Agenda Item No. 3.5

AGENDA ITEM BRIEFING

Submitted by: Dr. John E. Hurtado, Interim Director
Texas A&M Engineering Experiment Station

Subject: Approval of the Revised Project Budget, Appropriation for Construction Services, and Approval for Construction for the Propulsion Test Facility at the TEES Turbomachinery Lab Project, Texas A&M Engineering Experiment Station, College Station, Texas (Project No. 2021-07747)

Background and Prior Actions:

The Propulsion Test Facility at the Texas A&M Engineering Experiment Station (TEES) Turbomachinery Lab Project was included as an approved project on the FY 2023 – FY 2027 A&M System Capital Plan approved by the Board at the May 2022 meeting with a planning amount of $5,000,000.

Proposed Board Action:

(1) Approve the revised project budget.

(2) Appropriate $5,900,000 for construction services and related project costs. $500,000 has been previously appropriated to this project.

(3) Approve construction of the Propulsion Test Facility at the TEES Turbomachinery Lab Project at TEES.

Funding/Budget Amount:

Funding Source	Budget Amount	Proposed Adjustment	Proposed Budget	Average Estimated Annual Debt Service	Debt Service Source
Revenue Financing System Debt Proceeds	$2,300,000	$1,400,000	$3,700,000	$300,050	Indirect Cost Recoveries
Revenue Financing System Debt Proceeds	$1,200,000	$0	$1,200,000	$97,688	Turbomachinery Symposium Revenue
Revenue Financing System Debt Proceeds	$500,000	$0	$500,000	$40,513	Gifts
Cash (Governor's University Research Initiative (GURI))*	$500,000	$0	$500,000	N/A	N/A
Cash AUF (Chancellor's Research Initiative (CRI)) *	$500,000	$0	$500,000	N/A	N/A
Total Project Funds	$5,000,000	$1,400,000	$6,400,000		

*Texas A&M University is using $500,000 of Dr. Robert Ambrose's Governor's University Research Initiative (GURI) Award and $500,000 of Dr. Robert Ambrose's Chancellor's Research Initiative (CRI) Award to provide funding for this project.

Change Justification:

The Program of Requirements (POR) for this project was developed and finalized in June 2021. The POR did not adequately anticipate the escalation of costs. An increase in the capital planning amount is needed to align the budget with the project scope currently identified.

Project Justification:

For over 100 years, TEES has served the citizens of Texas through engineering, technology-oriented research, and educational collaborations. TEES research has made significant impacts on the health, safety and quality of life of Texas citizens and has contributed to the state's economic growth and development. In support of its mission, TEES engineering and technology research programs continue to evolve and expand. To foster this growth, TEES proposes the construction of the Propulsion Test Facility to be located at the existing TEES Turbomachinery Laboratory.

Over the past several years, Texas A&M University (Texas A&M) has assembled a critical mass of faculty members who have complementary research programs in propulsion, energetics, high-speed gas dynamics, power generation, and reacting flows. State-of-the-art research in these areas, both fundamental and applied, requires the ability to reproduce conditions in extreme environments: high pressures, high temperatures, high speeds, and high energy. One aspect that is lacking at Texas A&M but would make the university an unparalleled international leader in this area is a dedicated building to safely perform experiments that require a semi-remote location with unique test facilities and sophisticated instrumentation. Sample experiments include, among others, subscale rocket motor testing; supersonic combustion; high-energy rotating machinery; jet engine combustor test rigs; energetic materials testing; detonation-based propulsion; and advanced optical and laser diagnostics applied to all such experiments. To this end, we propose the establishment of the Propulsion Test Facility.

This undertaking will provide the infrastructure that allows multidisciplinary research to be performed for important defense, energy, and homeland security technologies for many decades beyond the careers of the core faculty members who will initially put the Propulsion Test Facility into operation. Arguably, only one other university in the nation has a similar capability, but combined with Texas A&M's other related strengths such as the Bush Combat Development Center and the National Aerothermochemistry and Hypersonics Lab, the Propulsion Test Facility would give Texas A&M a singular advantage over any other university.

The Propulsion Test Facility satisfies a critical niche between the fundamental, detailed work that a university can do and the full-scale testing that only major government laboratories can perform. The core team of initial researchers and related faculty will be able to leverage the Propulsion Test Facility capability toward the pursuit of major grants from a wide range of government and industry sources in areas ranging from defense, homeland security, and process safety to energy, transportation, and space exploration.

Scope:

The Propulsion Test Facility will be a new approximately 7,000 sf freestanding building to be constructed on the existing TEES Turbomachinery Lab site located at 1485 George Bush Drive West, College Station, Texas 77845. The proposed structure will be constructed to the rear (southeast) of the existing main Turbolab building.

The building will include seven high-pressure test cells with associated control rooms, a laser diagnostic lab and wet lab. All test cells are to be constructed with blast-resistant walls and structural floor anchors for thrust equipment. Test cells will have overhead coiling doors and/or large exterior swing doors for moving in or out various test rigs with exhaust into a semi-remote area. An exterior projectile barrier wall is included behind the new facility.

Propellants to be utilized in test cells may vary but will include both flammable gases and liquids. A provision is included for onsite flammable and explosives storage in limited quantities. Adjacent covered but open exterior storage is included for supporting tanks and equipment.

Construction on this project is scheduled to start in March 2023 with substantial completion scheduled for March 2024. The total project budget is $6,400,000.

Other Major Fiscal Impacts:

None.

Strategic Plan Imperative(s) this Item Advances:

The TEES Propulsion Test Facility Project advances System Strategic Plan Imperative #4, increasing the A&M System's prominence by developing a state-of-the-art propulsion and energetics test facility that will enhance industry-based research.

Agenda Item No. 3.5

TEXAS A&M ENGINEERING EXPERIMENT STATION
Office of the Director
January 5, 2023

Members, Board of Regents
The Texas A&M University System

Subject: Approval of the Revised Project Budget, Appropriation for Construction Services, and Approval for Construction for the Propulsion Test Facility at the TEES Turbomachinery Lab Project, Texas A&M Engineering Experiment Station, College Station, Texas (Project No. 2021-07747)

I recommend adoption of the following minute order:

"The project scope along with a revised project budget of $6,400,000 for the Propulsion Test Facility at the Texas Engineering Experiment Station (TEES) Turbomachinery Lab Project is approved.

The amount of $3,700,000 is appropriated from Account No. 01-083538 Revenue Financing System Debt Proceeds (Indirect Cost Recoveries), the amount of $1,200,000 is appropriated from Account No. 01-083538 Revenue Financing System Debt Proceeds (Turbomachinery Symposium Revenue), the amount of $500,000 is appropriated from Account No. 01-083538 Revenue Financing System Debt Proceeds (Gifts), the amount of $250,000 is appropriated from Account No. 02-410551 Governor's University Research Initiative (GURI) and the amount of $250,000 is appropriated from Account No. 02-290316 CRI - Ambrose, for construction services and related project costs.

The Propulsion Test Facility at the TEES Turbomachinery Lab Project, Texas A&M Engineering Experiment Station, College Station, Texas, is approved for construction.

The Board of Regents of The Texas A&M University System (Board) reasonably expects to incur debt in one or more obligations for this project, and all or a portion of the proceeds received from the sale of such obligations is reasonably expected to be used to reimburse the account(s) for amounts previously appropriated and/or expended from such account(s).

As required by Section 5(a) of the Master Resolution of the Revenue Financing System, the Board hereby determines that it will have sufficient funds to meet the financial obligations of The Texas A&M University System, including sufficient Pledged Revenues to satisfy the Annual Debt Service Requirements of the Revenue Financing System and to meet all financial obligations of the Board relating to the Revenue Financing System and that

the Participants, on whose behalf the debt is issued, possess the financial capacity to satisfy their Direct Obligations."

Respectfully submitted,

[ORIGINAL SIGNED BY]

Dr. John E. Hurtado, Interim Director
Texas A&M Engineering Experiment Station

Approval Recommended:

[ORIGINAL SIGNED BY]

John Sharp
Chancellor

Approved for Legal Sufficiency:

[ORIGINAL SIGNED BY]

Ray Bonilla
General Counsel

[ORIGINAL SIGNED BY]

Billy Hamilton
Deputy Chancellor and
Chief Financial Officer

[ORIGINAL SIGNED BY]

Phillip Ray
Vice Chancellor for Business Affairs

PROPULSION TEST FACILITY AT THE TEES TURBOMACHINERY LAB
TEXAS A&M ENGINEERING EXPERIMENT STATION
PROJECT NO. 2021-07747

PROJECT BUDGET

1.	Construction	$5,372,300
2.	Project Contingency	268,611
3.	Program of Requirements	0
4.	Pre-Construction Services	360,181
5.	Commissioning	40,000
6.	Construction Testing	35,000
7.	Campus Services & Technology	40,000
8.	Furnishings	0
9.	Equipment	0
10.	Other Project Costs	97,500
11.	Project Management & Inspection	$186,408
12.	TOTAL ESTIMATED COST OF PROJECT	$6,400,000

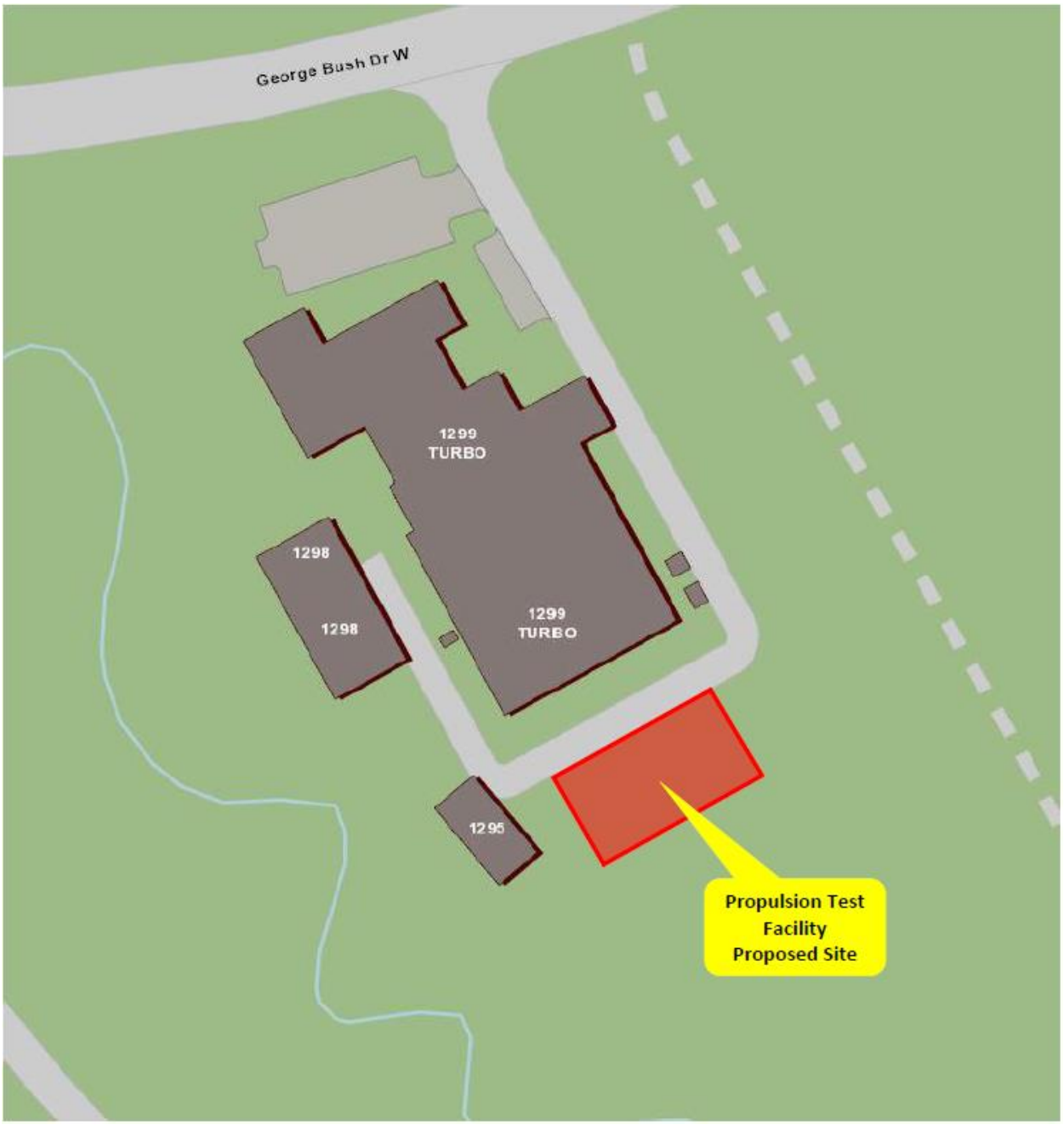
PROPULSION TEST FACILITY AT THE TEES TURBOMACHINERY LAB **PROJECT SCHEDULE**

TEXAS A&M ENGINEERING EXPERIMENT STATION

PROJECT NO. 2021-07747

1. BOR Approval to Include in Capital Plan ..... August 2021
2. Issue A/E RFQ ..... September 2021
3. Receive A/E RFQ Responses ..... September 2021
4. Shortlist A/E Firms ..... October 2021
5. Interview A/E Shortlist ..... October 2021
6. A/E Ranked Order Approved by Chancellor ..... November 2021
7. Execute A/E Agreement ..... December 2021
8. A/E Design Kick-Off ..... December 2021
9. Advertise for CSP ..... August 2022
10. Receive CSP Response ..... September 2022
11. CSP Ranked Order Approved by Chancellor ..... October 2022
12. Complete Schematic Design ..... January 2022
13. Complete Design Development ..... April 2022
14. Complete Construction Documents ..... July 2022
15. Submit THECB Application ..... October 2022
16. BOR Approval for Construction ..... February 2023
17. Begin Construction ..... March 2023
18. Substantial Completion ..... March 2024
19. Owner Occupancy ..... March 2024


TAMU Main Campus
Easterwood Airfield
TAMU West Campus
Turbomachinery Lab
(Proposed Site)



Propulsion Test Facility at the TEES Turbomachinery Lab

Texas A&M Engineering Experiment Station **Project No. 2021-07747**

TEXAS A&M ENGINEERING EXPERIMENT STATION
REVENUE FINANCING SYSTEM
Propulsion Test Facility at the TEES Turbomachinery Lab
Indirect Cost Recoveries

Dates	Outstanding Principal	Principal Amount	Interest Amount	Annual Total	Coverage 1.15x
BONDS	3,740,000.00				
YEAR 1	3,625,000.00	115,000.00	187,000.00	302,000.00	347,300.00
YEAR 2	3,505,000.00	120,000.00	181,250.00	301,250.00	346,437.50
YEAR 3	3,380,000.00	125,000.00	175,250.00	300,250.00	345,287.50
YEAR 4	3,250,000.00	130,000.00	169,000.00	299,000.00	343,850.00
YEAR 5	3,115,000.00	135,000.00	162,500.00	297,500.00	342,125.00
YEAR 6	2,970,000.00	145,000.00	155,750.00	300,750.00	345,862.50
YEAR 7	2,820,000.00	150,000.00	148,500.00	298,500.00	343,275.00
YEAR 8	2,660,000.00	160,000.00	141,000.00	301,000.00	346,150.00
YEAR 9	2,495,000.00	165,000.00	133,000.00	298,000.00	342,700.00
YEAR 10	2,320,000.00	175,000.00	124,750.00	299,750.00	344,712.50
YEAR 11	2,135,000.00	185,000.00	116,000.00	301,000.00	346,150.00
YEAR 12	1,940,000.00	195,000.00	106,750.00	301,750.00	347,012.50
YEAR 13	1,735,000.00	205,000.00	97,000.00	302,000.00	347,300.00
YEAR 14	1,520,000.00	215,000.00	86,750.00	301,750.00	347,012.50
YEAR 15	1,295,000.00	225,000.00	76,000.00	301,000.00	346,150.00
YEAR 16	1,060,000.00	235,000.00	64,750.00	299,750.00	344,712.50
YEAR 17	815,000.00	245,000.00	53,000.00	298,000.00	342,700.00
YEAR 18	555,000.00	260,000.00	40,750.00	300,750.00	345,862.50
YEAR 19	285,000.00	270,000.00	27,750.00	297,750.00	342,412.50
YEAR 20	-	285,000.00	14,250.00	299,250.00	344,137.50
		$ 3,740,000.00	$ 2,261,000.00	$ 6,001,000.00	$ 6,901,150.00

Estimated issuance costs and rounding of $40,000 are included in this schedule.
Long-term rates are assumed to be 5.00%. Rates are subject to market change.
Prepared by the Office of the Treasurer - Treasury Services 11/30/2022

Rates are subject to market change. Amounts are preliminary estimates that will be revised at the time bonds are issued.

TEXAS A&M ENGINEERING EXPERIMENT STATION
REVENUE FINANCING SYSTEM
Propulsion Test Facility at the TEES Turbomachinery Lab
Symposium Revenue

Dates	Outstanding Principal	Principal Amount	Interest Amount	Annual Total	Coverage 1.15x
BONDS	1,215,000.00				
YEAR 1	1,180,000.00	35,000.00	60,750.00	95,750.00	110,112.50
YEAR 2	1,140,000.00	40,000.00	59,000.00	99,000.00	113,850.00
YEAR 3	1,100,000.00	40,000.00	57,000.00	97,000.00	111,550.00
YEAR 4	1,060,000.00	40,000.00	55,000.00	95,000.00	109,250.00
YEAR 5	1,015,000.00	45,000.00	53,000.00	98,000.00	112,700.00
YEAR 6	970,000.00	45,000.00	50,750.00	95,750.00	110,112.50
YEAR 7	920,000.00	50,000.00	48,500.00	98,500.00	113,275.00
YEAR 8	870,000.00	50,000.00	46,000.00	96,000.00	110,400.00
YEAR 9	815,000.00	55,000.00	43,500.00	98,500.00	113,275.00
YEAR 10	760,000.00	55,000.00	40,750.00	95,750.00	110,112.50
YEAR 11	700,000.00	60,000.00	38,000.00	98,000.00	112,700.00
YEAR 12	635,000.00	65,000.00	35,000.00	100,000.00	115,000.00
YEAR 13	570,000.00	65,000.00	31,750.00	96,750.00	111,262.50
YEAR 14	500,000.00	70,000.00	28,500.00	98,500.00	113,275.00
YEAR 15	425,000.00	75,000.00	25,000.00	100,000.00	115,000.00
YEAR 16	350,000.00	75,000.00	21,250.00	96,250.00	110,687.50
YEAR 17	270,000.00	80,000.00	17,500.00	97,500.00	112,125.00
YEAR 18	185,000.00	85,000.00	13,500.00	98,500.00	113,275.00
YEAR 19	95,000.00	90,000.00	9,250.00	99,250.00	114,137.50
YEAR 20	-	95,000.00	4,750.00	99,750.00	114,712.50
		$ 1,215,000.00	$ 738,750.00	$ 1,953,750.00	$ 2,246,812.50

Estimated issuance costs and rounding of $15,000 are included in this schedule.
Long-term rates are assumed to be 5.00%. Rates are subject to market change.
Prepared by the Office of the Treasurer - Treasury Services 11/30/2022

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TEXAS A&M ENGINEERING EXPERIMENT STATION
REVENUE FINANCING SYSTEM
Propulsion Test Facility at the TEES Turbomachinery Lab
Gifts

Dates	Outstanding Principal	Principal Amount	Interest Amount	Annual Total	Coverage 1.15x
BONDS	505,000.00				
YEAR 1	490,000.00	15,000.00	25,250.00	40,250.00	46,287.50
YEAR 2	475,000.00	15,000.00	24,500.00	39,500.00	45,425.00
YEAR 3	460,000.00	15,000.00	23,750.00	38,750.00	44,562.50
YEAR 4	440,000.00	20,000.00	23,000.00	43,000.00	49,450.00
YEAR 5	420,000.00	20,000.00	22,000.00	42,000.00	48,300.00
YEAR 6	400,000.00	20,000.00	21,000.00	41,000.00	47,150.00
YEAR 7	380,000.00	20,000.00	20,000.00	40,000.00	46,000.00
YEAR 8	360,000.00	20,000.00	19,000.00	39,000.00	44,850.00
YEAR 9	335,000.00	25,000.00	18,000.00	43,000.00	49,450.00
YEAR 10	310,000.00	25,000.00	16,750.00	41,750.00	48,012.50
YEAR 11	285,000.00	25,000.00	15,500.00	40,500.00	46,575.00
YEAR 12	260,000.00	25,000.00	14,250.00	39,250.00	45,137.50
YEAR 13	235,000.00	25,000.00	13,000.00	38,000.00	43,700.00
YEAR 14	205,000.00	30,000.00	11,750.00	41,750.00	48,012.50
YEAR 15	175,000.00	30,000.00	10,250.00	40,250.00	46,287.50
YEAR 16	145,000.00	30,000.00	8,750.00	38,750.00	44,562.50
YEAR 17	110,000.00	35,000.00	7,250.00	42,250.00	48,587.50
YEAR 18	75,000.00	35,000.00	5,500.00	40,500.00	46,575.00
YEAR 19	40,000.00	35,000.00	3,750.00	38,750.00	44,562.50
YEAR 20	-	40,000.00	2,000.00	42,000.00	48,300.00
		$ 505,000.00	$ 305,250.00	$ 810,250.00	$ 931,787.50

Estimated issuance costs and rounding of $5,000 are included in this schedule.
Long-term rates are assumed to be 5.00%. Rates are subject to market change.
Prepared by the Office of the Treasurer - Treasury Services 11/30/2022

Rates are subject to market change. Amounts are preliminary estimates that will be revised at the time bonds are issued.

Funded by the $20M J. Mike Walker Gift held at the TAMU Foundation.