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

2023-2025 Biennial Budget Request

Presented to:
The Senate Appropriations Committee

March 2, 2023

Upper Great Plains Transportation Institute
Programs, Centers, and Focus Areas

- Advanced Traffic Analysis
- ND Local Technical Assistance
- Western ND Transportation Liaison
- Small Urban & Rural Mobility
- Road & Bridge Needs Assessment
- Mountain-Plains Consortium
- Advanced Technologies
- DOT Support Center
- Tribal Technical Assistance
- Commercial Vehicle Safety
- Transportation Safety & Security
- Agricultural Freight
- Transportation Learning Network
- Grade Crossing Safety

Upper Great Plains Transportation Institute Advisory Council

- Aeronautics Commission
- Associated General Contractors of ND
- Association of Counties
- Greater ND Chamber
- Corn Council
- Department of Agriculture
- Department of Commerce
- Department of Transportation
- Farmers Union
- Grain Dealers Association
- Grain Growers Association
- League of Cities
- Lignite Energy Council
- Motor Carriers Association
- Public Service Commission
- Wheat Commission
- Member of Dakota Transit Association
- Representative of manufacturing sector
- Representative of railway industry

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 (N.D.C.C 54-53-03)."

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 council shall elect its own chairman and the Director of the Institute shall serve as the executive secretary of the council.

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 the North Dakota State University are responsible for the selection of personnel for and the administration of the Institute.

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. 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 424 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 the traffic counts, UGPTI analyzed the surface conditions of more than 2,750 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) and develop composite ride scores. A survey was administered to each county to determine blading and gaveling practices, the sources and costs of gravel, and other cost factors needed for the unpaved portion of the road analysis. All 53 counties responded to the survey. The current conditions of 2,336 bridges on county roads were assessed during the biennium. The results are summarized below.

County, Township, & Tribal Road & Bridge Investment Needs Estimates (Millions)

Time Period	Unpaved Roads	Paved Roads	Bridges	All
Twenty Years	$6,545.66	$3,248.80	$715.57	$10,510.01
Current Biennium	$660.35	$557.10	$139.42	$1,356.87
Avg. Biennial	$654.57	$324.88	$71.56	$1,051.00

Road & Bridge Asset Management

With its general fund appropriation, UGPTI is improving the Geographic Roadway Inventory Tool (GRIT), which stores and displays information on road surface type, current condition, shoulder width, subgrade strength, and other design features, as well as traffic, construction history, and improvement plans. A pavement condition forecasting procedure is included in GRIT that allows counties to project conditions of roads for up to 35 years. Recent enhancements include the incorporation of emergency-related projects such as flooding (so the public can see where roads are closed), a load restriction web-map linked to the NDDOT's Traveler Information Map that allows truckers to view state and local road restrictions on one web-based map, and an inventory and map of bridges and minor structures.

Tribal Technical Assistance Program Center

UGPTI was selected by Federal Highway Administration as the home of the Northern Region TTAP Center, with funding of $300,000 per year with potential options for additional funding. TTAP Vision: 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. The awarding of this center is a recognition of UGPTI's past and on-going efforts and a great tool for leveraging partnerships and resources.

One-Time Funding

Funding Amount and Source

The Legislature provided UGPTI with $225,000 in one-time funding from the strategic investment and improvements fund to be matched by at least that amount in federal funds. The funds have been used as match for $336,000 in Federal grant funds (which require a dollar-for-dollar match). The federal funding extends through the end of Federal FY 2023. Two on-going project reports will be completed by then.

Remote Sensing using Drones and AI

These research results will inform stakeholders about appropriate types of drone and sensor payloads, as a function of the types of transportation assets being inspected. The research will describe the downstream data processing and model building required using artificial intelligence. The findings will support broad initiatives within North Dakota to expand remote sensing applications that can utilize the statewide deployment of a beyond visual line of sight (BVLOS) network.

Autonomous Aircraft Logistics

Technological advancements in energy storage, capacity, computing, communications, and lightweight structural materials promise to reduce the cost, size, noise, and risks of drone vehicle operations, making them potentially competitive with trucks for certain movements. This research will develop a better understanding of the opportunities that may exist for companies in the regions and challenges to deployment, including how drone deliveries fit into the overall logistics process.

Audits

A team from the Office of the State Auditor audited UGPTI's financial transactions and expenditures for the biennium that ended June 30, 2021. The audit did not identify any areas of concern. This was the only audit of UGPTI during the biennium.

UGPTI 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) are the other regular providers of grant funding in addition to the NDDOT. 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 very 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.

UGPTI Budget Requests

As shown in Table 1, the House increased UGPTI's general fund budget from $4,485,607 to $5,427,961. UGPTI's federal and special fund appropriations (which are shown as estimated income) were also increased in HB 1020. UGPTI's full-time equivalent positions have not been adjusted for the last several biennia and remain at 43.88 FTE.

Table 1. Budget Request as Approved by the House of Representatives

Item	Base Level	Enhancements	Appropriation
Total all funds	$23,527,957	$2,000,375	$25,528,332
Less estimated income	$19,042,350	$1,058,021	$20,100,371
Total general fund	$4,485,607	$942,354	$5,427,961
Full-time equivalent positions	43.88	0	43.88

As shown in Table 2, UGPTI's base-level general fund appropriation was increased by a total of $543,904 by the House of Representatives. Of this total, $243,904 are targeted for salary and benefit increases. The remaining $300,000 are meant for a new freight transportation and logistics program, which is described below.

Table 2. Adjustments to Appropriations in HB 1020

Item	Base Level	One-Time
Salary & Benefit Increases	$243,904	
Freight Transportation & Logistics Program	$300,000	
Multimodal CO2 Transportation Study	$0	$398,450
Total Adjustments	$543,904	$398,450
Source	General Funds	Special Funds

In addition to the $543,904 increase in base funding, the House of Representatives appropriated $398,450 of one-time funding for a Multimodal CO_2 Transportation Study, which is also described below. The increase of $1,058,021 in estimated income shown in Table 1 includes $423,600 in one-time special funds that would be allocated from the Strategic Investment and Improvements Fund to establish a Transportation Data Intelligence Center. The remainder of the $1,058,021 enhancement in estimated income consists of authorizations to collect additional grant and contract funds to cover the portion of the salary and benefit package that is not funded from general funds.

Transportation Data Intelligence Center

Request

This request, which was included in the Executive Recommendation and approved by the North Dakota Board of Higher Education and UGPTI's Advisory Council, is for $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 Center 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.

Benefits to the State

This one-time investment will support the deployment of advanced transportation technologies that enable safe and efficient travel, as well as facilitate future research which will benefit the State for years to come. The programs made possible by this one-time investment will enable data-driven transportation decision-making through the availability of timely information

and online tools and it will enhance UGPTI's capability to compete for federal grants in the field of advanced transportation technologies, partner with private entities, and support the training of future workers in artificial intelligence and advanced transportation technologies

Functions and Roles

The Transportation Data Intelligence Center will receive data from a variety of field sensors (e.g., roadway environmental sensors, traffic counters, vehicles classification sites, speed, and weigh-in-motion sensors), cameras, UAVs, and (ultimately) vehicles; process, temporarily store, and archive the data; mine and analyze the data using machine and deep learning algorithms written specifically for the tasks; provide near real-time data feeds of road and traffic conditions; and consolidate and analyze the field data needed for roadway and bridge asset management. The Center will support State initiatives such as the Transportation Management Center, as well as the deployment of advanced technologies (such as connected vehicle technologies).

Details

Specifically, the funding will be used to repurpose and equip a room in the Quentin Burdick Building, including remodeling expenses, computer workstations for staff and students, monitors to display field and traffic data, mini supercomputer to process large incoming data streams and run computationally intensive data mining and machine learning algorithms, servers to store and archive large data streams, and supporting telecom equipment.

Freight Transportation & Logistics Biennial Surveys and Reports

Background and Needs

North Dakota's economy is dependent on freight transportation and logistics services. Transportation and supply-chain bottlenecks and breakdowns have major impacts on producers and industries. The Legislature and State agencies need comprehensive and current information to monitor rapidly changing industry activity levels and logistics patterns and identify trends, issues, and needs in a proactive manner. UGPTI currently analyzes and publishes shipment data from elevators to markets. However, this report covers only a portion of the supply chain and does not include information on farm-to-elevator, farm-to-processing plant, and elevator-to-processing plant movements or manufactured goods.

Benefits to the State

If this request is funded, UGPTI will conduct surveys and publish reports each biennium about the transportation patterns and needs of agricultural processors, shipments from farms to elevators, inbound and outbound shipments to and from manufacturing plants by mode and shipment type (as well as assessments of the quality of transportation services provided), and information on commercial trucking in North Dakota, including the sizes of firms, the commodities hauled, the types of equipment used, equipment ages and utilization rates, fuel consumption rates, and other information. In addition to this detailed information, the reports will include assessments of the transportation challenges and needs facing each sector. The reports will provide the Departments of Transportation, Agriculture, and Commerce (and other agencies) with critical planning information.

Details of Request

This request (which was initially for $408,134 in base funding) was approved by the North Dakota Board of Higher Education and UGPTI's Advisory Council. However, it was not included in the Executive Recommendation. The House of Representatives decided to fund the program, but not at the level initially requested, reducing the funding level to $300,000. This funding level will allow for the establishment of the program and for most of the surveys and reports to be undertaken.

UGPTI's Role and Statutory Responsibility

UGPTI is the ideal agency for this effort, as UGPTI can: (1) offer individuals and companies confidentiality of the raw data they provide, (2) combine the data collected by the new surveys with existing data to provide a comprehensive picture of freight transportation and logistics in the State, and (3) serve State agencies and the Legislature by providing them with tailored reports and information each biennium. The request will allow UGPTI to better fulfil its statutory responsibilities to study "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."

Multimodal Transportation System for Captured Carbon Dioxide

Public Interest

As stated in N.D.C.C. 38-22-1, "it is in the public interest to promote the geologic storage of carbon dioxide. Doing so will benefit the state and the global environment by reducing greenhouse gas emissions." Governor Burgum's vision is for North Dakota to lead the nation in carbon capture, utilization, and storage (CCUS) and achieve carbon neutrality by 2030. CO_2 has many industrial uses—including enhanced oil recovery—that could spur economic growth and productivity in the state.

Need for Transportation Study

North Dakota has the capacity to safely store much of the nation's carbon dioxide output for years to come. However, leading the nation in CCUS (while meeting the demands of industry for carbon dioxide) will require the movement of substantial quantities of CO_2 into the state. Many miles of new pipeline will be needed, not only in North Dakota but in the surrounding region. Other modes of transportation (especially railroads) will also be needed to move CO_2 into North Dakota from dispersed sources and serve CO_2 hubs and sequestration centers in the State. In many respects, a strategic CO_2 transportation plan is needed to support the State's vision,

Need for Multimodal Options

Pipelines can best serve large installations connected by a trunk-line network. However, many potential sources of CO_2 are not served by pipeline, and it is not economically feasible to connect all CO_2 generators to a trunk pipeline network. Most of these facilities, however, are already being served by rail. According to the Association of American Railroads (AAR), about 12,000 shipments of CO_2 are transported by railroads in the United States each year in specially designed tank cars. According to AAR, "railroads are interested in working with the Department of Energy to explore opportunities to transport captured carbon dioxide." Because the railroad network is already in place, the acquisition of

new right-of-way across farmland and the exercise of eminent domain would not be needed to start transporting CO_2.

Study Plan

A strategic vision for a multimodal CO_2 transportation system that includes pipeline, railroad, and local delivery options is needed. The purpose of this one-time funding request is to conduct such a study and develop proposals for federal funding. In this effort, UGPTI will collaborate with pipeline operators, Class I and regional railroads, logistics and transload companies, potential supply-chain partners, and state agencies, including the Departments of Agriculture, Commerce, and Transportation and the Oil and Gas Division. The project will result in assessments of:

Key Study Components

- The potential for a multimodal (pipeline and railroad) transportation system to transport CO_2 into and within North Dakota, including:
  - Key connector and feeder pipelines that would allow more CO_2 to flow into North Dakota from the surrounding region
  - A rail CO_2 network that would allow the movement of shipments from dispersed locations around the nation into the state.
- The need for transloading and temporary storage facilities and integrated multipurpose hubs through which CO2 could be moved, originated, or terminated.
- Potential suppliers of substantial quantities of CO_2 outside of North Dakota that do not have pipeline connections but which have railroad service and could, therefore, start shipping CO_2 into the state immediately.
- The need for possible spur tracks within North Dakota, that would allow railroads to directly serve hubs and distributions centers where direct connections to Class I railroads do not exist.
- The railcar fleet (which is privately owned) and must be expanded to move substantial quantities of CO_2 by rail.