

West Virginia DOT

GIS Enhancement Project & Project Prioritization Process

presented to

WVDOT/MPO/FHWA Transportation Planning and Programming Conference

presented by

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Transportation leadership you can trust.



Agenda

- Project Background and Overview
- Components of Project
- Approach to Prioritization Process
- Stakeholder Input
- Presentation of Results
- Next Steps

Overview

- Five Components of Project
 - » GIS Enhancement Project
 - » Project Prioritization Process
 - » Benefit/Cost Calculator
 - » Performance Measures Dashboard
 - » Project Mapping Application

Overview (GIS Enhancement Project)

- GIS Enhancement Project
 - » Geospatial Integration and Implementation Strategy
 - Broad Assessment of GIS for the WVDOT
 - » Project Mapping Application Tool
 - To Display and Track Current, Past and Future Transportation Projects in the LRTP, STIP and TIPs
 - » Project Prioritization Process Based on State and/or MPO Priorities
 - » Future Modules
 - Benefit/Cost Calculator
 - Greenhouse Gas Calculator
 - Project Conformity
 - ...etc.

Project Mapping Application Tool - Functionality

- Application access and security
 - » Web application accessible by public, WVDOT, MPO, and other agency staff with different permission levels
- General capabilities
 - » View transportation and demographic data on a map
 - » View and query projects (retrieve relevant documents, attributes, and history)
- Redlining tools
- Reporting

Project Prioritization Process - Overview

- Purpose and Background
- Types of Projects
- Scoring Approach
- Prioritization Weights for Goals and Criteria
- Benefit/Cost Index
- Next Steps

Project Prioritization Process – Purpose and Background

● Purpose

- » Prioritize potential projects based on a combined project score and benefit/cost index to assist WVDOT with programming projects
- » Integrate the approach into the GIS Project Mapping Application in order to display all potential projects, their scores, locations, history, etc.

● Input

- » Statewide Goals from WV Multi-Modal Statewide Transportation Plan
- » Interviews with WVDOT Staff
- » Best practices from the region and across the nation
- » Stakeholder workshops – February 2012 and August 2012

Project Prioritization Process

Statewide Plan Goals

- Support West Virginia's economic development goals with multimodal access to markets in West Virginia, the U.S., and overseas;
- Support the health and well-being of West Virginians, as well as the environment and overall quality of life, with a range of mobility options;
- Preserve past investments by maintaining the existing system; and
- Promote efficient use of resources, especially in light of diminishing revenues.

Stakeholder Input – Interviews

- WVDOT Stakeholder Interviews
Fall 2011
 - » 25 DOT staff participated
 - » Confirmed transportation goals
 - » Defined project categories
 - » Identified potential project prioritization criteria
 - » Determined available data



Project Prioritization Process

Scoring Approach



1. Separate the projects into scoring groups;
2. Assign goals to project categories and develop weighting;
3. Develop criteria for each goal under each project category and assign weights;
4. Quantify a relative score for each project prioritization criterion for each project;
5. For each criterion, multiply each project's relative score by that criterion's weight;
6. For each project, sum weighted scores for all criteria; and
7. Assign projects to priority tiers, based on total project score and B/C index.

Stakeholder Input - Workshop

- Stakeholder Workshop #1 - February 2012
 - » 30 participants
 - » Defined project prioritization criteria by project type
 - » Weighted project prioritization criteria and goals by project type



Step 1: Separate Projects into Scoring Groups



Capacity Expansion



Operational Improvement

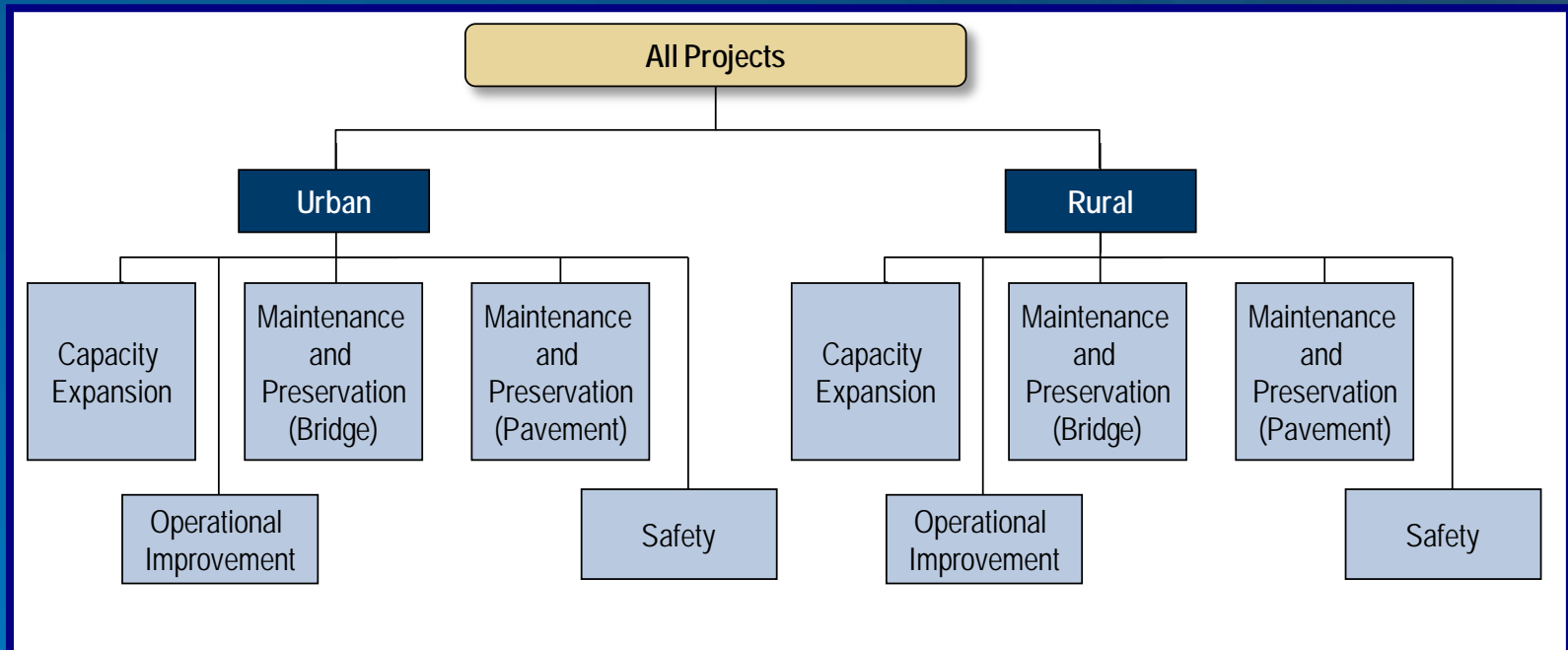


Maintenance & Preservation
bridge/pavement



Safety

Step 1: Separate Projects into Scoring Groups



Step 2: Assign Goals to Project Categories and Weight

- Identified goals addressed by each project type
- Defined weights for goals by project type at February Stakeholder Workshop

Step 2: Assign Goals to Project Categories



Project Prioritization Goal Weights

Pairwise Survey Exercise

1. Compare each item to every other item
2. Write preference in space provided
3. Add item values to get score

Example for Goals:

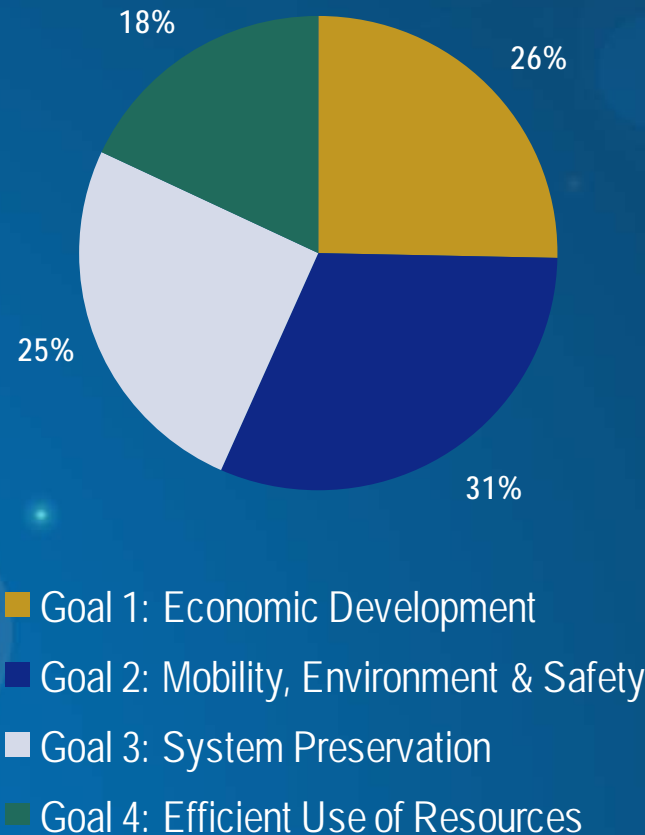
		<i>B. Multimodal, Mobility, Environment, & Safety</i>		<i>C. System Preservation</i>		<i>D. Efficient Use of Resources</i>	
A. Economic Development	A	C	A				
B. Multimodal, Mobility, Environment, & Safety		B	D				
C. System Preservation			C				

Totals:

A	B	C	D

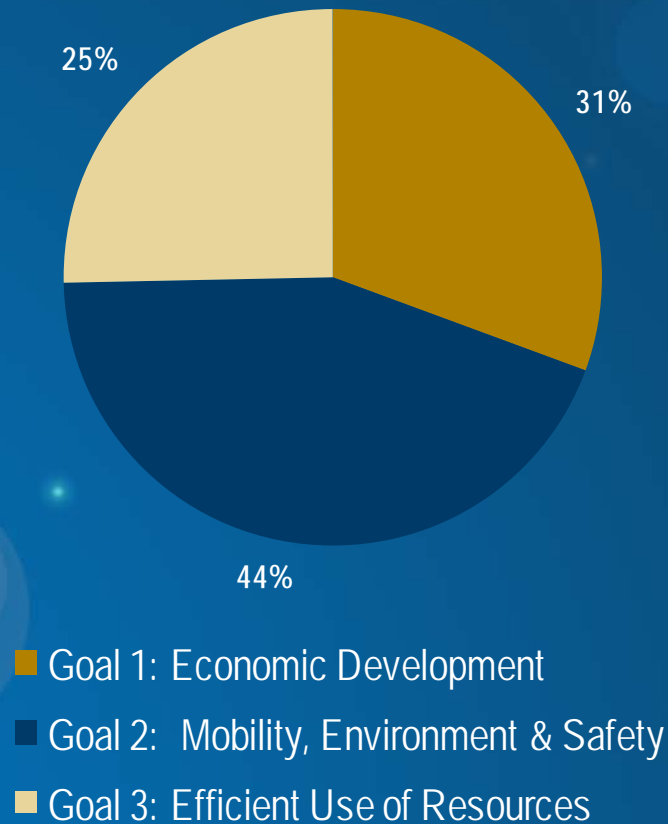
Step 2: Assign Goals to Project Categories & Weight

Goal Weighting: Capacity Expansion Projects



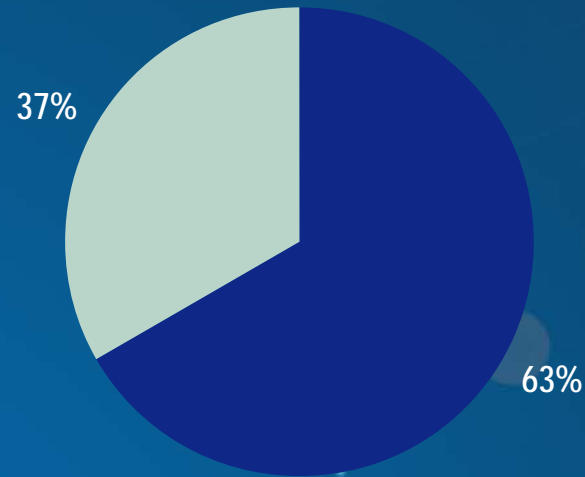
Step 2: Assign Goals to Project Categories & Weight

Goal Weighting: Operational Improvements



Step 2: Assign Goals to Project Categories & Weight

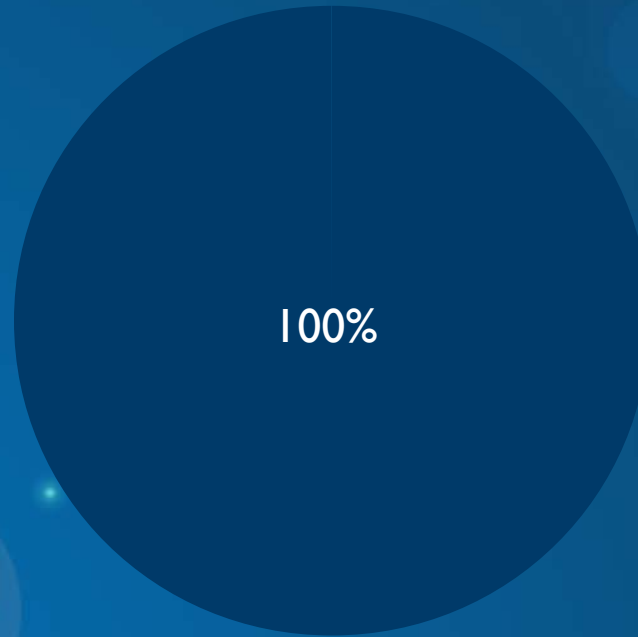
Goal Weighting: Maintenance and Preservation



- Goal 1: Economic Development
- Goal 2 : Mobility, Environment & Safety

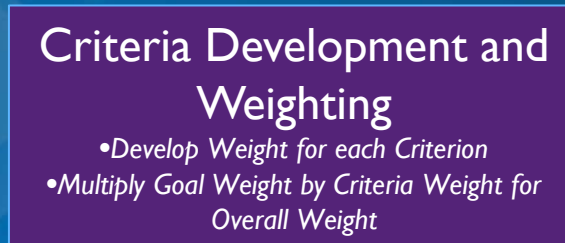
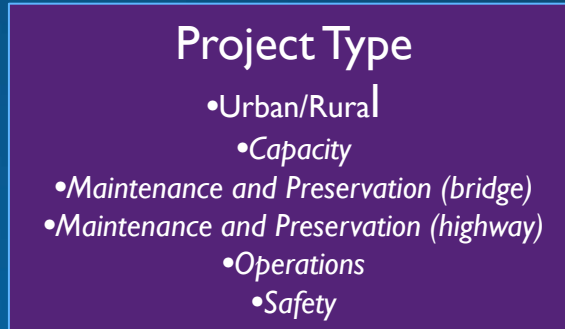
Step 2: Assign Goals to Project Categories & Weight

Goal Weighting: Safety

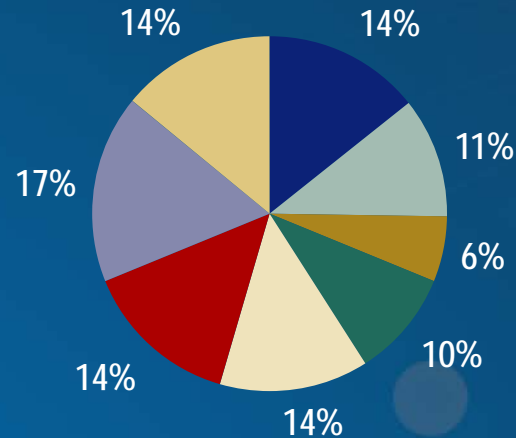


■ Goal 2: Mobility, Environment & Safety

Step 3: Develop Criteria Under each Goal for each Project Category and Assign Weights

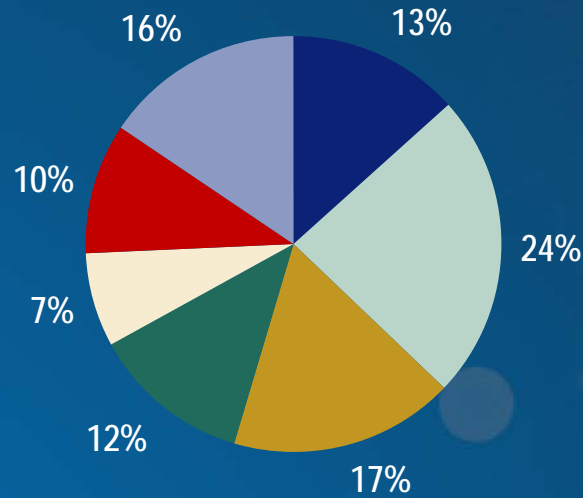


Capacity Projects Criteria Weighting for Goal I: Economic Development



- Criterion A: Commercial/industrial development potential
- Criterion B: Truck AADT
- Criterion C: Designation as economically distressed area
- Criterion D: Significance to tourism industry
- Criterion E: Number of employees within 20 miles of project
- Criterion F: Population within 20 miles of project
- Criterion G: Number of municipalities over 5,000 in population and number of employment centers within 20 miles

Capacity Projects Criteria Weighting for Goal 2: Mobility, Environment, Safety



■ Criterion A: Total AADT

■ Criterion B: Reduction in crash rate

■ Criterion C: Travel time, delay reduction

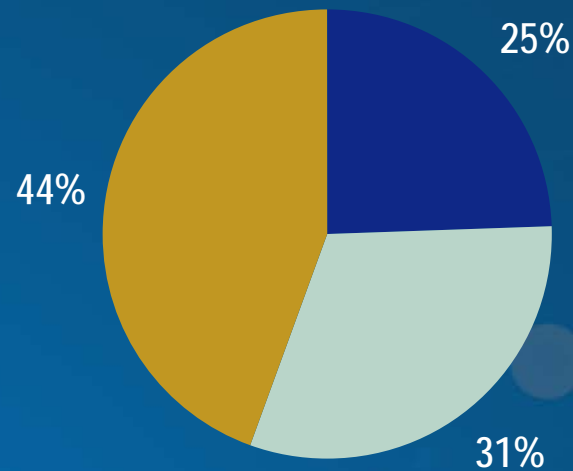
■ Criterion D: Evaluated for Complete Streets and incorporated into projects as appropriate

■ Criterion E: Location on or within 3/4 mile of an existing or new fixed route transit route

■ Criterion F: Air quality conformity

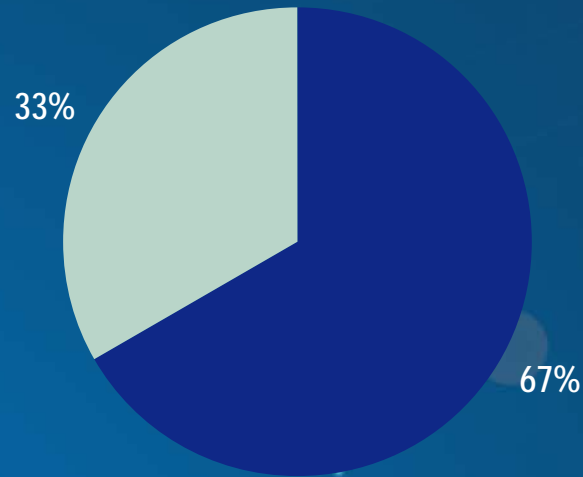
■ Criterion G: Number of environmentally sensitive areas per mile through which project passes

Capacity Projects Criteria Weighting for Goal 3: System Preservation



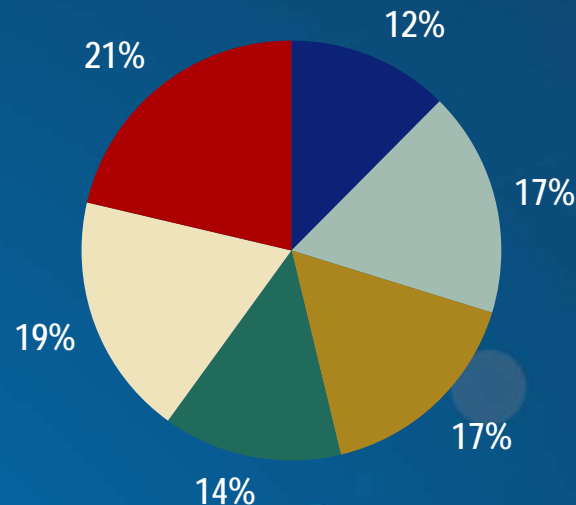
- Criterion A: Compatibility with Land Use
- Criterion B: Contribution to completion of key corridor
- Criterion C: Pavement index; bridge sufficiency rating

Capacity Projects Criteria Weighting for Goal 4: Efficient Use of Resources



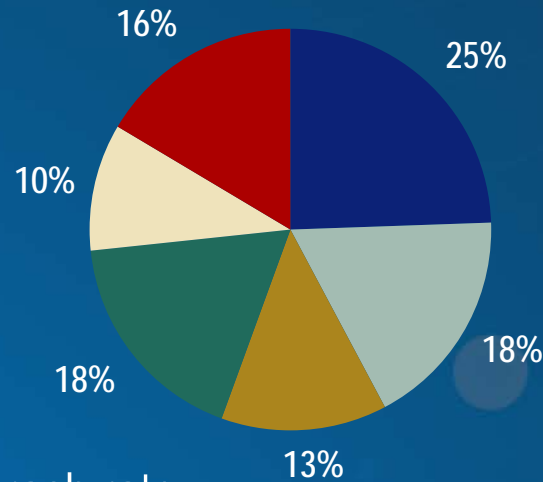
- Criterion A: Consistent w/Local & Regional Priorities
- Criterion B: Local dollars contributed to Project as percentage of total project cost

Operations Projects Criteria Weighting for Goal I: Economic Development



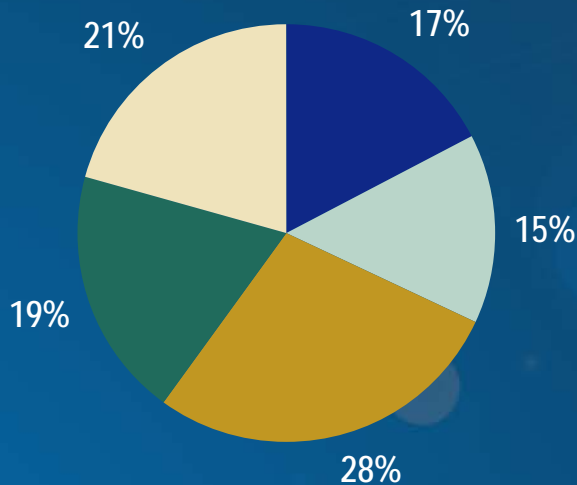
- Criterion A: Number of employees within 20 miles
- Criterion B: Population within 20 miles
- Criterion C: Truck AADT
- Criterion D: Designation as an economically distressed area
- Criterion E: Significance to tourism industry
- Criterion F: Number of freight intermodal transportation hubs within 20 miles

Operations Projects Criteria Weighting for Goal 2: Mobility, Environment and Safety



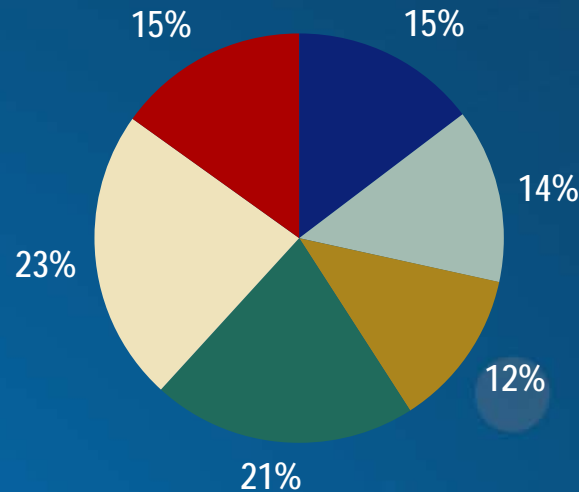
- Criterion A: Reduction in crash rate
- Criterion B: Reduction in travel time/delay reduction
- Criterion C: Total AADT
- Criterion D: Evaluated for Complete Streets and incorporated elements into project as appropriate
- Criterion E: Location on or within 3/4 mile of a fixed route transit route
- Criterion F: Number of environmentally sensitive areas per mile through which project passes

Operations Projects Criteria Weighting for Goal 4: Efficient Use of Resources



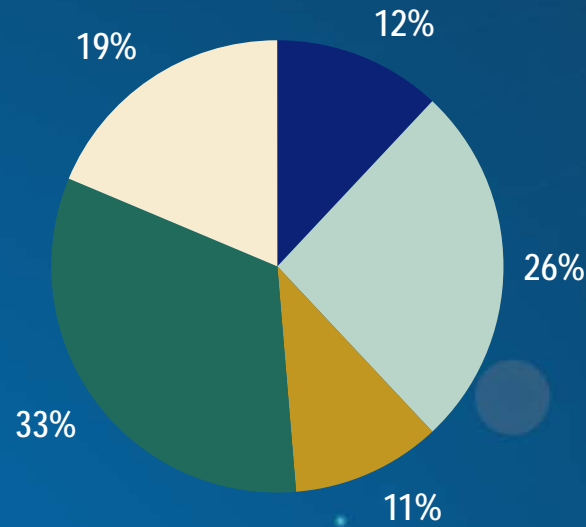
- Criterion A: Compatibility with land use
- Criterion B: Contribution to completion of a key corridor
- Criterion C: Pavement index; bridge sufficiency rating
- Criterion D: Consistent with local and regional priorities
- Criterion E: Local dollars contributed as a percentage of total project costs

Maint. and Pres. – Bridges Criteria Weighting for Goal I: Economic Development



- Criterion A: Importance to Economic Development
- Criterion B: Whether the bridge is on the historic preservation program
- Criterion C: Detour length
- Criterion D: Truck AADT
- Criterion E: Posted for reduced weights below threshold for heavy trucks
- Criterion F: Number of freight intermodal transportation hubs within 20 miles

Maint. and Pres. – Bridges Criteria Weighting for Goal 2: Mobility, Environment & Safety



■ Criterion A: Increases capacity

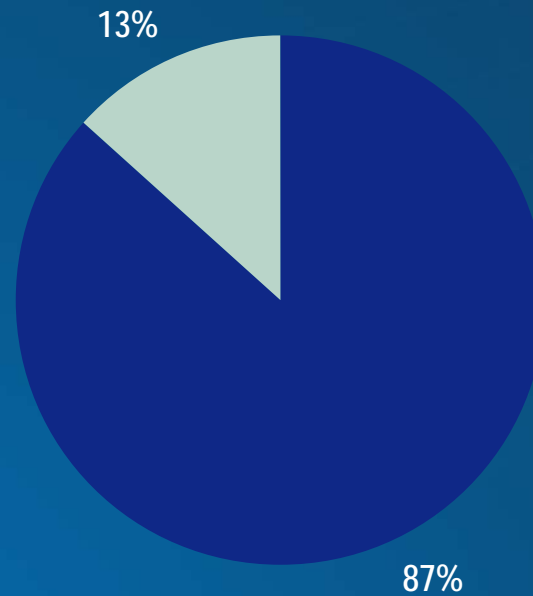
■ Criterion B: Reduction in crash rate

■ Criterion C: Evaluated for Complete Streets and incorporated elements into project as appropriate

■ Criterion D: Sufficiency Rating Score

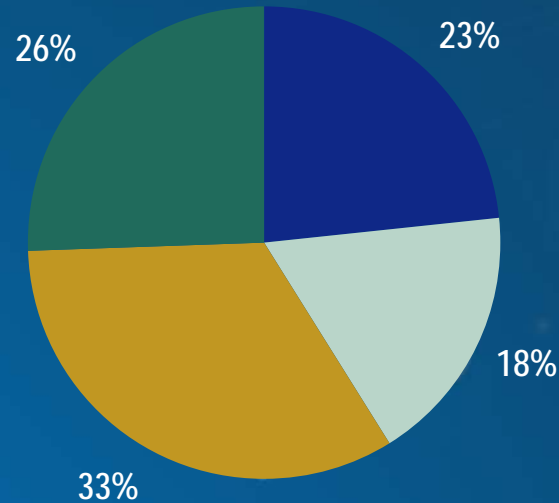
■ Criterion E: Total AADT

Maint. and Pres. – Pvmt. Criteria Weighting for Goal I: Economic Development



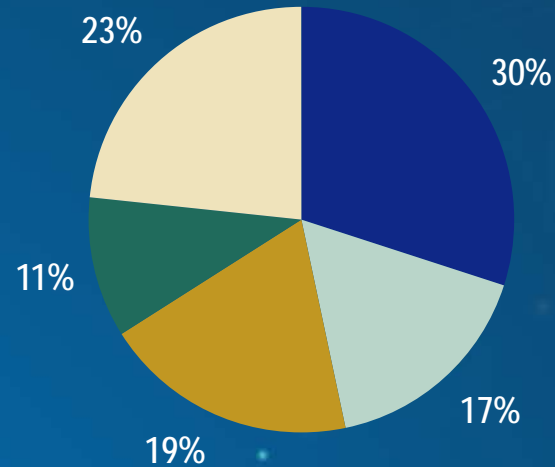
- Criterion A: Truck AADT
- Criterion B: Number of freight intermodal transportation hubs within 20 miles

Maint. and Pres. – Pvmt. Criteria Weighting for Goal 2: Mobility, Environment & Safety



- Criterion A: Total AADT
- Criterion B: Evaluated for Complete Streets and Incorporated elements into project as appropriate
- Criterion C: Reduction in Crash Rate
- Criterion D: Composite Pavement Index

Safety Projects Criteria Weighting for Goal 2: Mobility, Environment & Safety



- Criterion A: Reduction in crash rate
- Criterion B: Total AADT
- Criterion C: Population within 20 miles of project
- Criterion D: Number of employees within 20 miles
- Criterion E: Addresses an existing bike/ped or transit safety issue

Develop Overall Weighting (example exercise)

- Multiply Goal Weight by Criterion Weight for overall weight

Capacity Projects				
Goal 3: System Preservation	Goal Weight	Criterion A: Compatibility with Land Use	Criterion B: Contribution to completion of key corridor	Criterion C: Pavement index; bridge sufficiency rating
	25%			
Criterion Weight		0.244	0.311	0.444
Overall Weight		0.061	0.078	0.111
Goal 4: Efficient Use	Goal Weight	Criterion A: Consistent w/Local and Regional Priorities	Criterion B: Local dollars contributed to Project as percentage of total project cost	
	18%			
Criterion Weight		0.667	0.333	
Overall Weight		0.120	0.060	

Step 4: Assign Project Scores (Example Exercise)

Step 5: Multiply Relative Score by Criterion Weight

Criteria	Criterion Weight	Project Score (0-100)	Total Score
Goal 1			
Criterion A: Commercial/ industrial development potential	0.036	50	1.8
Criterion B: Truck AADT	0.027	40	1.1
Criterion C: Designation as economically distressed area	0.015	0	0.0
Criterion D: Significance to tourism industry	0.024	60	1.5
Criterion E: Number of employees within 20 miles of project	0.034	40	1.4
Criterion F: Population within 20 miles of project	0.036	50	1.8
Criterion G: Number of municipalities over 5,000 in population and number of employment centers within 20 miles	0.043	40	1.7
Criterion H: Number of freight intermodal transportation hubs within 20 miles	0.035	0	0.0
Goal 2			
Criterion A: Total AADT	0.041	60	2.5
Criterion B: Reduction in crash rate	0.074	30	2.2
Criterion C: Travel time, delay reduction	0.054	30	1.6
Criterion D: Evaluated for Complete Streets and incorporated into projects as appropriate	0.038	100	3.8
Criterion E: Location on or within 3/4 mile of an existing or new fixed-route transit route	0.023	100	2.3
Criterion F: Air quality conformity	0.031	100	3.1
Criterion G: Number of environmentally sensitive	0.048	50	2.4
Goal 3			
Criterion A: Compatibility with Land Use	0.061	70	4.3
Criterion B: Contribution to completion of key corridor	0.078	0	0
Criterion C: Pavement index; bridge sufficiency rating	0.111	37	4.1
Goal 4			
Criterion A: Consistent w/Local and Regional Priorities	0.120	100	12.0
Criterion B: Local dollars contributed to Project as percentage of total project cost	0.060	0	0

Step 6: Sum Weighted Scores for All Criteria (Example Exercise)

Criteria	Total Score
Goal 1	
Criterion A: Commercial/ industrial development potential	1.8
Criterion B: Truck AADT	1.1
Criterion C: Designation as economically distressed area	0.0
Criterion D: Significance to tourism industry	1.5
Criterion E: Number of employees within 20 miles of project	1.4
Criterion F: Population within 20 miles of project	1.8
Criterion G: Number of municipalities over 5,000 in population and number of employment centers within 20 miles	1.7
Criterion H: Number of freight intermodal transportation hubs within 20 miles	0.0
Goal 2	
Criterion A: Total AADT	2.5
Criterion B: Reduction in crash rate	2.2
Criterion C: Travel time, delay reduction	1.6
Criterion D: Evaluated for Complete Streets and incorporated into projects as appropriate	3.8
Criterion E: Location on or within 3/4 mile of an existing or new fixed-route transit route	2.3
Criterion F: Air quality conformity	3.1
Criterion G: Number of environmentally sensitive	2.4
Goal 3	
Criterion A: Compatibility with Land Use	4.3
Criterion B: Contribution to completion of key corridor	0
Criterion C: Pavement index; bridge sufficiency rating	4.1
Goal 4	
Criterion A: Consistent w/Local and Regional Priorities	12.0
Criterion B: Local dollars contributed to Project as percentage of total project cost	0
TOTAL Project Score	47.6

Step 7: Assign Projects to Priority Tiers

Calculate Benefit/Cost (B/C) Index

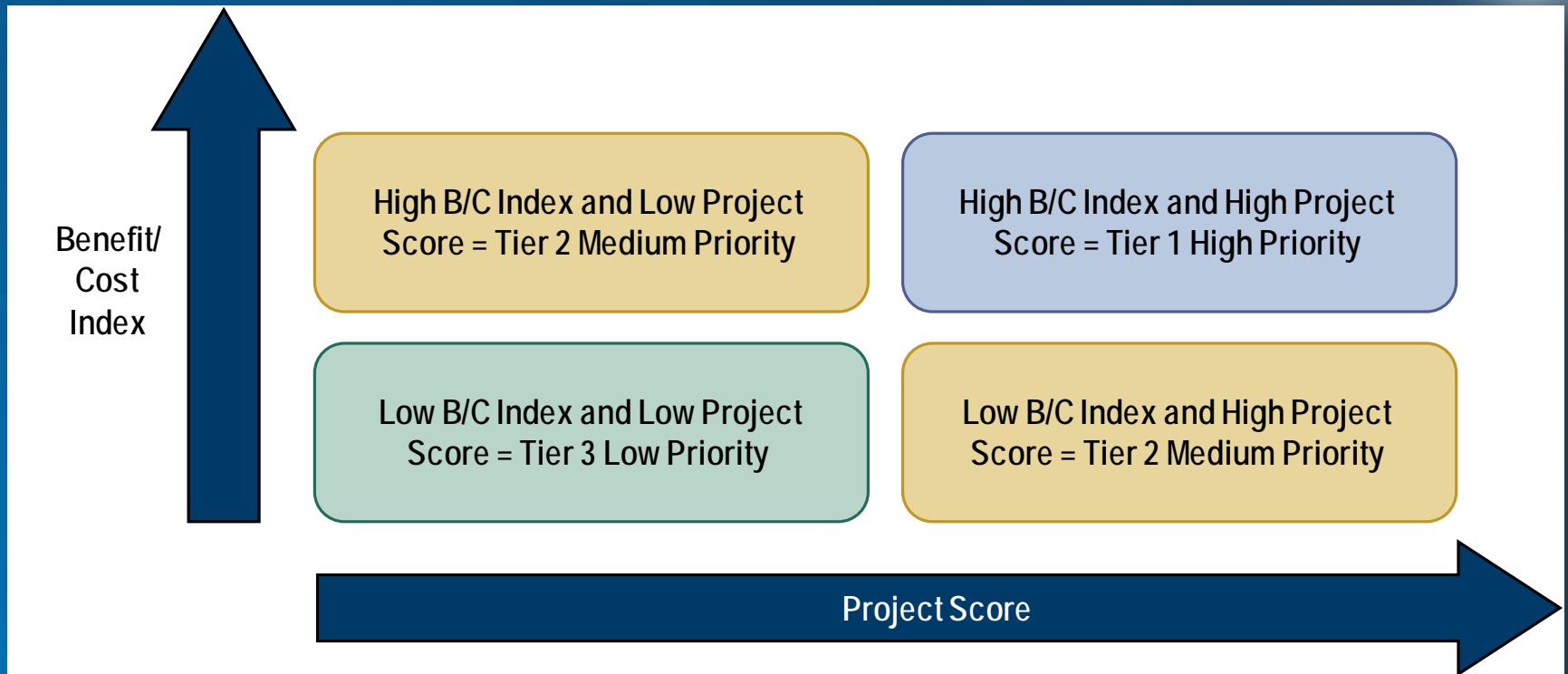
- Project Benefits (B)

- » Travel time savings
- » Fuel cost savings
- » Crash cost savings
- » Greenhouse gas cost savings
- » Economic Savings

- Project Costs (C)

- » Engineering
- » ROW
- » Construction

Step 7: Assign Projects to Priority Tiers



Benefits of Approach

- Transparent
- Defendable
- Reflects established goals in the statewide plan
- Data-driven process that is quantitative when possible, qualitative when necessary
- Tiered approach provides flexibility to program projects

Next Steps

- Finalize B/C calculator tool
 - » Test with sample of actual WV projects
- Develop project prioritization function within GIS mapping tool (as part of a future task order)
- Populate project prioritization GIS tool with projects currently included in the *West Virginia Multimodal Statewide Transportation Plan* and experiment with different funding allocation scenarios (as part of a future task order)

Questions?