TECHNICAL NOTE
Transportation Air Quality Technical Support
Interagency Contract
with
Texas Commission on Environmental Quality

TO: Peter Ogbeide, Project Manager
Texas Commission on Environmental Quality
DATE: 31 August 2004

FROM: Dennis G. Perkinson, Ph.D.,
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TTI Study No.: 402131-25

SUBJECT: Assess Currently Available Houston Ship Channel Area VMT Mix Data and Identify Additional Data Required (Umbrella Contract 60200-04-17: Task 1) - **Revised Final**

INTRODUCTION

The Texas Commission on Environmental Quality (TCEQ) works with local planning districts, the Texas Department of Transportation (TxDOT), and the Texas Transportation Institute (TTI) to provide on-road mobile source inventories of air quality pollutants. TxDOT typically funds transportation conformity determinations required under 40 CFR part 93, and the TCEQ typically funds mobile source inventory work in support of Federal Clean Air Act requirements for attainment of the National Ambient Air Quality Standards (NAAQS, 42 USCA 7409).

BACKGROUND

Transportation professionals have long recognized that high quality data is the cornerstone of transportation planning, research and analysis. Current air quality regulations and procedures require planners to address transportation and environmental issues with a precision and accuracy that challenges the capabilities of the data and methods in use today. The models and other analytical tools used to provide these analyses are only as good as the data fed into them.

TxDOT maintains vehicle classification data collection sites throughout Texas. However, interest in some nonattainment areas has focused on very specific specialized locations. These areas of interest (e.g., the Houston ship channel area) contain specialized activities that may have significantly different distributions of vehicle miles traveled among the various vehicle types (VMT mix) than the region as a whole. A better understanding of these specialized locations could improve emissions estimates and the effectiveness of reduction measures.

TASK DESCRIPTION

TTI reviewed available TxDOT vehicle classification data for the Houston ship channel area (Figure 1). VMT mix for the ship channel area was calculated using the currently available vehicle classification data and procedures. The results of these calculations are documented in a summary table. The quality of these data is assured by the collecting agency (TxDOT), however, the adequacy of the data for this analysis (i.e., ship channel VMT mix) was assessed by TTI. To the extent that the data are inadequate, a determination is provided regarding the additional data needed to adequately represent VMT mix in the ship channel area. The following activities were completed under this task.

- Review the current TxDOT vehicle classification data for the Houston ship channel area. An estimate ship channel area VMT from existing data sources is also provided. Summarize ship channel VMT mix (and VMT) in a summary table format.

- If the current vehicle classification data are deemed inadequate for determining a ship channel specific VMT mix, develop a data collection plan that will provide adequate data for calculating the geographic specific VMT mix.

- Prepare complete documentation, which includes all TTI generated data files used in this analysis consistent in format and level of detail with previous TTI reports.

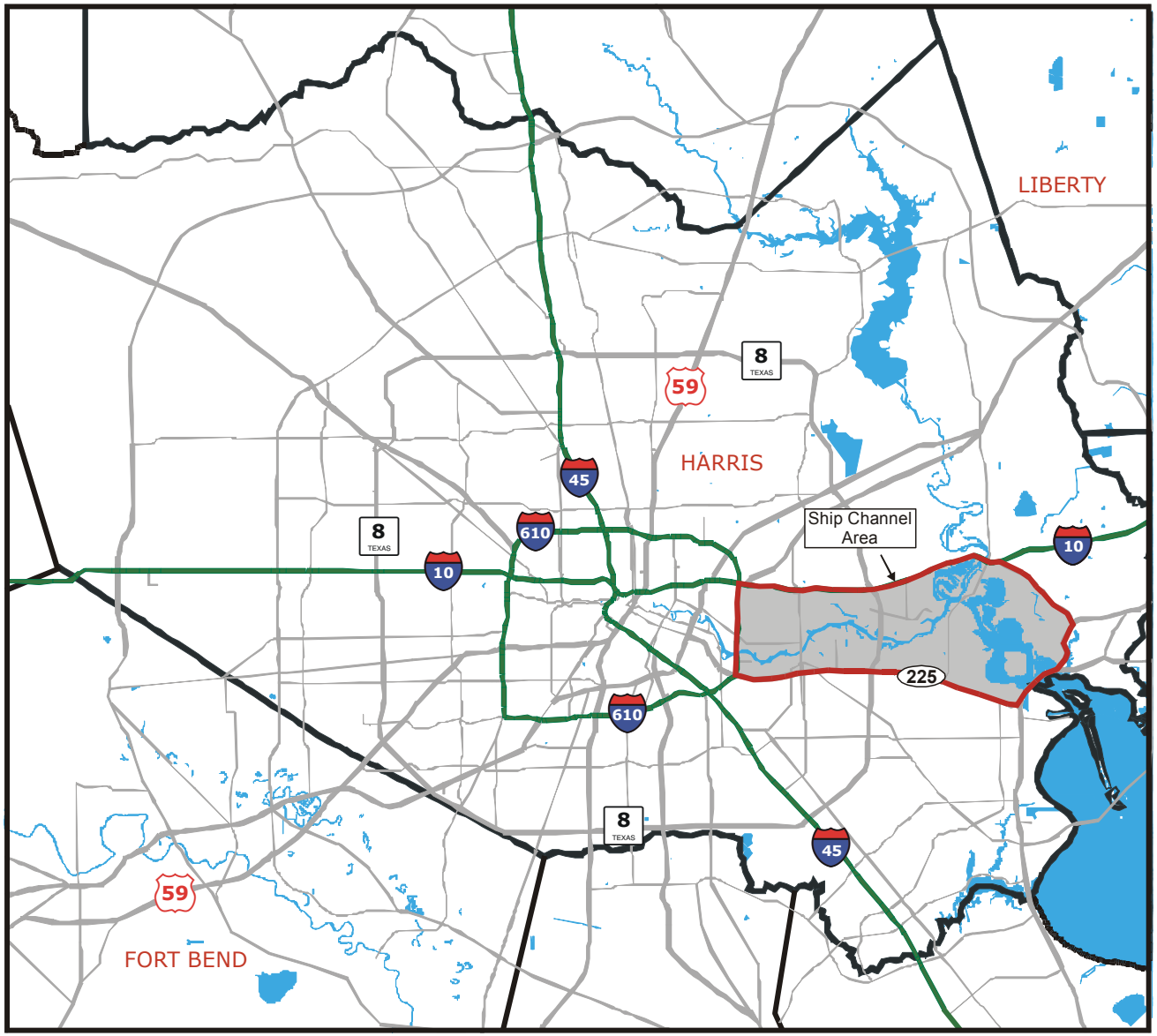

Figure 1. Houston Ship Channel Area.

VMT MIX ESTIMATION METHOD OVERVIEW

VMT mix refers to the mix of vehicles types on the road and the relative contribution to total VMT of each category of vehicle. The mix of vehicles varies from place-to-place and by road type. VMT mix is estimated from the most recent available TxDOT vehicle classification count data, aggregated in various ways. Thus, there are two elements in the estimation of VMT mix, the TxDOT vehicle classification counts themselves (i.e., the data), and the conversion of those counts into EPA categories (i.e., the conversion procedure).

Regarding the data, TxDOT classification counts separate vehicles into the standard Federal Highway Administration (FHWA) vehicle categories (based on vehicle length/number of axles). The quality of these data is assured by the collecting agency (TxDOT). TTI typically aggregates multiple years into three roadway functional classification groups (freeway, arterial, and collector). TTI frequently combines adjacent counties into regional estimates and sometimes into TxDOT Districts.

Regarding the conversion procedure, the U.S. Environmental Protection Agency (EPA) and the MOBILE model use a different vehicle classification scheme than FHWA. The 28 EPA vehicle categories are defined as a function of gross vehicle weight rating (GVWR) and fuel type. The FHWA axle/vehicle length-based classification categories must be converted into the 28 MOBILE GVWR/fuel-type-based categories. This is accomplished through a series of steps using local registration data, regional registration data, and MOBILE default values (for fuel type). The heaviest trucks (HDDV8b) are counted directly. This process and the rationale behind it is documented in *VMT Mix Estimation Method Refinement for MOBILE6* (Umbrella Contract 60200-03-06: Task 2, August 2003).

The issue of the representativeness of the count locations vis-à-vis the unit of analysis (i.e., region or county) is relevant here. The objective of the VMT mix estimation procedures as currently applied and summarized above is to provide a “best available” estimate of the probable distribution of the various vehicle classification categories for a given jurisdiction (i.e., county or multi-county region) using real vehicle classification count data.

The goal is area wide representation of VMT mix and TTI's strategy is the aggregation of the TxDOT vehicle classification count data to fit the needs of each application (e.g., aggregation of multiple years into functional classification groups, regional estimates, or even TxDOT Districts as noted). This procedure itself is scale free in that it can be applied in principle to any size area, including sub-areas such as the Houston Ship Channel area.

DISCUSSION

The Houston ship channel area is the area east of central Houston, bounded by I-10 on the north, Highway 225 on the south, Highway 146 and Highway 330 on the east, and Loop 610 on the west (Figure 1). TxDOT maintains eight directional vehicle classification stations in this area (along the perimeter), compared to 38 directional stations on the same roadway functional classification for the rest of Harris County. (A detailed map of the stations is included with the electronic deliverables.)

The issue and focus of this analysis is to what extent do these ship channel area stations accurately capture the VMT mix of the ship channel area itself. This must be answered (at least initially) indirectly, since TTI does not have any other ship channel VMT mix data for comparison. One approach is to determine if the VMT mix from the aggregated ship channel stations is substantially different from the VMT mix for similar roadway functional classifications in the rest of Harris County. (For a discussion of this and similar experimental designs for use under conditions of limited data availability see *Experimental and Quasi-Experimental Designs for Research*, Donald T. Campbell and Julian C. Stanley, Rand McNally, Chicago, 1966.)

Briefly, the logic is that since we know a priori that ship channel VMT mix is likely to be different from the aggregate VMT mix for the region (technically, this is the hypothesis), and we assume that there are no other factors that would cause a similar difference, any difference identified may reasonably be attributed to the hypothesized cause (i.e., the ship channel) and more importantly, given the absence of other causes, the order of magnitude may also be attributed to the ship channel. (Technically, this is an ex post facto design. However, since the

ship channel is already there, it is, practically speaking, our only choice in terms of experimental design. We therefore use the inductive logic described above.)

Harris County and ship channel area VMT are provided for reference. Harris County VMT is taken directly from official TxDOT Highway Performance Monitoring System (HPMS) VMT data for 2002. Ship channel area VMT is estimated based on the Houston Galveston Area Council's current 2002 travel demand model and TxDOT HPMS VMT data for 2002. Specifically, the proportion of travel demand model VMT attributable to the ship channel area as defined (i.e., 5.6 percent, boundary road VMT included) is applied to TxDOT HPMS VMT estimates. The resulting VMT estimates are therefore an upper bound and represent a maximum likely value. They are also Average Annual Daily Traffic (AADT) and are not adjusted for day of week or season.

The results of the analysis are summarized in the table below using selected vehicle category groups. A listing of the station locations is provided for reference, along with a detailed 28-vehicle category analysis by region and by station and the program used to produce the calculations. As noted earlier, a map of the data stations is provided in the electronic deliverables.

Table 1

Houston versus Ship Channel Area VMT and VMT Mix for Selected Vehicle Categories

Region	VMT	LDGV	HDDV	HDDV8b
Harris County	89,650,361	0.640	0.058	0.033
Ship Channel Area	4,994,578	0.593	0.122	0.085

Clearly, the ship channel VMT mix is different from that of the rest of Harris County, even controlling for roadway functional classification by comparing only "freeway" road types, TxDOT HPMS types 1, 11 or 12. This is most obvious in Table 1, but is also clearly visible in the more detailed summaries (e.g., the detailed VMT mix by region showing all 28 vehicle

categories). (This part of the analysis and the associated calculations constitutes Activity A. This document and the associated electronic files constitutes Activity C.)

Activity B, the issue of the adequacy of these data to represent the VMT mix of the ship channel area (and the concomitant data collection plan to remedy any identified inadequacy), is less straight forward and requires some discussion. In terms of its incorporation into the emissions estimation and regional analysis procedure, the representation of the ship channel area is clearly adequate, based on the configuration of the current official TxDOT operated and federally-approved sampling plan within the official HPMS protocols.

Consequently, for regional emissions estimation purposes, we believe the current vehicle classification data provide an adequate representation of ship channel area VMT mix. For more micro scale analyses (e.g., specific intersections), more detailed classification counts might be required. The impact of more detailed classification data on regional or area emissions estimates, however, would be negligible since the VMT associated with the more detailed counts would be small compared to regional VMT. (VMT mix is applied to VMT to produce estimates of VMT allocated to each of the 28 vehicle types.) In any case, were additional data to be collected separately in the ship channel area for whatever reason, it could not be directly used in the regional emissions estimation process, since it is not part of the TxDOT/HPMS sampling protocol and would undermine the statistical validity of the rest of the data and the resulting analyses.

Harris County Vehicle Classification Count Station List

Obs	Region	Station	Dir	Location
1	Houston	08L	1	SH146 1 MI N OF NASA 1 (1212 on station map)
2	Houston	08L	5	SH146 1 MI N OF NASA 1 (1212 on station map)
3	Houston	316	1	.5MI N FM1960 HOUSTON
4	Houston	316	5	.5MI N FM1960 HOUSTON
5	Houston	842	1	US 59 WEST OF SH 28
6	Houston	842	5	US 59 WEST OF SH 28
7	Houston	843	3	US 290 WEST OF IH 610
8	Houston	843	7	US 290 WEST OF IH 610
9	Houston	844	1	IH 45 SOUTH OF SPUR 261
10	Houston	844	5	IH 45 SOUTH OF SPUR 261
11	Houston	845	1	IH 45 NORTH OF LOOP 8
12	Houston	845	5	IH 45 NORTH OF LOOP 8
13	Houston	846	1	US 59 SOUTH OF FM 1960
14	Houston	846	5	US 59 SOUTH OF FM 1960
15	Houston	847	1	US 59 SOUTH OF IH 10
16	Houston	847	5	US 59 SOUTH OF IH 10
17	Houston	849	3	IH 10 WEST OF SH 6
18	Houston	849	7	IH 10 WEST OF SH 6
19	Houston	850	3	IH 10 EAST OF WIRT STREET
20	Houston	850	7	IH 10 EAST OF WIRT STREET
21	Houston	851	1	IH 610 NORTH OF IH 10
22	Houston	851	5	IH 610 NORTH OF IH 10
23	Houston	852	3	IH 610 EAST OF SPUR 261
24	Houston	852	7	IH 610 EAST OF SPUR 261
25	Houston	853	3	IH 610 WEST OF FM 521
26	Houston	853	7	IH 610 WEST OF FM 521
27	Houston	854	1	IH 610 NORTH OF US 59
28	Houston	854	5	IH 610 NORTH OF US 59
29	Houston	855	1	IH 45 NORTH OF SH 3
30	Houston	855	5	IH 45 NORTH OF SH 3
31	Houston	856	1	IH 45 NORTH OF IH 10
32	Houston	856	5	IH 45 NORTH OF IH 10
33	Houston	857	1	IH 45 SOUTH OF FM 528
34	Houston	857	5	IH 45 SOUTH OF FM 528
35	Houston	859	3	IH 610 WEST OF IH 45
36	Houston	859	7	IH 610 WEST OF IH 45

37	Houston	860	3	IH 10 EAST OF US 59
38	Houston	860	7	IH 10 EAST OF US 59
39	Ship	09L	4	SH0300 NW OF BAYTOWN TUNNEL (1213 on station map)
40	Ship	09L	8	SH0300 NW OF BAYTOWN TUNNEL (1213 on station map)
41	Ship	107	2	N END BAYTOWN TUNNEL
42	Ship	107	5	N END BAYTOWN TUNNEL
43	Ship	125	3	8.7MI W SH146 HOUSTON
44	Ship	125	7	8.7MI W SH146 HOUSTON
45	Ship	858	3	SH 225 WEST OF LOOP 8
46	Ship	858	7	SH 225 WEST OF LOOP 8

Detailed VMT Mix by Region

Obs	Total	Region	P_LDGV	P_LDGT1	P_LDGT2	P_LDGT3	P_LDGT4	P_HDGV2b	P_HDGV_3	P_HDGV_4
1	15,198,319	Houston	0.6401775	0.0526413	0.1752484	0.0361022	0.0166024	0.0074232	0.0027747	0.0013445
2	1,186,342	Ship	0.5929690	0.0487654	0.1623453	0.0334441	0.0153800	0.0106600	0.0039847	0.0019307
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	16,384,661									

Obs	P_HDGV_5	P_HDGV_6	P_HDGV_7	P_HDGV8a	P_HDGV8b	P_LDDV	P_LDDT12	P_HDDV2b	P_HDDV_3	P_HDDV_4
1	0.0004863	0.0013016	0.0004577	0.0004577	0.0000572	0.0010546	0.0001525	0.0071305	0.0034370	0.0020776
2	0.0006983	0.0018691	0.0006573	0.0006573	0.0000822	0.0009770	0.0001413	0.0102397	0.0049357	0.0029835

Obs	P_HDDV_5	P_HDDV_6	P_HDDV_7	P_HDDV8a	P_HDDV8b	P_MC	P_HDGB	P_HDDBT	P_HDDBS	P_LDDT34
1	0.0013594	0.0043091	0.0026162	0.0047195	0.0327651	0.0010000	0.0005417	0.0010411	0.0016252	0.0010960
2	0.0019522	0.0061880	0.0037570	0.0067774	0.0851475	0.0010000	0.0002435	0.0004681	0.0007307	0.0010153

Detailed VMT Mix by Region and Station

Obs	Total	Region	Station	P_LDGV	P_LDGT1	P_LDGT2	P_LDGT3	P_LDGT4	P_HDGV2b	P_HDGV_3	P_HDGV_4
1	87,321	Houston	08L 1	0.6444274	0.0529902	0.1764101	0.0363415	0.0167125	0.0086282	0.0032252	0.0015627
2	86,545	Houston	08L 5	0.6419247	0.0527847	0.1757260	0.0362006	0.0166477	0.0090105	0.0033681	0.0016320
3	306,584	Houston	316 1	0.6105736	0.0502108	0.1671570	0.0344353	0.0158359	0.0093706	0.0035027	0.0016972
4	332,548	Houston	316 5	0.6120865	0.0503350	0.1675705	0.0345205	0.0158750	0.0087691	0.0032779	0.0015882
5	461,460	Houston	842 1	0.6562066	0.0539573	0.1796296	0.0370047	0.0170175	0.0055842	0.0020874	0.0010114
6	494,581	Houston	842 5	0.6567672	0.0540033	0.1797828	0.0370363	0.0170320	0.0054225	0.0020269	0.0009821
7	455,858	Houston	843 3	0.6338045	0.0521181	0.1735066	0.0357434	0.0164374	0.0089551	0.0033474	0.0016219
8	467,012	Houston	843 7	0.6367780	0.0523622	0.1743193	0.0359108	0.0165144	0.0085610	0.0032001	0.0015505
9	415,537	Houston	844 1	0.6383435	0.0524907	0.1747472	0.0359989	0.0165549	0.0074108	0.0027701	0.0013422
10	423,724	Houston	844 5	0.6380721	0.0524684	0.1746730	0.0359836	0.0165479	0.0074071	0.0027687	0.0013416
11	355,969	Houston	845 1	0.6293612	0.0517533	0.1722921	0.0354932	0.0163224	0.0070940	0.0026517	0.0012848
12	507,222	Houston	845 5	0.6334893	0.0520922	0.1734204	0.0357256	0.0164292	0.0077541	0.0028985	0.0014044
13	216,323	Houston	846 1	0.6128024	0.0503938	0.1677662	0.0345608	0.0158936	0.0086071	0.0032173	0.0015589
14	230,382	Houston	846 5	0.6159802	0.0506547	0.1686348	0.0347397	0.0159759	0.0087174	0.0032585	0.0015789
15	125,508	Houston	847 1	0.6378622	0.0524512	0.1746156	0.0359718	0.0165425	0.0076877	0.0028736	0.0013924
16	126,107	Houston	847 5	0.6405554	0.0526723	0.1753517	0.0361235	0.0166122	0.0074538	0.0027862	0.0013500
17	261,319	Houston	849 3	0.6214228	0.0511015	0.1701224	0.0350462	0.0161168	0.0072403	0.0027064	0.0013113
18	266,998	Houston	849 7	0.6214245	0.0511017	0.1701228	0.0350463	0.0161168	0.0072185	0.0026982	0.0013074
19	560,549	Houston	850 3	0.6411401	0.0527203	0.1755116	0.0361564	0.0166274	0.0064387	0.0024068	0.0011662
20	515,793	Houston	850 7	0.6375107	0.0524224	0.1745196	0.0359520	0.0165334	0.0066483	0.0024851	0.0012041
21	818,030	Houston	851 1	0.6535002	0.0537351	0.1788899	0.0368523	0.0169474	0.0063604	0.0023775	0.0011520
22	780,471	Houston	851 5	0.6509821	0.0535284	0.1782016	0.0367106	0.0168822	0.0067105	0.0025084	0.0012154
23	512,877	Houston	852 3	0.6255153	0.0514375	0.1712409	0.0352766	0.0162228	0.0095405	0.0035662	0.0017279
24	547,029	Houston	852 7	0.6264307	0.0515127	0.1714911	0.0353282	0.0162465	0.0094730	0.0035410	0.0017157
25	521,861	Houston	853 3	0.6552022	0.0538748	0.1793550	0.0369482	0.0169915	0.0059882	0.0022384	0.0010846
26	503,878	Houston	853 7	0.6546446	0.0538291	0.1792026	0.0369168	0.0169770	0.0060935	0.0022777	0.0011036
27	587,354	Houston	854 1	0.6616374	0.0544032	0.1811139	0.0373105	0.0171581	0.0056764	0.0021218	0.0010281
28	639,106	Houston	854 5	0.6636509	0.0545685	0.1816643	0.0374239	0.0172102	0.0052536	0.0019638	0.0009515
29	412,348	Houston	855 1	0.6485162	0.0533259	0.1775276	0.0365717	0.0168183	0.0074911	0.0028002	0.0013568
30	418,979	Houston	855 5	0.6474162	0.0532356	0.1772269	0.0365098	0.0167899	0.0079690	0.0029788	0.0014433
31	467,075	Houston	856 1	0.6471264	0.0532118	0.1771477	0.0364935	0.0167824	0.0072447	0.0027080	0.0013121

32	468,734	Houston	856	5	0.6440346	0.0529580	0.1763027	0.0363194	0.0167023	0.0077280	0.0028887	0.0013997
33	254,554	Houston	857	1	0.6444052	0.0529884	0.1764040	0.0363402	0.0167119	0.0085465	0.0031947	0.0015479
34	257,057	Houston	857	5	0.6477004	0.0532589	0.1773046	0.0365258	0.0167972	0.0078012	0.0029161	0.0014129
35	319,358	Houston	859	3	0.6287216	0.0517008	0.1721173	0.0354572	0.0163058	0.0089940	0.0033619	0.0016290
36	335,168	Houston	859	7	0.6360819	0.0523051	0.1741290	0.0358716	0.0164964	0.0080204	0.0029980	0.0014526
37	331,096	Houston	860	3	0.6130588	0.0504148	0.1678363	0.0345752	0.0159002	0.0093351	0.0034894	0.0016908
38	326,004	Houston	860	7	0.6113845	0.0502774	0.1673787	0.0344810	0.0158569	0.0097556	0.0036466	0.0017669
39	90,845	Ship	09L	4	0.6339329	0.0521286	0.1735416	0.0357506	0.0164407	0.0093980	0.0035129	0.0017021
40	86,557	Ship	09L	8	0.6317191	0.0519469	0.1729366	0.0356259	0.0163834	0.0093312	0.0034880	0.0016900
41	173,735	Ship	107	2	0.6230755	0.0512372	0.1705741	0.0351392	0.0161596	0.0095663	0.0035758	0.0017326
42	175,210	Ship	107	5	0.6268865	0.0515501	0.1716157	0.0353538	0.0162583	0.0086215	0.0032227	0.0015615
43	124,516	Ship	125	3	0.5132476	0.0422202	0.1405556	0.0289553	0.0133158	0.0116884	0.0043691	0.0021170
44	133,128	Ship	125	7	0.5246425	0.0431558	0.1436701	0.0295969	0.0136108	0.0119804	0.0044782	0.0021699
45	199,164	Ship	858	3	0.5921126	0.0486951	0.1621112	0.0333958	0.0153579	0.0123368	0.0046114	0.0022344
46	203,187	Ship	858	7	0.5976178	0.0491471	0.1636159	0.0337058	0.0155004	0.0113445	0.0042405	0.0020547

Obs	P_HDGV_5	P_HDGV_6	P_HDGV_7	P_HDGV8a	P_HDGV8b	P_LDDV	P_LDDT12	P_HDDV2b	P_HDDV_3	P_HDDV_4	P_HDDV_5
1	0.0005652	0.0015129	0.0005320	0.0005320	0.0000665	0.0010616	0.0001535	0.0082880	0.0039950	0.0024149	0.0015801
2	0.0005903	0.0015799	0.0005556	0.0005556	0.0000694	0.0010575	0.0001529	0.0086552	0.0041719	0.0025218	0.0016501
3	0.0006139	0.0016430	0.0005778	0.0005778	0.0000722	0.0010059	0.0001455	0.0090011	0.0043387	0.0026226	0.0017160
4	0.0005745	0.0015376	0.0005407	0.0005407	0.0000676	0.0010084	0.0001459	0.0084234	0.0040602	0.0024543	0.0016059
5	0.0003658	0.0009791	0.0003443	0.0003443	0.0000430	0.0010810	0.0001563	0.0053640	0.0025855	0.0015629	0.0010226
6	0.0003552	0.0009508	0.0003343	0.0003343	0.0000418	0.0010819	0.0001565	0.0052087	0.0025107	0.0015176	0.0009930
7	0.0005867	0.0015702	0.0005521	0.0005521	0.0000690	0.0010441	0.0001510	0.0086020	0.0041463	0.0025063	0.0016400
8	0.0005608	0.0015011	0.0005278	0.0005278	0.0000660	0.0010490	0.0001517	0.0082234	0.0039638	0.0023960	0.0015678
9	0.0004855	0.0012994	0.0004569	0.0004569	0.0000571	0.0010516	0.0001521	0.0071186	0.0034313	0.0020741	0.0013572
10	0.0004852	0.0012987	0.0004567	0.0004567	0.0000571	0.0010511	0.0001520	0.0071150	0.0034296	0.0020731	0.0013565
11	0.0004647	0.0012438	0.0004374	0.0004374	0.0000547	0.0010368	0.0001500	0.0068143	0.0032846	0.0019855	0.0012991
12	0.0005080	0.0013596	0.0004781	0.0004781	0.0000598	0.0010436	0.0001509	0.0074484	0.0035902	0.0021702	0.0014200
13	0.0005639	0.0015092	0.0005307	0.0005307	0.0000663	0.0010096	0.0001460	0.0082678	0.0039852	0.0024090	0.0015762
14	0.0005711	0.0015285	0.0005375	0.0005375	0.0000672	0.0010148	0.0001468	0.0083737	0.0040362	0.0024398	0.0015964
15	0.0005036	0.0013479	0.0004740	0.0004740	0.0000593	0.0010508	0.0001520	0.0073846	0.0035595	0.0021516	0.0014079
16	0.0004883	0.0013069	0.0004596	0.0004596	0.0000574	0.0010552	0.0001526	0.0071599	0.0034512	0.0020861	0.0013650
17	0.0004743	0.0012695	0.0004464	0.0004464	0.0000558	0.0010238	0.0001481	0.0069548	0.0033523	0.0020264	0.0013259
18	0.0004729	0.0012657	0.0004451	0.0004451	0.0000556	0.0010238	0.0001481	0.0069339	0.0033422	0.0020203	0.0013219
19	0.0004218	0.0011289	0.0003970	0.0003970	0.0000496	0.0010562	0.0001528	0.0061848	0.0029812	0.0018021	0.0011791
20	0.0004355	0.0011657	0.0004099	0.0004099	0.0000512	0.0010502	0.0001519	0.0063862	0.0030782	0.0018607	0.0012175
21	0.0004167	0.0011152	0.0003922	0.0003922	0.0000490	0.0010765	0.0001557	0.0061096	0.0029449	0.0017801	0.0011648
22	0.0004396	0.0011766	0.0004138	0.0004138	0.0000517	0.0010724	0.0001551	0.0064460	0.0031070	0.0018781	0.0012289
23	0.0006250	0.0016728	0.0005882	0.0005882	0.0000735	0.0010305	0.0001490	0.0091643	0.0044173	0.0026702	0.0017472
24	0.0006206	0.0016610	0.0005841	0.0005841	0.0000730	0.0010320	0.0001493	0.0090995	0.0043861	0.0026513	0.0017348
25	0.0003923	0.0010500	0.0003692	0.0003692	0.0000462	0.0010793	0.0001561	0.0057521	0.0027726	0.0016760	0.0010966
26	0.0003992	0.0010684	0.0003757	0.0003757	0.0000470	0.0010784	0.0001560	0.0058532	0.0028213	0.0017054	0.0011159
27	0.0003719	0.0009953	0.0003500	0.0003500	0.0000437	0.0010899	0.0001576	0.0054525	0.0026282	0.0015887	0.0010395
28	0.0003442	0.0009212	0.0003239	0.0003239	0.0000405	0.0010932	0.0001581	0.0050465	0.0024325	0.0014704	0.0009621
29	0.0004907	0.0013135	0.0004619	0.0004619	0.0000577	0.0010683	0.0001545	0.0071958	0.0034685	0.0020966	0.0013719
30	0.0005221	0.0013973	0.0004913	0.0004913	0.0000614	0.0010665	0.0001543	0.0076548	0.0036897	0.0022304	0.0014594
31	0.0004746	0.0012703	0.0004467	0.0004467	0.0000558	0.0010660	0.0001542	0.0069591	0.0033544	0.0020276	0.0013267
32	0.0005063	0.0013550	0.0004765	0.0004765	0.0000596	0.0010610	0.0001535	0.0074233	0.0035782	0.0021629	0.0014152
33	0.0005599	0.0014985	0.0005270	0.0005270	0.0000659	0.0010616	0.0001535	0.0082096	0.0039571	0.0023920	0.0015651

34	0.0005111	0.0013678	0.0004810	0.0004810	0.0000601	0.0010670	0.0001543	0.0074936	0.0036120	0.0021834	0.0014286
35	0.0005892	0.0015770	0.0005545	0.0005545	0.0000693	0.0010358	0.0001498	0.0086394	0.0041643	0.0025172	0.0016471
36	0.0005254	0.0014063	0.0004945	0.0004945	0.0000618	0.0010479	0.0001516	0.0077042	0.0037135	0.0022447	0.0014688
37	0.0006115	0.0016368	0.0005756	0.0005756	0.0000719	0.0010100	0.0001461	0.0089670	0.0043222	0.0026127	0.0017095
38	0.0006391	0.0017105	0.0006015	0.0006015	0.0000752	0.0010073	0.0001457	0.0093710	0.0045169	0.0027304	0.0017866
39	0.0006157	0.0016478	0.0005795	0.0005795	0.0000724	0.0010443	0.0001510	0.0090274	0.0043514	0.0026303	0.0017211
40	0.0006113	0.0016361	0.0005753	0.0005753	0.0000719	0.0010407	0.0001505	0.0089633	0.0043204	0.0026116	0.0017088
41	0.0006267	0.0016773	0.0005898	0.0005898	0.0000737	0.0010265	0.0001485	0.0091891	0.0044293	0.0026774	0.0017519
42	0.0005648	0.0015117	0.0005316	0.0005316	0.0000664	0.0010327	0.0001494	0.0082815	0.0039918	0.0024130	0.0015789
43	0.0007657	0.0020494	0.0007207	0.0007207	0.0000901	0.0008458	0.0001223	0.0112275	0.0054118	0.0032713	0.0021405
44	0.0007848	0.0021006	0.0007387	0.0007387	0.0000923	0.0008646	0.0001250	0.0115080	0.0055470	0.0033531	0.0021940
45	0.0008082	0.0021631	0.0007607	0.0007607	0.0000951	0.0009756	0.0001411	0.0118504	0.0057120	0.0034528	0.0022592
46	0.0007432	0.0019891	0.0006995	0.0006995	0.0000874	0.0009846	0.0001424	0.0108972	0.0052526	0.0031751	0.0020775

Obs	P_HDDV_6	P_HDDV_7	P_HDDV8a	P_HDDV8b	P_MC	P_HDGB	P_HDDBT	P_HDDBS	P_LDDT34
1	0.0050086	0.0030409	0.0054856	0.0221482	0.0010000	0.0002050	0.0003940	0.0006150	0.0011032
2	0.0052305	0.0031756	0.0057286	0.0227858	0.0010000	0.0003590	0.0006900	0.0010771	0.0010990
3	0.0054395	0.0033026	0.0059576	0.0657047	0.0010000	0.0004142	0.0007960	0.0012426	0.0010454
4	0.0050904	0.0030906	0.0055752	0.0667543	0.0010000	0.0004154	0.0007983	0.0012462	0.0010480
5	0.0032416	0.0019681	0.0035503	0.0198500	0.0010000	0.0004929	0.0009473	0.0014788	0.0011234
6	0.0031477	0.0019111	0.0034475	0.0198370	0.0010000	0.0005056	0.0009718	0.0015170	0.0011243
7	0.0051983	0.0031561	0.0056934	0.0340106	0.0010000	0.0004901	0.0009419	0.0014703	0.0010851
8	0.0049696	0.0030172	0.0054429	0.0317893	0.0010000	0.0004997	0.0009604	0.0014992	0.0010902
9	0.0043019	0.0026119	0.0047116	0.0353398	0.0010000	0.0005644	0.0010848	0.0016934	0.0010928
10	0.0042997	0.0026106	0.0047092	0.0357827	0.0010000	0.0005591	0.0010746	0.0016774	0.0010924
11	0.0041180	0.0025002	0.0045102	0.0499369	0.0010000	0.0005735	0.0011022	0.0017206	0.0010775
12	0.0045012	0.0027329	0.0049299	0.0403630	0.0010000	0.0005856	0.0011254	0.0017569	0.0010845
13	0.0049963	0.0030335	0.0054722	0.0656472	0.0010000	0.0005753	0.0011057	0.0017260	0.0010492
14	0.0050604	0.0030724	0.0055423	0.0604952	0.0010000	0.0005717	0.0010988	0.0017152	0.0010546
15	0.0044626	0.0027095	0.0048876	0.0335915	0.0010000	0.0007252	0.0013937	0.0021757	0.0010920
16	0.0043268	0.0026270	0.0047389	0.0316398	0.0010000	0.0006119	0.0011761	0.0018359	0.0010966
17	0.0042029	0.0025518	0.0046032	0.0616603	0.0010000	0.0003929	0.0007551	0.0011787	0.0010639
18	0.0041903	0.0025441	0.0045893	0.0616447	0.0010000	0.0004149	0.0007974	0.0012447	0.0010639
19	0.0037376	0.0022693	0.0040936	0.0366444	0.0010000	0.0005470	0.0010514	0.0016413	0.0010976
20	0.0038593	0.0023431	0.0042268	0.0403204	0.0010000	0.0006191	0.0011898	0.0018573	0.0010914
21	0.0036922	0.0022417	0.0040438	0.0198037	0.0010000	0.0004539	0.0008724	0.0013619	0.0011187
22	0.0038954	0.0023651	0.0042664	0.0217189	0.0010000	0.0004251	0.0008171	0.0012755	0.0011144
23	0.0055381	0.0033624	0.0060656	0.0422577	0.0010000	0.0005828	0.0011200	0.0017484	0.0010709
24	0.0054990	0.0033387	0.0060227	0.0417583	0.0010000	0.0005056	0.0009718	0.0015170	0.0010725
25	0.0034761	0.0021105	0.0038071	0.0181964	0.0010000	0.0006494	0.0012481	0.0019484	0.0011217
26	0.0035372	0.0021476	0.0038741	0.0185204	0.0010000	0.0006347	0.0012199	0.0019043	0.0011207
27	0.0032951	0.0020006	0.0036089	0.0129087	0.0010000	0.0002596	0.0004989	0.0007789	0.0011327
28	0.0030497	0.0018516	0.0033401	0.0121028	0.0010000	0.0002898	0.0005570	0.0008696	0.0011361
29	0.0043485	0.0026402	0.0047627	0.0205555	0.0010000	0.0005123	0.0009846	0.0015370	0.0011102
30	0.0046259	0.0028086	0.0050665	0.0196454	0.0010000	0.0004993	0.0009597	0.0014981	0.0011083
31	0.0042055	0.0025533	0.0046060	0.0202023	0.0010000	0.0011341	0.0021796	0.0034025	0.0011078
32	0.0044860	0.0027237	0.0049133	0.0215922	0.0010000	0.0012126	0.0023305	0.0036380	0.0011026
33	0.0049612	0.0030121	0.0054337	0.0223882	0.0010000	0.0002441	0.0004692	0.0007324	0.0011032

34	0.0045285	0.0027495	0.0049598	0.0217034	0.0010000	0.0002352	0.0004520	0.0007056	0.0011088
35	0.0052209	0.0031699	0.0057182	0.0410981	0.0010000	0.0004949	0.0009512	0.0014848	0.0010764
36	0.0046558	0.0028267	0.0050992	0.0359581	0.0010000	0.0004564	0.0008772	0.0013694	0.0010890
37	0.0054189	0.0032901	0.0059350	0.0604326	0.0010000	0.0007318	0.0014065	0.0021957	0.0010496
38	0.0056630	0.0034383	0.0062024	0.0598582	0.0010000	0.0008541	0.0016415	0.0025625	0.0010468
39	0.0054554	0.0033122	0.0059750	0.0325279	0.0010000	0.0003067	0.0005894	0.0009201	0.0010853
40	0.0054167	0.0032887	0.0059325	0.0360918	0.0010000	0.0003043	0.0005849	0.0009131	0.0010815
41	0.0055531	0.0033715	0.0060820	0.0484992	0.0010000	0.0000991	0.0001905	0.0002974	0.0010667
42	0.0050047	0.0030386	0.0054813	0.0477884	0.0010000	0.0001503	0.0002889	0.0004511	0.0010733
43	0.0067850	0.0041194	0.0074311	0.1924090	0.0010000	0.0005980	0.0011494	0.0017943	0.0008790
44	0.0069545	0.0042224	0.0076168	0.1746364	0.0010000	0.0005606	0.0010775	0.0016820	0.0008985
45	0.0071614	0.0043480	0.0078434	0.0782069	0.0010000	0.0001000	0.0001923	0.0003002	0.0010138
46	0.0065854	0.0039983	0.0072125	0.0755609	0.0010000	0.0001089	0.0002092	0.0003266	0.0010232

VMT Mix Estimation Procedure

```
Options LineSize=125 Pagesize=650;
* Ship_Mix.SAS => Vehicle classification *;
* Ship Channel Area versus Harris & Region *;
* 28 EPA categories *;
* Functional Classification Group = Fwy *;
* Time Period NA *;
* 2002 Weekdays *;
* HGAC Classification Counts *;
* 1997 - 2002 TxDOT mainlane data *;
* 2002 County registration data for HDV *;
DATA COUNTY02;
Infile 'C:\SASDATA\Raw02m.2CD';
Input FX 4-5 Station $ 6-9 Year 10-11 Cty 18-20;
Proc Sort;
  By Station;
DATA COUNTY01;
Infile 'C:\SASDATA\Raw01m.2CD';
Input FX 4-5 Station $ 6-9 Year 10-11 Cty 18-20;
Proc Sort;
  By Station;
DATA COUNTY00;
Infile 'C:\SASDATA\Raw00m.2CD';
Input FX 4-5 Station $ 6-9 Year 10-11 Cty 18-20;
Proc Sort;
  By Station;
DATA COUNTY99;
Infile 'C:\SASDATA\Raw99m.2CD';
Input FX 4-5 Station $ 6-9 Year 10-11 Cty 18-20;
Proc Sort;
  By Station;
DATA COUNTY98;
Infile 'C:\SASDATA\Raw98m.2CD';
Input FX 4-5 Station $ 6-9 Year 10-11 Cty 18-20;
Proc Sort;
  By Station;
DATA COUNTY97;
Infile 'C:\SASDATA\Raw97m.2CD';
Input FX 4-5 Station $ 6-9 Year 10-11 Cty 18-20;
Proc Sort;
  By Station;
DATA COUNTY;
 Merge County02 County01 County00 County99 County98 County97;
 By Station;
Proc Sort;
  By Station;
************;
DATA COUNTS02;
Infile 'C:\SASDATA\Raw02m.4CD';
Input Station $ 6-9 Date 10-15 Hour 16-17
      C 20-23 P 24-26 B 27-28 SU2 29-31 SU3 32-33 SU4 34-35
      SE3 36-37 SE5 38-40 SE6 41-42 SD5 43-44 SD6 45-46 SD7 47-48;
Proc Sort;
  By Date;
DATA COUNTS01;
Infile 'C:\SASDATA\Raw01m.4CD';
Input Station $ 6-9 Date 10-15 Hour 16-17
      C 20-23 P 24-26 B 27-28 SU2 29-31 SU3 32-33 SU4 34-35
      SE3 36-37 SE5 38-40 SE6 41-42 SD5 43-44 SD6 45-46 SD7 47-48;
Proc Sort;
  By Date;
DATA COUNTS00;
Infile 'C:\SASDATA\Raw00M.4CD';
Input Station $ 6-9 Date 10-15 Hour 16-17
      C 20-23 P 24-26 B 27-28 SU2 29-31 SU3 32-33 SU4 34-35
      SE3 36-37 SE5 38-40 SE6 41-42 SD5 43-44 SD6 45-46 SD7 47-48;
Proc Sort;
  By Date;
DATA COUNTS99;
Infile 'C:\SASDATA\Raw99m.4CD';
Input Station $ 6-9 Date 10-15 Hour 16-17
      C 20-23 P 24-26 B 27-28 SU2 29-31 SU3 32-33 SU4 34-35
      SE3 36-37 SE5 38-40 SE6 41-42 SD5 43-44 SD6 45-46 SD7 47-48;
```

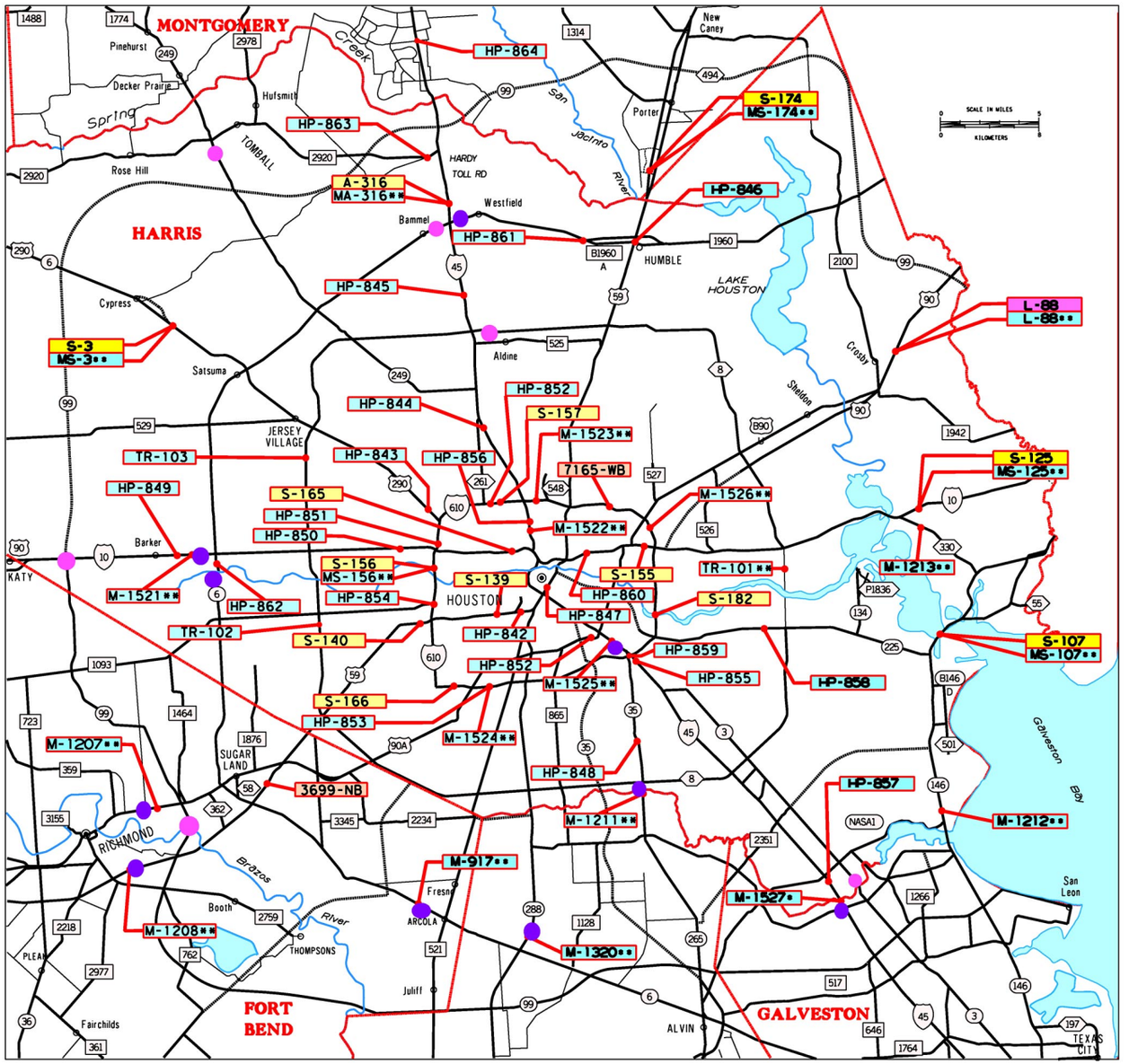
```
Proc Sort;
  By Date;
DATA COUNTS98;
Infile 'C:\SASDATA\Raw98m.4CD';
Input Station $ 6-9 Date 10-15 Hour 16-17
      C 20-23 P 24-26 B 27-28 SU2 29-31 SU3 32-33 SU4 34-35
      SE3 36-37 SE5 38-40 SE6 41-42 SD5 43-44 SD6 45-46 SD7 47-48;
Proc Sort;
  By Date;
DATA COUNTS97;
Infile 'C:\SASDATA\Raw97m.4CD';
Input Station $ 6-9 Date 10-15 Hour 16-17
      C 20-23 P 24-26 B 27-28 SU2 29-31 SU3 32-33 SU4 34-35
      SE3 36-37 SE5 38-40 SE6 41-42 SD5 43-44 SD6 45-46 SD7 47-48;
Proc Sort;
  By Date;
DATA COUNTS;
  Merge Counts02 Counts01 Counts00 Counts99 Counts98 Counts97;
  By Date;
Proc Sort;
  By Station;
*******************;
DATA VMT_Mix;
MERGE COUNTY COUNTS;
  By Station;
*******************;
*  Assign & Select County  *;
*******************;
If Cty = 039 then County = 'Brazoria  ';
If Cty = 071 then County = 'Chambers  ';
If Cty = 157 then County = 'Fort_Bend  ';
If Cty = 167 then County = 'Galveston ';
If Cty = 201 then County = 'Harris    ';
If Cty = 291 then County = 'Liberty   ';
If Cty = 339 then County = 'Montgomery';
If Cty = 473 then County = 'Waller    ';
If County = ' ' then Delete;
*******************;
Day = 'Week';
Hour = Hour + 1;
*****************************;
* Define time-of-day groups *;
*****************************;
If Hour GE 07 and Hour LE 09 then TP = 'AM_Peak ';
If Hour GE 16 and Hour LE 19 then TP = 'PM_Peak ';
If Hour GE 10 and Hour LE 15 then TP = 'Mid_Day ';
If Hour LE 06 or Hour GE 20 then TP = 'Ovr_Nite';
*************************************;
* Redefine & group functional classes *;
*************************************;
If FX = 1 or FX = 11 or FX = 12 then FC = 'Fwy';
If FX = 2 or FX = 6 or FX = 14 or FX = 16 then FC = 'Art';
If FX = 7 or FX = 8 or FX = 9 or FX = 17 then FC = 'Col';
*****************************;
* Define Sub-Regions         *;
* Ship Channel versus Harris *;
*****************************;
If County = 'Harris';
If FC = 'Fwy';
If Station = '1072' or Station = '1075' or
   Station = '1253' or Station = '1257' or
   Station = '8583' or Station = '8587' or
   Station = '09L4' or Station = '09L8'
   then Region = 'Ship   ';
   Else Region = 'Houston';
*************************;
HDV = SU2 + SU3 + SU4 + SE3;
HDX = SE5 + SE6 + SD5 + SD6 + SD7;
PV = C + P;
*************************;
* LDV Allocation         *;
* 2002 Registration Data *;
*************************;
```

```
If County = 'Brazoria  ' then LDV = .592*PV;
If County = 'Brazoria  ' then LDT = .408*PV;
If County = 'Chambers  ' then LDV = .492*PV;
If County = 'Chambers  ' then LDT = .508*PV;
If County = 'Fort_Bend ' then LDV = .707*PV;
If County = 'Fort_Bend ' then LDT = .293*PV;
If County = 'Galveston ' then LDV = .642*PV;
If County = 'Galveston ' then LDT = .358*PV;
If County = 'Harris    ' then LDV = .695*PV;
If County = 'Harris    ' then LDT = .305*PV;
If County = 'Liberty   ' then LDV = .508*PV;
If County = 'Liberty   ' then LDT = .492*PV;
If County = 'Montgomery' then LDV = .607*PV;
If County = 'Montgomery' then LDT = .393*PV;
If County = 'Waller    ' then LDV = .530*PV;
If County = 'Waller    ' then LDT = .470*PV;
*************************;
* LDT Allocation         *;
* 2002 Registration Data *;
*************************;
If County = 'Brazoria  ' then LDT1 = .785*LDT;
If County = 'Brazoria  ' then HLDT = .215*LDT;
If County = 'Chambers  ' then LDT1 = .768*LDT;
If County = 'Chambers  ' then HLDT = .232*LDT;
If County = 'Fort_Bend ' then LDT1 = .790*LDT;
If County = 'Fort_Bend ' then HLDT = .210*LDT;
If County = 'Galveston ' then LDT1 = .814*LDT;
If County = 'Galveston ' then HLDT = .186*LDT;
If County = 'Harris    ' then LDT1 = .813*LDT;
If County = 'Harris    ' then HLDT = .187*LDT;
If County = 'Liberty   ' then LDT1 = .789*LDT;
If County = 'Liberty   ' then HLDT = .211*LDT;
If County = 'Montgomery' then LDT1 = .777*LDT;
If County = 'Montgomery' then HLDT = .223*LDT;
If County = 'Waller    ' then LDT1 = .745*LDT;
If County = 'Waller    ' then HLDT = .255*LDT;
*******************************;
* EPA Classifications MOBILE 6 *;
* LDGV  02=.9983579/.0016421   *;
* LDGT1 02=.9945513/.0054487   *;
*******************************;
LDGV = .9983579 * LDV;
LDDV = .0016421 * LDV;
LLDT = .9945513 * LDT1;
LDDT = .0054487 * LDT1;
*******************;
* LDDT12 vs LDDT34 *;
* EPA MOBILE 6     *;
*******************;
LDDT12 = .1221730 * LDDT;
LDDT34 = .8778270 * LDDT;
**************************;
*  HDGV vs HDDV          *;
*  2002 Registration Data *;
**************************;
If County = 'Brazoria  ' then HDGV = .326*HDV;
If County = 'Brazoria  ' then HDDV = .674*HDV;
If County = 'Chambers  ' then HDGV = .280*HDV;
If County = 'Chambers  ' then HDDV = .720*HDV;
If County = 'Fort_Bend ' then HDGV = .265*HDV;
If County = 'Fort_Bend ' then HDDV = .735*HDV;
If County = 'Galveston ' then HDGV = .352*HDV;
If County = 'Galveston ' then HDDV = .648*HDV;
If County = 'Harris    ' then HDGV = .358*HDV;
If County = 'Harris    ' then HDDV = .642*HDV;
If County = 'Liberty   ' then HDGV = .226*HDV;
If County = 'Liberty   ' then HDDV = .774*HDV;
If County = 'Montgomery' then HDGV = .279*HDV;
If County = 'Montgomery' then HDDV = .721*HDV;
If County = 'Waller    ' then HDGV = .247*HDV;
If County = 'Waller    ' then HDDV = .753*HDV;
*******************************;
* Separate old LDGT1 category *;
```

```
* LDGT1 eqv < 3,450 GVW       *;
* LDGT2 eqv 3,450 - 5,700 GVW *;
*******************************;
LDGT1 = .2309946 * LLDT;
LDGT2 = .7690054 * LLDT;
*******************************;
* Separate old LDGT2 category *;
* LDGT3 eqv 5,700 - 7,600 GVW *;
* LDGT4 eqv 7,600 - 8,500 GVW *;
*******************************;
LDGT3 = .6849910 * HLDT;
LDGT4 = .3150090 * HLDT;
****************************************;
* Calculate Mobile 6 subcategories      *;
* 2002 TxDOT Regional Registration data *;
****************************************;

HDGV_2b = .519 * HDGV;
HDGV_3  = .194 * HDGV;
HDGV_4  = .094 * HDGV;
HDGV_5  = .034 * HDGV;
HDGV_6  = .091 * HDGV;
HDGV_7  = .032 * HDGV;
HDGV_8a = .032 * HDGV;
HDGV_8b = .004 * HDGV;
*  HDDV Trucks  *;
HDDV_2b = .278 * HDDV;
HDDV_3  = .134 * HDDV;
HDDV_4  = .081 * HDDV;
HDDV_5  = .053 * HDDV;
HDDV_6  = .168 * HDDV;
HDDV_7  = .102 * HDDV;
HDDV_8a = .184 * HDDV;
HDDV_8b = HDX;
*  Buses  *;
HDGB = .1688587 * B;
HDDBT = .3245303 * B;
HDDBS = .5066110 * B;
*  Aggregate and calculate percentages  *;
*  28 categories  *;
Proc Sort;
  By Region Station;
Proc Means NoPrint Sum;
  Var LDGV LDDV LDGT1 LDGT2 LDGT3 LDGT4 LDDT12 LDDT34 HDGV_2b HDGV_3
      HDGV_4 HDGV_5 HDGV_6 HDGV_7 HDGV_8a HDGV_8b HDGB HDDBT HDDBS
      HDDV_2b HDDV_3 HDDV_4 HDDV_5 HDDV_6 HDDV_7 HDDV_8a HDDV_8b;
  By Region Station;
  OutPut OUT=Stats
  Sum = XLDGV XLDDV XLDGT1 XLDGT2 XLDGT3 XLDGT4 XLDDT12 XLDDT34 XHDGV2b
      XHDGV_3 XHDGV_4 XHDGV_5 XHDGV_6 XHDGV_7 XHDGV_8a XHDGV_8b XHDGB
      XHDDBT XHDDBS XHDDV_2b XHDDV_3 XHDDV_4 XHDDV_5 XHDDV_6 XHDDV_7
      XHDDV_8a XHDDV_8b;
Data NewSet;
  Set Stats;
  Total = XLDGV + XLDDV + XLDGT1 + XLDGT2 + XLDGT3 + XLDGT4 + XLDDT12 +
      XLDDT34 + XHDGV2b + XHDGV_3 + XHDGV_4 + XHDGV_5 + XHDGV_6 + XHDGV_7 +
      XHDGV_8a + XHDGV_8b + XHDGB + XHDDBT + XHDDBS + XHDDV_2b + XHDDV_3 +
      XHDDV_4 + XHDDV_5 + XHDDV_6 + XHDDV_7 + XHDDV_8a + XHDDV_8b;
  P_LDGV   = XLDGV/Total;
  P_LDDV   = XLDDV/Total;
  P_LDGT1  = XLDGT1/Total;
  P_LDGT2  = XLDGT2/Total;
  P_LDGT3  = XLDGT3/Total;
  P_LDGT4  = XLDGT4/Total;
  P_LDDT12 = XLDDT12/Total;
  P_LDDT34 = XLDDT34/Total;
  P_HDGV2b = XHDGV2b/Total;
  P_HDGV_3 = XHDGV_3/Total;
  P_HDGV_4 = XHDGV_4/Total;
  P_HDGV_5 = XHDGV_5/Total;
  P_HDGV_6 = XHDGV_6/Total;
  P_HDGV_7 = XHDGV_7/Total;
  P_HDGV8a = XHDGV_8a/Total;
```

```
  P_HDGV8b = XHDGV_8b/Total;
  P_HDGB   = XHDGB/Total;
  P_HDDBT  = XHDDBT/Total;
  P_HDDBS  = XHDDBS/Total;
  P_HDDV2b = XHDDV_2b/Total;
  P_HDDV_3 = XHDDV_3/Total;
  P_HDDV_4 = XHDDV_4/Total;
  P_HDDV_5 = XHDDV_5/Total;
  P_HDDV_6 = XHDDV_6/Total;
  P_HDDV_7 = XHDDV_7/Total;
  P_HDDV8a = XHDDV_8a/Total;
  P_HDDV8b = XHDDV_8b/Total;
* Force MC value and balance from LDGV *;
  P_MC = .001;
* Balance MC change from LDGV *;
  P_LDGV = ((XLDGV/Total)-.001);
  P_Total = P_LDGV + P_LDDV + P_LDGT1 + P_LDGT2 + P_LDGT3 + P_LDGT4 +
      P_LDDT12 + P_LDDT34 + P_HDGV2b + P_HDGV_3 + P_HDGV_4 + P_HDGV_5 +
      P_HDGV_6 + P_HDGV_7 + P_HDGV8a + P_HDGV8b + P_HDGB + P_HDDBT +
      P_HDDBS +  P_HDDV2b + P_HDDV_3 + P_HDDV_4 + P_HDDV_5 + P_HDDV_6 +
      P_HDDV_7 + P_HDDV8a + P_HDDV8b + P_MC;
  P_HDDV = P_HDDV2b + P_HDDV_3 + P_HDDV_4 + P_HDDV_5 + P_HDDV_6 +
           P_HDDV_7 + P_HDDV8a + P_HDDV8b;
  P_HDGV = P_HDGV2b + P_HDGV_3 + P_HDGV_4 + P_HDGV_5 + P_HDGV_6 +
           P_HDGV_7 + P_HDGV8a + P_HDGV8b;
  P_Bus = P_HDGB + P_HDDBT + P_HDDBS;
Proc Sort;
  By Region Station;
*Proc Print;
*  Format Total Comma11.0 P_LDGV--P_Bus 9.7;
*  Var Total Region P_LDGV P_LDGT1 P_LDGT2 P_LDGT3 P_LDGT4 P_HDGV2b
*      P_HDGV_3 P_HDGV_4 P_HDGV_5 P_HDGV_6 P_HDGV_7 P_HDGV8a P_HDGV8b
*      P_LDDV P_LDDT12 P_HDDV2b P_HDDV_3 P_HDDV_4 P_HDDV_5 P_HDDV_6
*      P_HDDV_7 P_HDDV8a P_HDDV8b P_MC P_HDGB P_HDDBT P_HDDBS P_LDDT34;
*  Sum Total;
Proc Print;
  Format Total Comma11.0 P_LDGV--P_Bus 9.7;
  Var Total Region Station P_LDGV P_HDDV P_HDGV P_Bus;
  Sum Total;
Run;
```



KEY TO DISTRICT

HOUSTON DISTRICT
TEXAS DEPARTMENT OF TRANSPORTATION
TRANSPORTATION PLANNING & PROGRAMMING DIVISION
DATA COLLECTION SITES
AS OF JANUARY 1, 2003

LEGEND

S-0000	Continuous Vehicle Volume Counts (ATR)
M-0000	Vehicle Volumes W / Classification types by Axle Spacings (AVC)
M-0000	Vehicle Classification (Automated or Visual Identification)
M-0000	Visual Vehicle Classification (Performed by Contract)
M-0000	Visual Vehicle Classification at Bridges (Performed by Contract)
000-N	Timed Vehicle Speeds for determining Speed compliance by direction: N, S ,E or W
LW-0000	Dynamic Truck Weights by Axle Weigh-in-Motion (WIM)
BC-0000	Vehicle Volumes W / Classification types by Axle Spacings to Monitor Trends from Border Crossings
000-AVI	Automated Vehicle Identification for Vehicles equiped w / transponders (AVI)
0000-NB	Vehicle Volume type by Axle Spacing and Axle Weights for LTPP test sections by direction in a single lane
SS-00	Survey Sites
HV-00	High Volume Sites

NOTICE
This map has been prepared for internal use within the Texas Department of Transportation. Accuracy is limited to the validity of available data as of dates shown.

SHEET A