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Appendix A Performance Specifications

I. Single Space Electronic Parking Meter Mechanism

For the single space electronic parking meter, Serco will provide the MacKay Guardian E-Purse meter (referred to as the "MacKay E-Purse"), which is described and represented, generally, as follows, but further detailed in subsequent sections of this Appendix.

A General Specifications

1. The MacKay E-Purse is a fully electronic meter, with solid state semiconductor components.
2. The MacKay E-Purse provided will be new and warranted to operate accurately and dependably within the specified temperature range of -20 degrees Fahrenheit to +185 degrees Fahrenheit and under environmental conditions found in the City and County of San Francisco, including but not limited to wind blown grime, rain, fog, salt air, and vibrations.
3. All electronic components and connections are fully weatherproofed.
4. The MacKay E-Purse fits into the POM model “E”, Duncan 95, and the MacKay MKH4500 meter case without modification. All exposed mechanism parts fit flush with the outside of the case.
5. The only moving parts are those associated with the required anti-tampering, anti-pullback features of the coin-chute module.
6. The MacKay E-Purse zinc frame detaches front from the back, with one screw on the front and two screws on the back.
7. The MacKay E-Purse has a dual processor design. One low power microprocessor is dedicated to liquid crystal display (LCD) and time-keeping functions and the second microprocessor is dedicated to run the main meter applications.
8. The meter application is designed to support a smart card interface for data transfer and transaction data management.
9. The MacKay E-Purse can support both coin and card operations and supports up to 16 different coins and/or tokens and up to three internal plug-in secure access modules (SAMs). It accepts coins through a coin interface and card payments through a card interface. The programming and configuration of the MacKay E-Purse to accept smart card payments is not included in the price of the mechanism. The cost to program and configure the MacKay E-Purse to accept the Translink card is included in Section VIII, Smart Card Program
10. The ISO compliant smart card interface supports both T=0 and T=1 protocols. The meter can be programmed to accept both asynchronous and synchronous card types.
11. The MacKay-E Purse has a 16 by 80 pixel front dot matrix LCD display capable of displaying alphanumeric messages and graphics.

12. The MacKay E-Purse contains 1 megabyte non-volatile flash memory and 8 Kbytes EEPROM.
13. The MacKay E-Purse is powered by a 4.5V battery pack.
14. The MacKay E-Purse is activated by either the insertion of a coin or card.
15. The general description and capabilities of the MacKay E-Purse are summarized in Figure D-1, which is attached hereto.

Figure D1

Description of Parking Meter Feature	RFP Reference	Required by City	MacKay Guardian E-Purse
GENERAL SPECIFICATIONS			
fully electronic	1.A	yes	compliant
solid state components	1.A	yes	compliant
all new materials	1.A	yes	compliant
operate dependably from -20 to +185 deg. F.	1.A	yes	compliant
powered by 9-volt alkaline or 6-volt alkaline	1.A	yes	compliant
fit in POM Model "E", Duncan 95 or MacKay	1.A	yes	compliant
fit flush with the outside of the case	1.A	yes	compliant
programmable: 8 different coins/tokens or cards	1.A	yes	exceeds requirement
fully weatherproof	1.A	yes	exceeds requirement
FIELD SERVICEABILITY			
foreign objects can be cleared	1.B	yes	compliant
within a 3-minute time frame	1.B	yes	compliant
no special tools required	1.B	yes	compliant
POWER SUPPLY			
capable of operating for min. of 8 months	1.C	yes	compliant
maintain accurate time clock for min. of 5 minutes	1.C	yes	compliant
INDICATION, FRONT			
have a 5-digit LCD display on front of meter	1.D	yes	exceeds requirement
capable of indicating paid time and expired time	1.D	yes	exceeds requirement
separated by a colon(:) that flashes	1.D	yes	compliant

Description of Parking Meter Feature	RFP Reference	Required by City	MacKay Guardian E-Purse
indicate all necessary operating status messages	1.D	yes	exceeds requirement
additional front indications, mechanical and/or LED	1.D	yes	compliant
green for "paid", red for "expired", yellow for "failed"	1.D	yes	compliant
a user option to switch them off or on	1.D	yes	compliant
LCD or rotating mechanical display on rear of meter	1.E	yes	exceeds requirement
capable of clearly indicating paid/expired/failed status	1.E	yes	exceeds requirement
from a distance of at least 70 feet	1.E	yes	compliant
LCD indicators shall be a minimum size of 1" by 3"	1.E	yes	compliant
high contrast, high visibility red,	1.E	yes	compliant
programmable flash rate	1.E	yes	compliant
additional rear LED indications	1.E	yes	compliant
green "paid", red "expired", yellow "failed"	1.E	yes	compliant
a user option to switch them off or on	1.E	yes	compliant
RATE AND HOURS OF OPERATION INDICATION			
Rates, days, and hours of meter operation displayed clearly in the front of the meter	1.F	yes	compliant
MECHANISM INVENTORY			
supply and install a database file	1.G	yes	compliant
mechanism serial numbers	1.G	yes	compliant
models	1.G	yes	compliant
programmed rate and operational hours	1.G	yes	compliant
color/s of cases and caps	1.G	yes	compliant
COIN/CARD ACCEPTANCE			

Description of Parking Meter Feature	RFP Reference	Required by City	MacKay Guardian E-Purse
programmable: 8 different coins/tokens and/or cards	1.H	yes	exceeds requirement
user re-programmable to change recognition/time value	1.H	yes	compliant
coin chute shall be free-fall type	1.H	yes	compliant
no contact points; affected by grime and moisture	1.H	yes	compliant
entrance to chute: replaceable stainless steel	1.H	yes	compliant
entrance to chute: accommodate/screen var. coins	1.H	yes	compliant
an anti-backup provision to prevent retrieval of coins	1.H	yes	compliant
deposited directly into a sealed container	1.H	yes	compliant
card discriminator shall check validity of the card	1.H	yes	compliant
should have a wiper to remove moisture from the card	1.H	yes	compliant
UPGRADEABILITY			
upgradeable for future improvements	1.I	yes	exceeds requirement
PROGRAMMABLE FEATURE OPTIONS			
minimum standard time and rate features	1.J	yes	compliant
standard rate operation	1.J	yes	compliant
time of day multi-rate operation	1.J	yes	compliant
day of week multi-rate operation	1.J	yes	compliant
change current rate	1.J	yes	compliant
pre-payment during free or non-paid time	1.J	yes	compliant
no-parking times	1.J	yes	compliant
power saver feature for no-pay periods	1.J	yes	compliant
overtime periods	1.J	yes	compliant
grace periods	1.J	yes	compliant
initial free time for card users	1.J	yes	compliant

Description of Parking Meter Feature	RFP Reference	Required by City	MacKay Guardian E-Purse
INTERNAL TIMEKEEPING			
365-day calendar real-time clock	1.K	yes	compliant
backup capacitor to retain time settings; replacements	1.K	yes	compliant
programmable: 1-year advance, daylight savings time	1.K	yes	exceeds requirement
time of day clock: accurate to 10-20 seconds per week	1.K	yes	compliant
time of day clock: operate during standard/multi-rate	1.K	yes	compliant
time of day clock: tracks the day of week - Mon. to Sun.	1.K	yes	compliant
time of day and day of week must be displayed	1.K	yes	compliant
time of day clock: perform complete electronic check	1.K	yes	compliant
MEMORY RETENTION AT POWER FAILURE			
mechanism must be able to retain all stored program and audit data for minimum period of one year	1.L	yes	exceeds requirement
ELECTRONIC PURSE REQUIREMENTS			
secure application module (SAM) socket mounted	1.M	yes	exceeds requirement
easily replaced in the field	1.M	yes	compliant
meter microprocessor	1.M	yes	exceeds requirement
minimum of 8 K serial EEPROM for electronic data storage	1.M	yes	exceeds requirement
control parameters and transaction data	1.M	yes	exceeds requirement
store card balance and transaction amounts	1.M	yes	exceeds requirement
store card serial numbers	1.M	yes	compliant

Description of Parking Meter Feature	RFP Reference	Required by City	MacKay Guardian E-Purse
store other electronic cash data transaction requirements	1.M	yes	exceeds requirement
REVENUE AUDIT CAPABILITIES			
record/store the number of valid coins	1.N	yes	compliant
record/store the number of valid cards	1.N	yes	compliant
accurate to 99% of actual deposits	1.N	yes	compliant
information retrieved via a PDT	1.N	yes	compliant
programmable: reset to zero after audit	1.N	yes	compliant
cumulative until purposely reset	1.N	yes	compliant
audit figures not affected by maintenance, resetting the meter or other purposes	1.N	yes	compliant
COIN/CARD ACCEPTANCE AND DISCRIMINATION			
coin chute & coin reader must be plug-in modules and must be easily serviced and repaired in the field	1.O	yes	compliant
accept up to 8 different coins/tokens and a chip-based smart card	1.O	yes	exceeds requirement
accept coins through a single, replaceable, stainless steel coin entrance slot	1.O	yes	compliant
use a dual coil coin discriminator device	1.O	yes	compliant
use a third coil activation system	1.O	yes	compliant
coin discrimination system registers both metallic and non-metallic jams	1.O	yes	compliant
coin chute and card reader allows the easy removal of foreign objects	1.O	yes	compliant
mechanism records all invalid coins passing through the coin chute	1.O	yes	compliant
card reader must be non-locking or otherwise permit users to remove cards without damage during a fault situation or power failure	1.O	yes	compliant
DATA MANAGEMENT AND INTEGRATION			
all operational data must be downloadable from the meter mechanism to the PDT	1.P	yes	compliant
incorporated into meter management sys.	1.P	yes	compliant

Description of Parking Meter Feature	RFP Reference	Required by City	MacKay Guardian E-Purse
TRANSFER OF DATA			
avg. time of repair/field audit: 3 seconds	1.Q	yes	compliant
avg. time of field progamming: 10 seconds	1.Q	yes	compliant
FIELD COMMUNICATIONS			
field communications shall be via PDT	1.R	yes	compliant
infrared meter face systems must be able to communicate with the meter up to a distance of 8 inches	1.R	yes	compliant
within a 45-degree angle of the meter face	1.R	yes	compliant
must recognize and verify commands from an authorized PDT only	1.R	yes	compliant
activities using a PDT:	1.R	yes	compliant
reprogramming of time and rate structures	1.R	yes	compliant
retrieval of audit information and electronic cash transactions (including mechanism serial number)	1.R	yes	compliant
retrieval of maintainance information (including mechanism serial number and battery voltage)	1.R	yes	compliant
FIELD COMMUNICATIONS (continued)			
each communication session update the mechanism's clock, calendar, and day of week information	1.R	yes	compliant
sufficient memory and appropriate programming to keep a minimum of a 50 items, date and time stamped internal record of the meter's operational status	1.R	yes	exceeds requirement
record must include all data that relate to the enforceability of the mechanism	1.R	yes	compliant
data shall be securely transferred from the meter, through the PDT, to the meter management system	1.R	yes	compliant
SWAPPING METERS			
PDT will program the replacement mechanism with a new copy of the rate/time program in effect at that post location	1.S	yes	compliant

Description of Parking Meter Feature	RFP Reference	Required by City	MacKay Guardian E-Purse
PDT must allow a repairer to enter essential data manually at the time of the exchange	1.S	yes	compliant
PDT must record this data and be able to transfer it to the meter management system	1.S	yes	compliant
COIN/CARD CHECK DURING MAINTENANCE			
feature that prevents coin and debit card maintenance or test transactions from registering in revenue totals	1.T	yes	compliant
SMART CARD READER			
equipped with a card reader: smart card	1.U	yes	compliant
accept an industry standard size card	1.U	yes	compliant
secure smart card support	1.U	yes	compliant
molded instruction for card insertion	1.U	yes	compliant
debit card slot shall not allow U.S. coin entry	1.U	yes	compliant
objects can be removed within 3-minutes	1.U	yes	compliant
foreign objects removed within 3-minutes	1.U	yes	compliant
display the balance loaded on the card	1.U	yes	compliant
meter display must credit in increments	1.U	yes	compliant
card cannot be decremented in excess of the time available for purchase on the meter	1.U	yes	compliant
electronic cash transaction must be recorded before time is credited on the meter mechanism	1.U	yes	compliant
Increment debits for each transaction should be accumulated and posted as one transaction to save meter and card memory	1.U	yes	compliant
programmed with an appropriate delay	1.U	yes	compliant
message to prompt cardholder to reinsert card	1.U	yes	compliant
meter mechanism will reset itself after an appropriate interval	1.U	yes	compliant

Description of Parking Meter Feature	RFP Reference	Required by City	MacKay Guardian E-Purse
PERIPHERAL PORT			
shall feature a peripheral port interface	1.V	yes	compliant
connected to the mechanism's microprocessor	1.V	yes	compliant
mult-functional port	1.V	yes	compliant
capable of inputting and retrieving data	1.V	yes	compliant
to and from the mechanism	1.V	yes	compliant
MODULAR COMPONENTS			
modular components	1.W	yes	compliant
PERFORMANCE STANDARD FOR SINGLE-SPACE METER MECHANISMS			
technical specifications	1.X	yes	compliant
specifications must match the mechanisms that the Proposer plans to deliver to the City	1.X	yes	compliant

B Field Serviceability

1. The MacKay E-Purse is designed so that metallic and non-metallic foreign objects can be cleared from the coin chute and card reader slot under varied weather conditions within three minutes.
2. The MacKay E-Purse returns to full functionality after being cleared and reset. No special tools are required.

C Power Supply

1. All 4.5 volt battery packs will be shipped uninstalled and without dielectric grease.
2. The battery pack is factory shrink-wrapped and supplied with a non-reversible waterproof plug-in connector as used in the automotive industry.
3. The batteries will last for a minimum of 12 months before entering a low battery indication as long as the assumptions of power use over 52 weeks as set out in Table 2 are not surpassed.
4. A dedicated "Low Battery" icon on the front LCD will be activated when the MacKay E-Purse detects that there is between 10 and 30 days of battery life remaining.
5. A high-efficiency (approximately 85%) switching power supply on the Mother Board Module (MBM) supplies 5 volts to the MacKay E-Purse when powered up.
6. When powered down the graphic display module (GDM) and some event detection circuitry on the MBM continue to run at a reduced unregulated voltage supplied directly from the battery pack.
7. The MacKay E-Purse is powered by three standard alkaline C-size cell batteries (NEDA 14A) with a nominal output voltage of 4.5 volts. Alkaline C-size cell batteries have an optimal energy rating of 7000 mA/hour or 5250 mA/hr after derating the battery energy rating by 25%.
8. Serco will supply two battery packs for each MacKay E-Purse.

Table 1: Summary of MacKay E-Purse Features and Related Energy Consumption

Feature	**Power Consumption**
EPM idle “Expired or Count Down”	170 uA
EPM idle “Low Power After Hours”	160uA
EPM idle “Scrolling Msg”	360 uA
LEDs (at 1 Hz)	5 mA
Coin Transaction	60 mA
Card Transaction	55mA
Backlight	11.5 mA
Audits	120 mA

The batteries in the MacKay E-Purse should last 12 months on average based on the

meter power use table below. The following table defines the worst case energy consumption of the MacKay E-Purse for the purpose of calculating battery life.

Table 2: Worst Case Energy Consumption				
Event	**Current**	**Time**	**mA/hrs per week**	**Percent**
EPM idle “Pay”	170 uA	10 hr/day * 7 days/wk	11.90	12.42%
EPM idle “Low”	100 uA	14 hr/day * 7 days/wk	9.80	10.23%
LEDs (1 Hz)	5 mA	8msec/sec * 24 hr/day * 7 days/wk	6.72	7.01%
Card Transactions	60 mA	8 sec/trans * 250 wk	33.33	34.79%
Coin Transactions	55 mA	6 sec/trans * 250 trans/wk	22.92	23.05%
Backlight	11.5 mA	7 sec/trans * 500 trans/wk	11.1	8.33%
Audits	120 mA	120 sec/audit * 1/wk	4.00	4.17%
		Total mA hrs/wk	99.74	100%
		Weeks of Operation @ 75% of battery life	52.6 weeks	

D Indication Front

1. The MacKay E-Purse is capable of displaying the following:

    - Any symbol or pattern in a 16 high by 80 wide pixel graphics viewing area.
    - Five 16 by 16 pixel characters, full alphanumerical or graphic.
    - Six 16 by 12 pixel full height alphanumeric characters.
    - Two rows of 13, half-height characters (7 by 5 pixels each).
    - Negative sign or $ symbol (or other symbol) located to the left of the left-most character.
    - Colon located between the second and third digits, when displaying time.
    - Decimal point located between the second and third digits for displaying cash values (up to $999.99).
    - International "No Parking" icon.
    - "Low Battery" icon.
    - "Out of Order" icon.
    - Messages are fully programmable.
    - Four separate scrolling messages of up to 20 characters in length.

2. The MacKay E-Purse has two front LED indicators, a dual color red /green super bright LED and a mono-colored yellow LED, which are programmed as follows: green for “paid”, red for “expired” and yellow for “failed” or “maintenance required.”
3. The LEDs can be disabled by changing the MacKay E-Purse meter display configuration file. However, the LEDs on the front and rear of the MacKay E-Purse must be programmed together.

E Indication Rear

1. The MacKay E-Purse has a three square inch solid state high contrast LCD on the back that indicates paid status, expired status, and failed status. The LCD uses a red polarizer, which produces a high contrast, high visibility red color with a programmable variable flash rate.
2. The MacKay E-Purse can independently either statically display or flash the following information: "Out of Order", "Expired", 2 x International "No Parking" icons, and a solid red display.
3. Subject to viewing angle, window glare or available light conditions, the display is viewable by an enforcement officer in a vehicle.
4. The MacKay E-Purse also has two LED devices visible from the rear, a dual color red /green super-bright LED and a mono-colored yellow LED, which are programmed as follows: green for “paid”, red for “expired” and yellow for “failed” or “maintenance required.” These LEDs can be disabled by changing the MacKay E-Purse meter display configuration file. However, the LEDs on the front and rear of the MacKay E-Purse must be programmed together.

F Rate and Hours of Operation Indication

1. UV-tolerant vinyl labels with the rate and hours of operation printed on them will be placed on a metal rate plate (D-plate) which is displayed clearly on the MacKay E-Purse front below the front LCD. The City can change the rate plates by placing a new vinyl label over the old.
2. The City will provide the messages to be placed on the vinyl labels. Serco will provide a sample vinyl label design, including graphics and messages, for the final approval of the City before the vinyl labels are produced. This approval shall not be unreasonably withheld or delayed.

G Mechanism Inventory

Each MacKay E-Purse will have a unique serial identification number.

H Coin Chute– General

1. The meter coin chute, using magnetic coils, registers the parameters of coins that pass through the chute and relays this information to the main electronics board. The main electronics board decides the award of purchase time.
2. This main board can accept and sort up to 16 different coins and/or tokens.
3. The coin chute is a plug-in module and can be serviced and repaired without re-calibration or the use of special tools.
4. Subject to the actual location of the foreign object within the meter, the MacKay E-Purse can detect both metallic and non-metallic jams. When the coin chute detects a

metallic or non-metallic jam, MacKay E-Purse displays that it is inoperable. All jams are recorded in the maintenance log. The MacKay E-Purse can detect the following objects:

- bent paper clip
- bent soda can tab
- cotton
- toothpick
- paper matchbook cover
- folded plastic straw
- coffee stirrer
- coin-wrapped tape

H (1) Coin Acceptance and Discrimination

1. The MacKay E-Purse is programmed to accept the following coins: the US Dollar coin (Sacagawea golden dollar), Susan B. Anthony dollar, Quarter, Dime and Nickel. The MacKay E-Purse is re-programmable to change the recognition and parking rate of acceptable coins and tokens. New coins should be accommodated in the future.
2. Working with the meter supplier, Serco will alter the coin table to add new coins or to improve screening of invalid coins upon the City's request. The City will provide at least 100 samples of all coins that it wants to be screened out as invalid coins.
3. The coin sensor uses a proprietary inductive sensor design consisting of no less than three different coils to both activate and discriminate on coin insertion.
4. The MacKay E-Purse provides a count of all coins or other metallic objects passing through the coin chute which did not match the programmed characteristics of valid coins.
5. The coin chute provides a free-fall, almost straight drop channel. Coin jams can be cleared from either the top or bottom of the coin-chute.
6. Neither grime nor moisture affects the coin-chute operation.
7. The MacKay E-Purse has several independent mechanical anti-pull back levers, located at the lower part of the coin-chute, which prevent the retrieval of deposited coins attached to strings, paddles, wires, etc.
8. The coin entrance has a replaceable stainless steel insert to provide some mechanical restriction of the maximum size (width/diameter) of the coins that can be inserted.
9. Coins pass directly through the coin-chute into the sealed coin canister located in the vault area of the meter.

H (2) Card Reader – General

1. The card reader is a plug in module and can be serviced and repaired without recalibration or special tools

2. The MacKay E-Purse main board makes the decision on the purchase of time from all valid cards.
3. The card reader will have a “card present switch” that activates when a card is fully inserted into the card reader. If the card is not removed after a purchase or if the switch is jammed “on,” the MacKay E-Purse will deem the card reader jammed, will indicate the appropriate message, and record on maintenance log.
4. The card slot will not allow entry by currently minted U.S. coins and will have clean outs to allow for removal of debris/paper during maintenance.
5. The MacKay E-Purse frame provides an embossed molded card contact symbol and arrow to indicate which way the card should be inserted.

H (3) Card Acceptance and Discrimination/ Smart Card Reader

1. The MacKay E-Purse has three SAM slots and can be programmed to accept up to three (3) SAM-based smart card schemes. The MacKay E-Purse has non-volatile flash memory and can be re-programmed to change recognition and time value of acceptable cards so new card schemes can be accommodated at a future time.
2. The SAM is used to actively challenge and authenticate each card. Each card transaction is recorded in the MacKay E-Purse’s meter's memory. After card - transactions are collected, they are stored as secondary records, which remain until the next data collection.
3. The MacKay E-Purse can be programmed to accept an industry standard size smart card that has been pre-programmed with a maximum value, decrement value, and security codes to prevent unauthorized duplication of cards.
4. The MacKay E-Purse software controls the card acceptance. The inserted card is powered up and interrogated using the appropriate command sequences and protocols associated with the card application in place to check the validity of the card. Once the validity of the card has been determined, the card purchasing cycle begins. The validity of a card is determined by the protocol requirements of the card scheme.
5. The following language describes generally the internal transactions that occur within the MacKay E-Purse mechanism for a card transaction:

    - Card inserted – card interrupt wakes meter
    - Meter applies power to card – hardware protects against over current, if so shuts down
    - Checks card manufacturer or "answer to reset" – determines card type
    - The card reader checks the issuer area for the correct city/client codes and mapping
    - For the transaction to proceed, the balance on the card cannot be less than the card increment
    - If all above okay, submit security challenge and read balance if successful
    - If balance is sufficient, remove value from card and verify new balance
    - Place time on meter if value has been removed.

6. The following language describes the customer interface for a card transaction:
    - Upon insertion of an authorized card, the mechanism displays the balance of the amount loaded on the card.
    - The longer a card is left in a meter after the card balance is displayed, the more value is debited from the card and time credited to the meter.
    - The meter display credits in increments determined by meter rate table, which is programmed from the San Francisco Parking Management software (SFPM).
    - If the balance on the smart card is less than the increment from the rate table, the full balance will be debited with an appropriate amount of time credited based on the meter's current rate.
    - When the desired time shows on the meter, the customer removes the card to end the transaction.
    - The card cannot be decremented in excess of the time limit available for purchase on the meter.
    - The electronic cash transaction is recorded before time is credited on the meter.

7. The card reader does not lock the card in place, allowing the user to retrieve it at any time in the purchase process.
8. The MacKay E-Purse supports cards with “anti-tear” logic for those instances when a card is removed suddenly from the card reader in the middle of a purchase cycle.
9. Incremental debits for each transaction are accumulated and posted as one transaction to save meter and card memory unless the card scheme selected by the City requires otherwise.
10. The card connector is rated at more than 200,000 cycles under ideal conditions. The MacKay E-purse shall use a sealed card detect switch for the card connector.
11. The card reader module has a connector with internal card contacts. It is mated to a small circuit board to provide a rigid transition to the main board connector.
12. The card reader module has no electronic intelligence of its own. All of the driver and decision-making circuitry that establish communication with inserted cards is located on the main board.
13. The card reader connector provides physical contacts as described by ISO 7816 specifications, Parts One to Four.
14. The card reader has over-voltage protection and current-limiting devices that provide it with protection against acts of vandalism, such as metal plates being inserted into the card reader or AC power being applied to the internal card contacts. The card reader will act as the sacrificial component in this regard and will “blow safe,” protecting internal components and the main board.
15. The card slot has a moisture wipe to minimize the amount of moisture on the card from entering the card reader.
16. The three SAM slots in the MacKay E-Purse can be accessed through either the removal of the battery cover or the removal of the coin chute and front zinc plate.

I Upgradeability and Peripheral Port

1. The MacKay E-Purse has an RJ 45 jack connection visible and accessible just behind the mechanism front zinc frame that supports eight control lines.
2. The connector comes protected with installed rubber dust caps/seals. This connector has the necessary interface signals as well as two industry standard serial interfaces (I^2C and TTL serial UART communications). The I^2C interface provides the ability to add-on a multitude of peripheral devices and hardware such as additional input/output (I/O) memory.
3. The TTL serial interface using an on-board UART allows the meters to communicate with support equipment to re-program the meters, change rates, etc., using a direct connection process. Two-way data transfer is possible, initiated by either the MacKay E-Purse or hardware attached to the RJ 45 peripheral port.

I (1) Lock/Mechanism Peripheral Interface

1. The MacKay E-Purse has a dedicated interface cable that connects the meter to a connector plate located behind the vault door. When the meter vault door is closed, the connector plate establishes a hardwired interface with the electronic lock.
2. During use, the meter will update a remote memory located in the electronic lock, and keep a current count of coins and data on meter status.

J Programmable Feature Options

1. The following time and rate features are programmable on the MacKay E-Purse:
    - Standard rate operation (one rate, 24 hours a day, 7 days a week)
    - Time of day multi-rate operation (up to 8 rates in a 24 hour period)
    - Day of week multi-rate operation (different rates and time limits per day)
    - Charge current rate if time purchased extends into the next rate period, or charge the current rate till the time purchased enters the next rate period, then charge that rate
    - Pre-payment during free or non-paid time (purchase time is held in escrow until meter is operational)
    - No-parking times with warning period
    - Power saver features for no-pay periods
    - Overtime or grace periods
    - Meter holidays (free parking or no pay periods)
2. The City will provide Serco with the description of the profiles that incorporate some or all of the time and rate features described above. The City will have the capability of changing the meter profiles after the initial installation by reprogramming the profiles in the SFPM and uploading the data to each meter.
3. The MacKay E-Purse is programmed with a specific profile to match the desired standard time and rate features. The SFPM software creates these profiles. Once

created, the profiles are transferred to a Personal Data Terminal (PDT) and uploaded to the MacKay E-Purse. See Section VII, Parking Meter Management System.

K Internal Timekeeping

1. The MacKay E-Purse has a 365-day calendar real-time clock with backup capacitor/circuit to retain the day/date/time clock settings during battery replacement. The back-up power provides 3 to 5 minutes to change the batteries without losing the clock settings.
2. The MacKay E-Purse can be programmed at least one year in advance for daylight savings time and will be programmed accordingly by Serco for the first year of the agreement.
3. Time of day clock is accurate to +/- 10-20 seconds per week.
4. The time of day clock is unaffected by the selection of standard or multi-rate operation. It remains in continuous operation and is never adjusted or stopped once the time is set except for daylight savings time.
5. The day of week is tracked in the meter and is displayed along with the time-of-day when the reset button is pressed.
6. The MacKay E-Purse uses the time of day clock to schedule many events, including but not limited to, rate changes, on/off periods, and self-diagnostics.
7. The MacKay E-Purse internal display timers are designed to ensure that a user receives paid parking time. If the display shows 20 minutes after the last coin has been inserted, the user will never get less than 20 minutes of purchase time.
8. Serco will provide a certification by an independent third party test center to certify that the accuracy of the timer countdown meets the criteria set forth in Section I K 3, to confirm that the timer countdown accuracy remains unaffected over the temperature range set forth in Section I A 2, and to confirm real-time accuracy in terms of seconds over a 24-hour period, at ambient as well as high and low temperature extremes.
9. The time on the internal clock will be reset to the PDT time when data is retrieved from the mechanism, including but not limited to during coin collections.

L (1) Memory

1. The MacKay E-Purse has two (2) types of physical storage memory, an 8 KB serial EEPROM for data/graphics messages and 1 MB of non-volatile flash memory used to store the application programs, audit data, card transaction data, and other required data. A reserved block of 32 KB of flash memory can hold up to 1,200 25-byte records.
2. The MacKay E-Purse stores all required maintenance and card transaction data, keeping primary and redundant records in memory.

L (2) Memory Retention at Power Failure

1. Stored data remains unaffected and is retained during power outages, such as a depleted or disconnected battery. The MacKay E-Purse memory stores programs and data for 10 years without degradation.

M Electronic Purse Requirements -Reserved, See H(2), H(3), and L(1)

N Revenue Audit Capabilities

1. The MacKay E-Purse maintains a count of each type of valid coin, invalid coins, and summary of electronic cash amounts, storing each type of information separately in memory. The memory in the electromechanical lock maintains the same information. This information is referred to as Summary Audit Data.
2. The MacKay E-Purse coin count total will be accurate to within 99% of the physical coin count total.
3. All financial audit data and all other card transaction data are retrieved via a PDT.
4. The MacKay E-Purse has two sets of coin count registers; one register is reset after each retrieval of primary audit data, while the other retains a cumulative count of coins until it reaches 64,000 counts (2^{16} bits). Once it reaches its limit, it will reset.
5. Reading maintenance data or resetting the meter for other purposes will not affect financial audit data held in memory by the MacKay E-Purse.

O Coin/Card Acceptance Discrimination – Reserved (See Section I.H)

P Data Management and Integration – Reserved (See Section VI, PDT)

Q Transfer of Data

1. The average time to download Summary Audit Data will not exceed 3 seconds. All other data transfer times will vary by the amount of data being held in the meter.
2. The average time of field programming of meter profiles will not exceed 10 seconds.
3. The transfer time associated with card transaction data will depend on the selected card scheme.

R Field Communications – Reserved, See VI, PDT.

S Swapping Meters –Reserved, See VI, PDT

T Coin Check during Maintenance

1. The MacKay E-Purse has a feature that temporarily disables the recording of cash totals to allow audit data test purchases by coin without being recorded in the audit data. The feature is invoked by pressing the reset button on the meter.
2. After the meter displays its reset sequence, the recording of any coins is immediately disabled to allow for coin testing. The test coins will not register until there has been no coin activity for at least 60 seconds, after which time the registering of coins is enabled automatically.
3. Once the meter testing is completed, the meter will revert back to normal operation without further operator intervention or commands.

U Smart Card Reader – Reserved, See I. H(2)

V Peripheral Port - Reserved, See Section I.I

W Modular Components

1. The MacKay E-Purse will consist of modular components that can be separated for repair and/or replacement.
2. The main wear and tear components can be accessed by removing the three screws, one located on the front and two located on the back of the mechanism casing, using a common Philips screwdriver. All screws remain attached to the zinc frame and will not fall out after disassembly.
3. While the wear and tear components can be easily replaced with the front zinc frame removed, the main board electronics remain covered and protected in their zinc shell.

II. Single Space Parking Meter Case

For the single-space parking meter case, Serco will provide the MacKay MKH4500 meter case (hereafter referred to as the "housing") which is described and represented as follows:

A General Specifications

1. The housing features contoured ductile iron components with the strength of 63,000 psi and a Brinell hardness of 143-187. The nominal wall thickness is 0.280 inches.
2. The housing is fitted with a high security Medeco mechanical top lock (part number 60W1353HT-26-GD) for the upper housing and a Medeco electromechanical lock for the vault.

B General Features – Reserved

C Upper Housing

1. The upper housing cap has four (4) machined lugs that interlock with the upper housing to ensure a tight fit when in the locked position. The cap, when in place, overlaps a raised edge on the main upper housing and is prevented from releasing at four points by a case hardened steel locking bar.
2. The strength of the cap and upper housing interlocking members and tolerances of fit between the upper housing and cap are sufficient to prevent entry into the upper housing by means of wedges, prying attacks and/or less than 100 hits with a 4-lb sledge hammer, as tested by the City.
3. Access to the upper housing does not allow access to the lower housing. The upper housing lock is keyed to a distinct set of lock combinations that cannot be used to open the vault lock. See Section III, Single Space Parking Meter Top Lock and Vault Locks.
4. Serco will provide colored upper housing caps (green, yellow, or gray) depending on the location of the meters. The City will provide Serco with the quantities required for each color.

D Lower Housing

1. The lower housing will be constructed as a one-piece integral ductile iron casting.
2. The lower housing door is field replaceable with common hand-held tools.
3. The lower housing has a round door that is internally hinged to curtail entry by prying.

4. The vault bottom provides a smooth transition from the pole mounting location to the top of the meter to curtail outside forces from hammering or jacking the housing off the post.
5. The lower housing door is precision machined of such materials and to such close tolerances between the door and the lower housing as to prevent any attempt to gain entry by prying or attacks with outside forces such as hammers, wedges and punches.
6. The lower housing has an extended vault that can accommodate an extended coin canister with the capacity for a minimum of $60.00 in U.S. quarters.
7. The lower housing has two 1/8" diameter weep holes located on the bottom of the casing at such a position and angle as to prevent tampering with the lock or sealed coin canister through the hole. The holes do not drain into the mounting post.
8. When open, the lower housing door positions the coin canister at the front of the meter at approximately a 45-degree angle to permit easy removal and collection.
9. The housing is engineered so that the coin canister and the coin chute on the MacKay E-Purse are aligned to allow a straight, unimpeded coin drop between the coin chute and coin canister.
10. Access to the lower housing coin vault is gained through a lock on the vault door that is fitted with a Medeco electromechanical lock. (See Section III, Single Space Parking Meter Top Lock and Vault Locks.) The lower housing vault lock is accessible only through a narrow channel in the lower housing door.
11. The lower housing vault lock will be rear-loaded. No physical portion of the vault lock is exposed outside the meter housing.

E Exterior Finish

The housing is phosphatized, rinsed, dried, electrostatically polyester powder painted and baked to withstand at least 1,000 hours salt spray and 140 inch pounds of impact resistance. The finish will be scratch resistant and will not flake or crack upon impact.

F Viewing Dome

The housing has a one-piece, high-visibility, flat-face-style viewing dome. It is made of a high impact polycarbonate material. There is a waterproof seal between the viewing dome and the base of the upper housing cap. The housing cap and viewing dome have three (3) vent holes to reduce condensation inside the casing. If these vent holes are not sufficient to reduce the condensation for more than ten percent of the MacKay E-Purses for four hours of an operational day and four months of the year, Serco shall work with the City to reduce the condensation in the housing.

G Attachment to Post

The housing is fastened to the mounting post with an internal mounting system that incorporates three jaws, an expander nut and a grade 5 bolt.

H Testing

Prior to the start of installation, Serco shall provide the City with a certificate from an independent certified lab showing that the complete housing has passed a 300 lb impact test of the dome cap assembly, upper housing, lower housing, and vault door and that the lower housing vault door locking system and the upper housing cap locking system is resistant to forced entry by use of manual (non-powered) tools.

I Upper Housing Lock, Reserved, See Section III, Single-Space Parking Meter Top Lock & Vault Lock

J Coin Canisters/Collection Vault

1. The extended coin canister is sealed and holds a minimum of $60.00 in quarters.
2. The extended coin canister is constructed so that it allows the entire process of transferring coins from the meter housing to the collection vault to be completed without access to the coins by collection personnel. The coin canister is inserted into a receptacle mounted on a collection vault for depositing coins. Rotating the coin canister while inserted in the collection vault permits coins to drop into the secure collection vault. Upon removal from the collection vault, the sealed coin canister automatically locks for reinsertion into the meter housing.
3. The extended coin canister (MacKay part number 16-511-J) is 6.070" tall and 3.000" in diameter and is comparable to a POM model 108-006 coin canister**.**
4. The extended coin canister is made of impact-resistant acrylonitrile-butadien-styrene (ABS) material.
5. The extended coin canisters will be coded with a unique identification number on a waterproof sticker.

K Housing/Identification

A small metal ID tag will be permanently attached to the housing. The metal tag will have a unique identification number. The ID numbers will be sequential, 6 digit numbers, starting at 000001, with leading zeros shown. The metal ID tags are secured to the lower housing using small metal rivets pressed into pre-drilled and painted anchor holes. The metal ID tag will be located on the lower back side of the lower housing.

L Vault Door Label

A single label/decal will be attached to the vault door. The City will provide the text/graphics associated with the label. The label will be attached using a proven adhesive. The vault label text is identical on all housings.

III. Single-Space Parking Meter Top Lock and Vault Lock

For the MacKay MKH4500 meter case, Serco will provide a Medeco mechanical lock (part number 60W1353HT-26-GD) for the upper housing lock, and a Medeco electromechanical lock for the lower housing vault door, which are described and represented as follows:

A General Specifications – Mechanical Lock

1. The mechanical lock is a high security, multi-pin lock with anti-drill and anti-pick features. The lock is a four-pin high security lock comprising of variable-length tumbler pins, the tips of which are cut at angles leading to pins which lift and rotate when a proper key is inserted, providing a high resistance to picking attacks. The basic plug material is plated brass. The lock technology is patented until 2015
2. The lock has the following design features for attack resistance; 1) small stainless steel rods (security pins) are inserted in the plug face of the lock in front of the lock's sidebar and tumbler pins making the lock more difficult to drill and reducing the risk of access to critical locking mechanisms; 2) stainless steel rods are inserted into selected tumbler pins, making the lock resistant to a drilling attack.
3. The lock is rated at UL437 for picking and drilling resistance and meets or exceeds the ANSI/BHMA A 156.11 Grade I testing requirements.
4. Serco will provide four (4) top lock combinations unique to the City. The City will provide Serco with the required quantities of each lock combination.

A (2) General Specification – Electromechanical Lock

1. The electromechanical lock includes the mechanical lock described in Part A above. In addition, a cam design enables a fail-secure “free rotation” of the plug in the event of over-torquing with a tool inserted in the keyway.
2. The electromechanical lock uses the Data Encryption Standard (DES) method for secure communication with the PDT. The circuit board assembly in the lock contains a microprocessor while the memory chip contains the unique, encrypted electronic key number for that specific lock. The DES communication assures the vault lock identifies the PDT as being properly programmed with the electronic key number. Once this combination is verified, the circuit board's microprocessor allows current to flow to a solenoid device, which interferes with normal bolt movement. Once the solenoid is activated and moves out of the way, the normal rotation of the key in the lock allows the bolt to move the vault door to open.
3. The solenoid plunger operates perpendicular to the road surface to prevent jarring attacks against the lock. The solenoid locking mechanism will be completely factory sealed to prevent field tampering.
4. The random number generation during DES communication assures that the data transferred between the lock and the PDT differs on every transaction. Using the

DES standard, a thief has about a one chance in 72,000 trillion of selecting the correct lock identification number.

5. The lock circuitry can determine a legitimate or illegitimate power source and can distinguish between a valid PDT device and a surreptitious electronic entry method. In case of lock failure, the entire lock circuitry fails secure without allowing the solenoid blocking device to be powered and the lock to be compromised.
6. The electromechanical lock is fully integrated and installed into the housing.
7. The electromechanical lock is self-contained and requires no electrical connection to other devices. The lock has no power when the meter is idle and when the keycord is not present. Power is provided to the lock when the MacKay E-Purse is active and updating the lock memory. Once a PDT is connected to the electromechanical lock via a keycord, the PDT battery will provide the power needed for the lock. Once the keycord is removed, the lock has no power connection and waits passively until the next PDT is connected to it or until the next MacKay E-Purse activity.
8. The electromechanical lock has a 32KB memory that can store 65,000 records of each of the valid coin types and electronic cash.

B Keys and Keycords

1. The lock key is one-eighth inch thick and made of nickel-silver alloy. The key is used horizontally, with angled key cuts on the wide edge of the blade. The key is used as a vault door handle when opening the housing.
2. The key blade is connected to one end of a heavy duty "telescoping" electronic keycord. The key blade will be held in the handle with hex screws to make the key blade field replaceable. The key handle is ergonomic in design and provides for strain avoidance.
3. On the key, mounted in close proximity to the key blade, is a spring-loaded contact pin that aligns and makes an electrical contact with the data contact of the lock's plug face. This connection provides for communication and power transfer between the PDT and lock.
4. The other end of the keycord ends with a DB-9 screw down connector to the PDT. This connector has been designed to provide maximum strain avoidance.
5. Serco will provide replacement keycords to the City for each PDT for the Term of the Agreement. The key and keycord have adequate stress relief at both ends to provide a useful life of between 12 and 18 months normal service.

C Field Serviceability

1. The mechanical locks are field replaceable with the use of common hand tools.
2. The electromechanical part of the vault lock is not a field serviceable unit. Simple service to external brackets is possible by field personnel, but not repair or service of the electromechanical locking portion, circuitry, solenoid, wiring, or custom brackets.

Service is accomplished by removing the vault door and installing a replacement door while the old vault door is returned to Serco.

D Environmental Tests

The locks operate dependably under environmental conditions found in the City. The locks have been tested for proper operation after being subjected to the following conditions:

Environment	**Condition**
Operation at high temperature	+60 Celsius
Operation at cold temperature	-40 Celsius
Thermal cycle	10 cycles, +60/-40 Celsius
Thermal shock	10 cycles, +60/-40 Celsius 50 degrees change per minute
Salt fog	ASTM B-117, 48 hours, 5% salt
Freezing rain	ASTM F-883, 2 gallon soak, -10 Celsius
Humidity	Mil 883C, Method 1004; 15 to 90%, 0-60 Celsius
Vibration	Sinewave, three axes, 100-500 Hz, 1.5 g's, 0.25 Oct./min

E Cycle Testing

Electronic components used in the lock circuitry are rated for at least 50,000 cycles without any sign of improper or excessive wear.

F Electronic Tests

1. The electronic circuitry contains intelligence to determine whether the input voltage comes from a valid source. If the source is valid, the lock and PDT exchange encryption challenges and the electromechanical lock will open if authorized. If the source is invalid, the lock will fail secure. At no time will the lock fail in a manner that would allow the electromagnetic blocking device to be inadvertently moved and enable the lock to be opened.
2. The electronic components of the lock have been evaluated for susceptibility and failure to severe attacks such as those described below. In some cases below, the lock fails secure but the electronics of the lock are permanently damaged and would need to be replaced.

Test	**Condition**
DC over-voltage	up to 60 volts, unlimited current
AC over-voltage	up to 120 volts, unlimited current
Electrostatic discharge	qualified to +/- 25,000 volts.

Test	Condition
Modulated DC input	9 volts, 0-100 hertz
Data retention	168 hours at 135 Celsius
Memory endurance	10,000 read-write cycles, no loss of data

G Physical Attack Tests

The lock assembly as mounted in the housing has been tested for its resistance to physical attack methods and has the following performance characteristics:

Test	Description	Measured Value
Plug Drill	Drill plug and gain access	9/64 drill; 4 minutes; no entry to cash vault
Plug Punch	Punch the plug to gain access	3 lb hammer; 5/8 punch; multiple blows; no entry to cash vault.
Plug Pull	Pull the plug to gain access	Greater than 3,000 lbs; no entry to cash vault.
Plug Torque	Attempt to open by rotating plug with a tool inserted in key way.	Unique cam design allows for fail secure at 65 inch pounds; no entry to cash vault.
External Heat	Heat with a propane torch.	Direct heat 3 minutes; no entry to cash vault.
Hammer Bounce	Use a 2-lb hammer to overcome spring device in solenoid	Multiple sets of 25 blows to lock; no entry to cash vault

H Electronic Lock PDT

1. The electromechanical lock uses the PDT with an attached Add on Device (AOD) electronics block and battery pack to operate the vault locks and download Summary Audit Data, Primary Audit Data, and maintenance data.
2. The electromechanical lock is managed using Meter Secure software, a utility module that will be fully integrated, physically and operationally, in the SFPM software. The locks have a proprietary protocol for communication between the lock and the PDT. The City will retain the rights to the license to the communication in perpetuity. For more information, see Section VII –San Francisco Parking Management Software.

I Mechanical Lock Key Security

1. The key blanks are solely manufactured by Medeco High Security Locks, Inc. and protected under patents 5,615,565 and 6,023,954, which are valid until 2015.

2. The key way is factory restricted, so all orders for duplicate keys must be ordered by an authorized signature from the Medeco factory. The City will be the authorized agent for the ordering of duplicate keys.

J Data Security – Reserved, See Section VII, San Francisco Parking Management Software

K PDT Software – Reserved, See Section VII, San Francisco Parking Management Software

L Electronic Key Management Software– Reserved, See Section VII, San Francisco Parking Management Software

M Software and New Release Support –Reserved, Reserved, See Section VII, San Francisco Parking Management Software

N Electronic Lock/Mechanism Peripheral Interface

1. The peripheral interface uses a three conductor, data cable and stainless steel spring terminal assembly that connects the MacKay E-Purse and the electromechanical vault lock.
2. The interface data cable is attached to insulated contact posts on the right hand vault door mounting bracket of the housing. The cable is placed through a wire guide to keep it out of the way of the coin canister in the vault housing and to provide a drip loop. The cable is inserted through the vault into the upper head of the housing through one of two holes provided for this purpose. The data cable end from the electromechanical lock is plugged into a mating cable attached to the MacKay E-Purse.
3. When the vault door is closed, the spring data points make contact with the interface connector and data can be passed to and from the MacKay E-Purse. When the door is opened, this connection is broken and there is no communication with the MacKay E-Purse.
4. The mating cable has a molded waterproof automotive style connector. The mating cable end contacts will be brass with gold flash plating.
5. The data cable is of sufficient length to allow the MacKay E-Purse to be removed from the upper housing to change the battery and carry out other inspections without having to disconnect the data cable.
6. The mating data cable on the electronic meter does not make use of the electronic meter's RJ45 peripheral port, which is reserved for future upgrades.
7. Summary Audit Data is held inside the electromechanical lock memory and retrieved through the lock automatically when the vault door is open.

8. The peripheral interface between the electromechanical lock and the MacKay E-Purse will allow financial audit data, card transaction data, and maintenance record data to be automatically and selectively retrieved by the PDT whenever a key is inserted into the vault lock. This functionality will be implemented in phase two of the project. See Section VII, San Francisco Parking Management Software.

O Installation Plan, Reserved, See Section X, Installation

IV. Multi-Space Electronic Parking Meter

For the multi-space meter, Serco will provide the Reino multi-space meter (hereafter referred to as the "Reino") which is described and represented generally as follows:

A General Specification

1. The Reino's fully electronic parking control unit can control between 2- and 10 spaces depending on the model used.
2. The Reino features a 12-button touch-sensitive keypad mounted behind ½ inch of polycarbonate substrate. There are no moving parts and the entire keypad area is sealed from the effects of rain, pollution and other environmental elements.
3. One Reino controls the timekeeping of each parking space and has sequentially numbered individual space activation buttons.
4. The Reino is designed for people of various heights, including those confined to wheelchairs.
5. Interactive help screens on the Reino front display guide the user through the use of the machine.
6. In regular operation a user cannot insert coins without first selecting a space. If a user tries to enter a coin without selecting a space number, the Reino will detect the coin, sound a warning tone and display an on-screen message.
7. The unit is fully field programmable and is capable of future upgrades. All meter updates and programming changes and future upgrades are loaded using a Field Programming Module (FPM).
8. Most accessories and upgrades for the Reino can be added without special tools, such as software upgrades for additional features, implementation of additional smart card systems and on-line network capability.

B Indications

1. A backlit Liquid Crystal Display ("LCD") on the front of the Reino will indicate to the user which space is being paid for and time remaining for that space. The Reino has one 3-1/2 inches x 2 inches backlit graphics display.
2. The screen can display custom characters of different sizes and graphics, providing interactive instructions and messages for users, including but not limited to time of day, type of parking zone, and rates.
3. The electronic display also indicates all necessary operating status messages to smart card users and repair personnel.
4. The backlighting feature of the front display is a fully automatic "sensing" type, varying depending on ambient light. During daytime, backlighting is not turned on in normal operation. At dusk and dawn, backlighting is applied at full power, gradually decreasing as darkness descends or increasing as daylight brightens, using the lowest

backlight power for nighttime viewing. A technician can change these settings and turn off the backlight feature in an average time of 30 seconds. Changing these settings can be made by using the controls on the inside of the Reino or by using an infrared identity key.

5. Reino's "Enforcer" rear indicators show the status of the metered spaces. The indicators show blank if the space is paid and red if the space is expired. All indicators are large, bright, street-side mechanical "dots" that allow the meters to be enforced from a vehicle. In addition, the Reino has two additional indicators below the variable space number indicators. These indicators display a yellow dot if the device is out of service. With the rear indicators, an enforcement officer has a clear view of the status of the Reino controlled parking spaces from a distance on a vehicle.
6. From the sidewalk, to enforce parking an officer pushes the enforcement button to provide instant space status for up to 10 vehicles at a glance. This button gives an accurate single screen summary of how much time each space has remaining. If the space is expired, it shows how long that space has been in an unpaid status.
7. Rates and enforcement information are also displayed on slide-in graphic sheets. They consist of laminated paper sheets that mount behind a 10mm thick, polycarbonate facial lens so they cannot be vandalized and are changeable.
8. The Reino has a large white on blue international "P" parking symbol decal on its casing. It is located on the front, back and side of the machine and is manufactured from 3M exterior grade reflective film.

C (1) Coin Acceptance and Coin Slot

1. The Reino can be programmable to accept up to 14 different coins and/or tokens. It will be pre-programmed to accept the U.S. dollar coin (Sacagawea Golden dollar), Susan B. Anthony dollar, Quarter, Dime and, Nickel.
2. The Reino can be re-programmed to change recognition and time value of acceptable coins and/or tokens.
3. Reino uses the Mars Cashflow 330 coin validator. The coin validator can discriminate and report on 14 different coins at once.
4. The Reino has an automated return mechanism that returns coins that are rejected by the validator.
5. The Reino coin counts are accurate to 99% of physical coin count totals.
6. The coin validator is located centrally in the unit and is accessible by service technicians. The coin validator uses no contact points and is highly resistant to the effects of grime or moisture. Any moisture from humidity or heavy rain must pass through the closed coin shutter and cross a deliberate moisture gap before it can reach the upper coin race. The upper coin race is a "helix" construction, which turns coins 90 degrees before they enter the validator, so moisture or fluids drain out of the way through the integrated drainage slots.

7. The entrance to the coin chute is replaceable plastic to accommodate or screen out coins of various sizes.
8. The Reino coin entry shield helps to prevent debris from being entered into the machine. Unless a space is pressed and a coin is inserted into the coin entry chute, the coin chute door will not open. After-hours, the door remains closed while the front displays the next paid parking period.
9. The Reino has an automatic coin jam clearing function. If the Reino's optics-based system detects that a metallic or non-metallic object has entered the validator but has been neither rejected nor accepted, it will automatically open the validator "flight-deck" to more than 4 times its regular path width and attempt to eject the jam. If the jam is not cleared or ejected, the Reino will shut down after a specified number of subsequent coins/objects are inserted and also fail to clear/eject. The City will provide Serco with this setting.
10. The coin chute contains an anti-backup mechanism to prevent the retrieval of coins. The Reino will not allow the retrieval of coins up the chute by way of "stringing".
11. The coin entry is positioned so it does not obscure the front display during a transaction

C (2) Card Acceptance and Card Slot

1. The Reino has 4 SAM slots.
2. The programming and configuration of the Reino to accept smart card payments is not included in the price of the unit. The cost to program and configure the Reino to accept the Translink card is included in Section VIII, Smart Card Program.
3. The Reino can log up to 800 transactions with the following card transaction information

    - Equipment type
    - Area number
    - Meter number
    - Record number
    - Bay number
    - Bay credit in seconds before deduction
    - Amount paid
    - Date of transaction
    - Card serial number
    - Card balance
    - Data checksum

4. The card reader is angled upwards into the machine so that moisture, dirt or debris cannot easily penetrate it.
5. The card slot is positioned so that it does not obscure the front display during a transaction.

D Housing

1. The Reino has a theft-resistant stainless steel housing. The housing is made of marine-grade 316 stainless steel, which is "pickled" and "passivated" in a multi-step process that removes imperfections and ferrites and seals the surface from environmental attack. The housing is resistant to drilling, cutting and oxy-acetylene attack and will not rust or corrode. Graffiti and spray paint can be removed with little effect on its surface and it will not chip, flake, scratch or fade. The housing also reflects heat away from internal components.
2. The contours of the housing protect the keypad, display, and coin entry from direct blows by vandals.
3. The vault door is a 5mm thick laser-cut stainless steel and has 5mm laser-cut stainless steel sliding double lock bar. The flanges around the vault door are 10mm thick stainless steel. The door hinges are concealed, internal 10mm stainless steel rods. The vault door defaults solidly to the closed position.
4. The housing is reinforced by double "U" section stainless channeling. The entire unit is welded together using high-powered precision spot welding machines.
5. The housing is plumb mountable on inclined sidewalk surfaces by mounting bolts that are accessible only to City maintenance personnel. Reino will be anchored to the ground with six hardened steel "L" bolts buried into a large concrete footing. The Reino can be mounted on sidewalks of any grade, including the steepest hill in San Francisco (17 degrees).

E Locks

1. Reino meter vault doors have Medeco electromechanical locks compatible with the single space parking meter electromechanical locks as described in Section III herein.
2. The upper locking mechanism is made from stainless steel. It features a "double hook" mechanism that distributes any attempt at force between the 5mm locking plate and the heavy stainless steel meter body. It will also "over tighten" so that any force applied to it will make it close more tightly.
3. All Reino lock mounts are press-formed from 5mm stainless steel. The upper locking mechanism and the vault locks are mounted behind the body armor of the housing so that they cannot be attacked from the front or pulled forward. Both lock mounts have an integrated "punch-through" protector to stop them from being pushed inwards. The lock mounts also have sliding lock covers to prevent idle vandalism.

F Power Supply

1. The Reino uses a Zinc-Air battery, which gives the Reino a minimum of 12 months of operation.
2. The Reino displays a low battery indication on the technician’s on screen menus or automatically through the Intelligent Cash Box system and the SFPM software.

3. The Reino offers three methods of checking for low battery voltage: (1) A red LED on front display signifies low battery voltage; (2) the maintenance menu provides a running total of the current battery voltage; (3) the Intelligent Cash Box provides a log of the meter's battery voltage.
4. The Reino unit will retain its rate structure and all financial audit and maintenance data during battery replacement and/or failure. An on-board capacitor will ensure that no programming or current time settings are lost during battery changes. The Reino programming and time settings can be kept for approximately 10 years in memory without data loss.
5. Serco will provide one spare Zinc-Air battery with each Reino.
6. The Reino has a power saving settings in its programming, putting the Reino into "sleep" mode when idle. This feature saves power and extends battery life.

G Serviceability

1. The Reino circuit board, LCD display coin path components, locks, and keypad can be exchanged in the field.
2. The Reino will not require replacement of any components due to wear and tear during the warranty period, except for the battery, under the condition that the City regularly inspects the unit for damage due to accidents, abuse and vandalism, promptly repairs any such damage, regularly cleans the unit, including the mechanical “dots”, according to the manufacturer’s specifications and regularly lubricates the locks according to the lock manufacturer’s specifications.

H Diagnostics

The Reino features on-board diagnostics that include a full on-screen menu which enables technicians to analyze problems on-site, including but not limited to the light sensor, infrared ports, door switches, cash box detectors, and coin validator. The Reino also features an out-of-order function which time stamps the out-of-order event for eventual comparison to parking ticket information. This information is automatically collected as part of the Intelligent Cash Box data and is incorporated into the SFPM.

I Data Management and Integration

All operational data, maintenance data and financial audit data (including itemized smart card transactions) will be available for import to the SFPM software through the Intelligent Cash Box. All data is stored in a memory chip on the Intelligent Cash Box and will be transferred to the SFPM software via the Intelligent Cash Box reader at the time of coin counting.

J Transfer of Data – Reserved, See Section IV, K

K Field Communications

1. The Field Programming Module (FPM) is a small handheld device that can contain up to 100 different meter profile settings. Using the FPM, maintenance staff can upload rate and meter profile information from the SFPM to the Reino. Once in front of the Reino, the maintenance staff plugs the FPM into an interface on the central processing unit (CPU) of the Reino. The technician selects the desired program for the entire Reino using the on-screen maintenance menu.
2. The Reino has an infrared data port. With an infrared identity key enables technicians to access the programming menus without opening the meter. These keys are encrypted and security rated for access to only the City's Reinos. Lost or stolen keys can easily be de-listed.
3. Once the Reino is in service mode, maintenance staff can run four test functions to investigate or change the working condition of the meter. They are:

    a) *Display Sensors*
    Checks the operational status of the top door, vault door, cashbox, temperature, and battery voltage.

    b) *Set RTC*
    Set the time

    c) *Bay Setup*
    Set up the parking spaces to operate on different schedules

    d) *Meter Setup*
    Change the function of the rear space status indicators, associate rear space indicators with different parking spaces, and set the optics monitor that controls the sensor settings.

L Electronic Purse Requirements

1. The Reino has a 4-SAM slots mounted so that the SAMs can be replaced in the field.
2. The Reino microprocessor can act as an intermediary between the SAM and the card, passing commands to the card based on the information in the SAM’s configuration file. The Reino has four flash memory areas of 64K each. The control parameters for smart cards are a part of the 64K storage area for the parking meter program. The Reino also has 16K flash memory storage area for smart card transaction data. The Reino will store card balance and transaction amounts, card serial numbers, and other electronic cash data requirements.

M Revenue Audit Capabilities/ Intelligent Cash Box

1. All financial audit data and maintenance data will be collected using the Intelligent Cash Box. As cash is collected and drops into the cash box, the data is stored on the meter motherboard, and a duplicate set of data is generated and stored on a memory chip in the cash box. At the time of collection, the meter collector removes the cash box and replaces with a new one. When the coins are counted, the cash boxes will be placed on a cash box reader, which downloads all financial audit data and maintenance data into the SFPM. The financial data on the Reino will be held for 11 collections before being deleted from memory.
2. The Intelligent Cash Box captures the following data:
    - full coin breakdowns (into coin denominations)
    - percentage full
    - date and time the cash was inserted
    - date and time the cash box was removed
    - previous ten collection records
    - voltage level of battery powered machines
    - times and dates when the meter has been in and out of order
    - card transaction data
3. The high impact, polycarbonate Intelligent Cash Box has been designed with an integrated recessed handle unit and flat exterior surfaces, which allows them to be stacked, side by side and on top of each other.
4. The Intelligent Cash Box is fully interchangeable between Reinos.
5. Each Intelligent Cash Box has a coin volume of nearly 1 gallon or between $400 and $450 in quarters.
6. The cash box is a closed unit that uses a cam lock for security. The lock ensures that no cash is handled on the street by any collection staff. Cash collection is by locked cash box exchange.

N Smart Card Reader – Reserved, See I.H(2)

O Warranty – Reserved, See XIV, Warranty.

P Memory

1. The Reino's memory is divided into four sections, with each one having a specific function. The memory capacity of every Reino can be expanded by adding an expansion board to the meter.
2. Memory bank one is an E2PROM that is used to store the customized information specific to the particular Reino, such as but not limited to location, identification number, and area number.

3. Memory bank two is a battery backed RAM (62256) that is used as secure data storage space for bay timers and customer information. The RAM is also used as a working area for the Reino software application and as a buffer for download data.
4. Memory bank three a EPROM (27C010) divided into two sections of 64K. This memory stores the Reino default parking meter software and the service program.
5. Memory bank four is flash memory (AM27F040) divided into four sections of 64K each. The Parking meter program takes up one 64K segment. The set up messages are stored in one 32K segment, schedules and rate configurations are stored in one 16K segment. The card transaction log is stored in one 16K segment. The Reino also has two additional 64K blocks for additional storage capacity.

Q Upgradeability

1. The Reino has a RS232 port that can be used to communicate with external serial devices
2. The Reino has an I2C industry standard bus, which allows it to communicate with other I2C devices.
3. The Reino main electronics board has a I/O processor bus connector. This interface has power, address, data, and control lines.

R Programmable Feature Options

1. The Reino is programmable to accept a schedule for all of the different parking spaces controlled by the device. Each schedule can contain settings for the following conditions:
    - Regulated parking periods
    - Free parking
    - Pre-pay or deferred decrement periods
    - No parking
    - No stopping
    - Street cleaning
    - Loading zones
    - Bus zones

2. The Reino rate table contains the settings for the parking rate, maximum parking time, grace periods, no coin timeout, card maximum amounts, and card purchase increments.

S Internal Timekeeping

1. The Reino uses a quartz crystal to keep time. These crystals have an accuracy of +/- 20 ppm. Using this worst case scenario, the internal clock of the Reino will be off by .072 seconds per hour.

1 second	=32.76800 Khz
1 hour	=3600*32.768 Khz
	=117,965,000 counts per hour
20 ppm	=117,965,000/1,000,000
	=2359 counts per hour
	=2359/32768 seconds
	=.072 seconds per hour

2. Time drift is corrected by using the Infrared Identity Key or through the keypad as part of routine maintenance.

V. Multi-Space Unit Materials, Parts and Supplies, Reserved

A Installation and Training – Reserved, See Section X, Installation Plan and Section XI, Training Plan

B Subsequent System Maintenance - Reserved, See Section XIII, Warranty

VI. Lock and Maintenance Portable Data Terminals/Cradles

For the electromechanical lock and single-space meter maintenance Portable Data Terminals, Serco will provide the DAP technologies model CE5320 personal data terminals (hereafter referred to as the "PDT"), which are represented and described as follows:

A General Specifications

1. The PDTs use an Intel StrongARM SA1110 processor, 206 MHz
2. The PDT has a hard connection to allow for hands-free operation during data downloads.
3. The PDT uses Microsoft Windows CE Version 3.0 operating software with custom software installed to provide users with tasks from a menu driven interface. Users will not have access to the base operating system to make changes to the programming of the PDTs.
4. The PDT performs the following activities for the MacKay E-Purse:
    - Retrieval of financial and other itemized transaction data
    - Re-programming time and rate structures
    - Retrieval of maintenance information
    - Inventory management
    - Repair functions
5. To open the electromechanical lock, the PDT uses an attached AOD, which is an electronics block and battery pack designed to provide power and a modulated signal via the single data contact on the key to the lock.
6. The PDTs are configured to accept both the MacKay smart card interface (SCI) and the electromechanical lock interface (LKI). Field communications for maintenance functions will be via the PDT initially by direct contact with the MacKay E-Purse through the SCI, then via the LKI at the end of Phase II of the SFPM implementation. For more information, see Section VII, San Francisco Parking Management Software.
7. The PDTs, using the LKI, will open the electromechanical locks on the MacKay E-Purse and the Reino.
8. The SCI is attached with a cable to the PDT communications port. The LKI is attached to the AOD.
9. The LKI will only communicate with authorized PDTs. Unauthorized devices will be ignored.
10. The PDT is able to open 600 locks and download summary audit data on one battery charge.
11. The PDT with the vault key attached has the ability to open successive meters within 2 seconds of the removal of the key from the previous meter.

B RAM Memory

The PDT has at least 16 Megabytes of RAM and 8 Megabytes of Flash Memory.

C ROM Memory

The PDT uses non-volatile memory to store the vendor supplied operating system software, including:

- BIOS
- Operating system
- Systems utilities
- Battery levels power manager utility
- PC to PDT communications software

D Data Transfer and Charging

1. Serco will provide one "drop in" fast recharging cradle per PDT. The PDTs will connect to the SFOM and other person computer resident software when placed in the cradle.
2. Once the PDT is placed in the cradle, the PDT batteries will recharge. The cradles do not require an operator to make any further physical connection with the PDT.
3. The SFPM will schedule the data transfer between the PDTs and the SFPM.
4. For Phase I, PDT cradles will be installed at the DPT meter shop. Once Phase II of the SFPM is complete, PDT cradles will be located at the DPT meter shop and the Serco San Francisco Office.
5. During charging, the PDT displays a red LED when charging or a green LED when charging is complete. Charging a PDT can take up to five (5) hours.
6. To maximize battery life and overcome battery memory effect, the cradle has an automatic utility for PDT battery self-discharge and conditioning.
7. Batteries for the PDT are rated to last between 12 and 18 months. Serco will, for the term of this agreement, replace any batteries that stop re-charging or stop holding their charge.

E Readers and Ports

The PDT reader and port configuration will be two internal RS 232/V24 serial communications ports directed to two robust externally accessible connectors, one located on the AOD and the other on the side of the PDT.

F PDT Management Software –Reserved, See VII, San Francisco Parking Management Software

G Data Input and Availability – Reserved, See VII, San Francisco Parking Management Software

H PC to PDT Communication – Reserved, See VII, San Francisco Parking Management Software

I Portability

1. The PDT is ergonomically sized and shaped, and light enough to be carried in an average person's hand comfortably.
2. The PDT has a lightweight rugged case with an integral back strap and positive retention device to prevent loss.
3. The PDTs are equipped with a holster that can be either slung from the neck and shoulder or fastened by a belt at the waist level.

J PDT Software and New Release Support – Reserved, See VII, San Francisco Parking Management Software

K PDT Warranty – See XIV, Warranty

L Reserved

VII. San Francisco Parking Management Software

Serco will supply and install the San Francisco Parking Management Software, hereafter referred to as "SFPM," which is described and represented as follows.

A SFPM Functionality for Users

The SFPM will allow specific user groups to carry out the following tasks:

DPT management staff
- Program meter profiles.
- Set up maintenance and meter collection routes.
- Authorize and manage the downloading of route data to the PDTs, including authorization codes for the electromechanical locks and maintenance work orders.
- Review all data uploaded to the SFPM software from PDTs and the Reino Intelligent Cash Box Reader.
- Generate both programmed and user defined reports.
- Collect GPS meter locations.
- Connect SFPM data to external GIS applications and databases. This data will be SQL compliant.

DPT meter maintenance staff
- Open the electromechanical locks on the parking meters either according to pre-set routes or individually according to previously submitted work orders.
- Collect maintenance transactions data using PDTs and the Reino Intelligent Cash Box.
- Upload meter profiles using the PDTs.
- Program the Reinos using the infrared identification key and FPM.
- Using a PDT, view single space meter maintenance transactions, look up work orders according to pre-set maintenance routes or individually, and enter work order data.

DPT citation division staff
- Look up the maintenance status of individual meters according to date and time.

DPT IT administrators
- Manage system access control and security.
- Monitor activity on the system.
- Undertake standard network management tasks and load software updates.

San Francisco-based Serco management staff
- Set up meter collection routes.
- Manage the downloading of collection route data to the PDTs
- Input coin counting data.
- Review all data uploaded to the system from PDTs and the Reino Intelligent Cash Box Reader.
- Generate both programmed and user defined reports.

- Ensure SFPM-generated data is seamlessly compliant with CCSF GIS system.

Serco technical support staff
- Access the system remotely to undertake fault/incident investigation.
- Monitor the system, perform required maintenance and implement intermediate software upgrades.

Serco parking meter collectors
- Open the electromechanical locks on the parking meters according to pre-set routes.
- Collect audit data using PDTs and the Reino Intelligent Cash Box.
- Using the PDTs, enter meter maintenance requests for individual meters.

B Computer Hardware and Related Software

Serco shall provide the following computer hardware items for the SFPM System. The City shall approve all hardware before purchase. The specifications described below are the minimum specifications for the devices described below:

1. One (1) Compaq Proliant ML370 Database server system
   - 5U rack mount assembly complete with integrated 100 Mbit/sec network adapter
   - Single Pentium III, 1GHz/133, 256K cache processor
   - Two Hot Plug power supplies for redundancy purposes
   - 1024 Mb ECC WORKSTATION133 memory as 128MB, 256MB and 512MB chip packs
   - Basic keyboard, monitor and mouse
   - 4, hot swap hard drive bays populated with 18.2GB, 10,000 rpm hard drives configured as a RAID-5 array with a nominated hot spare drive. This is estimated to provide approximately 36 Gb of RAID-5 hard disk storage
   - Internal tape backup – 30/70 MB AIT Tape Drive
   - Smart RAID controller
   - Windows NT Server V4.0 operating system
   - Adaptec 2944 UWSCSI adapter and cable

2. Four (4) Dell GX110 – ‘S’ chassis Workstation systems
   - Desktop enclosure with 2 WORKSTATIONI expansion slots, integrated 10/100 RJ45 auto-sensing network adapter, embedded AGP graphic adapter, CD-ROM and 1.44MB floppy disk drive.
   - Pentium III, 800 MHz processor with 256K L2 cache.
   - 128 Mb, 100 MHz SDRAM.
   - 10 GB EIDE hard drive (7,200 rpm).
   - Dell P791 Performance 17” (16” VIS) FST Monitor, Standard 105 key, keyboard and 2 button PS/2 mouse.
   - Windows NT Workstation V4.0 operating system.

3. One (1) Dell GX110 – 'S' chassis Workstation system
   - Desktop enclosure with 2 WORKSTATIONI expansion slots, integrated 10/100 RJ45 auto-sensing network adapter, embedded AGP graphic adapter, CD-ROM and 1.44MB floppy disk drive
   - Pentium III, 800 MHz processor with 256K L2 cache
   - 128 Mb, 100 MHz SDRAM
   - 10 GB EIDE hard drive (7,200 rpm)
   - Dell P791 Performance 17" (16" VIS) FST Monitor, Standard 105 key, keyboard and 2 button PS/2 mouse
   - Windows NT Workstation V4.0 operating system
   - Adaptec AHA-2940 Ultra SCSI adapter and cable

4. Two (2) HP LaserJet 2100 TN Network printers
   - 4 MB memory
   - WORKSTATIONL 6 /Postscript L2 printer languages.
   - 3 paper trays together
   - Ethernet connectivity

5. One (1) Cisco 2501 router
   The Cisco 2501 router shall be a fixed configuration device which offers Ethernet (AUI), 10BaseT and Ethernet Hub and 2 (two) Synchronous Serial interfaces. The Cisco 2501 switch shall use Flash EPROM technology with IOS rev 12 or later for simplified software maintenance and support a variety of Cisco IOS software feature sets, allowing a selection of a feature set that supports the specific protocol environment. The software feature sets shall support (but not necessarily be limited to) IP/IPX functionality. The 2501 router is a single LAN router based on a 20 MHz 68030 processor with a minimum of 8 MB of Flash memory. The system shall be packaged as a 19 in. rack-mount/wall-mount and will be delivered complete with power supply and cord, a Console cable kit and an RJ-45-to-DB-9 adapter kit.

6. One (1) Cisco 2503 router. The Cisco 2503 router is identical in every respect to the 2501 router except that it also has an ISDN BR1 interface fitted to provide remote support from the Serco Transport Office.

7. Two (1) Netgear FS750 10/100 48 port switches
   The Netgear FS750 switch will provide forty-eight (48) RJ45 based 10/100 autosensing connections providing high bandwidth connections for the PDTs handheld terminals, existing network requirements, and future expansion capacity. connections, one of which will be used as an "Uplink" connection to the Cisco 2503 router. The switch is provided with a 100 to 240 volt, 50Hz to 60Hz auto voltage sensing power supply unit with local power cord to plug directly into a standard electricity supply. One switch will be installed in the Serco San Francisco Office, where one of the forty-eight (48) ports will be used as an "Uplink" connection to the Cisco 2503 router. The remaining forty-seven (47) ports will be available for network connections of PDT terminals, workstations, or printers. The second FS 750 switch will replace the existing switch in the Meter Shop. One of the forty-eight (48) ports

will be used as an "Uplink" connection to the existing Cisco 1600 router. The remaining forty-seven (47) ports will be available for network connections of PDT terminals, new or existing workstations, or printers.

8. One (1) Cisco Secure PIX 515 Firewall
   The Cisco Secure PIX 515 Firewall has a throughput measured at 120 Mbps with the ability to handle up to 125,000 simultaneous sessions. The Cisco Secure PIX 515 Firewall has IPSEC encryption built-in, permitting both site-to-site and remote access VPN deployments, and operates on a hardened operating system focused on protecting both the security of the device and the networks that it protects. In addition to having the ability to be managed by the PIX Configuration Manager, the Cisco Secure PIX Firewalls also may be centrally managed by the Cisco Secure Policy Manager, which can manage up to 500 PIX Firewalls, Cisco Secure Integrated Software deployments, and site-to-site VPN installations. As there is only one Cisco PIX firewall being supplied, the supply of the Secure Policy Manager does not form part of Serco's scope of supply.

9. Three (3) Addtran TSU 100 CSU/DSU (Channel Service Unit/Digital Service Unit) to provide connections at each end of the Frame relay Link between the DPT Server Room and the Serco San Francisco Office and for the new connection to the 4500 router in the DPT Server Room.

10. One (1) APC NetShelter rack unit, 42U high to house the equipment to be located in the DPT Server Room.

11. One (1) APC 2200RM Un-Interruptible Power Supply (UPS) complete with a Web/SNMP Management Smart Card Slot. This unit will provide "clean" power for the new rack.

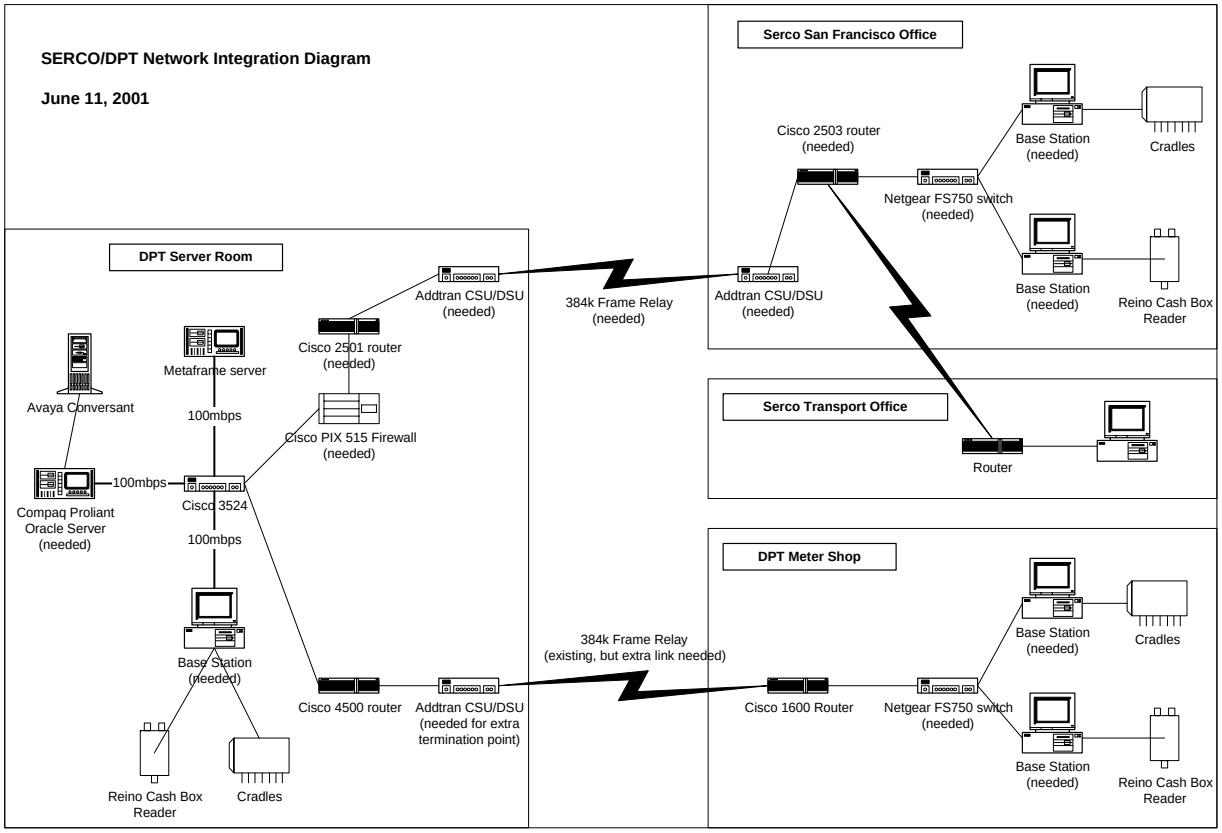
12. One (1) Rack Mount ADIC Faststor 7 DLT 4000 (7 slot). Arcserve IT 6.61 for NT Advanced edition with tape library support option, backup agent for Oracle, and backup agent for open files.

13. Six (6) GPS coordinate capture unit packages consisting of a Compaq iPAQ H3670 with DP PCM2 (Compaq Dual-Slot PC Card Expansion Pack with Kingston DataPak 2 GB PC Card Type II Hard Drive), iPAQ Serial Cradle, iPAQ Auto Adapter, iPAQ Expandable Case, Targus Stowaway Portable Keyboard for the iPAQ, ArcPad software by ERSI, Trimble GPS Pathfinder Pocket Receiver, GPS Pathfinder Pocket Receiver Li-Ion Battery, GPS Pathfinder Pocket Receiver Waist Pouch, Cap (Hat) for Miniature Antenna for use with Trimble GPS Pathfinder Pocket Receiver,

C Network Connections

1. Serco shall set up the communications hardware between the DPT Server Room, the DPT Meter Shop, and Serco San Francisco Office, including the intermediate cabling between the switches and the base stations. The City must approve telecommunications links before they are ordered.

2. Serco shall order and maintain an additional 384 Kbit Frame Relay telecommunications link between the DPT Server Room and the DPT Meter Shop.
3. Serco shall order and maintain a 384K frame relay telecommunications link between the Serco San Francisco Office and the DPT Server Room, a 128K ISDN backup telecommunications link between Serco San Francisco Office and the Serco Transport Office for the duration of this Agreement. The City will provide Serco with assistance in arranging the supply of Frame Relay links with local telecommunications suppliers and their connection to existing service points within the DPT Server Room.



D Network Implementation

1. Serco shall test all equipment and implement the network configuration described below with the participation of the City. The City must approve all network configurations before the system is activated.
2. Serco shall provide a Compaq Proliant ML370 server to be located at the DPT Server Room, an additional license for ArcServe for NT backup software, and procedures for the regular back up of all or part of the system at any time and for dynamically back up the database to track changes.

3. The City shall configure and define the access rules for the Cisco PIX 515 Firewall. The firewall shall allow Serco San Francisco Office and the Serco Transport Office controlled secure access to the City network for system operation and maintenance.

4. Serco shall install the Compaq Proliant ML 370, the Cisco PIX firewalls and the Cisco 2501 router in the NetShelter rack located in the DPT Server Room. The database server will be connected into the City network via the Cisco 3524XL switch stack. The Cisco PIX 515 firewall will be connected between the City network and the Cisco 2501 router.

5. The equipment located at the Serco San Francisco Office will join the City network as a distinct subnet with its own IP address. Additional equipment located at the DPT Meter Shop and the DPT Server Room will be a part of the subnet already in place for that site.

6. Serco shall ensure that hardware residing at DPT facilities can communicate with City GIS servers currently located at 1 Market Plaza. The City will be responsible for ensuring that Serco receives the information it needs from various City departments to make this communication work.

7. The two workstations installed at the DPT Meter Shop will use a 10/100 Mbit, UTP connection to the new Netgear FS750 switch. These workstations will require at least two ports on the switch. One workstation will run DPT handling software, which interfaces to PDT terminals connected to the network via cradles connected to ports on the FS370 switch. The second workstations will have a Reino Intelligent Cash Box Reader attached to one of the four Rocketport serial ports. Either workstation will be capable of performing both functions.

8. The two workstations installed at the Serco San Francisco Office will use a 10/100 Mbit, UTP connection to a single, 8 port, Netgear FS750 switch. The switch will supply a single 10/100 Mbit, UTP uplink connection to the Cisco 2503 router. The use of the uplink connection to the Cisco switch shall consume one of the forty-eight (48) ports, two will be for the workstation connections. The remaining ports will be used to support a network printer and a number of PDT terminals connected to the network via cradles. The second workstation will have a Reino Intelligent Cash Box Reader attached to one of the four Rocketport serial ports. Either workstation will be capable of performing both functions.

9. The single workstation system to be located in the DPT Server Room will employ a 100 Mbit, direct connection to the City's existing Cisco 3524 switch. The workstation will have one Reino Intelligent Cash Box Reader attached to one of the four Rocketport serial ports for troubleshooting equipment problems. This workstation will also be capable of interfacing to other PDT terminals via cradles to appropriate points on the City network.

10. The City shall be responsible for managing the new network devices connected to its WAN once the equipment is activated. Serco shall be responsible for warranty repairs on all devices. See Section XIV, Warranty.

11. Serco shall also provide:

    - All cables, connections and DCE equipment, such as Channel and Digital Service Units and other wall ports that may be required up to the point of connection to the Frame relay connection.
    - PDT cradles and Reino Intelligent Cash Box Reader set up and their connection to network (via workstation serial ports).
    - Assistance in providing the interfaces with the City network.

E PDT Cradle and Reino Intelligent Cash Box Reader Hookups

1. The workstations shall be able to connect to the City's MetaFrame server for the purpose of extracting collection data from the Oracle database. This data is then downloaded from the workstations to the PDT cradles connected to the network and the Reino Intelligent Cash Box readers connected to serial ports of the workstations.
2. Serco shall install and attach the PDT cradles, Reino Intelligent Cash Box Readers and associated hardware as described in this Agreement to the workstation systems in the Serco San Francisco Office, the DPT Meter Shop and the DPT Server Room. These workstations shall download and upload collection and maintenance data into the PDTs and Reino Intelligent Cash Boxes before and after collection and/or maintenance activities. The workstation at the DPT Server Room will be used for troubleshooting and testing the various devices.

F SFPM Software – General Description

1. Serco shall develop the SFPM for the City. The SFPM will be a customized database application based on the Oracle Relational Database System. It will include the PDT communications software, Crystal Reports, modules created by integrating the WinEMU, MeterSecure, and Reino Parking Management proprietary software applications (known hereafter as "device applications"), an Order Entry Module, an Automated Fault Reporting Module, and a Data Import Module.
2. Each of the device applications generate and use a database. The SFPM software will merge, using ODBC and OLE techniques, the three device application databases into a single, heterogeneous database. This database shall ensure that common information such as users, meters, locations, locks and routes is maintained and presented in a consistent manner to all users of the database for task management, report generation and data retrieval. The device applications, the PDT communications software, and Crystal Reports shall provide access to the features of the SFPM software. These features shall be presented to the user as a menu or desktop icon driven "toolbox" on the computer screen.
3. The PDT communication software will provide functions for data transfer between the PDTs and the rest of the SFPM software. The internal RAM of the PDTs will be mapped onto the workstations at the DPT Meter Shop and the Serco San Francisco Office as a virtual disk and communications software will upload and download data and programs between the workstations and the PDTs.

4. The SFPM software shall incorporate the following features:

    - A uniform user interface, where the same colors, fonts, nomenclature, icons and logos are used for all modules.
    - User defined fields and a suite of custom reports.
    - A maintenance work order management module.
    - Duplicated functions among the various modules (device applications) not visible or available to users.
    - Network management functions/security functions.

5. The SFPM software shall have security functions that allow the City to manage user access to different modules, screens and reports within the application. Citation Division users will be able to open the SFPM software on their computers and view the appropriate application screens. The City will be responsible for ensuring that the Citation Division operators' computers can access the SFPM server.

6. Serco shall provide the operating system software and communication software to run the network and computer hardware and allow Serco technical staff to provide remote software support.

7. Serco shall install the SFPM software on the Compaq ML370 database server. The SFPM software shall be able to interact with the City's MetaFrame server and other network servers with a variety of environments, including Netware 5.0 environment using IP protocols.

8. Serco shall provide Windows NT server V4.0 operating system with 20 Client Access Licenses (CALs) which are assignable on a dynamic basis and provides concurrent access to 20 users of the database server. Windows NT Server will be patched to the latest appropriate Service Pack release. Serco shall provide Oracle V8.0 DBMS, WinEMU, Meter Secure and Reino Parking Management software with 20 concurrent CALs. Serco shall provide all workstations with Windows NT V4.0 operating system, patched to the latest appropriate Service Pack release.

G SFPM Development Phases

1. The SFPM development will have two phases. In Phase I, while the SFPM is being developed, the City will use the Device Applications on one standalone workstation located at the DPT Meter Shop. By the completion of Phase II, the SFPM will be operational, all hardware and network connections will be installed, and the PDT LKI interface shall be enabled. For more information on implementation, see Section Q, Implementation.

2. During Phase I, the MacKay PDT software will be used for any maintenance function communications with the MacKay E-Purse through the SCI and the Medeco PDT software will be used for any collections function communications through the LKI. At the completion of Phase II, the PDT software will be modified so that maintenance functions can be performed through the LKI.

H SFPM Device Applications

The device applications that will be incorporated into the SFPM software are:

1. The **MacKay WinEMU** software providing functions for the management of single space meters, including:

    - A windows-based **User Interface**
    - **Import/Export** of data files going to or originating from the PDT.
    - **Database Access**, implementing all features of the processing, storage and retrieval of data from the PDT and required by the PDT.
    - **Reports** producing predefined and custom reports from the database.
    - **Security** implementing the security features of the system.
    - **Support Functions** implementing general service procedures used by other modules referred to above.

2. **Medeco MeterSecure** software providing functions for electronic key management, including:

    - **Route Management** using a calendar for the programming, displaying and color coded scheduling of routes and an explorer window for the editing and deleting of routes, locations, meters and employees together with summaries of routes, locations, meters, PDTs and locks.
    - **Communications** – transfer of files to and from the PDT.
    - **Route Status Information** via a simple selection (i.e. radio button) of All Routes, Routes Pending, Routes Uploaded, Routes in PDTs or Routes completed.
    - **Route Administration** capabilities to program a specific route, printing of reports, processing of a route file, transmission to a PDT, reassigning a PDT or employee group, editing and resending of messages to a PDT, and assignment of locks to install and removal of items from a schedule

3. The **Reino Parking Management** software providing the ability to record, store and report data relating to Intelligent Cash Box collections from Reino. The Reino Parking Management software includes the following features:

- **Cash Box Collection Utility**: the program allows users to enter counted coin totals for reconciliation purposes and gives them the ability to test and verify that the Intelligent Cash Box memory is storing information properly.
- **Audit and Reporting Utility**: the audit and reporting utility accepts audit record files from one or more Cash Box collection utilities. The data contained within the files is stored in an audit record database. In addition to the current collection audit data, the intelligent Cash Box transfers historical data that summarizes the ten previous Cash Box collections from each Reino. The program software compares this data with the accumulated Cash Box collection records and generates a report that identifies any anomalies such as missing Cash Boxes, missing collections from particular Reinos or

discrepancies in cash collection records. The program can export the data in CSV format.

- **User Security**: the software has security mechanisms based on password-controlled access to prevent unauthorized access to audit records. The Cash Box Collection Utility includes measures that prevent tampering with Intelligent Cash Box data by collectors or coin counters.
- **Reports**: the software includes a collection audit report for a particular collection run, including identification of corrupted collection data signifying a fault either with the Cash Box or the Reino. A flexible selection mechanism allows reports to be generated for particular Reinos over a specified time period. A supplementary report is available to advise maintenance staff of the battery condition of each Reino.
- **Maintenance**: the Intelligent Cash Box also transfers data recorded by the Reino that summarizes any detected service outages or faults detected by the built-in test facilities. The Reino Parking Management application generates service outage reports that can be used to verify customer complaints as a part of the parking enforcement. The program also generates maintenance action reports to ensure appropriate Reino maintenance.

Electronic copies of the three device applications and their licensing are included as Appendix H of this Agreement and form a part of this specification.

I SFPM Master Database Table Design

The SFPM software functionality, which shall be fully defined as part of the project implementation, will be limited by the data generated by and stored on the various devices and by the data available on the SFPM master database. The SFPM master database will consist of a variety of tables and will incorporate fields that make up the records generated by the meters and locks together with other user defined fields, and map the tables within the WinEMU, MeterSecure and Intelligent Cash Box software applications using ODBC and OLE. The SFPM software will synchronize the data in the fields that are common among the three device applications so that user inputs need to be entered only once. The Master OB Table will seamlessly relate to CCSF GIS data (the primary keys are identical).

J Device Application Data Flow

The data that the SFPM can generate and how that data is either acquired by or downloaded from the System is defined by the abilities inherent in each device application. As a result, the Detailed Requirements Definition and System Design undertaken during the Implementation of the System cannot exceed the functionality and capability of each device application as described in the following sections.

1 MacKay E-Purse– PDT Communications

a) The PDT shall be the normal tool or device used to communicate with the MacKay E-Purse. The PDT can communicate with the MacKay E-Purse through the SCI or the LKI.

b) PDT shall have two communication protocols through the LKI: the closed door protocol and the open door protocol. The closed-door protocol and allows a direct connection to the MacKay E-Purse. It is known as the closed door protocol because the vault door must remain closed and the electronic lock must be set into a pass through mode for information to be exchanged. The “open door” protocol is typically used in the coin collection process where the vault door is opened and communications with the MacKay E-Purse is not possible. The default protocol is the “open door” protocol.

c) In Phase I of the SFPM implementation, the PDT shall communicate with the MacKay E-Purse through the SCI. At the completion of Phase II, the PDT shall communicate with the MacKay E-Purse through the SCI and the LKI. The primary method to be used in the field is the PDT-LKI while the PDT-SCI interface will be used when the MacKay E-Purse is not inside its housing.

d) The PDT-LKI hardware consists of a PDT, an AOD, and a data/vault key all interconnected via a tethered cable. To enter into the “closed door” protocol, the protocol change must first be negotiated between the PDT/AOD, the lock electronics and the MacKay E-Purse. As part of the protocol switch, the electronic lock interrupts the MacKay E-Purse, the PDT bypasses the AOD for the lock, and the electronic lock is placed into a data pass through mode. Once the PDT establishes the communication protocol it communicates directly with the MacKay E-Purse using serial (TTL level) communications.

2 MacKay E-Purse – PDT Data Transfer

a) The PDT can send the following data categories to the MacKay E-Purse:

Meter ID, Group ID
Specific alphanumeric values are programmed into the main board of MacKay E-Purse at the time of manufacture to uniquely identify the board and meter. These values shall be programmed by special manufacturing procedures and tools at the factory, cannot be changed after leaving the factory, and are usually a sequential number.

Zone
A zone is generally defined as a set of MacKay E-Purses with the same profile. This term may or may not have some geographic significance. A zone ID consists of a value that defines which zone a meter is to be placed. A zone must be defined before a profile can be sent to a MacKay E-Purse.

Location
This is the alphanumeric post identification where the MacKay E-Purse is currently located and is limited to 10 characters. The “install meter” procedure run on the PDT will require that the operator define a zone, followed by a location. When the operator selects the “send profile” command, the MacKay E-Purse will automatically be loaded with the correct profile associated with that zone. After the “install meter”

procedure has successfully run, the PDT will create/append a data record listing the installed meter ID, group ID, zone, and post ID.

Profile
A profile is a file of settings or properties that is created using the SFPM software and sent to the MacKay E-Purse to define certain operational behavior. Settings include but are not limited to current rate, maximum time, enforcement periods, on times and off times. A profile can only be loaded if the specified zone is valid. Only one active profile is allowed in a MacKay E-Purse. The MacKay E-Purse immediately assumes the behavior of the profile sent to it.

Time and Date
The date and time will be unspecified the first time that the MacKay E-Purse is powered up or following battery disconnection for longer than 5 minutes. The current date and time can be set using the PDT-Lock Interface (LKI) or the PDT-Smart Card Interface (SCI). During a coin collection, the date and time will be placed into the lock memory by the PDT and uploaded to the meter automatically once the vault door is closed. The time loaded will be the current date/time in the PDT.

Purse System Control Information (Blacklist)
The MacKay E-Purse will maintain a list of smart cards that should be rejected as a method of payment by the meter mechanism. The blacklist file shall consist of a file header and blacklist card records. The file header contains file identifier information, the number of blacklist records, a checksum, and a security signature. The MacKay E-Purse can accept a maximum of 100 blacklist records. These records can be for an entire batch, range in a batch, individual card entry, range of card entries, or entire face value of the card. The MacKay E-Purse can accept any combination of records as long as the total number does not exceed 100 records.

Coin Parameters
A MacKay E-Purse that accepts coins has a table of parameters to compare valid coins and inserted coins. This table shall be known as the coin parameters table and can be loaded separately from the meter application. This table shall allow additional coins to be added by replacing one table with another. The table holds parameters for up to 16 different coins. Coin parameter table details are proprietary information. The City cannot modify or create these tables. Serco shall provide new files to the City upon request.

Display Attributes File
A MacKay E-Purse can have some of its display parameters or attributes modified by downloading a special data file. This data file is called a “display attributes file” and it will modify the LCD icons available and the LED behavior (disable, change flash rates, etc.). The display attribute file details are proprietary information. The City cannot create or modify this file. Serco will provide new files to the City upon request.

b) The PDT can receive the following data categories from the MacKay E-Purse:

Meter Identification, (including assigned zone / post and status)
This information is provided as part of a "check meter" command from the PDT. This information allows operators to confirm the MacKay E-Purse's current settings. The data also includes information for maintenance staff, such as the current count of invalid coins in the MacKay E-Purse as well as the current number of maintenance records.

Summary Audit Data
Summary audit data contains the current count of valid coins by accepted denominations, invalid coins (did not match valid coin criteria) and a total of electronic cash payments accepted by each operating card scheme since the last coin collection. Both the MacKay E-Purse and the electronic lock keep coin and card usage data current in memory. The PDT collects the Summary Audit Data using the PDT-Lock Interface (LKI) and the "open door" protocol as part of the coin collection. Once the summary audit data is collected, the memory area of the electronic lock used to store the summary audit data is reset. On closure of the vault door, the meter will create a maintenance record showing that the vault door was opened. The audit data on the MacKay E-Purse is not cleared or affected by the collection of the summary audit data from the lock memory.

Primary Audit Data
Primary audit data consists of detailed information on usage, such as coin counts, detailed card transaction data, and maintenance records. This data must be periodically collected to prevent loss (due to potential overflow) and to allow for closer inspection or audit by managers. The default setting for the memory area reserved for the primary audit data is set to 1000 card transactions, and 200 maintenance records, assuming each record is no more than 25 bytes. Once the data collected in the MacKay E-Purse exceeds either of these limits, it will go out of service. However, a warning signal (yellow LED blinking) will be activated when the MacKay E-Purse reaches a consumption threshold of 80 percent. Maintenance staff collects the primary audit data by issuing the "get primary" audit command on the PDT. In Phase II, primary audit data shall be automatically downloaded into the PDT at the time of collection. Once collected successfully the primary audit data is now flagged as "secondary", and a new primary data storage area is defined.

Secondary (Backup) Audit Data
The MacKay E-Purse maintains a secondary data storage area of previously collected detailed card usage and maintenance records known as the secondary audit data. This data is for back up purposes in case the originally collected data is lost. This data is an image of previously collected data and includes detailed card transaction data and maintenance data identical to the last primary audit. The size reserved for the secondary audit data is identical to that of the primary audit data. The secondary audit data is collected by issuing the "get secondary" audit command on the PDT. The

secondary audit data is over written with each subsequent successful primary audit data collection.

Maintenance Records Accessible Using the PDT
The detailed maintenance records will be extracted from the MacKay E-Purse using a "get maintenance" command on the PDT. The records will then be viewable on the PDT display, showing the most recent events first and in the opposite or reverse order that they were created. Technicians will be able to view up to 200 maintenance records. Unlike the get primary audit command, the MacKay E-Purse does not remove maintenance records or put them to secondary storage when they are requested in this fashion.

3 PDT Protocols for the Medeco Electromechanical Lock

a) The PDT serves two purposes in the Medeco electromechanical lock system:

- It defines and restricts which locks a collector may open.
- It stores data recording the sequence of locks accessed by the collector.

b) The PDT also stores the data being communicated between the meters and the back end system, and controls the AOD to implement necessary protocol sequences that cause the right data to be exchanged. When purchases are made on the MacKay e-Purse meter, it will send coin counts and other important status information to the lock for supply at collection time.

c) The electromechanical lock system uses the following protocols:

- **AOD/Lock Data Link** - This Pulse Width Modulation (PWM) protocol is proprietary to Medeco. The speed of this interface shall be approximately 9,600 bits per second.
- **AOD/Lock Command Response** - This protocol is proprietary to Medeco. It provides commands allowing efficient access to the EEPROM by the AOD. It is built upon the AOD/Lock Data Link.
- **Open Door** - This protocol requires certain data items to be communicated from the PDT to the lock, and from the lock to the PDT. This interface is implemented using the AOD/Lock Command Response protocol.
- **Closed Door** - This protocol provides for the communication of data received by the lock as part of the Open Door protocol to the meter. It is built upon the Meter/Lock Shared Memory Protocol.
- **Meter Attention Protocol** - This provides a mechanism for alerting the meter to service the lock, and initiate the Meter/Lock Link Layer.
- **AOD/Meter Command Response** - This protocol provides for the PDT to send commands and receive responses from the meter. It will be built upon EEPROM memory space shared by both the meter and AOD, with some initialization assistance from the lock.

- **Meter/Lock Link Layer** - This protocol supplies a method for exchanging messages with the lock. The selected protocol is T=0 as defined in ISO-7816-3, without CLK or RST.
- **Meter/Lock Application** - This protocol, built upon T=0, and consistent with ISO-7816-4, provides the meter with access to a shared memory space on the lock's EEPROM. The addresses are virtual, meaning that some physical locations of the EEPROM will not be accessible to the meter. Commands are provided to read, write, increment and decrement single and multi-byte quantities.
- **Lock Pass-Through** - This protocol is initiated via a command transferred on the Meter/Lock Link Layer, and is implemented exclusively by the Lock. It provides for a direct electrical connection between the meter and the AOD.
- **AOD/Meter Direct** - This protocol is initiated upon request of the AOD, and is built on top of the Lock Pass-Through protocol. During this protocol, the key will not be powering the lock.

4A PDT User Interface in Phase I

Two general groups of users shall use PDTs:

- City Maintenance Staff (mainly collecting meter status, changing profiles, swapping/installing meters and gathering maintenance data). City maintenance staff will use the **MacKay PDT Meter Maintenance Interface** in Phase I of the SFPM development.
- Collection Staff (mainly collecting coins, but also summary audit data, detailed audit data and maintenance data). Serco collectors will use the **Medeco PDT Meter Collections Interface.**

Serco will configure each PDT with the appropriate interface software depending on the location and the intended use of the device. The PDTs will have a menu-driven batch file installed that will launch either interface and the subfunctions beneath them. This menu will display three options:

Maintenance: Selecting this option will launch the MacKay PDT Meter Maintenance Interface Software.

Collections: Selecting this option will launch the Medeco PDT Collection Interface Software.

Communications: Selecting this option will initiate a connection to remote computers through the attached charging/communications cradle.

MacKay PDT Meter Maintenance Interface

The PDT loaded with MacKay PDT software will operate in three possible user-defined states and have the following functions to the extent allowed by a user's security settings:

Login State

- **Login** - Accept a user name and password and enter operate state.
- **Logout** – Enter Login state.

Operate State

- **Define Meter Routine** - Select from a number of meter actions that will be repeated for each meter to which the PDT is subsequently attached using the Connect to Meter Routine function.
- **Connect To Meter Interactively** - Enters a mode in which the PDT will connect to a meter and display a menu allowing the user to select which actions are performed.
- **Connect To Meter Routine** - Enter a mode in which the PDT will connect to a meter and immediately execute a predefined sequence of actions.
- **Review Logged Data** - Review the meter data. Record selections allowed.
- **Review Last Maintenance Log** - Review the most recent maintenance log retrieved from the meter via the snapshot meter maintenance function noted below.
- **Logout PDT** - Revert to Login state.

Connect to MacKay E-Purse Interactive State

- **Collect Primary Audit Record** - Collects the primary version of the current audit record (including transaction, maintenance and alert records).
- **Collect Secondary Audit Record** - Collects the backup version of the previously collected primary audit record.
- **Collect and Reset Coin Totals** - Collect and store the resettable coin totals, and reset them.
- **Collect Rolling Coin Totals** - Collect and store the rolling coin totals.
- **Review Meter Audit Status** - Review the coin totals, audit summary, primary and secondary audit header data obtained from the meter.
- **Snapshot Meter Maintenance Data** - Collect the meter's stored maintenance history.
- **Set Time** - Synchronizes the real time clock in the meter with the real time clock in the PDT.
- **Check Meter** - Perform a predefined sequence of commands designed to check the meter's operational state and advise the maintenance personnel of any discrepancies from nominal behavior.
- **Profile Meter** - Update all data items in the meter with correct data stored on the PDT. Advise of any data items not replaced.
- **Logout Meter** - Power down the meter, and return to Operate state.

Medeco PDT Meter Collections Interface

A PDT loaded with Medeco PDT software shall show the user a screen consisting of two menu options. But before the PDT will display the Medeco collections menu, it will prompt the user for a password. If the user fails to logon after three attempts, all

logins are disabled except for the master password login. All logins can be re-enabled via the "reset Login" option of the systems utilities screen.

Quick Collect – Selecting this option will prompt the user for a collection vault number. After entering the collection vault number, the user will be prompted to "Insert Key in Lock". From here the user can open doors that have been programmed into the PDT. To change collection vault numbers, the user exits quick collect by pressing the number "9". If restarted to the quick collect function, the PDT will prompt for a collection vault number.

Run Route – Selecting this option will display a screen with the Stop number, Stop name, Address information and a menu selection to:

- ***Collect*** – Selecting this option will prompt the user to enter a collection vault number. After entering the collection vault number the user will be prompted to "Insert Key in Lock".
- ***Find*** - Selecting this option will display a screen to "Insert key in Lock". The PDT will search its loaded database to find the lock. If found the screen will read "Meter Found", if not it will read "Meter Not Found".
- ***Install*** – Selecting this option will enable the user to remove a currently installed lock from a meter and replace it with a new lock.
- ***Done***

4B PDT User Interrface Phase I Additional Functionality

Within 44 weeks of contract award, the Phase I PDT interface will be enhanced to include the following additional functionality.

MacKay DPT Meter Maintenance Interface

Login State

- **Link to CCS** – Enter slave state

Operate State

- **Lock PDT** – Re-prompt for current users password
- **Review Logged Data** – Review the meter data, record selections allowed are restricted by security.

Connect to MacKay E-Purse Interactive State

- **Collect Requested Audit Data –** Acts like "Collect Secondary Audit Record" if the currently connected meter is on the revisit list and acts like "Collect Primary Audit Record" otherwise.
- **Collect and Store Operating Statistics –** Collect and store the meter's operating statistics.

- **Review Meter Status –** Review the state, identity, configuration, capacity, operating statistics, and other similar data obtained from the meter.
- **Snapshot Meter Maintenance Data –** Collect a user-defined subset of the meter's stored maintenance history.
- **Perform Selected Diagnostics -** Perform a diagnostic function selected at Run Time.
- **Download Application –** Allow the user to initiate a download sequence provided by MacKay.

Medeco PDT Meter Collections Interface

Run Route

- **Repair –** Selecting this option will display a screen with a list of repair codes. Up to three repair codes can be entered. A second page displays a list of parts codes. Up to three parts codes can be entered.
- **Serv Req –** Selecting this option will display a screen which displays the AOD battery status and has the following user selectable options:

Read Message
Reset Login
Lock Open Time
Turn beep on/off
Resend Route
Done

The following menu will be added to the PDT interface screen.

System Utilities – Selecting this option brings up the Medeco utilities. The user will be presented with two options:

- **Reset Login –** A user would use this function if an operator is locked out of the DPT after three failed attempts to login.
- **System Options –** This function offers the following user selectable options:

Password
Keyclick

5 PDT User Interface Phase II

a) At the completion of Phase II of the SFPM implementation, Serco shall enhance the MacKay E-Purse - Lock Interface- PDT data flow capability so that it has the same functionality as the MacKay SCI including:

- The capability to download the full audit record, including card transaction data.
- The capability to upload meter profiles.
- The capability to reprogram meter software/utilities

- The capability to check meter maintenance records and the status of the meter on demand and create a record of the query.

b) Serco shall upload any software upgrades to the installed or delivered MacKay E-Purse meters that may be necessary to provide the final functionality of the Meter - Lock Interface.

c) City maintenance staff shall be able to send the most current profiles to the MacKay E-Purse using the lock interface and the "open door" protocol used with the coin collection. Serco collectors shall have the capability of automatically downloading summary audit data and uploading MacKay E-Purse profiles while the coins are being collected. Uploading a MacKay E-Purse profile shall occur only if a new profile has been uploaded to the PDT. The PDT will place the new profile into the memory of the electronic lock. Once the vault door is closed, the MacKay E-Purse will retrieve the profile from the electronic lock memory and load it. This activity will be logged in the same manner as in the "pass through" or "closed door" protocols.

d) The PDT will have two distinct user interfaces, a Meter Collection Interface and a Meter Maintenance Interface. Each interface will have unique menu choices associated with the specific interface as well as some menu items common to both. Each interface will have specific menu choices to allow users associated with each interface to carry out the tasks and functions described. Exiting from either interface will present a standardized startup menu that will either let the user to log in or connect the PDT to the SFPM system. Use/access to the individual interface menu items will be controlled by a set of user rights defined or set in the SFPM software.

PDT Start Menu
When the PDT program is first executed the user will be presented with two options:

- **Login** – The user selects this item to use the PDT. The PDT will prompt the user for a user ID and then for a password. Depending on the user ID entered, either the Collection Interface Menu or the Maintenance Interface Menu will appear.

- **Connect to SFPM System** – This menu item is selected when the PDT is to be dropped into a communications/charging cradle. Once the menu item is selected the PDT is placed into the cradle and the SFPM software will upload all data at the appropriate scheduled time defined in the SFPM system.

Meter Collection Interface
In this mode, the users will be able to carry out the following menu driven tasks associated with meter collections:

- Collect route, where the PDT-LKI interface is used to access and open the coin vault door so that the coin canister can be emptied into the collection vault.
- Enter maintenance code, where the meter collector can enter specific maintenance codes during the coin collection process.
- Enter collection vault identification, where the meter collectors identify the specific collection vault that will be used for the emptying of the coin canisters.
- Esc or Exit, which exits from the current interface and logs the current user off.

Meter Maintenance Interface

In this interface, the users will be able to carry out the following menu driven tasks:

- Collect (primary audit), where coin totals and card/maintenance transaction data will be uploaded from the meter to the PDT memory. Once the PDT is connected to a cradle attached to the SFPM system, the data is uploaded.
- Collect (secondary audit), where secondary card and maintenance data is collected from the meter. Once the PDT is connected to a cradle attached to the SFPM system, the data is uploaded.
- Install meter, allows the meter to be 'zoned' and installed into a particular post ID.
- Profile meter, allows a meter to be loaded with the proper profile associated with the meter zone.
- Enter maintenance code, the user can enter specific maintenance codes associated with a particular post ID or meter ID
- View maintenance Log, the user retrieves and views a portion of up to 200 maintenance records.
- Get Status, the user can retrieve the meter status, as well as a count of invalid coins, number of maintenance records. The clock will also be updated to match the PDT clock.
- Access Vault, if the PDT has been authorized to access a particular vault housing, or group of housings to carry out normal maintenance or to remove one or more functional or damaged housings, the PDT will allow for one time access to those authorized locks/vaults. The summary audit data can either be collected or left in the lock memory.
- ESC or Exit – Exits from the current interface and logs the current user off from the PDT.

Lock Security

Regardless to which group of users require access, communication to any lock shall be strictly controlled by the Medeco MeterSecure program. This means that a security challenge shall be issued regardless of which type of activity is being carried out. This shall require that a common security module and interface be present in order to deal with both groups of users with one group normally being

granted access to the coin vault and coin can, while the other is normally only granted access to the meter interface. For those instances where maintenance staff must access the vault, the MeterSecure program will be used to manage and record that access.

If a maintenance technician shall wish to down load maintenance records from a meter, the Key shall be inserted into the lock and a challenge issued. If successfully authenticated, permission shall be granted to allow the PDT to establish the meter interface which will allow maintenance records to be collected. To accomplish this however, the proper "switch protocol" sequence must be followed.

Manual Data Entry
Manual data entry shall be kept to a minimum for both maintenance and collections functions. To limit human error, the use of the PDT-LKI interface shall be used as much as possible to establish the meter/post identification information.

6 PDT – SFPM Data Flow

Data uploaded from the PDT to the SFPM software shall generally be:

- Records generated by the MacKay E-Purse
- Records generated by the Medeco electromechanical lock
- Data manually entered onto the PDT by the meter collectors and meter maintenance technicians.

Data downloaded from the SFPM software to the PDT shall generally be:

- MacKay E-Purse profile instructions
- Electromechanical lock security codes
- Current time and date

The MacKay E-Purse software shall be downloaded from the System server onto the PDT using the PDT cradle connections.

The MacKay E-Purse Primary and Secondary Data Records consist of three sections in the following order:

- A fixed size header, which will include the coin totals
- A card transaction area with a variable number of fixed-length records
- A maintenance area with a variable number of fixed-length records

The transaction and maintenance data records are 20 bytes each. The header size is a multiple of 20 bytes for ease of storage and retrieval.

Collection Record
The MacKay E-Purse collection record structure incorporates the following described fields:

- File Layout Version Number.
- Application SW Version Number of the MAIN application used to create this meter software file.
- Batch Sequence Number.
- Batch Start Date and Time.
- Batch Ending Date and Time.
- Meter ID
- ID of local SAM resident in the terminal (SAM 1).
- PDT ID doing the collection.
- User ID of the operator of the PDT doing the collection.
- Latest PDT ID range, currently active in the terminal.
- Meter Profile Version number, currently active in the terminal.
- ID of PDT which loaded the current meter profile.
- Sum total of all transactions making up the batch being collected, including card transactions.
- Residual value at the time of original collection.
- Total number of transaction records.
- Total number of maintenance records.
- Total number of transaction exception records
- Total number of maintenance exception records.
- Total time (in minutes) the terminal was available to grant parking time, during this batch.
- Meter status indicating the machine operating status at the time the collection occurred.
- The SAM ID for the e-purse module installed on the meter in SAM slot 2.
- Meter battery voltage (mVolts) at the time of collection.

Maintenance Record
The MacKay E-Purse maintenance record structure incorporates the following described fields:

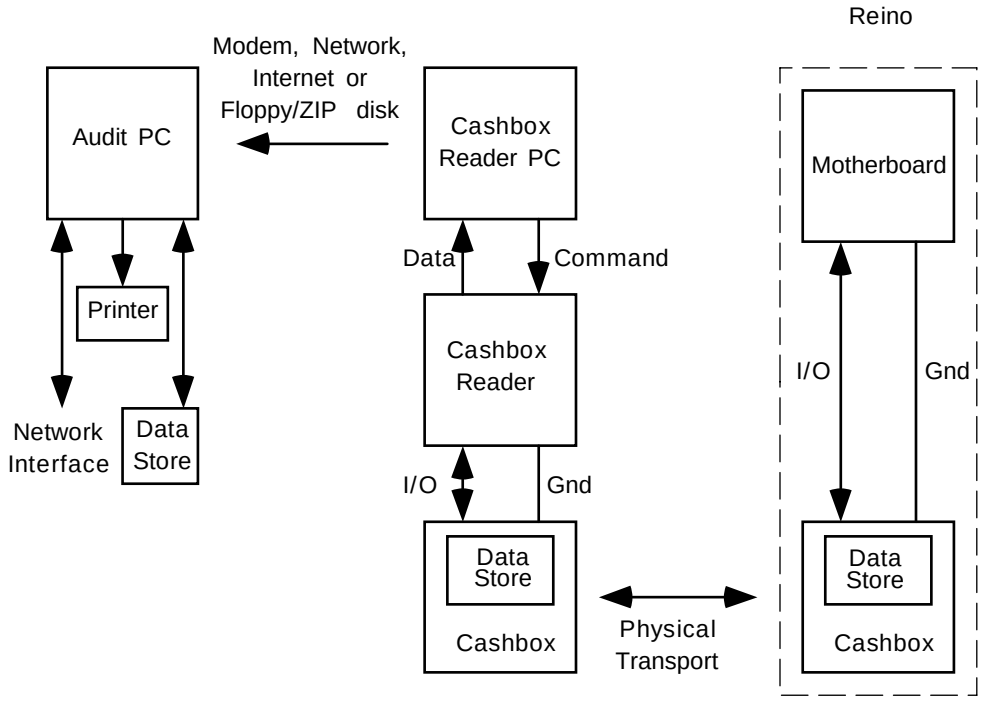
- Maintenance event number within current collection batch.
- Number of minutes since the collection batch start date and time (in header record).
- Meter status indicating the operating status at the time of the maintenance event.
- Event Code referring to a specific problem and/or the solution.
- Event Detail, which depending on the event code, can be a meter location ID, a PDT ID and PDT User ID, or battery voltage at the time of collection

PDT to Lock Data Interchange

The PDT will provide the meter profile and time to the lock. The lock will provide back to the PDT a single record per meter collection consisting of meter status, meter ID, meter zone, meter profile, gold dollar (Sacagawea) count, silver dollar count (Susan B. Anthony), quarter count, dime count, nickel count, electronic cash total and count of slugs.

7 Reino – SFPM Software Data Flow

The Reino Intelligent Cash Box System components and data flow are shown in the figure below:



System Components

a) The Reino parking meter motherboard contains processing and battery backed data storage facilities that accumulate and maintain a record of cash entered into the Reino since the last cash box collection. The record includes a count of each coin type entered, the total cash entered, and the total of electronic cash transactions. The system also maintains additional data for maintenance, including minimum battery volts, maximum temperature and any error or fault conditions that have occurred.

b) The motherboard interfaces via a connector with a battery backed memory device contained within the cash box. On the completion of each user transaction, the cash box memory is updated with the transaction record, collection history and

maintenance data. The protected stored data includes additional information relating to Reino identity, cash box insertion time, firmware revision and maintenance-related data. When the cash box vault door is opened, the removal time is immediately logged to the storage device.

c) Following a collection, the cash box is emptied and placed in the reader station, which reads the storage device data and uploads them to the workstation. The Cash Box contents are counted, and the system prompts the operator to enter the counted coin tally. For security reasons, the stored cash box coin tally is not displayed to the operator. In the case of a discrepancy between the stored and entered tallies, the operator is given a limited number of opportunities to correct the entered count.

Protocols

The Reino Intelligent Cash Box System uses the following protocols:

- **Motherboard to Cash Box Link**. This link uses a single wire interface to the Dallas touch memory storage device contained within the Cash Box. The link level protocol is the proprietary Dallas Semiconductor touch memory protocol. Stored data is checksum protected, and after writing is verified using a read-back strategy. Cash Box vault door openings and Cash Box insertions or removals are detected by sensing contacts.
- **Cash Box to Cash Box Reader Link**. Same as for the Motherboard to Cash Box Link.
- **Cash Box Reader to Cash Box Reader Workstation Link**. This link uses a standard RS-232 connection operating at 9600,N,8,1, no handshaking. Hardware handshake lines are used for the automatic reporting to the workstation of Cash Box insertion into the reader. Data upload from the Cash Box reader to the workstation is prompted by a simple ASCII character driven command set, with the uploaded data consisting of a complete dump of the Cash Box storage contents as ASCII-coded hex characters. Data integrity is maintained inherently, by the stored data checksum protection facility.
- **Cash Box Reader Workstation to the Database Server Link**. Data is transferred from the Cash Box reader workstation to the database server in standard DOS/Windows file format, each file containing the transaction records for the collection.
- **Database Server to External System Link**. Selected collection records or the entire collection database may be exported in database table or CSV format to an external system typically via a local area network.

Additional Collection Workstation Functions

Reino configuration including parking schedules and rates, display messages, daylight savings calendar and coin acceptance settings may be downloaded to the Reino via a Field Programming Module as described in Section V, Multi-Space Meter.

Collection Data Format

The following table summarizes the data fields stored in the Intelligent Cash Box System database for each Reino Cash Box collection record.

- Date that the record is saved.
- Time that the record is saved.
- Operator ID used to record the particular Cash Box.
- Parking meter ID.
- Date that the Cash Box is inserted into the Reino.
- Time that the Cash Box is inserted into the Reino.
- Date that the Cash Box is removed from the Reino.
- Time that the Cash Box is removed from the Reino.
- Cash Box ID.
- AutoFlag.
- Area number.
- Cash Box counter.
- No. of $1 coins.
- No. of 50c coins.
- No. of 25c coins.
- No. of 10c coins.
- No. of 5c coins.
- Amount recorded for Smart Card transactions.
- Automatic total of money collected.
- Manual total of money collected.
- The difference between the automatic and manual totals.
- Cash Box percent full.
- Meter status for Reino fault reporting.
- Number of coin rejects.
- Credit counter (free parking credit allocations).
- Time Reino was active (seconds).
- Minimum battery voltage (volts).
- Maximum temperature (degrees C).
- Reino firmware version.
- Reino firmware revision.

K Telephone-based Parking Meter Repair Reporting System

3. Serco shall develop a module for the SFPM to accept information from the City's telephone-based parking meter repair reporting system. This system will allow motorists to report meter problems using codes entered on a telephone handset according to pre-recorded instructions in either English, Spanish, or Cantonese Chinese. The City shall change its alpha-numeric meter post numbering system to entirely numeric system prior to the start of the design of the telephone-based parking meter repair reporting system module.

2. The City shall procure additional programming for its telephone system, which shall have the ability to process repair reports from motorists by numeric codes entered by a telephone handset. The City will assume software maintenance responsibilities for the telephone system. The City shall provide to Serco all technical specification of this telephone system required so that Serco can design an SFPM module to accept data from the telephone-based parking meter repair reporting system.
3. The telephone-based parking meter repair reporting system will run on a separate system from the SFPM software. This system will report meter problems directly to the SFPM system, in real time, using a network link an Oracle table on the SFPM system dedicated for that purpose. Store triggers associated with this table will alert the SFPM whenever data is written into this table. The SFPM will then extract the data into the SFPM database as maintenance records.
4. For Phase I, while the SFPM is being developed, this table will reside on the workstation located at the DPT meter shop that will store the stand-alone device applications.
5. The Serco Transport Office shall use copies of the files generated by the parking meter repair reporting system to test the SFPM module in its testing facility.
6. The maintenance records imported into the SFPM from the meter repair reporting system will be identical to those records generated by other means by other SFPM modules. However, users shall be able to distinguish the maintenance records generated by the repair reporting system from those created as a normal part of meter collection and maintenance.
7. The telephone system will use a limited number of repair codes. These are:

- Meter will not accept coins
- Meter will not accept card
- Meter does not provide any or correct time
- Meter simply does not work

8. Each maintenance repair entry generated by the telephone system will be given a unique log number which will allow the Meter Repairers to reconcile an telephone system entry with the more detailed maintenance and repair history extracted from the meter itself.

L Digital Coordinate Data

Serco shall provide a means of recording the GPS coordinates of each installed meter in the inventory database. This information will be automatically transferred to an existing digital mapping database maintained by the City's Department of Telecommunications and Information Services (DTIS). The City's database provides general, citywide digital mapping services based on a DB2 relational database. Serco shall, at a minimum, develop a transfer method from its Oracle-based system for the coordinate, meter and post ID numbers, and meter type. Any additional information that may be transferred to the City's digital mapping database will be agreed to following contract award but will be

limited to the information stored by the meter inventory database. The GPS coordinates will be captured using GPS handheld devices operated by the installation crews during meter installation.

The handheld devices will have a formatted copy of the City's digital basemap installed. The City shall provide an electronic copy of this map to Serco within 30 days of contract award. The handheld device to be supplied will handle all conventional map formats, including the ArcView format. The handheld device will also contain entry form driven software that will allow installation crew members to enter other data associated with meter installation that will used to create the meter inventory database. The information recorded in this system shall include at a minimum:

- GPS coordinates
- Meter ID
- Post ID
- Meter Type
- Meter Serial Number
- Lock Serial Number
- Vault Serial Number
- Installation Date
- Installation Time
- Installation Crew ID

M Citation Data Import Module

The SFPM software will include a Data Import Module that will allow the software users to import citation record data in SQL compatible tables of up to 1,000,000 rows and 100 columns into the SFPM software database. These tables shall be accesses through the Crystal Reports utility to create custom reports and queries.

N Enforcement Repair Data Import Module

The SFPM software will include a Data Import Module that will allow the software users to import meter repair data from the Enforcement Division handheld ticket writers. The City shall provide Serco with data from the Enforcement Division in a file in a recognized comma separated values format. The SFPM will decode these files and load the data into the SFMPM database as maintenance records.

O User Defined Fields

Serco shall add up to a maximum of 25 additional user defined fields into the SFPM master database tables. The data to be held in these fields will be either user-entered (user has to manually input the data), or calculated. The City shall define and approve the definition of the data in terms of its format, validation and semantics. In the case of calculated field, the City shall define and approve the definition of the mechanism by

which the data is derived, the sources of data employed in the calculation and the circumstances of data selection.

P SFPM Reports

1. Serco shall create up to a maximum of 50 custom reports as specified by the City. The scope and content of the reports will be limited to information drawn from or calculated from the user defined fields in the SFPM software, and the source records and tables created by the MacKay E-Purse, the Reino, the Medeco electromechanical lock, and the WinEMU, MeterSecure and Reino Meter Management application software.
2. The SFPM software will incorporate the Crystal Reports Development utility together with a copy of the Crystal reports run-time software on each workstation in order to allow the City to perform customized analysis of data and create special purpose reports.

Q SFPM Development and Implementation

The implementation of the SFPM will be carried out in two phases.

1 Phase I

The interim system with the stand-alone device applications shall enable the City to create and modify post and mechanism records, program parking meters, collect coin audit data and operate the electromechanical locks.

Within 30 days of contract award, Serco shall:

- Provide one (1) Dell GX110 – 'S' chassis Workstation systems with tape backup drive to be provided as part of this Agreement and install the workstation at the DPT Meter Shop.
- Load the Reino Parking Management device application on the workstation. The Reino Parking Management device application will be kept secure through the use of password protection.

Within 90 days of contract award, Serco shall:

- Load the MacKay WinEMU and Medeco MeterSecure device applications and the PDT communications utility on the workstation. The MacKay WinEM and Medeco Meter device applications will be kept secure through the use of password protection.

MacKay Win EMU, Medeco Meter Secure, the Reino Parking Management device applications will have all of the functionality described in the previous sections.

Medeco Meter Secure shall store the following additional information:

- Meter collection canister numbers
- Value of coins counted for each collection vault
- Value of coins collected into each collection vault as reported by the meters in a collection route.
- Total value of coins counted compared to total value of coins collected as reported by the parking meters compared to the value of the deposit made into the City bank account.

Meter Secure shall generate the following reports:

- **Summary Revenue Report** – For a user specified period, the report will include total revenues collected for each collection route for each collection date that falls during the user specified period, sorted by collection route. The report will include a revenue subtotal provided for all routes that make up a particular zone and a revenue total provided for the specified period.
- **Detailed Route Revenue Report** – For a user specified period, the report will include a record for each meter showing meter number, collection date, individual coin totals, total revenues from that meter, and name of collector, sorted by route and by collection canister.
- **Statistics Report** – For a user-specified period, the report will include a comparison of revenues collected on a particular route or zone during period and the variance between the different collection days.
- **Data Export**: Meter Secure shall also have export capability to create custom reports as needed.

Collectors shall have the ability to collect Summary Audit Data from the MacKay E-Purse through the LKI. Data will flow only from the MacKay E-Purse through the lock to the PDT. The default setting for Primary Audit Data records for the MacKay E-Purse shall be 200 card transactions and 1000 maintenance records.

Serco shall generate and maintain a meter inventory and installation database that will be integrated into the SFPM database upon delivery. This database will include GPS reference values gathered for each meter as part of meter installation.

Serco shall provide a separate database table into which the telephone-based meter repair system will write repair requests.

Serco shall integrate and retain all data and records generated during Phase I into the SFPM software.

2 Phase II

Phase II of the implementation of the SFPM includes the network design, installation and set up, development implementation of the SFPM software and the activation of the full range of features of the MacKay E-Purse LKI and the PDT. The default settings for

Primary Audit Data of the MacKay E-Purse shall be returned to 1,000 card transactions and 200 maintenance records.

a) Network Design, Installation and Set Up

Serco shall perform the network design, installation and set up in the following stages. All timelines are calculated from the first day of contract award.

Hardware Procurement

With the review and approval of the City, Serco shall place orders for and procure all hardware and obtain a sample MacKay E-Purse, a MacKay HD4500 single space meter housing with the vault door fitted with a Medeco electromechanical lock, a Reino, two PDTs, one fitted with a Medeco Add On Device (AOD), and another fitted with the SCI, two PDT cradles, one Reino Intelligent Cash Box reader, and all associated cables and attachments.

This activity will start within 30 days of contract award and will be completed in thirteen weeks.

Prototyping

This stage of work will be used to develop and test the database server system on which the SFPM software will operate. Serco shall set up a prototype of the network at Serco Transport Office. The prototype network will include the computer hardware, networking, and communications software, the MacKay E-Purse, a MacKay HD4500 housing with the vault door fitted with a Medeco electromechanical lock, a Reino MultiBay meter, two PDTs, one fitted with a Medeco AOD, and another fitted with the MacKay SCI, two PDT cradles and one Reino Intelligent Cash Box reader. The output from this stage will be a fully configured database server system with operational workstations and device connections that has been tested to ensure that all components communicate with each other as required to support the SFPM software and deliver the capabilities of the System described in Section 1.

This activity will start at the completion of the Hardware Procurement stage and will be completed in six weeks.

Hardware and Network Installation and Final Testing

Serco shall install the network at the specified locations in the City.

This activity will start at the completion of the Acceptance Testing and will be completed in four weeks.

b) SFPM Software Development

Serco shall develop the SFPM software in the following stages. All timelines are calculated from the first day of contract award.

Preliminary Requirements Specification and Preliminary Acceptance Test Specification

The requirements specification capture and definition will be carried out in San Francisco and at various Serco offices by Serco staff, with the participation of City employees and Serco sub-contractors. The City shall make available office space and facilities such as printing capability and network support for Serco staff's own laptop computers. The City shall take an active role in the development of the SFPM requirements, collaborating with Serco in the development of data storage schemas, the algorithms used for calculating specific data and reports, and the description of the various user interfaces. The City shall provide Serco access to all City staff that will have an interface with the SFPM and/or those individuals whose work is impacted by the functionality and capabilities of the System. Serco staff will require continued access to City staff. Serco, while working in San Francisco, shall propose to the City, on a weekly basis, a timetable of access to City staff. The City and Serco shall conduct weekly progress review meetings throughout this stage of the SFPM software development.

At the end of this stage, Serco will present to the City a Preliminary Requirements Specification and a Preliminary Acceptance Test Specification for approval.

This activity will start within 30 days of contract award and will be completed in eight weeks.

City Approval of Preliminary Requirement Specification and Preliminary Acceptance Test Specification

After a review period of eight weeks, the City shall return the Preliminary Requirement Specification and Preliminary Acceptance Test Specification with comments. The next stage of the SFPM development process shall not begin until the City has returned the Preliminary Requirements Specification and the Preliminary Acceptance Test Specification with comments. Serco shall have two weeks to incorporate the City's requests into the documents before proceeding to the next development phase.

Design Document

The System Design Document will describe how the SFPM software will work and how the individual software components interact to produce the required System operation. In addition to describing System architecture, this document will also provide details of all software data structures and data stores together with details of how the data enters the system and in those instances of calculated data, the manner in which such data is calculated. This detail will include details of source information used in the calculation, details of the algorithms used and the locations of data stores where the results of calculations are stored.

The Design Document will provide details of all reports to be produced, the circumstances under which they will be produced, the layout of such reports, and the source of data used to formulate such reports.

The Design Document will include details of all ancillary processes required to operate and maintain the software as well as any manual reports or operations that need to take place at regular, or infrequent intervals in order to preserve effective software operation.

The output from this stage will be a Design Document together with appropriate data specifications and details, in the form of technical notes, of specialized operations required to maintain the software. Additional outputs will define explicit test requirements of components of the software and the means by which the device applications will be integrated to form a whole.

This activity will start once the City approves the Preliminary Requirements Specification and Preliminary Acceptance Test Specification and will be completed in four weeks.

Update Requirements Specification and Acceptance Test Specification
The Preliminary Requirements Specifications will be reviewed to ensure that subsequent software prototyping and design have not uncovered additional requirements or made earlier requirements invalid. The output from this phase will be an updated Requirements Specification and System Design document. In addition, Serco shall finalize the Acceptance Test Specification.

This activity will start at the end of the Design Document stage and will be completed in one week.

Serco shall submit the System Design Document, Revised Requirements, and Acceptance Test Specification to the City for approval.

City Approval of the System Design Document, Revised Requirements, and Acceptance Test Specification
After a review period of four weeks, the City shall return the System Design Document, the Revised Requirements Specification, and the Revised Acceptance Test Specification with comments. The next stage of the SFPM development process shall not begin until the City has approved the documents described above. Serco shall incorporate the City's requests into the documents within two weeks before proceeding to the next development phase.

System Development
System development will take place using sample data provided by the City from the results of meter installation and collections. This data will be used to develop the contents of reports and to provide a source of real data to shape the

development of additional software that may be needed to support the operation of the SFPM on the City's network.

The system development phase will be considered complete when all of the designed components of the system can be shown to have successfully completed the individual tests prescribed for them in the design stage.

This activity will start after the City approves the System Design Document, Revised Requirement Specifications, and the Revised Acceptance Test Specification and will be completed in twelve weeks.

Integration

Integration will be carried out according to the integration plan developed during the System design phase. At this point, defects in the operation of the System will start to be formally documented together with an analysis of the cause of the defects and the remedial actions taken to correct the defects. During this phase, Serco will provide reports on defect exposure and correction to the City. The System integration will be complete when the System has no serious defects and an acceptable number of cosmetic defects as defined by the City.

At the conclusion of this stage, Serco shall provide a report to the City summarizing the results of the system development and integration work.

This activity will start at the end of the system development stage and will be completed in six weeks.

Approval of System Development and Integration

After a review period of two weeks, the City shall return the System Development and Integration work reports with comments. The next stage of the SFPM development process shall not begin until the City has approved the documents described above. Serco shall incorporate the City's requests into the documents within two weeks before proceeding to the next development phase.

Factory Acceptance Testing

Serco will carry out Factory Acceptance Testing (FAT) against the approved Acceptance Test Specification in two stages.

- Serco shall complete a Pre-FAT and deliver the test results to the City. This will be a "dry run" and the outcome of this set of tests may result in additional software corrections. Depending on the magnitude of revisions that are required, Serco may run additional Pre-FAT or "dry run" tests, which will be completed within two weeks.

- A City representative will witness the formal FAT. Serco will cover the travel costs for one City representative for travel from San Francisco to the United Kingdom and lodging near Serco Transport Office to witness the FAT.

Approval of Factory Acceptance Testing
Based on the results of the formal Factory Acceptance Test, the City shall approve the completion of this phase of the project within two weeks or shall notify Serco of what steps must be taken to meet the City's requirements.

This activity will start at the end of the integration stage and will be completed in six weeks.

Draft of Operator Manual
Serco shall write an Operator Manual in Microsoft Word that shall be delivered for operator use in Adobe Portable Document Format (PDF). Serco shall write the manual in easy to understand, non-technical English with screen prints to illustrate important procedures and features and include step-by-step instructions.

Serco shall begin the production of the Operator Manual will start as soon as possible and provide at least two drafts to the City at regular intervals for its review and approval. This manual will be available in Microsoft Word.

This activity will start at the end of the testing stage and will be completed in two weeks.

Approval of the Operator Manual
Serco shall provide the City with final draft of the operator manual. After a review period of four weeks, the City will return the document to Serco with its comments. Serco shall incorporate the City's requests into the document within two weeks and submit it to the City for final review and approval.

Site Work
Delivery of the SFPM to San Francisco will take place following the City's approval of the Factory Tests. Delivery will include installation of the software and the successful site testing of the System. The tests to be carried out in San Francisco will include a subset of the SFPM Factory Tests with those tests that could not be carried out at Serco for specific geographic or logistic reasons. In addition to final testing of the software, site testing will also include the commissioning of the entire Serco supplied System.

This activity will start at the end of the testing stage and will be completed in four weeks. This activity will happen at the same time as Serco staff install the computer and network equipment and includes shipment of the SFPM to the City.

City Acceptance of the SFPM
The City shall accept the SFPM upon the successful completion of the following: 1) site installation; 2) initial testing of the System; and 3) an operational period not to exceed 6 months. The City shall provide a reasonable opportunity for Serco

to correct the observed defects. The City shall require the correction of such defects within the six-month approval period and may insist on revisions to the acceptance criteria to ensure that the defects are corrected. The City reserves the right to extend the SFPM acceptance time period so that corrected defects can be fully tested.

R Documentation

Serco shall provide one soft copy in Microsoft Word format and PDF file format and one hard copy of the following documentation, except as otherwise specified:

- System Design documentation which will provide details of data structures, entity relationships and algorithms used in the calculation of other data.
- Hardware documentation provided by the manufacturers of computer equipment. This will be provided "as is" and its content will not be supplemented by Serco..
- User Manual documentation that will provide any user of the system with on-going assistance in the operation and use of the system following their attendance on one of the user training courses. Serco shall provide User Manual updates for software upgrades or modifications
- Engineering, Maintenance and Management documentation which will provide details of the maintenance of the system and any engineering and management procedures to be adopted to help ensure the continuous, trouble free operation of the system.
- Technical bulletins to be provided as supporting documentation for any software or system upgrades.
- A copy of the SFPM software as developed by Serco and all component device applications provided by meter and lock suppliers will be provided on a custom mastered CD-ROM.

S Training

Serco shall provide user and management training on the use and operation of the Parking Meter Management Information System will be provided as described in Section XII, Training.

T Technical Support

Serco shall employ a Product Support Technician located at the Serco San Francisco Office who will act as a single point of contact for user support and troubleshooting for the SFPM. The Product Support Technician will be available from 7:00 a.m. to 4:00 p.m. PST Monday to Friday.

U On-Going SFPM Modifications

Serco shall make available software and hardware engineering services to the City throughout the term of the contract as required.

VIII. Smart Card Program

Serco will provide the management, staff, and technology to enable the use of Smart Cards for payment in the MacKay E-Purse and Reino meters.

This task will be carried out in two phases. Phase 1 – Smart Card Pilot Program, will let the city evaluate the viability of the technology and the prospects of successful acceptance of the smart card payment option by motorists. Phase 2 – Full System Activation, shall be undertaken at the City's option once Phase 1 is complete, and the Pilot Program is evaluated.

A Phase I, Smart Card Pilot Program

Four months after the completion of the installation of the new parking meters, Serco shall conduct a Smart Card Pilot Program (Pilot Program) using the Translink card.

1. The Pilot Program will run for three months.
2. Prior to the start of the Pilot Program, the City shall provide Serco with a copy of the clearinghouse agreement that the City has entered into with the Metropolitan Transportation Commission (MTC) regarding the Translink card.
3. Serco will purchase the Translink SAMS to be installed in the pilot meters.
4. Serco will develop the necessary software so that the MacKay E-Purse operating software will be able to accept Translink card payments.
5. In the 30 days prior to the start of the Pilot Project, the City shall install TransLink SAMs in no more than 500 single space meters in a contiguous section of the City, to be selected by the City, and activate the meters to accept Smart Card payments.
6. Serco shall provide a dedicated Smart Card Pilot Program Manager for the Pilot Program. The Smart Card Pilot Program Manager will be responsible for implementing and managing the Pilot Program and will report to Serco's Contract Manager.
7. Serco shall provide 5 full time "Greeters" to promote the use of the Smart Cards on the streets in the Pilot Program area, working for three months.
8. Serco shall not be responsible for the distribution and sale of the TransLink cards.
9. Serco shall provide one standalone desktop computer to run the TransLink transaction processing software for the term of the Pilot Program. This computer shall be located at the DPT Meter Shop and will be connected to the City's network.
10. Serco shall be responsible for managing and maintaining the transaction processing software for the term of the Pilot Program. Serco shall provide weekly transaction, audit and meter performance reports to the City.
11. Serco shall transmit transaction data to the Translink Card Service Center in compliance with the City's clearinghouse agreement with MTC.

12. Serco will provide the City with a project report no more that one month after the end of the project. The report will provide statistics on user acceptance and meter performance. In addition, the report will offer a recommendation whether to proceed with full implementation of the use of Smart Cards in parking meters throughout the City.
13. The SAMs will not be removed at the end of the Pilot Program, whether it is successful or not. If the Pilot Program is not successful, Serco and the City will deactivate all the SAMs six months after the end of the Pilot Program.

Evaluation Criteria for Pilot Program

Serco shall use the following criteria to assess the success of the smart card pilot program. The pilot programs would be considered a success if they met the following criteria:

- The survey indicates that the majority of card users are either satisfied or very satisfied with the payment scheme.
- At the end of the Pilot, more than 5% of the payments in the meters are made by a Smart Card.
- The meters in the Pilot Program have no greater rate of failure or maintenance problems than the rest of the meters throughout the City.
- There are no breaches of security for the payment scheme.
- Savings from meter collection, coin counting, or other program elements cover the projected costs of running the smart card program.

B Phase II, Full System Activation

If the Pilot Program is successful, the City shall activate the entire inventory of meters to accept smart card payments.

1. Serco shall provide SAMs or similar microprocessors as specified by the Translink program for the MacKay E-Purses and Reinos. The City shall fit all MacKay E-Purse single-space meters and all Reinos with the SAMs or similar microprocessors and activate all MacKay E-Purse single-space meters to accept the Translink card.
2. Serco shall develop the necessary operational software so that the Reino MultiBay meters will be able to accept the Translink card payment scheme. The City shall upload the modified operational software to the Reinos.
3. Serco shall integrate the transaction processing software used during the Smart Card Pilot Program into the SFPM by creating an additional module and developing up to 10 new management reports that are generated using Translink transaction data.
4. Serco shall enable the transmission of Primary Audit Data from the MacKay E-Purse through the LKI. This data will automatically flow from the MacKay E-Purse to the lock at the time of collection.

5. Serco shall automate the daily download of transaction data to the Translink Service Center in compliance with the City's clearinghouse agreement with MTC.

IX. Quantities and Implementation - Reserved

X. Installation of Parking Meters

Serco will supply services to install and commission all new meters, housing and locks.

A Pre-Installation Responsibilities of the City

1. On contract award, the City shall provide Serco with an electronic listing of the following information:
   - Old post ID number
   - Street Name
   - Old collection route number
   - New post ID number
   - Meter profile for each post
   - Upper lock combination
   - Housing cap color
   - Parking regulation sticker for each location by post ID number

2. On contract award, the City shall provide Serco with the text and/or graphics that is to be printed on the single space meter housing decal.

B Scheduling Responsibilities of the City

1. The City shall ensure that it has staff available to issue meter keys from 6:00 a.m. to 9:00 a.m., Monday through Friday, City holidays excepted, and staff available to accept the return of meter keys from 4:00 p.m. to 6:00 p.m., Monday through Friday, City holidays excepted.
2. On five days' notice, the City shall have staff available to issue meter keys from 6:00 a.m. to 9:00 a.m. on Saturdays, Sundays, and City Holidays and accept the return of meter keys from 4:00 p.m. to 6:00 p.m.
3. On contract award, the City will provide Serco with a list of meters and locations, if known, of meters that are installed over underground vaults and basement spaces.

C Installation Schedule

1. Serco shall schedule the installation of meters following current collection routes. Serco shall provide to the City a proposed installation schedule for approval. The City shall approve an installation schedule that designates every installation location.
2. Serco shall install all of the multi-space meters beginning 60 days after Contract Award.
3. Serco shall install 2,000 single space meters beginning 90 days after Contract Award and install 4,200 single space meters for each month thereafter until installation is complete. According to this schedule, installation of the single-space meters will take six months to complete from the installation commencement date.

4. Installation of all multi-space meters and single space meters must be completed within 9 months from Contract Award.
5. The Installation Schedule is part of the Project Schedule. See Appendix B.

D Meter Installation Database

1. Prior to the start of the meter installation, Serco shall set up the MacKay WinEmu, Medeco MeterSecure, and the Reino Parking Management software on a standalone desktop computer at the DPT Meter Shop. Serco shall start to create the master database from the first day of installation. For additional information, see Section VII, San Francisco Parking Management Software.
2. Once installation begins, Serco shall build a database of records including meter mechanism ID number, meter mechanism manufacture date, post number and location, meter collection canister number, meter housing number, lock ID number, lock manufacture date, meter delivery date, meter installation date, meter profile, cap color, and the post GPS location as each single space meter is replaced with a MacKay E-Purse meter. For the Reinos, Serco shall build a database that contains the location number and location, Intelligent Cash Box Number, the meter ID number, the meter mechanism manufacture date, the lock ID number, the lock manufacture date, the meter delivery date, the meter installation date, meter profile and GPS location.
3. Once the electronic locks are installed, the programming of the lock codes for meter collections will become the responsibility of the City.

E Serco Facility

Prior to the start of installation, Serco shall establish an Installation Support Depot to receive shipments of single and multi-space meters from the manufacturers, to conduct quality tests on the meters received, to build the meter inventory database, and to prepare single and multi-space meters for daily installation.

F Materials and Equipment

1. Serco will supply all materials and equipment required to install the meters, including tools, vehicles and fittings.
2. Serco will supply all galvanized steel sleeves to fit over single space meter posts.
3. Serco shall provide 4 Global Positioning System (GPS) terminals and related equipment that will be used during installation to obtain coordinates for each meter installed (See Section VII.B). Once installation is complete, the GPS terminals shall become the property of the City and be used by the DPT Meter Shop for data capture of new and revised installations. Serco shall allow the City to use the GPS terminals during the meter installation if necessary.

G Personnel

1. Serco shall provide sufficient trained labor resources to successfully install all single space and multi-space meters within the 9-month period from contract award. These staff will be under the supervision of Serco's Project Director or Contract Manager. Serco, upon the approval of the City, can subcontract any or all of the work required to install the parking meters. Serco shall retain all responsibility for meeting the installation schedule and adhering to all performance standards set out in this agreement. Serco shall be responsible for receiving, counting, recording, preparing and issuing the daily batches of meters to be installed. The Serco Project Director or Contract Manager shall oversee meter installation subcontractor.
2. Serco shall provide a full-time Quality Assurance Coordinator to implement and oversee the Meter Installation Quality Assurance Program
3. Serco shall mark single space meter post sleeves with decals prior to meter installation.

H Repair and Replacement of Single Space Parking Meter Posts and Designation of Locations for Multi-Space Meter Installation

1. After contract award but before installation of the MacKay E-Purses, all single space meter mounting posts and brackets will be inspected by Serco and the City to ensure that they are in place, plumb and in good condition and at least 36 inches high, plus or minus one half inch. Plumb is defined as vertical to a flat surface, plus or minus 5 degrees. Inspections will be scheduled so that they occur approximately no more than two weeks prior to commencement of installation of the meters. Based on the criteria described above, the City shall determine whether the post will be repaired or replaced.
2. All posts that are straightened so that the sleeves can spin freely around the pole. If the post cannot be straightened to work with the sleeve, it must be replaced.
3. Serco shall mark all posts not meeting the condition set out above with different colored spray paint to indicate they are to be either repaired or replaced.
4. Serco shall notify the City of its intention to replace a post at least two days in advance, and the City shall remove the meters from these posts.
5. Three days prior to beginning scheduled installation in a given area, but after the City has removed the old meters, Serco shall replace or repair all marked posts. Serco shall install all new posts according to the City's installation standard. Serco shall ensure that all new meter posts installed over underground vaults and basement spaces do not allow water to enter the vault or basement area.
6. Prior to installation of the Reinos, Serco and the City shall determine and inspect the proposed locations.
7. The inventory of all installed meters shall be attached hereto as Appendix K.

I Installation of the MacKay E-Purse

1. Prior to installation, Serco shall inspect and perform quality testing of all equipment received. This testing will include but not be limited to a functional test of the electronic locks, a coin test of the meter, and a verification of the meter inventory database. Serco shall give the City the results of these tests in writing as they are completed.
2. Serco shall submit to the City for its review and approval the master schedule, supporting detailed work schedule, and other quality assurance documents and, thereafter, proof of compliance with the plans.
3. Serco shall check all received shipments of MacKay E-Purses, Reinos, and related components against the orders. Serco will store all equipment at Serco's Installation Support Depot until assembly is required. All MacKay E-Purses will have already been programmed with specific rate information according to City specifications at the factory.
4. On receipt of parking meters and related components from the manufacturers, Serco shall attach the battery pack to each MacKay E-Purse, applying di-electric grease to the connections. Serco shall then place and secure the MacKay E-Purse into the meter housing. The electromechanical locks shall already be factory installed.
5. Serco shall apply one decal on each housing according to the City's specifications. This decal will be identical for all meters supplied. Serco shall supply the City with 500 extra decals for future use.
6. Meters designated for replacement shall have their coins collected the day before the scheduled installation of the new meters. Where there are no coin canisters in the meters, the installation crew shall vacuum the loose coins and empty the coins into a collection vault.
7. In coordination with the City, Serco shall post no parking notices 48 hours in advance to reserve up to 20 metered spaces on the installation route to reserve positions for the installation vehicles.
8. Each installation day, Serco shall pick up meter collection vault and meter keys from the City.
9. On the day of installation, Serco shall open each meter that is to be replaced, remove the coin canister from the vault and empty coins into a collection vault. The old coin canisters will be set aside separately and returned to the City. In no event shall the old coin canisters be placed into the new meters
10. Serco shall then remove the old meter housing and mechanism, verify that the post is sound, install the sleeve and mount the new meter according to the manufacturer's specifications.
11. Serco shall be responsible for obtaining the coordinates of each meter using a GPS terminal with an accuracy to 1 meter of the meters actual position, and entering these GPS coordinates into the SFPM meter inventory database.

12. Serco shall apply a weatherproof wrap-around sticker on each sleeve indicating the post ID number. The post ID number will be printed three times on each sticker so that the post ID number will be visible from all directions. The City will specify the design and materials to be used for these stickers.
13. Serco shall perform a final quality check of the installation, ensuring that each meter has been installed on its designated post as specified in the meter installation schedule and the meter inventory database, and that the meters are securely fastened to the meter post in compliance with the manufacturer's published standards and specifications stated herein this Agreement. Serco shall then place the meter in service, setting each meter at maximum time.

J Installation of the Reino

1. On receipt of the Reinos from the manufacturers, Serco will temporarily attach a battery to each Reino to test the meter; however, the batteries will not be installed to the Reino until it is installed in the ground.
2. Prior to installation, Serco shall perform quality testing of the Reinos. This quality testing will include a functional test of the electronic locks, a coin test of the meter, and a verification of the meter inventory database. Serco shall give the City the results of these tests in writing as they are completed.
3. Serco will apply a location number on the back of each Reino according to the City's specifications. Serco will apply a meter housing decal to the face of each Reino according to the City's specifications.
4. Serco will collect from the old meters on the selected route the day before. Where there are no coin canisters in the meters, the crew will vacuum the loose coins and place them in a collection vault.
5. In coordination with the City, Serco shall post no parking notices 48 hours in advance to reserve up to 20 metered spaces on the installation route to reserve positions for the installation vehicles.
6. On each installation day, Serco shall pick meter collection vaults and meter keys from the City.
7. On the day of installation, Serco shall open each meter that is to be replaced, remove the coin canister from the vault and empty coins into a collection box. The old coin canisters will be set aside separately and returned to the City.
8. Serco shall remove the old meters scheduled to be replaced by the Reinos and bring them on that day to a location designated by the City. If the installation crews are delayed for any reason and cannot bring the old meters to the City's designated location, Serco will store the meters and transfer them to the City at a later time that is mutually agreed upon.
9. Serco shall install the multi-space meters according to the manufacturer's standards.

10. Serco shall be responsible for obtaining the coordinates of each meter using a GPS terminal with an accuracy to 1 meter of the meters actual position, and entering these GPS coordinates into the SFPM meter inventory database.
11. Serco shall install the appropriate street markings for the number of spaces controlled by the multi-space meter according to manufacturer's standards.
12. Serco shall remove the old single-space parking meter posts.
13. Serco shall perform a final quality check of the multi-space meters, ensuring that each meter has been installed in its designated location as specified in the meter installation schedule and the meter inventory database, and that they have been securely fastened to ground in compliance with the manufacturer's published standards, and that the street markings have been properly installed. Serco shall then place the meter in service, setting each parking meter at maximum time.

K Replacement of Batteries

Serco shall provide the City with one set of replacement batteries for single and multi-space meters as previously stated in this Agreement at the completion of installation.

L Quality Assurance

1. Prior to the start of meter installation, Serco will implement a set of procedures to ensure contract compliance, consistent meter installation methodology, regular sampling and processes for corrective action.
2. Serco will submit to the City within 30 days of Contract Award a Meter Installation Quality Assurance Program. The ISO 9000 series of standards will be the guiding principles to ensure consistency and uniformity of all equipment received. Serco will be responsible for the design of the QA processes until their deployment. The program will start before Serco receives any equipment from its suppliers.

M Disposal of Old Meters

Serco shall deliver old parking meters to a warehouse location in San Francisco as specified by the City.

XI. Training

Serco shall conduct training for City and Serco staff before the installation of the meters as described below. Serco will provide classroom training and on-the-job training.

A Training on Contract Award

1. Serco shall provide software and product training within 30 days of contract award to the City management and meter maintenance staff and Serco management, meter collectors, and coin counting staff.
2. The software training will be based on the Phase I standalone system described in Section VII, San Francisco Parking Management Software. Serco shall provide training for the following standalone software applications: MacKay WinEMU, Medeco MeterSecure, the Reino Parking Management software, and the PDT communications software.
3. Serco shall provide training to the various groups as described below:

   a) City management staff shall receive at least a one (1) day training session that will include:
      - Program meter profiles using the WinEMU and Reino Parking Management software.
      - Review data uploaded from the PDTs and Reino Intelligent Cash Boxes to the WinEmu and Reino Parking Management software.
      - Set up maintenance and collection routes using MeterSecure.
      - Download of route and maintenance data to and from the PDTs.

   b) City meter maintenance staff shall receive at least a one (1) week training session (eight hours a day for five days) offered on three occasions that will include the following:
      - Upload meter profiles using a PDT using WinEMU and Reino Parking Management software.
      - Open the electromechanical locks on the single and multi-space parking meters according to pre-set routes or individually using MeterSecure and PDTs.
      - Program the Reino using the technician infrared identification keys and the Field Programming Modules.
      - Operation, maintenance and repair of the MacKay E-Purse and Reino meters and the Medeco electronic lock system

   c) City parking enforcement staff shall receive at least one (1) half-day training session (four hours a day) offered at least ten (10) times that will include the following:
      - Basic operation of the MacKay E-Purse and Reinos.
      - Review of enforcement indicators and MacKay E-Purse and Reino displays.

- Overview of the information collected by the MacKay E-Purse and Reino meters.

d) Serco management staff shall receive at least three (3) days of training (eight hours a day) that will include the following:
   - Set up meter collection routes using MeterSecure.
   - Manage the downloading of route data to the PDTs, including authorization codes for the electromechanical locks using MeterSecure.
   - Review data downloaded to from the PDTs and Reino Intelligent Cash Box to WinEmu and the Reino Parking Management software.
   - Serco Managers and Supervisors will receive at least a one (1) week training (five days, eight hours a day) in the use of the PDTs and the Medeco electromechanical locks, as well as training in the operation of the MacKay E-Purse and Reino meters and the SFPM software. In addition, Serco Managers and Supervisors will participate in standard management training throughout the term of the Agreement.

e) Serco's parking meter collectors shall receive at least one (1) day of training (eight hours) that will include the following:
   - The general operations of the MacKay E-Purse and Reino.
   - Open the electromechanical locks on the parking meters according to pre-set routes using MeterSecure.
   - Collect meter audit data using PDTs and the Reino Intelligent Cash Box.

f) Serco's coin counters shall receive at least three (3) days of training (eight hours a day) that will include the following:
   - Operation of the coin counting machines
   - Security procedures for the strong rooms

g) The meter installation personnel shall receive at least three (3) days of training (eight hours a day) that will include the following
   - Installation of the MacKay E-Purse and Reino parking meters according to manufacturer's specification and City standards.

Serco shall provide training to all groups described above until each group can show mastery of all of the system tools. This mastery will be assessed by an examination administered by Serco that will test the employees' ability to use and/or maintain the equipment, software and PDTs.

B Training on Completion of the SFPM

Serco shall provide training for the following groups for the activities described below once the SFPM is complete:

1. City management staff shall receive at least a three (3) day training session (eight hours a day), offered twice, that will include the following:
    - Program meter profiles.
    - Review data uploaded from the PDTs.
    - Set up maintenance and collection routes including electromechanical lock codes and maintenance work orders.
    - Download route and maintenance data to and from the PDTs.
    - Generate programmed and user defined reports
    - Create digital maps showing meter location
    - Create charts and graphs combining data from the SFPM database and digital maps of the City

2. City meter maintenance staff shall receive at least a two (2) day training session (eight hours a day), offered three times, that will include the following:

    - Open the electromechanical locks on the single and multi-space parking meters according to pre-set routes or individually.
    - Collect maintenance transactions data using PDTs and the Reino Intelligent Cash Box.
    - Upload meter profiles using a PDT.
    - Program the Reino meter using Reino's technician infrared identification keys and the Reino Field Programming modules.
    - Use a PDT to view a single-space meter maintenance transactions, enter work order data. And look up work orders according to preset maintenance routes or individually.
    - Learn the operation, maintenance and repair of the MacKay E-Purses, Reinos, and the Medeco electronic lock system

3. City Parking Citation Division staff shall receive at least one (1) ½ day training session (four hours) hoffered twice that includes the following:
    - Look up the maintenance status of individual meters according to date and time

4. City IT Administrators will receive at least a one (1) day training session (eight hours) that includes the following:
    - Manage system access and control security
    - Monitor activity on the system
    - Undertake network management tasks and load software updates

5. Serco's management staff will receive at least one (1) week (five days, eight hours a day) of training that includes the following:
    - Set up meter collection routes.
    - Manage the downloading of route data to the PDTs, including authorization codes for the electromechanical locks.
    - Input coin counting data

- Review data uploaded from the PDTs and Reino Intelligent Cash Box Reader.
- Generate programmed and user defined reports.

6. Serco Parking Meter Collectors will receive a one (1) day training session (eight hours) that includes the following:
    - Open the electromechanical locks on the parking meters according to pre-set routes.
    - Collect meter audit data using PDTs and the Reino Intelligent Cash Box.
    - Use a PDTs to enter meter maintenance requests for individual meters.

Serco will provide training to all groups described above until each group can show mastery of all of the system tools. This mastery will be assessed by an examination administered by Serco that will test the employees ability to use the software and PDTs.

C On-Going Training for City Staff

1. A Product Support Technician will be assigned by Serco to the contract for the full term of the Agreement. The Product Support Technician will be responsible for the administration of the on-going training program after the first year of the contract, including the annual refresher course for current City employees. He/she will be the contact person for the provision of on-the-job training. He/she will be conversant with the working of all the systems and tools and will be able to answer questions on the operations of the tools and systems.
2. The on-going training program will include an annual three-day (24 hours) course for new City employees, and an annual eight (8) hour refresher course for current City employees.

D On-Going Training for Serco Staff

1. New meter collectors will receive a one-week orientation (five days, eight hours a day) on collection procedures and routes.
2. New coin counters will receive a three-day orientation training (eight hours a day) in the operation of counting machines and security procedures for the strong rooms.

XII. Collection Services

Serco will collect coins, card transaction data, and summary audit data from all single and multi-space parking meters under the jurisdiction of the City on the streets, in metered parking lots, and parking garages in San Francisco.

Serco shall provide a full time Collections Manager, reporting to the Contract Manager, to provide direct supervision of collection services.

A Collection Routes and Schedules

Serco will develop and submit a parking meter collection plan on behalf of the City for its review and approval that will ensure that every parking meter is collected on a consistent schedule. This schedule will prevent the meters from jamming because they are full of coins and discourage theft. Once approved and implemented, the City requires that the collection plan be re-evaluated by the City and Serco every three months.

Serco shall incorporate the following considerations into its proposed collection plan.

- Collection work will be set at a frequency such that the coin canister inside the meter will not be heavier than an average of 1.5 pounds.
- Collection work will be designed so that the number of collection crew shifts required to collect the assigned meters is distributed as evenly as possible across all five working days of the week.
- The collection plan will address how the different parking meter rates affect the frequency of collection
- The collection plan will minimize the amount of non-productive time. Non-productive time is defined as the driving time between routes and walking time on blocks that have few or no meters.
- Collection routes for single space and multi-space meters shall be separate.
- Serco will perform meter collections daily, Monday through Friday. The City currently observes 11 legal holidays and will provide Serco with a schedule of holidays for each calendar year. However, the City reserves the right to require Serco to collect from City parking meters on City observed holidays if necessary

The City reserves the right to change the route schedule and collection frequency as required by normal meter installations and removals, rate changes, segregated revenue rate tests, security concerns, or when additional collections are required. The City will provide Serco with 48-hour notice of changes in the collection schedule and confirm the scheduling change in writing.

If the City and Serco decide to change collection routes and sub-routes, Serco shall reprogram the PDTs used by the collectors to open the electromechanical locks and audit the MacKay E-Purse.

Serco will also develop and maintain a set of policies and procedures describing the methodology used to provide the meter collections services. The City and Serco will jointly own the Intellectual Property Rights to these policies and procedures.

B Phase II Collection of Coins and Card Data

The number of collection crews required to collect the MacKay E-Purse meters after the implementation of the Smart Card Pilot Program and the subsequent full implementation of Smart Cards at all MacKay E-Purse meters shall be determined by dividing the number of assigned meters by the productivity measures in the table below. The productivity measure applied shall be based on the average number of card transaction records downloaded per MacKay E-Purse in a given area. If the acceptance of smart card payments has just begun, the productivity measure shall be 711 MacKay E-Purse meters collected per crew per shift until Serco can determine a card use pattern.

Card transaction data for the Reino multi-space meters is communicated to the SFPM when the Reino cash box is placed in a reader at the time of coin counting, so the collection time for Reino meters is not included in this model.

Max. Number of card transactions to collect per meter	Maximum byte size per download	Card transaction download time	Total collection time per meter	Total meters collected per collector	Productivity measure (total meters per crew)
0	0	0	30	325	750
25	750	2	32	308	711
50	1,500	3	33	293	675
75	2,250	5	35	279	643
100	3,000	7	37	266	614
125	3,750	8	38	254	587
150	4,500	10	40	244	563
175	5,250	12	42	234	540
200	6,000	13	43	225	519
225	6,750	15	45	217	500
250	7,500	17	47	209	482
275	8,250	18	48	202	466
300	9,000	20	50	195	450
325	9,750	22	52	189	435
350	10,500	23	53	183	422
375	11,250	25	55	177	409
400	12,000	27	57	172	397
425	12,750	28	58	167	386
450	13,500	30	60	163	375
475	14,250	32	62	158	365
500	15,000	33	63	154	355

This productivity measure is based on a card scheme with a transaction of 30 bytes. If the Translink system or any other card system that the City selects has a card transaction size that is larger than 30 bytes, Serco shall re-calculate the productivity measure using a card transaction donwload speed of 9600 baud or 450 bytes per second.

C City Property

Serco Management Services shall be responsible for any equipment issued to it by the City that it will use in the performance of its duties. Serco will be responsible for all the monies collected by Serco for the City.

D Collection Vaults

Serco shall provide the City with secured collection vaults with permanent identification numbers, carts to collect parking meter revenues, and the security seals used to mark each collection vault once collection is complete. The City must approve the design and materials of the proposed collection vaults and carts before purchase. The collection vaults and carts will become the property of the City at the end of the contract term

Serco shall be responsible for keeping an inventory list of all of the collection equipment in its possession. Serco shall inspect and maintain the collection vaults and carts in good working condition including but not limited to the integrity of the vault, the condition of the vault head, the key, and the security boot.

The City reserves the right to inspect the inventory list and all collection vaults and related equipment at any time without prior notice.

E Collection Vehicles

Serco shall provide a sufficient number of vehicles and backup vehicles to perform the collection services required under this Agreement. Serco will be responsible for ensuring that its vehicles remain in good working condition and that they have procedures in place to procure or lease additional vehicles if necessary to complete daily collection services.

Serco’s vehicles shall meet the following specifications:

- All vehicles must have the capacity to handle the maximum number of full collection boxes that will be carried on a collection route.
- All vehicles shall have a method of securing the collection boxes to the cargo area to prevent injury or damage.
- All vehicles shall carry Serco’s identification on the exterior. The identification method must be reviewed and approved by the City.
- All vehicles have a security system that protects the vehicle’s contents against theft and an identification chip that would allow Serco to track the vehicle if stolen.

- All vehicles must have safety equipment, including but not limited to such items as spare tires, flares and cones.

F Radios

Serco shall provide a radio communication system to be approved by the City with a minimum of four two-way radios, batteries, and holsters. Every crew leader and field supervisor must be accessible during working hours by radio communication.

G Uniforms

Serco will provide all collection personnel with standard security guard style uniforms in sufficient changes for each employee to maintain a professional clean and neat appearance. The City must approve the proposed uniform before purchase. Serco will also provide at a minimum to every meter collector a reflective security vest, a back brace, one pair of shoes, and work gloves as needed.

H Employee Identification

Serco will provide each employee with a photo identification badge that must be visibly worn while on duty and turned into the office daily after the collection schedule is completed. The I.D. badge shall not be stored in a pant or jacket pocket. The City must approve the format and content of this identification prior to issuance.

I Issuance of Portable Data Terminals

The City shall program in advance the SFPM electromechanical lock module for the daily collection schedule so that access codes are downloaded to the meter collector's PDTs. Serco will issue each collector a PDT at the beginning of the day with the programming to open the meters assigned to the collector for the chosen route.

If keys or locks fail while a coin vault is open, Serco shall report the failure to the City within one hour of the occurrence. Collectors shall retrieve all pieces of a broken key if they are not stuck in the meter and deliver them to the City. Serco must cover and lock any parking meters with broken keys or key pieces with a meter bag. The City will provide Serco with parking meter bags as needed.

J Collection from Single and Multi-Space Meters

Each collector will be responsible for collecting coins from all meters, Summary Audit Data from single space meters, and the Intelligent Cash Box data on each daily assigned route. Each collector shall open and collect from only one single or multi space parking meter vault at a time. Serco shall ensure that collectors and field supervisors do not carry any tools when performing their collection duties.

During a collection from a single space meter, the collector will remove the coin canister, insert the coin canister in the head of the collection vault, and turn the coin canister sufficiently to empty it. Once empty, the collector shall remove the coin canister from the head of the collection vault, reinsert the empty canister into the parking meter vault, and close, secure and lock the parking meter vault door. Serco will be responsible for ensuring that collectors re-install coin canisters correctly in the meter vault. If Serco needs to exchange a collection vault in the field, it will be responsible for securing each collection vault, reporting the incident to the City, and entering the information into the SFPM.

During a collection from a multi-space meter, a collector will open the multi-space meter vault, exchange the cash box inside the multi space parking meter with an empty cash box, lock the meter vault door, and secure the full cash box in the vehicle.

If a route cannot be collected, Serco will be responsible for notifying the City by radio of the problem immediately. Once the problem is solved, Serco will return to the route and complete the collection. Serco will be responsible for ensuring that all data from that interrupted collection route is properly transmitted to the SFPM.

Serco will notify the City immediately if it discovers that a parking meter has an empty coin canister, is missing a coin canister, or has any other urgent problem discovered in the field.

K Delivery to the Counting Facility

Serco shall deliver parking meter coins the same day they are collected to their counting facility on a schedule approved by the City. At the end of each collection route, every Crew Leader will notify the Serco Collections Manager that collection route has been completed. The Serco Collections Manager will notify the Serco Coin Counting Supervisor each day with the expected time of arrival for each collection crew.

At the end of the collection shift, the vehicles will return to the Serco facility to be inspected. Once this inspection is complete, Serco's collectors will move the vehicles into a secured holding area and unload the collection vaults. Serco's Coin Counting Supervisor will inventory the single space meter collection vaults and multi-space meter cash boxes and inspect all seals and locks.

Each Crew Leader will submit to the Coin Counting Supervisor their daily collection report, which will include the collection boxes and seals used for each route. The Collection Crew Leader will be required to sign the document acknowledging that the appropriate security seal was placed on each collection vault. Once the inspection is complete, the vehicle and the collection crew will leave the secured area.

L Collection Service Staffing Requirements

The Proposer must provide a sufficient number of Collectors, Crew Leaders, Field Supervisors, Collection Managers, and contract managers to ensure the timely collection of parking meter coins and data.

As representatives of the City, the Contract Manager, Collection's Manager, On-Street Supervisor and Crew Leaders must have the ability to speak and understand basic English so that they can communicate with the public.
Crew Leaders will ensure that all routes are collected according to the instructions of the Collections Manager and the City. Crew Leaders will transport their collection crew, collection equipment, and collected coins and data safely to and from their designated routes each collection day. Crew Leaders will ensure that all meter collectors are aware and knowledgeable of the routes assigned for collection and that each collector collects the route in sequence and completely. They will be responsible for securing all collections equipment and vehicles. They will also document the equipment used during the collection day.

The On Street Supervisor will provide mobile support to all of the crews in the field collecting in case they encounter mechanical or technical problems. The On Street Supervisor will supervise all of the crew leaders and collectors to ensure that they are following approved policies and procedures.

The Collections Manager shall have general oversight of all of Serco employees that work for the City on parking meter collections. The Collections Manager will ensure that all crews complete their daily assignments following Serco's standard operating procedure. The Collection Manager will monitor daily activity and track such problems as broken meters, faulty keys or locks, or any other equipment problem that might arise.

M Collection Reporting Requirements

Serco will enter in the SFPM on a daily basis the name of the collector and the collection vaults assigned to each collector for every daily collection route. Serco will also enter maintenance requests that have been reported by collectors. These reports must be completed by 12:00 p.m. on the day after the collection occurred and the information was reported.

XIII. Coin Counting Services

Serco shall provide coin counting services Monday through Friday excluding holidays observed by the City and County of San Francisco to ensure that all coins collected from single and multi space parking meters are sorted, counted, and deposited within 24 hours of receipt. The City reserves the right to require Serco to provide coin counting services on City observed holidays if necessary.

Serco shall provide a full time Coin Counting Supervisor, reporting to the Contract Manager, to provide direct supervision of the coin counting services.

Serco will develop and maintain a set of policies and procedures describing the methodology used to provide the coin counting services. The City and Serco shall jointly own the Intellectual Property Rights to these policies and procedures.

A Acceptance of Collection Vaults

Once notified of the imminent arrival of a collection crew, the Coin Counting Supervisor will ensure that the vehicle and the area around it are secure before allowing the vehicle into the facility. The Coin Counting Supervisor will collect the daily collection report from the Crew Leader, confirm that the seals on each collection vault are intact, and sign a form acknowledging that the collection crew placed a security seal on each collection vault.

B Required Coin Counting Services

Serco's coin counting staff will verify the collection vault identification number and security seal match the daily collection report. For single space meters, the coin counter will remove the security seal from the collection vault, the security lock and head of the collection box and empty the contents of the collection vault onto a culling table. Coin counters will only open one collection vault at a time.

For multi-space meters, coin counters will open the cash box with a key and empty the content of the cash box onto a culling table. Once the cash box is empty, the counter will place the cash box in its cradle to download the audit information.

The coin counter will initially inspect all coins for bent coins, foreign coins, slugs, or other problem coins and then insert the coins into the coin counting machine. Once the machine has completed sorting the coins, the coin counter will place each denomination of coins into a coin storage bin that meets the City's financial institution cash vault requirements. The coin counter will take the coin denomination totals provided by the coin sorting machine and record them on a cash vault transmittal slip.

C Transportation and Cash Vault Services

Serco will contract for transportation and cash vault services that will meet the requirements of the City's financial institution. This contractor will deliver the sorted coin bins to the verification center of the City's financial institution. Serco will provide a transmittal report to its cash vault contractor of the value of the coins given to it for deposit. This coin total will be compared to the cash vault total once the coins are received and accepted by the cash vault. Serco will be responsible for resolving any discrepancies that may arise between its recorded coin totals and the cash vault totals.

Serco must have a contract in place to secure its coin counting facility using armed security guards in the event that its chosen transportation contractor cannot pickup the coin bins as scheduled.

D Facility Requirements

Serco will provide a secure facility in the City of San Francisco for coin counting. The coin counting facility must be available to accept collection boxes Monday through Friday from 10 a.m. and 6:00 p.m. Serco will provide the City with a proposed facility plan and security procedures for approval prior to beginning construction.

E Coin Counting Equipment

Serco will provide two high speed coin sorters, a sufficient number of handheld magnetic wands to seach for slugs, a sufficient number of oversize coin culling tables, and towels and cloths to dry wet coins. The City will own the equipment purchased at the end of the contract term.

Serco will enter into a maintenance agreement for its coin sorting equipment to keep the coin sorters in good condition.

Serco will negotiate and maintain an agreement with a vendor to count the coins in the event that both coin counting machines are not operational. The City will be named on this subcontract with the right to assume the services should Serco fail to provide these services. The City must be notified if this contract is cancelled.

F Uniforms

Serco will provide pocketless uniforms approved by the City to all of its coin counting employees. These uniforms will be worn at all times while the employees are in the coin counting area.

G Coin Reporting Requirements

Serco will enter the coin counting data into the SFPM on a daily basis. This data will include but is not limited to the date the coins were counted, the coin counter identification number, collection route number, the canister number, the collector identification number, the seal number, and the cash value of each coin denomination.

Appendix B Project Schedule

The attached Project Schedule is based on an Effective Date of Contract of March 29th 2002. Should the Effective Date be delayed beyond this date all activities in the Schedule will be delayed by an equivalent duration.

Assuming a contract award date of May 10, 2002, the deadline for completion of meter installation shall be February 6, 2003. Should the contract award date be earlier or later than this estimated date, the installation deadline shall be adjusted by the equivalent number of days in either direction.

Appendix C Deliverables

I. Serco Deliverables

Category	Description	Date Due
Time accuracy, MacKay E-Purse	Certification that timer countdown meets criteria described in K3, confirm accuracy over temperature ranges in Section A2, real time accuracy over a 24-hour period at ambient, high, and low temperatures	Within 30 days of contract award
Housing, single space meter	300 pound impact test for dome cap assembly, upper housing, lower housing, and vault door.	Within 30 days of contract award
Housing, single space meter	Upper housing cap locking system and lower vault door locking system are resistant to entry by use of manual tools	Within 30 days of contract award
SFPM	Procure specified hardware needed for the device applications Provide stand alone device applications	Within 30 days of contract award
SFPM	Procure remaining hardware	13 weeks
SFPM	Prototype network design	6 weeks
SFPM	Installation and testing of network design	4 weeks, at completion of acceptance testing of SFPM system software
SFPM	SFPM Preliminary Software Requirements Specification and Preliminary Outline of Acceptance Testing	Within 12 weeks of contract award
SFPM	SFPM Software System Design Document and Revised Requirements Specification and Revised Outline of Acceptance Testing	Within 5 weeks of City approval of prior phase
SFPM	SFPM System Development, Software Integration, Testing, and Operations Manual	Within 26 weeks of City approval of prior phase

Category	Description	Date Due
SFPM	SFPM Site Testing in San Francisco	Within 4 weeks of City approval of prior phase
Installation	Master Installation Schedule	Within 30 days of contract award
Installation	Quality Assurance Documents	Within 30 days of contract award
Collections	Collection Plan	Within 30 days of contract award
Collections	Schedule of Coin Deliveries	Within 30 days of contract award
Coin Counting	Coin Counting Service Plan	Within 30 days of contract award
Coin Counting	Facility Security Plan	Within 30 days of contract award

II. City Deliverables

Category	Description
D Plate	Message to be placed on the rate plate label
Messages	Messages to be programmed to MacKay E-Purses and Reinos
All Meter Profiles	Description of time and rate features for MacKay E-Purse and Reino
Caps for Single Space Meters	Number of colored caps
Housing Vault	Message for vault decal
Mechanical Locks	Required number of each lock combination

Category	Description
Jam detection - Reino	Number of coins to be inserted before the Reinos will register a jam and shut down
Installation	Meter inventory: old post id, street name, old collection route, new post id, meter profile for each post, upper lock combination, housing cap color, parking regulation sticker by post ID number
Installation	Location to deliver old mechanical meters and cases once uninstalled

Appendix D Acceptance Criteria

The City shall inspect a random number of all equipment delivered as a part of this Agreement. City's acceptance of those equipment resulting from the random inspection does not constitute the City's final acceptance of the Equipment. As such, acceptance resulting from the random inspection does not imply that the Equipment satisfy all the specifications set forth in Appendix A of this Agreement. City's acceptance of the Equipment from the random inspection in no way precludes any of the rights and remedies under this Agreement.

I. MacKay E-Purse

The City shall inspect a random number of MacKay E-Purses from each delivery received by Serco prior to installation. The City will inspect the MacKay E-Purses to ensure that they meet the following minimum criteria:

- Accepts all coin denominations as programmed
- Not shipped with batteries
- Can clear foreign objects within 3 minutes w/o tools
- Display size, front and rear, as specified
- Serial number on mechanism
- Programmable using PDT
  - ✓ Field audit within 3 seconds
  - ✓ Field programming within 10 seconds
- Card slot has moisture wiper
- Card slot does not allow coins to enter
- Coin chute is free fall
- Entrance to coin chute has stainless steel plate
- Has pullback levers in the coin chute
- Capacitor retains time settings when battery detached
- Device has three SAM sockets
- Registers metallic and non-metallic jams
- Testing feature does not register deposited coins in revenue record
- Device has peripheral port
- Device has lock interface
- Has lock/mechanism interface
- Has City specified meter profile software installed

II. Housing

The City shall inspect a random number of Housings from each delivery received by Serco prior to installation. The City will inspect the Housings to ensure that they meet the following minimum criteria:

- Made of ductile iron
- Tapered vault

- Unique serial numbers stamped on a plate and affixed to each housing
- Can withstand 50 blows with a 5 pound hammer from the weak side, replicating the City vandalism test
- Two weep holes for moisture in vault bottom
- Vault door lock is rear loaded
- Polyester powder painted finish
- One-piece dome with seal
- Three vent holes for moisture in the dome assembly
- Holds coin canister
- Includes an extended coin canister with capacity for a minimum of $60 in quarters
- Provide specified number of colored domes

III. Mechanical Locks and Electromechanical Lock

The City shall inspect a random number of mechanical and electromechanical from each delivery received by Serco prior to installation. The City shall inspect the mechanical and electromechanical locks to ensure that they meet the following minimum criteria:

- High security upper vault lock, installed with one of four unique lock combinations
- Electromechanical lock pre-installed in vault door
- Has lock/mechanism interface

IV. PDTS

The City shall inspect a random number of PDTs from each delivery received by Serco prior to installation. The City will inspect the PDTs to ensure that they meet the following minimum criteria:

- Each PDT is provided with three lock attachments and 1 SCI attachment
- Each PDT has an AOD
- Provided with specified cradles with battery self discharge feature and charging indicators
- Provided with City-approved holsters for collection and maintenance
- Operational software installed

V. Reinos

The City shall inspect a random number of Reinos from each delivery received by Serco prior to installation. The City will inspect the Reinos to ensure that they meet the following minimum criteria:

- Electromechanical lock installed
- Proper number of spaces controlled
- Individual space buttons
- Field programmable within specified times

- Backlit LCD
- Rear indicators to show paid, expired, or out of service
- Displays rate and enforcement information
- Accepts programmed coins
- Has coin return
- Includes Intelligent Cash Box
- Holds at least $100 in quarters in cash box
- Housing made of specified steel
- Theft resistant housing
- Plumb mountable
- Commercially available battery (not lithium)
- Has low battery indicator
- Field programming is stated to take between 2 to 30 seconds.
- Has 4 SAM slots
- Has City specified meter profile software installed

VI. Installation

The City will inspect all of the posts repaired and the meters installed by Serco to ensure conformance to the specifications described in this Agreement. The City shall inspect each location to ensure that it meets the following minimum criteria:

- All poles are sleeved (single space meters only)
- All poles are marked with location identification numbers (single space meters only)
- All multi-space meters are assigned location and space identification numbers
- Sidewalk markings that designate spaces for multi-space meter installed
- Specified batteries installed
- Correct meter profile installed with proper messages displayed
- LEDs work as programmed
- Decals affixed to housing
- All poles and flange mountings meet City installation specification, including installing, repairing, or replacing poles and flange or surface mounting for underground vaults and/or basements
- All meter mechanism, housing, and lock information imported into master database
- Take coordinate of every installed meter
- Coordinate imported into master database
- Installed appropriate colored dome at each site

VII. SFPM

The City will approve the following design stages for the SFPM System

Phase I

a) Hardware Procurement
b) Standalone Device Application Installation and Testing

c) Acceptance

Phase II

a) Requirements Capture and Definition
b) Design Documentation
c) System Development
d) Hardware Procurement
e) Site Testing
f) Final Acceptance

Appendix E Pricing and Payment Schedule

I. Pricing

Product	Quantity	Unit Price	Total Price
MacKay E-Purse	25,000	397.92	9,948,000.00
MKH4500 Case	25,000	158.60	3,965,000.00
Medeco Electromechanical Locks	25,000	136.96	3,424,000.00
Medeco Mechanical Locks with 1,000 keys	25,000	16.04	401,000.00
PDTS - DAP CE 5320 handheld	55	6.090.50	334,977.50
Reino Two Space (w/ 2 battery packs and electronic lock)	0	3,479.77	0
Reino Four Space (w/ 2 battery packs and electronic lock)	0	3,788.40	0
Reino Six Space (w/ 2 battery packs and electronic lock)	125	4,598.10	574,762.25
Reino Eight Space (w/ 2 battery packs and electronic lock)	125	4,944.48	618,060.00
Reino Ten Space (w/ 2 battery packs and electronic lock)	0	4,714.29	0
Reino Accessories and Audit Tools, including 400 locks and keys	1	40,449	40,499.00
MacKay E-Purse spares	1,500	385.65	578,475.00
MacKay E-Purse spare batteries	5,000	4.57	22,850.00
PDT spare batteries	25	74.57	1,864.25
Medeco Electromechanical Lock Spares	1,000	132.74	132,740.00
Medeco Mechanical Lock Spares	4,000	15.54	62,160.00
Medeco PDT keycords	165	56.60	9,339.00
Decals	50,000	0.34	17,000.00
Parking Meter Management System (including hardware)	1	1,073,784	1,073,784.00
Smart Card Program	1	552,057	552,057.00

Stated discount for all spare parts 20%

Service	Description	Unit Price	Total
Installation Services	22,050 single 250 multi space meters 1,840 pole repair, replacement, and installation 2,000 twin mount pole replacement	254.67	5,615,473.50
Collection Services	Initial monthly management fee (24 months)	55,771.67	1,338,520.00
	Monthly fee increment	1,654.11	

Service	Description	Unit Price	Total
	Cost per collection crew 4,000 = (8 crews [1 driver, 2 collectors], 2 shifts/day, 250 collection days)	429.68	1,718,727.00
Coin Counting Services	Monthly management fee (24 months)	24,906.76	597,762.00
	Coin counter per hour 7,500 = (3 employees, 10 hours/day, 250 days)	24.28	182,071.00
SFPM	Programmer (16 months)	8,552.45	136,839.00

U.S. Department of Labor, Bureau of Labor Statistics, Consumer Price Index for Urban Wage and Clerical Workers (CPI-W) for the San Francisco-Oakland-San Jose Area for the month of the contract anniversary will be used to adjust the labor pricing on services for collection and coin counting after the first two years of the contract.

II Progress Payment Schedule

Serco shall receive payments for its equipment and services from the City in the manner described below

A One Time Equipment or Services

1 Installed Single and Multi-Space Meters

For each delivery received, Serco shall provide the City with single space meters, cases, and locks to use for maintenance and repair according to the following schedule. The City has assumed that Serco will be receiving deliveries once per month.

Delivery Month	Number of Single Space Meters
Month 1	100
Month 2	200
Month 3	300
Month 4	400
Month 5	500
Month 6	600
Month 7	700
Month 8	800
Month 9	1,400
Total	5,000

Once the City has agreed that the meters installed have met the Acceptance Criteria, Serco shall bill the City for installed single and multi-space space meters in the following manner. The billings for installed single and multi-space meters shall have the following format.

Product	**Quantity Installed**	**Quantity Delivered**	**Unit Cost**	**Total Cost**
MacKay E-Purse				
MKH4500 Case				
Medeco Electromechanical Locks				
Medeco Mechanical Locks				
Reino Six Space				
Reino Eight Space				
Total Amount Due				

2 Meter-Related Equipment

The City shall pay Serco for the following meter related equipment as they are supplied. Serco shall bill the City on a monthly basis.

Product	**Quantity Delivered**	**Unit Cost**	**Total Cost**
Reino FPMs			
Reino IR keys			
Reino Intelligent Cash Boxes			
PDTS – DAP CE 5320			

3 SFPM

Serco shall bill the City for satisfactory completion of the project phases. Serco shall invoice the City for each phase as it is completed as defined in the project schedule.

Project Phase	**Amount**
Phase I	
(a) Hardware procurement	
(b) Standalone Device Application Installation and Testing	
(c) Acceptance	
Phase II	
(a) Requirements Capture and Definition	
(b) Design Documentation	
(c) System Development	
(d) Hardware Procurement	

Project Phase	Amount
(e) Site Testing	
(f) Final Acceptance	
Amount Due	

4 Installation Services

The City shall pay the Contractor for installation services on a monthly basis. The Contractor shall repair, replace, or install 1,840 single space meter poles at no charge. Any additional repairs, replacements, or installations shall be billed at the rate listed below. The City shall withhold 10% from each invoice. Once the City formally accepts the installations as complete as described in Appendix A, Section X, it will remit the retained amount. The Contractor shall invoice the City as follows:

Service	Quantity Installed	Unit Cost	Total Cost
Single Space Meters Installed (sleeving and GIS in price)			
Multi Space Meters Installed (GIS in price)			
Pole repair, replacement, or installation			
Amount Due			

5 Smart Card Program

Project Phase	Cost
Phase I: Pilot	
Completion of software development for Translink card	
Provide SAMS, start pilot, train greetings	
Collect and analyze data of pilot project	
Phase II: Full Implementation	
Complete software programming for all meters to accept Translink card	

B Ongoing Equipment and Services

1 Replacement Parts

All extra or replacement parts from product catalogs for the MacKay E-Purse, Reino, Medeco mechanical and electromechanical locks, and PDTs.

2 Collection Services

The frequency of collection crews shall be set in accordance to the collection plan as described in Appendix A, Section XII, Part A of this Agreement. Serco shall bill the City each month per collection crew per day based on the productivity measure as described in Appendix A, Section XII, Part B of this Agreement.

3 Coin Counting Services

Serco shall bill the City each month a fixed management fee and an hourly rate for the direct labor costs. The number of hours will be set as part of the coin counting plan and revised every three months as described in Appendix A, Section XIII of this Agreement.

4 Programming for SFPM

If the City chooses to contract for modifications to the SFPM, the City shall negotiate with Serco in advance on the scope of the work and the maximum number of hours for the specified modification. Serco will bill the City for direct time and materials cost on the requested modification.

Appendix F Defaults and Remedies

I MacKay E-Purse Power Consumption

The standard for the average power consumption of the MacKay E-Purse and expected battery life is based on the City's meter profiles installed. If more than five percent of the batteries in the installed base of MacKay E-Purses within a 12 month period register a low power indication before the agreed upon time frame based on the City's meter profile, Serco shall, within 30 calendar days of receiving the City's written Notice of Default, submit a written finding of whether the power consumption is due to a failure of the batteries or the MacKay E-Purse mechanism.

Serco agrees to pay the City for the costs of the following: 1) the labor costs for replacing the batteries if required to cure the default; 2) the cost of the replacement batteries if required to cure the default; and 3) the cost of properly disposing of the batteries for the term of the Agreement if required to cure the default. If the MacKay E-Purse mechanism is the source of the high power consumption, Serco must submit a plan for correction within 30 calendar days of its finding and will be responsible for any costs and/or revenue losses directly associated with the excessive power consumption, from and including the date Serco received the City's notice of the default up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average daily revenue per meter along the collection route where each defective mechanism is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written acceptance that the default has been cured.

II MacKay E-Purse Internal Clock

In the event that more than half a percent of the installed base of MacKay E-Purse internal clocks are not accurate to within 3 seconds per day over 30 calendar days, Serco shall be responsible for repairing or replacing all of the defective mechanisms within 30 calendar days of receiving written notice of the default. If the City does not have enough MacKay E-Purses in its inventory to replace the Defective mechanisms currently in operation on the street, Serco shall be responsible for any revenue losses that the City incurs due to this defect from and including the date Serco receives notice that the number of MacKay E-Purses in the City's inventory is insufficient, up to and including the date on which the City accepts in writing that the defective mechanisms have been repaired or replaced. The City shall respond to Serco's written certification within 20 working days. The revenue loss shall be calculated using the average daily revenue per meter along the collection route where each defective mechanism is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written acceptance that the default has been cured.

III MacKay E-Purse Coin Discrimination

In the event that the installed base of MacKay E-Purses reject more than one percent of valid coins over 30 calendar days, Serco shall be responsible for reprogramming the coin discrimination parameters or replacing defective mechanisms until they satisfy the representation within 10 working days of receiving written notice by the City of the default. If the City does not have enough MacKay E-Purses in its inventory to replace the defective mechanisms currently in operation on the street, Serco shall be responsible for any revenue losses that the City incurs due to this defect from and including the date Serco receives notice that the number of MacKay E-Purses in the City's inventory is insufficient, up to and including the date the City accepts Serco's written certification that the coin discrimination parameters have been reprogrammed or the defective mechanisms have been replaced. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average revenue per meter along the collection route where each defective mechanism is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

IV MacKay E-Purse Paid Parking Time

In the event that one percent of the installed base of MacKay E-Purse mechanisms over 30 calendar days fail to provide the user with accurate time for the amount paid when a coin is successfully inserted into the coin chute as described in Appendix A, Section I, Part K. Serco shall replace all defective meters within 10 working days of receiving written notice by the City of the default. If the City does not have enough MacKay E-Purses in its inventory to replace the defective mechanisms currently in operation on the street, Serco shall be responsible for any revenue losses that the City incurs due to this defect, from and including the date that Serco receives the notice of default, up to and including the date the City accepts Serco's written certification that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average daily revenue per meter along the collection route where each defective mechanism is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

V MacKay E-Purse Operational Software

In the event that more than one percent of the installed base of the MacKay E-Purse mechanisms operational software does not satisfy the representations in Appendix A, Section I over 30 calendar days, Serco shall be responsible for correcting the malfunction until it satisfies all of the representations in Appendix A, Section I of this Agreement within 30 calendar days of receiving the written notice of the default. Serco will be responsible for any costs and/or revenue losses directly associated with this defect from and including the date Serco received the City's notice of the default up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average revenue per

meter along the collection route where each defective mechanism is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

VI MacKay E-Purse Non-Metallic Jam Detection

In the event that more than five percent of the installed base of the MacKay E-Purse mechanisms non metallic jam detection equipment does not satisfy the representations in Appendix A, Section I, over 30 calendar days, Serco shall be responsible for correcting the malfunction until it satisfies all of the representations in Appendix A, Section I of this Agreement within 30 calendar days of receiving written notice of the default. Serco will be responsible for any costs and/or revenue losses directly associated with this defect, from and including the date Serco receives the notice of default up to and including the date the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average daily revenue per meter along the collection route where each defective mechanism is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

VII MacKay E-Purse Card Reader

In the event that more than five percent of the installed base of the MacKay E-Purse mechanisms card readers do not satisfy the representations in Appendix A, Section I, over 30 calendar days, Serco shall be responsible for correcting the malfunction until it satisfies all of the representations in Appendix A, Section I of this Agreement within 30 calendar days of receiving written notice of the default. Serco will be responsible for any costs and/or revenue losses directly associated with this defect from and including the date that Serco receives the City's notice of default up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average daily revenue per meter along the collection route where each defective mechanism is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

VIII MacKay E-Purse Front and Rear Displays

In the event that more than five percent of the installed base of the MacKay E-Purse front and/or rear displays do not satisfy the representations in Appendix A, Section I, over 30 calendar days, Serco shall be responsible for correcting the malfunction until it satisfies all of the representations in Appendix A, Section I of this Agreement within 30 calendar days of receiving the written notice of the default. Serco will be responsible for any costs and/or revenue losses directly associated with this defect from and including the date Serco received the City's notice of default up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The

revenue loss shall be calculated using the average revenue per meter along the collection route where each defective mechanism is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

IX MacKay E-Purse Motherboard

In the event that more than one percent of the installed base of the MacKay E-Purse mechanisms motherboards have defects such that the mechanisms do not satisfy the representations in Appendix A, Section I, over 30 calendar days, Serco shall be responsible for correcting the defect until it satisfies all of the representations in Appendix A, Section I of this Agreement within 30 calendar days of receiving the written notice of the default. Serco will be responsible for any costs and/or revenue losses associated with this defect, from and including the date Serco receives notice of the default, up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average daily revenue per meter along the collection route where each defective mechanism is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

X MacKay E-Purse Field Programming

In the event the MacKay E-Purse cannot be programmed by the PDT within 10 seconds through the SCI and LKI interfaces, Serco shall adjust or repair the MacKay E-Purse so that it is capable of meeting the promised programming time and incur all labor and related costs resulting from the repair or replacement within 30 calendar days of receiving the written notice of the default. Serco will be responsible for any costs and/or revenue losses directly associated with this defect from and including the date Serco receives notice of the default, up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average daily revenue per meter along the collection route where each defective mechanism is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

XI Lock/MacKay E-Purse Peripheral Interface

In Phase I of the implementation of the SFPM, in the event that the LKI cannot pass Summary Audit Data to the PDTs at the time of coin collection, Serco shall be responsible for repairing the LKI until it satisfies all of the representations in Appendix A of this Agreement within 30 calendar days of receiving the written notice of the default. In the interim period and at its own expense, Serco shall collect Summary Audit Data using the MacKay E-Purse SCI at the time of coin collection while maintaining the same collection schedule.

In Phase II of the implementation of the SFPM, in the event that LKI cannot pass primary audit data to the PDTs at the time of coin collection and field programming data for maintenance to and from the PDTs, Serco shall be responsible for repairing the LKI until it satisfies all of the representations in Appendix A of this Agreement within 30 calendar days of receiving the written notice of the default. In the interim period, Serco shall at its own expense collect primary audit data using the MacKay E-Purse SCI at the time of coin collection while maintaining the same collection schedule.

XII MacKay MKH 4500 Parking Meter Case Top Cap

In the event that vandals are able to knock the top cap off of more than five percent of the MacKay MKH 4500 parking meter housings over a 12 month period, Serco shall test other undamaged housings in the same collection area as the damaged housings in accordance with the specifications set forth in Appendix A, Section II, C, 2. This test will take place in the presence of a City-designated representative. If the housing fails the test, Serco shall be responsible for re-engineering the improvement of all housings within 30 calendar days of receiving the written notice of the default. Serco will be responsible for any costs and/or revenue losses directly associated with the failure of the top cap from and including the date Serco received the City's notice of the default up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average daily revenue per meter along the collection route where each defective mechanism is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

If the parking meter case top cap passes the test described in the paragraph above, Serco shall, within 30 calendar days of the completion of the test, work with the City to re-engineer the existing housings or procure an acceptable alternative that can withstand the unanticipated assault method on the housings. The City and Serco shall mutually agree on pricing for any re-engineered or procured parking meter case.

In the event that more than five percent of the MacKay MKH 4500 parking meter casing top caps tolerances are such that the maintenance staff must force the caps on to the vaults to engage the locking bar over a 12-month period, Serco shall be responsible for re-engineering the improvement of all housings within 30 working days of receiving the notice of default. Serco will be responsible for any costs and/or revenue losses directly associated with the failure of the top cap from and including the date Serco received the City's notice of default up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average revenue per meter along the collection route where each defective mechanism is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

XIII MacKay MKH 4500 Parking Meter Case Vault

In the event that more than five percent of the MacKay parking meter case vaults over the term of the Agreement do not satisfy all of the representations in Appendix A, Section II of this Agreement, Serco will be responsible for repairing the defects until it satisfies all of the representations in Appendix A, Section II of this Agreement within 30 calendar days of receiving the written notice of the default. Serco shall be responsible for any revenue losses that the City incurs due to this defect from and including the date Serco received the City's notice of default up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average daily revenue per meter along the collection route where each defective casing is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

XIV Reino Power Consumption

The standard for the average power consumption of the Reino and expected battery life is based on the City's standard Reino meter profile. If more than 5 percent of the batteries of the installed base of Reinos within a 12-month period register a low power indication before the agreed upon time frame based on the City's meter profile, Serco, within 30 calendar days of receiving the City's written notice of the default, shall submit a written finding of whether the power consumption is due to a failure of the batteries or the Reino mechanism.

Serco agrees to pay the City for the costs of the following: 1) the labor costs for replacing the batteries if required to cure the default; 2) the cost of the replacement batteries if required to cure the default; and 3) the cost of properly disposing of the batteries for the term of the Agreement if required to cure the default.

If the Reino mechanism is the source of the high power consumption, Serco must submit a plan for correction within 30 calendar days of its finding and will be responsible for any costs and/or revenue losses directly associated with this defect from and including the date Serco received the City's notice of the default up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average daily revenue per meter along the collection route where each defective casing is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

XV Reino Internal Clock

In the event that more than one percent of the installed base of Reino internal clocks are not accurate to within 3 seconds per day over 30 calendar days, Serco shall be responsible for replacing all of the defective mechanisms within 30 calendar days of receiving the

written notice of the defect. If the City does not have enough Reinos in its inventory to replace the defective mechanisms currently in operation on the street, Serco shall be responsible for any revenue losses that the City incurs due to this defect from and including the date Serco receives the notice that the number of Reinos in the City's inventory is insufficient, up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average daily revenue per meter along the collection route where each defective casing is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

XVI Reino Coin Discrimination

In the event that the installed base of Reinos reject more than one percent of valid coins over 30 calendar days, Serco shall be responsible for reprogramming the coin discrimination parameters or replacing defective mechanisms until they satisfy the representation within 10 working days of receiving written notice of the default. If the City does not have enough Reinos in its inventory to replace the defective mechanisms currently in operation on the street, Serco shall be responsible for any revenue losses that the City incurs due to this defect, from and including the date Serco receives the notice that the number of Reinos in the City's inventory is insufficient, up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average daily revenue per meter along the collection route where each defective mechanism is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

XVII Reino Paid Parking Time

In the event that one percent of installed base of Reino mechanisms over 30 calendar days fail to provide the user with accurate time for the amount paid when a coin is successfully inserted into the coin chute, Serco shall repair or replace all defective Reinos within 10 working days of receiving written notice of the defect. If the City does not have enough Reinos in its inventory to replace the defective mechanisms currently in operation on the street, Serco shall be responsible for any revenue losses that the City incurs due to this defect, from and including the date Serco receives the notice that the number of Reinos in the City's inventory is insufficient, up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average daily revenue per meter along the collection route where each defective mechanism is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

XVIII Reino Operational Software

In the event that more than one percent of the installed base of the Reinos operational software does not satisfy the representations in Appendix A, Section IV over 30 calendar days, Serco shall be responsible for correcting the malfunction until it satisfies all of the representations in Appendix A, Section IV of this Agreement within 30 calendar days of receiving written notice of the default. Serco will be responsible for any costs and/or revenue losses directly associated with this defect, from and including the date Serco receives the notice of default up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average daily revenue per meter along the collection route where each defective mechanism is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

XIX Reino Non-Metallic Jam Detection

In the event that more than five percent of the installed base of the Reino mechanisms non metallic jam detection equipment does not satisfy the representations in Appendix A, Section IV, over 30 calendar days, Serco shall be responsible for correcting the malfunction until it satisfies all of the representations in Appendix A, Section IV of this Agreement within 30 calendar days of receiving the written notice of default. Serco will be responsible for any costs and/or revenue losses directly associated with this defect, from and including the date Serco receives the notice of default up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average daily revenue per meter along the collection route where each defective mechanism is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

XX Reino Card Reader

In the event that more than five percent of the installed base of the Reino mechanisms card readers do not satisfy the representations in Appendix A, Section IV, over 30 calendar days, Serco shall be responsible for correcting the malfunction until it satisfies all of the representations in Appendix A, Section IV of this Agreement within 30 calendar days of receiving the written notice of default. Serco will be responsible for any costs and/or revenue losses associated with this defect, from and including the date Serco receives the notice of default up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average daily revenue per meter along the collection route where each defective mechanism is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

XXI Reino Front and Rear Displays

In the event that more than five percent of the installed base of the Reino front and or rear displays do not satisfy the representations in Appendix A, Section IV, over 30 calendar days, Serco shall be responsible for correcting the malfunctions until it satisfies all of the representations in Appendix A, Section IV of this Agreement within 30 calendar days of receiving the written notice of default. Serco will be responsible for any costs and/or revenue losses associated with this defect, from and including the date Serco receives the notice of default up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average daily revenue per meter along the collection route where each defective mechanism is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

XXII Reino Motherboard

In the event that more than one percent of the installed base of the Reino mechanisms motherboards have defects such that the mechanisms do not satisfy the representations in Appendix A, Section IV, over 30 calendar days, Serco shall be responsible for correcting the defect until it satisfies all of the representations in Appendix A, Section IV of this Agreement within 30 calendar days of receiving the written notice of default. Serco will be responsible for any costs and/or revenue losses directly associated with this defect, from and including the date Serco receives the notice of default up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average daily revenue per meter along the collection route where each defective mechanism is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

XXIII Reino Field Programming

In the event the Reino cannot be upgraded by the field programming module within 20 seconds, Serco shall adjust or repair the Reino so that it is capable of meeting the promised programming time and incur all labor and related costs resulting from the repair or replacement within 30 calendar days of receiving the written notice of default. Serco will be responsible for any costs and/or revenue losses directly associated with this defect, from and including the date Serco receives the notice of default up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average daily revenue per meter along the collection route where each defective mechanism is located. Any payments for costs and/or revenue losses shall be due and payable to the

City upon the City's written certification that the default has been cured.

XXIV Reino Housing

In the event that more than five percent of the Reino housings over the initial term of the contract do not satisfy all of the representations in Appendix A, Section IV of this Agreement, Serco will be responsible for repairing the defects until it satisfies all of the representations in Appendix A, Section IV of this Agreement within 30 calendar days of receiving the written notice of the default. Serco shall be responsible for any revenue losses that the City incurs due to this defect, from and including the date Serco receives the notice of default up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. The revenue loss shall be calculated using the average daily revenue per meter along the collection route where each defective casing is located. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

XXV Electromechanical Lock Failure for MacKay E-Purse and Reino

In the event that more than five percent of the electromechanical locks are compromised over a 90 day period, Serco shall be responsible for repairing the defects until it satisfies all of the representations in Appendix A, Sections III and IV of this Agreement within 30 calendar days of receiving the written notice of default. Serco shall be responsible for reimbursing the City for lost revenue per day for each meter vault that is compromised, from and including the date Serco receives the notice of default up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. These losses shall be calculated based on the average daily revenue collection per day in the collection zone. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written certification that the default has been cured.

XXVI SFPM Software

In the event that the SFPM software fails to perform as specified in Appendix A, Section VIII, of this Agreement, Serco shall be responsible for repairing all defects until it satisfies all of the representations in Appendix A, Section VII of this Agreement within 30 calendar days of receiving the written notice of default. Serco shall be responsible for reimbursing the City for any costs and/or revenue losses directly associated with the defect, from and including the date Serco receives the notice of default up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. These revenue losses shall be calculated based on the average daily revenue collection per day in the collection zone. Any payments for costs and/or revenue losses shall be due and payable to the City upon the City's written

certification that the default has been cured.

XXVIISFPM Software Development Schedule

In the event that Serco fails to deliver a specification or product within the agreed upon schedule, Serco shall owe the City a credit of $500 for every day that the specification of product exceeds the promised schedule. For delays resulting from delay by the City, the deadline shall be extended by the number of days delayed by the City.

XXVIII Additional Programming Requests

In the event that Serco fails to respond to the City's request for additional programming services to modify the SFPM software within 30 calendar days, it shall owe the City a credit of $500 for each day that it fails to respond to the City's request.

XXIX Smart Card Program Schedule

In the event that Serco fails to implement the Smart Card Program within the agreed upon schedule, Serco shall owe the City a credit of $500 for every day that the program exceeds the promised schedule. For delays resulting from delay by the City, the deadline shall be extended by the number of days delayed by the City.

XXX Smart Card Program Software Module

In the event that the Smart Card SFPM module fails to perform as presented by Serco and approved by the City, Serco shall be responsible for repairing all defects until it satisfies all representations within 30 calendar days of receiving the written notice of default. Serco shall owe the City a credit of $500 per day for every day that the module fails to satisfy all representations.

XXXI Installation

Any deviance from the installation process as provided for herein for the installation of single and multi-space meters must be approved by the City in writing. In the event Serco deviates from the process provided herein without written approval and the installation is delayed in any way, Serco shall be liable for losses directly incurred by the City resulting from the delay, from and including the date Serco receives the notice of default up to and including the date that the City accepts in writing that the default has been cured. The City shall respond in writing to Serco's written certification that the default has been cured within 20 working days. These losses shall be calculated based on the average daily revenue collection per day in the collection zone. In the event that the City has no basis to calculate average revenue collection, Serco shall owe the City $2.00 per day per meter.

In the event that installation is not complete within the agreed upon schedule in this Agreement exclusive of any unanticipated delays caused by the City, Serco shall pay the City the amount of lost revenue per day for every meter that has not been installed. The

amount due shall be based on the average daily revenue collection per day in that collection zone.

XXXII Collection Services

In the event that the City discovers that Serco collectors are not wearing the approved uniforms, displaying their badges, working in an unsafe manner, the City will issue a formal warning. If Serco receives more than two warnings for the same violation within a two-month period, the City shall send Serco a written notice of default. Serco shall owe the City a credit of $100 a day for each day from the date of the notice that it fails to remedy the default.

XXXIII Radio Response

In the event that Serco employees fail to respond to the City by radio after the City has made three attempts to contact Serco over a 15-minute period, Serco shall owe the City a credit of $100 for each occurrence.

XXXIV Collection Equipment

If City-owned equipment is damaged or stolen while Serco is performing collection services, Serco shall repair or replace the equipment within 10 working days. If Serco fails to repair or replace the items within the specified time, the City shall have the option of repairing or purchasing replacement equipment and crediting the expense from monies owed to Serco for routine monthly services.

XXXV City Meter Revenue Loss

If City coin monies from meter collection are stolen while under Serco's possession, Serco shall reimburse the City for the estimated value of the coin monies lost based on the Primary Audit Data from each meter collected for each coin canister.

XXXVI Deposit of Revenue within 24 Hours

In the event that Serco fails to deposit parking meter coin revenues within 24 hours of receipt, Serco shall reimburse the City for the loss of interest for every day that the deposit is delayed. The City Treasurer shall provide Serco with the interest rate calculation for this payment.

XXXVII Contract Manager Response

In the event that the Department of Parking and Traffic's Executive Director or designee attempts to contact Serco's contract manager or designee during normal business hours and Serco fails to respond within 15 minutes, Serco shall owe the City a credit of $100 for every 15 minute increment that it fails to respond to the City's request.

XXXVIII Maintenance Support

In the event that Serco fails to provide the maintenance support within the time frame for each item submitted as described in Appendix G of this Agreement, the City shall notify Serco in writing of the default. Serco shall owe the City a credit of $250 per day for every day from the date of the notice that it fails to provide support.

XXXIX Replacement Parts

Except as provided otherwise in this Agreement, in the event that the City orders replacement parts for any of the equipment purchased under this agreement and Serco fails to provide the product within 90 calendar days, Serco shall owe the City a credit of $100 for every working day the product is delayed.

XL Adjustment to Payment

The City will deduct any costs, loss of revenues, and/or credits due from any payments owed to Serco. If the credits due to the City are greater than any payment due to Serco, the City will bill Serco for the credit balance remaining. Serco shall remit payment within 10 working days of the billing date.

Appendix G Warranty and Maintenance Support

I. Warranties

Effective Acceptance, Serco warrants to the City that all Equipment used in the performance of this Agreement and described in Appendix A and their installation, provided as part of this Agreement, shall be free from defects in materials and workmanship and shall function as represented above in Appendix A for the Term of this Agreement or the length of the manufacturer's warranty, whichever is the later date: For purposes of easier review only, the summary of Equipment (which is not intended as an exhaustive list) under warranty are as follows:

- MacKay Guardian E-Purse single space meter mechanism
- MacKay MKH4500 single space parking meter housing
- Medeco high security lock for the parking meter upper housings, part number 60W1353HT-26-GD
- Medeco electromechanical lock
- Medeco electromechanical lock interface with the MacKay Guardian E-Purse single space parking meter
- Coin canisters (MacKay part number 16-511-J)
- Reino MultiBay meter
- DAP Personal Data Terminal, including the Medeco Add On Device (AOD) and charging/data transfer cradle
- SFPM software, including the MacKay WinEMU, Medeco MeterSecure and Reino Intelligent Cash Box software components
- Compaq Proliant ML370 Database server system
- Dell GX110 - 'S' chassis Workstation system
- HP LaserJet 2100 TN network printer
- Cisco 2503Frame Relay/ISDN and 2501 Frame Relay switches
- Cisco PIX 515 Secure Network Firewall
- Netgear FS308 10/100 Autosensing switch
- Addtran CSU/DSU Frame relay terminations
- APC 2200RM UPS

(hereafter called the "Equipment")

1. The warranty provided by herein by Serco is a full warranty.
2. Serco warrants that it will convey good title to the Equipment purchased by the City and that at the time of any such sale the Equipment will be free and clear from all liens and encumbrances.
3. No charges shall be made for warranty work required within the warranty period defined above.
4. Serco will repair, adjust or replace all Defective Equipment. If any of the Equipment require repair for the same defect more than three times, Serco will replace the

Equipment. No repairs or adjustments to the Equipment in response to a warranty claim shall extend the warranty, which shall remain for the Term of the Agreement or the length of the manufacturer's warranty, whichever is the later date, from the date of Acceptance of such Equipment.

5. Should repair become necessary during the warranty period, the City will deliver the Equipment to the Serco San Francisco Office. Any Equipment repaired, adjusted or replaced under this warranty will be returned to the City at Serco's cost.

6. **THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS WARRANTIES AND IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS OF PURPOSE, WHICH ARE SPECIFICALLY EXCLUDED.**

7. **THE CITY ACKNOWLEDGES THAT ANY MAJOR MODIFICATION NOT IN REASONABLE ACCORDANCE WITH SERCO'S DIRECTIONS OR PERFORMED BY OTHERS IN SUCH MANNER TO AFFECT THE EQUIPMENT MATERIALLY AND ADVERSELY MAY VOID THIS WARRANTY. PRIOR TO ANY MAJOR MODIFICATION TO THE EQUIPMENT, THE CITY SHALL NOTIFY SERCO IN WRITING. SERCO SHALL RESPOND IN WRITING WITHIN THREE (3) BUSINESS DAYS DESCRIBING HOW THE CITY'S MAJOR MODIFICATION WILL AFFECT THE WARRANTY.**

8. **THIS WARRANTY DOES NOT COVER DAMAGES, DEFECTS OR FAILURES CAUSED BY OR DUE TO ACCIDENT, IMPROPER HANDLING OR OPERATION, USE OF THE EQUIPMENT FOR EXPERIMENTAL PURPOSES, NATURAL DISASTER (INCLUDING EARTHQUAKE), VANDALISM, AND NEGLECT OF ROUTINE MAINTENANCE AS INSTRUCTED BY SERCO IN THEIR TRAINING. HOWEVER, THE CITY MAY PURCHASE THE EQUIPMENT FROM SERCO ACCORDING TO THE PRICING SCHEDULE IN SUCH INSTANCES.**

9. **NO EMPLOYEE OR REPRESENTATIVE OF SERCO, ITS AGENTS, SERVANTS, CONTRACTORS AND SUBCONTRACTORS IS AUTHORIZED TO CHANGE THIS WARRANTY IN ANY WAY OR GRANT ANY OTHER WARRANTY UNLESS IN WRITING AND SIGNED BY A SERCO OFFICER.**

10. Serco shall employ a Product Support Technician located at the Serco San Francisco Office who will act as a single point of contact for the City for all requests for support or warranty service throughout the term of this Agreement. The Product Support Technician or qualified designee shall be available from 7:00 a.m. to 4:00 p.m. PST, Monday through Friday.

11. Serco shall maintain an inventory of replacement parts and components at the Serco San Francisco Office so that a new part or component can be provided immediately to the City as required for the MacKay E-Purse, MacKay MKH4500 housing, Medeco mechanical lock, the Medeco electromechanical lock and the Reino. Serco shall also have two PDTs, including the Medeco Add On Device (AOD) and two charging/data

transfer cradles at the Serco San Francisco Office that can be loaned to the City while the City's own PDTs or charging/data transfer cradles are being serviced under warranty.

12. Software and computer-related hardware excepted, all items covered under warranty must be repaired or replaced under warranty within 30 days of the day that the item was sent to Serco.

13. When the City, through its designated personnel brings Equipment to the Service Facility for evaluation, the Product Support Technician will inspect or test the part brought in under warranty to determine if the reported problem is in fact a valid warranty claim. If required, the Equipment may be sent back to the manufacturer for additional review. If the Equipment cannot be transported to the Serco San Francisco Office, the Product Support Technician will visit the site with the City's designated liaison. During the evaluation by Serco's Product Support Technician and/or manufacturer of the Equipment, Serco shall provide a replacement for such Equipment within 24 hours.

14. The Product Support Technician will carry out any minor repairs, with more extensive work done by the manufacturer.

15. Where Serco decides that the Equipment is not malfunctioning due to a defect covered under warranty, it will contact the designated City liaison and provide in writing the reasons why it does not believe that the malfunctioning Equipment is not due to a defect covered under the warranty. The City liaison shall review the reasons provided by Serco. If the City liaison agrees with Serco's determination, the City shall have the option to either return the new Equipment that Serco has provided or purchase it. If, however, the City liaison does not agree with Serco's determination, the matter may be submitted to voluntary mediation as provided for in Section 54 of the Agreement. During the period of the dispute, Serco shall provide the repaired or replacement Equipment such that the City's meter operation is not interrupted.

II. Maintenance Support

1. Computer-Related Hardware

   a) Serco's Product Support Technician shall provide regular hardware maintenance for the server, five workstations, two printers and other network equipment provided as part of the SFPM. Serco may sub-contract some or all of this work with the City's prior written approval.

   b) Serco shall provide 4-hour response on-site maintenance support during business hours (Monday through Friday, 7 a.m. to 4 p.m.) for the database server for the term of the Agreement.

   c) Serco shall provide next business day on-site maintenance support for the workstations for the term of the Agreement.

   d) Serco shall provide next business day on-site maintenance service for the network printers for the term of the Agreement.

2. SFPM

a) Serco shall provide 4-hour maintenance support during business hours for the SFPM software.

b) Serco shall provide minor software upgrades (corrections to faults and minor changes of functionality) for the Term of the Agreement as they are completed. Serco shall provide software patches and updates using one of the following mechanisms:

- Via the Internet in which the Serco Product Support Technician will download the patches from an Internet site provided and maintained by Serco. These patches will then be applied to the SFPM software under the control of Serco Product Support Technician and City IS staff, after ensuring that the appropriate system backups have been taken of the database and software system.

- Via an FTP client connection in which remote Serco support engineers in the United Kingdom will download the appropriate patches to a secure area of the database server. Application of these patches will take place, again under the control of the Serco Product Support Technician and City IS staff, and will be applied to the SFPM software either by Serco support engineers in the United Kingdom or the Serco Product Support Technician after ensuring that the appropriate system backups have been taken of the database and software system.

- City IS staff involvement in the upgrades described herein does not in any way lessen or diminish Serco's warranty obligations provided in this Appendix.

c) Serco engineers supported by the Serco Product Support Technician shall always carry out major software upgrades in San Francisco. Major software upgrades are defined as large or extensive changes in functionality and/or minor fault corrections that have an impact on the majority of the software elements comprising the SFPM software. On every occasion when Serco intends to upgrade the SFPM software, Serco shall seek permission from the City to carry out the work and arrange suitable dates and times.

d) Prior to any software release for the SFPM, Serco shall provide the City with a method statement and a set of release notes. The method statement will detail what Serco intends to do, how it intends to do it and in what time frame the work is expected to occur. The release notes shall provide information on software faults that have been corrected, any new functionality that has been added, and any differences in use the users or maintainers may experience. In addition, Serco shall provide updates to all SFPM user manuals and System documentation each time a change is made to the System.

Appendix H License Agreements

I. License Agreement For MacKay Software

A. Grant of License

MacKay does hereby grant to the City in perpetuity, an irrevocable, non-exclusive, non-transferable License to use the following software of MacKay and/or Medeco in connection with the Project and the City's operation and maintenance of MacKay's parking meters and the SFPM Software.

Owner of Software	*Description of Software*
(a) Source Device Software	
MacKay	the embedded software on the parking meter mechanisms
MacKay	handheld software [to be loaded onto each DAP handheld supplied]
Medeco	handheld software [to be loaded onto each DAP handheld supplied]
Medeco	the embedded software on all the electro-mechanical locks
(b) Device Application Software	
MacKay	WinEmu software, including the WinEmu/MeterSecure/SFPM Interface
Medeco	MeterSecure

- hereinafter referred to as the "Software".

In the event the parties have failed to include a MacKay and/or Medeco software in the list above but, which, is necessary to satisfy the specifications set forth in Appendix A, MacKay and Medeco shall license the omitted software under the terms of this Agreement without further cost to the City. Such an omission shall be deemed an inadvertent omission and MacKay/Medeco shall not have a legal basis for witholding such software.

B. Copyright

The Software is owned by MacKay and/or Medeco and is protected by copyright laws, international treaty provisions and all other applicable laws. The City may only make sufficient copies of the Software as are reasonably necessary for operational and security use. Further copies will be subject to payment to MacKay in accordance with the rates as specified in Appendix "E". The City may not release copies of the Software to any third party without the express written permission of MacKay.

Subject to Section 17 (b) and the escrow agreement, the right to use, access or view the software source code is hereby expressly not granted to the City.

C. Other Restrictions

The City may not rent or lease the Software. Except as otherwise set forth in Section 17 (b) of this Agreement, the City shall not reverse engineer, decompile, disassemble, alter, modify, assign, or adapt the Software including but not limited to translating, decompiling, disassembly or creating derivative works. This License and the City's right to use the Software will terminate if there is a legal finding that the City has failed to comply with any provision of this License Agreement.

D. Warranty

MacKay's warranty of the Software is contained in Appendix "G".

E. Ownership

Ownership of the Software is retained by MacKay and/or Medeco. The Software is licensed and not sold.

II. License Agreement For Medeco Software

A. Grant of License

Medeco does hereby grant to the City and County of San Francisco ("City") in perpetuity, an irrevocable, non-exclusive to use the following software of Medeco in connection with the Project and the City's operation and maintenance of MacKay's and Reino's parking meters and the SFPM Software.

Owner of Software	*Description of Software*
(a) Source Device Software	
Medeco	handheld software [to be loaded onto each DAP handheld supplied]
Medeco	the embedded software on the electro-mechanical locks
(b) Device Application Software	
Medeco	MeterSecure

- hereinafter referred to as the "Software".

B. Copyright

The Software is owned by Medeco and is protected by copyright laws, international treaty provisions and all other applicable laws. The City may only make sufficient copies of the Software as are reasonably necessary for operational and security use. The City may not release copies of the Software to any third party without the express written permission of Medeco.

Subject to Section 17 (b), the right to use, access or view the software source code is hereby expressly not granted to the City.

C. Other Restrictions

The City may not rent or lease the Software. The City shall not reverse engineer, decompile, disassemble, alter, modify, assign, or adapt the Software including but not limited to translating, decompiling, disassembly or creating derivative works. This License and the City's right to use the Software will automatically terminate if MacKay fails to comply with any provision of this License Agreement. In such an event, Medeco shall license the software directly to the City under the same terms of this Agreement.

D. Warranty

Medeco's warranty of the Software is contained in Appendix "G".

E. Ownership

Ownership of the Software is retained by Medeco. The Software is licensed and not sold.

III. License Agreement For Reino Software

A. Grant of License

Reino does hereby grant to the City in perpetuity, an irrevocable, non-exclusive, non-transferable License to use the following software of Reino in connection with the Project and the City's operation and maintenance of MacKay's parking meters and the SFPM Software.

Owner of Software	*Description of Software*
(a) Source Device Software	
Reino	the software resident or loaded onto the MultiBay meter and any modifications to this software carried out by Reino under this Agreement.
Reino	the software resident or loaded onto the Reino Smart Cash Box and Reader and any modifications to this software carried out by Reino to satisfy the requirement of this Agreement.
(b) Device Application Software	
Reino	Reino Meter Management software and any modifications to this software carried out by the owner of the software to satisfy the requirement of this Agreement.

- hereinafter referred to as the "Software".

In the event the parties have failed to include a Reino software in the list above but, which, is necessary to satisfy the specifications set forth in Appendix A, Reino shall license the omitted software under the terms of this Agreement without further cost to the City. Such an omission shall be deemed an inadvertent omission and Reino shall not have a legal basis for witholding such software.

B. Copyright

The Software is owned by Reino and is protected by copyright laws, international treaty provisions and all other applicable laws. The City may only make sufficient copies of the Software as are reasonably necessary for operational and security use. Further copies will be subject to payment to MacKay in accordance with the rates as specified in Appendix "E". The City may not release copies of the Software to any third party without the express written permission of Reino.

Subject to Section 17 (b) and the escrow agreement, the right to use, access or view the software source code is hereby expressly not granted to the City.

C. Other Restrictions

The City may not rent or lease the Software. Except as otherwise set forth in Section 17 (b) of this Agreement, the City shall not reverse engineer, decompile, disassemble, alter, modify, assign, or adapt the Software including but not limited to translating, decompiling, disassembly or creating derivative works. This License and the City's right to use the Software will terminate if there is a legal finding that the City has failed to comply with any provision of this License Agreement.

D. Warranty

Reino's warranty of the Software is contained in Appendix "G".

E. Ownership

Ownership of the Software is retained by Reino. The Software is licensed and not sold.

Appendix I Left Blank by Agreement of the Parties

Appendix J Installed Meters

Material submitted as an electronic file in Microsoft Access 97. CD attached.

Exhibit 1 City Holidays 2002

2002
January 1st, New Year's Day
January 21st, Martin Luther King Jr. Birthday
February 18th, President's Day
May 27th, Memorial Day
July 4th, Independence Day
September 2nd, Labor Day
October 14th, Columbus Day
November 11th, Veteran's Day
November 28th, Thanksgiving
November 29th, Day after Thanksgiving
December 25th, Christmas