Mercy Capitol Study

Prepared for:

Iowa Department of Administrative Services

Dean Ibsen

109 East 13th Street

Design and Construction Division

Des Moines, Iowa 50319

Iowa Department of Administrative Services

Government's Partner in Achieving Results

DAS

Prepared by:

Shive-Hattery, Inc.

1601 48TH STREET

SUITE 200

WEST DES MOINES, IOWA 50266

515.223.8104

SHIVE HATTERY

ARCHITECTURE - ENGINEERING

October 1, 2009

PROJECT NO. 409289-0

1601 48   Street, Suite 200
West Des Moines, IA 50266-6748

October 1, 2009

Mr. Dean Ibsen
Iowa Department of Administrative Services
109 East 13th Street
Design and Construction Division
Des Moines, Iowa 50319

RE: IA DAS Mercy Capitol Study

Dear Mr. Ibsen:

Thank you for the opportunity to perform the services referenced above. We have completed our services and have summarized the results in the attached report. This report describes the building, the mechanical/electrical/roofing systems, and recommendations for improvement where necessary for each category. In addition, we have included a list addressing prioritization and costs of the recommended improvements.

We appreciate the opportunity to provide our services for this project. If you have any questions or need further assistance, please contact us at your convenience.

Sincerely,

SHIVE-HATTERY, INC.

	I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and responsible charge. I am a duly Registered Architect under the laws of the State of Iowa. Signature: ______ Date: ______ Name: Mark H. Allen, AIA Registration Expires: 6/30/2010 Date Issued: ______ Pages, Sheets, or Divisions covered by this seal: This report

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This evaluation provided a cursory review of architectural, minor structural, mechanical, and electrical systems. The general intent of this evaluation was to identify issues and items that if remedied, would extend the useful occupation of this building by an additional 5 or 10 years by converting the facility from and "I" Occupancy to a "B" Occupancy. With respect to the condition of the building, there are obstacles to overcome if this facility is to reach current minimal standards. However, given the general nature of the facility and its location, the potential value far exceeds the steps that must be taken to overcome these obstacles improving both safety and increasing efficiency!

ARCHITECTURAL

A cursory architectural evaluation of the Mercy Capitol Facility was conducted with the purpose of evaluating an adaptive re-use of this building converting from an Institutional Occupancy to a Business Occupancy. What was once a hospital will now be an office building. Fortunately, the building codes are less stringent for the business classification thus affirming that we are traveling in the more cost efficient direction. However, this review has identified recommended improvements for the adaptive re-use of this building. Three fundamental areas of review consisted of the exterior envelope, interior spaces, and safety and accessibility. These three areas constitute the core architectural issues for substantiating the investment to adaptively re-use this building. Paramount is to ascertain that the building is water tight and stop or prevent any moisture infiltration. Secondly, is to identify space suitable in size and type for an intended new purpose. Finally we must maintain public safety and accessibility for all building users.

Exterior envelope - General moisture protection is key to protect the State's investment into the facility. Evidence of moisture penetration is present and if left unchecked can lead to devastating consequences. Heavy infiltration areas center at failing windows and at a dated roof membrane. Several small areas of damaged siding exist that may also be permitting moisture infiltration. All known leaks should be repaired. Ultimately, a well sealed envelope will help extend the building occupation. Recommendations provide for the replacement of failed windows as well as roof replacement program for a full update for the moisture protection systems.

Interior spaces - This review is about converting space from one type of use to a completely different use. Some spaces are conducive to this change while others are not. The most flexible of solutions would be simply carve each floor plate into reasonably sized tenant spaces and demolish all the interior construction and refinish as an open office plan. However, funding sources do not exist for this strategy. With limited funding in mind, each floor plate was evaluated for larger tenant spaces that with limited to no physical improvements planned for the adaptive re-use. While some level of effort is necessary to make this adjustment, great lengths were spent to minimize overall project costs to adaptively re-use this building.

Public safety and accessibility - General building safety and accessibility focused on the elimination of architectural barriers. Accessible entrances and elevators have been effectively providing barrier free access to every level of the building. It is within individual levels that architectural barriers become prevalent. Most barriers are minor and can be resolved through a continual maintenance program removing each barrier one by one until all barriers have been removed. Such barriers include accessible routes, compliant door hardware, elimination of protruding objects, etc. However, special attention should be given towards accessible restrooms and accessible drinking fountains. At present none of the restroom facilities meet accessible guidelines nor provide basic core building services for the occupants. One pair of men's and women's restrooms should be provided on an accessible route on every level or as proposed one at each wing on every level. The combination of these improvements and the improvements to be carried out in an annual maintenance program eliminating architectural barriers will effectively bring this facility into compliance with minimum accessibility requirements.

MECHANICAL

Mechanical systems of heating, ventilating and air conditioning, plumbing and fire protection were reviewed with respect to the condition and efficiency of the existing equipment and its contribution to occupant comfort. There are three main mechanical systems serving the facility. These are separated into the North, East, and West Wings of the facility. Some of the original pieces of equipment, such as boiler burners, have either been replaced or repaired recently. The antiquated original system design and aging mechanical equipment that remain are not energy efficient by today's standards, and will cause ongoing increases of repair, service and corrective maintenance costs, as well as reduced indoor air quality characteristics of temperature, humidity control, ventilation and filtration. Water for restrooms appears adequate, although there are areas of excess energy usage with the current system design. Water for fire protection appears adequate for the system that is currently in place.

ELECTRICAL

Building electrical systems of lighting, power distribution, emergency generators, and fire alarm were reviewed with respect to general condition of equipment and safety.

Lighting - In evaluation of lighting, primary considerations were condition of fixtures, adequacy of illumination levels for the change of occupancy, and energy efficiency. Existing office and storage areas have adequate lighting for continued use without modification. The largest area of concern is in the old patient rooms. Fixtures in these spaces are minimal and do not provide illumination levels which meet current design standards.

Power Distribution – The condition of existing panels and equipment is generally acceptable and safe for continued operation. Most equipment is original to the construction of the wing in which it is located. While replacement of the oldest panels and transformers in the West wing is desirable from a preventive maintenance perspective, this equipment is in satisfactory condition and does not require immediate upgrade. As with the lighting, the greatest concern is in the existing patient rooms where most outlets are installed in hospital headwall units which are anticipated to be removed for conversion to an office type environment. Upon removal of the headwalls, these rooms will be left with few, if any, outlets.

Emergency Generators – The generators are in acceptable condition for continued operation. They have been maintained and should continue to perform as required. With the change from an Institutional to Business occupancy, the systems are only required to support operation of emergency egress lighting and alarm systems which are a small fraction of their capacity. While they are oversized, they will need to remain in service to support the emergency lighting functions until fixtures with battery backup can be installed. After those lighting upgrades have been completed, the building service may be connected to the Capitol complex high voltage loop and the generators taken out of service.

Fire Alarm – This essential life safety system has been upgraded in the last 10 years including a new main control panel and upgrading of audible and visual notification devices. As an institutional occupancy, some detection and notification requirements are less than what is required for a business occupancy. These reduced requirements are related to detector coverage and the sound pressure level of the alarm notification horns. For the change of occupancy, the system configuration will need to be modified to provide detector coverage in the corridors and addition of horns to boost the sound pressure in the old patient areas.

ROOFING

The roof areas consist of Built-up, Ballast EPDM, Fully Adhered EPDM, and one EPDM with pavers to make a patio. From a building materials standpoint the majority of the roof areas are in unsatisfactory condition and are at the end of their life cycle. All of the Built-up roofs are at the end of their life cycle and have been repaired many times. The combination of existing conditions and the commitment to re-develop this building are the basis behind the recommendation to proceed with an active roofing replacement program.

SUMMATION

Please find attached Shive-Hattery's operational review regarding Mercy Capitol. We have completed our assessment and have prepared this report documenting our findings and recommendations. This report is intended to assist you in your decision making process and provide you fundamental information as you move forward in your decision making process.

As you reach your decision to proceed please know that Shive-Hattery is available as a resource to assist you in the preparation and administration of any design and construction documentation services that you may require.

OPINION OF PROBABLE COST SUMMARY

REFER TO REVISED COST OPINION AT END OF REPORT

System	Priority/Probable Cost		
	A	B	C
Architectural	$615,000	$1,794,500	$657,500
Mechanical	$1,575,000	$1,650,000	$795,000
Electrical	$432,000	$465,000	$760,000
Roofing	$290,000	$472,608	$95,040
Sub-Total	$2,912,000	$4,382,108	$2,307,540
Fees & Soft Costs 10%	$291,200	$438,210	$230,754
Total	$3,203,200	$4,820,318	$2,538,294
Grand Total			$10,561,812

Alternate	Item	Priority	Probable Cost
Demolition	Demolish entire building	A	$1,850,000
Replacement	New building 200,000 SF @ $175/SF	B	$35,000,000

** Cost Opinion Disclaimer*

The Architect/Engineer, as design professionals familiar with the construction industry, has prepared this opinion of the Probable Cost of Construction. It is recognized, however, that neither the Architect/Engineer nor the owner has control over the cost of labor, materials, or equipment, over the Contractor's method of determining bid prices, or over competitive bidding market, or negotiated conditions. Accordingly the Architect/Engineer cannot and does not warrant or represent which bids or negotiated prices will not vary from the Probable Cost of Construction.

SCOPE OF REVIEW

Shive-Hattery, Inc. was retained by The State of Iowa Department of Administrative Services to perform a building condition review of the Mercy Capitol building located 603 East 12th Street in downtown Des Moines, Iowa. The review was primarily of a general nature intended to target physical improvements that may facilitate an adaptive re-use of the facility from that of an Institutional Occupancy to that of a Business Occupancy. The re-use of this building has been described as temporary in nature seeking extended use at this location for an additional 5 or 10 year period.

On-site walk-through reviews were conducted during the third quarter of 2009 by Shive-Hattery personnel:

Mark Allen, AIA, NCARB, LEED AP, Architectural
Cameron Manley, Architectural
Andy McCormick, Architectural
Andrew Pritchard, Roofing Systems
James Lee, P.E. LEED AP, Mechanical Systems
Jacob Newman, EI, Mechanical Systems
Norman Sutton, P.E., Electrical Systems
Tim McCabe, EI, LEED AP, Electrical Systems

We were accompanied on site at times by DAS and Mercy staff and held a short inquiry prior to our initial walk-around. Our observations were of both of a general and specific nature. Most, but not all, areas of the building were available for our review. Most areas were generally viewed, but no attempt was made to exhaustively cover all the areas of the entire facility. More thorough special observations were made in certain areas such as restrooms, electrical and mechanical rooms and closets. Spot observations were made above lay-in ceilings. Additional information was obtained from maintenance records and record drawings.

GENERAL BUILDING OBSERVATIONS

A. Architectural Systems

1. General location and description

The Mercy Capitol building is located just east of East 12th Street and is bordered on the north by Lyon Street and the south by Des Moines Street. The original 4-story brick building was built in the early 1900's. In the mid-1950's, a new wing was completed. Following a fire that destroyed much of the original building in 1965, an addition was constructed to wrap around the west and north sides of the 1950's building. The next addition was built to the northeast in the 1970's, and the final addition was completed in the 1980's with a large component to the southeast and a small addition to the north of the 1950/1960's building. Although several areas and/or floors of the building have been remodeled or have received updated finishes, there are still some areas of the hospital (i.e. the 1950's Delivery suite) which have remained untouched.

The building consists of three fairly distinct masses. For the purpose of this report, we will refer to the 1950's/1960's mass as the West Wing, the 1970's addition as the North Wing, and the 1980's addition as the East Wing.

This facility was designed as an "I" occupancy for hospital use and is in the process of being converted to a "B" occupancy for office and storage use.

2. Exterior Appearance and Entrance

The general appearance of the exterior is dated and could be renovated to give it a new life, but more critical is the need for a defined entrance to the building. Currently, there are public entrances on the west, south, and east sides of the building. The intended main entrance is on the east side and is demarcated by a canopy. Unfortunately, this entrance does not stand out as the primary entrance. It seems somewhat dark and closed-in, with the ambulance garage jutting out to the south and a tall wood partition/screen wall attempting to conceal the loading dark to the north. Redesigning the canopy and main entrance could provide a much more inviting and obvious entrance to the building. However, less costly changes, such as adding strategically-placed landscaping (trees, plantings, flagpoles, water features, or outdoor furnishings) could also help lead visitors to the building entrance and prevent confusion and frustration.

Increased fenestration should be considered as a way to improve the appearance of the building, but also to improve the quality of interior spaces by harvesting natural daylight. It appears that, over the years, windows have been removed and infilled, leaving little or no windows in facades where glazing once was. By installing energy-efficient ribbon windows, natural daylight could be harvested to create a much more pleasant and productive environment for the building's occupants.

In the north wing (1970's addition) primarily, there is evidence of moisture problems around and below the windows in the patient rooms. Cracking drywall, bubbling paint, and peeling paint are indications of moisture infiltration. In some rooms, tape covers the gap where the operable sash meets the frame. In other rooms, the gap has been filled in with caulk or stuffed with paper or fabric. These indicators all point to the fact that these windows are old and inefficient and should be replaced.

Recommendations to increase the prominence of the entrance and to improve the exterior appearance, window performance, and interior experience:

1) Year 1-5: Add site features such as landscaping and exterior signage
2) Immediate: Replace 1970's windows in north wing that show evidence of moisture penetration
3) Year 1-5: Replace remainder of windows in north wing
4) Year 1-5: New entrance and canopy
5) Year 1-10: Add fenestration in east and west wings

3. Conversion to office space/Space utilization

One of the first issues to tackle is finding a way to carve the existing floor plates up into leasable suites for office use. Although money would certainly be saved up front by not removing walls and reconfiguring spaces, there are significant inefficiencies that will result by not renovating the spaces. It is our recommendation that the floors be cleared to create modern open office spaces and gain flexibility.

Spending the money up front on renovation and reconfiguration would likely result in spaces that are better organized, more flexible, and more supportive of business practices related to office functions, rather than hospital functions. In addition, the total amount of space devoted to circulation is disproportionately high with respect to the total square footage of the facility, and the corridor system currently in place could be optimized to capture needed square footage while simplifying total building circulation.

However, based on available budget, it is recommended that, at a minimum, the patient toilet rooms be removed to create slightly larger and somewhat more efficient office spaces from former patient rooms.

Recommendations to increase space utilization/convert to office space:

1) Immediate: Add wall and double-egress doors on 2nd level to create east suite
2) Immediate: Miscellaneous renovations – Phase 1
3) Year 1-5: Remove patient toilet rooms and convert to office space at North Wing – 2nd level, 3rd level, and 4th level
4) Year 1-5: Remove patient toilet rooms and convert to office space at West Wing – 2nd level, 3rd level, and 4th level

4. Interior Finishes

Although some areas of the building have been remodeled in more recent years, interior finishes need to be updated in many areas throughout the building. In many areas, colors are outdated and finishes are worn. Acoustical ceiling tiles are frequently mismatched, some tiles yellowed with age next to bright white replacement tiles.

Recommendations to update interior finishes:

1) Year 1-5: New finishes (new carpet, new paint, acoustical ceiling tile replacement) for North wing – 2nd level
2) Year 1-5: Miscellaneous renovations/finish upgrades – Phase 2

5. Wayfinding and Signage

Many hospitals, and this is no exception, are complex mazes of long and confusing corridor systems with bends, turns, and unclear signage. The building likely started out simply, with a main entrance and primary corridor leading to the main vertical circulation. But over time, as additions were constructed and interior spaces renovated, the original pathways became less obvious, due to new entrances, new elevators and new circulation pathways. The corridor system is now circuitous and maze-like, and not at all intuitive.

Interior architecture and finishes can work together to optimize a wayfinding system and provide intuitive pathways. Redesigning and renovating to create direct pathways that are simple to navigate would be the best solution. However, less extensive measures can still improve the existing situation. Interior finishes can delineate visitor pathways from staff pathways. Varying color palettes within departments or floors can aid in wayfinding. Lighting can help provide direction on circulation pathways. Signage can provide information and directions for people who rely on maps and written directions. And landmarks, colors, and artwork can aid those who need visual cues.

A concierge desk/information kiosk should also be included to provide basic information about locations of departments, restrooms, and vertical circulation. It should be the first thing visitors see when entering the facility.

A good wayfinding system provides good tools and clues to aid in successful decision-making and clear recognition of pathways and destinations. This, in turn, helps communicate that the facility is organized and professional and promotes functional efficiency, reduction of stress and frustration, and visitor accessibility and safety.

Recommendations to improve wayfinding system:

1) Immediate: Interior signage – arterial/egress corridors
2) Year 1-5: Concierge desk/lobby remodel

6. Security

As suites and departments are programmed into the existing spaces, access and security will need to be considered to allow general access into the building but limited access to the individual suites. Management of suites of spaces will promote a simplified security plan with general access to public corridors and individual access to suites.

Recommendations to improve security:

1) Immediate and ongoing: Maintain general building security as-is and tailor security to fit at new individual departments

Door hardware varies throughout the facility, from 1950's-vintage door pulls to modern ADA-compliant hardware. Since Mercy plans to remove their Medeco cores/tumblers from the building, it would probably be a good time to also replace door levers with ADA-compliant levers, wherever possible.

Recommendations to increase accessibility of door hardware:

1) Immediate: New cylinders and new accessible levers

7. Asbestos Abatement

Mercy facility maintenance personnel identified that much of the west wing was abated in the early 1990's. Asbestos remains in the 1960's portion of the west wing above ceilings and in pipe chases. An asbestos report was completed in 2000 or 2001; no abatement has been done since the report was completed. Abatement should concur with future renovation.

Recommendations to continue abatement:

1) Immediate and ongoing: Remove asbestos as it is encountered.

8. Cafeteria

This facility is equipped with a moderate to large cafeteria and commercial kitchen. These amenities were sized to accommodate a large metropolitan hospital capable of feeding staff, patient families and visitors capable of serving between 400 to 600 meals in peak hour. A kitchen with this capacity should be more than adequate to serve the same size facility re-purposed to a business occupancy.

The state of the cafeteria is generally good. The space has been renovated and updated in recent years and provides for a pleasant dining space. The kitchen, while dated, appears to be in order and fully functional. The built in equipment was functioning at the time of this walk through. However, they are indeed showing signs of age and should be kept on a rigorous maintenance schedule.

If the cafeteria is planned to remain in operation, professional food service consultants should be procured to outfit the kitchen to serve a targeted menu.

9. Structural

Typical structural design is based on prescriptive design performance identified in the germane building codes. Uniform and concentrated minimum load limits are defined by occupancy type and use. Even though this facility has experienced three significant construction periods over a period of 4 decades, the structural design criteria has not changed significantly. Thus current prescriptive limits should serve as a general basis of loading capacity.

The current version of the International Building Code identifies the following loading criteria:

B. Mechanical Systems

There are three main mechanical systems serving the facility. These are separated into the North, East, and West Wings of the facility. There is a central chilled water plant and steam heating converters above the East Wing. The heating water converters in this room serve only the East Wing. The chilled water plant serves the entire facility. There are steam heating water converters in the West Wing penthouse serving that area of the facility. A central boiler plant is located above the North Wing that supplies steam to the entire facility. The North Wing penthouse also contains steam heating water converters to serve that respective area of the facility.

The following analysis and recommendations are our professional opinions based on our visual field observations and discussions with Bob Hagins, Maintenance Director for the Mercy Capitol Complex.

1. Cooling System

The chilled water cooling system consists of four chillers manufactured by the Trane Company, two 300 ton and two 210 ton . (Mechanical Photos 1-3). The chillers have had regular wintertime inspections and maintenance. The condenser tubes are rodded out annually, while the evaporator tubes are cleaned every three years.

The chillers are all R-11 refrigerant machines. This refrigerant is no longer manufactured, and the standard drop-in replacement refrigerant, R-123, is also on a phase out schedule. The 210 ton chillers are roughly 27 years old, while the 300 ton units are 23 years old. The median life expectancy for centrifugal chillers based on ASHRAE research is 25-30 years. This puts these units on the back end of their useful life. For future planning, the replacement of these units should be considered for environmental, energy and maintenance reasons.

Each chiller has its own cooling tower (Mechanical Photo 4). The towers serving the two 210 ton chillers are manifolded together; the two towers for the 300 ton chillers are independent. Tower 4 is tied into a free cooling heat exchanger to generate chilled water in the winter season. This plate and frame exchanger appears to be in good condition and has functioning properly (Mechanical Photo 5). The cooling towers appear to be in fair condition. The PVC fill in the towers is old and brittle, and should be replaced (Mechanical Photo 6). Replacing the fill should improve the towers capacity and keep the towers operational for some time. Replacement of the cooling towers should be considered when the chillers are replaced. The cooling tower fan motors and bearings have received regular maintenance and are in good condition. The gear housings have been replaced in the past for the towers.

The chilled water pumps in the central plant are controlled by variable frequency drives. The drives on three of the pumps have invertors that have failed, so they have been placed in bypass mode. These drives would need to be replaced for the system to operate most effectively and efficiently. The condenser water pumps have been rebuilt in the past year and run very smoothly (Mechanical Photo 7).

2. Heating System

Steam is provided to the facility from three Superior Mohawk scotch marine boilers, located in the North Wing penthouse (Mechanical Photo 8). Two of the boilers were installed in 1976 and the third in 1982. All three have had the burner assemblies replaced since the original installation. The units on the east and west have Gordon-Piatt burners, while the center unit has a Power Flame burner. The burners have dual fuel capability, with natural gas as the primary fuel, with a fuel oil system as a backup (Mechanical Photo 10)

All of the boilers are opened every summer for cleaning and inspection. The boiler feed water and deaerator tank assembly is relatively new, being replaced about 5 years ago when Mercy purchased the building (Mechanical Photo 9)

Also in the North Wing boiler room are two steam to heating water converters. The converters supply heating water to radiant panels, cabinet unit heaters, duct heating coils and all other associated heating water items in the North Wing. The heating water pumps associated with the system appear to be in good condition (Mechanical Photos 11 & 12).

The heating water converters located in the East Wing penthouse serve that wing of the facility. All of the heating equipment for this system is original to the building (1980's). The converters leak when first started, and drip over the winter. The insulation is original as well, and has deteriorated in some areas (Mechanical Photo 13).

The West Wing penthouse has three steam to hot water converters. One serves the reheat coils in the wing, while the other two serve the perimeter convectors and fin tube (Mechanical Photo 14). All of these converters are original to the West Wing addition to the hospital (1960's).

3. Air Handling Systems

There are 5 main air handling systems serving the Mercy Capitol facility, with several other smaller systems in the oldest part of the building.

In the West Wing, there are two large air handling units on the Fifth Floor. These units serve all of the former patient rooms through the West Wing. One of the units is a 100% outside air unit with a heat recovery loop. This same unit has had the main bearings replaced about 7-8 years ago. The other unit in this space has had the main chilled water coil and drain pan replaced within the last 8 years. Both units are in generally good condition (Mechanical Photo 15).

There are several small air handling units that serve isolated spaces throughout the West Wing. These units are located in a penthouse constructed in the 1950's. One unit serves the former lab area. This unit has a run around heat recovery loop from the lab exhaust and an inline vane axial fan that is incredibly noisy (Mechanical Photo 16). . The lab unit is the only air handling system cooled by a rooftop condensing unit. The condensing unit is located outdoors directly east of the penthouse. All the other units in this penthouse are served from the central chilled water system. They were dedicated to the former labor/delivery room, surgery, and x-ray areas of the hospital. All of the air handling units in this penthouse are well past there useful life and should be replaced or have the areas served by a different system.

The East Wing is served by a large built up dual duct air handling unit (Mechanical Photo 17). This unit is in very good condition, and has a significant amount of capacity. The hot deck, cold deck, and return fans are all on variable speed drives. These drives have been replaced recently and are in good operating condition. The heating water valve for this unit leaks in the winter, and needs to have the packing replaced. The chilled water valve is also in need of repacking.

The upper floors of the North Wing are served by a large draw thru air handling system manufactured by Trane. (Mechanical Photo 18). This unit serves Floors 2 through 4, and is a 100% outside air unit with a heat recovery loop. The coils in the unit are quite dirty and scaled up, but the rest of the unit is in good shape for its age.

The other unit in the North Wing is the dietary air handling unit (Mechanical Photo 19). This unit is located on a mezzanine above the Ground Floor area. This unit, manufactured by Trane, is a constant volume system with an energy recovery loop, heating water coil, chilled water coil and supply and exhaust fan. The unit is in fairly good shape, with only a slight vibration from the fan system. The vibration could be an indication of bad bearings, an unbalanced fan wheel, or a shaft out of alignment.

4. Air Distribution System

Being installed at different times, each wing of the hospital incorporates different air distribution strategies.

The North Wing unit serving the upper floors is a constant volume draw thru unit with an energy recovery loop, a wing type heating coil, and a cooling coil. This unit serves the main distribution ductwork down through a chase to the three floors of patient rooms below. The ductwork supplies the ventilation air for the spaces, while each room is supplemented by radiant ceiling panels to handle the room loads (Mechanical Photo 20). The radiant ceiling panels are used for both heating and cooling. The exhaust for the wing is ducted back to the North Wing penthouse and through the exhaust side of the energy recovery loop before being vented from the building.

The East Wing unit is a built-up dual duct system. This variable volume unit is a two level unit, with hot deck and cold deck supply ductwork, and return ductwork from the spaces. The unit has an energy recovery loop, cooling coil, heating coil, prefilters, final filters, return fan, and hot and cold deck supply fans. The main supply ductwork is fed through chases to the entire East wing, where at terminal units the hot and cold supply streams are mixed to temper the air to the individual spaces. The exhaust for this wing is ducted out through an energy recovery unit in the East Penthouse. The distribution ductwork for this wing is in good shape, and should be able to be re-used for serving the reprogrammed spaces.

The West Wing has several air handling systems. The first is a constant volume 100% outside air unit in the fifth floor mechanical room. This unit has an energy recovery loop, chilled water and steam heating coil, with supply and exhaust fans. This unit serves the patient areas of the West Wing. The main distribution ductwork is served to the spaces where terminal reheat coils temper the air to the spaces. These rooms also have perimeter heaters, either fin tube or unit heaters, to help with the heating load in the space (Mechanical Photo 21).

The second unit in the Fifth Floor West Wing mechanical room is a constant volume system very similar to the first unit, only not a 100% OA unit. This unit serves the Ground and First Floor areas of the West Wing, as well as some interior spaces on Floors 2 through 4. This unit also has terminal heating coils in the distribution ductwork for zone control.

The last unit serving the West Wing is a small air handling system located in a closet on the First Floor near the north elevators. This unit was added when the lobby area was expanded during the addition of the East Wing.

The smaller units in the 1950's penthouse serving the isolated areas in the West Wing are constant volume package systems with steam heating coils, cooling coils, and supply fans. All of these units are well past their expected life and need to be replaced. Most of them are showing clear signs of aging, and with the isolated spaces they serve, would not have much usefulness as the retrofit proceeds.

5. IT Room Units

   There are several split system Liebert units in the hospital that were installed to handle the high heat generation of the computer spaces. There are two units that serve the basement IT room that will remain in service to cool the Mercy IT computers that are to remain in the facility. There is another unit that served the former Cath lab that has been tripping on high head pressure, and has been disabled. There were also two other units serving the CAT scan and 5th floor wound care. These units will no longer be needed with the removal of the medical equipment.

6. Toilet Exhaust

   Since this was hospital occupancy, there are no large public toilet areas on the floors. Most restroom facilities were dedicated to each patient room with some small public/staff toilets located throughout the non-patient areas. The exhaust air from the restrooms was gathered into a main exhaust riser in each wing and ducted back to the air handlers to be used with the energy recovery systems.

7. Controls

   The controls and valve and damper operators appear to be pneumatic throughout the entire facility. In each area, these are served by a dedicated air compressor in the wing. With most rooms out of operation during the walk through, the space temperature controls have not been tested for proper operation.

8. Domestic Water and Sewer

   The domestic hot water is provided by tank storage heaters in each wing. In the North Wing, there are two tanks serving this area of the facility (Mechanical Photo 22). The larger tank serves the domestic hot water needs for the wing. The smaller tank serves just the dishwasher in the food service area. The larger unit should have more than adequate capacity for the new space program once the State moves into the facility. The smaller unit may not be needed if a dining facility does not remain in the building.

   The other two wings have their own set of water storage heaters to provide the domestic hot water for their area (Mechanical Photos 23 & 24).

   Water pressure in the restroom sinks appeared to be adequate. Toilets and urinals are flush valve type.

The Culligan water softening equipment is located in the North Wing, and is primarily used to soften the boiler feed water, as well as the domestic hot water storage tanks (Mechanical Photo 25).

There are two sewage ejectors in the facility to lift sewage from the basement to the city sewer system. One is in the North Wing; the other is in the East Wing. There currently is an odor issue with one of the ejectors, as noted to us by Bob Hagins from Mercy.

Domestic water supply and sanitary waste piping is of various ages and material. The pipe is located behind walls and has not been verified as to the condition of the entire system. Any changes and modifications made to the system may cause leaks or expose existing damage that will need to be addressed.

9. Fire Protection

The facility is sprinkled throughout with a wet pipe fire suppression system for the majority of the building. The majority of the sprinklers have been replaced since the original installation. Throughout the occupied areas, there are all types of heads used, from exposed to recessed and concealed type heads. The sprinkler entrance serving the building is located at the North and South sides of the facility (Mechanical Photos 26-28).

Manual dry type standpipes with hose connections are located in the stairwells and on the roof. These require water from a fire department pumper truck to be pumped into the piping to meet the flow and pressure demands. High-rise buildings typically require an automatic standpipe in the stairs and on the roof with 2-1/2" hose connections. There are 4 locations, each at a stair tower, to connect to theses systems from the exterior of the building (Mechanical Photo 29).

10. Mechanical Analysis

The ages of the mechanical systems at Mercy Capitol are shown below in Table 1 along with the typical or median life for mechanical equipment. The median equipment life indicated is based on the average service life documented by ASHRAE, the American Society of Heating, Refrigerating, and Air Conditioning Engineers.

REFER TO REVISED COST OPINION AT END OF REPORT

MECHANICAL, PLUMBING AND FIRE PROTECTION REPAIR / REPLACEMENT
PRIORITIZATION AND OPINION OF PROBABLE COST

SYSTEM	ITEM	PRIORITY A = Immediate B = Year 1-5 C = Year 5-10	PROBABLE COST* (2009 dollars)	REMARKS
Heating and Cooling Plants	Chiller	B	$300,000	Replace (2) 210 ton chillers with (1) 300 ton chiller. Provide new pumping, piping, and cooling tower for chiller.
	Cooling Towers	B	$200,000	Replace (2) old towers on existing 300 ton chillers with new cooling towers.
		A	$80,000	Replace existing PVC fill on current cooling towers for improved performance and capacity.
	Connect CHW to State central plant	C	Unknown	Closest location to tap into State central plant is not known, as well as capacity of existing system.
	Heating Water System	A	$10,000	Replace worn out gaskets on converters and old pump seals to fix leaks in system
Air Handling and Air Distribution	Air Distribution	C	**	Fix duct leaks, close holes, balance system. Scope not known.
	Air Handling, Air Distribution	A	$1,100,000 - $1,600,000	North Wing Unit: Replace constant volume radiant ceiling panel system with a VAV system to provide the minimum outside air required for office occupancy, and provide return air ductwork back to new air handler.
		B	$500,000 - $750,000	100% OA West Wing Unit: Retrofit constant volume system with a VAV system sized to provide the minimum outside air required for office occupancy, and revise air paths to allow for return air back to air handlers. Revise exhaust from existing patient bathrooms areas to maintain pressurization.
		B	$400,000 - $600,000	West Wing Unit: Retrofit constant volume system with a VAV system sized to provide the minimum outside air required for office occupancy, and rebalance return air for new outdoor air requirements.
		A	$300,000 - $500,000	1950's Penthouse Units: Replace existing smaller units with one larger VAV air handler to reserve spaces.
		C	$750,000 - $1,000,000	East Wing Unit: Retrofit with a dual duct VAV system sized to provide the minimum outside air required for office occupancy.
	Controls	B	**	Fix compressed air leaks. Check dampers and replace broken actuators. Scope not known.
		C	Unknown	Full conversion of control system from pneumatic to DDC.
	Computer room HVAC	C	$45,000	Replace system with newer system sized for increased cooling loads and energy efficiency.

REFER TO REVISED COST OPINION AT END OF REPORT

Continued **SYSTEM**	**ITEM**	**PRIORITY** **A = Immediate** **B = Year 1-5** **C = Year 5-10**	**PROBABLE COST*** (2009 dollars)	**REMARKS**
Plumbing	Domestic Water Piping	B	**	Ongoing replacement of piping when leaks occur or during remodels. Insulate piping. Scope not known.
	Sewage ejectors	A	$10,000	Repair to fix odor issues with existing system.
	Group Restrooms	A	$75,000	Provide new domestic service to gang restrooms to serve office occupancy instead of multiple single toilet rooms.
	Hot Water Heater	B	$50,000	Provide new instantaneous water heaters for domestic system to replace steam to hot water storage tanks.
Fire Protection	Fire Sprinkler	B	$200,000	Replace heads over 50 years old, replace or test dry heads over 10 years old. Check head temperature ratings conform to current use of spaces.
		A	Unknown	Modify fire protection layout as required for renovation to existing spaces.

** Cost Opinion Disclaimer*
The Architect/Engineer, as design professionals familiar with the construction industry, has prepared this opinion of the Probable Cost of Construction. It is recognized, however, that neither the Architect/Engineer nor the owner has control over the cost of labor, materials, or equipment, over the Contractor's method of determining bid prices, or over competitive bidding market, or negotiated conditions. Accordingly the Architect/Engineer cannot and does not warrant or represent which bids or negotiated prices will not vary from the Probable Cost of Construction.

*** Costs associated with these items will be a factor of the overall size of the renovated area.*

Hospital Corridors: 80 Pounds per square foot
Hospital Patient Suites: 40 Pounds per square foot
Office Corridors: 80 Pounds per square foot
Offices: 50 Pounds per square foot
Light Warehouse Storage: 125 Pounds per square foot

In general, the design criteria between both uses are very near the same and adaptive re-use of the building as office space is reasonable based on this comparison. However, spaces targeted for storage should be evaluated on a case by case basis to calculate actual loading limits. Storage densities can vary immensely causing a wide range of additional structural loading. Thus it is important to identify the materials to be stored and in what quantities so that a proper analysis can be performed to maintain public safety and the structural integrity of the system.

10. Safety

This facility was reviewed regarding general building safety. Many rules and regulations are associated with building safety and are beyond the intent of this evaluation; however with respect to this existing facility, three general areas were considered: means of egress, separation of spaces, and vertical circulation (stairs and elevators).

Means of Egress: Modern building codes define means of egress as a continuous and unobstructed path of vertical and horizontal egress travel from any occupied portion of a building to a public way. A means of egress consists of three separate and distinct parts:

EXIT ACCESS – The portion of a means of egress system that leads from any occupied portion of a building to an exit

EXIT – The portion of a means of egress system which is separated from other interior spaces of a building by fire-resistance-rated construction that provide a protected path of egress travel between the exit access and the exit discharge. Exits include exterior exit doors at ground level, exit enclosures, exit passageways, exterior exit stairs, exterior exit ramps and horizontal exits.

EXIT DISCHARGE – The portion of a means of egress system between the termination of an exit and a public way.

The intent being, in the event of an emergency, every occupant will have access to at least 2 exit paths in case one is blocked. The exit path should provide continuous protection against smoke and fire from the time the individual enters the exit system until they leave the building buying them valuable time to safely evacuate the premises. The 2006 International Building Code does not require corridors in a Business (B) occupancy to be fire rated if the building is sprinklered. However, exit access must be arranged such that there are no dead ends in corridors more than 50 feet in length, for a B occupancy that is sprinklered. This is to avoid having occupants backtrack after they have gone some distance down a corridor before discovering that there is no exit or exit-access doorway at its end.

Separation of Spaces: Certain building uses are required to be separated from other building uses by utilizing construction that has a minimum fire rating to help slow the spread of fire. As a hospital, the Life Safety Code required separation/protection around several functions considered “hazardous areas,” such as soiled linen rooms, storage rooms larger than 100 square feet, etc. Table 508.3.3 in the 2006 IBC indicates that there is no requirement for separation between a B occupancy and S-1 (storage) occupancy. However, some single-occupancy buildings are required to use fire barriers to divide the building into different fire areas. This separation may be required due to total building area, type of construction, or travel distance. In this facility, there are 3 fairly distinct masses (North Wing, East Wing, and West Wing) which are separated from each other by 2-hour fire barriers with 90-minute fire-rated doors that create horizontal exits. Each wing has two sets of stairs, which are isolated with a two-hour fire rating and 90-minute fire-rated doors, and each wing has its own pair of elevators. Elevators and other shaft enclosures are required to have a 2 hour fire rating where connecting four stories or more and a 1 hour fire rating where connecting less than four stories.

Stairs: As noted above, the stairs appear to be fire-rated, with 90-minute fire rated doors as required. The east 2-story stair near the freight elevator has had some water damage which has caused rusting at the bottom of the stringers at basement level (see photos labeled “Architectural Basement_0007” and “Architectural Basement_0008”). Stairs appear to be appropriately sized for required egress width; however, most of them do not have the handrail extensions currently required by code.

Elevators: Load tests have been performed monthly on the elevators; Ziegler has been responsible/contracted for the preventative maintenance program. There are (3) Otis elevators (1 – 1950’s vintage and 2 – 1960’s vintage), (2) 1970’s vintage Montgomery elevators, and several 1980’s vintage Dover elevators (2 – passenger, 1 – freight, and 1 – special car to serve Surgery to ICU between 3rd and 5th floors). The two core elevators should be replaced, as they could potentially fail at any time. However, for the time being, they are functioning. Containment may need to be added at the elevator pit, and safety stops need to be upgraded by July 2011.

Taking a holistic view of this facility, one can quickly see the value of approximately 300,000 square feet of real estate so near the Capitol Complex. For the most part, this facility can operate in a satisfactory manner providing potential usable space for business occupancy. While some of the features and amenities are dated, this facility is prime location for office space for various governmental departments. With that said, we offer the following recommendations for improvement, helping sustain the viability of this facility for continued operations through a safer operating environment.

Recommendations to improve safety:

1) Immediate: Eliminate dead-end corridors that exceed 50 feet.
2) Immediate and Year 1-10: Fire caulk all miscellaneous penetrations at fire-rated walls.
3) Immediate: Maintain existing elevators
4) Year 1-10: Replace 2 core elevators.

11. Accessibility

This facility was reviewed regarding general handicap accessibility. All public access buildings are required to adhere to the guidelines set forth by the Americans with Disability Act (ADA). The primary goal of the ADA is to eliminate architectural barriers so that patrons and employees with disabilities may have clear access to all the public areas of the facility. While these regulations permit existing structures to continue operation under “grandfather” clauses, it is the responsibility of the building owner to reasonably address the removal of architectural barriers to reduce the risk of civil suit being brought against the building owner.

Existing buildings are to comply by removing “architectural barriers” as much as possible, when this is readily achievable. This effort, in theory, is to be ever on-going until all the barriers are removed. When barriers cannot be removed, equivalent facilitation is allowed.

Having been a functioning hospital until very recently, the building is, in large part, an accessible facility. With the exception of a ramp at the west entrance, we have observed that the primary public entrances to the facility are accessible at the point of entrance. Elevators provide accessible access to each main public level of the building. Corridors are excessively wide (8’-0”) for an office building. There are, however, a few areas that do not meet ADA requirements.

Elevation Changes: We observed a few minor elevation changes in the facility; most of these occur in primarily service/mechanical areas that are not open to the public. Also, in the Medical Education Conference room on Second Floor, there are a few steps up into a projection room that is not accessible. One floor elevation change that the public would encounter is just inside the west entrance vestibule. At this location, there is a ramp which drops 2’-9- ½” from the entrance at grade down to the main ground level elevation. The slope does not exceed the maximum allowable slope of 1:12, but the rise does exceed the maximum rise for any run of 30”, although only by 3-1/2”. Also, according to the accessibility guidelines, the handrails on each side of the ramp should extend at least 12” beyond the top and bottom of the ramp segment. At this ramp location, the handrails stop at the end of the ramp, except where it is continuous at the southeast corner. The fully-compliant solution would be to overbuild to create a 5’-0” landing at the midpoint and extend the ramp to the east. However, as it stands now, the current ramp falls in the category of “Legal – Non-conforming” and may continue in use until such time that more than 50% of the value of the building has been renovated.

Restrooms: From an accessibility standpoint, the facility can be greatly improved by introducing a set of accessible Men’s and Women’s Restrooms on each level and providing accessible drinking fountains on each level. As a hospital, the existing building currently has a multitude of toilet rooms. However, most of them are in patient rooms and most of them are not accessible/ADA-compliant. In the conversion to an office building, the patient room plumbing fixtures will be removed and capped, leaving the building without a sufficient number of restrooms. To function as an office building, and meet code requirements, accessible/ADA-compliant multi-stall public restrooms will need to be added on an accessible route on each floor. Wherever possible, stacking these restrooms vertically on each floor would help consolidate rerouted building utilities. Any renovated areas should meet and maintain accessibility guidelines.

Drinking Fountains: In general, drinking fountains in the facility do not meet the requirements for persons using wheelchairs. In new construction, accessible drinking fountains are required to be positioned for a forward approach with clear floor space, including knee and toe clearances. Most of the drinking fountains in the facility are semi-recessed and do not have the knee clearance required. Since this is an existing facility, the administrative authority may allow a parallel approach centered on the drinking fountain. However, it is our recommendation, that new compliant drinking fountains be installed on each level.

Other Architectural Barriers: In addition, whenever any architectural barriers are encountered, every effort should be made to remove those barriers. Accessible routes should be provided on every level. Elevation changes should be eliminated where possible. Protruding objects should systematically be relocated or eliminated. As previously mentioned, accessible door hardware should be installed on every door. New doors in renovated areas should maintain 12 inches clear of the latch on the push side and 24 inches clear of the latch on the pull side. Depending on the configuration, wheelchair approach minimums should be provided (see Americans with Disabilities Act Accessibility Guidelines). All newly installed handrails and guardrails should comply with the Americans with Disabilities Act Accessibility Guidelines. All newly renovated spaces should comply with the Americans with Disabilities Act Accessibility Guidelines.

Recommendations to improve accessibility:

1) Immediate: Add public restrooms and drinking fountains in Phase 1 – 2010 tenant spaces.
2) Year 1-5: Add public restrooms and drinking fountains in Phase 2 – future tenant spaces
3) Year 5-10: Overbuild existing ramp to meet current code requirements for maximum rise.
4) Immediate and ongoing: Annual barrier removal campaign.

REFER TO REVISED COST OPINION AT END OF REPORT

IMPROVEMENTS PRIORITIZATION AND OPINION OF PROBABLE COSTS

ARCHITECTURAL SYSTEMS REPAIR / REPLACEMENT PRIORITIZATION AND OPINION OF PROBABLE COST

SYSTEM	ITEM	PRIORITY A = Immediate B = Year 1-5 C = Year 5-10	PROBABLE COST* (2009 dollars)	REMARKS
Building Entrance	Add site features to demarcate entrance	B	$5,000	
	New entrance and canopy	B	$50,000	
Windows	Replace leaking windows in north wing	A	$50,000	
	Replace remainder of windows in north wing	B	$50,000	
	Add fenestration in east and west wings	C	$300,000	
Exterior Painting	Allowance for selective painting	B	$150,000	
Wayfinding	Interior signage – arterial/egress corridors, all levels	A	$10,000	
	Concierge desk/lobby remodel	B	$25,000	
Security and Door Hardware	New cylinders and accessible levers (Allowance for approximately 500 doors)	A	$100,000	
Conversion to office space/Space utilization	Add wall and double-egress doors on 2nd floor to create east suite	A	$3,000	
	Remove patient toilet rooms and convert to office space at North Wing - 2nd level, 3rd level, and 4th level	B	$300,000	
	Remove patient toilet rooms and convert to office space at West Wing – 2nd level, 3rd level, and 4th level	B	$100,000	
	Miscellaneous Renovations – Phase 1	A	$150,000	
Interior Finishes	New finishes for 2nd level – north wing	B	$500,000	
	Miscellaneous Renovations/Finish Upgrades – Phase 2	B	$150,000	
Asbestos Abatement	Ongoing effort to remove asbestos as encountered – Annual Budget	A-C	$2,000	
Safety	Eliminate dead-end corridors	A	$10,000	
	Fire caulk all penetrations in fire-rated walls – Annual Budget	A-C	$1,000	
	Replace two core elevators	C	$250,000	

REFER TO REVISED COST OPINION AT END OF REPORT

ARCHITECTURAL SYSTEMS REPAIR / REPLACEMENT PRIORITIZATION AND OPINION OF PROBABLE COST (Continued)

SYSTEM	ITEM	PRIORITY	PROBABLE COST* (2009 dollars)	REMARKS
Accessibility	Add 5 pairs of restrooms and drinking fountains for Phase 1 – 2010 tenant spaces; East, West, and North Wings	A	$287,500	
	Add 8 pairs of restrooms and drinking fountains for Phase 2 – future tenant spaces; East, West, and North Wings	B	$460,000	
	Create compliant ramp	C	$3,000	
	Ongoing effort for the removal of architectural barriers – Annual budget	A-C	$1,500	

** Cost Opinion Disclaimer*
The Architect/Engineer, as design professionals familiar with the construction industry, has prepared this opinion of the Probable Cost of Construction. It is recognized, however, that neither the Architect/Engineer nor the owner has control over the cost of labor, materials, or equipment, over the Contractor's method of determining bid prices, or over competitive bidding market, or negotiated conditions. Accordingly the Architect/Engineer cannot and does not warrant or represent which bids or negotiated prices will not vary from the Probable Cost of Construction.

B. Mechanical Systems

There are three main mechanical systems serving the facility. These are separated into the North, East, and West Wings of the facility. There is a central chilled water plant and steam heating converters above the East Wing. The heating water converters in this room serve only the East Wing. The chilled water plant serves the entire facility. There are steam heating water converters in the West Wing penthouse serving that area of the facility. A central boiler plant is located above the North Wing that supplies steam to the entire facility. The North Wing penthouse also contains steam heating water converters to serve that respective area of the facility.

The following analysis and recommendations are our professional opinions based on our visual field observations and discussions with Bob Hagins, Maintenance Director for the Mercy Capitol Complex.

1. Cooling System

The chilled water cooling system consists of four chillers manufactured by the Trane Company, two 300 ton and two 210 ton . (Mechanical Photos 1-3). The chillers have had regular wintertime inspections and maintenance. The condenser tubes are rodded out annually, while the evaporator tubes are cleaned every three years.

The chillers are all R-11 refrigerant machines. This refrigerant is no longer manufactured, and the standard drop-in replacement refrigerant, R-123, is also on a phase out schedule. The 210 ton chillers are roughly 27 years old, while the 300 ton units are 23 years old. The median life expectancy for centrifugal chillers based on ASHRAE research is 25-30 years. This puts these units on the back end of their useful life. For future planning, the replacement of these units should be considered for environmental, energy and maintenance reasons.

Each chiller has its own cooling tower (Mechanical Photo 4). The towers serving the two 210 ton chillers are manifolded together; the two towers for the 300 ton chillers are independent. Tower 4 is tied into a free cooling heat exchanger to generate chilled water in the winter season. This plate and frame exchanger appears to be in good condition and has functioning properly (Mechanical Photo 5). The cooling towers appear to be in fair condition. The PVC fill in the towers is old and brittle, and should be replaced (Mechanical Photo 6). Replacing the fill should improve the towers capacity and keep the towers operational for some time. Replacement of the cooling towers should be considered when the chillers are replaced. The cooling tower fan motors and bearings have received regular maintenance and are in good condition. The gear housings have been replaced in the past for the towers.

The chilled water pumps in the central plant are controlled by variable frequency drives. The drives on three of the pumps have invertors that have failed, so they have been placed in bypass mode. These drives would need to be replaced for the system to operate most effectively and efficiently. The condenser water pumps have been rebuilt in the past year and run very smoothly (Mechanical Photo 7).

2. Heating System

Steam is provided to the facility from three Superior Mohawk scotch marine boilers, located in the North Wing penthouse (Mechanical Photo 8). Two of the boilers were installed in 1976 and the third in 1982. All three have had the burner assemblies replaced since the original installation. The units on the east and west have Gordon-Piatt burners, while the center unit has a Power Flame burner. The burners have dual fuel capability, with natural gas as the primary fuel, with a fuel oil system as a backup (Mechanical Photo 10)

All of the boilers are opened every summer for cleaning and inspection. The boiler feed water and deaerator tank assembly is relatively new, being replaced about 5 years ago when Mercy purchased the building (Mechanical Photo 9)

Also in the North Wing boiler room are two steam to heating water converters. The converters supply heating water to radiant panels, cabinet unit heaters, duct heating coils and all other associated heating water items in the North Wing. The heating water pumps associated with the system appear to be in good condition (Mechanical Photos 11 & 12).

The heating water converters located in the East Wing penthouse serve that wing of the facility. All of the heating equipment for this system is original to the building (1980's). The converters leak when first started, and drip over the winter. The insulation is original as well, and has deteriorated in some areas (Mechanical Photo 13).

The West Wing penthouse has three steam to hot water converters. One serves the reheat coils in the wing, while the other two serve the perimeter convectors and fin tube (Mechanical Photo 14). All of these converters are original to the West Wing addition to the hospital (1960's).

3. Air Handling Systems

There are 5 main air handling systems serving the Mercy Capitol facility, with several other smaller systems in the oldest part of the building.

In the West Wing, there are two large air handling units on the Fifth Floor. These units serve all of the former patient rooms through the West Wing. One of the units is a 100% outside air unit with a heat recovery loop. This same unit has had the main bearings replaced about 7-8 years ago. The other unit in this space has had the main chilled water coil and drain pan replaced within the last 8 years. Both units are in generally good condition (Mechanical Photo 15).

There are several small air handling units that serve isolated spaces throughout the West Wing. These units are located in a penthouse constructed in the 1950's. One unit serves the former lab area. This unit has a run around heat recovery loop from the lab exhaust and an inline vane axial fan that is incredibly noisy (Mechanical Photo 16). . The lab unit is the only air handling system cooled by a rooftop condensing unit. The condensing unit is located outdoors directly east of the penthouse. All the other units in this penthouse are served from the central chilled water system. They were dedicated to the former labor/delivery room, surgery, and x-ray areas of the hospital. All of the air handling units in this penthouse are well past there useful life and should be replaced or have the areas served by a different system.

The East Wing is served by a large built up dual duct air handling unit (Mechanical Photo 17). This unit is in very good condition, and has a significant amount of capacity. The hot deck, cold deck, and return fans are all on variable speed drives. These drives have been replaced recently and are in good operating condition. The heating water valve for this unit leaks in the winter, and needs to have the packing replaced. The chilled water valve is also in need of repacking.

The upper floors of the North Wing are served by a large draw thru air handling system manufactured by Trane. (Mechanical Photo 18). This unit serves Floors 2 through 4, and is a 100% outside air unit with a heat recovery loop. The coils in the unit are quite dirty and scaled up, but the rest of the unit is in good shape for its age.

The other unit in the North Wing is the dietary air handling unit (Mechanical Photo 19). This unit is located on a mezzanine above the Ground Floor area. This unit, manufactured by Trane, is a constant volume system with an energy recovery loop, heating water coil, chilled water coil and supply and exhaust fan. The unit is in fairly good shape, with only a slight vibration from the fan system. The vibration could be an indication of bad bearings, an unbalanced fan wheel, or a shaft out of alignment.

4. Air Distribution System

Being installed at different times, each wing of the hospital incorporates different air distribution strategies.

The North Wing unit serving the upper floors is a constant volume draw thru unit with an energy recovery loop, a wing type heating coil, and a cooling coil. This unit serves the main distribution ductwork down through a chase to the three floors of patient rooms below. The ductwork supplies the ventilation air for the spaces, while each room is supplemented by radiant ceiling panels to handle the room loads (Mechanical Photo 20). The radiant ceiling panels are used for both heating and cooling. The exhaust for the wing is ducted back to the North Wing penthouse and through the exhaust side of the energy recovery loop before being vented from the building.

The East Wing unit is a built-up dual duct system. This variable volume unit is a two level unit, with hot deck and cold deck supply ductwork, and return ductwork from the spaces. The unit has an energy recovery loop, cooling coil, heating coil, prefilters, final filters, return fan, and hot and cold deck supply fans. The main supply ductwork is fed through chases to the entire East wing, where at terminal units the hot and cold supply streams are mixed to temper the air to the individual spaces. The exhaust for this wing is ducted out through an energy recovery unit in the East Penthouse. The distribution ductwork for this wing is in good shape, and should be able to be re-used for serving the reprogrammed spaces.

The West Wing has several air handling systems. The first is a constant volume 100% outside air unit in the fifth floor mechanical room. This unit has an energy recovery loop, chilled water and steam heating coil, with supply and exhaust fans. This unit serves the patient areas of the West Wing. The main distribution ductwork is served to the spaces where terminal reheat coils temper the air to the spaces. These rooms also have perimeter heaters, either fin tube or unit heaters, to help with the heating load in the space (Mechanical Photo 21).

The second unit in the Fifth Floor West Wing mechanical room is a constant volume system very similar to the first unit, only not a 100% OA unit. This unit serves the Ground and First Floor areas of the West Wing, as well as some interior spaces on Floors 2 through 4. This unit also has terminal heating coils in the distribution ductwork for zone control.

The last unit serving the West Wing is a small air handling system located in a closet on the First Floor near the north elevators. This unit was added when the lobby area was expanded during the addition of the East Wing.

The smaller units in the 1950's penthouse serving the isolated areas in the West Wing are constant volume package systems with steam heating coils, cooling coils, and supply fans. All of these units are well past their expected life and need to be replaced. Most of them are showing clear signs of aging, and with the isolated spaces they serve, would not have much usefulness as the retrofit proceeds.

5. IT Room Units

There are several split system Liebert units in the hospital that were installed to handle the high heat generation of the computer spaces. There are two units that serve the basement IT room that will remain in service to cool the Mercy IT computers that are to remain in the facility. There is another unit that served the former Cath lab that has been tripping on high head pressure, and has been disabled. There were also two other units serving the CAT scan and 5th floor wound care. These units will no longer be needed with the removal of the medical equipment.

6. Toilet Exhaust

Since this was hospital occupancy, there are no large public toilet areas on the floors. Most restroom facilities were dedicated to each patient room with some small public/staff toilets located throughout the non-patient areas. The exhaust air from the restrooms was gathered into a main exhaust riser in each wing and ducted back to the air handlers to be used with the energy recovery systems.

7. Controls

The controls and valve and damper operators appear to be pneumatic throughout the entire facility. In each area, these are served by a dedicated air compressor in the wing. With most rooms out of operation during the walk through, the space temperature controls have not been tested for proper operation.

8. Domestic Water and Sewer

The domestic hot water is provided by tank storage heaters in each wing. In the North Wing, there are two tanks serving this area of the facility (Mechanical Photo 22). The larger tank serves the domestic hot water needs for the wing. The smaller tank serves just the dishwasher in the food service area. The larger unit should have more than adequate capacity for the new space program once the State moves into the facility. The smaller unit may not be needed if a dining facility does not remain in the building.

The other two wings have their own set of water storage heaters to provide the domestic hot water for their area (Mechanical Photos 23 & 24).

Water pressure in the restroom sinks appeared to be adequate. Toilets and urinals are flush valve type.

The Culligan water softening equipment is located in the North Wing, and is primarily used to soften the boiler feed water, as well as the domestic hot water storage tanks (Mechanical Photo 25).

There are two sewage ejectors in the facility to lift sewage from the basement to the city sewer system. One is in the North Wing; the other is in the East Wing. There currently is an odor issue with one of the ejectors, as noted to us by Bob Hagins from Mercy.

Domestic water supply and sanitary waste piping is of various ages and material. The pipe is located behind walls and has not been verified as to the condition of the entire system. Any changes and modifications made to the system may cause leaks or expose existing damage that will need to be addressed.

9. Fire Protection

The facility is sprinkled throughout with a wet pipe fire suppression system for the majority of the building. The majority of the sprinklers have been replaced since the original installation. Throughout the occupied areas, there are all types of heads used, from exposed to recessed and concealed type heads. The sprinkler entrance serving the building is located at the North and South sides of the facility (Mechanical Photos 26-28).

Manual dry type standpipes with hose connections are located in the stairwells and on the roof. These require water from a fire department pumper truck to be pumped into the piping to meet the flow and pressure demands. High-rise buildings typically require an automatic standpipe in the stairs and on the roof with 2-1/2" hose connections. There are 4 locations, each at a stair tower, to connect to theses systems from the exterior of the building (Mechanical Photo 29).

10. Mechanical Analysis

The ages of the mechanical systems at Mercy Capitol are shown below in Table 1 along with the typical or median life for mechanical equipment. The median equipment life indicated is based on the average service life documented by ASHRAE, the American Society of Heating, Refrigerating, and Air Conditioning Engineers.

REFER TO REVISED COST OPINION AT END OF REPORT

MECHANICAL, PLUMBING AND FIRE PROTECTION REPAIR / REPLACEMENT
PRIORITIZATION AND OPINION OF PROBABLE COST

SYSTEM	ITEM	PRIORITY A = Immediate B = Year 1-5 C = Year 5-10	PROBABLE COST* (2009 dollars)	REMARKS
Heating and Cooling Plants	Chiller	B	$300,000	Replace (2) 210 ton chillers with (1) 300 ton chiller. Provide new pumping, piping, and cooling tower for chiller.
	Cooling Towers	B	$200,000	Replace (2) old towers on existing 300 ton chillers with new cooling towers.
		A	$80,000	Replace existing PVC fill on current cooling towers for improved performance and capacity.
	Connect CHW to State central plant	C	Unknown	Closest location to tap into State central plant is not known, as well as capacity of existing system.
	Heating Water System	A	$10,000	Replace worn out gaskets on converters and old pump seals to fix leaks in system
Air Handling and Air Distribution	Air Distribution	C	**	Fix duct leaks, close holes, balance system. Scope not known.
	Air Handling, Air Distribution	A	$1,100,000 - $1,600,000	North Wing Unit: Replace constant volume radiant ceiling panel system with a VAV system to provide the minimum outside air required for office occupancy, and provide return air ductwork back to new air handler.
		B	$500,000 - $750,000	100% OA West Wing Unit: Retrofit constant volume system with a VAV system sized to provide the minimum outside air required for office occupancy, and revise air paths to allow for return air back to air handlers. Revise exhaust from existing patient bathrooms areas to maintain pressurization.
		B	$400,000 - $600,000	West Wing Unit: Retrofit constant volume system with a VAV system sized to provide the minimum outside air required for office occupancy, and rebalance return air for new outdoor air requirements.
		A	$300,000 - $500,000	1950's Penthouse Units: Replace existing smaller units with one larger VAV air handler to reserve spaces.
		C	$750,000 - $1,000,000	East Wing Unit: Retrofit with a dual duct VAV system sized to provide the minimum outside air required for office occupancy.
	Controls	B	**	Fix compressed air leaks. Check dampers and replace broken actuators. Scope not known.
		C	Unknown	Full conversion of control system from pneumatic to DDC.
	Computer room HVAC	C	$45,000	Replace system with newer system sized for increased cooling loads and energy efficiency.

REFER TO REVISED COST OPINION AT END OF REPORT

Continued **SYSTEM**	**ITEM**	**PRIORITY** **A = Immediate** **B = Year 1-5** **C = Year 5-10**	**PROBABLE COST*** (2009 dollars)	**REMARKS**
Plumbing	Domestic Water Piping	B	**	Ongoing replacement of piping when leaks occur or during remodels. Insulate piping. Scope not known.
	Sewage ejectors	A	$10,000	Repair to fix odor issues with existing system.
	Group Restrooms	A	$75,000	Provide new domestic service to gang restrooms to serve office occupancy instead of multiple single toilet rooms.
	Hot Water Heater	B	$50,000	Provide new instantaneous water heaters for domestic system to replace steam to hot water storage tanks.
Fire Protection	Fire Sprinkler	B	$200,000	Replace heads over 50 years old, replace or test dry heads over 10 years old. Check head temperature ratings conform to current use of spaces.
		A	Unknown	Modify fire protection layout as required for renovation to existing spaces.

** Cost Opinion Disclaimer*
The Architect/Engineer, as design professionals familiar with the construction industry, has prepared this opinion of the Probable Cost of Construction. It is recognized, however, that neither the Architect/Engineer nor the owner has control over the cost of labor, materials, or equipment, over the Contractor's method of determining bid prices, or over competitive bidding market, or negotiated conditions. Accordingly the Architect/Engineer cannot and does not warrant or represent which bids or negotiated prices will not vary from the Probable Cost of Construction.

*** Costs associated with these items will be a factor of the overall size of the renovated area.*

C. Electrical Systems

1. Lighting

Lighting throughout the building is generally provided by use of fluorescent fixtures with four foot lamps. Lamp types vary and include 40 watt T12 lamps, 34 watt energy saving T12 lamps, and 32 watt T8 lamps. A mass retrofit of lighting to T8 systems has not been done, but T8 lamps have been installed in areas of recent remodeling. Approximately 50% of the lighting in the building utilizes T12 lamps. The lamps also appear to be of differing Kelvin temperatures giving the light in some areas inconsistent color.

Incandescent lighting is in limited use in the building. It is typically used in waiting areas or conference rooms where dimming is necessary.

Fixtures are generally in good condition. Typical problems include sagging lenses as in the second floor of the West wing, discolored lenses were found on the third floor of the West wing, and a few broken lenses throughout the building.

In existing office spaces, illumination levels are adequate for continued use of that type.

In the existing patient rooms throughout the building lighting is typically provided by wall mounted fluorescent fixtures at the head of the bed. Rooms in the North wing of the building do not have any ceiling mounted fixtures due to the radiant heating system. In the West and East wings, single patient rooms have one ceiling mounted fixture, and two ceiling mounted fixtures are in double patient rooms. In all cases, the illumination levels provided by the existing lighting are considerably below the design recommendations for an office space.

Lighting is controlled by standard wall switches. Occupancy sensor control was only found in the operating rooms on the third floor of the East wing. In some patient rooms on the second floor of the North wing, the only light switches are in the headwall units. When the headwall is removed to convert the space for office use, there will be not switch for control of the fixtures.

Emergency lighting is provided by connection of general area lighting fixtures to the life safety branch of the emergency power system. The fixtures do not contain batteries.

Exit lighting in the building is adequate, but similar to the emergency lighting, individual fixtures are connected to the life safety branch of the emergency power system and do not contain batteries.

2. Power and Distribution

Electric Service

The main electric service for the building located in the West wing of the building and is provided by two utility company transformers located on the site outside of the electric room. Each transformer feeds to a dedicated 3000A main circuit breaker with a tie circuit breaker between them. The three breakers are key intelocked such that the two transformers cannot be paralleled together, however opening of one main and closing of the tie permits both services to be energized from a single transformer.

The mains feed overhead to distribution sections on the north wall of the electric room by way of feeder busway. As installed, there is approximately 3-1/2 feet between the panels on the north wall and the transfer switches on the south wall. While this working clearance meets the minimum code requirements, gear of this rating requires two exits from the working space. At this time there are two exits but both are at west end of the working space. If a person was working at the east end of the gear they could be trapped if a fire occurred at the opposite end of the gear.

Each main circuit breaker has associated analog volt and ammeters, however it appears that the meters on the ‘A’ service are not working properly. In particular, the volt meter gave readings considerably lower than the voltage level of the service. Other readings appeared to be in the range expected but were not verified.

The main service gear is Westinghouse Powerline series and was installed new with the construction of the East wing of the building in the 1980’s. The gear appears to be in good condition. Although Westinghouse no longer manufactures electrical panels and equipment, replacement parts are available through Cutler-Hammer.

Distribution Rooms

There are three rooms with major distribution for the building. These coincide with the different additions to the building. The oldest is located on the first floor in the West wing in a dedicated room near the elevators. The equipment is manufactured by Square D and is rated 1000 amperes, 120/208 volts, 3-phase. The gear is used for distribution of power to the West wing of the building. The gear is original to the construction of this part of the building and appears to be in good condition. There is a 750 kva dry type transformer in the adjacent room which serves this distribution gear. The transformer is fed from the distribution equipment in the North wing Ground floor room.

The second oldest is located on the Ground floor in the North wing of the building. The equipment is manufactured by Kinney and is rated 1600 amperes, 277/480 volts, 3-phase. This gear serves power to the North wing and the West wing. The gear is original to the construction of the North wing and appears to be in good condition. While Kinney is not a prevalent manufacturer of electrical equipment in this area, they are still producing equipment and replacement parts are available. This gear is fed directly from the main service gear in the West wing of the building.

The newest is located in the electric service room in the West wing of the building and is part of the main service gear. This gear was installed at the same time as the service gear and is in comparable condition.

Branch Panels and General Distribution

Branch panels throughout the building are generally original to construction of the wing in which they are located. However, there has been some addition and replacement of panels in remodeled areas. In general, panels in the North and East wings of the building are in good condition.

The panels in the West wing of the building are 40 to 50 years old. While no problems with these panels were reported by hospital staff, and age alone does not indicate a panel should be replaced, this part of the building will likely be the first experience problems in the future.

The oldest dry type transformers in the building were installed when the North wing was constructed in the 1970's. While not all transformers were observed, those that were are generally operating acceptably. There are two large transformers in the building. One is a 750 kva unit serving the West wing distribution gear on the First floor. This transformer was cool to the touch. The other large transformer is a 300 kva unit located in the North wing distribution room. At the time of observation, this transformer was hot to the touch. Another hot 15 kva transformer was found in an electric closet on the fourth floor in the West addition. In both cases, the high temperature is possibly due to high loading or excessive harmonic currents caused by electronic power supplies or electronic fluorescent lighting ballasts.

Outlets throughout the building are generally in good condition. Noted exceptions are in the first floor of the West wing where a number of outlets were observed to have broken faces around the ground pin, and on the second floor of the West wing where outlets are discolored.

In patient rooms on the second, third, and fourth floors of the North and West wings, power outlets are generally installed in headwall units. There are few, if any, other power outlets installed in other walls of these spaces. When the headwall units are removed to prepare the space for office type use, there will be inadequate numbers of outlets remaining.

3. Emergency Generators

There are two generators in the building with one located in the North wing and the second located in the West wing. The two generators serve two independent emergency power distribution systems. In the event that one generator does not start, there is an interconnection between the two units to allow one generator to serve both distribution systems. This is strictly a manual operation to make the cross connection and the generators cannot be operated in parallel.

West Wing

The generator in the West wing was installed with the construction of that wing. This generator is in a dedicated space adjacent to building electrical service. It is a Caterpillar diesel engine generator rated 750 kw, 277/480 volts, 3-phase. Ziegler Caterpillar has performed maintenance on the unit on a bi-annual basis since it's installation in the 1980's. The service tag indicates the last oil change was performed in December of 2008.

A load bank test was performed in June of 2006. The test report indicates that the engine would overheat and shut down if the load exceeded 80% of capacity. This was likely due to a high ambient temperature of over 100 degress during the test. At the time of this test, the running hour meter on the engine showed 1138 hours of operation.

What appeared to be an oil spot was noted on the floor at the radiator end of the engine. The spot may be from condensation at the crankcase ventilation.

The batteries appear to be well maintained and in good condition.

There are two Fenwal Halon fire protection system cylinders in the generator room. If these systems should discharge their gas they will have to be replaced with a system similar to the Fike Ecaro25 clean agent fire protection system.

North Wing

The generator in the North wing was installed with the construction of that wing. This generator is located in a shared room with the North wing electrical distribution room. It is a Caterpillar diesel engine generator rated 375 kw, 277/480 volts, 3-phase. Ziegler Caterpillar has performed maintenance on the unit on a bi-annual basis since it's installation in the 1970's. The service tag indicates the last oil change was performed in June of 2008.

A load bank test was performed in June of 2006. The test report indicates that the engine would overheat and shut down if the load exceeded 50% of capacity. While the ambient temperature was noted as 90 °F at the time of the test, other factors contributing to overheating may be a hot distribution transformer and an uninsulated engine exhaust system in the same room. At the time of this test, the running hour meter on the engine showed 2102 hours of operation.

What appeared to be an oil spot was noted on the floor at the radiator end of the engine. The spot may be from condensation at the crankcase ventilation.

The batteries appear to be well maintained and in good condition.

The day tank in the generator room sets on the floor and has a secondary containment barrier constructed from 4-inch thick concrete blocks. There is granular oil absorbent material between the tank and the secondary containment on the east side of the tank. No visible leaks were noted.

There are two chemical extinguishing systems in the north generator room. One is located directly behind the distribution gear along the north wall of the space. It is a Fike corporation Ecaro25 clean agent fire protection system. This gas is non-flammable pentofluoroethane which is water based and is safe for people and equipment. It has zero ozone depleting potential and can be used in occupied spaces. The other system is believed to be a Fenwal Halon system. If this system discharges, it will need to be replaced with a new system similar to the Fike system.

Fuel System

Fuel for both generators is stored in an underground tank on the north side of the building outside of the North wing generator room. The tank was installed in 1999 and is a double wall vessel with leak detection and fuel level indicating equipment located in the adjacent generator room. The tank is split into two 10,000 gallon compartments with one dedicated to the two generators, and the second compartment dedicated as backup fuel to the boilers.

At full load, the two generators combined would consume approximately 80 gallons of fuel per hour. The 10,000 gallons of fuel dedicated to the generators would provide about five days of operation at full load.

4. Fire Alarm

The main fire alarm control panel is a Simplex 4100U addressable system that was installed in 2002. The panel is located in the second floor mechanical space in the East wing of the building. When the Simplex panel was installed, it replaced an existing Notifier control panel that was located on Level 1 in the electrical distribution room for West wing of the building. The Notifier panel has had its interior removed and the box has remained for splicing and extension of fire alarm cabling to the new Simplex panel location. Although the Notifier panel was removed, the existing detectors and pull stations were left in place and interfaced to the new system by means of zone interface modules.

As currently configured, the Simplex system has cards installed to support 250 points. With installation of additional cards, the existing control panel can be expanded to a maximum of 2000 addressable points. If necessary, additional 4100 series panel may be networked with the existing one to expand beyond the 2000 point capacity of a single panel. The system also has (8) eight-zone cards serving 58 different zones throughout the building. The system does not have voice evacuation equipment installed, but it can be added.

In 2006, approximately 240 new addressable strobe and horn/strobe devices were installed to replace all such devices in the building. The addressable notification devices of this type offer an advantage when testing in that they can be tested individually rather than by putting the entire system or a given circuit into alarm.

Selected parts of the building still have original chime type devices to notify occupants of an alarm condition. This may be a concern since the chime is typically not as loud a device as the horn and the sound produced is not the same. Chimes typically are installed in surgical areas, patient wings, and similar spaces where loud noises would be a disturbance to patients and staff. These devices are not utilized in business occupancies as they do not produce an adequate sound pressure level to alert occupants. In addition to this mix, it was also noted that some of the installed notification devices do not meet the current fire alarm code with respect to their location in corridors.

While detection and notification devices are generally installed throughout the building, there are some areas of concern. As a business occupancy, this building would require a system of selective coverage for detection. This normally includes detection in corridors, storage rooms, other unoccupied spaces, and areas with identified hazards. As currently arranged, detection is lacking throughout the corridors of the building and relocation or addition of detectors may be necessary depending upon new uses of the space.

Three remote annunciators were found in the building. An LED zone annunciator panel is located in the Emergency department on the first floor of the East wing. A second digital LCD annunciator is located in the Reception and Admitting area on the first floor of the East wing. The third is an LED zone annunciator located in the Nurse station on the second floor of the North wing.

REFER TO REVISED COST OPINION AT END OF REPORT

ELECTRICAL OPINION OF PROBABLE COST

System	Location	Priority	Cost	Remarks
Lighting	Basement	C	$75,000	Very low priority, update all for gained energy efficiency and addition of occupancy sensor type control
	Ground Level	A	$20,000	Lighting replacement in miscellaneous spaces of emergency department for office use
		C	$230,000	Very low priority, update balance of floor for gained energy efficiency and addition of occupancy sensor type control
	Level 1	C	$85,000	Very low priority, update all occupied spaces for gained energy efficiency and addition of occupancy sensor type control
	Level 2	A	$80,000	Lighting additions in patient rooms for conversion to office use
		C	$90,000	Very low priority, update balance of floor for gained energy efficiency and addition of occupancy sensor type control
	Level 3	A	$85,000	Lighting additions in patient rooms and surgery for conversion to office use
		C	$100,000	Very low priority, update balance of floor for gained energy efficiency and addition of occupancy sensor type control
	Level 4	A	$38,000	Lighting additions in patient rooms for conversion to office use
		C	$75,000	Very low priority, update balance of floor for gained energy efficiency and addition of occupancy sensor type control
	Level 5	A	$10,000	Lighting additions in patient and exam rooms for conversion to office use
		C	$105,000	Very low priority, update balance of floor for gained energy efficiency and addition of occupancy sensor type control
Power	Basement	N/A	N/A	N/A
	Ground Level	A	$10,000	Additional power outlets in emergency department
		B	$90,000	Replacement of old distribution equipment in West wing
	Level 1	A	$5,000	Replacement of miscellaneous broken outlets

REFER TO REVISED COST OPINION AT END OF REPORT

System	Location	Priority	Cost	Remarks
		B	$90,000	Replacement of old distribution equipment in West wing
	Level 2	A	$30,000	Additional power outlets in patient rooms
		B	$60,000	Replacement of old distribution equipment in West wing
	Level 3	A	$30,000	Additional power outlets in patient rooms
		B	$70,000	Replacement of old distribution equipment in West wing
	Level 4	A	$21,000	Additional power outlets in patient rooms
		B	$40,000	Replacement of old distribution equipment in West wing
	Level 5	A	$5,000	Additional power outlets in patient rooms
		B	$40,000	Replacement of old distribution equipment in West wing
	Connect service to Capitol Complex HV loop	B or C	$75,000?	Assumed loop feed, (2) 1000 ft runs of #4/0 aluminum 15 kV cable, purchase of transformers from utility, splicing and termination
Fire Alarm	Basement	A	$5,000	Address corridor detector coverage, upgrade devices to addressable
	Ground Level	A	$25,000	Address corridor detector coverage, upgrade devices to addressable
	Level 1	A	$9,000	Address corridor detector coverage, upgrade devices to addressable
	Level 2	A	$17,500	Address corridor detector coverage, upgrade devices to addressable
	Level 3	A	$17,500	Address corridor detector coverage, upgrade devices to addressable
	Level 4	A	$14,000	Address corridor detector coverage, upgrade devices to addressable
	Level 5	A	$10,000	Address corridor detector coverage, upgrade devices to addressable
Generator	Emergency Power	N/A	N/A	N/A

** Cost Opinion Disclaimer*

The Architect/Engineer, as design professionals familiar with the construction industry, has prepared this opinion of the Probable Cost of Construction. It is recognized, however, that neither the

Architect/Engineer nor the owner has control over the cost of labor, materials, or equipment, over the Contractor's method of determining bid prices, or over competitive bidding market, or negotiated conditions. Accordingly the Architect/Engineer cannot and does not warrant or represent which bids or negotiated prices will not vary from the Probable Cost of Construction.

D. Roof Conditions and Recommendations

1. Roof Conditions and Recommendations

From a building materials standpoint the majority of the roof areas are in unsatisfactory condition and are at the end of their life cycle. The roof areas consist of Built-up, Ballast EPDM, Fully Adhered EPDM, and one EPDM with pavers to make a patio. All of the Built-up roofs are at the end of their life cycle and have been repaired many times. Also, a majority of the Ballast EPDM roofs are in poor condition. However, the following table is a breakdown of the deficiencies observed during our roof review:

1) Built-up Roof Systems Deficiencies:

- Item #1 Blisters in membrane shall be cut out and patched using a 2 ply APP modified system.
- Item #2 Cracks in built-up membrane shall be patched using a 2 ply APP modified system.
- Item #3 Cracked or tears in the flashing membrane shall be covered using a 2 ply APP modified system.
- Item #4 Flashing membrane delaminating from membrane along roof edge shall be reflashed using a 2 ply APP modified system.
- Item #5 Spots of exposed felts due to asphalt and pea gravel coating deterioration. These shall be covered using a 2 ply APP modified system.
- Item #6 Shrinkage of pourable sealer in pitch pans. These shall be refilled with pourable sealer.
- Item #7 Cracked or deteriorated sealant along termination bars or metal flashings shall be resealed.
- Item #8 Plant growth shall be removed and membrane patched as needed.
- Item #9 Ponding water on roof area 2.1 is due to not being designed to drain. This area shall have a scupper cut into roof edge to allow for drainage.

- Ballast EPDM Roof Systems Deficiencies:
  - Item #10 Lap sealant deterioration. Nothing shall be done
  - Item #11 Seams starting to delaminate shall be cover striped with six inch cover strip.
  - Item #12 Membrane ballooning from wind uplift shall have the ballast spread evenly back over area.
  - Item #13 Metal edge fasteners backing out shall be replaced with new fasteners and new six inch cover strip shall be installed along edge.
  - Item #14 Punctures and tears in membrane shall be cover striped.

  - Item #15 Deteriorated and cracking sealant at termination bars, metal flashings, and stone copings shall be resealed.
  - Item #16 Shrinkage of pourable sealer in pitch pans. These shall be refilled with pourable sealer.
  - Item #17 Punctures and tears in flashing membrane shall be patched with form flashing.
  - Item #18 Ponding water, this is an item that can be addressed with tapered insulation once roof area is replaced.
  - Item #19 Membrane shrinkage causing the membrane to be pulled from the wall shall be released of the stress, secured to the wall, and then be reflashed along wall.
  - Item #20 Insulation that is out of position from wind uplift on roof area 4. The membrane shall be cut open so the insulation can be repositioned and the membrane sealed back up with ballast spread back over membrane evenly.
  - Item #21 Spider web cracking of flashing membrane on roof area 6. These parapet wall flashings shall be replaced with new membrane flashing.
  - Item #22 Grease and oil damage to membrane on roof area 15. The damaged area of membrane shall be cut out and replaced with new membrane with a slip sheet to protect the new membrane.
  - Item #23 Plant growth shall be removed and membrane patched as needed.
  - Item #24 Deteriorated wood and paver walkways shall be removed when roof is replaced.
  - Item #25 Glued seams with no lap sealant. Only the seams that are starting to delaminate shall be cover striped.
- Fully Adhered EPDM Roof Systems (Not all items exist on each roof area see table below.) (Roof Areas 8, 11, 12, 17, 20, 21, 22.) (Item #'s for table shown below)
  - Item #26 Lap sealant deterioration.
  - Item #27 Seams starting to delaminate shall be cover striped with six inch cover strip.
  - Item #28 Ponding water, this is an item that can be addressed with tapered insulation once roof area is replaced.
  - Item #29 Lap sealant deterioration along gravel stop metal edge. The gap between cover strip and gravel stop metal edge shall be resealed with lap sealant.
  - Item #30 Flashing membrane being pulled apart from metal edge. Metal edge shall be cover striped.
  - Item #31 Insulation fasteners backing out shall be replaced with new fasteners and membrane patched.

  - Item #32 Concrete deck deteriorating and falling apart. Concrete deck shall be repaired or replaced when reroofed.
  - Item #33 Membrane has delaminated from insulation and wall in a 2' section along wall on roof area 21. Membrane shall be refastened to deck and wall with batten bar and flashed.
- Paver Patio over EPDM Roof Systems (Not all items exist on each roof area see table below.) (Roof Areas 14.) (Item #'s for table shown below)
  - Item #34 Plant growth shall be removed and membrane patched as needed.

REFER TO REVISED COST OPINION AT END OF REPORT

Roof Area	Roof System	Condition **	Deficiencies****	A = Immediate B = 1-5 C = 5-10	Probable Cost (2009)
1	Built-up	Poor	Cracks in built-up membrane shall be patched using a 2-ply APP modified system Cracked or tears in flashing membrane shall be covered using a 2-ply APP modified system Spots of exposed felts due to asphalt and pea gravel coating deterioration. These shall be covered using a 2-ply APP modified system. Shrinkage of pourable sealer in pitch pans. These shall be refilled with pourable sealer. Cracked or deteriorated sealant along termination bars or metal flashings shall be resealed. Plant growth shall be removed and membrane patched as needed.	B	$73,668
1.1	Built-up	Poor	Not able to review – roof area inaccessible.	B	$2,352
2	Ballast EPDM	Poor	Lap sealant deterioration. Seams starting to delaminate shall be cover stripped with six-inch cover strip. Metal edge fasteners backing out shall be replaced with new fasteners and new six-inch cover strip shall be installed along edge. Deteriorated and cracking sealant at termination bars, metal flashings, and stone copings shall be resealed. Shrinkage of pourable sealer in pitch pans shall be refilled with pourable sealer. Punctures and tears in flashing membrane shall be patched with form flashing.	B	$94,476
2.1	Built-up	Poor	Ponding water is due to not being designed to drain. This area shall have a scupper cut into roof edge to allow for drainage.	B	$360
2.2	Built-up	Poor	Blisters in membrane shall be cut out and patched using a 2-ply APP modified system. Cracks I built-up membrane shall be patched using a 2-ply APP modified system. Cracked or tears in the flashing membrane shall be covered using a 2-ply APP modified system. Spots of exposed felts due to asphalt and pea	B	$2,676

REFER TO REVISED COST OPINION AT END OF REPORT

Roof Area	Roof System	Condition **	Deficiencies****	A = Immediate B = 1-5 C = 5-10	Probable Cost (2009)
			gravel coating deterioration. These shall be covered using a 2-ply APP modified system.		
3	Ballast EPDM	Poor	Lap sealant deterioration. Seams starting to delaminate shall be cover stripped with six-inch cover strip. Ponding water. This is an item that can be addressed with tapered insulation once roof system is replaced. Plant growth shall be removed and membrane patched as needed. Deteriorated wood and paver walkways shall be removed when roof is replaced. Glued seams with no lap sealant. Only the seams that are starting to delaminate shall be cover stripped.	A	$130,500
4	Ballast EPDM	Poor	Lap sealant deterioration. Seams starting to delaminate shall be cover stripped with six-inch cover strip. Membrane ballooning from wind uplift shall have the ballast respread evenly. Punctures and tears in membrane shall be cover stripped. Shrinkage of pourable sealer in pitch pans shall be refilled with pourable sealer. Punctures and tears in flashing membrane shall be patched with form flashing. Membrane shrinkage causing the membrane to be pulled from the wall shall be released of the stress, secured to the wall, and then reflashed along wall. Insulation was observed which is out of position from wind uplift. Membrane shall be cut open so insulation can be repositioned, membrane sealed, and ballast spread back evenly over membrane.	A	$82,932
5	Ballast EPDM	Fair	Lap sealant deterioration. Deteriorated and cracking sealant at termination bars, metal flashings, and stone copings shall be resealed. Deteriorated wood and paver walkways shall be removed when roof is replaced	B	$14,196
6	Ballast EPDM	Poor	Lap sealant deterioration. Punctures and tears in flashing membrane	A	$3,336

REFER TO REVISED COST OPINION AT END OF REPORT

Roof Area	Roof System	Condition **	Deficiencies****	A = Immediate B = 1-5 C = 5-10	Probable Cost (2009)
			shall be patched with form flashing. Membrane shrinkage causing the membrane to be pulled from the wall shall be released of the stress, secured to wall, and reflashed along wall. Spider web cracking of flashing membrane. These parapet wall flashings shall be replaced with new membrane flashing.		
7	Ballast EPDM	Fair	Ponding water. This is an item that can be addressed with tapered insulation once roof system is replaced. Membrane shrinkage causing the membrane to be pulled from the wall shall be released of the stress, secured to wall, and reflashed along wall. Deteriorated wood and paver walkways shall be removed when roof system is replaced.	B	$4,788
8	Fully Adhered EPDM	Fair	Lap sealant deterioration. Seams starting to delaminate shall be cover stripped with six-inch cover strip. Ponding water. This is an area that can be addressed with tapered insulation once roof system is replaced.	B	$8,856
9	Ballast EPDM	Poor	Lap sealant deterioration. Seams starting to delaminate shall be cover stripped with six-inch cover strip. Metal edge fasteners backing out shall be replaced with new fasteners and new six-inch cover strip shall be installed along edge. Deteriorated and cracking sealant at termination bars, metal flashings, and stone copings shall be resealed. Punctures and tears in flashing membrane shall be patched with form flashing. Membrane shrinkage causing the membrane to be pulled from the wall shall be released of the stress, secured to wall, and then reflashed along wall. Deteriorated wood and paver walkways shall be removed when roof system is replaced.	A	$43,824
10	Ballast EPDM	Good	None	B	$14,136
11	Fully Adhered EPDM	Fair	Lap sealant deterioration. Seams starting to delaminate shall be cover	B	$3,312

REFER TO REVISED COST OPINION AT END OF REPORT

Roof Area	Roof System	Condition **	Deficiencies****	A = Immediate B = 1-5 C = 5-10	Probable Cost (2009)
			stripped with six-inch cover strip. Ponding water. This is an item that can be addressed with tapered insulation once roof system is replaced.		
12	Fully Adhered EPDM	Good	Not able to review – roof area inaccessible.	B	$3,420
13	Ballast EPDM	Fair	Lap sealant deterioration. Seams starting to delaminate shall be cover stripped with six-inch cover strip.	B	$14,232
14	Paver Patio over EPDM		Not able to review – roof area inaccessible. Plant growth shall be removed and membrane patched as needed.		$4,464
15	Ballast EPDM	Fair	Not able to review – roof area inaccessible. Grease and oil damage to membrane. Damaged area of membrane shall be cut out and replaced with new membrane with a slip sheet to protect the new membrane.		$58,920
16	Built-Up	Poor	Blisters in membrane shall be cut out and patched using a 2-ply APP modified system. Cracks in built-up membrane shall be patched using a 2-ply APP modified system. Cracked or tears in the flashing membrane shall be covered using a 2-ply APP modified system. Spots of exposed felts due to asphalt and pea gravel coating deterioration. These shall be covered using a 2-ply APP modified system.	B	$69,540
17	Fully Adhered EPDM	Fair	Lap sealant deterioration. Seams starting to delaminate shall be cover stripped with six-inch cover strip. Ponding water. This is an item that can be addressed with tapered insulation once roof system is replaced.	B	$4,692
17.1	Fully Adhered EPDM	Fair	Ponding water. This is an item that can be addressed with tapered insulation once 17.1 continued: roof system is replaced. Lap sealant deterioration along gravel stop metal edge. The gap between cover strip and gravel stop metal edge shall be	B	$192

REFER TO REVISED COST OPINION AT END OF REPORT

Roof Area	Roof System	Condition **	Deficiencies****	A = Immediate B = 1-5 C = 5-10	Probable Cost (2009)
			resealed with lap sealant.		
18	Ballast EPDM	Poor	Ponding water. This is an item that can be addressed with tapered insulation once roof system is replaced. Membrane shrinkage causing the membrane to be pulled from the wall shall be released of the stress, secured to the wall, and reflashed along wall. Spider web cracking of flashing membrane. These parapet wall flashings shall be replaced with new membrane flashing. Deteriorated wood and paver walkways shall be removed when roof system is replaced. Glued seams with no lap sealant. Only the seams that are starting to delaminate shall be cover stripped	A	$28,836
19	Ballast EPDM	Fair	Lap sealant deterioration. Cost of resealing seam laps is not cover effective. Seams starting t5o delaminate shall be cover stripped with six-inch cover strip.	B	$9,348
20	Fully Adhered EPDM	Poor	Lap sealant deterioration. Ponding water. This is an item that can be addressed with tapered insulation once roof system is replaced. Flashing membrane being pulled apart from metal edge. Metal edge shall be cover stripped. Insulation fasteners backing out shall be replaced with new fasteners and membrane flashed. Concrete deck deteriorating and falling apart. Concrete deck shall be repaired or replaced when reroofed.	A	$972
21	Fully Adhered EPDM	Fair	Lap sealant deterioration. Seams starting to delaminate shall be cover stripped with six-inch cover strip. 21 Continued: Ponding water. This is an item that can be addressed with tapered insulation once roof system is replaced. Membrane has delaminated from insulation and wall in a 2' section along wall. Membrane shall be refastened to deck and	B	$5,460

REFER TO REVISED COST OPINION AT END OF REPORT

Roof Area	Roof System	Condition **	Deficiencies****	A = Immediate B = 1-5 C = 5-10	Probable Cost (2009)
			wall with batten bar and flashed.		
22	Fully Adhered EPDM	Excellent	Leak from floor above	C	$852
23	Ballast EPDM	Good	Deteriorated and cracking sealant at termination bars, metal flashings, and stone copings shall be resealed.	B	$1,512
24	Ballast EPDM	Poor	Lap sealant deterioration Punctures and tears in membrane shall be cover stripped. Punctures and tears in flashing membrane shall be patched with form flashing. Membrane shrinkage causing the membrane to be pulled from the wall shall be released of the stress, secured to wall, then reflashed along wall. Plant growth shall be removed and membrane patched as needed.	B	$38,952
25	Ballast EPDM	Good	Membrane shrinkage causing the membrane to be pulled from the wall shall be released of the stress, secured to wall, then reflashed along wall.	B	$11,640
26	Built-up	Poor	Blisters in membrane shall be cut out and patched using a 2-ply APP modified system. Cracks in built-up membrane shall be patched using a 2-ply APP modified system. Cracked or tears in the flashing membrane shall e covered using a 2-ply APP modified system. Flashing membrane delaminating from membrane along roof edge shall be reflashed using a 2-ply APP modified system.	B	$25,740
27	Ballast EPDM		Not able to review – roof area inaccessible.		$5,676
28	Ballast EPDM		Not able to review – roof area inaccessible.		$2,460
29	Ballast EPDM		Not able to review – roof area inaccessible.		$23,400
30	Ballast EPDM		Not able to review – roof area inaccessible.		$43,200
31	Ballast EPDM		Not able to review – roof area inaccessible.		$6,684

REFER TO REVISED COST OPINION AT END OF REPORT

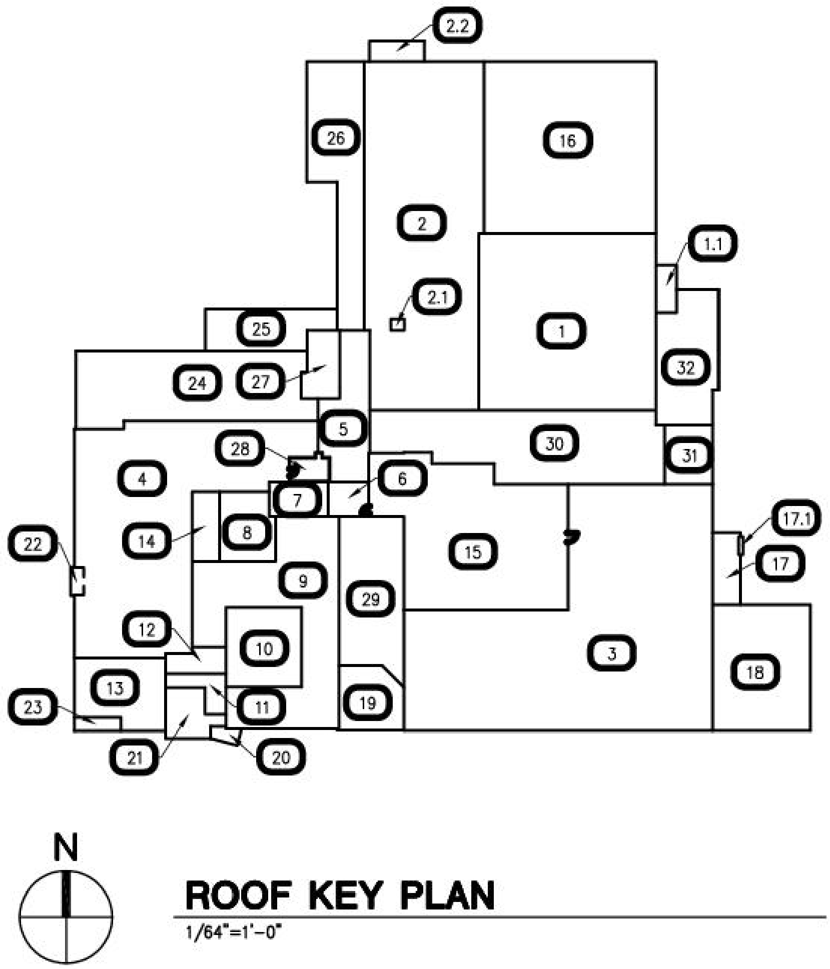
Roof Area	Roof System	Condition **	Deficiencies****	A = Immediate B = 1-5 C = 5-10	Probable Cost (2009)
32	Ballast EPDM		Not able to review – roof area inaccessible.		$18,444
Grand Total					**$858,048**

** All conditions based on current condition.
*** ? = Unable to gain access to roof area.
Note: Probable cost for Roof Level 20 does not include deck replacement.

Probable cost is based on removal of two roof systems.

** Cost Opinion Disclaimer*

The Architect/Engineer, as design professionals familiar with the construction industry, has prepared this opinion of the Probable Cost of Construction. It is recognized, however, that neither the Architect/Engineer nor the Owner has control over the cost of labor, materials, or equipment, over the Contractor's method of determining bid prices, or over competitive bidding market, or negotiated conditions. Accordingly, the Architect/Engineer cannot and does not warrant or represent which bids or negotiated prices will not vary from the Probable Cost of Construction.



ROOF KEY PLAN
1/64"=1'-0"

SHIVE-HATTERY
ARCHITECTURE - ENGINEERING
http://www.shive-hattery.com
Iowa - Illinois - Missouri - Nebraska
ILLINOIS FIRM NUMBER: 184-000214

MERCY CAPITOL STUDY IOWA DAS DES MOINES, IA				PROJECT NO. 409289-0
DATE	9-29-09	SCALE		SHEET NO.
DRAWN	AJP	FIELD BOOK	1/64"=1'-0"	R1
APPROVED	KDL	REVISION		

CONCLUSION

The logistics of tackling projects of these sizes and complexities raises many questions with respect to scope and schedule and finding a balance that fits with budget, immediate needs, and demanding day to day activities. It is easy to imagine how quickly total project costs can escalate to a sizable sum and may require a phasing schedule to accommodate any capital improvement budget. Just know that after this review of your facility, we believe that you do have options with which you can proceed. Some or all of these proposed improvements can be addressed now or spread out over time giving you the option to address varied initial costs or varied functional efficiencies. Many combinations exist and may allow the flexibility that you may require to realize these improvements and extend the useful occupation of your current facility.

We hope that this information will assist you in your decision making process and assure you that Shive-Hattery will always be available as a resource for the Iowa Department of Administrative Services regarding any design-related issues that you may require.

OPINION OF PROBABLE COST SUMMARY
REVISED 10-20-2009

System	Priority/Probable Cost		
	A	B	C
Architectural	$960,000	$1,449,500	$657,500
Mechanical	$315,000	$2,910,000	$795,000
Electrical	$240,500	$656,500	$760,000
Roofing	$290,000	$472,608	$95,040
Sub-Total	$1,805,500	$5,488,608	$2,307,540.00
Fees & Soft Costs 10%	$180,550	$548,860	$230,754
Total	$1,986,050	$6,037,468	$2,538,294
Grand Total			$10,561,812

Alternate	Item	Priority	Probable Cost
Demolition	Demolish entire building	A	$1,850,000
Replacement	New building 200,000 SF @ $175/SF	B	$35,000,000
Grand Total			$36,850,000

** Cost Opinion Disclaimer*

The Architect/Engineer, as design professionals familiar with the construction industry, has prepared this opinion of the Probable Cost of Construction. It is recognized, however, that neither the Architect/Engineer nor the owner has control over the cost of labor, materials, or equipment, over the Contractor's method of determining bid prices, or over competitive bidding market, or negotiated conditions. Accordingly the Architect/Engineer cannot and does not warrant or represent which bids or negotiated prices will not vary from the Probable Cost of Construction.

IMPROVEMENTS PRIORITIZATION AND OPINION OF PROBABLE COSTS

ARCHITECTURAL SYSTEMS REPAIR / REPLACEMENT PRIORITIZATION AND OPINION OF PROBABLE COST

SYSTEM	ITEM	PRIORITY A = Immediate A/O = Immediate w/other funding source B = Year 1-5 C = Year 5-10	PROBABLE COST* (2009 dollars)	REMARKS
Building Entrance	Add site features to demarcate entrance	B	$5,000	
	New entrance and canopy	B	$50,000	
Windows	Replace leaking windows in north wing	A/O	$50,000	
	Replace remainder of windows in north wing	B	$50,000	
	Add fenestration in east and west wings	C	$300,000	
Exterior Painting	Allowance for selective painting	B	$150,000	
Wayfinding	Interior signage – arterial/egress corridors, all levels	A	$2,500	
		B	$7,500	
	Concierge desk/lobby remodel	B	$25,000	
Security and Door Hardware	New cylinders and accessible levers (Allowance for approximately 500 doors)	A	$25,000	
		B	$75,000	
Conversion to office space/Space utilization	Add wall and double-egress doors on 2nd floor to create east suite.	A	$3,000	
	Remove patient toilet rooms and convert to office space at North Wing - 2nd level, 3rd level, and 4th level	A	150,000	
		B	$150,000	
	Remove patient toilet rooms and convert to office space at West Wing – 2nd level, 3rd level, and 4th level	A	$50,000	
		B	$50,000	
	Miscellaneous Renovations – Phase 1	B	$150,000	
Interior Finishes	New finishes for 2nd level – north wing	A	$500,000	
	Miscellaneous Renovations/Finish Upgrades – Phase 2	B	$150,000	
Asbestos	Ongoing effort to remove asbestos as	B-C	$2,000	

SYSTEM	ITEM	PRIORITY A = Immediate A/O = Immediate w/other funding source B = Year 1-5 C = Year 5-10	PROBABLE COST* (2009 dollars)	REMARKS
Abatement	encountered – Annual Budget			
Safety	Eliminate dead-end corridors	A	$2,500	
		B	$7,500	
	Fire caulk all penetrations in fire-rated walls – Annual Budget	B-C	$1,000	
	Replace two core elevators	C	$250,000	

ARCHITECTURAL SYSTEMS REPAIR / REPLACEMENT PRIORITIZATION AND OPINION OF PROBABLE COST (Continued)

SYSTEM	ITEM	PRIORITY	PROBABLE COST* (2009 dollars)	REMARKS
Accessibility	Add 5 pairs of restrooms and drinking fountains for Phase 1 – 2010 tenant spaces; East, West, and North Wings	A	$230,000	4 pairs RR
		B	$57,500	1 pair RR
	Add 8 pairs of restrooms and drinking fountains for Phase 2 – future tenant spaces; East, West, and North Wings	B	$460,000	
	Create compliant ramp	C	$3,000	
	Ongoing effort for the removal of architectural barriers – Annual budget	A-C	$1,500	

OPINION OF PROBABLE COST - MECHANICAL

MECHANICAL, PLUMBING AND FIRE PROTECTION REPAIR / REPLACEMENT
PRIORITIZATION AND OPINION OF PROBABLE COST

SYSTEM	ITEM	PRIORITY A = Immediate B = Year 1-5 C = Year 5-10	PROBABLE COST* (2009 dollars)	REMARKS
Heating and Cooling Plants	Chiller	B	$300,000	Replace (2) 210 ton chillers with (1) 300 ton chiller. Provide new pumping, piping, and cooling tower for chiller.
	Cooling Towers	B	$200,000	Replace (2) old towers on existing 300 ton chillers with new cooling towers.
		A	$80,000	Replace existing PVC fill on current cooling towers for improved performance and capacity.
	Connect CHW to State central plant	C	Unknown	Closest location to tap into State central plant is not known, as well as capacity of existing system.
	Heating Water System	A	$10,000	Replace worn out gaskets on converters and old pump seals to fix leaks in system
Air Handling and Air Distribution	Air Distribution	C	**	Fix duct leaks, close holes, balance system. Scope not known.
	Air Handling, Air Distribution	A	$200,000 – North wing Lev. 2 ductwork & rooftop units	
		B	$1,100,000 - $1,600,000	North Wing Unit: Replace constant volume radiant ceiling panel system with a VAV system to provide the minimum outside air required for office occupancy, and provide return air ductwork back to new air handler.
		B	$500,000 - $750,000	100% OA West Wing Unit: Retrofit constant volume system with a VAV system sized to provide the minimum outside air required for office occupancy, and revise air paths to allow for return air back to air handlers. Revise exhaust from existing patient bathrooms areas to maintain pressurization.
		B	$400,000 - $600,000	West Wing Unit: Retrofit constant volume system with a VAV system sized to provide the minimum outside air required for office occupancy, and rebalance return air for new outdoor air requirements.
		B	$300,000 - $500,000	1950's Penthouse Units: Replace existing smaller units with one larger VAV air handler to reserve spaces.
		C	$750,000 - $1,000,000	East Wing Unit: Retrofit with a dual duct VAV system sized to provide the minimum outside air required for office occupancy.

OPINION OF PROBABLE COST - MECHANICAL

	Controls	B	**	Fix compressed air leaks. Check dampers and replace broken actuators. Scope not known.
		C	Unknown	Full conversion of control system from pneumatic to DDC.
	Computer room HVAC	C	$45,000	Replace system with newer system sized for increased cooling loads and energy efficiency.

Continued **SYSTEM**	**ITEM**	**PRIORITY** **A = Immediate** **B = Year 1-5** **C = Year 5-10**	**PROBABLE COST*** (2009 dollars)	**REMARKS**
Plumbing	Domestic Water Piping	B	**	Ongoing replacement of piping when leaks occur or during remodels. Insulate piping. Scope not known.
	Sewage ejectors	A	$10,000	Repair to fix odor issues with existing system.
	Group Restrooms	A	$25,000	
		B	$50,000	Provide new domestic service to gang restrooms to serve office occupancy instead of multiple single toilet rooms.
	Hot Water Heater	B	$50,000	Provide new instantaneous water heaters for domestic system to replace steam to hot water storage tanks.
Fire Protection	Fire Sprinkler	B	$200,000	Replace heads over 50 years old, replace or test dry heads over 10 years old. Check head temperature ratings conform to current use of spaces.
		A	Unknown	Modify fire protection layout as required for renovation to existing spaces.

OPINION OF PROBABLE COST - ELECTRICAL

System	Location	Priority	Cost	Remarks
Lighting	Basement	C	$75,000	Very low priority, update all for gained energy efficiency and addition of occupancy sensor type control
Lighting	Ground Level	A	$20,000	Lighting replacement in miscellaneous spaces of emergency department for office use
Lighting	Ground Level	C	$230,000	Very low priority, update balance of floor for gained energy efficiency and addition of occupancy sensor type control
Lighting	Level 1	C	$85,000	Very low priority, update all occupied spaces for gained energy efficiency and addition of occupancy sensor type control
Lighting	Level 2	A	$80,000	Lighting additions in patient rooms for conversion to office use
Lighting	Level 2	C	$90,000	Very low priority, update balance of floor for gained energy efficiency and addition of occupancy sensor type control
Lighting	Level 3	A	$30,000	Lighting additions in patient rooms and surgery for conversion to office use
Lighting	Level 3	B	$55,000	Lighting additions in patient rooms and surgery for conversion to office use
Lighting	Level 3	C	$100,000	Very low priority, update balance of floor for gained energy efficiency and addition of occupancy sensor type control
Lighting	Level 4	B	$38,000	Lighting additions in patient rooms for conversion to office use
Lighting	Level 4	C	$75,000	Very low priority, update balance of floor for gained energy efficiency and addition of occupancy sensor type control
Lighting	Level 5	B	$10,000	Lighting additions in patient and exam rooms for conversion to office use
Lighting	Level 5	C	$105,000	Very low priority, update balance of floor for gained energy efficiency and addition of occupancy sensor type control
Power	Basement	N/A	N/A	N/A
Power	Ground Level	A	$2,500	Additional power outlets in emergency department
Power	Ground Level	B	$7,500	Additional power outlets in emergency department
Power	Ground Level	B	$90,000	Replacement of old distribution equipment in West wing
Power	Level 1	A/O	$5,000	Replacement of miscellaneous broken outlets
Power	Level 1	B	$90,000	Replacement of old distribution equipment in West wing
Power	Level 2	A	$5,000	Additional power outlets in patient rooms

OPINION OF PROBABLE COST - ELECTRICAL

System	Location	Priority	Cost	Remarks
		B	$25,000	
		B	$60,000	Replacement of old distribution equipment in West wing
	Level 3	A	$5,000	Additional power outlets in patient rooms
		B	$25,000	
		B	$70,000	Replacement of old distribution equipment in West wing
	Level 4	B	$21,000	Additional power outlets in patient rooms
		B	$40,000	Replacement of old distribution equipment in West wing
	Level 5	B	$5,000	Additional power outlets in patient rooms
		B	$40,000	Replacement of old distribution equipment in West wing
	Connect service to Capitol Complex HV loop	B or C	$75,000?	Assumed loop feed, (2) 1000 ft runs of #4/0 aluminum 15 kV cable, purchase of transformers from utility, splicing and termination
Fire Alarm	Basement	A	$5,000	Address corridor detector coverage, upgrade devices to addressable
	Ground Level	A	$25,000	Address corridor detector coverage, upgrade devices to addressable
	Level 1	A	$9,000	Address corridor detector coverage, upgrade devices to addressable
	Level 2	A	$17,500	Address corridor detector coverage, upgrade devices to addressable
	Level 3	A	$17,500	Address corridor detector coverage, upgrade devices to addressable
	Level 4	A	$14,000	Address corridor detector coverage, upgrade devices to addressable
	Level 5	A	$10,000	Address corridor detector coverage, upgrade devices to addressable
Generator	Emergency Power	N/A	N/A	N/A

OPINION OF PROBABLE COST - ROOFING

Roof Area	Roof System	Condition **	Deficiencies****	A = Immediate B = 1-5 C = 5-10	Probable Cost (2009)
1	Built-up	Poor	Cracks in built-up membrane shall be patched using a 2-ply APP modified system Cracked or tears in flashing membrane shall be covered using a 2-ply APP modified system Spots of exposed felts due to asphalt and pea gravel coating deterioration. These shall be covered using a 2-ply APP modified system. Shrinkage of pourable sealer in pitch pans. These shall be refilled with pourable sealer. Cracked or deteriorated sealant along termination bars or metal flashings shall be resealed. Plant growth shall be removed and membrane patched as needed.	B	$73,668
1.1	Built-up	Poor	Not able to review – roof area inaccessible.	B	$2,352
2	Ballast EPDM	Poor	Lap sealant deterioration. Seams starting to delaminate shall be cover stripped with six-inch cover strip. Metal edge fasteners backing out shall be replaced with new fasteners and new six-inch cover strip shall be installed along edge. Deteriorated and cracking sealant at termination bars, metal flashings, and stone copings shall be resealed. Shrinkage of pourable sealer in pitch pans shall be refilled with pourable sealer. Punctures and tears in flashing membrane shall be patched with form flashing.	B	$94,476
2.1	Built-up	Poor	Ponding water is due to not being designed to drain. This area shall have a scupper cut into roof edge to allow for drainage.	B	$360
2.2	Built-up	Poor	Blisters in membrane shall be cut out and patched using a 2-ply APP modified system. Cracks I built-up membrane shall be patched using a 2-ply APP modified system. Cracked or tears in the flashing membrane shall be covered using a 2-ply APP modified system. Spots of exposed felts due to asphalt and pea gravel coating deterioration. These shall be covered using a 2-ply APP modified	B	$2,676

OPINION OF PROBABLE COST - ROOFING

Roof Area	Roof System	Condition **	Deficiencies****	A = Immediate B = 1-5 C = 5-10	Probable Cost (2009)
			system.		
3	Ballast EPDM	Poor	Lap sealant deterioration. Seams starting to delaminate shall be cover stripped with six-inch cover strip. Ponding water. This is an item that can be addressed with tapered insulation once roof system is replaced. Plant growth shall be removed and membrane patched as needed. Deteriorated wood and paver walkways shall be removed when roof is replaced. Glued seams with no lap sealant. Only the seams that are starting to delaminate shall be cover stripped.	A	$130,500
4	Ballast EPDM	Poor	Lap sealant deterioration. Seams starting to delaminate shall be cover stripped with six-inch cover strip. Membrane ballooning from wind uplift shall have the ballast respread evenly. Punctures and tears in membrane shall be cover stripped. Shrinkage of pourable sealer in pitch pans shall be refilled with pourable sealer. Punctures and tears in flashing membrane shall be patched with form flashing. Membrane shrinkage causing the membrane to be pulled from the wall shall be released of the stress, secured to the wall, and then reflashed along wall. Insulation was observed which is out of position from wind uplift. Membrane shall be cut open so insulation can be repositioned, membrane sealed, and ballast spread back evenly over membrane.	A	$82,932
5	Ballast EPDM	Fair	Lap sealant deterioration. Deteriorated and cracking sealant at termination bars, metal flashings, and stone copings shall be resealed. Deteriorated wood and paver walkways shall be removed when roof is replaced	B	$14,196
6	Ballast EPDM	Poor	Lap sealant deterioration. Punctures and tears in flashing membrane shall be patched with form flashing. Membrane shrinkage causing the membrane to be pulled from the wall shall be released of the stress, secured to wall, and reflashed along wall.	A	$3,336

OPINION OF PROBABLE COST - ROOFING

Roof Area	Roof System	Condition **	Deficiencies****	A = Immediate B = 1-5 C = 5-10	Probable Cost (2009)
			Spider web cracking of flashing membrane. These parapet wall flashings shall be replaced with new membrane flashing.		
7	Ballast EPDM	Fair	Ponding water. This is an item that can be addressed with tapered insulation once roof system is replaced. Membrane shrinkage causing the membrane to be pulled from the wall shall be released of the stress, secured to wall, and reflashed along wall. Deteriorated wood and paver walkways shall be removed when roof system is replaced.	B	$4,788
8	Fully Adhered EPDM	Fair	Lap sealant deterioration. Seams starting to delaminate shall be cover stripped with six-inch cover strip. Ponding water. This is an area that can be addressed with tapered insulation once roof system is replaced.	B	$8,856
9	Ballast EPDM	Poor	Lap sealant deterioration. Seams starting to delaminate shall be cover stripped with six-inch cover strip. Metal edge fasteners backing out shall be replaced with new fasteners and new six-inch cover strip shall be installed along edge. Deteriorated and cracking sealant at termination bars, metal flashings, and stone copings shall be resealed. Punctures and tears in flashing membrane shall be patched with form flashing. Membrane shrinkage causing the membrane to be pulled from the wall shall be released of the stress, secured to wall, and then reflashed along wall. Deteriorated wood and paver walkways shall be removed when roof system is replaced.	A	$43,824
10	Ballast EPDM	Good	None	B	$14,136
11	Fully Adhered EPDM	Fair	Lap sealant deterioration. Seams starting to delaminate shall be cover stripped with six-inch cover strip. Ponding water. This is an item that can be addressed with tapered insulation once roof system is replaced.	B	$3,312
12	Fully Adhered EPDM	Good	Not able to review – roof area inaccessible.	B	$3,420

OPINION OF PROBABLE COST - ROOFING

Roof Area	Roof System	Condition **	Deficiencies****	A = Immediate B = 1-5 C = 5-10	Probable Cost (2009)
13	Ballast EPDM	Fair	Lap sealant deterioration. Seams starting to delaminate shall be cover stripped with six-inch cover strip.	B	$14,232
14	Paver Patio over EPDM		Not able to review – roof area inaccessible. Plant growth shall be removed and membrane patched as needed.		$4,464
15	Ballast EPDM	Fair	Not able to review – roof area inaccessible. Grease and oil damage to membrane. Damaged area of membrane shall be cut out and replaced with new membrane with a slip sheet to protect the new membrane.		$58,920
16	Built-Up	Poor	Blisters in membrane shall be cut out and patched using a 2-ply APP modified system. Cracks in built-up membrane shall be patched using a 2-ply APP modified system. Cracked or tears in the flashing membrane shall be covered using a 2-ply APP modified system. Spots of exposed felts due to asphalt and pea gravel coating deterioration. These shall be covered using a 2-ply APP modified system.	B	$69,540
17	Fully Adhered EPDM	Fair	Lap sealant deterioration. Seams starting to delaminate shall be cover stripped with six-inch cover strip. Ponding water. This is an item that can be addressed with tapered insulation once roof system is replaced.	B	$4,692
17.1	Fully Adhered EPDM	Fair	Ponding water. This is an item that can be addressed with tapered insulation once 17.1 continued: roof system is replaced. Lap sealant deterioration along gravel stop metal edge. The gap between cover strip and gravel stop metal edge shall be resealed with lap sealant.	B	$192
18	Ballast EPDM	Poor	Ponding water. This is an item that can be addressed with tapered insulation once roof system is replaced. Membrane shrinkage causing the membrane to be pulled from the wall shall be released of the stress, secured to the wall, and reflashed along wall. Spider web cracking of flashing membrane.	A	$28,836

OPINION OF PROBABLE COST - ROOFING

Roof Area	Roof System	Condition **	Deficiencies****	A = Immediate B = 1-5 C = 5-10	Probable Cost (2009)
			These parapet wall flashings shall be replaced with new membrane flashing. Deteriorated wood and paver walkways shall be removed when roof system is replaced. Glued seams with no lap sealant. Only the seams that are starting to delaminate shall be cover stripped		
19	Ballast EPDM	Fair	Lap sealant deterioration. Cost of resealing seam laps is not cover effective. Seams starting t5o delaminate shall be cover stripped with six-inch cover strip.	B	$9,348
20	Fully Adhered EPDM	Poor	Lap sealant deterioration. Ponding water. This is an item that can be addressed with tapered insulation once roof system is replaced. Flashing membrane being pulled apart from metal edge. Metal edge shall be cover stripped. Insulation fasteners backing out shall be replaced with new fasteners and membrane flashed. Concrete deck deteriorating and falling apart. Concrete deck shall be repaired or replaced when reroofed.	A	$972
21	Fully Adhered EPDM	Fair	Lap sealant deterioration. Seams starting to delaminate shall be cover stripped with six-inch cover strip. 21 Continued: Ponding water. This is an item that can be addressed with tapered insulation once roof system is replaced. Membrane has delaminated from insulation and wall in a 2' section along wall. Membrane shall be refastened to deck and wall with batten bar and flashed.	B	$5,460
22	Fully Adhered EPDM	Excellent	Leak from floor above	C	$852
23	Ballast EPDM	Good	Deteriorated and cracking sealant at termination bars, metal flashings, and stone copings shall be resealed.	B	$1,512
24	Ballast EPDM	Poor	Lap sealant deterioration Punctures and tears in membrane shall be cover stripped. Punctures and tears in flashing membrane	B	$38,952

OPINION OF PROBABLE COST - ROOFING

Roof Area	Roof System	Condition **	Deficiencies****	A = Immediate B = 1-5 C = 5-10	Probable Cost (2009)
			shall be patched with form flashing. Membrane shrinkage causing the membrane to be pulled from the wall shall be released of the stress, secured to wall, then reflashed along wall. Plant growth shall be removed and membrane patched as needed.		
25	Ballast EPDM	Good	Membrane shrinkage causing the membrane to be pulled from the wall shall be released of the stress, secured to wall, then reflashed along wall.	B	$11,640
26	Built-up	Poor	Blisters in membrane shall be cut out and patched using a 2-ply APP modified system. Cracks in built-up membrane shall be patched using a 2-ply APP modified system. Cracked or tears in the flashing membrane shall e covered using a 2-ply APP modified system. Flashing membrane delaminating from membrane along roof edge shall be reflashed using a 2-ply APP modified system.	B	$25,740
27	Ballast EPDM		Not able to review – roof area inaccessible.		$5,676
28	Ballast EPDM		Not able to review – roof area inaccessible.		$2,460
29	Ballast EPDM		Not able to review – roof area inaccessible.		$23,400
30	Ballast EPDM		Not able to review – roof area inaccessible.		$43,200
31	Ballast EPDM		Not able to review – roof area inaccessible.		$6,684
32	Ballast EPDM		Not able to review – roof area inaccessible.		$18,444
Grand Total					**$858,048**

** All conditions based on current condition.
*** ? = Unable to gain access to roof area.
Note: Probable cost for Roof Level 20 does not include deck replacement.