

# Nature of Weekend Travel by Urban Households

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Paper prepared for presentation

at the **Emerging Best Practices in Urban Transportation Planning (A)** Session

of the 2005 Annual Conference of the  
Transportation Association of Canada  
Calgary, Alberta

September, 2005

## Acknowledgements

The analysis work reported in this paper was funded in part by the City of Calgary, and in part, along with the preparation of the paper, by grants provided by the Natural Sciences and Engineering Council of Canada and the Social Sciences and Humanities Research Council of Canada as part of a Major Collaborative Research Initiative, and also by the Institute for Advanced Policy Research at the University of Calgary. The work reported here also benefited from the assistance of Rachel Gossen at the Metropolitan Transportation Commission (in the San Francisco Bay Area). Notwithstanding the above funding support and assistance, the views expressed in this paper are entirely those of the authors and cannot be taken to indicate the positions of any of the sponsoring agencies. Any errors or omissions are also solely the responsibilities of the authors.

## Abstract

In comparison to weekday travel in urban areas, very little is known about weekend travel behaviour. Knowledge of weekend behaviour is important for a number of purposes, including the prediction of weekend congestion – an emerging problem, especially in concentrated shopping districts. It is intuitively obvious that weekend travel is different than weekday travel. Weekends have a greater focus on shopping and leisure, with a lesser one on work and school journeys; heavier automobile usage but higher occupancies; and a mid-day peak rather than AM and PM peaks. However, there is little knowledge and no agreement on the size and scale of the differences between weekend and weekday travel behaviour. This paper presents some basic descriptions of weekend travel behaviour as revealed in a 2001 survey of household travel behaviour in Calgary and in a similar 2000 survey in the San Francisco Bay Area. Analysis and comparison of these descriptions show that the weekend patterns differ from the corresponding weekday patterns in ways that are consistent with expectations, with the weekends containing more discretionary travel (more HB Shop and HB Social / Recreational, less HB Work and HB School) higher auto occupancies (consistent with larger family groups travelling together) and less transit use. Further, the weekday patterns in the two areas are broadly similar, as are the weekend patterns, and the differences between the weekday and the weekend patterns seem greater than the differences between areas.

**Keywords:** Weekend Urban Travel Behaviour; Weekday vs Weekend Travel; Shopping and Leisure Travel; Calgary; San Francisco

## 1 OVERVIEW

Two very similar household travel surveys have recently been completed, in 2001 in Calgary, Canada (IBI Group, 2002) and in 2000 in the San Francisco Bay Area, USA (MTC, 2004). Participating households recorded all activities, including travel activities, over assigned periods using activity diaries and telephone recovery. The assigned

periods were spread evenly across all 7 days of the week (in Calgary) or were 48-hour periods including either Friday-Saturday or Sunday-Monday combinations (the Bay Area). These dataset provide indications of weekend travel patterns for comparison, both between the two areas and with the patterns for weekdays – with comparable categorizations possible because of similarities in definitions.

Calgary is a major regional centre located in the southern portion of Alberta. It has the 5<sup>th</sup> largest metropolitan population in Canada, the 2<sup>nd</sup> largest in Western Canada, after Vancouver. The City of Calgary comprises roughly 85% of the total population of the larger region covered in the household survey. The remainder of this region (including Foothills and Rockyview rural municipalities and portions of Vulcan and Wheatland counties) is best characterised as primarily agricultural land, dotted with towns.

The San Francisco Bay Area (Bay Area) is a major international centre and port that is one of the primary gateways to the United States. Its metropolitan population is the 5<sup>th</sup> largest in the United States and the 2<sup>nd</sup> largest in the western half of the country, behind Los Angeles. The region covered in the household survey includes a large urban conurbation with three major cities, San Francisco, Oakland and San Jose, and 9 counties (San Francisco, San Mateo, Santa Clara, Alameda, Contra Costa, Solano, Napa, Sonoma and Marin).

Some summary statistics for the two survey areas and the coverage of weekend travel in their respective surveys are provided in Table 1.

**Table 1: Summary Statistics for Survey Areas and Survey Samples**

	Calgary (2001)	Bay Area (2000)
Total population	1 010 000	6 640 000
Total households	391 200	2 466 000
Households surveyed on Weekend days	2 342	15 064
Sampling rate	0.60%	0.61%

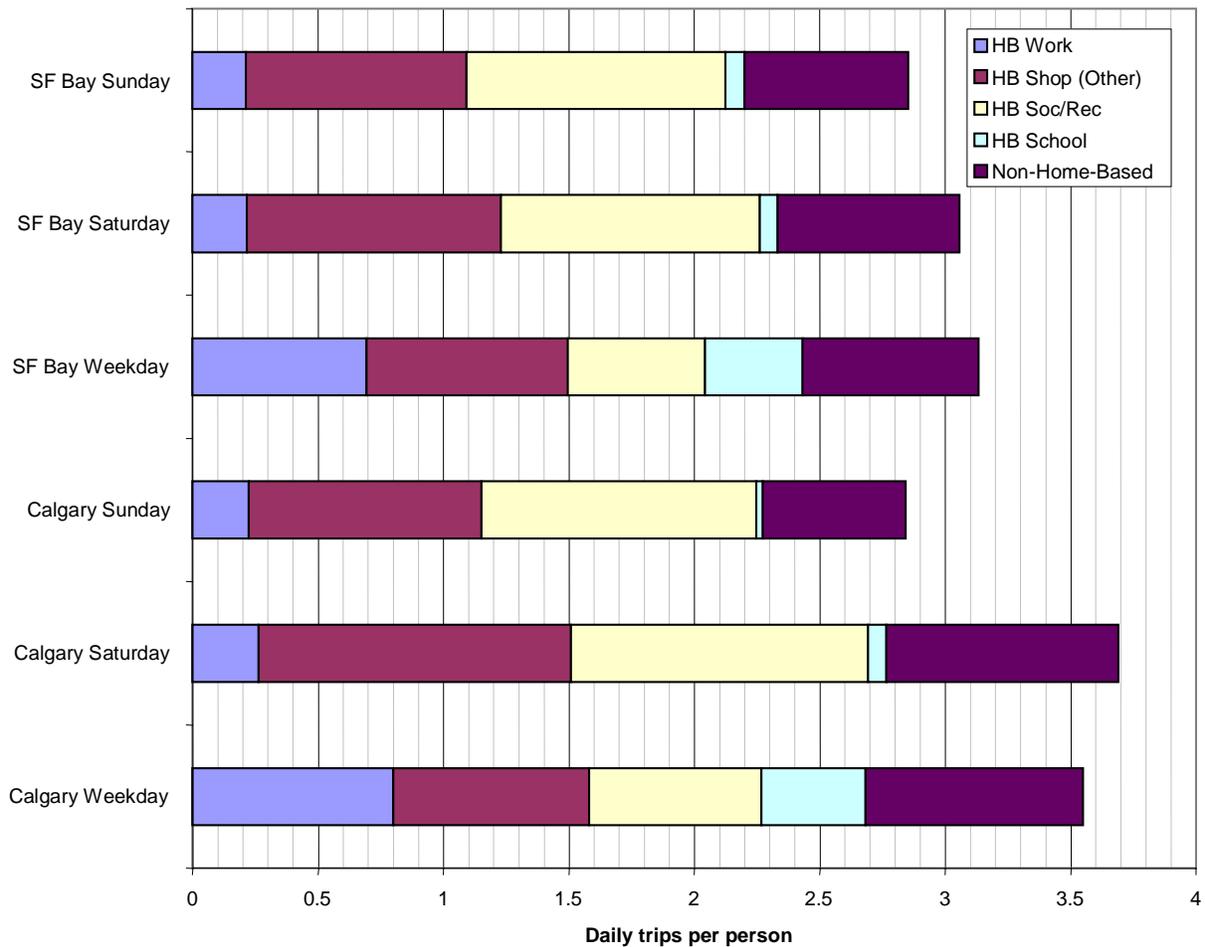
## 2 TRIP GENERATION

Figure 1 shows the person trip rates by purpose for weekdays, Saturdays and Sundays for both areas.

The trip rates for Sundays are very similar in the two areas. Those for Saturdays and weekdays are higher in Calgary than in the Bay Area, particularly for HB Shop on Saturdays and for HB Social/Recreational and non-home-based on both days.

In both areas the trip rates for Saturdays show shifts from HB work and HB School to HB Shop and HB Social/Recreational compared to weekdays, consistent with expectations. The overall rates do not change much from weekdays to Saturdays, but they do become slightly higher in Calgary and slightly lower in the Bay Area.

There has to be some concern that these differences in the trip rates for the two areas are due to some form of systematic bias. The very strong similarities for Sundays reduces this concern to some extent – but, with Saturdays only included as the second day in two-day diaries in the Bay Area, was there some attrition in reporting for those days in particular that did not occur in Calgary? Still, such attrition for Saturdays would not explain the differences for weekdays.



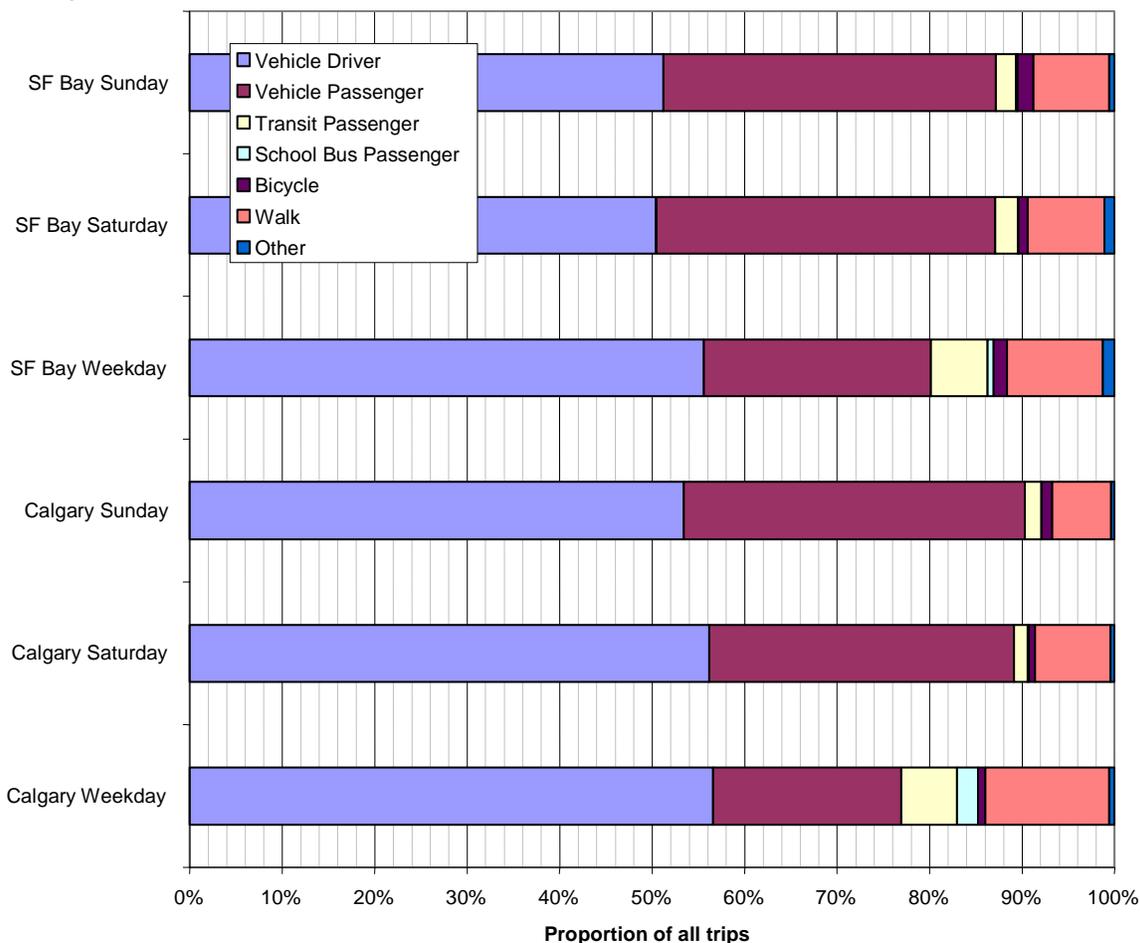
**Figure 1: Trips per person by trip purpose**

### 3 MODE SPLIT

#### 3.1 Model Split for All Trip Purposes

Figure 2 shows the overall trip mode split for weekdays, Saturdays and Sundays for both areas.

In broad terms, the proportions of transit, walk, bike and other use are higher in the Bay Area than in Calgary on weekends and higher in Calgary than in the Bay Area on weekdays.



**Figure 2: Mode use for all trip purposes**

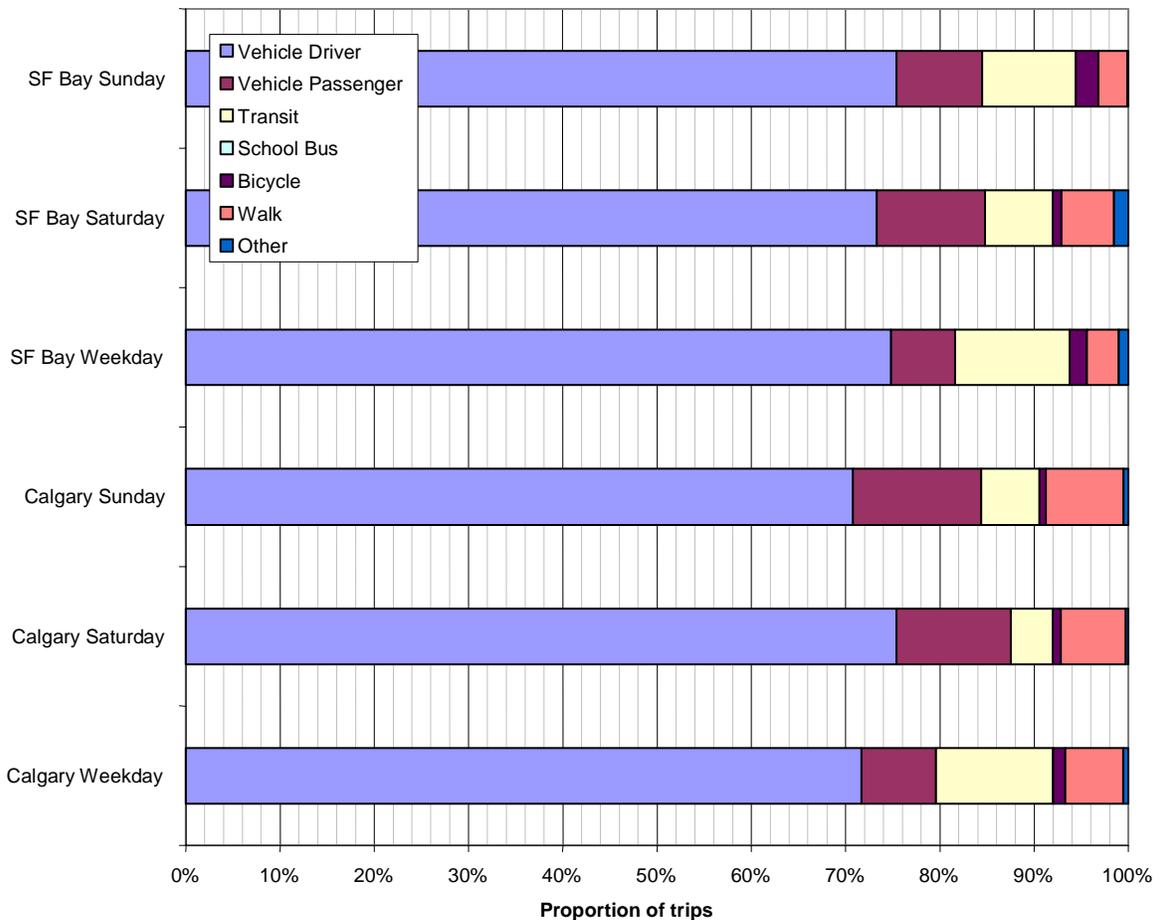
The proportion of auto use on weekdays is a bit lower in Calgary than in the Bay Area. The amount of vehicle driver use is about the same; there is more walking and less vehicle passenger use in Calgary on these days. This may arise because the Bay Area has a greater proportion of long distance commuting, where walking is not an option, along with toll road operations that favour carpools.

Auto use goes up on both Saturdays and Sundays in both areas, with slightly less vehicle driver use and substantially more vehicle passenger use – indicating much higher vehicle occupancies on weekends in both areas. There is slightly more transit use and less auto use on both Saturdays and Sundays in the Bay Area compared to Calgary.

There is also more bicycle use in the Bay Area compared to Calgary on Sundays and on weekdays, and about the same in both areas on Saturdays.

### 3.2 Mode Split for HB Work Trip Purpose

Figure 3 shows the overall trip mode split for weekdays, Saturdays and Sundays for HB work trips for both areas.



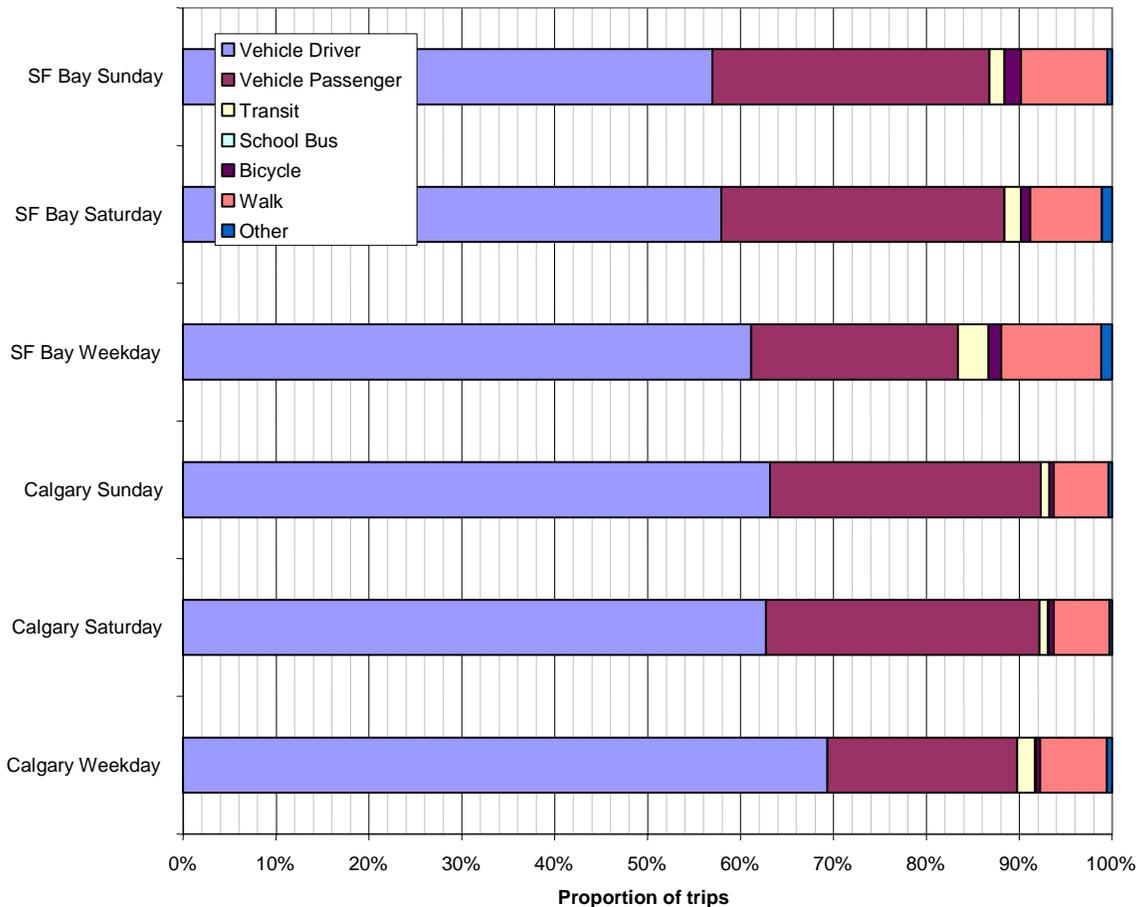
**Figure 3: Mode use for HB Work trips**

Vehicle driver use dominates for HB Work in both areas at all times. There is substantially more vehicle passenger use on Saturdays in both areas and in Calgary on Sundays, with corresponding reductions in transit use.

The patterns of mode use for HB Work on weekdays are quite similar for the two areas, with slightly more vehicle driver and less walk for the Bay Area. The patterns of mode use for HB Work on Saturdays are also quite similar for the two areas, with a small amount more vehicle driver and walk and less transit and other for Calgary. The patterns for the two areas are most different for Sundays, with Calgary compared to the Bay Area displaying a fair amount more auto passenger and walk and less auto driver, transit and bicycle proportions for HB Work. Of course, with HB Work constituting a much smaller proportion of travel on weekends, these differences for Sundays are muted for the most part when considering the differences in mode use between the two areas for travel for all purposes.

### 3.3 Mode Split for HB Shop Trip Purpose

Figure 4 shows the overall trip mode split for weekdays, Saturdays and Sundays for HB shop trips for both areas.



**Figure 4: Mode use for HB Shop trips**

Comparing Figure 4 with Figure 3, vehicle passenger use is much more prevalent overall for HB Shop relative to HB Work.

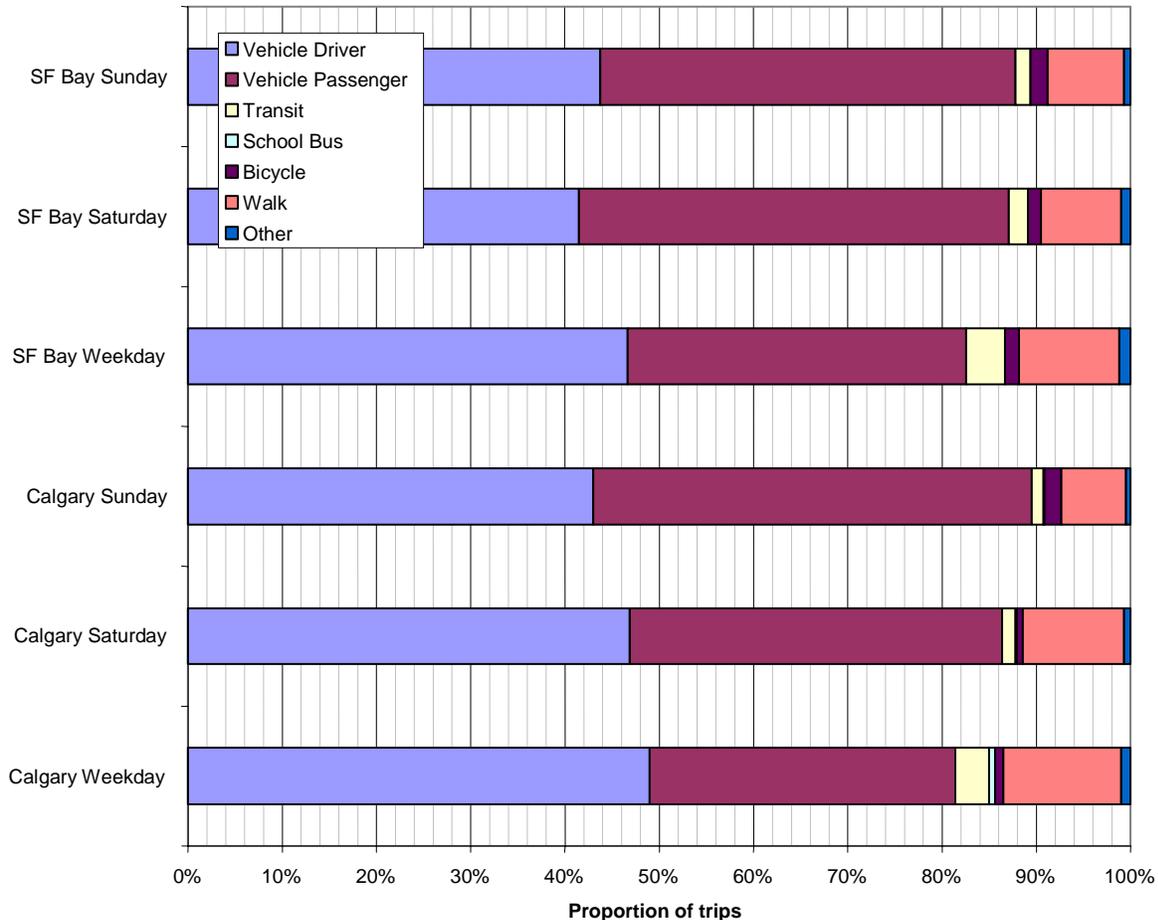
Regarding the mode split patterns for weekdays in the two areas, there is substantially more vehicle driver use in Calgary and more walk, transit and bicycle use in the Bay Area.

For each area separately, the mode use patterns for HB Shop are very similar on Saturdays and Sundays. Further, in both areas the weekend patterns display less vehicle driver, transit and walk along with more vehicle passenger relative to the corresponding weekday shares – which likely reflects more household groups on shopping expeditions.

Relative to the weekend pattern for the Bay Area, the weekend pattern for Calgary shows a higher proportion of vehicle driver and a lower proportion of walk in particular, along with lower proportions of transit, bicycle and other.

### 3.4 Mode Split for HB Social / Recreational Trip Purpose

Figure 5 shows the overall trip mode split for weekdays, Saturdays and Sundays for HB social / recreational trips for both areas.



**Figure 5: Mode use for HB Social / Recreational Trips**

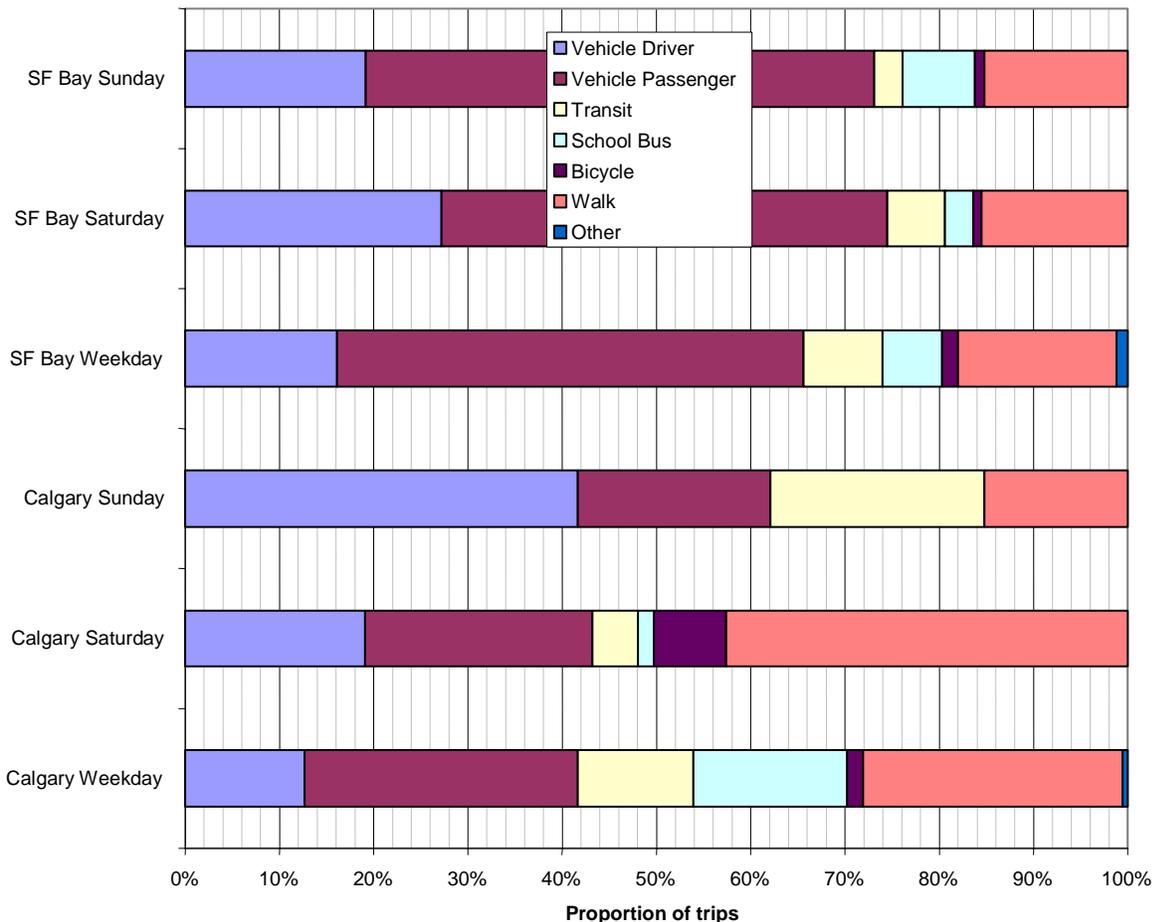
Vehicle passenger use is even more prevalent overall for HB Social/Recreational trips than it is for HB Shop trips, with reduced vehicle driver use throughout for HB Social/Recreational to the point where average vehicle occupancies are around 2. This reflects the much higher group sizes involved in social /recreational activities generally. In Calgary, the proportions of walking use are also somewhat higher for HB Social/Recreational trips than for either HB Work or HB Shop trips.

Calgary and the Bay Area display very similar mode use patterns for HB Social/Recreational trips on the same days. On weekdays their patterns are almost the same, except that Calgary has a bit of school bus use (related to school day trips recorded in this way) and slightly more walking and less vehicle driver. On Saturdays their patterns are nearly identical, except that the Bay Area has a bit less vehicle driver and a bit more vehicle passenger. On Sundays their patterns match just about exactly, with slightly more walking use in the Bay Area.

Comparing the patterns for HB Social/Recreational trips on different days, which for the most part applies for both areas: vehicle driver use proportions are higher and vehicle passenger use proportions are lower on weekdays than on Saturdays or Sundays; transit use proportion on weekdays is twice what it is on weekends; bicycle use proportions are higher on Sundays (more so in Calgary than in the Bay Area) and walking proportions are somewhat higher on weekdays. These differences are consistent with weekend activities involving larger travelling groups (higher vehicle occupancies and less transit) and more physical recreation (higher bicycle use and walking).

### 3.5 Mode Split for HB School Trip Purpose

Figure 6 shows the overall trip mode split for weekdays, Saturdays and Sundays for HB social / recreational trips for both areas.



**Figure 6: Mode use for HB School Trips**

As shown in Figure 1, the amount of HB School travel on Saturdays and Sundays is very small, which means that the mode splits for HB School trips have little impact on

overall mode splits on these days and there should also be some greater caution exercised when interpreting the results presented here because of the potentially greater sample errors involved.

Comparing the patterns for weekdays for the two areas, the vehicle driver proportion is somewhat higher in the Bay Area than in Calgary. Given that this mode option is only available to a fairly small proportion of those making school trips – those old enough to drive – the higher proportion in the Bay Area must reflect a much greater use among those who have it available. Vehicle passenger use proportion is also much higher and transit, school bus and walk use proportions much lower in the Bay Area than in Calgary. There may be less school bus service available in the Bay Area, there may also be a higher proportion of the population attending PSE institutions, and schools may be further away generally in the Bay Area, but it also seems possible that at least some of the difference in vehicle passenger use between Calgary and the Bay Area relates to differing levels of concern about the personal safety of children traveling unaccompanied.

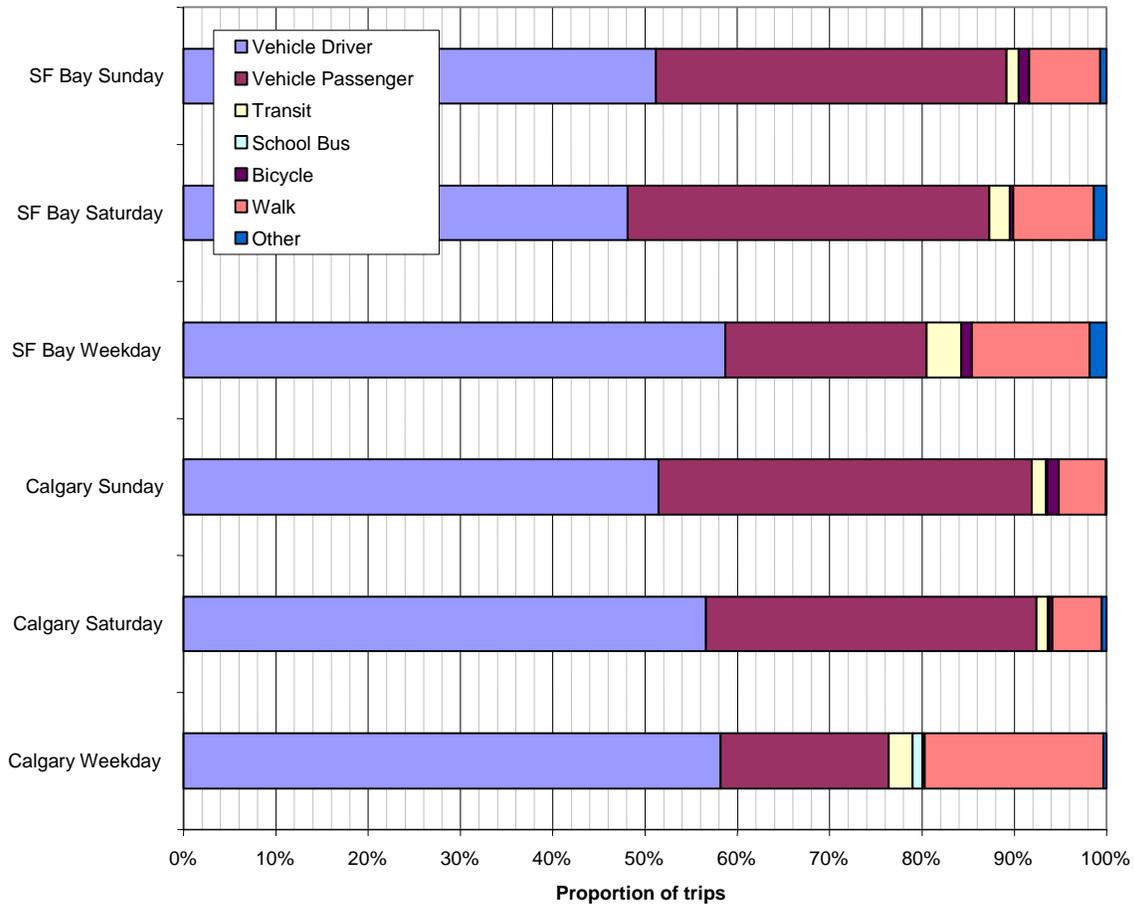
In the Bay Area, the mode use patterns for HB School trips on Saturdays and Sundays are fairly similar to those on weekdays, given the likely sample errors involved as discussed above, with some greater amount of vehicle driver use on Saturdays. In Calgary, the patterns on Saturdays and Sundays differ more substantially from those on weekdays, with a much higher proportion of walking and higher proportions of vehicle driver and bicycle use on Saturday and very much higher proportions of vehicle driver and transit use and a lower proportion of walking on Sundays. These differences in part reflect the absence of school bus service on Sundays – but in general need to be considered with caution given the sample errors involved.

### **3.6 Mode Split for NHB Trip Purpose**

Figure 7 shows the overall trip mode split for weekdays, Saturdays and Sundays for Non-Home-Based (NHB) trips for both areas.

Comparing the mode use patterns for non-home-based trips on weekdays for the two areas, the vehicle driver proportions are very similar, the proportions of vehicle passenger use and other use are higher and the proportion of walk use is lower in the Bay Area relative to Calgary. There is also a slightly higher proportion of transit use in the Bay Area, perhaps reflecting the greater density and spread of such services in some parts of the region to the extent that tours of linked trips away from home locations can include more use of such services.

Walk use proportions for non-home-based trips are much higher on weekdays than Saturdays or Sundays in both areas, possibly the result of much greater amounts of work-based walking during lunch breaks on weekdays. As with other trip purposes, vehicle driver proportions are slightly lower and vehicle passenger proportions are much higher on both Saturdays and Sundays relative to weekdays in both areas. Transit use proportions for non-home based trips are lower on weekends than weekdays in both areas.



**Figure 7: Mode Use for NHB Trips**

On the weekend the mode use patterns on Saturdays are very similar to those on Sundays in each area. In Calgary, the proportion of vehicle driver use on Sundays is slightly lower than it is on Saturdays, whereas in the Bay Area the reverse is true.

On the weekends, the walk use proportions are slightly higher and the vehicle driver use proportions are slightly lower in the Bay Area than in Calgary. There is also a slightly higher transit use proportion in the Bay Area than in Calgary on Saturdays in particular.

#### 4 OUT-OF-HOME ACTIVITIES

The vectors of activity types used in the surveys in the two areas are not identical. Table 2 shows how these vectors of activity types have been grouped into a set of 11 categories with more consistent definitions for comparison here. The only apparent difference with the resulting 11 groups concerns internet use, which is in with the Shop (other) category in the Bay Area data and with the Entertainment/Leisure category in the Calgary data. Since this involves slightly less than 5,000 of the approximately 20 million expanded stops it is not going cause much distortion in the comparison here.

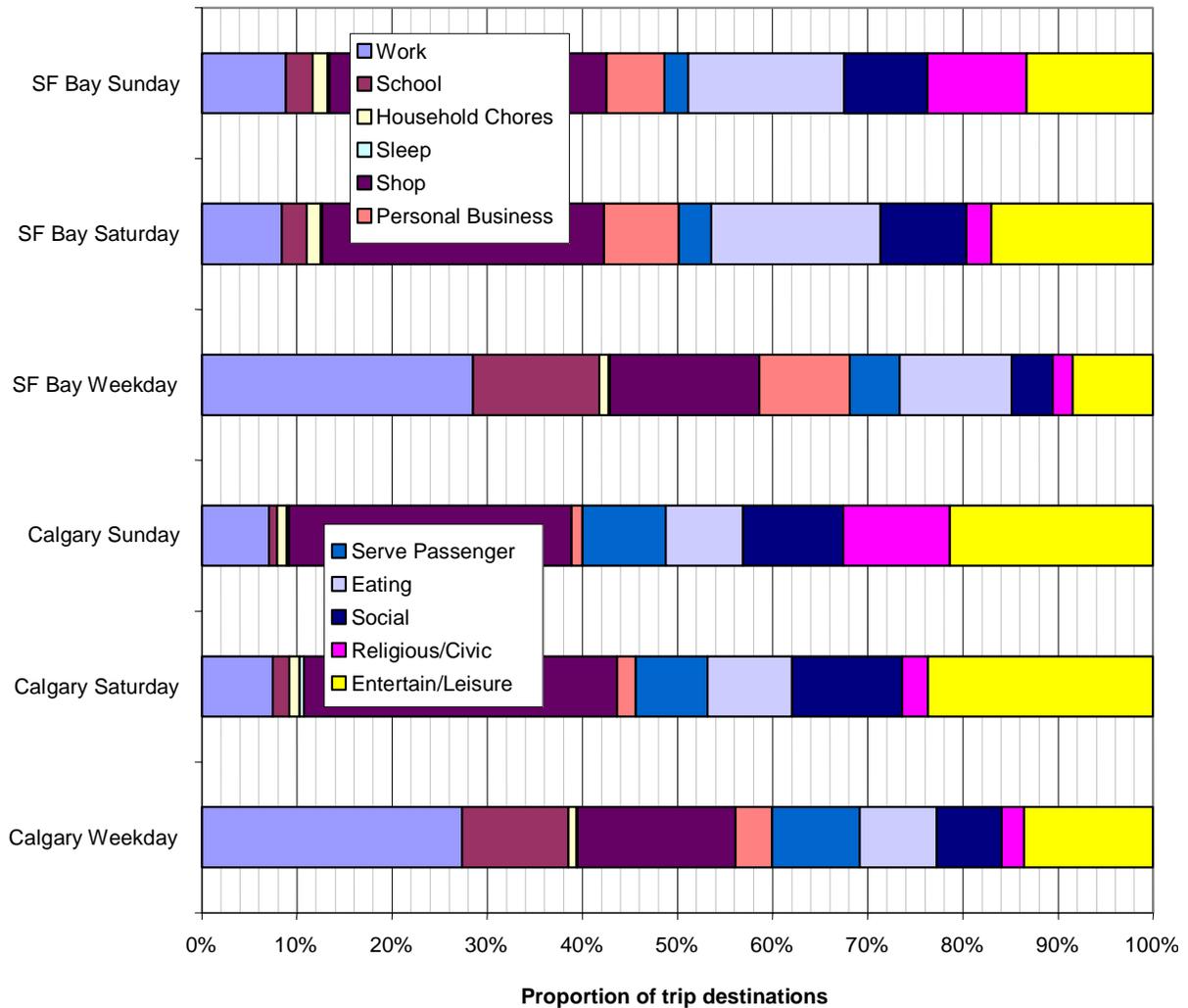
**Table 2: Definitions of Activity Categories from Types used in Two Area Surveys**

Activity Categories for Comparisons Here	Calgary Survey Activity Types	SF Bay Area Survey Activity Types
Work	Work, Travel for work	Work or work related
School	School/Homework, Daycare	School or school related
Household Chores	Household	Household Chores/ Personal Care
Sleep	Sleep	Sleep
Shop	Shop	Shopping, Shopping at home
Personal Business	Medical/Financial	Personal Services / Bank / Gov't, Sick/Medical appt.
Serve Passenger	Drop off passenger, Pick up passenger	Pick-up / Drop-off passenger
Eating	Eat	Meals
Social	Social	Social activities
Religious/Civic	Religious/Civic, Volunteer	Volunteer / Civic / Religious
Entertainment/Leisure	Exercise, Entertainment/Leisure	Recreation / Entertainment, Relaxing / Resting
n/a	Unpark vehicle, Out of town, Travel	Change mode, Non-work & non-shop internet, Other

Figure 8 displays the distributions of activities at all stops on travel away from the home for weekdays, Saturdays and Sundays for both areas. These proportions are based on stops counts, not durations, and thus indicate distributions of trip purposes – based on the activity at the destination end and excluding trips where home is the destination.

Comparing the distributions of activities at stops on weekdays indicated for the two areas, there are substantially higher proportions for personal business and eating, a somewhat higher proportion for school, and lower proportions for serve passenger, social and entertainment/leisure in the Bay Area relative to Calgary. The difference regarding school may relate in part to a difference in age groups in the populations – to the extent that there are greater proportions of school attendees in the Bay Area. The large difference regarding personal business is surprising, and may relate to differences between the surveys with regard to definition, interpretation and/or application that are not apparent in the available documentation. Such differences may also have contributed to the indicated differences regarding the proportions of entertainment/leisure, social and eating. Notwithstanding these possible distortions, it is

still possible to consider some of the general trends for weekends as opposed to weekdays in both areas.



**Figure 8: Distribution of Activities at Stops Away from Home**

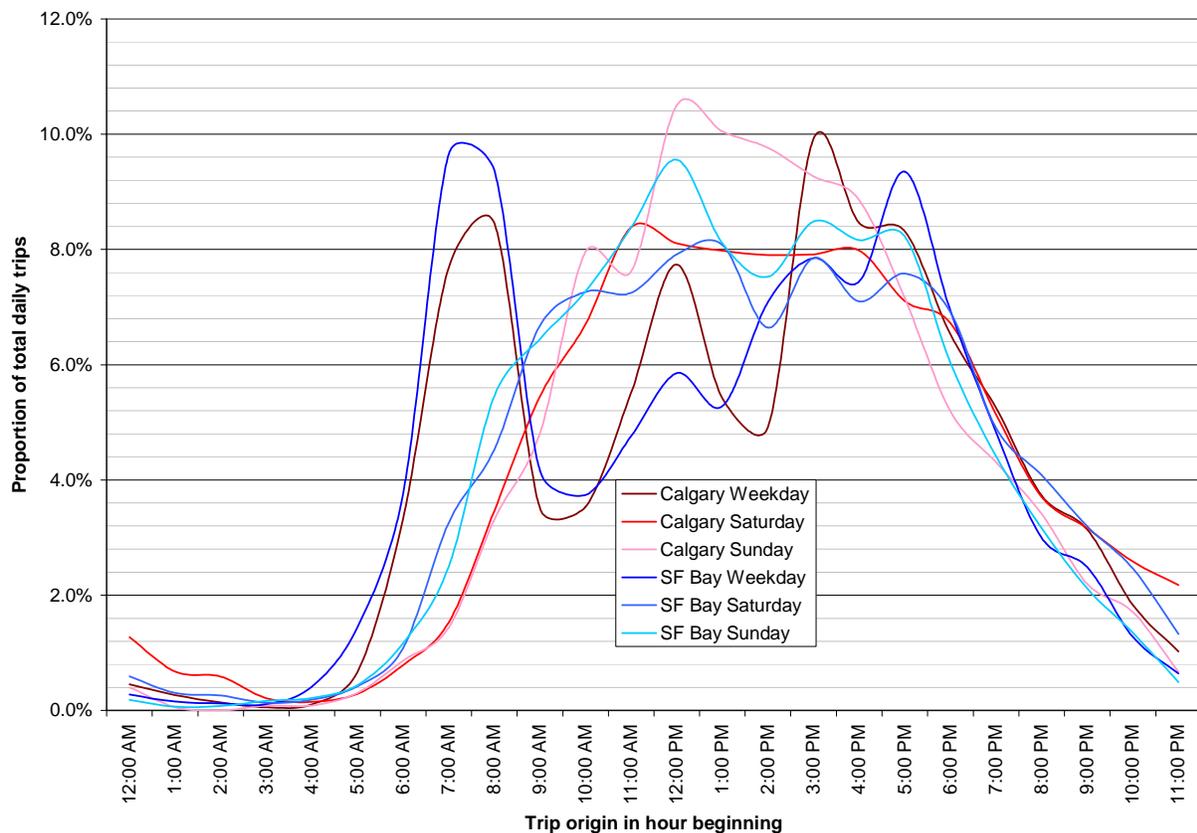
The proportions of stops for work and school drop substantially on the weekends in both areas, and the proportions of stops for shop, social and entertainment/leisure increase, which is consistent with expectations. The proportions of trips for eating out increase on the weekends in the Bay Area, and remain about the same on the weekends in Calgary, with the result that the difference between areas with regard to the proportion of stops for eating out becomes even greater on weekends. Religious/Civic stop proportions increase only for Sundays in both areas.

The distributions of activities at stops on weekends for the two areas are fairly similar, but with differences broadly similar to those for weekdays in that there are substantially higher proportions for personal business and eating and a lower proportion for entertainment/leisure in the Bay Area. Again, there needs to be some concern that these differences relate at least in part to differences in the application of the survey and

the definitions and/or interpretations used: It could be that visits to certain types of eating establishments were recorded as eating in the Bay Area and as entertainment/leisure in Calgary. But such differences would not impact the indications of the split between more obligatory activities (plotted to the left in Figure 8) and more discretionary activities (plotted to the right in Figure 8). Using the break between serve passenger and eating in Figure 8 as indicative, the split between the more obligatory and the more discretionary is at about 70% on weekdays for both Calgary (69%) and the Bay Area (73%), and shifts to about 50% on weekends for both Calgary (53% on Saturdays and 49% on Sundays) and the Bay Area (54% on Saturdays and 51% on Sundays) suggesting a closer degree of similarity in the overall nature of activity patterns in the two areas on both weekdays and weekends.

## 5 TIME OF TRAVEL

Figure 9 displays the distributions of start times for trips on weekdays, Saturdays and Sundays in both areas.



**Figure 9: Distributions of Trip Start Times**

Comparing the distributions of start times on weekdays for the two areas, the peak in the AM is sharper and in the PM is later after a more gradual build-up during the middle

of the day in the Bay Area. Calgary has a much more pronounced mid-day peak followed by a trough before the PM peak.

The distributions of start times for the weekends have much flatter and broader single peaks throughout the middle of the day in both areas. There is a slightly more pronounced peaking right at about noon with a slight trailing off until about 6pm and a typical falling off after that on Sundays in both areas. The patterns for Saturdays in the two areas are very similar, but with a tendency for trips to start earlier in the Bay Area on both Saturdays and Sundays.

## **6 CONCLUSIONS**

Comparatively little is known about urban weekend travel and activity patterns; these have not been the focus of much work to date. The weekday has received the vast majority of attention. The intention here was to compare indications regarding weekend travel patterns for two different areas – Calgary and the San Francisco Bay Area – in part to gain some further confidence in the indications being provided; seeking to develop a more complete understanding of the general nature of weekend travel. This was undertaken in support of more weekend-related considerations in design and evaluation.

At the most general level overall, the travel patterns in Calgary and the Bay Area are broadly similar, as expected. More specifically, weekday behaviour in Calgary is broadly similar to weekday behaviour in the Bay Area, and the same holds for weekend behaviour. The bigger differences involve weekday vs weekend behaviour in each area.

Consistent with the overall similarity between the two areas, the differences between weekday and weekend travel patterns are broadly similar in the two areas. Some of these differences between weekday and weekend patterns are:

- There is a switch to more discretionary activities on weekends. This is certainly as expected, but the results here provide indications of the magnitudes of the switches in more specific activities and how these can vary in different urban areas; consistent with a switch to more discretionary activities, it is appropriate to expect to observe higher elasticities in travel choices on weekends, which can be helpful when developing models of these weekend choices;
- More specifically in terms of trip purposes, on weekends there are dramatic reductions in HB Work and HB Shop travel and corresponding increases in HB Shop and HB Social/Recreational;
- There is more auto passenger use on weekends and less transit and walking, consistent with more group travel and higher auto occupancies;
- The travel patterns on Saturdays and Sundays have many similarities; in some ways they seem to be more alike than some pairs of weekdays (based on, for example, the often-observed tendencies for traffic volumes to be relatively low on Tuesdays and much busier on Fridays); this suggests that in many instances it may be entirely appropriate to consider and to model a typical weekend day in the

- same way a typical weekday is modeled;
- There is a single fairly flat peak from about noon to 6pm in the distributions of trip times on weekend days; this peak for Sundays in particular is perhaps a bit skewed towards noon with a slight trailing off to 6pm;
- Weekend travel patterns are as similar across areas as weekday ones; in as much as there is a general, typical weekday pattern in urban areas, the results here suggest there is also a weekend pattern that can be used in much the same way.

With findings like this for two areas, it is possible to be more confident of their more general applicability than would be the case if only one area were considered.

Stronger, more confident findings would be obtained if these comparisons are expanded to include other areas. Other fairly recent travel surveys have included observations of weekend patterns, including ones in Oregon, USA (ODOT, 1994; Freedman *et al*, 2005) and London, UK (TfL, 2002). It would seem that such expanded comparisons would be appropriate future work.

### References

Freedman, J., Zmud, J. and Knudson, R. (2005) COSMO: A continuous survey for modeling in Oregon. Presented at the **10<sup>th</sup> Transportation Planning Applications Conference**, Portland OR, USA, April 2005.

IBI Group (2002) **City of Calgary – Transportation: 2001 Household Activity Survey: Preliminary Data Expansion and Validation**, . Report prepared for the Transportation Planning Business Unit, City of Calgary, Calgary AB, Canada.

Lockwood, A., Srinivasan, S., and Bhat, C. (2005) Exploratory Analysis of Weekend Activity Patterns in San Francisco Bay Area. Presented at **the 84<sup>th</sup> Annual Meeting of the Transportation Research Board**, Washington, DC, USA, January 2005.

Oregon Department of Transportation (ODOT) (1994) Oregon Travel Behavior Survey. Oregon Department of Transportation, Transportation Planning Analysis Unit (TPAU), Salem OR, USA. Data for Municipal Planning Organizations (MPOs): Portland Metro, Salem/MWVCOG, Eugene/LCOG, Medford/RVCOG.  
[http://www.oregon.gov/ODOT/TD/TP/TMR.shtml#96\\_OR\\_Travel\\_Behavior\\_Surveys](http://www.oregon.gov/ODOT/TD/TP/TMR.shtml#96_OR_Travel_Behavior_Surveys)

Metropolitan Transportation Commission (MTC) (2004) **San Francisco Bay Area Travel Survey 2000 Regional Travel Characteristics Report** Volume 1. Metropolitan Transportation Commission, Oakland, CA, USA.

Transport for London (TfL) (2002) **London Area Transport Survey**  
<http://www.lats.org.uk/overview.htm>