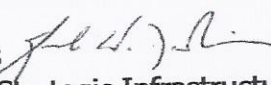


MICHIGAN STATE UNIVERSITY

June 11, 2014

MEMORANDUM

To: Trustee Finance Committee

From: Kemel W. Dawkins 
Vice President for Strategic Infrastructure Planning and Facilities

Subject: **Project Approval - Authorization to Proceed**
Facility for Rare Isotope Beams - Completion of Civil and Technical Construction

RECOMMENDATION

BE IT RESOLVED that the Trustee Finance Committee recommends that the Board of Trustees authorize the Administration to proceed with the project entitled Facility for Rare Isotope Beams - Completion of Civil and Technical Construction, and that it approve a budget of \$648,700,000.



Office of the
Vice President
for Strategic
Infrastructure
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Facilities

Kemel W. Dawkins
Vice President

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BACKGROUND

Michigan State University was selected by the U.S. Department of Energy Office of Science (DOE-SC) to design and establish the Facility for Rare Isotope Beams (FRIB), a DOE-SC national user facility to be owned and operated by Michigan State University in support for DOE-SC's mission. FRIB builds on MSU's leadership in nuclear physics developed since the 1960's and its experience operating the National Superconducting Cyclotron Laboratory (NSCL). Upon completion of FRIB, NSCL will cease to exist and its assets will be incorporated into FRIB.

In May 2008, the Board of Trustees authorized the administration to plan for the Facility for Rare Isotope Beams. Since that time, the Board authorized the Administration to proceed with the following components of the FRIB project, which were timed with DOE-SC approval and funding:

1. utility relocation phase two with a budget of \$6,300,000 approved in April 2011;
2. site preparation and excavation with a budget of \$20,000,000 approved in January 2012; and
3. the building structure with a budget of \$55,000,000 approved in September 2012.

The remaining components of the FRIB project to be approved by the Board are the civil construction and technical construction. In August 2013, DOE-SC approved the civil construction of FRIB under CD2/3A (Approve Performance Baseline/Start of Civil Construction), subject to a federal fiscal year 2014 appropriation. In January 2014, \$55,000,000 of FY2014 appropriations were approved and DOE-SC issued a notice to proceed with civil construction. Technical construction is expected to be approved in September 2014, under the CD3/B review and approval. This resolution authorizes the Administration to proceed with the civil construction and technical construction of FRIB.

The State of Michigan agreed to provide the \$94,500,000 community share portion of the FRIB project. In April 2014, the Michigan Strategic Fund issued Bonds to provide the funds to make a grant to MSU to satisfy the community share, which will be used to fund a portion of the civil construction. A memorandum more thoroughly describing the MSF Bond issuance and the Reimbursement Agreement executed by MSU is available to the Board.

Description of the Project:

The FRIB project is located at the corner of Wilson Road and Bogue Street in the central academic district.

The completion of civil and technical construction will include a build out of the electrical, mechanical, and technical systems. The mechanical fit-out includes air handling units, low connectivity water systems, and non-conventional utilities. The electrical systems include transformers, emergency generators, electrical substations, and uninterrupted power supplies. This construction includes the installation of the technical systems which consist of the linear accelerator and the experimental systems. The Architect/Engineer is SmithGroup. The Construction Manager is Barton Malow.

Consistent with the FRIB construction already under way and with previous determinations for the components of the FRIB project already approved by the Board, a project labor agreement will not be required for the remainder of the FRIB project.

Communication Feedback:

The campus community was given opportunities to provide feedback during the planning phase and any concerns have been addressed in the project design.

The Office of Campus Planning and Administration has reviewed this project and found it to be consistent with the Campus Master Plan. The Campus Infrastructure Planning Work Group also supports the recommendation to proceed with the project.

As construction proceeds, the schedule will be reviewed with the campus community.

Project Cost and Timetable:

The total budget for FRIB is \$730,000,000. The Board previously approved FRIB project budgets totaling \$81,300,000 for utility relocation, site preparation, excavation, and the building structure. The budget for the completion of civil and technical construction (a Construction Manager project) is \$648,700,000 which is being funded by a combination of DOE-SC and State of Michigan funding.

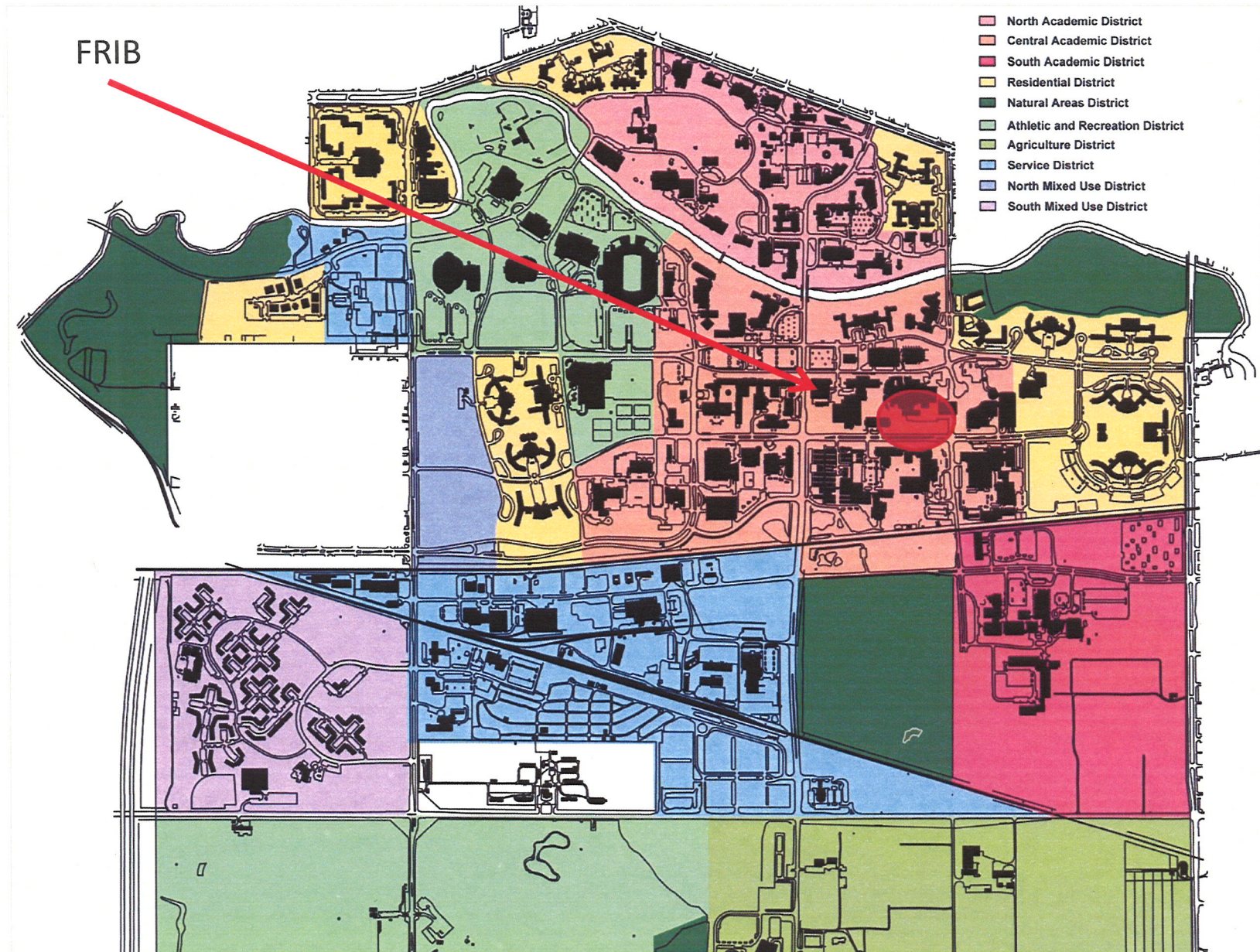
Substantial completion is expected in May 2022, and final completion by June 2022.

cc: L. Simon, J. Youatt, S. Udpa, B. Beekman, B. Noto, K. Dawkins,
V. Gore, M. Haas, J. Kacos, G. Klein, B. Kranz, M. McCabe, J. Mumma,
D. Quinney, T. Glasmacher, B. Bull, A. Bryan, L. Adams

CP09298

Project Approval – Authorization to Proceed
FRIB – Completion of Civil and Technical Construction

MICHIGAN STATE
UNIVERSITY



Conventional Facilities Site Layout



Conventional Facilities Site Layout

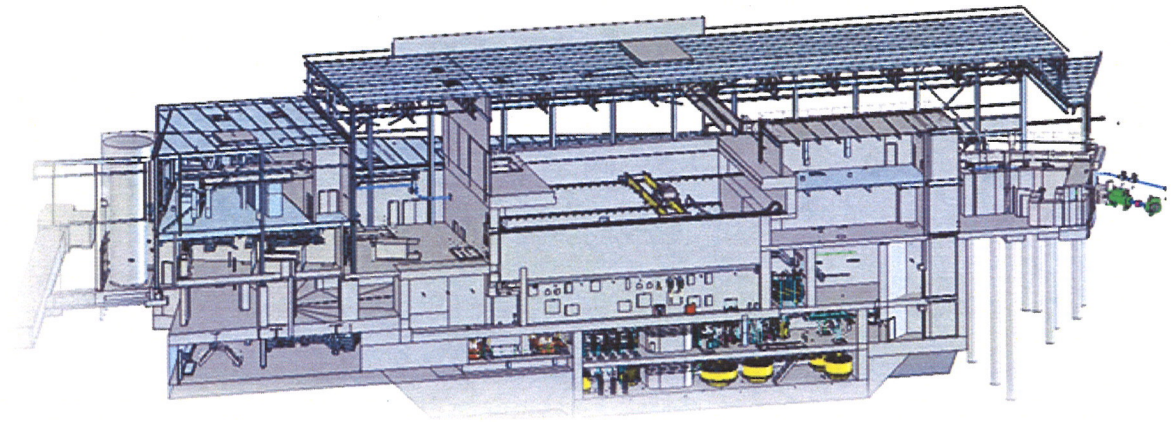


Conventional Facilities Site Layout

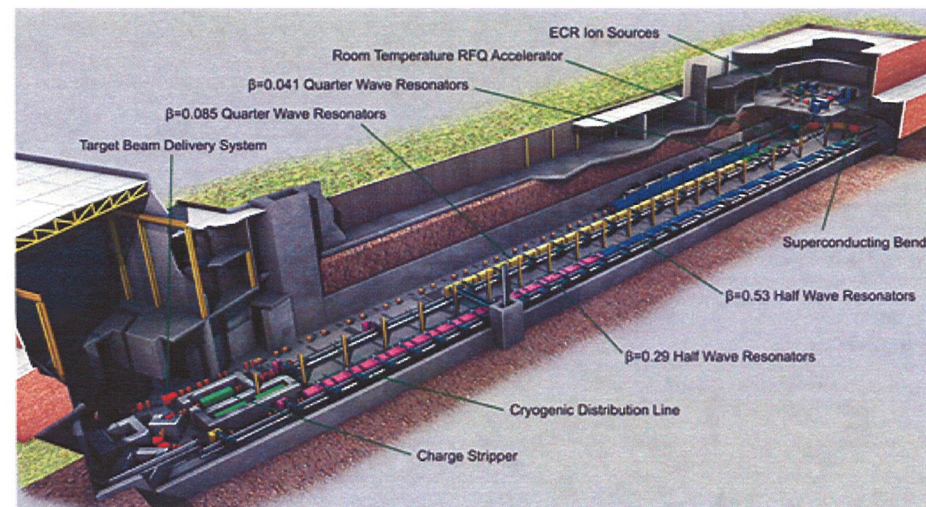


Technical Systems

Experimental
Systems



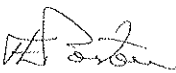
Accelerator
Systems



MICHIGAN STATE UNIVERSITY

May 7, 2008

MEMORANDUM

To: Trustee Finance Committee
From: Fred L. Poston 
Subject: **Authorization to Plan**
Facility for Rare Isotope Beams



RECOMMENDATION

BE IT RESOLVED that the Trustee Finance Committee recommends to the Board of Trustees that it authorize the administration to plan for the project entitled Facility for Rare Isotope Beams.

BACKGROUND

Program Need:

The National Superconducting Cyclotron Laboratory (NSCL) at MSU is the world-leading rare isotope science facility at this time. Scientists at NSCL study the interaction of atomic nuclei and the origin of the elements on earth. Discovery potential in this field of science is related to the power of the driver accelerator, which for the NSCL, is the coupled cyclotron accelerator system. The current NSCL facility is being eclipsed by a Japanese facility, which became operational in 2007, and a facility under construction in Germany. Successful attainment of funding would enable the establishment of a world-class national user facility for the next several decades on the MSU campus. The facility for rare isotope beams represents a logical progression of NSCL's scientific and research capabilities.

General Description of the Project:

The planning of this project is anticipated to support a successful application to the U.S. Department of Energy Funding Opportunity Announcement for a facility for rare isotope beams. MSU proposes to replace the coupled cyclotron driver accelerators with a linear driver accelerator (based on superconducting cavities) - the latter is about 100 times more powerful than the existing coupled cyclotrons.

The Department of Energy has issued a draft FOA (Funding Opportunity Announcement), which is based on a linear driver accelerator and the production mechanisms currently used at NSCL, in addition to a rare isotope beam reacceleration capability. MSU has started to add a 3.2 MeV reacceleration capability to NSCL, as approved by the Board of Trustees on April 18, 2008.

The Facility for Rare Isotope Beams (FRIB) will replace the cyclotron driver accelerators at NSCL with a superconducting linac accelerator, thereby making it the world's most powerful rare isotope science facility.

The Cyclotron building is located on the corner of South Shaw Lane and Bogue Street in the Central Academic District. The location of this project is consistent with the Campus Master Plan and Planning Principles.

S

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517/355-5014
FAX: 517/353-6772

Communication and Labor Planning:

During the planning phase, the campus community will be given an opportunity to provide feedback on the project as it is being designed. The planning process will include multiple feedback opportunities. Input from the project planning team will also be solicited during the design phase. Because planning authorization is needed early to support the funding application process, it is not yet possible to assess the utility of requiring a project labor agreement for construction.

Preliminary Project Cost Information:

Based on the draft FOA issued by the Department of Energy the project funding may be up to \$550,000,000. This estimate may change as planning progresses.

cc: D. Brower, R. Flinn, J. Kacos, G. Klein, W. Latta, K. Lindahl, M. McCabe, J. Mumma,
R. Nestle, D. Quinney, D. Lawton, K. Gelbke

CP07493

**MICHIGAN STATE
UNIVERSITY**

April 6, 2011



MEMORANDUM

To: Trustee Finance Committee

From: Fred L. Poston *F.L.P.*

Subject: **Project Approval - Authorization to Proceed**
Facility for Rare Isotope Beams - Utility Relocation - Phase II

RECOMMENDATION

BE IT RESOLVED that the Trustee Finance Committee recommends that the Board of Trustees authorize the Administration to proceed with the project entitled Facility for Rare Isotope Beams - Utility Relocation - Phase II, and to approve a budget of \$6,300,000.

BACKGROUND

Program Need:

Construction is scheduled to commence in 2012 on the primary building for the Facility for Rare Isotope Beams (FRIB). Prior to start of this work, the university must relocate utilities to support FRIB in a manner that manages potential timing and staging conflicts between these utility requirements and the ongoing Cyclotron High Bay construction addition.

Description of the Project:

This project is located in the central academic district, roughly bounded by the Biochemistry Building, Wharton Center, Plant and Soil Sciences, and the Cyclotron. This project includes the relocation of chilled water main distribution, electrical and communication duct banks, steam tunnels, and a natural gas main.

The Architect/Engineer is SmithGroup. The Construction Manager is Skanska.

Based on an assessment of the factors stated in the Project Planning and Approval process concerning Project Labor Agreements (PLA), the Vice President for Finance and Operations and Treasurer has determined that a PLA would not be required for this project.



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Communication Feedback:

The campus community was given opportunities to provide feedback during the planning phase; concerns have been addressed in the project design.

The Office of Campus Planning and Administration has reviewed this project and found it to be consistent with the Campus Master Plan and Planning Principles. The Campus Infrastructure Planning Work Group also supports the recommendation to proceed with the project.

As construction proceeds, the schedule and phasing will be reviewed with the campus community.

Project Cost and Timetable:

The budget for this Construction Manager project is \$6,300,000. The source of funds for this project is expected to be from FRIB project funds or tax-exempt financings with debt repayment from the general fund.

Construction for this project is planned to begin in May 2011 with substantial completion in June 2012, and a final completion in December 2012.

cc: D. Brower, R. Flinn, M. Haas, J. Kacos, G. Klein, B. Kranz, K. Lindahl,
M. McCabe, J. Mumma, R. Nestle, D. Quinney, K. Gelbke, L. Adams,
T. Glasmacher, C. Grubbe

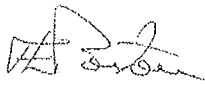
**MICHIGAN STATE
UNIVERSITY**

January 18, 2012

MEMORANDUM



To: Trustee Finance Committee

From: Fred L. Poston 

Subject: **Project Approval - Authorization to Proceed**
Facility for Rare Isotope Beams - Phase I - Site Preparation and
Excavation

RECOMMENDATION

BE IT RESOLVED that the Trustee Finance Committee recommends that the Board of Trustees authorize the Administration to proceed with the project entitled Facility for Rare Isotope Beams - Phase I - Site Preparation and Excavation, and to approve a budget of \$20,000,000.

BE IT FURTHER RESOLVED that the Trustee Finance Committee recommends that the Board of Trustees grant a variance to the University Zoning Ordinance to allow a 14-foot encroachment into the 40-foot Wilson Road setback for the proposed addition.

BACKGROUND

Program Need:

The Facility for Rare Isotope Beams (FRIB) will be a new national user facility for nuclear science, funded by the Department of Energy Office of Science (DOE-SC), Michigan State University, and the State of Michigan. FRIB will be owned and operated by Michigan State University (MSU). FRIB will provide intense beams of rare isotopes (that is, short-lived nuclei not normally found on earth). FRIB will enable scientists to make discoveries about the properties of these rare isotopes in order to better understand the physics of nuclei, nuclear astrophysics, fundamental interactions, and application for society.

Description of the Project:

The FRIB project is located at the corner of Wilson Road and Bogue Street in the Central Academic District. This project involves partial demolition of, and an addition to, the existing Cyclotron laboratory, excavation, storm water mitigation off site, and site preparation of the project site for the construction of the new FRIB facilities.

The Architect/Engineer is SmithGroup. The Construction Manager is Barton Malow.



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Based on an assessment of the factors stated in the project planning and approval process concerning Project Labor Agreements (PLA), the Vice President for Finance and Operations and Treasurer has determined that a PLA would not be required for this project.

Communication Feedback:

The campus community was given opportunities to provide feedback during the planning phase; concerns have been addressed in the project design.

A variance to the MSU zoning ordinance is required because the encroachment, measuring 10 feet by 442 for a total area of 4,420 square feet, is required to support:

- (1) the surface and sub-grade building configuration to meet the scientific bending requirements for the ground floor connection between the FRIB addition's Experimental Systems equipment and the existing equipment in the NSCL's Experimental Core, as well as the Beam delivery interface between the Target Systems at the Lower Subfloor and Linear Accelerator (LINAC) in the LINAC Tunnel, and
- (2) the requirement that the surface building cover the footprint of the Tunnel for shielding purposes. The required clear interior width for these programmatic functions sets the south exterior face of the Cryogenic building at twenty six feet (26') and the south exterior face of the Primary Switchgear Building at thirty feet (30') respectively from the back of curb line of Wilson Road.

The Office of Campus Planning and Administration has reviewed this project and found it to be consistent with the Campus Master Plan and Planning Principles, but noted that it does not comply with the University Zoning Ordinance setback requirement of 40 feet from the nearest roadway curb line. After evaluating design, both CPA and the Campus Infrastructure Planning Work Group support the project proceeding with the requested setback variance.

As construction proceeds, the schedule and phasing will be reviewed with the campus community.

Project Cost and Timetable:

The budget for this Construction Manager project is \$20,000,000, which is being funded by a combination of DOE-SC funding, appropriations from the State of Michigan, and MSU tax-exempt financing with repayment from the FRIB.

Site preparation for construction is planned to begin in February 2012 and will be substantially complete by June 2015, with final completion by December 2020.

cc: M. Haas, R. Flinn, J. Kacos, G. Klein, B. Kranz, B. Latta, K. Lindahl, M. McCabe, J. Mumma, R. Nestle, D. Quinney, T. Glasmacher, B. Bull, J. Manon, C. Grubbe

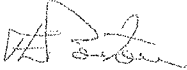
**MICHIGAN STATE
UNIVERSITY**

August 29, 2012

MEMORANDUM



To: Trustee Finance Committee

From: Fred L. Poston 

Subject: **Project Approval - Authorization to Proceed**
Facility for Rare Isotope Beams - Building Structure

RECOMMENDATION

BE IT RESOLVED that the Trustee Finance Committee recommends that the Board of Trustees authorize the Administration to proceed with the project entitled Facility for Rare Isotope Beams - Building Structure, and to approve a budget of \$55,000,000.

BACKGROUND

Program Need:

The Facility for Rare Isotope Beams (FRIB) will be a new national user facility for nuclear science, funded by the Department of Energy Office of Science (DOE-SC), Michigan State University, and the State of Michigan. FRIB will be owned and operated by Michigan State University (MSU). FRIB will provide intense beams of rare isotopes (that is, short-lived nuclei not normally found on earth). FRIB will enable scientists to make discoveries about the properties of these rare isotopes in order to better understand the physics of nuclei, nuclear astrophysics, fundamental interactions, and application for society. To accommodate the planned construction schedule and eventually house the program, the building enclosure is now required.

Description of the Project:

The FRIB project is located at the corner of Wilson Road and Bogue Street in the central academic district. This project involves building the exterior structures (exterior walls, roof) of the target high bay, linear accelerator support building, cryopant building, and ECR (Electron Cyclotron Resonance) area in the location directly south of the existing Cyclotron Building. A variance to the MSU zoning ordinance was detailed in the FRIB Phase I Site Preparation and Excavation resolution approved by the Board on January 27, 2012.

The FRIB building structure will encroach into the current Bogue Street location; as a result, a section of Bogue Street will need to be relocated or moved. It is anticipated that this action will take place at the October Board meeting.



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The Architect/Engineer is SmithGroup, and the Construction Manager is Barton Malow.

Based on an assessment of the factors stated in the Project Planning and Approval process concerning Project Labor Agreements (PLA), the Vice President for Finance and Operations and Treasurer has determined that a PLA would not be required for this project.

Communication Feedback:

The campus community was given opportunities to provide feedback during the planning phase and any concerns have been addressed in the project design.

The Office of Campus Planning and Administration has reviewed this project and found it to be consistent with the Campus Master Plan and Planning Principles. The Campus Infrastructure Planning Work Group also supports the recommendation to proceed with the project.

As construction proceeds, the schedule will be reviewed with the campus community.

Project Cost and Timetable:

The budget for this Construction Manager project is \$55,000,000 which is being funded by a combination of DOE-SC funding, appropriations from the State of Michigan, and MSU financing, including tax-exempt and/or taxable debt.

Construction is planned to begin in October 2012 and will be substantially complete by June 2016, with final completion by December 2021.

In the unlikely event that future appropriations are not made for this project, the cost to cancel this contract for building structure would be paid for by funding already approved by Department of Energy (DOE) and the State of Michigan.

cc: R. Flinn, M. Haas, J. Kacos, G. Klein, B. Kranz, B. Latta, K. Lindahl,
M. McCabe, J. Mumma, R. Nestle, D. Quinney, T. Glasmacher, B. Bull,
C. Grubbe, K. Caron, L. Adams