Predesign Report for

Veterinary Medical Imaging Center

1365 Gortner Avenue
St. Paul, MN 55108

U of M Project # 371-06-2061

March 21, 2007
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Predesign Report March 21, 2007
1.0 EXECUTIVE SUMMARY

The Veterinary Medical Center (VMC) is located on the St. Paul Campus of the University of Minnesota, and provides a full range of clinical and teaching services and a venue for clinical research for both small and large animals. The VMC has significant imaging capabilities, and with the addition of Magnetic Resonance Imaging (MRI) will provide a full range of imaging technologies.

Program:

In addition to the MRI Procedure Room prepared to house a high-field magnet, one large animal Prep and Recovery Room, a small animal Prep and Recovery area, small animal Exam Rooms, Outpatient Reception and Waiting, and staff Work areas are needed to support the program. Two accessible staff toilets area required by code. The initial construction includes only the MRI Procedure Room and Control area, large and small animal Prep and Recovery areas, and the two accessible staff toilets. The spaces are arranged to ensure the separation of large and small animals, while maintaining staff flow from each area into the Procedure and Support areas. Future plans for wellness activities and improved outpatient access for referred clients requiring diagnostic services have been incorporated into the plan with consideration of subsequent construction that would be needed in the area. Future construction will provide the remaining spaces; the location of initial spaces has been designed to minimize disruption of services while the future spaces are constructed.

Existing Conditions:

The area designated to house the MRI unit and associated support functions, is located on the Second Floor of the Veterinary Medical Center South, Building Number 371. This location allows for easy access for small and large animals staying in the hospital, and easy access for outpatient animals that eventually will come from the southern portion of the hospital. Originally constructed in 1948, the poured concrete structure has been remodeled in specific areas over the years. HGA Architects and Hunt Mechanical Engineers investigated the renovation area to verify existing conditions for the proposed Schematic plan. Infrastructure upgrades are required to meet the mechanical and electrical needs of the imaging equipment. There are no significant structural or architectural upgrades needed to meet the programs requirements.

Budget Estimate:

The total budget estimate: $3.7 million [$1.7 construction; $2.0 non-construction]

Construction Schedule:

Start of construction is slated for June 1, 2007; completion December 31, 2007.
Location Plan

Building 371
2.0 STATEMENT OF NEED

Consistent with the strategic planning process initiated by the College of Veterinary Medicine (CVM) in the spring of 2004, the growth strategy intends to increase the market presence and capture growth opportunities for the Veterinary Medical Center (VMC) by investing in equipment and facility upgrades that will improve clinical quality and patient care, maintain the availability of state-of-the-art technology, and strengthen referral veterinarian relationship-building initiatives that enhance service quality and solidify the commitment back to the CVM.

The VMC has identified the Medical Imaging Department as a “Center of Excellence”. The success of the center will be measured by the degree to which it is recognized nationally for research innovations and discovery, attracts the highest quality clinicians and trainees into its programs, and improves the health and well-being of animals and service to clients and referring veterinarians.

To remain a leader in animal health and service to the public, the VMC will need to provide state-of-the-art imaging capabilities at its service location on the St. Paul campus. Further development of the Medical Imaging Department to include MRI capabilities is essential and complements the services of helical computed tomography (CT), ultrasound, computed radiography, fluoroscopy and teleradiology that are already available.

The access to MRI will broaden the learning experiences for students, interns, residents and clinicians and provide the necessary technology to recruit and retain talented faculty and clinicians in the field of medical imaging and other specialty services (for example, oncology and equine surgery) critical to the strategic development plans of the CVM.

The enhancement of medical imaging through the acquisition of MRI technology will strengthen the VMC capabilities in diagnosis, treatment and care of both small and large animals. Companion animal owners are demanding more sophisticated levels of quality and service. Food animal owners are expecting continued advancement in improving the health and productivity of their animals.

Many community veterinarians would like to offer this diagnostic modality to their clients but the magnitude of the initial investment prohibits most from investing in it themselves. Currently there is a large void in the access to MRI regionally, with the closest companion animal service in Madison, Wisconsin. There is a unique opportunity for the CVM to build a cooperative relationship with the veterinarian delivering primary health care in the private sector. The imaging center concept will allow the private veterinary care deliverer direct access to this service or will allow the private veterinary care deliverer to refer clients to a specialist at the VMC. There is opportunity for early entry into the market as there have been no private groups, as yet, organized to invest in MRI locally.

Investment in MRI capabilities augments and enhances the investment that has already been made in another recent initiative of the CVM, the Equine Center, opening in 2007. The ability to offer this diagnostic tool will differentiate the University Equine Center from other equine practices in the state.
There is mounting concern that MRI capabilities, initiated and organized by providers in the fast growing horse market, will be developed soon if the University does not make the investment now. Currently there are potentially high returns for entry into the imaging market with the most significant barrier in the size of the initial investment being managed through economies of scale available through the VMC.

No MRI research capabilities currently exist on the St. Paul campus. The logistics of transferring animals from one campus to another for research purposes is significant and creates a barrier, whether real or perceived, to research collaboration between faculties. For principal investigators who work in or near the CVM, this project will provide increased access to technology that will enhance applications for extramural funding. For those investigators who are located on another campus, it will provide increased opportunities for collaboration with researchers trained specifically in the imaging of animals.

Activity at other academic institutions around the country and in the region suggests that the VMC is entering late in the market for offering this diagnostic modality. Iowa State University in Ames recently broke ground for a new teaching hospital with an advanced medical imaging facility that will include two MRI units. Other schools that compete for talented trainees and faculty have already invested and developed MRI facilities at Cornell, University of Wisconsin, Washington State University, the University of Georgia, and the University of Pennsylvania, to name just a few.
3.0 FACILITY PROGRAM

3.1 Description

The initial phase of the new Imaging Center will be designed to house a high field magnet for imaging (MRI) and an area to hold, anesthetize and recover both large and small animals. The design allows for further development of easy access for clients of referring practitioners that would be solely coming to the Veterinary Medical Center for MRI or other imaging. Ease of access and sufficient parking are provided via the south building entry; additionally, animal transfer logistics from the rest of the Veterinary Medical Center are improved.

Program Start-up:

<table>
<thead>
<tr>
<th>Space</th>
<th>SF</th>
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<tbody>
<tr>
<td>MRI Procedure Room</td>
<td>900</td>
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<tr>
<td>MRI Equipment Room</td>
<td>190</td>
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<tr>
<td>MRI Control Area</td>
<td>150</td>
</tr>
<tr>
<td>Small Animal Prep</td>
<td>370</td>
</tr>
<tr>
<td>Small Animal Recovery</td>
<td>120</td>
</tr>
<tr>
<td>Large Animal Work &amp; Equipment Storage</td>
<td>790</td>
</tr>
<tr>
<td>Tech Work Area</td>
<td>230</td>
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<tr>
<td>Accessible Toilets (2)</td>
<td>140</td>
</tr>
<tr>
<td>Shell Space I (future construction)</td>
<td>760</td>
</tr>
<tr>
<td>Shell Space II (future construction)</td>
<td>280</td>
</tr>
</tbody>
</table>

Total Net SF 2,890 SF

1.4 Multiplier (circulation, walls) 1,179 SF

Program DGSF 4,046 SF

Actual Finished Spaces DGSF 4,100 SF

Shell Space I (future construction) 760 SF
Shell Space II (future construction) 280 SF

Total Shell Net SF 1,040 SF

Actual Project/Construction GSF 5,140 SF
3.2 Schematic Plan
Floor Plan
3.3 Architectural and Interiors Scope of Work

Architectural and interiors materials will comply with the University standards, and with material selections recommended for the care of large and small animals. Following is a general outline of materials proposed for the renovation:

A. Interior Partitions and Finishes

Typical partitions will be concrete masonry units with joint reinforcing at 16” on center. Walls will be painted for ease of cleaning. The walls of the large animal Prep and Recovery Room will have padding and flooring that consists of a closed cell foam with a solid cast polyvinyl chloride (PVC) covering.

B. Ceilings

The ceiling of the large animal Prep and Recovery areas and adjacent work space will be open to the structure above. This will facilitate the use of a two ton hoist required for large animal care. The MRI Procedure Room and all other spaces will have a scrubbable type acoustical ceiling tile. The exposed structure will be painted.

C. Floors

Floors will have sealed concrete or epoxy resin flooring. The large animal Prep and Recovery Room will utilize a one inch thick two piece laminated flooring system of soft underlayment with a trac-roll top surface.

D. Millwork/Casework

Metal cabinets with stainless steel countertops will be used in the small animal prep areas. The Control area for the procedure room will have a plastic laminate countertop with pedestal files (systems furniture) and opening shelving for manuals and related procedure equipment.

E. MRI Procedure Room Finishes

Adequate radio frequency (RF) shielding will be provided that encloses the selected MR equipment at the floor, walls and ceiling to ensure the health and safety of patients and staff, as well as facilitate proper operation of the magnet. Walls will be painted. The room will sit on an isolated concrete slab of sufficient thickness to dampen and separate magnet vibration from adjacent areas.
3.4 Structural Scope of Work

A. Hoist Support Structure
   The hoist will run along a steel beam hung from the existing pan-joist concrete structure with steel angles. The steel angles will be connected to the concrete using mechanical expansion anchors. Based on a preliminary hoist capacity of 4000 pounds, the existing concrete pan-joist structure should not require any additional strengthening.

B. New Wall Openings
   Steel lintels will be required over new openings in existing structural masonry walls. Steel angles will be used for lintels over small openings, while steel beams will be used over large openings.

C. Slab-on-Grade
   The typical slab-on-grade will be 5 inches thick and unreinforced. The portion of slab under the MRI unit will be 8 to 12 inches thick and reinforced in each direction.
3.5 Mechanical Systems Description

Plumbing Systems
A. Provide a stainless steel sink with gooseneck faucet for each of the four three (3) small animal prep rooms. Connect to existing sanitary waste, vent and domestic water services.
B. Provide an ADA water closet and lavatory for each of the two (2) bathrooms. Connect to existing sanitary waste, vent and domestic water services.
C. Provide three (3) wash down stations. Connect to existing domestic water services.
D. Provide fourteen (14) floor drains. Connect to existing sanitary waste and vent services.
E. Provide manual city water emergency connection to MRI air-cooled chiller piping system.
F. Provide one (1) RPZ backflow preventer to serve glycol fill and hose washdown stations.

Medical Gas Systems
A. Provide two (2) shut-off valve boxes.
B. Provide two (2) local alarm panels and associated alarm wiring.
C. Provide six (6) medical gas outlet stations consisting of O, VAC, N\textsubscript{2}O and Scavenger Vacuum and associated piping.
D. Test and certification of medical gas systems.
E. Connect to existing medical gas services located nearby.

Rooftop Air Handling System
A. Provide 10,000 CFM unit with steam heating coil, DX cooling coil, steam humidification and economizer.

HVAC Piping Systems
A. Disconnect existing three (3) fan coils and cap chilled water piping.
B. Provide steam and condensate to new RTU preheat coil and humidifier.
C. Provide five (5) ton computer room unit and associated air-cooled condensing unit with DX line set.
D. Provide air-cooled chiller and associated piping for MRI equipment.

Existing HVAC Systems Demolition
A. Remove ductwork serving remodeled area.
B. Remove rooftop unit and associated piping.

HVAC Systems
A. Provide nine (9) electric reheat coil boxes.
B. Provide two (2) electric humidifiers.
C. Provide one (1) general exhaust PRV fan.
D. Provide one (1) emergency MRI room exhaust utility set.
E. Provide cryogenic vent from MRI to roof.
Temperature Controls
   A. Provide thermostat control to nine (9) electric reheat coil boxes.
   B. Provide humidistat control to two (2) electric humidifiers.
   C. Connect controls to existing building management system.

Fire Protection
   A. Provide coverage in existing corridor as required by University Building Code plans examiner.
3.6 Electrical Systems Description

Lighting
A. All light levels shall meet IES guidelines.
B. The Exam rooms and recovery room shall have general fluorescent lighting and each shall have an Amsco Examiner 10, ceiling mounted Exam light.
C. The MRI room shall have non-ferrous, recessed incandescent lighting, 150W lamps, and be switched in several areas around the table to provide multiple light levels.
D. The Control area shall have general fluorescent lighting and recessed incandescent downlights on dimmers.
E. Areas that do not have ceilings shall have pendant-mounted compact fluorescent high-bay luminaires (Cooper Lighting DPAXIO Series or equal). Wall mounting shall be used where the hoist is located. These fixtures to be dimmable fluorescent, with wall controls in two locations.
F. All remaining areas shall have standard lay-in type fluorescent troffers.
G. Exit and emergency lights shall be located at egress paths.
H. All lighting shall be controlled by local wall switches or dimmers.

Power
A. Electrical services in this building are 120/208 volt, 3 phase, 4 wire. The main electrical room is located in the lower level, south of this area. We will be utilizing the existing switchboard capacity for larger motors, and corridor panels for general lighting and receptacle loads.
B. The MRI machine shall get its power from an existing 200 amp, 480 volt switch in the main electrical room. The switch is fed from a buck-boost transformer (150 kVA) fed from a 400 amp, 208 volt service in the switchboard.
C. We will use the existing horse tread mill power to serve the hoist or other motor that meets the load requirement.
D. Other larger equipment or motors shall be served from the main service. Other motors/equipment include (2) MRI chillers, (1) air handling unit, (2) exhaust fans.
E. All receptacles in the MRI room shall be GFCI, served by at least three separate circuits. This room is to be considered a “Wet Location” per NEC 517.

Telephone/Data
A. Telephone and Data accommodations shall be provided as required for equipment and staff needs.
B. Routing requirements and device locations shall be coordinated with the University.
C. Cables and equipment shall be by owner.

Fire Alarm
A. Fire alarm devices shall be provided to meet the code requirements and needs within the space.
B. Devices shall match existing and tie into the existing building system.
C. Door hold opens shall be provided at access doors into this space and shall tie into fire alarm system to close doors when an alarm is indicated.
D. The motorized overhead door shall also tie into the fire alarm so it closes during an alarm situation.

Security
   A. No security requirements needed for this project other than mechanical door locks.
4.0 **FINANCIAL ANALYSIS**

A discounted cash-flow analysis was performed to determine project costs that would result in a positive net present value given a 10-year horizon and based on reasonable expectations for demand and growth.

**Project Demand**

MR technology will be used most extensively by our Neurology, Oncology and Orthopedic Surgery services. Current small animal caseload would support approximately 13 inpatient MRI procedures per week and we expect that demand to grow at a minimum of 3% per year, as the hospital increases throughput and better leverages market-share. The facility will be built to accommodate horses, to greatly enhance diagnostic capabilities in equine lameness and performance for the region and compliment clinical capabilities in the University’s new Equine Center. We anticipate this initial demand will be quite low – perhaps one case per week for the first year – but we expect demand will double in Year 2 and continue to grow at 5% thereafter, as our equine service grows.

An important component of the larger vision of an Imaging Center is the ability to provide imaging services on an outpatient basis to support regional veterinarians and veterinary specialists. While discussions with area veterinarians and specialists have lent anecdotal support to this premise, we have been very conservative in projecting outpatient demand, at least initially, given the uncertainty of demand and potential for competition for this market in the future. We anticipate one small animal case per week will be referred directly for MR in Year 1, and two cases per week for both large and small animals in Year 2, with subsequent annual growth projected to be 3%.

Additionally, a 3T magnet will provide the highest quality MR capabilities for veterinary medicine in the country which, we anticipate, will drive demand for research in comparative medicine, surgery, neurology, oncology and radiology, among other disciplines. This demand will complement but also depend upon the college’s ability to grow its research base and foster interdisciplinary activities within the university, in accordance with the University’s vision to become a tip-three public research institution. This demand may prove to be very significant, yet we’ve modeled it to be low or nonexistent at the onset yet grow at 3% annually for subsequent years.

We expect total MR caseload to be about 15 cases per week in Year 1 and 24 cases per week in Year 2 with approximate growth thereafter of 3%.

**Pricing projections**

Fees charged for MR procedures by veterinary hospitals polled offering this capability range form $650 to $800 per scan, depending on the technology used (lower quality magnets are less expensive), regional economic differences, and other considerations. The quality of images produced by a 3T magnet is considered superior in diagnostic sensitivity and specificity to those produced by the more common 1.5T magnet. We believe projected demand, current competition, and the value of these diagnostic capabilities will support a fee of $1K for small animal cases. As large animal cases are considerably more time-consuming, necessitating imaging of multiple limbs in most cases, we anticipate a higher fee for $1600 for equine cases.

**Cost projections**
Capital costs are projected to be about $3.6M with acquisition of the 3T magnet a $1.8M, construction costs of $1.7M, and ancillary costs of about $130K. Loan payments on that amount, based on contracted terms, will total about $518K on all annual basis over the nine years of the loan. Total operating expenses, including labor, fringe, debt service, and contribution to a replacement account to fund replacement of the equipment at Year 10, would be approximately $1.3M in Year 1, or 125% of revenue by Year 2 we anticipate revenue growth will outpace cost increase, resulting in a net of $138K.

**Expected returns**

Projections used in this model were based on current caseload and conservative projections of growth. Constraints used for capital costs were based on a zero net present value (NPV) over the ten-year horizon using a cost of capital of 7%. An overhead rate of 12% of revenue is also applied and contributions to a reserve account totaling $1.8M at the end of Year 10 will help fund the unit's replacement or upgrade. Cash flow is expected to be negative in Year 1 ($138K) but positive in subsequent years. Additional revenue generated through other services (e.g. surgery, neurology, medicine) as a result of MR imaging are expected to be significant but are not included in the model.
5.0 CODE ANALYSIS

- University Building Code Division: Ann Houske Jacklitch, Plans Examiner
- University Department of Environmental Health & Safety: Andy Streifel, Health Specialist

Construction Type:

The project is located on Level 2 in Building 371 of the Veterinary Medical Center (constructed in 1948). Level 2 is accessible to grade. The building is classified as Type II-A construction. The fire resistive ratings required for Type II-A construction are:

- Structural frame 1 Hr
- Exterior Walls 1 Hr
- Interior Walls 1 Hr
- Floor construction 1 Hr
- Roof Construction 1 Hr
- Shaft enclosures 1 Hr

The allowable number of stories is five; building 371 has two stories. The project area is a one story infill space that was originally designed as a courtyard.

The University of Minnesota Building Code Deficiency Survey rates the building as having a code deficiency of 1, primarily due to an unprotected egress system and unprotected shafts. The renovated area for this project will include a rated corridor system that is equipped with an automatic fire suppression system. The total gross square footage for the project is 5,140 SF, with 1,040 SF of shell space for future program spaces. In addition, the corridors located to the north, west and south of the renovated spaces will be equipped with an automatic fire suppression system as part of this project.

The western portion of the building will be separated from the rest of the building by one-hour-rated fire wall separation with double egress and overhead coiling doors in the corridors. The University will provide a list of any hazardous materials known to be in the renovated area, and these materials will be removed by the University. The egress system will include appropriate egress signage and emergency lighting. Two accessible toilets will be provided as the adjacent existing locker rooms available for staff do not meet accessibility requirements.

Use and Occupancy:

- Classrooms ‘B’ Business
- Animal stalls ‘B’ Business
- Office & Lounge ‘B’ Business
- Lab area ‘H-3’ Hazardous
Special Requirements Based on Use and Occupancy:

The Minnesota State Building Code (MSBC) Chapter 1305.0414 Section 414 Hazardous Materials supersedes the IBC for control areas for chemicals in “B” Occupancy buildings. The hazardous materials that will be used in the programmed spaces are required to meet the maximum quantity of hazardous materials allowed per control area by the MSBC. Tables 307.7(1) and 414.1.1 of the International Building Code will be referenced. Existing control areas for Level 2 of Building 371 will also be evaluated to ensure compliance.

The one hour fire separation provided at the western portion of the building, separating it from the rest of the Level 2 building spaces will provide a control area for any hazardous materials used in the renovated Imaging area.

Applicable Codes:

- Mechanical Code: 2004 MN State Mechanical Code
- Electrical Code: 2005 National Electrical Code
- City Amendments/Code: University of Minnesota (MN State Building Code MN Stat. 16B.59)
- Accessibility Code: ADAAG (MN State Building Code Chapter 1341)
- Energy Code: Minnesota State Building Code Chapters 7670-7678
Life Safety Plan

Rooms to be sprinklered
Corridors to be sprinklered
Project construction limits
Construction limits
## 6.0 **Equipment List**

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<th>Item</th>
<th>Quantity</th>
<th>Price</th>
<th>Cost Range Estimate</th>
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<tbody>
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<td>Magnetic Resonance Imaging Scanner (MRI)</td>
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<td>$1,800,000</td>
<td>$2,200,000</td>
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<td>MRI large animal (equine) table</td>
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<td>MRI large animal anesthesia machine</td>
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<tr>
<td>MRI small animal anesthesia machine</td>
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<td>MRI compatible injector for contrast (for large &amp; small animal)</td>
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<tr>
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<tr>
<td>Anesthesia monitoring equipment</td>
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<td>MRI compatible gurneys/animal cages/misc.</td>
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<td>$8,000</td>
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<td><strong>Totals</strong></td>
<td></td>
<td><strong>$1,966,000</strong></td>
<td><strong>$2,642,000</strong></td>
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# Cost Analysis

## 7.0 Cost Analysis

### Date: 02/12/07

**Project Name:** Vet Med Imaging Center  
**Project Number:** 371-06-2061  
**Constr Phase:** Design

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<td>- DEHS Survey</td>
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<td>- Technical Support</td>
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<td>Hazardous Air Monitoring</td>
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<td>Special Consultants</td>
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<td>PERMITS &amp; FEES</td>
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<td>- Technical Support</td>
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<td>35</td>
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<td>Miscellaneous Permits</td>
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<td>Permit &amp; Fees Contingency</td>
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<td>Miscellaneous Site Work</td>
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<td>Equipment</td>
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<td>Graphics</td>
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<td>F &amp; E Contingency</td>
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<td>Moving Expense</td>
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<td>Swing Space Accommodations</td>
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<td>Travel Expenses</td>
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<td>Art</td>
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<td>Incidental Expenses</td>
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<td>Unallocated Funds</td>
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<td>Miscellaneous Contingency</td>
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**Estimated Project Cost:** $3,703,456

K:\PROC\FORMSEXCEL\PD-BUD.XLS (Revised: 11-11-03)

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**Predesign Report**  
**November 15, 2006**  
**Cost Analysis**
8.0 PROJECT SCHEDULE

Project Delivery:
The project delivery method will be Construction Manager at Risk.

Design and Project Delivery:
It is anticipated that the project design will proceed as a single phase through design development and onto the completion of construction documents. There will be one set of construction documents with installation drawings provided by the selected MRI manufacturer. Future construction has been planned to minimize disruption of the spaces constructed in this project.

Design and Construction Team:
Architectural & Structural Engineering: HGA Architects  
Electrical Engineers: HGA Architects  
Mechanical Engineers: HGA Architects  
Construction Manager: Knutson Construction Services
9.0 PARTICIPANTS

HGA has prepared the University of Minnesota Predesign Report with assistance and guidance from faculty, staff and planning groups at the Veterinary Medical Imaging Center, with engineering and construction consultants. We wish to acknowledge the following participants.

University of Minnesota
Donald Adderley, Academic Health Center
Pete Nickel, Capital Planning and Project Management

Kari Anderson, Veterinary Medical Center, Medical Imaging Program Director
Pat Berzins, Veterinary Medical Center, Director of Operations
Marcie Christensen, AHC Medical School
Ed Kosciolek, CVM Facilities Manager
David Lee, Veterinary Medical Center, Hospital Director
Erin Malone, Veterinary Medical Center, Large Animal Associate Medical Director
Ron Mandsager, DVM Anesthesiology
Travis Saveraid, Veterinary Medical Center, Radiologist
Andrew Streifel, Hospital Environmental Health Specialist
Lorelee Wederstrom, Academic Health Center, Director of Facilities

Cost Estimating
Knutson Construction Services
Cy-Con, Inc.
Hammel, Green and Abrahamson

Architectural
Hal Henderson, Hammel, Green and Abrahamson
Mary Opila, Hammel, Green and Abrahamson

Structural Engineering
Jonathon Wacker, Hammel, Green and Abrahamson

Mechanical Engineering
George Strand, PE, Hammel, Green and Abrahamson

Electrical Engineering
Michael Woodson, Hammel, Green and Abrahamson