



Nova Scotia
Segway Pilot Project
Evaluation Report

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INTRODUCTION

In 2012, The Department of Transportation and Infrastructure Renewal (TIR) was asked by Segway Nova Scotia to consider amending the *Motor Vehicle Act (MVA)* to allow Segway Personal Transporters to be legally permitted on Nova Scotia streets and sidewalks. Under the current *MVA*, these types of devices were not permitted anywhere other than private property.



Segway Personal Transporter

A Segway is a brand of personal transporter. Personal transporters of relevance for this report are self-balancing, electric-powered transportation devices able to turn in place and designed for one person. Computers and motors in the base of the device keep the transporter upright. Segways have a handle for the rider to hold on to. A user commands the transporter to move by shifting their weight. Top speeds for these devices are approximately 20 km/hour, therefore they are slower than bicycles but faster than pedestrians. It is estimated that there are tens of thousands of these type of devices now in use worldwide.

A jurisdictional review in 2012 revealed that Alberta, Ontario, and New Brunswick were conducting pilot projects to evaluate the safety of Segways on roadways. Alberta currently prohibits them from roadways with the exception of Emergency Medical Services, various police agencies, and parking authorities. A pilot conducted with Segway Alberta in the Edmonton River valley in 2011 found that Segways could be safely integrated into the traffic environment but consultation with municipalities and legislative work is still needed before amendments to the Alberta *Traffic Safety Act* can be made. In the meantime, an exemption has also been issued to Segway Alberta to expand their tour operations to include the city of Calgary.

Ontario's pilot project began in October 2006 and is due to expire in October 2018. It is limited to persons 14 years of age or older with mobility impairment, Canada Post employees who deliver door to door, and police officers for law enforcement purposes. They are only to be used on sidewalks, trails, paths and walkways provided municipal by-laws do not prohibit them. If prohibited on sidewalks by the municipality, then they may be permitted on the roadway. Ontario is not considering Segway use by the general public at this time. However, they are not prohibited from operating on private property.

The pilot in New Brunswick only permits law enforcement officers in Saint John to use them off private property.

Given the nature of these devices and pilots underway in other provinces, TIR concluded that it would be prudent to test and evaluate the use of Segways on Nova Scotia's public streets and sidewalks, prior to making permanent amendments to the *MVA*. In order to do a pilot, an amendment was passed in the spring of 2013, allowing Governor-in-Council to make regulations that permit pilot projects for the two year testing and evaluation of any matter governed by the *MVA* or relevant to highway traffic. As such, TIR proceeded to develop regulations to establish a pilot project to test and evaluate the use of Segways on Nova Scotia's streets and sidewalks, in a controlled tour guide situation. Other personal transporters of similar design were not available for testing at the time of the pilot, but would expect to have similar results.

TWO YEAR PILOT PROJECT

PURPOSE It was determined that beginning February 1, 2014, a two year Segway Pilot Project would be implemented to test and evaluate Segways in a controlled manner in Nova Scotia. This would allow TIR to gather information on Segway operation within Nova Scotia's highway environment, evaluate use and interactions with all road users, and evaluate safety measures and operational requirements with an aim to determining appropriate permanent amendments to the *MVA*.

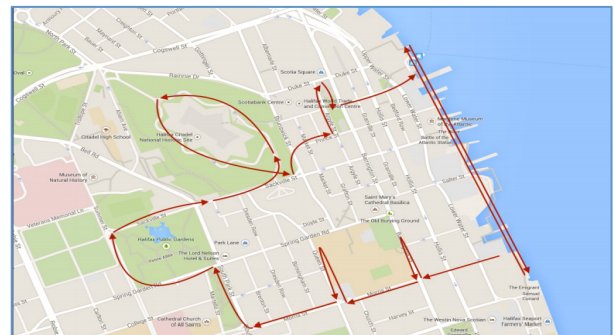
Interested vendors, owning three or more Segways, were encouraged to apply for a participant permit for either public use of Segways, whereby they could lead tours of Segway riders; or for commercial use, to be used by businesses. Very specific operating and equipment requirements would have to be met and routes on streets/roads of Nova Scotia would need to be pre-approved by TIR and by local traffic authorities where applicable.

PARTICIPANTS During the first year of the pilot, three different vendors were granted permits to operate Segway tours around the province. The locations were:

- 1) Truro, on the town sidewalks near Victoria Park as well as the trails within Victoria Park
- 2) South Shore at the Atlantica Hotel and Marina Oak Island, along the highway and paths leading to the causeway to Oak Island
- 3) Various routes around Halifax and parts of Dartmouth.

During the second year of the pilot however, only the vendor in HRM was operating, with several different routes approved around Halifax and over to Dartmouth via the ferry.

Important to note, the municipal traffic authorities were involved in approving the routes and exercised their right to control whether Segways could be used on municipal sidewalks/streets by prohibiting them from specific streets (e.g. Spring Garden Road in Halifax) or specific times of day (e.g. crossing Young Street during rush hour in Truro).



E.g. Tour of Downtown Halifax

Please note, tours conducted strictly on the board walk along the Halifax water front, and on trails (e.g. Beechville Lakeside Timberlea trail) or city parks (e.g. Point Pleasant Park) were technically not part of the pilot project as they did not involve public roadways controlled by TIR. Permission for use of Segways on those properties was managed separately with the owners/operators of those properties and Segway Nova Scotia. Also, no applications to operate Segways on a broader commercial basis were received by TIR.

OPERATING CONDITIONS required during the pilot for both the vendors and the riders were as follows:

The Segways were to be equipped with:

- working bell or horn
- light

Riders participating on tours involving public roadways were to:

- be a minimum age of 16 (14 with parental/guardian consent)
- wear a helmet

- stand when Segways were in motion
- not tow another person or device
- be trained by the vendor prior to starting the tour
- be led on the tour by an employee of the vendor

Segways were to be ridden:

- single file
- on sidewalks (where available) and to yield right-of-way to pedestrians
- at lowest speed setting on sidewalks (less than 8 km/h)
- on bike lanes (where available) when sidewalks were not available, up to 20 km/h
- on right-hand side of the road/road shoulder only when sidewalks or bike lanes were not available and when speed limits were 60 km/h or less.

EVALUATION

This evaluation report outlines the purpose of the pilot project, the objectives of the evaluation, the methodology used, reports on the survey results and the responses received by email and mail, as well as the conclusions and recommendations reached regarding the use of Segways in Nova Scotia.

The pilot project was conducted over a two year period from February 2014 to January 2016, providing opportunity to conduct an evaluation of the public use of Segways on Nova Scotia's roadways. This would allow for two seasons of tours, time to collect and analyze the data, as well as provide a report that would assist with decisions regarding changes to be made to the *MVA*.

OBJECTIVES of the evaluation addressed the key purposes of the Segway Pilot Project, which was to test and evaluate the interaction of Segways with other road users (pedestrians, cyclists and motorists), and determining whether safety measures and operational requirements were appropriate, in order to inform changes needed to the *MVA*. The objectives of the evaluation were to measure:

1) Safety

- Safety of Segway device for riders and other road users
- Safety of use of Segways on sidewalks, bike lanes and right-hand side of road/road shoulder

2) Acceptability

- Perceptions about use by Segway riders and other road users

3) Operating requirements and equipment

- Whether riding and equipment conditions put in place for the Segway pilot project were appropriate

METHODOLOGY was based on an evaluation framework that was devised to address the objectives of the evaluation and the pilot project. Evaluation data was collected through a variety of sources including reports from the vendors/participants, feedback from local traffic authorities and business owners, surveys completed by the riders and other road users such as pedestrians, cyclists, and drivers in Nova Scotia. A 1-800 number and a project specific email address was provided for interested Nova Scotians to offer unstructured feedback.

Early in 2014, online surveys for both *Other Road Users* and *Segway Riders* were developed and made available on the Department's website. A press release announcing the pilot project was sent out in February of 2014, with a follow-up press release in September of 2015. The press releases highlighted the purpose of the pilot project and directed interested Nova Scotians to provide feedback via the *Other Road User* survey link on the department's website, the 1-800 number, or by email.



TIR's summer interns, between June and August of 2014 and again in 2015, conducted hundreds of intercept surveys with pedestrians along the downtown Halifax Segway tour routes. Surveying shifts were set to coordinate with scheduled tour times when possible. This resulted in the capture of a large number of the *Other Road User* surveys.

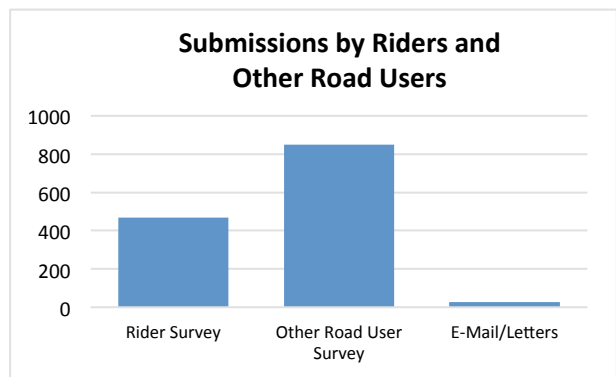
The email addresses of Segway tour riders were collected by each of the vendors and passed on to TIR so a survey link could be emailed to

them separately.

TIR also sent letters to the local business development associations in downtown Halifax and contact was made with Bicycle Nova Scotia and the Halifax Cycling Coalition to request that emails be sent to their members to solicit feedback regarding any encounters or opinions they had with Segways on provincial streets and roadways. The local traffic authorities, Metro Transit, and the Halifax Citadel Historic Site were also contacted at several points during the pilot to request feedback.

RESPONSES via the two surveys were fairly robust. As of December 2, 2015, more than 831 emails were sent to Segway riders requesting they complete an online survey. Specifically, 761 emails were sent to Halifax based riders, resulting in 401 responses - producing a fairly good response rate of 53%. A total of 47 email addresses from the Truro based routes during the first summer resulted in 36 *Rider* responses, a very good responses rate of 77%; and of the 23 emails sent to riders on the South Shore, 21 responses produced a strong 91% response rate. There were another nine respondents who did not indicate where they took the Segway tour. With a total of 467 *Rider* surveys, the overall response rate was a respectable 56%.

Nova Scotians were encouraged to complete the *Other Road User* survey about the perceived safety and use of Segways around the province. By December 2, 2015 more than 850 responses were received via the face-to-face and online surveys. In addition, a total of eight (8) emails were sent in to the Segway Pilot Project email address. After the announcement of the proposed changes to the *MVA*, government received a further 18 letters and emails advising the Department on this issue.



No official responses were received to the letters sent to the business development offices for Spring Garden Area, Waterfront Development, and Downtown Halifax.

Halifax Regional Municipality (HRM) traffic authority was contacted at several points during the pilot to determine if they were aware of any issues arising, as was Metro Transit with regards to any concerns raised by bus drivers encountering them around the downtown area of the city or on the ferries. There were no issues reported by HRM traffic authority or Metro Transit.

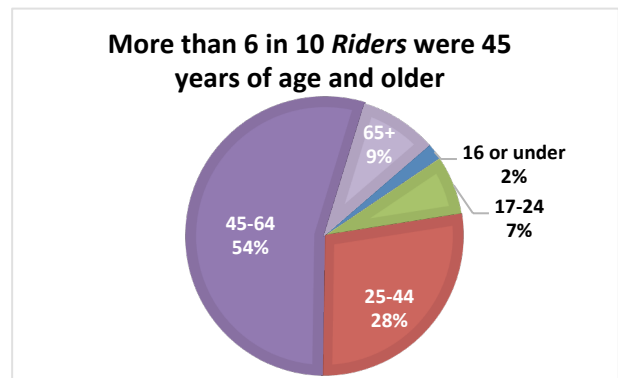
Feedback solicited from the Commissionaire Supervisor at the Halifax Citadel Historic Site was very positive: *“They were great visitors! They were very courteous, always asked if it was okay for them to proceed, never caused any difficulties with our mixed traffic in the front entrance area.”*

TIR staff also met with the vendors at the end of each season to discuss how the pilot was running, whether there were any incidents during tours, and whether they had any concerns with the parameters’ set out for the pilot. No reports of collisions or accidents were provided by the vendors and they were satisfied with the operating conditions of the project as it went along.

DATA RESULTS are based on survey data provided by the Segway tour *Riders* and *Other Road Users* such as pedestrians, bicyclists, and motorists. Comments from the surveys, emails, and letters sent to the department or other government offices, were also considered and included in the evaluation.

RIDER SURVEY RESPONDENTS

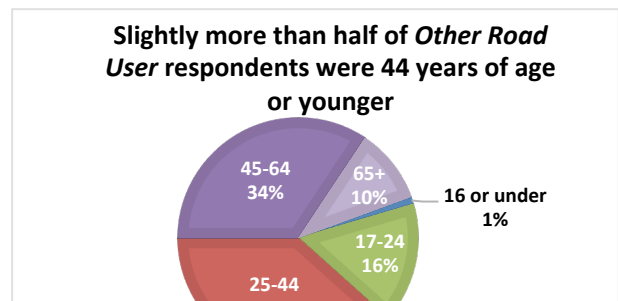
As of December 3, 2015 there were 467 Segway *Rider* responses to the online survey with virtually an equal number of men and women responding to the survey. Sixty three per cent of *Riders* were over the age of 44, with more than half (54%) between 45-64 years of age, and another 9% were 65 or older. The remaining 37% were 44 or younger, with 25-44 year olds representing 28%, and those 24 or younger only 9% of the respondents.



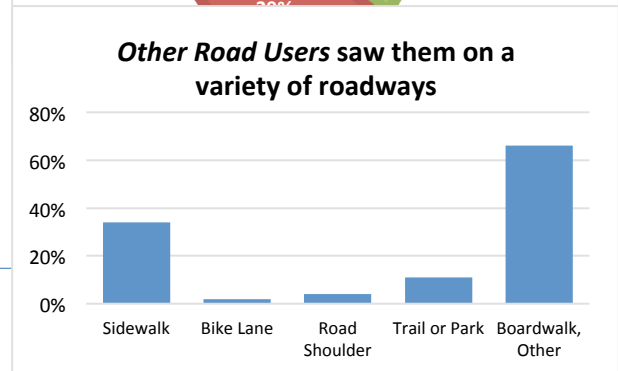
Since only the Halifax vendor had a license to participate in the pilot during the second year, the majority of *Rider* responses reflect a Halifax/Dartmouth experience (82%).

OTHER ROAD USER SURVEY RESPONDENTS

By December 2, 2015, more than 850 responses were received from other road users via the online and face to face surveys. Similar to the *Rider* survey, there was an almost even split of males (52%) and females (48%) responding to the survey. However, the *Other Road User* respondents were more likely than the riders, to be under 45 years of age (56% vs 37%).



A majority of the *Other Road Users* (82%) said they saw the Segways in action, 90% while a pedestrian, and virtually all had seen them around HRM (99%). Segways were seen by respondents on sidewalks (34%), trails (11%),



roads (4%), and bike lanes (2%) but mostly on Halifax’s waterfront board walk (66%).

As noted earlier, the purpose of the evaluation was to measure:

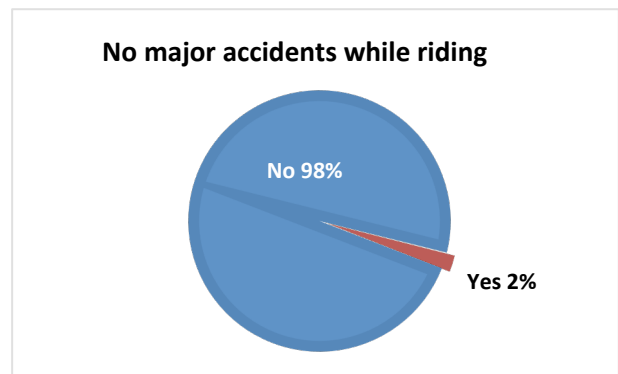
- 1) safety
- 2) acceptance, and the
- 3) operating conditions for Segway use on Nova Scotia’s sidewalks, streets and roadways.

The survey questions asked of *Riders* and *Other Road Users* and requests for specific stakeholder feedback were designed to help evaluate these objectives. The results from both surveys and other feedback are presented below on each of the components being evaluated.

1) **SAFETY** was the single most important factor being tested during the pilot project. The following information was used to assess the safety of the device from both perspectives, riders and other road users; as well as the perceived safety of their use on sidewalks, right-hand side of the road/road shoulders and bike lanes. This information was gathered through:

- a) Accident reports from traffic authorities, riders or vendors.
- b) The *Rider* survey asked about perceived safety, the comprehensiveness of the training prior to the tour, comfort in using the Segway, use of the rules while riding on the sidewalks and streets, wearing of helmets, and whether there had been any incidents while riding.
- c) The survey of *Other Road Users* gathered their opinions on where Segways should be ridden and perceived safety of the Segways.
- d) Comments via emails/letters.

To begin, over the course of the pilot project, there were no reports of major incidents between Segways and pedestrians, bicyclists or motorists from traffic authorities, riders, other road users, or vendors. Only 2% of riders said they had an accident. In these instances, *Riders* recounted having bumped into other Segways in front of them, or losing their balance and falling or needing to step off the machine. Two others mentioned having difficulty during training, one strained their calf. One rider said another person in the group had an accident but did not elaborate.

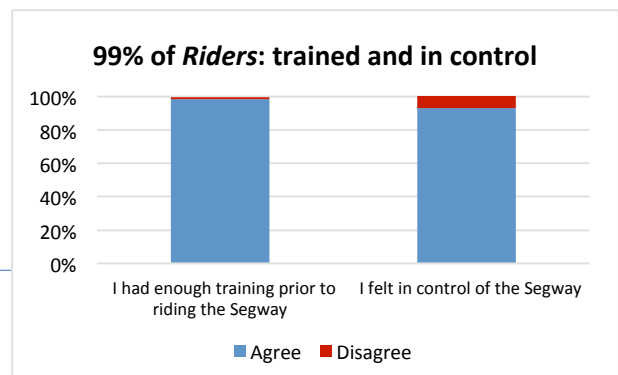


A number of *Other Road Users* mentioned that they saw people bumping into each other or falling off the Segways in various locations. However, no official reports were submitted by the vendor (as was required by the rules of the Pilot Project), or by riders/other road users to traffic authorities. It is presumed that incidents were minor and not severe enough to warrant reporting.

RIDER SURVEY RESPONDENTS

Virtually all of the *Riders* indicated that they were well trained and felt in control of the Segway prior to starting the tour.

Riders also indicated they were informed about the need to yield to pedestrians, to sound their



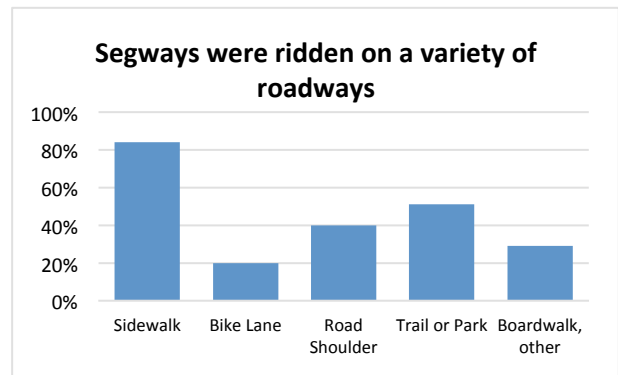
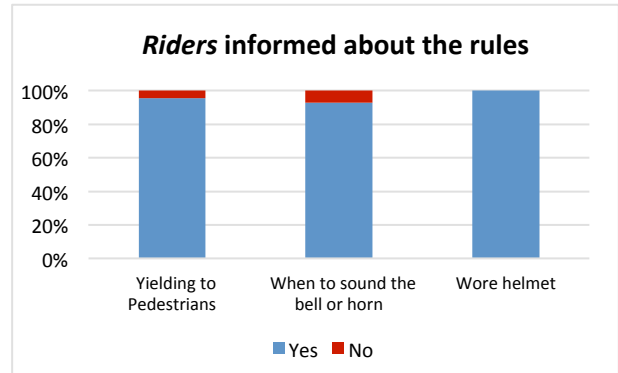
bells to alert people of their presence, and always wore helmets.

Although HRM did not approve Segways to be ridden on Spring Garden Road due to the high volume of pedestrians, the majority of city tours directed riders on other nearby streets around the downtown core; some tours went on to Point Pleasant park, others rode up to the Citadel, then down through Grand Parade, and along the waterfront board walk. A few tours continued to Dartmouth via the ferry.

Based on the approved Halifax/Dartmouth routes and *Rider* responses, the Segways were driven on a variety of roadways. *Riders* noted having ridden on: sidewalks (84%), parks/trails (51%), streets (40%), bike lanes (20%), as well as the Halifax waterfront board walk (29%).

Many *Riders* mentioned how easy and quick it was to learn to use the Segways. One woman celebrated her 75th birthday by taking a tour around Halifax.

This was lots of fun and I highly recommend it. It was my 75th birthday present and I couldn't have asked for anything more. We were a group of 5 with 2 staff accompanying us. One of our group found it difficult at times and she was given lots of support and positive reinforcement by the staff.



Those with mobility issues were particularly supportive of Segway use. Several said they would not have been able to manage the hills in Halifax without the use of a Segway and felt completely safe using the Segway on the hills.

"I LOVE THE SEGWAY, as a disabled person with poor balance and physically disabled, I felt totally safe on the Segway, I even rolled up/down a few grass hills, I felt awesome; I rode several times."

Another said, *"I'm 66 years old with having had serious ankle damage. This unit was great and I did not once feel nervous or unsafe."*

Riders' comments reflected that they felt safe on the sidewalks, and did not consider Segways a problem for pedestrians. One rider said,

The tour route we took put us on sidewalks a greater percentage of the time than my previous experiences with Segway tours. That said, the people we 'encountered' on the sidewalk seemed more curious and amused rather than inconvenienced by the need to share the space. I am sure much credit goes to the positive attitude of the Halifax citizens recognizing the economic impact the Segway riding guests bring to their city.

Another noted,

I now think that Segways are much safer on sidewalks than motorized wheelchairs and scooters. Segways take up less room on the sidewalk and are easily maneuvered, able to literally turn in place. Wheelchairs and scooters are awkward and heavy in comparison.

From a fun tourism perspective, another rider indicated Segways allow you to:

Cover a lot of ground in a short amount of time, you can still get close to the attraction and you can decide where you would like to spend more time there later. I am 56 years old and have no special sense of balance or coordination but the Segways are very easy to operate and not to mention a lot of fun.

Another added:

My mother was down visiting from Alberta... and she decided to take me on this Segway tour. ...At first I was a little skeptical about riding the Segway, but the video was very informative and the practise runs helped greatly! We didn't leave for the tour until we were completely comfortable, and it was amazing! ...and this, I am proud to say, was one of the most exhilarating and exciting experiences I have ever encountered. I felt so alive and it gave me a whole new zest for life.

Surprisingly many respondents had ridden Segways in several other cities around the world. *"The Halifax Segway tour was our 56th experience! My husband and I would rate it as one of the top five we have ever done."* One couple was frustrated their 13 year old was not permitted on the Segways even though they had successfully ridden Segways in other cities.

One tourist said,

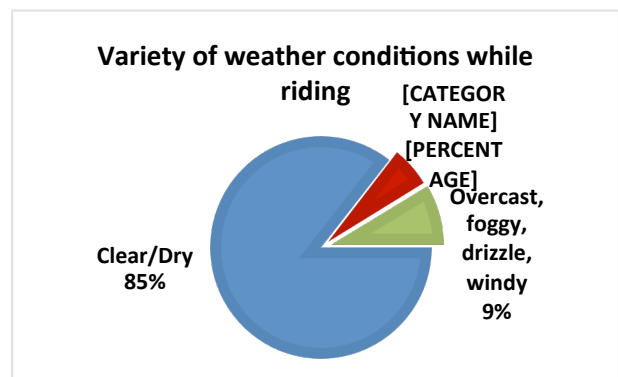
It's a great way to tour a new city, provided the opportunity to explore a larger area than we could on foot and much more intimate than a bus or car tour. I always look for cities with Segway tour options when planning vacation trips."

Less than ideal weather conditions did not seem to be a safety factor as fifteen per cent of *Rider* respondents reported riding when it was wet, rainy, overcast, foggy, drizzling, and/or windy. *Riders* did not mention any weather related issues in their comments.

Overall, a few respondents noted feeling apprehensive in the beginning but quickly gained confidence as the training/tour proceeded, and only one noted still feeling uncomfortable at the end of the tour but added she was the only one in her group to feel this way.

A respondent who rode on the sidewalks and trails in a park in Truro noted,

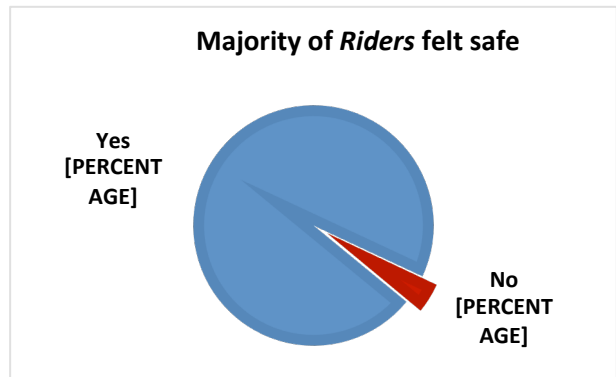
I took a tour in Truro along with my two senior sisters and we loved it. [The instructor] gave us the confidence to go on. After a very few minutes... we learned to trust the Segway and had a wonderful



experience travelling thru the park... will do it again. Walking home yesterday, was almost run over by teenager on bicycle... much more dangerous than a Segway on the sidewalks.

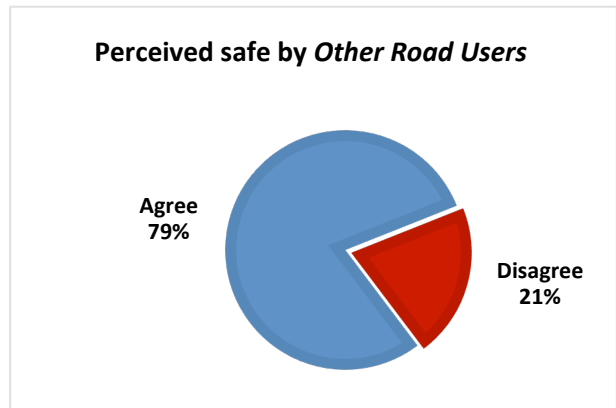
If a rider was not comfortable on the Segway there is evidence they were not pressured to continue to take a tour. One gentleman in Halifax, said his father was 82 years of age, took the training but chose not to take the tour. He said the Segway group never pushed his father to do the ride. They were more concerned that he *“be comfortable and capable of riding than getting another person to go on the tour”*.

In summation, the vast majority of *Riders* responded that they felt safe while riding the Segway (96%). As noted earlier, they felt they were well trained and did not feel uncomfortable riding on different roadways or weather conditions, and did not have many incidents. Segways were perceived by *Riders* to be a safe, fun and an efficient way to travel around Halifax, especially for those with mobility issues.



OTHER ROAD USER SURVEY RESPONDENTS

From the perspective of *Other Road Users*, the opinions regarding the safety of Segways is more varied. More than three-quarters (79%) believed Segways to be at least somewhat safe and 93% of those who saw Segways in use, said they did not have a negative experience with them.

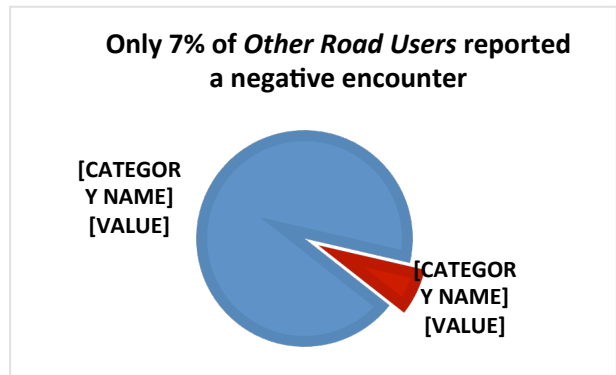


Of the 7% who had a negative experience with the Segways on the sidewalks, trails, and board walks around Halifax, their key concerns were that Segways took up too much room, were too fast for sidewalks and were not respectful of pedestrians. One email comment received noted that a young man on a Segway,

Forced me to jump aside to avoid being hit by his machine. I yelled at him, telling him he should watch out for pedestrians. He yelled back that I should get out of his way.

One road user said Segways,

Took up majority of the sidewalk... impeding me to be able to walk without having to let the 4 Segways pass.



One respondent noted,

These vehicles are too large and impractical to share sidewalks and bicycle lanes. When riding my bicycle I had to slow down considerably to

navigate with a Segway. While encountering a user on the sidewalk I had to jump out of my way on several occasions.

A near accident described by a motorist included, *“Rider kept easing out into the road and almost caused 2 accidents that I saw myself, people were blowing their horns at the rider - very unsafe”.*

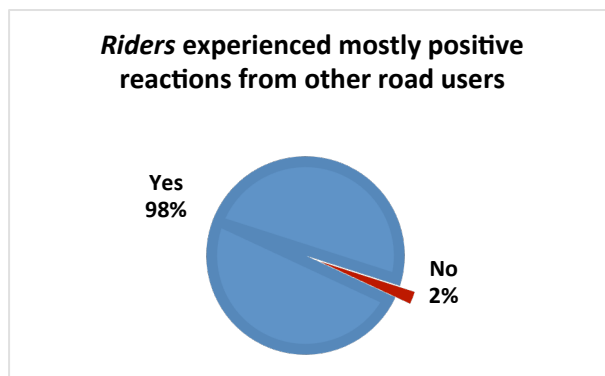
Another reported,

Mixing Segways with pedestrian traffic forces pedestrians to stop and wait for the Segway (or group of Segways in the case of tour operators) to pass. It's disruptive, especially in already crowded areas.

- 2) **ACCEPTANCE** of Segways by Nova Scotians was measured by comments made by respondents to the *Riders* and *Other Road Users* surveys, as well as emails and phone calls regarding the use of Segways on sidewalks, roads, bike lanes, and in general.

RIDER SURVEY RESPONDENTS

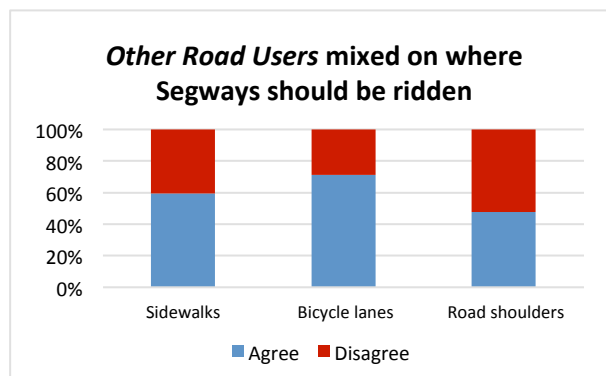
The vast majority (98%) of *Riders* experienced mostly positive reactions from other road users while riding Segways. Of the 2% of *Riders* noting a negative response by pedestrians, comments centered around the belief that they should not be allowed on the sidewalks or board walk. One rider reported that a *“pedestrian refused to let them pass even though the guide did everything correctly”*. Another said a man yelled at them to get off the sidewalks and to use the street, and a car honked at them in the crosswalk although the walk signal had not changed. One rider noted, *“There was one elderly gentleman who stepped off the sidewalk (he didn't need to as we were a least 3 ft. away from him) & cursed at us! Totally unnecessary. Otherwise all positive comments by the Public”.*



However, *Riders* said most people were looking and taking pictures, thought they were a great way to see the city, and wanted to know where to sign up for a tour. One rider said they were *“amazed at the politeness of pedestrians, and motorists. Not one time did we experience any one being abusive, rude or horn honking. The Segway ride was one of the highlights of our trip.”*

OTHER ROAD USER SURVEY RESPONDENTS

When considering where Segways should or should not be ridden *Other Road Users* were mixed in their opinions. Overall, 60% at least somewhat agreed Segways should be used on sidewalks, more than two thirds (71%) at least somewhat agreed they could be used on bike lanes, while fewer supported their use on the right-hand side of the road/road shoulder (48%). When the *Other Road Users* had specifically seen Segways used on sidewalks the per cent agreeing they should be used there rose to 68%.



Sidewalks:

Those in support of sidewalk use primarily noted that as long as pedestrians had the right of way and speed was controlled they did not have a problem with Segways using sidewalks. They also noted that motorized scooters and bicycles were larger and less nimble than Segways.

Given the prevalence of large, motorized scooters for people with impairments, I see no reason to limit Segway use. The scooters run faster and take up more room than Segways would and we seem to have adapted to them.

Those opposed to Segways on sidewalks believed they were bulky and took up too much space unless sidewalks were widened to *“allow safer flow for pedestrians and Segways”*. Another said, *“I think they are safe but going too fast to operate where people walk. Children or elderly may be harmed.”* More specifically another replied, *“Segway on sidewalk + my 4 year old on sidewalk = a big safety concern.”* An email received in December 2015 raised concerns for the disabled community, especially hazards Segways create for blind or deaf individuals. In general, it was believed that Segways were not appropriate in congested areas due to safety concerns.

Bike Lanes:

Some *Other Road Users* indicated Segways should be allowed in bike lanes and that they should be treated like a bicycle and follow the same rules as bikes. However, this also generated comments regarding the need to improve the bike lanes around Halifax. Others said bike lanes were a good option when sidewalks were too congested. Opponents to bike lane use believed they were *“not fast enough for bike lanes”* and would obstruct bicycle use in the limited bike lane space and cause them to move out into the path of vehicles which was too dangerous.

Right-hand Side of the Road/Road Shoulder:

Others preferred they be restricted to purely road use *“like other motorized machines”*. However, several others believed they were *“too slow for the road”*, causing *“problems for cyclists”* and noted motorized vehicles should not *“make use of the limited infrastructure available to cyclists and pedestrians”*. One comment said Segways were not able to dodge potholes and debris like bikes are, so were not suited to roadways. One letter noted that the road shoulders in rural areas are not maintained well enough, creating a hazard with vehicles.

Other:

Several comments indicated that Segway use should be *“restricted to wide off-street paths with low pedestrian volumes”*, or private areas like golf courses and warehouses, while others thought they were *“too fast for sidewalks and too slow for bike lanes... not something to be on our roads”* at all.

Overall, comments from *Other Road Users* were mixed about where they should be used. Some considered them unsafe for pedestrians, especially those with disabilities. Others suggested widening or dividing the sidewalks was necessary to accommodate them. Bike lanes were considered a good place as long as they were in good condition while others felt they would be hazardous for cyclists. Right-hand side of the road/road shoulder in general were considered less favourable. Still others thought more open areas such as the board walk or trails would be the best place for them, and another believed they should only be used on private property, such as golf courses. Several comments also suggested, *“Segways are safe, it’s the drivers that are sometimes unsafe”*.

General comments:

General comments ranged from thinking they looked “*futuristic*” to “*silly*”. A couple of respondents referred to them as “*toys*”, and several felt they had “*limited use*” and that “*we should encourage healthier forms of transportation*”.

Segways are weird. People are confused by them - what purpose do they have. They don't seem to be fast enough for the road but they aren't quite slow enough for comfortable sidewalk transportation. They are not a good promoter of active transportation. They are lazy and nerdy-looking devices.

While still others thought they were “*fun*” and a “*great way to get around*”, “*environmentally friendly alternative mode of transportation*”, “*helpful for people with disabilities*”, and a “*way to encourage tourism, bring visitors and locals out for a nice day*”.

Important to note, concerns were raised about Segways blocking park pathways, multi-use trails, and board walks for pedestrians. Concerns on the board walk and trails technically did not fall under the scope of this pilot project as they are not part of the streets/roadways of the province. Riders in these groups were not included in the survey respondents, however *Other Road User* respondents noted having seen Segways ridden in these areas so comments generally reflect the location that they were seen in.

- 3) **OPERATING REQUIREMENTS AND EQUIPMENT** was also measured by the comments received regarding the need for safety equipment or other controls for the use of Segways, and whether the riders or vendors complied with the operational requirements set out for the pilot project.

As reported earlier, *Riders* noted having been informed about the rules for riding Segways single file on the sidewalks, all riders wore helmets, and the Segways had bells and lights. They all received training on the use of Segways.

Other Road Users provided comments about the need to regulate and control the use of Segways. Bells or horns were considered by many respondents to be needed, as was wearing helmets, being of a ‘certain age’, riding single-file, and training, so riders “*know what they are doing and how to ride it appropriately*”. Not surprising, riding while smoking or using cell phones was considered unsafe. A few suggested that Segway users should be licensed, and even insured.

Only once properly regulated, through the establishment of safety and other precautionary measures, Segway use could provide a valuable opportunity for alternate transportation for Nova Scotians.

The controls and regulations mentioned by *Other Road Users* mostly reflected the safety conditions that were put in place for the pilot project. The *Riders’* responses supported the view that these requirements made for a safe and comfortable riding experience.

CONCLUSION

SAFETY

Overall, the vast majority of Segway riders only noted a few issues with regards to safety while riding on any type of roadway, and thoroughly enjoyed the experience. A few riders admitted they

sometimes bumped into the Segway in front of them or needed to step/fell off if they lost their balance.

Personal mobility issues did not hamper use of Segways and in fact, Segways were considered an asset in helping less mobile people to move around the city. Wet weather did not appear to negatively impact riders' ability to control the Segways.

Although not always appreciated, Segways did not prove to be a major hazard to pedestrians as there were no major incidents reported between Segways and pedestrians by the riders, vendors, other road users or traffic authorities over two tour seasons. Overall, *Other Road Users* were accepting of Segway use on sidewalks and bicycle lanes, especially those who witnessed them in use.

Virtually all the Segway *Riders* believed they had enough training, wore helmets, and felt safe on the machines; more than three quarters of *Other Road Users* who saw them in action, also thought they were safe.

ACCEPTANCE

Comments by *Other Road Users* regarding Segways included that they were considered futuristic and odd, but were generally recognized as a viable, alternative mode of transportation. Although not considered a healthy transportation alternative by many, they did prove to be a useful one, especially for those with mobility issues or who needed to cover a wide area in a short period of time.

Perspectives were mixed as to whether they should be ridden on sidewalks or road ways and bike lanes. Concerns centered on Segways being too fast and taking up too much room on sidewalks making them unsafe for pedestrians. Others believed they were too slow to be in the bike lanes to be safe, while others said if they were motorized they should be on the right-hand side of the road/road shoulder. However, there was less inclination to agree they should be allowed to be ridden on the right-hand side of the road/road shoulder.

One rider summed it by saying:

As with bicycles and cars it will require all drivers to respect each other and follow the rules of the road. Let's be progressive on this issue and not bury our heads in the sand to avoid what progress can provide as alternatives for transportation... for those with mobility issues.

OPERATING REQUIREMENTS AND EQUIPMENT

It was widely agreed by *Riders* and *Other Road Users* alike, that safety precautions were prudent. Similar to bicycle requirements, helmets and bells should be mandatory, speed limited according to the location, pedestrians need to be respected, and it is necessary to follow known rules of the road.

Segways appear to be as safe/unsafe as any other mode of transport. They have their place. As long as regulations are in place such [as] a max speed and helmet use then there should not be issues more than any other mode of transport.

SUMMARY

The purpose of the Segway Pilot Project was to assess the safety, acceptance and operating conditions of Segways on roadways around the province. Permission to test their use on HRM and other municipal sidewalks/roadways was obtained in conjunction with developing the pilot. Segway tour

vendors agreed to provide training, meet specific safety requirements for the riders and machines, and submitted proposed route plans for approval. These routes were approved by local traffic authorities.

Local traffic authority's ability to control the approved routes limited Segway use on the busiest sidewalks in HRM and during rush hour in Truro. This may have influenced the safety results by abstaining their use on the most crowded sidewalks in Halifax. The ability for municipal jurisdictions to control their use may address pedestrian's concerns regarding Segway safety on hectic sidewalks/streets.

A lack of vendors conducting tours in more rural areas of the province during the second season, restricted testing of Segways in this less busy roadway environment. Although data from rural areas is limited, it is believed that safe operations in a dense urban area provides enough evidence for safe use in quieter rural areas.

According to the data provided over the course of the two tour seasons, Segways were, by and large, safe when ridden by those 16 and older, wearing helmets, and having training. As many were new riders there is an expected learning curve and as with other forms of transportation, with experience would come improved performance. Segways appear to have a broader appeal to older adults, especially those who may have some mobility issues and tend to use less active forms of personal transportation.

Segways were ridden safely in a variety of places – primarily sidewalks, but also bike lanes, and to the right-hand side of road/road shoulder when needed. Along with controlling where Segways could be ridden, speed limits for use on sidewalks likely reduced the negative impact of Segways' movement among pedestrians. Pedestrians had the right of way on sidewalks, but it was expected that sidewalks be respectfully shared by all users, whether walking, jogging, running, using motorized scooters, or Segways. This was evidenced by the positive experience noted by the majority of Segway riders.

While generally accepted as a practical mode of transportation when driven respectfully, views regarding where Segways (or other personal transporters) should be ridden were mixed. Our roadways are intended to transport both people and goods, and are not limited only to motorized vehicles. Motorized vehicles already share the roadways with bicycles, and even pedestrians when there are no sidewalks.

For safety reasons, preference is generally to separate slower forms of transportation from the faster and larger ones. The upright nature of travelling on a Segway, their slower speed, the fact that they take up less physical space than a bicycle, and they have the ability to respond and turn quicker, makes them a more natural fit for a sidewalk, or the more protected bike lanes, rather than the right-hand side of the road/road shoulder.

The various weather conditions experienced in Nova Scotia between May and October also did not appear to be a problem. Although Segways can be used off road, on trails, etc. winter weather may hamper their use in slush and snow, however this was not tested by the vendors.

With regards to comments about insuring Segway riders, the Insurance Bureau of Canada indicated that, at this time, Segways or other personal transporters for individual use are not covered by homeowner's or tenant's insurance. An owner would have to refer to their insurer to determine options for liability coverage.

Overall, the Segway Pilot Project did not raise major safety concerns for the riders nor the majority of other road users. Like other personal modes of transportation it is imperative that they be used in a safe and respectful manner for the safety of the rider and those in close proximity. Although not always appreciated they were noted to be a more environmentally friendly form of transportation than vehicles, and useful for those with mobility issues.

RECOMMENDATIONS

- 1) Segways may be used by individuals (not only those involved with tour groups) on provincial roadways, in conjunction with the majority of the conditions used during the two year pilot project. This includes but is not limited to:
 - i) Driven alone and in a standing position at all times.
 - ii) Single-file, at limited speeds, on sidewalks, or bike lanes in the absence of sidewalks, and the right-hand side of the road/road shoulder only in the absence of sidewalks and bike lanes;
 - iii) Yielding to pedestrians on sidewalks until safe to pass.
 - iv) Riders should be no less than 16 years of age, unless at least age 14 and has a parent or guardian's consent while on a tour.
 - v) Uses safety equipment such as helmets, and working bells/horns and lights.
 - vi) Segway riders will use their horns/bells to alert pedestrians of their presence, including when overtaking a pedestrian.
 - vii) Riders are not permitted to use hand-held cellular phones or to text.
 - viii) Use is prohibited on highways with a posted speed limit of greater than 60 km/h, controlled access highways, highways where bicycles are prohibited, and on private property.
- 2) Municipal governments retain the ability to restrict Segway use in their jurisdictions.

APPENDICES

SEGWAY RIDER SURVEY

Transportation and Infrastructure Renewal (TIR) is conducting a survey about Segway use in Nova Scotia, to help us evaluate the Segway Pilot Project. We are seeking feedback on your experiences while riding the Segway device. All information collected through this survey will be kept confidential and will be used for evaluation purposes only. Your responses will help us to make a decision on whether to permanently allow use of Segways on Nova Scotia streets and sidewalks.

Please respond to the following questions, based on your last use of the Segway device.

1. Are you?
 - Male
 - Female

2. How old are you?
 - 16 or under
 - 17-24
 - 25-44
 - 45-64
 - 65+

3. When did you ride the Segway? Date (dd/mmm/yyyy): _____

4. At what time of day did you ride the Segway? (Please check all that apply)
 - Morning
 - Afternoon
 - Evening
 - Night

5. In what area of the province did you ride the Segway?
 - South Shore (e.g. Chester, Mahone Bay)
 - Truro
 - Halifax Regional Municipality (HRM)
 - Other (please specify) _____

6. Where did you ride the Segway? (Please check all that apply)
 - Sidewalk
 - Bike Lane
 - Road Shoulder/Side of the road
 - Trail or Park
 - Other (please specify): _____

7. What were the weather conditions like while riding the Segway?

- Clear/Dry
- Wet/Raining
- Other (Please specify): _____

8. Please indicate your level of agreement with the following statements:

	Disagree	Somewhat Disagree	Somewhat Agree	Agree
I had enough training prior to riding the Segway				
I felt safe riding the Segway				
I felt in control of the Segway				

9. As part of my Segway training, I was informed about:

	Yes	No
Yielding to Pedestrians		
When to sound the bell or horn		

10. Did you wear a helmet while riding the Segway?

- Yes
- No

11. At any time during your Segway ride did you feel unsafe?

- Yes
- No

12. During your ride on the Segway, were you involved in an accident or collision?

- Yes
- No

13. Did you experience any negative reactions from other road users (pedestrians, cyclists, motorists) while riding the Segway?

- Yes
- No

14. Please provide any additional comments you feel will help us make a decision about Segway use in Nova Scotia.

OTHER ROAD USER

Hello! My name is _____, and I am an intern at the Dept. of Transportation and Infrastructure Renewal. We are doing a pilot study of Segway use in Nova Scotia and wondered if you would be willing to answer just a few questions about your interactions with Segways in the province?

1. Gender:

- M
- F

2. Which age group do you belong in?

- 16 or under
- 17-24
- 25-44
- 45-64
- 65 and up

3. Have you seen a Segway being used anywhere in NS?

- Yes
- No *(if no, skip to question 9)*

4. At the time you saw the Segway being used, were you a: *(check only one)*

- Driver
- Cyclist
- Pedestrian
- Other _____

5. When did you see the Segway being used? *mm/dd/yyyy* _____

6. In what area of the Province did you see the Segway being used? (Check only one)

- South Shore
- Truro
- Halifax Regional Municipality
- Other _____

7. Where did you see the Segway being used? (Check all that apply)

- Sidewalk
- Bike lane
- Road Shoulder/Side of Road
- Trail/Park
- Other _____

8. Did you have any negative experiences with the Segway and/or its rider?

- Yes *(If yes, please specify below)*
- No

9. Please provide any additional comments you feel will help us make a decision about Segway use in Nova Scotia.
