



## Strategic Highway Investment Formula for Tomorrow

**DRAFT** KYTC District Transportation Plan

**2020**



## Contents

Table of Figures .....	ii
Table of Tables .....	ii
Section 1 – Introduction and Background .....	1
Section 2- SHIFT 2020 Schedule .....	2
Section 3 - Scoring Components .....	3
Section 4 - Workgroup and Advisory Committee .....	3
Section 5 - Component Improvements .....	4
Section 6 - Project Sponsorship .....	4
Section 7 - Project Types .....	5
Section 8 - Project Families .....	6
Section 9 - Committed Projects .....	6
Section 10 - Statewide Project Scoring .....	6
Section 11 – Regional Project Scoring .....	7
Section 12 – Prioritization Plans .....	11
Section 13 – Summary/Conclusion .....	15
Appendix A – Workgroup Analysis and Recommendations Appendix B – Advisory Committee Appendix C – Committed Projects List Appendix D – Scoring Formulas Appendix E – Prioritization Plans Appendix F – Statewide Projects List Appendix G – Regional Projects Lists .....	15

## Table of Figures

Figure 1 - SHIFT 2020 Schedule.....	2
Figure 2 - Scoring Components.....	3
Figure 3 - Statewide Scoring Component Weights.....	7
Figure 4- Regional Scoring Component Weights.....	8
Figure 5 - Kentucky Regions.....	9
Figure 6 - Statewide and Regional Processes Flowchart.....	9

## Table of Tables

Table 1 – SHIFT 2020 Component Improvements.....	4
Table 2 - Project Sponsorships per Organization.....	5
Table 3 - SHIFT Project Types.....	5
Table 4 - Boost Budget by Organization.....	10
Table 5 - Prioritization Plan Summary - Highway Districts.....	12
Table 6 - Prioritization Plan Summary - Area Development Districts (ADDs).....	13
Table 7 - Prioritization Plan Summary - Metropolitan Planning Organizations (MPOs).....	14

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## Section 1 – Introduction and Background

The KYTC Strategic Highway Investment Formula for Tomorrow (SHIFT) process is a data-driven, objective, and collaborative approach to identify significant transportation needs and prioritize them. For many years prior to SHIFT, the State Highway Plan had been overprogrammed. In the 2016 Highway Plan, state funds were available to pay for only 10 percent of projects promised. The SHIFT prioritization process has significantly reduced overprogramming. The biennium years of the 2016 Enacted Plan contained \$3 billion more projects than funding could support. Whereas, the biennium years of the 2018 Enacted Plan contained only \$200 million more projects than estimated funding, an appropriate amount should projects be dropped and there be a need for replacements. Nearly 80 percent of projects in the 2018 Highway Plan were SHIFT priorities.

SHIFT was initially developed by a 22-member, multidisciplinary Workgroup that included KYTC Central Office (CO), KYTC Highway District Office (HDO), Area Development District (ADD) and Metropolitan Planning Organization (MPO) representation. The Workgroup examined processes used in other states and collaborated with planning partners via a series of meetings. Periodic progress and results were reported to the Secretary and State Highway Engineer's office. A mix of quantitative and qualitative criteria were identified and evaluated considering the availability of data statewide. In order to be scored, projects had to be identified and sponsored by a KYTC highway district, ADD or MPO. For a detailed look at the processes and scoring methods from the initial SHIFT rollout, refer to the [2017 District Transportation Plan \(DTP\)](#).

## Section 2- SHIFT 2020 Schedule

The second round, SHIFT 2020, began with Workgroup meetings in the summer of 2018 and ran for a two-year period. Figure 1 shows the schedule for SHIFT 2020 development and scoring:

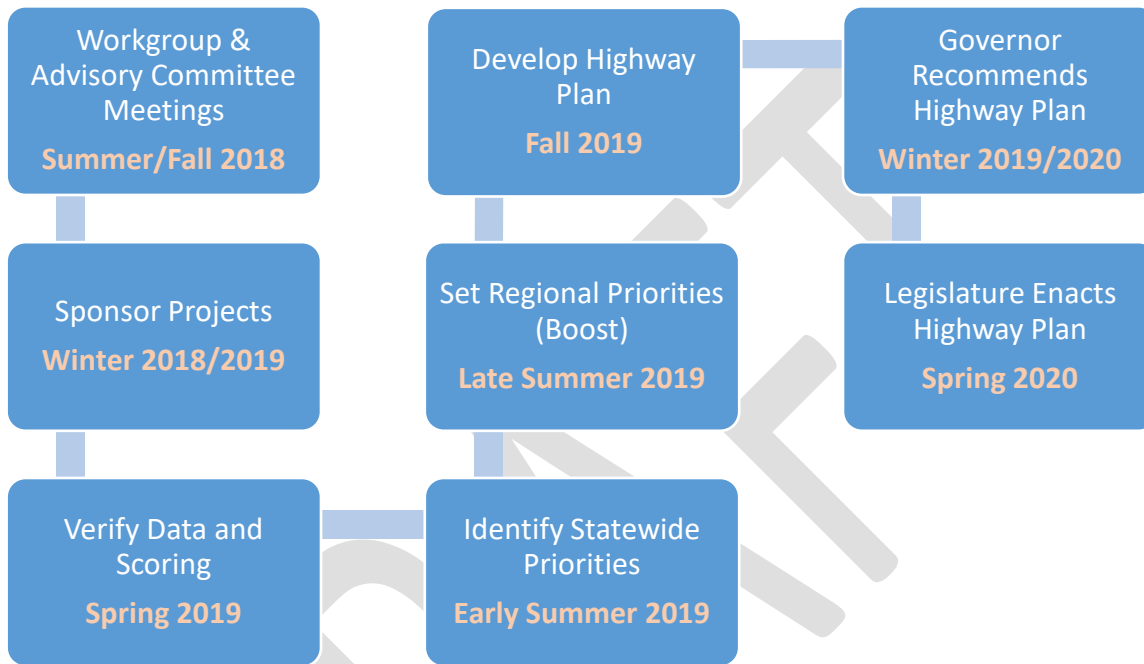
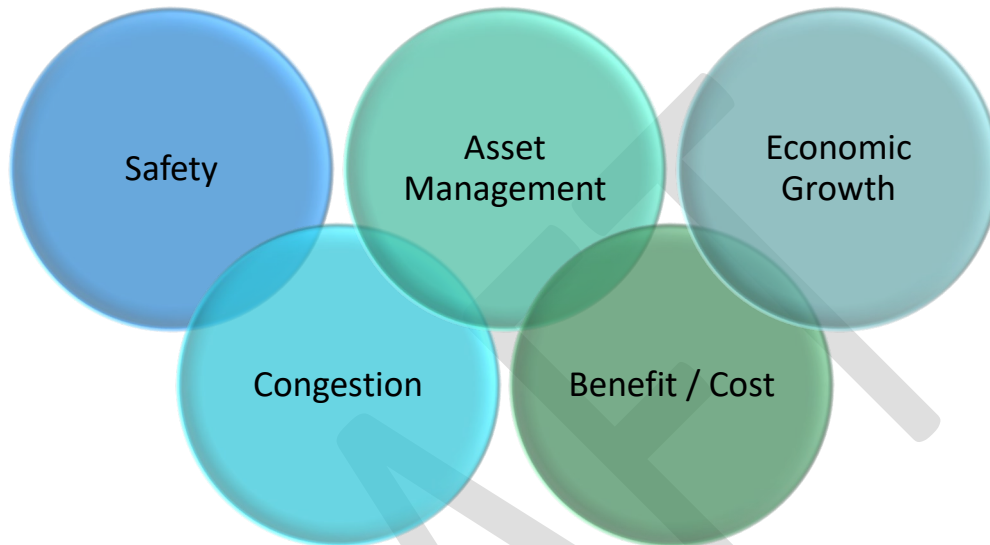


Figure 1 - SHIFT 2020 Schedule

### Section 3 - Scoring Components

SHIFT scores approximately 1200 projects (nominated by ADDs, MPOs, and Highway Districts) on five metrics: Safety, Congestion, Asset Management, Benefit/Cost and Economic Growth, shown in Figure 2.



*Figure 2 - Scoring Components*

### Section 4 - Workgroup and Advisory Committee

SHIFT 2020 teams reexamined processes. A 16 person Workgroup was formed to look for improved techniques, better data sources and refinements to deliver more accurate and equitable scoring and prioritization of projects across the state. This workgroup included members from KYTC's State Highway Engineer's Office, Program Management, Division of Maintenance, Highway Safety Improvement Programs, Division of Planning, Division of Highway Design, Highway District Offices, MPOs and ADDs. There were also approximately 40 KYTC and University of Kentucky Transportation Center (KTC) staff involved as technical advisors. The workgroup met regularly from June through October, 2018. Workgroup meeting presentations, minutes, participants list and summary are included in Appendix A of this document.

A 15 member Advisory Committee was also formed that convened on September 27, 2018. This committee included members of the Kentucky legislature, KY League of Cities, KY Judge/Executive Association, Legislative Research Commission, Department of Rural and Municipal Aid, KYTC Division of Program Management, KYTC Division of Planning, KYTC State Highway Engineer's Office and KYTC Secretary's Office. The Advisory Committee's purpose was to increase transparency and improve collaboration with key stakeholders. The Advisory Committee provided valuable feedback emphasizing the importance of continuing to educate officials throughout the SHIFT process. Advisory Committee meeting minutes (with participants list) and presentation are included in Appendix B of this document.

## Section 5 - Component Improvements

The SHIFT 2020 Workgroup was broken down into subgroups by scoring component and supplemented by technical advisors. These subgroups met separately to brainstorm and analyze potential process and scoring improvements. They reported findings to the main Workgroup and adopted changes by consensus of the main Workgroup. See Table 1 for a summary of improvements implemented by the Workgroup.

*Table 1 – SHIFT 2020 Component Improvements*

Component	Improvements
Safety	Incorporate new Highway Safety Manual methods
Congestion	Update with field sampled real data as a measure of congestion
Economic Growth	Improve travel time inputs for TREDIS economic modeling software Add truck reliability and coal haul routes
Benefit/Cost	Customize safety improvement types for Kentucky Improve travel time modeling methods.
Asset Management	Incorporate Pavement Distress Index in Pavement Assessments

For a detailed discussion of component improvements that were suggested, evaluated and/or implemented, see Appendix A.

## Section 6 - Project Sponsorship

Projects that were to be considered for scoring came from the current highway plan (approximately 1,400 projects) and Continuous Highway Analysis Framework (CHAF) database of unscheduled projects. (approximately 2,500 projects). Totaling nearly 4,000 projects, this number was too large for all to be scored given the need for economic analysis, project by project. For this reason, in order to be considered for scoring, a project had to be sponsored by either KYTC District, an ADD or an MPO. The number of sponsorships per organization was limited based on number of counties, population and lane miles according to the following formula: Sponsorship # =  $2 * \text{Number of Counties} + \text{Population}/25000 + \text{Lane Miles}/1000$ . 1,208 total projects were sponsored. A breakdown of the number of allowable sponsorships by group is shown in Table 2.

*Table 2 - Project Sponsorships per Organization*

District	Sponsorships	ADD	Sponsorships	MPO	Sponsorships
1	50	BARREN RIVER	40	BOWLING GREEN	10
2	56	BIG SANDY	23	CLARKSVILLE	3
3	48	BLUEGRASS	67	EVANSVILLE	6
4	52	BUFFALO TRACE	16	KYOVA	10
5	74	CUMBERLAND VALLEY	38	LEXINGTON	23
6	53	FIVCO	16	LOUISVILLE	54
7	68	GATEWAY	18	OKI	27
8	45	GREEN RIVER	23	OWENSBORO	9
9	40	KENTUCKY RIVER	29	RADCLIFF	12
10	35	KIPDA	22		
11	37	LAKE CUMBERLAND	43		
12	31	LINCOLN TRAIL	30		
		NORTHERN KENTUCKY	23		
		PENNYRILE	41		
		PURCHASE	36		

### Section 7 - Project Types

Project types considered for the SHIFT process included safety improvements, road widening, reconstruction, new routes and interchanges. Project types outside of SHIFT included Rural and Municipal Aid, Maintenance, Federally Dedicated and MPO Dedicated projects. These are shown in Table 3.

*Table 3 - SHIFT Project Types*

Project Types Included in SHIFT	Project Types Outside of SHIFT
Safety Improvements	Rural and Municipal Aid
Road Widening	Maintenance
Reconstruction	Federally Dedicated Projects
New routes and Interchanges	MPO Dedicated Projects



## Section 8 - Project Families

Project item numbers were allowed to be grouped into project families for scoring. Projects must be combined to demonstrate independent utility (i.e., a new road should not stop in a field, but tie back into the network). All projects covered by a single environmental document may be combined. The schedules for individual construction sections were considered during programming with dates obtained from the 2018 Enacted Highway Plan or from consultation with Highway District Offices.

## Section 9 - Committed Projects

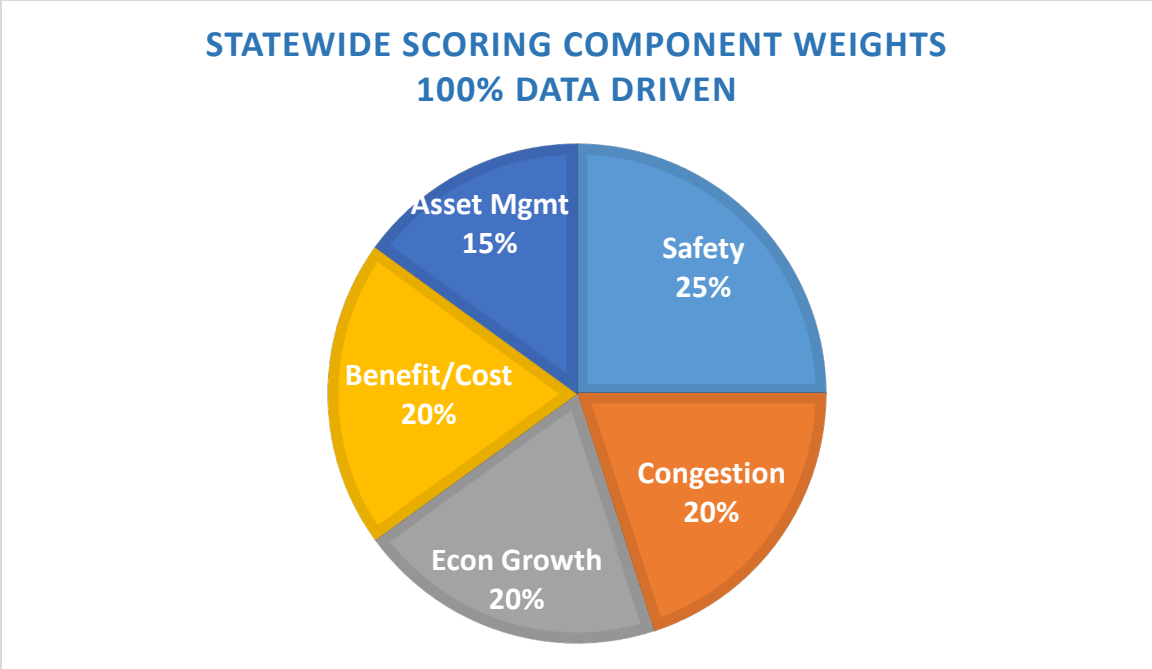
The 2020 Recommended Highway Plan included 49 committed projects. These were highly ranked enacted projects from the 2018 Recommended Plan with the Design phase complete and with the following conditions:

- Were evaluated in SHIFT 2018; and
- Had either Right-of-Way, Utilities, or Construction programmed in the biennium (2018-2020) of the 2018 Enacted Plan or only Construction programmed in 2021-2024 of the 2018 Enacted Plan (and no other phase in the Plan); and
- Had consistent scope with what was proposed in 2018 and costs within 5 percent; and if Right-of-Way was programmed in the biennium, was on schedule for funding authorization within the biennium;
- Includes federal grant projects (BUILD and INFRA) and I-Move Kentucky corridor project

Committed projects did not require sponsorship. All other projects in SHIFT needed to be sponsored to be included in prioritization. A list of the Committed projects is included in Appendix C.

## Section 10 - Statewide Project Scoring

Statewide Project Scoring methods were developed for sponsored projects on the National Highway System (NHS). These projects are primarily on interstates or parkways. To be considered NHS, greater than 50 percent of the project must be on the NHS. Statewide Components were identified during the Workgroup sessions previously mentioned and weights applied as shown in Figure 3:



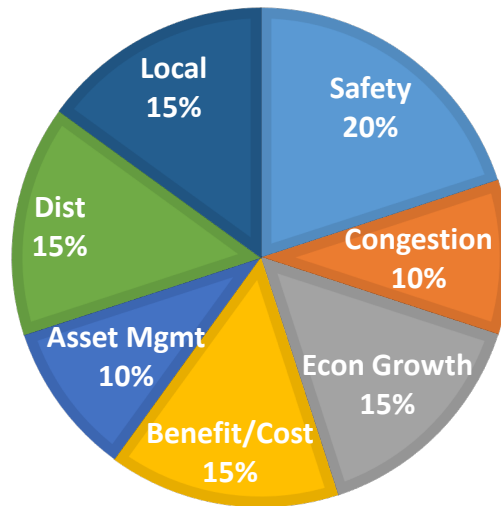
*Figure 3 - Statewide Scoring Component Weights*

Statewide Safety scores are primarily driven by crash history but also influenced by roadway geometry. Congestion scores are based on hourly volume as well as volume to capacity ratio. The Economic Growth score for Statewide projects consists of an Economic Competitiveness component and a Freight component. Economic Competitiveness is based on the potential for jobs to be created over a ten year period. The Freight component looks at percent trucks, ADT, Freight Network Tier and the maximum truck volume within that tier. The Benefit-Cost ratio uses benefits derived from travel-time and crash reduction savings divided by the project cost. The Asset Management component considers bridge and pavement needs within the project limits that could be addressed by the proposed project resulting in an added benefit. Statewide project selection is 100 percent data driven. Detailed Statewide project formulas can be found in Appendix D of this document.

**Section 11 – Regional Project Scoring**

Regional Project Scoring methods, criteria and formulas were developed for sponsored non-NHS projects and for NHS projects that did not advance in the Statewide scoring. Regional scoring components and their weights are shown in Figure 4.

**REGIONAL SCORING COMPONENT WEIGHTS  
70% DATA & 30% DISTRICT+LOCAL INPUT**



*Figure 4- Regional Scoring Component Weights*

Regional scoring and project selection is 70 percent data driven and 30 percent subjective based on District and Local priorities. Highway Districts coordinated with MPOs, ADDs and local and state officials to ensure their priorities were understood and given fair consideration. Regional component weighting varies from Statewide to account for the more rural nature of the Regional projects. Safety scores are primarily driven by Crash History but also by Roadway Characteristics. The Regional Crash History component is weighted the same as for Statewide, while the Roadway Characteristics weighting is half that of the Statewide weighting. Congestion scores are based on hourly volume as well as volume to capacity ratio. The Regional Congestion score receives half the weight of the Statewide score. The Economic Growth score for Regional projects differs from the Statewide score in that it is “needs” based. Instead of jobs created, it looks at accessibility and connectivity needs based on improvement type, county economic indicators and ADT. The Regional Economic Score also includes a Freight component weighted half that of the Statewide Freight component. The Benefit-Cost ratio uses benefits derived from travel-time and crash reduction savings divided by the project cost. The Regional Benefit-Cost component is three quarters the weight of the Statewide component. The Asset Management component considers bridge and pavement needs within the project limits that could be addressed by the proposed project resulting in an added benefit. The Regional Asset Management component is weighted fifty percent heavier than the Statewide component. Detailed formulas for scoring Regional projects can be found in Appendix D of this document.

Four Regions, each made up of three Highway Districts, were grouped for Regional scoring and are shown on the map in Figure 5. Larger regions allow for a greater pool of resources to fund larger projects. District boundaries are maintained within the regions. The regions combine contiguous districts with similar challenges including mountainous terrain, urban areas, highway mileage, population, etc. Each region receives equal funding. The districts compete within their respective region for this funding. Each district receives a minimum 25% of the funding.

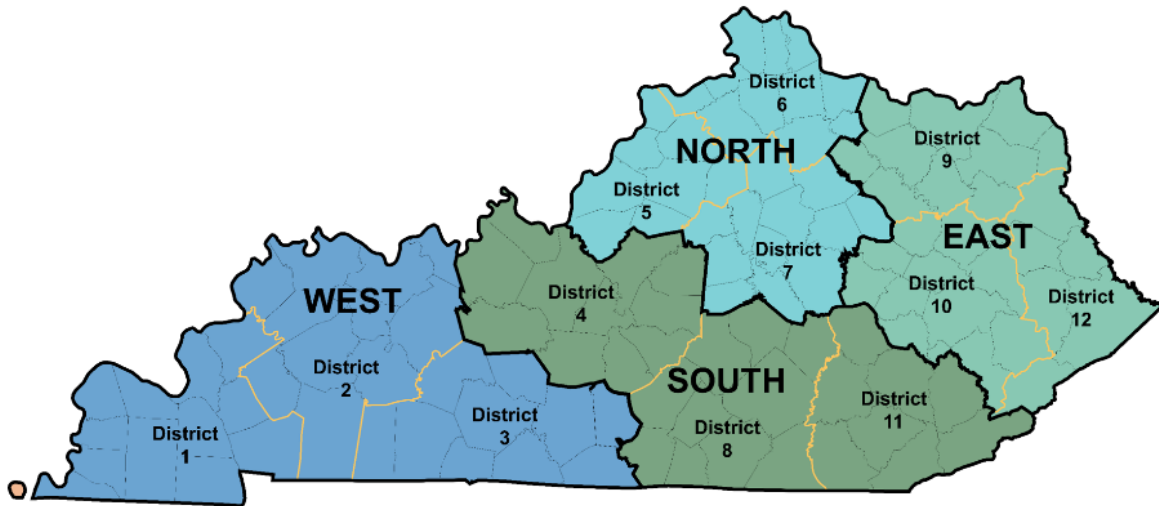


Figure 5 - Kentucky Regions

See Figure 6 for a flowchart depicting the Statewide and Regional processes. Regional Scoring offers an opportunity to apply a 15 point boost to 25 percent of the Regional projects for each KYTC District (District Priorities) and for each ADD or MPO (Local Priorities). That gives an opportunity for a total of 30 additional points if both the District and Local boost is applied to the same project.

### SHIFT Statewide and Regional Processes

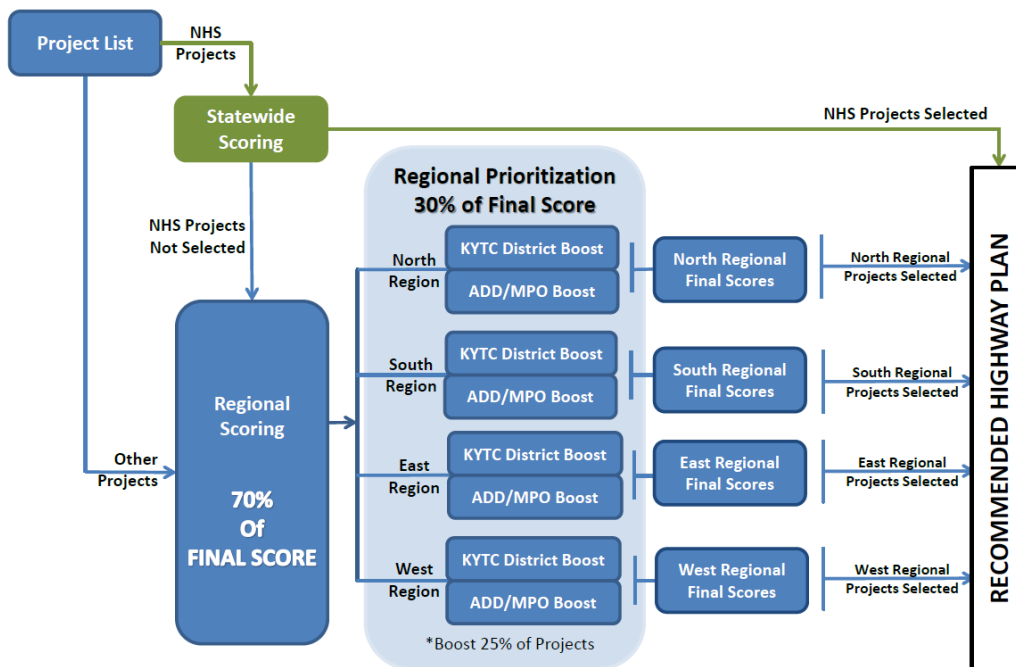


Figure 6 - Statewide and Regional Processes Flowchart

Each Region receives an equal amount of budgeted Regional funding. The Regional amount is divided equally with each District receiving a quarter. Since there are only three Districts per Region, one quarter of each Region’s funding is left over for regionally significant projects that qualify through scoring but need additional funding.

The boost for Regional scoring gives an opportunity to apply more points to those projects that have needs that cannot be identified through scoring algorithms, such as for local economic development and associated traffic increases not captured by the rest of the scoring process. The process is transparent and encourages collaboration and coordination between the state and local officials. Local knowledge is gained during the process that can be applied for a better informed prioritization. The number of Regional projects and number of boosts allowed for each organization are shown in Table 4.

*Table 4 - Boost Budget by Organization*

District	Regional Projects	Boosts
1	100	25
2	121	31
3	104	26
4	107	27
5	129	33
6	108	27
7	129	32
8	81	21
9	82	21
10	38	10
11	67	17
12	60	15

ADD	Regional Projects	Boosts
BARREN RIVER	78	20
BIG SANDY	38	10
BLUEGRASS	110	28
BUFFALO TRACE	38	10
CUMBERLAND VALLEY	70	18
FIVCO	26	7
GATEWAY	36	9
GREEN RIVER	42	11
KENTUCKY RIVER	40	10
KIPDA	38	10
LAKE CUMBERLAND	81	21
LINCOLN TRAIL	59	15
NORTHERN KENTUCKY	36	9
PENNYRILE	73	19
PURCHASE	82	21

ADD	Regional Projects	Boosts
Bowling Green	27	7
Clarksville	4	1
Evansville	10	3
KYOVA	14	4
Lexington	45	12
Louisville	84	21
OKI	58	15
Owensboro	15	4
Radcliff/Etown	22	6

## Section 12 – Prioritization Plans

Each KYTC Highway District Office, ADD and MPO developed a Prioritization Plan for how they would approach scoring their Regional projects, what priorities were considered, coordination between Highway Districts, ADDs and MPOs and any other considerations for how to best identify and rank those projects with the greatest need and/or offer the most benefit to the region. A summary comparison of those priorities is included in Table 5 for the Highway Districts, Table 6 for the ADDs and Table 7 for the MPOs. Complete plan narratives for each organization are included in Appendix E.

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Table 5 - Prioritization Plan Summary - Highway Districts

Factors are ranked by importance with "1" being the most important.												
Factors	District											
	D1	D2	D3*	D4	D5*	D6*	D7*	D8	D9*	D10*	D11*	D12*
Project has begun	1			4				3			1	
Regional significance	2	3		6			1	5		1	1	1
Safety	3	2		1	1	1	1	1	1		1	1
Currently in Highway Plan		1										1
Economic development	3	4			1	1	1		1			
District priority project listing			1		1		1					1
Project score	1	1	1	1	1	1	1	1	1	1	1	1
Sup. from mult. Loc. agencies				2	1			2	1		1	
Proj. ident. by planning study				3		1						
Growth anticipated				5				4			1	
Auth. in Des., R/W or Utilities					1	1	1		1		1	
Congestion	3				1	1	1	6	1		1	
Asset Management					1							
Construction ready					1	1	1		1			
Project in STIP/TIP						1	1		1			
Continuity						1			1			
Proj. in loc./reg. comp. plan						1	1		1			
Public Interest						1	1		1			
Public Infrastructure							1		1			
Fiscal practicability							1		1	1		
Multi district need						1						
Mobility							1					
Infrastructure							1		1			
Local input							1			1	1	
Employee knowledge										1		
District Goals & Objectives									1			
Legislative Support									1		1	
Connectivity	2			6			1		1		1	
Past project priorities		3			1					1		
Need to const. w/other proj.												
Req. significant maint. work					1							
Geo. dispersion of projects					1							

\*Factors are valued equally.

Table 6 - Prioritization Plan Summary - Area Development Districts (ADDs)

Factors for each ADD are checked with a "1" and indicate no particular order for importance or weight.															
Area Development District (ADD)															
Factors	Barren River	Big Sandy	Bluegrass	Buffalo Trace	Cumberland Valley	FIVCO	Green River	Gateway	Kentucky River	KIPDA	Lake Cumberland	Lincoln Trail	Northern KY	Pennyrile	Purchase
Consistent with district			1			1					1		1	1	
County distribution	1							1	1	1				1	
Population														1	
Economic development		1					1	1		1			1		
Access management		1								1		1			
Congestion/Mobility		1						1		1					
Safety/Security		1					1	1		1		1	1		
Local Input	1		1			1	1	1		1					
Regional significance			1		1		1	1	1		1	1	1		1
Connectivity			1		1							1			1
Project score	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Construction ready					1								1		
Cost					1										1
Individual critical data components					1		1		1		1				1
Currently in 6YP							1		1	1	1		1		1
Project underway												1			
Tourism												1			
Past project priorities															
Committee priorities						1									
Primary routes								1							
Project identified in a study					1							1			
Address growth												1			
Multimodal												1			
Stage of project development			1												



Table 7 - Prioritization Plan Summary - Metropolitan Planning Organizations (MPOs)

Factors for each ADD are checked with a "1" and indicate no particular order for importance or weight.									
Metropolitan Planning Organization (MPO)									
Factors	Bowling Green	Clarksville	Henderson- Evansville	KYOVA	Lexington	Louisville	OKI	Owensboro	Radcliff- Elizabethtown
Commitment								1	
D-phase or beyond			1		1			1	
Additional funding sources								1	
Local/Public support	1	1	1	1	1	1	1	1	
District support	1	1	1	1	1	1	1	1	
Identified in a study	1	1	1						1
Supports local land use planning	1								
Economic development	1	1		1	1		1	1	1
Freight/Multimodal connections	1								1
Future growth expected									1
Tourism									1
Congestion		1	1	1			1	1	
Mobility	1		1						
Access	1		1		1				1
Bike/Ped connections									
Project score	1	1	1	1	1	1	1	1	1
Safety	1	1	1	1	1		1	1	1
System Preservation		1		1			1		
Consistent with MTP	1	1	1	1	1	1	1		1
Consistent with comprehensive plans	1	1	1	1			1		1
Transit and non-motorized traffic		1	1	1					1
Cost effective		1		1					
Connectivity	1		1		1				1
Maintenance					1				
System efficiency/reliability					1				
Community character					1				
Environment					1				
Health/Wellness					1				
Project history					1				
Constructability							1		
Regionally significant									1
Project underway									1

## Section 13 – Summary/Conclusion

SHIFT acknowledges current highway funding shortfalls and offers a balanced, dependable approach to project selection and prioritization. It provides a transparent process that encourages collaboration between planning partners. SHIFT is data driven, using quantitative measures such as crashes, traffic volumes, delays and employment to assess the benefits of planned projects and compare them to one another. Scoring components are Safety, Congestion, Asset Management, Economic Growth and Benefit-Cost and address the needs in Kentucky’s rural and urban areas. SHIFT informs the Recommended Highway Plan while acknowledging other considerations including investments-to-date, associated impacts to communities, fulfillment of previous commitments, and completion of significant corridors. This gives the Governor and General Assembly a solid foundation and realistic approach to project selection based on available funding. SHIFT is a process that will continue to improve as technological developments and new data sources become available.

A complete list of Statewide projects with scores is included in Appendix F; and Regional Projects with scores in Appendix G of this document.

## Appendix A – Workgroup Analysis and Recommendations

## Appendix B – Advisory Committee

## Appendix C – Committed Projects List

## Appendix D – Scoring Formulas

## Appendix E – Prioritization Plans

## Appendix F – Statewide Projects List

## Appendix G – Regional Projects Lists