

Attachment B

**Fiscal Year 2016
Capital Outlay Project Request
STEM Laboratory Classroom Building**

Institution Name: Wayne State University

Project Title: STEM Laboratory Classroom Building

Project Focus: Academic

Type of Project: Renovation

Program Focus of Occupants: Dedicated to the training and education of undergraduate students in science, technology, engineering and mathematics (STEM) programs.

Approximate Square Footage: Approximately 100,000 gross square feet

Total Estimated Cost: \$30.0 million

Estimated Start/Completion Dates: Construction Start August 2015, Use and Occupancy September 2016

Is the Five-Year Plan posted on the institution's public internet site? YES

Is the requested project the top priority in the Five-Year Capital Outlay Plan?
YES

Is the requested project focused on a single, stand-alone facility? YES

Introduction

Construction of the State supported Multidisciplinary Biomedical Research Building (MBRB) on Wayne State University's campus began during December 2012 and is now scheduled to be complete in May 2015. The MBRB was the University's number one capital outlay priority in FY2013 and subsequently this project has been awarded \$30.0 million of State capital outlay funds.

During 2012, Wayne State updated its 2020 Campus Master Plan, and that effort served as the basis for the University's 5-Year Capital Outlay Plan submitted the previous two years, as well as for the Series 2013 bond issue that is being used to partially fund many projects listed in the Plan. These projects include the State supported Multidisciplinary Biomedical Research Building and Student Center Building Renovation which are under construction, and the recently completed Manoogian classroom renovations and Macomb Advanced Technology Education Center. The University submitted the new Science and Engineering Laboratory Classroom Building (SELC) project as its top priority FY2015-2019 Capital Outlay Project Request in November, 2013 and this project, with some updates, modifications and improvements continues to be Wayne State University's top priority Capital Outlay Project Request.

The new SELC Building, which we are now referring to as the STEM Laboratory Classroom Building, will be exclusively dedicated to the training and education of undergraduate students in science, technology, engineering and mathematics (STEM) programs. Increased focus on STEM fields has been deemed critically necessary to maintaining and advancing the State's economy as evidenced by the State establishing a performance funding metric related to STEM degrees awarded. Although Wayne State has shown a positive trend in enrollment in this area over the past five years including an increase of 52 percent in enrollment in the College of Engineering, our absolute numbers of critical skills degrees awarded need to improve. This new facility is essential to attract and retain students in science and technology majors and enable the University to significantly increase the number of STEM degrees awarded while supporting 15-20 permanent jobs. And based on history, the vast majority of these graduates will live and work in Michigan.

According to a report issued by the President's Council of Advisors on Science and Technology, if the nation is to remain competitive in science, technology, engineering, and mathematics, American universities collectively will need to increase graduates in these areas by a third.

The approaches to teaching and learning being used nationally to successfully increase the number of domestic STEM graduates, the diversity of domestic STEM graduates and the quality of learning of these graduates are exactly the same approaches that this facility will enable Wayne State to implement or strengthen in the coming years.

As initially planned, the 45,300 gross square foot building was to provide 30 separate teaching laboratories and support facilities for various academic programs including physics, engineering, computer science, psychology, nutrition and food science, and biological science, for a cost of \$20.0 million to design and construct. The project scored well when evaluated by the State Budget Office, accumulating 123 points which ranked 5th among 12 University projects submitted. However, in the year since the Plan and Project Request was submitted a new opportunity has developed enabling the University to repurpose an existing structure rather than build new, while enhancing the programming and functionality of the facility compared to the initial concept by taking advantage of more than double the amount of floor space provided. In this regard, the University's Science and Engineering Library (SEL) was closed in January 2014 as part of ongoing cost reduction programs. The University now plans to renovate the nearly vacant SEL and repurpose it as the new STEM Laboratory Classroom Building. This revised plan has many advantages in areas of cost, utilization, life safety improvements and sustainability compared with the original SELC concept.

The SEL is structurally sound and its 100,000 gross square feet will accommodate not only the programming planned previously for the new building, but also will enable the University to relocate and consolidate its entire math department in the new facility creating a highly efficient STEM corridor along Warren Avenue. The additional space will also accommodate several more general-purpose classrooms, as well as tutoring, colloquium, study and gathering spaces which are needs identified by the faculty that would not have been met in the space provided by the initial building concept.

By repurposing an existing building, costs for the construction of the foundation, frame and building enclosure systems will be avoided. Also, the SEL shares mechanical infrastructure with the adjacent, recently renovated A. Paul Schaap Chemistry Building, eliminating the need to purchase new heating and cooling systems. These cost avoidances will enable the University to reduce the project cost per square foot by up to 32 percent, from \$440 per square foot to \$300 per square foot and realize an increase of 120 percent in usable net square feet for a 50 percent increase in total

project cost. In addition, the cost of maintaining the mostly vacant SEL will be avoided, and the site of the previously proposed new SELC building will be retained as a surface parking lot and will still be available for future development if needed.

The new, cutting-edge facility will allow integration and re-assignment of existing and redesigned STEM courses that are currently housed in aged and obsolete facilities and teaching labs, some of which were constructed over 50 years ago and have seen limited updates since. Courses from departments that are presently disbursed throughout main campus will be brought together to take advantage of interdisciplinary teaching and learning opportunities and shared resources, thereby reducing some facilities costs. Most important, however, is that this project will provide a critical context for best practices in STEM teaching and learning that can translate into more graduates who will be successful in their chosen field.

Many existing classrooms will be vacated when the STEM Laboratory Classroom Building has been completed. As a separate but closely related project, the existing lab classrooms in Shapero Hall, the Physics building and the Engineering building, will be upgraded and converted to research space. The University will invest approximately \$8.0 million to convert these labs to state-of-the-art research space which could help generate incremental research funding totaling \$5.0 to \$7.0 million annually bringing 35-50 new permanent jobs to Detroit in addition to the 45 construction and 12 design related jobs which would be required for the duration of the project.

In summary, by implementing the planned STEM Laboratory Classroom Building project, Wayne State will significantly improve its facilities dedicated to STEM teaching and learning environments; resources that are critical to preparing students to excel in an increasingly advanced and interconnected global society. In addition to the significant advantage provided to our students, the University and the State will both benefit from increasing the number of STEM graduates well prepared to meet a growing need and to contribute to the State's economic growth.

Wayne State is requesting \$22.5 million in State Capital Outlay funding (75 percent of the total project cost) to support the STEM Laboratory Classroom Building project, and will use existing bond proceeds to fund its \$10.0 million share of the project as well as the \$8.0 million separate project for research space renovations.

Please provide detailed, yet appropriately concise responses to the following questions that will enhance our understanding of the requested project:

1. How does the project enhance Michigan's job creation, talent enhancement and economic growth initiatives on a local, regional and/or statewide basis?

The renovation of the existing Science and Engineering Library and its conversion to a STEM Laboratory Classroom Building will provide experiential and interdisciplinary learning environments leading to an increase of 25 percent (250) or more STEM degrees awarded annually. Increased STEM enrollment will support 15-20 new faculty/staff jobs. With regard to research, subsequent renovations to develop additional research laboratory space will create 35-50 new faculty jobs. The project is also expected to create jobs for 45 full-time construction worker and 12 design professionals over the 30 month project duration.

Approximately 90 percent of the University's students are from Michigan, with about 80 percent from the tri-county metropolitan Detroit area. Historically, upon graduation most of these students will remain in southeast Michigan to contribute to the region's growing economy. Wayne State graduates are a significant part of the highly educated workforce needed to transform Michigan's economy. Wayne State's core academic mission is focused on the sciences, engineering and healthcare fields, and this project will enable continued growth in these areas which are critical to sustaining economic growth in Michigan.

2. How does the project enhance the core academic and/or research mission of the institution?

Wayne State University is one of the nation's top urban, public, research institutions, offering more than 350 academic programs to nearly 28,000 students through 13 schools and colleges. Along with the University of Michigan and Michigan State University, Wayne State is designated as a university with very high research activity, recognized for research and

educational strengths in health and life sciences, physical sciences, engineering, and mathematics. The University awarded a total of 6,059 degrees in fiscal year 2014 with 1,101 being awarded in STEM fields of study. Relative to 2010, the University's STEM graduation rate has increased by 19.1 percent.

While Wayne State has been successful in producing STEM graduates, we must increase degree attainment and STEM literacy in these critical areas not only to ensure that students are best prepared for a knowledge based economy, but also to meet a growing national and statewide need. According to a report issued by the President's Council of Advisors on Science and Technology, if the nation is to remain competitive in science, technology, engineering, and mathematics, American universities collectively will need to increase graduates in these areas by a third. Nationally, 60% of students who intend to major in a STEM field ultimately graduate in a non-STEM area. Reducing attrition by only 10% will fulfill three-fourths of the necessary increase. Educational reform in STEM undergraduate teaching aimed at improving student retention and academic success in these fields include active and experiential learning, interdisciplinary teaching and learning, integration of knowledge across the curriculum, and flexible learning spaces. The proposed renovation of the existing Science and Engineering Library and its conversion to a STEM Laboratory Classroom Building will provide up-to-date facilities that will promote and enhance these best-practice teaching methods utilizing the latest classroom and teaching technology. Enhancing undergraduate teaching and learning more generally is also a cornerstone of the University's Strategic Plan.

This cutting-edge facility will allow integration and re-assignment of existing and redesigned STEM courses that are currently housed in aged and obsolete facilities and teaching labs, some of which were constructed over 50 years ago and have seen limited updates since. Courses from departments that are presently disbursed throughout main campus will be brought together to take advantage of interdisciplinary teaching and learning opportunities and shared resources, reducing some facilities costs. Most important, however, is that this project will provide a critical context for best practices in STEM teaching and learning that can translate into more graduates who will be successful in their chosen field.

A secondary benefit from the project, which enhances the research mission of the University, is the opportunity for a follow-on project funded by the University to reclaim and convert approximately 35,000 square feet of obsolete laboratory classroom space into state-of-the-art research space which will lead to an anticipated increase in research funding of \$5.0 to \$7.0 million annually.

3. How does the project support investment in or adaptive repurposing of existing facilities and infrastructure?

During the year since Wayne State submitted its FY15 5-Year Capital Outlay Plan and Project Request a new opportunity has developed enabling the University to repurpose an existing structure rather than build new as then proposed. The Science and Engineering Library (SEL) was closed in January, 2014 as part of the University's ongoing cost reduction program and the University now plans to renovate the nearly vacant SEL and repurpose it as the new STEM Laboratory Classroom Building. This revised plan has many advantages compared with the original Science and Engineering Laboratory Classroom Building concept.

The SEL is structurally sound and its 100,000 gross square feet will accommodate not only the programming planned previously for the new building, but also will enable the University to relocate and consolidate its entire math department in the new facility creating a true STEM corridor along Warren Avenue.

The additional space will also accommodate several general purpose classrooms, as well as tutoring, colloquium, study and gathering spaces which are needs identified by the faculty. These needs would not have been met by the initial building concept. The inclusion of these additional functional spaces will further enhance the effectiveness of the building by increasing the academic success and rates of degree attainment for Wayne State STEM students.

The SEL shares mechanical infrastructure with the adjacent, recently renovated Chemistry building. In this regard, an added benefit of repurposing the SEL to become the new STEM Laboratory Classroom

Building is the cost avoidance of new heating and cooling systems which would have been required in a new building. Additional costs for the construction of foundation, frame and building enclosure systems will be avoided as well by repurposing the existing building.

These cost avoidances will enable the University to reduce the project cost per square foot by 32 percent from \$440/sq. ft. to \$300/sq. ft. and realize an increase of 120 percent in usable net square feet for a 50 percent increase in total cost. In addition, the cost of maintaining the mostly vacant SEL will be avoided, and the site of the previously proposed new SELC building will be retained as a surface parking lot and will still be available for future development if needed.

4. Does the project address or mitigate any current life/safety deficiencies relative to existing facilities? If yes, please explain.

Yes. Courses that will be taught in the proposed project are presently offered in four buildings including Science Hall, Shapero Hall, Physics, and Engineering. Science Hall was constructed in 1949, Shapero Hall and Physics in 1965, and the laboratory wing of Engineering in 1951. Each building has pipe stands for fire suppression in stair towers, but horizontal distribution to occupied spaces is quite limited, with the exception of Engineering which offers fairly broad but not complete coverage. Engineering's fire alarm system was recently upgraded. The other three buildings do not satisfy current code requirements. The renovation of the Science and Engineering Library and its conversion to a STEM Laboratory Classroom Building will include scope to expand fire suppression coverage to the entire building. Presently, fire suppression coverage is limited to basement and first floor student computer labs. The fire alarm system will also be modified and enhanced to be fully code compliant with the new interior floor configurations. Accomplishing these improvements and relocating STEM courses from the buildings noted will eliminate the current life safety exposures students and faculty now face. Subsequent planned renovations of the existing class labs, converting them for traditional research will address the life safety deficiencies of those buildings following the completion of the STEM Laboratory Classroom Building project.

5. How does the institution measure utilization of its existing facilities, and how does it compare relative to established benchmarks? How does the project help to improve the utilization of existing space and infrastructure, or support the need for additional space and infrastructure?

The University tracks utilization of existing laboratory classrooms on a departmental basis (i.e. physics, chemistry, engineering etc.). In connection with the review of science and engineering facilities conducted in support of the 2012 update of the Campus Master Plan, the administration identified a critical need to upgrade existing laboratory classrooms dedicated to STEM courses because these facilities are obsolete, and cannot support active and experiential learning or interdisciplinary teaching and learning. Subsequently, a joint faculty/administration task force confirmed that during periods of maximum utilization (Monday through Friday between 8:00 AM and 8:00 PM) facilities dedicated to engineering, chemistry, biology, physics, nutrition and food science, psychology and computer science were heavily utilized. In addition, laboratory classroom space is not available to accommodate expected and continuing growth in these areas. In this regard, enrollment has increased by more than 52 percent in the College of Engineering over the past five years and as a result, the project will include additional engineering labs.

This project helps to improve the utilization of existing space and infrastructure by combining STEM laboratory classrooms in one location which promotes interdisciplinary teaching and learning, providing a significantly improved life/safety environment for students, and freeing up space which will be made available to support growth in research in STEM fields.

The University does not benchmark laboratory classroom space utilization.

6. How does the institution intend to integrate sustainable design principles to enhance the efficiency and operations of the facility?

The STEM Laboratory Classroom Building will be designed and constructed to meet State requirements for Leadership in Energy and Environmental Design (LEED). All Wayne State University new construction and major renovation projects built in recent years have been developed to minimally achieve silver certification with significant focus on mechanical / HVAC solutions that minimize energy costs and related environmental impacts. This project will be no exception. As noted, the Science and Engineering Library already benefits from substantial efficiencies in heating and cooling that were introduced when the Chemistry Building was recently renovated. Prior to the renovation of Chemistry there were three chiller plants in its sub-basement serving adjacent buildings. Now there is one integrated plant of three chillers serving the same buildings that are staged / sequenced into production only when cooling demands increase. Before all three plants would run even when demand was low. Therefore, the production of heating and cooling BTU's is as efficient as possible. The renovation of SEL for the STEM Laboratory Classroom Building will focus on sustainable opportunities relative to minimizing the consumption of BTU's.

Of particular interest on this project is the use of dimmable LED lighting and daylight harvesting, replacement of single pane glazing with double or triple pane units, incorporation of occupancy and CO2 sensors, and VAV box technology within the building automation system program to reduce unnecessary HVAC system operation, and use of modulating air valves on laboratory fume hoods to safely minimize conditioned exhaust air rates from the building. Because this project focuses on setting the standard for STEM education, special consideration will be given to creating a facility that has its LEED solutions on display as complimentary instructional tools for our faculty and students.

7. Are match resources currently available for this project? If yes, what is the source of the match resources? If no, identify the intended source and the estimated timeline for securing said resources?

Yes. On February 6, 2013 the Wayne State University Board of Governors authorized the sale of general revenue bonds totaling \$92.0 million to

partially fund several capital construction projects including the STEM Laboratory Classroom Building project. Bonds were issued in May 2013 and a portion of the proceeds are immediately available for this project.

8. If authorized for construction, the state typically provides a maximum of 75% of the total cost for university projects and 50% of the total cost for community college projects. Does the institution intend to commit additional resources that would reduce the state share from the amounts indicated? If so, by what amount?

The total cost to design and construct the new SELC building is expected to be \$30.0 million. Wayne State is requesting State Capital Outlay funding support in the amount of \$22.5 million or 75 percent of the project cost. As part of the University's overall science and engineering facilities initiative, however, it is essential that we reclaim the obsolete classroom labs which will be vacated when the project is completed and convert them into state-of-the-art research space. This closely related project is expected to cost about \$8.0 million and will be funded with the University's own resources obtained as part of its Series 2013 bond issue.

When considered together, the total cost of both projects is expected to be \$38.0 million and the State's contribution of \$22.5 million would represent a 59 percent share.

9. Will the completed project increase operating costs to the institution? If yes, please provide an estimated cost (annually, and over a five-year period) and indicate whether the institution had identified available funds to support the additional cost.

Yes. The University estimates that operations and maintenance costs for converting the library to a lab classroom building will increase general fund expenditures by approximately \$175,000 annually due to increase utility consumption and added custodial demands. Over five years this totals \$875,000. These costs will be offset partially by operating and energy

efficiencies in the renovated research labs and be covered within inflationary cost estimates included in the University's General Fund budget projections.

10. What impact, if any, will the project have on tuition costs?

This project will not have any direct impact on tuition costs.

11. If this project is not authorized, what are the impacts to the institution and its students?

If this project is not authorized the benefits to our students, the region and the nation in STEM education outlined above will be much more difficult, if not impossible, to achieve. Students' learning in these key fields will be challenged in sub-optimal and outdated spaces and STEM graduates will continue to lag behind regional and national need. Wayne State is dedicated to educational excellence by mission and strategic vision and can only enact best practices if contemporary facilities exist to support pedagogical innovation and need. Currently, our campus is equipped primarily with traditional classrooms. A few active and experiential learning classrooms are available, but none exist to enhance laboratory instruction. Construction of the STEM Laboratory Classroom Building will provide our students up-to-date, flexible classrooms that are equipped with enabling active learning technologies. If this project is not authorized and advanced, Wayne State students risk falling behind their peers both regionally and nationally only because of obsolete and deficient facilities. Without this facility the University will be significantly disadvantaged in its efforts to attract, retain, and graduate more students in STEM fields and will be unable to make significant progress in related State performance funding metrics.

12. What alternatives to this project were considered? Why is the requested project preferable to those alternatives?

For several years through FY2012, Wayne State's Capital Outlay Plan included a \$110.0 million project to design and construct a 250,000 sq. ft. Interdisciplinary Science Research Building on the site of the current Life Sciences Building. Although this alternative would have met all of the University's science and technology research and teaching facility needs for years to come, it was simply too expensive. Given numerous competing facility needs, even with substantial State support, the University cannot afford to proceed with a project of that magnitude. During the 2012 Campus Master Plan update, the plan to construct the new SELC Building and subsequently renovate vacated labs to create new research space was developed as an alternative. As noted, the original concept for this project has evolved further to where Wayne State now requests State Capital Outlay support to renovate the existing Science and Engineering Library and convert its use to a Science and Engineering Laboratory Classroom Building.

Another alternative considered to address the significant need to upgrade existing teaching labs included renovating labs in the various buildings where they are located currently with no new construction. While this would be a lower cost alternative, the requested project is preferable because it facilitates interdisciplinary teaching opportunities, enables growth in engineering and other STEM fields, provides 35,000 sq. ft. of space in Shapero Hall, and the Engineering and Physics buildings for re-purposed research facilities, and enables the University to provide a significantly enhanced life/safety environment for classroom facilities and the student population.