International

Energy

Alliance

Analysis for Traffic Turnout Project

by Andrew Hunter

IEA in collaboration with:

Aliso Niguel High School

Aliso Niguel High School Energy Club

City of Aliso Viejo

Orange County Sheriff

Project Goals:

Reduce Fuel Consumption

Reduce Carbon Gas Emissions

Relieve Traffic Congestion

Safe Route to School

DATA from video of speedometer and instantaneous fuel comsumption with time stamp

t1	*t2*	*instantaneous mpg*	*instantaneous mph*	mph/mpg*(t2-t1)/3600
0.2	2.19	1.5	30	0.011055556
2.21	4.2	4.3	30	0.003856589
4.21	6.19	5.8	30	0.002844828
6.22	8.21	74.8	30	0.000221702
8.22	10.2	7.5	30	0.0022
10.23	12.23	8.9	30	0.001872659
12.24	14.2	9.4	30	0.001737589
14.21	16.23	7.6	30	0.002214912
16.26	20.25	8.4	30	0.003958333
20.26	22.25	8.6	30	0.001928295
22.27	24.25	8.2	30	0.002012195
24.29	28.27	8.5	30	0.003901961
28.28	30.26	8	30	0.0020625
30.29	32.27	7.9	30	0.002088608
33	36.26	8.4	30	0.003234127
37	38.27			
gas used by test car going up hill (gallons)				**0.045**

test car: 2011 Toyota Rav4: 22 mpg city

Average city mpg for Aliso Niguel High School cars from sampling

http://www.fueleconomy.gov/feg/findacar.shtml

Make	Model	city mpg
Toyota	Matrix	26
Mercedez	E320	18
Acura	MDX	16
Honda	Pilot	16
Ford	Fusion	17
Jeep	Cheroke	15
Lexus	GS300	19
Toyota	Tundra	15
Ford	ZX5	18
Lexus	LS450	17
Ford	Thunderbird	18
Scion	EC	23
Lexus	350	16
Lexus	IS300	18
Mazda	3	20
Mercedez	E320	18
Honda	Civic EX	21
Hyundai	Accent	27
Volvo	XC90	13
Toyota	Camery XLE	19
estimated parent average mpg		**18.5**

Calculating average fuel consuption uphill by parents for Aliso Niguel High School

overall average gas used going up hill: (fuel used test car)*(test car mph)/(parent average mph)

average fuel used per car (gallons)	**0.054**

ALTITUDE DIFFERENCE (not used in calculations)

http://www.earthtools.org/		
corner of Wolverine Way and Aliso Creek	33.5641°N 117.7249°W	380.6 ft
Uturn area at school (bottom of hill)	33.5606°N 117.7205°W	180.4 ft
change in altitude		**200.2 ft**

IDLING WHILE GOING DOWNHILL

http://www.makealeap.org/idling_myth

Every 30 minutes of idling costs you at least 2/10 (0.2) of a gallon of gas - and up about 7/10 (0.7) of a gallon for an 8-cylinder engine.

Average idle gas use for 10 minutes:	0.30

http://www.consumerenergycenter.org/myths/idling.html

Idling for 1 hour burns nearly 1 gallon of gasoline.

Average idle gas use for 10 minutes:	0.17
Use the median value	**0.23**

(for every gallon of gas, about 19 pounds of carbon dioxide is produced)

CONCLUSION

Summary of fuel consumption single round trip drop off

0.054	uphill fuel (gallons)
0.23	downhill fuel (gallons)
0.287	total fuel one round trip (gallons)
2,979	total students ANHS (http://capousd.ca.schoolloop.com/file/1218998864154/5098335788960987984.pdf)
298	assume 10%-50% students will take new traffic turnout, based upon petition results
	10% is a low estimate -petition results show possibility of more than 10% using turnout
86	fuel saved morning (gallons)
86	fuel saved afternoon (gallons)
171	total fuel saved per day round trip (gallons)
176	number of instructional days per year
30,103	**total fuel saved per year (gallons)**
602,053	**total annual carbon dioxide gas eliminated (lbs)**
$ 120,411	**total annual cost of fuel ($4 per gallon)**