallons)	Diesel (gallons)	Total Fuel (gallons)	Fuel Economy (miles/gallon)
Freeway	43,504,637	1,957,564	407,909	2,365,474	18.39
Arterial	43,174,444	1,955,092	446,455	2,401,547	17.98
Collector	9,919,597	450,354	148,176	598,531	16.57
Daily	96,598,678	4,363,012	1,002,542	5,365,554	18

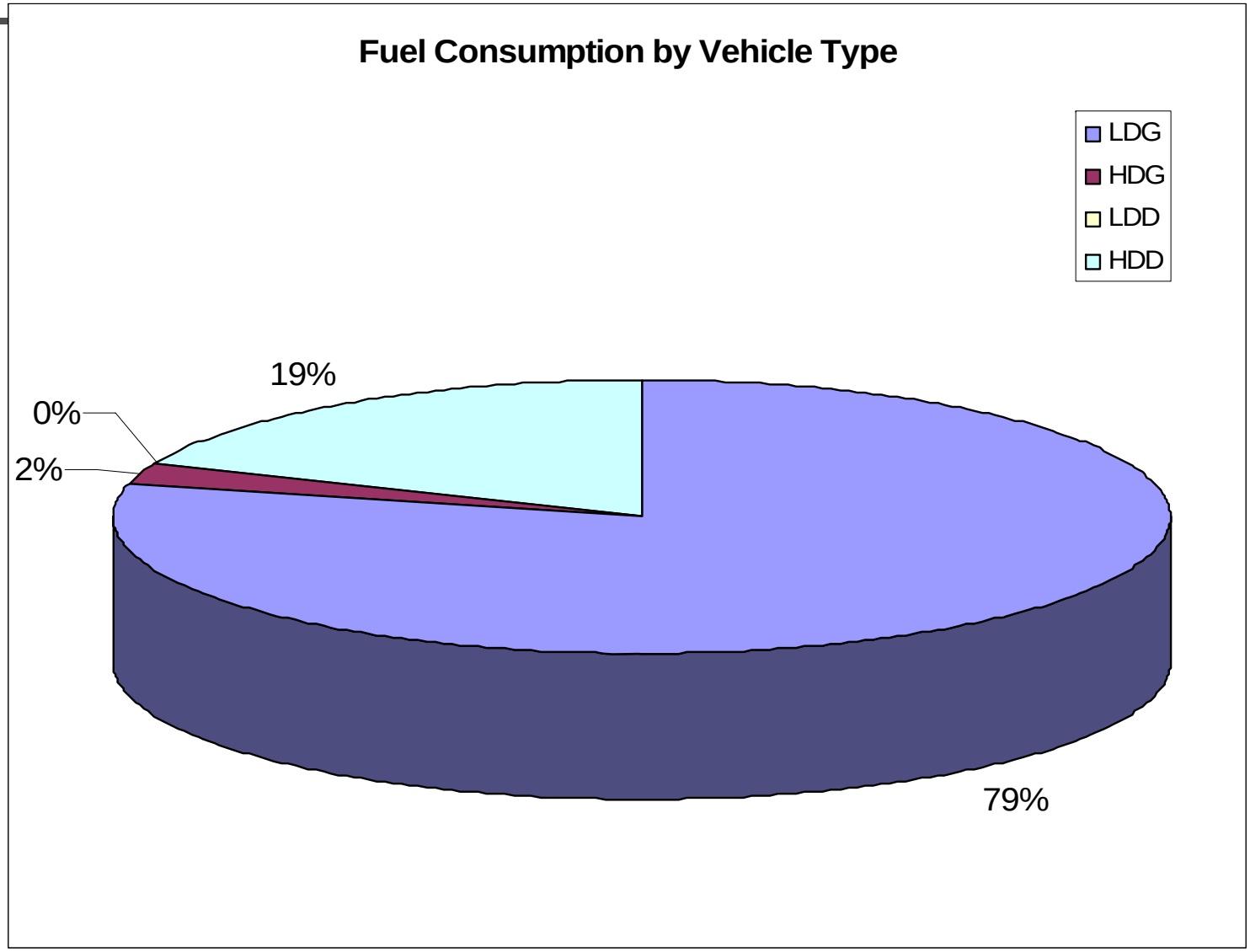
Daily Fuel Consumption by Roadway Type



Daily Fuel Consumption by Aggregated Vehicle Classes

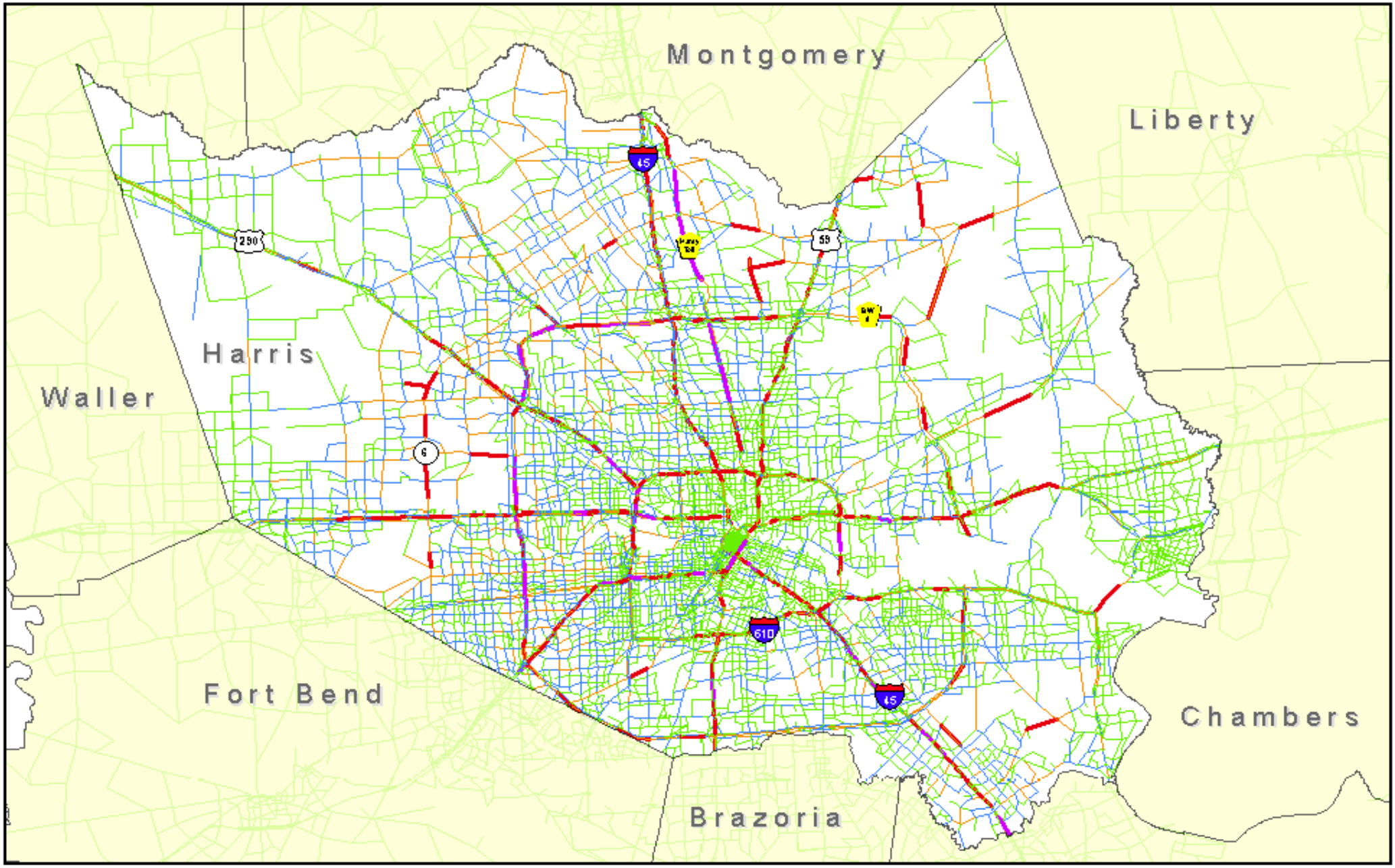
Vehicle Class	VMT(miles)	Gas (gallons)	Diesel (gallons)	Fuel Economy (miles/gallon)
LDG	87,969,928	4,230,245	0	21
HDG	1,198,110	132,767	0	9
LDD	174,506	0	8,769	20
HDD	7,256,134	0	993,772	7

Daily Fuel Consumption by Vehicle Type



Conclusions

- On an average weekday, approximately 5,000,000 gallons of fuel is consumed in Houston.
- Gasoline consumption is approximately four times more than diesel consumption.
- Light duty gasoline vehicles clearly dominate the VMT and the fuel consumption.
- The fuel economy is almost constant during the day, with the best occurring during peak periods and the worst during midday. These facts are primarily due to changes in the proportion of heavy duty and light duty traffic volumes.
- Diesel traffic tends to be highest on collectors, while gasoline vehicles tend to travel the most on freeways



Harris County

Daily Total Gallons

- 0 - 50 Gal
- 51 - 200 Gal
- 201 - 500 Gal
- 501 - 1000 Gal
- > 1000 Gal

Fuel Consumption Chart - Afternoon Period
Harris County

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Contact Information

A copy of the full report is available at:
http://www.h-gac.com/taq/airquality/studies/default.aspx

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