

North Dakota State University
Upper Great Plains Transportation Institute
Agency 627
Denver Tolliver, Director

2025 – 2027 Biennial Budget Request

Presented to:
The Government Operations Division
of the North Dakota House of Representatives

March 11, 2025

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

I. Background Agency Information

Legislative Directives and Purpose N.D.C.C 54-53-03 The Upper Great Plains Transportation Institute’s purpose is to “conduct and supervise research in the field of transportation and logistics in order to facilitate acquisition of a wider knowledge and understanding of marketing factors associated with the geographical location of the state of North Dakota and the upper great plains in the field of transportation and their influence on the socioeconomic systems of the state, region, and country.” UGPTI’s research areas “must include the study of commodity and other freight movements into and out of the state in order to better know and understand the various factors affecting the marketing of area products and services.”

Advisory Council N.D.C.C 54-53-02 The Legislature established a transportation council to serve in an advisory capacity and “consult with the Institute in matters of policy affecting the administration of this chapter and in the development of transportation in the state of North Dakota.” The current members of UGPTI’s Advisory Council are listed below.

Upper Great Plains Transportation Institute Advisory Council

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| <ul style="list-style-type: none"> ▪ ND Aeronautics Commission ▪ Associated General Contractors of ND ▪ ND Association of Counties ▪ Greater ND Chamber ▪ ND Corn Council ▪ ND Department of Agriculture ▪ ND Department of Commerce ▪ ND Department of Transportation ▪ ND Farmers Union ▪ ND Grain Dealers Association | <ul style="list-style-type: none"> ▪ ND Grain Growers Association ▪ ND League of Cities ▪ Lignite Energy Council ▪ ND Motor Carriers Association ▪ ND Public Service Commission ▪ ND Wheat Commission ▪ Dakota Transit Association ▪ Rep. of the manufacturing sector ▪ Rep. of the railway industry |
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Administration N.D.C.C 54-53-01 The Institute must be administered by and in conjunction with the North Dakota State University of Agriculture and Applied Science. The president and administration of North Dakota State University are responsible for the selection of personnel for and the administration of the Institute.

II. Major Accomplishments in Current Biennium

Biennial Road & Bridge Needs Assessment With its general fund appropriation, UGPTI conducted its biennial analysis of county, township, and tribal road investment needs in the state in 2024 and 2025. The study included 71,808 miles of road, including 5,843 miles of paved county road and 56,656 miles of gravel road. UGPTI staff and student employees counted and classified vehicles at approximately 100 locations on county, township, and tribal roads throughout the state, recording the total number of vehicles per day at each site, as well as the number of trucks, by size category.

When combined with NDDOT traffic counts on county roads, UGPTI’s traffic data provide a comprehensive picture of traffic around the state. In addition to traffic counts, UGPTI analyzed the surface conditions of 5,843 miles of paved county road, collecting ride quality data in a cost-effective manner using sensors and special smart phones apps to measure road roughness and video images to assess road conditions (e.g., cracking). Using these roughness and condition measurements, composite ride scores were developed for all paved road sections. In order to estimate unpaved road funding needs, a survey was administered to each county to determine blading and graveling practices, the sources and costs of gravel, and other cost factors. All 53 counties responded to the survey. The current ages and conditions of 2,079 bridges on county roads and 2,095 minor structures with spans of less than 20 feet were also analyzed and investment and maintenance costs were estimated. The results are summarized in Table 1.

Table 1. County, Township, & Tribal Road & Bridge Needs (Millions)

<i>Time Period</i>	<i>Unpaved Roads</i>	<i>Paved Roads</i>	<i>Bridges</i>	<i>Minor Structures</i>	<i>All</i>
Twenty Years	\$6,971.45	\$3,496.17	\$1,087.16	\$805.00	\$12,359.78
Current Biennium	\$707.88	\$433.82	\$178.94	\$151.06	\$1,471.70
Avg. Biennial	\$697.15	\$349.62	\$108.72	\$80.50	\$1,235.98

Road & Bridge Asset Management With its general fund appropriation, UGPTI continues to maintain and improve the Geographic Roadway Inventory Tool (GRIT), which is an on-line resource for North Dakota’s local and Tribal Governments to use for inventorying and efficiently managing their road and bridge infrastructure assets and recording maintenance activities. Information gathered within GRIT provides a critical foundation for the county and local needs study conducted each biennium. In addition, GRIT includes tools for local governments to do performance-based construction and maintenance planning based on continually updated pavement condition and traffic data collected by UGPTI. GRIT also includes on-line reporting capabilities with web-based maps and dashboards which provide transparency and critical information for the public and decision makers. Some of the capabilities recently added to GRIT include a sign inventory layer and the development of artificial intelligence tools to make the road inventory and evaluation process more efficient for short-staffed local government agencies.

Freight Data & Analysis As part of its Biennial Freight Analysis, UGPTI is compiling data on shipment volumes, weights, and the values of commodities originating or terminating in North Dakota, including: (1) an inventory and analysis of the farm truck fleet, (2) commercial truck inventories and use patterns, (3) grain flows from farms to elevators and processing plants, and (4) goods movements within and through the state by truck. In addition, UGPTI has developed a railroad freight analysis tool that summarizes rail freight shipments to, from, and within the state by

commodity group. Moreover, a North Dakota Community Freight Survey has been implemented this biennium to assess the existing and desired transportation services in North Dakota communities and their impacts on economic development.

Tribal Technical Assistance UGPTI is the home of Federal Highway Administration’s Northern Region Tribal Technical Assistance Program (TTAP) Center. Its vision is to enhance the quality of life in Tribal communities by building capacity for Tribes to administer and manage their transportation programs and systems. The mission is to “serve as a go-to local resource for Tribal transportation training, technical assistance, and technology transfer needs and opportunities.”

Productivity and Results For the two latest federal fiscal years (extending from October 1, 2022, through Sept 30, 2024), UGPTI and the Mountain-Plains Consortium (which is led by UGPTI) have published 179 peer-reviewed journal articles and 68 peer-reviewed transportation research reports, which are available from UGPTI’s website. In addition, 883 training, e-learning, and outreach events were offered during this time, in which there were 16,054 participants. These measures are typical of UGPTI’s outputs for a biennium.

III. Report on One-Time Funding

Funding Amount and Source The 68th Legislative Assembly provided \$432,600 of one-time funding to repurpose and equip a room in the Quentin Burdick Building at North Dakota State University to receive, process, archive, and analyze data from field sensors, vehicles, and many other sources. The Transportation Data Intelligence Lab will enable UGPTI to perform advanced data analytics, develop artificial intelligence solutions and tools, contribute timely transportation information to travelers and service providers, and train students in artificial intelligence and automation. The project is nearing completion. It is on schedule and within budget.

IV. UGPTI’s Funding Sources

Special Funds UGPTI does not operate facilities or assess fees that generate revenue on a continuous basis. Rather, UGPTI’s special funds appropriation request represents the authority to collect grants and contracts from state and local agencies and private industries. Most of UGPTI’s special funds originate from the North Dakota Department of Transportation under a strategic agency partnership that has benefited North Dakota for the last four decades. The ND Wheat Commission and several metropolitan planning organizations (MPOs) also regularly provide grant funding. There is uncertainty in the levels of these grants and contracts that will be received during any biennium.

Federal Funds The federal fund request represents a ceiling for UGPTI’s federal grant collections. It is the agency’s best projection of the authority needed to procure

all grants that may become available during the biennium. The vast majority originates from the U.S. Department of Transportation (U.S. DOT), including grants from the Office of the Secretary, Federal Highway Administration, Federal Transit Administration, Federal Motor Carrier Safety Administration, and the National Highway Traffic and Safety Administration. Some grants (such as the University Transportation Center grant) are provided directly to UGPTI by federal agencies. In other cases, the funds are “federal source funds” provided by third parties through the federal procurement process. Although federal funds are important to UGPTI’s budget, they have pre-determined uses. Ultimately, UGPTI has limited discretion in determining which critical issues are researched with federal funds. Federal research funds (although important) are not a substitute for state research dollars.

General Funds

Although state general funds comprise a minor portion of UGPTI’s overall budget, they are essential to the agency’s success and sustainability. State general funds are needed to match federal grants and provide continuity in times of delay or disruption in federal funding. Many of UGPTI’s direct grants (such as the University Transportation Centers grant) require a 100% match of non-federal source funds. UGPTI’s general funds are the only dependable source of match for these funds. Moreover, general funds are the only hard dollars in UGPTI’s budget. Federal and special funds are provided at the discretion of intermediate agencies and third parties and are subject to the budget limits placed on these agencies.

V. Executive Recommendations and Senate Actions

As shown in Table 2, UGPTI’s proposed 2025-27 budget includes base and one-time funding requests. However, only two of UGPTI’s three requests were included in Governor Burgum’s Executive Recommendation. Governor Armstrong’s Executive Recommendation included the same two requests. Both Executive Recommendations provide \$408,100 of one-time funding from the General Fund for a captured carbon dioxide transportation network study and \$375,000 from the General Fund for a program in artificial intelligence for surface transportation. UGPTI’s request for an autonomous surface transportation research center was not included in either recommendation or funded by the Senate.

Table 2. UGPTI’s Supplemental Budget Requests Included in Executive Recommendations

Request	Funding Request		
	Base	One Time	Total
Autonomous Surface Transp. Center	<i>Not Included in either recommendation</i>		
AI for Surface Transportation	\$375,000	\$0	\$375,000
CO2 Multimodal Network	\$0	\$408,100	\$408,100
Total	\$375,000	\$408,100	\$783,100
Included in Senate Bill 2020	\$0	\$0	\$0

In fact, the budget passed by the Senate (Table 3) includes none of UGPTI's three budget requests. However, it includes other adjustments. Funding was added to replace the 2023-25 vacant FTE pool funding that was previously sequestered at OMB. At the same time, a vacant FTE position was removed, and funding was transferred for the 2025-27 new and vacant FTE pool.

Table 3. SB 2020 as Passed by the Senate

Item	Base	Adjustments	Appropriation
UGPTI	\$24,807,516	\$521,955	\$25,329,471
New and vacant FTE pool	\$0	\$266,019	\$266,019
Total all funds	\$24,807,516	\$787,974	\$25,595,490
Less other funds	\$19,581,141	\$507,090	\$20,088,231
Total general funds	\$5,226,375	\$280,884	\$5,507,259
FTE	43.88	-1	42.88

The details of these adjustments are given in Table 4, which shows that \$157,136 of funding was removed from UGPTI's budget (corresponding to the removed FTE). Another \$380,027 was transferred to the new and vacant FTE pool for the 2025-27 biennium. A total of \$719,877 was added for salary and benefit adjustments, including salary adjustments of 3% on July 1, 2025, and 3% on July 1, 2026, as well as increases in health insurance premiums from \$1,643 to \$1,893 per month. The sum of these adjustments equals \$521,955, which is shown in Column 3 of Table 3. In a separate adjustment, \$266,019 was added to a new and vacant FTE pool line item. The effect of all adjustments was to increase UGPTI's General Fund from its base level of \$5,226,375 per biennium to \$5,507,259 per biennium, an increase of \$280,884.

Table 4. Details of Senate Changes to Executive Recommendations

Item	Add Funding for Salary and Benefit Increases	Add Funding to Replace 2023-25 Vacant FTE Pool	Remove Vacant FTE Position	Transfer Funding for 2025- 27 New and Vacant FTE Pool	Total Senate Changes
New and vacant FTE Pool				\$266,019	\$266,019
Upper Great Plains Trans.	\$719,877	\$339,241	(\$157,136)	(\$380,027)	\$521,955
Total all funds	\$719,877	\$339,241	(\$157,136)	(\$114,008)	\$787,974
Less estimated income	\$507,163	\$236,946	(\$157,136)	(\$70,883)	\$507,090
General fund	\$212,714	\$102,295	\$0	(\$34,125)	\$280,884
FTE	0.00	0.00	(1.00)	0.00	(1.00)

Because two of the three requests were included in the executive recommendations and the third request is timely given recent developments in the state, UGPTI requests that the House consider all three budget requests, which are described next. These requests have been

approved by (and recommended by) UGPTI’s Advisory Council and the State Board of Higher Education.

VI. UGPTI’s Budget Initiative Requests for 2025-2027

1. Multimodal Transportation System for Captured Carbon Dioxide

*Relevant
State Goals
and Policies*

As stated in N.D.C.C. 38-22-1, “it is in the public interest [of North Dakota] to promote the geologic storage of carbon dioxide. Doing so will benefit the state and the global environment by reducing greenhouse gas emissions.” Former Governor Burgum provided a vision for North Dakota to lead the nation in carbon capture, utilization, and storage (CCUS) and achieve carbon neutrality by 2030. CO₂ has many industrial uses, including enhanced oil recovery, that could spur economic growth and productivity in the state. However, this CO₂ vision requires that captured carbon dioxide be transported from producing locations to utilization and sequestration sites. Although some regional CO₂ pipelines are in place (mostly in Texas and surrounding states), the transportation network needed to support these movements does not exist on a national scale and must be built to accommodate greatly increased future demands.

*Federal
Funding
Opportunities*

The Department of Energy (DOE) has introduced several programs to encourage the expansion and interconnection of a CO₂ transportation network, including the Front-End Engineering and Design (FEED) and Transportation Infrastructure Finance and Innovation (CIFIA) Future Growth Grants programs. The CIFIA program is intended to “support shared infrastructure projects, including pipelines, rail transport, ships and barges, and ground shipping, that connect anthropogenic sources of carbon dioxide with endpoints for its storage or utilization.” These programs are intended to “finance projects that build shared transport infrastructure to move CO₂ from points of capture to utilization facilities and storage wells” and “help form a domestic interconnected carbon management ecosystem.” However, a piecemeal approach to constructing CO₂ transportation infrastructure requires “close coordination and alignment in the development of each element of the CCUS value chain” to realize the nation’s goals.

*Funding
Request*

The purpose of this one-time funding request of \$408,100 is to conduct a strategic study of multimodal CO₂ transportation options and infrastructure needs to support North Dakota’s goals and position the state (including private industries and transportation modes) to develop proposals for federal funding. Having a CO₂ transportation plan in place could provide competitive advantages in seeking DOE infrastructure funds. Moreover, one-time funding is needed to match federal research grants. If funded, this one-time request

could provide an initial boost to the state's CCUS aspirations and provide benefits for years to come.

*Planned
Activities*

In this foundational study, UGPTI will seek input from the Departments of Agriculture, Commerce, and Transportation; the Oil and Gas Division; the Public Service Commission; the Energy and Environmental Research Center; biofuels and ethanol industries; national DOE labs; Class I and regional railroads; and other interested parties. The project will result in assessments of:

- Sources of potential CO₂ suppliers in the United States, including sources that are not connected to pipelines, but which have railroad service and could potentially ship CO₂ into the state without large-scale infrastructure investments
- The potential for a multimodal system to transport CO₂ into and within North Dakota that could serve key industries and allow access to sequestration sites
- The potential for transportation of CO₂ by rail and truck in complementary roles to pipelines in a comprehensive transportation system that includes service to potential CO₂ hubs and distribution centers
- The initial development of a multimodal GIS-based network model that could identify connecting links and hubs that would enhance the connectivity of the CO₂ network
- The need for intermodal connections within North Dakota, which would allow railroads to directly serve hubs and distributions centers where direct connections do not currently exist.

2. Artificial Intelligence in Surface Transportation

*Potential
for AI in
Transportation*

Artificial intelligence (AI) has the potential to alleviate many workforce shortages, improve worker safety, boost the consistency and reliability of data, and foster cost-effectiveness in transportation operations and asset management. Using data from smart sensors, high-resolution cameras, drones, and vehicles, AI can automate and improve the reliability of transportation infrastructure inspection and monitoring; traffic monitoring, control, and safety; and autonomous and connected vehicle operations. In addition to alleviating worker shortages, AI can reduce the exposure of employees to risks during inspections and increase worker productivity and job satisfaction.

*Goals of
Transportation
AI Research
Program*

The 68th Legislative Assembly provided \$432,600 of one-time funding for room renovation, equipment, and sensors to establish a Transportation Data and Intelligence Center, focused on advanced data analytics and artificial intelligence. The main goals of the Transportation Data and Intelligence Center

are to: (1) conduct leading edge research in intelligent transportation solutions that benefit transportation planning and infrastructure/asset management; (2) develop new planning and forecasting models of freight and passenger transportation in a connected/automated vehicle environment; (3) provide advanced data analysis capabilities for the North Dakota DOT, MPOs, cities, Tribal nations, and other clients in the state and region; and (4) train and mentor future transportation specialists in machine learning, artificial intelligence, and agency operations in a highly automated environment. The focus of this effort would be restricted to transportation-related research and workforce development and the development of prototypes which could potentially be implemented by state and local agencies or commercialized by private industry with further development and integration.

Funding Request

This request (for \$375,000 in base funding) will cover some senior researcher time and the hiring and mentoring of 1 to 2 postdocs and 3 to 4 students. Moreover, the base funding will be used to leverage federal grants, many of which require a 50% to 100% match in non-federal funds.

Planned Activities

Potential activities and topics that could be included in the 2025-2027 work plan include:

- AI tools and algorithms for predictive data modeling to support traffic management, route optimization, traffic safety management, and infrastructure management systems
- Tools such as advanced 3D graphical animation and generative AI that can facilitate seamless integrations of autonomous multimodal transport systems with existing physical and digital infrastructures
- AI models that leverage historical data and real-time inputs to predict future demands for goods movements across various sectors, improving the accuracy of logistics planning
- AI algorithms that dynamically optimize routes and schedules for freight transportation based on traffic conditions, weather, and delivery priorities
- Training and mentoring of students in writing AI algorithms and identifying potential AI solutions in transportation

3. Autonomous Surface Transportation Freight Center

Critical Driver Shortages

North Dakota's economy is dependent on efficient, reliable freight transportation services. Grains, oilseeds, and many farm products produced in North Dakota move at least part of the way to market by truck. In addition, many of the inputs needed by the oil, gas, and manufacturing industries are delivered by trucks. However, the trucking industry is plagued by driver shortages and rapid turnover. The average turnover rate for truck drivers exceeds 90%, meaning that more than 90% of drivers leave the company after

one year on the job. Driver shortages are hurting the agriculture and energy sectors, which depend heavily on contract trucking. Additionally, nearly 90% of all large truck crashes involve human factors.

*Benefits of
Autonomous
Trucks*

Autonomous trucks have the potential to mitigate driver shortages, improve safety, improve fuel economy, make freight transportation more efficient, maintain and improve freight services to rural communities, spur economic development, and create new and attractive jobs. The vehicles are not limited by hours-of-service regulations and do not need to stand idle while drivers take mandatory breaks. The number of operational hours per week is limited only by vehicle servicing requirements and constraints imposed by logistical operations (e.g., loading, unloading, queueing, and traffic delays). Autonomous trucks may be especially valuable to the agricultural industry during peak harvest period and first- and last-mile deliveries.

*Challenges to
Autonomous
Trucks in
Rural North
Dakota*

Autonomous trucking is proliferating in the Southwest under good weather conditions on interstate and well-designed highways. However, the spread of autonomous trucks to rural areas, where the vehicles must travel over two-lane rural roads under challenging conditions, is likely to be slower. Rural operations pose unique challenges related to (1) roadway conditions (e.g., faded edge markings and stripes, deteriorated or damaged traffic signs, narrower shoulders, and irregular roadway geometry); (2) uncontrolled access with intersections of farm roads and trails; (3) numerous at-grade highway-railroad crossings with lower levels of protection; (4) relatively few roadside landmarks for vehicle navigation; (5) snow, ice, and weather extremes; (6) near-zero visibility at times due to fog and drifting snow; and (7) unusual traffic and pedestrian patterns, such as wildlife crossings, pedestrians walking on highway shoulders and in traffic lanes (in the absence of sidewalks), and farm equipment entering and existing roadways and partially occupying lanes. Infrastructure improvements and training of autonomous driving systems may be needed before North Dakota can widely realize the benefits of autonomous trucks off the Interstate highway system.

*A Research/
Information
Sharing Center
is Needed*

As North Dakota makes the transition to autonomous freight transportation systems, research, technology transfer, and training are necessary to optimize emerging opportunities and make the transition as smooth as possible. UGPTI has a tentative program in autonomous trucking, primarily as a result of a federal grant that ends in 2025. However, reliable funding is needed to continue research and demonstrations and expand the research focus.

*Goals of
Proposed
Center*

If this request is funded, an Autonomous Surface Transportation Freight Center will be established at the Upper Great Plains Transportation Institute. The center will focus on applied research and technology transfer rather than basic research. The goal is not to develop autonomous driving systems, which

have already been developed in the private sector. Rather, UGPTI's roles would be to:

- Conduct research into possible enhancements to ADSs to address the challenges posed by rural and northern operations
- Work with private-sector autonomous vehicle developers to better understand the markets, types of freight operations, and conditions most conducive to autonomous truck operations
- Keep abreast of developments in autonomous trucking and success stories in other states
- Learn from the policies and practices of states with established autonomous truck businesses
- Analyze and evaluate highway infrastructure enhancements and investments to support automated driving and allow autonomous trucks to penetrate edge markets, such as rural communities
- Work with the Commercial Vehicle Safety Alliance, Federal Motor Carrier Safety Administration, the North Dakota Highway Patrol, and autonomous truck companies to identify their plans for enhanced safety inspections of autonomous trucks, safety protocols, and training and resources needs of the Highway Patrol
- Facilitate a collaborative strategic planning process that involves all stakeholders and increases the transparency of developments in the autonomous trucking industry.

Funding Request

This request is for one-time funding of \$750,000 to effectively launch the autonomous freight center and demonstrate its value to the state. The funding could potentially leverage expertise and in-kind contributions from autonomous truck companies and freight industry partners. In addition, the funding could be used to match federal grant opportunities, which typically require a 50% to 100% match in non-federal funds.

Planned Activities

If this request is funded, an advisory panel will be established to provide input to the Center. The panel will include representatives of the North Dakota Department of Transportation and the Highway Patrol; the Department of Commerce; the trucking sector; agricultural and energy industries; autonomous truck companies; and national experts. The initial tasks will include fact-finding and identification of the goals and objectives of various stakeholders through outreach and consultations, including:

- Consultations with autonomous truck and technology companies and original equipment manufacturers (OEMs) that result in long-term strategic partnerships and provide opportunities to improve the efficiency and safety of freight movements in the state.
- Consultations with the agricultural sector (including the North Dakota Soybean Council, the Soy Transportation Coalition, the North Dakota Ethanol Producers, the North Dakota Grain Growers, the North

Dakota Grain Dealers, and the North Dakota Ethanol Producers, among others) to identify prospects for AV truck usage, technical assistance needs, possible scales of operation, and perceived obstacles.

- Consultations with the Western Dakota Energy Association, the North Dakota Petroleum Council, and the North Dakota Oil and Gas Division to gauge interests and potential prospects for the transportation of non-hazardous inputs, like the frac sand deliveries that occur in the Permian Basin.

Some of the actionable items planned for the biennium include:

- Work with the Department of Commerce and industry trade associations to identify potential opportunities for autonomous trucks in first, last, and middle movements of food products and manufactured goods.
- Work with autonomous truck companies to identify the types of industries needed to support and sustain autonomous truck operations, potential workforce opportunities resulting from these high-tech/service jobs, and the curricula and training needed for these skills. A report will include recommendations on how the NDUS could potentially develop training and educational programs that would attract companies and create new high-paying jobs in North Dakota.
- With the cooperation of Cass County, conduct tests of autonomous driving systems in specially equipped autonomous test vehicles over roads temporarily closed, or at the lowest traffic times when only a few travelers would be impacted. Safety drivers will be in the vehicles and the results of the tests will provide feedback on how effectively AVs can navigate two lane rural roads and the effectiveness of low-cost landmarks that could be placed roadside. Tests will occur during winter and summer conditions.
- Plan and deliver outreach events across the state and a newsletter that will keep decision makers abreast of developments and emerging issues.
- Plan and hold an autonomous truck conference in Bismarck in 2026.

UGPTI's three supplemental budget requests are summarized in Table 5. Three-fourths of UGPTI's total request consists of one-time funding initiatives. The base funding request of \$375,000 represents a 6.8% increase over the base budget passed by the Senate (shown earlier in Table 4). We respectively request that the North Dakota House of Representatives consider these requests, which are important to transportation efficiency, safety, economic and technological advancement, and workforce development in the State.

Table 5. UGPTI's Supplemental Budget Requests Included in Executive Recommendations

Request	Funding Request		
	Base	One Time	Total
CO2 Multimodal Network	\$0	\$408,100	\$408,100
AI for Surface Transportation	\$375,000	\$0	\$375,000
Autonomous Surface Transp. Center		\$750,000	\$750,000
Total	\$375,000	\$1,158,100	\$1,533,100

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