Report on the Card Key System Implementation
for
Princeton University’s Dormitories
January 9, 2003

Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page #</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Executive Summary</td>
<td>2</td>
</tr>
<tr>
<td>II. Introduction</td>
<td>3</td>
</tr>
<tr>
<td>III. System Advantages and Disadvantages</td>
<td>4</td>
</tr>
<tr>
<td>IV. Lock System Options</td>
<td>7</td>
</tr>
<tr>
<td>V. Recommended Manufacturer</td>
<td>8</td>
</tr>
<tr>
<td>VI. System Initial Costs</td>
<td>10</td>
</tr>
<tr>
<td>VII. Card Key Lock System Administration</td>
<td>11</td>
</tr>
<tr>
<td>VIII. Implementation Schedule</td>
<td>14</td>
</tr>
<tr>
<td>IX. Outstanding Issues</td>
<td>15</td>
</tr>
<tr>
<td>X. Appendix</td>
<td>15</td>
</tr>
</tbody>
</table>
I. Executive Summary

A card key lock system for the dormitories consists of a lockset operated by the magnetic stripe on the back of a student’s ID card. It does not have a wire connection to any kind of front-end system. The lock is preprogrammed before installation and it is designed with the flexibility to allow changes based upon new information that can be put on an ID card, or from a hand held portable programming unit. These systems are typically used by the hotel industry and are recently being purchased by many institutions of higher education for dormitory applications.

The lock systems provide a higher level of dormitory security because they provide very tight control of the card keys and an audit trail to detect attempted unauthorized entry. A lost card key is automatically invalidated once a student uses their new ID card and their roommates can continue to use their ID cards without any changes. Summer CVCS guests, reunion alumni, and people staying over for graduation can be given a card with an encoded expiration date that does not need to be returned and cannot be used after their stay.

Besides security, the new system offers the following benefits:

- Reduces the time and frustration of issuing all the dormitory keys in September and collecting them at the end of the year.
- Similarly, we would not have to issue and collect mechanical keys for reunions, graduation housing, and summer guests.
- Reduces maintenance effort, now required for re-coring locks when keys are lost. Approximately 300 cores are replaced in the summer and 700 during the rest of the year.

Implementation of a card key lock system requires:

The estimated first cost is between $1.7M and $2.0M and includes startup costs, computer servers, kiosks, and training. (October 2005 figures)

Annual operating cost is between $35K and $113K. The cost is currently being reviewed to reduce the $78K range. (October 2005 figures)

There are several alternatives for scheduling the installation of the locks. We recommend installing locks now for the dorms under construction. Then replacing the rest of the dorms the following summer (2004). In 2005, we would install the locks in the graduate college and annexes.

Currently, we have a small prototype installation in 1938 and Wilcox Halls. Frist is using three locksets and wants to expand, and athletics has many installations. Future card key efforts may include laboratories, high security areas, graduate housing, and maybe offices.

II. Introduction

There are many benefits to a card key lock system for the dormitories and some added cost to purchase the system and administer it, which will be detailed in this report. In 1996, Princeton University installed card key locksets in 1938 and Wilcox Halls to evaluate their effectiveness, reliability, and to understand the administrative needs of the system. Later, these locks were installed in Caldwell Field House for the Athletics Department, Frist Campus Center and CVCS offices. Athletics wanted the system to be able to easily manage their keys and the access rights of various
groups to their spaces, while Frist wanted to reduce theft. Both groups succeeded in their goals. For several years, the dormitory effort did not expand beyond the first two dorms because a card key system is more expensive than continuing to use our mechanical locks, and we do not have the administrative infrastructure to manage more card key locks.

In the summer of 2002, an interdepartmental committee was assembled in response to dormitory security concerns. The committee includes representatives from most of the offices that have a vested interest in the project and this report is the result of their findings. The people and offices represented on the committee are:

<table>
<thead>
<tr>
<th>Representative</th>
<th>University Office</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kathleen Bozowski</td>
<td>ID Office</td>
</tr>
<tr>
<td>Becky Goodman</td>
<td>OIT</td>
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<td>Patty Smith</td>
<td>Housing</td>
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<td>Don Reichling</td>
<td>Public Safety</td>
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<td>Barry Weiser</td>
<td>Public Safety</td>
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<td>Garth Walters</td>
<td>EHS</td>
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<tr>
<td>Kevin Brannon</td>
<td>Lock Shop</td>
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<tr>
<td>Lou Dursi</td>
<td>Maintenance</td>
</tr>
<tr>
<td>Alex Trosko</td>
<td>Maintenance</td>
</tr>
<tr>
<td>Tom Myers</td>
<td>Frist Campus Center</td>
</tr>
<tr>
<td>Stu Orefice</td>
<td>Dining Services</td>
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<tr>
<td>David Olsen</td>
<td>Engineering</td>
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<tr>
<td>Tom Nyquist</td>
<td>Engineering</td>
</tr>
<tr>
<td>Tara Zarillo</td>
<td>CVCS</td>
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III. Advantages and Disadvantages of Card Key Lock for Dormitories and Academic Departments

The advantages of a card key lock system for the dormitories and other uses are listed below. These benefits are divided up for students, Facilities, Reunions, Public Safety, and the Academic Departments

A. Students

Move-in and move out

Advantages
1. Freshman: In the future, there is the potential to have their ID cards sent to them.
2. All other students: No visit needed to the Housing Department because the students would go directly to the Kiosks.
3. When the students leave in the spring, they do not have to worry about returning keys.

Disadvantages - None

Lost student keys

Advantages - Same as administration

Disadvantages - None

General Day-to-Day Use

Advantages
1. Better security - Lost cards would not work locks, minimum number of master card keys with better control, and an audit trail to help find perpetrator of thefts.
2. Do not need to carry a key (assumes mail boxes converted).
3. Easy to change PIN number (at Kiosk).

Disadvantages – none. (Although many students do not like having their door lock every time it closes. This function is independent of lock type and is a policy of the university.)

B. Facilities

Move-in and Move out

Advantages
1. Freshman: Don’t need to issue a key
2. All other Students - Eliminates mass crowds and confusion at move in time because they would use their existing ID.
3. Students must be out of the dormitories, on schedule, at the end of the year because their key would longer work.
4. Don’t have to worry about non-returned keys.

Disadvantages - None

Lost student keys

Advantages - No keys to lose and therefore no cores to replace. This should save time.
Disadvantages:
1. The locks are more complicated and therefore require more maintenance including battery replacement every two years.
2. We must have a working card key administration system or else the program will be a disaster.

Lost ID

Advantages
1. No one has to go to the door.
2. Only one point of contact (ID office) needed during business hours and two (PS & ID office) if ID lost after hours.
3. Rapid reporting of lost key (ID).

Disadvantages – None

Cost

Advantages
1. Eliminates the need for re-cores in the dormitories.
2. Reduces labor at the beginning and end of the year associated with key distribution, especially around reunions.
3. Lost card keys - including master keys - are cheap, quick, and easy to replace.

Disadvantages
1. First cost – We need to remove a working mechanical lockset and replace it with a new lock.
2. We will need to do preventative maintenance on the locks.
3. We need to organize an effective administration for the card keys, which may mean that we need additional help.

Lost master keys

Advantages - Don’t have to re-key building(s). All that is required is to create a new master card key and then dip it into each lock that the master key opens. This process can be done very quickly and improves safety because a building is not secure as long as the master key is lost.

Disadvantages - None

Maintenance

Advantages
1. Easier key control
2. Don’t have to go to the lock when students or guests lose a key. It is estimated that we loose 1000 keys per year.

Disadvantages
1. Must change batteries and clean the door card reader heads every two years.
2. More complicated then standard lock. Therefore, there is probably more time needed to maintain each lock assembly.
CVCS - Summer Events

**Advantages**
1. Better security.
2. Reduce the 300 yearly re-cores to zero.
3. Eliminate the problems associated with handling large numbers of keys.

**Disadvantages** - None

C. Reunions

**Advantages**
1. Better room security.
2. The prox system can be included on the card key so that we can lock the dorms down for better building security.
3. Card distribution is easier than key distribution and collection.
4. Potential to distribute more card keys for spouses and children.
5. Card can contain a memento picture and that the alumni may keep.

**Disadvantages**
1. A prox. chip in a temporary card will increase the card cost by several dollars per card.
2. ID office will need help in entering alumni information/clearance codes into the prox. system.

D. Public Safety

**Advantages**
1. Audit trail available to track unauthorized users of the lock.
2. Rapid replacement of card key because it is used for many functions on campus. Previously, students could use a roommate’s key for a while or just not lock their room.
3. Eliminates the problems associated with officers handling large numbers of keys.
4. Ability to hand out a temporary card for weekend use. Students can then lock room for the rest of the weekend when they leave.
5. No unauthorized keys (including master keys) will be held by unknown people.

**Disadvantages** - none

E. Academic Departments

**Advantages** – Increased security because master keys in buildings are completely out of control. Card keys could bring this back under control.

**Disadvantages** – none except transitional adoption of the new system.
IV. Lock System Options

There are numerous options and ways of doing essentially the same thing. The committee evaluated most options and the following are the basic recommendations.

*PIN # Validation* – Princeton University will use the student ID for the card key, which has a students name and picture on the front. Any person that finds a lost card could easily find a student's address and insert the lost card into the lockset. A PIN # would prevent them from entering the room. This option is a firm requirement.

*Deadbolt* – We are not recommending the use of a deadbolt on the dormitory locks. They are not required by law in dorms. Too often students use them to prop open a door so that the door cannot shut and therefore lock. These propped doors can be readily spotted by any person walking down the hallway creating a major security problem for the occupants and a liability problem for the University.

*Lock Set Field Programmer* – Various vendors have different approaches to field programming a lockset. The major requirements we require are that the programmer be fast, it minimizes data entry, and can power up a lock set whose batteries have died.

*Lock Type* – There are two basic configurations of lock set for doors, cylindrical and mortise. There is a difference of opinion among the committee members as to the best style. The lock shop firmly believes that in their experience the cylindrical locksets are the simplest and most reliable units. Many in the lock industry believe that mortise is the best and only lock set to install for security and durability reasons. The recommendation is to replace existing locks with their equivalent style lock set. We still need to finalize a recommendation for new installations.

*Mechanical Key Override* – This option uses a mechanical key that mechanically opens the door without the need for a card key. It can be done with a Best core to take advantage of all our existing Best Lock resources. The key would be a master key for each building and we would have just one master key made that would be stored in a locked vault in Public Safety’s office.

Most members of the committee did not want this option because we could easily be in the same predicament that we are in now if mechanical master override keys are not carefully controlled. We are recommending that the mechanical key override NOT be installed in the dormitories. The portable programmer can be used as a master key in most situations and can power the lock in situations where the batteries have died. The Campus Center is adamant that they do not want mechanical keys because of the potential of poor key control and they feel that they are not needed.

*Kiosk* – A Kiosk is essentially a computer with a card encoder that is connected to the card key database server. It can be sited anywhere on campus and we can have several units. The function of the Kiosk is to allow the students to reprogram their cards. They can change their PIN #’s, they can change their rooms for the next year or during the year if they have the Housing Department’s approval. This unit has the potential of eliminating the long lines of students checking into dorms with the Housing Department every year.

Another function of the Kiosk is that it could be used to program a Public Safety Master card for each shift. The officers would have global access, but a lost card would be deactivated after every shift through the use of an end time code on each card for every shift.
Data Transfer – There are three ways of getting the data into the system. One is to type each entry into the database. Another is to have a batch download from the Diebold Housing system, and the third is to have a real time data connection between Diebold and the new card key database. The last option means that when the Housing Department changes the student records, then the card key database is automatically updated at the same time. Real time data transfer will minimize problems for our students whenever changes are made to the database - such as room assignments. The minimum requirement for Princeton is a batch-loading feature, but the highly preferred option is the real time data connection.

V. Recommended Manufacturer

We only interviewed vendors that could provide a card key lock set with PIN # validation because this is a fundamental security need for the University. The three manufacturers that can provide the PIN # function are Onity (formally called Tesa), Best (recently purchased by Stanley), and Ving (now called Persona).

No one vendor can provide the best lockset, software, and options. Therefore, a compromise is needed that best fits the University’s overall needs. A brief explanation of each manufacturer’s equipment is given below:

Onity

We have had a pilot program in place in two of our dorms for about six years now that uses Onity locks. We have found three problems with their locksets. They had a problem with their first cylindrical installations because they had just marketed this style lock. They also had a problem with a bad set of batteries, and they had spring failures in some of the locks. There were some Onity locks put on some very low quality doors in Caldwell and the Boathouse that had door related problems. Onity has instituted and tested new designs and changed battery suppliers to eliminate these problems. The locks are now working reliably.

Their software resides on a server and is reported by Housing, Conference Services, Frist, and Athletics to be very user friendly. They can download batch data from Diebold and they are just bringing a real time interface to Diebold to the market. (They will be beta testing this feature at two institutions starting in January and will release it to the market in spring of 2003.)

Onity has the most installations in the university market with over 70 higher education institutions that have significant card key programs in operation.

They are the only vendor to offer a Kiosk with the functions the University desires.

Onity uses a field programmer that automatically identifies which lock it is connected to. This feature ensures reliable and rapid data entry, and it also powers up a unit with dead batteries.
Best

We currently use Best mechanical locks on campus. They are a very good lock set with a long record of reliability. The electronic system that they are proposing for our campus is only two years old and we do not have any experience with it.

Their software demonstration had several error boxes appear every time they programmed a card. It appeared to be somewhat slow and awkward to use. Best outsourced their software, which limits the amount of control they have over it and slows down any response to future modifications.

They use two different types of locksets for different applications. A dormitory would use a guest system that uses track three on the card. Their academic system would be used in the rest of campus and uses track two, which will contain the user’s campus ID number. We want all locksets to be the same.

Their field programmer is slow to use because the user needs to identify and key in the lockset that the programmer is connected to. This can cause data entry errors.

Best does not have a Kiosk.

Persona

Persona is a large vendor in the hotel and cruise ship industries. They make a good lock, but they have only been in the education market for about three years. They have a competitive system, but they refuse to make a cylindrical lock set and they do not have a Kiosk system in North America. They do have a Kiosk in Europe, but it provides different functions than what we require.

Recommendation

Most of the members of the committee felt very strongly that only Onity provided the best overall features in a system. Onity is the only vendor with an installed Kiosk and their software is easy to use and has worked great in our pilot program. Multiple users can access the database and can program cards that do not interfere with the card programming of other users. Their new locksets are working very well, and they have a large installed base of locks in the university market. Attached are notes of recommendations from various universities. We need to proceed with an RFP to Onity.

Those members of the committee who supported Best did so because of the proven quality of the Best cylindrical lock. This lock is used, almost exclusively, throughout the campus because of its' ruggedness and zero-maintenance record. The problem is that their software is not at the same level of development as Onity, and they do not offer a kiosk. Another problem is that they use different inner workings and different databases for locks in dorms and academic settings. Also, with the purchase of this company by the Stanley Corporation, it is not absolutely clear what level of future support and development will be afforded the card key lock, although Stanley claims that they intend to aggressively pursue this market.

Persona makes a good lockset and overall system. However, they do not make cylindrical locksets, which we require, and they are just now getting into the higher education market. They are not recommended because of these two reasons.

A detailed recommendation checklist is included in the appendix.
VI. System Initial Costs
(Note: See Section I. Executive Summary for October 2005 cost estimates)

The breakdown of the installation costs are shown below:

**Equipment Cost:**
(Given) - The University has ~ $60K worth of equipment already installed.
- Mortise Lock $366.00
- Cylindrical Lock $309.00
- Key Override $20.00
- Encoding Package $3000.00 (Currently have (5) pkgs. installed)
- Kiosk $10,000.00 / Unit

**Installation and Maintenance:**
- a. Lockset (New Installation) $35.00 ea
- b. Bi-yearly Maintenance (Battery & Cleaning) $30.00 ea

**Training & Support:**
- a. Master Planning/Project Management $1500/day
- b. Basic Training
- c. Housing Data Base Configuration for Kiosk Application (Diebold)

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**Lock Count**
- Existing Undergraduate Doors......2,246 (does not include 100 existing card key locks in 1938 & Wilcox)
- West Ellipse Dorm.........................226
- College Area Doors.......................50
- Maintenance/Bldg Services Doors.......0 (300 total doors – assume they stay as mechanical keys)

**Subtotal** 2,522

**Graduate & Annexes** 535

**Grand Total** 3,057

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**Total Equipment Costs:**
1. 1,3057 Locks @ $350.00 ea. = $1,070K
2. 2831 Lock Installations @ $35.00 ea. = $99K (installation part of W. Ellipse bldg. Contract)
3. (4) Additional Encoding Packages @ $3K ea. = $12K
4. (3) Kiosks @ $10K ea. = $30K
5. Conversion of mailboxes to combination locks = $23K

**Total Development Costs:**
(60days) @ $1.5K/day = $90K

**Total Project Costs**
= $1,324K
≈ $1,350K
Some of the doors from the suite to the hallway may need to be replaced to ensure that the locks work properly. It has been reported by maintenance that these doors are in reasonably good shape and that all the frames are steel to comply with the fire code. An estimate to upgrade doors is listed below and assumes a nominal 50 doors will be to be replaced.

**Door Replacement Costs:**

<table>
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<tr>
<th>Door Cost</th>
<th>$1k/door</th>
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</thead>
<tbody>
<tr>
<td>Total Cost</td>
<td>$50k</td>
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</tbody>
</table>

It is uncertain whether the major maintenance program will cover these costs.

**VII. Card Key Lock System Administration**

The administration of the card key system involves the operation and maintenance of the central card key database on a computer server; data input and card programming; new installations; and maintenance of the locksets. Each item is discussed below. Please see appendix for details on specific processes for check in, check out, lost ID’s, reunions, etc.

**Database**

We are recommending a central database be used to store all the required keyless lock information. This database would reside on a server located in 87 Prospect. OIT would manage the server at a cost of about $5k/year (this number has not been finalized by OIT). The database would be accessible by all those people that manage the lock information and by Kiosks strategically located throughout the campus.

The card key database will require approximately 50% to 100% of the time of a database administrator. The functions that the database administrator needs to do for this system are listed below:

- Handle data transfer from the Housing Department’s Diebold database to the card key lock database.
- Handle data transfer between reunions and the card key lock database.
- Backup system.
- Handle card key lock database program updates.
- Be responsible for the integrity of the data.
- Troubleshoot software problems found by data input personnel, maintenance, Public Safety, etc.

Estimated cost for the data administrator is $50 - $100k/year. If we proceed with implementation of a card key system this summer, then this person needs to be hired as soon as possible after the decision is made.

**Kiosks**

We do not have any details at this time on maintenance and operating costs for the kiosks. A very rough estimate is $10k for four kiosks per year.
Data Input

Card programming would be done in the ID office, Athletics, Frist Campus Center, the kiosks, Public Safety, and any individual department that chooses to install these locks. Each department would only see their portion of the database and would not be able to access data meant for another lock.

*ID Office functions* – Initially, the ID department will need to program all the student ID cards to include the card key function on track three. The students keep their cards from year-to-year which means they can go to a kiosk every year and have it reprogram the card for their new room.

Programming 1200 cards with card key information will take about 1 to 2 person-weeks of effort. This could be done in parallel with the new re-carding effort this summer. The ID office will also need to replace and reprogram new cards similar to what they do now.

They also need to program cards for some non-dormitory uses (see further explanation below).

The anticipated cost would be for 1/3 to ½ of an FTE (~$21k).

*Housing* – Card keys have potential of saving the Housing department lots of time. They should be able to download their housing data from the Diebold system into the card key system. Once, that process is complete, the ID office would program the freshman cards and deliver them to the Housing Department for distribution. Key boxes would no longer be required. Upperclassman would go directly to a Kiosk and reprogram their ID cards.

Housing would not have to handle keys for reunions. Temporary cards could be programmed and distributed by the Alumni Council. This would not increase the staff workload in Housing because of the savings in labor from the various mechanical key distributions and collections.

For Graduation Ceremonies housing, the student volunteers make the room assignments. This information could be entered into the card key system by the Housing department and then the cards could be handed out just as mechanical keys are done now, (or the cards could be sent by mail).

*Public Safety Responsibilities* – Lockouts would be handled by Public Safety department or designated staff or student employees. Cards could be validated to work for specific times and issued to staff as they go on duty, and can be re-validated at beginning of each shift.

Temporary cards could be issued to students/residents who come to Stanhope to report lost cards to be used until they can secure a new card. Temporary cards could be re-issued to reunion participants due to lost cards.

Public Safety could also have one master card key for each building to allow them access as needed.

There is an audit trail in each lock set to assist Public Safety in their investigation of room thefts. There would need to be an “approved policy” that governs the gathering and use of this information.
Conference Services – They currently handle data entry for the two dorms that have the card key system. They will need to program all their rooms in the future. This should be slightly easier and less time consuming than issuing mechanical keys.

Non-Housing Uses - The programming of the users into the card key database can be handled in two ways. The user department can be trained in this function or they could supply the data to the ID department for programming. Probably, the departments that need cards programmed regularly would do it themselves and those that rarely need a card programmed would ask the ID office to do it. Suggested ways to protect the ID office from being required to program excessive numbers of cards would be to cap the number of cards programmed by the ID office to a fixed number per year per department, or charge each department a significant fixed fee per card.

New installations or new Kiosks

New installations would be installed and tested by Facilities Engineering at the request of the Housing Department, Public Safety, academic departments or other departments.

Maintenance of lock sets

The lock shop would be called in to repair or replace a non-functioning lockset. They could come to the door with a new-programmed card to verify that the problem is not the card. They could also try the field-programming unit before replacing a lockset.

If all else fails, they would replace the lockset with a new one and then reprogram the new unit with the field-programming unit.

The lock shop would need access to the data on the server to be able to reprogram a new lock set. They should also have several working locksets on the shelf ready for replacement service.

Card key lock support should be managed by a dedicated person (along with a backup) within the shop that would be the “champion” of the system. This person would need to be fully trained in installation and maintenance of the locksets and know how to input data into the system. This person also needs to setup a preventative maintenance (PM) program for cleaning the magnetic read heads within the lock set, changing batteries, and lock lubrication. An estimated cost for a PM program for the locks is $20/lock every other year. PM will cost us $31k per year based upon the number of locks that we need.

We do not need another person in the lock shop to handle card key locks for the dormitories. Currently, there are so many cores replaced annually that will not have to be done in the future. The time saved not doing core replacement can easily cover the maintenance on the card key system. We do currently receive some revenue for core replacements that will be lost.

Annual Administrative Cost Summary:
(Note: See Section I. Executive Summary for October 2005 cost estimates)
The following table summarizes the annual administrative cost for the card key lock system:

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<thead>
<tr>
<th>Office</th>
<th>Need</th>
<th>Cost</th>
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<tbody>
<tr>
<td>CVCS</td>
<td>System should save some office time</td>
<td>$0</td>
</tr>
<tr>
<td>Housing</td>
<td>System should save some office time</td>
<td>$0</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Loss of revenue because re-coring not needed</td>
<td>$9</td>
</tr>
<tr>
<td></td>
<td>Preventative Maint. (head cleaning &amp; battery changes)</td>
<td>$31k</td>
</tr>
<tr>
<td></td>
<td>Additional parts inventory and consumption</td>
<td>$4k</td>
</tr>
<tr>
<td>ID Office</td>
<td>~½ of an FTE for initial card programming and Card replacement</td>
<td>$21k</td>
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<tr>
<td>OIT</td>
<td>~0.5 to 1 FTE to administer data base</td>
<td>$75k</td>
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<tr>
<td></td>
<td>Charges for server maintenance</td>
<td>$5k</td>
</tr>
<tr>
<td>Kiosks</td>
<td>Uncertain at this time – estimated cost</td>
<td>$10k</td>
</tr>
<tr>
<td>Public Safety</td>
<td>No resources needed</td>
<td>$0</td>
</tr>
<tr>
<td>Total</td>
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<td>$155k</td>
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**VIII. Implementation Schedule**

Please see the attached schedule for obtaining approvals, vendor final selection, development of the administrative procedures and data base configuration and lock set installation.

The number of locks installed per year is really a function of risk, workload, and available funds. We have experience with the card key locks so we feel that we could install all the locks for the undergraduate dorms this summer if that is all we had to do. However, it will be very difficult to implement this card key program at the same time as we re-card the entire campus community, along with all the required prox. card reader changes. Therefore, we recommend installing card key locks in the West Ellipse dorm and Witherspoon Hall now, as part of their construction work. The administration of these locksets could be taken on now without much effort. The following summer (2004) we could install the balance of the undergraduate dormitories with the exception of Holder. Holder would get the locks during its major renovation cycle. The graduate dorms would follow the in the summer of 2005. This schedule would allow us to hire the system manager long before we need to get all the software systems complete and operational.

Another schedule option is based upon regular dorm maintenance. Dorms are fully painted inside every two years, which takes about two weeks in the summer per dorm. We could install locks while the dorm is being painted, which would mean that we could complete the card key lock installation in three years. (Witherspoon and West Ellipse in 2003, one half of the remaining dorms in 2004 and the rest in 2005.) The graduate dorms and annexes would follow during the fourth summer (2006).

**IX. Outstanding Issues**
There are still some outstanding issues for card key locksets that need further investigation. The significant issues are itemized below:

- Mechanical locks that do not work well now because of poor door quality will still not work in the future with a card key lock set.

- Graduate Housing costs have been included in the analysis above for dorms and the annexes, but not the apartments.

- We have noticed some infrequent damage to ID cards along the magnetic stripe. We have sent some of these cards to the manufacturer so that they can identify the problem.

- Costs for College area doors where included above, but no costs were included for janitor closets or mechanical rooms. All common bathrooms will get a card key lock, but the locks on the male bathrooms will probably not be used unless they are used for female bathrooms in the future.

- We need to get members from the academic departments to form a separate committee to determine any needs for card key locks in other areas of campus. These areas could include computer clusters, libraries, laboratories, etc. Key control throughout many of our academic buildings is a known problem.

- We have not come to any conclusion concerning the lock style (mortise or cylindrical) for new installations.

X. Appendix

Mechanical and Card Key Distribution Processes

Tabulation of vendor comparisons

Letters of recommendation