Relating Connecticut Department of Transportation Performance Measures and National Transportation Performance Measures

Performance management increases accountability and transparency of an organization by relating actions to outcomes. Recognizing this, since 2009 the Connecticut Department of Transportation (CTDOT) has adopted and reported performance measures to monitor its progress in achieving eight Department policy objectives related to its core mission. This is also taking place nationally: beginning with enactment of the Moving Ahead for Progress in the 21st Century Act (MAP-21) in 2012, a transportation performance management framework underpins the way that the federal government oversees our collective investments in surface transportation infrastructure and services.

Key observations

There is a common structure in the Connecticut and national frameworks: They both lay out a set of performance goals and measure progress toward achieving these goals by establishing performance measures. The set of goals is remarkably similar, given that each was developed independent of the other.

Connecticut DOT Performance Goals	***National Performance Goals***
➢ Provide Safe and Secure Travel	➢ Safety
➢ Reduce Congestion and Maximize Throughput	➢ Congestion Reduction
➢ Preserve and Maintain Transportation Infrastructure	➢ Infrastructure Condition
➢ Provide Mobility Choice, Connectivity, and Accessibility	*(No corresponding national goal)*
➢ Improve Efficiency and Reliability	➢ System Reliability
➢ Preserve and Protect the Environment	➢ Environmental Sustainability
➢ Support Economic Growth	➢ Freight Movement and Economic Vitality
➢ Strive for Organizational Excellence	➢ Reduction in Project Delivery Delays

Relative to the goals, the performance measures themselves present more variation between the Connecticut and national sets, which reflects the different perspectives from the state and federal level. In addition to the scale issue, there are differences in how the measures are used. The CTDOT measures have a focus on outcomes, which are well understood and which are used to guide Department actions and decisions. The national measures have the added requirement of providing a nationwide assessment of performance that is consistent among the various state Departments of Transportation which are stewarding the federal investments in infrastructure. At this stage of performance management development, the focus on consistency requires the federal rulemaking agency to simplify, or scale back, measure definitions in order to achieve some degree of uniformity in the reporting.

There are performance dimensions where our collective understanding needs to evolve. In these areas the state agency or the national agency may not have established performance measures, or the measures are still in an evolutionary stage – this is the case with system reliability, for example.

Side-by-Side comparison of CTDOT and National performance measures

There is significant overlap in the general measures and concepts, and there are other areas where the CTDOT measures focus more specifically on the most pressing performance dimensions in the state. In order to understand the both the similarities as well as the differences in Connecticut versus national performance measures, this document contains side-by-side comparison tables with explanations of why the measures overlap or differ. The measures are organized by major performance area, with comparable measures listed on each row.

Notes:

- If there is a state measure with no national counterpart, the corresponding national column indicates this. Likewise, the absence of a state measure for a national measure is listed in the state column.
- The national measures included and discussed are mostly those set forth by the Federal Highway Administration (FHWA) to implement the Transportation Performance Management (TPM) framework underpinning the federal surface-transportation authorizing legislation. These national measures have target-setting requirements for states and Metropolitan Planning Organizations (MPOs). The Federal Transit Administration (FTA) has also set performance measure and target setting requirements for states and MPOs in four performance areas: rolling stock, service vehicles, facilities and rail infrastructure. These official national performance measures and associated targets are structured differently, however, and are discussed in transit asset management plans and other required documents.
- In other surface-transportation areas there may be additional national-scope performance measures (for example, some additional National Highway Traffic Safety Administration (NHTSA) measures used in highway-safety plans); these are omitted from this document if they are not official national performance measures for the purpose of the MAP-21/FAST Act rules.

Glossary of commonly used acronyms and abbreviations:

CMAQ:	Congestion Mitigation and Air Quality Improvement program.
CT:	Connecticut
CTDOT:	Connecticut Department of Transportation
FAST Act:	Fixing America's Surface Transportation Act – the current federal surface-transportation legislation (enacted in 2015); it continues the implementation of the transportation performance management framework laid out in its predecessor, MAP21 (see below in the glossary).
FHWA:	Federal Highway Administration, the agency within the US Department of Transportation focusing on highways.
FTA:	Federal Transit Administration, the agency within the US Department of Transportation dealing with public transportation in the rail and bus modes.
HPMS:	Highway Performance Monitoring System, a federally-mandated system for reporting data about highways in the United states.
IRI:	International Roughness Index, a measure of highway ride quality.
MAP21:	Moving Ahead for Progress in the 21st Century Act, the federal surface-transportation legislation enacted in 2012 that sets forth a transportation-performance-management framework for the delivery of the federal-aid surface-transportation programs. Its successor is the FAST Act (see glossary).
MDBF:	Mean Distance Between Failures (miles) –the rail industry standard reliability measure for revenue equipment.
MPO:	Metropolitan Planning Organization.
NHS:	National Highway System – Roadways important to the nation's economy, defense, and mobility. Includes Interstates, other freeways and expressways, Other Principal Arterials, Strategic Highway Network, Major Strategic Highway Network Connectors, and Intermodal Connectors.
NHTSA:	National Highway Traffic Safety Administration – the agency within the US Department of Transportation that is responsible for regulating the safety of motor vehicles and related equipment.
NPMRDS:	National Performance Management Research Data Set – a data set of travel times on highway segments (typically 0.5 miles to 2 miles) summarized every five minutes, all within the National Highway System.
SOGR:	State of Good Repair
SOV:	Single-Occupancy Vehicle
TAM:	Transportation Asset Management
TAMP:	Transportation Asset Management Plan
TPM:	Transportation Performance Management
VMT:	Vehicle Miles Traveled

GOAL AREA 1 - Safety

State	National
➢ Provide Safe and Secure Travel	➢ Safety

HIGHWAY SAFETY

CTDOT Measure	How CTDOT measure relates to national measure	NATIONAL Measure
Number of Fatalities This is a direct, bottom-line safety outcome measure. A fatality is the most undesirable outcome of travel activity and the CTDOT has a goal of zero fatalities on the state's highways.	Fatalities are continually monitored by the CTDOT and their elimination is at the heart of its highway-safety plans. Because this is a measure of strong public interest, CTDOT will also be reporting it on its performance dashboard. There are typically less than 300 fatalities per year in CT, representing a tiny fraction of the more than 100,000 vehicle crashes that occur. As with the national measure, a 5-year moving average is used to make this a more reliable indicator of the risk of traffic fatalities in CT.	**Number of Fatalities** The national measure calculates the average number of fatalities over the most recent 5 years. The 5-year moving average helps focus on the underlying trends.
Rate of Annual Highway Fatalities per 100M Vehicle Miles Traveled (VMT) Fatality rate/VMT is a more stable and reliable measure of traffic fatality levels and trends than the raw number of fatalities per year. It is calculated as the # fatalities/100 million VMT and includes a five-year moving average.	CT already uses and reports this measure on its performance dashboard and will continue do so since it is the same as the federal measure.	**Rate of Fatalities by VMT** Fatality rate/VMT is a more stable and reliable measure of traffic fatality levels and trends than the raw number of fatalities per year. It is calculated as the # fatalities/100 million VMT, averaged over the most recent five years.
Rate of Annual Highway Fatalities per 100,000 population	Like the fatality rate/VMT, this rate also is a more stable and reliable measure of traffic fatality levels than the raw	(No corresponding national measure for performance management.)

In addition to Fatality Rate by VMT, the CTDOT considers it important to convey the fatality rate by population, a representation of the risk of highway travel in residents' overall activity patterns.	number of fatalities per year. Rather than comparing fatalities to vehicle mile traveled, the rate is based on population (fatalities per 100,000 living in CT) and uses a five-year moving average to increase measure reliability. While the federal government does not require states to report this measure, CT will continue to do so on its public website.	
Percent of Seat Belt Usage This measure tracks seat belt usage by Connecticut's motorists. Drivers, front-seat passengers and all rear-seat passengers aged 4 to 16 are required to wear seat belts. When worn correctly, seat belts reduce the risk of fatal injury to front seat occupants by 45 percent. In 2013, seat belts saved an estimated 12,584 lives in the United States.	The CTDOT plans to continue to use this highly valuable performance indicator in the management of its highway safety program.	(No corresponding national measure for performance management.)
Number of Serious Injuries Serious injuries are a good indicator of crash severity. While fatalities are the most severe form of injury, the broader range of non-fatal but serious injuries included in this measure make it a more reliable measure of the level of vehicle crashes of a severe or serious nature. This measure is also a more stable or reliable measure than number of fatalities since there are typically 5 times as many injuries than fatalities each year.	Already used in our highway safety plans, we plan to adopt the national measure for reporting on our Performance dashboard.	**Number of Serious Injuries** This is a direct safety outcome measure. Serious injuries are a highly undesirable outcome of highway travel.
Rate of Serious Injuries by VMT Serious injury rate is also a good indicator of crash severity. The rate is always a more stable indicator that the raw number	Already used in our highway safety plans, we plan to adopt the national measure for reporting on our Performance dashboard.	**Rate of Serious Injuries by VMT** Along with fatalities, this is the most important outcomes-based highway-safety performance measure.

of serious injuries since it is adjusted for the volume of traffic. It is calculated as the # serious injuries/100 million vehicles miles traveled (VMT) in Connecticut. Using the rate rather than the raw number also makes it possible to directly compare CT's rate to other states – regardless of the size of the other state.		
Number of non-motorized fatalities and serious injuries Pedestrian and bicyclist safety is a priority for CTDOT. Since there are relatively few non-motorist fatalities each year, we are better served by the federal measure that combines fatalities and serious injuries in a single measure. Adding serious injuries makes it a much more reliable measure.	We are already using this measure in our highway safety plans and are adopting the federal performance measure for reporting on our Performance dashboard since it is a good a way for CT to monitor progress on non-motorist safety.	**Number of non-motorized fatalities and serious injuries** The objectives of the FHWA in implementing this performance measure are: (1) Encourage all States to address pedestrian and bicycle safety; (2) Recognize that walking and biking are modes of transportation with unique crash countermeasures distinct from motor vehicles; and (3) Address the increasing trend in the total number of pedestrian and bicyclist fatalities in the United States. These fatalities have shown a 15.6 percent increase from 4,737 in 2009 to 5,478 in 2013.

Goal Area 2 - Congestion

State	National
➢ Reduce congestion and maximize throughput	➢ Congestion Reduction

CONGESTION

Two notes on congestion:

(1) Some of the focus on congestion is related to air quality impacts. In this comparison, the air quality measure, discussed in conjunction with congestion in the Federal rule, is presented in the "Preserve and protect the environment" state goal.

(2) "System reliability" is also related to congestion – it uses the same travel-time data employed in national congestion-measure calculations but the concept relates more to predictability of travel times. It is listed under the "Improve Efficiency and Reliability" state goal.

CTDOT Measure	How CTDOT measure relates to national measure	NATIONAL Measure
(No corresponding state measure for performance management.)	The national measure for congestion is brand new. As such, understanding of this measure both at the state and national level is limited, and significant national focus is on collecting and learning to analyze and forecast using travel time data sets. The national measure will apply to Connecticut in 2022, and CTDOT is focusing on developing a linkage between actions and outcomes in this area and make the best decision as to the congestion measure(s) that are most responsive to Connecticut conditions.	**Annual Peak Hour Excessive Delay (PHED) Per Capita** This urban-congestion measure compares the actual travel time during certain peak hours during the day against the desired travel time for that roadway at that time of day. It is calculated using travel-time information from the NPMRDS. Initially the measure applies to urbanized areas of more than 1M people. It will be applicable to CT in 2022.
(No corresponding state measure for performance management.)	This brand-new measure will be applicable to Connecticut in 2022; the CTDOT is focusing on developing capabilities to collect and analyze the data on a systematic basis as well as how to best target our actions in this area.	**Percent of non-SOV travel** This measure assesses modal share percentage; non-SOV travel includes all other travel choices (such as carpooling, or bus, or walking) and accounts for telecommuting. Like the PHED measure, it is a congestion measure that focuses on urbanized areas. It will be applicable to CT in 2022.

Goal Area 3 – Infrastructure Condition

Connecticut DOT Performance Goals	*National Performance Goals*
➢ Preserve and Maintain Transportation Infrastructure	➢ Infrastructure Condition

In highway infrastructure, this goal area of the national performance measures is focused on bridges and pavements, which together comprise the largest components of physical infrastructure assets on the highway system by value. The bridge and pavement measures are linked to a Highway Transportation Asset Management Plan (TAMP), which relies on mature links between projects and performance. The initial TAMP, which has been certified by FHWA, contains the strategies that, if executed, will drive performance of these two assets. The TAMP is used to set targets and determine progress toward these targets.

For bridges, the CTDOT plans to incorporate the national measures into its dashboard reporting while keeping its own state measure. This will result in a more comprehensive and responsive reporting and management structure. In the pavements area, the CTDOT is studying updating its comprehensive pavement measure based on the data for the national performance measure but in a way that describes state-of-good-repair, which is key for driving investment decisions, particularly preservation vs. rehabilitation decisions. The national measure for pavement is useful for comparing data across jurisdictions, but it does not describe the state of good repair well. (State of Good Repair is contained well within the "in-between," i.e. "Fair," condition state.) The State measure is likely to show a condition distribution that differs significantly from that depicted in the national measure. It should be noted that this is an issue that a majority of state DOTs are experiencing with the national measure and has prompted research efforts to address this major gap.

In rail infrastructure, the FTA has established measures under the Transit Asset Management Rule which requires annual targets on the rail infrastructure be reported to National Transit Database (NTD). % of track guideway under a performance restriction (slow zone.) The FTA has also established a performance measure for facilities, based on the rating on the Transit Economic Requirements Model (TERM) scale. Performance of service equipment is also measured by the FTA. FTA infrastructure measures are structured differently, resulting in a matrix of individual measures and targets that will be reported on separately.

INFRASTRUCTURE: BRIDGES

CTDOT Measure	How CTDOT measure relates to national measure	NATIONAL Measure
Percent of State Maintained Roadway Bridges in a State of Good Repair (by number of bridges) This measure encompasses all bridges maintained by the CTDOT regardless of highway system classification. Our management responsibility is for all bridges in our network, regardless of size.	We plan to continue using this measure. It is more indicative of how we manage all of the bridges that we maintain. CTDOT responsibilities encompass bridges beyond the NHS and it is important to maintain a focus on these segments of our highway network.	(No corresponding national measure for performance management.)
(No corresponding state measure for performance management.)	We plan to adopt these measures as they are required in our TAMP to set targets and analyze performance gaps of NHS bridges.	**Percent of National Highway System Bridges in "Good" Condition (by deck area)** Weighting bridge condition by deck area prioritizes larger bridge structures and correlates condition to funding needs.
(No corresponding state measure for performance management.)	We plan to adopt these measures as they are required in our TAMP to set targets and analyze performance gaps of NHS bridges.	**Percent of NHS Bridges in "Poor" Condition (by deck area)** Weighting bridge condition by deck area prioritizes larger bridge structures and correlates condition to funding needs.

INFRASTRUCTURE: BRIDGE MAINTENANCE

The vast majority of bridges on the NHS in the state of Connecticut are maintained by the CTDOT. Given the criticality of bridge structures in making the highway network safe and available to users, there is a long-standing focus on keeping up with required maintenance. The two state measures listed below are instrumental in accomplishing the Department's objective of keeping bridges in a state of good repair. Coupled with the bridge-condition measures, the CTDOT is able to prudently manage this critical transportation asset.

CTDOT Measure	How CTDOT measure relates to national measure	NATIONAL Measure
Number of Bridge Work Items Completed This productivity measure is used along with the size of the work-items backlog (below) to allocate resources to bridge maintenance activities.	The CTDOT considers this an important component of its transportation-asset-management plan and will continue to manage and report on bridge-maintenance activities.	(No corresponding national measure for performance management.)
Number of Backlogged Bridge Work Items This measure is used along with work-item-completion numbers to ensure that bridge-maintenance activities are keeping pace with needs. To manage the backlog, it should be noted that some bridge work items are accomplished along with a rehabilitation project when not critical to bridge performance (e.g. cosmetic work items.)	The CTDOT considers this an important component of its transportation-asset-management plan and will continue to manage and report on bridge-maintenance activities.	(No corresponding national measure for performance management.)

INFRASTRUCTURE: PAVEMENTS

CTDOT Measure	How CTDOT measure relates to national measure	NATIONAL Measure
Percent of State Maintained Roads with Acceptable or Better Ride Quality (NHS) Ride quality (IRI) is a well-established indicator of pavement condition. However, it is influenced by age of the roadway, geography and degree of urbanization.	There is legacy data for the current measures, which enables us to show trends. IRI is a long-established measure of ride quality. Therefore, we plan to keep using this measure for the immediate future.	(No corresponding national measure for performance management.)
(No corresponding state measure for performance management.)	We plan to adopt the national measure because it is more comprehensive than our current measure. Our current measures are based on only one metric, IRI, while the national measures are based on three, IRI, Rutting and Crack Percentage.	**Percent of Pavements on the Interstate System that are in Good Condition** This measure combines IRI, rutting, and cracking metrics; if two (or more) of the three are Good then the overall classification is "Good."
(No corresponding state measure for performance management.)	We plan to adopt the national measure because it is more comprehensive than our current measure. Our current measures are based on only one metric, IRI, while the national measures are based on three, IRI, Rutting and Crack Percentage.	**Percent of Pavements on the Interstate System that are in Poor Condition** This measure combines IRI, rutting, and cracking metrics; if two (or more) of the three are Poor then the overall classification is "Poor."
(No corresponding state measure for performance management.)	We plan to adopt the national measure because it is more comprehensive than our current measure. Our current measures are based on only one metric, IRI, while the nation measures are based on three, IRI, Rutting and Crack Percentage.	**Percent of non-Interstate NHS Pavements in Good Condition** This measure combines IRI, rutting, and cracking metrics; if two (or more) of the three are Good then the overall classification is "Good."
(No corresponding state measure for performance management.)	We plan to adopt this measure because it is more comprehensive than our current measure. Our current measures are based on only one metric, IRI, while the nation measures are based on three, IRI, Rutting and Crack Percentage.	**Percent of non-Interstate NHS Pavements in Poor Condition** This measure combines IRI, rutting, and cracking metrics; if two (or more) of the three are Poor then the overall classification is "Poor."

Percent of State Maintained Roads with Acceptable or Better Ride Quality (Entire Network) Ride quality (IRI) is a well-established indicator of pavement condition. However, it is influenced by age of the roadway, geography and degree of urbanization.	There is legacy data for the current measures, which enables us to show trends. Therefore, we plan to keep using this measure.	(No corresponding national measure for performance management.)

Goal area 4 – Mobility

Connecticut DOT Performance Goals	*National Performance Goals*
➢ Provide Mobility Choice, Connectivity, and Accessibility	*(No corresponding national goal)*

The CTDOT's Performance dashboard includes data on services by mode – rail, bus, and non-motorized travel (bicycles and pedestrians). Our measures reflect operational efficiency, level of investment, or reliability of services, with a focus on how our customers experience these services and modes.

Nationally there are no equivalent customer-centric measures. The national measures in the transit area are formulated differently to reflect the Federal Transit Administration (FTA) and transit operators' governance structure. Vehicle classes include rail vehicles and buses, and span a variety of fleets, including service (non-revenue) vehicles, resulting in a large variety of individual measure calculations and target setting processes.

In general, the CTDOT Performance dashboard will likely continue to focus on the customers as we present our performance results; the national measures will be reported on as required and will be used for the management of transit assets and transit safety.

RAIL SERVICE AND OPERATIONS MEASURES

CTDOT Measure	How CTDOT measure relates to national measure	NATIONAL Measure
Locomotives (P32) – Mean Distance Between Failures (MDBF) Mean Distance Between Failures is the rail-industry standard for fleet reliability. It is obtained by dividing total miles operated by total number of confirmed primary failures. P32 locomotives are one of the kinds used in the Shore Line East, Danbury, and Waterbury lines.	MDBF is a reliability measure focused on how customers experience service reliability; it is also a key indicator of equipment reliability. CTDOT has no plans to cease managing or reporting it on its Performance dashboard. Federal measures on Useful Life Benchmark will be reported as required and used for its transit asset management plans.	**Percent of [revenue and non-revenue] vehicles that have exceeded the Useful Life Benchmark (ULB)** This measure applies to all transit vehicles, whether they are rail vehicles or buses. The Useful Life Benchmark considers the age of the vehicles and their operating environment.

Locomotives (BL20) – Mean Distance Between Failures (MDBF) Mean Distance Between Failures is the rail-industry standard for fleet reliability. It is obtained by dividing total miles operated by total number of confirmed primary failures. BL20 locomotives are one of the kinds used in the Shore Line East, Danbury, and Waterbury lines.	MDBF is a reliability measure focused on how customers experience service reliability; it is also a key indicator of equipment reliability. CTDOT has no plans to cease managing or reporting it on its Performance dashboard. Federal measures on Useful Life Benchmark will be reported as required and used for its transit asset management plans.	**Percent of [revenue and non-revenue] vehicles that have exceeded the Useful Life Benchmark (ULB)** This measure applies to all transit vehicles, whether they are rail vehicles or buses. The Useful Life Benchmark considers the age of the vehicles and their operating environment.
Coaches– Mean Distance Between Failures (MDBF) Mean Distance Between Failures is the rail-industry standard for fleet reliability. It is obtained by dividing total miles operated by total number of confirmed primary failures. Coaches are primarily used in the Shore Line East, Danbury, and Waterbury lines.	MDBF is a reliability measure focused on how customers experience service reliability; it is also a key indicator of equipment reliability. CTDOT has no plans to cease managing or reporting it on its Performance dashboard. Federal measures on Useful Life Benchmark will be reported as required and used for its transit asset management plans.	**Percent of [revenue and non-revenue] vehicles that have exceeded the Useful Life Benchmark (ULB)** This measure applies to all transit vehicles, whether they are rail vehicles or buses. The Useful Life Benchmark considers the age of the vehicles and their operating environment.
Electric Multiple Units (M8) – Mean Distance Between Failures (MDBF) Mean Distance Between Failures is the rail-industry standard for fleet reliability. It is obtained by dividing total miles operated by total number of confirmed primary failures. M8 self-propelled Electric Multiple Units are used in the New Haven line service.	MDBF is a reliability measure focused on how customers experience service reliability; it is also a key indicator of equipment reliability. CTDOT has no plans to cease managing or reporting it on its Performance dashboard. Federal measures on Useful Life Benchmark will be reported as required and used for its transit asset management plans.	**Percent of [revenue and non-revenue] vehicles that have exceeded the Useful Life Benchmark (ULB)** This measure applies to all transit vehicles, whether they are rail vehicles or buses. The Useful Life Benchmark considers the age of the vehicles and their operating environment.

On-Time Performance – New Haven Line Percent of rail on-time performance is a key measure for service reliability to its customers and is the industry standard used to compare existing services with other similar competitors.	The CTDOT considers this a key service reliability measure for its customers and it plans to continue to report on this bottom-line service performance measure.	(No corresponding national measure for performance management.)
On-Time Performance – Shore Line East Percent of rail on-time performance is a key measure for service reliability to its customers and is the industry standard used to compare existing services with other similar competitors.	The CTDOT considers this a key service reliability measure for its customers and it plans to continue to report on this bottom-line service performance measure.	(No corresponding national measure for performance management.)
Ridership – New Haven Line Number of rail passengers is the key bottom-line measure for utilization of the rail transport mode. The New Haven Line, operated by Metro-North Railroad, connects New Haven and three branch lines with Bridgeport, Stamford, and New York City. The New Haven Line is one of the busiest commuter lines in North America.	The CTDOT considers this a key service-delivery measure and it plans to continue to report on this bottom-line service performance measure.	(No corresponding national measure for performance management.)
Ridership – Shore Line East Number of rail passengers is the key bottom-line measure for utilization of the rail transport mode. The Shore Line East (SLE) is operated by Amtrak and connects New London with New Haven, with select trains continuing to Bridgeport and Stamford.	The CTDOT considers this a key service-delivery measure and it plans to continue to report on this bottom-line service performance measure.	(No corresponding national measure for performance management.)

PUBLIC TRANSIT (BUS) OPERATIONS

CTDOT Measure	How CTDOT measure relates to national measure	NATIONAL Measure
Average Miles Between Road Calls The industry standard performance metric used nationally by bus operators to measure availability and reliability of equipment. Road calls are traditionally counted when a bus misses one of its scheduled trips. Factors include the age of the fleet, fleet-wide defects on a certain model year, the weather, and other reasons.	Average Miles Between Road Calls is a reliability measure focused on how customers experience service reliability; it is also a key indicator of equipment reliability. CTDOT has no plans to cease managing or reporting it on its Performance dashboard. Federal measures on equipment reliability will be reported as required and used for its transit asset management plans.	**Percent of [revenue and non-revenue] vehicles that have exceeded the Useful Life Benchmark (ULB)** This measure applies to all transit vehicles, whether they are rail vehicles or buses. The Useful Life Benchmark considers the age of the vehicles and their operating environment.
CT*Transit* Ridership Number of CTTransit Passenger Trips is the bottom-line measure for utilization of the CTTransit fleet and its routes. Each person boarding a bus is counted as one passenger trip. CTTransit provides fixed-route bus service for Hartford, New Haven, and Stamford. CTTransit also provides express bus service to Hartford from surrounding areas.	The CTDOT considers this a key service-delivery measure and it plans to continue to report on this bottom-line service performance measure.	(No corresponding national measure for performance management.)

BICYCLE AND PEDESTRIAN MODE INVESTMENTS

CTDOT Measure	How CTDOT measure relates to national measure	NATIONAL Measure
Percent of Funds Expended for Bicycle/Pedestrian Access Percent of dollars spent (or programmed to be spent) on projects containing items that improve accessibility for pedestrians and bicyclists.	In an effort to meet the public's demand for improved mobility and a better quality of life, CTDOT supports the use of bicycling and walking. It plans to continue to monitor and report on this highly important measure for Connecticut and its residents.	(No corresponding national measure for performance management.)

Goal Area 5 – System Reliability

Connecticut DOT Performance Goals	*National Performance Goals*
➢ Improve Efficiency and Reliability	➢ System Reliability

SYSTEM RELIABILITY

On the highway system, this concept is related to congestion and draws from the National Performance Management Research Data Set (NPMRDS), a data set of travel times on highway segments. System reliability addresses the predictability of travel times as opposed to their actual duration – for that, the national TPM framework refers to the "Congestion Reduction" goal and associated measure(s). Reliability is calculated as a compilation of the ratio of the 80th percentile travel time to the 50th percentile travel time on all applicable segments over the course of the year. A ratio of 1.5 or below is considered reliable. The national measures consider the Interstate system and the remainder of the NHS separately.

The NPMRDS only has one year of reliable data, and at the same time the reliability measure is new to the field in general. In this situation there is a pressing need to focus on learning the meaning and nature of specific reliability numbers and a corresponding need to establish links between CTDOT actions (projects and investments) and reliability outcomes. Individual travelers using a particular route experience the reliability of that route individually, and also experience the concrete reliability of their route at a particular point in time – seasonal patterns in congestion and reliability are not fully reflected in a measure that mitigates seasonal unreliability (by averaging results over an entire 12-month period).

In short, there is much learning that needs to happen before this measure can be fully understood – and utilized to its fullest potential. Recognizing this, the CTDOT is striving to develop the capability of analyzing the data and using it to achieve the objective of maximizing reliability in the highway system.

Note:

- On the rail and bus systems, reliability of the system is accounted for under the "Provide Mobility Choice, Connectivity, and Accessibility" goal. On-Time Performance and equipment reliability measures not only refer to the availability of these travel options to customers, but also express the reliability of the services provided.

HIGHWAY SYSTEM RELIABILITY

CTDOT Measure	How CTDOT measure relates to national measure	NATIONAL Measure
(No corresponding state measure for performance management.)	This is a brand new measure and there is little state or national experience with its measurement and how state DOT actions impact system reliability given the variety of influencing factors. National and state focus is currently on collecting and summarizing NPMRDS data. The CTDOT plans to develop the capability to analyze and forecast reliability to guide our actions in this area.	**Percent of the Person-miles traveled on the Interstate that are "reliable."** This measure reports the predictability of passenger car travel time on Interstate highway segments. The 80th percentile travel time (fourth longest out of five measured) is divided by the 50th percentile (median) travel time to obtain a ratio. An Interstate segment with a ratio of 1.5 or less is considered reliable. This measure draws on data from the NPMRDS and combines it with average vehicle occupancy rates to derive "person miles traveled."
(No corresponding state measure for performance management.)	This is a brand new measure and there is little state or national experience with its measurement and how state DOT actions impact system reliability given the variety of influencing factors. National and state focus is currently on collecting and summarizing NPMRDS data. The CTDOT plans to develop the capability to analyze and forecast reliability to guide our actions in this area.	**Percent of the Person-miles traveled on the non-Interstate NHS that are "reliable."** This measure reports the predictability of passenger car travel time on Interstate highway segments. The 80th percentile travel time (fourth longest out of five measured) is divided by the 50th percentile (median) travel time to obtain a ratio. A non-Interstate NHS segment with a ratio of 1.5 or less is considered reliable. This measure draws on data from the NPMRDS and combines it with average vehicle occupancy rates to derive "person miles traveled."

Goal Area 6 – Environmental Sustainability

Connecticut DOT Performance Goals	*National Performance Goals*
➢ Preserve and Protect the Environment	➢ Environmental Sustainability

AIR QUALITY

While the national measure focuses on new air-quality improvement investments, reductions are only counted on the initial year of investment. Furthermore, although projects with qualitative benefits only are known to be effective, there is no provision in the national measure for accounting for these investments. There is a resulting apparent gap in the effectiveness of Congestion Mitigation and Air Quality (CMAQ) programs and the numbers portrayed in the national measure.

The CTDOT is considering development of a more comprehensive and intuitive measure that closes the aforementioned gap and that better reflect program outcomes on Connecticut's air quality.

CTDOT Measure	How CTDOT measure relates to national measure	NATIONAL Measure
(No corresponding state measure for performance management.)	In addition to reporting the national measure as required, the CTDOT is analyzing an alternative measure that is more responsive and relatable to air-quality outcomes. In particular, the air pollutant reductions that continue to accrue over the life cycle of an air-quality improvement project need to be considered as well as investments with only "qualitative benefits" such as bicycle/pedestrian access projects.	**State Total Emissions Reduction** This measure does not account for investments in air-quality improvement made after the initial project year. This results in a highly abstract, derivative measure. In addition, projects that provide "qualitative benefits" are excluded from the measure.

Goal Area 7 – Economic Vitality

Connecticut DOT Performance Goals	*National Performance Goals*
➢ Support Economic Growth	➢ Freight Movement and Economic Vitality

FREIGHT MOVEMENT

The ability of the surface-transportation system to move goods into and out of a state impacts the competitiveness of the state economy. Freight measures are not the entire story of economic development, but they are an indicator of the contribution of the transportation system to economic development.

CTDOT Measure	How CTDOT measure relates to national measure	NATIONAL Measure
(No corresponding state measure for performance management.)	This is a brand new measure and there is little state or national experience with its measurement and its impacts on ease of movement of goods into and out of the state economy. The CTDOT is focused on developing capabilities to collect and analyze the data on a systematic basis as well as how to best target our actions in this area.	**Truck Travel Time Reliability** This measure reports the predictability of truck travel time during times when freight movement is greater, especially in urban areas. Freight companies require higher reliability in order to make business decisions, so the 95th percentile travel time is used to measure reliability of travel times. This measure draws on data from the NPMRDS.

Goal Area 8 – Organizational Excellence / Productivity

Connecticut DOT Performance Goals	*National Performance Goals*
➢ Strive for Organizational Excellence	➢ Reduction in Project Delivery Delays

PROJECT DELIVERY

In this area, the national goal of reducing project-delivery delays has no established measure at this time. In contrast, the CTDOT has long-established measures for project delivery: Projects on time, projects within budget, and construction contracts awarded within 60 days of Bid Opening.

CTDOT Measure	How CTDOT measure relates to national measure	NATIONAL Measure
Percent of Construction Contracts Completed Within Budget This measure tracks the number of projects that are completed within contract amounts established. Using a percentage of all contracts allows for comprehensive program management regardless of contract size.	The CTDOT plans to keep managing and reporting on this important bottom-line measure of project delivery.	(No corresponding national measure for performance management.)
Percent of Construction Contracts Completed On Time This measure tracks the number of projects completed within schedule. Using a percentage of all contracts allows for comprehensive program management regardless of contract size.	The CTDOT plans to keep managing and reporting on this important bottom-line measure of project delivery.	(No corresponding national measure for performance management.)
Percent of Construction Contracts Awarded within 60 Days of Bid Opening This measure tracks the progress of awarding construction contracts once the bids have been received. The timely execution of the many contracts executed by CTDOT each year is critical to minimizing project costs as well as to delivering safe infrastructure quickly to the traveling public.	The CTDOT plans to keep managing and reporting on this important measure of project delivery efficiency.	(No corresponding national measure for performance management.)