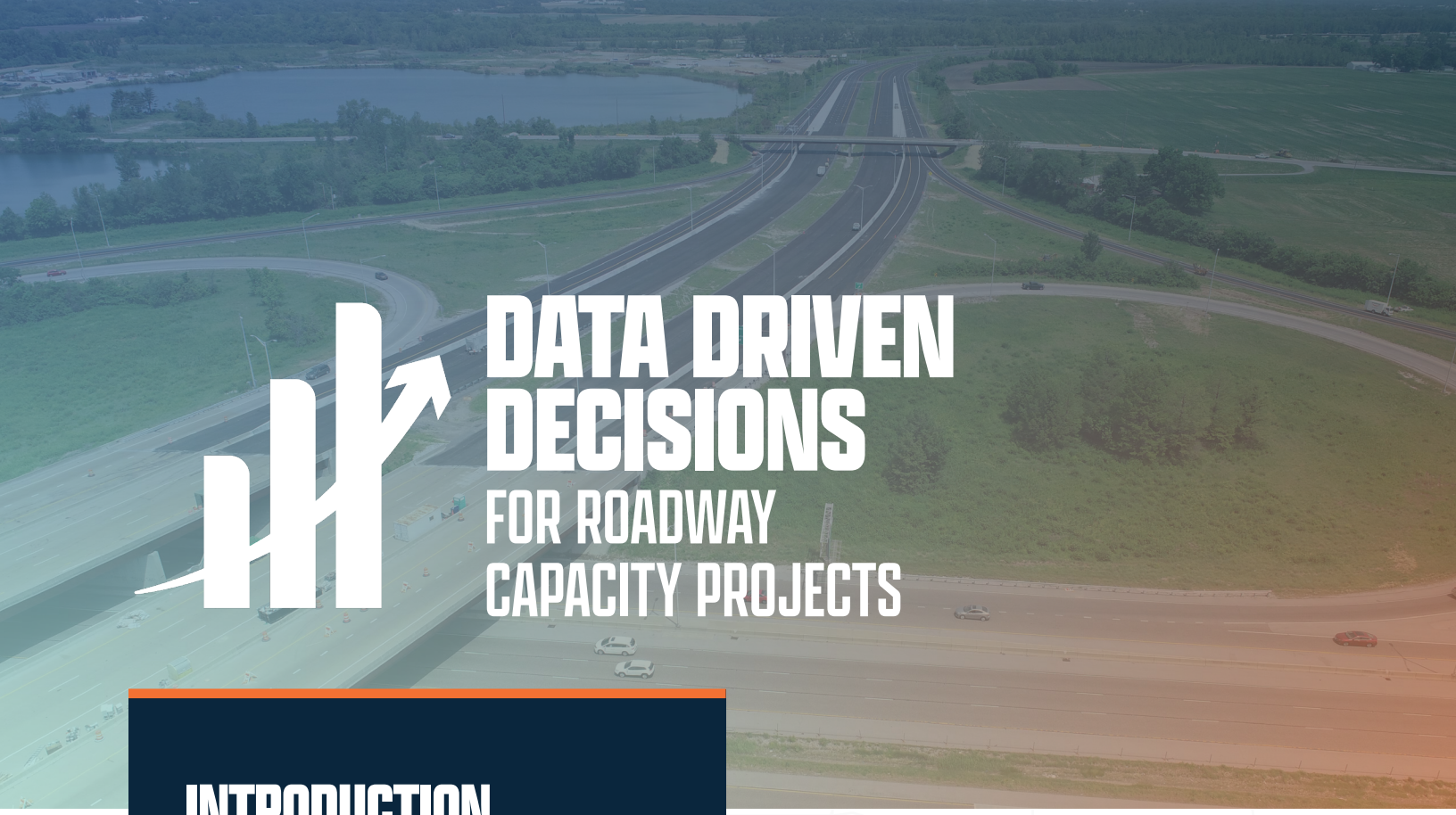


DATA DRIVEN DECISIONS FOR ROADWAY CAPACITY PROJECTS

INTRODUCTION

Illinois, located at the crossroads of the nation, often boasts itself as the freight hub of North America. This is often said due to its vast, complex, and diverse transportation system which separates it from other states. The system is made up of over 7,000 miles of rail, 1,000 miles of navigable waterways, 2,000 interstate miles, 145,000 miles of public roads, and a vast network of airports and transit. It is this transportation system that facilitates the movement of people and goods which make Illinois the fifth largest economy in the United States. However, in order to keep up with resident's and businesses' demand, the system often has to be expanded. Transportation funding is limited and the number of projects to meet capacity needs exceeds the funding available. In order to provide transparency and improve how the Illinois Department of Transportation (IDOT) selects roadway capacity projects, the Department developed the Data-Driven Decisions (DDD) Tool.

Illinois Department of Transportation

How the Data-Driven Decisions Tool was Developed

The DDD Tool was developed with federal guidance set forth by the Moving Ahead for Progress in the 21st Century Act (MAP-21), as well as existing IDOT planning documents including the Illinois Long-Range Transportation Plan. Additionally, IDOT sought counsel from transportation stakeholders within Illinois and nationally and received input from local and regional leaders and the public. IDOT also received input from the research completed for Transportation for Tomorrow and other state DOT practices and requirements from Public Act 102-02-0573. The input and guidance received during the DDD Tool development process established five goal areas with eleven selection criteria, all of which are in line with accepted industry metrics. This document outlines the goals and criteria, how the DDD Tool works, and what kind of work triggers use of the DDD Tool. It is important to note that IDOT will continue to refine the goals and criteria of the DDD Tool, this includes adding additional criteria and adjusting existing criteria as needed.

Stakeholder Feedback

During the development process, IDOT reached out to the public and identified stakeholders for feedback on the DDD Tool. An informational webinar was held September 29th 2021 to present the tool and allow for questions and answers. Following the webinar, IDOT sent out an interactive survey asking a series of questions on the goals and criteria being used for project selection, and provided an email address to receive comments directly via email. The feedback that IDOT received provided IDOT with direction on where certain goals and criteria needed further explanation and definition and where the DDD Tool could use additional metrics or considerations for how a project is scored.

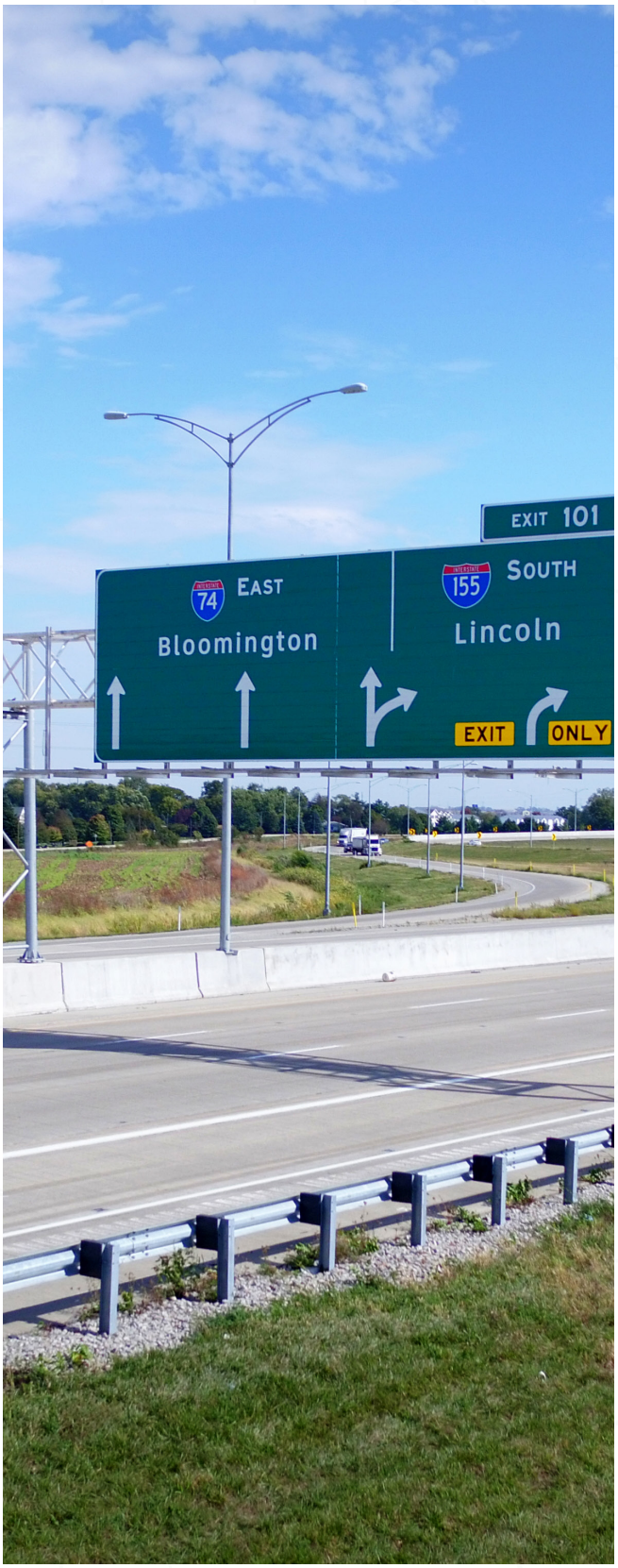
The input on weighting criteria, and their importance to project selection, provided guidance to IDOT and was the basis for the weights developed for each criterion.

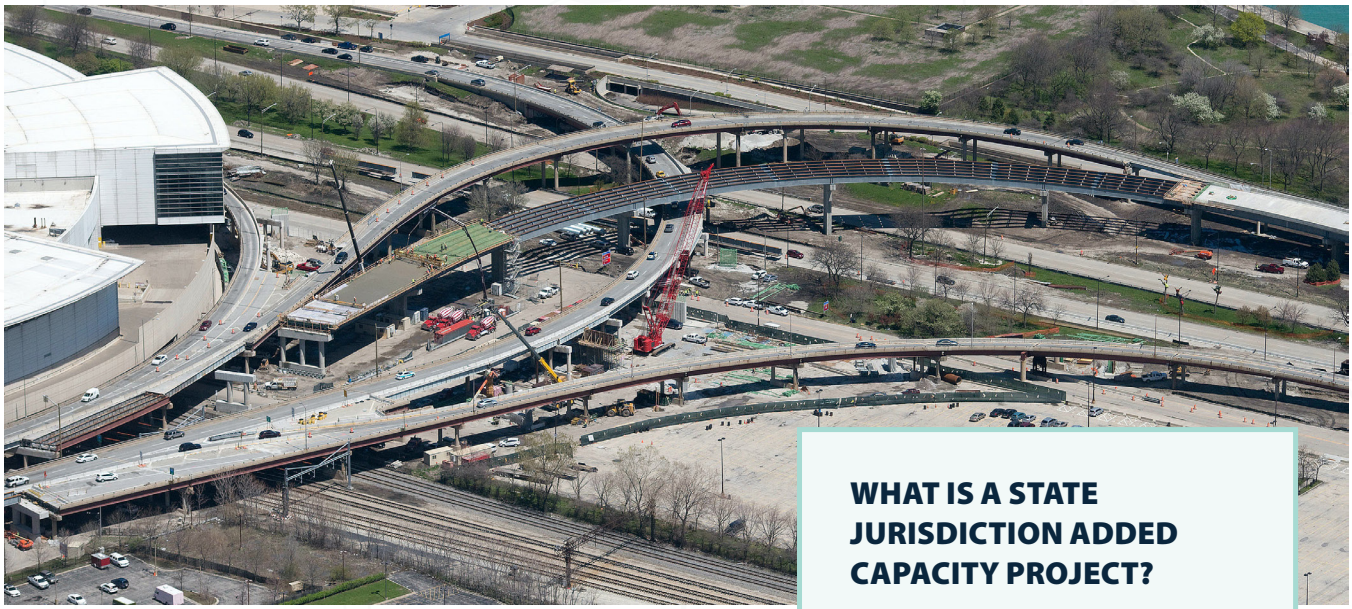
What Triggers the Tool

All phases of state jurisdiction projects that add capacity must be evaluated through the DDD Tool and approved based on their merits, as demonstrated in the DDD tool, before inclusion in the FY 2023-2028 Multi-Year Highway Improvement Program (MYP). The definition of 'add capacity' includes construction of:

- Additional lanes on an existing road
- A new road
- A new or expanded interchange
- A new or expanded bridge
- A new alignment of a railroad grade separation
- A new alignment of a roadway

State jurisdiction capacity projects that have had any previous phase(s) included in previous MYPs do not have to be evaluated through the DDD tool, however the projects may be evaluated at the Department's discretion.





WHAT IS A STATE JURISDICTION ADDED CAPACITY PROJECT?

These are projects that will add capacity to an existing roadway through adding lanes or provide new capacity by building a new bypass or new roadway. These projects are ones which will be funded via IDOT's Highway Program.

Goals and Criteria

The DDD Tool in its current iteration has five goal areas and eleven selection criteria within those goal areas. These goals and criteria will assist IDOT in selecting "state jurisdiction added capacity projects". This section will provide the following information for each Criteria:

DESCRIPTION	A description of the criteria
METHODOLOGY	How the criteria is calculated
DATA SOURCE	The source of the data, there are two types of sources for this data. A) data which IDOT's Central Office will populate and B) data which IDOT's district offices will provide based on knowledge of the project via a form.
POINT VALUE	**Fixed:** Points are calculated for these criteria based off a fixed-point scale if they meet specific parameters as outlined in the methodology **Variable:** Points are calculated utilizing specific counts or data points for the project as outlined in the methodology.

GOAL

TRAFFIC OPERATIONS/ CONGESTION

CRITERIA | **Average Annual Daily Traffic (AADT)**

DESCRIPTION	AADT represents the average annual daily traffic volume (vehicles per day, vpd) of a highway or roadway adjusted for variations in traffic throughout the year.
METHODOLOGY	The current AADT is used to prioritize candidate projects by traffic volume. Roadways with higher traffic volumes are given a higher priority than roadways with lower traffic volumes. The Current AADT is calculated as the average AADT over the entire length of the project.
POINT VALUE	Variable
DATA SOURCE	IDOT Traffic Data

CRITERIA | **Annual Vehicle Miles of Travel (AVMT)**

DESCRIPTION	AVMT represents the annual vehicle miles of travel for a given county. The DDD Tool uses the percent change in AVMT over the next 20 years.
METHODOLOGY	AVMT prioritizes candidate projects using projected growth in traffic volume. Roadways with higher projected rates of growth in traffic are given a higher priority than roadways with lower projected rates of growth. Projected AVMT numbers are calculated using existing AVMT numbers and county AVMT growth trends. The AVMT projections are then used to calculate the percent change in AVMT expected to occur over the next 20 years.
POINT VALUE	Variable
DATA SOURCE	IDOT Traffic Data

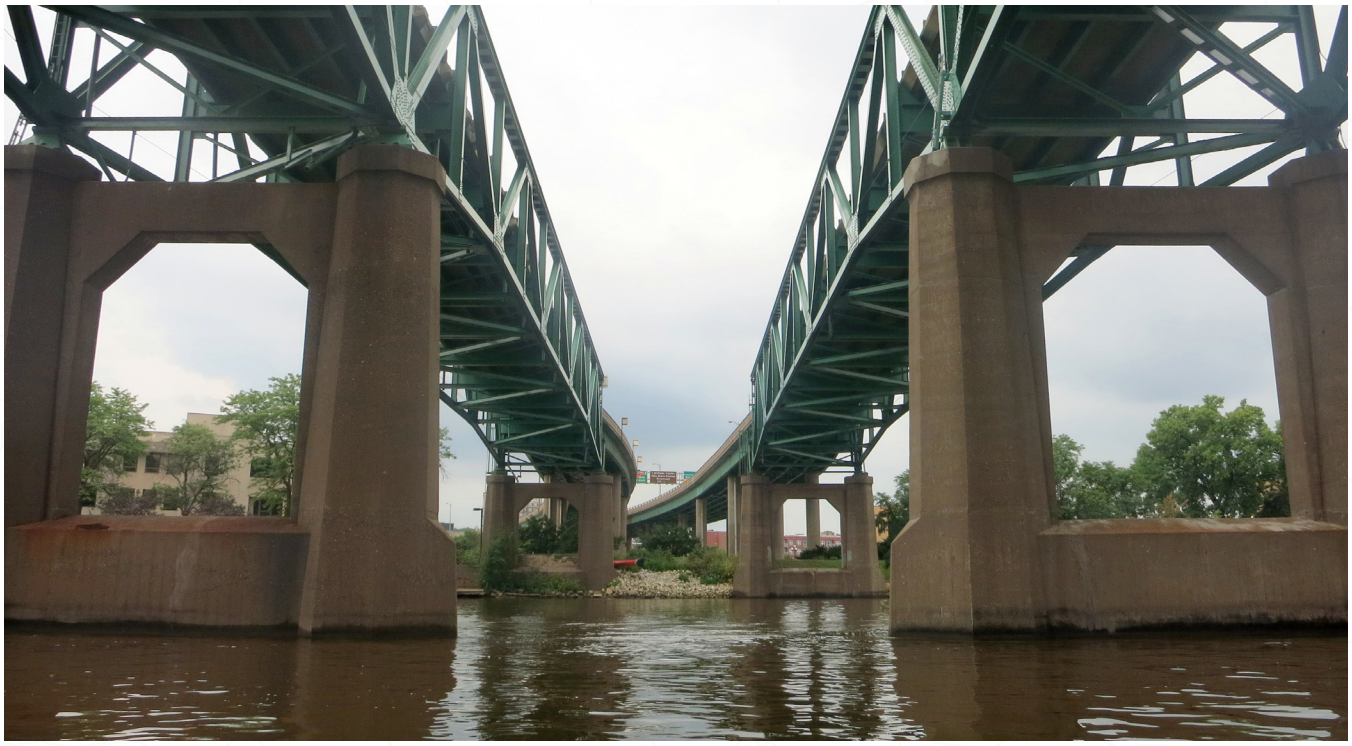
CRITERIA | **Travel Time Index (TTI)**

DESCRIPTION	Travel Time Index measures the variability in travel times that occur along a project corridor. The TTI calculates how much longer, on average, travel times are during peak hour congestion compared to free flow conditions. The DDD Tool gives higher priority to projects with high Travel Time Index values as this indicates travel times are being significantly impacted by road traffic.
METHODOLOGY	The TTI for the project corridor is calculated by dividing the average peak hour travel time from one end of the project boundaries to the other by the free-flow travel time. To calculate TTIs, RITIS uses the NPMRDS dataset of calculated speeds and travel times which was created by INRIX using actual reported vehicle data.
POINT VALUE	Variable
DATA SOURCE	Regional Integrated Transportation Information System (RITIS) data

RITIS: Regional Integrated Transportation Information System

NPMRDS: National Performance Measure Reporting Data Set

INRIX: Data analysis company specializing in real-time transportation data and analysis



GOAL

SAFETY NEEDS

CRITERIA | **Crash Frequency**

DESCRIPTION	The number and severity of vehicle crashes along the route can be used to assess the safety of the project corridor. The Crash Frequency measure quantifies the extent to which vehicle traffic safety is a problem on the section of road where the proposed project is planned. Projects on routes that are shown to have frequent major crashes will be given higher priority. The issue of how the project will improve the safety of the route will be addressed after the DDD Tool process is complete.
METHODOLOGY	IDOT's Crash Data Points shapefile contains crash locations and details for crashes in the past year. Only crashes that resulted in death, incapacitating injury, or non-incapacitating injury are considered major crashes and are used for the purposes of the Major Crash Frequency measure. Crash cost factors are used to give different weights to the type of crash-related injury or fatality. These numbers were derived from the Human Capital Crash Costs as outlined in the 2010 HSM with adjustments made by IDOT's Bureau of Safety Programs and Engineering to have the numbers specifically represent the current year in the state of Illinois. The Major Crash Frequency measure assigns the appropriate crash cost factor to each crash on the route corridor. The crash cost factors are then summed together and divided by the length of the route corridor. The result is the Major Crash Frequency for the project.
POINT VALUE	Variable
DATA SOURCE	IDOT Crash Data and 2010 Highway Safety Manual (HSM)

GOAL

ECONOMIC DEVELOPMENT

CRITERIA | National Freight Highway Network

DESCRIPTION

The project is scored on whether it is located on the National Freight Highway Network (NFHN). The NFHN is broken down into four subsystems as outlined below. The Federal Highway Administration (FHWA) determines two of the systems, while IDOT determines the remaining two.

FHWA Determination

- Primary Highway Freight System (PHFS) - In Illinois the PHFS consists of 1,685.40 miles of highways and intermodal connectors that have been determined to be the most critical portions of the national freight transportation system. The vast majority of these miles (1,589.07) are on the interstate, with the balance being made up of 151 intermodal connectors and other federal, state, and local roads.
- Other Interstate portions not on the PHFS - There are also 586.89 miles of "Non-PHFS" interstate miles in Illinois. These routes provide important continuity and access to freight transportation facilities.

IDOT Determination

- Critical Rural Freight Corridors (CRFCs) - These are public roads not in an urbanized area which provide access and connection to the PHFS and the Interstate from other important ports, public transportation facilities, or other intermodal freight facilities. In Illinois, there are 337.08 miles of CRFC roadway.
- Critical Urban Freight Corridors (CUFCs) - These are public roads in urbanized areas which provide access and connection to the PHFS and the interstate from other ports, public transportation facilities, or other intermodal transportation facilities. In Illinois, there are 168.54 centerline miles designated as CUFCs.

METHODOLOGY	The project is scored on whether it is located on the NHFN. If the project is on the NHFN it is awarded 1 point. Max Points 1.
POINT VALUE	Fixed
DATA SOURCE	IDOT Roads Data

CRITERIA | **Major Development**

DESCRIPTION	The Major Development measure takes into consideration whether any major development has recently happened or is underway along the project corridor. The development can be industrial, business, or residential. The purpose of this measure is to consider whether a project will help accommodate a recent or future increase in traffic created by an increase in local population or jobs.
METHODOLOGY	The district must identify and describe new or anticipated major development along the project corridor. The following scoring method is used in a qualitative manner (1 point max): • New major employer or development along corridor (1 point) **OR** • Anticipate change in population/employment along the corridor (1 point)
POINT VALUE	Fixed
DATA SOURCE	Project Evaluation form submitted by IDOT District

CRITERIA | **Intermodal Accessibility**

DESCRIPTION	The Intermodal Accessibility measure evaluates a project corridor's accessibility to intermodal facilities. Intermodal facilities include ports, airports, or rail/truck intermodal facilities.
METHODOLOGY	Districts must determine whether any intermodal facilities exist within one (1) mile of the project. If there are no intermodal facilities with one (1) mile, the district then determines whether there are any within three (3) miles. The following scoring method is used in a qualitative manner (2 points max): • One or more facilities within 1 mile (2 points) • One or more facilities between 1 mile and 3 miles (1 point)
POINT VALUE	Fixed
DATA SOURCE	Project Evaluation form submitted by IDOT District

GOAL

ENVIRONMENTAL IMPACTS/LIVABILITY

CRITERIA | **Equity**

DESCRIPTION	This performance measure indicates a project's potential ability to positively impact disadvantaged communities. The criteria considers how a capacity improvement project will serve our disadvantaged communities and citizens by looking at travel volumes from those disadvantaged communities as a percentage of overall traffic volume on a proposed project. It also looks at the proximity of the project to disadvantaged neighborhoods. The higher the percentage of users of a proposed project are disadvantaged citizens and the closer a project is to a disadvantaged neighborhood, the higher the score assigned to that project
METHODOLOGY	Data from Replica about transit riders on project routes is combined with the U.S. Department of Transportation's Justice40, Illinois EPA's Environmental Justice Community, and the Illinois Power Agency's R3 Communities datasets. The data inputs are used to determine what percentage of riders on the project route live in a disadvantaged community. The projects with the minimum and maximum percentages of riders who reside in disadvantaged communities serve as baselines to transform the percentages from the group of projects being evaluated into scores between 0 and 1.
POINT VALUE	Variable
DATA SOURCE	United States Department of Transportation (USDOT) Transportation Disadvantaged Census Tracts, two state files used in Illinois legislation, Illinois Department of Commerce and Economic Opportunity (DCEO) Underserved Areas tool, data from Replica database and Climate and Equitable Jobs Act (CEJA) Illinois map.

CRITERIA | **Level of Environmental Impact Analysis Required**

DESCRIPTION	This performance measure indicates a project's potential impact on sensitive environmental resources.
METHODOLOGY	The expected environmental impact of a given project can be inferred from the type of environmental document the project requires. This measure uses the environmental document to score the project's environmental impact. If the environmental document is a Categorical Exclusion, the project is expected to have no impacts to environmental resources. If the document is an Environmental Assessment, the project is expected to have few environmental impacts, or the impacts are limited to tree clearing done in compliance with restrictions to protect listed bat species. If the document is an Environmental Impact Statement, the project is expected to require multiple avoidance, minimization, and mitigation measures. If a proposed project has no environmental documentation and the district can't provide information about a forthcoming document, it is assumed for the purposes of this DDD Tool process that the project will require multiple mitigation measures. (3 points max): • Categorical Exclusion (3 points) • Environmental Assessment (2 points) • Environmental Impact Statement OR no environmental document (1 point)
POINT VALUE	Fixed
DATA SOURCE	Environmental documentation provided by IDOT, or documents found on IDOT's Environmental Review Documentation website (http://www.idot.illinois.gov/transportation-system/environment/environmental-review-documents)

CRITERIA | **Resiliency**

DESCRIPTION	This measure uses the locations of past emergency event repairs as indicators of where new road construction might help to mitigate the risk of damage in the future. Emergency events are natural disasters or catastrophic failures resulting in an emergency declaration by the Governor of Illinois or by the U.S. President. Special funds are made available to repair damage incurred by the emergency event.
METHODOLOGY	The locations of emergency events are overlayed on a map of the project corridor to see if IDOT has made repairs on that section of roadway. The following scoring method is used in a qualitative manner (1 point max): • Emergency event repair has been made anywhere within the project corridor (1 point)
POINT VALUE	Fixed
DATA SOURCE	IDOT emergency event repair records

CRITERIA | **Emissions**

DESCRIPTION	This performance measure indicates a project's potential ability to reduce harmful vehicle emissions and improve overall air quality. By considering how a proposed project will reduce emissions impacts on surrounding areas and the residents in those areas, IDOT can improve the quality of life for our citizens
METHODOLOGY	Emissions changes on proposed improvements are calculated by the ILSTDM emissions tool that considers changes to traffic volume, speed, the facility type and the mix of vehicle types using the facility to determine the change in emissions for a proposed project. This number is adjusted using the project length to determine the change in emissions per mile. A Transit Competitiveness Factor is applied to projects that compete with existing or planned bus and rail transportation routes. The factor reduces emissions benefits or increases emission harms. Projects are ranked by increase/decrease in emissions per mile with low emissions being high rankings. The ranks are transformed into numbers ranging from 0 to 1, with 1 being the highest ranked project. Projects that reduce emissions are scored higher than projects with little or no emission reduction.
POINT VALUE	Variable
DATA SOURCE	United States Environmental Protection Agency's (USEPA) Motor Vehicle Emission Simulator (MOVES) emission rates; traffic volume, speed and facility type from the Illinois Statewide Travel Demand Model (ILSTDM).

GOAL

REGIONAL RATING

CRITERIA | **Ranking by Region/District**

DESCRIPTION	The regional ranking performance measure is a qualitative measure based on information provided by IDOT districts. Each IDOT district ranks their proposed projects by importance. This allows local IDOT offices to provide input on how projects score in the DDD Tool.
METHODOLOGY	Candidate projects are scored according to where they rank in their respective districts' priorities.
POINT VALUE	Fixed
DATA SOURCE	Project Evaluation form submitted by IDOT District

CRITERIA WEIGHTING

The weighting for the five goal areas and eleven criteria was developed utilizing input from stakeholders and the public. A survey released by IDOT asked people to provide weight to the goals and criteria currently being used by the DDD Tool. The data from the survey was used by IDOT to develop the following weighting scale for the DDD Tool. The weighting of the goals and criteria are used in the final determination and ranking of projects for funding consideration. The process is described below.

CRITERIA	WEIGHT
Goal Area - Traffic Operations/Congestion	
Annual Average Daily Traffic (AADT)	**7%**
Annual Vehicle Miles Traveled (AVMT)	**6%**
Travel Time Index	**7%**
TOTAL	**20%**
Goal Area - Safety Needs	
Crash Frequency	**30%**
TOTAL	**30%**
Goal Area - Economic Development	
National Highway Freight Network	**6%**
Major Development	**7%**
Intermodal Accessibility	**7%**
TOTAL	**20%**

CRITERIA	WEIGHT
Goal Area - Livability/Environment	
Equity	**5%**
Level of Environmental Impact Analysis	**5%**
Resiliency	**5%**
Emissions	**5%**
TOTAL	**20%**
Goal Area - Regional Rating	
Regional Rating	**10%**
TOTAL	**10%**

HOW THE TOOL WORKS?

The project value score represents the value or benefit of a proposed project. Weights are used to define how much influence each criterion is given in the project value score. The weight is the percent of the project value score that a given criteria will account for. All capacity projects submitted for consideration are evaluated and a score as it relates to the set of projects is determined.

1

The input number a project has for a given measure is scored on scale of 0 to 1 using the following equation:

$$\text{PROJECT CRITERIA SCORE} = \frac{\text{(Project Raw Value – Lowest Value)}}{\text{(Highest Value – Lowest Value)}}$$

Project Raw Value = Project input number for criteria

Lowest Value = Lowest Value within the set of projects for the criteria

Highest Value = Highest Value within the set of projects for the criteria

***Note** Certain criteria have fixed Highest and Lowest Values*

2

This number is multiplied by the weight of that measure.

3

The resulting numbers for all the measures are added together. This is the project's project value score. The project value score is always between 0 and 100.

How the Tool Works: Example

The following section will provide an example of how the tool works using the calculations previously explained. For this example, three example projects have been selected to highlight how the project criteria score is calculated and the project value score. The example provides sample score calculations for three criteria types fixed points, variable points, and regional ranking. Regional ranking is calculated slightly differently than other criteria as will be explained below.

PROJECT UNIVERSE

Below is an example of the type of data that will be collected which will then be used to calculate the project criteria score and ultimately the project value score. Of the eleven criteria four of them have variable points and six have fixed points, with regional ranking being its own structure.

REMINDER

What are the Point Structures?

Variable: Points are calculated utilizing specific counts or data points for the project as outlined in the methodology

Fixed: Points are calculated for these criteria based off a fixed-point scale if they meet specific parameters as outlined in the methodology

Regional Ranking: Points are calculated according to where they rank in their respective districts' priorities. For Regional Ranking, the highest priority project has the lowest value (1) and the lowest priority project has the highest value (3).

GOAL	CRITERIA	POINT VALUE	PROJECT A	PROJECT B	PROJECT C
Traffic Operations/ Congestion	AADT	Variable	**17,241**	**41,379**	**4,214**
	AVMT	Variable	**23.76%**	**4.53%**	**4.56%**
	TTI	Variable	**1.70**	**1.13**	**1.44**
Safety	Crash Frequency	Variable	**57**	**26**	**5**
Economic Development	NHFN	Fixed	**0**	**1**	**0**
	Major Development	Fixed	**1**	**0**	**0**
	Intermodal Accessibility	Fixed	**0**	**0**	**0**
Environmental Impacts/Livability	Level of Environmental Impact Analysis Required	Fixed	**3**	**2**	**3**
	Equity	Variable	**62%**	**13%**	**36%**
	Emissions	Variable	**.78**	**1**	**.26**
	Resiliency	Fixed	**0**	**0**	**0**
Regional Ranking	Regional Ranking	Regional	**3**	**2**	**1**

POINT CALCULATIONS

The example below outlines how AADT points are calculated. This process will be repeated for each of the eleven criterion.

REMINDER

How to Calculate Project Criteria Score

$$\text{PROJECT CRITERIA SCORE} = \frac{\text{(Project Raw Value – Lowest Value)}}{\text{(Highest Value – Lowest Value)}}$$

GOAL	CRITERIA	PROJECT A	PROJECT B	PROJECT C
Traffic Operations/ Congestion	AADT	**17,241**	**41,379**	**4,214**

PROJECT CRITERIA SCORE =

PROJECT RAW VALUE — LOWEST PROJECT VALUE

$$\frac{(17{,}241 - 4{,}214)}{(41{,}379 - 4{,}214)}$$

HIGHEST PROJECT VALUE — LOWEST PROJECT VALUE

$$= \frac{13{,}027}{37{,}165}$$

$$= .35$$

FINAL PROJECT VALUE SCORE CALCULATION

The final Project Value Score is calculated after the project criteria score for each criteria as previously explained. To calculate the Project Value Score, multiply the project criteria score by the weighting percentage as a whole number, not a decimal/ percent. For example, to calculate the criteria score for AADT for Project A, multiply 7 (weight) by .04 (criteria score) to get a value score of 2.5. You then do this for each criteria and then add them together to get the final Project Value Score.

		x7 Project A Criteria Score		**x7** Project B Criteria Score		**x7** Project C Criteria Score
CRITERIA	PROJECT A CRITERIA SCORE	**PROJECT A VALUE SCORE**	PROJECT B CRITERIA SCORE	**PROJECT B VALUE SCORE**	PROJECT C CRITERIA SCORE	**PROJECT C VALUE SCORE**
AADT	**0.35**	**2.5**	**1**	**7**	**0**	**0**
AVMT	**1**	**6**	**0**	**0**	**0**	**0**
TTI	**1**	**7**	**0**	**0**	**0.54**	**3.7**
Crash Frequency	**1**	**30**	**0.39**	**11.8**	**0**	**0**
NHFN	**0**	**0**	**1**	**6**	**0**	**0**
Major Development	**1**	**7**	**0**	**0**	**0**	**0**
Intermodal Accessibility	**0**	**0**	**0**	**0**	**0**	**0**
Level of Environmental Impact Analysis Required	**1**	**5**	**0**	**0**	**1**	**7**
Equity	**1**	**5**	**0**	**0**	**0.46**	**2.3**
Resiliency	**0**	**0**	**0**	**0**	**0**	**0**
Emissions	**0.7**	**3.5**	**1**	**5**	**0**	**0**
Regional Ranking	**0**	**0**	**0.5**	**5**	**1**	**10**
FINAL PROJECT VALUE SCORE		**66**		**34.8**		**23**

In the example above project A received the highest project value score followed by project B, then project C. This means that the priority for the projects in this example set would be prioritized in that order of Project A, Project B, Project C.