



## TECHNICAL MEMORANDUM #5: TECHNOLOGY

To: Town of Concord  
From: Nelson\Nygaard  
Date: March 20, 2013

Subject: Parking Payment and Enforcement Technologies

The Town of Concord is undertaking a Comprehensive Study of their parking regulations, policy and management. In addition to assessing time limits, pricing, on-street and off-street regulations, a review of the state of the practice in parking technology is included in this memorandum. This memorandum also includes a summary of the parking equipment currently in use in Concord.

Recommendations on the appropriate technology for use in Concord will ultimately be part of the final study findings. Technology changes often are most easily completed as part of the implementation of the overall parking study recommendations, and in conjunction with changes in the geography, time limits and hourly rates associated with the overall recommendations. Technology changes may also be driven by the cost of equipment, ease of maintenance, enforcement strategy, age and condition of existing equipment, long term maintainability, ease of making future changes, and even aesthetics. As discussed with the Project Team, a range of current technologies commonly employed in parking management has been prepared for Team and community review, and was included in the community presentations. Nelson\Nygaard has incorporated feedback on preferred technology into the Study's final recommendations.

## CURRENT PARKING EQUIPMENT - CONCORD

### Meters

The Town of Concord has single, pole-mounted parking meters in Concord Center, including Thoreau Depot, and in the business district in West Concord. Meters are in operation from Monday through Saturday from 9 AM until 6 PM. Meters, for the most part have a one hour time limit, and charge a rate of \$0.50 per hour. The meters offer the first 12 minutes free, activated by pushing a button on the meter, effectively making the price to park for an hour \$0.40 (if the button is pushed). Meters accept nickels, dimes and quarters only, and as presently configured cannot take dollars or credit cards.

All meters are single-head, coin-operated meters that stand on individual posts. Meters are a digital model from



Coin meter in Concord, MA

McKay (Canada), purchased by the Town in 2003. The meters are in good condition, are reported to have very few problems, and are maintained by the Town Police Department staff. An inventory of meters in Concord is below in Figure 1.

Figure 1 Meter Inventory in Concord

	Concord Center	West Concord	Storage
Number of Meters	156	80	-30

## Pay Boxes

Besides meters, others that park in Concord need to pay daily fees at the West Concord Train Station using an MBTA pay box. There are 156 pay by space parking spaces by the station, plus 41 pay by resident permit spaces. Parking costs \$4 per day for the MBTA and is maintained by the Town of Concord. 60% of the MBTA daily parking fees go to the MBTA; 40% go to the Town of Concord.



Pay by Space, West Concord MBTA Parking

## Enforcement

For parking enforcement, the Police Department uses Complus Parking Enforcement software, which is an electronic, real-time system that prints electronic tickets. The handheld unit scans the vehicle registration sticker, and the enforcement officer confirms the license plate of the vehicle. At the busiest times, the enforcement officer may issue up to 70 tickets in a day; on slow days, about 10-15 tickets are issued. Parking fine fees (as of July 2006) are \$15 for a meter violation, \$20 for improper parking (in a crosswalk, wrong direction, etc.), \$50 if too close to a hydrant, and \$100 for a handicap space or curb ramp violation.

## TECHNOLOGY OVERVIEW

Innovations in parking meter technology are rapidly changing the way cities across the United States manage parking. The market of parking payment technology has seen the most rapid change by taking full advantage of electronic information systems.

Below is a description of a wide variety of unique parking payment applications across the country. These include smart meters, multi-space meters, smart cards, in-car meters, and wireless / pay-by-phone technology.

Also described are parking enforcement technology which automates the enforcement process.

## PARKING PAYMENT TECHNOLOGIES

### SINGLE-SPACE METERS

#### Conventional Coin Meters

These meters have been used by municipalities since the 1930s. They only accept change, and do not exhibit illuminated displays. The meters in Concord are essentially conventional coin meters, though with the added 12 minute free button.

#### Smart Meters

Smart meters are very similar to conventional coin meters; however, they allow motorists to pay for parking via credit or debit card. They also have illuminated displays that allow viewing of parking rates, hours, time limits, and other important information. The ease of payment with smart meters tends to reduce parking and ticketing anxiety.

Furthermore, when combined with embedded roadway sensors, smart meters allow for demand based pricing schemes, as they can send and receive data regarding parking pricing and availability.

Some smart meters are pay-by-phone enabled. Typically, parking management programs with this system require users to register their cell phones and credit card numbers online. Once registered, a driver finds a parking space, dials the parking phone number, and then enters his space number to start his legal parking time.

#### Case Study

Smart meters are in use in Coral Gables and West Palm Beach, Florida. In West Palm Beach, the program vastly exceeded expectations, reaching the first month goal of 400 transactions in the first week of implementation, and attaining 1,300 transactions by the end of the first month. For enforcement, parking officials utilize PDAs that have web-browsing capability to see which cars are compliant and which have exceeded their time.

#### Cost

A single smart meter can cost around \$200-500.



Coin meter in Sausalito, CA  
Source: Flickr user wuestenigel



Smart meters (pay-by-phone) in San Francisco, CA  
Source: SFPark

## Smart Cards

Smart cards represent another alternative payment system for metered parking that eliminates the need to carry cash without using multi-space kiosks. Smart cards are stored-value cards that can be inserted in the meters to add time. Users insert the card when they first arrive at the meter and allow the meter to increase the time increment purchased in \$0.25 steps; users remove the card when the amount of time displayed is adequate. Users are billed only for the time actually spent parking – rounded to the nearest minute by swiping the card again when they leave the space. This is another advantage over coin systems, where users may need to run back to the meter to add more time, or may overpay initially and lose the money.

## Case Study

In the past few years, the Borough of Princeton, NJ has replaced roughly 1,200 on-street meters with new meters capable of accepting both coins and smart card technology. Users insert the card when they first arrive at the meter and allow the meter to increase the time increment purchased in \$0.25 steps; users remove the card when the amount of time displayed is adequate. Users are billed only for the time actually spent parking – rounded to the nearest minute by swiping the card again when they leave the space. In addition to on-street meters, the cards can also be used at a 540-space garage.

## Cost

Cost is roughly \$600 per meter including cards, software and meters. Using smart cards can reduce maintenance costs and has the potential to raise 25% more net revenue.

## MULTI-SPACE PAY STATIONS

Likely the most broad reaching innovation is wirelessly networked, solar-powered “pay stations” or “multi-space meters” that accept a wide variety of payment forms. They are in use throughout the Boston area today, including the communities of Lowell, Wilmington, Northampton, Boston and Cambridge. Others are installing pay stations soon, including Brookline and Somerville.

Pay stations come in two primary varieties:

- Pay-and-Display
- Pay-by-Space

The differences are simple: Pay-and-display meters give motorists a permit they then place on their dashboard; with pay-by-space, motorists enter their parking stall number into the meter before paying and they do not need to return to their vehicle. Each technology has drawbacks: pay-and-display is more inconvenient for the patron, as they need to return to their car to display a printed receipt on the dash; pay-by-space requires the municipality to number each parking space.



Pay-and-display meter in Portland, OR  
Source: Flickr user Ian Broyles

In general, pay-and-display machines are more common in on-street environments, whereas pay-by-space machines are to a larger extent used in parking lots and garages.

Among cities that have implemented multi-space meters in on-street environments, pay-and-display is the most common, with fewer cities implementing successful pay-by-space programs:

Figure 2 Cities with Pay-and-Display and Pay-by-Space Meters

Pay-and-Display	Pay-by-Space
Boston, MA	Lowell, MA
Portland, OR (100-percent of meters)	Redwood City, CA
Seattle, WA (100-percent of meters)	Whiterock, BC, Canada
Park City, UT	San Francisco, CA (motorcycle parking only)
Cherry Creek North, Denver, CO	Charlotte, NC (pilot test)
Savannah, GA	Glendale, CA
Cambridge, MA (lots only) West Hollywood, CA	
Berkeley, CA	
Oakland, CA	
Baltimore, MD	
Chicago, IL	

## **Pay-and-Display Meters**

Pay-and-display meters can be placed on existing light or utility poles and serve roughly 10 to 30 parking spaces each. People must park, walk to the meter where they receive a receipt and return to their vehicle to display the receipt on their dashboard. These meters have minimal maintenance costs; operating costs vary depending on the type of power system used. Some pay-by-space meters can use solar-power, keeping operational costs very low and requiring no utility work for installation (battery powered meters are also available).

### **Advantages of Pay-and-Display**

- **More parking spaces per block:** Previous parking studies have shown that when individual stalls are not striped, parallel parking along a street (with few driveways) can typically accommodate 15- to 20-percent more cars per block because drivers tend to park more efficiently. Since pay and display machines only require the motorist to place a receipt on the car's dashboard, there is no need to stripe or designate individual stalls (as is required with individual meters, or pay-by-space machines where individual stalls must be marked and numbered). Striping would still be required for diagonal stalls, to help people align their cars, but not for parallel or perpendicular parking.
- **No need to stripe stalls:** Not needing to stripe stalls also reduces maintenance expenses, and can improve the beauty of the street (especially in historic areas, such as, for example, cobblestone streets).
- **Receipt provided:** For business travelers, pay-and-display machines automatically provide a receipt for their expense reports. This function can be built into pay-by-space machines.
- **Increased revenue:** When motorists leave, they typically drive away with the receipt that indicates the amount of time they have paid for; so that the next motorist to arrive will have to pay from the minute they park (individual motorists may see this as a disadvantage of pay-and-display).

### **Cost**

Pay-and-display meters cost approximately \$10,000 to \$12,000.

## **Pay-by-Space Meters**

Multi-space pay-by-space meters require on-street parking stalls be numbered. They are more convenient to motorists because they are not required to return to their cars. Similar to pay-and-display meters, operational and maintenance costs are minimal, and many new models can support pay-by-phone technology. Finally, such meters have substantially lower enforcement costs, as enforcement staff do not have to inspect each vehicle, and can instead utilize handheld devices. Although such meters require each space to be numbered, this can be done in an inexpensive and conspicuous manner, typically with stencils on the curb.

### **Advantages of Pay-by-Space**

- **More convenient payment:** Motorists do not need to walk back to their car to place a receipt on the dashboard. Motorists can also pay for additional time on their space from

any pay-by-space machine in the system, or even by cell phone, without having to return to their car to place another receipt on the dashboard. One vendor's system allows the driver to register their cell phone number, credit card, and license plate online or by phone. Users can simply place a call to pay for parking without visiting the pay station, or they can have the pay station print out a proof of payment receipt remotely. The parking is charged to the registered credit card.

- **Pay only for time used:** If motorists use the “pay maximum” option with their credit card, they can also pay for the maximum length of stay allowed, and then get a refund on their unused time if they return early, simply by reentering their space number in the machine. While this seems like a disadvantage to cities from a revenue perspective, any new parkers in the refunded space must pay to park versus “stealing” time from the previous parker.
- **Easier enforcement:** Pay-by-space machines can indicate which spaces on a block have not been paid for, either when an officer queries the machine, or by wireless communication with handheld enforcement devices. This is considerably easier than checking dashboards to see which receipts indicate that time has expired, therefore reducing enforcement costs substantially.
- **No receipt printing required:** This can cut down on litter on the street, and can reduce the downtime and operating and maintenance expenses created by the printer jams and paper replacement needs associated with pay-and-display machines.

### Cost

Pay-by-space meters cost between \$7,000 and \$10,000 per unit.

## Multi-Space Pay Stations vs. Single-Space Smart Meters

Below are the advantages of using multi-space pay stations instead of single space meters:

- **Customer Convenience:** Pay stations provide more payment options, including bills and credit/debit cards. This makes payment more convenient for parkers, as they do not need to carry around excessive amounts of coins and don't park illegally when they don't have a quarter. A recent installation in Cambridge MA has seen over 75-percent transactions by credit.
- **Better Information:** Pay stations can provide a higher level of customer information using electronic screens. Some stations are able to provide dynamic messaging controlled through a central computer.
- **Revenue:** Almost universally, cities that have implemented pay stations have found that parking revenues increase over conventional meters. During the transition period as Seattle shifted from conventional meters to 100-percent pay-and-display, it saw significantly more revenue per space with multi-space meters:
  - **Single-Space Meters:** \$3.70 per space per day; Pay Stations: \$6.80 per space per day
- Portland, OR, has seen a 40-percent increase in meter revenue per space since shifting to 100-percent pay-and-display meters in 2002. Parking managers believe part of this increase is due to parkers now paying their full share. Previously, parkers could use remaining minutes on a meter from the previous parker; now a parker must pay for parking right from the start, even if the previous parker stayed less time than they paid for. According to Karen Moore, parking manager for the City of Berkeley, the City has experienced a 300-percent increase in meter revenues with its new pay-and-display machines, in part due to the severe vandalism problem its previous conventional meters faced.
- **Data Collection:** Pay stations produce detailed records of use that can be analyzed using computer software. This allows parking managers to respond much more quickly and accurately to parking issues caused by ineffective pricing or regulations.
- **Capital Costs:** Although individual pay stations are substantially more expensive than individual single-space meters, the overall long-term savings made by covering 6 to 12 spaces with a single multi-space meter may make this technology cheaper overall. Typical capital costs are below.

Figure 3 Capital Costs of Single-Space Smart Meters vs. Multi-Space Meters

	Single-Space Smart Meters	Multi-Space Meters
Cost per meter	\$500	\$7,000 - \$9,000
Number of spaces covered	1-2	6 - 12
Total capital cost per parking space	\$250-\$500	\$580-\$1,500

- **Operating & Maintenance Costs:** According to the cities surveyed, pay stations have lower maintenance costs per space largely because there are fewer meters. In other words, if a city once had 5,000 parking meters, they had to maintain 5,000 devices, while with multi-space meters they may only have 500 devices which require the same or less maintenance due to their design advantages over single-space meters.
- Pay stations are much more resistant to vandalism and theft through their physical design. Traditional single-space meters sometimes have their heads knocked off for theft, or their coin slots jammed to prevent them from functioning so a driver can park for free. Because multi-space meters use multiple payment options, cities have seen fewer attempts at vandalism and efforts to jam machines. The multiple payment options discourage coin slot jamming, and theft is less common because many of the payments are by credit card so less cash is available inside if a thief were ever to successfully break into the meter.
- Pay stations are connected wirelessly, which allows meters to communicate with the parking department. If the meter runs out of paper for receipts, it sends an e-mail indicating it needs refilling. If the meter has a technical problem, it is reported via e-mail so repair crews can target only those meters that have problems. The e-mail sent from the meter indicates exactly what the repair crew needs to bring in order to fix the meter.
- **Power Supply:** Pay stations are often run using solar power from a photovoltaic panel installed on top of the station, eliminating the need for electric power supply and the associated capital costs of providing overhead or underground connections to the power grid. Many models also offer a battery back-up option ensuring that meters do not go out of service should the photovoltaic array fail for some reason. Concerns about sufficient solar exposure in northern cities have been disproven, especially in New York City where winter sun angles are low, skyscraper shadows are long.
- **Ease of enforcement:** After switching to pay-and-display, West Hollywood saw a reduction in enforcement revenue of \$900 per month per space (~\$30 per day per space), due to higher compliance with the meters, but this was generally matched by an increase in meter revenue. Savannah, on the other hand, saw an increase in enforcement revenue of 11.5-percent from citations due to increased efficiency in issuing citations. Seattle has not been able to identify any changes in either enforcement costs or revenues when it changed to pay-and-display.

## INDIVIDUAL PAYMENT TECHNOLOGY

There are also non-traditional multi-space parking “meters” that utilize individual payment technologies such as in-car parking meters and pay-by-phone technology.

### In-Car Meters

In-car meters are small mirror-hanging units that can be purchased from cities and that can store prepaid parking time. Users can turn the meters on when they leave their vehicle and turn it off when they return. In-car meters are popular because they work in real time and people can avoid over or underpaying. Some of these meters operate using cellular technology, allowing people to pay-by-phone with a credit card. Time is then credited to a central database and the in-car meter “calls” the central computer when the meter is in operation.

Motorists prepay, either by using a smart card that they purchase in advance and then insert into the device, by telephone, or by connecting their device to a computer and purchasing parking credits over the internet. The device displays the number of minutes available based on the amount of money on the smart card and the current hourly price for that parking zone (which the parker enters). The meter alternately flashes between the minutes remaining and the parking zone for verification by enforcement. When time has run out, the monitor shuts off, and a blank screen shows enforcement personnel that the parker is in violation.

Enforcement is done in a similar fashion to traditional parking meters except that they must look inside the windshield of cars rather than parking meter displays.

### Implementation

A typical solution is for a city to outsource the operation to the in-car parking meter vendor. The vendor then handles all aspects of running the system, including distribution of in-car meters to residents and commuters, maintenance of meters, and hosting a customized website for each city where customers can purchase credit for their parking meter. The in-car meters are pre-programmed with all parking regulations specific to the city, which means that the meter could both be used for parking in a monthly permit zone and for short-term retail parking.

### Advantages

- **No upfront investment by the City:** It is recommended that the unit is not free to customers, as a nominal charge tends to encourage greater utilization of the system than a free in-car meter. This is at the discretion of the City, and the cost to the customer could, for example, be included as part of a monthly parking permit.
- **People pay only for actual time parked:** If a person parks for 5 minutes, they pay for 5 minutes. There is no walking to parking meter; people can just park their car, insert



In-car meter  
Source: Comet

their card, and go. The system allows geographic transferability; people can use the in-car meter at any parking meter or public lot/garage that accepts the device.

- **Easy accounting and program management:** In-car meters simplify accounting and program management because there is no need to manage petty cash for parking or reconciling dozens of 'Pay & Display' tickets. They also reduce operating costs by eliminating periodic coin collection. Compared with other parking meter options, in-car parking meters require far less capital funding; in-car meters cost just \$30, whereas other options cost from \$500-\$7,000.

## Disadvantages

In-car meters work well where people routinely park in the same place, such as motorists parking for work, routine visitors to government buildings, or commuters. Motorists who park repeatedly at the same place have an incentive to buy a \$20-\$80 smart card. They also work well for trips where convenience and saving time is highly valued. The system is not practical for those who infrequently park and likely wouldn't pay \$20 for a card that they wouldn't use.

## Cost

The palm size unit is usually provided to motorists who pay a refundable deposit and possibly also a nominal monthly fee.

A typical pricing structure is as follows:

- \$30 deposit and \$4.95 monthly fee per unit
- Vendor charges 20-percent of revenue for service

## Pay-by-Phone / Wireless Technology

Pay-by Phone technology allows a driver to pay a parking fare via cell phone, mobile phone application, or computer. Motorists can receive a reminder text when their time is almost up, and can add time without returning to their vehicle or parking meter. Receipts are available via email or text message. Typically these programs require pre-registration. Pay-phone technology reduces maintenance and operational costs associated with meters, fare collection, and ticketing.

These meters typically require wireless technology, which can increase setup and maintenance costs, but also offer the potential benefit of creating a free, publicly available wireless network for the area in which the meters are installed.

## Case Study

Montgomery County began a 90-day pilot program for drivers to pay for parking by their cell phones, and the success of the pilot has determined that the program will be expanded to the entire county. Begun on January 4, 2010, the test area includes approximately 1,200 meters in a parking lot and garage, as well as on-street meters. The program eliminates the need for coins, allows people to receive text messages notifying them that their time is about to expire as well as extend their legal parking time by paying remotely. Additionally, upon returning to their vehicle, a person may terminate the parking session and avoid paying for time that will not be used. Between the initiation of the pilot and April 2, 2010, more than 1,900 people have signed up for the program using it 6,749 times. At this point, there is an average of more than 150 pay-by-cell sessions per day, constituting approximately 6% of daily use within the study area.

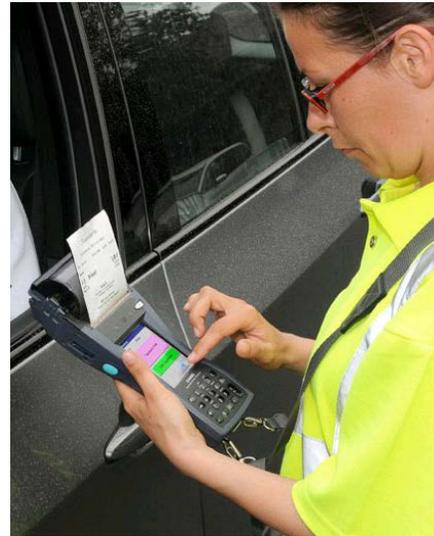
## PARKING ENFORCEMENT TECHNOLOGIES

### Handheld Ticketing Units

Handheld ticketing units are small, computerized devices that aid parking enforcement officers in issuing accurate and legible citations. Units can improve recordkeeping and reduce errors by directly communicating with central records; account for more complicated regulatory structures such as fines that escalate with each additional violation; and print the citations which improves legibility over handwritten notices.

#### Case Study

Provincetown, MA has utilized handheld computer technology to enforce parking regulations and issue tickets for the past eight years. The handheld system accommodates the different parking permit privileges for year-round residents, property owners, and full summer residents, as well as the varying permitted parking times for meters. After incorporating handheld technology into their enforcement practices, Provincetown now issues 12,000 citations a year using this system with only one to two enforcement officers on the street.



#### Cost

\$10,000 to \$13,000 per unit (includes associated software costs, staff training, etc). Maintenance costs of units are minimal. Operating costs of the parking enforcement program are reduced, while revenues from tickets increase due to more efficient enforcement. Staff needs are reduced as well.

### Curbside Sensors

Curbside sensors are embedded in the pavement and linked with advanced parking meters (single-head or multi-space) enabling the parking system to determine when a car is actively occupying a space. This allows several advantages over regular meters in terms of revenue generation and improved enforcement. Because the meter is able to determine when a car leaves, it is able to reset the paid time on the meter to zero even if the previous occupant had paid time remaining, thus increasing revenues. In the case of time-limited paid parking, since the meter is able to determine the vehicle's length of stay, curbside sensors can help reduce the problem of "meter feeding" by preventing patrons from returning to add more money once the time limit has been reached.

## Case study

Pacific Grove, California installed 100 Smart Meters near the American Tin Cannery, a destination shopping neighborhood, and the Monterey Bay Aquarium. This area has more than two million visitors annually, and as a result, a very high demand for parking. Applying this technology involved installing a sensor in the curb to detect when a car enters or leaves a space, which re-sets the meter time (i.e. no one can find a meter that still has time paid for by the previous occupant).

The use of Smart Meters has allowed the City to encourage turnover of parking spaces by utilizing progressive rates which increase the amount charged as more time is spent in the parking space, rather than imposing a time limit on how long a car may remain in the space. In a study conducted with the cooperation of the neighboring City of Monterey, the two cities compared Smart Meter daily collections with standard meters in Monterey.

The Smart Meters yielded \$10.50 per day, while the standard meters provided \$7.50 per day, demonstrating a 40% revenue benefit from the technologically advanced meters, helping to cover their higher installation costs and promote good parking management at the same time.

## Cost

Curbside sensors cost \$250-\$800 per space for vehicle sensor and up to \$150 per meter for data management. There is also a \$20 per month per space cost for data management. This strategy improves revenue due to increased enforcement productivity and can potentially reduce enforcement staffing needs.



## Automatic License Plate Readers

Automatic License Plate Readers, also sometimes referred to as “digital chalk” allow a fast-moving vehicle to scan the license plates of parked cars and check for vehicles that overstay the maximum time. This allows a single enforcement officer to check for parking compliance much faster than on foot. Automated license plate readers are capable of processing 2 vehicles per second at 30 mph/50 km/h and 1500 to 3000 parallel parked vehicles per shift in typical city situations. It significantly improves the enforcement officer’s range and productivity (typically 3 to 5 times better than walking with a handheld), thereby reducing enforcement cost and parker cheating. Because vehicle photos facilitate quicker and more accurate appeal resolution, overall revenue from tickets generally increases.

### Case Study

The City of Fredericksburg, Virginia is nestled in a region which is home to a number of civil war battle sites that generate a large volume of tourism activity for the city. Downtown boasts a thriving, charming business district with time-limited parking spaces. Monitoring the usage of spaces was a challenge to the City’s lone parking enforcement officer. The officer could handle only a small amount of the downtown area, to the exclusion of other parts of the city; to sweep the whole city would take five hours. Moreover, drivers were beginning to cheat the system by moving their cars according to the officer’s walking schedule; many of these drivers were not downtown patrons but employees consuming spaces intended for business patrons.



To deal with these issues, a proposal was made to add two additional parking enforcement officers and additional handheld units, for a total cost of \$110,000-\$120,000 in the first year and \$80,000 in years after. Instead, the city invested in drive-by digital chalking technology – or automated license plate readers – which scan license plates as the vehicle drives around the city. The system cost half of what the proposed handheld ticket writers and additional staff would have cost. Automated license plate readers are capable of processing 2 vehicles per second at 30 mph/50 km/h and 1500 to 3000 parallel parked vehicles per shift in typical city situations. It has significantly improved the enforcement officer’s range and productivity (typically 3 to 5 times better than walking with a handheld), thereby reducing enforcement cost and parker cheating.

### Cost

The cost of automatic license plate readers ranges from \$5,000 (handheld unit) to \$75,000 (per in-vehicle unit). The strategy can improve revenue due to increased enforcement efficiency, reduced enforcement costs and liability costs associated with injuries of enforcement officers. It can also reduce staffing needs and increases the productivity of officers.

## PUBLIC INPUT ON PARKING TECHNOLOGY

Concord residents and stakeholders expressed few complaints about the current operations and maintenance of the existing meters, pay boxes and enforcement technologies employed in both study areas. Meters were generally considered functional, with few reported outages. The 12 minute free button is also a popular feature. Complaints primarily centered around the meter windows, which over time become more opaque and difficult to read. Current meters also only take coins, and expanding payment options was seen as highly desirable.

As the Concord Parking Management system evolved, there was significant interest in new technologies for operational and aesthetic reasons. The ability to easily extend time limits, using the latest in technology (by smart phone for example) was attractive to all stakeholders. Expanding paid parking to Monument Square and other areas within the Center's historic district was seen as being more palatable with pay stations either to cover new areas or to replace existing meters. Reductions in street clutter were also seen as a motivation for using new technology.

In general, through the Study, a preference was expressed for a combination of smart meters and pay stations that allowed for multiple payment options and technology integration. The recommendations section will further detail how these would be employed based on geography and parking regulation. An analysis of the costs, benefits, and appropriate timeframes for conversion and upgrade will also be included in the memorandum looking at overall cost implications of the recommended Concord Parking Management Plan.