



**AN ASSESSMENT OF PARKING
IN DOWNTOWN REYKJAVIK**

OCTOBER 7, 2019

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An Assessment of Parking in Downtown Reykjavik

An Interactive Qualifying Project
submitted to the faculty of
WORCESTER POLYTECHNIC INSTITUTE
in partial fulfillment of the requirement for the
degree of Bachelor of Science

7 October 2019

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This report represents work of WPI undergraduate students submitted to the faculty as evidence of a degree requirement. WPI routinely publishes these reports on its web site without editorial or peer review

Abstract

As Iceland has become a major tourist destination over the past ten years, parking congestion has increased in downtown Reykjavik along with the concerns of residents. To better understand the parking situation, we assessed the public's awareness of parking locations and evaluated the usage of parking resources in downtown Reykjavik to generate data that we used to develop recommendations to reduce parking congestion concerns. Our results demonstrated that rental cars are not having a significant impact on parking congestion. Our recommendations included improving parking signage, revising their parking/permit policies, removing car stickers that make rental cars easily identifiable, and creating a phone application to centralize parking payments.

Executive Summary

Introduction and Background

In Iceland, there are 345,000 registered cars (Icelandic Monitor, 2017), making it the country with the fifth-highest ratio of cars per capita in the world (List of countries by vehicles per capita, 2019). Given that 97% of tourists who visit Iceland spend part of their trip in Reykjavik, and 54% of tourists rent cars, it is no wonder that residents of Reykjavik blame tourists for the increased parking congestion in the city (Sheivachman, 2016). The primary tourism marketing organization, [Visit Reykjavik](#), has received complaints from residents who have noticed a lack of parking spaces in the central business district (CBD), where it used to be easy to find a space. Although the Reykjavik Parking Service, [Bilastaedasjodur](#), has taken steps to expand the paid parking zones, *Visit Reykjavik* is now also receiving complaints about an increased number of rental cars from residents living just outside the new parking zone borders.

For residents and visitors who drive, there are 11 public and private car parks and numerous parking lots centrally located in Reykjavik. These car parks and parking lots are the most inexpensive way to park your car in the CBD. There is also a permit available for long term parking in any of the public car parks. This permit allows 24/7 access to a specific car park where you will always be guaranteed a spot. Reykjavik also has a street parking system. The streets in the CBD are split into 4 zones that vary in size and cost based on proximity to Laugavegur, the main shopping street. Zone 1 is the most expensive and zone 4 is the least expensive. There is also a residential zone parking permit which has its own zones and allows residents who live in that zone to park there without paying the metered parking fee.

The purpose of this project was to assess the public's awareness of parking locations and evaluate the usage of parking resources in the CBD to generate data that could be used to develop recommendations to reduce parking congestion concerns.

Methodology

We completed three objectives to achieve our goal. Our first objective was to create a baseline set of parking data from the Reykjavik CBD. To do this we obtained archival data and recorded location, capacity, and signage of car parks and parking lots. We also photographed and digitally archived parking signage, capacity, and location of CBD car parks and parking lots. Additionally, we contacted local rental car companies and local hotels and asked them where they recommend people to park.

Our second objective was to identify parking usage. To address this objective, we selected streets, car parks, and parking lots throughout the city that our team visited twice a day to count the number of cars parked, the number of empty spaces there were in each parking lot or car park, and the number of rental cars vs residential cars. The utilization of car parks, parking lots, and streets were then determined.

Our third and last objective was to identify perspectives on parking and the impact of rental cars. To gauge community perspective, we identified key stakeholders including residents and local government agencies within the CBD. We used a survey to collect the viewpoints of the community on rental cars and parking, which was administered in a neighborhood Facebook group. Additionally, we surveyed tourists to determine where they parked and their reason for

choosing that location. Our data was collected during late August and early September of 2019, so it is only an accurate reflection of this time period.

Results, Discussion, and Recommendations

Although some of Reykjavik's residents maintain a perspective that rental cars are taking up residential parking spots, the data shows that this is not the case. In fact, rental cars only take up on average 10% of parking spaces in free parking areas, which are mainly residential. Additionally, car parks located within the CBD were always underutilized, dropping from an average of 57% utilization during the afternoon to 23% at night. Since car parks are being underutilized, this leaves parking congestion to occur near the edges of Reykjavik's zoned parking, which happens to be near residential areas. Survey results also indicated that signage directing drivers to car parks was confusing, potentially dissuading residents and tourists from locating and parking at car parks. Of the rental car companies and hotels we spoke to, 90% (n=20) referred us to street parking because of its low cost.

We developed five recommendations the city should consider in order to reduce parking congestion in the CBD. Our team's recommendations with short descriptions are as follows:

1. *Improve the visibility of signage for car parks and the parking information available to tourists*

The signage near car parks is limited and poorly designed for tourists. Adding more signs and improving their design, as well as modifying the Bilastædasjodur website to have more information available in English, will help both residents and tourists better use these resources and reduce street parking congestion.

2. *Install time-limited parking for P1 and P2 parking zones*

Data from observational studies and surveys has indicated that time-limited parking spots in the P1 and P2 zones that require parked vehicles to leave after a set number of hours would meet the desires of the tourist district business owners who would like more parking availability near their stores. This change would force cars parked in these zones to cycle out on a regular basis, allowing more residents and tourists to park in these areas.

3. *Revise residential street parking permits to increase the availability of parking for residents*

This recommendation addresses residential concerns over the lack of available parking in residential areas. The desired change is to create permit-parking only areas on residential streets and require non-residential cars to park in specific areas or car parks. This change would help ensure that street parking in residential neighborhoods is being used by the residents who live there.

4. *Remove stickers identifying rental cars*

Residents easily recognize rental cars because of their identifying stickers. Our team believes that this visual indication is giving residents a false impression of the number of rental cars parked in parking spaces. Thus, removing the stickers should decrease the number of complaints and perceived impact of rental cars.

5. *Adopt a software system and cell phone application that combines the payment process for parking on streets, car parks, and parking lots.*

The current parking system uses a variation of digital and analog methods of recording parking payments. By having place to find information about all of Reykjavik's parking resources and to pay for parking, this application would simplify the parking experience for users.

Conclusion

Our data demonstrates that while there is parking congestion in Reykjavik, rental cars are not the perceived primary contributor. Rather, the problem is the underutilization of car parks and parking lots, caused by the lack of visibility and awareness of their locations. The main problem *Visit Reykjavik* could address is not parking space, but rather informing residents and tourists on how to better use the available car parks and parking lots. Reykjavik can implement strategies to improve its parking system for residents and tourists. By modifying its parking system, Reykjavik will not only continue to be a destination for tourists for years to come but will also be the home of happy residents.

Acknowledgements

We would like to recognize the individuals who supported our team during the last seven weeks. Our project could not have been successfully completed without their guidance.

We would first like to thank our sponsor, *Visit Reykjavik*, for partnering with Worcester Polytechnic Institute and allowing us the opportunity to work on this incredible project. Special thanks to Karen María Jónsdóttir for her continuous support and help throughout the last seven weeks.

We are very grateful to all the Icelandic Government employees that took the time to sit down and speak with us. Special thanks to Sæunn Ósk Unnsteinsdóttir: Project Manager at the Office of the Mayor and Chief Executive Officer; Rannveig Þórisdóttir: Police Officer at Lögreglan á höfuðborgarsvæðinu; Gunnar Geir Gunnarsson: Head of Safety and Promotion Section at the Icelandic Transport Authority.; Gunnar Valur Sveinsson: Project Manager at SAF; and Albert Heimisson: Parking Manager of Reykjavik's Parking Service.

Finally, we would like to acknowledge the staff at Worcester Polytechnic Institute that advised our project from beginning to end. Thank you to our on-site advisors, Professors Fred Looft and Ingrid Shockey, for their continued advice throughout the completion of our project. We would also like to acknowledge Professor Aaron Sakulich, whose collaboration with the Reykjavik Project Center gave us this incredible opportunity.

Thank you.

Authorship

Our team worked closely together to write this report. Before writing, we made an outline together of the sections to be written. We then divided up the writing and after the first draft of each section was complete, we then regrouped to all edit together. The completion of this IQP would not have been possible without the full participation and contribution of every team member.

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1.0 Introduction

Although the total population of Iceland is only 338,000, an influx of 260,000 tourists arrive each month from May to September (Tourism in Iceland in Figures, 2018). In Iceland, there are 345,000 registered cars (Icelandic Monitor, 2017), making it the country with the fifth-highest ratio of cars per capita in the world (List of countries by vehicles per capita, 2019). Given that 97% of tourists who visit Iceland spend part of their trip in Reykjavik, and 54% of tourists rent cars, it's no wonder why residents of Reykjavik blame tourists for the increased parking congestion in the city (Sheivachman, 2016). The primary tourism marketing organization, [Visit Reykjavik](#), has received complaints from residents who have noticed a lack of parking spaces in the central business district (CBD), where it used to be easy to find a space. Although the Reykjavik Parking Service, [Bilastaedasjodur](#), has taken steps to expand the paid parking zones, *Visit Reykjavik* is now also receiving complaints about an increased number of rental cars from residents living just outside the new parking zone borders. While this has helped clear up some of the parking congestion within the CBD, residential areas may now be more affected by tourists who do not want to pay for parking.

To better understand the dynamic between rental car parking and residents, and to better understand the impact of rental cars on the availability of parking spaces in the CBD, we assessed the usage of parking resources within the CBD to provide recommendations to increase use of available parking resources.

2.0 Literature Review

This section introduces Reykjavik's current parking situation in greater detail. Topics covered will include Reykjavik's walkability, parking in Reykjavik, parking permits, Reykjavik's future city plans, and other factors that impact parking.

2.1 - Getting Around and Parking in Reykjavik

Reykjavik is a beautiful city of mixed commercial and residential use, set alongside a scenic harbor at the base of Mt. Esja. The city sees a steady stream of cruise ships, tourist buses and arrivals from nearby Keflavik airport.



Figure 1. Reykjavik at dusk.

2.1.1 - Reykjavik's Walkability

Despite cars being used for 75% of total trips within Reykjavik, the city is theoretically easy to get around on foot (Municipal Plan, 2014). There is nevertheless a perception that it takes too long to get to locations within Reykjavik that used to be easily accessible (Fontaine, 2015). In a study conducted in 2015, architect Andri Gunnar Lyngberg calculated how long it would take to walk from any downtown car park to any business on the main shopping street, Laugavegur. He discovered that “the longest possible distance any car driver would have to walk is about 350 meters – about three minutes’ walk at a reasonable pace” (Lyngberg as cited in Fontaine, 2015). This is clearly illustrated in Figure 2 below, which shows the distance one can travel in the CBD on foot in 15, 30, and 45 minutes.



Figure 2. Map showing how far one can walk from Reykjavik city center in 15, 30, and 45 minutes (Meet in Reykjavik, 2019).

The figure illustrates that regardless of where you park in the CBD, you can reach your destination within a reasonable amount of time.

2.1.2 - Parking in Reykjavik

In addition to being walkable, Reykjavik also offers an established street parking system. In the downtown area, street parking is split into 4 zones, as shown below in Figure 3.

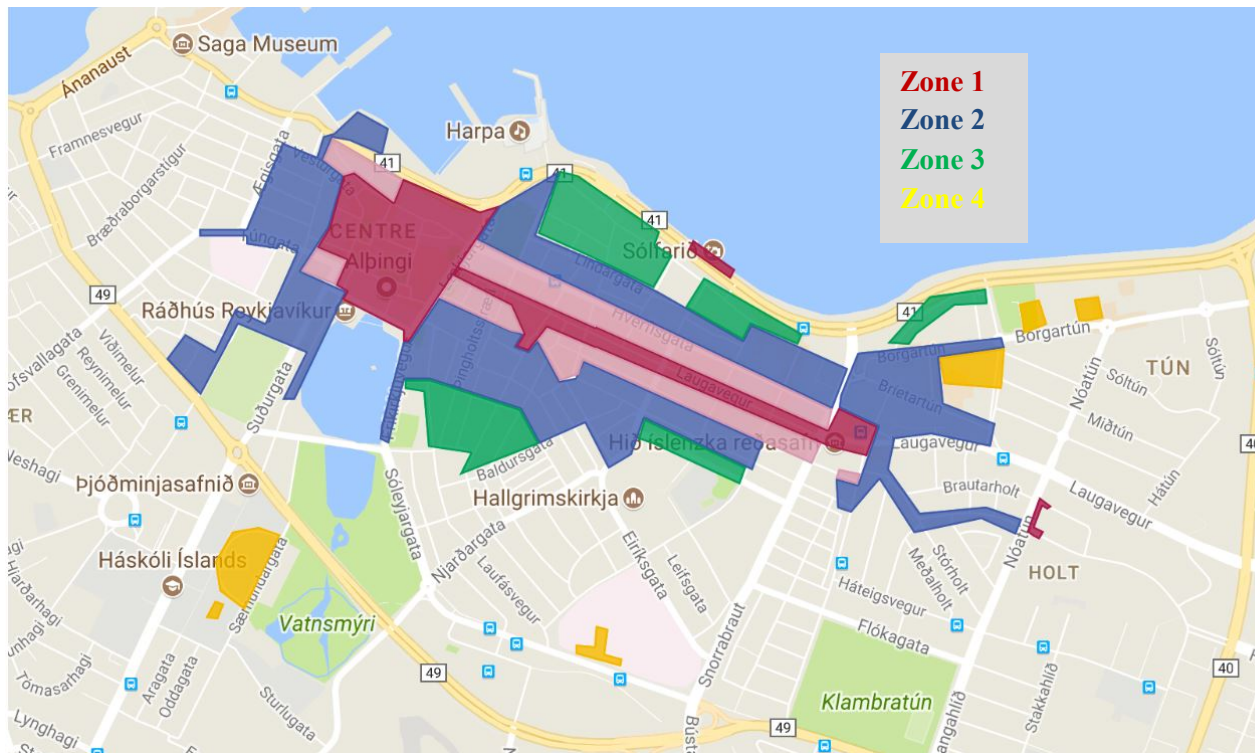


Figure 3. Map of the parking zones in Reykjavik city center (Google Maps, 2019).

The zones are based on proximity to Laugavegur, which is denoted by the long strip of red on the map (Ösp, 2015). Zone 1 (shown in pink and red) is for the most expensive parking, and the closest to Laugavegur, while zone 4 (shown in yellow) offers the least expensive parking. The price for street parking ranges from 170 ISK (\$1.40) to 320 ISK (\$2.64) per hour, depending on parking zone, and all parking zones are free from 18:00 to 09:00 on weekdays and 18:00 to 10:00 on Saturdays, and all-day Sundays (Ösp, 2015). However, in an effort to encourage environmental sustainability, electric cars can park anywhere in the city for free for an hour and a half. These cars have a clock-shaped sign on their windshield (Reykjavik Rent a Car, 2019). There is free parking in areas that are not zoned, but these are mostly residential neighborhoods and are intended to be used by residents or private owners (Ösp, 2015).

An alternative to street parking is car parks. There are 11 covered car parks, 7 public and 4 private, in the city along with a variety of open-air parking lots. Both car parks and lots are conveniently located around the CBD, including at popular places like Harpa (the concert hall by the harbor), at the city hall where bus tours start and end, and near shopping districts like Laugavegur. All of the public car parks offer both long and short-term parking, except for Bergstaðir, which only offers long term parking. A map of the lots and car parks is shown in Figure 4 below.



Figure 4. Map of car parks and observed parking lots.

The car parks charge between 100 ISK (\$0.81) and 240 ISK (\$1.94) per hour and are paid for by a ticketing machine at the entrance/exit, such as the one shown in Figure 5 (Ösp, 2015). The public car parks are closed every day from 00:00 to 07:00, so cars are unable to enter or leave during that time.

2.1.3 - Parking Permits

There are street parking and long-term car park parking permits available only to residents. The monthly fee for a long-term car park permit is between 7.500 ISK (\$60) and 14.500 ISK (\$115) depending on the car park (Bilastaedasjodur, 2019). The street parking permit costs 8.000 ISK (\$65) annually and allows residents to park in the permit parking zone in which they live. Note that the permit parking zones are different than the metered street parking zones described in section 2.1.2. Figure 6 depicts the layout of the multiple parking zones that the street parking permit covers.



Figure 5. Ticketing machine located at the entrance/exit of the public car parks.

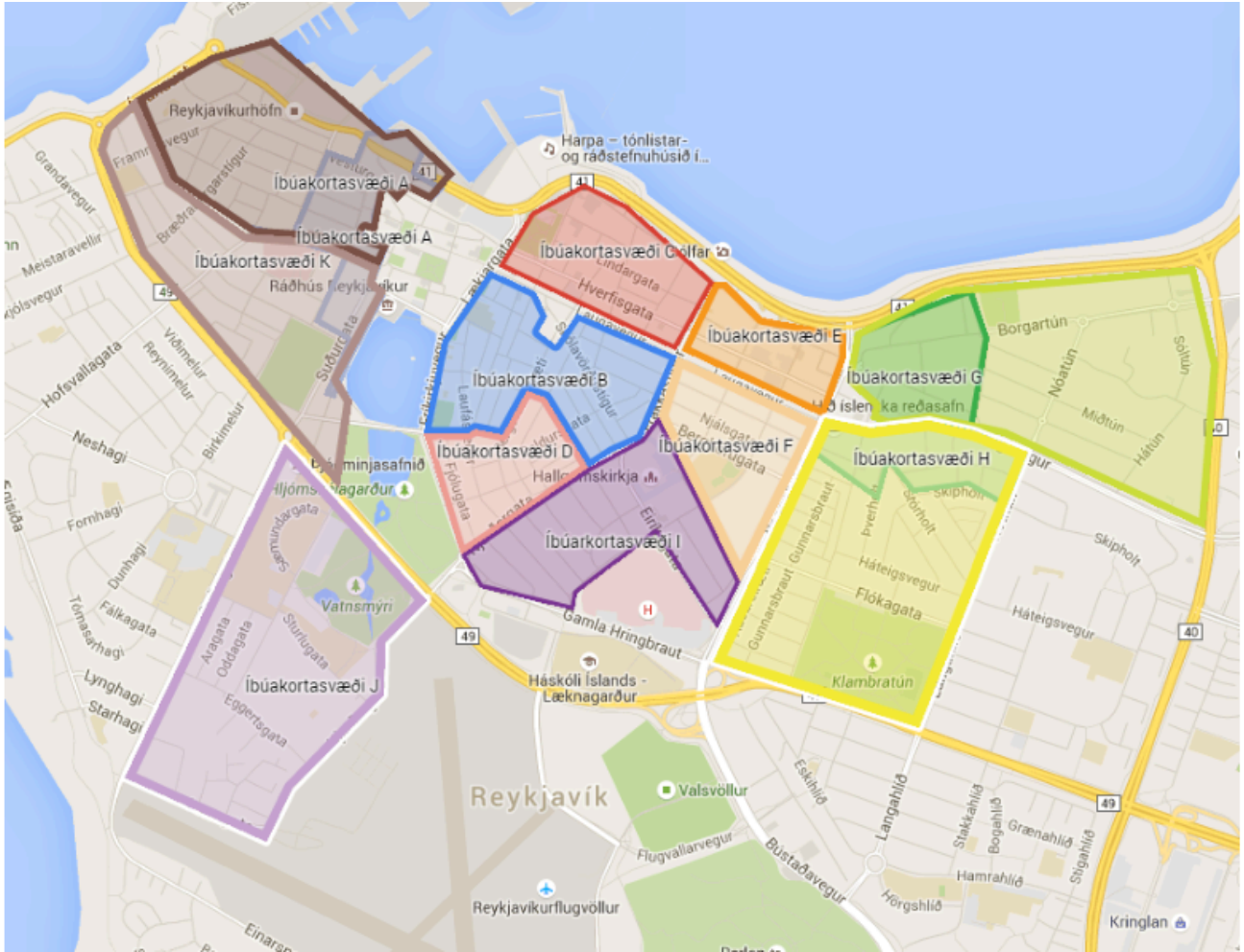


Figure 6. Map of current parking permit zones (Bilastaedasjodur, 2019).

The specifications of the permit allow one parking spot per apartment/household registered to a single name, social security number, and license plate (Bilastaedasjodur, 2019). This means that in an apartment of multiple unassociated people, only a single person may own this reserved parking spot. This permit is an inexpensive way for residents to utilize street parking near their home.

2.2 - Urban Planning

Reykjavik faces similar problems to other older, tourist-focused European cities. Even though public transportation is available and attractions in Reykjavik are usually within walking distance of the CBD, improvements to public transportation are currently being made to reduce congestion.

2.2.1 - Projected Plans for Reykjavik

The Reykjavik city government has transportation development plans for the upcoming years that are outlined in the municipal plan for 2010 to 2030. One of the main objectives of the plan is for pedestrian, bicycle, and public transportation options to have priority over traditional car travel (Municipal Plan, 2014). To achieve this goal, the city government will place an emphasis on alternative modes of transportation in an effort to reduce the number of cars on the road and take some of the pressure off the road system (Municipal Plan, 2014). For example, when new buildings are constructed outside of the CBD, they will be required to have both parking spaces and bike storage spaces in accordance with the parking policy for motor vehicles and bicycles. This will not be a requirement in the CBD. Instead, Reykjavik's city government hopes that by moving more people without cars into the CBD they will be able to encourage walking, biking, and use of public transportation. Reykjavik's city government also hopes to bring the percentage of all trips made with a car down from 75% to 58%, and raise walking and biking trips from 21% to 30% and public transportation from 4% up to 12% of total trips (Municipal Plan, 2014).

Iceland currently lacks any form of rail transportation, and the government had not shown any interest in developing a rail system until the rapid increase in tourism drew attention to the inability of the public transportation system to effectively handle the traffic increase (Þórsson, 2017). In fact, as of September 2019, there is a government approved proposal to complete a light rail system for the greater Reykjavik area by 2040 (Icelandmag.is, 2019). The proposal suggests first creating additional express bus lanes exclusive to Straeto bs, then converting the existing express lanes into light rail lines (Icelandmag.is, 2019). The planned routes of the new light rail system can be seen below in Figure 7. This infrastructure expansion is being designed to reduce car traffic and shift the car passengers onto public transportation.

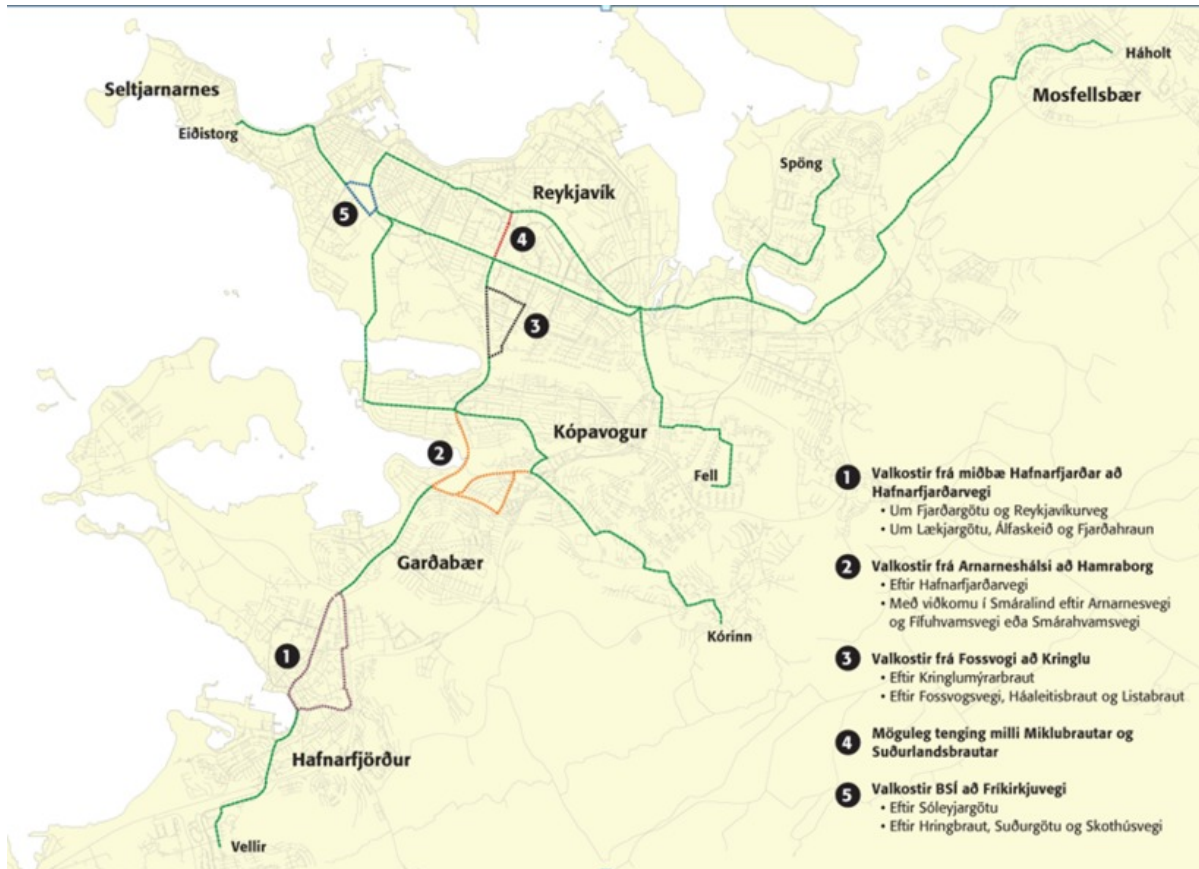


Figure 7. Map of future light rail routes (Iceland Monitor, 2017).

Looking ahead, Reykjavik's transportation network is shifting to more environmentally friendly technologies and policies to reduce traffic, parking, and carbon emissions levels. Bike lanes, a light rail system, new building codes, and electric busses and cars will act as major factors in reducing parking congestion and transportation environmental impacts. In 2018, Reykjavik received a grant from the European Union to restart their hydrogen-powered bus system that the city maintained previously in an effort to improve its bus fleet and develop an environmentally friendly public transportation system (Dalrymple, 2018). In addition to hydrogen-powered buses, Strætó bs is also adding 14 electric busses to their network to further expand on their green plan initiative (Dalrymple, 2018).

2.2.2 - Outside Factors That Affect Parking Congestion

In addition to parking patterns, there are external factors that contribute to increased parking congestion. Factors such as weather conditions, day of the week, and construction can have an impact on parking congestion. For example, during periods of heavy snow, parking lots and street parking may become inaccessible, leaving covered car parks as the most viable option for

parking. Road construction, as seen in Figure 8, is another factor that influences street traffic and reduces the available parking through road closures and delays.



Figure 8. Road construction on Tysgata disrupting traffic patterns and reducing CBD parking (fall 2019).

Much like the weather, construction can seemingly come out of nowhere. Projects can take months, even up to years, to complete. This can impact traffic and parking for long durations of time and require alternative measures to be taken that further impact parking.

2.3 - Case Study: Alternative Parking Locations in Newport, Rhode Island

Newport, Rhode Island is a coastal community in the eastern United States and home to just 26,500 residents, but, like Reykjavik, receives a disproportionate number of tourists (3.5 million tourists annually, Anderson, Das, and Tyrrell, 2006). Similar to Reykjavik, Newport experiences the largest influx of tourists in the summer because of the popularity of its beaches. The study sought to determine the factors that each tourist considered when deciding where to park, as the town wanted to build more parking for summer tourists and reduce congestion in the CBD.

The city surveyed summer tourists, to ask if tourists would rather park in a lot that was a ten-minute walk to their destination or a lot that had a 5-minute shuttle ride to their destination. Both lots cost the same. The lot that involved walking was overwhelmingly chosen. The study concluded that tourists may prefer to spend time outside cars even if it means more travel time, as tourists are on vacation and want to enjoy the scenery as well as the atmosphere (Anderson, Das, and Tyrrell, 2006). The authors recommended building a parking lot outside the CBD that would allow tourists to walk to their desired location. Having affordable and convenient parking lots was noted as the key to preventing congestion in Newport's CBD (Anderson, Das, and Tyrrell, 2006).

2.4 - Summary

With the sudden increase in tourism in the last 10 years, Reykjavik has updated their public transportation network and has plans to further expand into a light rail system. While there is an abundance of information available about public transportation and the zoned street parking system, there is a lack of information online about parking lots and car parks. Unfortunately, there is a perception by residents that rental cars are the primary cause of congestion and the lack of parking in the CBD.

3.0 Methodology

The goal of this project was to assess the usage of parking resources within Reykjavik's CBD and to provide recommendations to increase use of available parking resources. The term "utilization" is used throughout the following sections to refer to the number of cars parked in a car park, parking lot, or street versus the parking resources' maximum number of parking spots.

To achieve our goal, we developed 3 objectives:

1. Create a baseline set of parking data from Reykjavik's CBD
2. Identify parking usage
3. Identify perspectives on parking and the impact of rental cars

The strategies used to achieve these objectives and collect data are summarized in Figure 9.

Assess the usage of parking resources within Reykjavik's central businesses district (CBD) and to provide recommendations to increase the use of parking resources



Figure 9. Methodology flowchart.

3.1 - Objective 1. Create a baseline set of parking data from Reykjavik's CBD

To evaluate archival records, we collected parking data from the Icelandic Transport Authority, the Icelandic Police Department, SAF (The Icelandic Travel Industry Association), Bilastaedasjodur (Reykjavik Parking Service), and additional officials at city hall and related government organizations. We interviewed employees including Karen María Jónsdóttir, *Visit Reykjavik's* Project Manager; Sæunn Ósk at SAF; and Albert Heimisson: Parking Manager of Reykjavik's Parking Service.

To better understand how tourists are being informed about CBD parking and which car parks, if any, they are being directed to, we contacted 10 local rental car companies and 10 local hotels and asked them where they would recommend we park when spending a day in the CBD. We also photographed and digitally archived parking signage, parking type, capacity, and location of CBD car parks and parking lots.

3.2 - Objective 2. Identify parking usage

We created observation routes throughout the city to target the areas perceived by Icelanders to have the most parking congestion and visited them twice a day, 3 to 4 times a week for 4 weeks. Along these routes we assessed options for parking at 7 car parks, both public and private, and 6 parking lots. On a different route we observed selected streets within the 4 zoned street parking areas around the city in the afternoon (13:00 to 15:00). On these selected streets we noted the total number of spots, number of total parked cars, and number of rental cars. For car parks and parking lots, we observed and recorded parking data during the afternoon (13:00 to 15:00) and at night (21:00 to 23:00). We noted factors such as the number of cars parked, the number of empty spaces, and the number of rental cars vs residential cars. We also tracked the variation in numbers of parked cars over time. In order to understand where cars were being parked and whether the parking options in the city were being fully utilized, we created visuals to show the general number of parking spaces available vs the total number of spots.

3.3 - Objective 3. Identify perspectives on parking and the impact of rental cars

To gauge community perspective, we identified key stakeholders including residents and local government agencies within the CBD. We identified areas that were most heavily impacted by rental cars by meeting with individuals at *Visit Reykjavik* to learn which areas report a high number of complaints.

We used surveys to collect the viewpoints of the community on rental cars and parking. The surveys were also designed to gather data on residential parking behaviors. To administer the survey for residents we joined the [101 neighborhood Facebook group](#). The survey asked questions about where the residents park near their place of work and residence, as well as how they believe rental cars have impacted them. The format of the survey was primarily multiple-

choice and dropdown questions, with 1-2 short-answer questions. The survey took 3 to 5 minutes to complete. Our survey questions are posted in Appendix A.

Finally, we interacted with tourists using a 3-5-minute face to face survey. The survey asked tourists how often they parked in car parks and on the street. Additionally, we asked for their main reason for parking in car parks and in street parking zones. The questions for this survey are posted in Appendix B.

4.0 Results

This chapter will present the results of our activities and discuss our findings for our three objectives. Our results presentation will be organized by objective. A map of the car parks and parking lots we will be referring to in this section can be found in Figure 10 on the following page. This is not a complete list of car parks and parking lots in the CBD, however we believe it is a representative sample we selected for the purpose of our data collection.



Figure 10. Map of observed car parks and parking lots in Reykjavik's CBD.

4.1 - Create a baseline set of parking data from Reykjavik's CBD

This objective was designed to bring together city records and other clearly documented information to create a centralized collection of parking data. We began with a site assessment of parking locations to identify existing capacity and charges for city parking.

4.1.1 - Site assessment data

We collected physical data on 7 car parks and 6 parking lots in the city. For the car parks we took note of the total number of spaces and the price per hour. We collected data at 6 out of the 7 public car parks. The 7th car park is long term parking only, so we did not collect data there. This information can be found in Table 1 below.

Public Car Parks				
	Capacity	Price - first hour(ISK)	Price - following hours (ISK)	Hours
Stjörnuport	122	150	100	07:00 - 00:00
Vitatorg	223	150	100	07:00 - 00:00
Kolaport	166	240	120	07:00 - 00:00
Vesturgata	106	240	120	07:00 - 00:00
Ráðhúsið	130	240	120	07:00 - 00:00
Traðarkot	270	240	120	07:00 - 00:00

Table 1. Physical data collected in 6 public car parks.

We also collected data at 1 private car park located under the Hafnartorg shopping center. There are other private car parks located around the city, however this is the only one at which we collected data. The car parks are divided between public and private because, in part, they utilize different pricing structures. This information can be found in Table 2 below.

As the tables show, public car parks close between 00:00 and 07:00 so they are free during this time. Private car parks, on the other hand, are open all night and charge for every hour. Public car parks are located conveniently throughout the city, but not necessarily near a particular attraction or store. However, the private car parks are strategically located near high-traffic public spaces, such as under the Harpa and in an area of higher-end stores. These private car parks are intended for people who are utilizing the business at which they are located.

Private Car Parks				
	Capacity	Price 08:00-18:00 (ISK/hr)	Price 18:00-08:00 (ISK/hr)	Hours
Hafnartorg	230	370	140	24/7

Table 2. Physical data collected in a private car park.

For the parking lots, which were all public, we recorded the total number of spots and the parking zone the lot was located in. The prices for these lots are the same as the prices for the parking zone they are located in. This information can be found in Table 3 below.

Parking Lots				
Lots	Capacity	Zone	Price (ISK/hr)	Hours
Lot 1	60	Free	0	24/7
Lot 2	150	Free	0	24/7
Lot 3	34	P2	190	09:00 - 18:00
Lot 4	110	P2	190	09:00 - 18:00
Lot 5	36	P2	190	09:00 - 18:00
Lot 6	42	P1	370	09:00 - 18:00

Table 3. Physical data collected at 6 parking lots.

In terms of signage, car parks are marked by a blue sign with a P with a hat on it. The public car parks signs include an electronic number on the bottom of the sign showing the number of parking spots available in the car park. A photo of the sign with the electronic display is shown in Figure 11. This feature of the sign appeared wildly inaccurate to us when we first began inspecting car parks, as the sign only displays the number of short-term spots available. There is no obvious distinction made inside car parks between the marking of short-term and long-term spots. Thus, the sign showed a much lower number than what we believed was the actual number of available spots within the car park.



Figure 11. A photo of the electronic spot display sign outside Kolaport car park.

Street parking is marked with similar signs, however they also denote which zone that section of the street is in. This sign also has the words “Pay Here” written on it in Icelandic and English and is most commonly located above a parking meter, however, not all parking meters have this sign. There are similar signs not near parking meters that display which parking zone you are in. A photo of a “Pay Here” sign is shown in Figure 12. Photos of parking meters can be found in Figure 13.



Figure 12. Photo of a “pay here” sign.



Figure 13. Two pictures of parking meters.

We found in our meeting with the Icelandic Transport Authority that while information is given to rental cars users about safe driving practices and highway signage, there is little information provided to them about street signage within Reykjavik, or other city areas. Through this conversation we were able to learn about the safety pamphlet that is given to renters when they pick up their car. This pamphlet is focused on safety and driving best practices mainly in the areas outside of Reykjavik. Due to the safety focus, this pamphlet provides no information that would inform tourists about driving and parking within the city. A digital version of this pamphlet can be found in Appendix C.

When our team first checked into our hotel accommodations, we were provided a map of the CBD. When we attempted to use this map to locate car parks around the city we discovered that many of the car parks we found were missing from the map, and one of our team members spent 10 minutes wandering around looking for a car park that was shown on the map but no longer existed. There is a section of the [Bilastaedasjodur website](#) intended to convey information about the 7 public car parks, but it is mainly in Icelandic, so important information about the car parks is hard to find.

4.1.2 - Evaluating Archival Data

Many of the organizations we reached out to, including Bilastaedasjodur, had either never collected parking data or were in the process of updating their systems to begin collecting data. This meant that nearly all previously recorded data was inaccessible. We were able to access data published by the Icelandic Tourism Board on tourism within Iceland, however this data was focused nationally, so this was not specific to Reykjavik.

We reached out to interview four city officials. These included Sæunn Ósk Unnsteinsdóttir, Project Manager at the Office of the Mayor and Chief Executive Officer; Rannveig Þórisdóttir, Police Officer at Lögreglan; Gunnar Geir Gunnarsson, Director of Safety and Production at the Icelandic Transport Authority; and Gunnar Valur Sveinsson, Project Manager at SAF. These individuals expressed their own personal opinions rather than statements of their respective organizations. The interviews revealed that none of these individuals view rental cars as a primary contributor to the problem of parking congestion in Reykjavik. In fact, Rannveig noted that after the tourist boom, there has been a revitalization of downtown Reykjavik which has led to an increase in the number of cars. However, she does not see this as a problem. Gunnar Geir added that while traffic has increased in Reykjavik, most of the rental cars are used outside of the city and thus are not contributing to the traffic increase in Reykjavik. Furthermore, Sæunn expressed that more information is necessary to distinguish between facts and feelings. She also noted that businesses that are designed for tourists are indifferent towards rental cars while those for residents do not enjoy them. Gunnar Valur from the Icelandic Tourist Association (SAF) expressed that rental cars are not an issue and that Iceland will continue to be a type of destination where people rent cars. Although these individuals come from different organizations, they all agree that rental cars are not the main cause of parking congestion.

We were also able to interview Albert Heimisson, the Parking Manager at the Reykjavik Parking Service. From this meeting our team learned about how the parking system at car parks functioned. The number displayed on electronic signs and the Bilastaedasjodur website is based on an estimation of how many long-term permit holders might use their spot. He described the future system for tracking entering and exiting cars from car parks, which will use cameras rather than tickets. While discussing street parking, Albert mentioned that there are proposals to expand the times and days that paid parking is in effect.

We called 10 Reykjavik based rental car companies, including Hertz and Blue Car Rental, and 10 local hotels and asked where they would recommend parking a car while spending a day in the CBD. Of the 20 total businesses we called, only two mentioned car parks, and they were not the first option mentioned. The rest recommended private hotel parking or street parking. Almost all said that a tourist should have no trouble finding street parking and that street parking was free after 6 pm.

4.2 - Identify Parking Usage

We recorded data on how car parks, parking lots, and street parking were being used in order to determine parking patterns in central Reykjavik. Data was recorded at the end of Iceland's tourism season from mid-August to the mid-September. Initially our team looked at the data as a function of time, hoping to find interesting trends. However, the data was very consistent so there were no discernible trends. This led our team to analyze the data as an aggregate. To illustrate the distribution of cars throughout Reykjavik, we created a series of maps and charts that displayed the data our team collected. An illustration of what rental cars on a CBD street in Reykjavik might look like is provided below in Figure 14.



Figure 14. Street section with rental cars highlighted.

We were able to identify rental cars such as in the figure above by looking for stickers denoting which rental car company the vehicle belonged to. It should be noted that not all rental car companies put these stickers in the window, so the data we collected is a minimum estimate for the number of total rental cars present in the CBD.

4.2.1 - Car Park Data

Data was collected from 7 public and private car parks located in the CBD. Data was collected during the afternoon (13:00 - 15:00) and at night (20:00 - 22:00). Figures 15 and 16 below depict the usage of car parks by rental cars during the afternoon and at night to highlight how car parks are used by tourists.

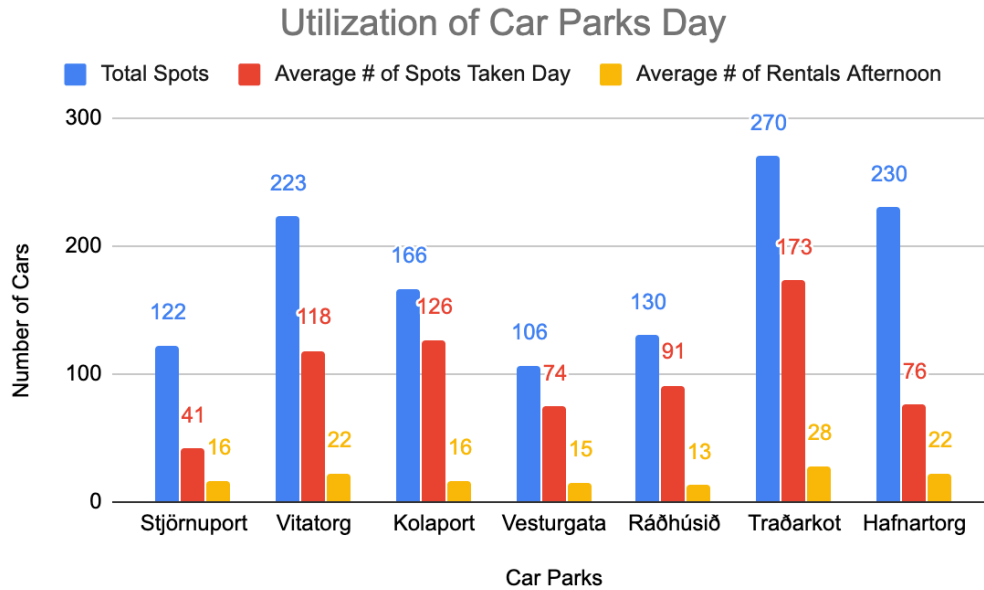


Figure 15. Chart visualizing the usage of car parks in the afternoon through raw car numbers.

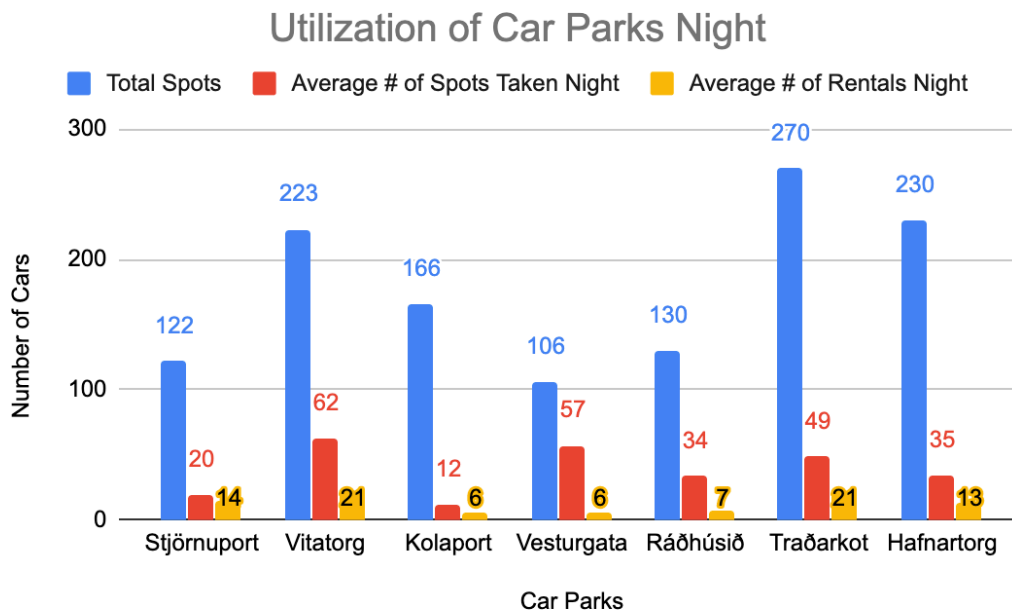


Figure 16. Chart visualizing the usage of car parks at night through raw car numbers.

4.2.2 - Parking Lot Data

Data was collected from 6 public parking lots located in the CBD during the same time intervals as the car parks. Figures 17 and 18 depict the utilization of parking lots by rental cars during the afternoon and at night, to highlight how parking lots are used by tourists.

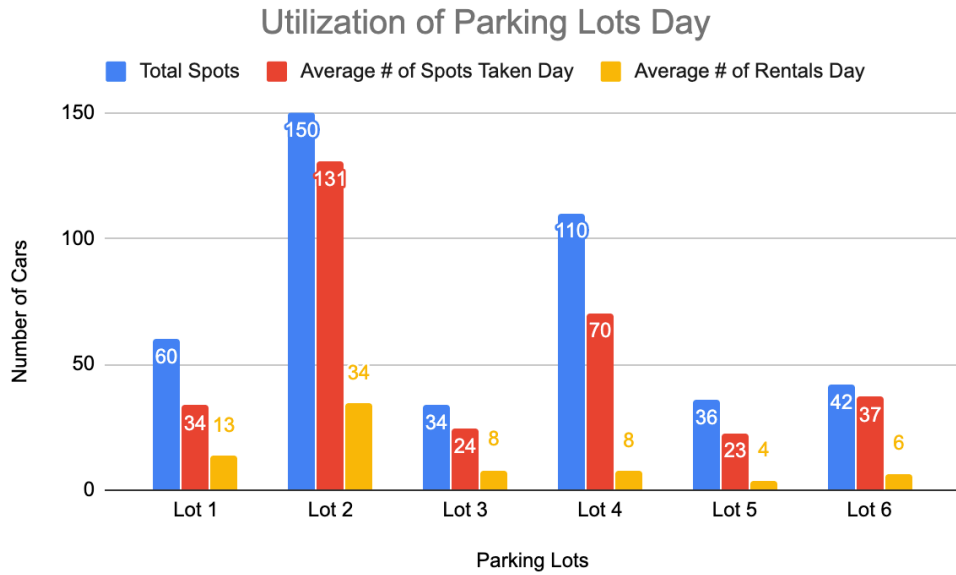


Figure 17. Chart visualizing the usage of parking lots during the afternoon through raw car numbers.

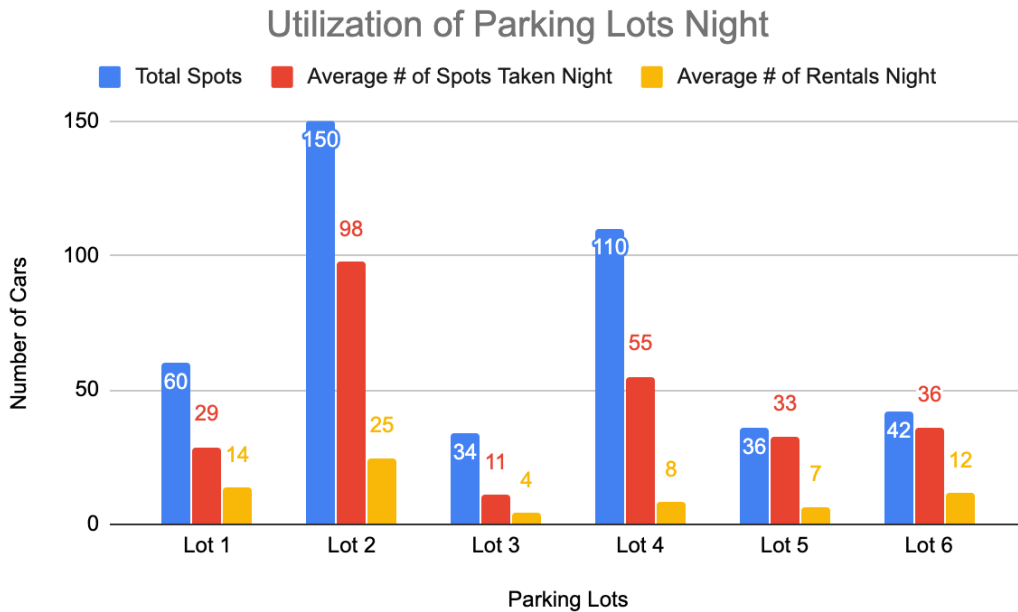


Figure 18. Chart visualizing the usage of parking lots at night through raw car numbers.

4.2.3 - Street Data

Data was collected from 23 different street sections located in central Reykjavik during the afternoon (13:00 - 15:00). Figures 19 and 20 below show the data collected, in the form of a heat map and chart.

Figure 19 is a heat map illustrating the average number of parked cars in one area of observed streets in the southwest section of the CBD. The rest of the street maps can be found in Appendix D. This map can be interpreted as a snapshot of what street parking might look like on any given weekday from August to September.

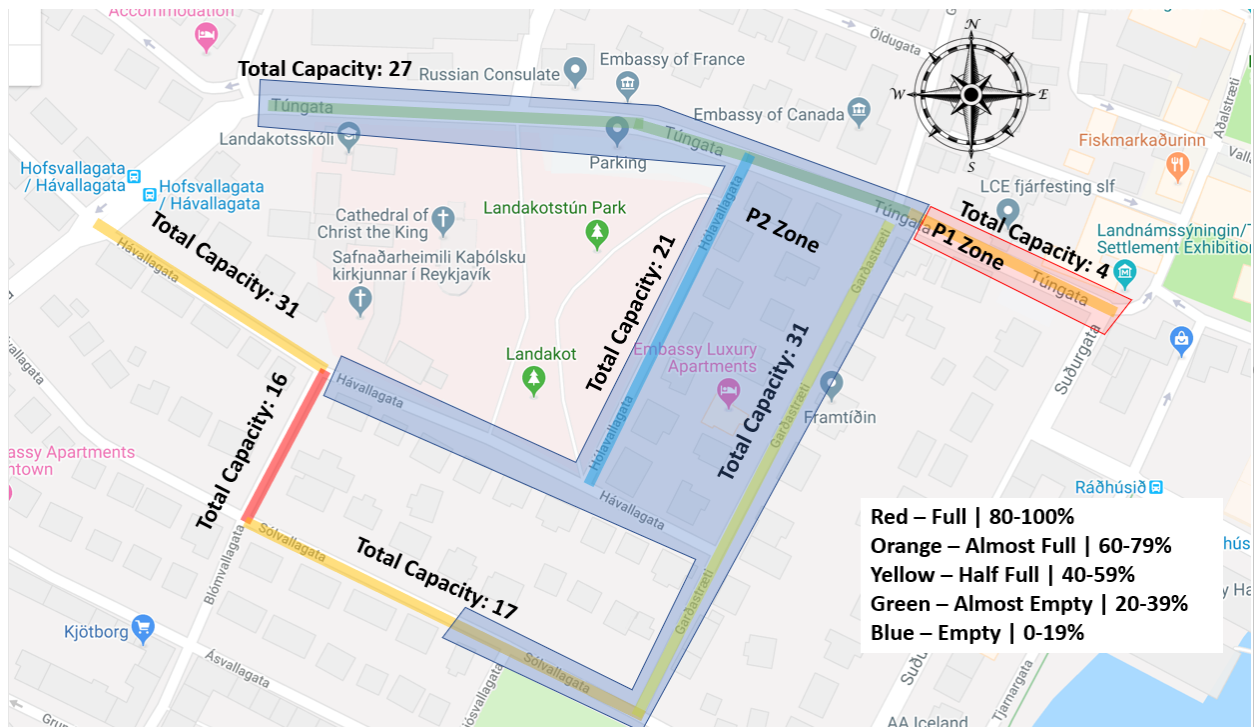


Figure 19. Heat map showing the utilization of streets in the southwest section of Reykjavik CBD.

Data on the percentage of rental cars within these zones was collected to determine their impact. This information can be found in Figure 20 below.

Percent Rental Cars vs. Parking Zone

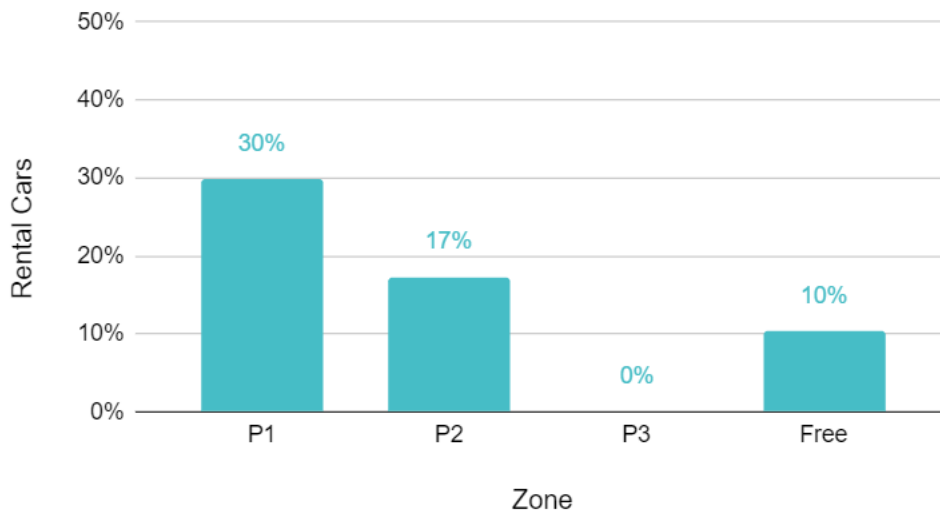


Figure 20. Percentage of rental cars in selected parking zones in September 2019.

4.2.4 - Additional Observations

We documented several instances of bad parking to record how residents and tourists complied with parking signage. Some examples include parking almost entirely on the sidewalk and parking with no regard to the lines that indicate each parking space, as shown in Figure 21 below.



(a) (b) (c)
Figure 21. (a) Car parked entirely on sidewalk (b) Car taking up two parking spaces (c) Car parked partially on the sidewalk.

4.3 - Identify perspectives on parking and the impact of rental cars

To identify perspectives on parking and rental cars we surveyed residents and tourists. From our residential survey we learned about the opinions and concerns that residents have about rental cars. The survey we administered to tourists helped us to determine how they decided where to park.

4.3.1 - Survey data

The residential survey garnered responses from people from a wide range of ages who were primarily residents of the 101 area of the city. We first asked for the respondents' preferred mode of transportation in the city. The results of this question are shown in Figure 22 below.

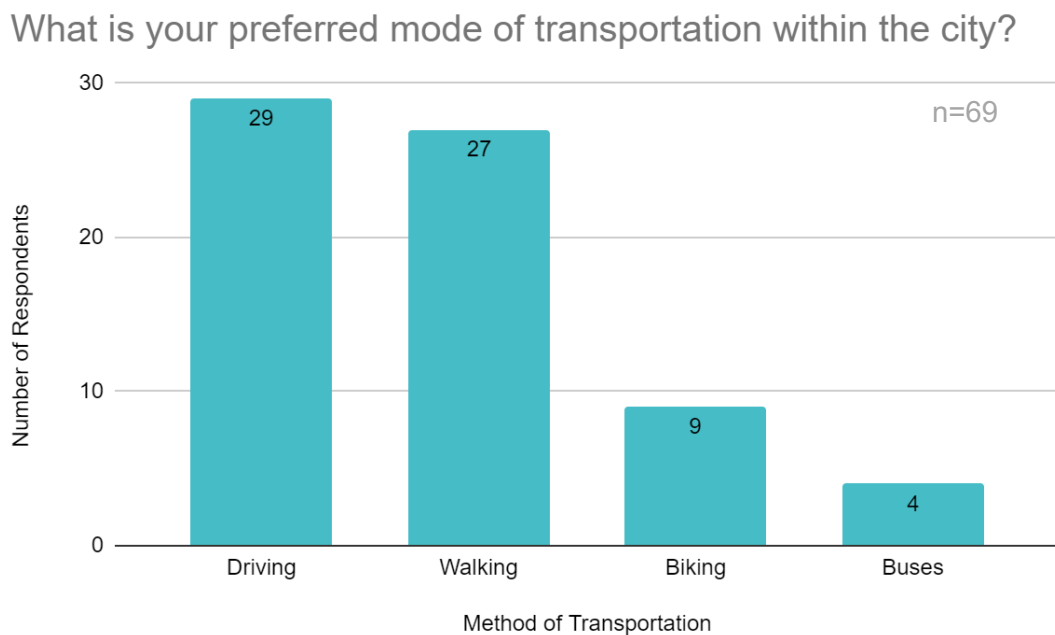


Figure 22. Chart showing the distribution of residents preferred method of transportation.

Of those who responded to our survey, 75% felt that rental cars have affected their life. Of those who responded yes, 58% felt that rental cars take up too many parking spaces, with respondents commenting that “sometimes I have to park 2+ blocks away” because of all the rental cars. Respondents also expressed that they feel that rental car drivers are bad drivers, with one respondent commenting that tourists “drive like they are on a movie set”, while another said that one tourist even parked in their backyard. Another 12% of respondents remarked that tourists staying at Airbnb’s on their street often took up street parking spaces. Some other concerns expressed by respondents include increased amounts of traffic and negative environmental effects.

Despite the negative comments, 68% of respondents felt that the benefits of tourism outweigh the negative effects. Respondents spoke about how tourism had both positive and negative effects on their economy and culture. For example, 30% of respondents value tourism because of the economic benefits, while 12% were wary of a tourism-based economy. One respondent pointed out that “Tourism has put a lot of money into a small number of pockets” and another remarked that tourism mainly brings low paying jobs.

Our second survey sought to determine where tourists parked. Through the survey (n=13) we discovered that only 30% of respondents had parked in a car park during their time in Reykjavik. These tourists mainly did so because they were unable to find street parking. The main reasons cited for parking on the street were the convenience and proximity to the destination. A respondent commented that that street parking in Reykjavik was similar to the U.S. Since the majority of tourists are from the U.S. (Fontaine 2019) it makes sense that the first instinct of tourists tends to be parking on the street.

4.4 - Discussion

Multiple trends emerged from analyzing our car park, parking lot, and street data. The most noticeable of these trends was that all car parks experienced a decline in usage from afternoon to night, with the average dropping from 57% to 23% respectively. It is also notable that although the percentage of rental cars increased at night, they still only took up a small portion of total parked cars, regardless of the time of day. On any given afternoon for car parks, there were around 700 parking spaces used, and of those taken spots, around 132, or 19%, were used by rental cars. At night, there was an average of 268 parking spaces being used, and only 88, or 33%, of spots were taken up by rental cars. It is clear from the data that rental cars were not taking up a significant portion of available parking spaces. Additionally, car parks as a whole were being underutilized. The combination of these trends indicates that a substantial number of cars are leaving the city after typical working hours, most likely commuters returning to their homes outside of the CBD. This would explain the change in utilization and the low percentage of rental cars at night. Our data shows that rental cars are simply not a major contributor to car park utilization.

Compared to car parks, parking lots had a lower decrease in utilization from afternoon to night. Parking lot utilization dropped from an average of 72% during the day to 62% during the night. The reasons for this could be the visibility and low price of parking lots. Unlike car parks, the parking lots that our team observed are easy for tourists to locate and are free at night and open 24/7 which is another incentive for tourists to park there.

A similar trend that car parks and parking lots shared was the percentage of parked cars in parking lots that were rentals increased at night. During the afternoon, the average number of used spots in parking lots was 319, with only 73, or 23%, of those spots being taken by rental

cars. At night, the average number of parking spots used was 261, and 68, or 26%, of these spots were taken by rental cars. In both cases, the number and percentage of rental cars present in the parking lots was low.

Lastly, the data that we gathered from our street observations demonstrated that streets are often not fully utilized in terms of available parking space. With only one street, Blomvallagata, averaging full utilization (14/16 spots taken), parking spaces are available to both residents and tourists readily and within a short walking distance of the CBD. It is also clear from our data that rental cars do not comprise a significant percentage of parked cars on the streets we observed. Within high-traffic tourist areas that we observed such as museums and cultural attractions, which are usually P1 zones, rental cars only made up around 30% of the total parked cars. Even in areas that target tourists, rental cars were still not the majority of parked cars. This percentage drops significantly, down to 10% in the free zone, which is the furthest outside the CBD. This contradicts the perspective residents have, as only 10% of parked cars in the residential neighborhoods we observed were rental cars.

The overall theme the data shows is that both residents and tourists are unaware of the readily available parking spaces offered by car parks and parking lots. From analyzing our survey responses, we concluded that the changes in Reykjavik from tourism have angered residents who miss some aspects of their city before tourism rapidly increased, such as more available parking spaces in front of their destination. The majority of tourists parked on the street for convenience and only parked in car parks when street parking was unavailable. Inconsiderate driving from tourists has also understandably upset residents.

Unclear signage is another issue that our team discovered. Signage is primarily in Icelandic and unclear symbols, such as the P-hat symbol representing car parks, are used to mark the type of parking. For example, it is not explicitly stated on the sign in the car parks that cars are unable to enter and exit between 00:00 and 07:00. This sign is also located on the wall opposite the driver's side at the entrance where it is difficult for the driver to see. This sign is shown below in Figure 23. The general lack of signage near car parks can also cause tourists to miss out on the less expensive option and instead only notice street parking.



Figure 23. Photo of sign at entrance to public car parks.

The presence of stickers on rental cars makes them easily identifiable. This may act as a visual reminder of the presence of tourism that impacts all residents but only benefits a select few. While rental cars have become the target of complaints related to parking, residential anger towards rental cars might be more than just related parking issues.

5.0 - Recommendations and Conclusion

5.1 - Recommendations

Through our data collection we have concluded that there is recognizable parking congestion in downtown Reykjavik, however it is only partially due to rental cars. Our recommendations to address the downtown Reykjavik parking issue are focused on seven areas for improvement.

Improve the visibility and clarity of parking and information signs for car parks

During our observation of parking signage around Reykjavik, our team struggled to identify the meaning and significance of certain signs. For example, it was not clear to us which signs denoted car parks, which unfortunately made street parking the more likely choice. Icelandic traffic and parking signs are influenced by the Vienna Convention on Road Signs and Signals that set the standard for road signage internationally. However, Iceland does not strictly follow



Figure 24. Current car park signage near Hlemmur.

the convention, and the two nations that the largest number of tourists come from, the United States and Great Britain, have their own sets of standards (Grapevine.is 2019) (MUTCD 2003). The differences in signage can cause English-speaking tourists to be unfamiliar with the currently installed signs. Due to this, our team recommends modifying existing parking signs to increase the visibility of car parks for residents and tourists. For example, along the way to each car park, there are signs that indicate the number of short-term parking spots available, however to unaware visitors it is not obvious what this number represents. An example of this signage can be seen in Figure 24.

An example of an improved car park sign can be seen in Figure 25.

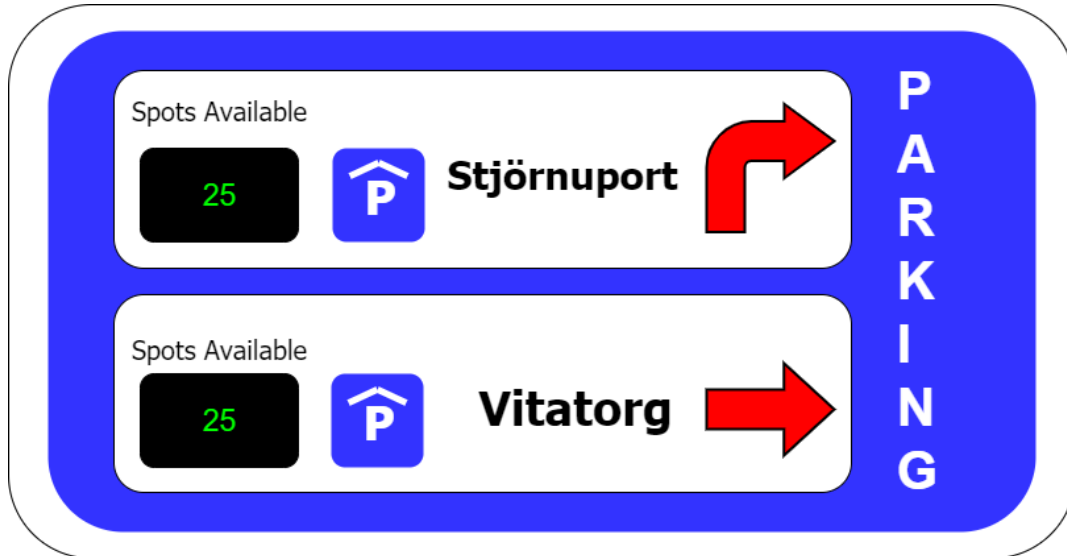


Figure 25. Improved car park sign that features English details.

This proposed new sign improves visibility by labelling the number of spots available and specifically states that the sign is referring to parking. The improved sign also includes more English to inform tourists that this sign is denoting parking. The awareness and usage of car parks could be increased by modifying the car park signs so that they are clearly labeled in Icelandic and English. Increasing readability of these signs should influence more tourists to use car parks.

Improve readability of Bilastædasjodur parking website for visitors

There is a section of the [Bilastædasjodur](#) website that shows both the location and number of available spaces in public car parks around the city. However, this website is primarily written in Icelandic. An example of important information from Bilastædasjodur's website that is only written in Icelandic can be seen in Figure 26.



Stjörnuport
Laugavegur 94



Skammtíamastæði
150 kr fyrsta klst.
100 kr klst. eftir það

Mánaðarkort
Allan sólarhringinn 8.700 kr

Eingöngu er hægt að fá langtíamastæði fyrir bifreiðar í daglegri notkun, ekki eru teknir til geymslu fornbílar, tjalðvagnar og annað þessháttar.

Fjöldi lausra langtíamastæða haust 2019: 15

Umsóknir um langtíamastæði, þar sem kemur fram nafn, símanúmer og greiðandi, ef annar en umsækjandi, sendist á bilastædasjodur@bilastædasjodur.is

Laus stæði **112**

Fjöldi stæða **191**

Opnunartími
07:00-24:00
Opið alla daga vikunnar

Figure 26. Icelandic-only version of available parking at car parks on the Bilastædasjodur website (Bilastædasjodur, 2019).

This information is very difficult to find for international tourists. Making this information more accessible to tourists could encourage them to park in car parks instead of on the streets. To do this our team recommends reworking the English options tab to allow users to click on the button and be brought to a complete English translation of the original homepage. By providing more information in English, the website will be more accessible to tourists. The result is a potential increase in car park usage.

Include Bilastædasjodur website URL on Visit Reykjavik’s main website

It is difficult to find the car park information on Bilastædasjodur’s website through search engines. Searching for “parking in Reykjavik” or “parking in Iceland” produces little car park information. From these searches, the street parking section of the Bilastædasjodur website appears as the 5th result. The results that appear before the Bilastædasjodur website primarily

discuss street parking, which might encourage tourists to use street parking rather than car parks. If you Google “driving in Reykjavik” or “driving in Iceland”, the first result is a URL to the section of *Visit Reykjavik*’s website that discusses driving and parking in Reykjavik. To improve visibility of car parks, our team recommends referencing the Bilastædasjodur website on *Visit Reykjavik*’s website. Although this section only mentions car parks once and focuses on discussing street parking, we recommend including the link to the Bilastædasjodur website. Additionally, we recommend further discussion of car parks in this section. This change should increase the usage of car parks and relieve a portion of the street parking congestion as tourists should be more aware of the available car parks.

Install time-limited street parking for P1 and P2 parking zones

Currently, P1 and P2 zones do not have a time limit on parking, allowing vehicles to be parked in high-traffic areas indefinitely. From our observational study we discovered that residents find it frustrating to find parking in commercial areas. Our team recommends setting timed parking limits for street parking in P1 and P2 zones. We recommend that P1 zones have a time limit of two hours while P2 zones have a three-hour time limit. Non-residents will only be able to park in time-limited zones once per day. This limitation should only be in effect during paid parking hours. Residents living within P1 and P2 zones, with the exception of Laugevagur, should be exempt from the time limit. An example of a potential sign denoting a timed parking area can be found in Figure 27 below.

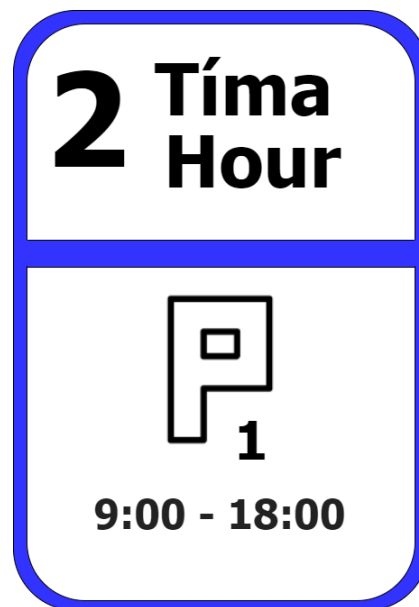


Figure 27. Prototype of time-limited parking sign.

This sign is written primarily in Icelandic as this change will have the greatest effect on residents who are accustomed to parking without time limits. English is, however, also included on the sign to ensure that tourists and other non-Icelandic speaking visitors have the necessary parking

information. The sign features the times during which parking would be time limited, the zone the driver is in, and the amount of time the driver is allowed to park there. This will limit the amount of time for which vehicles are allowed to park in high-traffic areas. Cycling cars in and out of these areas will allow residents and locals, as well as commercial vehicles, the opportunity to park in front of businesses located on these streets.

Revise residential street parking permit to increase the availability of street parking for residents

While the current street parking permit system in place is effective, it still allows for the possibility of every spot near a resident's home being taken up by non-resident's cars. To eliminate this risk, and to increase usage of car parks, we recommend the city modify the current street parking permit system for residents.

With this system, the city could decide which areas are primarily residential and make the street parking in those areas permit parking only. Due to the information available to city hall, we believe that they will be able to make more accurate zoning decisions related to this permit than our team is able to. The policy for distributing parking passes should remain the same, however each resident should be guaranteed access to parking in front of their residence. This policy would keep paid parking in the current P1 parking zone and other areas that are mainly commercial. To accommodate for the loss of revenue from taking away paid parking zones, we recommend the permit cost 25.000 ISK per year.

When tourists bring cars into the city, they would have to park in car parks, either public or private unless they are in the P1 zone. The operating hours of car parks would also be expanded to be 24/7 to better accommodate tourists. Parking during the extended time will remain free, because with the new car park system the extended operation will incur little additional cost.

We recommend this information be given to tourists in a handout distributed by rental car companies, at hotel lobbies, and at the airport, as well as stated on the Bilastædasjodur website in multiple languages. The information should also be conveyed verbally by the agent giving them the car. We also recommend that signs be installed on streets that communicate that the area is permit parking only. Figure 28 depicts a potential handout for tourists of where they could park in the CBD.

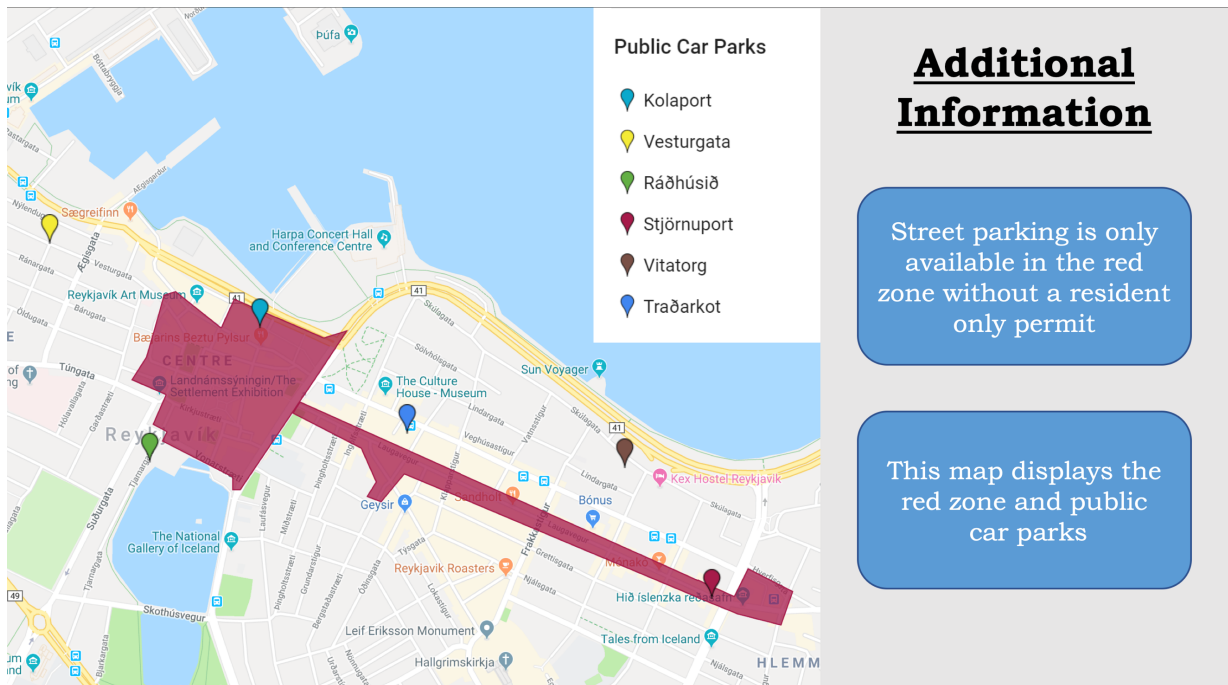


Figure 28, A draft of a pamphlet to be handed to tourists depicting where they can park.

Additionally, the distinction between permit parking, paid parking zones, and free parking could be denoted by the color of the lines on the street. This information could be communicated online and in the pamphlet given to tourists. If a similar parking issue becomes evident in other cities or parts of the capital area in the future, the same color system should be used in all areas to keep everything very clear for tourists.

Modifying the current street parking system should eliminate complaints from residents that they are not always able to park near their residence. The goal of this recommendation is for residents to always have an available parking spot in front of their home. This should be possible because more tourists will park in car parks rather than on streets.

Remove identifying stickers from rental cars

The presence of rental cars on city streets is more obvious when there is a large sticker in the window indicating which cars are rental cars. Almost all of the rental cars seen in Iceland have a sticker noting which company the car belongs to. Three examples of these stickers can be found in Figure 29 below.



Figure 29. Examples of 3 rental car stickers on car windows (Fred Looft, 2019).

These stickers are located either on the front or back windshields of the rental car, and occasionally both. The placement of the sticker varies based on the rental car company that provided the car. These stickers could be creating a perception that there are more rental cars than are actually present in the city. Our team recommends for *Visit Reykjavik* to consider collaborating with rental car companies to remove the company stickers from rental cars. By removing the stickers, residents may be less likely to notice the existence of rental cars around their homes or parked on the streets throughout the city.

Adopt a software system and cell phone application that combines the payment process for parking on streets, car parks, and parking lots

Currently there are a multitude of parking apps available to individuals parking in the CBD. These apps, however, are all for separate parking resources, do not communicate with each other, and are operated by different companies. This can be a cause of confusion and lead to ineffective use of parking resources. Unifying the variety of parking resources available would simplify parking for both residents and tourists. Our team proposes *Visit Reykjavik* adopt a software system to create a universal parking app for the CBD of Reykjavik.

This application would work with the current parking systems implemented for street parking and car parks. A major feature that this application would have to include to be successful would be providing access to parking payment options for public and private car parks and street parking. Additionally, the new camera system used in public car parks should be incorporated to track license plate numbers. Users of this application would be able to pay for parking anywhere in the CBD, basing their location on either GPS or QR codes to confirm their parking zone or car park. As a backup, existing parking meters and payment systems would provide manual payment options.

The user should create a profile from within the app with the option of storing their payment information and license plate number. This would integrate easily with the current *Leggja* system used for street parking that relies on the license plate and social security number to track

payment and users. Our team encourages dropping the social security number requirement so that the app can be used by tourists. Additional features that would improve the user experience might include timers for remaining parking time, push notifications to update the user when their parking is close to expiring, time extension from within the app, heat maps of parking congestion on streets and in car parks, and nearby attractions.

Creating a centralized app provides the opportunity for data collection on residents and tourists as the license plate number and credit card information can be linked back to an individual or family. Simplifying the payment process for car park parking should attract more residents and tourists to these resources. Instead of using an app for each type of parking, now users have a centralized app that provides easy access to street parking and car parks.

5.2 - Conclusion

It is important to balance the opinions of all parties to get the full picture of what is happening in order to be able to make smart policy decisions that will hopefully benefit everyone. Through our project we gathered a variety of opinions and collected data to support Visit Reykjavik in making decisions about this issue. Our project has been a part of Reykjavik's efforts to collect and organize data. Collecting data can benefit both the city of Reykjavik and its residents by allowing the government to make informed decisions for the future. The city is beginning to utilize the new technology available today to streamline its data collection. The impact this has on decision making will allow the city government to support its decisions based on data and trends, instead of relying on intuition.

Reykjavik has already begun to plan for a future guided by data with its smart city initiatives of using technology to benefit its residents. Additionally, Reykjavik has set goals to leverage data to improve parking infrastructure and public transportation. With more data, Reykjavik can enact policy that effectively targets these goals. The cities continued interest in bettering the lives of its residents and improving the tourist experience will make Reykjavik a better place.

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Appendix A

Residential Survey

This survey was administered to residents of Reykjavik's 101 Facebook group. From it, our team collected data about how residents feel and perceive the effects of rental cars.

We are a team of university research students from Worcester Polytechnic Institute in the United States. We are working with Visit Reykjavik to analyze the impact rental cars are having on parking and traffic congestion within the city and surrounding areas. The purpose of this survey is to gauge the impact of rental cars on parking in Reykjavik. We hope to gather data that will show how Reykjavik residents feel and perceive the effects of rental cars and tourism in their daily life. With this data, we hope to advise City Hall towards improving access and availability to parking areas for both locals and tourists. This survey will take around 5 minutes to complete. This section will ask basic questions about your demographics, parking near your workplace and housing, and interactions with rental car.

IRB Informed Consent:

Investigator: Sophia Brennan, Izzy Coughlin, John Mushatt

Contact Information: gr-A19visitcars@wpi.edu

Title of Research Study: Rental Cars in Reykjavik

Sponsor: Visit Reykjavik

Introduction

You are being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits, risks or discomfort that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation.

Purpose of the study: The goal of this project is to assess whether rental car usage in Reykjavik is impacting parking.

Procedures to be followed: Please fill out this 3-5-minute survey.

Risks to study participants: None

Benefits to research participants and others: None

Record keeping and confidentiality: Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or its designee and, under certain circumstances, the Worcester Polytechnic Institute Institutional Review Board (WPI IRB) will be able to inspect and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you.

Compensation or treatment in the event of injury: We will call medical assistance as soon as possible. You do not give up any of your legal rights by signing this statement.

For more information about this research or about the rights of research participants, or in case of research-related injury, contact:

gr-A19visitcars@wpi.edu

Professor Fred Looft Email: fjlooft@wpi.edu

Professor Ingrid Shockey Email: ishockey@wpi.edu

Your participation in this research is voluntary. Your refusal to participate will not result in any penalty to you or any loss of benefits to which you may otherwise be entitled. You may decide to stop participating in the research at any time without penalty or loss of other benefits. The project investigators retain the right to cancel or postpone the experimental procedures at any time they see fit.

Questions:

1. What is your Age? [20-29, 30-39, 40-49, 50-59, 60-69, 70-79]
2. What is your postal code? [101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 116]
3. What is your preferred mode of transportation within the city? [waling, biking, buses, driving, other]
4. Why is this is your preferred mode of transportation within the city? [ease of transportation, minimal travel time, low cost, other]
5. Is parking congested near your residence? [Yes, No]
6. Is parking congested near your place of work? [Yes, No]
7. Where do you park near your place of work? [in a parking lot, in a parking garage, street (paid parking zone), street (free parking zone), I don't drive]
8. Where do you park near your place of residence? [private driveway, in a parking lot, in a parking garage, street (paid parking zone), street (free parking zone), no car]
9. Have rental cars impacted your life? [Yes, No]
 - a. Is so please explain [short answer response]
10. In your opinion, do the benefits of tourism outweigh the negative effects? [Yes, No]
 - a. Why do you feel this way? [short answer response]
11. Is there anything else you would like to add? [short answer response]

Appendix B

Tourist Survey

This survey was administered to tourists face to face. From it, our team collected data about why rental users decide where to park.

We are a team of university research students from Worcester Polytechnic Institute in the United States. We are working with Visit Reykjavik to analyze the impact rental cars are having on parking and traffic congestion within the city and surrounding areas. The purpose of this survey is to understand why rental users decide where to park. This survey will take around 5 minutes to complete

IRB Informed Consent:

Investigator: Sophia Brennan, Izzy Coughlin, John Mushatt

Contact Information: gr-A19visitcars@wpi.edu

Title of Research Study: Rental Cars in Reykjavik

Sponsor: Visit Reykjavik

Introduction

You are being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits, risks or discomfort that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation.

Purpose of the study: The goal of this project is to assess whether rental car usage in Reykjavik is impacting parking.

Procedures to be followed: Please fill out this 3-5 minute survey.

Risks to study participants: None

Benefits to research participants and others: None

Record keeping and confidentiality: Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or its designee and, under certain circumstances, the Worcester Polytechnic Institute Institutional Review Board (WPI IRB) will be able to inspect and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you.

Compensation or treatment in the event of injury: We will call medical assistance as soon as possible. You do not give up any of your legal rights by signing this statement.

For more information about this research or about the rights of research participants, or in case of research-related injury, contact:

gr-A19visitcars@wpi.edu

Professor Fred Looft Email: fjlooft@wpi.edu

Professor Ingrid Shockey Email: ishockey@wpi.edu

Your participation in this research is voluntary. Your refusal to participate will not result in any penalty to you or any loss of benefits to which you may otherwise be entitled. You may decide to stop participating in the research at any time without penalty or loss of other benefits. The project investigators retain the right to cancel or postpone the experimental procedures at any time they see fit.

Questions:

1. Did you rent a car during your time in Iceland? [Yes, No]
 - a. While in Reykjavik how often did you park in a parking garage? [scale ranging from 1-5 with 1 being never 5 being always]
 - b. What was your main reason for parking in a parking garage? [low cost, did not want to find street parking, could not find street parking, I did not park in a parking garage, convenience, other]
 - c. While in Reykjavik how often did you park on the street? [scale ranging from 1-5 with 1 being never 5 being always]
 - d. What was your main reason for parking on the street? [minimum travel time to destination, convenience, I did not park in the street, no other option, other]
 - e. Is there anything else you would like to add? [short answer response]
 - f. 2. Did you use this car in Downton Reykjavik? [Yes, No]
2. What type of car did you rent? [compact, small, mid-size, large]

Appendix C

Tourist Safety Pamphlet

This pamphlet is given to rental car companies by the Icelandic Transport Authority to distribute to renters. It is usually attached to the steering wheel of the car. If it is not physically handed out, the information must be delivered in person. A copy is also available on the Icelandic Transport Authority [website](#) along with additional information in multiple languages.

Single lane bridge
Please approach with caution.
EINBREIÐ BRÚ

Blind crest
Please keep to the far right side of the road.
BLINDHÆÐIR

Roundabouts
In roundabouts, the inner lane has the right of way.

Gravel road
Please drive slowly as tires can lose grip.

Pavement changes to gravel
Gravel road ahead. Please exercise caution and slow down.
MALBKJ ENDAR

Unbridged river
Crossing a river is forbidden in this car.
ÖBRÚAÐAR AR

Difficult road
Using this road is forbidden in this car.
ILLFÆR VEGUR

Possibility of animals on the road

Headlights
While driving in Iceland, headlights are required to be on at all times, all year round.

Attention!
If you drive beyond this sign and a problem occurs, a substantial fee may be charged for assistance.
LOKAD CLOSED

IMPASSABLE

CLOSED

Travel with safety
112 SOS
safe travel.is
www.safetravel.is
Download the app to leave your GPS trail.

All passengers must wear seat belts!

Call 1777 for road information.
Visit www.road.is for road information.
Visit www.drive.is for information on safe driving.
Visit www.safetravel.is for alerts and information for your travel.
All use of mobile phones is prohibited while driving.

Icelandic Transport Authority

safe travel.is

Herólvöðgur
County police

SJÓVÁ
Insurance

The Icelandic Road and Coastal Administration

Ministry of Transport and Local Government

The Icelandic Travel Industry Association

This car is not suitable for highland roads

Welcome to Iceland!

Your rental car can bring you to many interesting and beautiful places in our country. Please stay safe and take the time to familiarize yourself with special Icelandic conditions by reading this card. Also, when planning your trip, please look up weather and road conditions on www.road.is and www.safetravel.is.

Off-road driving is forbidden. Violators are subject to substantial fines.

Turn for more information.



Speed limits

Gravel roads: 80 km/h (50 mph)
Paved roads: 90 km/h (56 mph)
Urban: 50 km/h (31 mph)



Seat belts for all

According to Icelandic law everyone must wear a seat belt regardless of where they are seated in the car.



Photo locations

It is extremely dangerous to stop your car on or by the road to take pictures. Choose your photo locations with safety in mind.



Headlights

While driving in Iceland, headlights are required to be on at all times, all year round.



Gravel roads

There are many gravel roads in Iceland. Take great caution and slow down.



112 The emergency number in Iceland is 112



Mobile phones

All use of mobile phones is prohibited while driving.

Appendix D

Additional Street Maps

Additional street maps from the entire collection of data that our team collected, focusing on the central Reykjavik area.

