

# PERFORMANCE BASED NEEDS BASED MAINTENANCE BUDGET

By: Arizona Department of Transportation

## IN THIS CASE STUDY YOU WILL LEARN:

1. A needs based budget (NBB) system has been applied internally to all of the Arizona Department of Transportation (ADOT).
2. Visual performance measures allow ADOT to make data-driven decisions based on the most recent data available.
3. The NBB process specifically aligns with Arizona's Lean Management principles of eliminating waste, implementing and following standard processes, focusing on data-driven performance, and continuous improvement.

and a systematic approach to measuring the level of service (LOS) within a sample of each feature.

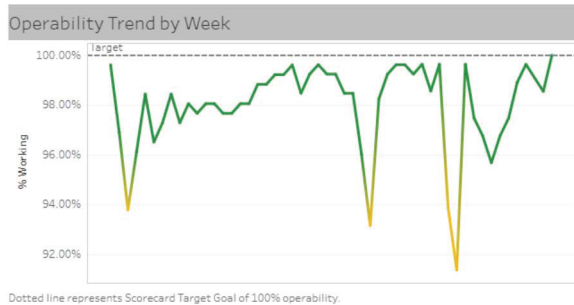
Performance measures have been implemented for all maintenance units to measure progress, identify gaps, and implement countermeasures to improve performance of the system. This is how TSMO manages progress.

## DEPLOYMENT

This process/system is used statewide in Arizona. The entire Needs Based Budget system has been implemented internally at ADOT. There are four applications included in the NBB process: Feature Inventory System (FIS), Level of Service (LOS), Maintenance Management System (Pecos), and the Needs Based Budget (NBB model).

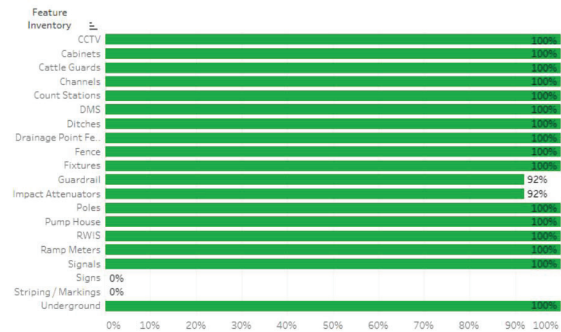
## BACKGROUND

Traditionally, maintenance planning and funding has been a historical perspective with budget allocations being based on what was accomplished the previous year. The Arizona Department of Transportation's (ADOT) Transportation Systems Management and Operations (TSMO) Division has implemented a data-driven, performance centered approach based on actual maintenance needs



that include all TSMO (CCTV, signals, lighting, ITS, signing, striping, etc.) features. Historically, TSMO features/assets were not even collected. The TSMO Division has now collected many of the roadway electrical assets and will have all assets included in this performance driven process by Fiscal Year 2020.

The process requires data collection for maintenance activities (resource costs and work accomplished), inventory of all TSMO assets,



**FIS** – A repository of all Roadway and TSMO features.

**LOS** – A data collection system that records the condition of features inspected.

**Pecos** – A system that is used for collecting all maintenance work history, materials inventory and activity planning (i.e., all cost data for the work performed).

**NBB** – A model that calculates budget allocations based on changes in the target LOS grade. The calculation is based on feature inventory count, current LOS feature grade and unit cost/ accomplishment.

## CASE STUDY: PERFORMANCE BASED NEEDS BASED MAINTENANCE BUDGET

Feature Inventory and LOS data collection is performed by staff using tablets. Pecos and the NBB model are client server applications.

Data is collected during the year and input into the NBB model for analysis and budget allocation.

The visual performance measures have been implemented using Tableau and represent either real-time or automatic nightly updates allowing ADOT to make data-driven decisions based on the most recent data available. All performance measures are available for viewing and analysis agency-wide to track progress towards targets and identify areas of improvement. TSMO has also implemented a data governance approach where all data sources are the system of record and are part of standard maintenance operations processes.

TSMO features currently implemented into this model are pump stations, signals, lighting, tunnel operations, CCTV and DMS. Planned implementations include loop detectors, RWIS, ramp meters, signing, striping, and the wrong way driver detection system. All TSMO features will be part of the model by Fiscal Year 2020.

### EXECUTION

FIS data is collected year-round which includes all newly added features. One hundred percent of all TSMO features are, or will be, captured in this inventory.

LOS surveys are conducted year-round and are designed to measure the deficiencies of the electrical and mechanical attributes of the asset. A score is defined for each feature attribute, recorded and a letter grade (A+ - F) is ultimately assigned based on the inspection scores. All of the features are aggregated and grades are assigned statewide per district/region based on the individual assets and segments inspected.

Maintenance technicians/workers enter information into the Pecos system as work is done relative to the feature that is being maintained. Data entered includes work accomplished, materials, labor, equipment, and location of the asset.

The maintenance budget model uses the Feature Inventory counts, LOS scores and historical unit cost in budget allocation algorithms. For example, if the target is set higher for the upcoming year, additional work is required and the budget allocation adjusts to accommodate this change.

Performance measures are reviewed monthly by both the maintenance teams and leadership to track progress against targets.

### OUTCOMES/PUBLIC BENEFIT

This system allows maintenance funds to be allocated more efficiently and maximizes the performance of the state's transportation system, while assuring that funding is being allocated to the system prioritized by the need.

The NBB process specifically aligns with Arizona's Lean Management principles of eliminating waste, implementing and following standard processes, focusing on data-driven performance and continuous improvement as well as building quality into all that we do.

#### FURTHER INFORMATION

NOCoE Knowledge Center: <https://transportationops.org/knowledge-center>