

Executive Summary

Yale University is a centralized educational institution located in downtown New Haven. As an educational institution, Yale's culture is naturally geared towards a more flexible work and academic schedule making it a less intensive traffic generator than other traditional businesses. For example, more than one quarter of Yale's employees and students arrive on campus before 7:30 am and approximately one third leave after 6:00 pm.

More than half of Yale's employee and student population live in New Haven. Of that number almost 56 percent are Yale University commuters who use alternative transportation to campus. Forty two percent (42%) of New Haven commuters use alternative transportation. Nationally 24 percent of the commuters use alternative transportation and Connecticut commuting trends show that approximately 22.3 percent of the population use alternative transportation to work. The high rate of alternative mode use by Yale's employees and students demonstrates the University's commitment to reduce the number of auto trips made by single occupant vehicles (SOVs) into its Campus and to increase trips by high occupancy vehicles (HOVs) such as shuttles, trains, buses, vans, and carpools. In fact, according the November 2007 transportation survey 19 percent of Yale's commuting population use public transit to get to work, leaving their cars at home. Interestingly, of the public-transit commuters, 10 percent selected the Yale Shuttle as their main commute choice. This choice is greater than all the other public transit modes taken together. According to the survey results Yale also has a relatively high bicycle and walk-to-work rate, 5 and 23 percent respectively. Yale's walk rate is nearly twice the New Haven walk rate.

One important program Yale offers employees that support the high walk to work rate and the high percent of employees living in New Haven is the Yale University Homebuyer Program. The program was created 1994 by President Richard C. Levin to encourage employees to invest and live in New Haven. It is reviewed every two years and has had great success in the fourteen years since it began, helping 835 Yale University employees purchase their homes. Yale University's program is the largest and most generous such employer-assisted homeownership program offered by any institution of higher education in the nation.

Yale University's commitment of over \$21 million of its own funds so far to the Homebuyer Program has yielded an investment of more than \$130 million in residential purchases in the city by employee homebuyers. More than 80% of the Yale University homebuyers are first-time homebuyers and nearly half of all participants are minority group members. Realtors report that the program is a factor in making New Haven attractive as a place to buy for both Yale University employees and others.

Incentives like the Yale Homebuyer's Program also support the University's goal to reduce its greenhouse gas emissions to 10 percent below 1990 levels by the year 2020, a 43 percent reduction from mid-2005 levels. In its first year, Yale succeeded in reducing campus greenhouse gas emissions by 6 percent.

However, the overall goal cannot be met without addressing a major source of emissions: the vehicles students and employees drive to campus. In February of 2007, in an effort to meet the University's goal of reducing its greenhouse gas emissions, and to reduce demand for the construction of new parking, the University finalized its Sustainable Transportation Program. At the end of April, a Director of Sustainable Transportation Systems was hired to implement programs and incentives that encourage use of sustainable transportation modes.

The Yale Sustainable Transportation Program serves as an information clearinghouse for commuters, and currently provides the following incentives for using sustainable modes of transportation:

- Carpool and vanpool matching services
- Pre-tax savings on monthly transit expenses
- Discounted parking permits for carpool and vanpool participants
- A Guaranteed Ride Home Program for people who use transit, carpool or vanpool
- Three free one-day parking permits per month for people who use transit, carpool or vanpool
- Discounted Zipcar membership
- Free use of the Yale Shuttle

More initiatives will be added to the menu of transportation offerings as the Sustainable Transportation Program tailors initiatives to the needs of the Yale population based on the results of the 2007 Yale Transportation Survey.

With all efforts taken together and including Yale's intense promotion of a greener campus through the Yale Green Campus Initiative, the University is clearly acting responsibly to improve the quality of life within the community of New Haven.

Section I. Overview of Survey Process

A campus wide transportation survey was created to provide Yale University with an accurate baseline assessment of Yale's current transportation and parking initiatives and how Yale's current population commutes to campus. The results from the survey not only constitute a base line for the Yale Campus to measure progress against itself but also in comparison to other similar institutions. In addition, the data lends support for implementing programs and initiatives that will help increase the use of alternative modes to driving alone and provide direction for new transportation initiatives. The survey results can be used to establish a base line for measuring the success of Yale's Sustainable Transportation Programs on an annual basis, and as a benchmark to measure against its peers.

The "Yale Transportation Survey" was conducted primarily online, but it was also distributed in paper form to those employees who do not have regular internet access at work. These employees received the survey from their Department supervisors. The survey asked questions of faculty, staff, and graduate students about the commute modes they used to get to campus the week of October 29 – November 2, 2007. Yale's survey was four pages with 31 questions, many open ended for individual responses. The survey was available online through November 12. Paper surveys were completed by November 21.

The survey used a stratified random-sample methodology that followed a process developed by the Environmental Protection Agency (EPA) that outlines the regulatory requirements and the process for states to follow that have a mandatory (or chose a voluntary) status for meeting Air Quality requirements. Non compliant states are required to identify employers of 250 or more employees to measure their annual progress toward reducing drive alone commute trips (DACTs) using an annual survey.

The method used to determine Yale's sample size also followed the Environmental Protection Agency's guidelines for states. The sample 997 falls into the category for 15,000 to 19,999 which corresponded to Yale's 19,914 commuting graduate students and employees. Of the 19,914 full time commuting employees and students who either work or attend class during the day, the student population represented 30.8 percent or 6,143 and employees represented 69.8 or 13,771.

Using a random skip interval of applicable employees and students in the following stratified categories selected by the Office of Human Resources, four separate sample survey tracts were constructed. The categories and numbers are represented in the chart below.

Employee and Student Category Chart 2007

Category	Total Number	Total Percent	Sample Size 997	Sample Returns	Sample Percent
Students	6,143	30.85	308	312	31.29
Faulty	3,436	17.25	172	159	15.95
Postdoc	1,556	7.81	78	78	7.82
Clerical & Technical	3,441	17.28	172	177	17.75
Managerial & Professional	4,157	20.87	208	212	21.26
Service & Maintenance	11,181	5.93	59	59	5.92
Total	19,914	99.99	997	997	99.99

Sample returns reflect only the first survey responses up to the goal number in each category. The target response rate for completed surveys was 997. The response rate was met in 5 out of the 6 categories. Only the category of Faculty was slightly below its target of 17.25% at 15.95%. To make up the sample goal for Faculty additional employee responses were added.

The survey provided both quantitative data for the establishing a baseline for commuting to the campus and qualitative data for Yale to use as supportive information for implementing additional campus-wide transportation demand measures (TDM). The first 18 questions were required making every respondent answer the question, with the exception of Questions #3 (gender) and # 7 (age) which were optional. Question 18 was the dividing question for those who answered “they drove alone to campus one or more days a week” and those respondents that used alternatives. The respondents that selected all five days or one to five days went on to a the second part of the online survey expressly designed for collecting information about survey participants in the sample who drive alone to campus. Respondents who used “only” alternatives ended the survey at Question 18.

In the combined employee and student results 37.11 percent indicated they drive alone all 5 days to campus and 19.16 percent drive alone 1 – 4 days a week. Therefore of the 997 total in the sample only 561 respondents who drive alone some or all of the time went onto the second part of the survey. Since Questions 19 though 31 were not required not all 561 answered every question. In addition, this section was designed for gathering opinions about possibilities for changing commute behavior (from SOV to alternatives); many of the questions were multiple-choice where each respondent could select multiple options or answers.

The high rate of return was due to careful monitoring and tracking of surveys sent and returned. Also, distributing the survey over time increased the likelihood of catching an employee or student at their computer during different times of the day and different days of the week.

Section III. Baseline Trips and Mode Split Process

Data results from survey question # 9 “Please indicate how you commuted to campus each day LAST week, Oct. 29 – Nov.2, 2007”, was totaled for each day by 15 different commute methods. The data was then totaled by trips per week for each mode and summarized into the commute trips chart provided below. To arrive at the total trips by all employees and students, the total number of Yale’s 19,914 employees and graduate students was multiplied by the number of days in the work/class week or 5 days. The result equaled 99,570 estimated total numbers of trips taken by all commuters at the University. Respondents who were not on campus are not counted in the trip chart below.

Commute Trips to Whole Chart

Commute mode for Yale University	Column I	÷	Column II	=	Column III	x	Column IV	=	Column V
	# of trips in mode taken by employees and students in the sample		Total # trips taken by a employees and students in sample		Proportion of trips taken in mode by employees and students in sample		Estimated total # of trips taken by <u>all</u> employees and students at facility		Estimated total # of trips in mode taken by <u>all</u> employees at facility
Total # of drive-alone trips	2076	÷	4,674	=	.44	x	99,570	=	44,224.93
Carpool	289	÷	4,674	=	.06	x	99,570	=	6,156.55
Vanpool	5	÷	4,674	=	.00	x	99,570	=	106.51
Public transit	893	÷	4,674	=	.19	x	99,570	=	19,023.54
Bicycle	250	÷	4,674	=	.05	x	99,570	=	5325.74
Walk	1,093	÷	4,674	=	.23	x	99,570	=	23,284.13
Other	68		4,674		.01		99,570		1448.60
TOTAL	4,674								99,570

A carpool carries 2 to 6 passengers, including the driver. A vanpool carries 7 or more passengers. Public transit includes the Yale Shuttle, Shore Line East and Metro North Trains, CTTransit Bus and Amtrak

When rounded for Yale’s base year 2007, a total of 99,572 commuting trips were made to the campus using basic of modes of transportation. The proportion of trips listed in Column III was extracted for use as a summary of overall commute results and they are represented in the column “Commute mode for Yale University” by generalized mode labels. These two columns can be referenced for future comparison to both Yale’s progress toward reducing Single Occupant Vehicle (SOV) trips and to other institutions.

However, when comparing the base modal split to another institution or to itself in a future survey, the comparisons should take into consideration the survey method applied, the response rate and population representation, and the corresponding parking costs, supply of and demand for parking, and the availability and accessibility of public transit. All factors that may have an impact of mode split must be put in a current year context for comparison for each additional survey year. Although these factors are the most important ones that can influence the numbers, there are other factors that should be included such as the TDM incentives and disincentives available and at what cost to the

employees (and students). It is also important to keep in mind that the lower the SOV rate, especially when it is below 50 percent (50%), the more difficult it is to achieve reductions.

Section IV. Overview of Survey Results

Background Information

Gender and Age: Although the gender and age questions were optional, 98.6 percent and 97.5 percent respectively.

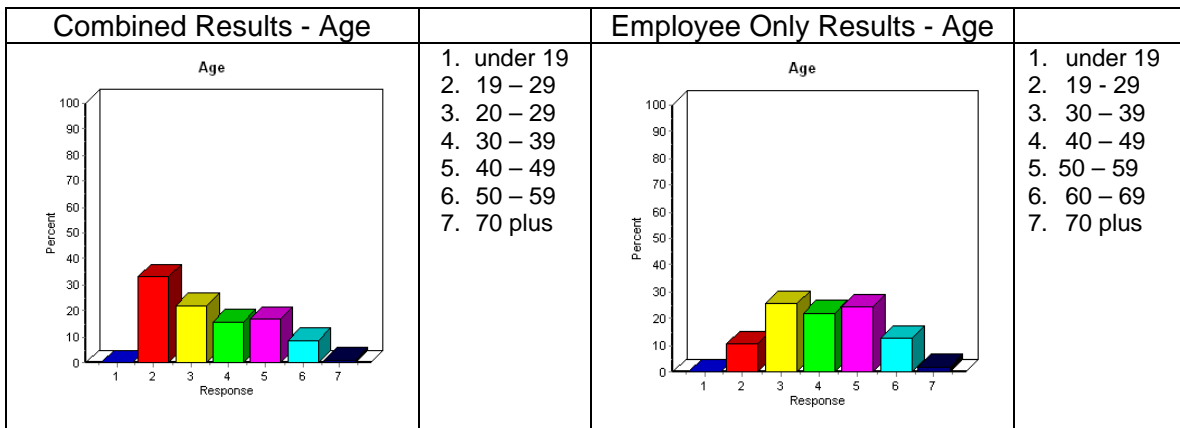
Gender Combined: Of the total respondents that voluntarily answered, approximately 58.5 percent were female and 40 percent male.

Employees-Only: With the student population removed from the survey results, female employees made up 60.2 percent of the responses, and 38.4 were male employees. The results indicate that there were slightly more female returns in the employee-only results compared to the combined results.

General Census for Gender: According to the New Haven Census Bureau's Population Estimates for 2006, employed females make up 31% the population. Yale's survey responses for women were double the general population of New Haven.

Age Combined: In the combined survey results, the 19 - 29 - age category ranked number one at 32.9 percent, followed by 30 - 39 at 21.9 percent, then skipped to the 50-59 age category at approximately 17 percent, closely followed by 40 - 49 at 15.8 percent.

Age Employees-Only: For employees-only the age categories shifted from the 19 -29 category up slightly to the 30 – 39 category (25.69%), then skipped over 40 - 49 category to 50 - 59 (24.38%) or second place, then dropped slightly to the 40 - 49 -age category at 22.04 percent. The changes in percents for employees-only follow what would be assumed would be the case with the removal of the students who would be representatively younger.



Town: Slightly more than half (52.3%) of all respondents live in New Haven followed by the surrounding towns of Hamden, Branford and East Haven at 9.2 percent, 4.7 percent and,

3.5 percent respectively. When student responses were removed, approximately one third (32.99%) of the employee population live in New Haven followed by the surrounding towns of Hamden (12.85%), Branford (6.57%), and East Haven (4.82%).

It is interesting to note that according to the January 2008 parking permit data, 59 percent of all permit holders live in New Haven or one of the six contiguous towns. The parking data included students and employees.

Primary Site Combined: Of the total sample responding 35.7 percent worked or attended class at the Central/Old Campus, with a close second or 32.4 percent at the School of Medicine, then almost halving to 15.6 percent at the Science Hill/Divinity, and dropping sharply to 2.5 percent at the School of Nursing, followed closely by 1.3% at the Payne Whitney Gym/YPD. More than 12 % of the respondents marked other, however a majority of the written in sites could have been assumed in the above sites.

Employee-Only: When factoring for employee only results, the top two sites changed positions, with 39.42 percent reporting the School of Medicine as their primary site, followed by 34.74 at Central/Old Campus, then dropping to 10.95 at the Science Hill/Divinity with “other” increasing to 12.46 percent. After reviewing the written “other” choice, it was again determined that most could have been assumed under the sites already supplied.

Town Summary

Yale’s faculty and staff and students live predominantly in greater New Haven, 52.3 percent (all neighborhoods). According to the survey results 55 percent of employees and students live within 1 to 10 miles of the Yale campus. This is supported by Yale’s high walk-to-work and bicycle commuting rates.

Yale’s employees have a slightly different pattern, 32.4 percent live in New Haven.

Combined Results	Number	Percent	Employee-Only Results	Number	Percent
New Haven	532	53.4%	New Haven	222	32.4%
Hamden	92	9.2%	Hamden	88	12.8%
Branford	47	4.7%	Branford	45	6.6%
East Haven	35	3.5%	East Haven	33	4.8%
West Hartford	28	2.8%	North Haven	31	4.5%
Guilford	24	2.4%	West Haven	24	3.5%
Wallingford	21	2.1%	Guilford	23	3.4%
Madison	20	2.0%	Wallingford	21	3.1%
Milford	17	1.7%	Madison	19	2.8%
Woodbridge	15	1.5%	Milford	17	2.5%
North Branford	11	1.1%	Woodbridge	15	2.2%
			North Branford	11	1.6%

The Commute

Commute Trips and Mode: National industry standards cited by the Environmental Protection Agency (EPA), note that although TDM programs are very important to reducing reliance on single occupant vehicles few produce more than a 15 percent net shift away from driving alone. In Yale’s case, and according to the recent survey, 44 percent of all commuting trips to campus were single occupant vehicle (SOV), with 6

percent using a form of rideshare. Taken together, approximately 50 percent of the trips to campus are in a vehicle 1 – 5 days per week. Nineteen percent (19%) of all commuters use public transit and of the 19 percent 10 percent use the Yale shuttle as their main commute mode; 5 percent bike, 23 percent walk, and 1 percent telecommute or work from home.

In comparison, employees' commutes represent the following breakdown: 58 percent in SOVs, with 8 percent ridesharing raising the total vehicle trips to campus to 66 percent 1 – 5 days per week. Interestingly, 19 percent still use public transit with 7.7 percent using the Yale Shuttle as their main commute mode, however, only 2 percent bicycle, and 9 percent walk, and 2 percent telecommute.

Combined Results			Employee- Only Results		
Percent	Mode	Rounded	Percent	Mode	Rounded
Extrapolated Mode		44%	Extrapolated Mode		58%
Yale 2007		6%	Yale 2007		8%
	SOV	19%		SOV	19%
	RS	5%		RS	2%
	PT	23%		PT	9%
	BK	1%		BK	4%
	WK			WK	
	Telecommute			Telecommute	

Using the National standard of a 15 percent shift, Yale would have to reduce from a combined 44 percent SOV rate to a 29 percent SOV rate. Accomplishing this reduction with Yale's relatively low SOV rate with out implementing rather drastic measures is unlikely. A more attainable goal might be a 2 percent decrease in SOVs over the next year. A 2 percent reduction in the current SOV rate translates into an estimated 88 solo drivers (employee and student). However, in order to accomplish even a 2 percent reduction goal, additional incentives to help employees and students switch to other alternative modes need to be implemented in tandem with upgrading the current incentives that are offered. Programs and incentives should match the level of interest (How likely would you change") indicated in the survey results from those who drive alone to campus.

To achieve a higher percent reduction than 2 percent, a cap on the amount of new parking spaces being built would be an important added measure that could push the "somewhat likely" into action as well. Also, if new spaces are tied proportionally to the number of new employees based on the current modal split as reflected in the November 2007 baseline survey, then the base number of new parking spaces would follow the percent per mode to the new employees. For example: 100 new employees, 58% SOV = 58 employees would be SOV, 19 employees would take some form of public transit, 8 would rideshare, etc. Depending on what is projected for future expansion, the modal numbers can be of use in maintaining a flat SOV rate.

Vehicle Type and Average Miles per gallon: Recently the AAA reported that the 2007 national composite average cost per-mile was 52.2 cents. The estimate was based on average fuel routine maintenance, tires, insurance, license and registration, loan finance charges and depreciation costs. Fuel prices were based on late 2006 national averages (\$2.256), so it reflects a lower cost compared to the skyrocketing cost of gasoline in 2007. The AAA also does a detailed break down by miles drive and vehicle type. The chart below shows the cost by vehicle type.

2006 Vehicle	10,000 mi/yr	15,000 mi/yr	20,000 mi/yr
Small Sedan	50.5 cents	41.4 cents	37.4 cents
Med. Sedan	61.8 cents	52.5 cents	48.2 cents
Large Sedan	74.2 cents	62.5 cents	56.8 cents
4WD Sport Utility	81.5 cents	66.6 cents	59.6 cents
Mini Van	69.2 cents	57.6 cents	52.2 cents

AAA defines the vehicle categories as follows:

Small Sedan: Chevrolet Cobalt, Ford Focus, Honda Civic, Nissan Sentra and Toyota Corolla.

Medium Sedan: Chevrolet Impala, Ford Fusion, Honda Accord, Nissan Altima and Toyota Camry.

Large Sedan: Buick Lucerne, Chrysler 300, Ford Five Hundred, Nissan Maxima and Toyota Avalon.

The 2007 Yale Transportation survey asked a variety of vehicle questions including:

“What type of car do you commute in?”

Hybrid/Alternative fueled

Small economy

Mid-sized

Full-sized/luxury

Sport utility or truck

“What is your vehicles gas mileage? “

“If you do not know, (then) what is the Model year, Model name and Manufacturer?”

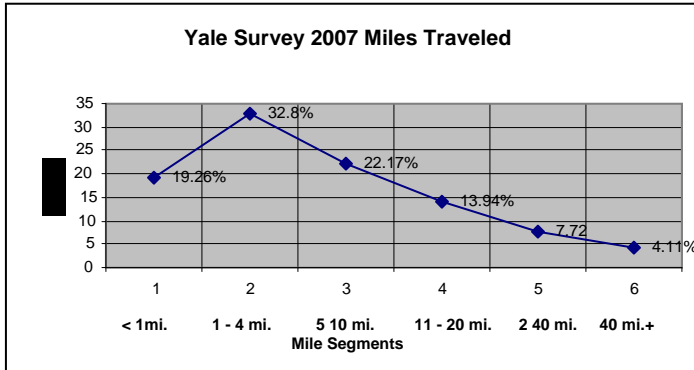
The purpose of the vehicle questions was to collect data to estimate the effect of commuter transportation on green house gas emissions.

Combined Results: According to the survey, of all respondents that drove to campus:
21.2 percent drove a mid-size vehicle,
18.8 percent drove a small economy vehicle,
9.4 percent drove a sport utility or truck, and
1.7 percent drove a Hybrid/alternative fueled vehicle to campus.

Employee-Only Results: In comparison to all or the combined responses, employee responses indicated that:
25.84 percent of employees drove a mid-sized car,
18.8 percent drove a small economy car,
12.85 percent drove a sport utility or truck, and
2.04 percent drove a Hybrid/ alternative fueled vehicle to campus.

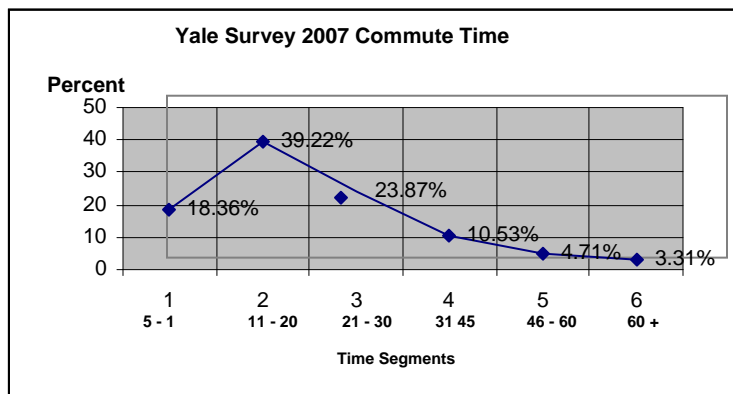
Miles Per-Gallon: The average miles per-gallon was the same, 25 mpg, for the combined results (employees and students) and employee only results (of everyone that drove to campus and responded to the vehicle questions). The average miles per gallon for the survey only captured the actual miles traveled, not the cost of what the SOV commuter really pays to drive his or her car as noted previously. According to AAA calculations the average cost per year for a person driving a medium sedan 15,000 miles a year will cost \$9,641 not including loan payments. None of the calculations take into consideration the cost of parking.

Miles Traveled (one way) Employees-Only: More than two thirds, (65.12%) of employees commute up to 10 miles (one way) with 30.7 percent employees traveling 5 -10 miles, 26.7 percent 1 – 4 miles, and 7.7 percent travel less than a mile. Another way to look at this is to say that more than a third (34.4 %) of Yale’s employees live-within walking and bicycling distance from the campus.



Even though Yale’s walking and bicycling mode rate is relatively high, 23 and 5 percent respectively, there is definitely room for improvement. Comparing the walk/bike results to the number of Yale parkers that live in New Haven, it would seem as though shifting even 2 percent of the 88 parkers to bicycling and/or walking may be an achievable short term goal. Using the mode split percents from the Mode Chart on page 8, 2 percent of 88 parkers would equal 1.8 or 2 SOVs that could be targeted to switch to bicycling, and 9 percent of 88 would equal 7.9 or 8 SOVs that could be targeted to switch to walking.

Travel Time (one way) Employees-Only: The mean travel time to work in 2000 for the USA was 25.5 minutes, for Connecticut it was 24.4, for New Haven it was 23.2. According to the survey results, 47.44 percent of employees commute only 5 to 20 minutes (one way) supporting the fact that employees travel a relatively short distance to work. An additional 28.61 percent commute only 21-30 minutes.



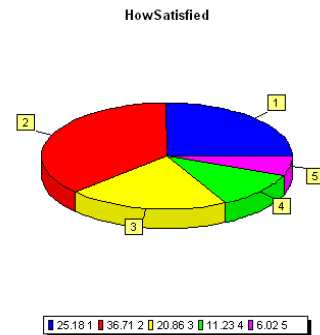
Arrival and Departure Combined: 46.44 percent of all respondents arrive at their campus destination during the commonly known peak hour of 8 am to 9 am, with 36.91 percent leaving during the corresponding peak hour of 5 pm to 6 pm.

Employees-Only: When employee results are separated, 48.9 percent arrive during 8 am and 9 am, with 42.92 percent leaving during the corresponding peak hour of 5 pm to 6 pm.

	<p>1 = before 6 am 2 = 6 -7 am Etc.</p>		<p>1 = before 4 pm 2 = 4 - 4:30 pm Etc.</p>
<p>Employee-Only Arrive Times</p>		<p>Employee-Only Leave Times</p>	

More than 40 percent of Yale’s workforce arrives and departs during peak hours, thus for those parker who arrive and leave during peak hours and who live near a transit stop (any transit type) could be targeted for recruitment into public transit (including the Yale Shuttle). According to the survey results, 19 percent of Yale’s population takes public transit, therefore following the example for walking and biking above and using the mode split for transit, of the 88 parkers 16.72 or 16 could be targeted to switch to transit.

Satisfaction: One quarter of the respondents are “very satisfied” (1) with their commute, with only 6% dissatisfied (5). The majority or 68.8% of respondents fall somewhere in-between (2 -4).



Employee results follow a similar response as the combined results: 27 percent of employees are “very satisfied” (1), similarly only 6 percent are dissatisfied (5) and 67 percent fall somewhere in-between (2 – 4). On average, the majority of employees and students are mostly satisfied with their current commute.

Weather: Even though the survey was conducted in late fall, almost three-fourths (73.4%) of all the respondents and more than 80 percent of employees would not change their commute just because of weather or season.

Safety After Dark: Slightly over half of all the respondents (58%) feel safe on campus after dark and 62.34 percent of employee respondents feel safe after dark.

Driving to Campus

The following results are from respondents that answered Question #18 with either, 5 days a week, or 1 – 4 days a week. For the entire sample (997), 37.11 percent of the respondents said they drove alone all 5 days during survey week and 19.16 percent drove 1 – 4 days totaling 56.27 percent. 43.73 percent do not drive alone at all. Therefore, the total number of all possible respondents that went on to answer questions #19 - # 31 was 561 or 56.27%.

According to the extrapolated employee only sample, 685 employees, 50.8 percent drove alone all 5 days, and 16.35 drove 1 – 4 days a week totaling 67.15 percent and 32.85 percent of employees use alternative transportation. Therefore, the total number of all possible employee respondents that went on to answer questions #19 - # 31 was 460.

Questions #19 - # 31 were not required therefore not all respondents answered all the questions. However, it can be surmised that those who took the time to answer the questions were slightly more motivated to consider changing commute behavior.

How often do you drive alone to campus?

Combined 997	Frequency	Percent	Employee 685	Frequency	Percent
5 day/wk	370	37.11	5 day/wk	348	50.80
1 – 4 days	191	19.16	1 – 4 days	112	16.35
NA	436	43.73	NA	225	32.85

Drive Alone Reasons: For all respondents, the top 5 reasons for driving to campus are: 1. Hours on campus are irregular (21.5%); 2. Need car for errands or appointments (18.9%); 3. Driving alone takes less time (18.5%); 4. Public transit doesn't work for me (17.3%); and 5. Need car in case of emergencies (13.7%).

For employees only the top 5 reasons are: "Hours are irregular" and "Need car for errands" at 24.2 percent each (tied for 1st place), followed by 2) "Public transit doesn't work for me" (21.5%), 3) "Driving alone takes less time" (21.2%), 4) "Need car in case of emergencies" (19.6), and 5) "Enjoy my privacy" (15.3).

What are your reasons for driving alone? Top five ranked

Combined Results	Rank and Percent	Employee Results	Rank and Percent
Hours on campus are irregular	1 21.5%	Hours on campus are irregular and Need car for errands or appointments	1 24.2 %
Need car for errands or appointments	2 18.9%	Public transit doesn't work for me	2 21.5%
Driving alone takes less time	3 18.5%	Driving alone takes less time	3 21.2%
Public transit doesn't work for me	4 17.3%	Need car in case of emergencies	4 19.6%
Need car in case of emergencies	5 13.7%	Enjoy my privacy, prefer to drive alone	5 15.3%

How likely to change: The top 3 "Very Likely" alternatives that would encourage respondents who drive alone are: 1) "Additional Yale Shuttle stops" (12.2%); 2) "More frequency on the Yale Shuttle" (11.3%); and 3) "Preferential parking for vanpools and carpools" (10.4%). Taken together, the two Yale Shuttle choices for trying an alternative equaled 23.5%, or the top alternative.

After removing student responses, employees also selected "Additional Yale Shuttle stops" (11.7%) as their as number one choice followed by "Flexible hours to accommodate transit, carpool or vanpool schedule (11.5%) and closely followed by "Preferential parking for carpools and vanpool (11.2%).

How likely is it that you would try an alternative commute option? if it were available? Top five ranked

Combined Results	Rank and Percent	Employee Results	Rank and Percent
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Additional Yale Shuttle stops	1 12.24%	Additional Yale Shuttle stops	1 11.68 %
More frequency on the Yale shuttle	2 11.33%	Flexible hours to accommodate transit, carpool or vanpool schedule	2 11.53%
Preferential parking for carpools and vanpools	3 10.43%	Preferential parking for carpools and vanpools	3 11.24%
Flexible hours to accommodate transit, carpool or vanpool schedule	4 9.13%	More frequency on the Yale shuttle	4 8.91%
Subsidy or other financial benefit for employees who walk for bicycle to work	5 7.32%	Additional savings on the cost of a train pass	5 7.01%

Parking

Parking at the University is limited, and spaces are allocated on a first-come first-served basis. Employees who must bring a car to campus may pay to park in a Yale garage, a Yale surface lot, or in private sector parking.

The parking services do not include the Yale Bowl athletic areas, revenue-producing leased parking lots and areas outside of New Haven.

Parking of vehicles is permitted only in designated YPS lots, areas specifically marked with signs or surface markings, or areas into which drivers may be directed by parking enforcement personnel on special occasions. Bicycles may be parked in areas specifically designated for bicycle parking. Motorized two-wheeled vehicles may park free in unlined corners of parking lots, or (for a fee) in the Pierson-Sage student garage.

The Yale Parking Service cooperates fully with the City of New Haven in parking matters. Members of the Yale community are asked to recognize the problems facing New Haven in matters of parking. Parking and Transit urges close adherence to both Yale and City of New Haven parking regulations at all times.

Parking has not only an environmental impact, but also a financial cost to the university. As demand for parking increases, new parking spaces will be needed. (There is already a waiting list for parking that is close to campus.) Taking into account current construction costs, if a new underground parking garage were to be built, the price tag could be as high as \$42 million for only 350 spaces, or \$120,000 apiece. To begin to catalogue what incentives might be used to persuade some of the employees to switch from parking to other alternatives, a variety of questions were asked in the survey to collect qualitative data for target marketing. The following are the summary results of the questions.

Pay to park: 28.6 percent of all respondents who drive pay to park in a Yale lot or garage, however, 18.5 percent park somewhere else, followed by 9.6 percent who pay to park at a non-Yale lot or garage. More than half of the drive alone respondents did not answer this question.

When student responses were removed, the employee results revealed the same pattern, 37.4 percent of employees pay to park in a Yale lot or garage, 16.6 percent park somewhere else, and 12.6 percent pay to park at a non-Yale lot or garage. However, the second choice for both employees and students was finding a place to park “somewhere else”. Actual parking records account for 5,813 parking permits for employees as of

January 2008, so the survey is quite accurate in reflecting the “somewhere else” population. Extrapolated to the whole, approximately 55% (includes “other mode” written answers) or 7,541 of all employees drive to campus, of which 12.6 % or 1728 say they park in a non-Yale garage or lot, and 16.6% or 1,251 say they park “somewhere else “. This raises the question: “Where is somewhere else?” and does the latter number represent an unmet demand? Could the “somewhere else” parking population be converted to parking off campus? The following results give some insight to this possibility.

Park off campus: According to the results for all respondents, 23.5 percent would park off campus if it cost less than they now pay, 25.7 percent would park off campus if it were served by an express shuttle, and 26.9 percent would park off campus if there was a lot located on route. On average, a quarter of all respondents would entertain some form of parking off campus, however slightly more than half of the respondents who drove alone did not answer the question.

Employee results followed the same pattern: 29.8 percent would park off campus if it cost less than they now pay, 32 percent would park off campus if it were served by an express shuttle, and 33.6 percent would park off campus if there was a lot located on route. However on average, almost one third (31.8%) of employee respondents would entertain some form of parking off campus, indicating that employees are more amenable to off-site parking than students.

Pay more if closer: Of all respondents, only 8.9 percent would pay more for parking if it was closer to their campus destination (46.2% did not answer the question). Employee only results indicated that slightly more or 10.5 percent would pay more if it was closer to their campus destination.

Travel Among Campuses

48.6 percent of all respondents travel among the various campus locations and 42.9 percent of employees travel among campuses. The breakdown between all respondents and employee respondents is shown in the chart below.

Combined	Frequency	Percent		Employees	Frequency	Percent	
Yes travel	484	48.55		Yes travel	294	42.92	
Do not travel	513	51.45		Do not travel	391	57.08	
2 times/ day	94	9.43		2 times/ day	45	6.57	
1 time/day	71	7.12		1 time/day	39	5.69	
2-4 times/wk	155	15.55		2-4 times/wk	83	12.12	
1 time/wk	105	10.53		1 time/wk	73	10.66	
Once/month	123	12.34		Once/month	106	15.47	
Walk	224	22.47		Walk	121	17.66	
Bicycle	48	4.81		Bicycle	4	0.58	
Shuttle	160	16.05		Shuttle	34	4.96	
My vehicle	118	11.84		My vehicle	60	8.76	
Dept. vehicle	10	1.0		Dept. vehicle	14	2.04	
CTT Bus	2	.2		CTT Bus	1	0.15	
Carpool	13	1.3		Carpool	1	0.15	

Knowledge of TDM programs offered at Yale

Results of employee respondents who drive alone to campus indicated that:

- 44.4 percent do NOT know that Yale offered three free 1-day parking permits/month to registered carpoolers and transit riders,
- 46 percent do NOT know there was a Guaranteed Ride Home program for employees registered for car/vanpools or transit, and
- 46 percent do NOT know that there was a pre-tax savings to employees who use transit.

Clearly there is a need for a larger more targeted marketing effort to educate the employee population to incentives already in place.

Section V. Demand Management Program

Yale University is an urban campus that is located in a neighborhood of New Haven. The University is “committed to increasing mobility and accessibility at Yale through long-term practices that minimize private vehicle use and capital investment in parking while expanding investment and provision of more environmentally and economically sound transportation options.”¹

Yale University employees and students have a variety of bus and train options available to them for commuting purposes depending on where they live and what time they work or go to class. The following is a description of the current TDM programs and initiatives that are offered through the Sustainable Transportation Program/Initiative.

Public Transit

Existing transit options available to the Yale community include: CTT Transit Bus, Shore Line East Train, MetroNorth Train and the Amtrak Train. For an additional cost, The CTT bus (Commuter Connection) offers direct service from Union and State Street Stations going directly to the campus. The J Bus also serves Union Station going to various parts of the campus.

While the various trains reach a population that live in the surround suburbs, the train stations are not easily accessible for those who walk or bicycle. Many of Yale’s employees who live farther from campus indicated that “Public transit doesn’t work for me” as their number 2 choice for why they drive alone to work. This could be an indication of work hours that do not correspond with transit schedules, inadequate parking facilities at transit stations and/or employees who are not within walking distance of stations and the fact that the train stations are not within walking distance of Yale.

¹ Yale University Transportation Policy Committee. *Fall 2006 TDM Implementation Roadmap*. August 28, 2006. Yale University, New Haven, CT.

However, according to the survey results, 2.8 percent of employees commute by the Shore line East Train, 1.2 percent commute by MetroNorth Train, .4 percent by Amtrak. 3.4 percent commute using the CTTransit Bus.

When employees were asked what alternative option would “likely” get them to try an alternative commute, 7 percent indicated that “if it were available”, “additional savings on the cost of a train pass” would “Very Likely” try train. This option was ranked number 5 out of 17 options. Below are some of the written comments received.

- If parking were available in at the Fairfield Train Station, train commuting would be an attractive option.
- I would prefer a bus route with a stop closer to campus.
- I would take the bus more often if it was more regular and ran later in the evening.

Commuter Parking & Mass Transit (“Transportation Benefit Plan”)

This plan allows paying for mass transit or (non-Yale) commuter parking with a pre-tax payroll reduction. Flexible spending accounts can be set up to manage pre-tax payroll reductions for non-Yale commuter parking and mass transit.

Federal law allows enrolled employees to pay for certain work-related transportation and parking expenses with pre-tax dollars by lowering taxable income by a designated amount specifically set aside for these expenses. Employees may designate up to \$185.00 per month for work-related parking at non-Yale lots and up to \$100.00 per month for work-related mass transit/vanpool expenses. Funds may be set aside for either or both programs.

Web Site: <http://www.yale.edu/parkingandtransit/parking/Rates1.htm>

Off-Campus Commuting Options

- AMTRAK (800) USARAIL
- Connecticut Transit (203) 624-0151
- DATTCO (800) 229-4879
(Hartford – New Haven Express Bus)
- Greyhound Bus Lines (203) 772-2470
- Metro-North Rail Service (800) 638-7646
- New Haven Bus Co. (203) 934-6600
- Northeast Trans. Co. (203) 753-2538
(Waterbury Bus)
- Rideworks (203) 777-RIDE
(Commuter Ridesharing Assistance)
- Shore Line East Rail Serv. (800) ALL-RIDE
- Valley Transit (203) 735-6824
(Naugatuck Valley Bus)

Shuttles

Yale has an extensive shuttle system that is free to the University community, and the shuttles' locations can be viewed in real time at <<http://www.yale.transloc-inc.com/>>.

Sixty four percent (64%) of the employee respondents drive alone to work, and 7.7 percent of employee respondents use the shuttle as their main commute mode to work.

Currently the Yale Shuttle only serves the New Haven zip codes 06511 and 06510. According to the employee survey results, 32.4 percent of respondents indicated they live in New Haven listing zip codes as 06510, 06511, 06512, 06513, 06515, and 06519. In some cases the same town name would have different zip codes. Therefore linking town to zip became a problem.

When factoring for just the zip codes 06511 and 06510 with their Town labeled as New Haven, 72 percent of the total of 32.4 percent wrote in the zip code 06511, and 4.5 percent wrote in 06510. Of those employees, 8.6 percent said their zip code was either 06511 or 06510 with almost all in 06511.

When factoring for employees who drive alone 1 to 5 days a week in just the two Shuttle zip codes, 15.8 percent indicated they would "Very Likely" try the Shuttle if it had additional stops and corresponding to this, 13.2 percent would "Very Likely" try the Shuttle if it were more frequent. Extrapolated to the whole, there is a potential of 126 employees who would very likely try the shuttle.

The following are some comments from respondents:

- Yale shuttle needs to make scheduled trips to West of campus.
- Yale Shuttle should run in Fair Haven and part of New Haven also.
- The shuttle should run at least every 30 minutes from the train station to Yale.
- Regular shuttle stops before 6PM.
- Bike racks on shuttles would help.

Going forward, it would be helpful to know what zip codes constitute New Haven, and what zip codes are contiguous to the current shuttle routes.

As an incentive to use the Yale Shuttle the service is free with a Yale Identification card. Shuttle schedules & routes can be accessed via the website or they are available at the Parking and Transit services office. *One of Yale's shuttle buses is run on fuel from recycled cooking oil from Yale's very own mess halls.*

Daytime Shuttle: This free service provides transportation to and from key locations in and around campus. The "daytime" shuttle runs from 7:20am-6:00pm Monday – Friday.

Nighttime Minibus Shuttle: This free service provides transportation to and from key locations in and around campus. The "nighttime" shuttle runs from 6:30pm – 7:00am Monday – Friday. It also offers a call service after 1:00 am from Union Station to Yale University.

Special Services Van: Transportation service for the permanently or temporarily disabled. This service runs 24 hrs. /day, Monday-Friday. No daytime service on week-ends, Sat. & Sun. 6:00pm – 7:30 am.

Carpool Incentives

Carpooling significantly reduces parking and gas costs. Two person carpools receive a discount of 60% off the annual parking permit fee. Three or more person carpools receive a discount of 75%. Employees that cannot carpool everyday can receive up to three free one-day permits per month for days when carpooling isn't possible.

Vanpool incentives

Vanpooling is a cost effective alternative for your daily commute, since vanpool members share the cost of the commute. You can enjoy the convenience of sharing a ride to work with others together in a friendly environment.

To obtain a list of existing vanpools please contact Rideworks at 1-800-ALL RIDE (255-7433), or visit <www.rideworks.com/rwvp.htm>.

Employees can ride most vanpools on a full-time or occasional basis, whichever fits your schedule. Full-time passengers have reserved seats and ride on a month-to-month basis. Occasional passengers ride on a space-available basis and pay a set fee per trip. And if you're the driver, you get free use of the van after-hours!

Emergency Ride Home Program

In case of emergency carpools and vanpoolers can take advantage of a FREE Guaranteed Ride Home program. For more information, please visit <http://www.yale.edu/parkingandtransit/alternatives/Carpooling.htm>

Other Ridesharing Incentives

Yale University supplies information on other commuting alternatives in and around the campus such as:

Rideshare is a non-profit organization that helps Connecticut commuters find ways of sharing a ride to work. A link to their website will help you connect with others that are looking to carpool.

Easy Street is a state wide commuter van service sponsored by the Connecticut DOT and operated by Rideshare. The service is designed to help people who live or work in Connecticut get to their jobs by providing 300 routes daily and transporting 3000 riders. A link to their website will help you connect with others that are looking to carpool.

Zipcar

Zipcars are for employees and graduate students at Yale who need regular 24-hour access to a vehicle, and are particularly good for employees who leave their car at home. Zipcars are available for use by members for as little as one hour—or as long as they need it. Yale employees can access a car whenever they want without the hassles of owning one. Benefits to Yale employees include:

- On-site 24-hour access to cars.
- Use of car for as little as one hour

- Access to other Zipcars in
- Efficient use of on-site parking (each vehicle replaces three to four private vehicles).
- Compelling environmental benefit.
- On-line reservation and smart card access eliminate annoying and time consuming paperwork of traditional car-rental agencies (or leasing).
- Car use can be billed to specific accounts or cost-centers.
- Hassle Free Program: Zipcar handles all customer service issues. Cars are fully insured.

The Zipcar program compliments the use of alternative transportation and encourages commuters to leave their car at home because it provides extra mobility during the day. Yale is in the planning stages with Zipcar to increase on campus parking for Zipcars. Faculty, staff and students, over 21, can be a member of Yale's Corporate Zipcar program.

Section VI. Recommendations

Yale Shuttle

The November 2007 transportation survey indicated that 19 percent of Yale's commuting population use public transit to get to work and of that percent 10 percent selected the Yale Shuttle as their main commute choice. As noted previously, this particular mode choice is greater than all the other public transit modes delineated in the question.

When factoring for employees who drive alone 1 to 5 days a week in just the two Shuttle zip codes, 15.8 percent indicated they would "Very Likely" try the Shuttle if it had additional stops and corresponding to this, 13.2 percent would "Very Likely" try the Shuttle if it were more frequent. Extrapolated to the whole, there is a potential of 126 employees who would very likely try the shuttle.

The Yale Shuttle is the most frequently used mode of transit among Yale faculty and staff. Based on survey data that indicates a strong willingness to use the Shuttle, we are proposing further investigation on how best to serve faculty and staff on the Yale Shuttle.

- Conduct awareness campaign about the Yale Shuttle to affiliates who pay to park in a Yale parking lot or garage, but live in New Haven or the immediately abutting communities.
- Focus groups or a chat line forum: Segment the employees similar to the categories in the survey and target email each category with the highlights pertaining to the results of the survey their responses including comments about the Yale Shuttle. Invite those who use the shuttle already as a main mode to join in on a chat/blog about their experiences and ideas to make it better. A different venue would need to be set up for students to collect information on their current commute using the Yale Shuttle perhaps more in an actual focus group setting.
- "Volunteers on the Shuttle" Concordant with collecting the information from the targeted employee groups concerning their Yale Shuttle experiences as a commute mode, conduct an analysis of current headways and routes. Have staff and or student ride the various routes with a checklist to observe patterns and problems. Then compare the "volunteers" to the results of the employee chat/blog.

Public Transit

In addition to collecting commute behavior data from the transportation survey, the home towns of Yale affiliates who park in Yale's parking lots and garages were reviewed to understand how best to market transit benefits to them.

Seven percent of faculty and staff who drive alone to campus, or an anticipated population of 964 indicated that they would change their mode of transportation if there were additional savings on the cost of a train pass; and only 5% of faculty and staff who drive

alone to campus, or an anticipated population of 683 people would change their mode of transportation if there were additional savings on the cost of a bus pass,

Parkers - to - Transit Pilot

Based on this information, the following initiatives are recommended to provide the greatest reductions in single-occupant vehicle use: free transit for up to 3 months, with the guarantee of re-issued parking permit if transit doesn't meet needs.

- A pilot program for a free “Try Transit” or “Three for Free” program that would encourage those who have access to the train or bus to try it for three months at no risk, and reward the faculty and staff currently using the train or bus with one free month of transit.

Cyclist and Walkers

Yale Sustainable Transportation has been awarded a \$5,000 grant from the Yale Office of Sustainability to purchase 10 bicycles such that 10 individual departments can each have a bicycle for members of a department to use around campus as an environmentally sustainable and healthy means of transport during the work day.

- Yale Departmental Bike Program
Employees sign out the bike (this can be done seamlessly through online scheduling software) to attend meetings or other destinations on campus. Bikes will be customized with the name of the Yale Department in reflective lettering.

Carpools and Vanpools

11.2 percent of faculty and staff who drive alone to campus stated that preferential parking for vanpools and carpools would encourage them to use an alternate mode of transportation, or approximately 1, 232 people when extrapolated to the whole population

- Free and preferential parking for carpools and vanpools
This can be accomplished through “Carpool Only” signs and enforcement. There are currently 187 carpoolers registered in Yale's Carpool Program.

For additional positive local and regional impacts on transportation demand management, the City of New Haven could assist Yale in its efforts by advocating with the CTTransit and improving the commuting environment for cyclists and walkers. According to the survey results Yale also has a relatively high bicycle and walk-to-work rate, 5 and 23 percent respectively. Yale's walk rate is almost twice the New Haven walk rate (12%). Some suggestions include:

- Secured bicycle storage at public transit stations.
- Bicycle racks on buses.
- Bicycle-lane and crosswalk striping.
- Improved roadway surfaces.
- Improved sidewalk conditions.

Guaranteed Ride Home Marketing Campaign

18.9% of faculty and staff and students who drove alone to campus, indicated that they “need a car for errands or appointments”, or 2,192 people when extrapolated to the whole population and 13.7% who drove alone to campus or 1,589 people also say they “need a car in case of emergencies”. In addition, 41.2 percent of the same respondent did NOT know about the GRH program. These responses make compelling reason to increase the visibility of Yale’s Guaranteed Ride Home program, it is a low cost item with a high potential for change especially when taken together with the implementation of other incentives or measures.

- Targeted outreach and new employee and student orientations, and through new website improvements.

Additional Measures to Consider

- Institute a Universal Pass program in cooperation with CTTransit.
- Work with CTTransit for:
 - More extensive and direct public transit service to Yale Campus.
 - Lengthened peak-service hours to the campus area.
 - Decreased bus headways.
 - Additional parking capacity at Train stations.
 - Clean well-maintained and safe Train stations.

Summary

Over 30 percent of drive-alone commuters are making their transportation decision based on needs that could be met by existing campus transportation options. 44.4 percent did NOT know that Yale offers three free 1-day parking permits/month to registered carpoolers and transit riders, 46 percent did NOT know there was a Guaranteed Ride Home program for employees registered for car/vanpools or transit, and, 46 percent did NOT know that there was a pre-tax savings to employees who use transit.

Yale would increase its potential to meet the goal of reducing its greenhouse gas emissions by 6 percent, and to reducing demand for the construction of new parking by creating a regular yearly marketing plan that promotes the use of commuter programs and provides clarity of message about commute incentives using creative designs and consistent messaging.

In addition, the Sustainable Transportation Department can use data collected from yearly surveys, monitoring, tracking and evaluation of the various components and other customer outreach and programs as recommended above to assist in determining the need for additional Transportation Demand Management (TDM) measures should it become necessary.