

ON-STREET PARKING MANAGEMENT
STUDY

CITY AND BOROUGH OF JUNEAU

JUNEAU, ALASKA

FINAL REPORT

MARCH 16, 2015



WALKER
PARKING CONSULTANTS

TABLE OF CONTENTS

EXECUTIVE SUMMARY III

INTRODUCTION AND BACKGROUND INFORMATION 1

GOALS AND CONCERNS 3

ON-STREET TECHNOLOGY OVERVIEW 4

 Credit Card Acceptance 4

 Complex Rate Structures and Demand Based Pricing 5

 Audit Control 7

 Maintenance 7

 Multi-Space and Single-Space Meter Technology 7

 Multi-Space Meters 8

 Pay and Display 9

 Pay-By-Space 10

 Pay-By-Plate 11

 Mobile License Plate Recognition 11

 Payment Options 13

 Conceptual Costs of Multi-Space Meters 16

 Life Expectancy 16

 Related Technologies 17

 Real Time Enforcement Handhelds 17

 Sensors 17

 In-Car Meter Option 19

 Near Field Communication 20

 Chip and Pin 20

PARKING GARAGE TECHNOLOGIES 20

 Exit Cashier 20

 Central Cashiering 21

 Pay-on-Foot (POF) 22

 Pay-in-Lane (PIL) 23

 Credit Card In/Credit Card Out 23

 Validations 24

 Monthly Parking 25

ANALYSIS AND RECOMMENDATIONS 26

 Impact on Enforcement 28

 Americans With Disabilities Act (ADA) Compliance 29

 Meter Quantities and Locations 29

SYSTEM COSTS AND REVENUE ANALYSIS 30

TWO HOUR FREE PARKING RATE 33

METER MAINTENANCE 34

MARCH 16, 2015

PROJECT NO. 33-1823

METER COLLECTIONS..... 35

IMPLEMENTATION PLAN..... 35
 Implementation Schedule 37

SIGNAGE 37

OUTSOURCING.....38

RECAP OF WALKER'S RECOMMENDATIONS.....39

STATEMENT OF LIMITING CONDITIONS..... 41

LIST OF FIGURES AND TABLES

Figure 1: "Bagged" Aparc Meter in Front of City Hall..... 3

Figure 2: Multi-Space Meter..... 8

Figure 3: Multi-Space Meter Face Plate (Example) 9

Figure 4: Multi-Space Meter Receipt..... 10

Figure 5: Mobile LPR Enforcement 11

Figure 6: Conventional Enforcement Handheld Unit, a Tablet and Smart Phones 17

Figure 7: Vehicle Sensor 18

Figure 8: In-Car Meters 19

Figure 9: Amano Cash and Credit Card POF Station and PIL Station..... 23

Figure 10: Carmel Go-4 Interior with LPR Laptop.....28

Figure 11: Multi-Space Meter Sign Samples 38

Table 1: Meter and Permit Revenue 30

Table 2: Estimated Meter System Costs 32

Table 3: Implementation Schedule 37

EXHIBITS

Exhibit 1: Parking System Providers.....42

Exhibit 2: Parking Operators Interested in Managing the CBJ Parking Program 45

EXECUTIVE SUMMARY

BACKGROUND

In January of 2010, the City and Borough of Juneau (CBJ) developed a Downtown Parking Management Plan that identified three goals:

1. Manage on-and off-street parking resources so as to ensure that both long-term and short-term parkers can find parking suitable to their needs at all times.
2. Manage parking as a component of a multi-modal transportation system that includes walking, bicycling, use of shuttles/buses, carpooling and other transportation tools.
3. Parking management must be simple enough that parkers can easily know how long they may park in any given space and what the fee for parking in that space is.

Pursuant to this plan, the CBJ issued a request for proposals (RFP) and awarded a contract to Aparc Systems (Aparc) to implement paid parking in the downtown core. To make downtown parking available and encourage turnover, the CBJ proposed a system to offer two consecutive hours of 'free' parking on-street each day; however, if a motorist wanted to park for longer than two hours, they would need to pay for the privilege.

Aparc provided 23 pay-by-plate multi-space parking meters, or kiosks, along with internet-based handheld enforcement units. The Aparc system had ongoing operational issues. There were frequent communication failures, which interfered with credit card processing and enforcement. The keypads frequently froze or failed, and the housings weren't properly sealed, enabling wind, dust, rain and salt to enter the units. Furthermore, the meters were not ADA compliant and the user interface was confusing to motorists.

Aparc was unable to resolve these issues, and the CBJ terminated their contract on January 1, 2014 and removed the meters.

CURRENT STUDY

In December 2014, the CBJ contracted with Tetra Tech and Walker to develop parking plans for the Willoughby and downtown districts. Walker was asked to make recommendations for a replacement system in the downtown core that would best meet the needs of the CBJ. Walker met with several stakeholders in three separate meetings, toured the downtown core and reviewed existing documentation.

Applicable Technologies

Walker analyzed various technological solutions, including single-space parking meters and pay-by-cell phone, and concluded that the CBJ was on the right track in 2010.

MARCH 16, 2015

PROJECT NO. 33-1823

Pay-by-Plate

The problems encountered were mostly due to the equipment selected. Pay-by-plate technology was still in its infancy. Pay and display was the predominant multi-space meter payment mode; however, it requires the motorist to return to their car after paying at the meter (to display a receipt). Pay-by-space requires signs to identify the space number of every parking stall. Pay-by-plate requires the motorist to enter their license plate at the meter, and while this presents a bit of a learning curve, it is proving to be a preferred system – particularly for municipalities to administer.

Juneau was one of the first pay-by-plate installations in North America, so it's understandable that there were challenges. Aparc had a very limited meter market in the US and may have been overambitious in both its claims and its ability to develop a reliable pay-by-plate system. The technology has matured and evolved in the past five years and not only has a proven track record, but also has developed a remarkably efficient enforcement option in mobile license plate recognition (LPR).

Combining Garages with On-Street Parking

Walker considered a gated system for the garages, but we understand that there would be queuing issues at the exit lanes. This may or may not be resolved by pay-on-foot technology, which removes the ticket transaction from the exit lane; however, gated equipment is more costly than parking meters to procure and install. Walker estimates procurement and installation costs of approximately \$25,000 per lane, plus \$45,000 per pay-on-foot station, plus \$50,000 for related software programs and servers. This does not include concrete and electrical work, and is already estimated at more than \$100,000 per garage, compared with \$10,000 per multi-space meter.

Furthermore, a city-wide meter program will be less complex, more efficient and less costly to operate than two separate programs (gated garages and on-street meters).

License Plate Recognition

Mobile license plate recognition (LPR) technology is now the most efficient type of parking enforcement and can be utilized in the garages and on-street. One person driving one vehicle will be able to enforce the entire downtown core in less than one hour, and in thirty minutes with no traffic. Each of the garages can be enforced in a matter of minutes. Mobile LPR also provides time-stamped images of the cited vehicle, confirming that the car was present at that time. Providing photos with citations will reduce contested citations and aid in adjudication.

Mobile LPR enforcement can capture, analyze and retain far more data than foot patrols. Mobile LPR captures detailed duration of stay and frequency data, and will enable the CBJ to locate or look for vehicles based on their license plates. The system software can also be used to search for scofflaws, stolen cars, Amber Alerts, etc. In addition, the software can calculate on-street and garage occupancy separately, which can be displayed on

MARCH 16, 2015

PROJECT NO. 33-1823

dynamic signs at strategic intersections, enabling motorists to make informed decisions about where to park.

Recommendations

Walker recommends re-implementing a pay-by-plate multi-space meter system. The public has already dealt with the learning curve of entering their license plate, and monitoring license plates is the most efficient way to enforce Juneau's two-hour time limit for free parking, should the CBJ wish to continue this practice. Rather than using handheld units for enforcement, Walker recommends implementing mobile license plate recognition technology.

Walker also recommends offering pay-by-cell phone as an additional payment option. This eliminates the need to walk to the meter and enter the license plate number, as it can be placed on file upon registering with the pay-by-cell vendor.

Enforcement

The CBJ will need to determine if it is permitted to mail citations, rather than placing them on vehicles, as this is legislated by municipality. The ability to mail citations is a remarkably efficient time saver and is safer for enforcement staff and for the public, as it reduces the possibility of a negative exchange or altercation resulting from the issuance of the citation.

Program Costs

Walker estimates the cost to procure and install the new meter system (meters and LPR system) to be approximately \$346,000; however, the two largest meter manufacturers (Parkeon and Cale) are both offering reduced pricing that could reduce the meter cost by approximately \$50,000, bringing the total cost below \$300,000.

Operating expenses should not significantly change. Enforcement will still require two persons; however, they will be driving rather than walking, and both coverage and frequency will improve significantly. When there is no traffic congestion the enforcement officers may have time for other parking-related duties such as collections and maintenance. Collections will be required on a monthly basis and will take just five minutes per meter (plus travel). Maintenance will be required on a daily basis, but on most days will be less than two hours per day.

Meter Revenue

Parking permit and meter revenue for FY 2012 and 2013 (the most reliable years for the Aparc meters) averaged \$332,000 for on-street, the two lots and the two garages. On-street parking represented 38% of the metered parking supply with 14 of 23 (60%) meters but accounted for only 15% of metered (and permitted) revenue. This is primarily due to the two hours of 'free' parking allotted to on-street parkers. Aparc transaction reports from September through December of 2013 show an average of 294 on-street transactions per day with 271 (92%) of them "two hours free" transactions. At \$1.00 per transaction the

MARCH 16, 2015

PROJECT NO. 33-1823

annual value of the 'free' transactions is approximately \$74,000 (Monday-Friday minus 10 holidays, or 250 days per year).

It should be noted that Aparc's meter revenue was probably compromised by performance issues. We expect increased revenue with a new and fully functional system. It should also be noted that the recommended system cost includes \$104,000 for a mobile license plate recognition system, which will significantly improve parking enforcement, which typically increases both parking and citation revenue.

Paid versus Free Parking

As a general principal, Walker recommends that when parking is in short supply people should be required to pay for parking. There are costs associated with parking, and parking programs should be self-sustaining. That being said, there are two primary reasons for implementing metered parking: Turnover and/or revenue enhancement. Walker understands that the CBJ's primary goal is turnover; therefore, Walker understands the desire to continue offering two free hours of parking to the public. As long as the CBJ has adequate parking to allow for the two hours of free parking, Walker supports such policies; however, if there is a shortage of on-street spaces, the CBJ should consider using hourly parking fees to push more cars into the garages.

The CBJ could also consider maintaining the current 'free' on-street parking with a two-hour time limit, which would eliminate the need for on-street parking meters. The mobile LPR system would provide a higher level of consistent enforcement, ensuring the two-hour turnover of parking spaces.

Eliminating on-street meters would reduce the total meter quantity from 23 to 9, which would reduce the budgeted procurement cost from \$346,000 to \$206,000.

The determining factor is whether or not the public needs the ability to park on-street for longer than two hours. The CBJ has been operating this way for one full year now and has probably received considerable feedback. Walker recommends conducting an on-line survey to determine how the public feels about this.

ADDITIONAL CONSIDERATIONS

Pay-by-Cellphone

If there is only a limited need for 'long-term' on-street parking, the CBJ could consider offering pay-by-cell phone as the only option for parking longer than two hours. This would also eliminate the need for on-street parking meters. It should be noted that offering PbC as the only payment option is rare, but so is two hours of free parking. The overwhelming majority of municipalities in the US either have metered on-street parking or free on-street parking (smaller cities and towns with more supply than demand).

MARCH 16, 2015

PROJECT NO. 33-1823

Piloting Programs

Whatever the CBJ ultimately decides, Walker understands the need for a proven solution in light of the failed Aparc system. Walker recommends piloting a system prior to procuring it, to ensure that the CBJ will get what it pays for. Walker spoke with the three largest multi-space meter manufacturers to gauge their interest in providing a meter pilot in Juneau. All three manufacturers are interested (Parkeon, Cale, Digital). Two of the three manufacturers offered below-market pricing (Parkeon and Cale).

Walker also spoke with PCS Mobile, the Northeast distributor for Genetec, the leading mobile LPR provider in the US. They are interested in providing an LPR enforcement pilot based on availability (they have a limited number of pilots available at any given time).

Out-Sourcing Parking

Walker spoke with four parking operators currently providing parking management in the Northwest and Canada (Diamond, Impark, Republic and Robbins). They are all interested in contracting with the CBJ, including scenarios where the CBJ would not have to lay out any capital costs to procure the new meter system; however, they would need to be provided with detailed revenue figures from meters, permits and citations in order to present specific offers.

It should be noted that multi-space meters, pay-by-cell services and mobile LPR systems are provided by different and separate companies, requiring separate contracts; however, parking operators will frequently serve as a 'prime' contractor with a city, procuring all equipment as part of their contract to manage the parking operation for the city.

SUMMARY

To recap Walker's recommendations:

1. Re-implement a pay-by-plate multi-space meter system.
2. Offer pay-by-cell phone as an additional payment option.
3. Motorists should not have to cross the street to pay a parking meter.
4. Maintenance staff should monitor the meters and implement repairs "same-day".
5. Walker does not recommend accepting bank notes at the meters.
6. Purchase extended meter warranties.
7. Implement mobile license plate recognition technology for enforcement.
8. If permissible, mail citations rather than placing them on vehicles.
9. If maintaining the free two-hour time limit, allow motorists to bypass the meter and use PbC when parking for fewer than two hours.
10. Conducting an on-line survey to determine how the public feels about the two-hour on-street time limit.

MARCH 16, 2015

PROJECT NO. 33-1823

11. Continue to waive parking fees for vehicles with ADA credentials; however, consider the impact of totally unrestricted parking for ADA credentialed vehicles.
12. During the RFP process, require vendors to provide pay-by-plate and mobile LPR qualifications and references.
13. Require a pilot prior to procuring a parking system, to ensure that the CBJ will get what it pays for.
14. Consider outsourcing to a private parking operator.
15. Launch a public relations campaign to introduce the "new and improved" program.

INTRODUCTION AND BACKGROUND INFORMATION

The CDD Downtown Parking Management Plan Status Update dated January 21, 2010, identified three draft goals that were created to provide direction for a parking management program:

1. Manage on-and off-street parking resources so as to ensure that both long-term and short-term parkers can find parking suitable to their needs at all times.
2. Manage parking as a component of a multi-modal transportation system, recognizing that adequate parking cannot be supplied at any destination in the downtown area for peak demand, and that walking, bicycling, use of shuttles/buses, carpooling and other transportation tools are part of the solution to any parking problem.
3. Parking management must be simple enough that parkers can easily know how long they may park in any given space, and for what the fee for parking in that space (if any) is.

In an effort to commence with the achievement of these goals, the City and Bureau of Juneau (CBJ) issued a request for proposals (RFP) and awarded a contract to Aparc Systems (Aparc) to implement paid parking in the downtown core.

The CBJ wanted to encourage turnover, as too many downtown employees were parking on-street all day, making it difficult for other motorists to find on-street parking near the stores, restaurants, offices and other businesses they wanted to visit. The downtown core had a 'free' one-hour time limit; however, employees would move their car to a different location once an hour to avoid citations.

The CBJ would offer two consecutive hours of 'free' on-street parking each day; however, if a motorist wanted to park for longer than two hours, they would need to pay for the privilege. Aparc provided 23 pay-by-plate multi-space parking meters, or kiosks, along with internet-based handheld enforcement units. Motorists would park, walk to a meter and enter the vehicle's license plate number in order to conduct a parking transaction. Motorists were required to enter the vehicle's license plate number to receive the two hours of 'free' parking so that enforcement staff could confirm that the vehicle hadn't exceeded the two-hour limit.

Enforcement officers would enter the license plate numbers of parked vehicles into handheld enforcement units that communicated with the meters. The system software would indicate if the vehicle's time limit had expired, and/or if the license plate had been entered for a previous transaction earlier in the day.

Meters were installed in the following locations:

1. Fourth Street and N. Franklin Street.
2. Main Street, between Third and Fourth (Alaska Office Building).

MARCH 16, 2015

PROJECT NO. 33-1823

3. Third Street and Seward Street (REACH).
4. North Franklin Street Lot.
5. Second Street and Seward Street.
6. Front Street and S. Seward Street (Sealaska).
7. Front Street and S. Franklin Street.
8. S. Franklin Street, between Front Street and Ferry Way (Senate Building).
9. Seward Street (City Hall).
10. Ferry Way and Marine Way.
11. Ferry Way and S. Franklin Street.
12. S. Franklin Street, between Ferry Way and Admiral Way (Filipino Hall).
13. Marine Way and Admiral Way.
14. Admiral Way and S. Franklin Street.
15. Main Street and Second Street (added later).
16. Shopper's Lot
17. Downtown Transportation Center (3 meters reduced to 2).
18. Marine Park Garage (3 meters).

The Aparc system had ongoing operational issues. There were frequent communication failures, which interfered with credit card processing and enforcement. The keypads frequently froze or failed, and the housings weren't properly sealed, enabling wind, dust, rain and salt to enter the unit. Furthermore, the meters were not ADA compliant and the user interface was confusing to motorists.

Aparc was unable to resolve these issues, and the CBJ terminated their contract on January 1, 2014 and removed the meters.

Figure 1 "Bagged" Aparc Meter in Front of City Hall



Source: Juneau Empire

Walker was asked to make recommendations for a replacement system that would best meet the needs of the CBJ. Walker met with several stakeholders in three separate meetings, toured the downtown core and reviewed the Community Development Department's (CDD) Downtown Parking Management Plan Status Update dated January 21, 2010. Following is our understanding of the CBJ's goals, an overview of the current related parking technologies and our analysis and recommendations for replacing the system.

GOALS AND CONCERNS

During stakeholder meetings, the following goals and/or areas of concern were discussed:

1. Reduce long-term use of short-term spaces.
2. Encourage the use of the garages.
3. Maintain the 2-hours free parking (although some felt it should be discontinued).
4. Increase revenue (although some felt revenue was not important).
5. Ensure that street parking is available.
6. Provide ADA compliant meters.
7. Procure a flexible, adaptable system.
8. The sidewalks are narrow and efforts are being made to keep them clear, so the size, quantities and locations of kiosks are a concern.
9. Cruise ships bring thousands of pedestrians, crowding the sidewalks and the streets.

MARCH 16, 2015

PROJECT NO. 33-1823

10. Prioritization of voice over data for wireless communication. Pre-test the solution to ensure solid, proven communication.
11. A desire to consolidate parking management into one department (and one "parking czar").
12. Parking receipts cannot be water soluble.
13. Consider a maintenance contract.
14. Consider an implementation plan (parking ambassadors during rollout).
15. Consider the user interface (back lighting, ease of use).
16. The pay-by-plate concept was sound when it worked.
17. Docks and Harbors utilizes Aparc pay and display meters (kiosks) in the Statter harbor and Taku Lots. They have no significant performance issues.
18. Consider pay at exit in the garages.
19. Consider security issues in the garages.
20. The question was raised as to whether the Docks and Harbor meters and the CBJ system should be integrated.

Following is an overview of various on-street parking technologies that Walker considered in order to address these goals and concerns). The CBJ may wish to consider some now, or in the future.

ON-STREET TECHNOLOGY OVERVIEW

The parking meter was invented by Carl Magee in Oklahoma City, Oklahoma, in 1935. Today it is ubiquitous. Anyone reading this report knows what it is and how it works; however, technological improvements may make the conventional parking meter obsolete. Newer 'smart' parking meters brought three key technologies to on-street parking: computers, solar power, and wireless communication. This allows customers to pay by credit card, cities to set complex rate structures, and the meters to communicate wirelessly via a central management system, providing remarkable audit control and maintenance capability.

CREDIT CARD ACCEPTANCE

One of the major benefits of smart meters (single-space or multi-space) is the ability to accept credit cards. Benefits include the following:

- Enhanced Customer Convenience: Most motorists do not carry coins with them, or keep enough coins in their vehicles to pay for parking. Most motorists do carry credit cards, enabling them to pay for parking at credit card-enabled meters.

MARCH 16, 2015

PROJECT NO. 33-1823

- Enhanced Compliance: The added customer convenience results in a higher level of meter compliance, as most motorists will pay the parking fees when they can, but may risk receiving a ticket once they've parked but don't have enough coins to purchase the time they need.
- Increased Revenue: Motorists tend to purchase more time when paying with credit cards. They are no longer limited to the number of coins carried on their person or in their car. Furthermore, credit card-accepting meters typically offer a "max" button that enables the motorist to purchase the maximum time allowed at the push of one button, rather than predicting how long they will actually be parked. Most people would rather leave unused time on the meter than risk getting a ticket for an expired meter.
- Fewer Collections: Credit card payments reduce the number of coins being inserted in the meter, reducing the frequency of coin collections. Conventional meter vaults hold approximately \$30 in quarters, requiring the coins to be collected at least once per week and more frequently in busy areas.
- Fewer Coins to Process: Credit cards reduce the number of coins that need to be processed; including transporting the coins, counting and rolling the coins and depositing them into the bank. Credit card transactions typically account for 35% - 70% of all transactions, reducing coin volume by more than that percentage, as credit card transactions typically replace the higher priced coin transactions. The higher the hourly parking rate, the higher the percentage of credit card use.
- Fewer Staff Injuries: Coin processing is a common cause of staff injuries. Coins are heavy in mass volumes. Most cities report frequent coin-related injuries to staff, leading to reduced productivity, time off from work and worker's compensation claims.
- PCI Certification: The Payment Card Industry (PCI) sets rigorous security standards for credit card processing. Best practices include contracting with a PCI-certified vendor, providing the CBJ with assurance that credit card processing protocols are being adhered to, such as credit card data being encrypted and not stored, etc. Most major manufacturers are PCI-certified. Walker always specifies PCI certification.

COMPLEX RATE STRUCTURES AND DEMAND BASED PRICING

Conventional parking meters have limited rate setting capabilities. Rate structures were limited to one fixed rate for one fixed time frame. Computer software programs enable smart meters (single space or multi-space) to create a variety of rate structures. Hourly rates can change from hour to hour, or by time of day, or day of week. Flat rates can also be programmed for any duration of time. Rate structures can also be changed remotely (conventional meters require a trip to each meter).

New meter technologies enable cities to implement demand-based pricing at parking meters. This is a relatively new concept that has garnered a lot of attention since Donald

MARCH 16, 2015

PROJECT NO. 33-1823

Shoup; Professor of Urban Planning at UCLA published “The High Cost of Free Parking” in 2004. Shoup cites motorists contributing to traffic congestion and air pollution while circling blocks looking for a parking space. Shoup called this “Cruising”. Shoup says that demand based (aka market rate) pricing would eliminate cruising. Shoup contends that cruising occurs because on-street parking is priced below market value. For example, off-street parking is typically more expensive, because there are more costs related to building and maintaining a garage; however, most people prefer parking on-street.

If on-street prices were higher, more people would opt to park in the garages. Furthermore, if on-street parking rates were more expensive in the high demand areas and less expensive a block or two away, some people would opt to pay more, while others would opt to save money by parking farther away and walking a block or two. Shoup suggests raising and lowering the parking rates on each block based on the occupancy. When there are one or two parking spaces available on all blocks, you have reached the “sweet spot”. Parking rates are “not too high, not too low, but just right”.

To restate Shoup’s theory, demand-based pricing uses demand as the key factor in establishing parking rates. The higher the demand is, the higher the rates are. It is also a method of redistributing the parking occupancy levels of various streets and neighborhoods throughout a city. Typically, the goal is to reduce demand on high occupancy streets, and increase demand on low occupancy streets. Hourly parking rates would be increased on high occupancy streets and decreased on low occupancy streets, inducing motorists to park on the low occupancy streets. High occupancy streets are typically closest to motorist’s final destinations, e.g., streets with high volume offices, stores, restaurants, theatres, etc. Low occupancy streets are typically on the outskirts of these areas, a block or two (or three) away.

Demand-based pricing is beneficial when demand exceeds supply, causing motorists to spend more time driving, or ‘cruising’ to find an open parking space. Motorists drive up and down multiple blocks until they find a space, and may circle the same block more than once, hoping to find someone pulling out of a space. This causes frustration, creates traffic congestion and releases air polluting gas emissions. Reducing cruising contributes to environmental sustainability.

Multi-space and single-space smart meters enable a city to implement demand-based pricing. Not only can the meters handle complex rate structures and rate changes, they also help to provide baseline data needed to determine which blocks are candidates for rate increases, and which blocks are candidates for reduced rates. The system software provides reports showing transaction details such as when motorists paid, where they paid and how much time they purchased. Once the rates are implemented, the reports will also help determine the effectiveness of the rates.

Note that meter reports cannot identify when cars actually come and go or duration of stay, they can only report on payment data. Payment data is typically consistent with motorists’ parking habits, but does not account for unpaid or overtime parking, and will not track actual duration of stay. Other technologies, such as vehicle sensors and/or license plate

MARCH 16, 2015

PROJECT NO. 33-1823

recognition systems will track actual vehicle activity (rather than payment data), and are discussed later in this report.

AUDIT CONTROL

Conventional meters have minimal audit control. No-one knows how much money is inside them until the meters are collected. If a meter was not collected, it could go undetected. No reports are generated. Furthermore, an open coin can collection system leaves the coins unsecured when emptied by collection staff. If coins are dropped, spilled, or go missing for any reason, they may not be detected.

When a conventional meter vault fills, the coin slot to the vault closes, but the coin slot to the meter remains open. Coins can still be inserted into the meter, but they land on top of (or on the side of) the vault. The collector needs to pick these individual coins up by hand. If any of these coins are left, dropped, misplaced, lost, forgotten about or taken, they may not be missed. This is also the case throughout the counting process.

Multi-space and single-space smart meters track every payment. The software tracks the date and time of all payments, how much time was purchased, and how it was paid for (coin denominations, credit card types, etc.). If any money goes missing, the auditors will know. They will be able to see how much money is in the meter at any time by simply logging in.

MAINTENANCE

Smart meters have self-diagnostic software that enables them to 'report' maintenance issues via wireless communication, enabling staff to respond immediately. Conventional meters may be out of service for days before a collector or enforcement personnel notices it and reports it.

MULTI-SPACE AND SINGLE-SPACE METER TECHNOLOGY

This new technology didn't come cheaply, which is why the multi-space meter was created. It wasn't cost effective to put all of this technology into every parking space, but if one meter could cover multiple spaces, they became affordable. In the past five years, a single-space retrofit meter has become an attractive and affordable option. The computer, solar power and wireless capability have been incorporated into the single-space meter, providing most of the benefits of the multi-space meter, without requiring the customer to walk to the multi-space meter.

Following are the major differences between smart single-space meters (SSMs) and smart multi-space meters (MSMs):

- The public generally finds SSMs easier to use. SSMs are familiar and require no special instructions. MSMs require instructions; in fact ambassadors are generally deployed to assist customers during initial rollout.

MARCH 16, 2015

PROJECT NO. 33-1823

- SSMS do not require signage. Motorists see the meter and know they are expected to pay. MSMS require signage (w/arrows) advising motorists to pay at the MSM. Pay-by-space meters also require space numbers.
- SSM manufacturers charge credit card transaction fees above and beyond typical merchant processing fees – typically \$0.13 per transaction. This is how they can afford to put all that technology into every meter. MSM manufacturers do not charge these fees.
- SSMS are more susceptible to vandalism and theft. MSMS are more secure and are recommended for high-risk vandalism areas.
- SSMS have smaller coin vaults and consequently need to be collected more frequently.
- MSMS, by their nature, do not allow for ‘piggybacking’ (parking at a meter that has time left on it from the previous parker). This can account for increased revenues of up to 10%. SSMS require sensors to zero out the meter, which also decreases battery life.
- SSMS cannot accommodate pay-by-space or mobile license plate enforcement, which are more efficient than physically inspecting every meter.

Walker understands that the City is concerned about the limited widths of CBJ sidewalks and is attempting to de-clutter them to make more room for pedestrians. Walker reasons that the CBJ has no interest in installing single-space parking meters in the CBJ, nor would we recommend doing so, therefore, we will focus on multi-space meters.

MULTI-SPACE METERS

The development of the multi-space meter (MSM) enhanced metered parking as a viable option for controlling revenue from multiple spaces with fewer devices. For on-street applications, multi-space meters usually manage eight to fifteen spaces. For surface lot or multi-level parking facility applications, one multi-space meter can manage any number of spaces, depending on the configuration and application.

Figure 2: Multi-Space Meter



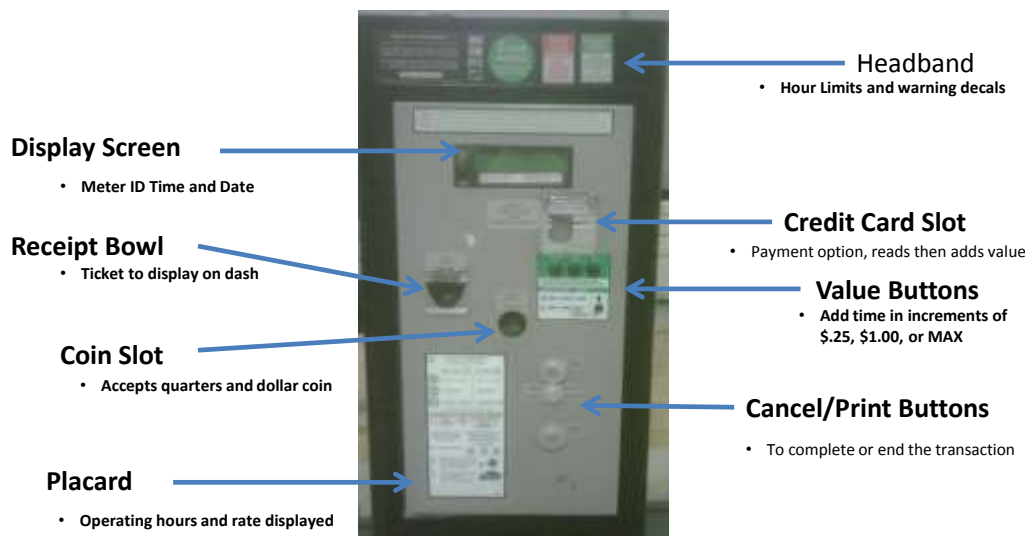
Source: Parkeon

MARCH 16, 2015

PROJECT NO. 33-1823

Each meter is equipped with graphical and LED displays to instruct patrons; one or a combination of coin, token, banknote, credit card or smart card acceptors; a cashbox and/or bill vault to securely store money; and user interface buttons and/or a keypad. The meters are computerized, which allows for complex rate structures and strong audit and enforcement trails.

Figure 3: Multi-Space Meter Face Plate (Example)



Source: Cale

A typical installation is networked, allowing transaction and revenue data to be consolidated to a central server and viewed remotely. This allows the owner to remotely generate reports and other useful data necessary to manage the parking assets, including changing the rates and monitoring revenue.

Depending on the specific application and manufacturer, most multi-space meters can be configured for use in one of three modes of operation: pay and display, pay-by-space, or pay-by-license plate. Most multi-space meter manufacturers make one meter capable of being programmed for all three payment modes by changing the user interface (face plate) and the system software (rather than replacing the meter).

PAY AND DISPLAY

Pay and display parking meters are currently being used by Docks and Harbors in the Statter harbor and Taku Lots. In pay and display mode, patrons park the vehicle, walk to the parking meter, pay for a certain amount of time and receive a receipt. Somewhat less convenient for the patron than individual meters, in pay and display mode, the patron has to return to their vehicle to place the receipt on the dashboard. The receipt indicates the duration, location, machine number and end time for which the vehicle has paid for parking. The receipts are visually inspected during enforcement procedures, which have

MARCH 16, 2015

PROJECT NO. 33-1823

been found to take more effort and time as compared to the enforcement of other meter types.

Figure 4: Multi-Space Meter Receipt



Source: CPM, City of Chicago

Pay and Display requires that the motorist return to the car to display the receipt. This requires the meter to be relatively close to the car. On average, the meter should be within 100 feet of the parking space. A good rule of thumb is to install the meter with five parallel parking spaces on each side of it for a 1:10 meter to car ratio. For diagonal parking spaces the ratio could increase to 1:20; however, this doesn't account for fire hydrants, driveways, loading zones and other interruptions in the parking layout.

In Pay and Display mode, parking spaces do not need to be identified (striped), which has shown to allow more cars to park on each block, depending on the sizes of the cars parked at different times and the lengths of uninterrupted parking spaces.

PAY-BY-SPACE

In pay-by-space mode, the patron is not required to return to the vehicle with a receipt. Each parking space is numbered. The patron approaches the parking meter, enters the parking space number in which the vehicle is parked and selects the amount of time desired. No receipt is needed for enforcement, but there can be a receipt for proof of transaction. Enforcement is done by viewing a web-based report of paid and/or unpaid spaces on a hand-held enforcement device or from any web-enabled computer or smart phone.

Most pay-by-space applications offer the added convenience of allowing patrons to add parking time to the meter from another meter or through their cell phone for added convenience. Pay-by-space meters are typically used in off-street applications where spaces can be easily numbered using signs or surface paint; however, they are also gaining popularity for on-street applications due to the pay-by-cell phone option (described later), no need for the customer to return to their car with the receipt, and their improved enforcement options.

MARCH 16, 2015

PROJECT NO. 33-1823

PAY-BY-PLATE

The CBJ implemented pay-by-plate in 2010. Unfortunately, Aparc had not fully mastered the technology. In pay-by-plate mode, the patron is not required to remember the parking space or return to the vehicle with a receipt. Instead, the patron enters the vehicle's license plate number and selects the amount of parking time. No receipt is required for enforcement, but there can be a receipt for proof of transaction. This system can allow a patron to move the vehicle to another spot within the same meter zone without having to pay for parking again - provided there was time still remaining on the original purchase, and they were not in violation of the posted time restrictions. As in pay and display mode, parking spaces do not need to be identified (striped), which has shown to allow more cars to park on each block, depending on the sizes of the cars parked at different times and the lengths of uninterrupted parking spaces.

Enforcement can be done with a vehicle mounted license plate recognition (LPR) system that scans the license plates of all parked cars, or with a hand held unit, either scanning or manually entering the license plate.

MOBILE LICENSE PLATE RECOGNITION

Mobile license plate recognition (LPR) technology has made the enforcement of pay-by-plate, pay-by-cell, and license plate permit parking remarkably efficient and cost effective.

Figure 5: Mobile LPR Enforcement



Mobile LPR utilizes vehicle mounted cameras that read and record license plate numbers as an enforcement vehicle is driven through the downtown core. The cameras are typically placed on the left and right side of the patrol vehicle and record the rear license plates of parked vehicles. The cameras use a series of algorithms to convert the photographic image of license plates into text data that can be compared with lists or databases of paid or permitted license plates, to determine if the vehicle has the right to park in that particular location at that particular time. A processor is installed in the vehicle's trunk or in the floor, and a laptop is installed on the dashboard, between the front seats.

The LPR software can integrate multi-space meter software, pay-by-cell software, permit

MARCH 16, 2015

PROJECT NO. 33-1823

software, and other databases such as law enforcement agencies to not only identify paid and unpaid parkers, but also stolen or otherwise significant license plates. If the LPR camera reads a plate that is not recorded as registered or paid, or has been otherwise identified as searchable, an audible alarm sounds to alert the driver, who can then take the appropriate action.

Mobile LPR can be used to enforce time restricted parking, as the software time-stamps every image. The software can be programmed to identify license plates that parked beyond the time limits of that particular zone.

Another benefit of LPR enforcement is the ability to use license plates as employee permits, as well as residential, business or monthly permits. This not only eliminates the need for paper, hang tag or decal permits, since the motorist already has the license plate; it also makes enforcement extremely efficient. Registration is typically done on-line, and can be done 24/7. Permit holders can enter their own data, saving office staff time. Furthermore, the license plate is a state regulated credential, providing a higher level of integrity and less opportunity for misuse or fraud.

License plate permitting significantly reduces the possibility of counterfeit permits or real permits being given, loaned or sold to unauthorized users. The permit software allows individuals to register more than one vehicle (for owners with multiple cars), while enforcement can restrict usage to one or more vehicle at a time. Permit parking can also be restricted to particular days, timeframes and even locations. The LPR system includes GPS monitoring to enable it to identify and segregate parking zones.

At a driving speed of just 15 MPH mobile LPR is five to seven times more efficient than foot-patrol, as the average foot patrol speed is two to three MPH. This means that one vehicle can cover the same territory as five to seven enforcement officers on foot-patrol.

Mobile LPR is not perfect. Accuracy varies greatly (from 70%-98%) due to a number of factors and variables. LPR cameras are similar to the human eye. If the license plate is not visible to the human eye, it is not visible to the camera. For example, the following scenarios can prevent the camera from capturing and/or identifying the license plate:

- Snow, sand, soot or dirt covering the plate.
- Trailer hitches, bicycle racks or bicycles covering the plate.

In these scenarios, manual intervention will be required, or the vehicle will not be properly enforced. In addition, the cameras may not be able to identify all of the characters in the following scenarios:

- Temporary cardboard plates.
- Plates with stacked characters.
- Out of state plates that use different styles, shapes or colors.

LPR software may not be able to capture a cardboard plate, as the character reflection is different than aluminum plates. LPR software may or may not be able to identify plates with

MARCH 16, 2015

PROJECT NO. 33-1823

stacked characters or plates from other states, as the software will be programmed for the types of license plates issued in Alaska (each state is different). The software will be calibrated by the manufacturer for Alaska's characteristics and will also learn from previous enforcement sessions to identify unusual characters and/or to correct or complete partial reads due to similar looking characters (such as the number and letter "o", a 5 and an s, etc.

The five to seven times efficiency in coverage makes up for a less than 100% accuracy rate, and enforcement staff always get to confirm the license plate on the in-vehicle monitor prior to issuing a citation. This prevents citations from being issued due to a camera error.

If and when snow covers a license plate, the LPR cameras will not be able to read the plate. Enforcement will need to be done manually, with enforcement personnel brushing the snow from the plate. Note that license plates do not become unreadable every time it snows, and some plates will become covered while others do not. There are multiple factors, including the shape of the car, the strength and direction of the wind, the location, the type and rate of snowfall, etc.

PAYMENT OPTIONS

As parking rates increase, payment with coins becomes impractical and/or inconvenient. Most meter manufacturers offer the following payment options:

Coins and tokens: All the meters described accept standard coins for payment. As an option, a token program may be added to the meters. Tokens can be offered as a validation incentive from merchants to encourage repeat business. Some municipalities offer downtown merchants the opportunity to purchase parking tokens at a discount. The merchants could provide them to their customers free of charge as an incentive to return to their store. As an added public relations benefit, the tokens can be embossed with the CBJ logo.

Bank Notes: Adding banknote payments allows patrons to pay with paper currency in addition to coins. Most multi-space manufacturers offer this as an added option. Additional equipment (bank note acceptor, bank note vault, etc.) is required, as well as additional instructions for patrons. Multi-space meters do not provide change. A parking patron inserting a \$5.00 bill for a \$3.00 parking charge will not receive any change.

In a damp environment bills will jam on a regular basis. The best manufacturers tout a 98% acceptance rate overall, meaning 2% of the time bills may jam (even in dry weather). Bills are easily removed by maintenance staff, but it requires a trip to the machine.

The bank note acceptor is one of the most expensive meter parts to replace.

Credit Cards: Paying for parking with a credit card has increased in popularity as more cities have increased parking rates and installed credit card-enabled meters. Credit card acceptance is an essential component to meter installations where the rates exceed \$1.00 per hour. Most people don't carry enough quarters to feed the meters for the length of time they desire. The advantages of credit card acceptance were addressed on page 4 of this

MARCH 16, 2015

PROJECT NO. 33-1823

report.

Smart Cards: Smart cards allow for the payment of parking through a pre-paid stored value memory card with an embedded microchip, similar to a credit card. The card is pre-loaded with a dollar value, and when inserted into the parking meter, the parking fee is deducted from the card. Most cards can be replenished either at the meter, at a re-loading station or via the internet. In many cities, the smart cards can be used for multiple purchases, most commonly for parking and transit.

According to the Smart Card Alliance, implementation of a smart card program can be challenging, as the acceptance of credit cards significantly diminish the need for a smart card. Many cities record percent usage rates in single-digits.

Advantages of smart cards include:

- Improved customer service (another way to pay for parking).
- Increased revenues due to more people paying, purchasing larger blocks of time, and losing the pre-paid card prior to using the full value.
- Increased operational efficiency.
- Avoidance of credit card fees.
- Stronger internal controls and security.
- Expanded strategic marketing opportunities such as discounted rates and loyalty programs.

Disadvantages of smart cards include:

- The CBJ needs to administer the smart card program.
- Smart cards are proprietary single-application cards that do not have the more universal adoption and appeal of a credit card. Reloading value to the card can be inconvenient.
- Adoption rates are generally low.

Cell Phone Payments: Technological improvements in the cell phone industry have extended to the parking industry; however, pay-by-cell (PbC) actually bypasses the meter completely. Here's how it works:

1. The PbC vendor sets up an account with the CBJ, identifying all parking spaces and/or zones.
2. Motorists register their cellphones and provide credit card payment information for the PbC vendor via their cell phone.
3. Upon parking, the motorist calls the PbC vendor's automated payment line.

MARCH 16, 2015

PROJECT NO. 33-1823

4. The motorist enters the appropriate location codes for the CBJ, zone, meter number, space number, etc., or enters their license plate. The motorist enters the desired parking time.
5. The PbC vendor charges a convenience fee, typically \$0.35 per transaction.
6. Enforcement is done by viewing a web-based report of paid transactions provided by the PbC vendor.
7. The PbC vendor deposits the parking fees into the CBJ's established bank account, keeping the convenience fees.

Benefits and features of PbC to customers:

- No need to walk to the parking meter.
- No need to worry about coin availability.
- After registering your phone, license plate and credit card information once, the information is stored for fast and efficient use in the future; including in other municipalities that use the same vendor.
- Receive a text message when parking time is about to expire.
- Extend parking remotely (within the maximum time limit).
- Pay for time parked only (in selected locations) by stopping a parking session manually via the cell phone.
- Simple and user friendly.
- View/maintain parking transactions and receipts online.

Benefits and features of pay-by-cell to the CBJ:

- PbC parking can be implemented quickly, for minimal cost and with minimal infrastructure.
- PbC can reduce the quantity of parking meters.
- Reduced cash handling.
- Real time statistics.
- Greater convenience, which leads to greater customer satisfaction.
- Supports green initiatives and flexible rate models.
- Promotes the image of a modern innovative administration.

PbC adds another layer of enforcement when used in conjunction with parking meters, as the enforcement officer needs to view a web based report of paid vehicles in addition to

MARCH 16, 2015

PROJECT NO. 33-1823

checking the meter reports. Most vendors integrate their software systems to enable enforcement to view combined payment data on one report.

PbC typically does not enjoy a high percentage of usage; however, it is easy and inexpensive to implement, and provides a high level of customer service to those who wish to use it.

Walker understands that Aparc experienced cellular communication issues that in part were attributed to heavy usage by cruise ship passengers. Walker is unfamiliar with this phenomenon and reached out to multi-space meter manufacturers, who were also not familiar. The cellular communication for the meters is for data rather than voice, so this should not be a factor. That being said, Walker would require the meter manufacturer to test the cellular communication prior to installing any meters.

CONCEPTUAL COSTS OF MULTI-SPACE METERS

Multi-space meter costs vary greatly depending on the options added to the unit. Our opinion of cost ranges from \$8,000 - \$8,500 for pay and display, \$8,500 to \$9,000 for pay-by-space, and \$9,000 to \$10,000 for pay-by-plate, including installation on an existing sidewalk. Our opinion of cost for adding a banknote acceptor to a multi-space meter is \$1,000 to \$2,000 per unit. Prices vary based on volume, features, and manufacturer, and may fluctuate based on the competitive environment in which the meters are being procured.

In addition to equipment costs, monthly connectivity fees from \$45.00 to \$70.00 per unit are required to maintain real-time wireless connectivity and to host the data. Maintenance costs include battery replacement and paper receipts. These fees exclude credit card merchant fees.

LIFE EXPECTANCY

The typical life expectancy of a multi-space meter is ten years; although the need for some modular part replacement will commence somewhat sooner, with different lifecycle lengths for different parts. At year 7, depending on usage, climate and how well it's been maintained, the cost to maintain the meter may or may not surpass the replacement cost. If the CBJ elects to purchase extended warranties, the onus of properly maintaining the meters shifts to the vendor; however, the warranty fees increase as the meters age.

There is not a large market for used multi-space meters, as the meters are typically tied to the manufacturer's hosted software system. A city with the same brand meter might be interested in buying used meters to expand their coverage or to farm them for spare parts.

Regarding the CBJ's Aparc meters, Aparc has a small market share, combined with bankruptcy and ongoing litigation tarnishing their reputation. Juneau would need to find a satisfied Aparc customer, which Aparc may or may not be willing or able to provide.

Multi-space meter technology has been rapidly advancing. Walker makes every effort to 'future-proof' our client's procurements by considering trends, market share, upcoming and competing technologies when we write RFP specifications; however, there are no

MARCH 16, 2015

PROJECT NO. 33-1823

guarantees that a current technology will not become outdated before it has served its useful service life.

RELATED TECHNOLOGIES

Additional technology can be added to the system to enhance productivity, effectiveness or the customer experience. Some examples of add-on technology include the following:

REAL TIME ENFORCEMENT HANDHELDS

Enforcement handheld devices that have two-way communications, allow the officer to receive data directly from the MSM and other software peripherals such as back-end citation management and/or motor vehicle checks. PEOs are able to work more efficiently because all violation data on handhelds is in real time. Supervisors can also monitor their location and progress. Enforcement handhelds that do not communicate in real time store all citation information in the device, and download it to the server at the end of the officers' shift.

Figure 6: Conventional Enforcement Handheld Unit, a Tablet and Smart Phones



Source: T2 Systems



Source: Engadget.com

SENSORS

The use of parking space sensor technology allows for the monitoring of each space 24 hours a day, 365 days a year, and provides the live information necessary to help policy makers make the best decisions on time restrictions and pricing. This technology also offers the added benefit of increasing the overall efficiency of parking enforcement by identifying parking violators. A Los Angeles study indicated that this technology increased the average citation volume by nearly 2.6 times the previous average.

Vehicle sensors are typically embedded in the surface of the parking space to identify if a car is parked, what time a car parks, how long it parks and what time it leaves. Sensors typically utilize magnetometers to detect the presence of a vehicle when it drives over the sensor and parks, and monitors the duration of stay until it drives off the sensor. Newer sensors utilize infrared light, image recognition and radar; however there are few on-street deployments in North America.

Figure 7: Vehicle Sensor



Source: Streetline

Sensors are used to determine occupancy levels, as well as duration of stay. This can be used to analyze supply and demand at different times and at different locations; which can lead to data-based decisions regarding time limits and hourly parking rates.

Sensor data can also be used to deploy enforcement staff to streets or areas with a higher density of unpaid or overtime parkers. Smart meters report when meters expire, and pay-by-space meters report if spaces are paid or unpaid, but meters don't know if a car is present. Sensors actually detect and report if a car is present (and in violation).

Occupancy monitoring can also be used to advise motorists where available parking spaces are located. This is typically done in real time, and communicated via mobile apps, the internet or on dynamic signage. Sensors provide the data. Several independent app providers will post the CBJ's parking availability at no charge to the CBJ.

Streetline has approximately 50 sensor installations worldwide, most of them in the United States. Streetline sensors use battery operated magnetometers and communicate to a server via a wireless mesh network. Repeaters are installed on telephone poles and/or streetlamps to relay data to a data center via the internet.

Streetline created "Parker", a free mobile app that communicates the locations of available parking spaces to motorists. Merchants can also display a "Parker Map" on their own websites that will show available spaces near their place of business. The data can also be sent to dynamic signage for wayfinding.

Sensors show promise, but have not been widely deployed for the following reasons:

- Accuracy: As with any technology, accuracy is integral to success. Sensors are unable to perform with 100% accuracy; therefore, municipalities need to determine an acceptable level of accuracy. Several municipalities have reported

MARCH 16, 2015

PROJECT NO. 33-1823

disappointment with accuracy levels, particularly in calculating lengths of stay and for resetting meters. Sensor accuracy is higher for detecting the static presence of a car than for identifying specific times a car enters or exits a parking space. There can also be interference with other metals in the area such as streetcar and subway wires, tracks, cables, etc.

- **Latency:** Some cities report latency issues resulting from delays in transmitting data from the sensor to enforcement staff. Real-time data is required for enforcement purposes.
- **Battery Life:** Sensor batteries are rated to last three years, but several cities have experienced battery life issues in fewer than three years. Since sensors are embedded in the pavement, they are typically replaced in whole when the battery dies. Even a sensor with a removable battery pack would still need to be 'dug-up' and reinstalled. There is not enough historical data to state with certainty how effective or economical this is, or how long the batteries will last.
- **Cost:** Sensors typically cost \$300 per unit to purchase and install, as well as ongoing monitoring fees per sensor.
- **Limited Need:** Smart meters provide detailed payment information, which can often be used to generate similar data as sensors. Payment data is not the same as duration of stay, but manual sampling, assumptions and extrapolation can provide a reasonably reliable and less expensive data source for directing enforcement and making policy decisions regarding rates and hours.
- **Politics:** Several cities have reported public resentment when cities have used sensors for directed enforcement and for resetting meters.

IN-CAR METER OPTION

In car meters act like pay & display receipts. Motorists purchase the device and load a dollar amount on it. Upon parking, the user activates the meter to pay for parking and to show that parking is paid. Upon returning to the car the user shuts off the meter. In-car meters compliment pay and display systems well, as they provide an alternative to walking to and from the meter. This is also an excellent option for frequent on-street parkers such as delivery vehicles; however, in-car meters have not caught on. The public appears to prefer pay-by-cell as a meter alternative.

Figure 8: In-Car Meters



NEAR FIELD COMMUNICATIONS

Near field communications (NFC) allows credit card transactions to be conducted without inserting or sliding a credit card into a reader. The credit cards are embedded with NFC processor chips, eliminating the need for reading the magnetic stripe on the credit card. The user either taps the reader ("Tap & Go") or waves the card close to the reader to conduct a transaction. The card needs to come within four centimeters of the card reader. The close proximity protects accidental charges from occurring if other cardholders are standing nearby. Smartphones can also be embedded with processors and serve in the same capacity. While these types of credit cards are not yet widely distributed in the U.S., most PARCS manufacturers have either designed their systems to accept NFC, or are designing them to be upgraded 'if and when' NFC is widely available.

CHIP AND PIN

Chip and pin transactions are similar to debit card transactions, as a PIN needs to be entered by the card holder. In addition, the conventional magnetic stripe on the credit card is eventually going to be replaced by a microchip that is embedded in the card. While not yet widely available in the U.S., "Europay, MasterCard and Visa" (EMV), a joint credit card processing council (that also includes AMEX and Discover), is slowly but surely bringing this to the U.S., one of the few countries where EMV credit card processing has not yet been deployed. EMV intends to shift counterfeit credit card and fraud liability from the card issuers to the card processors in October of 2015 if chip-enabled technology is not deployed.

Chip and pin technologies offer a higher level of protection against fraud than magnetic stripe transactions, as each chip has unique characteristics. In addition, the NFC reader is less susceptible to tampering than magnetic stripe readers. Visa has waived some PCI requirements for merchants with 75 percent NFC or chip-enabled transactions.

Walker's procurement specifications call for EMV-capable credit card processing.

PARKING GARAGE TECHNOLOGIES

Most parking garages are gated rather than metered, with motorists paying for parking as they leave (rather than prepaying at parking meters). Following is an overview of various gated technologies that Walker considered and the CBJ may wish to consider - now, or in the future.

EXIT CASHIER

Traditional Parking Access and Revenue Control Systems (PARCS) utilize exit cashiers at each exit lane. Patrons drive up to the entry gate and press a button on a ticket dispenser (AKA ticket spitter) in order to receive a parking ticket. Upon taking the parking ticket from the ticket dispenser, the dispenser sends a signal to open the entry gate. The patron enters the garage and parks. Upon exiting, the patron drives to the cashier window at the exit gate and hands the ticket to a cashier, who inserts it into a fee computer. The fee computer calculates the fee (typically a graduated hourly rate structure). The patron pays the cashier

MARCH 16, 2015

PROJECT NO. 33-1823

(typically cash or credit card). The cashier processes the payment in the fee computer, sending a signal to raise the exit gate. Embedded magnetic field loops (and detectors) send a signal to close the gate after the vehicle exits. These loops and detectors are also used to recognize vehicles at the entrance gate, so that tickets cannot be issued unless a vehicle is present.

Cashiers not only process tickets, they can also interact with and provide customer service to patrons. Cashiers can smile, thank patrons, answer questions and provide directions. While beneficial, cashiers also represent one of the largest operating expenses: payroll and the associated taxes, insurance and benefits. Cashiers also require cashier booths with heat and air conditioning. Cashiers also require uniforms, breaks, scheduling, supervision, auditing and oversight. Furthermore, cashiers are vulnerable to theft, and being human, can make mistakes or be dishonest, leading to financial loss.

Exit cashiers also take time to process tickets in the exit lane, which can lead to queuing issues when multiple cars exit at the same time.

CENTRAL CASHIERING

Central cashiering was one of the first technical innovations to replace exit cashiers. Prior to returning to his/her vehicle, the patron walks to a centrally located cashier window/office/counter/kiosk to process (pay for) his/her parking ticket. The ticket is validated and returned to the patron. The patron returns to his/her vehicle, drives to the exit and inserts the validated ticket into the exit verifier. The exit verifier uses visible and audible messaging to advise the patron to insert the validated ticket into the exit verifier. Upon confirming the validated ticket, a signal is sent to raise the exit gate.

Removing the cashier from the exit lane provides the following benefits:

1. Traffic flows more freely at the exits.
2. Fewer cashiers are required to service multiple exit lanes (rather than having one cashier in each exit lane).
3. Central cashiers can be cross-trained to perform other administrative or customer service functions that may not be feasible in the limited confines of a cashier booth.
4. The cashier is less isolated and less vulnerable to theft.

Technological breakthroughs have enabled parking operators to replace cashiers with automated payment systems, significantly reducing the largest operating expense of most systems: payroll. Automated payment systems replace cashiers with automated payment machines, allowing for 24/7/365 day coverage.

MARCH 16, 2015

PROJECT NO. 33-1823

PAY-ON-FOOT (POF)

As the name suggests, the patron walks up to the POF machine to process his/her ticket prior to returning to the vehicle. POF machines are strategically located so that patrons will be walking past them on their way to the garage (for example, in the Garage lobbies). The patron inserts the parking ticket into the ticket inlet of the POF machine. The ticket is read by a fee computer and the fee is calculated. The POF machine uses visible and audible messaging to communicate the parking fee and guide the patron through the process.

- If paying by cash, the patron inserts bills and/or coins into the designated inlet. The POF station is capable of returning change.
- If paying by credit card, the patron inserts a credit card into the designated inlet and the POF station processes the credit card.

The ticket is validated as paid, and returned to the patron. A receipt is provided 'upon request'. The POF station uses visible and audible messaging to advise the patron to insert the validated ticket into the exit verifier at the exit. An intercom button is available in the event the patron needs assistance.

The patron returns to his/her vehicle, drives to the exit, and inserts the validated ticket into the exit verifier. Upon reading the validated ticket a signal is sent to raise the exit gate.

The POF system allows for a predetermined grace period (i.e.: twenty minutes) to allow the patron enough time to return to their vehicle and drive to the exit. If the time expires the patron will be required to pay additional parking fees. This insures that patrons pay the appropriate fees (they can't intentionally pay for parking a few hours before leaving in an effort to pay a lower fee).

If a patron received a parking validation, they would proceed directly to the exit and insert the validated ticket into the exit verifier, bypassing the POF machine. The POF machine would only be used by patrons who need to pay for parking; however, if a fully validated ticket was erroneously inserted into a POF machine it would process it for exit without assessing a fee.

Patrons may misjudge the time, forget to validate the ticket, lose the ticket or forget to pay at the POF station. In the event that a patron arrives at the exit and a parking fee is due, the exit verifier can calculate the fee and process credit card payments.

An intercom button is available in the event that the patron needs assistance. If a transaction cannot be reconciled through assistance via the intercom, staff would be deployed to assist. In the event that staff is not readily available to assist in person, the gate can be raised remotely; however, raising the gate remotely without visually observing the exit lane could result in someone or something being struck by the gate. Surveillance cameras are recommended.

MARCH 16, 2015

PROJECT NO. 33-1823

PAY-IN-LANE (PIL)

The PIL machine is similar to the POF station, but it is located in the exit lane at the exit of the facility. The patron drives to the exit to pay, but the cashier has been replaced by the PIL machine. The patron processes the ticket as described with the POF. After the transaction is completed the PIL station sends a signal to raise the exit gate. An intercom button is available in the event the motorist needs assistance.

Pay-in-Lane can be problematic if there are multiple vehicles exiting at the same time. PIL is not very familiar to the public, creating a learning curve for first-time users. Furthermore, cash payments tend to be slower than a cashier exit. If the PIL is the only lane available, backups may occur. Monthlies can be particularly impatient behind a patron struggling to process a ticket at a PIL; consequently PIL is not recommended unless there are alternative lanes available.

POF and PIL machines come in two payment types: 'Cash and credit card' and 'credit card only'. The cash and credit card model is larger and more expensive to procure, as it includes coin and bill inlet, change making capabilities and cash vaults.

Figure 9: Amano Cash and Credit Card POF Station (left) and PIL Station (right)



Source: Amano

CREDIT CARD IN/CREDIT CARD OUT

Credit Card In/Credit Card Out is a credit card payment option available for all gated scenarios. This option removes the physical ticket from the transaction. Rather than pulling a ticket to enter the parking facility, the patron slides a credit card through the credit card reader at the entrance gate. The software time-stamps the transaction, ties it to the credit card, sends a signal to open the gate and stores the data until the patron drives to the exit

MARCH 16, 2015

PROJECT NO. 33-1823

and slides the credit card through the credit card reader at the exit gate. The software retrieves the entry data, calculates the fee, charges the credit card and sends a signal to open the exit gate.

VALIDATIONS

One of the advantages of a 'post-pay' system rather than 'pre-pay' is the ability to validate patron's parking tickets. There are three options for providing machine-readable validated parking with today's PARCS equipment:

1. **Offline validators** are compact, portable ticket encoders that encode parking entry tickets with validation information. A ticket is inserted into the validator and the validation code is imprinted on the ticket. The validation can be for full value, for a percentage or for a fixed dollar amount or timeframe; however, each validator can only be programmed to issue one type of validation at a time. Multiple validators would be required for multiple types of validations (employee, visitor, contractor, etc.).

Offline validators come in two types: "Hand encoder" and "electronic validators". Hand encoder validators are manually operated. The mag-stripe parking ticket is inserted into the 'bottom' portion of the encoder. The top is manually 'closed' to encode the ticket with the validation. An ink imprint is also included for visual confirmation. Note that hand encoders are not compatible with barcode tickets. Electronic validators are compatible with both mag-stripe and barcode tickets. The ticket is inserted into the electronic validator and the ticket is automatically encoded with the validation.

2. **Chaser tickets** are separate, 'second' tickets that possess machine-readable validation information. Departments that are authorized to validate tickets are issued chaser tickets. Each ticket is pre-printed with a validation type (100%, a smaller percentage or a fixed dollar amount or timeframe). The chaser tickets can be purchased with pre-printed validations, or a 'chaser ticket encoder' can be purchased, enabling the CBJ to print its own chaser tickets.

The patron inserts the original parking ticket into the exit verifier, then the chaser ticket. The exit verifier (or fee computer) confirms the validation, and a signal is sent to raise the gate. Chaser tickets can be confusing to motorists and may take longer to process at the exit, as there are two tickets to handle.

3. **Web-based validation systems** provide password protected accounts for each department (or person) authorized to validate parking. The issuer logs-on to a password protected account, enters the ticket number, selects the validation type and authorizes the validation. Magnetic stripe tickets can also be slid through an encoder, and barcode tickets can be scanned by a scanner, which is faster than entering a ticket number. Barcode validations can also be sent via the internet or smart phone

MARCH 16, 2015

PROJECT NO. 33-1823

Web-based validation systems are extremely flexible and auditable; however they require web access and subscription fees.

Web-based systems allow for a variety of validation types. The issuer simply selects from a list of pre-determined offerings. This is an advantage compared to chaser tickets and off-line validators, which require different/specific chaser tickets for each type of validation.

Web-based validation systems also allow for remote validations. The issuer could enter the ticket number and validation type online, and the validation software would know to apply the validation when the ticket was inserted into the exit verifier (or fee computer).

Barcode validations can also be emailed and/or downloaded from the internet and/or stored in a mobile phone. The PARCS would include a bar code reader at the entrance and exit lanes of the facility, enabling the patron to use the validation to enter or exit the Garage.

All three validation types include system software that tracks the validations that are redeemed in order to hold people accountable for the validations they issue. It also provides for statistical analysis and audit control, and if desired, system software can create invoices for billing purposes. Web-based validation systems also track validations that are issued but not redeemed.

A common problem that occurs in parking facilities is the abuse of validations. It is not uncommon for employees to validate unauthorized tickets. Validation programs require oversight and auditing to prevent abuse.

MONTHLY PARKING

Monthly parkers are pre-authorized to park in a parking facility on a regular basis. These parkers either work or live near the parking facility and therefore enter or exit several times per week, and possibly more than once per day. The term 'monthly' comes from the most common method of assessing parking fees. Rather than charging the posted hourly parking fees, a monthly fee is established and paid on a monthly basis. The monthly fee typically represents a discount compared to hourly or daily parking fees.

The monthly parker receives a credential such as a permit, proximity card or a transponder that is used to enter and exit gated parking facilities or to prove proof of authorization if un-gated. This is more efficient than having monthly parkers take tickets and have them processed/pay for parking or receive validations each time they park.

Credentials can be programmed for unlimited access or time-restricted access such as weekdays or weekends only, or during particular time periods such as days or nights.

MARCH 16, 2015

PROJECT NO. 33-1823

Proximity cards are the most common type of monthly credential at gated facilities. The monthly parker drives to the gate, rolls down the vehicle window, and waves the proximity ("prox") card within a few inches of a proximity card reader. The card reader confirms the validity of the card and if valid, sends a signal to open the gate.

Automatic Vehicle Identification (AVI) may be used in place of a proximity card system, and is actually more efficient. Radio Frequency Identification (RFID) transponders (tags) are issued in place of proximity cards, and are usually affixed to the windshield. When the vehicle drives within range of the AVI reader, it recognizes the transponder and sends a signal to open the gate. This allows monthlies to enter and exit without needing to wave a card or even roll down their window. This system is more expensive than a proximity card system, and the AVI tags are anywhere from two to five times as expensive as proximity cards, depending on the type. In addition, motorists who use multiple vehicles, such as a spouse's vehicle, may require multiple tags.

The proximity card or AVI transponder can be programmed to protect against misuse by insisting on an "in-out-in-out" pattern of use. The theory is that if a pattern of "in-in" or "out-out" was allowed, the user could be allowing other vehicles to enter or exit the facility. This programming feature is referred to as "anti-passback" and can be set as "hard" (the pass will not work if the pattern is broken) or "soft" (the card will work but an exception is noted in the software system).

Other features include combining a number of cards or transponders into one group and limiting the number of vehicles that are allowed to be in the facility at any given time. This feature allows for compromises such as a restriction of ten parking spaces for an outside lease with twenty part-time employees who work various shifts. Each employee can be issued a pass card or transponder with the understanding that only ten of them will be allowed to be in the garage at any given time. Once ten cards or transponders are in "in" status, the system will not allow another vehicle to access the entry gate until one of the ten vehicles exits the garage.

ANALYSIS AND RECOMMENDATIONS

Walker considered a gated system for the garages, but we understand that there would be queuing issues at the exit lanes. This may or may not be resolved by pay-on-foot technology, which removes the ticket transaction from the exit lane; however, gated equipment is more costly than parking meters to procure and install. Walker estimates procurement and installation costs of approximately \$25,000 per lane, plus \$45,000 per pay-on-foot station, plus \$50,000 for related software programs and servers. This does not include concrete and electrical work, and is already estimated at more than \$100,000 per garage, compared with \$10,000 per multi-space meter.

Furthermore, a city-wide meter program will be less complex, more efficient and less costly to operate than two separate programs (gated garages and on-street meters).

MARCH 16, 2015

PROJECT NO. 33-1823

The CBJ was on the right track in 2010; however, pay-by-plate technology was still in its infancy. Juneau was one of the first installations in North America, so it's understandable that there were challenges. Aparc had a very limited meter market in the US and may have been overambitious in both its claims and its ability to develop a reliable pay-by-plate system. The technology has matured and evolved in the past five years and not only has a proven track record, but also a remarkably efficient enforcement option in mobile license plate recognition.

Walker recommends re-implementing a pay-by-plate multi-space meter system in the garages and on-street. This would be the most cost effective way to create a consistent and unified parking program. Pay and display requires that the motorist return to their car after paying at the meter and pay-by-space requires that the CBJ number and sign every parking space. Pay by plate requires neither, although motorists will be required to enter the vehicle's license plate number at the meter. Juneau residents are already familiar with entering the license plate number at the meter, and monitoring license plates is the most efficient way to enforce the two-hour time limit for free parking, should the CBJ wish to continue this practice; however,

Walker also recommends implementing pay-by-cell phone as an additional payment option. This eliminates the need to walk to the meter. Juneau residents can register their license plate and their credit card to make parking transactions easier – simply call, confirm and select the duration of time. Pay-by-cell adds convenience and benefits for both the motorist and the CBJ at minimal cost. Most PbC vendors will implement the program at no cost to the CBJ, even providing signage and stickers. Even with minimal participation there is no down side; and this further addresses the best practice of offering multiple payment methods.

Walker does not recommend accepting bank notes at the meters, as they add considerable cost and maintenance. Offering coin, credit card and cell phone payments provides motorists with reasonable and convenient payment options. Furthermore, some manufacturers require a larger footprint for their bill accepting model, posing a challenge for Juneau's narrow sidewalks.

Rather than using handheld units for enforcement, Walker recommends implementing mobile license plate recognition technology. Mobile license plate recognition technology is now the most efficient type of parking enforcement. One person driving one vehicle will be able to enforce the entire downtown core in less than one hour, and in thirty minutes with no traffic. The garages can also be enforced with mobile LPR.

The following US cities have implemented pay by plate with LPR enforcement: Harrisburg, VA, Decatur, GA, Richmond, VA and Flint, MI. The City of Medford, MA has just implemented paid parking with pay by plate and mobile LPR, and the City of Carmel, CA is conducting a similar pilot.

The City of Pittsburgh, PA and the Miami, FL Parking Authority both converted to pay-by-plate meters in 2014, although they are still using handheld units for enforcement. Several

MARCH 16, 2015

PROJECT NO. 33-1823

universities have implemented pay by plate with LPR enforcement, including Loyola Marymount, Texas Tech, Borough State College and Michigan State.

In Canada, the City of Calgary has been using PbP and mobile LPR for more than four years. The Cities of Vancouver uses a hybrid system of PbP and IPS single space-smart meters, and the City of Edmonton is currently trialing PbP with mobile LPR.

Walker understands that the CBJ uses a “Go-4” three wheeler for enforcement, and is concerned about fitting the laptop monitor in the close-quartered vehicle. The City of Carmel also uses a Go-4 and sent the following photo of their LPR laptop mounted in the vehicle:

[Figure 10: Carmel Go-4 Interior with LPR Laptop](#)



IMPACT ON ENFORCEMENT

Mobile LPR covers more ground faster than foot patrol and should improve the CBJ's citation capture rate. Mobile LPR also provides time-stamped images of the cited vehicle, confirming that the car was present at that time. Providing photos with citations will reduce contested citations and aid in adjudication. Once the public learns that the enforcement technology (and coverage) has improved, meter compliance should improve. Some cities report reductions in citations, some report increases, and some report no change. Following are some of the reasons cited:

- When hourly time limits are in effect more tickets are typically written for expired meters (overtime parking) rather than for failing to make an initial payment. Credit card acceptance has no impact on these citations.

MARCH 16, 2015

PROJECT NO. 33-1823

- Most enforcement budgets do not allow for full city-wide coverage, and typically have capture rates below 20% (the % of meter violations that are actually cited). This suggests that enforcement will find violators even with increased compliance.
- Some cities report a decrease in parking meter violations but an increase in other parking violations with higher fines.
- Some cities report initial drops in citations, but that this is temporary (perhaps due to some of the above).
- Some cities report fewer contested citations due to greater meter uptime (fewer instances of broken meter claims).
- Some cities report fewer tickets being dismissed due to the availability of detailed transaction reports that may prove no payment was made at a particular meter at a particular time.

Mobile LPR enforcement can capture, analyze and retain far more data than foot patrols. Mobile LPR captures detailed duration of stay and frequency data, and will enable the CBJ to locate or look for vehicles based on their license plates. The system software can also be used to search for scofflaws, stolen cars, Amber Alerts, etc. In addition, the software can calculate on-street and garage occupancy (separately), which can be displayed on dynamic signs at strategic intersections, enabling motorists to make informed decisions about where they should park.

Walker recommends determining if it is permitted to mail citations (post-processing), rather than placing them on vehicles, as this is legislated by municipality. The ability to mail citations is a remarkably efficient time saver and is safer for enforcement staff and for the public, as it reduces the possibility of a negative exchange or altercation resulting from the issuance of the citation.

AMERICANS WITH DISABILITIES ACT (ADA) COMPLIANCE

Walker understands that almost half of the Aparc meters were located on non-ADA compliant sidewalks in relation to slopes and cross-slopes. Walker further understands that vehicles with ADA credentials may park for free and with no time restriction anywhere downtown.

Walker always specifies ADA compliant meters; however, if the sidewalk is not ADA compliant, meter compliance is irrelevant. Most cities exempt vehicles with ADA credentials from meter payments. This is primarily due to conventional meters not being ADA compliant, but also to make it easier for the disabled motorist. Since Juneau's sidewalks do not meet ADA requirements, Walker recommends that CBJ continue to waive parking fees for vehicles with ADA credentials; however, many cities and states are reviewing ADA parking policies due to the widespread abuse of ADA credentials. Walker further recommends that the CBJ consider the impact of totally unrestricted parking for ADA credentialed vehicles.

METER QUANTITIES AND LOCATIONS

Walker understands that the previous meter locations and quantities appeared to be adequate, but that the CBJ would prefer to reduce the footprints on the sidewalks. Pay-by-cell phone and/or Mobile LPR will enable residents to bypass the meters when parking for fewer than two hours, and the addition of PbC provides the opportunity to bypass the meter completely; therefore a reduction in meter locations may be possible; however Walker recommends that patrons should not have to cross the street to pay a meter, as they are being forced to go out of their way, and may hold the CBJ accountable if they were hit by a car.

SYSTEM COSTS AND REVENUE ANALYSIS

Walker estimates the cost to procure and install the new meter system (meters and LPR system) to be approximately \$346,000; however, the two largest meter manufacturers (Parkeon and Cale) are both offering reduced pricing that could reduce the meter cost by approximately \$50,000, bringing the total cost below \$300,000.

Operating expenses should not significantly change. Enforcement will still require two persons; however, they will be driving rather than walking, and both coverage and frequency will improve significantly. When there is minimal traffic congestion the enforcement officers should have time for other parking-related duties such as collections and maintenance. Collections will be required on a monthly basis and will take just five minutes per meter (plus travel). Maintenance will be required on a daily basis, but on most days will be less than two hours per day.

Parking permit and meter revenue for FY 2012 and 2013 (the most reliable years for the Aparc meters) averaged \$332,000 for on-street, the two lots and the two garages:

Table 1: Meter and Permit Revenue

	2012	2013	Average	% of Revenue
Marine Parking Garage	\$100,909	\$109,768	\$105,339	32%
DTC Garage & Lots	\$173,669	\$181,808	\$177,739	53%
On-Street	\$47,507	\$51,258	\$49,383	15%
Total	\$322,085	\$342,834	\$332,460	100%

On-street parking represented approximately 38% of the metered parking supply with 14 of 23 meters (60%) but accounted for only 15% of metered (and permitted) revenue. This is primarily due to the two hours of 'free' parking allotted to on-street parkers. Aparc transaction reports from September through December of 2013 show an average of 294 on-street transactions per day with 271 (92%) of them "two hours free" transactions. At \$1.00 per transaction the annual value of the 'free' transactions is approximately \$74,000 (Monday-Friday minus 10 holidays, or 250 days per year).

MARCH 16, 2015

PROJECT NO. 33-1823

It should be noted that Aparc's meter revenue was probably compromised by performance issues. We expect increased revenue with a new and fully functional system.

It should also be noted that the recommended system cost includes \$104,000 for a mobile license plate recognition system, which will significantly improve parking enforcement, which typically increases both parking and citation revenue.

When procuring the new system, Walker recommends requiring vendors to provide pay-by-plate and mobile LPR experience and references. Following are some sample qualifications from Walker's RFP specifications:

1. In continuous operations for previous five years.
2. Similar system and system integration installed in two or more municipalities.
3. Continuously worked with equipment manufacturers, including providing installations and/or service, for minimum of three years.
4. Approved in writing by manufacturers.
5. Documentation of manufacturer's installation and/or service training within previous two years.

MARCH 16, 2015

PROJECT NO. 33-1823

Table 2: Estimated Meter System Costs

Meter Unit Cost (installed)	\$10,000
Quantity	23
Meter Cost	\$230,000

Spare Parts	\$10,000
Concrete Pads (Contingency)	\$1,600
Sub-Total	\$11,600

Total Meter Cost	\$241,600
-------------------------	------------------

Mobile LPR Hardware (2 Units, Installed)	\$98,000
Mobile LPR System Software/Training	\$6,000
Total LPR Cost	\$104,000

TOTAL METER SYSTEM	\$345,600
---------------------------	------------------

Annual Meter Operating Expenses	MSM
Annual CMS Fees	\$19,320
Annual Paper Costs	\$3,680
TOTAL	\$23,000

Annual LPR Operating Expenses	LPR
SMA Base Package	\$500
On-site Preventative Maintenance	\$2,500
TOTAL	\$3,000

TOTAL OPERATING EXPENSES	\$26,000
---------------------------------	-----------------

Extended Warranties (after 1st year)	MSM
Extended Meter Warranty	\$11,500
Extended LPR Warranty	\$18,000
TOTAL EXTENDED WARRANTIES	\$29,500

Note that these meter costs do not reflect potential discounts recently offered by Parkeon and Cale.

Note that meter signage is excluded from this budget.

Note that concrete pads are not required for typical installations on sidewalks or in garages. Four pads were included as a contingency.

TWO HOUR FREE PARKING RATE

As a general principal, Walker recommends that when parking is in short supply people should be required to pay for parking. There are costs associated with parking, and parking programs should be self-sustaining. That being said, there are two primary reasons for implementing metered parking: Turnover and/or revenue enhancement. Walker understands that the CBJ's primary goal is turnover; therefore, Walker understands the desire to continue offering two free hours of parking to the public. As long as the CBJ has enough parking to allow for the two hours of free parking, and doesn't need the revenue, Walker is all for it; however, if there is a shortage of on-street spaces, or revenue to fund the program, the CBJ should consider using hourly parking fees to push more cars into the garages and help fund the parking program.

The LPR system could allow for motorists to bypass the meters if they were parking for fewer than two hours. The LPR software would be programmed to allow vehicles to park for up to two hours but to 'ping' an alarm condition if a vehicle is identified as parked for longer than two hours (or for more than one parking session) without paying. Note that the mobile LPR system would not know what time the parking session actually started, it would time stamp the vehicle the first time the license plate was scanned. If enforcement is patrolling a minimum of once per hour this should not be an issue and would simply mean that motorists might occasionally get away with parking for up to three hours; however, if enforcement staff is patrolling infrequently, a vehicle could be parked for a significant amount of time before the vehicle's license plate was scanned.

If the CBJ desires more consistent and/or strict enforcement, motorists should be required to conduct a transaction even when parking for free (fewer than two hours). This time stamps the parking session when the transaction is conducted and enables enforcement to cite a vehicle that has not started their parking session by conducting a transaction. The motorist could still bypass the meter by using their cell phone; however the cell phone vendors charge a user fee (typically \$0.35 per transaction). This would need to be paid by the motorist or by the CBJ.

Allowing motorists to bypass the meter for the free two-hour sessions provides a higher level of customer service and reduces foot traffic on the sidewalks at the meters.

The CBJ could also consider maintaining the current 'free' on-street parking with a two-hour time limit, which would eliminate the need for on-street parking meters. The mobile LPR system would provide a higher level of consistent enforcement, ensuring the two-hour turnover of parking spaces.

Eliminating on-street meters would reduce the total meter quantity from 23 to 9, which would reduce the budgeted procurement cost from \$346,000 to \$206,000.

The determining factor is whether or not the public needs the ability to park on-street for longer than two hours. The CBJ has been operating this way for one full year now and has

MARCH 16, 2015

PROJECT NO. 33-1823

probably received considerable feedback. Walker recommends conducting an on-line survey to determine how the public feels about this.

If there is only a limited need for 'long-term' on-street parking, the CBJ could consider offering pay-by-cell phone as the (only) option for parking longer than two hours. This would also eliminate the need for on-street parking meters. It should be noted that offering PbC as the only payment option is rare, but so is two hours of free parking. The overwhelming majority of municipalities in the US either have metered on-street parking or free on-street parking (smaller cities and towns with more supply than demand).

Whatever the CBJ ultimately decides, Walker understands the need for a proven solution in light of the failed Aparc system. Walker recommends piloting a system prior to procuring it, to ensure that the CBJ will get what it pays for.

Walker spoke with the three largest multi-space meter manufacturers to gauge their interest in providing a meter pilot in Juneau. All three manufacturers are interested (Parkeon, Cale, Digital).

- Parkeon offered to rent meters for the pilot for "a few hundred per meter per month" and would credit a percentage of the rental fees towards a purchase. They also offered a lease arrangement with an interest rate below 3% and a cancellation option after one year. Furthermore, they stated that current unit pricing could be less than \$8,000 (typical market rate is \$10,000). Note that in general, competitive pricing varies based on market conditions, inventory and current sales and project status of each vendor).
- Cale offered to pilot the meters at cost and currently have meters that are also available for less than \$8,000 due to a cancelled order – however these meters are the same color blue color as the Aparc meters (Cale meters are typically black). The Aparc blue color may be bad PR for the program.

Please note that pricing will become more definitive if and when the CBJ decides to move forward with a pilot or a purchase.

Walker also spoke with PCS Mobile, the Northeast distributor for Genetec, the leading mobile LPR provider in the US. They are interested in providing an LPR enforcement pilot based on availability (they have a limited number of pilots available at any given time).

METER MAINTENANCE

The meters will have self-diagnostic software that monitors most maintenance issues, enabling staff to maintain a higher level of meter uptime. Maintenance issues can be prioritized and reported as alarm conditions. If a meter is out of service due to a dead battery, coin jam, or full vault, a text message can be automatically generated and sent to maintenance staff, enabling an immediate response for greater meter uptime. Lower priority issues, such as low battery or coin vault 'almost full' are also reported, allowing staff to prioritize and schedule responses in a timely yet efficient manner.

MARCH 16, 2015

PROJECT NO. 33-1823

All maintenance issues are monitored and stored on system software, and visible via computer (password protected). Walker recommends that maintenance staff monitor the maintenance screen periodically throughout the day to prioritize and schedule required maintenance. Walker further recommends making every effort to respond immediately to meters that are out of service. Out of service meters reduce vehicular turnover, fail to provide revenue and are bad for public relations.

The meter manufacturer will train CBJ staff to maintain and repair the meters with telephone support as needed. Most repairs involve swapping out parts with minimal tools required. Sometimes a reboot of some type may be required. Paper rolls will need to be replaced on a quarterly basis (some more, some less). Each meter should also be cleaned and inspected on a monthly basis. Total maintenance time will probably average less than two hours per day, some days more, some days less.

Walker recommends purchasing extended warranties, as this will provide fixed operating costs and maximize continuous operation of the system. While spare parts are included with the warranty, a supply of spare parts needs to be on-site to avoid delays while waiting for parts.

Solar powered batteries enable meters to be installed and operate outdoors with no trenching or conduit. The batteries are typically 12-volts and are rated to last for three years. They require two hours of ambient light per day and have been successfully installed in many cold winter climates similar to Juneau's, including Anchorage, many provinces in Canada, as well as upstate NY (Albany, Niagara Falls, Buffalo and Syracuse).

Meters that are located in the garages would not get the required ambient light and require AC-mains electrical connections.

METER COLLECTIONS

System software will provide coin vault levels and provide alerts when the vaults need to be collected. Multi-space meter vaults hold \$600-\$800 in quarters, and Walker projects that more than 50% of all transactions will be conducted by credit card. Therefore, coin vaults will only need to be collected on a monthly basis (some more and some less). Each meter will take less than 5 minutes to collect, plus travel time to and from the meter.

If the CBJ prefers regularly scheduled collections, Walker recommends staggering the times and/or having a police escort for security purposes. Regularly scheduled collection routes may be noticed by would-be thieves.

IMPLEMENTATION PLAN

Implementing a new type of parking meter is a major investment that must be effectively communicated to the public to ensure acceptance and success. A strong public relations

MARCH 16, 2015

PROJECT NO. 33-1823

plan is imperative to the successful implementation of the new meters. Walker understands that this will be Juneau's second implementation, and that the failure of the previous system may cause skepticism.

Walker recommends the CBJ launch a public relations campaign to introduce the "new and improved" program. It would be beneficial to the CBJ to discuss strategies of successful implementation with its selected vendor, as most vendors offer samples of informational fliers, brochures, etc.

Based on other cities' experience and successful installations of new meter systems, the following list provides examples of communications activities prior to, during, and after installation:

- Issue a press release announcing plans for the new system, with a focus on what was learned from the previous experience and how the CBJ has worked to insure success (technological advances, hiring a consultant, requiring a proven track record, checking references, etc.).
- Conduct community outreach meetings with the stakeholders in advance of any rate change.
- Update the CBJ website with press releases, project updates, meter directions and "frequently asked questions and answers".
- Display 'sample' meters in a public area for people to see, touch, and feel prior to beginning the installation.
- Carefully train all related staff on all aspects of the new meters so they can easily assist motorists and communicate a consistent message regarding the details of the program.
- Develop and distribute informational and instructional handouts (card and/or fliers) illustrating how to use the new meters.
- Develop a directional video for municipal television and or YouTube. The City of Seattle injected humor into a video and gained positive attention and support.
- Issue a progress press release a few weeks prior to the initial installation.
- Conduct a ribbon-cutting and first-use ceremony to officially welcome the new meters.
- Utilize trained parking ambassadors to assist patrons with their use. Rotate ambassadors to new areas as meters are deployed.
- Issue a press release of the deployment of the new meters and areas scheduled for deployment.
- Provide citation warnings rather than fines for a short period of time following meter deployment.
- Design, publish, and distribute a downtown parking guide, including a downtown parking map and brochure describing the locations and availability of on-street

MARCH 16, 2015

PROJECT NO. 33-1823

and off-street parking, simplicity of access, rules and fees for parking for errand, short-term, and employee parking patrons.

IMPLEMENTATION SCHEDULE

Walker estimates that it will take approximately 21 weeks to implement the new parking system if it is to be publicly bid, from the day the RFP is released to the 'go live' date.

Table 3: Implementation Schedule

Milestone	# of Days
RFP Released	1
Press Release	(concurrent)
Questions Due	13
Addendum/ Answers to Questions	7
Bids due (31 Days)	10
Bid Analysis	14
Finalist Interviews	7
RFP Awarded (62 Days)	10
Contract Negotiations	28
Press Release	(concurrent)
Shipping/Coordination	49
Order Signage	(concurrent)
PR Campaign	(concurrent)
Installation	5
Press Release	(concurrent)
Training/Acceptance Testing	1
Go Live (146 Days)	1
Total Days	146
Total Weeks	21
Total Months	5

SIGNAGE

Signage is a key component of multi-space meter installations. If there isn't a meter adjacent to the parking space, motorists need to be told to pay for parking. Signage typically includes arrows pointing towards the meter, and a sign is typically located above the meter, with an arrow pointing down.

Figure 11: Multi-Space Meter Sign Samples



Source: CPM, Chicago

Walker assumes that the CBJ has similar signage from the previous installation and has excluded signage from the procurement budget.

OUTSOURCING

Walker understands that the CBJ might consider outsourcing the parking operations to a private parking operator. Walker recommends considering this, as the CBJ has limited parking expertise. Parking operators are parking experts. They will either bring trained personnel to Juneau or they will train personnel in Juneau. Either way, they will operate in a more professional and more efficient manner.

There are a number of ways to outsource the parking operation:

- The parking operator could operate the program for a management fee. All operating expenses would be paid by the parking operator but they would be “pass through” expenses. The CBJ would reimburse the parking operator on a monthly basis. In this scenario the CBJ maintains control of all business practices and decisions, including parking rates, hours of operation, citation management, etc. The CBJ would also keep all the revenue.
- The parking operator could lease the parking program from the CBJ. The operator would procure all the equipment and pay the CBJ for the right to operate the program in exchange for the revenue generated. The operator would pay the CBJ an agreed upon price. This can vary from a fixed fee, to a percentage of revenue, or a combination of the two. In some scenarios the operator will pay the city a lump-sum payment up-front. The term of the lease can be set at any length and needs to be long enough to make it worth the operator’s time and initial expense.
- The parking operator could ‘partner’ with the CBJ. The operator would procure and operate the program in exchange for a percentage of the revenue generated by the

MARCH 16, 2015

PROJECT NO. 33-1823

program. The operator would need to be guaranteed repayment for the cost of the equipment.

In each of these scenarios, the CBJ may maintain as much control as they desire in regard to parking rates, hours of operation, citation management, etc. These details will need to be agreed upon up front, in order to assess the true value and future potential of the parking program. For example, changing the parking rates and the hours of operation changes the value of the program.

Walker spoke with four parking operators currently providing parking management in the Northwest and Canada (Diamond, Impark, Republic and Robbins). All but Impark are interested in contracting with the CBJ, including scenarios where the CBJ would not have to lay out any capital costs to procure the new meter system; however, they would need to be provided with detailed revenue figures from meters, permits and citations in order to present specific offers.

The operators are interested in managing all aspects of the parking program, including maintenance, operations, collections, enforcement and citation management. Republic NW recalled bidding on and losing a security contract to Bootlegger, and mentioned the possibility of taking that over as well.

It should be noted that multi-space meters, pay-by-cell services and mobile LPR systems are provided by different and separate companies, requiring separate contracts; however, parking operators will frequently serve as a 'prime' contractor with a city, procuring all equipment as part of their contract to manage the parking operation for the city.

RECAP OF WALKER'S RECOMMENDATIONS

To recap Walker's recommendations:

1. Re-implement a pay-by-plate multi-space meter system.
2. Offer pay-by-cell phone as an additional payment option.
3. Motorists should not have to cross the street to pay a parking meter.
4. Maintenance staff should monitor the meters and implement repairs "same-day".
5. Walker does not recommend accepting bank notes at the meters.
6. Purchase extended meter warranties.
7. Implement mobile license plate recognition technology for enforcement.
8. If permissible, mail citations rather than placing them on vehicles.
9. If maintaining the free two-hour time limit, allow motorists to bypass the meter and use PbC when parking for fewer than two hours.

MARCH 16, 2015

PROJECT NO. 33-1823

10. Conducting an on-line survey to determine how the public feels about the two-hour on-street time limit.
11. Continue to waive parking fees for vehicles with ADA credentials; however, consider the impact of totally unrestricted parking for ADA credentialed vehicles.
12. During the RFP process, require vendors to provide pay-by-plate and mobile LPR qualifications and references.
13. Require a pilot prior to procuring a parking system, to ensure that the CBJ will get what it pays for.
14. Consider outsourcing to a private parking operator.
15. Launch a public relations campaign to introduce the "new and improved" program.

MARCH 16, 2015

PROJECT NO. 33-1823

STATEMENT OF LIMITING CONDITIONS

This report and conclusions are subject to the following limiting conditions:

1. This report is based on some assumptions that are outside the control of Walker Parking Consultants/Engineers, Inc. ("Walker") and/or our client. Therefore, Walker does not guarantee the results.
2. The results and conclusions presented in this report may be dependent on future assumptions regarding the local, national, or international economy. These assumptions and resultant conclusions may be invalid in the event of war, terrorism, economic recession, rationing, or other events that may cause a significant change in economic conditions.
3. Walker assumes no responsibility for any events or circumstances that take place or change subsequent to the date of our field inspections.
4. All information, estimates, and opinions obtained from parties not employed by Walker, are assumed to be accurate. We assume no liability resulting from information presented by the client or client's representatives, or received from third-party sources.
5. This report is to be used in whole and not in part. None of the contents of this report may be reproduced or disseminated in any form for external use by anyone other than our client without our written permission.
6. The projections presented in the analysis assume responsible ownership and competent management. Any departure from this assumption may have a negative impact on the conclusions.
7. Computer models that use and generate precise numbers generate some of the figures and conclusions presented in this report. The use of seemingly exact numbers is not intended to suggest a level of accuracy that may not exist. A reasonable margin of error may be assumed regarding most numerical conclusions. Conversely, some numbers are rounded and as a result some conclusions may be subject to small rounding errors.
8. This report was prepared by Walker Parking Consultants/Engineers, Inc. All opinions, recommendations, and conclusions expressed during the course of this assignment are rendered by the staff of Walker Parking Consultants as employees, rather than as individuals.
9. This report presents some conceptual financial information that is intended to provide an order-of-magnitude assessment of parking expenses and relative costs. This report is not to be used for financing purposes.

Exhibit 1: Parking System Providers

Multi-Space Meter (MSM) Manufacturers

Parkeon

40 Twosome Drive, Suite 7, Moorestown, NJ
Contact: James DuFon
Telephone: 512- 567-1662
Email: jdufon@parkeon.com

Parkeon is the market leading MSM manufacturer in the US (approx. 40-45%).

Cale USA

13808 Monroe's Business Park, Tampa, FL 33635
Contact: Ryan Bonardi
Telephone: 770.634.4947
Email: Ryan.Bonardi@caleamerica.com

Cale is the 2nd leading MSM manufacturer in the US (approx. 30-35%).

Digital Payment Technologies

330-4260 Still Creek Drive, Burnaby, BC, V5C 6C6
Contact: Andy Harman
Telephone: 773-575-1153
Email: andy.harman@digitalpaytech.com

Note: Digital was recently purchased by T2 Systems.

Digital is the 3rd leading MSM manufacturer in the US (approx. 20-25%).

Additional multi-space manufacturers (minimal market share – alphabetical):

Amano McGann (Metric Distributor)

400 North May Street, Chicago, IL 60642
Contact: Todd Townsend
Telephone: 615-636-3456
Email: todd.townsend@amanomcgann.com

Global Parking Solutions USA

200 West Washington Square, Suite 200, PSFS Building, Philadelphia, PA USA 19106
Contact: Michael Kavur
Telephone: 267.288.3766
Email: mkavur@golbalparkingusa.com

MARCH 16, 2015

PROJECT NO. 33-1823

Hectronic USA Corp.

2580 Kriedel Road, Harleysville, PA 19438
Contact: Steve Snyder
Telephone: 215.206.8545
Email: steve.snyder@hectronic.com

Global Parking Solutions USA

200 West Washington Square, Suite 200, PSFS Building, Philadelphia, PA USA 19106
Contact: Michael Kavur
Telephone: 267.288.3766
Email: mkavur@globalparkingusa.com

MacKay Meters

1342 Abercrombie Road, PO Box 338, New Glasgow, NS B2H 5C6
Contact: Jim Taylor
Telephone: 902.752.5124 ext. 247
Email: j.taylor@mackaymeters.com

VenTek International

1260 Holm Road, Petaluma, CA 94954
707-773-3373
Email: sales@ventek-intl.com

New MSM manufacturer (no market share)

IPS Group, Inc.

5601 Oberlin Drive, Suite 100, San Diego, CA USA 92121
Contact: Kevin Woznicki
Telephone: 858-404-0607
Email: kevin.woznicki@ipsgroup.com

The IPS Group also manufactures a multi-space meter retrofit that could potentially be installed in the CBJ's Aparc meters; however there is no track record for this product.

LICENSE PLATE RECOGNITION (LPR) SYSTEM MANUFACTURERS

GENTEC

2280 Alfred-Nobel Blvd. Suite 400
Montreal, Quebec, Canada H4S 2A
Contact: Pierre Hubert
Telephone: 1.866.684.8006
Email: Phubert@genetec.com

Genetec is the market leading LPR provider in North America. They also provide auto-chalking systems.

MARCH 16, 2015

PROJECT NO. 33-1823

GTECHNA

8550 Chemin de la Côte de Liesse,
St-Laurent, QC H4T 1H2, Canada
Contact: Sergio Mastronardi
Telephone: 514.953.9898 ext. 140
Email: Sergio.mastronardi@gtechna.com

Gtechna manufactures LPR systems and citation management software.

TANNERY CREEK SYSTEMS

160 Applewood Cres. Unit 32
Vaughan, ONL4K4H2, Canada
Contact: Jeff Bethune
Telephone: 1.905.738.1406
Email: Jeff@autochalk.com

Tannery Creek manufactures LPR and auto-chalking systems.

MSM/LPR SYSTEM INTEGRATOR

CALGARY PARKING AUTHORITY

(ParkPlus System)
620 9 Avenue Southwest,
Calgary, AB T2P 1L5, Canada
Contact: Kurt McCaw
Telephone: 403.537.7019
Email: Kurt.McCaw@calgaryparking.com

The Calgary Parking Authority created the ParkPlus System and recently entered into a Collaborative Marketing Agreement with Cubic Transportation Systems. They use Cale meters and Tannery Creek LPR.

Exhibit 2: Parking Operators

Parking Operators Interested in Managing the CBJ Parking Program

Diamond Parking - Anchorage

Contact: Matt Samuel
Alaska Regional Manager
Telephone: 907-887-6180
Email: Matthew.samuel@diamondparking.com

RepublicNW

Contact: Vince Speziale
Vice President
Telephone: (206) 786-8735
Email: vspeziale@rpnw.com

Robbins Parking

Contact: Dan Sawchuk
President
Telephone: 250-414-4457
Email: dsawchuk@robbinsparking.com