EXECUTIVE SUMMARY

Southern New Hampshire’s BioFabrication cluster could create 7,500 to 15,000 direct jobs in the region, increasing the rate of GDP growth by over 30% (from 2.3% to 3%).

The Coalition’s Vision for a BioFabrication Cluster

Over the last decade, Southern New Hampshire has established itself as a leader in the field of regenerative medicine, an emerging area of science that harnesses the body’s growth and healing properties to repair or replace damaged cells, tissues, and organs. BioFabrication, an innovative manufacturing industry segment, is creating state-of-the-art innovations in biomaterial and cell processing, bioprinting, and automation.

This proposal outlines our vision to transform the Southern New Hampshire economy with the establishment of a BioFabrication cluster to further grow the regenerative medicine industry and lead the nation in the production and distribution of regenerative tissues and organs. The coalition will utilize existing assets – including the Advanced Regenerative Manufacturing Institute, the historic Amoskeag Millyard (“the Millyard”), the Manchester-Boston Regional Airport, and institutions of higher education (IHEs). The cluster will leverage the burgeoning advanced aerial mobility (AAM) industry, advanced manufacturing technologies, workforce development initiatives, and physical infrastructure developments to help underserved populations obtain high-quality jobs and increased wages.

The Economic Opportunity

BioFabrication encompasses applications including skin and musculoskeletal tissues; neurological and ophthalmological tissues; cardiovascular and lung tissues; renal tissue; and hematological and immunological conditions. Each BioFabrication therapy brought to market will save lives and create hundreds to thousands of manufacturing jobs. According to the Economic Policy Institute (EPI), for every 100 jobs in manufacturing of pharmaceuticals and medical products, 394 supplier jobs are created, and 180 jobs are induced. With the establishment of a BioFabrication cluster, the coalition projects the creation of 7,500 to 15,000 new jobs in Southern New Hampshire alone over the next decade, with a total jobs impact of more than 50,000 direct, supplier, and induced jobs.

By creating connections between infrastructure, transportation, industry, and public and post-secondary education, we are ensuring this growth industry does not leave behind our existing workforce and community. While Manchester is the economic center of New Hampshire, it also has the highest rates of poverty, particularly among those with disabilities and residents of color. Far too often the low income residents of our community, located in Manchester’s higher density neighborhoods, do not benefit from the economic growth seen in the Millyard and Downtown.

In addition, the BioFabrication cluster presents significant economic opportunities in the emerging advanced aerial mobility (AAM) industry, which aims to develop and operate new air vehicles capable of safe, zero-emissions flight. Because living tissues require more sophisticated
logistics and transport infrastructure than their inorganic counterparts, the coalition is pioneering the world’s first electric vertical take-off and landing (eVTOL) tissue and organ delivery network. The AAM sector is expected to reach $115 billion by 2035 and employ more than 280,000 people, and Southern New Hampshire is primed for a leadership role as a result of the BioFabrication cluster and its proximity to major healthcare systems, academic centers, and leading AAM companies across New England.

**Coalition Members**

**The City of Manchester, New Hampshire** is the economic center of the region and the Phase 1 Lead Applicant, bringing together well-established relationships with the coalition members and partners in the Concept Proposal.

**Advanced Regenerative Manufacturing Institute (ARMI)**, a non-profit Manufacturing Innovation Institute (MII) within the Manufacturing USA network, is focused on large-scale manufacturing of cells, tissues, and organs. ARMI’s consortium of more than 170 member organizations is led by an unparalleled board of directors and cuts across industry, government, academia, and the nonprofit sector.

**Southern New Hampshire University (SNHU)**, is a private, non-profit institution with an 88-year history of educating traditional-aged students and working adults. Now serving more than 150,000 learners worldwide, SNHU offers approximately 200 accredited undergraduate, graduate and certificate programs, available online and on its 300-acre campus in Manchester, NH. Recognized as the “Most Innovative” regional university by U.S. News & World Report and one of the fastest-growing universities in the country, SNHU is committed to expanding access to high quality, affordable pathways that meet the needs of each learner.

**Manchester-Boston Regional Airport (MHT)**, is a municipal airport located in Manchester and Londonderry, NH. It operates flights daily through four commercial carriers and processes more air cargo each year than all other regional New England airports combined. MHT has suffered tremendous economic harm from the pandemic, and its role in the BioFabrication cluster would aid in its long-term recovery and resilience.

**University of New Hampshire (UNH)**, is New Hampshire’s flagship public research university with campuses in Durham, Manchester, and Concord. It is a designated Carnegie doctoral research university with very high research activity (i.e., R1) with annual research expenditures exceeding $140 million. The campus in Manchester is located in the heart of the Manchester Millyard to support the workforce needs of the BioFabrication cluster.

**Manchester Transit Authority (MTA)**, is the public transit provider for Manchester and ten additional communities including intercity commuter service to both Concord and Nashua. MTA saw a decline of more than 50% in ridership during the COVID-19 pandemic; the BioFabrication cluster would aid in its long-term recovery and resilience while connecting underserved communities with needed transit options.
Potential Component Projects

Component Project #1: BioFabrication Manufacturing Facility ($18MM)

**Lead Institution:** ARMI

This project will establish a facility to support the manufacturing of cells, tissues, and organs. A potential site is a soon-to-be vacant National Guard Armory within walking distance of ARMI’s process development labs that could be converted to an advanced manufacturing facility.

**Preliminary Proposed Metrics of Success:** Jobs created; number of dues-paying member organizations providing long-term sustainability

**Matching Funds and Complementary Investments:** $5-15MM in-kind match from the State of New Hampshire and industry partners

Component Project #2: BioFabrication Training Facility and Innovation Center ($3MM)

**Lead Institution:** ARMI (in partnership with UNH)

ARMI will develop a well-trained workforce to anticipate the needs of the emerging BioFabrication cluster, and build equity in the industry by providing opportunities to underserved populations in Southern New Hampshire. Program elements include a BioFabrication training laboratory, biotechnician certificate and apprenticeship programs, BioFab Engage, K-12 programs, and veteran and career and technical education (CTE) career pathways.

**Preliminary Proposed Metrics of Success:** Number of certificates awarded; number of apprentices placed; diversity of trainees and trainers

**Matching Funds and Complementary Investments:** $1MM; UNH Manchester launched a master’s program in biotechnology in 2020 and completed a 18,500 square foot facility dedicated to learning, research, training, and entrepreneurship in bioscience.

Component Project #3: BioFabrication Accelerator ($3MM)

**Lead Institution:** ARMI (in partnership with UNH)

The BioFabrication Accelerator would serve as an incubator for emerging therapies, translating research into a medical product ready for manufacturing.

**Preliminary Proposed Metrics of Success:** Jobs created; number dues-paying member organizations; number of accelerator customers; financing raised by accelerator customers

**Matching Funds and Complementary Investments:** $1MM private investment to help incubate early stage companies; membership dues to sustain the operations of the accelerator.

Component Project #4: BioFabrication Cluster Work & Learn Program ($4MM)

**Lead Institution:** SNHU

SNHU, the City of Manchester, and Manchester Community College will create a program to provide debt-free college tuition to Manchester School District graduates who enroll in fields of study relevant to the BioFabrication cluster, with options to participate in industry placements. Based on the self-sustaining Seattle Promise Program, these grants will allow disadvantaged students to attend college and secure a career pathway into the BioFabrication cluster. This program could include additional local IHE’s and communities.

**Preliminary Proposed Metrics of Success:** Student enrollments; student debt rate; number
and efficacy of student internships/apprenticeships/project-based experiences; persistence rate; graduation rate; work & learn student employment rate

**Matching Funds and Complementary Investments:** $3MM of American Rescue Plan State and Local Fiscal Recovery Funds, $148,000 from Davis Education Foundation to establish Center for Project Based Learning; free fixed route access for all participants provided by MTA

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**Component Project #5: A Teaching Airport ($8MM)**

**Lead Institution:** MHT

MHT is well-suited to pioneer a new model in workforce development for aerospace: the teaching airport. MHT, in conjunction with SNHU, Manchester School of Technology, and local IHEs, would deploy workforce development programs that better integrate apprenticeship models to create the leading aerospace training program in the region.

**Preliminary Proposed Metrics of Success:** Student enrollment; number of apprenticeships/internships/project-based experiences; number of graduates entering the aerospace workforce

**Matching Funds and Complementary Investments:** SNHU opened a 67,000 square foot building in January 2020 that includes a drone flying arena, robotics lab, and program-specific laboratories; 6,477 square feet of Commercial space in the Ammon Center; new hangar and classroom space at MHT; and a 190,000 square foot parcel of land immediately adjacent to the Ammon Center for an aviation campus.

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**Component Project #6: Vertiport Logistics Network ($7MM)**

**Lead Institution:** MHT (in partnership with BETA Technologies)

This project would establish an organ delivery network that would serve a population of 40 million people (the Northeast U.S. & Southern Canada) by augmenting existing hospital helipad infrastructure with rapid charging to support electric vertical take-off and landing (eVTOL) aircraft operations. Additional nodes in the Vertiport network can tighten the connections between research centers, technology parks, and manufacturing bases.

**Preliminary Proposed Metrics of Success:** Number of transplant centers in the network; environmental sustainability

**Matching Funds and Complementary Investments:** Millyard stakeholders are developing initial vertiport sites at MHT and within the Millyard to serve as the anchor nodes in the organ distribution network.

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**Component Project #7: Infrastructure for Equitable Economic Growth ($20MM)**

**Lead Institution:** City of Manchester

Far too often, the physical infrastructure of a community makes it so that only certain neighborhoods benefit from economic growth. The goal of this project is to ensure that the job growth within the BioFabrication cluster is not only academically accessible to the historically disadvantaged communities within Manchester, but also physically accessible as well. Though a pedestrian crossing across the Merrimack River near the Millyard, as outlined in the region’s Comprehensive Economic Development Strategy (CEDS), and the conversion of Valley Street, one of Manchester’s most heavily trafficked streets, into a multimodal complete street corridor, we are safely connecting Manchester’s most economically disadvantaged neighborhoods to the high-quality BioFabrication cluster jobs.
Preliminary Proposed Metrics of Success: Increased job accessibility; increased pedestrian traffic; decreased traffic accidents

Matching Funds and Complementary Investments: Design technical assistance provided by MTA, $2MM TAP Grant for Canal Street multimodal transit corridor, $25MM RAISE Grant Application for South Millyard/South Elm redesign

Component Project #8: Multimodal Transit Station ($12MM)

Lead Institution: MTA (in partnership with the City of Manchester)
This project would leverage existing FTA grants and locate a multimodal transit station in close proximity to a potential passenger rail station. MTA is the only transit authority in New Hampshire, servicing the City of Manchester and nearly a dozen communities along the Capitol Corridor. Despite its reach, it has never had a transit facility for riders. The CEDS identified a lack of quality public transportation as a significant regional weakness. Increasing public transportation options will ensure equitable access to industry jobs and create a sustainable path for increased job growth within an already built-out community.

Preliminary Proposed Metrics of Success: Increased ridership and necessary routes
Matching Funds and Complementary Investments: $3M in land donation and $200K MTA matching contribution

Barriers & Timeline for Implementation

A potential barrier to implementation is the availability of construction materials and labor, both of which can be mitigated through advanced planning. The implementation timeline accounts for this and projects the completion of all projects by September 20, 2027.