Revised 3-31-2025

## Answers to Questions from Government Operations Division on March 11, 2025

1. UGPTI's Federal and State Funding
   a. How much federal funding does UGPTI receive directly from federal agencies?
   b. How much funding does UGPTI receive from NDDOT?
   c. How much of the funding that UGPTI receives from NDDOT consists of federal source funds?

   All federal grants provided directly to UGPTI and all grants provided by NDDOT are included in the analysis. Many of UGPTI's grants are multiyear ones. So, for comparative purposes, all grants are placed on average annual basis. Of the approximately $3.68 million dollars in annual grants that UGPTI receives from NDDOT (shown in the table below), approximately 75% are federal funds provided to the North Dakota DOT by the U.S. DOT. The North Dakota DOT must match the federal funds it provides to UGPTI (e.g., 20%). Thus, a portion of the grants provided to UGPTI must come from non-federal source funds. Roughly 38% of the federal funds received directly from UGPTI are subcontracted to partner universities in the Region 8 consortium. The numbers are summarized in the table below.

**UGPTI Funding: Annualized Estimates of Federal and North Dakota DOT Funds**

| *Source of Funds* | *Amount* |
|---|---|
| Federal Funds | $11,901,893 |
| Funds subcontracted to other universities in consortium | $4,561,108 |
| NDDOT Total Funds | $3,682,145 |
| NDDOT funding from Federal Funds | $2,746,861 |

2. In UGPTI's biennial road and bridge funding needs study, do we assume that all trucks are legally loaded? What percentages of trucks are assumed to be overloaded and by how much?

   In the studies, equivalent single axle loads (ESALs) are used to measure the road impacts due to truck traffic. ESALS are computed for each axle group and summed to obtain an EASL factor for the truck. An ESAL factor for a specific axle represents the impact of that axle in comparison to an 18,000-pound single axle (which has an ESAL factor of 1.0). The ESAL or impact factor depends on the type of axle (e.g., single, tandem, or tridem) and the weight on the axle.
   The pavement impacts are nonlinear. For example, a 16,000-pound single axle followed by a 20,000-pound single axle on a good flexible (asphalt) pavement generates a total of 2.12 ESALs, as compared to 2.0 ESALs for the passage of two 18,000-pound single axles (Figure 1).[1] An increase in a single-axle load from

[1] The differences in impacts can be more pronounced on roads with lower structural numbers.

18,000 to 22,000 pounds more than doubles the pavement impact, increasing the ESAL factor from 1.0 to 2.09. In comparison, a 34,000-pound tandem axle has an ESAL factor of 1.11 (Figure 2).

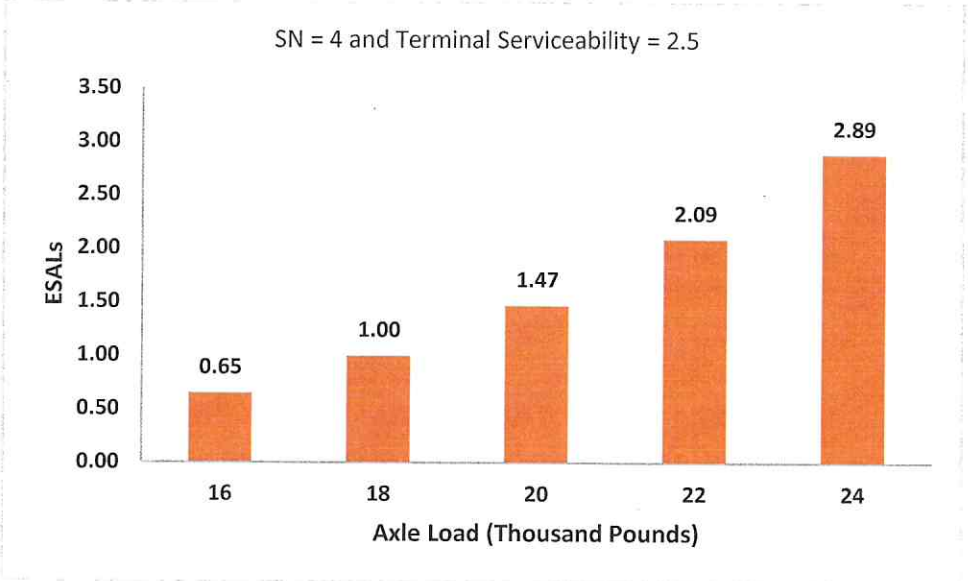


*Figure 1 Pavement Impact Factors for Single Axle*


*Figure 2 Pavement Impact Factors for Tandem Axle*

It is likely that a portion of the truck movements analyzed in the study are overloaded. Based on enforcement data from the North Dakota Highway Patrol and special studies conducted at truck weigh stations, it is estimated that 25% of divisible oil-related truck movements are overloaded. The typical overloaded vehicle weighs 90,000 pounds, which increases the truck EASL factor by 69% as compared to a legally loaded truck. For farm-to-market movements, most

movements are assumed to be overloaded by 10%. Secondary movements between elevators and between elevators and processors are assumed to be legally loaded.

3. **What confidence do we place in weigh-in-motion data? How has WIM technology improved over time?**

   The North Dakota DOT calibrates its WIM sites each year with a 5-axle semi loaded to 80,000 pounds. Generally, the WIM estimates of gross vehicle weights are within ± 6% of the actual weights. However, the accuracy may vary from site to site and with conditions, particularly with the wander of the truck's wheels, the temperature of the pavement materials, and the vehicle's speed.

   UGPTI has been researching ways to improve the accuracy, reliability, and cost-effectiveness of WIM systems for several years now, considering factors such as tire pressure (which affects the contact area between the wheel and pavement), pavement temperatures, vehicle speeds, and wander and using combinations of embedded sensors, high resolution cameras, and advanced signal processing. The initial results from tests at the MnRoad facility have been encouraging. However, prototype low-cost WIM stations are still a few years away.