



THE UNIVERSITY  
*of*  
**WISCONSIN**  
MADISON

**REQUEST FOR ARCHITECTURAL  
& ENGINEERING SERVICES**

Engineering Building Replacement Project  
Phase 1

2021-23

DFDM Project # 20E2X

October 2020

This request provides architectural/engineering/planning (AEP) resources to complete the project phases indicated below for **Project No. 20E2X Engineering Building Replacement Phase 1 at the University of Wisconsin-Madison** (see attached for further detail).

Pre-Design Phase	Preliminary Design Phase	Final Design Phase	Bidding Phase	Construction Phase
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Consultants should submit their qualifications per DFDM instructions to demonstrate specific expertise and experience in the design and coordination of engineering buildings, active learning classrooms, collaboration spaces, wet & dry research and instructional laboratories, characterization suites, interdisciplinary instructional facilities, utility extensions, space planning (including maximum allowable quantity and control area planning), and demolition of existing buildings as part of a design team. The project design team should consist of architectural, mechanical, electrical, plumbing (including experience with large scale compressed gas piping), fire protection, audio visual, interior design, landscape architecture, civil, and structural consultants. Work includes project area surveys, acquiring field data, and verifying as-built conditions, if necessary, to assure accurate development of design and bidding documents.

The consultant(s) will participate in a highly collaborative and interactive campus planning and design process by meeting with the Division of Facilities Development and Management (DFDM) and appropriate campus staff, including Facilities Planning & Management (FP&M), College of Engineering (COE), and other support services to develop final design documentation. Working in collaboration with DFDM and the campus project team, the consultant will be responsible for program development, verification, and documentation; developing of design alternatives with corresponding construction cost estimates and construction schedules for each design alternative; and determining and documenting any project work dependencies for selected design alternatives and in coordination with 20A11-Engineering Drive Utilities project.

The design consultant(s) will provide preliminary design through construction administration and project closeout services as indicated in the current Division of Facilities Development and Management (DFDM) *Policy and Procedure Manual for Architects/Engineers and Consultants*, and the DFDM *Contract for Professional Services*. These services may be contracted through multiple contracts or contracts with multiple parts and project-specific review/approval/authorization milestones as determined by the needs of the project. Authorization for subsequent services will be issued in writing upon satisfactory performance and completion of contracted services and deliverables.

**PRELIMINARY DESIGN SERVICES**

In addition to the requirements for preliminary design through construction in the DFDM Policy and Procedure Manual for Architects/Engineers and Consultants, the following additions and clarifications should be noted:

- Verify existing project planning. Evaluate and prepare for DFDM, UW System, and campus consideration options and scenarios for determining project priorities , this includes scheduling, phasing, estimated cost, and inflation.
- Prepare a Project Plan with an updated Concept Design including, code assessment, and project delivery scenarios with phases, and alternatives.
- The design consultant(s) will also prepare documents necessary for Board of Regents, DFDM Peer Review, and State Building Commission.

**COST ESTIMATING**

Provide conceptual construction cost estimates for all design alternatives and provide full budget estimates for selected design alternative. All estimates for a selected design alternative must provide construction cost detail with a dated reference for ease of future cost escalation. All project cost estimates not directly associated with the construction costs (basic and additional design services, project management fees, design contingency, project contingency, movable and special equipment, and escalation factors) must be indicated separately from the construction cost estimates.

Life cycle cost estimates must include annual energy consumption; operational maintenance and repair cost estimates; life expectancy; and capital maintenance, repair, and replacement cost estimates of all facilities and utilities included in the master plan. Energy consumption estimates will be provided in the unit of measure most appropriate to the associated utility service to allow cost impact calculations at a future date based on current rates and agreements.

**DELIVERABLES**

Produce a Concept Design document with narrative descriptions of each project component and implementation phase, executive summary, detailed construction cost estimates, detailed life cycle costing estimates, full schematic building level floor plans for each level impacted by the project, two-dimensional elevations and color renderings of selected components, and three-dimensional color renderings of selected project areas. The narrative descriptions must include functions, occupant capacity/limits, building/structure and site infrastructure requirements, proposed materials, and applicable building code impacts. The executive summary will include all planning findings, project goals and principles, key recommendations, and an implementation plan.

Produce a life cycle cost estimate document detailing energy consumption; operational maintenance and repair cost impacts; capital maintenance, repair, and replacement cost impacts; and life expectancy for all selected design alternatives.

Produce a schematic site and landscape plan including program spaces outside the building.

Prepare documents for, participate in, and assist campus staff in public review and approval processes such as those required for the Environmental Impact Statement (EIS) process, City of Madison Plan Commission, and Joint Campus Area Committee (JCAC) meetings. The UW FP&M staff will submit the project materials and associated forms for these approvals. The A/E will provide the number of sets of design documents needed for all submittals. The A/E will coordinate and conduct the approval process meetings in concert with the UW FP&M staff. Each submittal may require the A/E to provide from one to fifteen document sets and associated electronic copies. A/E should assume attendance at one meeting each for Plan Commission, JCAC, and EIA.

Prepare documents for, participate in, and assist campus staff in review and approvals associated with Integrated Design Review Workshop (DFDM, UW-Madison), DFDM Peer Review, and campus Design Review Board (DRB). Presentation documents shall be appropriate to the phase and suitable for the use. This includes 3D color renderings to show proposed building architecture, site features, and spatial relationship of the building expansion in its neighborhood. The Pre-Design concepts have already been presented on one occasion to the campus Design Review Board during the planning study. Additional expectations associated with the DRB include three meetings where early concepts can be presented and discussed. It is desired that these meetings occur during the conceptual design phase, the schematic design phase and prior to the submission of the 35% Design Report. The UW FP&M staff will submit the project materials and associated forms for these approvals. The A/E will provide the number of sets of design documents needed for all submittals. The A/E will coordinate and conduct the approval process meetings in concert with the UW FP&M staff

All graphics must be grayscale compatible without losing meaning, distinguishing characteristics, or legibility.

All final documentation must be provided electronically via download link, USB flash drive, or optical disc (CD or DVD) in Adobe Acrobat PDF format. All narrative text and cost estimate documentation shall also be provided in an unlocked, editable file format for future use and presentation outside of the final Concept Design document. Text shall be provided in rich text format (\*.RTF) or Microsoft Word XML document format (\*.DOCX) and cost estimates provided in Microsoft Excel XML workbook format (\*.XLSX). The content of the editable file formats must match the content of the final Concept Design document, but the organization, layout, and formatting needs only to be representative of the final content. All graphics, images, maps, plans, and renderings must be provided in electronic format separate from the master plan document in high-resolution 300 pixels per inch (ppi) raster format (\*.PNG), suitable for poster size (minimum 24-inches by 36-inches) publication. All graphics, images, maps, plans, renderings, models, and documentation will become the property of the university.

In addition to deliverables listed above, A/E shall provide:

- Seven (7) bound color copies. Six (6) bound color copies of the Concept Design report, letter size. (Diagrams may be 11" x 17", folded to fit in the bound report). One (1) copy for DFDM and six (6) for UW System/ campus.
- Electronic copies, in PDF format, downloadable or via web link. All diagrams shall be capable of full graphic clarity in either color or black and white.
- Provide one mounted color image of the building exterior, approximately 30" x 36", mounted on a foam core board. The image need not be an image created specifically for this purpose but may be an image that is produced as part of the Design Report content. Also provide an electronic PDF of the image.

**Preliminary, Final Design and Construction Phase Services:** In addition to the requirements for preliminary design through construction in the *DFDM Policy and Procedure Manual for Architects/Engineers and Consultants*, the following additions and clarifications should be noted:

- The design consultant(s) will work with DFDM and the appropriate campus staff (UW-Madison Division of Facilities Planning & Management, College of Engineering, Environmental Health and Safety, and UW Police Department) to review the Concept Design, Preliminary Design, and Final Design documents. The design consultant(s) will attend a design review meeting at each of the Preliminary Design and Final Design review stages. The reviewers will provide written comments to the DFDM Project Manager based on the documents and discuss the comments with the design consultant(s). The design consultant(s) are required to provide written responses to the DFDM Project Manager.
- The A/E team will attend a review meeting at each of the Preliminary Review and Final Review stages. The A/E will provide the campus with eight (8) physical copies of complete review sets in addition to the review sets required for DFDM for the Preliminary Review and Final Reviews.
- A/E will provide 3D detailed design renderings illustrating massing, volume of main spaces, finishes, and colors for review by DFDM, FP&M, and the College of Engineering as the project progresses. These drawings should show information appropriate to the phase of the work

(early drawings will show the architecture of the spaces; later drawings will show all colors and materials). These drawings will show exterior elevations and all major interior spaces. These drawings will also be used in the public and city zoning review process for the project.

- A/E will provide interior design services including design and specifications of systems furniture in office areas in addition to design and specification of all other movable furniture. This item should be a line item in the fee proposal.
- A/E will design building signage to include all life safety, room number, informational and way finding. Exterior building identification signage will be coordinated by FP&M staff and paid for by the project.
- The project will include design and construction documents for all landscape and site work around the new facility including new entry sidewalks, retaining walls, and landscape plantings and parking modifications, if necessary.
- At the end of construction, the A/E will provide DFDM with electronic copies and FP&M with two (2) electronic and two (2) hard-copies each of O&M manuals and record drawings/specifications in AutoCAD/MS Word/PDF format, including the work of all sub-consultants, furnishings, signage, etc. Any renderings or models generated by the AE will also be turned over to DFDM and campus.

Note that per the DFDM *Policy and Procedure Manual for Architects/Engineers and Consultants*, the following services will not be included in the scope of services:

- Hazardous material abatement design will be provided by a consultant under separate contract with DFDM based on the demolition plans. Abatement documents will be incorporated into the bid set.
- Third party Level-II commissioning will be contracted separately by DFDM.

The following documents are available for reference, verification, and update as it relates to the project intent, description, and scope of work.

[Engineering Building Advanced Planning Study  
DFDM Project #19J4J – \(April 2020\)](#)

[College of Engineering - Master Plan \(2015\)](#)

[Campus Master Plan Update \(2015\)](#)

[Design Review Board Process](#)

ID	Y/N?	Description	Comments and Clarification Notes
<b>1.00</b>	<input checked="" type="checkbox"/>	<b>Project and Program Considerations</b>	
1.01	<input checked="" type="checkbox"/>	<u>Programming &amp; Program Verification</u>	<b>1.05</b> Please see < <a href="https://www.wisconsin.edu/capitalplanning/reference/deliverables/">https://www.wisconsin.edu/capitalplanning/reference/deliverables/</a> > for more detailed AutoCAD and geospatial data definition requirements.
1.02	<input checked="" type="checkbox"/>	<u>Design Concept</u>	
1.03	<input checked="" type="checkbox"/>	<u>Site/Survey</u>	
1.04	<input checked="" type="checkbox"/>	Site/Existing Conditions	
1.05	<input checked="" type="checkbox"/>	Facilities Site Plan	
1.06	<input checked="" type="checkbox"/>	Existing Land Use	
1.07	<input checked="" type="checkbox"/>	<u>Topography/Drainage</u>	
1.08	<input checked="" type="checkbox"/>	<u>Vegetation/Landscaping</u>	
1.09	<input checked="" type="checkbox"/>	<u>Subsurface Conditions</u>	
1.10	<input checked="" type="checkbox"/>	<u>Construction Staging/Occupancy of Site During Construction</u>	
1.11	<input checked="" type="checkbox"/>	<u>WEPA – Environmental Impact Determination and Identification</u>	
1.12	<input checked="" type="checkbox"/>	<u>Utilities/Infrastructure</u>	
1.13	<input checked="" type="checkbox"/>	Existing: capacity and condition of existing lines and equipment	<b>1.13</b> Includes the central utility plant.
1.14	<input checked="" type="checkbox"/>	Proposed central and site utility systems	
1.15	<input checked="" type="checkbox"/>	Maintaining utility services and infrastructure during construction	
1.16	<input checked="" type="checkbox"/>	<u>Transportation/Circulation</u>	
1.17	<input checked="" type="checkbox"/>	Vehicular/Bicycle/Pedestrian	
1.18	<input checked="" type="checkbox"/>	Parking	
1.19	<input checked="" type="checkbox"/>	Service/Loading/Unloading	
1.20	<input checked="" type="checkbox"/>	Access to Site	
1.21	<input type="checkbox"/>	<u>Existing Building Conditions</u>	
1.22	<input type="checkbox"/>	Conditions of Existing Building Spaces as necessary for design	
1.23	<input type="checkbox"/>	Condition of Existing Infrastructure and Equipment	
1.24	<input checked="" type="checkbox"/>	<u>Demolition Planning/Phasing</u>	
1.25	<input checked="" type="checkbox"/>	<u>Building Systems</u>	
1.26	<input checked="" type="checkbox"/>	Structural Systems	<b>1.14</b> Coordinate with future Engineering Drive Utility Replacement Project for that may include upgrades to chilled water, domestic water, electrical power, natural gas, sanitary sewer, storm water sewer, steam and condensate return, and telecommunications.
1.27	<input checked="" type="checkbox"/>	Mechanical Systems/HVAC	
1.28	<input checked="" type="checkbox"/>	<u>Environmental Control</u>	
1.29	<input checked="" type="checkbox"/>	Electrical/Lighting	
1.30	<input checked="" type="checkbox"/>	<u>Lighting Design</u>	
1.31	<input checked="" type="checkbox"/>	<u>Fire Alarm</u>	
1.32	<input checked="" type="checkbox"/>	<u>Telecommunications Systems</u>	
1.33	<input checked="" type="checkbox"/>	<u>Access Control</u>	
1.34	<input checked="" type="checkbox"/>	Plumbing	
1.35	<input checked="" type="checkbox"/>	Fire Protection Systems	
1.36	<input checked="" type="checkbox"/>	Signage (Code Required; Building and Room/Space Identification)	
1.37	<input checked="" type="checkbox"/>	Other Systems	
<b>2.00</b>	<input checked="" type="checkbox"/>	<b>Design Considerations</b>	
2.01	<input checked="" type="checkbox"/>	<u>Cost Estimating</u>	<b>2.04</b> Includes the Sustainable Facilities Standards Checklist items applicable to the project. UW-Madison now follows COTE Top 10 (+2 UW-Madison additions)
2.02	<input checked="" type="checkbox"/>	<u>Constructability</u>	
2.03	<input checked="" type="checkbox"/>	<u>Accessibility</u>	
2.04	<input checked="" type="checkbox"/>	<u>Sustainable Facilities and Energy Conservation</u>	
2.05	<input checked="" type="checkbox"/>	<u>Equipment Layout</u>	
2.06	<input checked="" type="checkbox"/>	<u>Campus Technical Review</u>	<b>5.01</b> Please see < <a href="https://www.wisconsin.edu/capitalplanning/reference/deliverables/">https://www.wisconsin.edu/capitalplanning/reference/deliverables/</a> > for more detailed AutoCAD and geospatial data definition requirements.
<b>3.00</b>	<input checked="" type="checkbox"/>	<b>Bid Documents (see contract for details)</b>	
<b>4.00</b>	<input checked="" type="checkbox"/>	<b>Construction Administration (see contract for details)</b>	<b>5.02</b> Includes 3 <sup>rd</sup> party Commission
4.01	<input checked="" type="checkbox"/>	<u>Commissioning (Level 1 Independent 3<sup>rd</sup> Party)</u>	
<b>5.00</b>	<input checked="" type="checkbox"/>	<b>Post-Construction Deliverables (see contract for details)</b>	<b>5.03</b> Includes all newly installed components, include list of all input/output control points and custom software with programming requirements needed to maintain and/or field modify newly installed systems.
5.01	<input checked="" type="checkbox"/>	<u>As-Built Record Drawings</u>	
5.02	<input checked="" type="checkbox"/>	<u>Commissioning Details</u>	
5.03	<input checked="" type="checkbox"/>	<u>Operations and Maintenance Manuals</u>	
5.04	<input checked="" type="checkbox"/>	<u>Warranty/Guarantee Details</u>	
			<b>5.04</b> Includes contact information for responsible parties and date of warranty expiration.

ID	Y/N?	Description	Comments and Clarification Notes	
<b>A.00</b>	<input type="checkbox"/>	<b>Planning Considerations</b>		
A.01	<input type="checkbox"/>	Master Planning		
A.02	<input type="checkbox"/>	Blocking and Stacking Diagramming		
A.03	<input type="checkbox"/>	Scope Definition		
A.04	<input type="checkbox"/>	Space Needs Analysis		
A.05	<input type="checkbox"/>	Site Evaluation		
A.06	<input type="checkbox"/>	Market Study		
A.07	<input type="checkbox"/>	Space Utilization Analysis		
<b>B.00</b>	<input checked="" type="checkbox"/>	<b>Project and Program Considerations</b>		
B.01	<input type="checkbox"/>	Occupants/User Activities		
B.02	<input type="checkbox"/>	Space Tabulation		
B.03	<input type="checkbox"/>	Room Data Sheets		
B.04	<input checked="" type="checkbox"/>	Site/Survey	<b>B.04</b> Includes Geotechnical Survey and Report. Please see < <a href="https://www.wisconsin.edu/capitalplanning/reference/deliverables/">https://www.wisconsin.edu/capitalplanning/reference/deliverables/</a> > for more detailed AutoCAD and geospatial data definition requirements. All buildings, site improvements, and site utilities within the designated project area, including those not impacted by project construction. Reference known elevation datum and include attributes for input or transfer to campus GIS mapping.	
B.05	<input checked="" type="checkbox"/>	Easements		
B.06	<input checked="" type="checkbox"/>	Zoning Approval Efforts		
B.07	<input type="checkbox"/>	Floodplain Restrictions		
B.08	<input checked="" type="checkbox"/>	Landholdings/Ownership/Boundaries		
B.09	<input checked="" type="checkbox"/>	Utilities/Infrastructure		
B.10	<input type="checkbox"/>	Energy Modeling		
B.11	<input type="checkbox"/>	Existing Facilities Survey		
B.12	<input type="checkbox"/>	Facility Condition Assessment		
B.13	<input type="checkbox"/>	Document Existing Conditions		
B.14	<input type="checkbox"/>	Concealed Conditions		
B.15	<input type="checkbox"/>	Building Code Analysis		
B.16	<input type="checkbox"/>	Phasing Options and Analysis		
B.17	<input checked="" type="checkbox"/>	Adjacency Analysis and Matrix		
B.18	<input checked="" type="checkbox"/>	Facility Specialties		<b>B. 19</b> Includes sound isolation for vibration control for research equipment,
B.19	<input checked="" type="checkbox"/>	Acoustics		
B.20	<input checked="" type="checkbox"/>	Elevator Constructor/Vertical Transportation		
B.21	<input type="checkbox"/>	Food Service Operations/Kiosks		
B.22	<input type="checkbox"/>	Security/Video Surveillance	<b>B.25</b> Includes selection, recommendation, specification, and/or systems furniture layout.	
B.23	<input type="checkbox"/>	Specialty Lighting		
B.24	<input type="checkbox"/>	Space Planning		
B.25	<input checked="" type="checkbox"/>	Furnishings, Fixtures, & Equipment		
B.26	<input type="checkbox"/>	Select Only (campus to procure and install)	<b>B.30</b> A/E team will be involved with movable furniture & scientific equipment such low temp. freezers, etc.	
B.27	<input type="checkbox"/>	Select & Specify (campus to procure and install)		
B.28	<input checked="" type="checkbox"/>	Select, Specify, & Supervise Installation		
B.29	<input checked="" type="checkbox"/>	Fixed Equipment		
B.30	<input checked="" type="checkbox"/>	Movable Equipment		
B.31	<input type="checkbox"/>	Art Selection Assistance		
B.32	<input checked="" type="checkbox"/>	Universal Design		
B.33	<input type="checkbox"/>	Historic Preservation		
B.34	<input type="checkbox"/>	Historic Structure Report (HSR)		
B.35	<input type="checkbox"/>	Historic Preservation Plan (HPP)		
B.36	<input type="checkbox"/>	Wisconsin Historical Society Approval for Building Concept		
B.37	<input checked="" type="checkbox"/>	Presentations	<b>B.37</b> Prepare documents for, participate in, and assist campus staff in public review and approval processes such as those required for the EIS process, City of Madison Plan Commission, and Joint Campus Area Committee (JCAC) meetings.	
B.38	<input checked="" type="checkbox"/>	Formal Presentation(s)		
B.39	<input checked="" type="checkbox"/>	Presentation Materials		
B.40	<input checked="" type="checkbox"/>	Facilitate on Campus Design Document Review	<b>B.40</b> One day document review with campus physical plant staff for 35% and Final Review.	
<b>C.00</b>	<input type="checkbox"/>	<b>Construction Administration</b>		
C.01	<input checked="" type="checkbox"/>	Additional Construction Administration Services	<b>C.01</b> Includes additional on-site construction administration beyond basic services	

<b>D.00</b>	<input type="checkbox"/>	<b>Miscellaneous</b>
D.01	<input checked="" type="checkbox"/>	<u>Wayfinding</u>
D.02	<input checked="" type="checkbox"/>	<u>Building Performance and Certification Standards Compliance</u>
D.03	<input checked="" type="checkbox"/>	<u>Renderings, Models, and Mock-Ups</u>
D.04	<input checked="" type="checkbox"/>	<u>Building Information Modeling</u>
D.05	<input type="checkbox"/>	<u>Measured Drawings Beyond Project Area</u>
D.06	<input type="checkbox"/>	<u>Commissioning (i.e. Level 2, Exterior Envelope)</u>
D.07	<input type="checkbox"/>	<u>Post Occupancy Evaluation</u>
<b>E.00</b>	<input type="checkbox"/>	<b>Other (Please Specify)</b>

SUPPLEMENTAL SERVICES

ID	Y/N?	Description	Comments and Clarification Notes
<b>F.00</b>	<input checked="" type="checkbox"/>	<b>Pre-Requisite Considerations</b>	
F.01	<input type="checkbox"/>	<u>Surge Space(s) Identification and Suitability Determination</u>	<i>F.02 Determine and document if any site utility work is required to facilitate the proposed project scope that is not included in the proposed project solution/phase/alternate scope and budget estimate. Coordinate with 20A11 Engineering Drive Utilities Project.</i>
F.02	<input checked="" type="checkbox"/>	<u>Utility Infrastructure Impact(s) Identification and Strategy Recommendation</u>	
<b>G.00</b>	<input type="checkbox"/>	<b>Capital Plan Considerations</b>	
G.01	<input checked="" type="checkbox"/>	<u>Project Sequence Dependency Identification</u>	<i>G.01 Determine and document what capital project work is required to enable or facilitate any portion of the proposed project solution/phase/alternate. The scope of work identified in this section may not be included in the proposed project solution/phase/alternate scope or budget estimate.</i>
<b>H.00</b>	<input type="checkbox"/>	<b>Physical Development Impacts</b>	
H.01	<input type="checkbox"/>	Code Compliance Resolution	
H.02	<input type="checkbox"/>	Health & Safety Condition Resolution	
H.03	<input type="checkbox"/>	Environmental Protection Condition Resolution	
H.04	<input type="checkbox"/>	Facility and/or Program Standards Condition Resolution	
H.05	<input type="checkbox"/>	Space Profile (Demolition/Renovation/New Construction)	

## Major Project Request 2021 - 23 Biennium

<u>Agency</u>	<u>Institution</u>	<u>Facility ID</u>	<u>Facility Name</u>
University of Wisconsin	Madison	285-0A-9999	New Building

<u>Project Title</u>	<u>Priority</u>
Engineering Building Replacement – Phase I	

### Project Request

The UW System requests that the Board of Regents recommend this project of \$150,000,000 (\$100,000,000 General Fund Supported Borrowing and \$50,000,000 Gifts) to demolish the Computer Aided Engineering Facility and construct a replacement academic and research engineering facility at UW-Madison be included in the proposed 2021-23 Capital Budget request that will be submitted to the Department of Administration and the State Building Commission.

### Project Description and Scope

This project demolishes an engineering facility located at 1410 Engineering Drive and constructs the first of proposed two-phase replacement facility, creating contiguous space for the College of Engineering. It is anticipated that the new facility will be eight floors total (six floors above grade and two floors below grade) and provide modern classrooms and instructional laboratories, research laboratories, shared collaboration and support spaces, and offices. The new space is projected to accommodate undergraduate engineering students, 13 principal investigator led research teams, and 30 additional research teams. The following summary is the construction cost portion for the proposed scope of work.

<b>Demolition:</b>	34,390 ASF	63,561 GSF	\$	1,662,000
<b>Renovation:</b>	0 ASF	0 GSF	\$	0
<b>New Construction:</b>	106,300 ASF	170,000 GSF	\$	105,507,000
<b>Project Total:</b>	140,690 ASF	233,561 GSF	\$	107,169,000

The new facility will be planned around the convergence of instructional and research platforms. Innovation and discovery will not be confined to the traditional and individual physical spaces created, but rather through the collaborative and collective efforts of research teams and external stakeholders. The design locates the instructional program at the lower levels and the research program at the upper levels. Interconnecting spaces with communicating stairs are located throughout the building to further reinforce student collaboration and the interconnectivity of programs on multiple floors. The new building will provide four flat floor, flexible, active learning classrooms and associated support spaces. Each classroom will have a capacity of 100 to 120 students. Both dry and wet instructional laboratories with their associated support spaces will be developed. Each instructional laboratory will have a capacity of 40 students and movable interior walls so adjacent laboratories can be combined to enable sections of 80 students. The shared instructional spaces in between will be available as study space when not used for instruction. The proposed instructional laboratories will emphasize hands-on, project-based learning by integrating instrumentation and technology into the learning environment to support discovery and innovation.

In support of Governor Evers' Executive Order 38, this project will include energy efficiency and sustainable design concepts to reduce the university utility costs, reduce the impacts of climate change, and build resiliency into the design solution. The project will utilize the DFDM Sustainability Guidelines, based on the AIA Framework for Design Excellence (formerly known as the COTE Top 10) to guide the initial planning/design. The plan is to incorporate renewable energy features for both educational research of sustainable building design, energy efficiency, and clean energy and the reduction of energy costs. The project will include options for utilizing stormwater as a resource and will/may incorporate features such as a green roof, bioretention systems, rain gardens, and permeable paving to promote stormwater infiltration and aquifer recharge.

### Background

The 1410 Engineering Drive building (34,483 ASF/63,561 GSF) was constructed in 1938 with an addition in 1987 and is a composition of two different eras of construction and capability. The original structure, designed as a transportation building, has reached the end of useful life for many systems and its ability to support the functions of research are limited and costly to sustain. The addition is functional for the uses of instructional classrooms and offices, but the introduction of contemporary classroom capabilities and instructional laboratories would require continued investment and



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reconfiguration. The facility was identified in the 2005 and 2015 campus master plans for elimination, and regular capital maintenance has been deferred. The facility condition assessment completed under the 2015 College of Engineering Facilities Master Plan recommended that the facility be replaced. In 2019, a feasibility study was completed, including preliminary program development and cost estimates. This proposed scope of work and associated cost estimate is based upon that feasibility study.

This project was previously identified in the 2019-21 biennial capital budget as the primary facility for the Chemical and Biological Engineering program with shell space for engineering growth. In the interim, the campus has identified a greater need for a multi-disciplined research and education facility that can be used by all engineering programs. Advanced planning for this project was enumerated in 2019 Wisconsin Act 9 and recently confirmed that the proposed program fit onto the proposed site.

### **Analysis of Need and Project Justification**

A majority of the existing building infrastructure systems are in poor and unsatisfactory conditions and continued use as a research facility would require a significant capital reinvestment. The current facility cannot structurally provide the open and flexible spaces required for modern instructional or research spaces; the low floor-to-floor clearance impedes widespread implementation of instructional technology, instrumentation, or equipment in all but the smallest of rooms; and the uninsulated exterior envelope cannot be retrofitted to meet current energy efficiency or sustainability goals. Providing a safe instructional and research environment is a top priority for the college. Only three of the eight engineering buildings have fire suppression systems, which limits the occupancy and number of wet instructional and research laboratories. The maximum number of wet labs in Engineering Hall and Engineering Research Building (ERB) are already in place as well as the number of gas cylinders that can be deployed throughout these buildings. Exhaust gases from ERB are still being recaptured by the air handling system and reintroduced to the building, which poses a significant safety hazard. The research group growth in specific areas housed in ERB is restricted, which negatively impacts the progress in fusion energy, plasma science, and nuclear reactor systems. These research programs are recognized as among the best in the nation, but the state of the infrastructure places that recognition at risk.

The nature of organizational, physical, and social environments that support engineering research activities has changed dramatically over the past several decades – outpacing the outdated, individual research laboratories within Engineering Hall. The speed of change continues to increase along with growing competition for limited resources. This results in continual research program evolution to remain at the forefront. Success of an academic institution, its principal investigators, and its potential for discoveries and transformational impacts on society is largely contingent on the ability of the research program to adapt to these changes. The focus of a modern engineering instructional program is to produce students with the necessary soft and technical skills to enable them to assume responsibility, creatively innovate, and develop rapid solutions. The lack of new instructional and research spaces will make it more difficult to attract non-Wisconsin students to the state. The ability to attract non-Wisconsin students is essential to meet current and projected engineering workforce demands of Wisconsin industry, and this challenge will only be exacerbated with the looming change in the state demographics. Since most, if not all, the top engineering programs attempt to recruit non-resident students, the quality of the instructional facilities will be a deciding factor in many cases. The current state of UW-Madison's instructional and research infrastructure place it and the State of Wisconsin at a competitive disadvantage.

The demand for an engineering degree from UW-Madison has increased since 2008 when the total number of undergraduates enrolled was 3,414. In 2014, the total undergraduate engineering population was 4,992, but was decreased because there were insufficient faculty and staff to educate the students to campus standards and instructional facilities were inadequate to provide a safe, quality, hands-on educational experience. An important element regarding this recent growth is that the number of women pursuing an engineering degree has increased since 2015; the 2019 incoming class was 29% women. This is an important achievement that needs to continue, as companies demand a more diverse body of graduates. In 2019, the College of Engineering received 7,000 applications from students seeking to study engineering at UW-Madison, but only one in six became part of the incoming class. This means many qualified students are being denied the opportunity to study engineering at UW-Madison, which has repercussions on the number of engineers available to meet the demands of Wisconsin companies. The proposed new facility would increase the number of opportunities by at least 1,000 undergraduates, 350 one-year professional master's degree students, and 50 doctoral students.

The College of Engineering (COE) contributes to the economic growth of Wisconsin in a variety of impactful ways. This includes its research enterprise of more than \$100 million in annual expenditures; new jobs created through companies

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launched by faculty, staff, students and alumni (more than 200); service to Wisconsin industries through research partnerships, consulting, consortia, and other engagements (more than 400 companies interact with the COE); and opportunities of career advancement through its life-long learning programs. This project will help meet COE's demand for flexible, modern instructional and research space that will increase programmatic efficiencies and research expenditures; promote research innovation; help meet the growing demand of additional engineering degrees; and support the strategic growth of the college.

### Alternatives

The option to comprehensively remodel 1410 Engineering Drive was investigated and determined to be cost ineffective, as the budget estimate to renovate would have resulted in a significantly compromised facility that was approximately 70% of the cost to construct a new facility with no compromises. The planning and pre-design efforts already completed have concluded 1410 Engineering Drive cannot effectively be renovated for modern science laboratories due to irregular and undersized structural column grid, irregular and low floor-to-floor heights, and the poor condition and performance of the exterior envelope.

<b>Project Budget (Per Enumeration Request)</b>				<b>Project Budget (Target)</b>			
Construction:		\$	107,169,000	Construction:		\$	90,918,000
Hazardous Materials:		\$	0	Hazardous Materials:		\$	0
<b>Total Construction:</b>		<b>\$</b>	<b>107,169,000</b>	<b>Total Construction:</b>		<b>\$</b>	<b>90,918,000</b>
Design Fees (Basic):	8.32%	\$	8,916,000	Design Fees (Basic):	8.32%	\$	7,564,000
Design Fees (Other):	2.05%	\$	2,193,000	Design Fees (Other):	2.05%	\$	1,868,000
<b>Total Design Fees:</b>		<b>\$</b>	<b>11,109,000</b>	<b>Total Design Fees:</b>		<b>\$</b>	<b>9,432,000</b>
Contingency:	15.00%	\$	16,075,000	Contingency:	15.00%	\$	13,638,000
Management Fees:	4.00%	\$	4,930,000	Management Fees:	4.00%	\$	4,182,000
Furnishings/Fixtures/Eqpt:	10.00%	\$	10,717,000	Furnishings/Fixtures/Eqpt:	10.00%	\$	9,092,000
<b>Total Budget Estimate:</b>		<b>\$</b>	<b>150,000,000</b>	<b>Total Budget Estimate:</b>		<b>\$</b>	<b>127,262,000</b>

<b>Project Schedule (Per Enumeration Request)</b>		<b>Project Schedule (Target)</b>	
A/E Selection:	Jan 2022	A/E Selection:	Dec 2020
Design Report:	Jan 2023	Design Report:	Jan 2022
Approval:	Apr 2023	Approval:	Feb 2022
Bid Date:	Jul 2025	Bid Date:	Oct 2022
Start Project:	Sep 2025	Start Project:	Dec 2022
Substantial Completion:	Jul 2027	Substantial Completion:	Dec 2024
Project Close Out:	Jan 2028	Project Close Out:	Dec 2024

<b>Funding Sources</b>		
GFSB:	\$	100,000,000
PRSB:	\$	0
Cash:	\$	0
Gifts:	\$	50,000,000
Grants:	\$	0
BTF:	\$	0
Other (Please Describe):	\$	0
Other (Please Describe):	\$	0
Other (Please Describe):	\$	0

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<b>Total Funding Sources:</b>	<b>\$</b>	<b>150,000,000</b>
<b><u>Previous Action</u></b>  08/24/2018 Resolution 11079	The Board of Regents approved that the proposed 2019-21 Capital Budget request, including the planning and advanced enumeration of the Engineering Building project at an estimated total project cost of \$145,756,000 (\$68,872,500 General Fund Supported Borrowing; \$68,872,500 Gifts; \$2,915,000 Cash; and \$5,096,000 Building Trust Funds), be submitted to the Department of Administration and State Building Commission.	

**Segregated Fee Impact(s)**

Not Applicable.

**Impact on Operating Budget**

**Description**

It is estimated that an additional \$2,241,000 will be required annually to support the completion of this project for staffing, supplies and expenses, and energy bills. Adequate and appropriate operational budget sources have been identified and internally allocated/committed to support this proposed project.