Performance-based Planning and Asset Management

In January 2008, the INDOT implemented an Asset Management policy. This policy is the official institutional approach to managing infrastructure assets, and making capital investment decisions related to these assets. This approach serves to support and complement the annual Transportation Capital Program and the biennial Study and Development Program.

The INDOT recognizes that there are ever-increasing challenges to funding transportation improvements. Asset management offers an alternative to focusing solely on problem spots and/or the worst conditions. INDOT defines asset management as, “the systematic process of maintaining, upgrading, and operating physical assets cost-effectively”.

Recently, Performance-based Planning and Performance Management are terms used in relation to the broader use of performance measures to manage and improve the transportation system. Asset Management focuses on the subset of Performance-based Planning and Performance Management related to physical assets. However, the INDOT has used, and is continuing to use, a Performance-based Planning approach to make capital investment choices as well. The INDOT continues to seek out, and utilize, the best data and predictive models, to make the most effective, efficient and informed investment choices.

The current Federal transportation policy, Fixing America’s Surface Transportation Act (FAST) Act, was signed into law on December 4, 2015. The FAST Act, along with its predecessor, Moving Ahead for Progress in the 21st Century Act (MAP-21), established new requirements for performance management to ensure the most efficient investment of Federal transportation funds. States will invest resources in projects to achieve individual targets that collectively will make progress toward the national goals.

National performance goals for Federal Highway programs:

- **Safety** – to achieve a significant reduction in traffic fatalities and serious injuries on all public roads.
- **Infrastructure condition** – To maintain the highway infrastructure asset system in a state of good repair.
- **Congestion reduction** – To achieve a significant reduction in congestion on the National Highway System (NHS).
- **System reliability** – To improve the efficiency of the surface transportation system.
- **Freight movement and economic vitality** – To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development.
- **Environmental sustainability** – To enhance the performance of the transportation system while protecting and enhancing the natural environment.
• **Reduced project delivery delays** – To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices.

The Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) issued new transportation planning rules on the statewide and metropolitan transportation planning processes to reflect the use of a performance based approach to decision-making in support of the national goals. These processes must document in writing how the Metropolitan Planning Organizations (MPOs), Indiana Department of Transportation (INDOT) and providers of public transportation shall jointly agree to cooperatively develop and share information related to transportation performance data, the selection of performance targets, the reporting of performance to be used in tracking progress toward attainment of critical outcomes for the region of the MPO (see 23 CFR 450.306(d)) and the collection of data for the INDOT asset management plan for the National Highway System specified in in 23 CFR 450.314(h).

FTA has performance measures for Transit Asset Management, and final regulations are published and in effect. FHWA has performance measures and final regulations published for Safety, Bridge and Pavement Conditions, Congestion Reduction and System Reliability, but only the Safety Performance Measure regulation is in effect at this time.

INDOT along with the MPOs and FHWA will continue to collaborate to identify Performance Targets for each Performance Measure. Once Performance Targets are established, the Transportation Improvement Program (TIP) and Statewide Transportation Improvement Program (STIP) will be modified to reflect this information.

For FHWA and FTA to approve any TIP amendments after May 27, 2018, the INDOT, MPOs and Public Transit Operators must reflect this information and describe how projects in the TIP/STIP, to the maximum extent practicable, achieve the Federally required performance targets identified in the Statewide and Metropolitan Transportation Plans, linking investment priorities to these performance targets.

**Safety**

The INDOT, the MPOs, FHWA, and Indiana Criminal Justice Institute (ICJII) actively collaborated on the Safety Performance Measures and Safety Performance Targets. INDOT submitted its Safety Performance Measures by August 31, 2017. The fourteen Indiana MPOs had until February 27, 2018 to follow INDOT’s submission to either support the INDOT Safety Targets or set independent targets. This was accomplished. Thirteen of the MPOs adopted the INDOT Safety Targets and one MPO elected to establish its own, independent Safety Targets. The Highway Safety Improvement Program (HSIP) is a primary source of federal funds for qualifying safety improvement projects. HSIP along with other funding sources are used to implement safety improvements with the purpose to reduce roadway crashes, and a corresponding reduction in fatalities and serious injuries on all public roads. The five specific safety performance measures, including the INDOT targets are:

1) Number of fatalities: 814.9

   For the purpose of comparison to the SHSO annual report, the 5 year average performance target listed above is based on a projected calendar 2018 value of 846 as described in the following methodology. Baseline projections are
calculated using fatality counts and applying an equation to generate predictive values for 2017-2018. This was accomplished by the software built into Microsoft Excel for applying a logarithmic trend line with a forward forecast of two years. The equation is of the form \[y = A\ln(x) + B\]. The resulting equation is then adjusted to more closely fit recent peak years by shifting the value of \(B\) to produce a matching value for the recorded peak. INDOT estimates seven fatalities annually may be influenced by every .1% change in annual unemployment. Recent economic forecasts indicate an additional decrease in annual unemployment of .2% during the 2017-2018 period can be reasonably anticipated in Indiana. As of April 2017, Indiana, at 3.6% unemployment, is just .7% away from its historic high monthly employment level recorded during September and October 2000 (2.9% unemployment). Consequently, the fatality count projections include an additional seven fatalities each year in anticipation of an improving economic climate influencing greater risk-taking and unfortunately increased severe crash outcomes.

2) **Rate of fatalities: 1.036**  
   Data Source: Fatality Analysis Reporting System  
   The NHTSA calculated and reported values through 2015.  
   For the purpose of comparison to the SHSO annual report, the 5 year average performance target listed above is based on a projected calendar 2018 value of (1.070) as described in the following methodology. Estimated/Predicted values for 2016-2018: The predicted annual Vehicle Miles Traveled (VMT) growth rate for each of the next five years is estimated to be 1.20% from the last FHWA approved VMT in 2015. INDOT’s Technical Planning Support & Programming Division arrived at this figure by averaging the last 5 years of Annual Growth Rates for each of five factor groups and then averaging them. The predicted annual estimates for fatalities are then evaluated with the projected VMTs for their respective future years to produce predicted fatality rates per 100-million VMT.

3) **Number of serious injuries: 3479.8**  
   Data Source: Automated Reporting Information Exchange System (ARIES)  
   2009- 2013 the “As reported” count of “Incapacitating Injuries”  
   2014-2016 an estimated count amounting to 7.2% of all non-fatal injuries  
   For the purpose of comparison to the SHSO annual report, the 5 year average performance target listed above is based on a projected calendar 2018 value of (3,577) as described in the following methodology. Baseline projections are calculated using incapacitating injury counts (or estimations) and applying an equation to generate predictive values for 2014-2016. This was accomplished by the software built into Microsoft Excel for applying a logarithmic trend line with a forward forecast of four years. The equation is of the form \[y = A\ln(x) + B\]. The resulting equation is then adjusted to more closely fit recent peak years by shifting the value of \(B\) to produce a matching value for the recorded peak.
4) Rate of serious injuries: 4.347
Data Source: Automated Reporting Information Exchange System (ARIES)
The INDOT calculated and reported values through 2013. Using estimated incapacitating injuries and the FHWA VMT values for 2014-2015.

The 5 year average performance target listed above is based on a projected calendar 2018 value of (4.379) as described in the following methodology.
Estimated/Predicted values for 2016-2018: The predicted annual Vehicle Miles Traveled (VMT) growth rate for each of the next five years is estimated to be 1.20% from the last FHWA approved VMT in 2015. INDOT’s Technical Planning Support & Programming Division arrived at this figure by averaging the last 5 years of Annual Growth Rates for each of five factor groups and then averaging them. The predicted annual estimates for incapacitating injuries for are then evaluated with the projected VMTs for their respective future years to produce predicted incapacitating injury rates per 100-million VMT.

5) Number of non-motorized fatalities and non-motorized serious injuries: 417
Data Source: Fatality Analysis Reporting System (Non-motorist persons) 2009-2014 FARS Final File Count.

2009-2014 FARS Final File Count

“The 5 year average performance target listed above is based on a projected calendar 2018 value of (497) as described in the following methodology.” Baseline projections of Non-Motorist Fatalities are calculated using FARS Fatality counts and applying an equation to generate predictive values for 2016-2018. This was accomplished by the software built into Microsoft Excel for applying a logarithmic trend line with a forward forecast of two years. The equation is of the form \[ y = A\ln(x) + B \]. The resulting equation is then adjusted to more closely fit recent peak years by shifting the value of B to produce a matching value for the recorded peak.

Non-Motorist incapacitating injuries are projected logarithmically as above for 2017-2018 with non-motorist incapacitating injuries projected as 13% of projected all non-motorist non-fatal injuries.

Non-Motorist incapacitating injuries are projected logarithmically as above for 2017-2018 with non-motorist incapacitating injuries projected as 13% of projected all non-motorist non-fatal injuries.

If FHWA makes effective the rules they have published for assessing pavement and bridge condition for the National Highway Performance Program and performance of the National Highway System (NHS), freight movement on the Interstate System and Congestion Mitigation and Air Quality (CMAQ) improvement program, INDOT and the MPOs will have to establish performance targets for these measures, too.

Pavement and Bridge
The pavement and bridge condition performance measures are applicable to the Interstate and non-Interstate Highways that comprise the National Highway System (NHS). The NHS includes the Interstate Highway System as well as other roads important to the nation’s economy, defense, and mobility. The measures are focused on the condition of pavement and bridges, including ramps utilized to access the system. There are four measures to assess pavement condition and two measures for assessing bridge condition.

**Pavement Performance Measures**
1) Percentage of pavements of the Interstate System in Good condition
2) Percentage of pavements of the Interstate System in Poor condition
3) Percentage of pavements of the non-Interstate NHS in Good condition
4) Percentage of pavements of the non-interstate NHS in Poor condition

**Bridge Performance Measures**
1) Percentage of NHS bridges classified as in Good condition
2) Percentage of NHS bridges classified as in Poor condition

The INDOT, the MPO and FHWA will collectively develop targets for the pavement and bridge performance measures. The National Highway Performance Program is a core Federal-aid highway program that provides financial support to improve the condition and performance of the NHS, and the construction of new NHS facilities. INDOT utilizes these funds for maintenance activities on the NHS.

**System Performance**
The system performance measures are also applicable to the Interstate and non-Interstate NHS. These performance measures assess system reliability and freight movement, and establish several measures for on-road mobile source emissions consistent with the Congestion Mitigation and Air Quality (CMAQ) Program. There are two measures for assessing reliability, one measure to assess freight movement, and three measures for the CMAQ program.

**Reliability Performance Measures**
1) Percent of the Person-Miles Traveled on the Interstate System That Are Reliable
2) Percent of Person-Miles Traveled on the Non-Interstate NHS That Are Reliable

**Freight Movement Performance Measure**
1) Truck Travel Time Reliability (TTTR) Index

**CMAQ Measures**
1) Annual Hours of Peak-Hour Excessive Delay Per Capita Percent of Non-SOV Travel
2) Percent Change in Tailpipe CO2 Emissions on the NHS Compared to the Calendar Year 2017 Level
3) Total Emissions Reductions

**Policy statement**
INDOT formally adopts performance measures and targets through public planning processes or through review and approval by designated management groups. INDOT carefully considers
existing commitments, relative priorities and tradeoffs when adopting or modifying performance measures and targets.

The reason for the policy was due to INDOT’s need for a uniform process for adopting, revising, and retiring performance measures and targets, and an emphasis for the need to do so in FAST Act and it’s predecessor, MAP-21. This policy identifies roles and responsibilities and provides clear direction to INDOT decision-makers and staff seeking to adopt, revise, or retire performance measures and targets. The policy also clarifies the status of existing performance measures and targets and provides a basis for reviewing and approving measure and target proposals. Specifically, this policy:

- Requires that all adopted performance measures and targets lists are current,
- Ensures that INDOT meets state and federal laws,
- Measures progress toward goals or objectives identified in the Statewide Multimodal Transportation Plan or another statewide transportation plan,
- Guides investment on the state highway system or the development or improvement of a modal system, and
- Assesses the effectiveness or efficiency of INDOT products and services.

Procedures

INDOT maintains two paths for adopting performance measures and targets:

1. Planning processes that include a formal public comment period
   - All performance measures and targets that are included within a statewide plan or program that undergoes a formal public comment period become adopted when that plan or program is adopted.
   - In reviewing draft statewide plans or programs, the PMG must critically evaluate and discuss with senior leadership aligning performance measures and targets with INDOT’s vision, state and federal requirements, MPOs, department priorities and public expectations.
   - PMG and senior leadership must also discuss data management requirements and the implications of proposed performance measures and targets for existing commitments.

2. Internal review and approval by a designated management group
   - Proposals to establish new or modified performance measures or targets outside of a public planning process must be documented and reviewed and approved by one or more designated management groups.
   - Management groups are assigned responsibility for reviewing performance measure and target proposals by the Performance, Risk and Investment Analysis Unit with input from the Management Group Leadership Team (MGLT).
   - In conducting its review, a designated management group must critically evaluate the alignment of the proposal with INDOT’s vision, state and federal requirements, MPOs, department priorities and public expectations.
   - A designated management group must also consider data management requirements and the implications of proposed performance measures and targets for existing commitments.
   - The Performance, Risk and Investment Analysis Unit may designate senior leadership with responsibility for final review and approval of performance measure and target proposals determined to have significant implications for INDOT policy, finances, reputation or public communication.