Biomedical Science Research Facilities Funding Program

2012 Report
To the Minnesota State Legislature

January 15, 2012

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1.0 Executive Summary

Background

The University has established the goal of becoming one of the top three public research institutions in the world within the next decade. To achieve this goal, the University must expand its faculty by recruiting and retaining the best research talent, and must provide state-of-the-art research facilities.

In 2007, the University asked the State of Minnesota to create the Biomedical Facilities Authority as the mechanism to provide a predictable funding source for planning and building research facilities that, in turn, will allow the University to attract the nation's top research talent. **In 2008, the State established the $292 million Biomedical Science Research Facilities Funding Program.** This dedicated funding program will provide appropriations by the State to the University for up to 75% of the costs to design and construct four new and expanded laboratory facilities on the University's Twin Cities Campus.

Since the creation of the Biomedical Science Research Facilities Funding Program, **the University has made significant progress** in furthering the investment in biomedical science research facilities in Minnesota, including **completing master planning**, **completing the expansion of the CMRR building (Project #1), completing design and starting construction on the Cancer / Cardiovascular Research Center (Projects # 2 & 3)** and initiating preliminary programming for the fourth project.

District Master Plan: Initiated summer 2008 - Completed spring 2009

The East Gateway District adjacent to the east bank of the Twin Cities Campus represents one of the last non-developed areas available for future campus growth. This 54 acre area is currently utilized by the University as a remote surface parking reservoir.

In recognition of the need to plan for future growth, the University in July 2008 contracted with the Smith Group, a nationally recognized laboratory design and planning firm, to develop a master plan for the East Gateway District where the facilities authorized under the Biomedical Facilities Funding Program will be constructed. This district already contains several research facilities built within the past decade including the Lions Research Building/McGuire Translational Research Facility and Medical Biosciences Building, as well as the new TCF Bank Stadium. The purpose of the master plan is to guide future development in accordance with the mission, objectives and principles of the University.

The vision for the East Gateway District is to develop the District as a cohesive complex of research, support, and athletic facilities that has its own identity, but is integrated with the existing campus. **The District Master Plan proposes a mix of new research and academic facilities, core technical support functions, and new office and retail uses.**

The District will be supported with the development of the Central Corridor LRT line. A buildout calculation of future development estimated that the District will accommodate approximately 3 to 4 million gross square feet of total new development including 1.9 to 3.0 million gross square feet in new academic and research facilities.

Included in the District and representing the first phase of development is the Biomedical Discovery District. The Biomedical Discovery District will include research buildings previously funded and built by the, the research facilities funded by the Biomedical Funding Program, and development sites for additional research facilities growth.

After seven months of extensive planning work, the East Gateway District Master Plan was completed in February 2009 and adopted by the University of Minnesota Board of Regents in March 2009.

Expansion of the Center for Magnetic Resonance Research: Completed July 2010

The first project to be funded by the Biomedical Facilities Program is the expansion and renovation of the University's Center for Magnetic Resonance Research (CMRR) Building.

In the short period of time since its discovery, the magnetic resonance (MR) phenomenon has been utilized to extract an unprecedented wealth of information in chemical and biological sciences. The use of MR to acquire images has lead to magnetic resonance imaging (MRI) as an indispensable tool that permits the visualization of human anatomy with high spatial resolution and the ability to distinguish different types of tissues. The boundaries of this imaging methodology will continue to expand, and currently are focused on the acquisition of physiological, chemical and functional information non-invasively in intact animals and humans.

Expanding the capabilities in imaging and spectroscopy to higher spatial and temporal resolution, higher specificity, and exploiting them in biomedical research and clinical medicine are the central research themes for CMRR. Adding to the rapid new developments in the areas of MRI and MRS is the need to add PET/CT imaging to further explore the function, physiology, metabolism, and anatomy of the cell and larger organs. PET imaging allows for the development of selective markers of disease presence and response to therapy. The addition of small animal PET/CT/SPECT devices coupled with the expanded MRI/MRS devices in CMRR will provide a research environment equal to or better than other leading medical centers and will open up the possibility of research grants that were not previously possible. These new facilities will have significant application in cancer research, tumor biology, cardiac diseases, neurosciences and radiology.

In fall of 2008, the University together with the State Designer Selection Board interviewed architects and selected and contracted with RSP Architects to design a 75,000 gross square foot expansion to the existing CMRR building and renovation of existing spaces. The expansion consists of a one-story addition to the north that provides space for additional mechanical and support spaces, and a two-story addition to the east that provides space for additional imaging equipment, offices and a new entrance/lobby. The CMRR expansion provides space for 20 additional researchers.

Construction of the CMRR expansion was completed in July 2010. **The total cost of the project was $53,200,000**.

Combined with the additional imaging equipment, **the Center for Magnetic Resonance Research is now one of the top imaging facilities in the world**, and magnetic resonance imaging (MRI) has come to play an indispensable role in biomedical research. For example, **a recent National Institutes of Health grant (NIH P30) has supported ~248 projects and ~120**

investigators predominately from the UMN in the area of brain science research. In addition, strong collaborations are continuously being developed with Cardiology, Oncology (Masonic Cancer Center), Neurosurgery, Neurology, Orthopedic Surgery, Musculoskeletal Radiology, as well as the Institute of Technology, College of Liberal Arts, School of Dentistry, College of Veterinary Medicine, College of Science and Engineering, and others. **There is nearly no discipline or department within the Medical School that is not affected by the capabilities MRI brings to research and clinical practice.**

In September 2010, a University of Minnesota / Washington University of St. Louis consortium was **awarded the Human Connectome Project** (U54 MH091657), **a five-year initiative funded by the NIH Blueprint for Neuroscience Research**. This grant is to comprehensively map human brain circuitry which will yield information about brain connectivity and its relationship to genetic, environmental factors and behavior. This grant is providing resources to make the improvements in image data acquisition speed, spatial resolution and contrast, as demanded by this high-tech, high-profile, and high-impact project. Furthermore, in addition to improving imaging capabilities for UMN researchers, this project has an extensive reach into the worldwide MRI community, as techniques and methods are distributed via technology licenses to other academic institutions.

Finally, **CMRR researchers recently invented two fundamentally different approaches to MRI that have the capability to significantly enhance the quality and utility of the MRI method in several different areas of science.** These new imaging capabilities are made possible by the development of a new class of pulse sequences with acronyms **SWIFT, RASER, and STEREO.** The first type (SWIFT = sweep imaging with Fourier transformation) offers the ability to image hard tissues (e.g., cortical bone and teeth) and solid objects (plastics, soil, wood) which typically are invisible to conventional MRI because their signals undergo fast decay (called T_2 relaxation). The other methods (RASER and STEREO) make it possible to conduct MRI even when there is non-uniformity in the magnetic field (as occurs naturally in brain areas above the eyes when performing standard MRI). Previously MRI methodology has required the use of expensive, large magnets capable of producing uniform magnetic field. The STEREO method can relax that requirement, and thus, potentially allow the use of smaller, lower cost MRI systems for research and clinical imaging.

SWIFT and RASER were patented by the University and a patent application for STEREO has been filed. In April 2011, GE Healthcare took an exclusive license to SWIFT. Although just off the drawing board, STEREO is already attracting industry interest. **License agreements can produce royalty income for the University, which can in turn be used to further support the mission of the CMRR and its researchers** who are developing and utilizing molecular imaging in research on a large number of different diseases, cancer, neuroscience, and more.

Cancer and Cardiovascular Research Center: Initiated in spring 2009 - Construction Started in March 2011 – Projected Completion in early 2013

The second and third projects to be funded by the Biomedical Facilities Program are the Cancer Research Building and the Cardiovascular Research Building. These two projects were combined in order to realize construction and operating efficiencies.

In spring 2009, the University together with the State Designer Selection Board reviewed 24 proposals submitted by architectural teams across the country, and selected and contracted with

Architectural Alliance, a Minneapolis architectural firm, to program and design the Cancer and Cardiovascular buildings. Included as part of Architectural Alliance's team are Zimmer Gunsul Frasca Architects (ZGF), a laboratory design specialist, Jacobs Consulting, a nationally recognized laboratory planning firm and Affiliated Engineers, a laboratory engineering specialist.

In the summer of 2009, the University conducted a competitive Request for Proposals (RFP) process to select and retain M.A. Mortenson to be the University's construction manager and provide scheduling, cost estimating and constructability reviews during the design phases.

Programming and pre-design work to determine the size and location for the facility began in July 2009, and continued throughout the summer and fall with extensive workshops involving the consultants, University faculty and staff who will occupy the facility, and other University staff representing the Academic Health Center, Capital Planning, Facilities Management, Environmental Health & Safety, as well as other University departments.

The combined Cancer and Cardiovascular facility will be approximately 285,000 gross square feet in size. This space will be allocated to research laboratories, laboratory support spaces, offices, shared instruments, and lobby and support spaces. Research programs that are anticipated to be housed in the facility include chemoprevention and carcinogenesis, vascular biology and hypertension, cardiovascular imaging, spectroscopy and structural biology, cardiovascular genomics and cardiovascular signaling, metabolism and disease.

The site for the facility is a former University parking lot located to the north and east of the Wallin Medical Biosciences Building (WMBB). The Cancer/Cardiovascular facility was designed to be the centerpiece of a multi-building district called the Biomedical Discovery District, which includes the CMRR building, WMBB and Lions/MTRF building. The multi-building complex will be interconnected so that faculty and staff will be able to move seamlessly between buildings for collaboration and core research infrastructure support needs. Researchers in the Cancer/Cardiovascular facility as well as researchers in other buildings will be able to use the expanded CMRR facility for their research imaging needs.

The Pre-design phase of the project was completed in December 2009 and in January 2010, the project proceeded into design. Schematic Design was approved by the Board of Regents in June 2010. Construction began in March 2011 and will be complete in early 2013. **The total cost of the combined Cancer/Cardiovascular Research project, including the necessary infrastructure and utility improvements, is estimated to be $200,300,000.**

Fourth Building Project – Initiated in 2011 – Projected completion - TBD

The fourth project to be funded by the Program is currently in the concept phase. In the fall of 2011, the University convened several faculty committees to review and prioritize its research program priorities and recommend which programs would benefit most from proximity to the research programs and research infrastructure investment previously built or under construction in the Biomedical Discovery District. Upon completion of this initial programming review, the University intends to begin pre-design activities in early 2012. During pre-design, the exact program, project budget and schedule will be developed.

2.0 Appendices

A.1 Biomedical Discovery District – Schematic Design Report - November 2010

A.2 Biomedical Discovery District – construction progress photos – May – Dec 2011