

Our Vision for A Regional Advanced Mobility Cluster

For the first time in more than fifty years, we are in the midst of a dramatic shift in mobility that has the potential to completely disrupt the global economy. The future of transportation is taking shape around autonomous, electrically powered vehicles, and is expected to drive over \$2 trillion in new industries and services [1]. The 21-county Northeast Oklahoma region (“the region”, including the City of Tulsa and the 7-county Tulsa MSA), is stepping forward to embrace this revolution and create a resilient economy for the future, anchored in innovation, entrepreneurship, and sustainable manufacturing. Given the nexus to and the right to win in Advanced Mobility (“AM”), the region is committed to becoming the technological, educational, and industrial laboratory for the cluster in the United States.

The Tulsa Regional Advanced Mobility (TRAM) Corridor is a regional economic development proposal to fuel the growth of an industrial cluster at the intersection of Advanced Aerial Mobility (“AAM”) (manned and unmanned), advanced batteries, and electrification of ground mobility. The confluence of unmatched assets (e.g., non-replicable drone testing conditions), existing local expertise (e.g., 120,000+ Oklahomans employed in aerospace and defense [2]), and committed partners (across regional, educational, and innovation leaders) sets up the region to be a world-leading AM hub.

This coalition firmly believes that there is no better place in the nation for this cluster to grow – our relentless focus is driven by the acknowledgement that our city’s future depends on it.

Economic Opportunity from the Cluster

Based on an analysis using EMSI input-output model multipliers, we anticipate that a regional Advanced Mobility (“AM”) cluster will drive the generation of 30-40,000 jobs (including multiplier effects), equivalent to \$3.5-5 billion in economic activity, over the first 2-3 years of operationalization, implying an ROI of 35-50X [3] and directly addressing EDA’s key investment priorities.

The significance of AM is evidenced by the investment of ~\$445 billion in autonomous, connectivity, electrification, and smart mobility trends in the last 10 years [4]. Industry players are embracing its potential, having invested over \$10 billion in AAM [5]. OEMs are signaling that the first Urban Air Mobility aircraft could reach the US market in the next 2-3 years [6]. The industry is contestable, with 65% of aviation and aerospace companies clustered outside tech hubs [7]. Additionally, there is growing acknowledgement that the future of ground automotive is electric: Electric Vehicles (“EVs”) will account for ~85% of new passenger vehicle sales by 2035 [8].

The projects presented herein target the portions of the AM value chain that have the highest potential to succeed in Tulsa: for example, certification, verification, and testing of vehicles is receiving increased attention [9]. Additionally, with over \$35B of battery materials expected to be available for recycling by 2030 and an anticipated gap of 30%+ between battery demand and supply [10], companies are experimenting with business model archetypes around battery repurposing, remanufacturing, and recycling, with no clear winner across the value chain [11].

Industry leaders are recognizing the potential of AM to create a more direct and inclusive workforce (e.g., recent Community Benefits Agreements signed by Proterra [12] and BYD [13]. With a growing share of people of color (52% of the under-5 Tulsa County population in 2019 [14]), a disproportionate impact to families of color from the pandemic (e.g., 65% of surveyed Hispanic / Latinx families and 59% of American Indian / Alaskan Native families reported an income loss [15]), and a disproportionate share of female-headed families in crisis (39% at 100%

poverty [14]), we are committed to making Diversity, Equity and Inclusion a core component of the ecosystem, focused on creating pathways to quality careers.

Who We Are: An Inclusive Regional Coalition

The region will build on foundational strengths to compete in AM (e.g., aircraft manufacturing and maintenance is Tulsa’s largest and most specialized industry [16], and aerospace engineers account for ~40% of engineering graduates in the region [17]). The region is home to premier AM-focused research programs (e.g., Oklahoma State University’s Unmanned System Research Institute), as well as a variety of emerging startups (e.g., Canoo, Hover Visions, Vigilant Aerospace) and established companies (e.g., Spirit Aerosystems, L3Harris Aeromet, Navistar), several of whom are excited to support this pursuit (Ref. [Industry Leadership Appendix](#) and [Letters of Support](#)). The proposed Flight Corridor would be only the second commercial-scale beyond visual line-of-sight (BVLOS) testing site in the nation, and the only one near a major metro area.

The region not only includes urban and rural areas but also the jurisdictions of three federally recognized Native American Tribes. The regional coalition behind this proposal is comprised of the City of Tulsa, Tulsa Authority for Economic Opportunity (“TAEO”), Osage Nation, City of Tulsa-Rogers County Port Authority (“Tulsa Ports”), Oklahoma State University (“OSU”), Tulsa Innovation Labs (“TIL”), George Kaiser Family Foundation (“GKFF”), Tulsa Airports, Tulsa Regional Chamber of Commerce, and Indian Nations Council of Governments (“INCOG”). Many of the members are part of the INCOG-Economic Development District, Comprehensive Economic Development Strategy (CEDS) Committee.

INCOG will serve as the lead institution, employing the Regional Competitiveness Officer and facilitating implementation of all the projects in the event of an award. The City of Tulsa will serve as a co-sponsor for two of the four projects, focused on readying the city’s infrastructure for upcoming growth. Similarly, Tulsa Ports will serve as a co-sponsor for one wastewater infrastructure project. GKFF will steward and dedicate assets across three of the four projects, furthering the foundation’s mission to expand economic opportunity. TIL will sponsor two of the four projects, both closely aligned with its mission to drive economic development via innovation. OSU will play a key role in two projects focused on research and testing, and Osage Nation will serve as a key collaborator for the Flight Corridor. TAEO and the Tulsa Regional Chamber commit to leveraging established expertise and partnerships for the development and enforcement of strategies that drive equitable benefit distribution and sustainable execution (Ref. [Project Descriptions](#), [Regional Assets Appendix](#), and [Letters of Support](#) for details on role played by each).

The Need For A Catalyst: Headwinds in the Regional Economy

Several indicators point to recent socio-economic disparity and distress - poverty rates for Tulsa County grew from 11.0 to 14.3 in the 2010-2019 period [18]. People of color were disproportionately harmed by Covid-19 (in June 2020, Latinx people accounted for 24% of the total reported cases, but only 13% of the general population [19]). As detailed in the Equity Appendix, the coalition will address these issues in partnership with leading institutions including the Tulsa Economic Development Corporation, Lightship Capital, Black Tech Street, and Build in Tulsa. 40%+ of the anticipated 30-40k jobs generated will not require credentials beyond a high school degree [20], and our certification and training programs are targeted towards occupations with an underrepresentation of people of color. Additionally, TAEO will leverage proven expertise to manage public incentives, incorporating community benefit requirements into the contract

language with industry partners benefiting from public investments.

The region is also facing the ongoing impacts of transitioning from coal to cleaner forms of energy. The proposed Robson Ranch project is located on the former site of major coal strip-mine pits, and in the coming months the Grand River Dam Authority will begin retrofitting the region's last remaining coal-fired power plant.

Accelerating Toward this Vision: Project Descriptions

The four component projects below aim to support the growth of an AM cluster via facilitation of research, testing, commercialization, and entrepreneurship support, execution of a workforce development program, and preparation of two industrial parks for “pad readiness”. Planning funding will be directed towards further diligence across these projects (Ref. [Budget Narrative](#)).

Project: Flight Corridor

The Flight Corridor will connect research and development facilities at OSU with Skyway36, a droneport and technology innovation facility located five miles north of downtown Tulsa. The project comprises establishment of a 114-nautical mile corridor for drone testing, calling for the installation of BVLOS sensors and tracking assets. It addresses key challenges of air traffic management and technology commercialization (Ref. [Innovation Partner](#) Letters of Support), and will strive for impact similar to a corridor launched in Grand Sky, North Dakota in 2015 (the effort has led to over 1,000 jobs and \$400m in private sector investment over the past 5 years). We expect to generate ~100 direct jobs in the short term.

If awarded a Phase I grant, we will outline a governance structure and formally launch the Flight Corridor entity by June 2022 (Ref. [Budget Narrative](#)). We will aim to complete the FAA approval process no later than Q3 2023, and be operational by Q1 2024.

The Hangar will support the corridor by offering manufacturing and / or Maintenance, Repair, and Overhaul (“MRO”) capabilities in a newly developed hangar at Tulsa International Airport. The region has received 12+ requests for hangar space in the last 12 months, reflecting strong industry demand. We expect the project to generate ~65 direct jobs. Development will require 24-32 months to complete, including design (9-12 months), permitting (1 month), bidding and contracts (6 months), and construction (8-12 months).

Project Sponsor: Osage Nation (Flight Corridor) and City of Tulsa (Hangar) Estimated Project Cost: \$8-\$10 million (Flight Corridor) + \$12 million (Hangar) Estimated Matching Funds: \$1.6-\$2 million from GKFF (Flight Corridor) + \$2.4 million from City of Tulsa (Hangar)

Project: LaunchPad Research and Technology Center

Recognizing the disproportionate lack of R&D currently in Tulsa (8% of statewide R&D occurs in the Tulsa MSA [20]), the LaunchPad Research and Technology Center will be housed at the Helmerich Research Center (“HRC”) (Ref. [Regional Assets Appendix](#)). The Center will complement the Flight Corridor to offer a pathway to research commercialization, via four elements: 1) State-of-the-art lab space and prototyping facilities with AM-specific focus (e.g., base system design, AI for vehicle steering and air traffic management, security, advanced materials, battery reuse and recycling) (Ref. [TU, OSU-USRI Letters of Support](#)); 2) Entrepreneurial support programs (Ref. [iHub and OCAST Letters of Support](#)), including access to industry expertise

(Ref. [Vigilant](#), [Veroplane](#), [MaxQ](#) Letters of Support), legal and regulatory consulting, support for underrepresented entrepreneurs (Ref. [Lightship Foundation](#) Letter of Support), and access to venture capital networks (Ref. [Atento](#), [Radius](#), [Lightship](#) Letters of Support); 3) A fellowship program to facilitate PhD research, with capital for commercialization available upon graduation (Ref. [Atento](#), [Radius](#), [Cortado](#) Letters of Support); and 4) Industrial Coworking Space, where young companies can co-locate.

Upon being awarded funds, we will aim to complete modifications to the space and formalize agreements in Year 1. We anticipate designing and adding entrepreneurial support by the end of Year 2, and welcoming the inaugural Fellowship class by Fall 2023. Additionally, we will align with the in-progress efforts for the Kirkpatrick Heights Master Plan [21], ensuring that development in the area supports the growth of Black-owned businesses (Ref. [Regional Assets](#) Appendix).

Project Sponsor: Oklahoma State University and Tulsa Innovation Labs Estimated Project Cost: \$12 million Estimated Matching Funds: \$2.4 million from GKFF

Project: Advanced Mobility-Oriented Certification and Training Programs

The Certification and Training Programs will aim to re-align the skills of the regional workforce to future needs. The effort will be guided by the Labor Market Observatory (Ref. [InTulsa](#) Letter of Support) and will be administered in deep coordination with industry alliances, educational institutions, and regional workforce experts. Programs will include certifications (Ref. [TCC](#), [TCWA](#) Letters of Support), two- and four-year degrees including transfer pathways (Ref. [TCC](#) and [OSU-Tulsa](#) Letters of Support), and apprenticeship programs in new manufacturing specialties (Ref. [OMA](#) Letter of Support).

The programs will address the growing needs that the Advanced Mobility industry anticipates - an estimated 300k+ new pilots will be required nationally by 2028 [22], the FAA plans to grow its controller workforce by almost 30% over the next 5 years [23], and the US auto industry will need 45,000 mobility engineers and 70,000 skilled trades workers in the coming decade [24]. More than 25 candidate occupations in the Tulsa region, including engineers and technicians across fields, stand to benefit from retraining programs that enable career pathway progression – this covers 20k+ professionals, with a wage gap of up to 150% between origin and target occupations [25]. We will aim to impact 15% of these professionals within the first 2 years of operation.

Upon award of a Phase I grant, the Labor Market Observatory will complete an initial report and hold convenings by January 2022. In the event of a Phase II award, curriculum design will be completed in Year 1, with certificate programs ready to launch approximately 18 months after the award. The degree transfer pathway will aim to accept its first students in Fall 2023, and initial apprenticeship programs will aim to launch in late 2023.

Project Sponsor: Tulsa Innovation Labs Estimated Project Cost: \$10-12 million Estimated Matching Funds: \$2-2.4 million from GKFF

Project: Advanced Mobility-Focused Industrial Parks

This project comprises establishment of critical wastewater infrastructure at two complimentary industrial parks, for “pad readiness” in order to host Advanced Mobility players. The industrial parks will deliver valuable urban-rural linkages within the region: Strategically located 10 minutes

outside downtown Tulsa, the Robson Ranch site stands as the state’s largest contiguous landholding available for major economic development. Located just 15 minutes to the east of the Robson Ranch site, the Tulsa Port of Inola site provides direct waterway access through a barge slip and on-site rail. (Ref. [Regional Assets](#) Appendix for detail).

The lack of wastewater infrastructure was noted as the reason for eliminating the region from consideration after reaching the final stage of selection for 10+ advanced manufacturers looking to set up large scale projects (averaging 2,000+ jobs and ~\$1.5 billion in capex for each project). The industrial parks will aim for 3,000+ jobs to be generated within the first two years of operation, based on past interest in these sites.

TAEO and Tulsa Ports will provide and enforce an incentive framework to ensure that equity-based commitments are built into contracts. These may include minimum usage of small business enterprises (SBE); workforce recruitment and training requirements with a focus on disadvantaged populations; and minimum wage and benefit requirements.

The Robson Ranch site will aim for (1) approvals in place by July 2023; (2) appropriations for construction by July 2025; planning, design, and permitting by 2025-26; (3) bidding, award and contracting by end of 2026; and (4) completion of construction by September 2027. Tulsa Ports has begun preliminary engineering and permitting for the Tulsa Port of Inola site, and will continue efforts to drive project readiness with pre-award funds at its own risk. The site is expected to be operational by July 2025.

Project Sponsor: Tulsa Ports and City of Tulsa Estimated Project Cost: \$20,000,000 (Inola Site) and \$18,000,000 (Robson Site) Estimated Matching Funds: \$4,000,000 from Tulsa Ports (Inola Site) and \$3,600,000 from City of Tulsa (Robson Site)

Potential Risks and Mitigation Measures

The Flight Corridor project will need to meet Osage Nation regulatory and cultural review requirements, as well as FAA and NEPA regulatory requirements. We will stay on track by 1) continuing the close collaboration with FAA, and 2) in the event of Phase I selection, leverage a portion of the technical assistance grant to stand up a governance model for smooth operation (Ref Budget Narrative). Early utilization of the new LaunchPad Center will require upfront investment in the fundraising capacity of the institute, leveraging corporate engagement structures. GKFF has committed endowed chairs to guide the Center (Ref. [GKFF Letter of Support](#)), and we will build in mechanisms to right-size the services as needed. The Certification and Training programs pose the risk of misalignment with industry needs – we anticipate that the Labor Market Observatory will help mitigate the same. For the degree programs, we will draw on the expertise and experience of TCC and OSU-Tulsa to ensure timely accreditation of the curriculum. The AM-Focused Industrial Parks will require careful planning and accountability in order to avoid delays in construction – between Phase I and Phase II, the coalition will accelerate the planning process, establish a tracking and governance mechanism, and research the best legal structures to support the development of the Robson Ranch, which is privately owned.

¹ After consultations with the EDA Austin Regional Office, the project sponsor and property owner are aware of the federal conditions and restrictions applicable to the use of private property for project activities.