A Report to the California State Legislature

as required by

Assembly Bill 2353
(Chapter 422, Section 1. Chapter 7)

Neighborhood Electric Vehicle
Transportation Plan Evaluation

Prepared by: Kevan Shafizadeh, Ph.D., P.E., PTOE, and
Kimberly Fox, California State University, Sacramento

The City of Lincoln – John E. Pedri, P.E.,
Director of Public Works/City Engineer

Date: January 1, 2008

TABLE OF CONTENTS

Executive Summary iii

Background 1

Assembly Bill 2353 1
Evaluation Goals 2

NEV Transportation Plan Descriptions 2

Lincoln 2
Rocklin 6

Effectiveness of NEV Transportation Plan Elements 7

Data Collection and Analysis 7

Traffic Incident and Violation Databases 8
Traffic Engineering Studies 8
Surveys 11

Evaluation Results 11

Incident and Traffic Violation Databases 11
Traffic Engineering Studies 11
Surveys 18

Findings and Recommendations 26

Future Work and Refinements to Lincoln's NEV Transportation Plan 27

Statewide NEV Policy Implementation 28

References 29

APPENDIX A. Approved Signage and Pavement Marking 30

APPENDIX B. Statistical Analysis of Differences in Mean Speeds 33

APPENDIX C. Lincoln Transportation Survey 34

APPENDIX D. Lincoln Transportation Survey Results 40

APPENDIX E. California Assembly Bill 2353 81

APPENDIX F. Approved CTCDC Meeting Minutes 87

APPENDIX G. California Senate Bill 956 91

LIST OF TABLES AND FIGURES

Table 1. Facilities Authorized by Lincoln NEV Transportation Plan (2006) 4
Table 2. Facilities Surveyed by TY Lin (2005) 10
Table 3. Speed Data Analysis on East Lincoln Parkway 17
Table 4. Average Daily Traffic Volume Level of Service Thresholds 18
Table 5. Survey Respondent Summary Statistics 18
Table 6. Perceived Safety of NEV Facilities by NEV Users 20
Table 7. Preferred Facilities by NEV Users 20
Table 8. Perceived Safety of NEV Facilities by Traditional Auto Users 22
Table 9. Perceived Safety of NEV Facilities by Bicyclists 23
Table 10. Travel Behavior and Use of Other Modes Prior to Owning an NEV 26
Table 11. T-Test for Northbound Traffic 33
Table 12. T-Test for Southbound Traffic 33

Figure 1. City of Lincoln NEV Transportation Plan Map 3
Figure 2. Combination NEV/Bike Lane Sign and NEV Route Sign 5
Figure 3. Combination NEV/Bike Lane Pavement Marking and Striping 6
Figure 4. City of Rocklin Proposed NEV Transportation Plan Map 7
Figure 5. Location of Traffic Engineering Data Collection 9
Figure 6. Vehicle Speeds on Northbound East Lincoln Parkway 13
Figure 7. Vehicle Speeds on Southbound East Lincoln Parkway 14
Figure 8. NEV Speeds on Northbound East Lincoln Parkway 15
Figure 9. NEV Speeds on Southbound East Lincoln Parkway 16
Figure 10. Duration of NEV Ownership by Survey Respondents 19
Figure 11. Bicycling Respondents Average Weekly Mileage 24
Figure 12. Combination NEV/Bike Lane Sign 30
Figure 13. Combined NEV/Bicycle Lane Pavement Marking 31
Figure 14. NEV Route Sign 32

EXECUTIVE SUMMARY

In August 2006, Lincoln's City Council formally adopted a resolution to approve its Neighborhood Electric Vehicle (NEV) Transportation Plan that implements the City's vision to provide safe and efficient access for NEVs to downtown and other commercial areas. Prior to 2005, federal law only permitted NEVs to operate on streets with a posted speed limit of 35 mph or less, but California state law, Assembly Bill (AB) 2353, established special provisions to define the use of NEVs on city streets. The legislation allowed NEVs to operate on streets with posted speed limits above 35 mph where designated NEV lanes are available. This report evaluates the NEV Transportation Plan in the City of Lincoln with regard to traffic and safety impacts on higher speed facilities permitted by AB2353. The report also evaluates the design and implementation of NEV-specific signage and pavement markings as part of the plan.

While a large majority of the proposed NEV Transportation Plan is pending implementation of signage and striping, this report finds that the City of Lincoln is meeting its goals of maintaining safety and acceptable levels traffic flow while increasing mobility to its residents. Continued public education efforts are necessary to inform the general public about the presence NEVs and the introduction of new signage and striping, which has helped to integrate their use on facilities with traditional automobiles and bicycles.

The City of Rocklin has completed an NEV Transportation Plan and is awaiting City Council approval as of January 2008.

Based on these findings, it is recommended that the provisions in AB2353 should be continued in the Cities of Lincoln and Rocklin. The provisions in AB2353 can be expanded statewide, provided that more comprehensive analysis is conducted once the City of Lincoln's NEV Transportation Plan has been completely implemented. A more comprehensive analysis would help to better evaluate the potential safety concerns that may exist on higher speed facilities. At this time, only a fraction of total lane miles in the NEV Transportation Plan are located on higher-speed facilities, and there have been some safety concerns by NEV users on facilities shared with traditional automobiles and by bicyclists on facilities shared by NEVs.

BACKGROUND

Neighborhood Electric Vehicles (NEVs) are electric-powered low -speed vehicles (LSVs) that typically weigh less than 1,800 pounds and can travel up to 25 miles per hour (AASHTO, 2000). While they may look like golf carts to the casual observer, NEVs are not golf carts and must meet greater safety standards set forth by the National Highway Traffic Safety Administration (NHTSA, 1998); NEVs must be equipped with basic safety equipment including: headlights, rear lights, brake lights, turn signals, rearview mirrors, reflex reflectors, parking brake, windshields, seatbelts, and vehicle identification numbers (VINs). Additionally, drivers of NEVs must possess a valid driver's license, vehicle registration and insurance.

NEVs are designed as zero-emissions vehicles to accommodate short trips in neighborhoods and urban areas. NEVs are a federally-recognized sub-class of low-speed vehicle and are limited to 25 miles per hour (mph), and may be driven on streets with speed zones of 35 mph or less. Popularity for these energy-efficient vehicles is rapidly increasing, especially within the retirement community. Yet, very few cities have modified their infrastructure to accommodate this growing mode of transportation. With the rise in active adult communities, the need for electric vehicle plans has been growing (NHTSA, 2004). Slowly, small, efficient, low speed vehicles have migrated outside these communities for local trips. Still, little infrastructure has been modified. NEV signage and striping on preferred routes need to be posted on NEV facilities, and these facilities need to be integrated into city plans.

Assembly Bill 2353

In January 2005, The California State Legislature signed Assembly Bill (AB) 2353 into law, which enabled the cities of Lincoln and Rocklin, in Placer County, to create their own NEV transportation plans. It permitted each city to go beyond the federal regulation, which only allows NEVs on all streets with a posted speed limit of 35 mph or less, to allow NEVs on streets with a posted speed limit above 35 mph if designated NEV lanes are provided. Also, the bill states that NEVs may use and cross state highways where it is determined to be safe by the City and the State Department of Transportation. Prior to AB2353, California law lacked any formal process to create a city transportation plan involving the extensive use of low speed vehicles, and while the concept of these efficient low speed vehicles has been around for some time, little has been done to integrate them into our communities (Stein et al, 1996). The City of Lincoln represents the first major citywide NEV transportation project in the State of California (MHM, 2006).

Proposed experimental traffic control standards were presented by the City of Lincoln and approved by the California Traffic Control Devices Committee (CTCDC) in July 2005. In August 2005, the City conducted a public workshop with Caltrans in attendance to participate in consensus-building process and discuss NEV issues, such as signage, striping, lane spacing, and NEV lane designation priorities.

Evaluation Goals

While AB2353 allowed the City of Lincoln to create an NEV transportation plan, it also requires that a report be submitted to the Legislature by January 1, 2008. This report serves to meet the reporting requirements for both the State Legislature for AB2353 and the California Traffic Control Devices Committee (CTCDC) for experimental signage and striping. This report contains the following:

1. A description of all NEV transportation plans and their elements that have been authorized up to that time.
2. An evaluation of the effectiveness of the NEV transportation plan elements, including their impact on traffic flows and safety.
3. A recommendation as to whether the provisions in AB2353 should be terminated, continued in existence applicable solely to the City of Lincoln and the City of Rocklin in the County of Placer, or expanded statewide.

NEV TRANSPORTATION PLAN DESCRIPTIONS

Lincoln

On August 8, 2006 the Lincoln City Council unanimously approved the NEV Transportation Plan in accordance with AB2353 which incorporated the CTCDC approved standards. Lincoln's goal was to become "NEV ready" by having the "necessary infrastructure, including charging facilities, striping, signage, parking, and education to safely accommodate NEV travel" (MHM, 2006). This plan is still being implemented in stages, ultimately extending the transportation network throughout the City. The plan aims to reduce the use of traditional automobiles for short trips along with creating a more cohesive community, reducing travel and energy costs, increasing mobility and independence for aging drivers, and increasing the use of public transit.

A major design goal of the plan was to provide infrastructure improvements to allow for the safe, smooth flow of NEVs with pedestrians, bicycles, and other motor vehicles and to allow NEV users access to every part of the city (MHM, 2006). A circulation plan (shown in Figure 1) was approved that includes three different classes of NEV routes:

- Class I routes are designed for the exclusive use of NEVs and bicycles.
- Class II routes designate a separate striped lane adjacent to traffic for the use of both NEVs and bicycles.
- Class III routes allow NEVs to share lanes with automobiles on streets with a posted speed limit of 35 mph or less.

NEV facilities within the NEV Transportation Plan area are listed in Table 1.

Figure 1. City of Lincoln NEV Transportation Plan Map

Table 1. Facilities Authorized by Lincoln NEV Transportation Plan (2006)

Street	Between	Distance
Venture Drive	Aviation Boulevard to Joiner Parkway	1.22
Joiner Parkway	Venture Drive to East Lincoln Parkway	2.67
East Lincoln Parkway	Joiner Parkway to Lincoln City Limits	3.17
Twelve Bridges Drive	Highway 65 to Sierra College Boulevard	5.11
Ferrari Ranch Road	Joiner Parkway to Highway 193	1.79
Ferrari Ranch Road	Moore Road to Joiner Parkway	1.74
Groveland Lane	Ferrari Ranch Road to Home Depot	0.36
Highway 193	Ferrari Ranch Road to East Avenue	0.21
East Avenue	Highway 193 to Virginiatown Road	0.74
Virginiatown Road	East Avenue to Harrison Road	0.26
Gladding Parkway	Nicolaus Road to East Avenue	1.09
Nicolaus Road	Airport Road to Gladding Parkway	3.14
First Street	Fuller Lane to Ian Way	1.62
Moore Road	Aviation Boulevard to Joiner Parkway	2.79
Aviation Boulevard	Nicolaus Road to Moore Road	2.14
Stoneridge Boulevard	Del Webb Boulevard to Twelve Bridges Drive	1.18
Del Webb Boulevard	(all)	2.61
Third Street	Joiner Parkway to Highway 65	1.10
Fifth Street	Joiner Parkway to Highway 65	1.11
Sterling Parkway	Highway 65 to East Lincoln Parkway	0.32
Bella Breeze Drive	(all)	1.32
Spring Valley Parkway	Del Webb Boulevard to Stoneridge Boulevard	0.82
Sun City Boulevard	Ferrari Ranch Road to Del Webb Boulevard	0.19
Ingram Parkway	Ferrari Ranch Road to Del Webb Boulevard	1.26
McCourtney Road	Virginiatown Road to Lincoln City Limits	0.19
Twelve Bridges Drive	Highway 65 to Industrial Avenue	0.38
Aviation Boulevard	Nicolaus Road to Athens Avenue	2.01
Highway 65	First Street to Industrial Avenue	1.26
Industrial Avenue	Highway 65 to Athens Avenue	2.29
Athens Avenue	Industrial Avenue to Aviation Boulevard	2.28
Aviation Boulevard	Athens Avenue to Moore Road	2.01
TOTAL		48.38

The signage and pavement markings identified in the NEV Transportation Plan are consistent with Part 9 of the 2003 California Supplement of the Manual on Uniform Traffic Control Devices (MUTCD) issued by the California Department of Transportation (Caltrans) for bicycles and with the adopted 2001 Golf Cart Transportation Plan (GTCP) for Sun City Lincoln Hills (Fehr & Peers, 2006). The following NEV signs and pavement markings (shown in Appendix A) have been authorized for use within the plan area:

- NEV Route sign is designed to be placed on local streets, which have been designated as NEV Routes. The sign should be placed at the far side of collector street intersections and at a maximum of one-half mile intervals on all continuous residential streets. [Shown in Figure 2 on East Lincoln Parkway.]

- Combination NEV/Bike Lane Sign is designed to be placed on NEV lanes where a Class II bike lane is also provided. The sign should be placed at the far side of collector street intersections and at a minimum of one-half mile intervals on all continuous residential streets. [Shown in Figure 3 on East Lincoln Parkway.]

- Combination NEV/Bike Lane Pavement Marking is designed to be placed on NEV lanes where a Class II bike lane is also provided. [Shown in Figure 3 on East Lincoln Parkway.]

- NEV Pavement Marking is designed to be placed on local streets, which have been designated as NEV Routes.

- NEV Lane Striping is designed to be placed between the traffic lane and the NEV/Bike lane.

Figure 2. Combination NEV/Bike Lane Sign and NEV Route Sign

Figure 3. Combination NEV/Bike Lane Pavement Marking and Striping

Rocklin

The City of Rocklin has completed their NEV Transportation Plan and is awaiting City Council approval in January 2008 (Foster et al, undated). The City of Rocklin proposed to implement signage and striping in phases. The first phase includes identifying preferred Class III NEV routes and striping Class II routes where necessary to link to Class III routes. The first phase could begin as early as Spring 2008 and involve installing proper signage on all designated NEV routes where the speed limit is 35 miles per hour or less. The second phase includes striping Class II routes in preferred arterial roads. NEV facilities within the proposed Rocklin NEV Transportation Plan are shown in Figure 4.

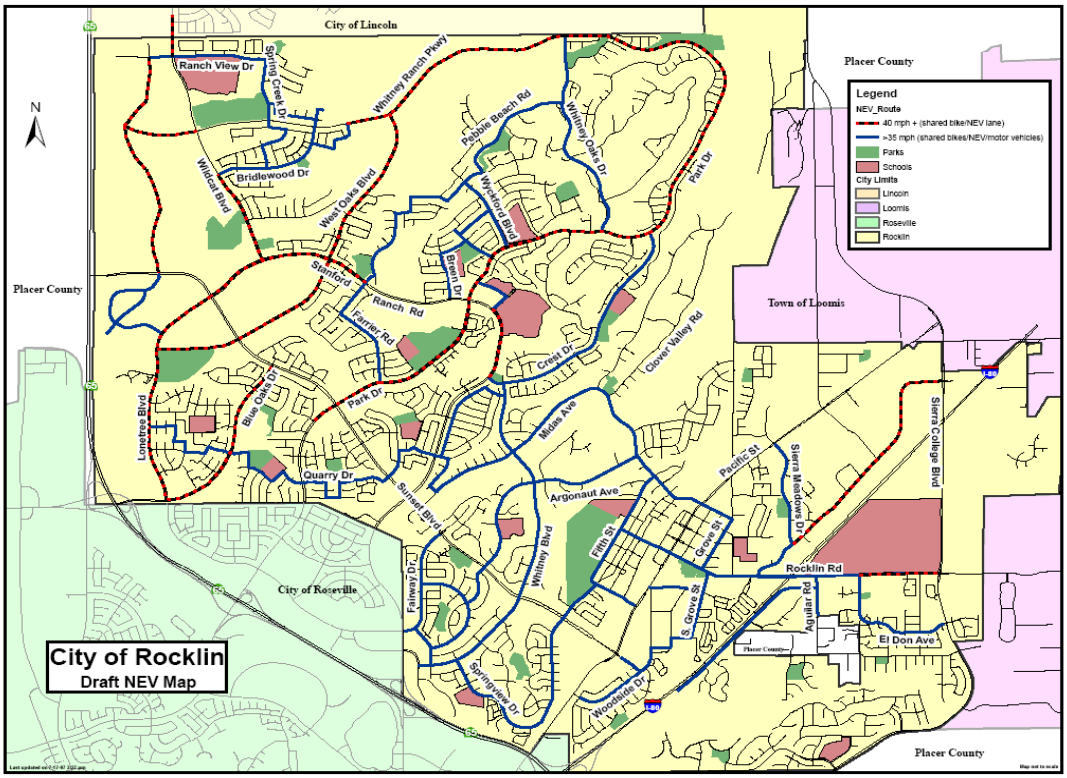


Figure 4. City of Rocklin Proposed NEV Transportation Plan Map

EFFECTIVENESS OF NEV TRANSPORTATION PLAN ELEMENTS

This report evaluates the effectiveness of the NEV Transportation Plan for the City of Lincoln, focusing on its impact on traffic flows and safety. We contacted the Lincoln Police Department and California Highway Patrol (CHP) to gather any reported information involving crashes or collisions involving NEVs in the City, and a public survey was administered regarding any non-reported incidents. The survey also included questions regarding the general perceived safety of NEVs by NEV users and the general public as well as questions about signage, striping, travel costs, community cohesion, mobility and independence for aging drivers, and the use of public transit. Finally, we gathered traffic speed data to compare the speeds before and after the NEV Transportation Plan was implemented to evaluate the effect of NEVs on traffic operations.

DATA COLLECTION AND ANALYSIS

This section reviews the three sets of data that were collected to evaluate the NEV Transportation Plan, paying particular focus on traffic conditions on higher speed facilities permitted by AB2353 as well as traffic signage and striping permitted by the CTCDC. The

three sources of data used in this study included: crash/collision incident databases and traffic violation data, traffic speed and compliance data, and user surveys. Each data source is explained in greater detail below.

Traffic Incident and Violation Databases

Collision crash data were requested from both the Lincoln Police Department and California Highway Patrol to determine if a common theme existed among incidents involving NEVs, or if common themes existed among moving traffic violations. Formal inquiry requests were made for collision/crash data involving NEVs in the City to the Lincoln Police Department and the California Highway Patrol (CHP) Statewide Integrated Traffic Records System (SWITRS). Safety records did not provide any issues with conflicts between bicycles, NEVs, and automobiles.

Traffic Engineering Studies

Speed Studies and Level of Service Analysis

Speed studies were conducted before and after NEV lanes were installed to determine if NEVs impacted traffic speed along travel corridors. During May and June 2005, engineering consulting firm TY Lin Inc. conducted speed surveys along twenty roadways (41 segments) throughout the City of Lincoln as required by the California Vehicle Code, Manual of Uniform Traffic Control Devices (MUTCD), and the 2003 California Supplement to the MUTCD to determine speed limits on the roadways. A random sample of the speed data were collected using machine counters during the mid-morning and mid-afternoon hours of the weekday was made based on the selection criteria that these be at least seven seconds apart. The random sample, at least 100 per direction, was used to calculate the mean, median, and 85th percentile speed (that speed at which 85% of the traffic is traveling at or below) for each direction. The same methodology was followed to collect and sample data at the same location during the same time of day in August 2007, and used as a basis of comparison to the 2005 data.

The location chosen for the study was East Lincoln Parkway between Del Webb Boulevard and Sterling Parkway, shown in Figure 5. The same location on East Lincoln Parkway was used to collect traffic volume data for a "level of service" (LOS) analysis, which was compared to similar analysis completed by Fehr & Peers in 2006. East Lincoln Parkway is a north/south two-lane collector with NEV lanes with approximately 12,800 vehicles per day with the planned medical and commercial development in place (Fehr & Peers, 2006).

Figure 5. Location of Traffic Engineering Data Collection

It should be noted here that the City plans to provide NEV facilities on several streets identified in the NEV Transportation Plan and shown in Figure 1, but only two facilities both 1) currently provide NEV facilities with speeds at or above 35 mph and 2) had data from 2005 to use for comparison, as shown in Table 2. These two facilities are East Lincoln Parkway and Joiner Parkway. On Joiner Parkway, however, the locations where TY Lin collected data in 2005 were within close proximity of traffic control devices (i.e., stop signs) in 2007. The introduction of these stop control devices would affect vehicle speeds, so data at those locations along Joiner Parkway were not used for this evaluation.

Table 2. Facilities Surveyed by TY Lin (2005)

Street	Between	Within NEV Plan?	Speed Limit
Aviation Rd	Nicolaus Rd and Venture Blvd	Yes	40 mph
D Street	First Street and SR 193 (McBean Park Dr)	No	25 mph
East Ave	Seventh and 12th St	Yes	30 mph
East Ave	SR 193 and Seventh St	Yes	30 mph
East Lincoln Pkwy	SR 65 and Del Webb Blvd	Yes	35 mph
East 12th Street	East Ave and McCourtney Rd	Yes	35 mph
Ferrari Ranch Rd	Joiner Pkwy & Kensington/Danbury	Yes	35 mph
Ferrari Ranch Rd	SR 65 and Ingram Pkwy	Yes	35 mph
Ferrari Ranch Rd	Sun City Blvd and SR 193	Yes	35 mph
Fifth Street	O Street and SR 65	Yes	25 mph
Fifth Street	Joiner Pkwy and Chambers Dr	No	25 mph
Fifth Street	O Street and Joiner Pkwy	Yes	25 mph
First Street	SR 65 and O Street	Yes	25 mph
Ingram Pkwy	Ferrari Ranch Rd and Northfield Ln	Yes	35 mph
Ingram Pkwy	Northfield Ln & Del Webb Blvd	Yes	30 mph
Joiner Pkwy	Ferrari Ranch Rd and SR 65	Yes	40 mph
Joiner Pkwy	Nicolaus Rd and Third Street	Yes	40 mph
Joiner Pkwy	Moore Rd and Nicolaus Rd (Third?)	Yes	40 mph
Lakeside Dr	Venture Dr and Moraga Rd	No	35 mph
Lakeside Dr	Nicolaus Rd and Moraga Dr	No	35 mph
Nicolaus Rd	Aviation and Waverly	Yes	40 mph
Nicolaus Rd	Waverly and Joiner Pkwy	Yes	40 mph
Nicolaus Rd / 9th St	O Street and SR 65	Yes	40 mph
O Street	First St and Fourth St	No	25 mph
O Street	Fourth St and Nicolaus Rd	No	25 mph
Seventh Street	SR 65 and East Ave	No	30 mph
Southcreek St	Twelve Bridges and Oak Valley Dr	No	25 mph
Southcreek St	Oak Valley Dr & Eastridge	Yes	25 mph
Stoneridge Blvd	E Spring Valley Blvd and Twelve Bridges	Yes	35 mph
Stoneridge Blvd	Del Webb and E Spring Valley Pkwy	Yes	35 mph
Sun City Blvd	Ferrari Ranch Rd and Hawthorne Ln	Yes	30 mph
Third Street	O Street and Joiner Parkway	Yes	25 mph
Third Street	O Street and SR 65	Yes	25 mph
Twelve Bridges Dr	Sierra College and Stoneridge Blvd	Yes	40 mph
Twelve Bridges Dr	Stonebridge Blvd and Rossi Ln	Yes	40 mph
Twelve Bridges Dr	Eastridge Dr and Rossi Ln	Yes	40 mph
Twelve Bridges Dr	Lincoln Pkwy and Eastridge Dr	Yes	40 mph
Twelve Bridges Dr	SR 65 and E Lincoln Pkwy	Yes	40 mph

Surveys

The effectiveness of authorized traffic devices and the perceived safety of NEVs, were evaluated through the administration of a transportation survey. The survey was administered on-line between June and August of 2007 and made available to NEV users, bicyclists, and the general public (traditional motorists, users of public transit, etc). The survey contained questions for all road users regarding the perceived safety of NEVs and their perceived affect on traffic flow. Traditional motorists and bicyclists were questioned about their opinions regarding safety issues and potential conflicts in shared use lanes with NEVs. NEV users were asked to express their opinion about many different aspects of their NEV usage including but not limited to: 1) implemented signage, striping, and pavement markings, 2) safety concerns with motorists, such as at intersection or in left turning lanes, and 3) safety concerns with bicyclists and shared NEV/bicycle lanes. It also contained questions about NEV signage and striping as well as questions about goals identified in the NEV Transportation Plan. The complete survey and its results are provided in Appendices C and D, respectively.

The survey website was sent out to NEV users and bicyclists through their local clubs. A presentation was given to the Lincoln Hills Low-Speed Vehicle (LSV) Users Group in June 2007, and a link to the survey was e-mailed to members of the Lincoln Bicycle Club. The survey was also made available to the general public through a link on the City of Lincoln's website. Hard copies were made available by telephone or e-mail request, and some surveys were completed for individuals who telephoned the number available on the survey.

In an attempt to capture more traditional motorists and users of other modes, intercept surveys were conducted outside of the Safeway Market on SR 65 in Lincoln in August 2007, which resulted in a very limited sampling of users. To obtain a more representative sample of Lincoln residents, additional sampling in the downtown core or at other mixed-use areas of the City should be considered.

EVALUATION RESULTS

In this section, we review results from all three data sources.

Incident and Traffic Violation Databases

Neither inquiry to LPD or CHP yielded any results about NEV incidents/crashes or traffic violations. According to CHP, there have not been any documented incidents involving NEVs in the Statewide Integrated Traffic Records System (SWITRS). A conversation with an officer in the Lincoln Police Department indicated that NEVs were perceived to be safe in areas where the transportation plan has been implemented.

Traffic Engineering Studies

Speed Studies

Histograms of the observed speeds by the general vehicle traffic, excluding NEVs, for northbound and southbound East Lincoln Parkway are shown in Figure 6 and Figure 7, respectively. Histograms of only NEV traffic on northbound and southbound East Lincoln Parkway are shown in Figure 8 and Figure 9, respectively. Data for general vehicle traffic were collected separately from NEVs so that general vehicle traffic could be compared between 2005 and 2007 without the influence of NEVs.

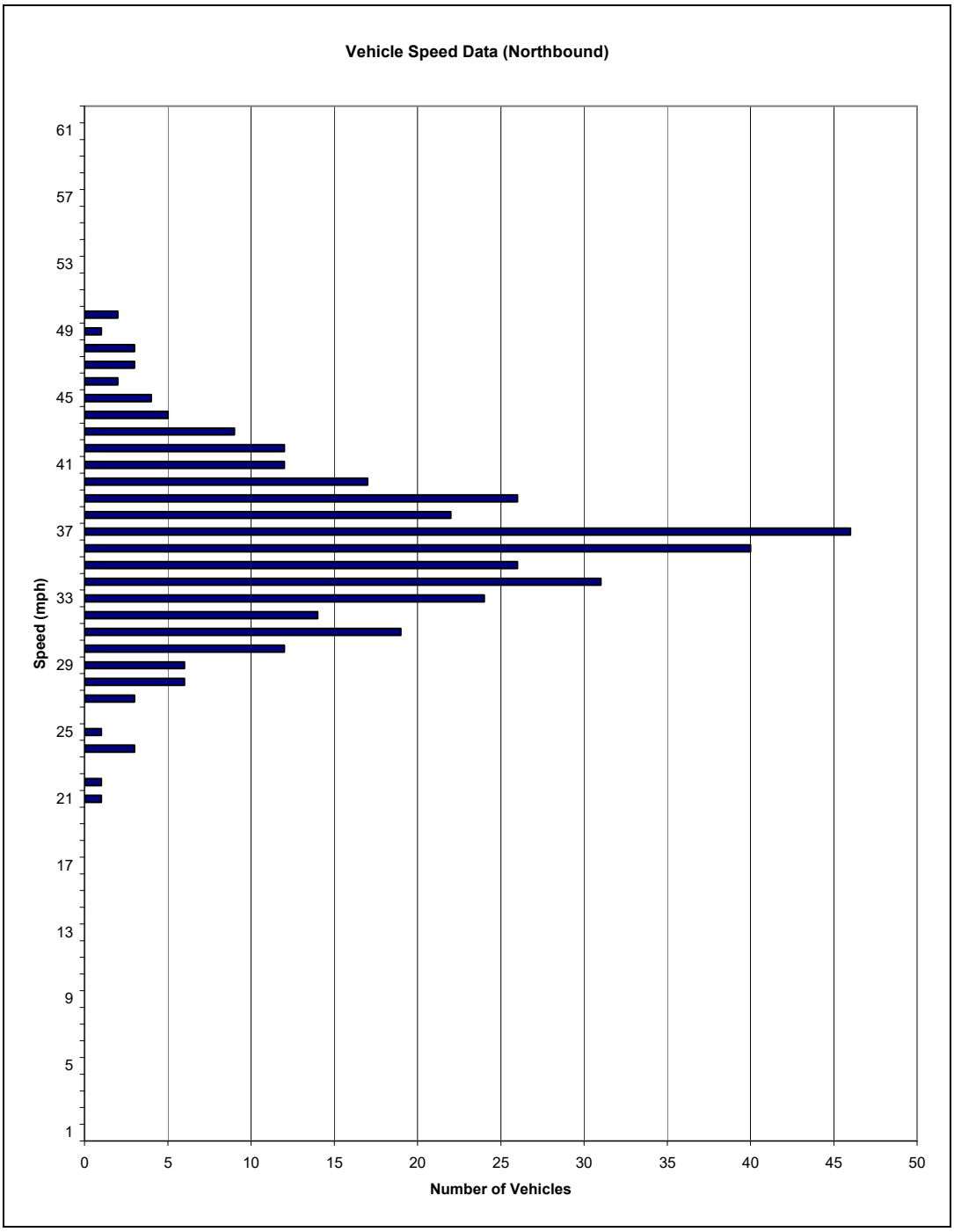


Figure 6. Vehicle Speeds on Northbound East Lincoln Parkway

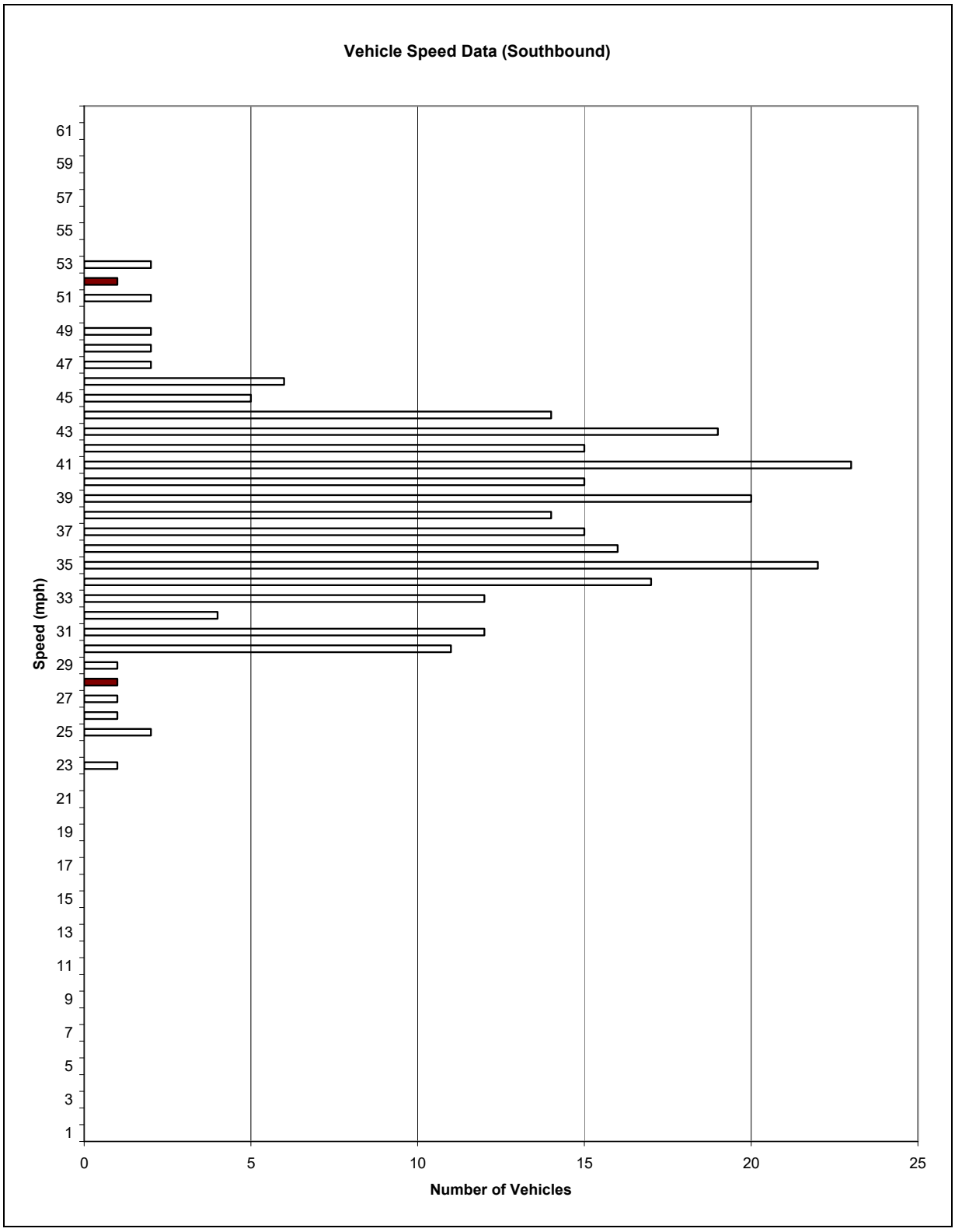


Figure 7. Vehicle Speeds on Southbound East Lincoln Parkway

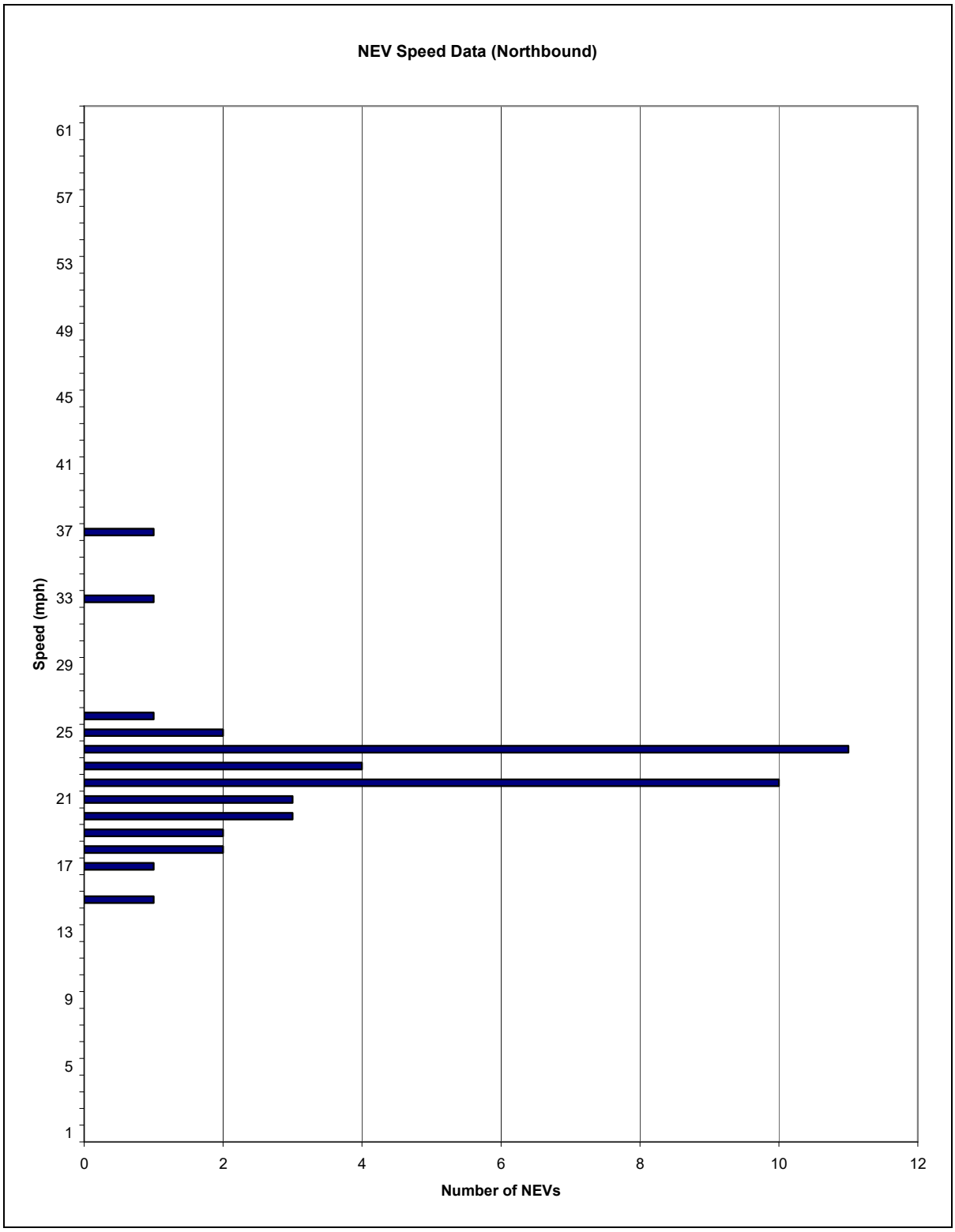


Figure 8. NEV Speeds on Northbound East Lincoln Parkway

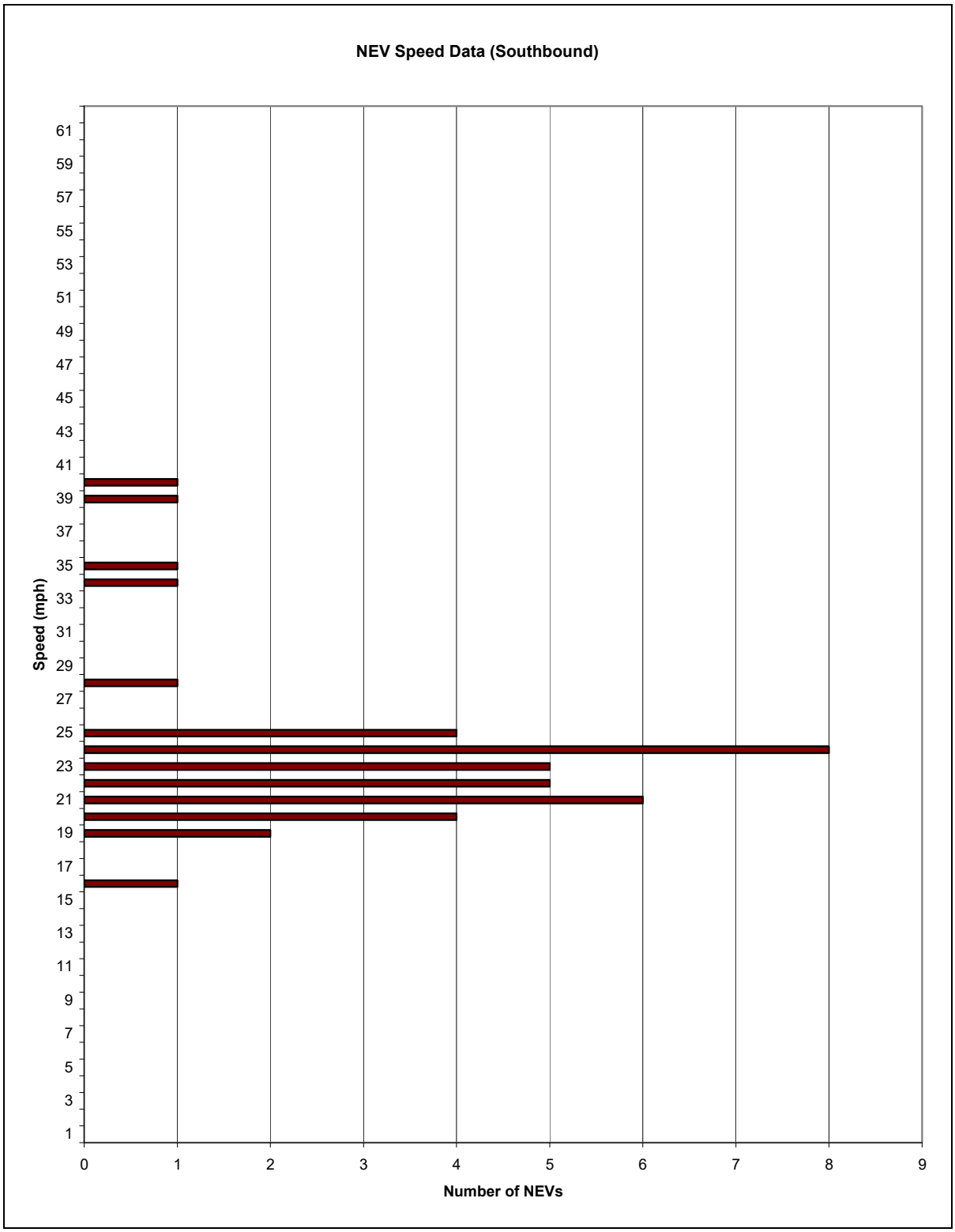


Figure 9. NEV Speeds on Southbound East Lincoln Parkway

The summary of results from both 2005 and 2007 traffic engineering studies is shown in Table 3 below. The results indicate that the average (mean) and median speeds in both directions decreased slightly from 2005 to 2007. The 85th percentile speed decreased by three miles per hour in the northbound direction and remained the same in the southbound direction. A statistical analysis indicates that the decrease in speed from 2005 to 2007 was statistically significant at the 95% confidence level. (This analysis is detailed in the appendix). In both 2005 and 2007, however, the average, median, and 85th percentile speeds were still above the posted speed limit of 35 miles per hour. As we might expect, this table also indicates that NEVs travel at a much lower speed, on average, than traditional automobiles. From this analysis, we can conclude that the introduction of NEVs has had little effect on traffic flow. In fact, it is possible that the introduction of NEVs may have a calming effect on vehicle speeds.

Table 3. Speed Data Analysis on East Lincoln Parkway

		Automobiles			NEVs
	Parameter	**2005 (Before NEV Plan)**	**2007 (After NEV Plan)**	**Difference**	**2007**
Northbound	Average Speed	39 mph	36 mph	-3 mph*	23 mph
	Median Speed	38 mph	36 mph	-2 mph	22 mph
	85th Percentile Speed	44 mph	41 mph	-3 mph	24 mph
	Standard Deviation	4.6 mph	4.6 mph	-	3.7 mph
	Observations	162	351	-	42
Southbound	Average Speed	40 mph	38 mph	-2 mph *	24 mph
	Median Speed	39 mph	38 mph	-1 mph	23 mph
	85th Percentile Speed	44 mph	44 mph	0 mph	25 mph
	Standard Deviation	4.4 mph	5.2 mph	-	5.0 mph
	Observations	101	258	-	40

* Difference is statistically significant at the 95% confidence level.

At this point, it is important to note, however, that these data were collected on one street in a growing part of the City. In 2005, East Lincoln Parkway ended at Sterling Parkway. Today, East Lincoln Parkway connects to a shopping area at Sterling Parkway then crosses over SR 65 to connect to the west side of Lincoln. While these changes are significant, it was assumed that vehicle speeds on the backside of an overcrossing would probably have yielded higher speeds than observed in 2005. In other words, these findings are assumed to be more conservative with the introduction of an overcrossing than without. Because of the little data available, it is recommended that a more comprehensive study be conducted once the City has implemented the majority of the proposed in the NEV Transportation Plan.

Level of Service Analysis

Level of service (LOS) is a qualitative measure of congestion and delay on intersections and roadways that is reported on a scale from A to F, with A representing the best performance

and F the worst in terms of congestion and delay. LOS is determined by comparing the measured daily volumes to LOS thresholds in Table 4 for various roadway types. These thresholds had been established for previous environmental analyses in the Cities of Lincoln and Rocklin and the Counties of Placer and Sacramento (MHM, 2006). The City of Lincoln has adopted LOS C as their minimum criteria for urban area intersections and roadways.

Table 4. Average Daily Traffic Volume Level of Service Thresholds

	Average Daily Traffic Volume Threshold				
Facility Type	**LOS A**	**LOS B**	**LOS C**	**LOS D**	**LOS E**
Two-Lane Street	9,000	10,700	12,000	13,500	15,000
Four-Lane Undivided Arterial	18,000	21,300	24,000	27,000	30,000
Four-Lane Divided Arterial	20,250	23,625	27,000	30,375	33,750

While it is not clear that a two-lane street with two additional NEV lanes (four lanes total) is necessarily equivalent to a traditional four-lane arterial, based on these criteria East Lincoln Parkway with an approximate daily traffic volume of 8,961 vehicles in both directions (less than 2% of which are NEVs) would easily maintain LOS A for a four-lane divided arterial, and remains well within the City's minimum criterion.

Surveys

Before the survey results pertaining to safety and traffic impacts of NEVs are discussed, it is useful to characterize the respondents. Of the 148 people surveyed, all drove traditional automobiles while 94 (64%) also drove NEVs and 24 (16%) also rode bicycles. Summary statistics of the average respondent are provided in Table 5 and indicates that the average respondent was a 63 year old, retired, married male without children living at home with 1.7 vehicles at home (not including an NEV), and an approximate average household income of $84,000. While this survey may provide valuable information regarding the perceived safety of the NEV Transportation Plan, it is clear that this study did not capture a representative sample of Lincoln residents and should not be used for generalizations beyond this evaluation. A representative sample would emulate the entire population of all residents in the City of Lincoln, not a subset of its residents.

Table 5. Survey Respondent Summary Statistics

Gender	63% Male / 37% Female
Average Age	63 years
Martial Status	82% Married / 14% Single
Employment Status	75% retired / 12% part-time / 10% full-time
Avg. Number of Workers in Household	0.4 persons
Avg. Annual Household Income (approx)	$84,000
Avg. Auto Ownership (not including NEVs)	1.7 vehicles

Additional analysis of the 94 NEV users who participated in the survey had an average of over 31 months (2.6 years) of NEV ownership (Q3), shown in Figure 10. They also averaged

almost 15 NEV one-way trips per week (Q22) while averaging a little less than 4.5 miles per trip (Q23). Based on these figures, the average NEV would travel almost 3,500 miles per year, which is over three and a half times higher than previous estimates (MHM, 2006). The amount of travel and potential benefits associated with NEV use is an area in need of future research.

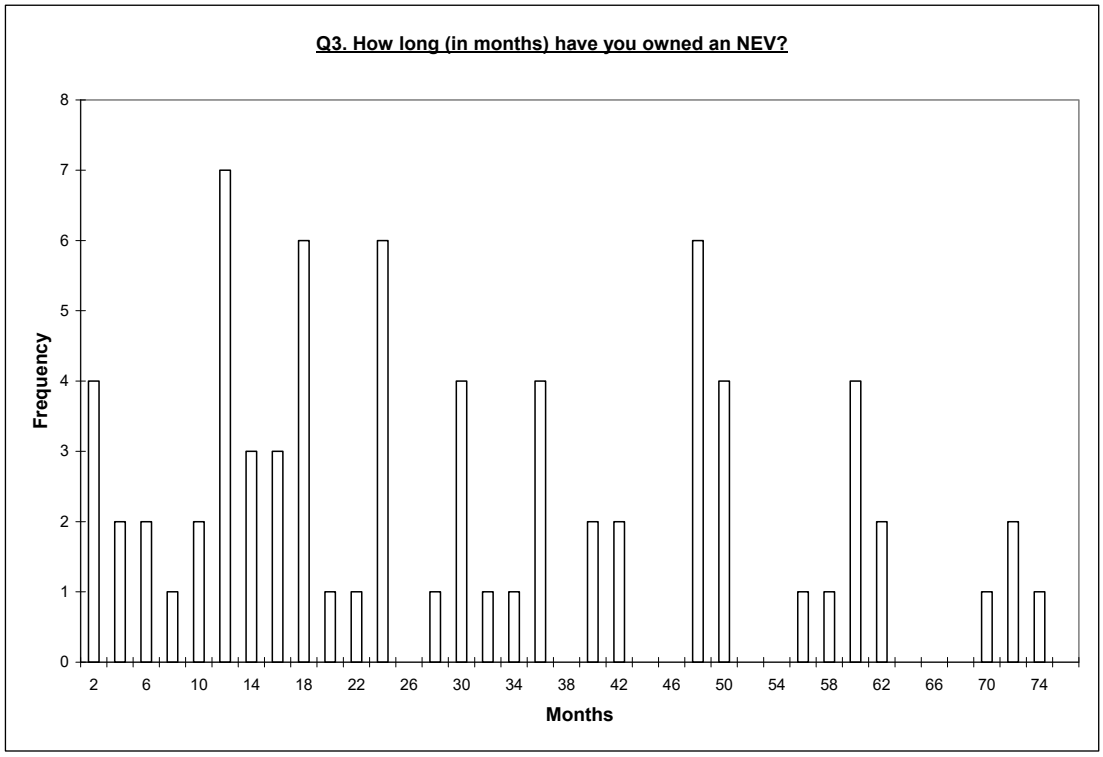


Figure 10. Duration of NEV Ownership by Survey Respondents

The following sections highlight noteworthy findings from the survey pertaining to perceived traffic flow, safety, as well as signage and striping by NEV users, traditional motorists, and bicyclists. The complete survey questionnaire and results are available in the appendix.

Perceived Safety by NEV Users

Table 6 indicates that NEV users perceive the greatest safety when separated from traditional automobiles. Roads with shared NEV lanes were perceived to be between "neither safe nor unsafe" and "somewhat safe" while roads with separate lanes for NEVs were "somewhat safe" to "very safe." Although not in part of the plan, NEV users perceive NEV-only paths to be the most safe.

Table 6. Perceived Safety of NEV Facilities by NEV Users

	Roads with *shared* lanes for NEVs and autos	Roads with *separate* lanes for NEVs and autos	Paths restricted only to NEVs
Very Safe (5)	13 (16.67%)	54 (69.23%)	70 (89.74%)
Somewhat Safe (4)	32 (41.03%)	22 (28.21%)	3 (3.85%)
Neither Safe nor Unsafe (3)	11 (14.10%)	0 (0%)	0 (0%)
Somewhat Unsafe (2)	16 (20.51%)	1 (1.28%)	0 (0%)
Very Unsafe (1)	3 (3.85%)	0 (0%)	0 (0%)
No Basis to Judge	3 (3.85%)	1 (1.28%)	5 (6.41%)
Mean	3.48	4.68	4.96

Surprisingly, the findings from Table 6 (Q6 – Q8) do not seem to coincide with the results from Question 9 which asked, "Where do you prefer to drive your NEV?" The results, shown in Table 7, indicate that most NEV users prefer to travel on facilities with separated NEV lanes paths restricted only to NEVs. This finding can be interpreted two ways. Because paths do not currently exist as part of the plan, NEV users may not have considered it to be a viable choice.

Table 7. Preferred Facilities by NEV Users

Facility Type	Response
Shared Lanes with Automobiles	0%
Separated NEV lanes	76.9%
NEV-only paths	8.97%
No preference	14.1%

The result from Question 9 may also indicate that NEV users prefer the additional separation from traditional automobiles available through on-street NEV lanes but also prefer the flexibility of being on the street, like a traditional automobile, without being relegated to off-street paths. As a result, the City may want to consider experimenting with NEV-only paths and enhancing traditional road facilities for NEVs before attempting to securing right-of-way for off-street NEV paths. This second explanation is supported by Question 10 where exactly half (50%) of all NEV users indicated that they would not drive longer distances to travel on dedicated NEV facilities. In other words, NEV facilities will only be effective if they provide direct access to destinations equivalent to traditional automobiles.

Over 88% of respondents indicated that the current NEV signs (Q13), were easy to read and understand, and 90% of respondents indicated that the current pavement markings (Q14), were easy to read and understand. All of the remaining 12% of respondents who indicated that NEV signs were not easy to understand provided similar comments to suggest that a public education campaign is needed for the general public and traditional automobilists who do not know what "NEV" means. In fact, one NEV user responded to this issue by asking, "What does the N stand for?" Some of these education issues also manifest themselves when

the NEV parking spaces are used by traditional automobiles. It is possible that signage may need to be designed to contain the phrase "neighborhood electric vehicle," instead use of the acronym.

Other responses (Q11 & Q12) seem to suggest that the NEV transportation plan seem to be working. The interaction between vehicles and NEV is important, yet the majority of NEV users do not indicate having problems merging from NEV lanes through traditional vehicle lanes (87%) or problems crossing mixed traffic to make left turns (83%). These findings are important reassurance to the City as it continues to implement more of the NEV Transportation Plan.

From the survey, it was revealed that exactly half (50%) of all NEV users surveyed cross or use a road designated for NEVs with a speed limit over 35 mph at least "occasionally" (Q15), implying that a large portion of NEV users in the City have benefited from AB2353 becoming law.

Perceived Safety of NEVs by Traditional Automobile Users

The survey results indicate that the majority of traditional motorists (54.8%) feel that NEVs affect the travel speeds on traditional roads where traditional automobiles and NEVs *share* lanes (Q29), but only a fraction (15.08%) feel that NEVs affect the travel speeds on roads where traditional automobiles and NEVs have *separate* lanes (Q30).

When traditional automobilists were questioned about their interaction with NEVs, most respondents indicated that they feel safe (either "very safe" or "somewhat safe") around NEVs (Table 8). The general perception by traditional automobilists is that traditional roads with separated NEV lanes are safer than traditional roads without NEV facilities, which, in turn, are safer than traditional roads with shared lanes. These findings seem to suggest that designated shared facilities are less desirable for traditional motorists than traditional roads without NEV designations, while traditional roads with separate facilities are the most desirable. Regardless of the facility type, a large majority of traditional motorists (70% to 88%) do not appear to feel their safety is threatened by NEVs.

Table 8. Perceived Safety of NEV Facilities by Traditional Auto Users

Facility	Traditional roads	Traditional roads with *shared* lanes for NEVs and autos	Traditional roads with *separate* lanes for NEVs and autos
Very Safe (5)	69 (54.76%)	57 (45.60%)	80 (64.00%)
Somewhat Safe (4)	43 (34.13%)	32 (25.60%)	30 (24.00%)
Neither Safe nor Unsafe (3)	6 (4.76%)	13 (10.40%)	6 (4.80%)
Somewhat Unsafe (2)	6 (4.76%)	14 (11.20%)	6 (4.80%)
Very Unsafe (1)	1 (0.79%)	5 (4.00%)	0 (0%)
No Basis to Judge	1 (0.79%)	4 (3.20%)	3 (2.40%)
Mean	4.38	4.01	4.51

Regardless of the facility type, 55% of traditional automobile users feel that NEVs affect the travel speed on roads where NEVs and traditional automobiles either share lanes (Q29), while only 19% of those respondents believe that NEVs affect travel speeds when both have separate lanes (Q30). Many traditional motorists commented that NEVs affect their driving speed, especially when on 35 mph roads where NEVs reach a top speed of 25 mph: "Traditional automobiles normally travel above the speed limits. NEVs have a maximum speed of 25 mph. Conflicts can and do occur especially on roadways posted at 30-35 mph." For this reason, it is critical that NEV lanes be available where appropriate to avoid impeding traditional automobiles." This finding appears to match the findings from the previous section where an analysis of the speeds indicated a reduction in average speed on the facility. It may be that NEVs exhibit a "calming effect" on traditional traffic.

As expected, traditional motorists perceived greater safety with NEVs in separated lanes than in shared lanes. Interestingly, they also perceived traditional roads as being safer than traditional roads with shared lanes for NEVs. It is possible that "traditional roads" was interpreted by some survey respondents to mean "traditional roads without the presence of NEVs" while it may have been interpreted by others to mean "traditional roads with the presence of NEVs but without NEV provisions."

Perceived Safety of NEVs by Bicyclists

Organized bicyclists have struggled for years to get adequate shoulders and roadside striping, and the needs of bicyclists were considered during the NEV planning process (Cosgrove et al, 2007). Some bicyclists are willing to use the new NEV/bike lanes but are reluctant to see a bicycle lane converted to a wider shared NEV/bike lane. Approximately 40% of all bicyclists surveyed also feel that the presence of NEVs affected their bicycling speed (Q44). Over 34% of bicyclists surveys do not believe that the combination NEV/bike signs easy to read and understand (Q45), and almost 49% of bicyclists find the NEV/bike pavement markings and striping easy to read and understand (Q46). Most of the comments by these bicycle respondents, like the traditional motorist respondents, indicate a need for better education by road users, "Many bicyclists don't know what an NEV is." The large proportion of the 49% who had a difficult time reading and understanding the pavement

markings attributed their response to faded striping or pavement markings. It should be noted that the NEV/bike lane markings or striping in the NEV Transportation Plan are new and are not faded. Some of the sentiment expressed by survey respondents may be a reflection of bicycle lane striping in other parts of the city which may be fading.

Others commented that the wider lanes present a potential safety hazard by traditional vehicles that misinterpret the NEV/bike lane as a smaller automobile lane. One respondent stated, "I think it is difficult for drivers who visit our city to understand that the bicycle-NEV lane is not to be entered by other motor vehicles. It is close to the same size as a regular lane and is used by some drivers to pass on the right." Another stated, "The new NEV/Bike lane is 7 feet wide. The standard automobile lane is 12 feet wide. A 7-foot wide lane tends to look like another car lane to some drivers. This is dangerous and a potential liability to the City of Lincoln." These concerns can be mitigated with proper signage and public education efforts aimed at general motorists.

From Table 9, we can see that bicyclists generally perceive traditional roads without bicycle lanes as being somewhat unsafe, while they perceive traditional roads with shared bicycle/NEV lanes as being neither safe nor unsafe. While shared bicycle/NEV lanes appear to help separate conflicts with motor vehicles, they seem to introduce new potential conflicts with bicyclists who travel at similar speeds. The primary issue in these instances seems to relate to conflicts when a passing event occurs, which may be because the speeds of these two modes are close and it may be more difficult to pass.

Table 9. Perceived Safety of NEV Facilities by Bicyclists

	Traditional roads without bicycle lanes or paths	Traditional roads with shared bicycle/NEV lanes	Traditional roads with bicycle-only lanes	On separated bicycle-only paths
Very Safe (5)	2 (5.26%)	2 (5.26%)	10 (26.32%)	28 (73.68%)
Somewhat Safe (4)	7 (18.42%)	16 (42.11%)	22 (57.89%)	7 (18.42%)
Neither Safe nor Unsafe (3)	7 (18.42%)	5 (13.16%)	3 (7.89%)	0 (0%)
Somewhat Unsafe (2)	11 (28.95%)	7 (18.42%)	2 (5.26%)	2 (5.26%)
Very Unsafe (1)	10 (26.32%)	6 (15.79%)	0 (0%)	0 (0%)
No Basis to Judge	1 (2.63%)	2 (5.26%)	1 (2.63%)	1 (2.63%)
Mean	2.46	3.03	4.08	4.65

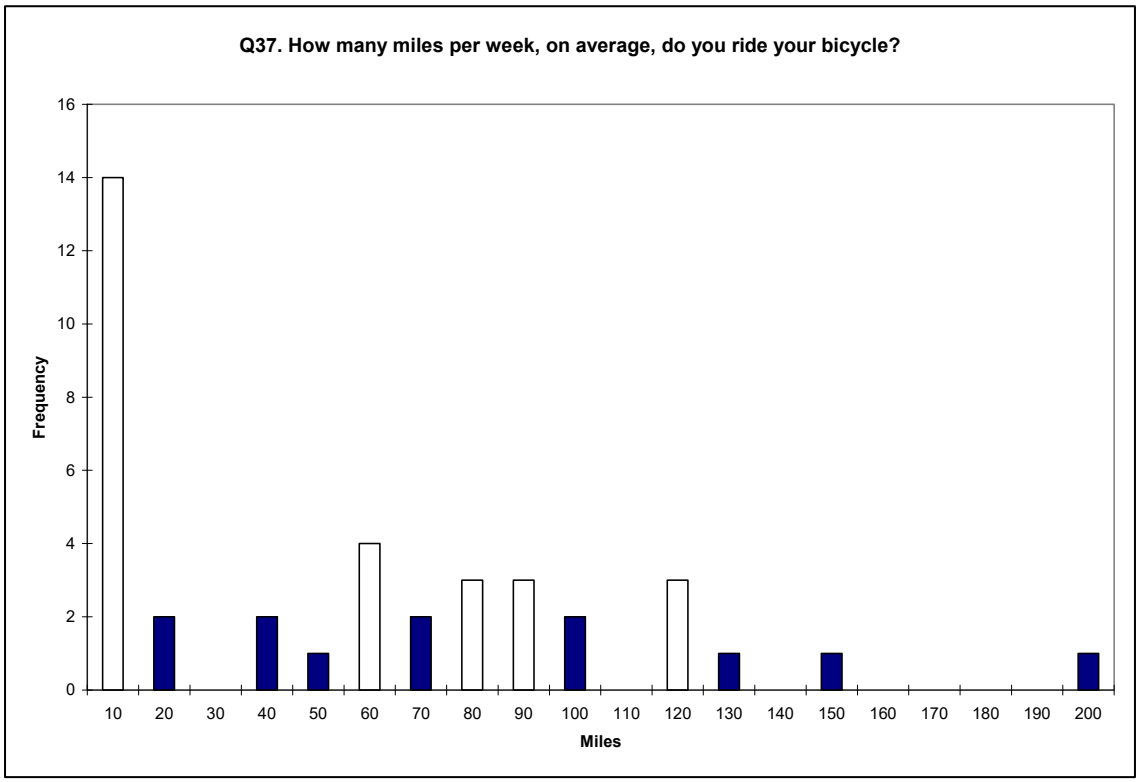


Figure 11. Bicycling Respondents Average Weekly Mileage

Figure 11 indicates that the survey participants who bicycle may not be a typical bicyclist. These findings may be expected as a result of encouraging bicyclists in the local bicycle club to participate in the survey during the summer months. The average and median weekly bicycling distance were both found to be a little a 55 miles per week.

Six of the 38 respondents (16%) indicated that they had been involved in "an accident or an incident" with an NEV (Q38). The comments of those six respondents, however, did not seem to involve crashes or collisions but "close calls" due to the interactions between NEVs and bicyclists. All six comments involved common driver courtesy when using a shared space. The bicyclists expressed particular concern about the quiet nature of NEVs which surprise or startle bicyclists especially when an NEV passes a bicyclist. NEVs are quieter than traditional automobiles and bicyclists may not have rear-view mirrors, so a potential conflict can arise when an NEV passes a slower moving bicyclist from the rear. For example, one respondent, "It is difficult to hear an NEV approaching from the rear when you are on a bicycle and I have been startled by them if they come too close to me as they pass." Another respondent indicated, "They have come up behind me fast then cut out into traffic to get past me. They… have often almost clipped me either when cutting out or cutting back in."

There were also two respondents who also expressed issues sharing the right-of-way. One crash, which was not reported to the police, that was identified occurred in a Class II bicycle lane and seemed to involve an NEV failing to provide adequate space for the bicyclist while

passing through a work zone. Neither the NEV nor the bicyclist yielded. "The NEV came along side me and pushed me into the cones and maintenance truck. Driver (male) looked back but never stopped. [I] could not get the license plate number." One respondent stated that an "NEV driver indicated displeasure with our group [while] riding in the NEV lane," and another complained about NEVs "not giving me space to ride along side them."

These issues between bicyclists and NEVs also became apparent when bicyclists were asked "Does the presence of an NEV affect your bicycle riding speed?" Most of the 40% of bicycle respondents who claimed that NEVs affect their travel behavior made reference to the quiet operation and speed capabilities of NEVs as well as aggressive or inconsiderate driving behavior by some NEV users.

Based on these findings, it is recommended that public awareness programs continue to educate both bicyclists and NEV users who may be traveling at similar speeds on shared facilities. Some education campaigns have already started to help NEV drivers interact with bicyclists, such as the driving tips provided on LincolnNEV.com website: http://www.lincolnev.com/driving.html. Similar public awareness efforts can emanate from the local bicycle and NEV user clubs.

This issue needs to be addressed because the City plans to encourage NEV users and bicyclists to continue to share right-of-way as all NEV striped lanes will be with sufficient width to allow lane sharing with bicycles. Striping a single, dual-use lane will be less expensive to implement and maintain than multiple- lane striping for each use.

Travel Impacts of NEVs

While not a focus of this study, the potential benefits of travel impacts of NEVs were explored in the survey. According to the survey, almost one quarter (24%) of NEV owners indicated that they had sold or disposed of a traditional automobile after they acquired their NEV. NEV users also reported an average almost 15 one-way trips per week and a little less than 4.5 miles per trip. Based on these figures, the average NEV would travel almost 3,500 miles per year, which is over three times higher than previous estimates (MHM, 2006). The results from the survey also indicate that NEVs generate fewer auto trips, fewer bicycle trips, but the same number of walking and transit trips (Table 10). Clearly, there is a discrepancy here because the same respondents also indicated that they take about the same number of trips overall, shown in the last column of Table 10 below. These findings indicate NEV use has been used to substitute primarily for traditional vehicle travel and some bicycle-related travel, but they do not seem to create an increase in the use of public transit as suggested by the NEV Transportation Plan (MHM, 2006). Clearly, the amount of travel and potential benefits associated with NEV use (and foregone travel by other modes) is an area in need of future research.

Table 10. Travel Behavior and Use of Other Modes Prior to Owning an NEV

Mode	Automobile	Bicycle	Transit	Walking	More Trips
More (1)	71 (91.03%)	8 (10.26%)	1 (1.28%)	6 (7.69%)	5 (6.41%)
Same (0)	3 (3.85%)	17 (21.79%)	9 (11.54%)	43 (55.13%)	50 (64.10%)
Less (-1)	4 (5.13%)	2 (2.56%)	1 (1.28%)	6 (7.69%)	5 (6.41%)
No Basis to Judge	0 (0%)	51 (65.38%)	67 (85.90%)	23 (29.49%)	18 (23.08%)
Mean	0.86	0.22	0	0	0

Community Cohesion

It is hypothesized that NEV travel provides an opportunity to develop a cohesive community because NEVs travel at lower speeds and invite attention from passers-by (Cosgrove, 2007). Because NEVs have a limited travel range (approximately thirty miles on one battery charge.), NEV users will be more likely to shop locally and support local businesses. From the survey, 94% of NEV respondents indicated that they use their NEV to attend or participate in community or social activities, and 81% would still attend or participate in these activities without their NEV. These findings indicate that NEVs do help develop community cohesion as some of the activities are NEV-based, such as the Lincoln Hills Low-Speed Vehicle (LSV) Users Group meetings and activities. Because most respondents indicated that they would participate in many of the same activities that are not NEV-based without an NEV, however, it is unclear if the NEVs provide more cohesion than traditional forms of transportation. This area would also be better understood with more research through a detailed travel study.

FINDINGS AND RECOMMENDATIONS

This evaluation of the Lincoln NEV Transportation Plan indicates that the City of Lincoln is meeting its goals of maintaining safety while increasing mobility to its residents. Based on these findings, the provisions in AB2353 should be continued in the City of Lincoln and the City of Rocklin in the County of Placer, and possibly expanded statewide. This evaluation shows no safety impacts with the implementation of the NEV Transportation Plan. While speeds may decrease slightly, traffic flow does not appear to be impeded. No crashes or incidents involving NEVs have been reported within the City, and survey responses indicate that traditional motorists feel safe around NEVs. Although bicyclists and NEV users have both indicated that they feel safer in their own lanes than in shared lanes, only 16% of all bicyclists surveyed indicated that they had a problem sharing space with NEVs in shared NEV/bicycle lanes. The primary issue in these instances seems to relate to conflicts when a quiet and generally faster NEV tries to pass and overtake a bicycle, which may be because these two modes operate at similar speeds and it may be more difficult to pass.

With regards to traffic flow, the survey indicates that traditional automobile drivers feel that NEVs slightly decrease the travel speed. A speed study on East Lincoln Parkway confirmed this finding, but it should be noted that the reduced speed was still above the posted speed

limit. With regard to signage and pavement markings, most NEV users, traditional motorists, and bicyclists confirm that the current signage and striping is easy to read and understand. However, it is clear that work still needs to be done to better educate the general public and all road users about what an "NEV" is.

Based on these findings, it is recommended that the provisions in AB2353 should be continued in the cities of Lincoln and Rocklin. The program can be successfully implemented statewide, but it is recommended that a more comprehensive analysis be conducted when more of the approved NEV Transportation Plan has been implemented. A more comprehensive analysis would help to better evaluate the potential safety concerns that may exist on higher speed facilities. At this time, only a small fraction of the total lane-miles in the NEV Transportation Plan are located on higher-speed facilities, and there have been some safety concerns by NEV users sharing facilities with traditional automobiles and by bicyclists sharing facilities with NEV users.

FUTURE WORK AND REFINEMENTS TO LINCOLN'S NEV TRANSPORTATION PLAN

To better evaluate Lincoln's NEV Transportation Plan and the associated benefits to the City, more comprehensive studies are needed. For the NEV Transportation Plan to continue to be successful, the City of Lincoln will need to continue to work with its residents as well as members of the NEV community to continue to evaluate potential safety and traffic issues related to signage, striping, and pavement marking. The user survey in this report was limited to the front of Safeway Market and resulted in a very limited sampling of users. To obtain a more representative sample of Lincoln residents, additional sampling in the downtown core or at other mixed-use areas of the City should be considered. The traffic engineering studies were limited to one facility on East Lincoln Parkway and resulted in a limited assessment of traffic impacts of NEVs. Additional data collection on other high-speed facilities should be considered where both speed and level of service (LOS) are evaluated.

As a result of this evaluation, the City Lincoln may consider addressing several items related to the implementation of the existing NEV Transportation Plan. These items include, but are not limited to:

- Exploring striping concepts to help facilitate the merging of NEVs across multiple general purpose lanes to make a left-hand turn at an intersections,
- Providing increased enforcement on NEV parking facilities,
- Implementing Class I NEV routes along major arterials and collectors where practical.

Along with continued evaluation of the NEV Transportation Plan, future research needs to address the energy and air quality impacts associated with trips generated by NEVs and substituted for other modes. There is a clear need for detailed travel studies by NEV users, which can help to provide additional insight on some of the following questions:

- What is the modal split of NEVs in the City of Lincoln?
- What are typical NEV trip characteristics, including trip length, frequency, and purpose?
- What household characteristics affect NEV trip generation?
- What factors affect the substitution of traditional automobile trips by NEVs?
- What roadway characteristics affect NEV route choice?

Through continued study and evaluation of these issues, NEVs can continue to add to the mobility of residents in the City of Lincoln and Rocklin and eventually throughout the State of California.

STATEWIDE NEV POLICY IMPLEMENTATION

To encourage statewide implementation of NEVs, the Cities of Lincoln and Rocklin may want to develop a statewide task force to coordinate efforts with other cities that are interested in similar NEV Transportation Plans. It is also recommended that the Cities of Lincoln and Rocklin continue to work with state legislature to coordinate these efforts.

There are several communities throughout the state that are currently pursuing drafting legislation to allow them to stripe NEV lanes on roadways with speed limits above 35 mph. Orange County was successful in drafting legislation (California Senate Bill 956) and in obtaining approval to begin developing an NEV Transportation Plan, similar to that of Lincoln and Rocklin, shown in Appendix G. In addition, cities in Yolo County such as Davis and Woodland have also expressed interest in developing an NEV Transportation Plan. If a statewide NEV policy is implemented, it could include the standardization of signage, striping, and design specifications, all of which could help Caltrans and federal transportation agencies expedite the approval process while helping to ensure consistency among local jurisdictions throughout the state.

REFERENCES

American Association of State Highway and Transportation Officials (AASHTO) (2000). *A Policy on Geometric Designs of Highways and Streets*. Washington D.C., 2000.

Cosgrove, T., J. Pedri, and R. Watkins (2007). "Thriving with Neighborhood Electric Vehicles," Transportation Research Board Conference on Transportation, Land-Use and Air Quality, Orlando, Florida, July.

Fehr & Peers Transportation Consultants (2006). *Twelve Bridges Golf Cart Transportation Plan. City of Lincoln.* June. <http://www.ci.lincoln.ca.us/pagedownloads/GCTP%20June%202006.pdf>. Last accessed November 1, 2007.

Foster, K.L., L. Rubio, M. Rock, S. Ainsworth, and R.O. Watkins (undated). *Final Draft NEV Transportation Plan*, City of Rocklin Public Works Department.

MHM Engineers & Surveyors (2006). *City of Lincoln NEV Transportation Plan*. August. <http://www.ci.lincoln.ca.us/pagedownloads/Final%20NEV%20Transportation%20Plan.pdf>. Last accessed November 1, 2007.

National Highway Traffic Safety Administration (NHTSA) (2004). "Federal Motor Vehicle Safety Standards and Regulations" Booklet, HS-808-878, March. <http://www.nhtsa.dot.gov/cars/rules/standards/FMVSS-Regs/pages/Part571SD301to500.htm>. Last accessed November 1, 2007.

National Highway Traffic Safety Administration (NHTSA) (1998). "Notices and Final Rules: Low Speed Vehicles," <http://www.nhtsa.gov/cars/rules/rulings/lsv/lsv.html>. Last accessed November 1, 2007.

Stein, A.G., K. Kurani, and D. Sperling (1996). "Roadway Infrastructure for Neighborhood Electric Vehicles," *Transportation Research Record 1444*, p. 23-27.

TY Lin International, Traffic and Engineering Surveys (2005). Prepared for the City of Lincoln, November 16, 2005.

APPENDIX A. APPROVED SIGNAGE AND PAVEMENT MARKING

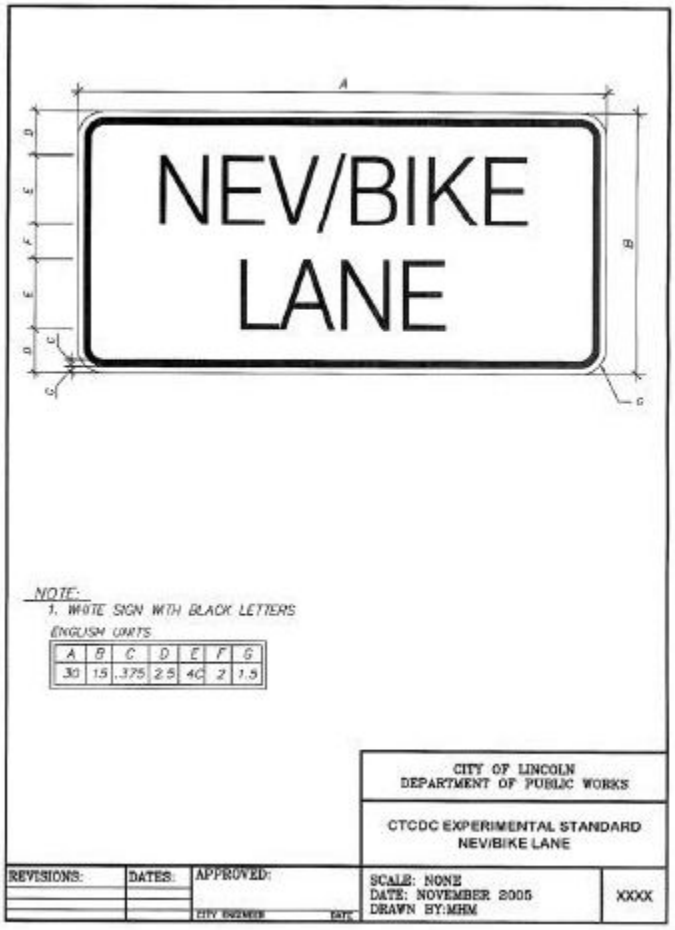


Figure 12. Combination NEV/Bike Lane Sign

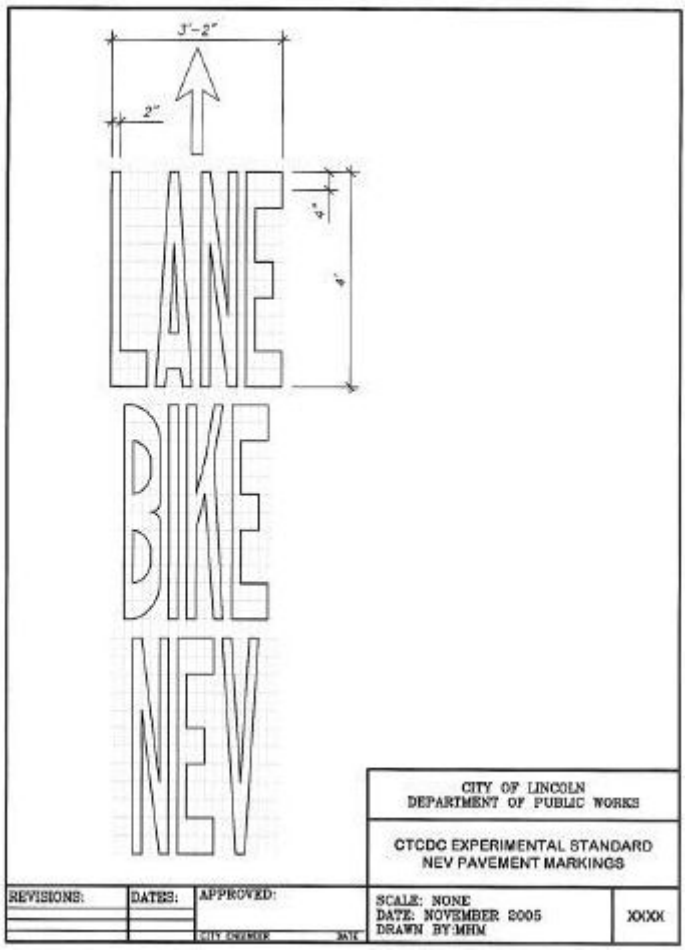


Figure 13. Combined NEV/Bicycle Lane Pavement Marking

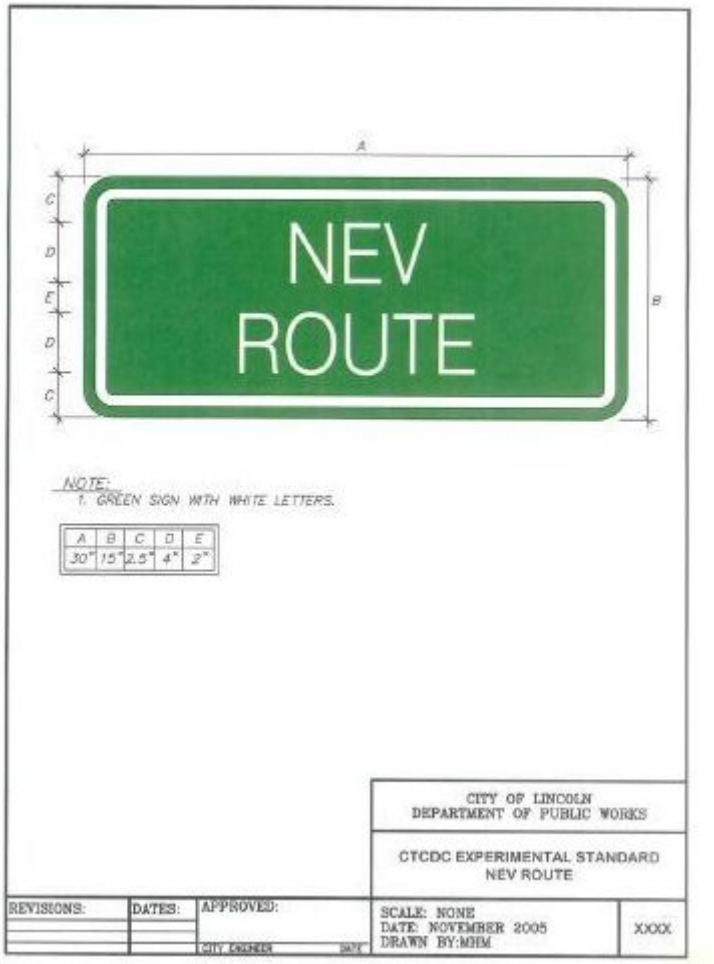


Figure 14. NEV Route Sign

APPENDIX B. STATISTICAL ANALYSIS OF DIFFERENCES IN MEAN SPEEDS

The t-test is used to assess whether the observed difference between the two mean speeds are *statistically* different from each other. The t-test can be used to determine if the difference between the mean (average) speeds is large enough, given the amount of variability or spread among the observed speeds.

The formula for the t-test is a ratio. The numerator of the ratio is just the difference between the two mean speeds, while the denominator is a measure of the variability or dispersion of the speeds. The difference in the average speed between 2005 and 2007 is thought to be attributable to changes along the roadway (i.e., the introduction of NEVs), while the bottom part of the formula is a measure of variability of the speed (s^2), given the number of observations (N).[1] The formula shows the formula for the t-test and how the numerator and denominator are related to the distributions.

$$t_{calc} = \frac{\overline{X}_{2005} - \overline{X}_{2007}}{\sqrt{\frac{s_{2005}^{\ 2}}{N_{2005}} + \frac{s_{2007}^{\ 2}}{N_{2007}}}}$$

The calculated t-statistic is compared with a t-statistic in a table to determine if it is too large to be attributable to the randomness of the observed speeds. Instead, we must infer that the difference is due to the some other source, like the addition of an NEV lane.

Table 11. T-Test for Northbound Traffic

	2005	2007
Mean, mph	39	36
Standard Deviation, mph	4.6	4.6
Sample Size, N	162	351
Calculated t- statistic	6.9	

Table 12. T-Test for Southbound Traffic

	2005	2007
Mean, mph	40	38
Standard Deviation, mph	4.4	5.2
Sample Size, N	101	258
Calculated t- statistic	3.4	

In both cases, the calculated t-statistics of 6.9 and 3.4, respectively, are greater than the value of 1.96 associated with a 95% confidence level, indicating that the difference in speeds is statistically significant in both directions.

[1] The variability or variance (s^2) is equal to the standard deviation (s) squared.

APPENDIX C. LINCOLN TRANSPORTATION SURVEY

The goal of this survey is to obtain your opinion of the transportation choices, particularly with regard to public opinion about the introduction of neighborhood electric vehicles (NEVs) in the City of Lincoln. Your views, experiences and insights will be greatly appreciated. It is hoped that this survey results could help the City of Lincoln prioritize future transportation planning, so your participation and input will make a difference. This survey is anonymous and your answers will not be associated with your name. If you have any questions, please call (916) 278-5348.

A. NEV USERS

Q1. Do you use a Neighborhood Electronic Vehicle (NEV) as a mode of transportation?
☐ Yes, go to Q2. ☐ No, jump to Q28.

Q2. How many NEVs do you own?
☐ One ☐ Two ☐ Three or more

Q3. How long (in months) have you owned an NEV? (If you own multiple NEVs, please enter the number of months for the NEV you have owned the longest.)
Enter numerical response: _____

Q4. How many individuals does the NEV (which you use most frequently) seat (including the driver)?
☐ One ☐ Two ☐ Three ☐ Four ☐ Five or more

Q5. Have you ever been in an accident or crash with your NEV?
☐ No ☐ Yes
If "Yes," please explain:_____.

Q6 through Q8. Please indicate how safe you feel driving your NEV ….

Q6. …On traditional roads with lanes shared by traditional automobiles and NEVs
☐ Very Safe ☐ Somewhat Safe ☐ Neither Safe Nor Unsafe
☐ Somewhat Unsafe ☐ Very Unsafe ☐ No Basis to Judge

Q7. …On traditional roads with separate lanes designated for NEVs:
☐ Very Safe ☐ Somewhat Safe ☐ Neither Safe Nor Unsafe
☐ Somewhat Unsafe ☐ Very Unsafe ☐ No Basis to Judge

Q8. …On paths restricted only to NEVs
☐ Very Safe ☐ Somewhat Safe ☐ Neither Safe Nor Unsafe
☐ Somewhat Unsafe ☐ Very Unsafe ☐ No Basis to Judge

Q9. Where do you prefer to drive your NEV?

- ☐ Shared lanes with traditional automobiles
- ☐ Separated NEV lanes
- ☐ NEV-only paths
- ☐ No preference

Q10. Do you drive longer distances to avoid traveling off dedicated NEV facilities?

☐ Yes ☐ No ☐ Not sure

Q11. Do you have problems merging from NEV lanes through into lanes with regular vehicles and mixed traffic?

☐ Yes ☐ No

Q12. Do you have problems crossing mixed traffic to make left turns?

☐ Yes ☐ No

Q13. Are the current NEV signs easy to read and understand?

☐ Yes ☐ No

If "No," please explain:_____.

Q14. Are the current NEV pavement markings and striping easy to read and understand?

☐ Yes ☐ No

If "No," please explain:_____.

Q15. While in your NEV, how often do you find yourself crossing or using a road designated for NEVs with a speed limit over 35 mph?

☐ Very Often ☐ Occasionally ☐ Rarely ☐ Never ☐ Not Sure

Q16 through 20. Before owning my NEV, I ….

Q16. … Drove a traditional automobile:

☐ More. ☐ With the same frequency as I do now. ☐ Less.

Q17. ... Rode my bicycle:

☐ More. ☐ With the same frequency as I do now. ☐ Less.

Q18. … Used public transportation:

☐ More. ☐ With the same frequency as I do now. ☐ Less.

Q19. … Walked:

☐ More. ☐ With the same frequency as I do now. ☐ Less.

Q20. … Traveled outside of my home

☐ More. ☐ With the same frequency as I do now. ☐ Less.

Q21. Did you sell or get rid of a traditional vehicle after acquiring your NEV?

☐ Yes ☐ No

Q22. How many trips (one-way) do you make in your NEV each week? (For example, if you go to the grocery store and back, you would be making two one-way trips.)

Enter numerical response: _____

Q23. Approximately, how far (on average) is each of your NEV trips?

☐ Less than one mile ☐ 1 – 2 miles ☐ 3 – 4 miles
☐ 5 – 6 miles ☐ 7 – 8 miles ☐ 9 – 10 miles
☐ 11 miles or more

Q24. Do you use your NEV to attend or participate in community or social activities?

☐ Yes ☐ No

Q25. What types of community or social activities do you use your NEV to attend or participate in?

Enter open-ended response: _____

Q26. Would you still attend or participate in these activities without your NEV?

☐ Yes ☐ No ☐ Not Applicable

Q27. Would you suggest expanding or reducing the NEV system in the City of Lincoln?

☐ Expanding ☐ Reducing ☐ Neither

B. TRADITIONAL MOTORISTS

Q28. Do you use an automobile as a form of transportation?

☐ Yes, go to Q29. ☐ No, jump to Q36.

Q29. Do you think NEVs affect the travel speed on roads where NEVs and traditional automobiles share lanes?

☐ Yes ☐ No

If "Yes," please explain:_____.

Q30. Do you think NEVs affect the travel speed on roads where NEVs and traditional automobiles have separate lanes?

☐ Yes ☐ No

If "Yes," please explain:_____.

Q31. While driving your traditional automobile, have you ever been in an accident or incident with a neighborhood electric vehicle (NEV)?

☐ Yes ☐ No

If "Yes," please explain:_____.

Q32 though Q34. Please indicate how safe you feel driving your automobile ….

Q32. …On traditional roads:
☐ Very Safe ☐ Somewhat Safe ☐ Neither Safe Nor Unsafe
☐ Somewhat Unsafe ☐ Very Unsafe ☐ No Basis to Judge

Q33. … On traditional roads with lanes shared by traditional automobiles and NEVs:
☐ Very Safe ☐ Somewhat Safe ☐ Neither Safe Nor Unsafe
☐ Somewhat Unsafe ☐ Very Unsafe ☐ No Basis to Judge

Q34. … On traditional roads with separate lanes designated for NEVs.
☐ Very Safe ☐ Somewhat Safe ☐ Neither Safe Nor Unsafe
☐ Somewhat Unsafe ☐ Very Unsafe ☐ No Basis to Judge

C. BICYCLISTS

Q35. Do you use a bicycle as a mode of transportation?
☐ Yes, go to Q36. ☐ No, jump to Q48.

Q36. How many days per week do you typically ride your bicycle?
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7

Q37. How many miles per week, on average, do you ride your bicycle?
Please enter numeric response: _____

Q38. Have you ever been in an accident or incident with an NEV?
☐ Yes ☐ No
If "Yes," please explain:_____.

Q39 through Q43. Please indicate how safe you feel riding your bicycle ….

Q39. … On traditional roads without bicycle lanes or paths:
☐ Very Safe ☐ Somewhat Safe ☐ Neither Safe Nor Unsafe
☐ Somewhat Unsafe ☐ Very Unsafe ☐ No Basis to Judge

Q40. … On traditional roads with shared bicycle/NEV lanes:
☐ Very Safe ☐ Somewhat Safe ☐ Neither Safe Nor Unsafe
☐ Somewhat Unsafe ☐ Very Unsafe ☐ No Basis to Judge

Q41. … On traditional roads with bicycle-only lanes:
☐ Very Safe ☐ Somewhat Safe ☐ Neither Safe Nor Unsafe
☐ Somewhat Unsafe ☐ Very Unsafe ☐ No Basis to Judge

Q42. … On separated bicycle/NEV paths:
☐ Very Safe ☐ Somewhat Safe ☐ Neither Safe Nor Unsafe
☐ Somewhat Unsafe ☐ Very Unsafe ☐ No Basis to Judge

Q43. … On separated bicycle-only paths:
☐ Very Safe ☐ Somewhat Safe ☐ Neither Safe Nor Unsafe
☐ Somewhat Unsafe ☐ Very Unsafe ☐ No Basis to Judge

Q44. Does the presence of an NEV affect your bicycle riding speed?
☐ Yes ☐ No
If "Yes," please explain:_____.

Q45. Are the current bicycle/NEV signs easy to read and understand?
☐ Yes ☐ No ☐ No Basis to Judge
If "No," please explain:_____.

Q46. Are the current bicycle/NEV pavement markings and striping easy to read and understand?
☐ Yes ☐ No ☐ No Basis to Judge
If "No," please explain:_____.

Q47. Do you use your bicycle to attend community or social activities?
☐ Yes ☐ No

D. GENERAL INFORMATION (ALL RESPONDENTS)

Q48. In what city do you live?
☐ Lincoln ☐ Other: _____

Q49. Gender: ☐ Male ☐ Female

Q50. Marital status: ☐ Married ☐ Single ☐ Other

Q51. Age:
☐ Under 21 ☐ 36-40 ☐ 56-60
☐ 21-25 ☐ 41-45 ☐ 61-65
☐ 26-30 ☐ 46-50 ☐ 66-70
☐ 31-35 ☐ 51-55 ☐ Over 70

Q52. Employment status: ☐ Full-time ☐ Part-time ☐ Retired ☐ Unemployed

Q53. Please indicate your highest level of education:
☐ Some high school ☐ Technical college degree (A.A.)
☐ High school diploma ☐ College degree (Bachelors degree)
☐ Post-graduate degree

Q54. Including yourself, how many people live in your household?
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 or more

Q55. How many people living in your household work outside the home?
☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 or more

Q56. How many children under age 6 live in your household?
☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 or more

Q57. How many children 6 to 16 live in your household?
☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 or more

Q58. How many automobiles (not including NEVs or golf carts) are in your household?
☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 or more

Q59. Do you have a disability that prevents you from driving an automobile?
☐ Yes ☐ No

Q60. Do you have a condition (other than a disability) that prevents you from driving an automobile?
☐ Yes ☐ No

Q61. What is your approximate annual household income?

☐ No Income	☐ under $15,000	☐ $15,000 –24,999
☐ $25,000 – 34,999	☐ $35,000 – 44,999	☐ $45,000 –54,999
☐ $55,000 – 64,999	☐ $65,000 – 74,999	☐ $75,000 – 84,999
☐ $85,000 – 99,999	☐ $100,000 – 150,000	☐ over 150,000

Q62. Would you be willing to participate in future transportation studies for the City of Lincoln?
☐ Yes ☐ No

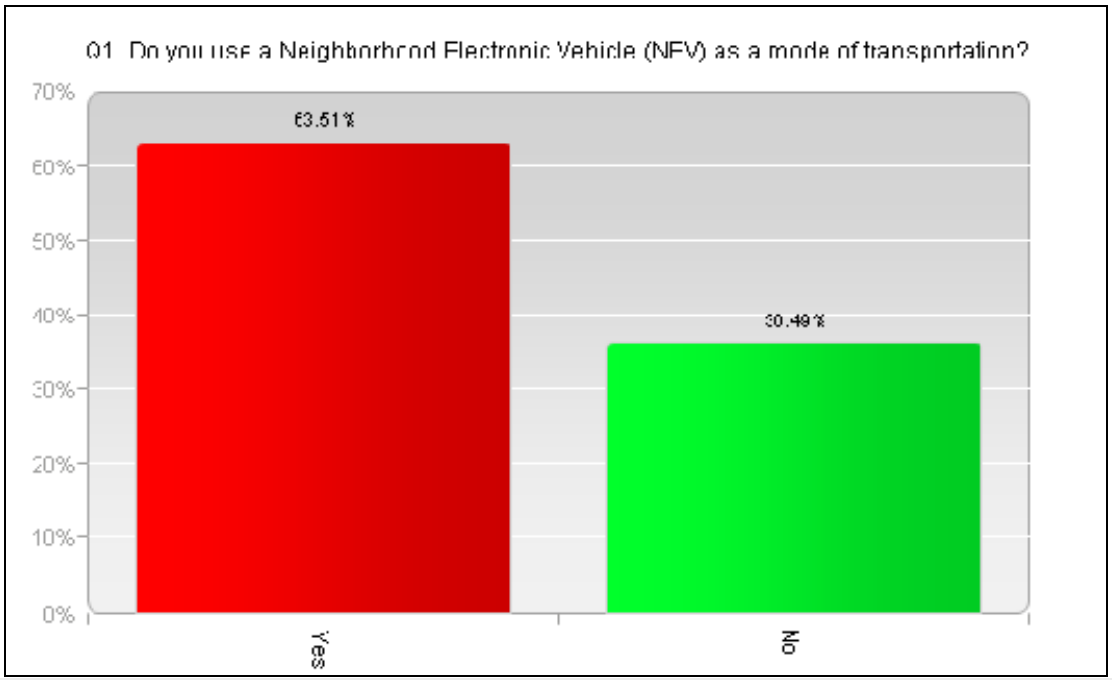
If "Yes," please include your name, and telephone number or e-mail address below so that we may contact you for further information and assistance.

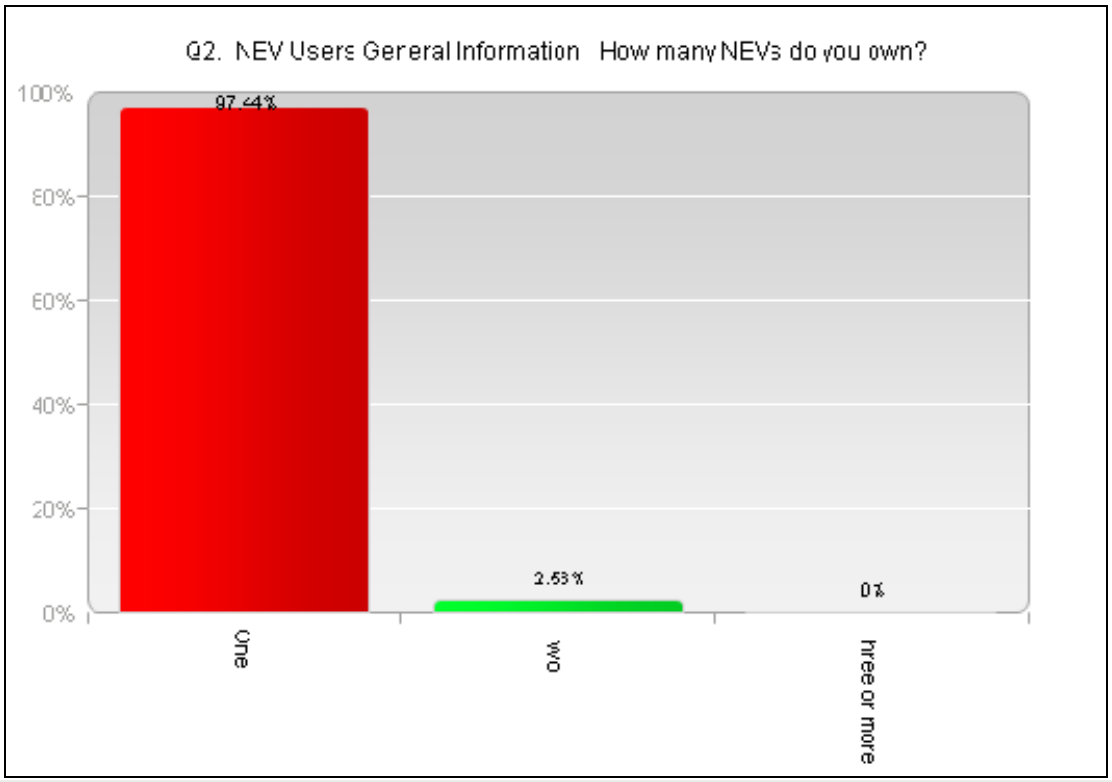
Name: _____

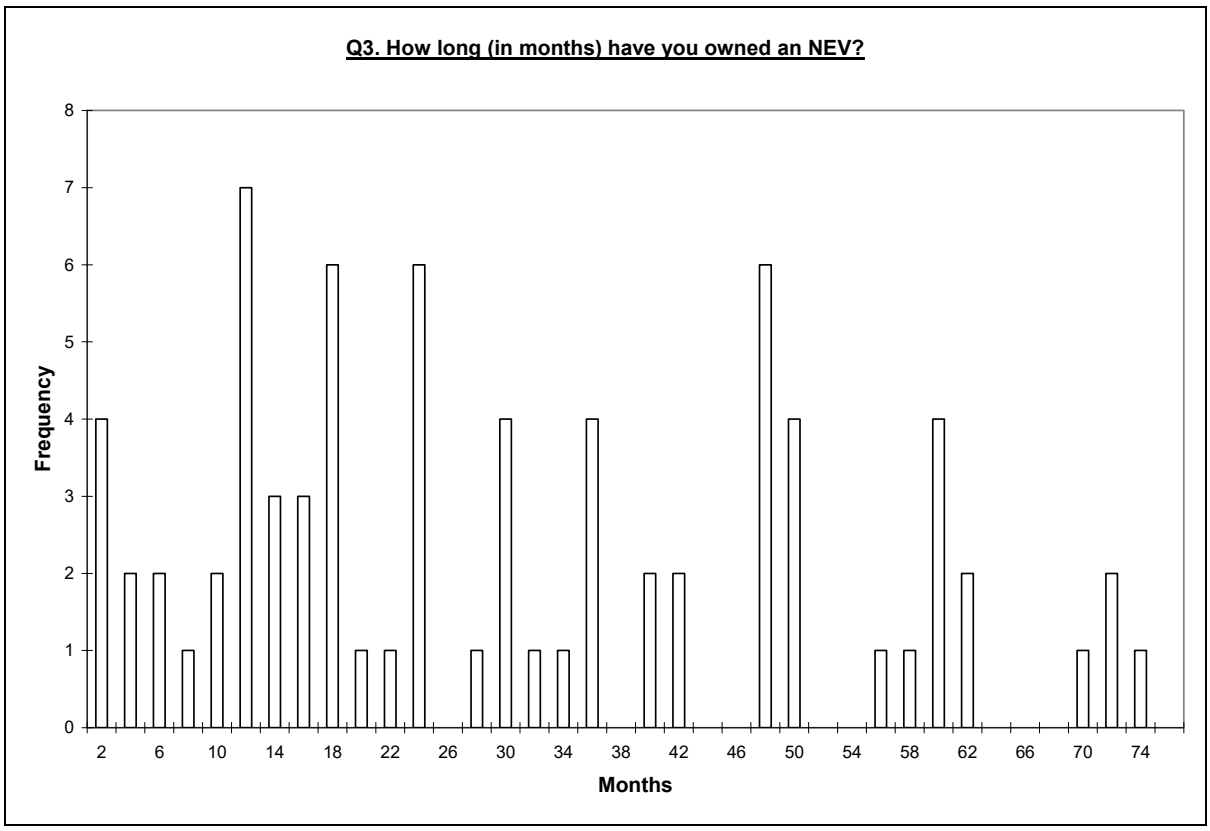
Phone Number: _____ (please include area code)
or
E-Mail Address: _____

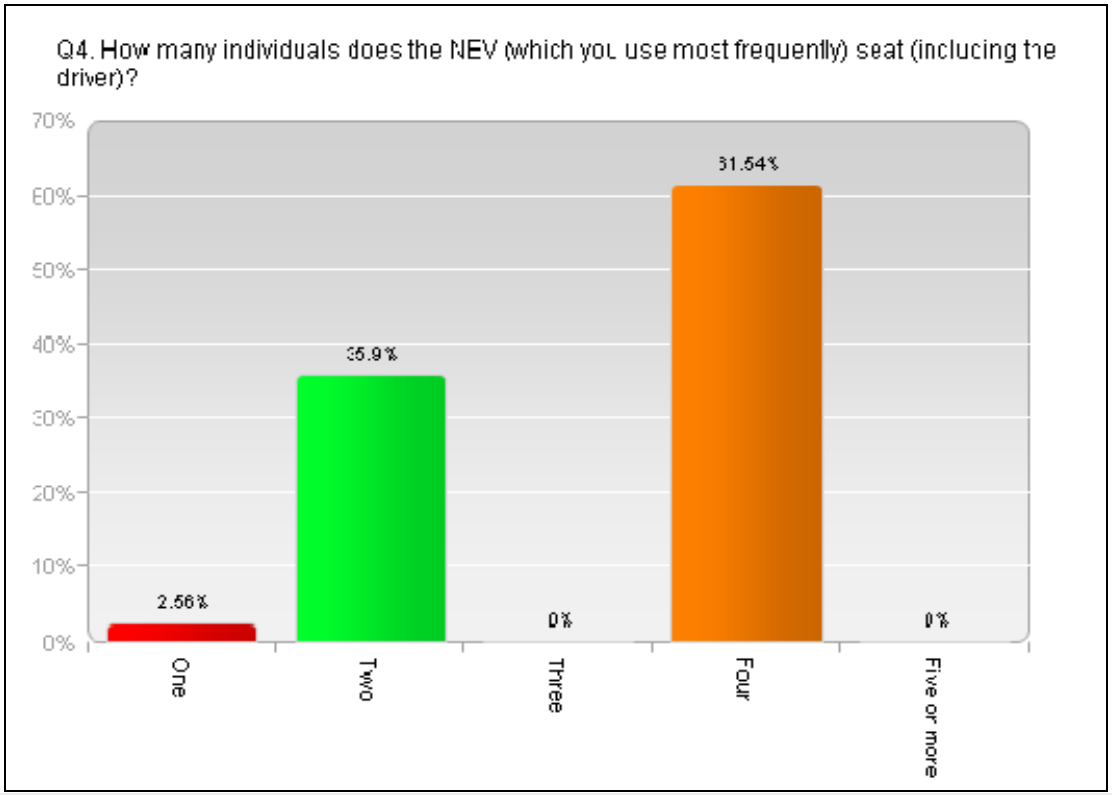
THANK YOU FOR YOUR PARTICIPATION!

APPENDIX D. LINCOLN TRANSPORTATION SURVEY RESULTS



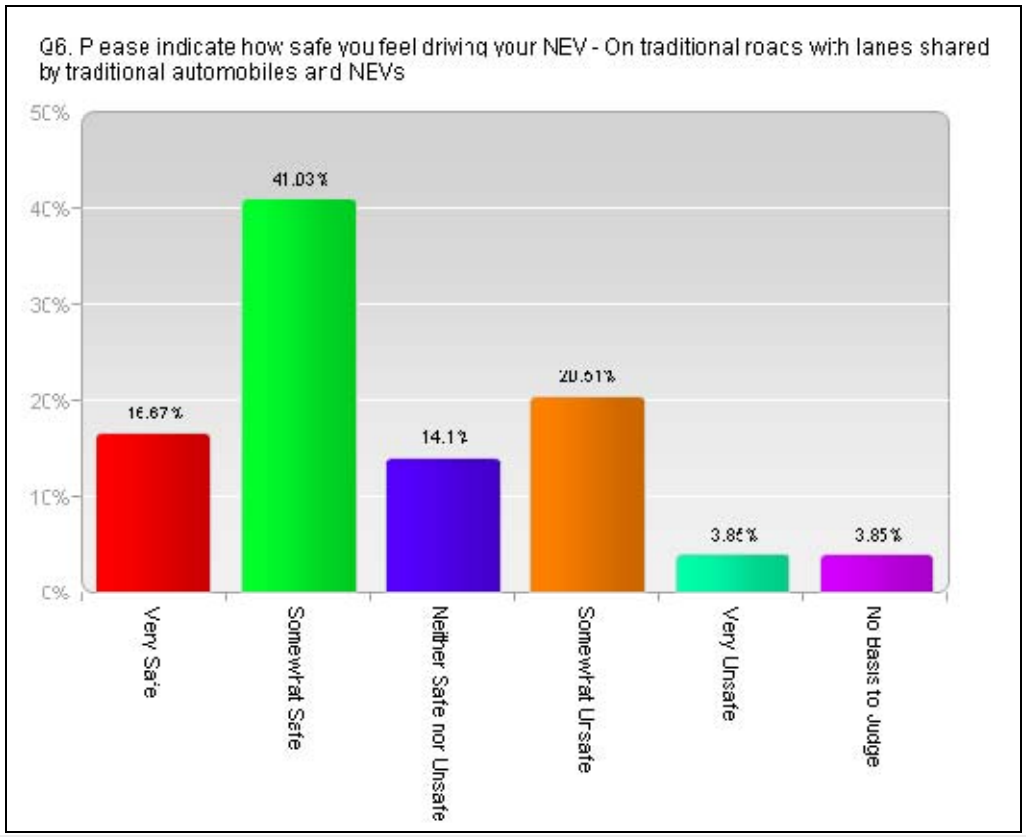


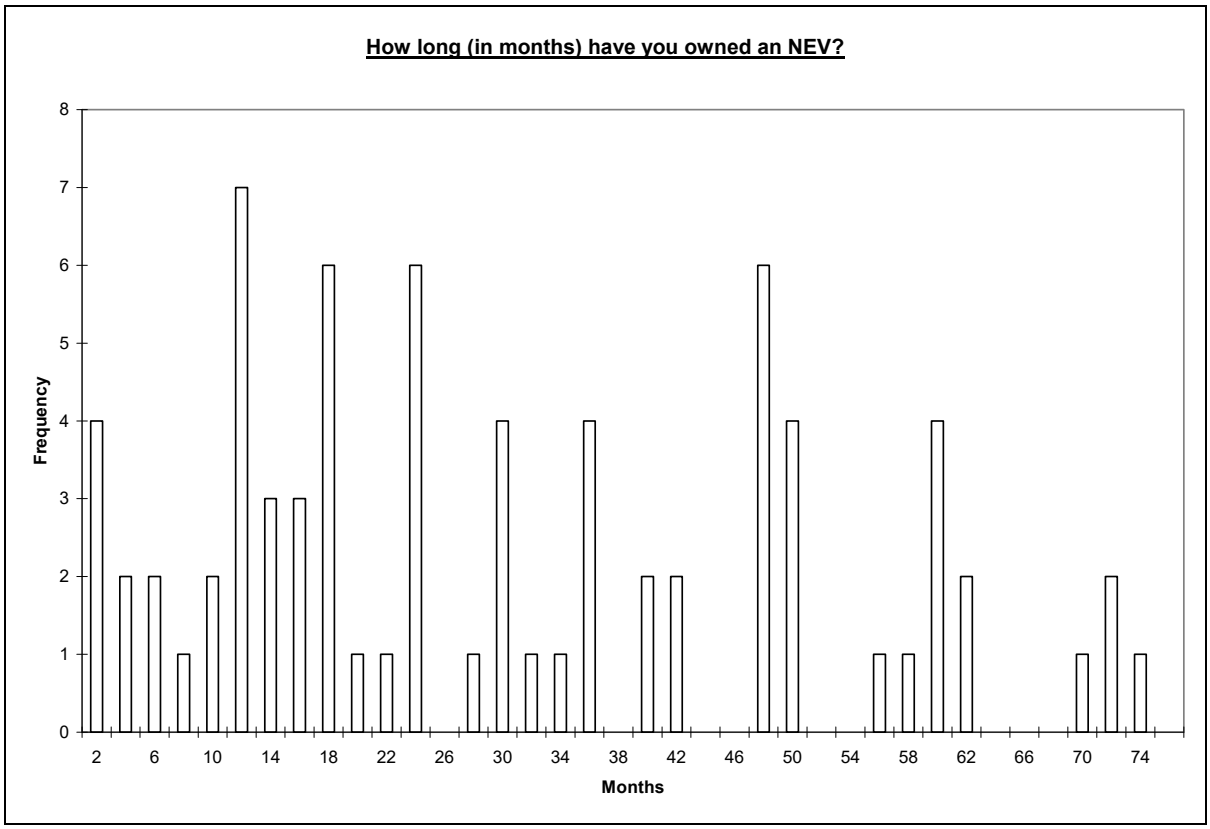

Q3. How long (in months) have you owned an NEV?
Frequency
Months
0
1
2
3
4
5
6
7
8
2
6
10
14
18
22
26
30
34
38
42
46
50
54
58
62
66
70
74

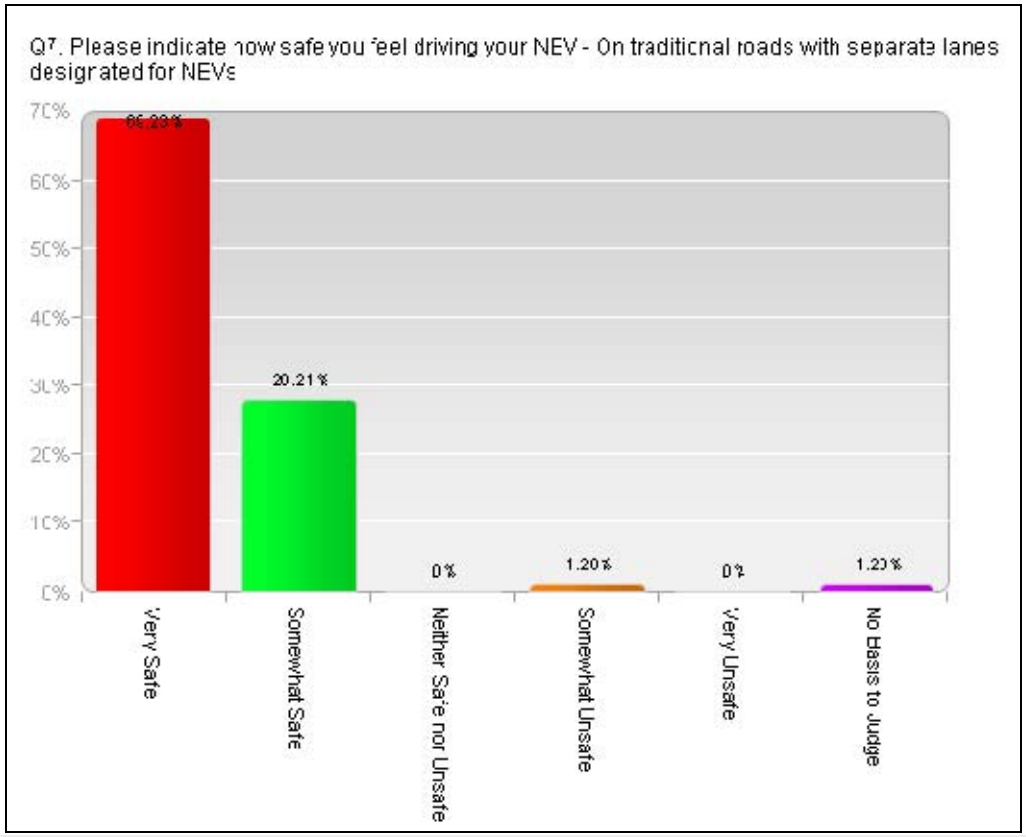

Q4. How many individuals does the NEV (which you use most frequently) seat (inclucing the driver)?
70%
60%
50%
40%
30%
20%
10%
0%
2.56%
35.9%
0%
31.54%
0%
One
Two
Three
Four
Five or more

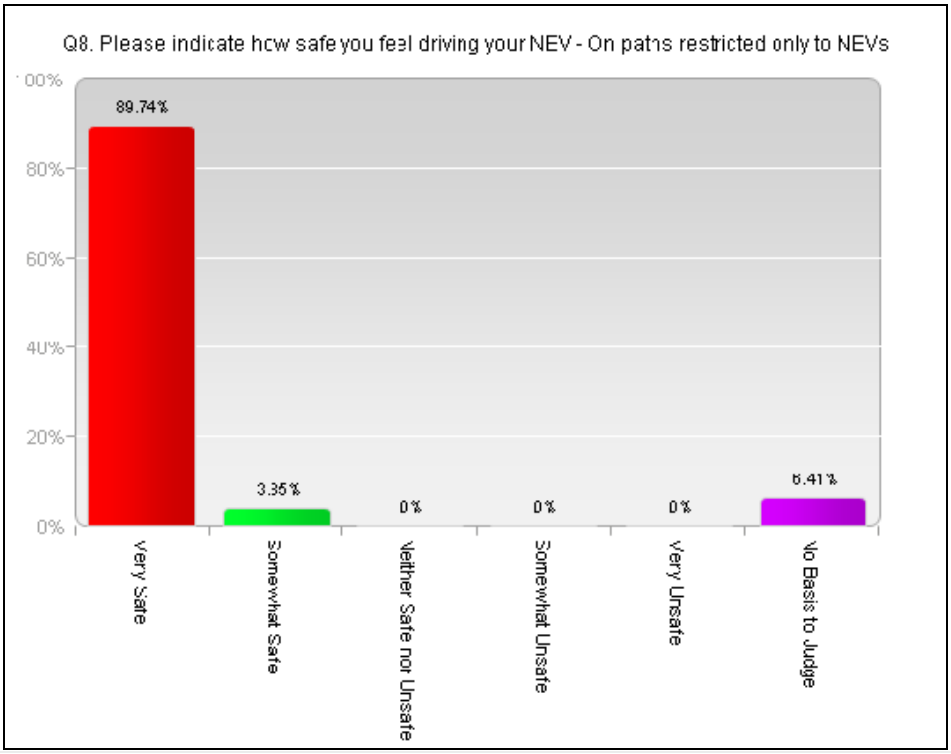
Q5. Safety Have you ever been in an accident or crash with your NEV?		
Count	**Percent**	
1	1.28%	Yes (please describe):
77	98.72%	No
78	Respondents	

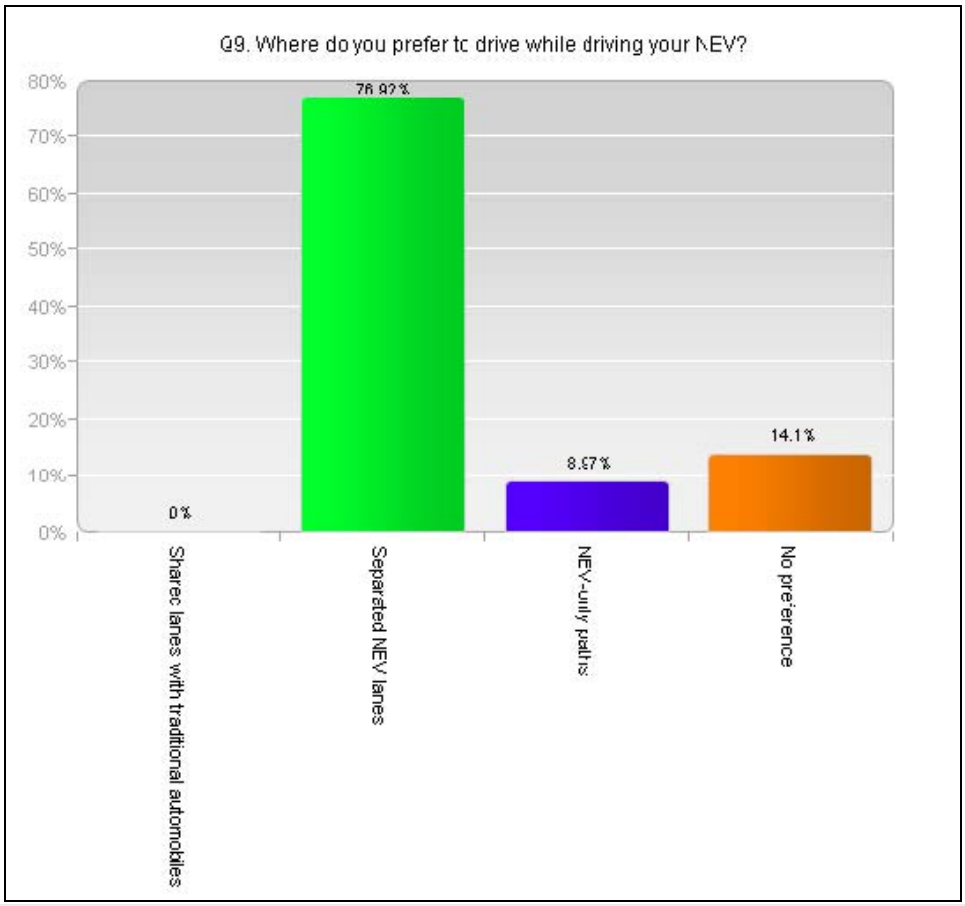
Note: The one "yes" response simply indicated "ran a red light" but the respondent did not elaborate on who was at fault or what the outcome was.

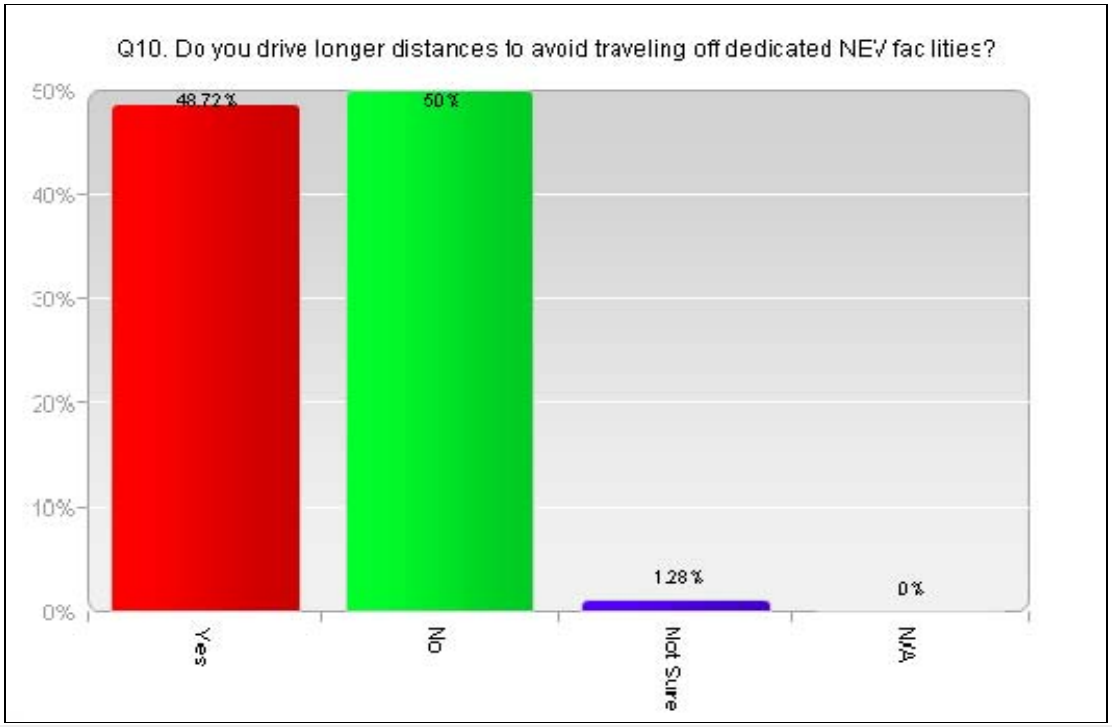


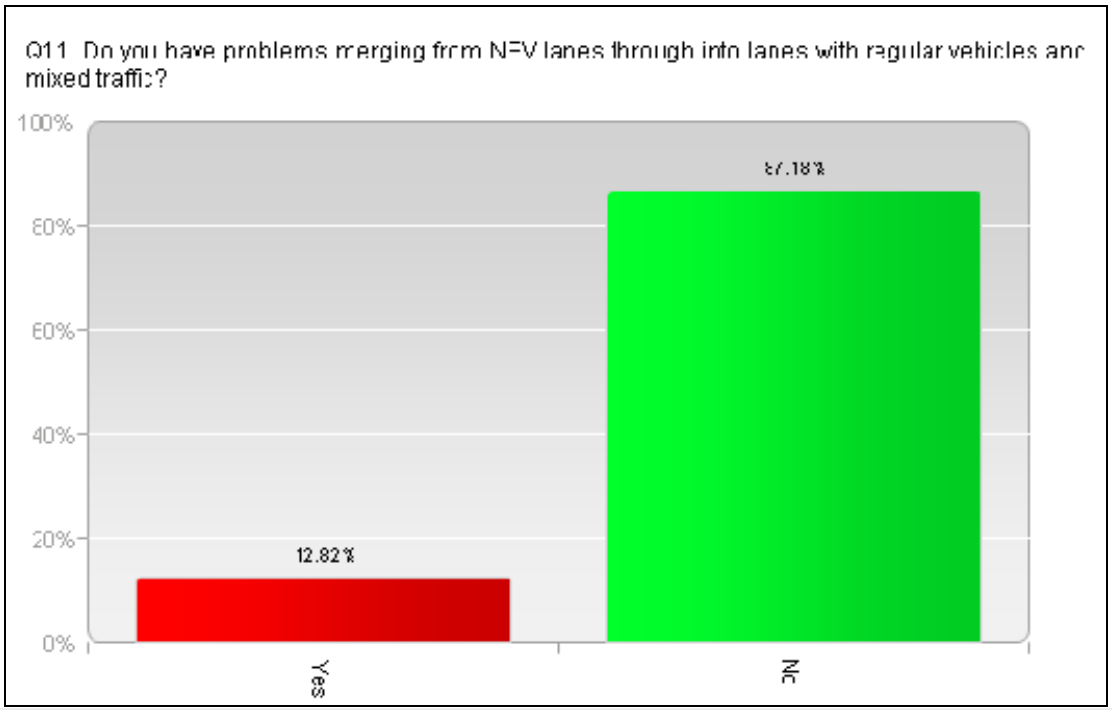

How long (in months) have you owned an NEV?
Frequency
Months
0
1
2
3
4
5
6
7
8
2
6
10
14
18
22
26
30
34
38
42
46
50
54
58
62
66
70
74

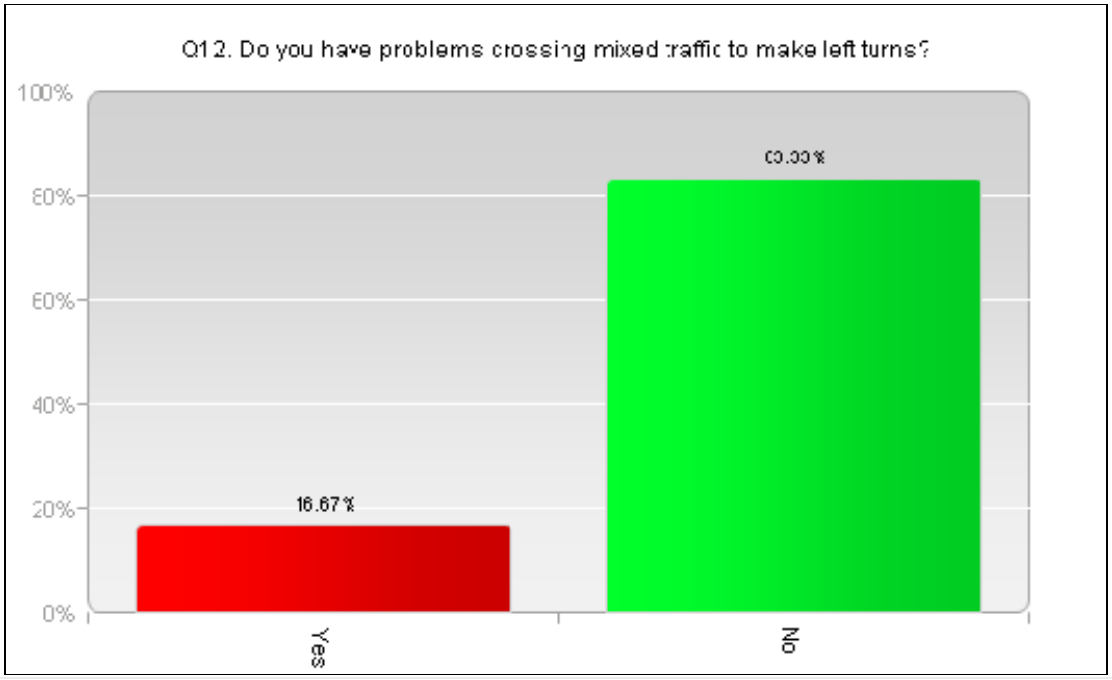

Q7. Please indicate how safe you feel driving your NEV - On traditional roads with separate lanes designated for NEVs
70%
60%
50%
40%
30%
20%
10%
0%
20.21%
0%
1.20%
0%
1.20%
Very Safe
Somewhat Safe
Neither Safe nor Unsafe
Somewhat Unsafe
Very Unsafe
No Basis to Judge

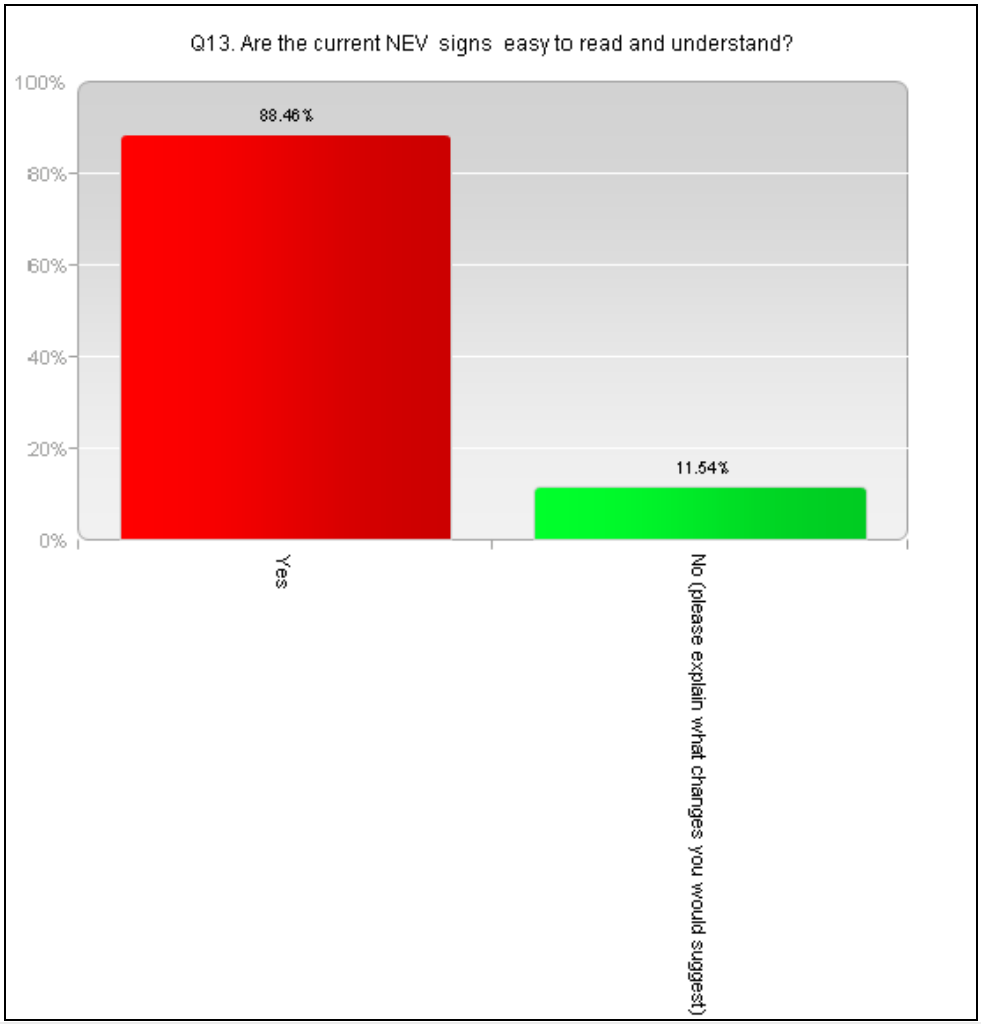

Q8. Please indicate how safe you feel driving your NEV - On paths restricted only to NEVs
100%
80%
60%
40%
20%
0%
89.74%
3.35%
0%
0%
0%
6.41%
Very Safe
Somewhat Safe
Neither Safe nor Unsafe
Somewhat Unsafe
Very Unsafe
No Basis to Judge

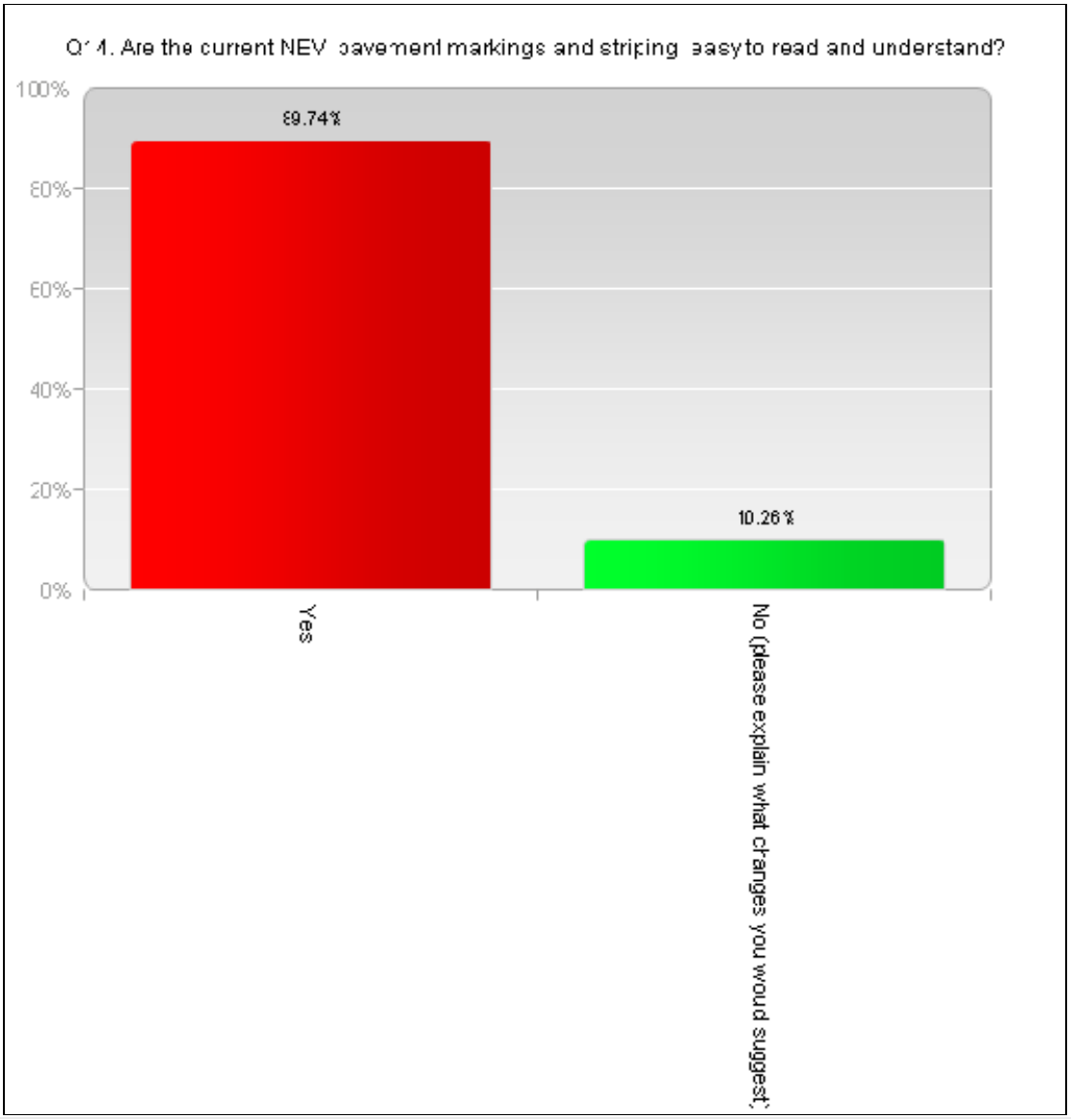

Q9. Where do you prefer to drive while driving your NEV?
80%
70%
60%
50%
40%
30%
20%
10%
0%
0%
76.92%
8.97%
14.1%
Shared lanes with traditional automobiles
Separated NEV lanes
NEV-only paths
No preference

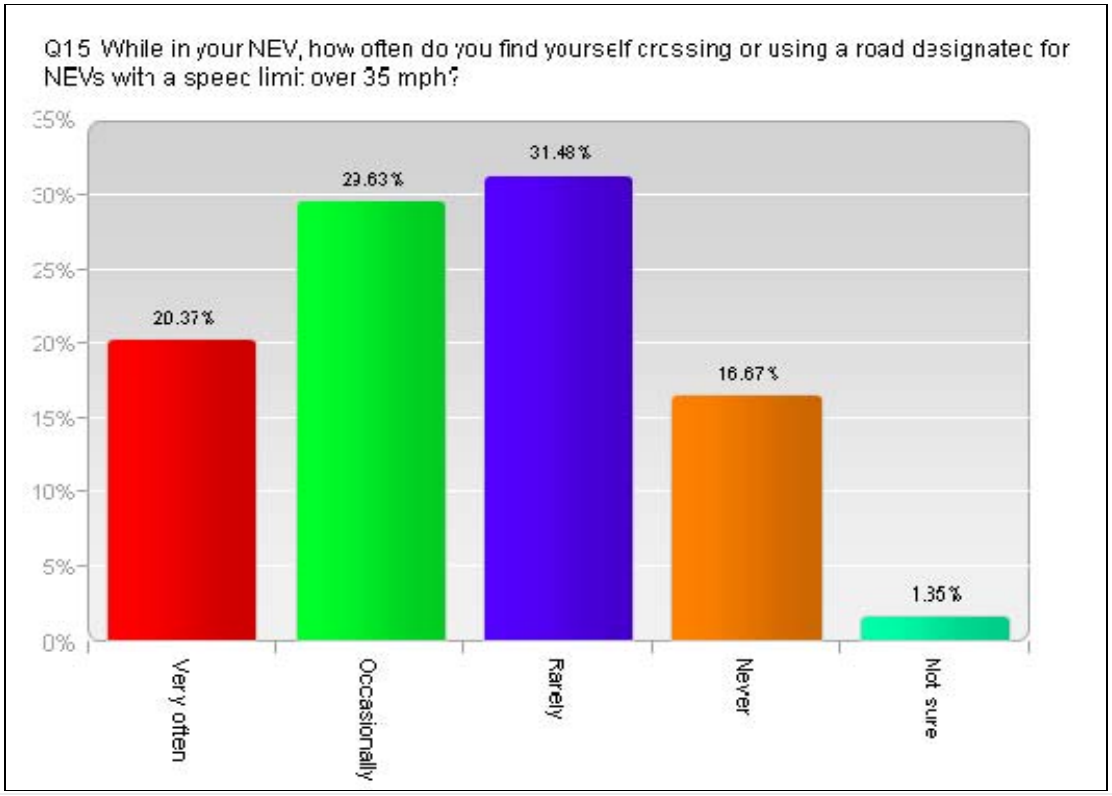

Q10. Do you drive longer distances to avoid traveling off dedicated NEV facilities?
50%
40%
30%
20%
10%
0%
48.72%
50%
1.28%
0%
Yes
No
Not Sure
N/A

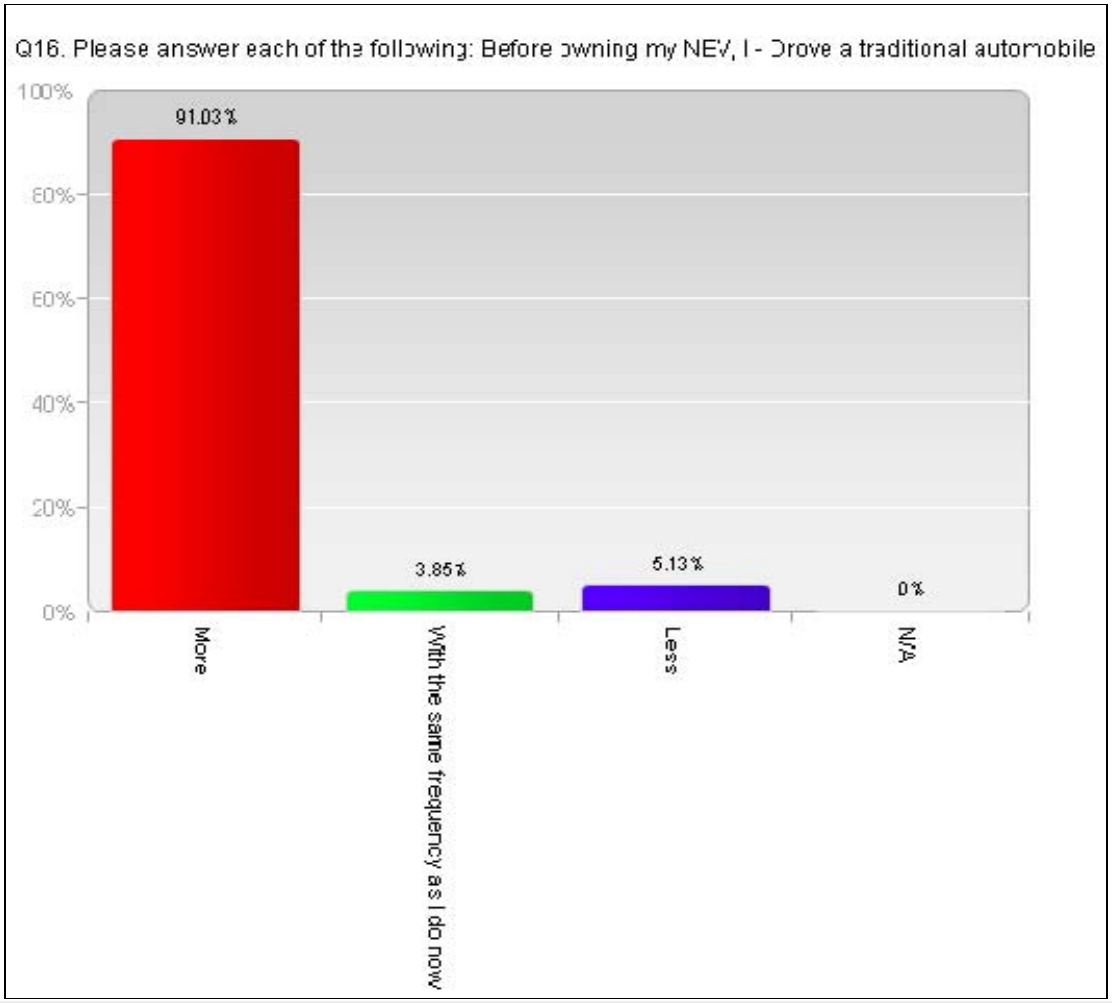

Q11. Do you have problems merging from NEV lanes through into lanes with regular vehicles and mixed traffic?
100%
80%
60%
40%
20%
0%
87.18%
12.82%
Yes
No

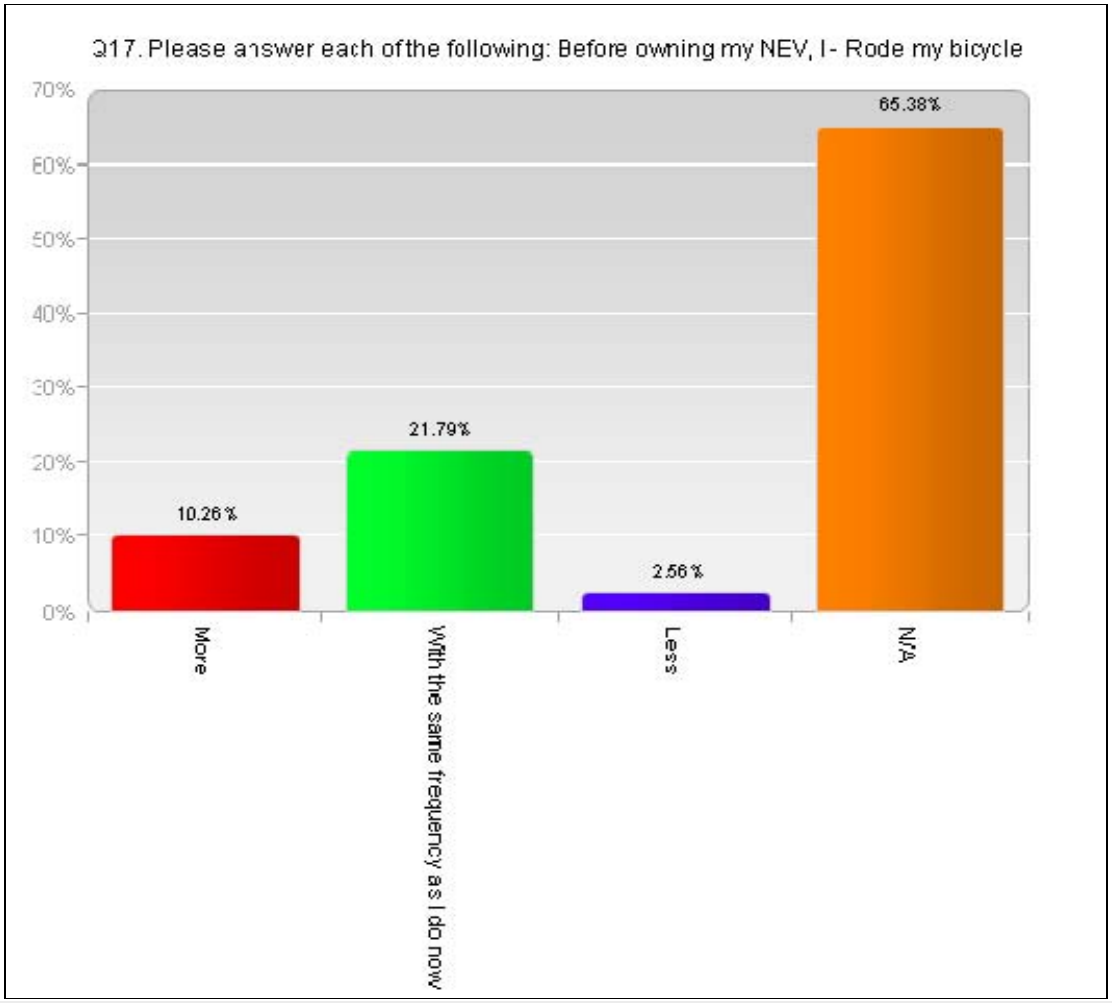

Q12. Do you have problems crossing mixed traffic to make left turns?
100%
80%
60%
40%
20%
0%
16.67%
Yes
No

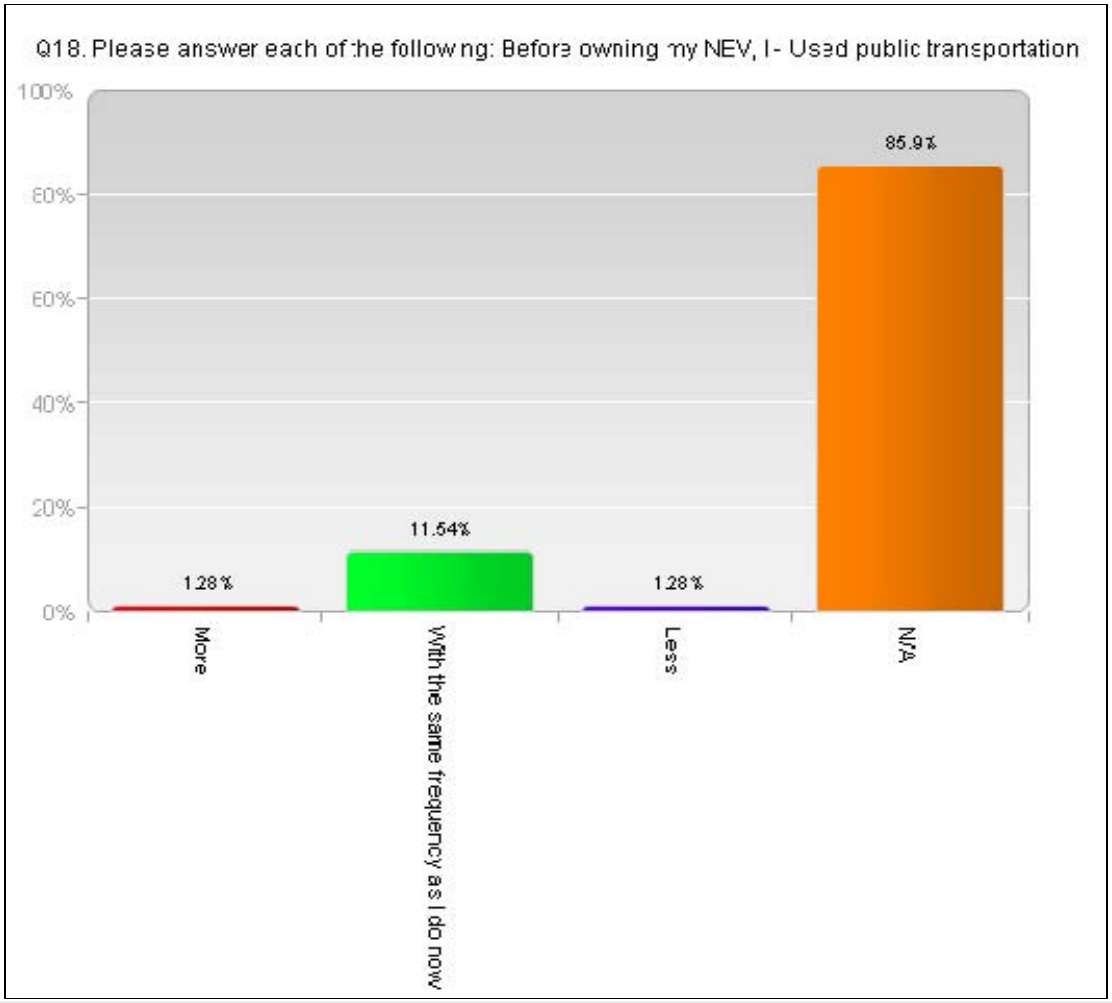

Q13. Are the current NEV signs easy to read and understand?
100%
80%
60%
40%
20%
0%
88.46%
11.54%
Yes
No (please explain what changes you would suggest)

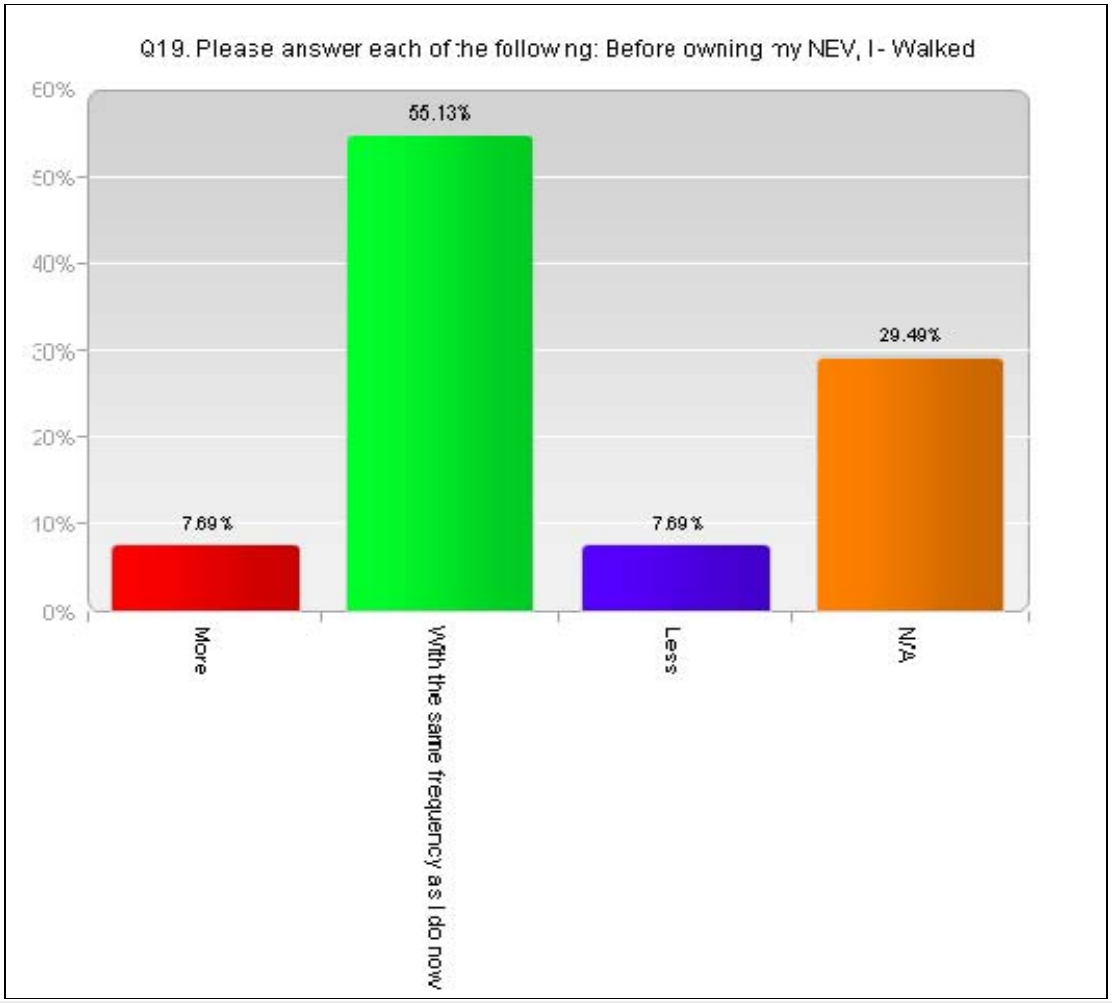

Q1. Are the current NEV pavement markings and striping easy to read and understand?
100%
80%
60%
40%
20%
0%
89.74%
10.26%
Yes
No (please explain what changes you would suggest)

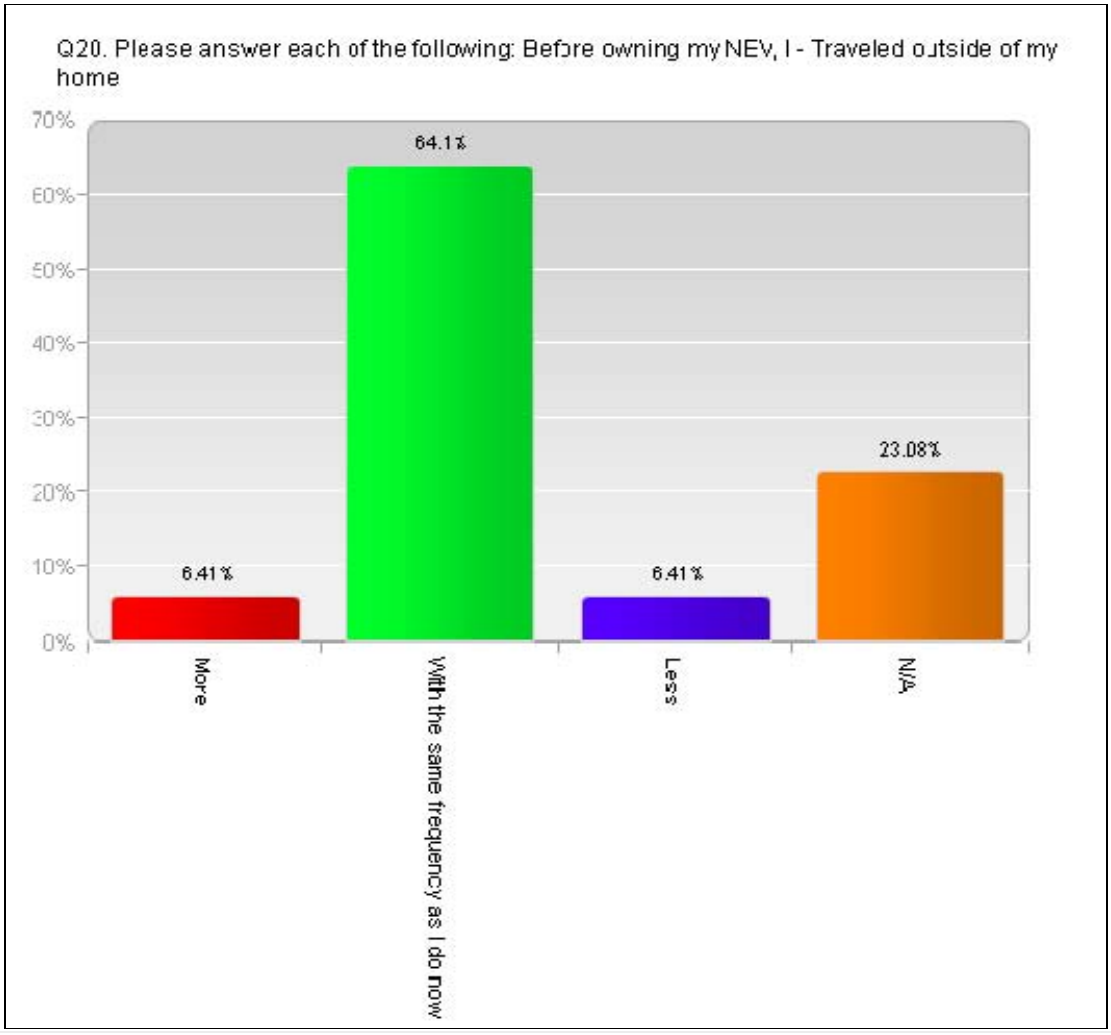

Q15 While in your NEV, how often do you find yourself crossing or using a road designated for NEVs with a speed limit over 35 mph?
35%
30%
25%
20%
15%
10%
5%
0%
20.37%
29.63%
31.48%
16.67%
1.85%
Very often
Occasionally
Rarely
Never
Not sure

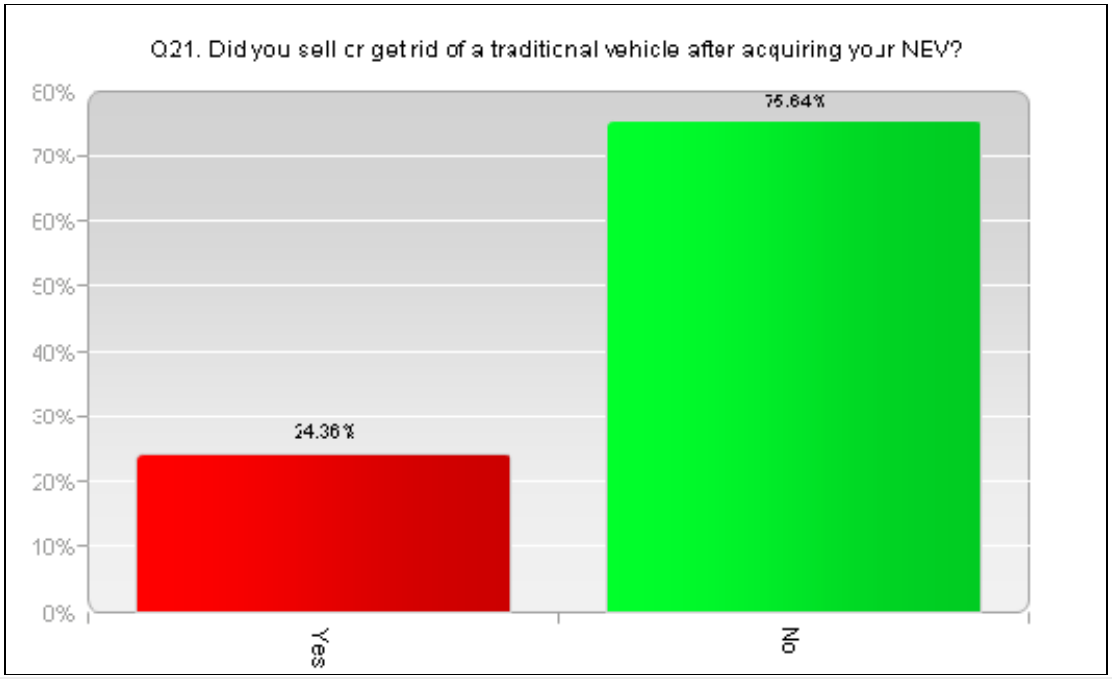

Q16. Please answer each of the following: Before owning my NEV, I - Drove a traditional automobile
100%
80%
60%
40%
20%
0%
91.03%
3.85%
5.13%
0%
More
With the same frequency as I do now
Less
N/A

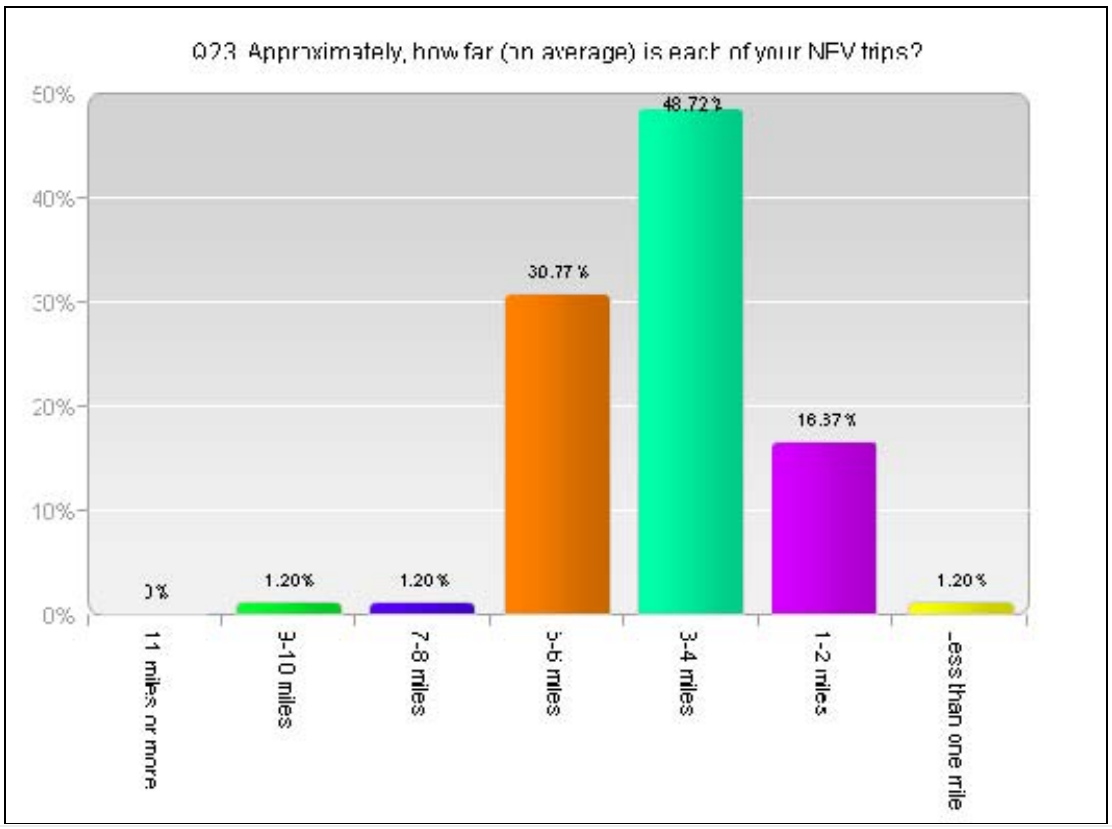

Q17. Please answer each of the following: Before owning my NEV, I - Rode my bicycle
70%
60%
50%
40%
30%
20%
10%
0%
10.26%
21.79%
2.56%
65.38%
More
With the same frequency as I do now
Less
N/A

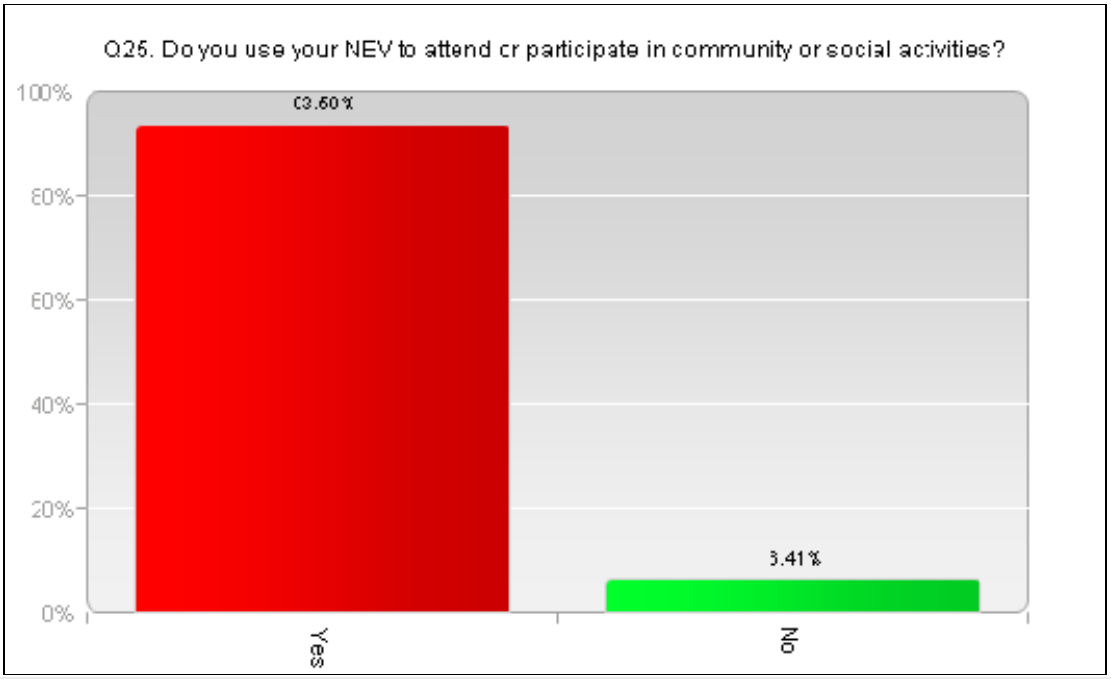

Q18. Please answer each of the following: Before owning my NEV, I - Used public transportation
100%
80%
60%
40%
20%
0%
1.28%
11.54%
1.28%
85.9%
More
With the same frequency as I do now
Less
N/A

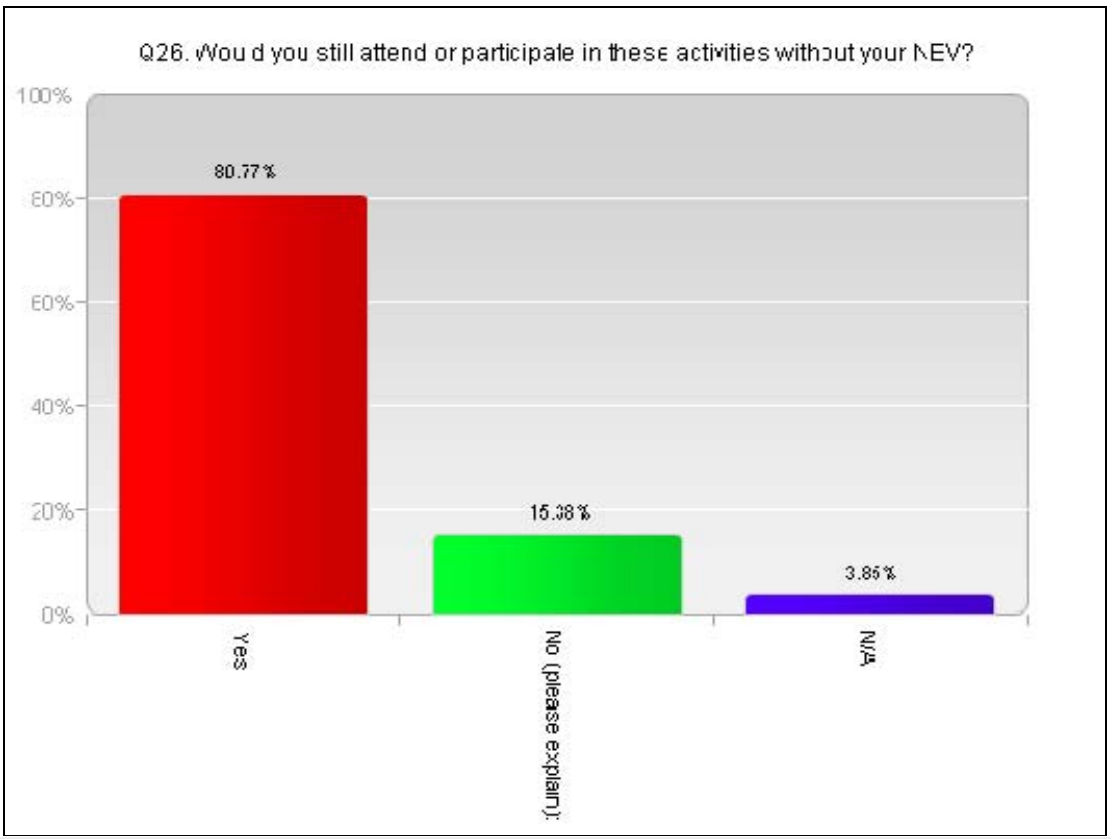

Q19. Please answer each of the following: Before owning my NEV, I - Walked
60%
50%
40%
30%
20%
10%
0%
7.69%
55.13%
7.69%
29.49%
More
With the same frequency as I do now
Less
N/A

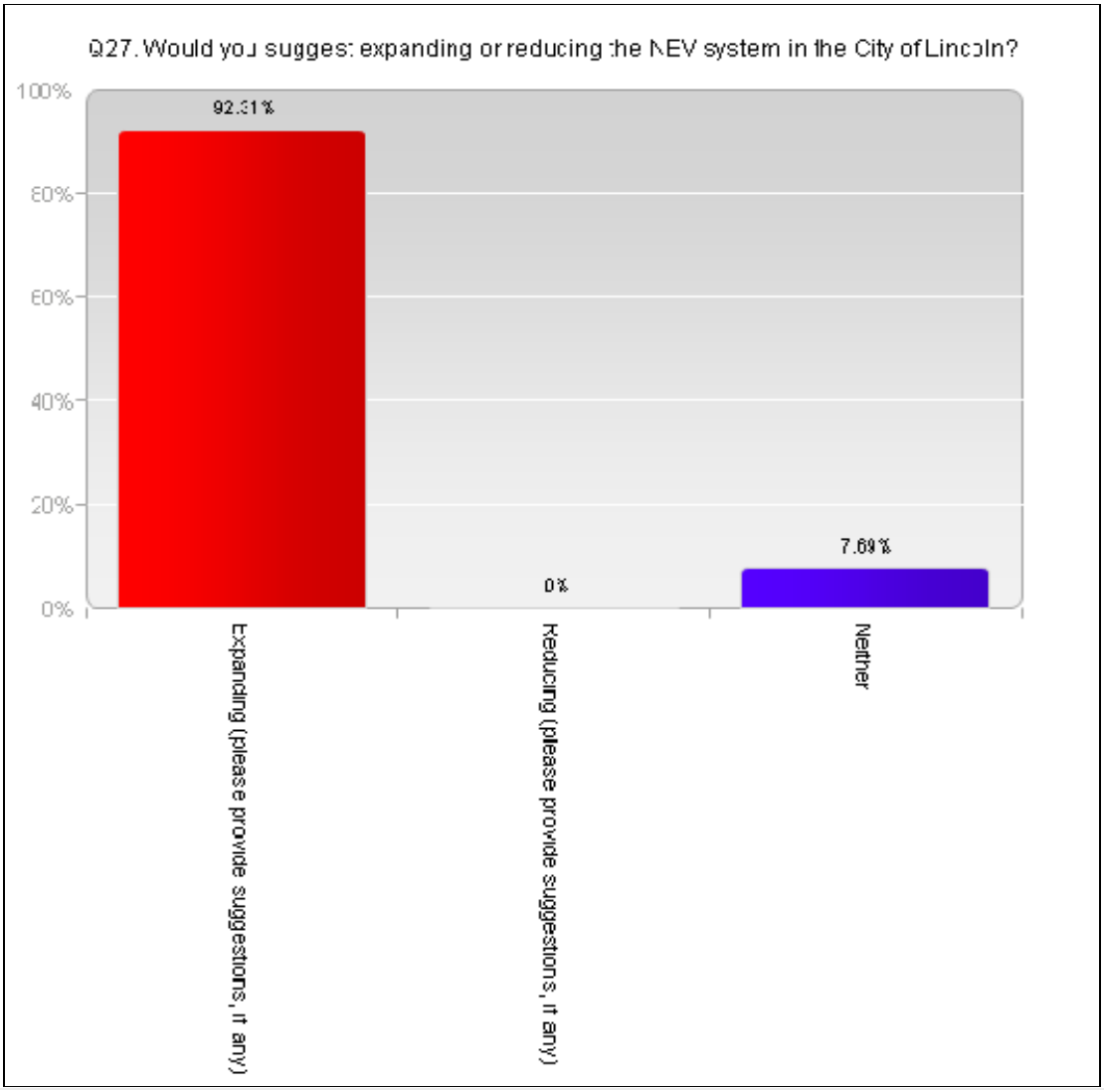

Q20. Please answer each of the following: Before owning my NEV, I - Traveled outside of my home
70%
60%
50%
40%
30%
20%
10%
0%
6.41%
64.1%
6.41%
23.08%
More
With the same frequency as I do now
Less
N/A

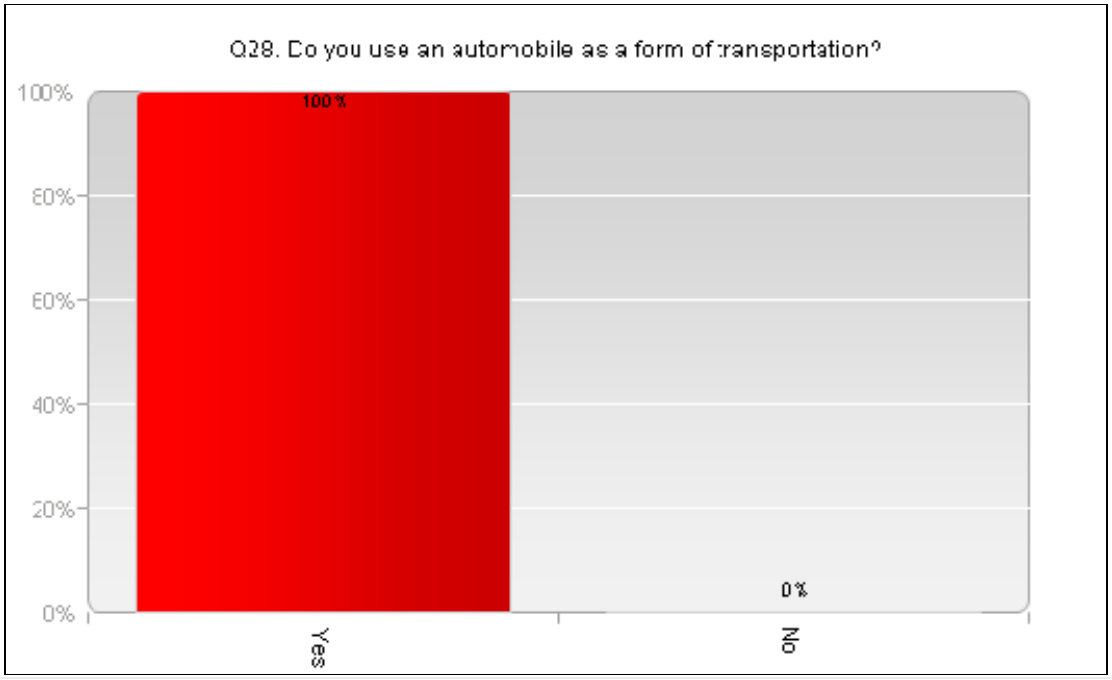

Q21. Did you sell or get rid of a traditional vehicle after acquiring your NEV?
80%
70%
60%
50%
40%
30%
20%
10%
0%
24.36%
75.64%
Yes
No

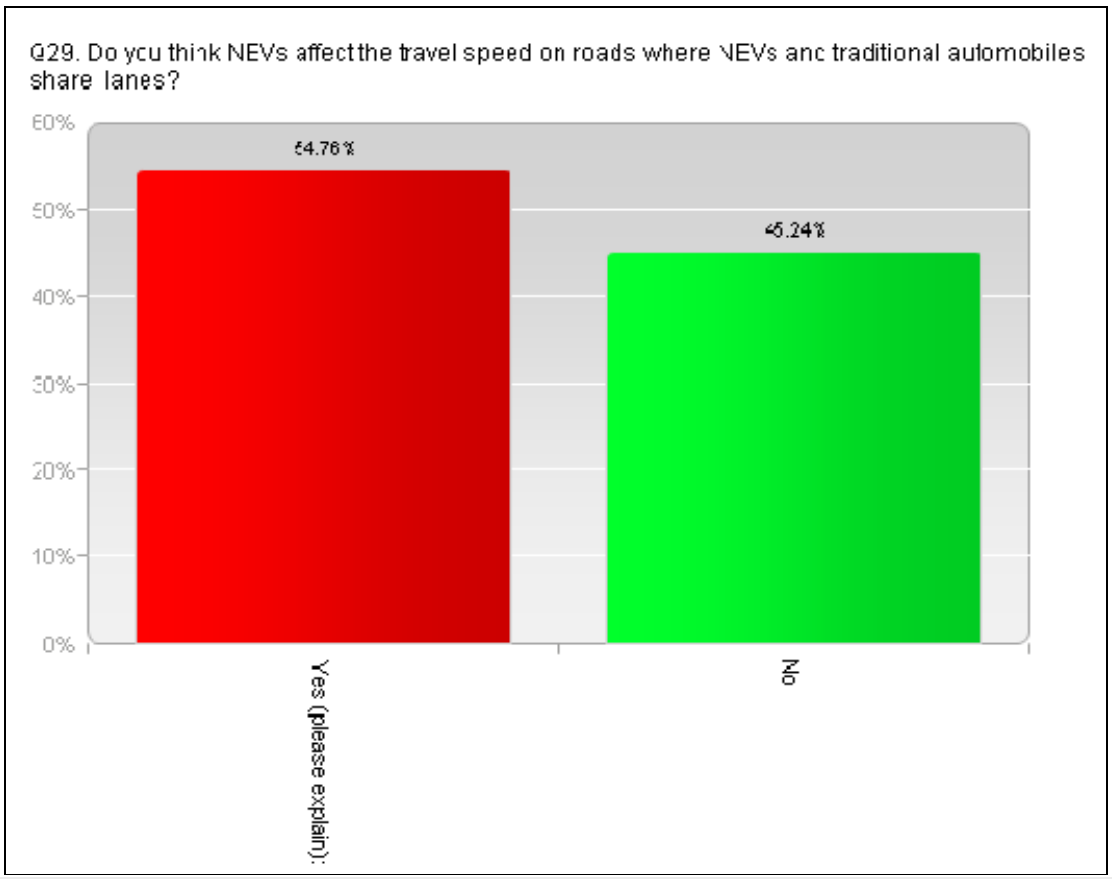

Q23. Approximately, how far (on average) is each of your NEV trips?
50%
40%
30%
20%
10%
0%
0%
1.20%
1.20%
30.77%
48.72%
16.37%
1.20%
11 miles or more
9-10 miles
7-8 miles
5-6 miles
3-4 miles
1-2 miles
Less than one mile

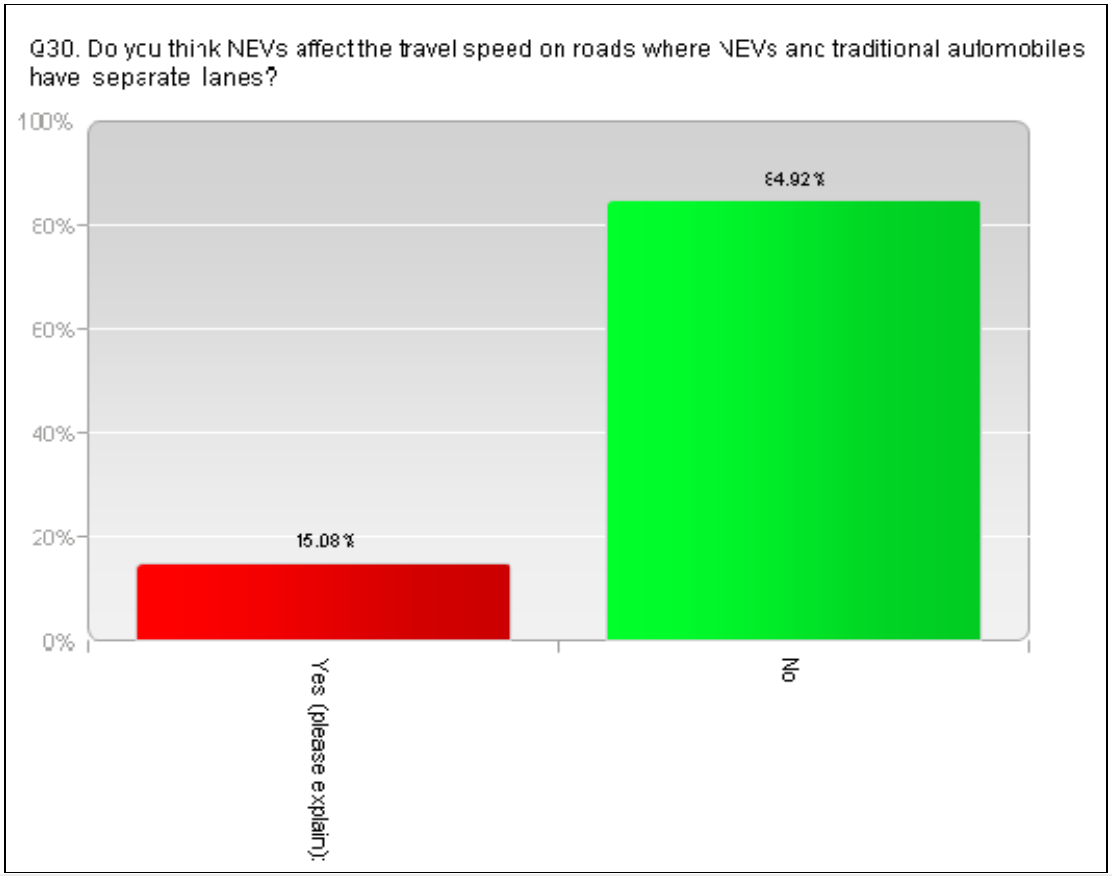

Q25. Do you use your NEV to attend or participate in community or social activities?
100%
80%
60%
40%
20%
0%
96.59%
3.41%
Yes
No

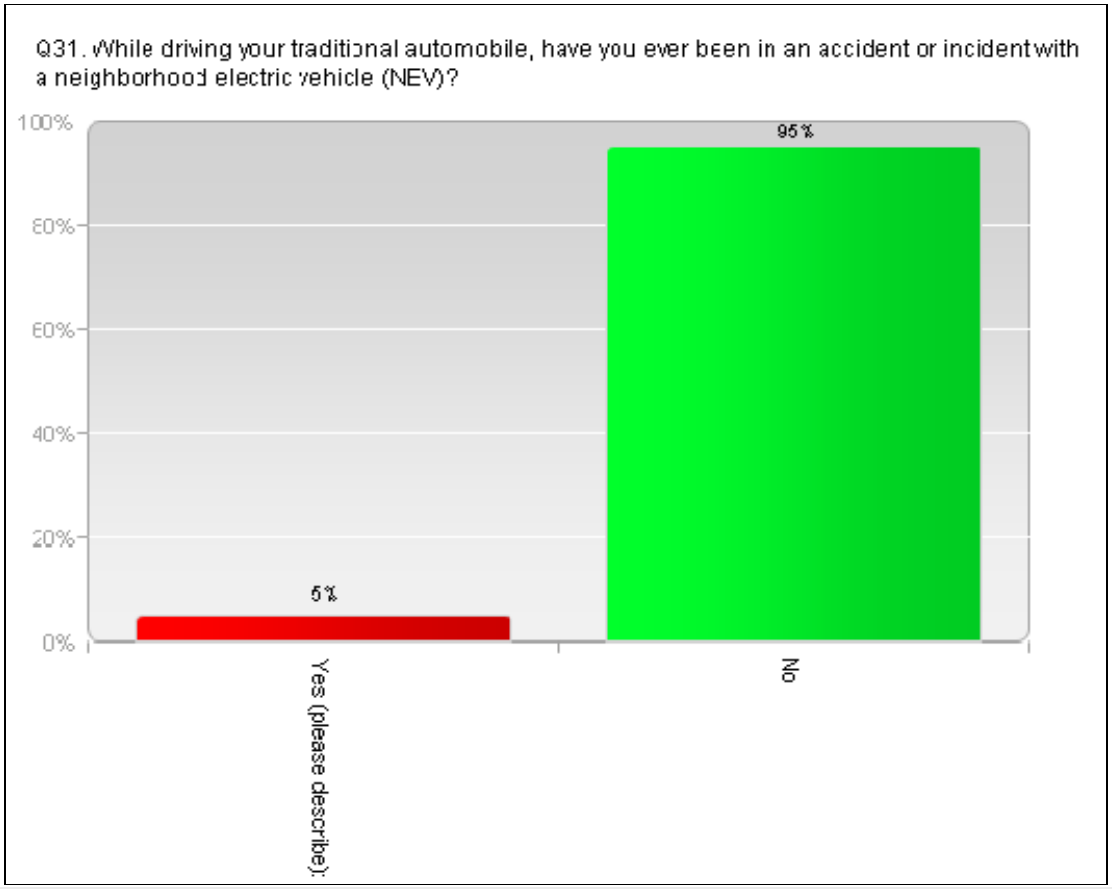

Q26. Would you still attend or participate in these activities without your NEV?
100%
80%
60%
40%
20%
0%
80.77%
15.38%
3.85%
Yes
No (please explain):
N/A

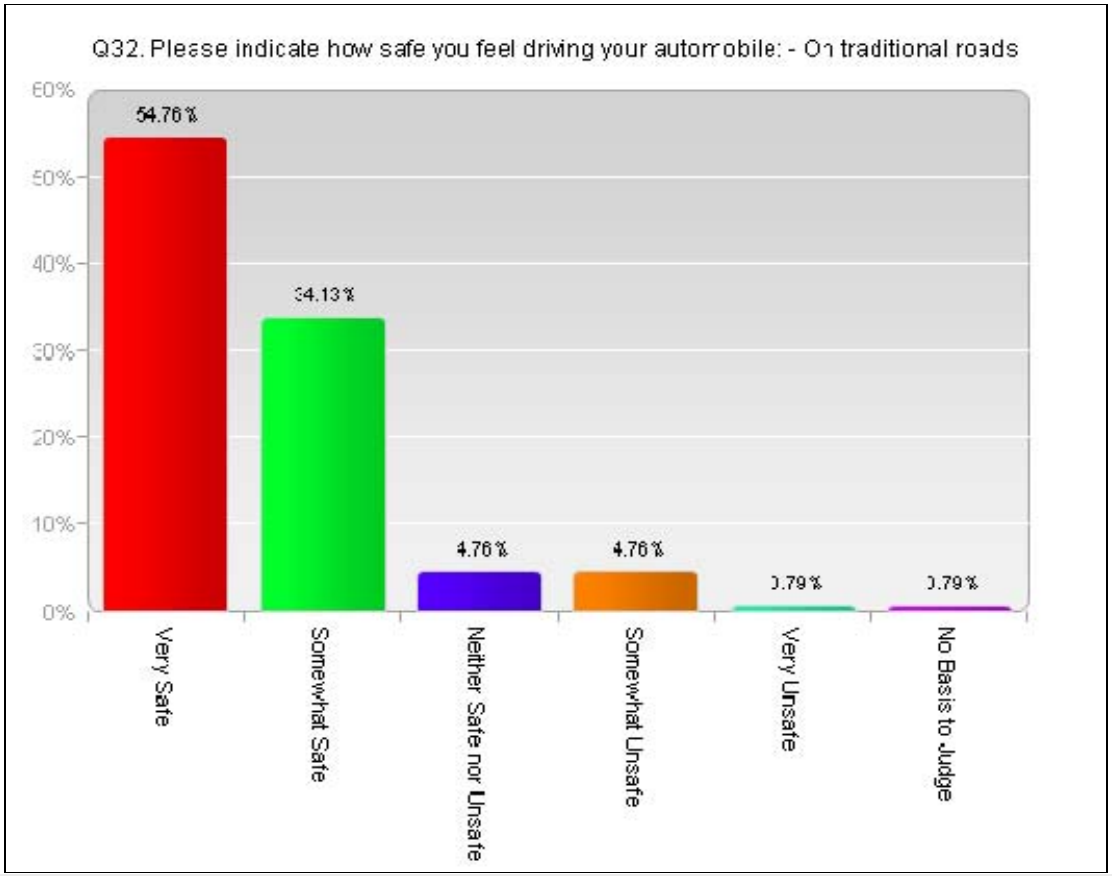

Q27. Would you suggest expanding or reducing the NEV system in the City of Lincoln?
100%
80%
60%
40%
20%
0%
92.31%
0%
7.69%
Expanding (please provide suggestions, if any)
Reducing (please provide suggestions, if any)
Neither

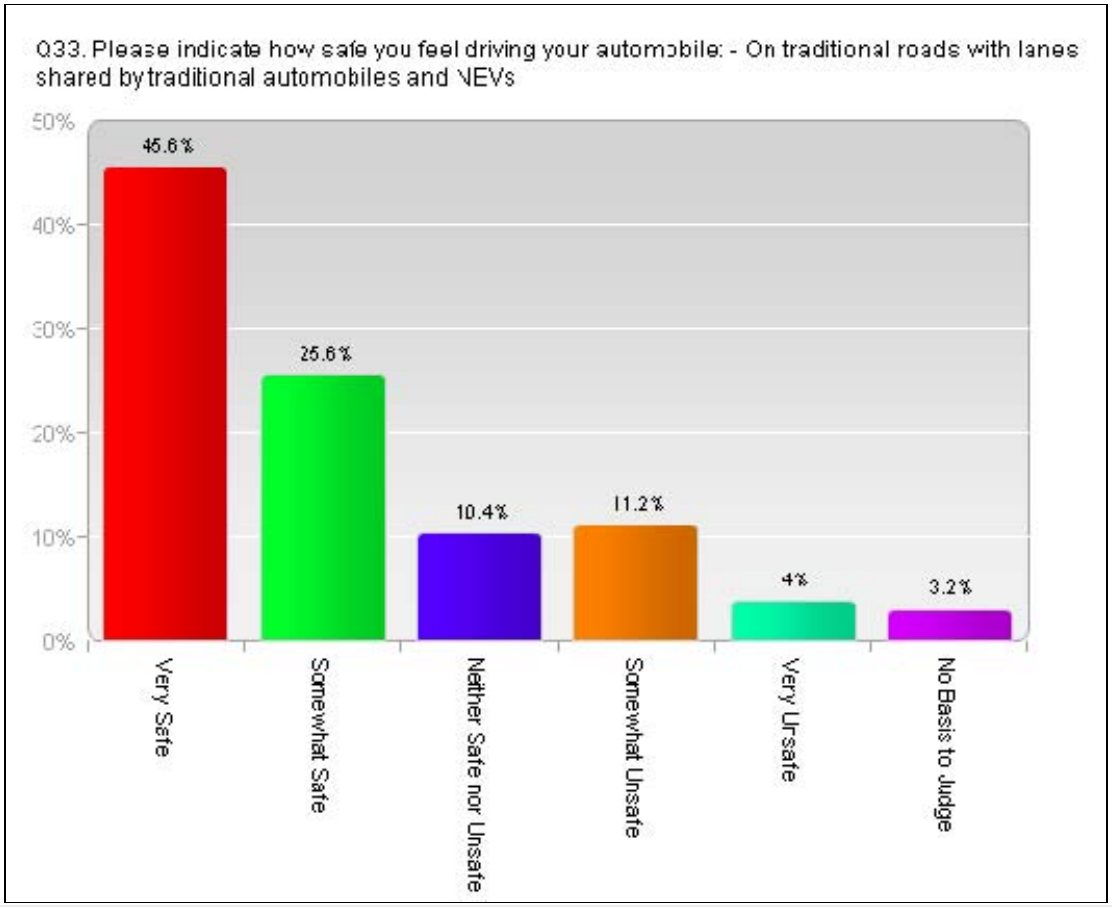

Q28. Do you use an automobile as a form of transportation?
100%
80%
60%
40%
20%
0%
100%
0%
Yes
No

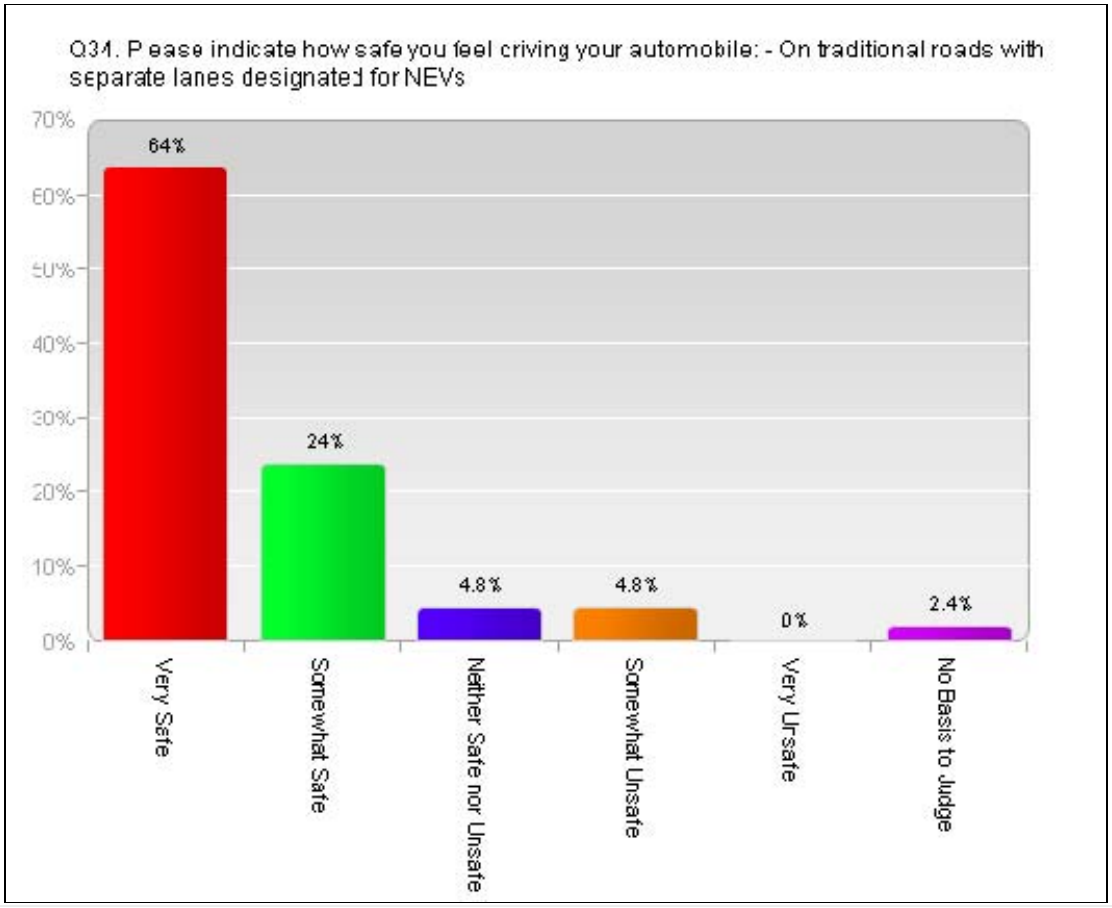

Q29. Do you think NEVs affect the travel speed on roads where NEVs and traditional automobiles share lanes?
60%
50%
40%
30%
20%
10%
0%
54.76%
45.24%
Yes (please explain)
No

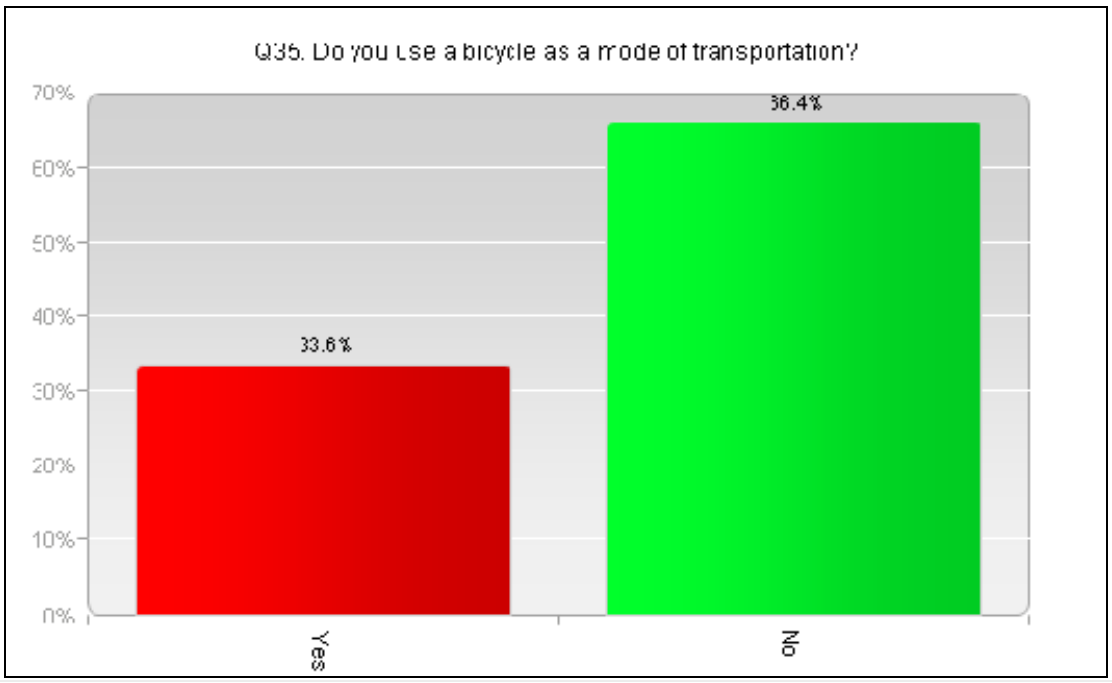

Q30. Do you think NEVs affect the travel speed on roads where NEVs and traditional automobiles have separate lanes?
100%
80%
60%
40%
20%
0%
84.92%
15.08%
No
Yes (please explain):

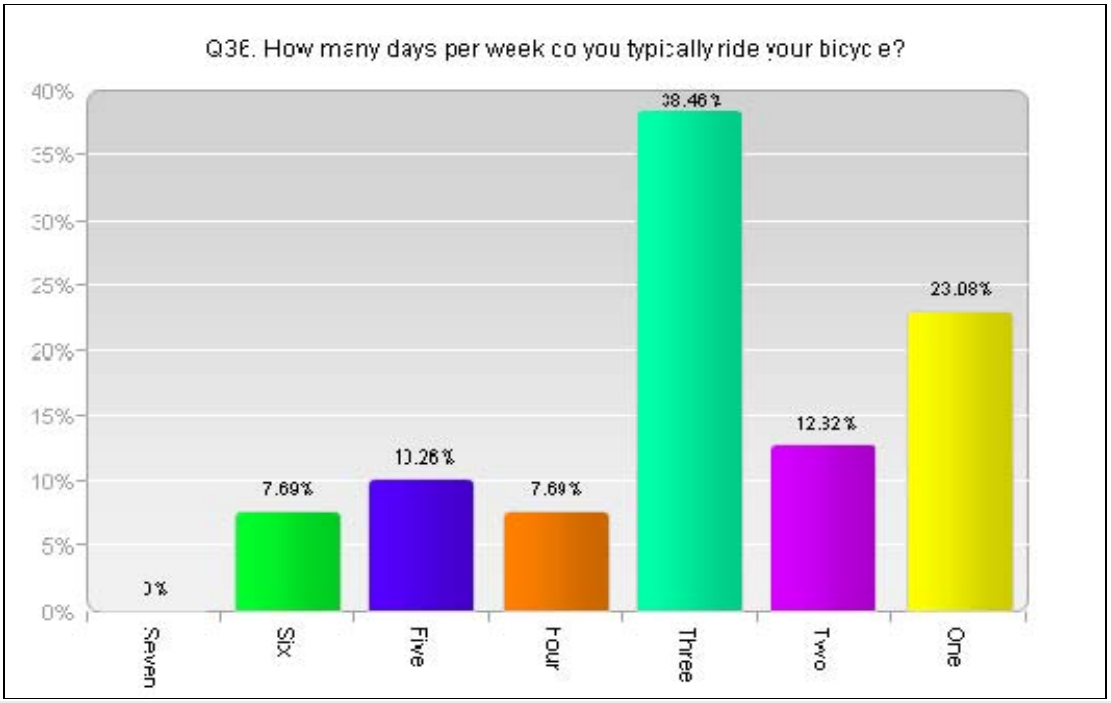

Q31. While driving your traditional automobile, have you ever been in an accident or incident with a neighborhood electric vehicle (NEV)?
100%
80%
60%
40%
20%
0%
5%
95%
Yes (please describe):
No

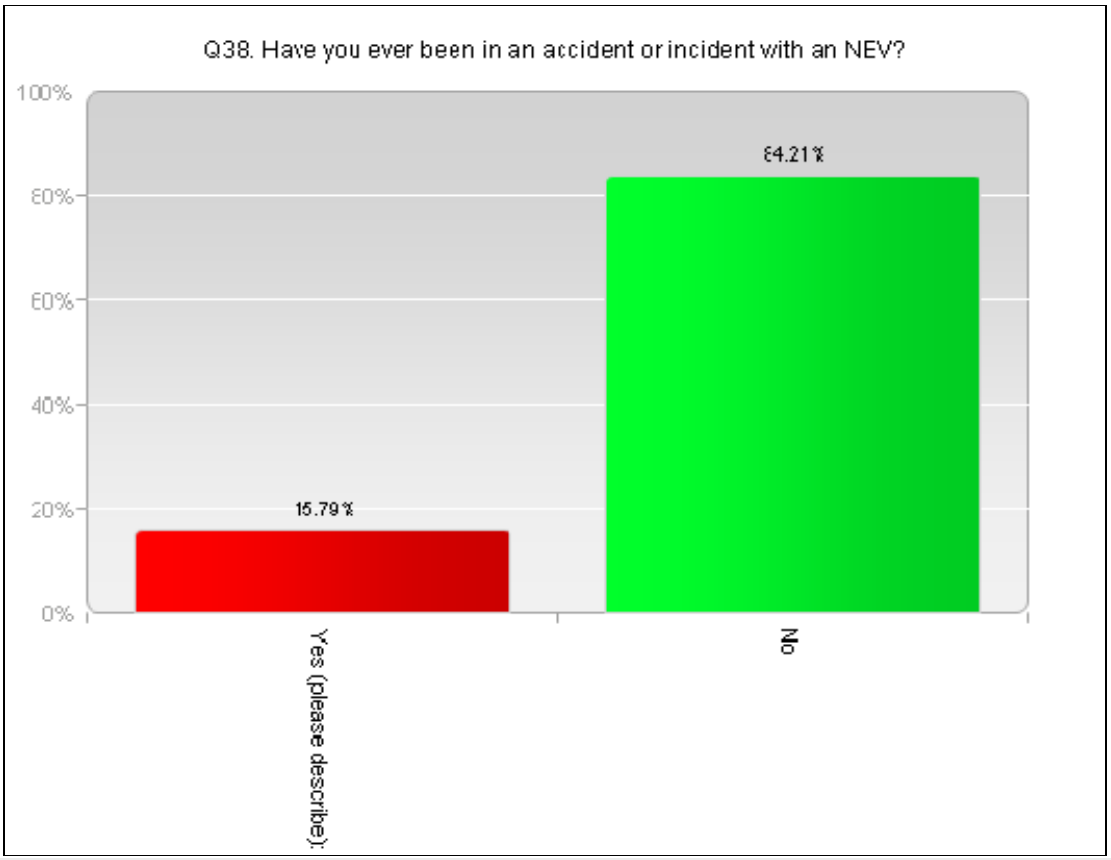

Q32. Please indicate how safe you feel driving your automobile: - On traditional roads
60%
50%
40%
30%
20%
10%
0%
54.76%
34.13%
4.76%
4.76%
0.79%
0.79%
Very Safe
Somewhat Safe
Neither Safe nor Unsafe
Somewhat Unsafe
Very Unsafe
No Basis to Judge

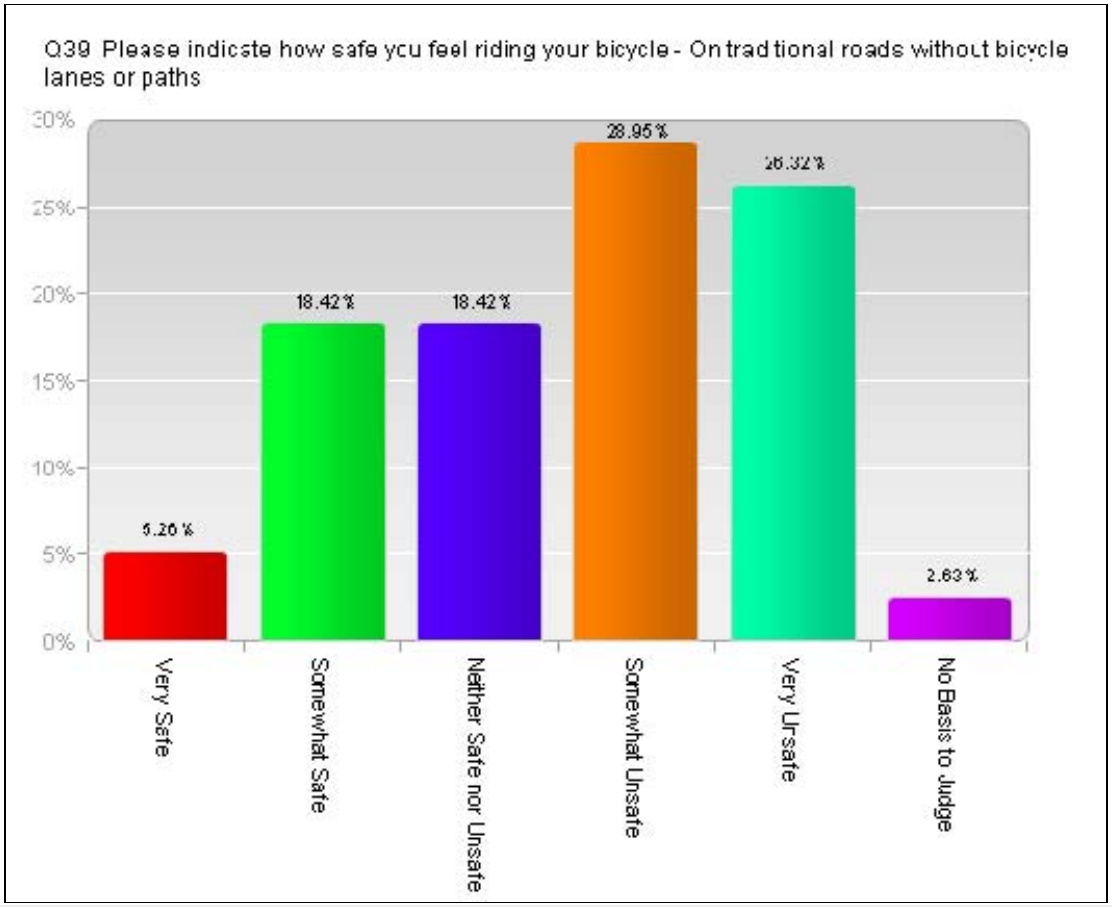

Q33. Please indicate how safe you feel driving your automobile: - On traditional roads with lanes shared by traditional automobiles and NEVs
50%
40%
30%
20%
10%
0%
45.6%
25.6%
10.4%
11.2%
4%
3.2%
Very Safe
Somewhat Safe
Neither Safe nor Unsafe
Somewhat Unsafe
Very Unsafe
No Basis to Judge

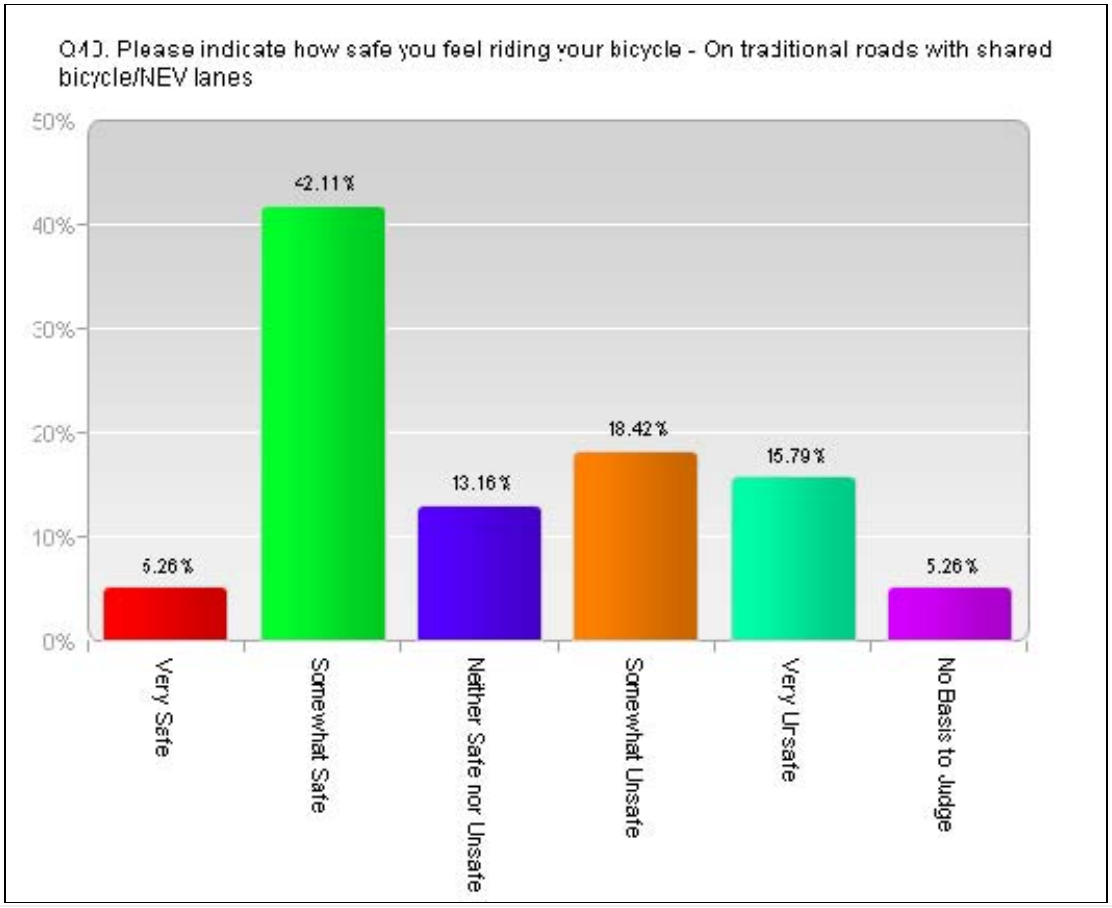

Q31. Please indicate how safe you feel driving your automobile: - On traditional roads with separate lanes designated for NEVs
70%
60%
50%
40%
30%
20%
10%
0%
64%
24%
4.8%
4.8%
0%
2.4%
Very Safe
Somewhat Safe
Neither Safe nor Unsafe
Somewhat Unsafe
Very Unsafe
No Basis to Judge

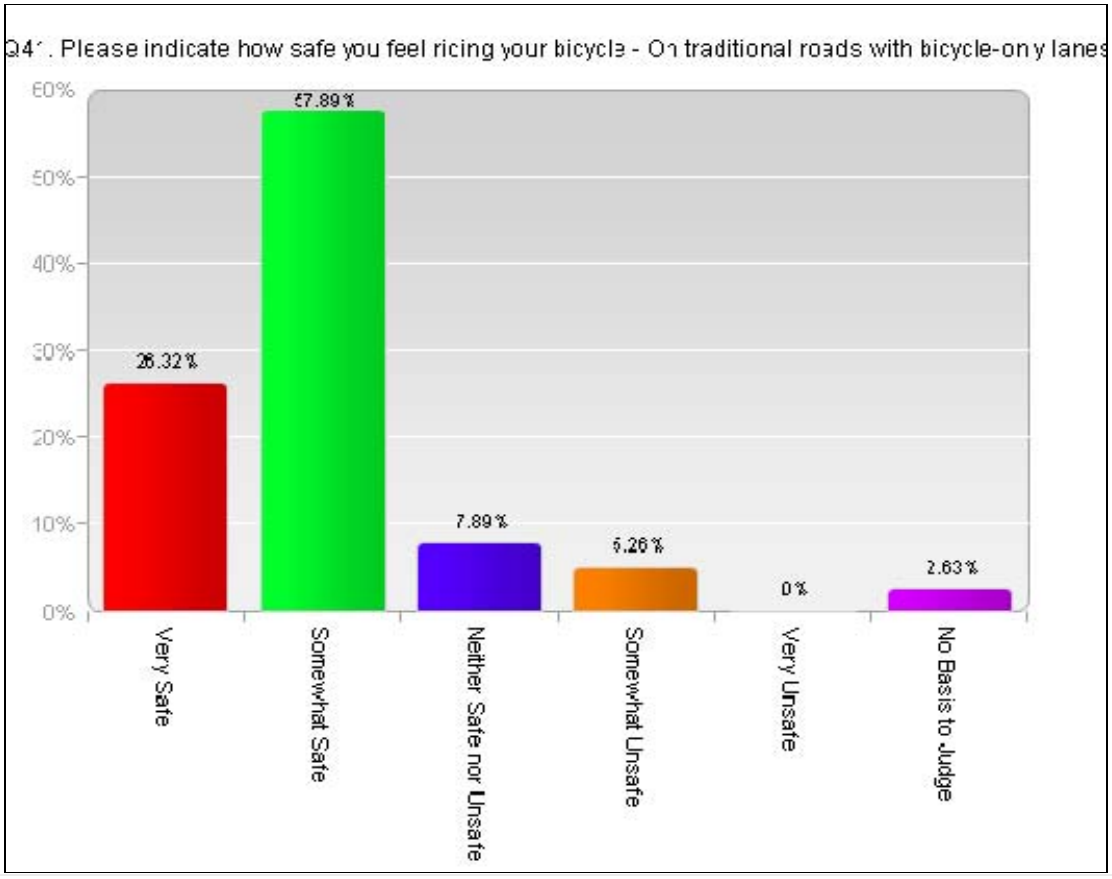

Q35. Do you use a bicycle as a mode of transportation?
70%
60%
50%
40%
30%
20%
10%
0%
36.4%
33.6%
Yes
No

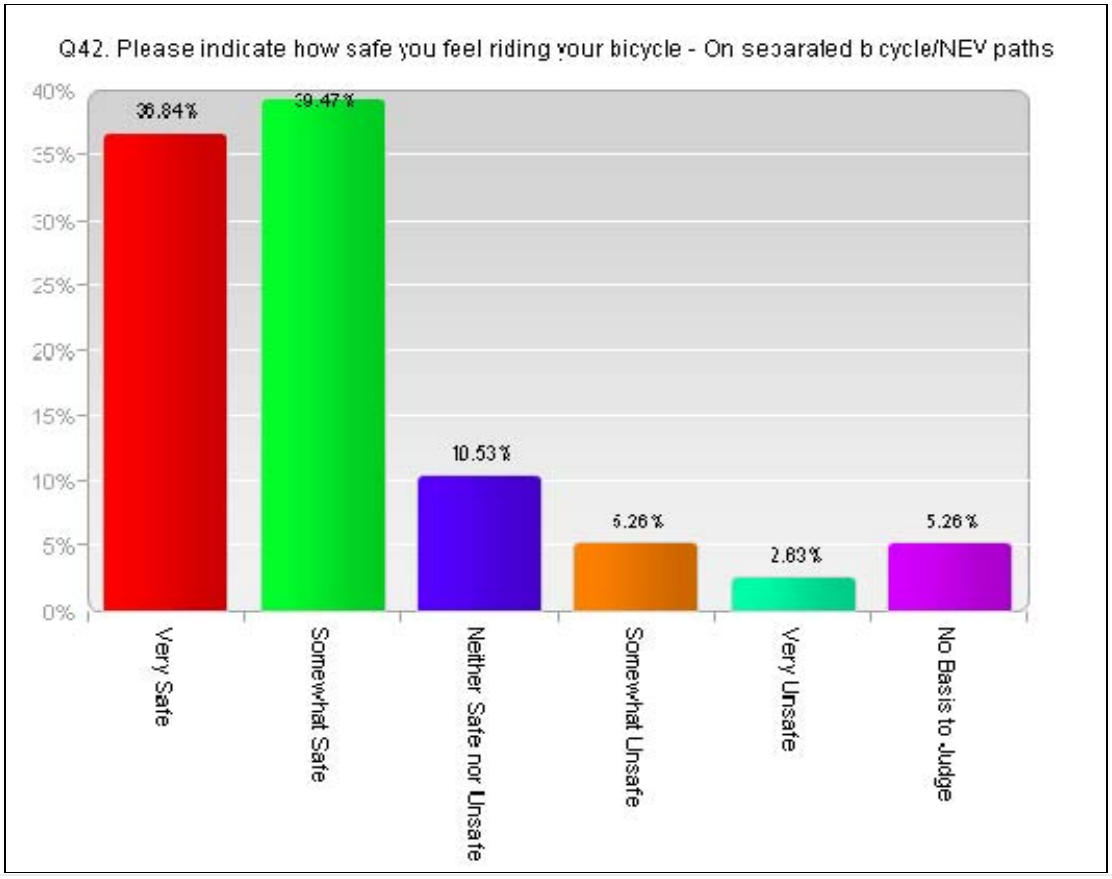

Q36. How many days per week do you typically ride your bicycle?
40%
35%
30%
25%
20%
15%
10%
5%
0%
0%
7.69%
10.26%
7.69%
38.46%
12.32%
23.08%
Seven
Six
Five
Four
Three
Two
One

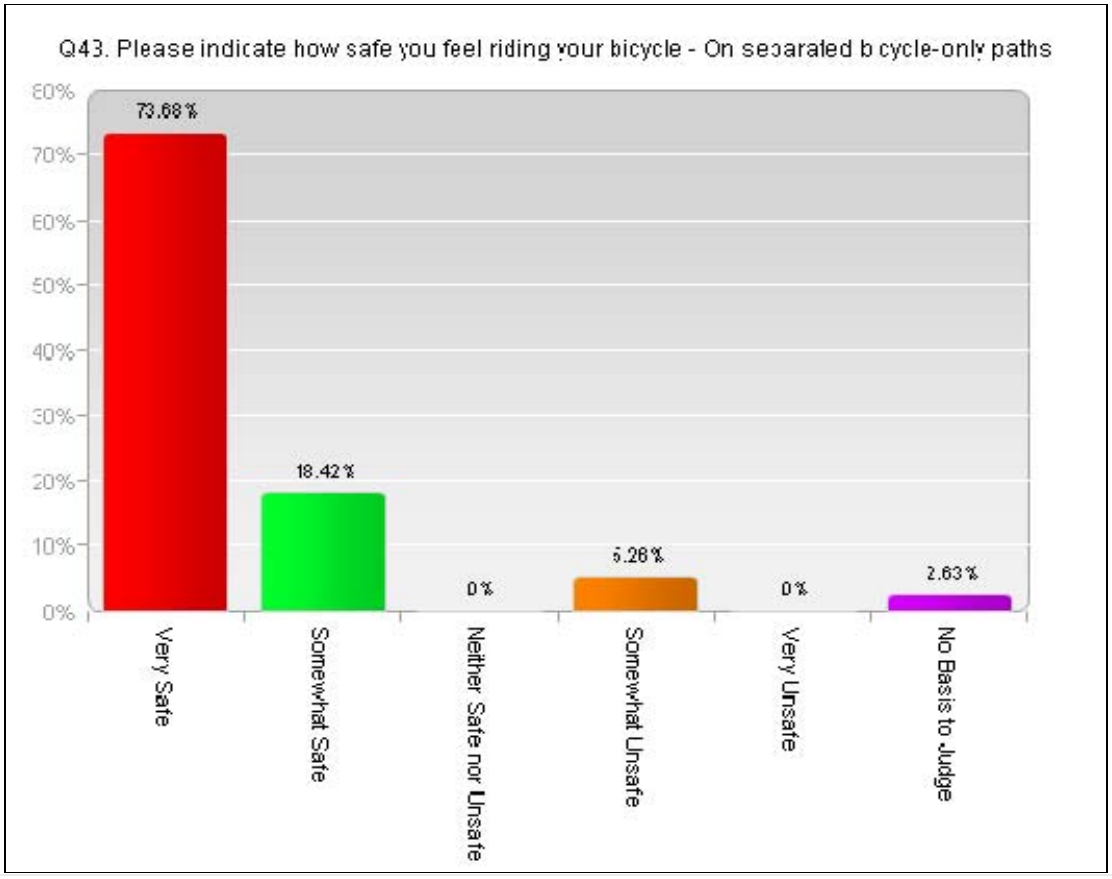

Q38. Have you ever been in an accident or incident with an NEV?
100%
80%
60%
40%
20%
0%
15.79%
84.21%
Yes (please describe)
No

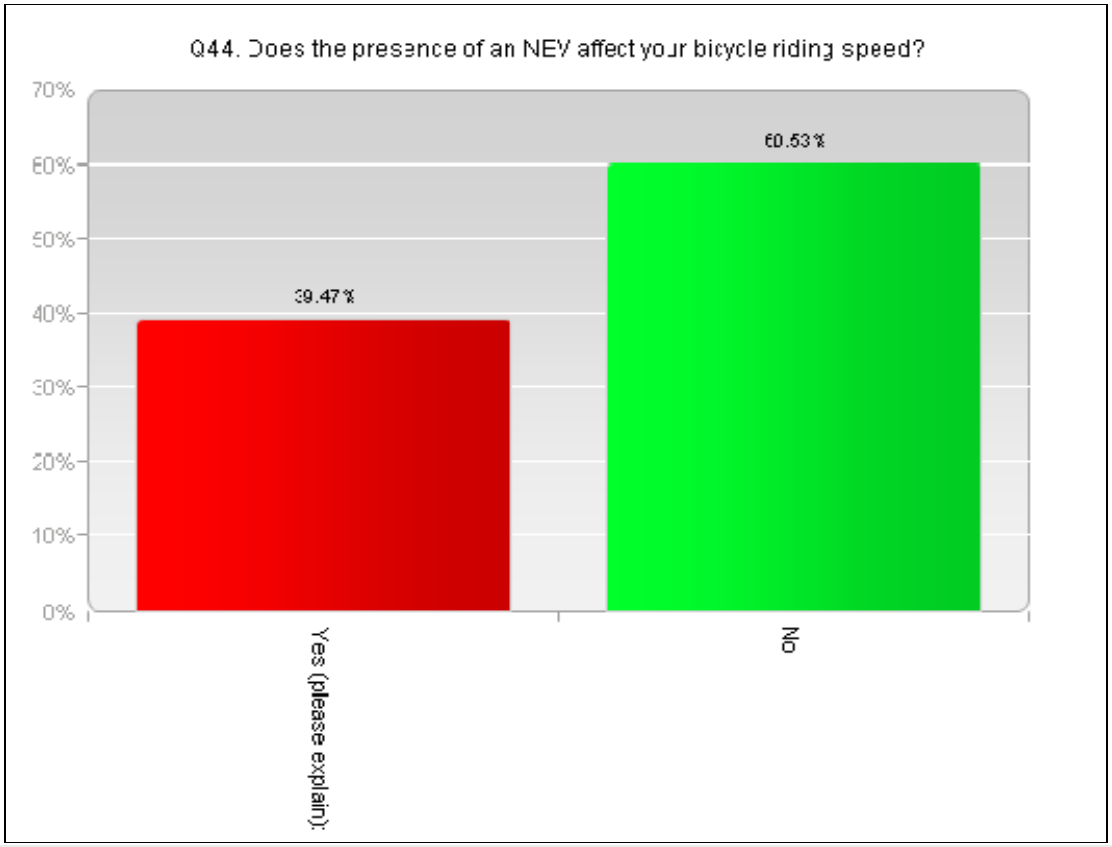

Q39 Please indicate how safe you feel riding your bicycle - On traditional roads without bicycle lanes or paths
30%
25%
20%
15%
10%
5%
0%
5.26 %
18.42 %
18.42 %
28.95 %
26.32 %
2.63 %
Very Safe
Somewhat Safe
Neither Safe nor Unsafe
Somewhat Unsafe
Very Unsafe
No Basis to Judge

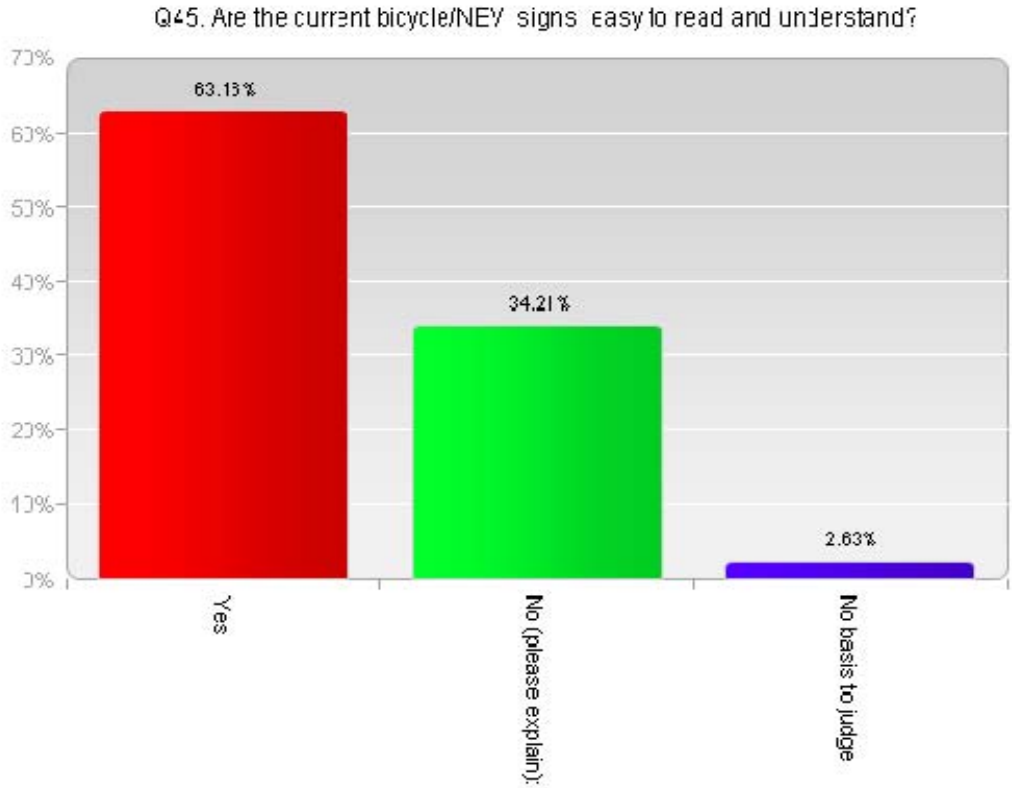

Q10. Please indicate how safe you feel riding your bicycle - On traditional roads with shared bicycle/NEV lanes
50%
40%
30%
20%
10%
0%
5.26%
42.11%
13.16%
18.42%
15.79%
5.26%
Very Safe
Somewhat Safe
Neither Safe nor Unsafe
Somewhat Unsafe
Very Unsafe
No Basis to Judge

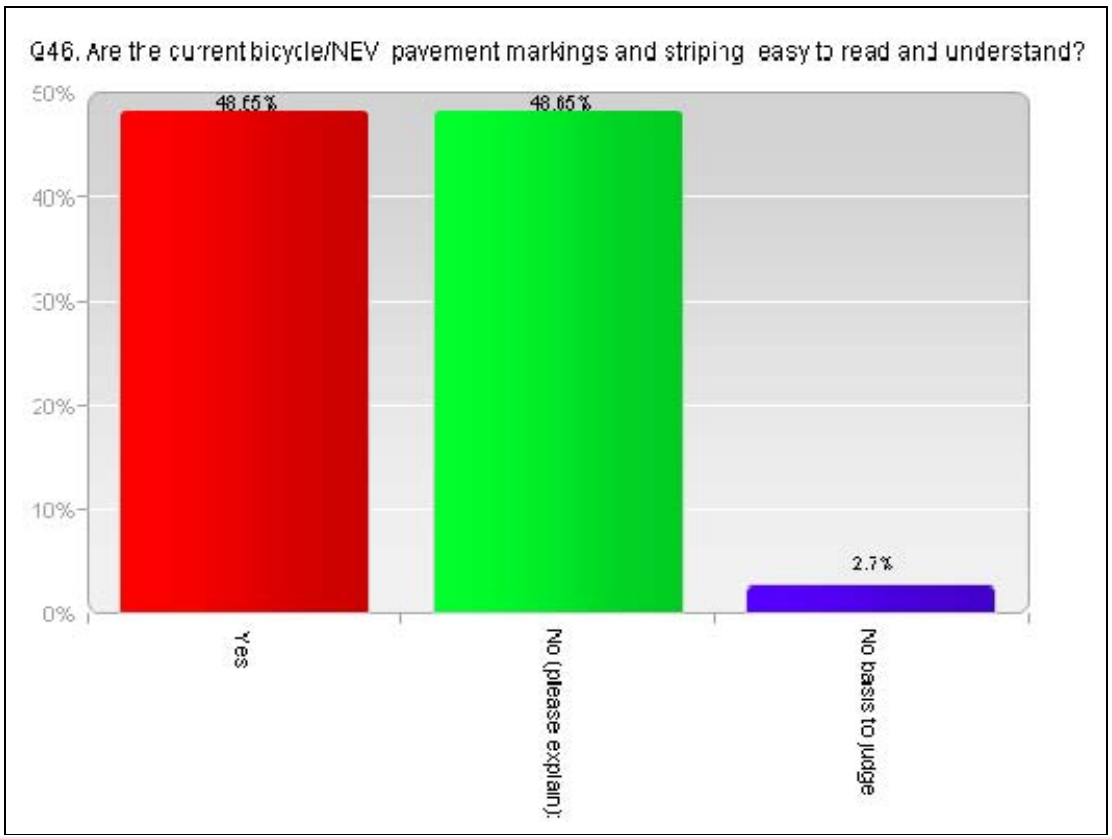

Q4'. Please indicate how safe you feel ricing your bicycle - On traditional roads with bicycle-only lanes
60%
50%
40%
30%
20%
10%
0%
26.32%
57.89%
7.89%
5.26%
0%
2.63%
Very Safe
Somewhat Safe
Neither Safe nor Unsafe
Somewhat Unsafe
Very Unsafe
No Basis to Judge

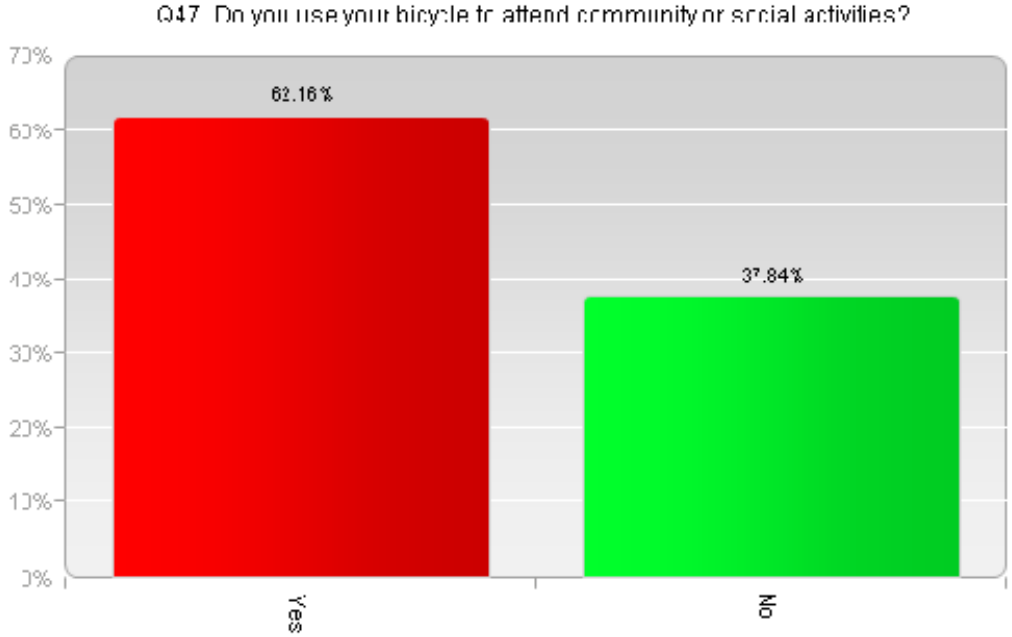

Q42. Please indicate how safe you feel riding your bicycle - On separated b cycle/NEV paths
40%
35%
30%
25%
20%
15%
10%
5%
0%
36.84%
39.47%
10.53%
5.26%
2.63%
5.26%
Very Safe
Somewhat Safe
Neither Safe nor Unsafe
Somewhat Unsafe
Very Unsafe
No Basis to Judge

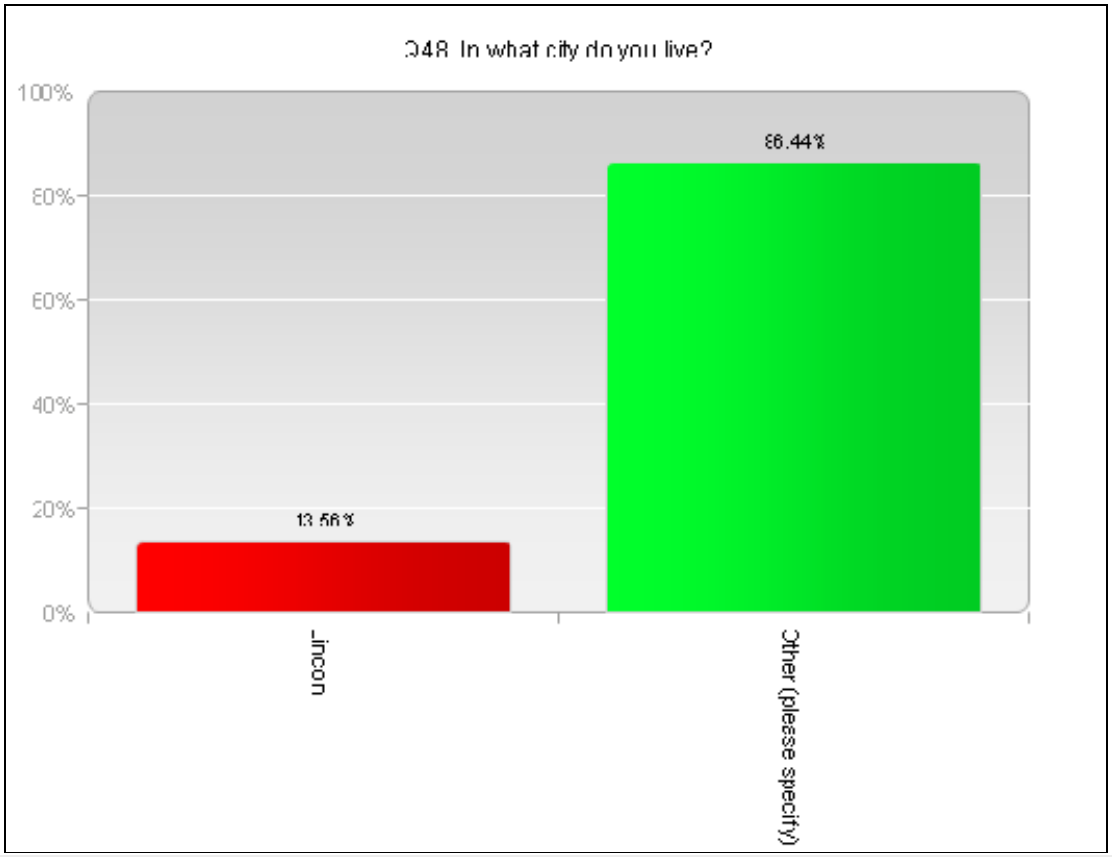

Q43. Please indicate how safe you feel riding your bicycle - On separated b cycle-only paths
80%
70%
60%
50%
40%
30%
20%
10%
0%
73.68%
18.42%
0%
5.26%
0%
2.63%
Very Safe
Somewhat Safe
Neither Safe nor Unsafe
Somewhat Unsafe
Very Unsafe
No Basis to Judge

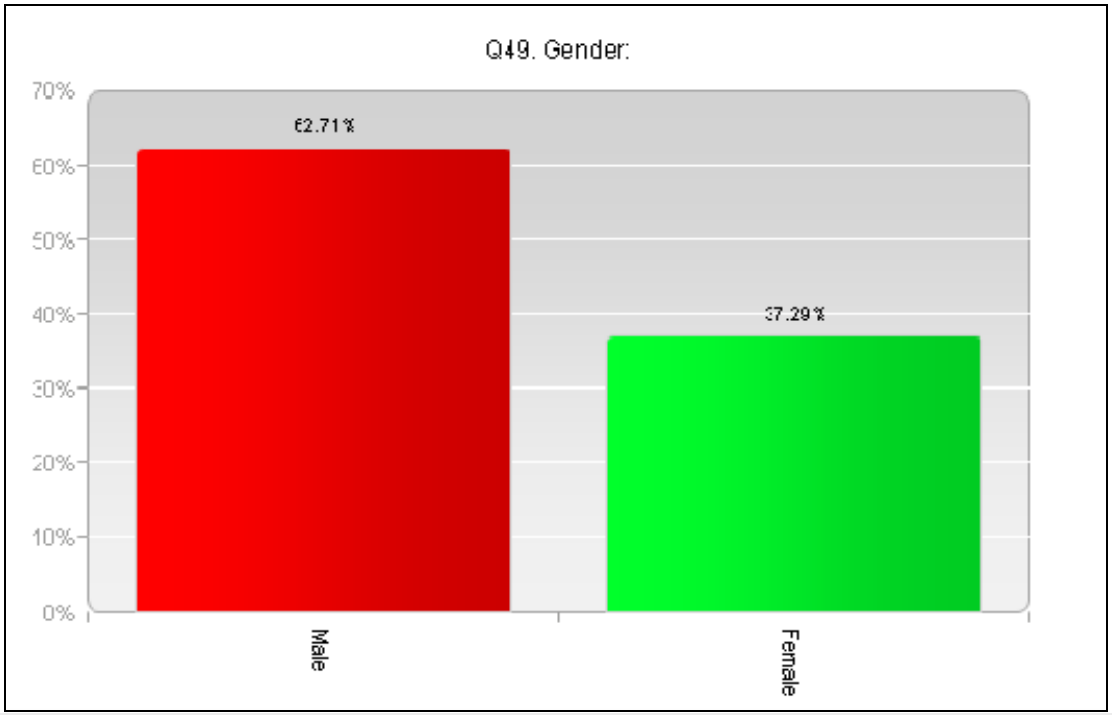

Q44. Does the presence of an NEV affect your bicycle riding speed?
70%
60%
50%
40%
30%
20%
10%
0%
39.47%
60.53%
Yes (please explain):
No

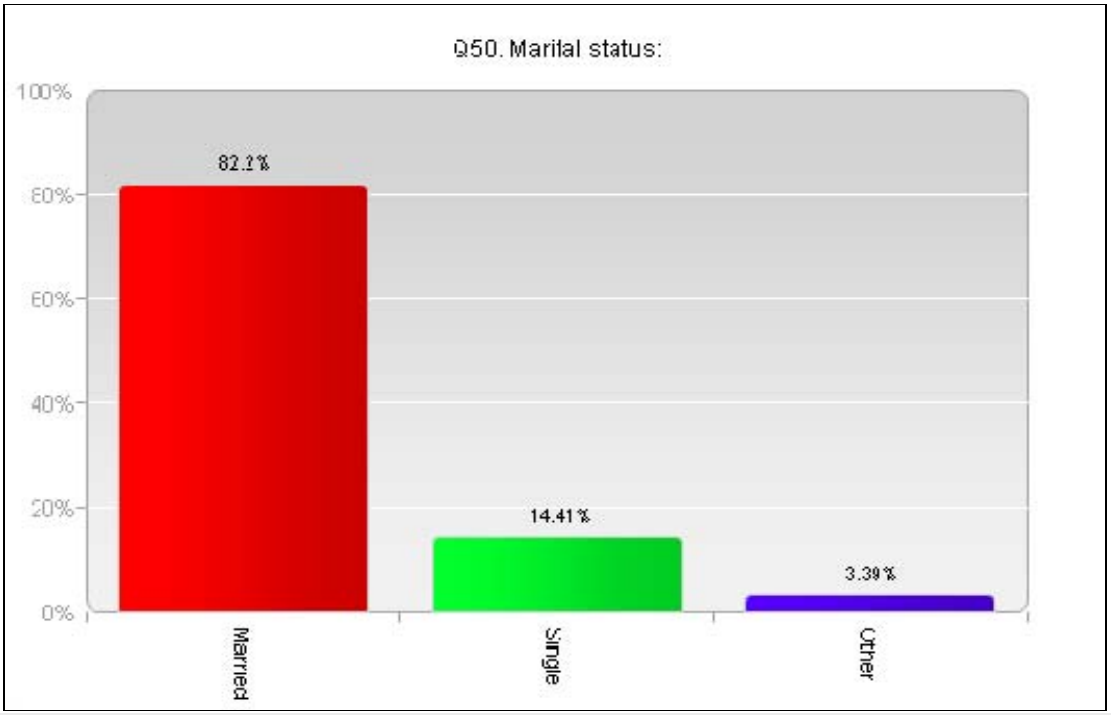

Q45. Are the current bicycle/NEV signs easy to read and understand?
70%
60%
50%
40%
30%
20%
10%
0%
63.16%
34.21%
2.63%
Yes
No (please explain):
No basis to judge

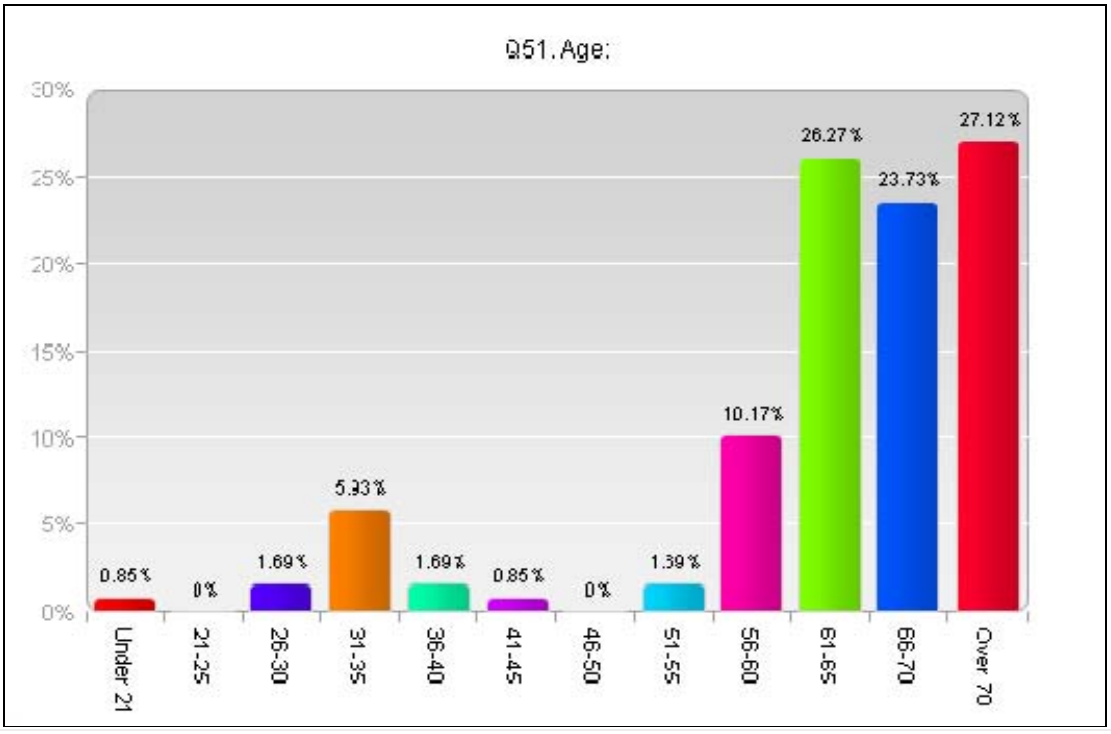

Q46. Are the current bicycle/NEV pavement markings and striping easy to read and understand?
50%
40%
30%
20%
10%
0%
48.65%
48.65%
2.7%
Yes
No (please explain):
No basis to judge

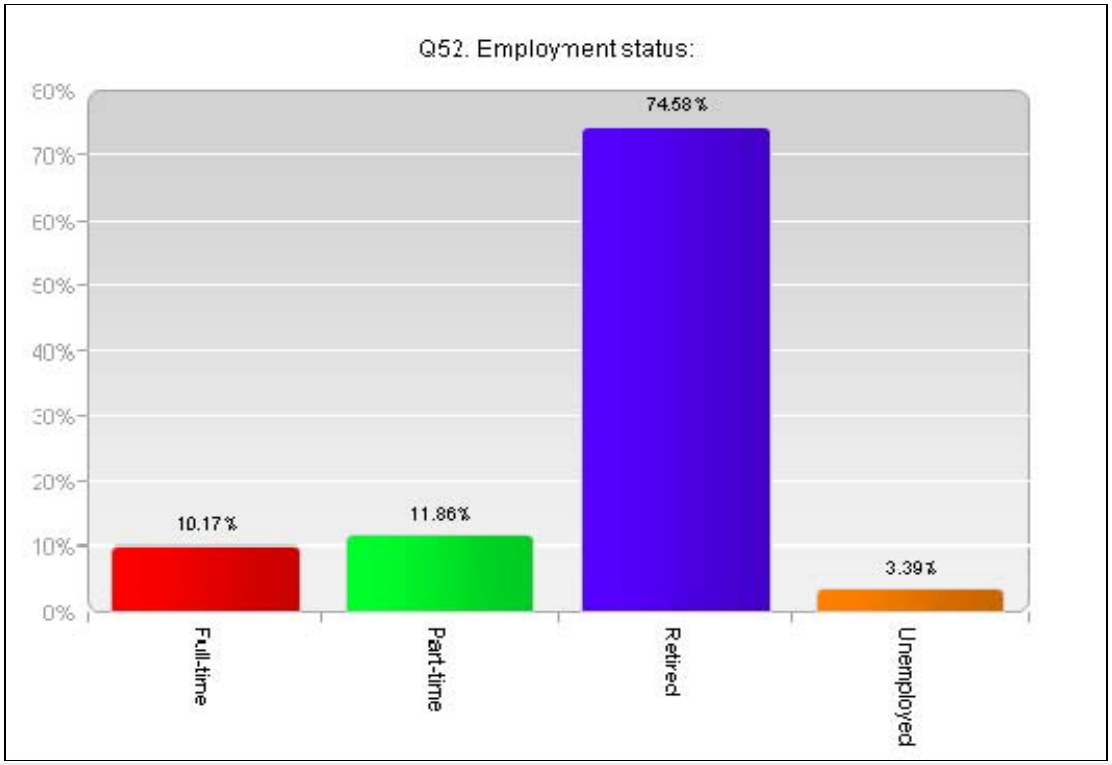

Q47. Do you use your bicycle to attend community or social activities?
70%
60%
50%
40%
30%
20%
10%
0%
62.16%
37.84%
Yes
No

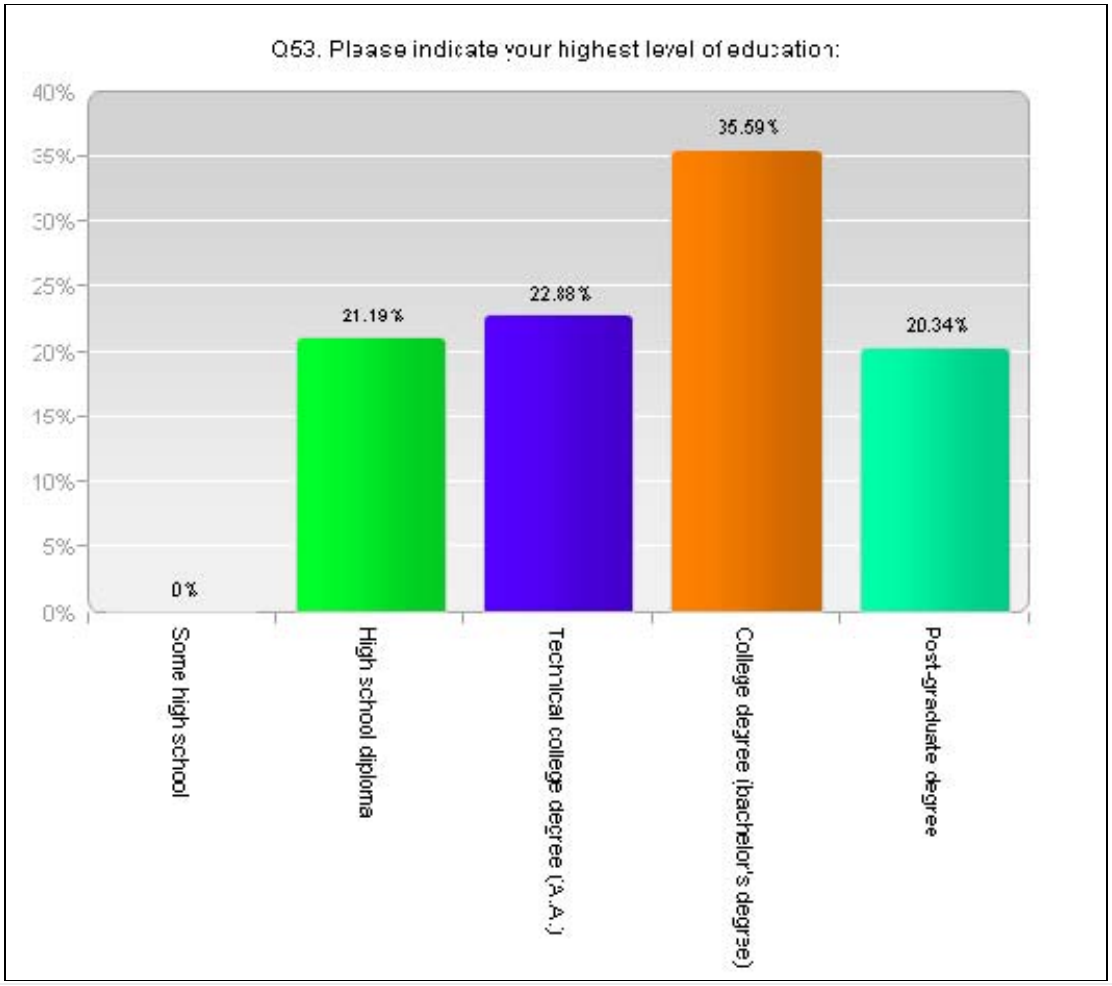

Q48. In what city do you live?
100%
80%
60%
40%
20%
0%
86.44%
13.56%
_incon
Other (please specify)

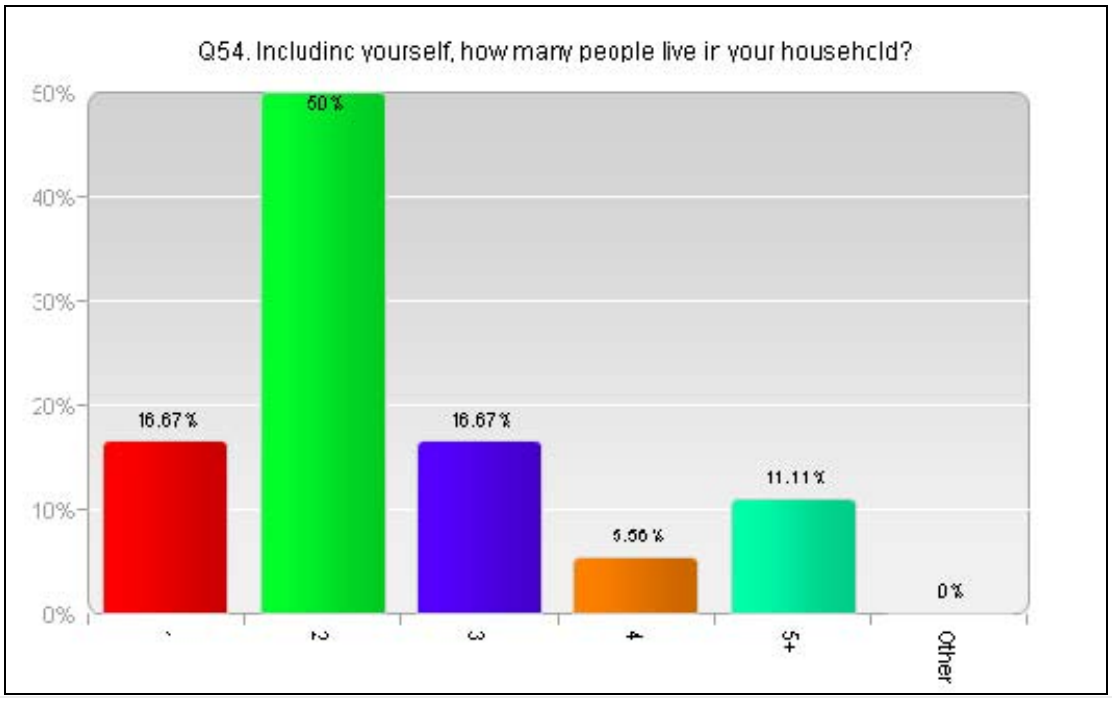

Q49. Gender:
70%
60%
50%
40%
30%
20%
10%
0%
62.71%
37.29%
Male
Female

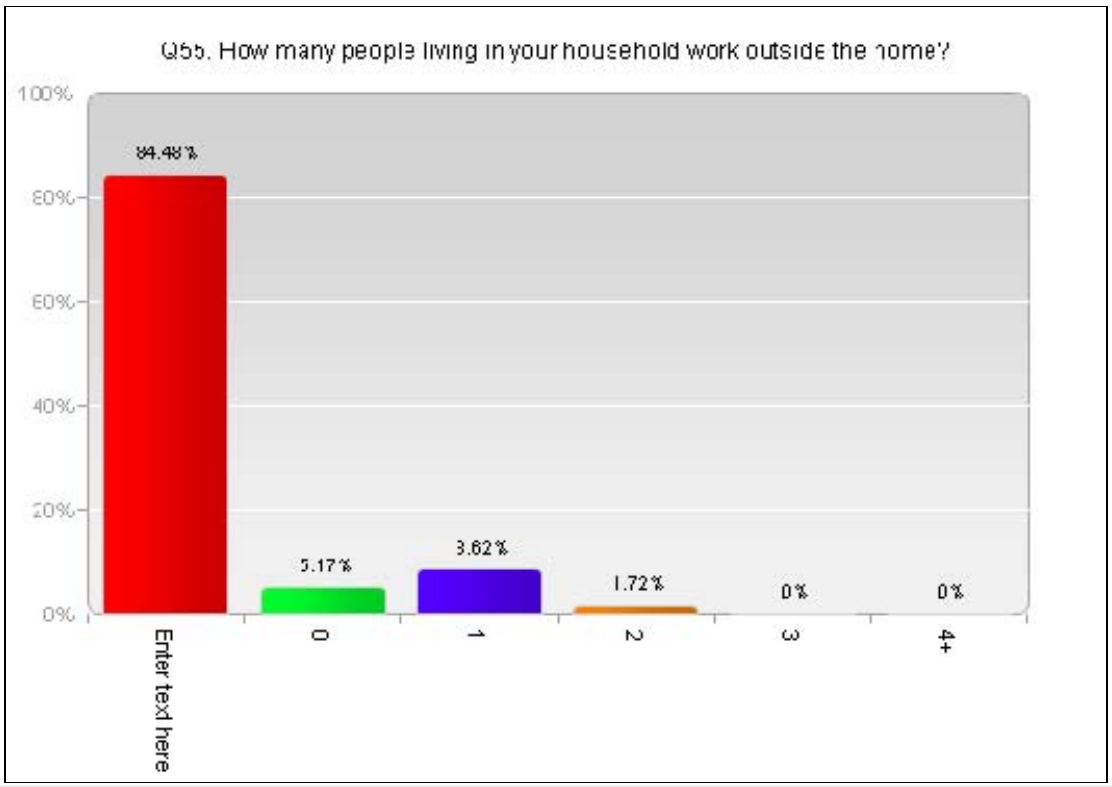

Q50. Marital status:
100%
80%
60%
40%
20%
0%
82.2%
14.41%
3.39%
Married
Single
Other

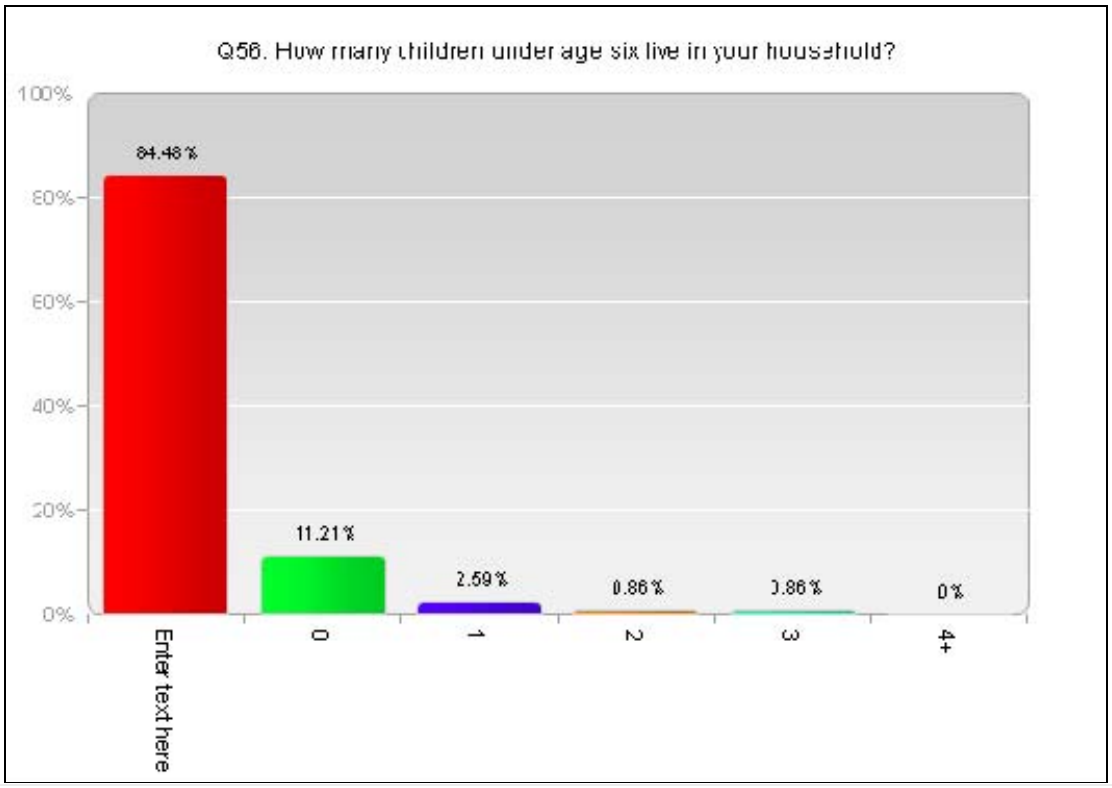

Q51. Age:
30%
25%
20%
15%
10%
5%
0%
0.85%
0%
1.69%
5.93%
1.69%
0.85%
0%
1.39%
10.17%
26.27%
23.73%
27.12%
Under 21
21-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
61-65
66-70
Over 70

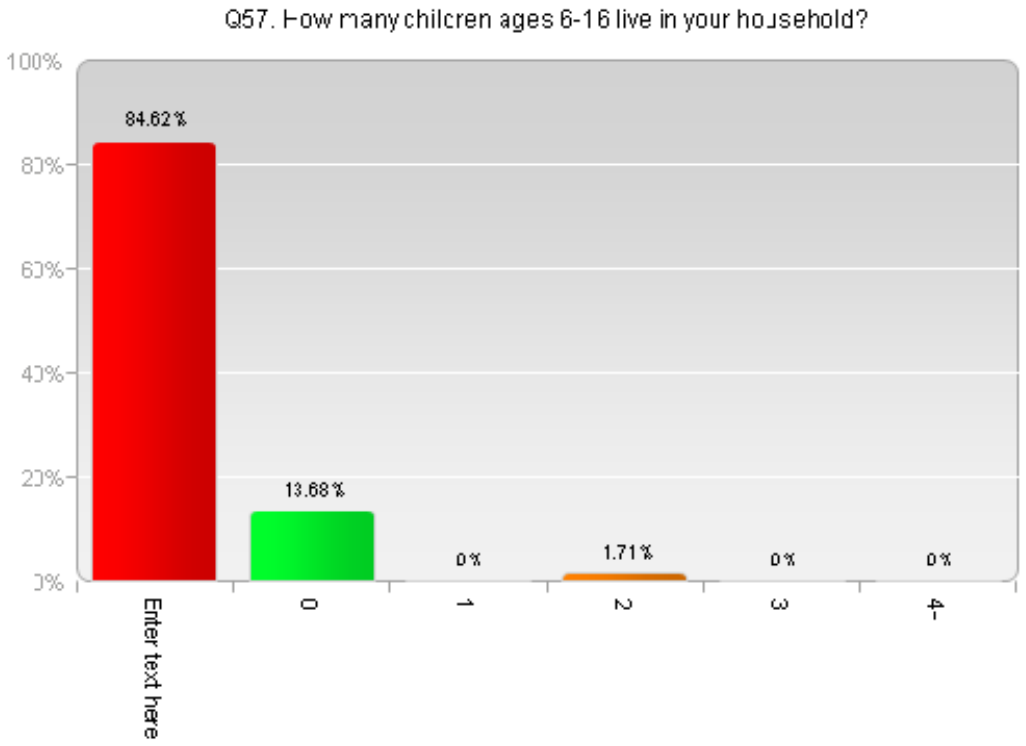

Q52. Employment status:
80%
70%
60%
50%
40%
30%
20%
10%
0%
10.17%
11.86%
74.58%
3.39%
Full-time
Part-time
Retired
Unemployed

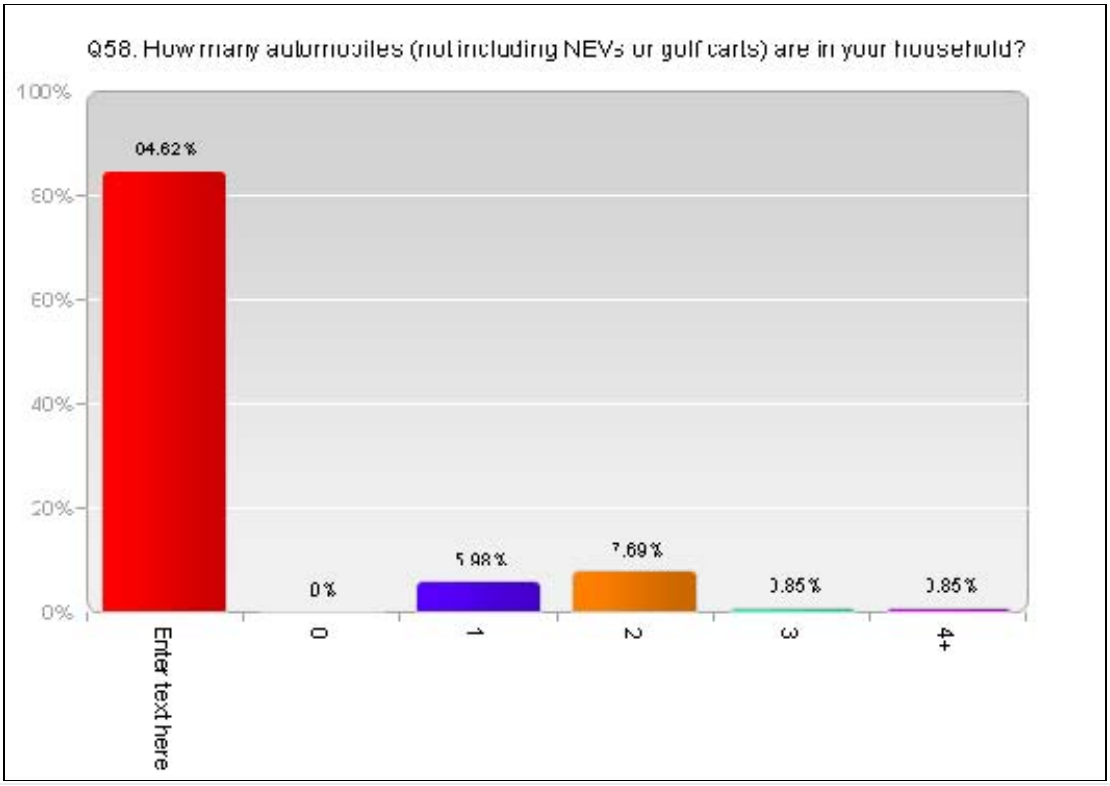

Q53. Please indicate your highest level of education:
40%
35%
30%
25%
20%
15%
10%
5%
0%
0%
21.19%
22.88%
35.59%
20.34%
Some high school
High school diploma
Technical college degree (A.A.)
College degree (bachelor's degree)
Post-graduate degree

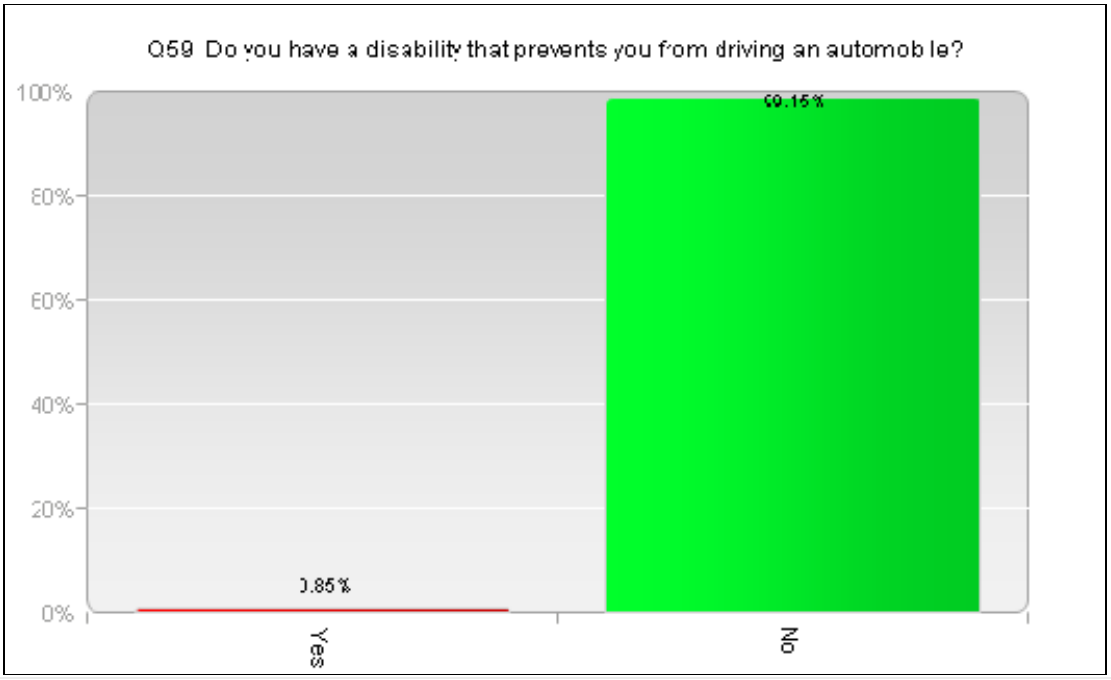

Q54. Including yourself, how many people live in your household?
50%
40%
30%
20%
10%
0%
16.67%
50%
16.67%
5.56%
11.11%
0%
1
2
3
4
5+
Other

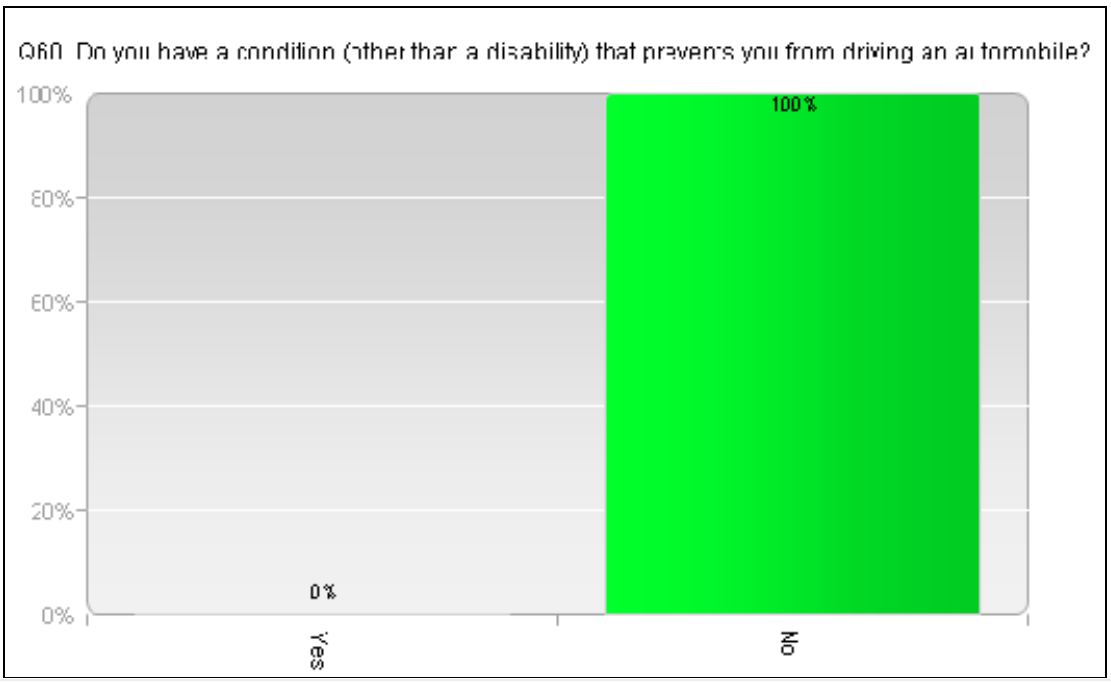

Q55. How many people living in your household work outside the home?
100%
80%
60%
40%
20%
0%
84.48%
5.17%
3.62%
1.72%
0%
0%
Enter text here
0
1
2
3
4+

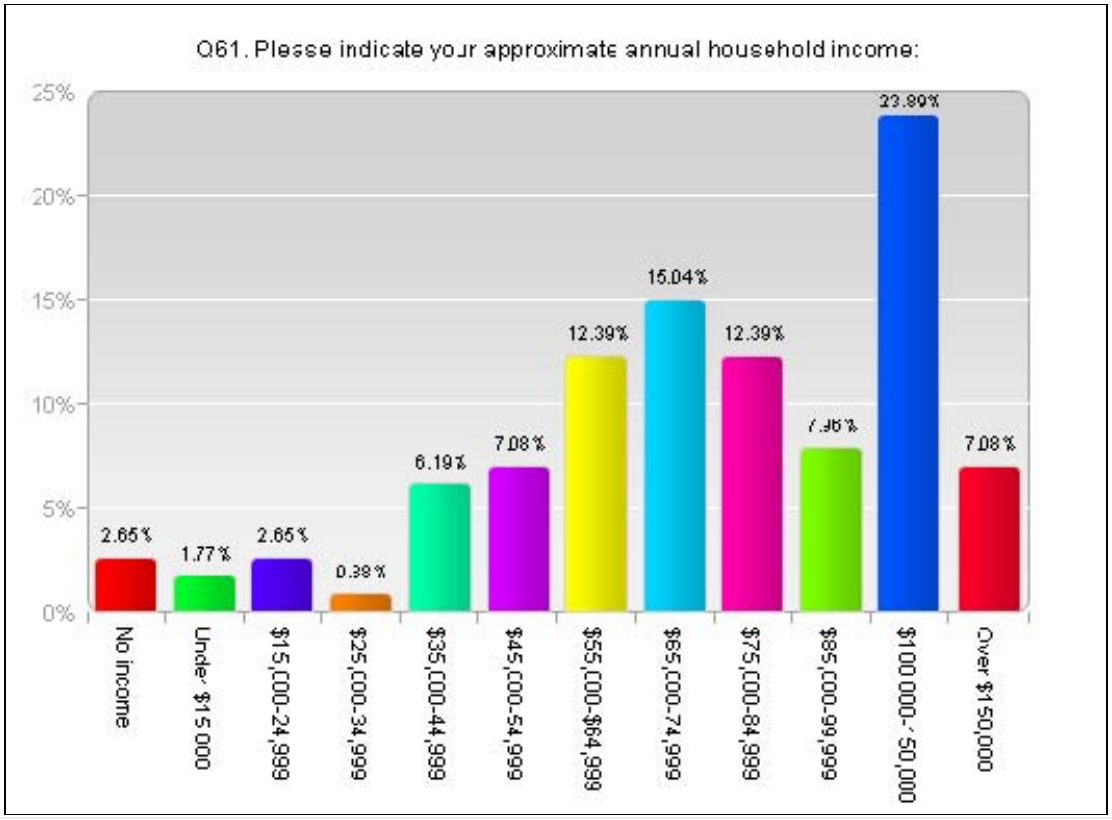

Q56. How many children under age six live in your household?
100%
80%
60%
40%
20%
0%
84.48%
11.21%
2.59%
0.86%
0.86%
0%
Enter text here
0
1
2
3
4+


Q57. How many children ages 6-16 live in your household?
100%
80%
60%
40%
20%
0%
84.62%
13.68%
0%
1.71%
0%
0%
Enter text here
0
1
2
3
4+

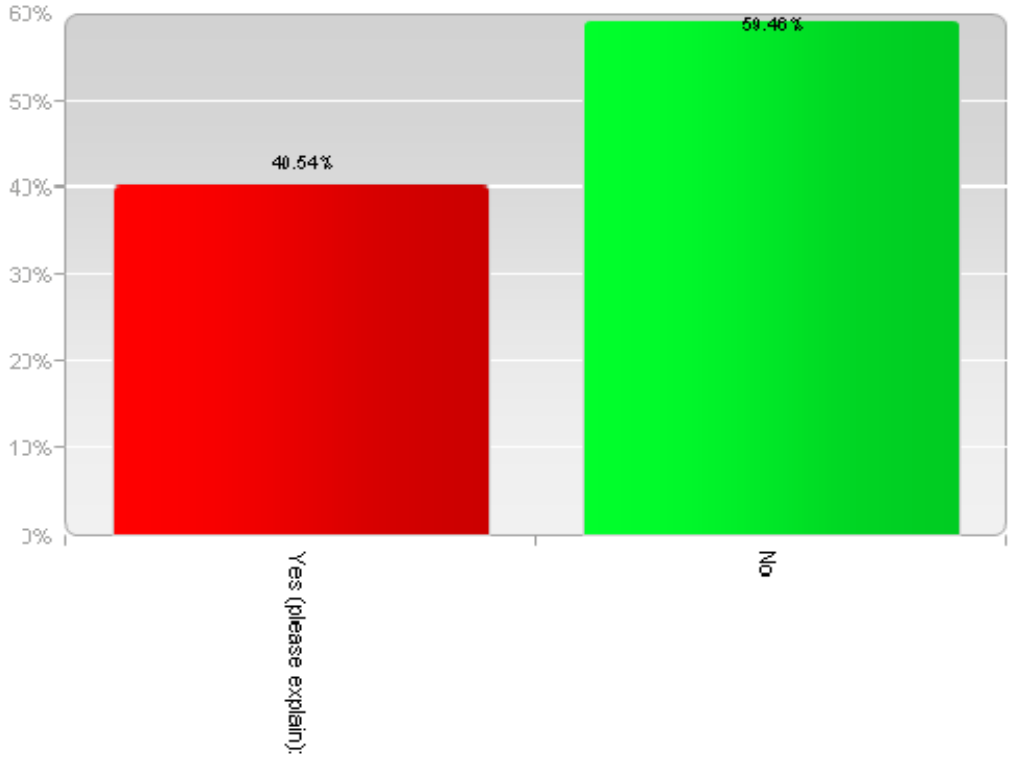

Q58. How many automobiles (not including NEVs or golf carts) are in your household?
100%
80%
60%
40%
20%
0%
84.62%
0%
5.98%
7.69%
0.85%
0.85%
Enter text here
0
1
2
3
4+


Q59 Do you have a disability that prevents you from driving an automobile?
100%
80%
60%
40%
20%
0%
0.85%
99.15%
Yes
No


Q60 Do you have a condition (other than a disability) that prevents you from driving an automobile?
100%
80%
60%
40%
20%
0%
0%
100%
Yes
No


Q61. Please indicate your approximate annual household income:
25%
20%
15%
10%
5%
0%
2.65%
1.77%
2.65%
0.38%
6.19%
7.08%
12.39%
15.04%
12.39%
7.96%
23.89%
7.08%
No income
Under $15,000
$15,000-24,999
$25,000-34,999
$35,000-44,999
$45,000-54,999
$55,000-64,999
$65,000-74,999
$75,000-84,999
$85,000-99,999
$100,000-150,000
Over $150,000

Q64. Do you think NEVs affect the travel speed on roads where NEVs and traditional automobiles have separate lanes?



APPENDIX E. CALIFORNIA ASSEMBLY BILL 2353

Assembly Bill No. 2353

CHAPTER 422

An act to add and repeal Chapter 7 (commencing with Section 1963) of Division 2.5 of the Streets and Highways Code, and to amend Sections 385.5, 21250, 21251, and 21260 of the Vehicle Code, relating to neighborhood electric vehicles.

[Approved by Governor September 9, 2004. Filed with Secretary of State September 9, 2004.]

LEGISLATIVE COUNSEL'S DIGEST

AB 2353, Leslie. Neighborhood Electric Vehicles.

Existing law defines "low-speed vehicle" for purposes of the Vehicle Code as a motor vehicle, other than a motor truck, with 4 wheels on the ground that is capable of a minimum speed of 20 miles per hour and a maximum speed of 25 miles per hour on a paved level surface and that has an unladen weight of 1800 pounds or less. Existing law imposes certain restrictions on the use of low-speed vehicles on public streets and highways, and generally requires an operator of a low-speed vehicle to have a driver's license. A violation of the Vehicle Code is an infraction, unless otherwise specified.

Existing law authorizes a city or county to establish a golf cart transportation plan subject to the review of the appropriate transportation planning agency and traffic law enforcement agency. Existing law provides that operating a golf cart other than on an authorized roadway is an infraction punishable by a fine not exceeding $100.

This bill would authorize, until January 1, 2009, the City of Lincoln and the City of Rocklin in the County of Placer to establish a neighborhood electric vehicle (NEV) transportation plan subject to the same review process established for a golf cart transportation plan. The bill would define "neighborhood electric vehicle" for these purposes to have the same meaning as the above definition of "low-speed vehicle." The bill, among other things, would provide for the plan to authorize the use of state highways by NEVs under certain conditions. The bill would require a report to the Legislature by January 1, 2008. The bill would enact other related provisions. Because the bill would revise the definition of a crime, it would impose a state-mandated local program.

The California Constitution requires the state to reimburse local agencies and school districts for certain costs mandated by the state.

Statutory provisions establish procedures for making that reimbursement.

This bill would provide that no reimbursement is required by this act for a specified reason.

The people of the State of California do enact as follows:

SECTION 1. Chapter 7 (commencing with Section 1963) is added to Division 2.5 of the Streets and Highways Code, to read:

CHAPTER 7. NEIGHBORHOOD ELECTRIC VEHICLE TRANSPORTATION PLAN

1963. It is the intent of the Legislature, in enacting this chapter, to authorize the City of Lincoln and the City of Rocklin in the County of Placer to establish a neighborhood electric vehicle (NEV) transportation plan for a plan area in the city. It is the further intent of the Legislature that this transportation plan be designed and developed to best serve the functional travel needs of the plan area, to have the physical safety of the NEV driver's person and property as a major planning component, and to have the capacity to accommodate NEV drivers of every legal age and range of skills. It is the intent of the Legislature, in enacting this chapter, to encourage discussions between the Legislature, the Department of Motor Vehicles, and the California Highway Patrol regarding the adoption of a new classification for licensing motorists who use neighborhood electric vehicles.

1963.1. The following definitions apply to this chapter:

(a) "Plan area" means that territory under the jurisdiction of the City of Lincoln or the City of Rocklin designated by the city for a NEV transportation plan, including the privately owned land of any owner that consents to its inclusion in the plan.

(b) "Neighborhood electric vehicle" or "NEV" means a low-speed vehicle as defined by Section 385.5 of the Vehicle Code.

(c) "NEV lanes" means all publicly owned facilities that provide for NEV travel including roadways designated by signs or permanent markings which are shared with pedestrians, bicyclists, and other motorists in the plan area.

(d) "Speed-modified golf cart" means a golf cart that is modified to meet the safety requirements of Section 571.500 of Title 49 of the Code of Federal Regulations.

1963.2. (a) The City of Lincoln and the City of Rocklin may, by ordinance or resolution, adopt a NEV transportation plan.

(b) The transportation plan shall have received a prior review and the comments of the appropriate transportation planning agency designated under subdivision (a) or (b) of Section 29532 of the Government Code and any agency having traffic law enforcement responsibilities in the City of Lincoln or the City of Rocklin.

(c) The transportation plan may include the use of a state highway, or any crossing of the highway, subject to the approval of the Department of Transportation.

1963.3. The transportation plan shall include, but is not limited to, all of the following elements:

(a) Route selection, which includes a finding that the route will accommodate NEVs without an adverse impact upon traffic safety, and will consider, among other things, the travel needs of commuters and other users.

(b) Transportation interfacing, which shall include, but not be limited to, coordination with other modes of transportation so that a NEV driver may employ multiple modes of transportation in reaching a destination in the plan area.

(c) Citizens and community involvement in planning.

(d) Flexibility and coordination with long-range transportation planning.

(e) Provision for NEV related facilities including, but not limited to, special access points and NEV crossings.

(f) Provisions for parking facilities, including, but not limited to, community commercial centers, golf courses, public areas, parks, and other destination locations.

(g) Provisions for special paving, road markings, signage and striping for NEV travel lanes, road crossings, parking, and circulation.

(h) Provisions for NEV electrical charging stations.

(i) NEV lanes for the purposes of the transportation plan shall be classified as follows:

(1) Class I NEV routes provide for a completely separate right-of-way for the use of NEVs.

(2) Class II NEV routes provide for a separate striped lane adjacent to roadways with speed limits of 55 miles per hour or less.

(3) Class III NEV routes provide for shared use by NEVs with conventional vehicle traffic on streets with a posted speed limit of 35 miles per hour or less.

1963.4. If the City of Lincoln or the City of Rocklin adopts a NEV transportation plan, it shall do both of the following:

(a) Establish minimum general design criteria for the development, planning, and construction of separated NEV lanes, including, but not

limited to, the design speed of the facility, the space requirements of the NEV, and roadway design criteria.

(b) In cooperation with the department, establish uniform specifications and symbols for signs, markers, and traffic control devices to control NEV traffic; to warn of dangerous conditions, obstacles, or hazards; to designate the right-of-way as between NEVs, other vehicles, and bicycles; to state the nature and destination of the NEV lane; and to warn pedestrians, bicyclists, and motorists of the presence of NEV traffic.

1963.5. If the City of Lincoln or the City of Rocklin adopts a NEV transportation plan, each city may do the following:

(a) Acquire, by dedication, purchase, or condemnation, real property, including easements or rights-of-way, to establish NEV lanes.

(b) Establish a NEV transportation plan as authorized by this chapter.

1963.6. If the City of Lincoln or the City of Rocklin adopts a NEV transportation plan, each city shall also adopt all of the following as part of the plan:

(a) NEVs eligible to use NEV lanes shall meet the safety requirements for low-speed vehicles as set forth in Section 571.500 of Title 49 of the Code of Federal Regulations.

(b) A permit process for golf carts that requires speed-modified golf carts to meet minimum design criteria adopted pursuant to subdivision (a). The permit process may include, but not be limited to, permit posting, permit renewal, operator education, and other related matters.

(c) Minimum safety criteria for NEV operators, including, but not limited to, requirements relating to NEV maintenance and NEV safety. Operators shall be required to possess a valid California driver's license and to comply with the financial responsibility requirements established pursuant to Chapter 1 (commencing with Section 16000) of Division 7.

(d) (1) Restrictions limiting the operation of NEVs to separated NEV lanes on those roadways identified in the transportation plan, and allowing only those NEVs and speed-modified golf carts that meet the safety equipment requirements specified in the plan to be operated on separated NEV lanes of approved roadways in the plan area.

(2) Any person operating a NEV in the plan area in violation of this subdivision is guilty of an infraction punishable by a fine not exceeding one hundred dollars ($100).

1963.7. (a) If the City of Lincoln or the City of Rocklin adopts a NEV transportation plan pursuant to this chapter, the cities shall jointly submit a report to the Legislature on or before January 1, 2008, in consultation with the Department of Transportation, the Department of the California Highway Patrol, and local law enforcement agencies.

(b) The report shall include all of the following:

(1) A description of all NEV transportation plans and their elements that have been authorized up to that time.

(2) An evaluation of the effectiveness of the NEV transportation plans, including their impact on traffic flows and safety.

(3) A recommendation as to whether this chapter should be terminated, continued in existence applicable solely to the City of Lincoln and the City of Rocklin in the County of Placer, or expanded statewide.

1963.8. This chapter shall remain in effect only until January 1, 2009, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2009, deletes or extends that date.

SEC. 2. Section 385.5 of the Vehicle Code is amended to read:

385.5. A "low-speed vehicle" is a motor vehicle, other than a motor truck, having four wheels on the ground and an unladen weight of 1,800 pounds or less, that is capable of propelling itself at a minimum speed of 20 miles per hour and a maximum speed of 25 miles per hour, on a paved level surface. For the purposes of this section, a "low-speed vehicle" is not a golf cart, except when operated pursuant to Section 21115 or 21115.1. A "low-speed vehicle" is also known as a "neighborhood electric vehicle."

SEC. 3. Section 21250 of the Vehicle Code is amended to read:

21250. For the purposes of this article, a low-speed vehicle means a vehicle as defined in Section 385.5. A "low-speed vehicle" is also known as a "neighborhood electric vehicle."

SEC. 4. Section 21251 of the Vehicle Code is amended to read:

21251. Except as provided in Sections 1963 to 1963.8, inclusive, of the Streets and Highways Code, and Sections 4023, 21115, and 21115.1, a low-speed vehicle is subject to all the provisions applicable to a motor vehicle, and the driver of a low-speed vehicle is subject to all the provisions applicable to the driver of a motor vehicle or other vehicle, when applicable, by this code or any other code, with the exception of those provisions which, by their very nature, can have no application.

SEC. 5. Section 21260 of the Vehicle Code is amended to read:

21260. (a) Except as provided in paragraph (1) of subdivision (b), or in an area where a neighborhood electric vehicle transportation plan has been adopted pursuant to Chapter 7 (commencing with Section 1963) of Division 2.5 of the Streets and Highways Code, the operator of a low-speed vehicle shall not operate the vehicle on any roadway with a speed limit in excess of 35 miles per hour.

(b) (1) The operator of a low-speed vehicle may cross a roadway with a speed limit in excess of 35 miles per hour if the crossing begins and ends on a roadway with a speed limit of 35 miles per hour or less and occurs at an intersection of approximately 90 degrees.

(2) Notwithstanding paragraph (1), the operator of a low-speed vehicle shall not traverse an uncontrolled intersection with any state highway unless that intersection has been approved and authorized by the agency having primary traffic enforcement responsibilities for that crossing by a low-speed vehicle.

SEC. 6. No reimbursement is required by this act pursuant to Section 6 of Article XIII B of the California Constitution because the only costs that may be incurred by a local agency or school district will be incurred because this act creates a new crime or infraction, eliminates a crime or infraction, or changes the penalty for a crime or infraction, within the meaning of Section 17556 of the Government Code, or changes the definition of a crime within the meaning of Section 6 of Article XIII B of the California Constitution.

O

APPENDIX F. APPROVED CTCDC MEETING MINUTES

MINUTES

CALIFORNIA TRAFFIC CONTROL DEVICES COMMITTEE (CTCDC) MEETING

Sacramento, July 28, 2005

The second CTCDC meeting of year 2005 was held in Sacramento, on July 28, 2005.

Chairman John Fisher opened the meeting at 9:10 a.m. with the introduction of Committee Members and guests. Chairman Fisher thanked Caltrans for hosting the meeting. The following Members, alternates and guests were in attendance:

ATTENDANCE	ORGANIZATION	TELEPHONE
Members (Voting)		
John Fisher Chairman	League of CA Cities City of Los Angeles	(213) 972-8424
Farhad Mansourian Vice Chairman	CA State Association of Counties Marin County	(415) 499-6570
Gerry Meis	Caltrans	(916) 654-4551
Lenley Duncan	CHP	(916) 657-7222
Ed von Borstel	League of CA Cities City of Modesto	(209) 577-5266
Merry Banks	California State Automobile Association	(415) 241-8904
Jacob Babico	CA State Association of Counties San Bernardino County	(909) 387-8186
Hamid Bahadori	Auto Club of Southern California	(714) 885-2326

ALTERNATES	ORGANIZATION	TELEPHONE
Gain Aggarwal	League of CA Cities City of Vacaville	(707) 449-5349

ATTENDEES	ORGANIZATION	TELEPHONE/E-Mail
Matt Schmitz	FHWA	matthew.schmitz@fhwa.dot.gov
Kent Milton	CHP Head Quarter	Kmilton@CHP.CA.GOV
Bret Goss	FCF Inc.	Bret@FirstCallFlagging.com
Steve Ainsworth	City of Lincoln	SAINSWORTH@MHMENGR.co
Chad Dornsife	Highway Safety Group	cdornsife@highwaysafety.us (858) 673-1926
Richard Haggstorm	Caltrans	richard_haggstorm@dot.ca.gov (916) 654-6600
Walter Laabs	City of Santa Rosa	wlaabs@srcity.org
Keith Lee	LA County, DPW	klee@ladpw.org
Dwight Ku	CSAA	DWIGHT-KU@CSAA.com
Joe Jeffrey	Road-Tech Safety	joe@roadtech.com (530) 676-7797
Don Howe	Caltrans	dhowe@dot.ca.gov
Ken Kochevar	FHWA	KenKochevar@fhwa.dot.gov (916) 498-5853
Nancy Dean	National Weather Service	nancy.dean@noaa.gov (707) 443-5610 x222
Barb Alberson	Co Dept. of Health Services	barberso@dhs.ca.gov
Ginny Mecham	CHP	Gmecham@chp.ca.gov
Meriko Hoshida	CHP	mhoshida@chp..ca.gov
Roger M. Bazeley	SF PTA	GAZeleg@designstlategy-usa.com
Craig A. Copelan	Caltrans	craig.copelen@dot.ca.gov
Carl Walker	City of Lincoln	cwalker@ci. Lincoln.ca.us
Jesse Bhullar	Caltrans	jesse-bhullar@dot.ca.gov
Ricardo Olea	City of San Francisco	ricardo.olea@sfgov.org
Bond M. Yee		bond.yee@sfgov.org
Robert Anderson	CSSC	anderson@stateseismic.com
Ken Coleman	LA Safe	colemank@metro.net (213) 922-2951
Ahmad Rastegarpour	CT	ahmud_rastegarpour@dot.ca.gov
Dennis Anderson	3M	d-anderson@mmm.com
Tedi Jackson	CSD	Tjackson@sandiego.gov (619) 527-3121
Mark Stone	City of San Diego	mstone@sandiego.gov
Kevin Taber	County of Placer	ktaber@placer.ca.gov

05-5 Proposal for Experimentation Use of a Nonstandard Signage for Neighborhood Electric Vehicles (NEV).

Chairman Fisher asked Gerry Meis to introduce item 05-5 experiment with Signage for Neighborhood Electric Vehicle (NEV) requested by the City of Lincoln.

Gerry introduced Carl Walker, City of Lincoln and asked him to present his experiment proposal to the Committee.

Carl Walker, City of Lincoln, stated that the City of Lincoln and City of Rockln are 6 months into a five-year pilot program for NEV travel within the city. The five-year trial is a result of AB2353 which became law as of January 1, 2005. Carl explained about NEVs and how they differ from golf carts. NEV is a compact vehicle, one to four passenger vehicles powered by rechargeable batteries and an electric motor. NEV are classified as a "low speed vehicle" (LSV) under Title 49 C.F.R Part 571.500. Because NEVs are classified as LSVs, they must meet all safety standards such as seat belts, brake lights, rear lights, headlights, mirrors and windshield. NEVs must comply with all the rules and regulations for a motor vehicle as set for in the California Vehicle Code. NEVs must be registered with the State Department of Motor Vehicles and the driver must hold a valid California driver's license and be insured. NEVs may travel on any street with a posted speed limit of 35 miles per hour or less. NEVs may cross state-highways at controlled intersections only. Golf carts are designed to carry golf equipment and not more than two persons, including the driver. Golf carts are not required to possess the safety equipment required of a low speed vehicle and have a top speed 15-mph. State law prohibits use of golf carts on public roadways outside of a "Golf Cart Transportation Plan".

Carl also pointed out a PowerPoint slide containing the specifications of the NEV. Carl added that the benefits of NEV uses are for short distance at low speeds where traffic, parking and air pollution might be of concern. NEV can travel 150 miles per gallon and it supports local businesses. NEV can reduce personal travel cost and provide mobility for people who cannot drive an automobile. A critical element of the NEV Transportation Plan includes the development of special paving, road markings, signage and striping for NEV travel lanes. Carl added that there are currently no State or Federal standards for NEV lane widths. The City of Lincoln's goal is to provide a safe NEV lane width without the lane being so wide that it encourages automobile use.

Carl also discussed different alternatives for NEV travel lanes, such as Class I NEV lanes, Class II NEV lanes and Class III NEV routes. Class II NEV lanes would be a portion of public roadways that are designated by signs and pavement markings for NEV travel. Class III NEV routes are mixed with traffic on most streets posted 35 mph or less. Carl also discussed different striping patterns which he shares with the Committee members by a Power Point Presentation. Carl also showed a proposed new symbol for the NEV, however he informed the Committee that the City will approach FHWA for symbol approval. In closing, Carl stated that the State of California would benefit from to the City of Lincoln's experience in implementing an NEV transportation plan. The City will identify the hurdles that will be encountered during the implementation of the NEV plan.

Chairman Fisher stated that the presentation showed marking and striping in addition to the signage. However the proposal in the agenda packet only talked about signs.

Carl responded that the City does not have the complete package for application submittal.

Farhad Mansourian stated that the proposed signage does not cover under Section 1A.3 which was recommended to include in the California Supplement earlier by the Committee.

Gerry Meis responded no, the earlier recommendation allows addition of date, extra timing, not to create a verbal message sign.

Hamid Bahadori stated that a golf cart is allowed on roadways with 25 mph or less speeds, so why is there a need to create new signs and striping.

Carl responded that the NEV could operate on roadways with speeds up to 35 mph. The purpose of a separate lane is that if a roadway has a speed higher than 35 mph, then the NEV will have their own travel lane.

Hamid asked whether the City would collect data to determine if NEVs are acceptable to travel on roadways having speeds over 35 mph as long as they have there own travel lanes.

Carl responded that AB2353 allows NEVs on roadways with speeds over 35 mph as long as there is proper signing, striping and a separate travel lane.

Chairman Fisher asked about the Vehicle Code allowing the establishment of separate bus lanes, bicycle lanes, then does this legislation allow the development of separate NEV lanes.

Carl responded yes.

Jacob Babico asked about the sign specification shown on page 32 0f 60 shows "NEV Lane", in his opinion the sign should be "NEV Route".

Carl responded that is correct, it should be "NEV Route".

Chairman Fisher suggested that "NEV Route" sign should be "White on Green".

Hamid added that the request is also for authorization of new pattern of striping.

Gerry Meis added that he was not aware if there would be a request for a marking and striping approval.

Chairman Fisher asked any other comments from the audience and from Committee members.

Roger Bazeley stated that if the proposal is proven to be successful, then it could be expanded throughout California.

Motion: Moved by Farhad Mansourian, seconded by John Fisher, to authorize experimentation with the signage package with the change of "NEV Lane" to "NEV Route" with the use of existing striping details available. Experiment will be conducted on Class II NEV Routes.

Motion carried 8-0.

Action: Item approved for experimentation.

APPENDIX G. CALIFORNIA SENATE BILL 956

Senate Bill No. 956

CHAPTER 442

An act to add and repeal Chapter 8 (commencing with Section 1965) of Division 2.5 of the Streets and Highways Code, and to amend Sections 21251 and 21260 of the Vehicle Code, relating to neighborhood electric vehicles.

[Approved by Governor October 10, 2007. Filed with Secretary of State October 10, 2007.]

LEGISLATIVE COUNSEL'S DIGEST

SB 956, Correa. Neighborhood electric vehicles.

Existing law defines "low-speed vehicle" for purposes of the Vehicle Code as a motor vehicle, other than a motor truck, with 4 wheels that is capable of a minimum speed of 20 miles per hour and a maximum speed of 25 miles per hour on a paved level surface and that has a gross vehicle weight rating of less than 3,000 pounds. Existing law imposes certain restrictions on the use of low-speed vehicles on public streets and highways, and generally requires an operator of a low-speed vehicle to have a driver's license. A violation of the Vehicle Code is an infraction, unless otherwise specified.

Existing law authorizes a city or county to establish a golf cart transportation plan subject to the review of the appropriate transportation planning agency and traffic law enforcement agency. Existing law provides that operating a golf cart other than on an authorized roadway is an infraction punishable by a fine not exceeding $100. Existing law authorizes, until January 1, 2009, the City of Lincoln and the City of Rocklin in the County of Placer to establish a neighborhood electric vehicle transportation plan subject to the same review process established for a golf cart transportation plan, and defines "neighborhood electric vehicle" for these purposes to have the same meaning as the above definition of low-speed vehicle. A person operating a neighborhood electric vehicle in the plan area in violation of certain provisions is guilty of an infraction punishable by a fine not exceeding $100.

This bill, until January 1, 2013, would enact similar provisions authorizing the County of Orange to establish a neighborhood electric vehicle transportation plan for the Ranch Plan Planned Community in that county, subject to similar penalties. The bill would require a report to the Legislature by November 1, 2011. Because the bill would create a new crime, it would impose a state-mandated local program.

The California Constitution requires the state to reimburse local agencies and school districts for certain costs mandated by the state. Statutory provisions establish procedures for making that reimbursement.

93

This bill would provide that no reimbursement is required by this act for a specified reason.

The people of the State of California do enact as follows:

SECTION 1. Chapter 8 (commencing with Section 1965) is added to Division 2.5 of the Streets and Highways Code, to read:

CHAPTER 8. NEIGHBORHOOD ELECTRIC VEHICLE TRANSPORTATION PLAN FOR RANCH PLAN PLANNED COMMUNITY IN ORANGE COUNTY

1965. It is the intent of the Legislature, in enacting this chapter, to authorize the County of Orange to establish a neighborhood electric vehicle (NEV) transportation plan for the Ranch Plan Planned Community in the county. The purpose of this NEV transportation plan is to further the community's vision of creating a sustainable development that reduces gasoline demand and vehicle emissions by offering a cleaner, more economical means of local transportation within the plan area. It is the further intent of the Legislature that this NEV transportation plan be designed and developed to best serve the functional travel needs of the plan area, to have the physical safety of the NEV driver's person and property as a major planning component, and to have the capacity to accommodate NEV drivers of every legal age and range of skills.

1965.1. The following definitions apply to this chapter:

(a) "Plan area" means the Ranch Plan Planned Community project area and all streets located within the project area.

(b) "Neighborhood electric vehicle" or "NEV" means a low-speed vehicle as defined by Section 385.5 of the Vehicle Code.

(c) "NEV lanes" means all publicly or privately owned facilities that provide for NEV travel including roadways designated by signs or permanent markings which are shared with pedestrians, bicyclists, and other motorists in the plan area.

(d) "Ranch Plan Planned Community" means the comprehensive land use, conservation, and development program initially approved by the Orange County Board of Supervisors on November 8, 2004, and covering the remaining 22,815 acres of the historic Rancho Mission Viejo located in southeastern Orange County.

(e) "Transportation planning agency" means the Orange County Transportation Authority.

1965.2. (a) The County of Orange may, by ordinance or resolution, adopt a NEV transportation plan for the Ranch Plan Planned Community.

(b) The transportation plan shall have received a prior review and the comments of the transportation planning agency and any agency having traffic law enforcement responsibilities in the County of Orange.

93

(c) The transportation plan may include the use of a state highway, or any crossing of the highway, subject to the approval of the Department of Transportation.

1965.3. The transportation plan shall include, but is not limited to, all of the following elements:

(a) Route selection, which includes a finding that the route will accommodate NEVs without an adverse impact upon traffic safety, and will consider, among other things, the travel needs of commuters and other users.

(b) Transportation interfacing, which shall include, but not be limited to, coordination with other modes of transportation so that a NEV driver may employ multiple modes of transportation in reaching a destination in the plan area.

(c) Provision for NEV related facilities including, but not limited to, special access points and NEV crossings.

(d) Provisions for parking facilities, including, but not limited to, community commercial centers, golf courses, public areas, parks, and other destination locations.

(e) Provisions for special paving, road markings, signage and striping for NEV travel lanes, road crossings, parking, and circulation.

(f) Provisions for NEV electrical charging stations.

(g) NEV lanes for the purposes of the transportation plan shall be classified as follows:

(1) Class I NEV routes provide for a completely separate right-of-way for the use of NEVs.

(2) Class II NEV routes provide for a separate striped lane adjacent to roadways with speed limits of 55 miles per hour or less.

(3) Class III NEV routes provide for shared use by NEVs with conventional vehicle traffic on streets with a speed limit of 25 miles per hour or less.

1965.4. If the County of Orange adopts a NEV transportation plan for the Ranch Plan Planned Community, it shall do both of the following:

(a) Establish minimum general design criteria for the development, planning, and construction of separated NEV lanes, including, but not limited to, the design speed of the facility, the space requirements of the NEV, and roadway design criteria.

(b) In cooperation with the department, establish uniform specifications and symbols for signs, markers, and traffic control devices to control NEV traffic; to warn of dangerous conditions, obstacles, or hazards; to designate the right-of-way as between NEVs, other vehicles, and bicycles; to state the nature and destination of the NEV lane; and to warn pedestrians, bicyclists, and motorists of the presence of NEV traffic.

1965.5. If the County of Orange adopts a NEV transportation plan for the Ranch Plan Planned Community, it shall also adopt all of the following as part of the plan:

(a) NEVs eligible to use NEV lanes shall meet the safety requirements for low-speed vehicles as set forth in Section 571.500 of Title 49 of the Code of Federal Regulations.

(b) Minimum safety criteria for NEV operators, including, but not limited to, requirements relating to NEV maintenance and NEV safety. Operators shall be required to possess a valid California driver's license and to comply with the financial responsibility requirements established pursuant to Chapter 1 (commencing with Section 16000) of Division 7 of the Vehicle Code.

(c) (1) Restrictions limiting the operation of NEVs to separated NEV lanes on those roadways identified in the transportation plan, and allowing only those NEVs and golf carts that meet the safety equipment requirements specified in the plan to be operated on separated NEV lanes of approved roadways in the plan area.

(2) Any person operating a NEV in the plan area in violation of this subdivision is guilty of an infraction punishable by a fine not exceeding one hundred dollars ($100).

1965.6. (a) If the County of Orange adopts a NEV transportation plan for the Ranch Plan Planned Community pursuant to this chapter, the county shall submit a report to the Legislature on or before November 1, 2011, in consultation with the Department of Transportation, the Department of the California Highway Patrol, and local law enforcement agencies.

(b) The report shall include all of the following:

(1) A description of the NEV transportation plan and its elements that have been authorized up to that time.

(2) An evaluation of the effectiveness of the NEV transportation plan, including its impact on traffic flows and safety.

(3) A recommendation as to whether this chapter should be terminated, continued in existence and applicable solely to the Ranch Plan Planned Community, or expanded statewide.

1965.7. This chapter shall remain in effect only until January 1, 2013, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2013, deletes or extends that date.

SEC. 2. Section 21251 of the Vehicle Code is amended to read:

21251. Except as provided in Chapter 7 (commencing with Section 1963) and Chapter 8 (commencing with Section 1965) of Division 2 of the Streets and Highways Code, and Sections 4023, 21115, and 21115.1, a low-speed vehicle is subject to all the provisions applicable to a motor vehicle, and the driver of a low-speed vehicle is subject to all the provisions applicable to the driver of a motor vehicle or other vehicle, when applicable, by this code or any other code, with the exception of those provisions which, by their very nature, can have no application.

SEC. 3. Section 21260 of the Vehicle Code is amended to read:

21260. (a) Except as provided in paragraph (1) of subdivision (b), or in an area where a neighborhood electric vehicle transportation plan has been adopted pursuant to Chapter 7 (commencing with Section 1963) or Chapter 8 (commencing with Section 1965) of Division 2.5 of the Streets and Highways Code, the operator of a low-speed vehicle shall not operate the vehicle on any roadway with a speed limit in excess of 35 miles per hour.

93

(b) (1) The operator of a low-speed vehicle may cross a roadway with a speed limit in excess of 35 miles per hour if the crossing begins and ends on a roadway with a speed limit of 35 miles per hour or less and occurs at an intersection of approximately 90 degrees.

(2) Notwithstanding paragraph (1), the operator of a low-speed vehicle shall not traverse an uncontrolled intersection with any state highway unless that intersection has been approved and authorized by the agency having primary traffic enforcement responsibilities for that crossing by a low-speed vehicle.

SEC. 4. No reimbursement is required by this act pursuant to Section 6 of Article XIII B of the California Constitution because the only costs that may be incurred by a local agency or school district will be incurred because this act creates a new crime or infraction, eliminates a crime or infraction, or changes the penalty for a crime or infraction, within the meaning of Section 17556 of the Government Code, or changes the definition of a crime within the meaning of Section 6 of Article XIII B of the California Constitution.

O

93