Plant Operations
Facilities Maintenance

FY 2005 Annual Report

Published: September 30, 2005

Newly renovated Hill Auditorium
Introduction

Fiscal Year 2005 continued as the fourth year of aggressive department budget cuts related to the General Fund. For the first time in these last four years, Facilities Maintenance (FM) as a whole was not able to balance these cuts with the growing service requests and growing maintenance needs of this institution. This information is discussed further within this report as well as the other program and department accomplishments from our various shops.

Facilities Maintenance Organization Chart
FY 05 Financial Summary for Facilities Maintenance

Yearly Financials
FM, as the fiscally inclusive parent entity (10000/681600/OPERA encompassing Construction Services & Work Control), finished Fiscal Year ‘05 with a negative General Fund margin of ($387,558). All three departments contributed to this net negative position. On the $23,940,249 budget overall, this represented (1.6%).

On the brighter side, the FM Enterprise finished with a positive balance of $611,067. This represents good progress toward our allowable 5% budget reserve of $1.85 million. Our Auxiliary rebilling revenue increased 4.7% this year to $37.2 million. Much of this difference was due to filling non-sustainable short-term vacancies from the prior budget year.

- The Hospital Maintenance contract started the year with a negative margin of $607,000 and finished with improvement to a negative $583,418. The Hospital contract is roughly $10 million annually and the present balance represents the entire contract in its final year of a cumulative 7-year contract. Negotiations began on years 8-10 tentatively. A two-year plan was put in place at the end of FY 04 to hold and reduce the deficit to $300,000 by end of FY 05. While successful in reducing FY 05 costs, the plan will continue to be implemented in FY 06.
- We continued to work with ISES to define our operational costs at an APPA Gold Level of service for our new World-Class buildings. We have presented this option to the Hospital for implementation on their three new buildings under construction and are pending a decision.
- For a second consecutive year we identified the collective net addition of building systems (coined “Phantom Building”) to our existing campus buildings supported by the General Fund. We were successful and appreciative in seeing $155,000 in support for these new systems being added to our budget for FY 06.
- We were supported in FY 05 with a positive decision to address our future manpower needs through the approval of FY06 funding of $300,000 to increase our apprenticeship ranks. This is an annual investment for four years addressing the projected attrition of our Trades staffing.

Year-End Operational Highlights

FM Campus Programs
- We continued to work towards the establishment of Service Level Agreements (SLA’s). We have SLA’s with the Hospital, ICLE, Crisler Arena, Dental School, Property Disposition, and Housing (refrigeration) and most recently one for total campus fire extinguisher inspections with OSEH and DPS. We are presently working on agreements with the Ross School of Business in order to address the interim GF needs in their dynamic building program and also with Michigan Administrative Information Services (MAIS) for their emergency power needs.
- Plant Operations, FM's parent organization conducted a second round of the Denison organizational culture survey and Facilities Maintenance scoring improved overall. We
also participated in the B&F Survey results, which indicated better than average scoring for the department. Our staff consistently recognizes the importance in value of their work to customers and remains highly dedicated to them and the University's mission. FM will be developing our next set of strategic plans with this information considered.

- On a “Personnel basis” a four year Skilled Trades Labor Agreement was finalized and ratified supporting the University into 2008. Several labor issues were addressed yielding benefits to both management and the bargaining unit. The department also finished the first part of their role in a new University classification system rollout.

- The North Campus Chiller plant has been brought on line with two FM shops contributing. The HVAC Controls Shop did all of the control work at the Chiller Plant and at each building where the chilled water enters. This was a large undertaking that was very successful. The Refrigeration Shop has taken over the operation of the plant from the contractor. The transition was smooth and completely unnoticed by the end users. Occupants of North Campus facilities will benefit from redundant systems and reduced utility costs due to the operational economy of scale.

- Roof & Elevator Replacement models were generated for general fund buildings and incorporated into the FCA database. This will benefit all occupants as prioritized replacements can now be approached methodically against a tight capital improvement program. Both the Elevator and Roofing design guidelines are being reviewed with Plant Extension for further cost savings on major construction projects.

- Our Building Automation system exceeded the 60,000-point level this year. Point growth is directly tied to the expansion of systems and equipment monitored on campus. This monitoring and control function allows greater operational efficiency through reduced energy, reduced troubleshooting time, etc. BAS initiated an automation system "Continuous Commissioning" pilot program in four buildings, which was deemed very successful and is being incorporated into the tune-up phase of the Energy Conservation & Outreach program (formerly Energy Star) building review.

- "We Make Blue Go" was adopted as a slogan for all of B&F in FY 05; the 7 year origin of the slogan is credited to BAS' Tim Kennedy.

- Emergency support crews responded when Wolverine Tower lost power over the winter and Plant personnel set the building up with portable power until repairs could be made averting a full building freeze-up. We obtained a portable fuel dispensing unit capable of hauling 110 gallons of fuel to further assist us in emergency preparations and response in support of our many buildings and infrastructure.

- We continue to work to define two new Zones supporting the new core research and academic buildings of the University. Our vision is to establish one additional Zone group specific to the service needs of the research community, and the second on North Campus.

- Our service contract for maintaining the Gerald R. Ford Presidential Library was renegotiated for another five-year term.

- The Fire Alarm Shop is experiencing changes. In January, the decision was finalized to transfer the shop into the” Zones”. Tasks are underway to place all of the Fire Systems into the FMS database to establish another step towards an all encompassing preventative maintenance program.

- Facilities Maintenance continues to be involved in planning regarding the Hospitals ongoing construction and expansion plans. This has primarily addressed the
Cardiovascular building (CVC), East Ann Arbor Health Center for Depression and Outpatient Surgery. The Hospital elevators and escalators service contracts for the Hospital are being renewed again through vendor negotiations.

- The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) completed its triennial visit early in FY 05 with outstanding compliments within the facility critique area. Following JCAHO, the Hospital underwent a rigorous review conducted by the Centers for Medicare & Medicaid Services (CMS).

**Notable Challenges for FY06**

- Campus resources to support our many code deficient programs such as fire alarm and systems testing, elevator phone systems, refrigerant compliance, and a definitive arc-flash program with corresponding safety training.
- Research related equipment and systems support for fume hood and exhaust systems, high purity water systems, cold rooms and refrigeration, vacuum and lab gas support, secondary electrical systems for generator and uninterruptible power supply systems,
- Growing electrical preventative maintenance for infrastructure and load side systems such as variable frequency drives contributing to the overall University bottom line savings for schools budgets, but at the expense of FM’s operational budget.
- Activation of three Hospital buildings under construction and continued support planning for the new Cardiovascular Center.
It takes two screens to effectively monitor campus buildings. Shown here is Joe Circoloff, BAS Lead Operator.
Introduction

In FY’05 Building Automation Services (BAS) experienced another year of challenges related to rapid system expansion and new building construction. It was also a year of successes in the budget arena as a portion of the funding lost over the last five years was restored and a new mechanism to fund future system expansion was approved and placed into effect.

BAS has 12 employees and functions 24 hours per day, 365 days per year. It is responsible for the monitoring, maintenance and development of the building automation computer systems throughout the general fund UM Ann Arbor campus buildings. To meet these obligations, BAS relies upon the extensive expertise of the Facilities Maintenance HVAC Controls & Energy Management Shop for field service and installation work, the Utilities & Plant Engineering mechanical engineers for HVAC-DDC system expansion designs, and Plant Operations’ Network Services group for Windows-based computer hardware and software maintenance.

During this past year, the department added three Utility Systems Technicians (USTs) to the BAS monitoring crew. The increased staffing level will support expanding system needs and provide additional coverage during each shift. The primary database server and associated software were upgraded to provide additional features that allow greater access by the Utilities engineers.

David Anderson
Management Systems Coordinator
BAS Organization Chart

Facilities Maintenance

Building Automation Services

Building Automation Coordination

BAS Staff
FY 05 Financial Summary

BAS started FY’05 with a carry-over surplus of $82,457 which was the result of unexpected deferred maintenance spending in preparation for a budget take-back that didn’t materialize. FY’05 via Utilities marked the first year where BAS was able to carry any surplus (or deficit) into the following fiscal year. Additional funding of $250,000 was added to the BAS budget mid-year FY’05 to make up for a portion of the budget that had eroded over the last ten years. The budget has grown at half the rate of the BAS system growth even after the additional funding is taken into account.

The most significant financial change in FY’05 was the approval and adoption of a BAS funding model that matches funding increases to new system growth for FY’06 and beyond. This model is the product of over two years of work in identifying prior needs and continued systems growth. This will prevent further reductions in preventive maintenance activities and allow for network infrastructure upgrades to continue at a responsible pace.

BAS successfully applied 98.6% of the allocated funds in FY’05 to the designated budget activities to further the mission of the University. In addition to operational efforts, BAS funded projects to upgrade field panels to prepare for the new North Campus Chiller Plant project. These upgrades enabled communication speeds to increase and improved the overall network environment for the newly added computer panels. Additional computer panel technology upgrades were performed throughout central campus along with network structural changes to increase communication speed. Technology upgrades are part of an ongoing effort to prevent disastrous building operation failures with some computer panels exceeding a 20-year life span, well beyond the intended 10-year replacement cycle.

General Fund

<table>
<thead>
<tr>
<th>Building Automation Services</th>
<th>Budget and Operating Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Fund</td>
<td>FY2005</td>
</tr>
<tr>
<td></td>
<td>BAS</td>
</tr>
<tr>
<td></td>
<td>Budget</td>
</tr>
<tr>
<td>Expenditures</td>
<td>$1,801,733</td>
</tr>
</tbody>
</table>

Year-End Operational Highlights

Building Automation Services (BAS) is part of the University of Michigan’s Facilities Maintenance department. BAS serves the University's General Fund Buildings, and a few non-general fund buildings (for a fee. BAS implements schedule and operational changes for various
types of HVAC equipment and lighting systems, and monitors the general fund campus building automation systems for alarm conditions and energy efficient operation.

The system has been growing at a rate of over 15%/year, however in the last 9 months of FY’05 (system size evaluations have traditionally taken place annually in October) the growth rate was over 16%.

BAS growth exceeded the capabilities of one person to monitor for all shifts. Additional Utility Systems Technicians (USTs) were added to allow all shifts to have a minimum of 2 UST’s scheduled. This also restored some computer interface project work capability to the BAS crew to move forward the systematic improvement of the user interface and the identification and correction of problems.

Additional access to the BAS computer systems was added in FY’05 for the Utilities engineers.

A funding model for new-space additions to the BAS system was approved and implemented in FY’05. It took 3 years of funding cycles to arrive at a long-term model that satisfied all of the criteria. This completes an area for improvement carried over from previous years.

A “Continuous Commissioning” pilot project was conducted in FY’05, and was deemed successful and subsequently incorporated into the Energy Conservation and Outreach program (formerly known as the UM Energy Star program). Continuous Commissioning is a program where BAS system data is exported to a third-party database and analyzed for potential energy savings opportunities. Instead of a snapshot view, it sees an extended time period and catches flaws that may only show up occasionally.

Examples of problems identified and corrected as a result of the Continuous Commissioning pilot project include leaking valves, hot water controls not optimized, multiple pieces of equipment operating simultaneously where only one piece of equipment is required, and excessive control valve and damper oscillations. The anticipated savings for the four buildings included in the pilot project were calculated to be $63,000 while the costs to monitor and evaluate potential problems were $37,700.

Tim Kennedy (BAS supervisor) was chosen to provide updates directly to Mary Sue Coleman, the U of M President, as a representative of the Voices of the Staff - Employee Recognition group.

The BAS system is a conglomeration of networks and computer systems ranging from the latest state-of-the-art equipment and physical communications mediums to 20+ year old networks and equipment. The challenge for FY’06 and beyond is maintaining interoperability between the diverse systems and upgrading performance capabilities before operational problems arise.
Plant Operations
Facilities Maintenance-Electrical Shops

FY 2005 Annual Report

Published: September 30, 2005

One of four U-M owned, 350 kilowatt portable generator units used for Special Event power, Utilities preventive maintenance or emergency power needs.
Introduction

The Plant Operations Electrical Shops are made up of four shops collectively, two in Utilities & Plant Engineering (UPE) and two in Facilities Maintenance (FM). Staff is comprised of one Electrical Utility and Maintenance Manager, four shop Foremen, one each: Materials Project Coordinator, Work Control Coordinator, Office Assistant; and fifty-two Tradesmen with up to eight electrician support staff from two vendor contracts; Turner Electric and Utilities Instrumentation Services.

The Electrical Construction and Electrical Technical Shops are managed under Facilities Maintenance, and are reported as follows.

It has been a challenging year for FM Electrical Shops. Due to increasing budget cuts at the State level passed down to the individual shop levels, we were tasked to maintain service levels to a growing UM campus. These shops have a combined general fund and customer pay budget of $3,282,051. The general fund portion of the total budget was $796,184.

Programs essential to system reliability, energy conservation, and customer satisfaction were continued from past years along with some new initiatives developed from the Plant Operations Denison Survey, customer feedback, and new regulations. Some of these initiatives were:

- Revised the standard operating procedure for the Electric Shop Hiring Practices. This procedure will help future interview committees maintain an efficient and reliable process to select the best candidates for the Electrical Shops.
- Implemented new OSEH Spill Prevention Control and Countermeasure (SPCC) compliance programs, which affected the Electrical Technical Shop.

A new directive from the Associate Director of UPE required his shops to concentrate on operations and maintenance functions and discontinue all electrical construction projects. To ensure construction standards, as well as keeping long term system maintainability in mind, electrical construction projects were consolidated to our FM Electrical Construction shop. This decision created the need for a revised responsibility structure of the Electrical Construction Shop. In an effort to accommodate the increased workload, 3 new High Voltage Shop FTE’s were hired and manpower was shifted within all electrical shops.

Midway through FY 05, another decision was made by the Associate Director of FM transferring the Fire Protection Shop to the FM Electrical Shops to the FM Zone Maintenance group. These program changes and initiatives have led the FM Electrical Shop through a financial and administrative challenging year, but in all, a successful one.

Joe Iott
Electrical Utilities and Maintenance Manager
**Electrical Shops Organization Chart**

**FY 05 Financial Summary**
Several years of budget reductions, including an auxiliary funded program budget reduced by 50% and an increased workload have taken their toll on the Electrical Shops general fund budget. Figures in the following financial tables include the Fire Protection Shop (now under Zone Shop Administration) portion in the FM Electrical Shop until fiscal year end.

**General Fund**

<table>
<thead>
<tr>
<th></th>
<th>Beginning Budget</th>
<th>Ending Totals</th>
<th>Remaining Balance</th>
<th>Under/Over</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labor</strong></td>
<td>1,125,137</td>
<td>1,394,867</td>
<td>-269,730</td>
<td>-269,730</td>
</tr>
<tr>
<td><strong>Material</strong></td>
<td>329,784</td>
<td>227,510</td>
<td>102,274</td>
<td>102,274</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,454,921</td>
<td>1,622,377</td>
<td>-167,456</td>
<td>-167,456</td>
</tr>
</tbody>
</table>
The overdraft was largely due to:

- Auxiliary funding ($320k) normally provided by contributions from Risk Management, OSEH and DPS for Fire Alarm Testing were cut in half three years ago. No staffing reductions were made and minimal labor charges were shifted to customer pay. The funding loss was not replaced. Efforts have been made to refocus the staff to other work as detailed within the Zones Report. Positions open due to retirements, promotions, and job transfers were filled. If these positions had not been filled, customer service would have been adversely affected.
- The unit experienced a significant number of unexpected equipment failures throughout the year. Each failure ranged in cost from $1,000 to $20,000. Equipment expenditures in this range are expected to be covered by departmental budgets. Over history more and more VFD’s are been being installed. As these units age, more and more are going to fail needing expensive operationally funded replacements.
- Increased material cost.

Many General Fund budget reductions were identified for FY 2004 & 2005 FM department wide. Status of the reductions pertaining to FM Electric Shops is documented below:

- Reduce Foreman overtime – Implemented – Necessary overtime now recharged to directly to work request.
- Reduce fleet vehicle costs- Keep the old vehicles – Implemented.
- Reduce On-Call – Last two hours of coverage – Implemented.
- Reduce On-Call – During low use hours – Implemented.
- Reduce overhead – Minimize Union Contract release time – Implemented.
- Reduce overhead – Reduce Committee Activity – Implemented.
- Reduce summer picnic – Implemented.
- Reduce retirement parties – Implemented.
- Reduce overhead – Minimize Union participation in Employee Selections – Implemented.
- Eliminate MGF project work $20,000 to 50,000 – Implemented.
- Replace a T-7 electrician position with Work Control Coordinator – Implemented.
- Replace Trades retirement with Apprentices – Partially Implemented.
- Reduce overtime to only essential high priority work – Implemented, but only minimal success in reducing overtime.
- Reduce overhead –Travel and Training costs – not successful, Travel for Essential technical training could not be delayed.

New space allocation has hidden the long range effect of budget cutting over the past few years. However, with new space, comes new equipment and it must be maintained as well. Continuance of budget cuts into FY 06 will limit our ability to respond in a timely manner to customers and impact the replacement of failed or nearly failing system components. Over time the University’s electrical systems will become less reliable and when failures do occur, the down time will be longer. The major concern is these less reliable systems will ultimately affect the University’s mission.
Enterprise Report

<table>
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</thead>
<tbody>
<tr>
<td>Total Revenue</td>
<td>5,022,580</td>
<td>5,331,611</td>
<td>309,031</td>
<td>5.79%</td>
</tr>
<tr>
<td>Total Expense</td>
<td>4,946,270</td>
<td>5,263,853</td>
<td>317,583</td>
<td>6.0%</td>
</tr>
<tr>
<td>Total Revenue/Expense Variance</td>
<td>76,310</td>
<td>67,758</td>
<td>8,552</td>
<td>.15%</td>
</tr>
<tr>
<td>Percent Variance</td>
<td>1.51%</td>
<td>1.27%</td>
<td></td>
<td>.21%</td>
</tr>
</tbody>
</table>

The Enterprise Report shows that both total revenue and expenses grew from FY 2004 to FY 2005, with the expenses growing .21% faster than revenue. The variance between FY 2005 total revenue and expenses was $67,758 or .15%. Considering all the factors that go into estimating overhead expenses and the potential for variances from those estimates, .15% difference is negligible. In FY 2006, we’ll pay attention to overhead expenses and adjust as needed from our original estimates, to help balance the FY 06 enterprise revenue and expense report as we move forward.

Year-End Operational Highlights

Dana Building Rooftop Solar Panels

Electrical Construction & Maintenance

The Electrical Construction and Maintenance Shop consists of one foreman and seventeen electricians. It is responsible for electrical construction and repairs of all General Fund buildings, customer pay projects, fixed price projects, Architecture and Engineering design projects, and Utilities & Plant Engineering design projects. All construction projects are installed applying the National Electric Code along with the University of Michigan master specifications and need to pass inspection. It also supplies the workforce for special events like the Art Fair, football, basketball, baseball, softball, and hockey games.

The Electrical Construction and Maintenance shop has been assigned all utility construction in addition to its facilities maintenance commitments. This shop has been restructured dedicating six staff to a separate crew to accommodate a long term effort of installing high voltage cable in campus duct banks. Outside lighting projects have been merged into the shop in a joint effort with the low voltage utility shop to continue these installations. The process of eliminating
Contract labor continued to require more of our staff. Since the last quarter of FY 05 two full time staff report to the CPP as their job assignment.

Project highlights and accomplishment during FY 05 include:

- Installation of prototype photovoltaic system on the roof of Dana Building.
- Heat trace installations on North Campus Grounds, Coliseum, Michigan League, and Parking Services buildings.
- Extensive electrical infrastructure upgrade to G.G. Brown building.
- Numerous campus camera installations to monitor new building construction projects.
- Installation of wireless network systems at the Medical Science complex, Business School complex, and School of Social Work building.

Over the last year the Electrical Construction foreman has interviewed twenty nine applicants and filled eleven full time positions within the Electric Shops. This hiring effort sets the precedent of forming a central hiring committee for all University of Michigan electricians.

The shop continued to rely on an outside contractor (Turner Electric) to fill four 65 electrician positions. The increased responsibilities associated with the daily operation along with new utility may warrant the unit to establish funding for a dedicated support staff so that projects are managed and completed within budget and labor recharge rates are controlled and sustained.

**Electrical/Technical Shop**

The Electrical/Technical Shop at the University of Michigan is comprised of 13 electricians and one apprentice electrician. Our primary duties consist of repair and replacement of variable speed drives, emergency and portable generators, uninterruptible power supplies, electrical support for operations and maintenance of boilers for the Outlying Boiler Shop, electrical support for Direct Digital Control (DDC) system installations, electrical support of operations and maintenance for the Air Conditioning Shop, special power quality monitoring request by Engineering or Customers, and management and labor support for special event and emergency power needs.

During FY 05, this department accepted responsibility for two electricians primarily assigned to the Air Conditioning Shop and two others who are primarily assigned to DDC installation tasks. Two apprentices have rotated through this shop in the last year, Jason Kayfesh and Phil Miller. Jason has moved on and Phil will be with us for another four months working with our AC electricians. We have purchased and received a trailer mounted 110 gallon diesel refueling station that we will use for emergency generator refueling. This will also allow us to fuel our generators (stationary or portable) if there is a danger of running out of fuel while waiting for our fuel contractor. It will also reduce our reliance on outside contractors for timely fuel deliveries on some of our shorter generator runs. We are establishing a means to obtain diesel fuel from the Central Power Plant. The foreman of this shop is working with Brandi Campbell from OSEH and CPP staff on
developing a procedure for Fueling Portable Diesel Generators. He is also working with Brandi on logging monthly diesel fuel tank inspections to ensure compliance with the Michigan Department of Environmental Quality and The University of Michigan’s Spill Prevention Control and Countermeasure Plan.

Accomplishments the department achieved during FY 05 include:

- Support of numerous shutdowns at the Modern Language Building to complete commissioning of the new Chiller substation and emergency power distribution to Hill Auditorium and Burton Tower.
- Completed generator test for the hazardous biolab containment at Med Sci II.
- Assisted the MGE company with the repair and maintenance of the Duderstadt Center server room UPS.
- Provided generator support for Crisler Arena emergency circuits for several months until repair of their Detroit Edison (DTE) emergency source was completed.
- Supported Dental/Kellogg Building with generator power after a primary cable failure and while temporary service could be completed.
- Fed power to the Advanced Technologies Lab and the School of Information North for three days while a construction project had the normal source interrupted.
- Generated power for former President Ford's groundbreaking ceremony of his new building, held at the Track and Tennis Center.
- Generated power for an emergency outage last winter at Wolverine Tower for one week with around-the-clock refueling for two generators in sync.
- Supported Thayer Street Parking Structure with generated power during a planned outage in advance of the new Thayer Building going up.
- Generated temporary power for the annual Indian PowWow at Crisler Arena and the concession area near the Michigan Union during this year’s Ann Arbor Art Fair.
- Completed the repair of the Woman's Gymnastics Facility sewage diversion valve installed during construction of the new facility; the equipment is now functional with the exception of the installation of a seven day timer to exercise the valve per manufacturer's recommendation; this should be accomplished soon.

The department must establish funding for additional FTE’s to support the variable speed drive preventive maintenance program. This PM program has been implemented, however a number of PM work requests are sent back due to non-compliance (not able to complete in normal time interval). Through use of the FMS reports, we have determined that an additional 3.5 FTE’s are needed to perform preventive maintenance on the drive equipment once/year. Further, the department will require two more FTE’s to perform preventive maintenance on stationary and portable generators and 1.5 FTE to meet the NFPA code compliance for the testing of emergency power equipment.
One of the many entrances to the University of Michigan Hospital.
Introduction

**Plant-Hospital Maintenance Mission Statement**
The Hospital Maintenance Department, a member of the University Community, maintains the physical environment and provides related services to support the Hospital in reaching its goal of excellence in healthcare and public service.

**Vision**
- To be a department where continuous and measurable improvement in services is the standard.
- To be recognized by the Hospital and University community for excellence in service, as a partner in solving our customers' problems, and as the provider of choice.
- To be an innovative leader in facilities management. To be an organization where all employees are treated equitably and honestly.
- To be an effective, diverse work community.
- To be a learning organization, where all staff members are empowered and supported in reaching their full potential.
- To be a workplace where the atmosphere of trust encourages creativity and innovation.

**Guiding Principles**
Our vision can only become reality through the efforts of all members of the Plant Operations team. This requires that everyone identify processes that need to be improved and the milestones that must be achieved as we seek to be the provider of choice for those we serve. While keeping the vision before us, it will serve to remind us what we are to do. It is critical that we also give attention to how we do it. We will be guided by these principles:

**Focus**
We exist to serve the needs of the Hospital through partnerships and mutual understanding.

**Integrity**
How we do our work and how we relate to each other are of paramount importance. Our conduct must conform to the highest, uncompromising standards of trustworthiness and character. We will never knowingly make decisions that harm people or that is not in the best interest of the Hospital community.

**Respect for People**
Respect for people and their intrinsic worth is the cornerstone of our relationships with one another, our customers, and our suppliers. We appreciate the diversity of the human family and recognize our differences as sources of collective strength and wisdom.

**Empowerment**
We are a team. Team members are stakeholders in the success of the enterprise, and must be involved in the decisions that affect their work lives. "Empowerment", with its freedoms, responsibilities and boundaries, describes the intended work culture. Empowerment requires competence, sharing of information and ongoing learning. We are dedicated to becoming the best workforce in our industry. A person seeking to improve service to a customer will not be blamed for taking reasonable risks or for trying something new that does not quite work out.

**Innovation**
- We are a learning organization.
- We recognize that improvement of our work processes, our methods, and ourselves is essential to our success.
- We must be creative.
- We must challenge our own thinking. We must seek to learn from our mistakes.
**JCAHO 2004**

- During November the Hospital underwent its tri-annual JCAHO survey. One of the focus areas of the survey is the Environment of Care component, which concentrates on facility, safety, security and emergency preparedness. JCAHO Officials were very impressed and one surveyor mentioned that we were one of the 10 best hospitals he has ever surveyed related in the case of environment of care in his 20 years of doing surveys. Our staff’s willingness and ability to prepare for this survey and remain in a state of readiness was instrumental in receiving the comment stated by the Surveyor. The Hospital Maintenance Staff was one of the many hospital units that contributed “more than 100 percent” necessary to receive such praise. Kudos to the Hospital Maintenance Department.

**CMS 2005**

- Centers for Medicare & Medicaid Services survey inspection occurred during February 15 – 25. The Centers for Medicare & Medicaid Services (CMS) is a Federal agency within the U.S. Department of Health and Human Services whose purpose is to assess the Hospital’s compliance with the CoP (Conditions of Participation) for all services and areas in which the provider receives reimbursement for patient care services. This is over $300 million for UMHS. The goal of the survey is to determine if the Hospital is in compliance set fourth within 42 CFR Part 482. Certification of Hospital compliance with the CoP is accomplished through observations, interviews, and document/record reviews. This survey is used to assess compliance with Federal health, safety, and quality standards that will insure that the beneficiary receives safe, quality care and services. Hospitals who participate are required to be in compliance with the Federal requirements set forth in order to receive Medicare/Medicaid payment/reimbursement.
- Plan of Correction has been submitted and maintenance related work requiring follow-up and correction is substantially completed (>95%).

**Utility Management**

- The Hospital’s on-going performance improvement activity for utilities is to maintain an average of one (1) utility incident/failure per month and achieve a monthly PM completion rating of 95% or above. This year’s performance rating was 95%. Elevator entrapment performance targets were met with only 16 occurrences for the year.
- The Utilities Committee is currently reviewing rationale of changing indicators. A special task group will review existing equipment and their APMI rating. It is desired to identify equipment based on APMI rating to warrant a 90% completion rate and identify equipment to have a 100% completion rate. Currently all equipment with an APMI rating of 12 and above has a “priority 4” ranking and a 95% PM completion goal.
Hospital Maintenance Organization Chart

Facilities Maintenance

Hospital Maintenance

Electric Shop

ENWAH

HVAC Shop

Plumbing Shop

Area 1

Area 2

Area 5
FY 05 Financial Summary

The Plant Operations – Hospitals & Health Centers (HHC) annual contract amount (including all outbuildings and engineering support services for FY 05 was $10.23 million. The final variance for FY 05 was $(583,000). An outstanding reimbursable amount of $291,340 will be recovered in FY 06 reflecting a “truer” variance of $(292,078), slightly under 3% of the total contract amount. This balance is cumulative for the seven years this contract has been in place.

Financials

<table>
<thead>
<tr>
<th>FY05</th>
<th>ACTUAL</th>
<th>BUDGET</th>
<th>($) VAR</th>
<th>(%) VAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beginning Fund Balance</td>
<td>(607,107)</td>
<td>(607,107)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Revenue</td>
<td>10,792,942</td>
<td>10,711,666,</td>
<td>81,275</td>
<td>.8</td>
</tr>
<tr>
<td>Total Comp &amp; Benefits</td>
<td>7,319,419</td>
<td>6,824,047,</td>
<td>(495,372)</td>
<td>-7.3</td>
</tr>
<tr>
<td>Total Other Expenses</td>
<td>3,578,378</td>
<td>3,559,428,</td>
<td>(18,950)</td>
<td>-.5</td>
</tr>
<tr>
<td>Total Expenses</td>
<td>10,897,797</td>
<td>10,383,475,</td>
<td>(514,322)</td>
<td>-5</td>
</tr>
<tr>
<td>Total Transfers</td>
<td>(128,544)</td>
<td>128,544</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Change After Transfers</td>
<td>23,689</td>
<td>328,192</td>
<td>(304,503)</td>
<td></td>
</tr>
<tr>
<td>Ending Fund Balance</td>
<td>(583,418)</td>
<td>(278,916)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Year-End Operational Highlights

Customer Survey

• The Department has implemented a “web-based” survey process to solicit info and comments from our customers. The process has worked very well.
• Scores for 2005 remain above threshold and overall at 4.18.

Denison (Employee) Survey 2004

• The Denison Survey serves as a “business” climate/cultural indicator for like industries. It compares via percentages how a particular industry stands in comparison with others in the “eyes of the employee”. Areas measured are adaptability, mission, involvement, and consistency. The Department has shown significant increase in the survey scoring results from 2001 to 2004. The more color, the better. We are moving in the right direction!

2004 Results

2001 Results
Additional Highlights FY05

- Steam trap replacement for Operating Rooms completed.
- Upgrade in HVAC controls package allowing tighter evaporator control and “hot-starts” allowing reduction in operational costs during cooling season.
- “Sealing” multiple mechanical room floors.
- Heat Exchanger replacement resulting in minimum $300,000/year in energy savings.
- Replacement of NIB and MPB fire pumps.
- Patient Room PM Program Implementation.
- Reconciliation of errand charges resulting in $128,544 in reimbursements.
- “Clean-up” Statement of Activity (SOA) Reports to reflect more accurate data.
- Program ledger account revision/update.
- New Plant Hospital Maintenance Contract Development.
- Policy Review Team.
- Development of “Photo Wall” for Maintenance Department.
- TACS (Training Administration & Compliance Software)/LearnerWeb Implementation
- New radios in service.
- Elevator re-numbering.
Plant Operations
Facilities Maintenance-Mechanical Systems

FY 2005 Annual Report

Published: September 30, 2005

The New North Campus Chiller Plant
3900 Tons of Cooling!
Introduction

The purpose of this report is to document the Mechanical Systems financial performance, operational highlights, new initiatives and programs, areas for improvement and future concerns.

The Mechanical Systems Department is responsible for the repair, maintenance and operation of the mechanical systems in general fund buildings and for a large percentage of the systems in Auxiliary buildings on the University of Michigan’s Ann Arbor Campus. The department is comprised of six Foremen, one General Foreman, ninety two Tradesmen, two HVAC Field Service Technicians and two Work Control and Project Coordinators, which represented the FY 05 combined general fund and customer pay budget of $13,914,450. The general fund portion of the total budget was $7,601,449 or 54.6% of the total budget.

The Mechanical Systems Department is divided into the following six shops:

- Plumbing Systems
- Steamfitting and Pumps
- Insulation and Asbestos Abatement
- Air Conditioning and Refrigeration
- Air Conditioning Systems and Balancing
- HVAC Controls and Energy Conservation

During the past year many vital programs that are central to energy conservation, system reliability and customer satisfaction were initiated or were continued from past years:

- Energy Conservation and Outreach (ECO) Program continued into its second year.
- Refrigerant Compliance Program.
- Best Practices Management program to clean the University storm water system twice a year and to exercise all of the water main valves on campus annually.
- Dining Services renewed their Service Level Agreement (SLA) for FY 06.
- Property Disposition continued their SLA for FY 06.
- Two new separate OSEH compliance programs were implemented (chemical containment for cooling tower chemicals and oil storage in mechanical rooms).
- New initiatives were implemented as a first step toward a strategic reorganization of the Air Conditioning Shops.
  - Specialized response crews were created in each of the three air conditioning shops. These small teams dealt exclusively with hot and cold work request complaints, which led to more effective, timely response to customer complaints.
  - A specialized chiller crew was created as a prototype for a new shop that will have responsibility for all of the chiller systems on Campus.

When the Air Conditioning Shop reorganization is complete shops will be dedicated to: HVAC Controls, Refrigeration, Chiller Systems, and Air Balancing/Comfort Complaints. The reorganization will allow our staff to focus on responsibilities within these respective shops, rather than being pulled in many different directions throughout the day. By being more efficient we will be able to accomplish more work with less labor hours. The reorganization will be completed in FY 06.

These and many other programs, which will be further developed throughout the report, led to a financially challenging, but successful year for the Mechanical Systems Shops.

Gary Ernst
General Foreman
Mechanical Systems Organization Chart

Facilities Maintenance

Mechanical Systems

AC Mechanical

AC Systems

Energy HVAC

Insulation/Abatement

Plumbing Systems

Steam Systems
FY 05 Financial Summary

Fiscal year 2005 was a difficult financial year for the Mechanical Systems Shops. Several years of budget reductions and increased workload took their toll on our general fund budget. At mid year it appeared that we were on track to end the year with a nearly balanced budget. However, by the end of the year our deficit had grown to (5.4%).

General Fund

<table>
<thead>
<tr>
<th>Mechanical Systems</th>
<th>General Fund Shop Budget Report FY 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beginning Budget</td>
</tr>
<tr>
<td>Labor</td>
<td>5,460,117</td>
</tr>
<tr>
<td>Material</td>
<td>2,141,332</td>
</tr>
<tr>
<td>Total</td>
<td>7,601,449</td>
</tr>
</tbody>
</table>

The overdraft was largely due to:
- A position left open for over a year was non sustainable and was filled with an Apprentice.
- Positions left open due to retirements were filled. Had these positions not been filled customer service would have been adversely affected.
- Many difficult chiller system start-ups in the spring of FY 05; which consumed more overtime than was budgeted.
- A series of unexpected equipment failures throughout the year. Each failure ranged in cost from $2,000 to $20,000. Equipment expenditures in this range are expected to be covered by departmental budgets.
- Urgent general fund work made it difficult to shift labor to customer pay work.
- Increased material costs
- Required training necessitated by combining the Steam Absorption and Mechanical Refrigeration classifications. This training had been delayed, but could not be delayed for yet another year.

For FY 2004 & 2005 many General Fund budget reductions were identified. The implementation status of the reductions is documented below:
- Eliminate Foreman overtime – Implemented.
- Reduce lead person pay – Implemented.
- Reduce overhead – Office supplies/lanyards – Implemented.
- Eliminate hosting – Implemented.
- Reduce fleet vehicle costs- Keep the old vehicles – Implemented.
- Reduce On-Call – Last two hours of coverage – Implemented.
- Reduce On-Call – During low use hours – Implemented.
- Reduce overhead – Minimize Union Contract release time – Implemented.
- Reduce overhead – Reduce Committee Activity – Implemented.
• Reduce summer picnic – Implemented.
• Reduce retirement parties – Implemented.
• Reduce overhead – Minimize Union participation in Employee Selections – Implemented.
• Eliminate MGF project work $30,000 to $39,999 – Implemented.
• Eliminate MGT project work $20,000 to 29,999 – Implemented, except for three projects in this range.
• Replace a T-6 Plumber with a T-4 Sanitary & Storm Water Systems Specialist – Implemented.
• Replace Trades retirement with Apprentices – Partially Implemented.
• Reduce overtime to only essential high priority work – Implemented, but not successful in reducing overtime.
• Reduce overhead – Travel and Training costs – Travel eliminated, Essential training was completed.
• Reduce material purchases – Attempted to implement, but purchases increased, due to systems needs.
• Leave FTE positions open – Partially implemented – One of two open positions was filled with an Apprentice.

Increased focus and attention to maintaining a balanced general fund budget for FY 06 will be a top priority. Budget cuts continued into FY 06 will limit our ability to respond in as timely of a manner as we would like to for customer complaints and to purchase and replace failed or nearly failing system components. Over time the University’s mechanical systems will become less reliable and when failures do occur, the down time will be longer. The concern, of course, is how will less reliable mechanical systems affect the University’s mission.

**Enterprise Report**

<table>
<thead>
<tr>
<th>Mechanical Systems Enterprise Report FY 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 2004</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>Total Revenue</td>
</tr>
<tr>
<td>Total Expense</td>
</tr>
<tr>
<td>Total Revenue/Expense Variance</td>
</tr>
<tr>
<td>Percent Variance</td>
</tr>
</tbody>
</table>

The Mechanical Systems Enterprise Report shows that both total revenue and expenses grew from FY 2004 to FY 2005, with expenses growing 1.2% faster than revenue. The variance between FY 2005 total revenue and expenses was $258,186 or 1.8%. Considering all of the factors that go into estimating overhead expenses at the beginning of the year and all of the potential for variances from these estimates, 1.8% is a reasonable variance. Going forward we will pay extra attention to overhead expenses and adjust as needed to improve our initial estimates, which will help to balance the FY 06 enterprise revenue and expense report.
Year-End Operational Highlights

Mechanical A/C and Refrigeration Shop  Frank Hilberer, Foreman

The Mechanical Air Conditioning and Refrigeration Shop (MACRS) is comprised of one Foreman and seventeen Air Conditioning and Refrigeration mechanics. All of the staff is EPA certified to install, remove and handle all refrigerants.

The MACRS is responsible for all refrigeration equipment in GF buildings on U of M’s Ann Arbor campus and for a great deal of the equipment in non general fund buildings. Examples of refrigeration equipment serviced:

- Cold rooms, ultra-low temperature freezers
- Compressed air dryers
- Ice machines, salad bars, pop machines, etc.
- Controlled environment chambers
- Walk-in and reach-in coolers & freezers
- Chilled water systems
- Ice machines
- Freezers
- Cold storage equipment
- Dryers
- Air water systems
- Fire protection systems
- HVAC systems
- Refrigerant equipment

The MACRS is also responsible for:

- Maintenance and operation of all chillers on the North and South campuses.
- Management of the U of M’s Refrigerant Compliance data base.
- Computer server rooms.
- Direct expansion air conditioning systems through out Campus.

The MACRS has agreements with Dining Services, Yost Ice Arena, Ford Library, and Property Disposition to repair, maintain and dispose of their refrigeration and air conditioning equipment.

During FY 05, the department completed the activities described below.

- Dining Services renewed their SLA to repair and maintain refrigeration and air conditioning equipment. The number of corrective work requests we receive from Dining Services is declining, primarily due to the properly funded preventive maintenance program we implemented for them.
- Dining Service is also contracting with us to install new refrigeration equipment. As a returning customer, they have openly shared the quality of work is higher, and the price is less expensive than contracting with outside firms.
- The MACRS took over the operation of the new North Campus Chilled Water Plant on April 15, 2005. The new Chiller Plant supplies chilled water to many buildings on North Campus which in the past relied on independent chillers in each building. Many of these chillers were old and obsolete and needed replacement. We look forward to many years of reliable chilled water production from this Plant.
- Due to retiring Trades staff we were able to hire two replacement Tradesmen with extensive experience overhauling large chillers. We are now able to do chiller overhauls with in-house staff, on our schedule, and at less expense to the University.

Highlights
• The successful continuing integration of the former “Mechanical Refrigeration” and “Steam Absorption Air Conditioning” classifications into one classification, the “Air Conditioning and Refrigeration” classification. Although the process is not totally complete, the transition is going well and anticipated to go smoothly into FY 2006. We hope to have the transition complete by FY 2008.

• All of the larger chillers (100 tons and greater) located on North Campus were bought online in the spring of FY 05 with minimal effort at start up. The successful start-up was due in large part to preparatory winter maintenance, which prepared the chillers in advance for summer operation.

• The continuation of the Refrigerant Recovery Center (RCC). Obsolete and defective refrigerant containing equipment declared scrap by Property Disposition is transferred to the RCC. Declared scrap cannot leave campus if it contains refrigerant. The refrigerant and refrigerant oil are recovered and sent to a recycling center. This program is necessary due to provisions within the Federal Clean Air Act dated July 1, 1992.

Refrigerant Recovery Center

• The continuing successful Window Air Conditioning cleaning program is a joint effort between the Machine Repair Shop and the Air Conditioning Shop. The Machine Repair Shop manages the EWOCs that do the actual cleaning. The MACRS assists with coordination and technical support when needed. Benefits of the program include:
  • Improved equipment operation and fewer failures resulted in improved customer satisfaction.
  • Reduced workload for the MACRS during the busiest times of the cooling season.
  • Extended equipment life.

• To provide improved customer service, shift changes were implemented to provide longer hours of coverage. Staff is now available Monday through Friday from 6:00 AM to 4:30 PM.

• Improved Trades Union Contract language concerning sick time usage has led to a greater awareness of the proper use of paid sick time.
Air Conditioning Systems

Craig Butcher, Foreman

The Air Conditioning Systems Shop is comprised of one Foreman, one HVAC Field Service Technician and twenty Air Conditioning and Refrigeration Mechanics.

AC Systems operates and maintains more than 60 steam absorption and vapor compression chillers 100 tons or greater throughout the central campus area. We also operate and maintain associated equipment such as cooling towers, chilled water distribution systems, and energy recovery systems. In addition, we respond to hot and cold complaints, provide test and balance services, maintain and service fume hoods, operate and maintain lab and building pressurization systems, and service and certify research animal housing facilities. We assist engineers, architects, and contractors all over the University as they re-design, renovate, and rebuild buildings and other facilities. We work hand-in-hand with other trades and shops to service, operate, and maintain the countless pumps, motors, fans, ductwork, valves, controls, heat exchangers, and other vital equipment without which the University could simply not function.

During FY 05, the department completed the activities described below.

- Absorption and Mechanical Air Conditioning Shops have reallocated FTE's, both to meet short term service needs and to simultaneously position us for further changes. In particular, we were able to begin "cross-training work assignments" to spread skills and increase campus-wide system knowledge.
- Retirements provided an opportunity to hire two superbly capable technicians from a major chiller manufacturer. Working in partnership with others on our crews, these individuals have already passed on considerable knowledge of the kind one can obtain only from "being on the inside" -- not trade secrets, but skills and information directly from the manufacturer.
- Increased regulatory and health/safety compliance requirements were imposed for oil storage, chemical handling, and similar recordkeeping.
- To fume hood certification, which is only a partially funded mandate, OSEH has added LEV (Local Exhaust Ventilation) certification, an added mission. To meet this challenge, a position previously held open for budgetary reasons was filled with a Test & Balance Specialist. Although this means one fewer FTE available for other HVAC operations, we hope to at least partially fund the position by taking on more customer pay testing and balance work through Utilities & Plant Engineering (UPE).
- Not new, but notable nevertheless: Continually increasing demands for service, coupled with increasingly constrained resources, mean the challenge of fulfilling our mission becomes ever more daunting. The only hope of accomplishing this task is to innovate and to educate. We must innovate by transforming our work operations, increasing our skills, and disciplining our work effort by focusing ruthlessly upon the essential. We must educate, not only by sharing our skills and knowledge within our own organization, but also by making the customer a partner in understanding how the University's physical environment affects their teaching, learning, and research.

Highlights

- Extensive manufacturer training in service and operation of centrifugal chillers.
- Refrigerant management compliance training.
- Upgraded licensure of 85% of our staff to EPA “Universal level”.

Page 36 of 74
• The LSI complex was occupied and O&M operations commenced.
• Nearly 4000 tons of cooling capacity brought on line, with as much and more to come in the next year.
• Last FY of operation for obsolete chillers at Hatcher and Med Sci I, to be replaced with more capacity and a new chiller plant at Hatcher to serve adjacent buildings such as Clements Library, Shapiro, Art Museum, Hatcher, and Tappan. Good riddance to all that old iron and the totally worn out systems!
• Years of putting off "non-critical" maintenance such as pump and chiller isolation valve replacement caught up with us in the Medical area, necessitating unavoidable but costly expenditures for OT and emergency shutdowns. In the Kresge complex, particularly, the aged condition of the chilled water plant piping and cooling towers meant countless hours restoring flow in blocked pipes, replacing obsolete pump starters, and doing other work which consumed resources we would much rather have put into buildings which are not scheduled for demolition.
• Horizon chiller performance, efficiency and reliability far exceed that of past and present absorption chillers on campus. The digital controller reacts precisely to varying load and water temperature changes, as well as to cooling tower water variations. Other advanced features include:
  o Advanced cycle-management system with adaptive frequency drive solution control.
  o Efficient stainless steel brazed plate solution heat exchanger.
  o Long life solution pumps.
  o Molybdinate inhibitor system.

Installation of Horizon Chiller

• For the first time, a chiller plant at UM (BSRB) will employ a series chiller arrangement, in which an absorption chiller feeds chilled water to a centrifugal chiller. This innovative and approach permits the absorption chiller to operate in its most effective range of chilled water input and output temperatures, and takes advantage of the centrifuge's capability of delivering much colder chilled water than the absorber normally can.
Areas of Improvement

- Commissioning of the new Cyclotron facility resulted in significant operational improvements with Plant Hospital AC shops and UPE working together. The changes implemented from what we learned should permit us to supply the overloaded Medical Science I Building with colder water--increasing average cooling capacity to that building by 5-10%. The biggest improvement should be obtained at peak load. Chilled water temperatures will still rise incrementally and building areas with substandard fans will still lag in performance, critical systems such as the Cyclotron and the animal fan should receive much lower chilled water temperatures.
- The AC Shop continues to refine our functional reorganization plan to meet the University's 21st century HVAC needs. We have implemented areas of focus within shops to create a chiller crew and a hot-and-cold crew. This reduced distractions and "yo-yoing" where technicians responsible for entire areas and buildings were being compelled by emergencies to drop low urgency tasks, important in the long-term, in favor of relatively less important but far more urgent complaints. Staff in these crews zero in to their assigned work with significantly increased effectiveness. We are counting upon this approach to yield further dividends as we proceed in the coming years.
- Allocation of dedicated Work Control staff particularly familiar with the ins and outs of HVAC work has improved flow of information back and forth between POCC and the technicians. Fewer confused or inexplicable work requests save technician's time, and increase the probability the customer's actual complaint will be addressed. Better feedback through the Work Control coordinator similarly increases the likelihood that the technician's response will actually be useful to the customer. This not only ensures more information makes it back into FMS, but also minimizes time and effort the technician must expend meeting recordkeeping requirements.

HVAC Controls

The Controls Shop is comprised of one Foreman, one HVAC Field Service Technician, four Steamfitters and fourteen HVAC Control Specialists.

The Controls Shop installs and maintains the Direct Digital Control systems (DDC) in all of the general fund buildings on the Ann Arbor Campus and in most of the non general fund building that have DDC.

Direct Digital Control Panel

The Energy Conservation Outreach (ECO) program is a large part of the Controls Shop responsibilities. The Control Shop is responsible for the building tune-up portion of the program:

- Complete tune-up of building HVAC systems which includes operational testing of:
  - Pneumatic, DDC, electric, and electronic controls.
- Dampers, humidifiers, heating and cooling valves, heating and cooling coils, heat exchangers, supply fans, return fans, exhaust fans.
- Room controls.

- Testing and maintenance of the steam, hot water and chilled water distribution systems which includes the following:
  - Testing of valves and steam traps.
  - Repair or replacement of the valves and traps depending on the results of the testing.

The maintenance and reading of the steam condensate meters is vital to the proper billing of utility charges to University Buildings:
- Accurate reading of 200 steam condensate meters throughout the central, athletic and the medical campus.
- Analysis of monthly readouts to determine proper functioning of metering systems.
- Preventive maintenance and repair of metering systems.
- Testing and research into new technologies of steam metering devices.
- Preparation of monthly reports for the Utilities Department as an aid in the billing process.

During FY 05, two new programs were initiated by Utilities and Plant Engineering and implemented by the Controls Shop:
- Temperature control in animal rooms is critical to providing a healthy and safe environment for research animals. Over one hundred sensors have been installed by the Controls Shop in animal rooms in various research buildings throughout campus. The sensors send temperature information to the Building Automation Systems (BAS) office. BAS monitors the sensors, if the temperature in the animal rooms varies from a predetermined safe zone, staff is called to investigate.
- Water in the utilities tunnels is a potential hazard that can disrupt electrical and communication systems. A new program to install water detection sensors in the tunnel system is being implemented by the Controls Shop. The sensors send alarm information to the BAS office. BAS monitors the water sensors, if water is sensed, an alarm is sent to BAS and staff is called to investigate.

**Highlights:**
- Over 90% of the Controls shop’s new fixed price DDC construction projects came in under budget, which resulted in a small operational surplus for fiscal year 2005.
- The following large DDC construction projects were completed on time and under budget: Dance Studio, Paton Center, Argus 2, Life Science Institute, Palmer Commons, North Campus Chiller Plant, Bentley Library, Rackham and Hill Auditorium renovations.

**Areas of Improvement:**
- To provide improved customer service, shift changes were implemented to provide longer hours of coverage. Staff is now available Monday through Friday from 6:00AM to 4:30PM.
• To improve holiday coverage, Controls Shop staff is now available throughout holiday periods. Coverage is provided through the On-Call program.

**Insulation/Asbestos Abatement Shop**  
**Fred Riecks, Foreman**

The Insulation and Asbestos Abatement Shop is comprised of one Foreman and seven Pipe Coverers.

The Foreman has professional certifications and accreditations related to the management of Asbestos in the following areas:

- Building Inspector
- Management Planner
- Project Designer
- Contractor Supervisor

All of the Journeymen Pipe Coverers have extensive training and certification in the proper work methods of asbestos abatement. They are Contractor/Supervisor certified, which qualifies them to do all aspects of asbestos abatement. The certification requires yearly training by a recognized State Certified Trainer.

The Insulation and Asbestos Abatement Shop provides the following services:

**Insulation:**
- Constant chilled water, hot and cold water, and steam piping temperatures.
- Constant air temperatures in heating, ventilating, and air conditioning ductwork.
- Provides burn protection from hot pipes, ducts, and boilers.
- Eliminates condensation from chilled water and cold water piping and from air conditioning units and their ductwork.

**Asbestos Containment and Control:**
- Removal and disposal of asbestos containing materials i.e.: Floor tile, pipe insulation, ductwork, boilers, plaster, etc.
- Clean up of debris and encapsulation of damaged asbestos.
- Drilling of holes in transite fume hoods, asbestos containing laboratory table tops, floor tile, etc.
- Test sampling of suspect materials for asbestos content.

During FY 05, the department completed the activities described below.

- To improve the insulation and asbestos service needs of The University of Michigan Hospital System during the last quarter of FY 2005, two Pipe Coverers from the Mechanical Systems Insulation and Asbestos Abatement Shop were temporarily transferred to the Hospital Construction Services Group. This temporary transfer provides full time insulation and asbestos abatement coverage for both the Hospital Maintenance Department and the Construction Services Group during peak maintenance periods.
- In addition to benefiting the Hospital’s maintenance activities, the transfer relieved pressure on the Insulation Shop’s general fund budget, which resulted in a year end general fund budget that was nearly balanced.
• Customer safety concerns and federal regulations require a high level of air filtration during asbestos abatement activities. To meet these needs the Insulation Shop continually assesses the performance of new equipment as it becomes available. New, more efficient equipment was purchased in FY 2005 to meet these needs.

**Highlights**

• The Insulation and Asbestos Abatement Shop is especially proud to be involved in a project that provides enhanced safety for the students at The University of Michigan. Working in conjunction with Construction Management the Insulation and Asbestos Abatement Shop is involved in a very important and interesting project to provide smoke and fire alarm systems for several of Housing’s older dormitories. These new safety systems will provide necessary protection for students and staff. Working in coordination with a number of contractors the Asbestos Abatement Crew provides safe penetrations through asbestos laden walls and floors.

![A specialized drill is being used in conjunction with a HEPA filtered collection system that prevents asbestos contamination.](image)

• The Insulation and Asbestos Abatement Shop is heavily involved with the Energy Conservation Outreach (ECO) program at the University of Michigan. Prior to upgrading inefficient energy consuming Heating and Air Conditioning components, the insulation (mostly asbestos containing) must be removed and after the upgrade is complete, non-asbestos containing insulation materials installed. These activities require extensive coordination with various Trades Shops and building occupants.

• The ECO program provides an opportunity for the Insulation & Asbestos Abatement Shop to be involved with energy conservation at the University of Michigan.

**Areas of Improvement**

• Constant monitoring of general fund expenditures forced mid year adjustments, which resulted in a year end budget that was nearly balanced.
• New technology was used to facilitate the removal of asbestos floor tile. The technology eliminates much of the physical strain involved in the removal of the tile, which will result in higher productivity and fewer staff injuries.

**Plumbing Systems**  
*Ivory Sims, Foreman*

The Plumbing Shop is comprised of one Foreman, one Steamfitter, one Apprentice Plumber, three Sanitary & Storm Water Systems Specialists and seven Plumbers.

The Plumbing Systems shop is responsible for:
• The maintenance and repair of the underground water mains, storm and sanitary sewers.
• The management of the high purity water vendor contract.
• The cleaning of obstructed sanitary drains in the all MGF Buildings.
• The operation of the Vactor Truck.
• The installation and repair backflow preventers located on the main water supply to each building.
• The installation, repair and maintenance of plumbing systems, as needed, in all University Buildings.
• The afternoon Plumber, who handles all plumbing service and repair calls between 3:30 PM and 11:00 PM.

During FY 05, the department completed the activities described below.
• Dave Gilbertson, the long time Foreman, of the Plumbing Shop retired on April 1, 2005. Ivory Sims the new Foreman for the Plumbing shop started his new position on August 15, 2005.
• A new Apprentice was brought into the Plumbing Shop. The opening for the Apprentice was created when one of the shops Journeymen Plumber retired. The Apprenticeship Committee was a great help during the selection process. They evaluate apprenticeship candidates from within the University, prior to being selected by individual shops for Trades Apprenticeships.
• New confined space entry equipment was purchased:
  o Complete ventilation system
  o Harnesses
  o Tripod
  o Man handler hoist

The new equipment was necessary to safely enter manholes to service valves, and to perform other cleaning and maintenance activities. In addition to the new equipment all Plumbing Shop Staff received new or refresher confined space training.

**Highlights**
• Filling the open Plumbing Shop’s Foreman’s position was a time consuming task. During the posting and selection process the Plumbing Shop’s business had to go on as usual. During the time without a Foreman, the Plumbing Shop Staff preformed extraordinarily well. Several major water main breaks and sanitary sewer blockages, along with all of the normal day to day work requests were handled professionally and in a timely manner. All of the Shop’s Staff pulled together and helped out whenever and where ever necessary to be sure that our customer’s needs were met without disruption.
• Again this year all of the University’s storm water system, which represents miles of piping, was cleaned twice. In addition to cleaning the system, mosquito larvicide briquettes were installed in each of the system catch basins. The purpose the larvicide is to kill mosquitoes, which in turn reduces the risk of West Nile Virus to the University Community.

• At times water main breaks can create spectacular disruptions.

[Image of water main break on North Campus]

Water Main Break On North Campus

Areas of Improvement

• Exercising the curb valves through which building supply water flows was a Best Practices initiative several years ago. Unfortunately, due other pressing needs in the Plumbing Shop, this valuable program got off track. Improvements were made to reinitiate the program in FY 2005 and will continue into FY 2006.

• Communication between Trades Staff and the front line Foreman although good in the past, was a focus of attention in FY 2005. We worked toward improving communication in the following areas:
  o Shop policies and procedures.
  o Making staff aware of shop budget line items for:
    ▪ Tools
    ▪ Supplies
    ▪ Training
Steamfitting and Pump Systems  Ken Easley, Foreman

The Steamfitting and Pump Shop is comprised of one Foreman, fourteen Journeyman Steamfitters and two Apprentice Steamfitters. The Shop’s Steamfitters are divided into two working groups: Steamfitting and Pump maintenance.

Steamfitters

- Installation and maintenance of radiators, fan coils, steam traps, steam valves, and high and low pressure steam systems.
- Steam heating coils and condensate receivers (air and steam).
- Installation of steam ovens, autoclaves, steam tables, etc.
- Maintain and install gas lines, air lines, steam and condensate mains, and branch lines, etc.
- Installing condensate receivers (air and steam).

Pumps

- Installation, repair, and replace vacuum pumps, chilled water pumps, sump pumps, sewage ejector pumps, hot water heating pumps, all circulating pumps, DI system pumps.
- Install & repair air compressors.
- Repair steam condensate pumps, air drives included.
- Repair of pump seals, flanges, and gaskets.

Fiscal year 2005 bought a number of new and interesting developments to the Steamfitting and Pump Repair Shop:

- A new Apprentice was brought into the Steamfitting and Pump repair Shop. The quality of our new Apprentice continues to impress his Foreman and the Journeymen. A lot of credit for this goes to the Apprenticeship Committee that evaluates apprenticeship candidates from within the University, prior to being selected for apprenticeships.
- Two new arc welding machines were purchased. The advantage is that they are 115 volt machines. Previous welders used by the Steamfitting Shop were 220 volts, which require an Electrician to wire the machines at each site before welding could proceed. The new welders have saved Electricians’ cost, that in the past were charged to welding projects.
- A centrally located mini welding fabrication shop was created in the basement of the Modern Languages Building. An extraordinarily efficient portable exhaust system is located in the fabrication shop to prevent welding fumes from entering the building. This centrally located small shop has saved many hours of Steamfitter labor.

Highlights

- Valuable technical repair and maintenance training for vacuum pumps was provided by Professional Pump Inc. The training covered all aspects of installation, operation and service maintenance for vacuum pumps. The staff was enthusiastic about this on site training seminar. The benefits of the training will be increased staff proficiency, which will lead to reduced labor cost to maintain and service these important pumping systems.
- The Steamfitting Shop replaced the original domestic cold water booster pumps that have been failing for several years at the Institute of Social Research Building. These pumps are necessary to supply sufficient pressure to the upper floors of the building. The new pumps are equipped with variable speed drives that are very energy efficient. The project has provided electrical cost savings and increased the reliability of water supply to the air
conditioning systems cooling tower on the roof, which is necessary for reliable cooling for the building.

- The Steamfitting Shop implemented an important cost saving project at the Med. Sci. One Building. The project was engineered by the Utilities and Plant Engineering Department. The project involved installing circulation pumps on several chilled water coils, which are located in fan systems that provide 100% fresh outside air to the building. The pumps are installed and designed to prevent the water in the coils from freezing and breaking the coils, which has been a serious problem in the past. This project will save the Mechanical Systems Department a great deal of time and material replacing coils, but more importantly save the occupants of the building lost time and productivity.

Pump Installation

Areas of Improvement

- Approved vendors that supply materials to the Steamfitting Shop are now being invited to the Shop’s monthly safety and informational meetings. The Vendors are providing valuable product information to the all of the Steamfitting Staff. This product information is increasingly being applied to improve the outcome of our maintenance activities on Campus.
- Improved communications between the Steamfitting Shop and Utilities and Plant Engineering has resulted in more effective implementation of engineered projects. The improved communication results in: reducing material and labor costs, and timely completion of projects.
1988 Chemistry Exhaust Fan w/200 hp motor


**Introduction**

Fiscal year 2005 was extremely challenging as the third straight year of general fund budget cuts took effect. Both the campus facilities and our customers’ desire for increased levels of service continue to grow. Educating the University community of our goals and limitations in facilities management is a growing part of our improved communication effort.

The Roofs, Metal Shops & Elevators enterprise consists of the Roofing Shop, Sheetmetal Shop, Weld Shop, Machine Shop, Millwright Shop and the Elevator Shop. We are a team within Facilities Maintenance in Plant Operations working together to support the mission of the University.

The U of M Elevator Shop is one of the largest private elevator service shops in the country, with eleven licensed mechanics and is responsible for over 400 pieces of vertical transportation equipment across campus. The shop administration manages the Hospital elevator maintenance contract using an external vendor. Staff performs construction plan and specification review for all of the Ann Arbor campus projects, acting as the in-house consultant for the University. Flint and Dearborn campuses receive similar consultation services as customer pay work.

The Roofing Shop manages over 4 million square feet of general fund roofing surface in addition to many other auxiliary building roofs on campus. Housing, Athletics, the Hospital and other auxiliary departments obtain roofing services on a limited basis. Much of this “customer pay” repair work is sent to outside contractors although the Roofing Shop usually oversees the work. All new roof and re-roof projects are handled by outside contractors with the Roofing Shop inspecting the work for conformance to codes, regulations, and University specifications. This shop also does customer pay roof plan and specification review for Flint and Dearborn campus projects.

The Sheetmetal Shop, Weld Shop, and Machine Shop all work to maintain, repair, or fabricate almost anything imaginable from metals. Work includes metal roof repairs, gutters, ductwork, hand rails and cat walks. Occasionally we make prototype parts for a researcher with an idea, repair hospital surgery tools, and fabricate obsolete parts for elevator component repairs.

The Millwright Shop repairs and assembles all sorts of equipment and components from fans to keyboard trays to office partitions. The Employees Working Out of Classification (EWOC) program is for Building Services staff to work in other shops and take educational classes for potential upgrades. The Millwright shop sponsors a portion of this program with six-month rotations of four or five people learning maintenance and repair skills. The Window Air Conditioner Maintenance Program is a very successful, customer pay service performed by the EWOCs in the spring and summer months. This assignment provides EWOCs with hands-on experience with equipment and is an excellent opportunity for this group to build their customer service skills.

The Roofs, Metal Shops & Elevators group of Facilities Maintenance continues to focus on increased efficiencies for our work processes. A Work Control & Project Coordinator was hired this year to improve the work process flow as well as increase inner shop and customer communications. This position was reallocated from another staff member retirement.
The department successfully implemented previously established business plan goals that included a customer communication “hang tag” for each shop. These “hang tags” were originally developed for the Roofing shop in FY 04. Based on enthusiastic customer response, the department expanded the hang tag program for the remaining shops. Customers appreciate knowing the status of their projects when a face-to-face “we’re done” or “when we will return” is not possible.

Each shop now has their own mission statement in relation to Plant Operations’ goals and the University mission.

Dennis Krieg
General Foreman

Roofs, Metal Shops & Elevators Organization Chart
FY 05 Financial Summary

General Fund

<table>
<thead>
<tr>
<th>Beginning</th>
<th>Ending</th>
<th>Remaining</th>
<th>Under/Over</th>
</tr>
</thead>
<tbody>
<tr>
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<td>$3,400,555</td>
<td>($223,965)</td>
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<tr>
<td>Material</td>
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<td>$657,879</td>
<td>$324,929</td>
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<tr>
<td>Total</td>
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<td>$4,058,434</td>
<td>$100,964</td>
</tr>
</tbody>
</table>

Roofs, Metal Shops & Elevators is made up of six shops including Roofing, Sheetmetal, Welding, Machine Shop, Machine Repair (Millwrights), and the Elevator Shop.

This group finished the year with a General Fund surplus of $100,964, which helped to cover some of the Facilities Maintenance overdraft. There were three major areas of contribution to the surplus.

The Millwrights and Elevator Mechanics worked nearly 500 fewer overtime hours than in the past. As a result, the department had an unexpected budget savings of $40,000. While this was an unanticipated reduction in FY 05 labor expenditures, it is unlikely that this will occur again during FY 06 based on historical maintenance data.

The sheetmetal shop and the millwrights purchased nearly $65,000 less in materials than originally budgeted. Some building equipment replacements were deferred to projects through Plant Engineering over the $20,000 threshold. Cooling tower repairs were minimal this year, as two of the three cooling tower problems were newer motors that failed and were covered under manufacturer warranty replacement.

New space funding of $77,368 was received. This additional amount nearly balanced the budget cuts for this year of $83,000 even though we now have additional space to maintain.

Year-End Operational Highlights

Elevator Shop

Mission statement: The Elevator Shop strives to maintain and repair vertical transportation equipment, while providing immediate response to community requests in order to maintain safe and reliable operation for the students, faculty, staff and guests of the University of Michigan.

We support our mission by:

- Providing top-notch preventive maintenance on the equipment for which we are responsible.
- Performing repairs in a proficient, expedient manner.
- Responding IMMEDIATELY to any emergency situation.
- Addressing customer concerns in a professional, timely manner.
- Adhering to the rules and codes promulgated by our governing authorities.
• Being a resource of elevator and escalator information with Plant Department and the University community.

During FY 04, the elevator mechanics began using Personal Digital Assistants [PDA’s] to simplify the transfer of information to and from our Facility Management System [FMS]. The information flow proved to be too much for the limited memory size of the PDA’s and the units were returned to Network Services after a frustrating pilot period. New PDA’s with significantly greater memory are now in the trial stage with two mechanics. The PDA issues greatly reduced the labor hours available to complete preventive maintenance. In the coming year, the department will place a greater emphasis on completing more preventive maintenance activities.

Highlights of FY 05 included the replacement of two elevators at Medical Science II, greatly increasing service and reliability to the facility. The Elevator Shop completed the Elevator Replacement Model report. The group analyzed the number and ages of existing elevating devices in general fund and auxiliary buildings on campus and provided its recommendations. In the report, they proposed to establish annual equipment replacement budgets before equipment fails due to age or obsolescence.

During FY 05, construction of the 202 Thayer Building was on a fast track for completion. The original plan was for an outside elevator contractor to install the least expensive elevator equipment within the “fast track” time frame. Costs analysis showed the contractor maintenance and equipment costs would quickly surpass the cost of installing and maintaining the U of M “standard” elevator package.

Areas of Improvement
Two years ago the Elevator Shop was directed to install 64 new emergency phones in general fund building elevators. The emergency phone is necessary for entrapped passengers to contact the Department of Public Safety for assistance in extraction from the stopped elevator car. Code requires the phone function properly if installed. The additional monthly testing is estimated to cost the shop $57,266 per year. Funding for this initiative has been requested in each of the last two years without success. The testing and repairs must still occur to maintain reliability of the emergency system and to avoid the Elevator Inspector writing a correction order against the elevator. The shop developed new work codes to better track the actual costs. The Elevator Shop finished the general fund budget year with a deficit of $101,599.

**Machine Repair Shop**

Mission Statement: To maintain comfortable and efficient environment/facilities for the students, faculty, staff and researchers of The University of Michigan.

The Machine Repair Shop provides the following services to the University community:

• Maintain and repair all types of fans
  o Supply fans.
  o Exhaust fans.
  o Return fans.
  o Fume hoods.
  o Cooling tower fans.
• Troubleshoot, repair and replace electric motors.
• Repair cooling towers.

_**Ed Wilson, Foreman**_
• Office furniture and equipment installation & repair.
• Repair auditorium and classroom seating.
• Repair window springs, latches, and handles, etc.
• Repair and replace loading docks.
• Lockers repaired.
• Mechanical blackboards and projection screens repaired.
• Window air conditioner maintenance program.

Lee Miller retired from the Millwright Foreman position after 35 years of University service. Ed Wilson, a millwright for 18 years was promoted to the foreman position.

The Electric Shops generated additional customer pay work for the EWOCs, through cleaning substations and labeling outside light poles with street visible identification numbers.

The annual window air conditioner cleaning program was another success, although many units in the Public Health I building are no longer in the program due to the building’s renovation.

The EWOCs also assisted the roofers cleaning leaves from roof drains and gutters on most campus buildings. There is a very short time span, usually about six weeks, to do this work after the leaves have fallen and before freezing temperatures.

Areas of Improvement
The department will analyze the work load and staffing level in this shop next year to determine proper staffing levels. The department will explore bringing fan balancing activities instead of using outside vendors to provide this service. Budget and training issues will also be evaluated during FY 06.

Roofing Shop John McCallum, Foreman
The mission of the Roofing Shop is to repair, maintain and replace roofing systems to provide a watertight environment for safety and comfort of the students, faculty and staff of the University of Michigan.

We provide complete roofing services consisting of:
• Repairs to any type of roof system.
• Re-roofs from tear-offs to recovers.
• New roofs of any type (shingles, slate, tile, rubber, metal, built up, single ply’s of any type, etc.).
• Inspection service for existing roof condition, survey included, during construction inspection of new work and re-roofs.
• Survey includes present condition, test cut information of the system, deck type and building roofing history.
• Water proofing above or below grade as well as inside building.
• Installation of new mechanical units on existing roofs.
• Cleaning of roof drains, roof gutters, and downspouts prior to the winter season.

An extensive Roof Replacement Model for all general fund buildings was completed showing all roof installation dates, square footage, roof type, projected life expectancy and projected replacement cost in today’s dollars. As the top priority roofs are replaced, their place on the list
moves to the bottom to work their way back up again when projected and practical life expectancy runs out.

The model needs to be adjusted periodically. Roof status changes due to construction projects and roof top equipment maintenance traffic. Our recurring survey process and findings will feed directly into this new model.

The work load for new construction roof installation inspections increased this year. The Roofing Shop is contracted by Construction Management to inspect the installation process ensuring compliance with University specifications.

Purchase orders to outside roofing contractors increased from $100,000 last year to over $150,000 this year. This work covers repairs to roofs that we can not complete in-house in a timely fashion.

The 1988 Chemistry building was re-roofed this summer. It was not a priority 1 for replacement this year, although the roof was at its life expectancy. Three years ago the University was notified of a nationwide class action law suit regarding phenolic foam roof insulation installed during the construction of the building. When the insulation comes in contact with water, an acid forms and attacks the metal roof deck. Deterioration of the metal deck is not visible. Roof leaks are not necessarily spotted immediately. Leaks can linger with water trapped in walls or other non-visible areas.

Major deterioration was uncovered during the re-roofing process. Left unrepaired, the deck would eventually have become unsafe to walk upon. Test cuts did not reveal the extent of the hidden damage.

The class action settlement paid to remediate the damaged portions of the metal roof deck, although the University paid for the new roof. About two hundred square feet of roof deck was replaced due to major deterioration. Most of the remainder of the metal deck was cleaned and coated with new metal primer where treatable corrosion was found.

Areas of Improvement
This department is focusing on doing more in the way of preventive maintenance since most all roofs on campus must be maintained many years past their expected life expectancy.

The roof inspection program needs to be increased to a true preventive maintenance process as opposed to the mostly reactive program in place now.

Today’s estimated roof values exceed $80 million just on general fund buildings. It is essential an appropriately funded roof replacement program be put in place to ensure dry facility interiors for the campus community.

Sheetmetal Shop

Ralph Rose, Foreman
Mission Statement: The Sheetmetal Shop supports Facilities Maintenance and Plant Operations in providing the University community with the highest quality customer service and superior craftsmanship to maintain a safe and comfortable physical environment.

**Heating Service**
- Install and service gas fired forced air furnaces and heating units.
- Install and service gas fired water heaters

**Sheetmetal Shop**
- Precision CAD-CAM sheetmetal fabrication and installation
- Fabricate, install or repair architectural, structural or ornamental ferrous and non-ferrous metals such as: duct work, grills, louvers, dampers, machine guards, gutters, flashing, tanks, cabinets, boxes, ventilators, window air conditioners, filter housings, roof vents, sinks, lab hoods, shelving, light fixtures, specialty medical equipment or anything made out of metal.

Preventive maintenance work requests and reporting processes are now in place through FMS for gas fired furnaces and roof top heaters. Preventive maintenance has always been performed but not assigned and tracked as it is now. In FY 05, the Sheetmetal Shop received 166 work requests, completed 132 resulting in a completion rate of 79.5%.

Customer pay work in the Sheetmetal Shop increased over $100,000 this year while the general fund work remained steady.

Fixed price work contributed over $112,000 worth of work with a positive margin of $12,905. The margin will help to reduce the shop recharge rates for FY 06.

**Areas of Improvement**
Service timing issues with heater preventive maintenance are being worked out with the shop and the PM team in Work Control so we can better identify potential problems before the heating season begins. We are looking closely at the work load versus staffing level in this area now that we have a better reporting mechanism.

A roof top heating unit replacement model is being developed similar to the models for roof and elevator replacement in general funded buildings. Several hundred units exist costing between $15,000 and $25,000 each to replace. Getting a handle on all installation dates is one of the greatest challenges for the furnace model to be effective in forecasting future change-outs and annual budget projections/allocations.

**Weld Shop**

**Randall Ramsey, Foreman**
Mission Statement: The Weld Shop’s mission is to maintain and improve a safe and efficient environment for the campus community area through specialized projects and needs in all aspects of metal fabrication.

**Weld Shop**
- Provide assistance in design and fabrication for prototype or research projects and specialty items
• Repair or replace all interior and exterior metals as needed due to damage, weather or wear
• Repair, reconstruct or fabricate kitchen or medical equipment
• Install rigging beams and walkways to aid in gaining or improving access

**Machine Shop**
• Design and fabricate metal and plastic precision and specialty parts and machinery components such as:
  o Student solar car project
  o Student future car project
  o Historical or obsolete components as in the Burton Bell Tower clock mechanisms and the Observatory telescope restoration

Tom Harrison, University welder since 1987, retired. The open position is one of this year’s budget reductions.

A major project was the installation of beams and rigging in the Life Sciences Initiative mechanical room and emergency generator area to facilitate maintenance and repair of the equipment. This was not included in the building project.

A similar project was incorporated at the Hospital. Beams were added over the chiller turbines in the main mechanical room to facilitate maintenance and repairs.

**Areas of Improvement**
The Weld Shop has established two business plan goals for FY 06. The first is to increase the expertise and certification credentials of the staff by conducting a skills inventory and identifying training needs. The second goal involves evaluating workload as compared to staffing levels.
Plant Operations
Facilities Maintenance-Training

FY 2005 Annual Report

Published: September 30, 2005

Hands-on Training for Department Employees
Introduction

It has been a challenging but rewarding year for the Facilities Maintenance Training & Apprenticeship program. In June 2004, the Training & Apprenticeship Coordinator was asked to serve as the Interim Manager of Plant Academy, and he remained in that position throughout the fiscal year. At the same time, he retained responsibility for the FM Training & Apprenticeship function. This dual assignment presented challenges to providing the level of services required by both units. However, it also provided opportunities for greater collaboration between the departments.

An example of this collaboration is the National Electric Code update training provided in conjunction with Plant Academy for a multi-departmental client base. Other major training initiatives were undertaken by the HVAC shops and the Sheetmetal shops, just to name a few.

Facilities Maintenance has taken a leading role in the project to select and develop a unified training tracking database for all of Plant Operations. A team has been charged with developing a comprehensive Training Administration Compliance System (TACS). The team has been customizing and populating a web-based, computerized learning management system called LearnerWeb, to be rolled out in FY 2006. This project is discussed in more detail in the “Year-End Operational Highlights” section.

The Skilled Trades Apprenticeship program remains robust. Six apprentices reached journeyperson status this year, and five new apprentices were added to the program. At year’s end, we have 18 apprentices, and anticipate 3 more in the 1st quarter of FY 2006. In addition, we are expecting to receive additional revenues to support more apprentice appointments to meet needs anticipated by projected retirements of skilled trades’ workers in the near future.

Tom Sullivan
Training Coordinator
Facilities Maintenance Training Organization Chart

FY 05 Financial Summary

The Facilities Maintenance Training operations budget is comprised primarily of salaries and benefits for the Training & Apprenticeship Coordinator, the part-time Training Specialist Associate, a portion of the OSEH representative’s compensation for safety training services, and the labor costs of employees attending the Facilities Maintenance Safety Committee and the Joint Apprenticeship Committee meetings and selection interview panels.

Expenditures ($138,221) exceeded the budget ($117,840) for a variance of $20,381. This variance was due to the addition of the part-time Training Specialist Associate; a temporary salary increase for the Training Coordinator for assuming the Interim Plant Academy Manager’s position; and greater than anticipated internal labor rebilling for the Joint Apprenticeship Committee and the FM Safety Committee participation.

However, any budget shortfall was more than offset by allowing Plant Operations to not fill the Plant Academy Manager position throughout the fiscal year. For FY 2006, we anticipate increased revenue by rebilling the Hospital Facilities Maintenance service contract for 20% of the Training & Apprenticeship Coordinator’s salary.
Year-End Operational Highlights

Training & Apprenticeships  Tom Sullivan, Training Specialist Senior
Facilities Maintenance Training is a small unit, comprised of one full-time Training Specialist Senior. In November 2004, we reached an agreement with Building Services to share the services of a Training Specialist Associate through a split assignment. Her appointment supports Building Services (40%), TACS project (40%), and Facilities Maintenance Training (20%).

Apprenticeship Program

Plant Operations has identified the replacement of journeypersons with apprentices as a potential area for meeting budget reductions, as apprentices earn a graduated percentage of the journeyperson rate. This year, the Joint Apprenticeship Committee (JAC) interviewed 49 candidates for apprenticeships in a recently adopted program to streamline the selection process by having one annual posting period rather than separate postings for each opening. This change has resulted in significant savings in time and costs for the selection committee.

Over the last several years, the Apprenticeship Program has participated in a groundbreaking effort in conjunction with the IBEW Local 252 and the UA Local 190 to provide the classroom training of our electrical, plumbing, steam fitting, and HVAC apprentices. These two locals are widely recognized as premier programs in the country for the quality of their apprentice training schools. These arrangements with the Locals’ training facilities have strong support of foremen, inspectors, and tradespersons who recognize the ability of these programs to provide training that is highly specific to each trade.

There were a few changes in the composition of the Joint Apprenticeship Committee. Mike Gaubatz of Construction Services joined the committee to fill the place vacated by Tom Maschke. In October, elections of the bargained-for Committee members were held. One new committee member, Kyle McClure, was elected to replace Jeff Erskine, who did not seek re-election.

During FY 2005, six apprentices completed the program and received promotions to Journeyperson status. This is an unusually large graduating group. These six highly-skilled tradespersons have proven their abilities during the course of their apprenticeships, and we expect that they will make great contributions in their respective crafts over the course of their careers. The apprentice graduates are:

<table>
<thead>
<tr>
<th>Graduating Apprentice</th>
<th>Trade</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bradley Greenfield</td>
<td>Steamfitter</td>
<td>Facilities Maintenance</td>
</tr>
<tr>
<td>Richard Lewis</td>
<td>Steamfitter</td>
<td>Facilities Maintenance</td>
</tr>
<tr>
<td>Keith O’Neil</td>
<td>Welder</td>
<td>Facilities Maintenance</td>
</tr>
<tr>
<td>Tom Hunget</td>
<td>HVAC Mechanic</td>
<td>Hospital Facilities Maintenance</td>
</tr>
<tr>
<td>David Hawks</td>
<td>Carpenter</td>
<td>Construction Services</td>
</tr>
<tr>
<td>Jason Miller</td>
<td>Plasterer</td>
<td>Construction Services</td>
</tr>
</tbody>
</table>
Five new apprentices were added. They are:

<table>
<thead>
<tr>
<th>New Apprentice</th>
<th>Trade</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ben Zick</td>
<td>Electrical</td>
<td>Construction Services</td>
</tr>
<tr>
<td>Sarah Morden</td>
<td>Electrical</td>
<td>Construction Services</td>
</tr>
<tr>
<td>Tom Baldwin</td>
<td>Plumber</td>
<td>Facilities Maintenance</td>
</tr>
<tr>
<td>Kevin Bordine</td>
<td>Steamfitter</td>
<td>Facilities Maintenance</td>
</tr>
<tr>
<td>Bruce Everard</td>
<td>Steamfitter</td>
<td>Utilities &amp; Plant Engineering</td>
</tr>
</tbody>
</table>

After accounting for graduations and new hires, there were 18 active apprentices at the close of FY 2005, a very respectable number considering the large graduating class. Two new electrical and one carpenter apprentices are due to start in the 1st quarter FY 2006, which will bring us to a new peak of 21 since a relative low of 12 active apprentices at the end of FY 2002. In addition, we are expecting to receive additional revenues to support more apprentice appointments to meet needs anticipated by projected retirements of skilled trades’ workers.

Other Training Programs

Because of ever-changing technology and the increased complexity of building systems, technical training sessions are frequent and too numerous to mention here. However, there were several major training efforts across a wide variety of shops and specializations this year that are noteworthy of the types of training provided.

Major Training Effort for HVAC Shops

This year, the staff of the Campus and Hospital HVAC shops had a great opportunity to update their skills. With the recent merger of our Steam Absorption and Mechanical AC mechanics into one new classification, there was a great need to get all of our AC mechanics fully versed and certified in the maintenance and operation of chillers and the use of the newer chiller control systems.

The first course, *Refrigeration Fundamentals & EPA Certification*, was a five-day course held in July, covering foundational principles and including the EPA Certification exam. In August, the HVAC mechanics received *CentraVac Operation & Maintenance and Chiller Controls*, a four-day session focusing on centrifugal chillers, and chiller controls, logic and architecture.

The training was provided for both the Central Campus and Hospital HVAC shops to maximize class size and reduce costs per person. It is expected that this training will result in a better-rounded and versatile corps of mechanics that will be better able to service the HVAC needs of the University community.
HVAC mechanics received hands-on instruction in Refrigeration Fundamentals and EPA Certification from instructor Elmer Franklin.

**National Electric Code Update Classes**
The NEC 2002 Electrical Code was adopted in 2004, requiring electricians to receive 15 hours of code update training for renewal of the Journeyman and Master’s licenses. Facilities Maintenance Training collaborated with Plant Academy to arrange the training for the more than 120 electricians, engineers, architects, and inspectors from Plant Operations, Plant Extension, Housing, and the Dearborn Campus, who benefited from the convenience afforded by holding these courses on site at the Kipke Conference Center. Thanks go out to the Plant Academy staffers Ben Liem, Irena Milenkova, and Anna Balhoff for their assistance in arranging and supporting these 15 evenings of classes for our multi-departmental customer base.

Hundreds of changes in the code were covered. Some of the most notable ones included:

- Code reorganization and metric measures & designators.
- Grounding & bonding of services of equipment.
- Circuit breaker developments.
- GFCIs, AFCIs, and LDCIs.
- Required receptacles.
- Abandoned low-voltage cables.
- Motor fuel dispensing.
- Work place safety.
  - Arc-flash protection.
  - Motor circuit disconnects.
- New items:
  - Transient voltage surge suppressors.
  - Fuel cell systems.

**Sheetmetal Shop Training**
In November and again in May, the Sheetmetal Shop provided Variable Air Volume (VAV) Systems training for 19 of their staff. In addition, select mechanics received training in Electrical Troubleshooting, Schematics & Wiring diagrams, Variable Frequency Drives, Intellipak Packaged Rooftops, and Voyager & Precedent Packaged Rooftops.
BOMI Certification

Dave Beurer, Work Control and Project Coordinator for the Mechanical Systems shops, completed the requirements to obtain the Systems Maintenance Administrator (SMA) designation by the Building Owners and Managers Institute (BOMI). The BOMI Institute is an internationally recognized leader in commercial property education.

The SMA certification requires the completion of three courses over and above the Systems Maintenance Technician designation. These three courses address broad issues of concern to systems administrators:

- Administration.
- Building Design and Maintenance.
- Environmental Health and Safety Issues.

Dave said that the knowledge of systems and their components acquired by taking the BOMI courses allows him to give customers more accurate estimates of time frames for repairs. “I can give the customer a better description of the problem and what is required to repair it when I understand how the system works”.

MECH Certification Testing Program

We continue to proctor bi-annually the Michigan Education and Certification for Healthcare exams for the Hospital Maintenance staff. Several employees had passed this certification just prior to this fiscal year; however, no staff members passed the exam at the mid-year administration. The next administration of the exam is during the 1st quarter of FY 2006.

Training Administration & Compliance System Project

The Facilities Maintenance Training function has maintained a leadership role in the Training Administration & Compliance System (TACS) project. The Training & Apprenticeship Coordinator continued serving as one of the System Administrators and as a TACS representative. This project has been tasked with developing a web-based learning management system for Plant Operations Employees in order to help supervisors identify and prioritize training needs, in order to more effectively allocate training resources and ensure compliance with regulatory training requirements. The end product will allow training to be targeted to the knowledge and skills required for competent job performance.

This year we completed the purchase of the software and are working with the developer on customizations. In addition, we have established an automated feed from the FMS HR database, and developed training for the Plant Operations supervisors. In November, the new part-time Training Specialist Associate joined in the effort as a TACS team member, and took over major responsibilities for data entry and for cleansing of legacy data. Training of supervisory staff will commence in the first quarter of FY 2006.
Norm Oleski and John Hellner perform Preventive Maintenance on a chilled water pump.
Introduction

Zones truly experienced a year of growth and change during FY 2005. The addition of a new Fire Extinguisher Inspection Department, the transfer of the Electronics Alarms and Radio Shop, and the anticipation of adding two additional Zones - one on North Campus, and one on Central Campus - were just a few of the changes and challenges.

By December 31, 2005, construction of BSRB and the Undergraduate Science Building will be complete. The department will then launch the preventive and corrective maintenance programs for those facilities.

Even with the new space dollars, the previous year’s budget cuts will place added pressure on individual Zone Shops to find new methods of maximizing the work effort and maintain the level of preventive maintenance and corrective repairs response time that our customers have come to expect.

The areas for improvement in all Zone Shops took several different forms this fiscal year. For the first time in the history of a new construction project we were funded by the project to do a complete inspection of the facility before Substantial Completion, and before the contractors leave the site. This will help resolve most of the preventive and corrective repair issues before we accept the building as complete and complement the University’s efforts in commissioning projects.

We will also improve communications within the Zone by providing a monthly newsletter highlighting pertinent news that impacts Zone personnel. All Zone Foremen will develop plans to help equalize the work loads between mechanics in each Zone.

Jim Almashy
Business Manager
Zone Maintenance Organization Chart

Facilities Maintenance

Zone Maintenance

Chemistry Zone

Fire Extinguisher Shop

LS&A Zone

North Campus Zone

Off Site Zone

SPH Zone

Electrical Alarms & Radio Shops

Life Science Zone*

Medical Zone

North Campus Zone 11*

South Campus Zone

* New Shops in FY 06
FY 05 Financial Summary

General Fund

The budget for FY 05 for the Zones ended with somewhat of a mystery. The Zones were under budget for the entire year until May 2005 when the tables turned and a negative margin created. We have identified two causes for the shortfall. The first was the loss of all customer pay work at Electrical Engineering and Computer Science [EECS] because of their anticipation of moving in to a new facility. The second was the continued need for overtime in the Med Zone.

The Alarm Shop was over budget for much of FY 05 and it will be a challenge this fiscal year to keep General Fund costs down. One reduction this year will be found through working with the Extinguisher Inspection Department to capture customer pay work related to inspection of cooking hood extinguishing systems throughout the campus. The plumbing group within the department will also be used to support the Zone Shops when customer pay work is available. Fifty percent of the Mechanical Alarm Shop effort will start this fiscal year by working with the Utilities Department to complete the water meter project. Efforts like this will help alleviate our prior year budget shortfall. Even with additional new space dollars and not increasing staffing, budget cuts from previous years will make management of the Alarm Shop budget the greatest challenge for FY 2006.

<table>
<thead>
<tr>
<th>FM Zone Maintenance Shops</th>
<th>General Fund Shop Budget Report FY 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beginning Budget</td>
</tr>
<tr>
<td>Labor</td>
<td>5,888,342</td>
</tr>
<tr>
<td>Material</td>
<td>1,490,769</td>
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<tr>
<td>Total</td>
<td>7,379,111</td>
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</table>

Year-End Operational Highlights

This fiscal year the Zones were issued 24,279 preventive maintenance [PM] work orders. The group collectively completed 87% of the work assigned. Both South Campus and School of Public Health (SPH) Zones completed 97% and 98% of the PM work assigned.

The Zones were also issued 29,688 corrective work orders and completed 89% of them. The Zones finished the year $51,000 over budget. As indicated earlier we were projected to be $81,000 under budget in May. In review of each shop, the biggest impact on Zones was the elimination of customer pay from EECS. That department has halted all their projects anticipating a new building in the near future. Several highlights occurred this year, and are addressed in detail in the following Zone Shop reports.
### Campus Corrective Completion Percentages
*(Fiscal Year 2005)*

<table>
<thead>
<tr>
<th>FY 2005</th>
<th>W.R.'s Issued:</th>
<th>Cancelled:</th>
<th>Not Completed:</th>
<th>Incomplete:</th>
<th>Completed:</th>
<th>% Complete:</th>
</tr>
</thead>
<tbody>
<tr>
<td>M2100</td>
<td>5,078</td>
<td>145</td>
<td>58</td>
<td>596</td>
<td>4,279</td>
<td>86.74</td>
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<tr>
<td>M2200</td>
<td>5,906</td>
<td>123</td>
<td>13</td>
<td>620</td>
<td>5,150</td>
<td>89.05</td>
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<tr>
<td>M2300</td>
<td>7,390</td>
<td>200</td>
<td>39</td>
<td>907</td>
<td>6,244</td>
<td>86.84</td>
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<tr>
<td>M2400</td>
<td>4,549</td>
<td>137</td>
<td>4</td>
<td>498</td>
<td>3,910</td>
<td>86.62</td>
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<tr>
<td>M2500</td>
<td>3,938</td>
<td>137</td>
<td>7</td>
<td>254</td>
<td>3,540</td>
<td>93.13</td>
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<tr>
<td>M2600</td>
<td>4,186</td>
<td>95</td>
<td>58</td>
<td>693</td>
<td>3,340</td>
<td>81.64</td>
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<tr>
<td></td>
<td>31,047</td>
<td>837</td>
<td>179</td>
<td>3,568</td>
<td>26,463</td>
<td>87.67</td>
</tr>
</tbody>
</table>

### Campus PM Completion Percentages
*(Fiscal Year 2005)*

<table>
<thead>
<tr>
<th>FY 2005</th>
<th>W.R.'s Issued:</th>
<th>Cancelled:</th>
<th>Not Completed:</th>
<th>Incomplete:</th>
<th>Completed:</th>
<th>% Complete:</th>
</tr>
</thead>
<tbody>
<tr>
<td>M2100</td>
<td>3,626</td>
<td>60</td>
<td>22</td>
<td>83</td>
<td>3,460</td>
<td>97.03</td>
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<tr>
<td>M2200</td>
<td>6,256</td>
<td>112</td>
<td>175</td>
<td>785</td>
<td>5,200</td>
<td>84.64</td>
</tr>
<tr>
<td>M2300</td>
<td>3,402</td>
<td>62</td>
<td>12</td>
<td>331</td>
<td>2,997</td>
<td>89.73</td>
</tr>
<tr>
<td>M2400</td>
<td>3,698</td>
<td>33</td>
<td>0</td>
<td>70</td>
<td>3,604</td>
<td>93.34</td>
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<tr>
<td>M2500</td>
<td>3,547</td>
<td>10</td>
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<td>3,438</td>
<td>97.20</td>
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<tr>
<td>M2600</td>
<td>3,750</td>
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<td>950</td>
<td>339</td>
<td>2,371</td>
<td>64.80</td>
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<tr>
<td></td>
<td>24,279</td>
<td>368</td>
<td>1,191</td>
<td>1,677</td>
<td>21,070</td>
<td>88.12</td>
</tr>
</tbody>
</table>

Report Definitions:
- **Cancelled**: Work requested cancelled by Work Control
- **Incomplete**: Work requests not completed and with no labor charges.
- **Completed**: Work requests that have satisfied the definition of complete – Labor charged and work request phase(s) complete

### Chemistry Zone, M2600

**Ron Sweeny, Foreman**

Chemistry Zone is a 14 man shop with four skilled trades, nine AFSCME, and one Employee Working Out of Classification (EWOC). They are responsible for approximately 2,247,363 square feet of lab and classroom facilities. Many of the buildings in the Zone are older and very labor intensive. 1908 Chemistry, 1948 Chemistry, Kraus Building, and Frieze Building are a few examples.

During FY 05, the following renovations were completed: Burton Tower, Modern Language, and Hill Auditorium.

The Chemistry Zone suffered a loss this year with the death of David Corwin, Maintenance Mechanic III. Dave was involved in a truck/motor cycle accident. A few months earlier Dave experienced a severe heart attack and was just getting back on his feet. Dave’s sense of humor and friendship will be missed.

The Chemistry Zone completed 81.64% of the 4,186 work orders for required PM and 64.8% of the 3,750 corrective work orders.
Areas of Improvement
This year’s performance will be improved by re-introducing the EWOC program to this Zone, and focusing on preventive maintenance. The EWOC program has produced a number of excellent employees over the past few years.

Electrical Alarms & Radio Shops, M2001  Tom Metty, Foreman
The Alarm Shop is divided into three distinct groups: electronic and radio repair; fire alarm testing and repair, and; mechanical fire pump testing, valve inspection, and fire piping repair. Much of the work is mandatory testing of fire alarm systems for Housing dormitories.

During FY 05, the department welcomed the Alarm Shop to the Zone Maintenance Group. The Zones Shops have been much more pro-active during emergency events like fires. Critical information that is needed to determine the type of event is now being shared with the Zone Shop. The four plumbers from the Alarm Shop will be very helpful in filling manpower gaps.

Technology has changed the way systems are maintained on campus and clocks are not an exception. At one time, hard wired clock circuits ran through the campus tunnels to each building. Time corrections were made by generators that sent a frequency through the electrical power wiring. Technicians maintained the clock correction generators and the Simplex clocks. Today, many of the University’s Primex clocks are battery operations, corrected through global positioning systems and require little or now maintenance. Staff that was specifically hired to work on the time systems have been freed up to work on emergency lighting systems and inverters, definitely more pressing and critical issues throughout campus.

Areas of Improvement
The biggest area of improvement will be in budget management. We will accomplish this goal by sharing staff among the Zone Shops, focusing on customer pay work when it is available and finding new customer pay business opportunities. We have already identified one opportunity -- the inspection of the customer-pay Ansul Fire Suppression Systems, i.e. cooking hood systems

This year will be the pay-off year for Electronics Shop sound system, unfortunately it has also reached the end of its useful life. The good news is like clocks, sound systems have also changed. For a fraction of the cost we can purchase a new state-of-the-art system that will be competitive with outside vendors, and re-capture some lost revenue.

Fire Extinguisher Shop, M2050  John Hirsch, Supervisor
This new unit is tasked with the inspection of over 10,000 fire extinguishers on campus. Student employees are conducting the required National Fire Protection Agency NFPA 10 monthly inspections by determining if the appropriate extinguisher is in place and properly charged. The unit will determine if the appropriate extinguisher is in place, and use student help to do the required NFPA 10 monthly inspections. The group is managed by John Hirsch with the support of Melissa Berry. John comes to us from DeLau Fire Inspection Company and will convert the North Ingalls extinguisher storage room into a refilling station for ABC type extinguishers, as well as a testing area for CO-2 types. John will also be providing testing for emergency lighting
in the near future. John will work closely with the Alarm shop to capture Ansul Fire Suppression systems testing.

The new department came on line in June, 2005. They have completed the inspection and NFPA compliance for nearly 30% of the units on campus. Most recently, competitive bids for new fire extinguishers, and fire extinguisher supplies were completed. The Eastman Company was the successful supplier. The testing facility at 300 North Ingalls building is about 60% complete. The new testing equipment has arrived and will be wired by the end of August.

We are pleased to add this new service to our customers. The new department is critical for staff and student safety and will ensure the fire extinguishers in buildings are the appropriate type for the application and all of the criteria of NFPA 10 for quantity and spacing.

Areas of Improvement
Currently most of the work being done in this department is by temporary student help. Hiring two permanent technicians that are trained to inspect, test, maintain, and re-fill extinguishers is the greatest area of improvement needed by this department. We are in the process of re-writing the job description for this position, the current job description was written primarily for visual inspection only. At the completion of the campus inventory, and fire extinguisher NFPA compliance, the group will start the inspection and testing of emergency lights. In FY 06, we will introduce this new department to the Facilities Users Network and the University community.

**LS&A Zone, M2500**

Chuck London, Foreman

The LS&A Zone shop consists of four skilled trades, and nine maintenance mechanics, the primary focus in this shop is preventive, and corrective repairs, and Special Events. The LSA Zone has 2,145,878 square feet of class room, and office space. Last year the LSA Zone completed 3,540 corrective work orders and 97% of their 3,438 preventive maintenance orders. Last year this department participated and coordinated over 100 separate events. The total labor and material costs for those events was $254,429.00

During FY 05, the addition to Mason Haven Hall was completed. The LSA renovation is about 50% completed.

Chuck London assisted in coordinating over 100 special events on campus during FY05. A key event is Commencement. This year’s event went off without a problem (as it seems to every year).

Areas of Improvement
The key to continued participation in Special events is cost containment, if our services cost too much, customers will go some place else to get support. Chuck continually finds less expensive methods to provide electrical support, sound support, and equipment storage. As our work force ages and moves closer to retirement, continual training is needed for new maintenance staff. Thing like knowing where the flags go on the stage at Hill Auditorium for the Business School graduation is critical. A lot of emphasis and effort has gone into recording setups for each event,
along with the staffing requirements, and the estimated costs. We will continue improving this process.

**Medical Zone, M2300**  
**Gerry Heath, Foreman**  
Medical Zone is a twelve man crew with five skilled trades managing 1,639,086 square feet. This is the smallest zone by square feet, yet the most complex and intense. Most of the space is laboratory and animal research. Last year the Med Zone received 7,389 corrective work orders, and 2,992 PM orders.

Not only is the Medical Zone the busiest Zone on campus, during FY 05 its crew worked three times the overtime of any other group in the Zones. To offset overtime related charges related to system shutdowns, we have changed the work schedule of the PM team in the Medical Zone. This decision has helped somewhat but using a different shift may be the only cost-effective solution to this problem.

The Medical Zone completed 89.73% of the 3,402 work orders for required PM and 86.84% of the 7,390 corrective work orders.

**Areas of Improvement**  
The biggest area of improvement must come from our ability to access critical areas within the facilities. As discussed earlier this may have to be accomplished by different shifts.

**North Campus Zone, M2200**  
**Doug Good, Foreman**  
The North Campus Zone is a 19 man shop with nine skilled trades and ten AFSCME employees. The department manages the PM and corrective repairs for over 3,000,000 square feet.

During FY 05, the North Campus Zones experienced phenomenal growth in their area of responsibility. Projects completed or nearing completion are the Gerstacker Hi Bay addition, Micro Biology, School of information, and Computer Science Buildings. Construction began on the Arthur Miller complex and the expansion of the Electrical Engineering & Computer Science (EECS) Building as well. We anticipate an additional 5 million square feet of facilities responsibility.

The North Campus Zone completed 84.64% of the 6,256 work orders for required PM and 89.05% of the 5,906 corrective work orders.

**Areas of Improvement**  
The North Campus Zone continues to work on improving communications with the Engineering Schools. While we have established a semi-annual meeting with the College of Engineering to discuss their facilities needs, the need for more frequent and regular meetings has become apparent. We are working to improve the information sharing process between the North Campus Zone and the College of Engineering.
However, the most important area of improvement for this Zone will be the creation of a second North Campus Zone. With the addition of Microbiology, Computer Science, EECS Expansion, and the Arthur Miller Center for Performing Arts, the current Zone will exceed 5 million square feet.

**Off Site Zone**  
**Jeff Bolgos, Supervisor**  
This is an off-campus operation managed by a single Zone supervisor. Jeff Bolgos insures that over 3000 acres are available for LS&A and Natural Science researchers. Various sites are used for the research and habitat for deer, and amphibian research, and radio and astronomy.

In recent years, usage of the many off site facilities at the University has been greatly reduced or discontinued. Many of the facilities in this Zone are in serious need of updating, especially the residence buildings.

*Areas of Improvement*  
Many of the buildings on the various properties have reached the end of their useful life, and require major capital improvements. Decisions will have to be made in the near future to completely remove these older building, and let the property return to its original state, or build new building.

**South Campus Zone, M2100**  
**Lee Lambarth, Foreman**  
This is a 15 man crew with 6 skilled trades. The special focus for the South Zone is customer pay electrical work. Lee Lambarth works closely with all other Zones foreman to ensure all electrical needs in individual zones are met.

In FY 05, Lee transferred to the South Zone. Lee brought his expertise in electrical projects to the Zone and with the already excellent South Campus zone staff, this shop has taken on most of the smaller pure electrical work projects for the entire campus. As parent shops become more focused on specialized types of electrical equipment such as drives and generators, the need for a quick response to customer electrical needs has become apparent. Lee’s shop has done a great job of filling that need.

The South Zone has 2,185,019 square feet of class room, office, and recreational sports facilities. The South Zone completed 97.03% of the 3,626 required PM and 86.74% of the 5,078 corrective work orders.

**SPH Zone, M2400**  
**Jim Barnes, Foreman**  
This is a 14 man zone, with 5 skilled trades, maintaining 1,973,085 square ft. The foreman, Jim Barnes leads all Zones in his percentage of completion in regard to PM and corrective repairs.

In FY 05, the completion of both Life Sciences and Commons buildings added about 334,000 additional square feet of facilities responsibility to this zone.
The SPH Zone completed 98.34% of the 3,698 work orders for required PM and 88.42% of the 4,549 corrective work orders.

**Areas of Improvement**

The SPH Zone will be the test case for a more balanced approach to work distribution. Currently work is distributed by buildings with each Zone employee assigned to a specific group of buildings. This Zone will implement a team approach to completing the work and the staff will provide their evaluations of the effectiveness of this approach to accomplishing preventive maintenance.