NOVEL APPROACHES TO PARKING MANAGEMENT ON NANTUCKET

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ABSTRACT

Nantucket residents and visitors struggle with parking during the summer tourist season. Our goal was to propose improvements to parking management in the historic downtown in collaboration with the Nantucket Planning Office and the Civic League. We interviewed stakeholders and surveyed homeowners to understand the preferences and concerns of residents. We found that lack of turnover, along with employee parking, are the primary causes of parking difficulties and, contrary to expectations, a majority of respondents favored paid parking as part of the solution. Finally, we propose short, medium, and long-term recommendations, such as the implementation of new technology and the improvement of alternative transportation, to improve the parking management.

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EXECUTIVE SUMMARY

Introduction

The notorious difficulty of searching for available parking is exceptionally difficult on Nantucket as the summer season attracts many tourists onto the island, nearly quadrupling the population during that three-month period. Despite efforts to provide sufficient parking downtown, the demand far exceeds what the town can provide. Drivers that cannot find a parking space circle the area, creating increased congestion and CO₂ emissions. Implementation of an effective parking management system on Nantucket, however, is limited by regulations designed to preserve the historic character of the downtown area. These regulations have prevented the integration of traditional options such as parking meters and kiosks in the past. Additionally, the town lacks off-street parking options in the downtown area and has limited space to build supplementary parking structures. The implementation of an effective paid parking system is also limited by the reluctance of some Nantucket residents, who are used to the current free time-limited parking system.

The goal of this project is to propose updated approaches to improve the management of parking in the Town of Nantucket. To reach our goals, the objectives for our project are:

- Objective 1: Identify stakeholder perspectives on parking issues and current and previous parking management approaches.
- Objective 2: Solicit public and other stakeholder perspectives on selected parking management approaches.
- Objective 3: Evaluate stakeholder and public feedback to identify the most significant factors that contribute to the parking situation to focus compatible management options.
- Objective 4: Propose short, medium, and long-term management options that comprise a comprehensive parking management system.

Public Attitudes and Opinions

We conducted a survey of homeowners through the Civic League to gauge interest in parking management options and parking usage, willingness to purchase an annual sticker or pay by hour for parking, and use of a satellite lot. The survey results indicate that:

- Seasonal residents favor directing paid parking revenues to be allocated to the following (in descending order of priority): increasing shuttle bus services, developing satellite parking lots, and expanding bike routes.
- Year-round residents favor directing paid parking revenues to be allocated to the following (in descending order of priority): increasing shuttle bus services, increasing enforcement, and adding more bike paths.
- Although both types of residents prioritized increasing shuttle bus services, only 25% of the residents expressed personal willingness to patronize a shuttle bus.
- Voting taxpayer residents are equally divided in their preference for a one-time parking permit or for paying for parking by the hour.

Interviews

Our interviews with major stakeholders of downtown revealed their perspectives on the causes of the parking problem, public attitudes and behavior, employee parking, and enforcement. The interviews highlight the following points:

- Employees occupy numerous parking spaces during business hours, which reduces the amount available to patrons of local businesses.
- Parking difficulties are exacerbated by traffic congestion downtown that results from the narrow streets and large volume of unmanaged pedestrians during the peak season.
- Residents' and visitors' attachment to their cars limits the usage of alternative forms of transportation.
- Mixing different time-limited zones leads to inconsistent enforcement because officers may not be able regulate some zones fast enough. The Stop & Shop parking lot downtown is heavily used but turnover is low because parking limits are not rigorously enforced in this private lot.

Recommendations

Our recommendations result from our interviews and surveys, which document the variety of factors that exacerbate downtown parking problems: pedestrian and vehicular traffic congestion, employee parking, and slow parking space turnover, as well as from our background research.

Short-Term:

We recommend instituting a **parking sticker** system (similar to the existing beach sticker system) within the next year, once the Town has established a **parking benefit district**. A one-time parking sticker fee is easy to implement and would generate a source of revenue to fund increased **shuttle bus services**, expanded **satellite lots**, and increased capacity of current **valet services**.

Medium-Term:

In 2-5 years, we recommend that the town transition from a basic parking sticker to an **RFID transponder**, similar to a device like EZ Pass, to facilitate automatic collection of an **hourly rate** for parking, with charges scaled to manage parking demand and behavior. We also recommend that the town **reevaluate parking technologies**. These technologies are advancing rapidly, and it will be important to avoid implementing an obsolete technology.

Long-Term:

Within the next 10 years, we recommend that the town move forward with the redevelopment of a section of waterfront property downtown as an **intermodal transportation center**, which would include a parking garage, bus stops and taxi access. The town can also **improve upon medium-term solutions** by implementing higher technologies that provide more real-time data on parking.

AUTHORSHIP

Writing responsibilities were divided among group members and are detailed below. There was typically a primary editor for each section and all group members were secondary editors for all sections prior to submission. Interview responsibilities were divided equally with two group members attending each meeting. Richard and Nicholas primarily performed the survey analytics through use of Excel. Nicholas also took the lead on formatting.

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1.0 INTRODUCTION

Finding a parking spot is a familiar problem to many people. Indeed, it is one "as old as the automobile" itself (Elliot, 2015). Drivers spend an average of 17 hours per year searching for parking spots (McKoy, 2017). The inability to acquire a parking space can lead to lost business, increased work tardiness and stress. The search for available parking is exceptionally difficult on Nantucket as the summer season attracts many tourists onto the island, nearly quadrupling the population during that three-month period. Despite efforts to provide sufficient parking downtown, the demand far exceeds what the town can provide, often forcing drivers to park on the sidewalk of narrow streets. Drivers that cannot find a parking space circle the area, creating congestion and increased CO_2 emissions. With the introduction of new technologies, such as license plate recognition and smartphone apps, many cities and towns can gather more data on their designated parking areas. This information allows cities and towns to better manage the supply and demand of parking spaces using pricing mechanisms.

Implementation of an effective parking management system on Nantucket, however, is limited by regulations designed to preserve the historic character of the downtown area. These regulations have prevented the integration of traditional options such as parking meters and kiosks in the past. Additionally, the town lacks off-street parking options close to the downtown area and has limited space to build supplementary parking structures. The implementation of an effective paid parking system is also limited by the reluctance of some Nantucket residents, who are used to free time-limited parking.

In 2010, Nelson & Nygaard conducted a study of Nantucket to assess potential parking systems and suggest solutions such as convenience-based pricing and *Park & Ride* services. While the options and opinions presented in this study are still relevant, it does not consider recent developments in parking technologies and strategies. Nantucket would like to implement a parking management system that improves the public transportation system, and eventually increase parking capacity long-term.

The goal of this project was to propose updated approaches to improve the management of parking in the Town of Nantucket. To help reach the town's goals, the objectives for our project were:

- Objective 1: Identify stakeholder perspectives on parking issues and current and previous parking management approaches.
- Objective 2: Solicit public and other stakeholder perspectives on selected parking management approaches.
- Objective 3: Evaluate stakeholder and public feedback to identify the most significant factors that contribute to the parking situation to focus compatible management options.
- Objective 4: Propose short, medium, and long-term management options that comprise a comprehensive parking management system.

To meet these objectives, we researched current parking management strategies and technologies and interviewed primary stakeholders to understand all perspectives on parking. We also distributed a survey to residents to solicit further feedback. Using this information, we evaluated and proposed short, medium, and long-term novel parking management systems tailored to the needs of Nantucket.

2.0 LITERATURE REVIEW

Nantucket is an island 30 miles off the coast of Southeastern Massachusetts shown in red in Figure 1. The island has a long and storied history and to this day has the greatest concentration of pre-Civil War buildings in the nation (*Nantucket Basic Facts*). Starting in the early 20th century, seasonal tourism on Nantucket has expanded dramatically. The population swells from 15,000 in the winter to almost 60,000 in the summer months (*Nantucket Basic Facts*).



Figure 1: Map of Massachusetts with Nantucket outlined in red. (Wikipedia, 2016)

2.1 PARKING ON NANTUCKET

Since the population of Nantucket nearly quadruples in the summer, the island faces a multitude of infrastructure problems to accommodate the tourist population. These problems are in areas such as housing, electricity, employment, and parking; the latter of these issues being the focus of this project. Parking in the downtown area of Nantucket is frustrating to residents and tourists alike. The island's economy depends on tourism so convenient customer access to businesses is essential, however, the supply of parking spots rarely meets demand in the summer. The congestion and lack of available parking can detract from tourist experiences and discourage people from visiting the area.

This problem is not new to the island and is something the town has been trying to alleviate for many years. Private stakeholders in the town have funded studies that have made recommendations such as improved and expanded satellite lots and demand-driven pricing, which will be discussed in greater detail later in the report. There have also been ongoing discussions about the construction of a parking garage in the downtown area. Most recently, in February 2017, the Nantucket Civic League and Nantucket Planning and Economic Development Commission (NP&EDC) held a forum to discuss in-town parking concerns; the Transportation Planner, Mike Burns, outlined the town's goals and strategies to address parking concerns in years to come. Two primary objectives are to "1. Manage the use of cars on Nantucket while, 2. Providing a transportation system that is safe, convenient, economical, and sensitive to the character of the island" (NP&EDC, 2017, Slide 5). The town has recently identified three action items to meet these objectives: (1) increase parking capacity, (2) increase public transportation, and (3) implement an updated parking management strategy (NP&EDC, 2017, Slide 4).

To increase parking capacity, a possible long-term option would be the construction of a parking garage in the downtown area. This parking garage would be a part of a larger transportation hub that would connect all modes of transportation with the goal of decreasing the number of people needing to bring a car to the island as well as increase supply of parking spaces. An alternative short-term option is to expand the satellite parking lot located mid-island on Fairgrounds Road from 80 to 200 spaces (NP&EDC, 2017). To increase public transportation

and meet public needs, planners have proposed a year-round bus service in addition to a ferry connector shuttle. Lastly, planners want to implement an updated parking management strategy that will help to increase parking availability by increasing turnover. A parking management system considers various factors and principles that are detailed in the following section.

2.2 MAIN PRINCIPLES OF PARKING AND TRANSPORTATION PLANNING

Before analyzing Nantucket's parking system in detail below, we begin by reviewing some of the general principles in the design of effective parking systems. An effective parking system is designed to balance parking supply with demand, but meeting the demand is not as simple as adding spaces. The system should decrease driver frustration by increasing convenience (Kost, 2015) as well as coincide with objectives in transportation planning to maximize traffic speeds and minimize congestion (Litman, 2017). In cities and thickly settled areas, roadways should be used primarily for travel rather than on-street parking, and sidewalks should be kept clear for optimal pedestrian traffic flow. This means there should be alternative off-street options to park to decrease the demand for on-street parking (Victor, 2012). Some common strategies for controlling demand and increasing turnover of spaces is to charge highrates for long term parking and lower rates for short-term, have higher charges for low occupancy vehicles, strictly enforce parking regulations, and eliminate parking during peak periods (Victor, 2012). When implementing pricing for parking, it is important to avoid mixing free and paid parking in small areas because drivers will circle to get a free spot rather than pay, which increases congestion and emissions. Furthermore, it is the responsibility of the management of the parking space to inform the drivers of the policies and if possible provide real-time information to further decrease congestion and circling (Kost, 2015). Adding bicycle parking, park and ride lots, and other modes of transportation alongside these strategies will incentivize drivers to use these other methods (Victor, 2012).

Providing multiple means of transport to a community is necessary to make travel fair and efficient. A multimodal transportation system considers factors of many transportation methods including availability, speed, density and costs. Picking the most appropriate options ensures as many groups in the community are accommodated as possible (Litman, 2017). Todd Litman, from the Victoria Transport Policy Institute, conducted research and recommends that such a system have transportation networks that connect facilities and stations, provide information on users, fare payment systems, improvements on existing options to various modes, reforms on pricing, and a combination of public and private transportation methods. The various modes of transportation should also have connectivity through the use of a station or other stopping area. Impacts on transportation (including congestion, roadway costs, parking costs, accidents, energy consumption, land-use and other factors) should be considered in the short and long term so that a system is prepared for changes in traffic for 20-40 years before needing significant reform (Litman, 2017).

It may be difficult for a community to utilize every principle because of limiting factors unique to the community, but the parking management and transportation systems should encourage behaviors that increase traffic flow, the turnover of parking spaces, and ease of use for as many groups as possible. The income generated from this system through parking fees could be used to make further improvements (Kost, 2015), allowing the system to adapt to changing driver behaviors and community landscapes.

2.3 CURRENT PARKING MANAGEMENT ON NANTUCKET

The Town's current system consists of free, time-limited parking, that is monitored and enforced year-round. Nantucket police and parking officers use chalk markings to determine if a vehicle has moved. If the tire mark lines up with the mark on the curb then it is assumed that the car has not moved in the allotted time for the zone, then the vehicle's owner must pay a fine for the parking violation (Nelson/Nygaard Consulting Association, 2011). This system has been in place for many years, but it neither meets the town's goals nor does it encourage sufficient turnover during peak periods.

Numerous rules, regulations, and customs preserve the architectural, historical, and aesthetic character of downtown Nantucket but make it difficult to update and modify the parking management system. For example, there are restrictions on the size, color, and placement of the lettering on the parking signs that notify visitors and residents of different timed parking zones (Nantucket HDC The Sign Book, 2017). Additionally, Nantucket resists implementing any parking meters, ticket kiosks and marked parking spots as they believe it would detract from Nantucket's aesthetic.

In Figure 2, a map of the downtown area is color-coded into districts. With the exception

of Main Street, most of the roads in the inner and outer district (red and orange) are narrow and a few are made of large cobblestones. Because many roads in the downtown are onedirectional, traffic can be impeded in certain roads like Main Street during peak times. Roads that are bidirectional necessitate parking partially on the sidewalk to keep streets drivable. There are many businesses in the inner and outer district that rely heavily on on-street parking as they lack dedicated parking spaces for both their employees and customers. It can also be seen in Figure 2 that the ferry terminal drops pedestrians and cars off into the inner and outer districts. This creates heavy congestion during the drop-off times, especially in the aforementioned narrow streets.



Figure 2: Map of the Downtown District of Nantucket (Nelson/Nygaard, 2011)

Finding their current system for parking inadequate, the Town of Nantucket hired two parking consulting firms in 2010, Nelson/Nygaard and Tetra Tech Rizzo, to assess the situation and provide recommendations to improve it. Nelson/Nygaard conducted surveys of the residents and business owners to ascertain the perceived nature of the parking problems and possible solutions. They researched options for the town and provided a thorough list of options based on survey results and research data.

According to polls taken by Nelson/Nygaard, the community is frustrated with time-limits on parking because they artificially restrict the time visitors are able to spend shopping and dining and cause anxiety (Nelson/Nygaard Consulting Association, 2016). Congestion is exacerbated because people circle to find spots and move regularly to avoid parking tickets. The anxiety and congestion both tarnish the Nantucket experience and some people are frustrated that the "streets [are] so narrow that one risks clipping a side view mirror against cars parked half on the sidewalk" (Rettig, 2014). The congestion in the downtown area can be seen in Figure 3. In this figure, there are no discerning street markings and cars are moving through traffic in a disorganized manner. Business owners are also frustrated with the current system because parking is scarce during the peak dining hours, limiting the number of customers and the time spent shopping in stores (Nelson/Nygaard Consulting Association, 2016). The lack of business parking is also exacerbated by town residents and employees taking up available parking spaces.

Nelson/Nygaard mapped the area of Nantucket where the parking problem is most concentrated (Figure 4). Yellow outlines the area studied, blue is the walkable area, and red is the core business district where traffic congestion and parking are most problematic. Nelson/Nygaard also polled the residents of Nantucket to gauge public preferences, finding that residents prioritized the preservation of Nantucket's character and the historic appearance, often favoring plans that increase the parking supply outside the downtown area. (Nelson/Nygaard Consulting Association, 2011). The Nelson/Nygaard study also explored a variety of parking management systems and



Figure 3: The streets become congested from drivers searching for parking



Figure 4: Nantucket Parking Study Area (Nelson/Nygaard Consulting Association, 2011).

ranked them based on feedback received. They found that in-car meters and handheld units would work well; however, an automated license plate reading technology would best meet the needs, public preferences, and restrictions of the Nantucket Historic District Commission. Additionally, the Nelson/Nygaard study recommended that Nantucket develop satellite parking outside the historic core and use parking revenues to fund a shuttle to downtown until a parking garage is constructed (Nelson/Nygaard Consulting Association, 2011).

In 2010, Tetra Tech Rizzo conducted a study that calculated the parking demand in Nantucket. Like Nelson/Nygaard, they divided the town into a total study area, core, and walkable areas, and determined the existing parking supply in terms of private, on-street and off-street parking, as seen in Table 1 (Tetra Tech Rizzo, 2010). They estimated the demand of parking in each of these areas by surveying all the existing parking spaces and determining when the spots were filled. They determined that the peak time for on-street parking was at 7:00 PM on Saturday nights during the summer months (Tetra Tech Rizzo, 2010), likely due to dining and shopping downtown. They estimated 77 additional parking spaces would be required to reduce the congestion during these peak hours (Tetra Tech Rizzo, 2010).

Type of Space	Core Downtown	Walkable	Total Study Area
On-Street			
General Use	276	683	988
Restricted	54	65	66
On-Street Total	330	748	1,054
Off-Street			
Steamboat Wharf*	52	52	52
Winthrop/NIR Lot*	131	131	131
Washington St. Lot			253
Off-Street Total	183	183	336
Total	513	931	1,390

Table 1: Summary of Existing	g Public Parking from	Tetra Tech Rizzo	(Tetra Tech Rizzo, 2	2010)
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2.4 PARKING STUDIES IN SIMILAR COMMUNITIES

In addition to the Nantucket parking studies, we also looked at studies conducted in other comparable communities, many of which were also implemented by Nelson/Nygaard. The findings from these studies provide insight on approaches being taken by similar communities and additional strategies that could be applied on Nantucket. Many of these towns have high demand in certain areas or during peak times and experience insufficient turnover. To address these needs, recommendations often include demand responsive pricing and revised enforcement policies. For example, in Salem, MA consultants recommended implementing a three-tiered pricing system to incorporate demand driven pricing into their management system. Listed in Table 2 are the comparable towns, the parking situation in that community, and the recommendations made by the consulting firm to address their needs.

Community	Problem/Setting	Recommendations
Annapolis, MD-2017 (SP+, 2017)	Busy capital city. Significant mix of residents and visitors from nearby colleges means parking demand exceeds supply.	 Designate reduced-rate parking areas for employees Hourly rate adjustments and shared parking options Extend paid parking into residential and time-limit areas
Provincetown, MA-2016 (Cape Cod Commission, 2016)	Seasonal summer coastal community with limited area to expand. High visitor demand in downtown area with limited parking for residents and employees.	 Reassess parking policy, more available parking information in phone App Conduct feasibility studies on valet service and addition of another parking structure
Onset, MA-2014 (Nelson/Nygaard, 2014)	Seasonal summer coastal community. High demand parking areas near beaches especially.	 Residential permit program, demand responsive pricing with updated meter technology Better wayfinding signage, increase supply with on-street striping changes
Lexington, MA-2013 (Nelson/Nygaard, 2014)	Difficulties parking downtown due to large influx of daily visitors for historic attractions and commuter traffic.	 Demand-responsive pricing for on and off-street parking Replace meters with updated technology and expand shared parking program
Columbus, IN-2013 (Nelson/Nygaard, 2014)	Congested city with large corporations and a thriving downtown area of smaller businesses and restaurants create competition for parking.	 New employee permit structure and add more on-street parking options Use limited pricing in the core downtown area
Haverhill, MA-2012 (Nelson/Nygaard, 2014)	Town outside of Boston that receives a lot of commuter traffic, parking not utilized effectively and new garage was about to be built.	 Paid parking in high demand areas, eliminate time limits, install in-car meters Establish clear enforcement policy
Salem, MA-2010 (Nelson/Nygaard, 2014)	Parking difficulties in historic downtown area especially during peak interest months, not enough on-street parking and garage was to be built.	 "Three-tiered pricing system for customers and visitors and a three- tier system for residential and employee permits". Eliminate excessive ticketing and conflicting regulations

Table 2: Study Data from Towns Similar to Nantucket

2.5 CURRENT PARKING PRACTICES FROM OTHER CITIES

The previous section focused on recommendations for towns similar in character to Nantucket, whereas this section focuses on major cities that have implemented different parking management strategies. These examples show a variety of successful techniques that suit the needs of different communities, which could be considered and adapted to fit Nantucket's needs.

2.5.1 BOSTON, MA

The city of Boston has improved the ease of use of its parking spaces for residents through the implementation of residential parking permits. Parking permit applications can be submitted online with photos and billing information and the sticker will be mailed to the applicant. This is not only convenient to apply for, but it also makes the issuance of stickers easily trackable and helps police verify who is parked in the city, allowing for abandoned cars to be identified quicker (Willson, 2015). The Boston city website also allows for drivers to easily pay a parking ticket or reserve parking for a moving truck (Pay and Apply)

2.5.2 COOPERSTOWN, NY

Cooperstown, New York, is an historic town with limited on street parking with a time limit of up to two hours. To accommodate those who do not get a spot in the time-limited area, a trolley system with three satellite lots was implemented to reduce traffic downtown. It is free to park in these satellite lots, and only a \$2 daily fee per person for the trolley (Trolley & Parking, 2016). Various season passes can be purchased for those who use this service daily, including a \$35 family pass and \$10 pass for underage students. A trolley runs every 20 minutes from 8:30AM to 9:00PM every day in the summer and 9:30AM to 7:15PM on weekends during the off-season. Users can track the trolley location by visiting the website www.followthetrolley.com (Trolley System).



Figure 5: Area that the Cooperstown Trolley covers

2.5.3 SEATTLE, WA

Seattle uses a system called *Performance-Based Parking Pricing*. This system uses occupancy and parking turnover data collected by wireless sensors throughout the day to assess and calculate the demand and rate that should be charged for a parking area (Seattle Department of Transportation, 2011). The prices change throughout the day; they are lower in the morning

and more expensive at night. The increased price at night is to incentivize the use of alternative modes of transportation because the parking occupancy is much higher then (Seattle DOT, 2015).

2.5.4 SPRINGFIELD, MA

Springfield implemented a valet parking system to assist patients and visitors to the Caring Health Center and other nearby local businesses in Springfield. The valet parking system was well received and in early 2017 up to \$2,000,000 was awarded to the city of Springfield to continue the free valet service. The cost to continue the free service until September of 2018, estimated at \$230,000, is significantly less than the amount awarded. Additional consideration has been made to further implement the service for other businesses throughout Springfield as well (Goonan, 2017). The valet system is very convenient for the users and likely many would be willing to pay for that convenience.

Overall, each of these towns actively aim to reduce demand of parking by encouraging other forms of transportation by enforcing paid parking, simplifying payment and providing more parking spaces to meet demand. Some of these methods, while suiting the needs of the cities they were designed in, may not be feasible for Nantucket. For example, many cities and towns use parking meters, but these would detract from the aesthetic of the historic core in Nantucket. Even if the Historic District Commission allowed parking meters on the streets of Nantucket, they are an aging technology that many towns are phasing out in favor of newer parking management technologies. This is exemplified in Framingham, MA and Natick, MA, both of which have recently removed meters downtown and replaced them with kiosks to cover parking of an entire street. The kiosks allow for alternative payment methods like credit cards in place of coins that are traditionally used for meters (Gleason, 2016). Although a kiosk can be used to manage parking of an entire lot or street, installing one on a Nantucket street would still compromise the desired aesthetic Nantucket aims to preserve. However, many new technologies have emerged over the last few years that allow for paid parking without the need for any installations on street while providing other capabilities to achieve an effective parking management system.

2.6 INNOVATIONS IN PARKING MANAGEMENT TECHNOLOGY

Since the Nelson/Nygaard Study in 2010, many new parking technologies and management systems have been developed that take advantage of smartphones and advanced sensors which allow parking to be monitored and managed more efficiently with more real-time data than previously possible. In this section, a few of these technologies that could be appropriate for Nantucket are explained in detail.

2.6.1 CLEVERCITI PARKING SENSORS

Cleverciti Systems is a German company founded in 2012 by Thomas Hohenacker that launched its first parking system in 2015 (Cleverciti - Company). The system uses sensors to monitor parking spaces in real time, utilizing an app to push data to its users. A network of sensors can be installed that communicate over LTE or Wi-Fi networks to cover a large area. Each sensor can track about 20-30 parking spots when mounted to a utility post, acting as surveillance or actively managing



the parking spots (J. Schulte, personal communication, October 27, 2017). This function of the sensor is described in Figure 6. Each sensor can track available spaces and the duration that a car has been parked in the same location for, alerting authorities if necessary (Cleverciti Explanation Video, 2016). To protect the privacy and anonymity of users, each sensor uses on-board image processing, so image data is not sent out to the system operator (Cleverciti - Sensors). These systems increase profitability of parking in many ways. Motorists can use the app to request a parking space and be guided to the nearest one with GPS navigation in real time, minimizing time that a space is open and not collecting revenue (Cleverciti Explanation Video, 2016). This also prevents motorists from circling to find a parking spot (Cleverciti Explanation Video, 2016). Motorists can also view parking prices across the area beforehand and conveniently pay through the app. The system constantly collects and reports data the operator can use to adjust pricing for maximum income and efficiency. This data can be used to identify areas with the most traffic to minimize the need for staff to enforce parking regulations elsewhere. Cleverciti also offers displays that can be mounted at parking lots or on streets to alert drivers to the current availability of parking in the area (Cleverciti Explanation Video, 2016). Cleverciti systems have been installed worldwide to reduce parking search traffic, gather analytics and provide authorities with real time data. The City of Bad Hersfeld, Germany, claims that their system outside of their historic center runs with over 99% reliability (Cleverciti - References).

2.6.2 LICENSE PLATE RECOGNITION SYSTEM FROM GENETEC

AutoVu is a license plate recognition system from Genetec that allows patrolling officers to easily keep track of all the vehicles in their designated areas through a vehicle-mounted camera. The camera is able to read the license plates of cars parked in parallel, at 45 and 90-degree angles, night and day. The system keeps track of each car scanned and alerts the officer if a car has the appropriate parking permit or if it has been parked longer than the allowed limit. This allows digital parking permits to be issued so that nothing needs to be attached to the vehicle. This system also allows for "virtual tire chalking", which keeps track of cars parked in

the same space, block or district for longer than the allowed time and notifies the patrolling officer. A wheel imaging feature determines if any of the cars have moved since the last drive-by to further verify that a person is violating parking regulations, minimizing ticket disputes. Cameras can also be installed at the entrance of a parking lot to eliminate the need for a patrol officer. The system can also be equipped with a pay-by-plate option allowing the driver to pay for the



Figure 7: License Plate Reading Cameras mounted on a Police Cruiser

parking space via a mobile app, alerting a patrol officer of someone who has not paid (EN Genetec AutoVu).

2.6.3 RFID "E-STICKERS"

RFID technology has started to make its way into parking and car management. Massachusetts for example now uses RFID transponders for toll payments. There are many different frequencies that a RFID device can operate on, but the most applicable to Nantucket would be a Super-High Frequency or Microwave device as they are smaller, and have the longest range. A system using RFID requires a RFID tag, a RFID reader and a database where user

information is stored (Karabacak, Koc, and Ceber, December 2013). This tag is passive, meaning it draws power from the signal put out by the RFID reader. The RFID sticker contains information about where the owner of the sticker is allowed to park, and a police officer can enforce parking regulations, if necessary, after verifying those parking privileges with a RFID reading device.

RFID technology is currently used for on-street parking in Vienna, Austria; it was implemented with the help of a RFID consulting company called Schreiner. Schreiner has claimed many benefits to



Figure 8: Concept of RFID Tag Technology

utilizing these RFID stickers, the first of which is that they make inspecting cars easier by allowing contactless monitoring using a reader from only a few meters away. Additionally, Schreiner claims the stickers reduce administrative workload since the stickers do not need to be reissued and the information can be updated in the city's database (LogiData).

2.6.4 INTELLIGENT PARKING RESERVATION

The goal of intelligent parking reservation systems is to reduce the amount of circling that cars do to find a spot, and thus reduce street congestion and CO emissions. This technology typically builds off other applications such as Parker which take advantage of parking monitoring technologies to guide users to open spaces (Polycarpou, Lambrinos, and Protopapadakis, June 2013). By reserving a space and paying for it ahead of time, the user can efficiently get a space and claim it for an allotted time. Once the driver has parked in the reserved space, the system updates that the reservation has been kept. Police officers on duty would have access to this database and be alerted if a space is taken by someone who did not reserve it. Enforcers can then fine the driver for the violation (Polycarpou, Lambrinos, and Protopapadakis, June 2013). The Cleverciti system provides a similar function, utilizing its sensors to enforce parking reservations (Cleverciti Explanation Video, 2016).

The development of new technology is beneficial in the advancement of parking systems. New technologies monitor parking spaces with more controlled autonomy than with than traditional parking meters, allowing for more efficient use of police resources. Most importantly, the use of sensor data can allow the city to create a pricing model that can optimize parking occupancy and generate greater income.

2.7 THE IMPORTANCE OF PAID PARKING

As stated previously, Nantucket's current system does not charge for parking. Paid parking can aid in reducing demand for parking spaces and also generate income to further improve a town's parking system or for other town services. In this section, we will discuss the drawbacks of free parking as well as explore pricing mechanisms.

2.7.1 THE HIGH COST OF FREE PARKING

In 2002, Donald C. Shoup, a professor of urban planning at UCLA, published a book titled *The High Cost of Free Parking*. In this book, he recommends to: "(1) set the right price for curb parking, (2) return the parking revenue to pay for local public services, and (3) remove minimum parking requirements" (Shoup, xix, 2002). Throughout his text he explains the economic shortcomings of free parking deducing, "who pays for free parking? Everyone but the motorist." (Cowen, 2010). People often take free parking for granted; not realizing their parking space can be worth more than the car they drive. Shoup gives the example of a Los Angeles parking space measured at a value of \$31,000 in 2002 and most likely worth much more now. He points out that in 99% of car trips people are able to find a free parking spot, not capitalizing on a value of "at least \$127 billion in 2002" across the United States (Cowen, 2010).

Not only is free parking harmful economically, but circling for a space causes increased traffic, wastes the time of motorists, and is environmentally detrimental. Shoup identifies many factors that cause people to search for free on-street parking rather than paying for a readily available off-street option. Some of these factors include the price of off-street parking, how long the motorist needs to be parked, and the value of the driver's and passenger's time. If the

motorist decides the cost of off-street parking "outweighs" the other factors, they will instead circle or cruise to search for a free spot (Tri-State Transportation Campaign). Shoup gives the example of Westwood, CA where he found that drivers typically spent 3.3 minutes in search of parking and as much as 10 minutes during peak hours and on average drove for half a mile during their search. These numbers do not seem significant on their own, but when all drivers in the city of Westwood are considered these values amount to much more. The summation of time all drivers in the city spend circling in one day totals to over 426 hours, while the distance driven comes out to almost 3,600 miles per day. This results in an additional 47,000 gallons of gas burned per year that then produces 728 tons of CO2, all for 3.3 extra minutes of driving for each motorist (Tri-State Transportation Campaign).

To decrease the time spent cruising or circling and address on-street parking shortages, Shoup recommends pricing the spaces as being the most effective option. Through his studies, he determined charging for previously cost-free spaces can result in 14% of spaces being open in turn helping to keep occupancy rates at a manageable level (Tri-State Transportation Campaign). However, there are a few obstacles involved in the implementation of paid parking including determining the appropriate pricing mechanism and overcoming the politics that surround the matter. When choosing a pricing system, the means of payment should be convenient for the motorist and it is often in the community's interest to incorporate demand driven pricing that charges increased amounts for high demand areas. The politics is often the more difficult obstacle to overcome, especially in areas where people are accustomed to free parking. Shoup recommends using parking benefit districts as a means to reduce opposition. Parking benefit districts allow the revenue generated from parking to return directly to the district rather than being added to general funds and this revenue can be used towards improvements in areas such as transportation and infrastructure (Tri-State Transportation Campaign).

2.7.2 PRICING MECHANISMS

Pricing mechanisms can be split into two categories, fixed pricing and dynamic pricing. *Fixed rate* pricing is implemented by setting and maintaining a static parking space price regardless of variable external factors. *A tiered* pricing system, as shown in Figure 9, is built upon this, and considers multiple factors such as residency when determining a price to assign an individual.

These fixed rate and tiered pricing mechanisms can work for basic parking management, but population-dense areas require a dynamic pricing scheme to maintain optimal levels of parking space occupancy. *Planned dynamic* pricing considers changing external factors, such as location popularity determined by events, local businesses, and the current season when determining prices. For example, parking managers could increase the parking prices right before an upcoming seasonal event in the city if they predict high parking demand during the event. Additionally, by posting these parking fees either on signage and or on a website, parking managers can incentivize visitors to seek alternative and cheaper methods of transportation such as public transit. This system can be built-upon to become *real-time dynamic* with the usage of new technologies, such as Cleverciti sensors, that make it easy to monitor traffic and parking turnover data to determine the pricing of spaces (Cleverciti Explanation Video, 2016). For example, if a sensor determines that the turnover rate is currently high, the fee charged for that space could be increased to reflect the demand. This system can also be used in conjunction with

intelligent parking reservation tools, such as Parker, to display available parking spaces to drivers in real time (Polycarpou, Lambrinos, and Protopapadakis, 2013). By tracking the number of people that reserve or take a space, parking managers can assign a price using a mathematical model that calculates a price based on demand.



More Simple

More Complex

Figure 9: Graphic of 4 parking pricing strategies.

A model introduced in Parking Space Management via Dynamic Performance-based Pricing assigns prices using an algorithm (Mackowski, Bai, and Ouyang, 2015). This model takes the following factors into consideration: the value of walking time, the value of driving time, and the average hourly wage of the city. With these factors, the city can price the parking spaces to bring occupancy of all lots to a target level. Figure 10is a combination of two graphs, showing both occupancy, and pricing data of both fixed and dynamic pricing systems when there is a medium demand for parking. The horizontal axis is the time of day in military time in 15minute intervals. After each interval, the parking price is determined based on demand in the past intervals. The left vertical axis displays the price in U.S dollars and it matches with the dotted line data towards the bottom of the graph. The right vertical axis is the percentage of occupied parking and corresponds to the solid line data towards the top of the graph. The 85% target line represents the goal to have at most 85% of available parking taken so that 15% is open at any given time. The relative demand level overlay line shows the demand for parking throughout the day. Dark blue lines show parking occupancy (solid lines) and cost (dotted lines) of dynamically priced parking. Red lines show parking occupancy (solid lines) and cost (dotted lines) of fixed pricing (Mackowski, Bai, and Ouyang, 2015). It can be seen in Figure 10 that dynamic pricing keeps occupancy just below the target level whereas fixed pricing allows occupancy to rise above the target level when demand increases from 13:50 to 17:00.



Figure 10: Average price and occupancy by time interval (Mackowski, Bai, and Ouyang, 2015)

3.0 METHODOLOGY

The goal of this project was to propose new approaches to improve the management of parking in the Town of Nantucket. The objectives for our research were to:

- Objective 1: Identify stakeholder perspectives on parking issues and current and previous parking management approaches.
- Objective 2: Solicit public and other stakeholder perspectives on selected parking management approaches.
- Objective 3: Evaluate stakeholder and public feedback to identify the most significant factors that contribute to the parking situation to focus compatible management options.
- Objective 4: Propose short, medium, and long-term management options that comprise a comprehensive parking management system.

The tasks pursued to achieve each of these objectives are presented in Figure 11 and discussed in more detail below.



Figure 11: Objective Flow-Chart

3.1 OBJECTIVE 1: IDENTIFY STAKEHOLDER PERSPECTIVES ON PARKING ISSUES AND CURRENT AND PREVIOUS PARKING MANAGEMENT APPROACHES

By interviewing stakeholders, we sought to understand what they consider to be the primary problems and challenges related to parking on Nantucket. This gave us a better idea of where resistance to changes would be. Additionally, we wanted to know what previous attempts have been tested and what could be learned from those.

3.1.1 OVERALL APPROACH

We conducted a series of interviews with major stakeholders of the downtown area to understand their perspectives on parking issues. Based on this feedback, we analyzed which parking management methods will address their needs and concerns. Some of these stakeholders, including the Nantucket Police Department, Nantucket Historic District Commission, and the Office of Culture and Tourism, had information on past parking systems that failed and had ideas for new parking systems that we had not identified. For the full list of stakeholders and the representatives we interviewed, refer to Appendix A.

3.1.2 DEVELOP INTERVIEW QUESTIONS

We developed an interview script with a variety of topics, shown in Appendix E. Each stakeholder has a unique role in the community, so the script was kept flexible which allowed us to ask stakeholder-specific questions based on their interests and expertise. For example, additional questions for the police department focused on the problems they have encountered when enforcing current parking policies or pilot systems in the past, whereas questions for the Historic District Commission focused on their regulations regarding the preservation of the streets.

Before conducting interviews, the scripts were pilot tested with the Nantucket Planning Office to ensure the clarity and effectiveness of each topic and its associated questions. We anticipated that the questions may change during the interview process, but we consulted our sponsors and advisors after the initial interviews to adjust the script as necessary.

3.1.3 CONTACT INTERVIEWEES AND PLAN MEETINGS

Prior to arriving on the island and while the scripts were being developed, we contacted the major stakeholders, introduced them to our project and scheduled a time for an interview (See Appendix C). If email communication was ineffective, our group attempted to contact them over the phone or in person to handle logistics. After arriving on island, we received contact information of additional organizations and representatives that we should reach out to and scheduled interviews with them. We kept a spreadsheet detailing the name of the stakeholders, their organization, the time and place of the interview, and their contact information for our group's reference.

3.1.4 CONDUCT INTERVIEWS

We conducted in-depth, qualitative, face-to-face interviews that lasted about 30-60 minutes in duration. At the beginning of each interview, we explained the nature of the research and solicited the interviewees' verbal consent by reading the preamble presented in Appendix D. Careful notes were taken during each interview for later reference and analysis. Each interview proceeded differently, and the script was not always strictly followed. Stakeholders, when asked to define the parking problem and how it pertains to their organization, would give their take on the matter at length. We then followed with additional questions from the script that related to the topics the stakeholder brought up. Any topic we felt was not addressed we brought up in questions towards the end. At the conclusion of the interview, we asked the stakeholder if they had any contacts that we should interview.

3.1.5 CODE AND ORGANIZE CONTENT

The notes taken during the interviews highlighted the most important points of the interview. After each interview, we typed our handwritten notes into a copy of the interview script to organize gathered feedback into their respective topics. When reviewing our notes, we identified common themes and points of disagreement on the topics that were discussed. The organized feedback further helped us find overlaps in perspectives between stakeholders.

3.2 OBJECTIVE 2: SOLICIT PUBLIC AND OTHER STAKEHOLDER PERSPECTIVES ON SELECTED PARKING MANAGEMENT APPROACHES

A greater portion of the population was needed to understand what the residents of Nantucket think needs to be taken into consideration with a paid parking program. We also wanted to better understand what the behavior and parking demand of residents.

3.2.1 OVERALL APPROACH

We conducted a survey with Homeowner Associations through the Nantucket Civic League. The purpose of the survey was to gauge interest in parking management options by gathering information about residency, parking usage, willingness to purchase an annual sticker and or use a satellite lot.

3.2.2 DEVELOPMENT OF A SURVEY INSTRUMENT

We developed a survey instrument with the assistance of our sponsors and advisors to gauge interest in parking management options and gather information on parking behavior. Our survey, which can be found in Appendix G, began with a brief preamble and an introduction of the survey that includes the general purpose of the survey along with additional information

relating to possible paid parking options. We sent each edition to our sponsors and advisors for further revision and direction. After all the final revisions were made, we formatted the survey questions in Google Forms. We chose Google Forms because all our data was organized in Google Drive, allowing for easy data transfer between documents. This platform also allowed us to distribute to our sample population and analyze results more efficiently.

3.2.3 RECRUITING PARTICIPANTS

In conjunction with the Nantucket Civic League, we surveyed residents that are members of Homeowner Associations or "friends" of the Civic League. Once our survey instrument was deemed ready, we sent it to the presidents of the 23 Homeowner Associations on Nantucket, who then forwarded the survey to the members of their association. We were provided with an email list of 334 "friends" of the Civic League and sent the survey to these individuals. Each survey had a unique URL so that we could see what Homeowners Association the respondent is a member of or if they were a "friend" of the Civic League. The email sent with the survey was accompanied by a letter of support written and signed by the co-presidents, Peter Morrison and Charles Stott, of the Civic League to establish the legitimacy of the survey (See Appendices H, I and J). All group members signed a confidentiality agreement, as seen in Appendix K, which stated that the email lists provided will only be used for the purpose of distributing our survey and it will not be shared with anyone.

3.2.4 ANALYZING RESULTS

The information gathered in the survey helped us determine information about the parking behavior of Nantucket residents and their sentiment on paid parking. Previous town surveys have been distributed recently, but they were not designed to gauge willingness to use a paid parking system. We designed our survey to gather additional information, as well as gauge the willingness to use a paid parking system. The survey data and results can be used by the Civic League and the town to assess where there may be a possible consensus on paid parking.

3.4 OBJECTIVE 3: EVALUATE STAKEHOLDER AND PUBLIC FEEDBACK TO IDENTIFY THE MOST SIGNIFICANT FACTORS THAT CONTRIBUTE TO THE PARKING SITUATION TO FOCUS COMPATIBLE MANAGEMENT OPTIONS

With the current feedback in mind, we wanted to identify what factors contributing to parking problems needed the most consideration when developing management options.

Building on our preliminary background research (See Chapter 2) and feedback from interviews and surveys, we characterized the important aspects of technologies and parking management systems that might be suitable for Nantucket. We organized the information gathered from our interview notes into a table that allowed us to compare the perspectives of all stakeholders on various topics simultaneously. The survey gave us insight on the perspectives of homeowners based on their proximity as well as their willingness to participate in future management systems. Identifying the most significant factors to the parking problem is important because it is much more plausible to propose a system that attempts to solve a few major problems rather than trying to solve all problems identified by our test subjects.

3.5 OBJECTIVE 4: PROPOSE SHORT, MEDIUM, AND LONG-TERM MANAGEMENT OPTIONS THAT COMPRISE A COMPREHENSIVE PARKING MANAGEMENT SYSTEM

We wanted to establish what would be feasible as short, medium, and long-term options for the town and what options together would best suit town goals.

After organizing our data, we proposed short, medium, and long-term parking management options. The feedback from stakeholders allowed us to spot inefficiencies and flaws associated with implementing any parking system on Nantucket. Another consideration was the bias of homeowners based on their location. For example, downtown owners may favor certain parking technologies over homeowners that live farther away. Since the downtown owners should be more directly impacted than owners further away from downtown, their views were taken into greater consideration. With this feedback, we further organized the systems by favorability and created a combination of short, medium, and long-term options. The purpose of proposing parking options with varying timelines is to act as steps the town could take to achieve a favorable and efficient system in the long term. It would be very difficult to implement an extensive and complex system in a short time due to obstacles like budgets, construction time, political and governmental factors, etc. A comprehensive plan that implements many options that contribute to a larger system overtime allows for many of these obstacles to be overcome. The most favored systems are those that addressed the concerns and needs of most stakeholders and will most likely suit Nantucket. In the case that the stakeholders disagree with our recommendations, the organization of our data will allow the stakeholders of Nantucket to further evaluate an alternative system.

3.6 CHALLENGES, LIMITATIONS AND FLAWS IN OUR STUDY

Due to our limited time and resources on the island, our study faced a variety of challenges when conducting research and discovered limitations and flaws in our methods. Regardless, the information we gathered may still be useful for the town and can be used in future projects to identify areas where further research is needed.

The first challenge was getting in contact with all the stakeholders we had identified. Some stakeholders like Steamship Authority and Nantucket Island resorts did not respond to requests for interviews. Fortunately, most of the stakeholders we contacted participated in interviews and responded to our questions. Another challenge was creating an instrument to collect data from a large portion of Nantucket residents. Originally, we planned to organize a group discussion with members of the Homeowner Associations. However, based on feedback from the Nantucket Civic League and the Nantucket Planning Office, we decided to distribute a survey focused on paid parking instead and parking behavior. This did not provide nearly as much qualitative information as a group discussion would, but a survey is easier to distribute, and it was of greater interest to the Nantucket Planning Office, which sought to understand public views on paid parking in general, rather than on specific technologies. We received enough survey responses in the timeframe of our project to analyze sufficiently representative data from the survey, but responses will most likely continue to be received after the completion of our project. The Civic League will continue to monitor responses after we have left and use the data for their purposes. Results from this survey will allow the Nantucket Planning Office and the Civic League to conduct future research. Future studies could build upon the findings in this report by further testing public opinion and will go into greater detail in later years.

The main limitations in our research were that we were neither able to solicit feedback from tourists nor able to witness the parking problem at its peak since we conducted this research in the off-season. Fortunately, many stakeholders, like Janet Schulte from the Department of Culture and Tourism, were able to speak on tourist views since they receive that feedback directly. This information has led us to believe that tourists would be willing to use a new parking system, and some may not see a problem so further study of this demographic is not necessary for the purposes of our project.

There were a few flaws in our interviews and survey instrument that may have added bias to our results. The interview script was often followed loosely so there was not much consistency in the topics discussed in each interview. This caused the coding and analysis of the data to be more difficult than a strictly followed script due to the large variation in responses. However, for our purposes, we believe this method of interviewing was most appropriate because our main priority was understanding each interviewee's unique viewpoint. Therefore, each interview was focused in areas that the interviewee is more knowledgeable in. Following a strict script so that each interview is as consistent as possible may have resulted in the loss useful information specific to that interviewee. The survey distributed to the Civic League members had some biases because some questions intentionally prevented a person from explaining their full thought. For example, the survey asked each recipient to choose between a parking sticker with a one-time fee and a system that charges for parking at an hourly rate. There was no option to choose both or neither, so the data obtained from this question is not reliable in gauging sentiment on the systems. This was done purposefully so our sponsors could predict how a vote between these two options at a town meeting would result. Sending the survey to only homeowners creates bias since this does not consider people who rent or lease a home or apartment on Nantucket. However, the sample received is large enough to be fairly confident in the general opinion of the island residents.

4.0 RESULTS & ANALYSIS

In this chapter, we will analyze the information we gathered from interviews and stakeholders to clarify social dynamics of the community and identify major factors contributing to Nantucket's complex parking situation.

Our interviews documented significant differences among stakeholders in their perspectives on local parking. The absence of political consensus and public recognition of certain contributing factors is inhibiting solutions to this problem.

First, we discuss the findings from stakeholder interviews to clarify the varying viewpoints that prevail. Next, we consider the findings from the email survey of residents concerning paid parking. Lastly, we explore the feasibility of specific parking options and technologies that are potentially compatible with these two barometers of local public opinion.

4.1 UNDERSTANDING STAKEHOLDER PERSPECTIVES ON PARKING

In this section, we discuss the viewpoints of major stakeholders: their definition of the problem of parking in Nantucket, their thoughts on public attitude and culture, issues involving downtown employees and businesses, parking behavior, traffic behavior and lastly, enforcement of the current parking policies.

4.1.1 STAKEHOLDER DEFINITIONS OF THE PARKING PROBLEM

Nearly, all the stakeholders we interviewed perceive parking on Nantucket as problematic, but they differ in their definition of this problem. Many regard this as a problem confined to the peak summer months, when the population swells. Others believe it extends into the fall. To some observers, the sheer number of people and vehicles on island during July and August pose a problem that is simply insurmountable.

Many stakeholders indicated that the source of parking difficulties is mainly a "lack of supply [of parking spaces] coupled with a strong demand" (Andrew Vorce, Planning and Land Use Services) while others thought that enforcement needs to be increased so there is greater turnover (Janet Schulte, Office of Culture & Tourism). Some stakeholders believed that the problem was mainly during the summer season but those who work downtown notice parking congestion on Main Street and other 1-hour zones for most of the year. Additionally, lack of parking turnover, which affects downtown merchants, is exacerbated on rainy summer days, when people favor downtown activities rather than going to beaches (Rachel Hobart, ReMain Nantucket).

4.1.2 PUBLIC ATTITUDES & THE CAR CULTURE

A common theme among most interviews was the culture and attitude surrounding parking and cars in general. Robert McNeil of the Nantucket Department of Public Works, mentioned that stakeholders seem frustrated that so many of the residents and visitors to Nantucket reflect the larger, "American love affair with cars" and Rachel Hobart, ReMain Nantucket, jokingly commented that she has heard from parking "gurus that in general, Americans love their cars and that people would park their cars next to their desks if they could". Another aspect of the "American mindset" is that many drivers are not accustomed to waiting for parking, so they quickly lose patience. Michael Cozort, Superintendent of the Nantucket School District, suggested that the parking and congestion problem would decrease if people acknowledged that they too are part of the problem instead of blaming others. Others we interviewed expressed close variants of this viewpoint: *that the attitude towards public transportation needs to change to reduce the presence of vehicles downtown*. Especially as yearround bus service was recently approved by the town, if residents become more accustomed to public transport in the off-season, they may learn to accept and use this option during the peak season.

4.1.3 BUSINESSES & EMPLOYEE PARKING

Each business stakeholder interviewed expressed different needs, and opinions, on how parking downtown ought to be managed and enforced to increase turnover and accessibility of their business to customers. Chief Pittman explained that a hypothetical restaurant owner would want a strictly enforced two-hour parking time limit on that street, so their customers are not rushed, but also do not extend their stay, thereby preventing other customers from easily parking. Other businesses (e.g. pharmacies or bakeries) want a much faster turnover for customers who only need to stop in for 15-20 minutes.

Several interviewees noted that many employees working downtown regard parking tickets as merely a cost of doing business and working downtown. Selectman Jason Bridges shared that servers in the restaurants come for their dinner shift at the end of the enforcement period, knowing that they will not be ticketed, and occupy much of the available on-street parking outside of the restaurants. He termed this the "hidden cost of free parking" to the restaurants: people who cannot conveniently park near a business are less likely to patronize it. Another stakeholder echoed this "hidden cost" concern, referring to real estate and insurance businesses downtown that reimburse employees who park in the two-hour spots and exceed that time restriction. Some businesses even have someone in their office move everyone's vehicles when they are approaching the end of their time limit which reduces the productivity of the business. To mitigate this "hidden cost", she suggested that such businesses instead subsidize employees' use of alternative forms of transportation that do not require parking spaces downtown.

Stakeholders offered other suggestions for reducing the number of employees taking customer parking, which would allow them to "focus on their work" rather than "think about where they are going to move their car next" (Allison Levy, Chamber of Commerce). Charles Stott, Co-President of the Nantucket Civic League, suggests possibly having employers purchase a certain number of bus passes so the majority of employees will take the bus to work, although he acknowledged that this might be difficult to enforce.

4.1.4 DOWNTOWN VISITOR PARKING

Over time, people devise strategies to work around the present parking situation, rendering it less effective. Some interviewees (who requested anonymity), confessed to knowing of "secret spots" or hidden parking spaces to park for extended time periods without getting ticketed. Selectman Matt Fee, who operates a business on the outer edge of downtown, reported that people know where the boundaries of the enforcement area and park just beyond those boundaries. The resultant clustering of parking just beyond enforcement boundaries frustrates local area residents accustomed to having those spaces available for their use.

Another common parking behavior that deprives would-be customers of convenient parking is that stores and restaurants have inconvenient delivery times, causing trucks to park and take up numerous illegal spots while being unloaded. Assistant Town Manager Gregg Tivnan noted that "delivery trucks unload their trucks during the day which leads to congestion and blocked roads in the downtown area". This is another example of how maintaining the historic nature of Nantucket constraints solutions to parking problems. Driveways designed originally for one carriage now must support a restaurant's worth of cars, which displaces the majority of parking into the streets and makes it difficult for larger vehicles to pull into the small driveways next to or behind shops.

4.1.5 TRAFFIC BEHAVIOR

Some interviewees attributed frustrations not only to parking, but to sheer congestion as well. Overall congestion is the byproduct of so many vehicles and uncontrolled pedestrian traffic on the island. Chief Pittman pointed to congestion stemming from pedestrians who avoid sidewalks, ignore designated crosswalks and cross whenever they please, or walk in the middle of a street, thereby slowing vehicular traffic to a crawl. Some uneven sidewalks are hazardous to pedestrians or are too narrow to accommodate peak season pedestrian traffic. Additionally, people who unlawfully ride their bikes on sidewalks add to the traffic and displace pedestrians (Janet Schulte, Office of Culture and Tourism). However, no traffic lights or signs can be installed to fix this aspect of the problem because they would tarnish the aesthetics of downtown Nantucket.

Jason Bridges pointed out that "too many pedestrians is a good problem to have" because it means that people are visiting the island and they want to be downtown. However, another stakeholder interviewed noted that "people wander without a clear idea of where they are going [which] impedes vehicular traffic" and speculated that less confusion might help smooth traffic flow.

The proposed Harbor Place Intermodal Transportation Hub contemplated by the town and private owners of the property would help redirect much of the pedestrian traffic and therefore alleviate some of the congestion. Janet Schulte from the Office of Culture & Tourism noted that "rush hour" conditions occur between 11:30 AM and 1:30 PM when four ferries arrive, with pedestrians and vehicles who must pass through downtown to reach their next
destination. Dave Fredericks believes that an intermodal transportation hub will give the pedestrians an easy, centralized place to find what they need to direct them around the island, thereby reducing pedestrian "wandering" that interrupts vehicular traffic. Fredericks foresees that a transportation hub may also diminish the desire for visitors to bring their car onto the island because it will increase the accessibility and convenience of public transportation.

Another common topic expressed by interviewees was commercial vehicle parking. Due to the construction boom in the last few years, large contractor vehicles use a lot of the on-street parking downtown (Gregg Tivnan, Assistant Town Manager). This is especially noticeable in the evenings when contractors park and leave their trucks in town lots and board a ferry to leave for the night (Chief Pittman, Police Department). Selectman Rita Higgins thinks that it would be helpful if commercial vehicles could be diverted to satellite parking lot with a reliable shuttle that corresponds to the ferry times.

4.1.6 PERSPECTIVES ON ENFORCEMENT

One of our first interviews was with the Nantucket Police Chief, William Pittman and Police Lieutenant Angus Macvicar, to gain their perspectives on current enforcement and alternative parking management options. Overall, they believe that the current chalking, timelimited system still works well. During the peak season, temporary summer employees are assigned to specific sections depending on the time restriction zones, which are based on the types of businesses in the immediate area. The zones are designed so that an enforcement officer can efficiently enforce the area. Chief Pittman also explained that when pilot studies were conducted in the past with higher technology parking management systems, productivity of the enforcement officers was greatly reduced by technical delays. The technology used at the time would fail or be unable to retrieve the required data due to the limitations of local network connectivity during the peak season. These effects of these technical limitations are reflected in Figure 12, which documents a significant decrease in the number of parking tickets issued during August, 2015. That period corresponds to when the Police Department conducted its pilot test of technology for parking management on Nantucket.

Other stakeholders believe that the parking regulations are not enforced strictly or consistently enough in downtown. Business owners sometimes see vehicles parked all day without being ticketed and if ticketed, are not deterred by this "cost of doing business". Some believe that "the consequences for staying too long are not high enough" (Gregg Tivnan, Assistant Town Manager) and would favor increasing the cost of parking tickets or implementing a municipal towing program. Owners of businesses downtown have noticed better profits when there is proper turnover in the spaces near them so an increased penalty such as compounding tickets for exceeded time-limits may help.



Figure 12: Graph of Parking Tickets Issued by the Nantucket Police Department

Some stakeholders favored a separate office dedicated to parking management and enforcement, because the Chief Security Officers are "stretched too thin" in the summer given their other responsibilities. They recognize these seasonal officers are important for the police department as their duties are substantially increased in the peak season and need this additional staff to be able to manage the law enforcement demands of the quadrupled summer population. However, this means that sometimes parking enforcement becomes a low priority and is less consistent.

4.2 FINDINGS ON PAID PARKING

The Town of Nantucket does not currently charge for parking. Instead, it offers different time-limited parking zones in the downtown area. It is evident that paid parking could yield funding and deter parking in the core downtown area. On November 8th, 2017, the Nantucket Board of Selectmen passed a motion to "embrace the concept of a parking management system." On November 29th, 2017, the Board unanimously passed a more detailed motion to "institute a parking management program based upon demand management principles...create a Transportation and Parking Commission; create a Parking and Benefit District; create a Parking Fund...and, engage an independent consultant to design the Parking Management System."

This consensus by the Selectmen to move forward with a motion to establish these funds and commissions is noteworthy. Our survey results, detailed below, are intended to inform their forthcoming discussions and decisions.

We analyzed responses received from a broad and representative sampling frame of residents through a survey distributed to those on email lists provided by the Nantucket Civic League. These lists included (1) the Nantucket Civic League's 25 Neighborhood Associations supplemented by (2) a list of "civically engaged citizens" (defined as persons who signed in as attendees at various Civic League forums and events). Overall, we regard this group of respondents as reasonably inclusive (if not precisely reflective) of the diverse views that might be voiced by attendees at Nantucket Annual Town Meeting. Of the total responses, 112 out of 262 are from Madaket residents, so our survey results are skewed towards their views. Madaket was also the only residential area to provide a sufficiently large sample for analysis so we were unable to do analysis based on residential area and instead used all responses to conduct analyses based on residential status and paid parking preference. (See Appendix N for additional written comments by respondents.)

4.2.1 PAID PARKING

The respondents of our survey are about evenly divided between an hourly-rate paid parking and a flat-fee parking permit system. This divide is understandable in light of the needs of two different groups: daily downtown workers and occasional downtown patrons. We asked respondents to consider these two options in our survey; the results of which can be seen in Figure 13 and show that 50% of respondents are in favor of a one-time fee and 43% for an hourly rate. These options were posed as possibilities that could be pilot tested and refined over time. Participants were not offered a "neither" option, nor were they required to choose between the two alternatives; only 7% of respondents elected not to answer. There are different benefits to either or the options depending on the usage of parking downtown. This can be seen in Appendix L where we have compared the cost of either option depending on amount of usage.



Figure 13: Paid Parking Preference Pie Chart

Those favoring the one-time fee want any updated system to remain similar to the current system. A one-time "downtown parking permit fee" analogous to beach stickers or other Town permits, would be subject to current time restrictions that govern parking. People who rarely park over 2 hours would have no need for a system allowing longer stays. Those needing to park downtown frequently favor a one-time fee, functioning almost as an "admission permit" (see Figure 15). A one-time fee, though, does not influence people's behaviors much differently from the current system, which is why many are also in favor of an hourly rate to impose demand-driven pricing. Figure 13 shows responses of seasonal and year-round residents, but seasonal residents are considered non-voting taxpayers. Figure 14, showing the responses of year-round residents only and can be seen as a possible indication of the vote outcome as the survey was completed by those who are more civically involved with the town meaning the respondents would likely attend the Annual Town Meeting to vote on this issue. The non-voting taxpayers are still an important group to consider. Although they cannot vote, they will still make up a large portion of those who would be subject to any system that is implemented.



Further analysis of this data in relation to other questions has revealed these correlations:

- Respondents who prefer a one-time fee typically park downtown at least a few days a week and park for at least 1-1/2 hours.
- Respondents who prefer an hourly rate typically park downtown once a week or less, and usually for under 2 hours.

Figure 15 shows that 70% of respondents who prefer a one-time fee, park downtown several times a week or daily. As seen in Figure 16, 67% of those who prefer a one-time fee park for 1.5 hours to 2 hours or over 2 hours. An hourly rate would allow these respondents to pay to park as long as needed without having to find a new spot. (We caution that some respondents may have misinterpreted the one-time fee parking explanation in the introduction of the survey, or may have contemplated repositioning their vehicles for the convenience of only paying once a year.)

Only 6% of survey respondents who prefer an hourly rate reported needing to park daily (see Figure 15), and 79% park for less than 2 hours. Since these respondents park less frequently, it is reasonable to prefer an hourly rate payment system so that they only pay for the limited time that they spend downtown.



Figure 15: Parking Frequency Corresponding to Paid Parking Preference



Figure 16: Parking Duration Corresponding to Paid Parking Preference

A flat-rate parking sticker would be relatively easy to implement and could generate significant revenue flow the town could use to refine a parking management system. Various parking permit programs are already in place and a permit for downtown parking would follow similar protocols. A presentation by the Nantucket Planning Office in February 2017, estimated that approximately 21,000 vehicles would purchase a downtown parking permit. Pricing such a permit \$50 would generate \$1,050,000 of funding annually for the town. Only vehicles that do not qualify for any of the existing permits would need to purchase one for downtown parking. Revenue generated from those other permits would still total around \$76,825 (i.e. the same as 2017 permit revenue), shown in Figure 17. Under this permit system, ticketing would most likely yield roughly \$287,091 (i.e. the same as 2017 parking tickets revenue), shown in Figure 18. Altogether, permits sales (\$1,050,000 and \$76,825) plus parking tickets (\$287,000), could generate a total of \$1,413,916. Paid parking is not just a means to generate revenue. It is meant to deter vehicles from parking in certain areas and using the revenue for those who do park to improve and promote other less expensive and viable alternatives.





Demand driven pricing through an hourly rate may control parking demand more effectively than a one-time fee. Some survey comments and stakeholder interviews have expressed the belief that parking should be more expensive in high-demand areas to deter cars from occupying parking spaces in those areas (a view that is supported by our background research). An argument against this system is that it would allow wealthy visitors to commandeer spots all day. This could be alleviated by a schedule of parking rates that increase rapidly after the first few hours to encourage people to vacate a space after several hours (or park elsewhere to begin with); exorbitant rates that virtually no one would pay is the goal of this payment method.

To accommodate those unwilling or unable to pay, easily accessible and frequent public transportation, as well as inexpensive parking lots outside of town would be necessary to ensure that everyone has easy access to downtown attractions. Most of the Nantucket's year-round

residents expect (and as taxpayers and voters are entitled to) easy and affordable access to downtown.

Other survey comments from year-round residents have voiced that they avoid downtown all-together with the current system and increased traffic. Thus, the reduced traffic from demanddriven pricing might actually encourage year-round residents to venture downtown more often than they otherwise do now. This system would only be necessary during the on-season and special weekend events so year-round residents would not be burdened to the same extent by expensive parking rates for other parts of the year.

An hourly rate pricing system needs to incorporate some degree of demand-driven pricing for the system to function as intended. Were such a system implemented, it could be assumed the revenue generated by permits would likely remain level whereas ticket revenue would likely decrease in the absence of time restrictions. As seen in Figure 18 funds from parking tickets have remained relatively consistent with a slight increasing trend over the past 6 years and a disruption in this consistency could result in insufficient funding if the same level of revenue is not generated from an hourly-rate system.





4.2.2 ALLOCATION OF REVENUE GENERATED FROM PARKING

On November 7th, 2016, Massachusetts passed the Municipal Modernization Act (MMA) which put in place a number of reforms directly related to municipal finance. The act grants municipalities the right to create parking benefit districts (PBD):

"A city or town may establish one or more parking benefit districts, as a geographically defined area, in which parking revenue collected therein may be designated in whole or in part for use in that district through a dedicated fund in accordance with the purposes and uses listed in section 22A. A parking benefit district may be managed by a body designated by the municipality, including, but not limited to, a business improvement district or main streets organization" (Mass.gov, G.L. c.40, 22A¹/₂).

Previously, revenue collected from parking enforcement was added to the general town fund. The creation of parking benefit districts allows funds to be allocated directly to the PBDs for improvements in parking, public transit, and public realm infrastructure (Hanlon, 2017).

A PBD can be established by the town's mayor or board of selectmen with input from stakeholders included in the proposed district. Typically, they outline the specific area the district will include, set rules or guidelines for how the fund will operate, and establish a commission to handle the revenue and decide on the projects to be funded. At its November 8th, 2017 meeting, the Nantucket Board of Selectmen passed a motion to begin the development of a parking benefit district and on November 29th, 2017 passed a further motion to establish it. This is an important first step toward implementing any new pricing mechanism on Nantucket.

As the town moves towards implementing paid parking, it will be necessary to communicate the benefits of a parking benefit district to the public, especially voters. A necessary prerequisite for receptiveness to paying for parking will be broad public understanding of its potential benefits to all stakeholders. To gauge current public opinion, we conducted a survey asking respondents how they would prioritize the allocation of revenue generated from paid parking.

Overall, those responding gave highest priority to two interdependent needs: improved shuttle bus service and more satellite parking options (see Figure 19). Figure 19 was created by assigning all responses with a priority of 1 with 6 points, all responses with second priority assigned 5 points, etc. and then used to determine the average point value for each option. Increased and improved shuttle bus services ranked highest (averaging above 4 on the 6-point scale, where 6 is "highest"). Next highest was satellite parking (averaging 3.7 on that scale). Apparently, a core group of respondents grasp the logic of advancing both these improvements in conjunction, as a means of reducing demand for core area parking while minimizing the inconvenience of parking elsewhere. The other options presented were increased enforcement, new and improved bike paths, improved sidewalks, and marketing of other transportation or parking options. Conceivably, the order in which options were presented to respondents may have biased their responses to this question in favor of those presented first.



Figure 19: Parking Revenue Funding Priority Chart (N = 247)

A key finding is that most respondents who supported expanded shuttle bus services were not themselves willing to use it. Of those respondents, 53% reported they were either unwilling or very unwilling to use the shuttle bus, even though they favored the expansion or improvement of "park and ride" systems (Figure 20). This response pattern is key to understanding the broad public support for improved shuttle services, and it is consistent with sentiments expressed in interviews we conducted. This is that residents believe satellite lots and shuttles could service short-term visitors to the island. However, survey responses indicate unwillingness to use the services themselves. An earlier pilot survey conducted by the Nantucket Civic League in February 2017 (based on a non-representative "convenience sample") showed the same pattern. That survey inquired about interest in six different parking options. As seen in Table 3, the 88% of respondents agreed or strongly favored the "Shuttle Bus to Satellite Parking Lots" option. (That survey, though, did not inquire about respondents' own willingness to make use of that option.)



Figure 20: Willingness to use a Shuttle Bus Corresponding to Residential Status (N = 261)

SUMMAR	RY, ALL RE	ESPONDI	ENTS (N=2	247)		
Proposal	Strongly	Agree	No	Disagree	Strongly	Total
	Agree		Opinion		Disagree	
Vigorous Enforcement of Parking	37%	29%	13%	17%	5%	101%
Regulations						
Shuttle Bus to Satellite Parking Lots	55%	33%	6%	5%	1%	100%
Paid Parking with Bumper Sticker in	20%	21%	16%	24%	19%	100%
Core District						
Paid Parking with Kiosks Issuing	18%	21%	14%	24%	23%	100%
Window Stickers						
Increase the Ferry Embarkation Fee	26%	31%	12%	19%	12%	100%
for NRTA						
Year-Round Bus Service	34%	36%	20%	9%	2%	101%

Table 3: Civic League Parking System Options Survey Responses from February 2017

We can summarize our insights from all three sources: our in-depth stakeholder interviews, our survey findings from a broadly representative sample of Nantucket residents, and the Civic League's earlier pilot survey. There is clear public support for "park and ride" as an acceptable way to manage downtown parking. Equally clear is that the actual willingness of residents to use that option as currently configured remains quite limited. Presumably, that reluctance reflects the combination of not enough park-and-ride lots with sufficient capacity and close to downtown, and/or shuttle bus service that is not sufficiently frequent. For example, the 37 Washington St. parking lot very close to downtown accommodates town employees and others needing nearby parking, yet it is fully occupied by early morning and sometimes occupied by some commercial vehicles. The lot located on 2 Fairgrounds road has a considerable available capacity, but is located further from downtown and is not serviced frequently by a shuttle dedicated to it.

Funding from paid parking along with well-crafted parking management procedures (considered in Section 4.3 below), could foster more effective use of these lots, and serve as pilot tests for adding further lots as "park and ride" gains acceptance over time. If funding is prioritized to park and ride lots, it could be used to address these areas and encourage more residents as well as visitors to utilize this option in lieu of parking in the core downtown area.

Interested readers are referred to Appendix O for further detailed survey results.

4.3 FINDINGS ON PARKING MANAGEMENT OPTIONS

We collected data on several promising parking management options in our stakeholder interviews and in comments (both positive and negative) volunteered by respondents to our survey. (See Appendix N for all comments by survey respondents.) In this section, we consider certain low-technology options for managing parking which could be implemented readily. We then consider other potentially suitable high-technology options, and the proposed Intermodal Transportation Center. Half of the stakeholders we interviewed were also generally receptive to the possibility of integrating higher technologies which would act "invisibly". This suggests that a technologically advanced option will be well received if careful consideration is given to making it unobtrusive, convenient, and easily managed. However, the system must have the required network infrastructure so that it will operate flawlessly (in contrast to the license plate scanning pilot test recounted in Section 4.3.4, where technical limitations undermined parking enforcement efforts).

4.3.1 STICKER

A parking sticker is one feasible option worthy of pilot testing in the near future, to generate a dedicated revenue stream for supporting and expanding public transportation innovations. By itself, though, does not offer a permanent remedy to the parking problems downtown in the long-term.

The Nantucket Planning Office believes that a parking sticker with a yearly fee would be simple and satisfy the public. We found public opinion to be split on this option. Many stakeholders we interviewed agreed that a sticker program would be easy to implement and would generate income for the town to improve transportation infrastructure. However, many of them (like Selectman Matt Fee) pointed out that this option would not solve the larger parking issue downtown because it does not change parking behavior. Indeed, it might well worsen the problem were a sticker to confer on its holders the belief that they are now "entitled" to park downtown (having purchased a sticker). Increased enforcement might change parking behavior, thereby increasing turnover of spaces, but some form of demand driven hourly-rate pricing has the most support for its ability to change parking behavior in ways that would lessen demand. Director of Office of Culture and Tourism, Janet Schulte, and Selectmen Jason Bridges and Jim Kelly, believe that the sticker program would be difficult for visitors to obtain and would not do much to solve the problem as well. Although, this may be another factor that deters more people from parking downtown. The survey results reveal an almost even split in support for paid parking, either through a sticker or through an hourly rate (Figure 13). Some of the respondents that favored hourly-rate parking also anticipate that a parking sticker with the existing time regulations would not change parking behavior and would add a burden to parking downtown.

4.3.2 VALET PARKING

The current valet parking system has been a success. It has demonstrated residents' and tourists' willingness to pay for parking. Stakeholder interviews have unanimously reported that the valet parking system works well and is worth the money because of the convenience it offers.

Valet parking affords drivers the option to park all day and night, thereby eliminating the stress of time-limiting parking downtown. Many business owners and town officials favor expanding this service and incorporating it into a larger parking management system that can benefit all residents and visitors. One negative consequence of this option is that it does nothing to reduce the number of vehicles downtown and resulting congestion. Although, it may help to reduce the amount of circling drivers searching for vacated spaces.

4.3.3 SATELLITE LOT WITH SHUTTLE SERVICES

Satellite lots with shuttle services could be successful if they result in convenient (i.e. fast and reliable) access to popular areas downtown. Our survey shows that most Nantucket residents are either neutral or unwilling to use the shuttle service, but many think that money generated from paid parking should be used to fund shuttle bus and satellite lots suggesting that they think this is a system they would prefer visitors use.

The Nantucket Regional Transit Authority has provided a summer "ferry connector" shuttle bus between satellite lots and the ferry drop-offs. Its ridership increased from 2014 to 2015, as more regular ferry users gained familiarity with the service and used it. In 2016, however, the ridership declined, apparently in response to a necessary reduction in the frequency of service because of reduced funding (Murray Scudder, Hy-Line Cruises). Many stakeholders, especially the town officials, have suggested that satellite lots be used by employees who would otherwise occupy parking spaces near their downtown places of work, thereby depriving customers of easy access to downtown businesses. Utilizing a satellite lot would also reduce the number of vehicles downtown. The main limitation with this option is finding the space for more lots or contract the use of excess parking lots at businesses or institutions as satellite parking convenient to downtown.

Shuttle services from satellite lots are seen as a possible parking option to be widely used by downtown employees. There is currently a discount on annual bus passes for downtown employees, but this could become a more popular option with a dedicated employee lot and shuttle that aligns with approximate shift change times. While a shuttle system may work for employees of various shops and restaurants, it would not be as viable an option for town government employees and real estate and insurance agents. A valet option at a close satellite lot would be a more viable for this market segment: managers and agents who need their vehicles more readily available for meetings and client responsibilities.

4.3.4 SENSOR SYSTEMS

In the summer of 2015, the police department conducted a pilot survey of a license plate scanning technology. The poor results of this pilot test reflect a noteworthy technical barrier facing the Town: insufficient network connectivity to support proven technologies that other communities have adopted successfully.

That pilot test tried out a license plate scanning technology instead of the existing chalking system. The sensors attached to the roof of a police cruiser scanned the license plates of parked cars as it drove by. The pilot test revealed that the devices often lacked the necessary network connectivity to maintain a reliable connection to a network. The time needed to reconnect the devices resulted in a 70% decrease in their productivity. There was also difficulty in scanning license plates when driving through uneven roads, such as ones made of cobblestone, which the technology could not reliably accommodate.

We inquired with Cleverciti about the feasibility of implementing a system of their sensors in downtown Nantucket. They expressed interest and stated that if the town would like, Cleverciti engineers can design their sensors specifically for Nantucket to integrate into the downtown aesthetic and assess the network requirements. Half of the stakeholders we interviewed were open to the idea of a new technology downtown, so long as it would be reliable and not visible.

With the increase in smartphone ownership since the Nelson/Nygaard studies smartphones applications offer further feasible options for parking management. Many residents would not mind paying through the use of as smartphone according to our interviewed stakeholders, but they are concerned about how the older residents would feel about it. Our interviewees mention that many of the older residents may still be using flip phones, so they will be unable to use parking applications.

4.3.5 RFID-ENABLED PARKING STICKERS

Parking stickers with embedded RFID technology could be the most easily implemented of these technologies in the near-term, replacing a flat-rate sticker to incorporate demand-driven pricing. At its November 8th, 2017 meeting, the Nantucket Board of Selectmen, concerns were expressed about using a flat-rate parking sticker as a method to manage parking, since a sticker does not provide any real-time parking data. However, when Mike Burns from the Nantucket Planning Office mentioned the possibility of incorporating RFID technology into stickers (as Vienna, Austria has done) the Selectmen expressed interest in such technology.

However, the RFID sticker system as implemented in Vienna would not be suitable for implementation on Nantucket, as their goal for using the technology is different. Vienna has short-term parking areas and uses the stickers to authorize people parking in certain districts. Residents, for example, can park by their home without restriction. In addition, the system in Vienna neither uses the stickers for charging hourly rates, nor do the stickers provide parking data based on location. Additionally, it is not known how well the system has improved their parking, as their project report for their pilot study is not open to the public (M. Liebhart, personal communication, Dec 1, 2017). Conceivably, further technological improvements by a RFID contractor like Schreiner could be engineered to output more parking data.

4.3.6 KIOSKS

With the mention of paid parking, many of the interviewed town officials and the HDC express concern about adding parking meters and kiosks. However, we wanted to explore the feasibility of implementing kiosks as they may even preserve the character of downtown by removing signage. Our interviewees brought our attention to a parking kiosk system implemented in the summer of 2017 at the airport. The system provides free parking for an initial 3 hours. A user must pay in advance at a kiosk for any additional time they will park over 3 hours. If the user inputs a phone number when they initially pay, they are alerted when their time limit is being approached and can add more time. The system is meant to be autonomous, but it is supplemented with enforcers who periodically take photographic evidence that they have parked and issue tickets when necessary. If someone parks, does not pay and leaves before an

officer checks the lot, the airport loses revenue. This happens frequently as the system is new to many residents, meaning many may be unaware that they must pay. However, the airport manager, Tom Rafter, is content with the system and thinks it will be more successful in the airport as more people become accustomed to it.

4.3.7 INTERMODAL TRANSPORTATION CENTER/HUB

An intermodal transportation hub is an idea that has been discussed for nearly a decade on Nantucket. It offers a long-term solution that will both increase parking supply and incentivize other forms of transportation. Incorporating a multi-level parking garage into this structure would add spaces; integration of a bus station, ferry offices, taxi services, etc. would make for near-seamless access to these interconnected modes of transport. The private owners of the property hired Desman, a parking consultant firm, to conduct a feasibility study by May of 2018 for a transportation hub.

The support for a transportation hub is divided; some residents think that it would be very helpful in the summer while others believe it would compromise the historical aesthetic of downtown, waste waterfront property, and ultimately prove unprofitable due to lack of use in the off-season. In a presentation at a Select Board meeting on November 1st, 2017, Desman described projects in similar towns where they proposed multipurpose parking garages, where in the off season the garage spaces are utilized for other storage, making it profitable and useful year-round. Regarding the aesthetic of the transportation hub, Andrew Vorce of the Nantucket Planning Office, made a point that the proposed area for the transportation hub has been industrial throughout its history so designing it to be industrial would preserve its historic character while contributing to alleviate parking difficulties downtown.

Implementing a parking management system that charges for parking should precede construction of a downtown parking facility. The transportation hub would likely charge for its parking spots to generate a revenue. If parking were still free on nearby streets, drivers will seek the free on-street parking before parking in the transportation hub. Having on-street parking rates above those of a downtown parking facility would incentivize use of the latter, relieving parking pressure on the former.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The findings from our interviews and survey, and the information given by the Nantucket Civic League and the Planning Office support several conclusions about the issues involved with parking on Nantucket and public views on these issues. We use these conclusions as a basis for our recommendations.

We recommend a comprehensive system that encompasses steps the town can undertake over the next 15 years to improve parking in the downtown area. As passed at the November 29th, 2017 Board of Selectmen meeting, the town should "engage an independent consultant to design the Parking Management System" that will consider all parking options under one encompassing system, incorporate demand management principles, and consider the latest parking technology. As stated in the Nantucket Traffic Rules and Regulations, it is the policy of the Board of Selectmen to:

"Protect the economic viability of downtown commerce by improving traffic flow and on-street parking opportunities for those needing to transact business and avail themselves of services in the downtown area; and to encourage the use of public transportation and parking opportunities made available to further these purposes. These Traffic Rules and Regulations are adopted in recognition of the close causal relationship between the availability of parking and the amount of traffic congestion in the downtown area." (Town of Nantucket, 2016)

Conclusion 1- Traffic congestion, employee parking, and turnover are the major elements of the parking problem.

The results from our interviews and surveys show that the problem with parking downtown is multifaceted. The major components are traffic congestion, employee parking, and insufficient parking space turnover. The absence of traffic signals and clearly indicated crosswalks leads to congested streets, increasing the time it takes to find an available parking space. In addition, contractors and employees of local businesses occupy parking spaces downtown that customers could use. Lastly, the current chalking and ticketing system does not produce enough turnover necessary to manage parking.

Conclusion 2 - Paid parking will be a necessary part of any long-term solution.

Stakeholders and the Town are moving towards implementing paid parking. Our interviews and survey detect no strong opposition to paid parking. Questions about it center where parking revenue will go, and transportation-related improvements. There is not a clear preference between an hourly rate vs. a one-time fee. It follows that a town vote offering the *choice* of one or the other might be close, whereas a town vote to adopt or oppose one recommended option might stand a better chance of passage.

Conclusion 3 - Changing people's parking behavior is difficult.

Both residents and visitors are attached to their cars. That attachment contributes to the problem by adding more cars than downtown is able to handle. In addition, many seasonal and year-round residents are not as willing to use alternative modes of transportation and would rather have increased shuttle services for others or visitors to use rather than themselves.

Recommendations

Based on our findings and conclusions, we have formulated recommendations the town can implement in the short, medium and long-term that will implement a comprehensive system to mitigate the parking problem insofar as may be possible. It would be beneficial to also consider the viewpoints of more downtown business owners, residents not involved with the Civic League, and short-term visitors when moving forward with any proposed options.

Short-Term

Within the next year we recommend that a **parking sticker**, similar to the existing beach stickers, be put into place after establishing a **parking benefit district**. A parking sticker is easy to implement and would generate a source of revenue to fund increased **shuttle bus services**, expanded **satellite lots**, and increased capacity of current **valet services**. We recommend that the shuttle bus services run during all hours that downtown employees work and that businesses encourage their employees to ride a shuttle bus to reduce the number of cars downtown. The valet service should be used by town employees that need to travel in and out of town regularly.

Medium-Term

In 2-5 years, we recommend that the town transition from a basic parking sticker to an **RFID transponder**, similar to a device like EZ Pass, that allows the town to charge an **hourly rate** for parking to manage parking demand and behavior. This would also allow the town to remove all of the parking time-limit signs, improving the downtown aesthetic. We also recommend that the town **reevaluate parking technologies** as advancements in parking technologies are made to avoid implementing an obsolete technology.

Long-Term

Within the next 10 years, we recommend that the town accept a proposal to redevelop the section of waterfront property that is currently downtown into an **intermodal transportation center** that would include a parking garage with bus and taxi access. Not only will the parking garage increase the volume of parking spaces, the centralization of all major transportation systems on island would make it more accessible to tourists, reducing the desire to bring a car downtown. The parking supply added by the transportation center would also give employees working downtown a parking location within half a mile of their businesses. The town can also **improve upon medium-term solutions** by implementing higher technologies that provide more real-time data on parking. This will assist in adjusting parking space pricing and, gather analytics on traffic flow, parking duration, parking locations, etc.

Nantucket's unique character poses unusual challenges for parking management, particularly in the summer peak season. However, there seems to be a growing consensus that an updated parking management system will help to alleviate the increased congestion and promote turnover in high-demand areas while generating funds to make improvements in the parking district.

It is our hope that these recommendations, the supporting evidence, and our conceptualization of Nantucket's "parking problem" can inform voters and guide public decisions both in the immediate future and over the next decade.

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APPENDICES

APPENDIX A: LIST OF INTERVIEWED STAKEHOLDERS

Organization	Representative(s)
Nantucket Historic District	John Hedden
Nantucket Police Department	Chief Pittman & Lieutenant Macvicar
Office of Culture and Tourism	Janet Schulte
Assistant Town Manager	Gregg Tivnan
ReMain Nantucket	Rachel Hobart
Chamber of Commerce	David Martin & Allison Levy
Roads and Right of Way	Lee Saperstein
Nantucket Regional Transit Authority	Paula Leary
Planning and Land Use Services	Andrew Vorce
Nantucket Civic League	Charles Stott
Private Project Management	David Fredericks
Superintendent of Nantucket Schools	Michael Cozort
Department of Public Works	Robert McNeil
Selectboard Member	Jason Bridges, Matt Fee, Rita Higgins, Jim Kelly, Dawn Hill-Holdgate
Town Manager	Libby Gibson
Nantucket Airport	Tom Rafter
Planning Board	Linda Williams & Nat Lowell
Nantucket Taxi Owners Association	Tom Walton
Former Selectmen	Bruce Miller

APPENDIX B: PROJECT TIMELINE

Objectives /tacks				Weel	k 1						W	/eek	2						Wee	ek 3						w	leek 4	4					W	Veek	5			Week 6					Week 7								
Objectives/tasks	1	2	2	3 4	4	5	6	7	8	9	10	11	12	13	14	1	51	.6 1	.7 1	.8 1	9	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
Characterize stakeholder opinions																																																			
Draft interview script																																																			
Pilot test/revise script with sponsors and advisors																																																			
Contact interviees and plan interviews					Γ																Τ																														
Conduct interviews																																																			
Code & analyse content																																																			
Characterize Civic League member opinions																																																			
Create survey instrument																																																			
Pilot test/revise survey instrument with sponsors and advisors																																																			
Distribute surveys																																																			
Wait for responses																																																			
Code & analyse content																																																			
Evaluate and prepare proposal for parking																																																			
Analyse all data collected and determine similarites and points of conflict																																																			
Prepare report & recommendations																																																			
Add to and edit final report																																																			
Create comprehensive plan and suggest short, medium and long-term options																																																			
Create final presentation																																																			
Conduct presentation to sponsors and town																																																			
Provide information on possible technologies																																																			
Submit final report																																																			

APPENDIX C: INTERVIEW REQUEST EMAIL TO STAKEHOLDER

Dear <insert_name>,

We are a group of Worcester Polytechnic Institute students working in collaboration with the Nantucket Planning Office to improve parking in the downtown Nantucket area. To move forward, we would like to interview you as a representative of your organization, <organization_name>. The interview should take no more than 30 minutes and we will ask questions pertaining to any issues you see with the current parking system, opinions you have on some alternate options we have researched, and any other feedback or suggestions you wish to provide. We would like to complete this interview sometime between [Enter Timeframe] and can meet whenever and wherever is most convenient for you in that timeframe. Your feedback will help us greatly to propose parking management strategies that meet the needs and concerns of your organization as well as Nantucket's residents and visitors. Please email our group at ack17npo@wpi.edu if you would or would not be willing to participate. Feel free to also contact us if you have any further questions/comments or would like us to provide any additional information.

Best Regards, Nicholas Lanotte Richard Hosea Angela MacLeod Shannon Alvarez

APPENDIX D: INTERVIEW PREAMBLE

We are a group of students from Worcester Polytechnic Institute (WPI) collaborating with the Nantucket Planning Office. We are conducting this interview to gather feedback about parking on Nantucket. Your participation in this interview is completely voluntary and you may opt out at any time. We will be taking notes during our conversation and may wish to quote you in our final report. We will give you an opportunity to review any quotations prior to publication. We will, of course, be happy to provide you with a copy of our report when it is completed. Thank you for your support.

If you have any questions, please email acknpo17@wpi.edu. You can also contact our project advisors, Dominic Golding and Rick Vaz, at golding@wpi.edu and vaz@wpi.edu.

APPENDIX E: INTERVIEW SCRIPT

General Interview Script

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Topic 1: Current parking problems identified by the stakeholder.

- Is there a problem with parking?
 - How do you define the problem? How does is pertain to your organization?
 - What do you identify as some of the major issues with parking in downtown?
 - What are your thoughts about the current time-limit system?
- *How do you think others feel about the problem?*

Topic 2: Solutions the stakeholder has to their identified problems.

- What do you think other people want to do about the problem?
- Do you have any ideas/suggestions to improve the problems you have identified?
 - What has restricted any possible solutions from being implemented?

Topic 3: Opinions on possible options. (If conversation moves this direction and they ask for more information on different parking systems)

Short-Term Options

- How well do you think a flat-rate sticker, similar to a beach sticker, would work?
- How well do you think a valet parking system through the town would work?

Long-Term Options

- How would you feel about the construction of a Wilkes parking garage?
- How would you feel about parking at an existing or extended satellite lot and shuttle to downtown?

High-Tech Options

- How would you feel paying for an electronic (RFID) sticker that you could renew yearly?
- How well do you think billing cars by scanning license plates with sensors would work? (Genetec)
- How well do you think an automated parking system that requires a smartphone app to locate spaces and pay would work for the residents and visitors? (Cleverciti)

Topic 4: Opinion on parking pricing systems described.

- How would you feel and how do you think others would feel about paying for parking?
 - How effective do you think a dynamic pricing system would be? (provide overview of dynamic pricing)
 - How would you feel using a smartphone app to find/pay for parking?
 - Would you mind being billed automatically for parking by license plate recognition?

Topic 5: Other people or groups that might have more information

• Are there any other groups or people that you believe could expand more on our conversation or that you believe would have important information for us to consider?

APPENDIX F: INTERVIEW THANK YOU EMAIL

Dear____,

Thank you so much for meeting with us today. Your feedback will be very useful in helping us attempt to determine the complexity of the parking problem in Downtown Nantucket and proposing potential management options. When we complete our report, we will give you the opportunity to review any quotations prior to publication. We will, of course, be happy to provide you with a copy of our report when it is completed.

If you have any further questions or would like to provide any additional information please feel free to email us at ack17npo@wpi.edu. You can also contact our WPI project advisors, Dominic Golding and Rick Vaz, at golding@wpi.edu and vaz@wpi.edu.

Thank you again for all of your support, Angela, Nick, Richard, Shannon

Nantucket Parking Survey

The Nantucket Civic League would like to gather information on parking behavior in the downtown Nantucket area and your views and feedback on some potential parking management options. We are a group of students from Worcester Polytechnic Institute (WPI) working in association with the Nantucket Planning Office and Civic League and together we have developed this short survey to gauge public interest in parking management options. Better management is needed because parking utilization in downtown regularly exceeds 100% of available spaces during the summer and the resulting congestion costs everyone time and causes economic loss to local business.

Research suggests that a paid parking system may offer a partial remedy for the frustrations everyone experiences. A paid parking system makes it possible to fund options like expanded park and ride services, that would lower the overall demand for parking spaces downtown. To evaluate the feasibility of this potential remedy, we would like to understand your views on whether or not paid parking is worth a try, and why.

How paid parking might work:

1. Any vehicle parked downtown during the peak season would have to display a small parking sticker on the windshield that is priced similarly to an inspection or beach sticker. Cars would still be subject to existing time regulations already in place in the downtown area.

2. Another method is to charge an hourly rate with possible prices being around \$0.50 per hour in low demand areas and as much as \$3.00 per hour in high demand areas to increase turnover during peak hours. Under this system cars would not be subject to the current time regulations.

Please help us by answering these few questions:

1. Do you reside on Nantucket:

- Most/all of the year
- Only seasonally during the summer or early fall
- Other:

2. What is the neighborhood or area where you reside or stay when here?

Your answer

3. Why do you drive and park downtown? (Select all that apply)
I live there
I work there
For necessary errands (pharmacy, grocery, etc.)
For dining or shopping
To attend church
For regular ferry travel
Other:
4. How frequently do you typically park downtown between Memorial Day and Columbus Day?

- O Daily
- O Several days a week
- O About once weekly
- $\bigcirc\$ Less than every week
- O Hardly ever/not at all
- O Other:

5. How long do you park, typically?

<30 min</p>

- 30 min 1 hour
- 1 hour 1.5 hours
- O 1.5 hours 2 hours

>2 hours

6. Would you rather pay a one-time, annual fee or an hourly-rate each time to park downtown? (See explanation above under "How Paid Parking May Work")

One-time fee

Hourly rate

7. How willing would you be to park in a satellite lot if free shuttle buses ran every 15-20 minutes directly to and from downtown?



8. Please rank the following in order of priority you think should be supported by funds generated by a paid-parking program. Mark the top priority with a "1", the lowest priority with a "6", and only assign each value once.

	1	2	3	4	5	6
Increased shuttle bus services	\bigcirc	\bigcirc	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Development of satellite lots	\bigcirc	\bigcirc	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Marketing of other transportation options	\bigcirc	\bigcirc	\bigcirc	\bigcirc	0	\bigcirc
Improving sidewalks	\bigcirc	\bigcirc	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Increased parking enforcement	\bigcirc	\bigcirc	\bigcirc	\bigcirc	\bigcirc	\bigcirc
new/improved bike routes	\bigcirc	\bigcirc	\bigcirc	\bigcirc	\bigcirc	\bigcirc

9. We welcome your additional comments or concerns [write in]

Your answer

Thank you very much for taking the time to fill out this survey!

WPI Parking Team, in Association with the Nantucket Civic League and Planning Office



Never submit passwords through Google Forms.

APPENDIX H: EMAIL ACCOMPANYING PUBLIC OPINION SURVEY TO HOMEOWNERS ASSOCIATION PRESIDENTS

Hello [Insert President Name],

The Nantucket Civic League would like to gather information on parking behavior in the downtown Nantucket area and your views and feedback on some potential parking management options. We are a group of students from Worcester Polytechnic Institute (WPI) working in association with the Nantucket Planning Office and Civic League and together we have developed this short survey (attached below) to gauge public interest in parking management options.

Please see the attached signed letter of support from Civic League Co-Presidents Peter Morrison and Charles Stott. In this letter, they ask that you please forward this email or the provided survey link to the members of your neighborhood association. We thank you in advance for your time as the feedback from this survey will be very useful in helping us attempt to determine the complexity of the parking situation in downtown Nantucket and proposing potential management options.

If you have any further questions, comments or concerns please feel free to email us at <u>ack17npo@wpi.edu</u>.

Thank you, Shannon Alvarez Richard Hosea Nick Lanotte Angela MacLeod

APPENDIX I: EMAIL ACCOMPANYING PUBLIC OPINION SURVEY TO FRIENDS OF THE CIVIC LEAGUE

Dear Civic League Friend,

The Nantucket Civic League would like to gather information on parking behavior in the downtown Nantucket area and your views and feedback on some potential parking management options. We are a group of students from Worcester Polytechnic Institute (WPI) working in association with the Nantucket Planning Office and Civic League and together we have developed this short survey (attached below) to gauge public interest in parking management options.

Please see the attached signed letter of support from Civic League Co-Presidents Peter Morrison and Charles Stott. In this letter, they ask that you please take a few minutes of your time to complete the attached survey. We thank you in advance for your time as the feedback from this survey will be very useful in helping us attempt to determine the complexity of the parking situation in downtown Nantucket and proposing potential management options.

If you have any further questions, comments or concerns please feel free to email us at <u>ack17npo@wpi.edu</u>.

Thank you, Shannon Alvarez Richard Hosea Nick Lanotte Angela MacLeod

APPENDIX J: CIVIC LEAGUE LETTERS OF SUPPORT ACCOMPANYING PUBLIC OPINION SURVEY TO CIVICALLY ENGAGED RESIDENTS

THE NANTUCKET CIVIC LEAGUE	THE NANTUCKET CIVIC LEAGUE
November 14, 2017	November 14, 2017
Dear Civic League Friend:	Dear [name of President]:
A student research team from Worcester Polytechnic Institute is working with the Nantucket Planning Office and the Civic League to evaluate possible ways to manage in- town parking. One remedy under study is a modestly-priced parking sticker (like the town's annual beach sticker).	A student research team from Worcester Polytechnic Institute is working with the Nantucket Planning Office and the Civic League to evaluate possible ways to manage in- town parking. One remedy under study is a modestly-priced parking sticker (like the town's annual beach sticker).
To evaluate its feasibility, the team first needs to gauge overall public interest in this idea.	To evaluate its feasibility, the team first needs to gauge overall public interest in this idea.
We urge you to respond to the attached survey. It is very brief and will take only 3-4 minutes. By doing so, you will help us assure that their findings are broadly representative of the Nantucket communityconsistent with our mission "to enhance the quality of island life through informed community participation in civic affairs."	We urge you to forward the attached survey to your entire membership and encourage them to respond. This survey is very brief and will take only 3-4 minutes. By doing so, you will help us assure that their findings are broadly representative of the Nantucket communityconsistent with our mission "to enhance the quality of island life through informed community participation in civic affairs."
Sincerely, Clarke ESH Peter A. Morrison, Co-President Charles Stott, Co-President	Sincerely, Marison, Co-President Charles Stott, Co-President
The Nantucket Civic League represents 26 neighborhood associations and over 2000 dues-paying femilies, its mission is to protect Nantucket's unique heritage, enhance the quality of kisend Me, and serve our neighborhoods through informed community participation in civic affairs.	The Naniuckel Civic Leegue represents 25 neighborhood associations and over 2000 dues-paying families, As mission is to protect Nanuuckel's unique hartisge, enhance the quality of Island Me, and serve our neighborhoods through informed community participation in divid affairs.

APPENDIX K: CIVIC LEAGUE CONFIDENTIALITY AGREEMENT

We, as members of the Worcester Polytechnic Institute Project Team, acknowledge that the emails provided to us by the Nantucket Civic League, are confidential and they will only be used for research purposes, specifically distributing our survey. These email addresses will not be used by us again or shared with anyone else.

Shannon Alvarez	Date//
Angela MacLeod	Date//
Richard Hosea	Date//
Nicholas Lanotte	Date//

APPENDIX L: SCENARIOS FOR PAID PARKING

Given: 250 business days in a year (excluding weekends & holidays)
Working 8 hours per business day, meaning 2,000 worked hours in a year
Hourly rates are \$0.50-\$3.00 depending on demand of space
\$0.50 - Low demand
\$1.25 - Medium demand
\$3.00 - High demand
Parking permit is \$50
Assuming 1 ticket per day for exceeding time limit (one-time fee)
Scenario 1: Year-round resident that works downtown everyday
Hourly
Total cost/year = (2,000hours) * (cost/hour based on demand)
Total cost/year = 2,000hours * \$0.50/hour
Total cost/year = \$1,000.00 , if parking in low demand spaces (low convenience)
Total cost/year = 2,000hours * \$1.75/hour
Total cost/year = \$3,500.00 , if parking in medium demand spaces (moderate convenience)
Total cost/year = 2,000hours * \$3.00/hour
Total cost/year = \$6,000.00 , if parking in high demand spaces (high convenience)
One-time
Total cost/year = (permit price) + (250 business days) * (tickets/day) * (ticket cost)
Assuming 1 ticket per day and tickets are \$25 each
Total cost/year = $50 + (250 \text{ business days}) * (1 \text{ ticket/day}) * 25.00
Total cost/year = \$6,300.00 , assuming 1 ticket is issued to resident per day and tickets are \$25
each
Scenario 2: Year-round resident that dines/shops downtown
Hourly
Total cost/year = (downtown visits/week) * (weeks visited in year) * (length of stay in hours) *
(cost/hour based on demand)
Total cost/year = (<i>downtown</i> visits/week) * \$273/week, at moderate convenience parking for 3
hours
Total cost/year = \$819.00 If visiting 3 times a week,
Total cost/year = \$546.00 if visiting 2 times a week
Total cost/year = \$273.00 if visiting 1 time a week
Total cost/year = $\$136.50$, if visiting 1 time every 2 weeks

*Total cost/year = (downtown visits/week) * \$182/week, at moderate convenience parking for 2 hours*

Total cost/year = **\$546.00**, If visiting 3 times a week,

Total cost/year = **\$364.00**, if visiting 2 times a week

Total cost/year = **\$182.00**, if visiting 1 time a week

Total cost/year = **\$91.00**, if visiting 1 time every 2 weeks

One-time

Total cost/year = (cost of permit) + (downtown visits/week) * (weeks visited in year) * (tickets/day) * (ticket cost)

Total cost/year = \$50 + (visits/week) * 52weeks * \$25/day, when parking for 3 hours in 2 hour zone, all year Total cost/year = \$3,950.00, If visiting 3 times a week Total cost/year = \$2,650.00, if visiting 2 times a week Total cost/year = \$1,350.00, if visiting 1 time a week Total cost/year = \$675.00, if visiting 1 time every 2 weeks

Total cost/year = 50 + (visits/week) * 52weeks * \$0/day, when parking for 2 hours in 2 hour zone, all year.

Provided the time limit is not exceeded, it will be \$50 regardless of frequency of visits.

Total cost/year = \$50.00

Scenario 3: Seasonal resident that dines/shops downtown

Hourly

Total cost/year = (downtown visits/week) * (weeks visited in year) * (length of stay in hours) * (cost/hour based on demand)

Total cost/year = (downtown visits/week) *\$52.50/week, at moderate convenience parking for 3 hours for 10 weeks in the year (last week of June to labor day)

Total cost/year = **\$157.50**, If visiting 3 times a week,

Total cost/year = **\$105.00**, if visiting 2 times a week

Total cost/year = **\$52.50**, if visiting 1 time a week

Total cost/year = **\$26.25**, if visiting 1 time every 2 weeks

*Total cost/year = (downtown visits/week) * \$35.00/week, at moderate convenience parking for 2 hours*

Total cost/year = **\$105.00**, If visiting 3 times a week,

Total cost/year = **\$70.00**, if visiting 2 times a week

Total cost/year = **\$35.00**, if visiting 1 time a week

Total cost/year = **\$17.50**, if visiting 1 time every 2 weeks

One-time

Total cost/year = (cost of permit) + (downtown visits/week) * (weeks visited in year) * (tickets/day) * (ticket cost)

Total cost/year = \$50 + (visits/week) * 10weeks * \$25/day, when parking for 3 hours in 2 hour zone, 10 weeks during the summer

Total cost/year = **\$800.00**, If visiting 3 times a week

Total cost/year = **\$550.00**, if visiting 2 times a week

Total cost/year = **\$300**, if visiting 1 time a week

Total cost/year = **\$175**, if visiting 1 time every 2 weeks

Total cost/year = $50 + (visits/week) * 10weeks * \frac{0}{day}$, when parking for 2 hours in 2 hour zone, all year.

Provided the time limit is not exceeded, it will be \$50 regardless of frequency of visits. Total cost/year = \$50.
APPENDIX M: FURTHER TECHNOLOGY INFORMATION

Smartphone Applications

All of the following smartphone applications were designed to make parking in major cities more convenient for drivers to prevent circling around searching for parking which wastes time and gas. Most of these applications allow users to find open spaces or make parking garage reservations ahead of time, and include a variety of different features. In order to provide this information, the apps need to be paired with sensor data and info on when space frees up, how long they have been parked and the demand for the space. These app companies will typically be contracted by cities to implement the necessary sensor or other technology for their program to function properly.

BestParking

BestParking was developed in 2016 and allows users to find the cheapest and most convenient parking facilities in over 100 cities and 115 airports throughout North America. It is known for having the most accurate data of any parking application. It is also available in a Plus version which includes: calculations of total fees, parking facility attributes (phone number, hours of operation, etc.) and on-street parking regulations for Manhattan and downtown Brooklyn. It also offers discounts on parking garages when reservations are made in advance (BestParking, 2016).

Parker

Parker, developed in 2011, allows users to find open, available parking spots in on-street parking spaces, garages and lots. Features include GPS navigation to real time available parking, reminders when meter is about to expire, and a variety of pricing and payment options. When searching for a space, Parker allows its users to use filters to find spots that meet their preferences and finally, saves car location and provides walking directions back to car (Parker, 2011).

ParkMe

ParkMe, is another smartphone application designed to help users find and reserve the closest and cheapest parking around. It provides real time available parking in over 500 cities around the world, with prices laid out on the map. ParkMe also provides a parking timer to help users avoid tickets by notifying them when the meter is about to expire (ParkMe Parking, 2017).

ParkWhiz

ParkWhiz is a newer smartphone application, developed in 2017 which is helpful with finding parking in any major city with comparative pricing. It also provides users with discounts when booking garages in ahead of time (ParkWhiz, 2017).

SpotHero

SpotHero gives users access to thousands of garages, lots and valets in 25 major cities including New York, Los Angeles and Chicago. This application makes it easier to find and reserve parking in major cities with possible discounts. It makes it easy to just enter the dates and times the driver needs parking, compare rates, prepay to reserve spot and finally follow directions on the app to selected garage and park. A unique feature offered by SpotHero is that the users can separate business and personal parking expenses (SpotHero, 2012).

EasyPark

EasyPark is a smartphone application that allows drivers in the downtown core of Vancouver to search for the closest lot. When making reservations, users can add multiple license plates and credit cards or link their PayPal accounts. It also provides detailed maps and directions so drivers do not get lost (EasyPark Parking, 2016).

Parkmobile

After downloading the Parkmobile App users can look for a Parkmobile sign or sticker and enter in the zone number that is listed on the sign. This will begin a parking session and the driver will receive a notification when the time limit is about to expire (Parkmobile, 2017).

Sensors:

Cleverciti

Cleverciti sensors are camera-like and they scan for cars and open spaces using imaging software. Each sensor must be mounted in high places, such as a telephone pole, where it can monitor up to 30 spaces. It tracks the duration that cars have parked and available spaces. The sensors communicate over an LTE or Wi-Fi network (J. Schulte, personal communication, October 27, 2017).

RFID:

Schreiner

Schreiner's RFID parking sticker, implemented in Vienna, as a way of monitoring parking permissions of the residents. The sticker has an RFID chip in it that contains a unique

ID. Using a scanner, wirelessly connected to an ID database, enforcement can check the parking permissions associated with the ID in the scanned sticker from up to 1 meter away. The chip and the scanner communicate with radio frequencies. Additionally, the chips in the stickers have no other information other than the ID. Also, until it receives power from a scanner, it is inactive. When it is provided power from a scanner it would provide its ID and then lose power, becoming inactive again. Instead of buying a new sticker annually, the chip in the sticker can be renewed. (M. Liebhart, personal communication, Dec 1, 2017).

EZPass

EZPass sensors were introduced to make paying tolls more efficient on highways. The system requires a transponder, an antenna, and a computer database. The transponder is a battery operated, two-way radio device containing basic account information and an ID. This transponder must be attached to the upper part of a windshield of a vehicle. As a vehicle drives through a toll booth, an antenna connected to the database, communicates with the transponder using radio frequencies to handle the toll transaction electronically (Bonsor, 2001).

APPENDIX N: SURVEY COMMENTS

Paid Parking

- I very much support paid parking with the idea that most expensive parking would be the core and lesser fees charged as you move out of town.
- Bring on paid parking! It's time!
- the problem ultimately lies with the number of cars allowed per seasonal household and the rental car companies that churn out vehicles. Putting a price tag on parking will have no effect whatsoever except irritate the people that currently live downtown full-time. The system in place obviously isn't working as expected...you have to fill out the form, prove residency and pay \$50. So with that being said, how do commercial establishments i.e. The Nantucket Hotel manage to have residential permits for all their off site managers? The fact is people AND businesses with money will never have issues paying for the right to park downtown. It's just another additional cost incurred to the ultimate "pay to play" package. The end result will always be the same.
- We avoid parking in town to the extent possible and most park there in the evenings to dine out and attend the theatre so would not want paid parking to extend into the evenings.
- Sticker may be first step toward a demand management program. But existing rules alone, even if tightly enforced, won't solve for issues such as all day parking, trucks parking overnight in residential areas, or residents not having spaces in their neighborhoods. And if the sticker causes more residents to feel entitled it could backfire. We need to value parking and charge fair market prices.
- An annual fee would benefit "Heavy users" at the expense of short term visitors...who are the major users of shops and restaurants. Even though it would benefit me, I don't encourage it.
- The price could be established to achieve selected objectives. Parking could be free downtown in the winter months.
- I already pay for a sticker to park in front of my house in the Historic District. I will not pay for another sticker.
- There should be larger discounts on fares for the summer buses to encourage families to take them.
- I don't want to pay for parking anywhere, but if it comes to that, it should be a flat fee without "low" or "high" demand areas.
- I would prefer stricter enforcement, including towing, rather than paid parking.
- A one-time fee with a sticker will do nothing to alleviate parking problems. It is merely a tax on vehicles.

- We need more lots (parking garage) on the outskirts of downtown and an app-based pay for parking system that makes it more costly to park downtown than in the lots or the garage.
- Paid parking would not improve congestion, but probably piss off more people especially year around and 4 month residents. It will not change their behaviors because they are well established here already. Actually all you would end up with is another revenue stream for the town under the excuse of improving traffic, which it won't.
- removing time limits and allowing people to pay hourly will result in wealthier people leaving their cars in town for long periods and preventing others from parking. If you have hourly paid rates you still need time limits. Low income should get reduced rates.

Madaket Residents:

- I'd rather a one time fee, but realize this will only make parkers feel more entitled and exasperate rather than improve the situation.
- One-time fee does not increase parking capacity and presumably would penalize residents. Hourly rate would apply to any user, however, that option does nothing to increase parking capacity.
- You do not provide the option to choose no paid parking and assume the respondent agrees with you that paid parking is with a try. I do not.
- One time fee sounds reasonable and less complicated
- If I have to pay to park, I'll dine outside of Town. If everyone feels this way, the parking problem will be solved.
- parking sticker option depends on price, can it be changed to different cars
- My preference on hourly or seasonal parking fees would depend a lot on the cost of a seasonal pass. I'm only on-island for a couple of weeks (or so) each year.
- Question #5 should offer a no fee option. Otherwise the results may well mislead, because #5 seems to assume some form of a fee is a given.
- Serious consideration should be given to incorporating an attractive paid parking deck/structure in the property behind Stop & Shop that includes both short term and long term parking.

- I don't like either option in question #5. You should have included a third option: none of the above. I think a paid-parking program is not a good idea. As homeowners we already pay taxes, and should be allowed to park a car as needed downtown without paying more.
- I am not a regular proponent of taxes, but...we need to limit the number of vehicles allowed on the island. visitors should be curtailed in the use of the ferry service by way of instituting a tax that curtails behavior. for example, if a non resident (someone who either does not have a home or a lease of at least 2 weeks) we should charge a convenience fee of say \$250 over and above the ferry charge which should also increase while

simultaneously improving bike lanes and shuttles. i don't suggest such fees that would drive away visitors, (just the cars). also homeowners should pay an annual parking fee of some magnitude to have a sticker on each car they plan to drive and park downtown.

- Nantucket needs a downtown parking garage
- No Paid Parking! Your survey assumes that we are for it- u force me to answer
- I think I would be more upset with getting charged to park in downtown or really pissed if I had to pay at the town lot. whether it's a sticker or a meter, I'm against it. Wealthy summer residents won't think twice about paying and many year round families will be hit with another cost that makes Nantucket even less affordable a place to live. But a sticker would be more efficient than smart meters or daily rates if this is happening.
- Having paid parking takes away the charm of Nantucket. I'm sorry to see that this is under consideration
- Do NOT charge for parking; leave it alone. If a parking lot is created downtown, fine; but MAKE the shopkeepers park in it. Also run fewer ferries, that will decrease sumner traffic volumes. It is what it is. It's Nantucket in the summer. Money's no object; parking fees with just impact the locals. Also, address commercial vehicles in the core district on weekends -- do not allow after 10 am.
- Most people that live on Nantucket (Seasonal May to October) can afford any rate you charge and would pay it to be able to park downtown. Today it's a huge challenge to find parking for more than 1 hour. A good example of this is the Valet lot which is full by 10 am with spots bought by people working downtown. (or buy people buying a spot just to use to park when they want to come into town) Money is not the issue.

GARAGE/TRANSPORTATION CENTER

- We need a parking garage
- Don't change anything just yet. Build the multi level parking garage at Wilkes Square, analyze the impact, then redo this study.
- All for garage and EV transportation on island.
- I am extremely opposed to a parking garage structure downtown.
- I believe a parking garage would be helpful
- I am strongly opposed to a downtown parking garage. It would be an eyesore in a historic waterfront area, and encourage people to bring even more vehicles into town. A majority of Nantucket voters has twice gone on record as opposing such a structure, and the Urban Land Institute has strongly recommended against it. The solution to Nantucket's traffic problem is not to build more places to put vehicles, but to discourage people from bringing those vehicles into town in the first place.
- While not the subject of this survey, I do not want to see a parking garage on valuable waterfront property.

- I think using waterfront property for an unprofitable parking garage that will be utilized 2-3 months a year is obscene. The above is a good start to alternative solutions.
- We need more parking downtown. Wilkes Square and a garage is a highly viable option. Less sticks (enforcement) and more carrots (workable options)

Madaket Residents:

- We need a well disguised multilevel parking in town center (oil tank field?) that allows the density, one time, plan for flow, etc. People will pay for that convenience and not far away parking and shuttles.
- Build a parking garage on the old power plant site. Works in Key West ... should work here.
- Single parking structure well designed rather than multiple surface lots which I think are an eyesore. This would require talents of a team of talented planners, civil engineers and urban planners. Instead of fee service plan development turn it into a completion. I think firms would consider it plum to have this opportunity to showcase their talents.
- Consider a multi story, metered, parking area to replace the tank farm at the wharf.
- How about a parking garage behind Stop and Shop

Other Neighborhood Associations:

• not sure how a paid parking sticker is going to help anyone. the problem as I see it is the limited amount of parking in total--not the cost of parking. parking for the most part is free. charging a small user fee as you propose to park is not going to change anyone's plans to come into town to shop, eat, browse, etc.

TRAFFIC/CAR RESTRICTION

- Also believe equipment to more quickly accommodate ferry exit to remote lot (open air trolley or similar) is required (along with new street configuration / change in access or direction by daypart).
- Concentrate on limiting the flow of vehicles coming here.
- We try to avoid town from July through mid-August due to parking difficulties and traffic.
- The first goal should be to reduce the number and SIZE of cars in town. Big, wide SUVs not only do more damage to cobblestones, and take up more space in parallel parking but are a real danger on the narrow town streets. Due to their weight and size and inappropriateness for Town streets, there should be a town surcharge on the ferries which goes to help parking issues and special satellite lots for these cars. The visitors who bring these cars will not be sensitive to a price increase.
- I like the idea of banning 'summer cars'

• Improve the flow of traffic in and out of town by making Gardner and Center Streets one way. Traffic problems in the core district would be improved if it were safer to walk.

Madaket Residents:

- Encourage leaving cars in Hyannis by offering free or discounted shuttle passes! It might help if commercial vehicles/pick-up trucks were not allowed to park in downtown area near where ferries arrive and depart.
- I believe Nantucket suffers from car congestion and parking issues due to families having multiple vehicles. Perhaps starting a car registration/sticker program with increasing fees for more than one car would help solve the problem (the Yacht Club uses such a program to restrict the number of parking passes per family for its member parking lot).
- My family also uses the shuttle bus quite a bit to get in and out of town. Perhaps you should find out who is driving into town and parking how many cars are being rented on a weekly basis are hotels providing shuttle services?
- I still like the idea of a pedestrian mall on Main Street from 5:30 pm until 11 pm. This would enhance the experience of being on NANTUCKET. The hustle and bustle of people walking seems so much more relaxing the cars competing for parking spaces.
- Answer 3 no change, no fees. Poor survey. Assumes fee based is already decided. Fees will destroy downtown businesses.
- 1: We don't have a parking problem. We have a walking problem. Start changing the ethic that parking within the Core District is the only option. It's been done. Often downtown parking is habit and convenience, but the cost is frustration and congestion. Exceptions of course: Handicapped, heavy bags, many passengers, etc.

Other Neighborhood Associations:

- Shouldn't part of this discussion be making it harder for people to bring over mega cars that can't fit down our streets and that take up several spaces at a time when they do park? Those cars should be much much more expensive to bring over to the Island. The sheer number and size of cars on the Island is also such an issue it's not just parking them we should be looking at the bigger picture as to why we have such a parking problem.
- I generally find the traffic downtown to be much more challenging than the parking. There are physically too many cars for the size and infrastructure of the island in the summer.
- I go to town as seldom as possible in season and either look online or to mid island or other ways to shop if needed

BUS/SHUTTLE SERVICES

Civically Engaged Residents:

• I work in town every day all year long, I mostly use the bus service in the summer months, although I do occasionally use the valet service.

- Even the proposed NRTA "all year" schedules are inadequate for persons outside the most popular routes. For example, the proposed Madaket Sunday route doesn't begin until 1000 hours, too late for most church services.
- Satellite lots are a great idea, but only if partnered with very frequent shuttle service (10 min or less is ideal no one wants to wait in the rain or hot sun).
- A shuttle service is the key to reducing core area congestion. One east and one west of town would prove effective...if large enough. I used to use the Town lot on Washington Street, but now it's always full of Town employee and permit holder cars! A park and ride with a \$2.00 round trip would be extremely popular, in my judgement.
- Is it possible to remodel the buses so that more bikes can be taken on board? Perhaps a space at the back? The two bike limit prevents many people from biking one way and taking the bus back.
- The NRTA Shuttle bus service is not practical for those of us working downtown who need to regularly leave downtown during the day for office business and/or who have young children who need to be driven to their various activities or attended to for sudden sickness or medical emergencies.

Madaket Residents:

- During "high" season we often use the bus except when going to dinner downtown which we probably only do 2 or 3 times a summer.
- Satellite lots are expensive and unnecessary if we improve NRTA, bike paths and sidewalks.
- As someone that lives at the end of the line in Madaket and works downtown, walking to work is not an option. I take "The Wave" when I can, but there is about a month at the beginning and a month at the end of the "summer season" where reasonable downtown parking locations are still 2 hour parking and the buses have stopped running. So we are in purgatory. We all seem to jockey our cars around the parking spots. Not good for our work day or the downtown businesses. An out of town lot with RELIABLE 15-20 min shuttles would be amazing!
- Longer season (e.g., Memorial Day to Columbus Day) for shuttle bus service to Madaket and other "remote" neighborhoods. Even running only 4 buses per day in the earliest and latest weeks would be an improvement.
- Stupid to ask to rate the priorities above. Some are equally important. Also, make the existing shuttle service known to the visiting public--and make it affordable. Promote it like crazy! "Headed to dinner? Having a few cocktails? Take the shuttle!!"
- How can workers afford the cost of taking the shuttle, especially when needing to use multiple routes? I think that improving shuttle service, and marketing it like crazy, around the entire island, is essential.
- Satellite parking areas w/ Shuttle buses will not be utilized by most Summer drivers.
- I think waiting more than 10 minutes during high season would draw a lot of flack.

- summer months are getting more difficult to find parking. Coming to nantucket without a car in the fall and winter without bus service is impossible. Some form of public transportation, even limited, would be nice!
- I would park less in town if the Madaket shuttle bus started earlier in June and ran later into September

- Satellite lots be located near beaches or other points of interest to encourage increase usage of shuttle buses for both inbound and outbound trips.
- Lots within walking distance not buses
- Public parking in walking distance to town...ie site behind stop and shop
- I travel downtown mostly for work by 7am or work later in the evening between 5-10pm. I almost always park in the town lot and generally find a spot. But at certain times that lot is at capacity. More and more. More parking like the current town lot in walking distance to town would be a huge benefit to the downtown working community. Satellite parking with a bus is better than nothing, and I'm sure some people will use it but not me. I bring tools to work in the morning and musical equipment at night. I need to drive and park near town. It would be too much of an inconvenience.
- I spend 4 mos. on island each year. A system like that used in Boston i.e. set aside of a % of spaces for cars with resident permit stickers (issued to all ACK homeowners through tax bills 1 sticker per home) plus a shuttle bus service seems fair. Putting everyone (homeowners and 1 week visitors) on equal footing when it comes to satellite lots/shuttle buses does not seem fair. How will you enforce parking fees when a majority (I think) of the cars downtown in the summer are owned by visitors on vacation?
- I park downtown in the evenings for dinner or occasionally during the day for a quick errand. I an fortunate enough to have membership in a club near downtown and typically park there and walk into town Satellite parking is good idea but should be close enough for walking—not relying on a bus to get u back forth. To time inefficient. Consider lots on periphery of town on the jetties end, upper main/ madaket end, marine home end—all within walking/biking distance. Improve sidewalks/bike paths from those areas to town
- Space for both workers and shoppers isn't adequate to handle the demand. A remote lot with good shuttle service would help a lot for both workers and shoppers. My suggestion is to have more than 1 remote lot so it could help more people and you wouldn't need as much land in 1 location. If you have stickers, how do the renters get them? Day trippers? You still have issues as there is not enough parking spots for the demand without a dual solution. Remote lots with Shuttle service plus paid options.
- Develop outside town (with shuttle service) for folks who work in town. Or, provide a reduced rate (proof of intown employment) for the WAVE shuttles. Increase, where possible, bus stops to make catching the shuttle easier. Some stops are not close by certain areas of the island. (ie Tom Nevers has one stop and another could be installed

either at "Old Tom Nevers Rd" / Tom Nevers Rd intersection. And /or a stop down at Tom Nevers field with parking lot on the abandoned "landing" site.

• Shuttles from other parts of the island (Madaket, Miacomet, Tom Nevers, and Siasconset) by NRTA are crucial. I would like to see some of the big routes (namely Old South route) run much longer (earlier in season and later in season). Year-round would be great, even if the bus only ran 4 times a day (twice to town, and twice back). This alone would help with parking.

COMMENTS ON SYSTEM (NEW & CURRENT)

- There should be no parking enforcement downtown from Jan 1- March 30 each year.
- Sticker may be first step toward a demand management program. But existing rules alone, even if tightly enforced, won't solve for issues such as all day parking, trucks parking overnight in residential areas, or residents not having spaces in their neighborhoods. And if the sticker causes more residents to feel entitled it could backfire. We need to value parking and charge fair market prices.
- We normally live (for close to 40 years) in Nantucket from mid June through late October. Other than going to church (St. Paul's) every Sunday we rarely go into town from late June until after Labor Day. During this time our shopping and restaurants are most always out of town. This was not so 5 or 10 years ago. Now, not only because of the impossible parking, but also because costs have almost become prohibitive (who needs it?). The charm of Nantucket disappears in the summer; we can't wait for the shoulder seasons to reappear and give us back the Nantucket we've always loved.
- This community needs to be exposed to examples of locations where parking supply was reduced (rather than increased) and conditions improved through increased commerce, reduced travel/commute times, or otherwise. Please consider researching such examples and publicizing for public consumption.
- Need more enforcement! Aim for turnover, not elitist parking. Get bike riders off sidewalks. More parking availability means more cars. I have off street parking.
- I like the idea of solar ticket dispensing kiosks in the downtown historic district.
- It's essential to find an equitable system to manage short-term parking.
- We need some kind of reliable permit parking for people who work downtown. If you have children in camp or are required to drive to other places to facilitate your job, you cannot take a shuttle or drive around for 20+ minutes looking for parking. For 20 years now I have to move my car every 2 hours throughout the summer and that is not convenient in my job or fair to my employer.
- An annual parking sticker is an appealing option, IF you are NOT subject to a 30 minute or 2 hour limit parking restriction otherwise what is the benefit of having the sticker? Paying \$3.00 hour to park without time restrictions is certainly NOT a viable expense for those of us who work downtown.

• Some people say that there is no parking problem downtown or that it only lasts 10 weeks or that it a part of "being on Nantucket". I disagree. Parking and traffic management is a critical lifeline to downtown businesses and the image of Nantucket.

Madaket Residents:

- we need a solution in August but increasingly across other months too.
- My only concerns with my answers above is that, during the memorial to Columbus Day stretch I go in for something quick (grab a coffee, post office, library etc) OR I go in for dinner so it was difficult to choose my average time in a way that I felt would be helpful. By day 30 min max, by night 2hrs is enough
- The parking sticker should be transferable so we and my various tenants can move it from car to car. The problem becomes how do short term (like a week) island visitors get the sticker without being a hassle? What if we increase the car ferry fee to pay for increased shuttle service? Better yet charge the ferry ticket according to the length of the car.
- I would suggest just continuing the status quo
- 2: Problem: Many households have 2+ cars parked downtown at same time. Solution: Only allow one car/residence AT A TIME to park in the Downtown Core District. Provide movable placard for dashboard so residents could exchange between cars as needed. (EG: Yacht Club provides placards for guest parkers) Exceptions: Cars registered to Core District addresses have no restrictions.
- 2: Problem: Downtown employees park in Core District, rotating spaces during the day to avoid tickets. Bad for their own business when they take spaces meant for customers! Solution: Owner/manager pay for daily parking for employees (placards could be rotated as needed), buy passes, and make parking in transient spaces a major transgression. No more parking rotation to avoid tickets. Customer first!

- I think more valet parking is what is needed. it works very well at the old utility building in town. sometimes there is an additional valet service on broad street which also works well. where the valets ultimately can park cars is an issue I'm sure and that would need to be solved. perhaps the jetties beach parking lot can be used at night for this service? valet parking is not an inexpensive alternative but it saves a vacationer from having to keep circling around town and causing traffic congestion while seeking a parking space. parking is certainly a real problem that needs to be solved.
- I like the idea of parking where the oil tanks are once they are moved.
- I'm not sure I understand how the one-time fee would work, if the existing time regulations remain in effect? It sounds like the parking situation remains the same, but now we have to pay for it? What happens if you don't have a sticker and park downtown? Do you automatically get a ticket? I live here year-round, but try to avoid town in the

summer as much as possible. if you are trying to get more people to avoid businesses downtown, making year-round residents pay for parking would do that. Perhaps yearrounders could get a different type of parking permit, and you could just charge the seasonal visitors? Or charge them more for the permit. Year-round residents should certainly get some kind of benefit.

MISCELLANEOUS

Civically Engaged Residents:

- We bike to town almost all of the time and we belong to the Nantucket Yacht Club so we can park there
- work downtown but use my car for my work.
- Parking needed to access the ferry should be considered separately.
- I'm glad the survey is being done.
- Cobbles make bike riding very difficult and dangerous in town. Needed paved bike lanes.
- If the parking utilization is over 100% already downtown with the enforcement we have now which I would say is good, then I would strongly argue merchants are maximizing their profits now and the excuse of economic loss is bull****.
- I have been on Nantucket going on 29 years and for 10 of our 20 weeks we are here basically we just deal with it. So if the town wants to put more burden on the local and full time seasonal people, shame on them. We are the ones paying all the other taxes and fees. You will also have the added costs of installing meters and maintenance. Just leave it alone. It solves itself every year.
- Parking isn't a big issue for me ... it's a few weeks in the summer. Compared to any other place I have lived our parking issue is a non-issue! Be patient, and deal with it.
- could be a burden for some

Madaket Residents:

- Get a fleet of self-driving Uber cars
- I want you all to leave Nantucket alone, the more you mess with it the more problems you create. Leave it alone.
- Bike Paths into town are not good....Cliff Road, which I use, needs a continued bike path all the way into town as does the east side of town to the Rotary. Also a bike path from Madaket Road/Main Street intersection to Hummock Pond Road. Bikers on the street halt traffic in this area. This issue continues to the High School and also on Pleasant Street to Stop and Shop. We need more bike paths.
- Bike path expansion / share bikes are the other way to allow access / health benefits / enjoy our island.
- Consider handicapped people. Shuttle buses can be a challenge.
- Please address lack of handicapped parking

- I want limits on the hours handicapped spots can be used. Our neighbor parks in a spot in front of our home continuously, days to weeks at a time.
- The 2 hour limit should be relaxed during the Nantucket Film Festival, when it's very hard to leave the car for less than 2 hours. Maybe there should be more spots with a longer than 2 hour limit in town.

- Enforce non handicapped people parking in handicapped spots. Have spots in front of Pharmacy for 10 minutes to run in to pick up prescription. Downtown SandS Lot should be for shopping not selling spots.
- The fact is we live in Pocomo and truly do not go beyond 56 Union St. in July & August because of the difficulty of parking both day and night. We are delighted that more restaurants and grocery shopping alternatives are increasing mid-island.
- Valet parking locations are terrific. Could use more.
- I like the concept of the valet parking lot however I resent that it is so expensive. That lot should be open to the public for some kind of fee.
- Although I'm very happy to see the Tom Nevers bike "path" move up as far as design, the
 improved bicycling option for Tom Nevers should be a bike lane on Tom Nevers Road,
 not a "path" as proposed by a neighborhood group in our area. Less design costs involved
 small taxpayer cost. Tom Nevers is a great area to live in, but after 30 years living yearround here, I'm not seeing the scrub oaks as a particular exciting view. As for the ticks....

APPENDIX O: SUPPLEMENTARY DATA FROM THE PUBLIC OPINION SURVEY



Pie Chart of Downtown Activity (Note respondents can select more than 1 answer)



Bar Chart of Downtown Activity Corresponding to Residential Status

■ Year-round ■ Seasonal



Bar Chart of Paid Parking Preference Corresponding to Residential Status

APPENDIX P: SUMMATIVE TEAM ASSESSMENT

At the beginning of each week we made a schedule specifying the general tasks that needed to be completed by the end of each day including: interviews, drafts of the report, etc. To start each day, we would divide up the responsibilities that needed to be accomplished. Throughout the day we periodically checked the progression of these tasks. At the end of the day, we assessed what had been completed that day and adjusted the schedule for the following day accordingly. We believe this was an effective strategy for our team as it allowed greater flexibility with the prioritization of certain tasks as they arose. It also documented the progress of our project and ensured that we were on track to meet our objectives.

However, with this flexibility, we did not always hold ourselves to personal deadlines as strictly as we could have. For example, we set a date for when we planned on walking around to all the downtown businesses to have informal interviews where we would ask them about their opinions on parking. However, we kept delaying it due to the prioritization of other work and bad weather until it was too late. We could have done it regardless of either factor if we had just stayed with the schedule. This would definitely be an area for improvement for future group work to ensure that time is being used as efficiently as possible.

For writing drafts of our report, together we first planned the concepts and logical flow that we wanted the section to follow to ensure cohesion throughout the report. We would then divide the major sections between us and we would write the sections separately. After drafting separately, we individually read the draft to make suggestions and edits. Finally, we read the revisions and then decided which edits and suggestions to make. We found this method effective because each member could contribute equally to writing and editing. This also allowed each member to strengthen the clarity and conciseness of their writing.

Although there were rarely cases of conflict, we handled each tactfully. We found it effective to have frequent conversations about areas of improvement or address a team member if he/she started to fall short of expectations. When addressing someone we made sure to not be accusatory but rather ask if they need help in the completion of a certain task. This addressed issues early on before it became a larger problem.

In future group work, we need to work on minimizing distractions in the workplace. Often times when we cannot complete work it is due to distractions that limit the amount of time worked. Having an effective strategy to regain productivity would make us more efficient group partners.

We have learned that an effective team needs to:

- Create flexible schedules to stay on task and be organized
- Communicate frequently to ensure that everyone is on equal terms
- Be open about frustrations and points of conflict early on before it becomes a serious issue that inhibits progress.