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**STRATEGIC HIGHWAY INVESTMENT FORMULA FOR TOMORROW**

**BENEFIT COST FORMULA:**

**SAFETY BENEFIT, TRAVEL TIME SAVINGS AND PROJECT COST**

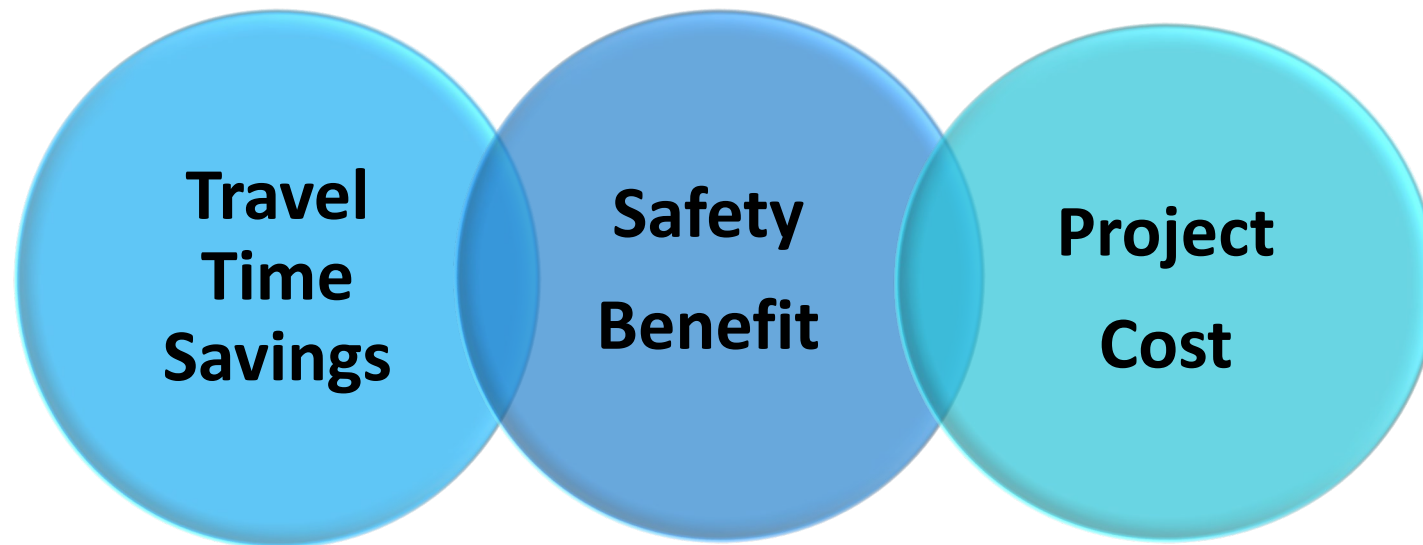




# Formula Components

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Look to evaluate the expected benefits in dollars of travel time savings and safety benefits against the project costs.



# Benefit / Cost Score

## SHIFT 2018 Formulas

Statewide: 20%

Regional: 15%

Statewide Score = 20% \* (Benefit / Cost) Measure (BCM) :

Regional Score = 15% \* (Benefit / Cost) Measure (BCM) :

**FORMULA:** 
$$B_{CM} = (B_{TTS} + B_{SAF}) / C_{PROJ} \quad \text{[Scaled]}$$

Description	Summary Method	Data Source
$C_{PROJ}$ : Family Project Cost (Phases R, U & C)	Summary	SYP CHAF
$B_{SAF}$ : Safety Benefit Factor	Safety Benefit Factor of Specific Improvement Type	Crash Database CHAF
$B_{TTS}$ : Travel Time Savings	TBA	TBA



# Formula Tweaks: Project Cost

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- **Project Cost**
  - We will continue to capture total project cost (R,U,C phases) for the 2020 B/C formula.
  - Formula Improvement: Chaf now can provide:annual cost estimations:
    - 5% adjustment for ROW
    - 4% adjustment for all others

Description	Summary Method	Data Source
<b>C<sub>PROJ</sub> : Family Project Cost (Phases R, U &amp; C)</b>	Summary	SYP CHAF

## Benefit / Cost Score

### SHIFT 2018 $B_{TTS}$ Formula

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Two Types of Methods to calculate:

- Modeling is based on KY Statewide Traffic Modeling methods.
- Non-modeling travel time savings method are based on Highway Capacity Manual (HCM) interactive formula.

$B_{TTS}$  = Travel Time Savings Benefit \$

= Travel Time Savings \* sum of delay costs by vehicle type



# Formula Tweaks: Modeling TTS

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## **Type of projects modeled:**

- new alignments
- new routes
- major facility upgrades.
- Changed to exclude weekends
- Annual growth rate of 1.25%.

# Formula Tweaks: Non-Modeling TTS

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## Non-Modeling Travel Time Savings (TTS)

### Two methods

- Estimate TTS for intersection improvements ;
- Estimate TTS for widening projects

Changed to exclude weekends and annual growth rate of 1.25%.

Method for intersection improvements will continue to start by estimating a design-hour delay reduction based on data available in HIS and then convert that delay reduction to a ten-year travel time savings.

The non-modeled method for segments will continue to use VSF ratios before and after the improvement as a basis for estimating travel time savings.

Planning to use travel time index (TTI) derived from probe data or the HERS model as the basis for determining current VSF ratios.



# Overall Tweaks: Benefit Cost Formula

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## Travel Time Savings (TTS)

- Scaled now before e addition Safety Benefit Cost
- TTS SHIFT 2020 Formula:

### 2020 FORMULA

$$B_{CM} = [(Scaled B_{TTS} / C_{PROJ}) + (Scaled B_{SAF} / C_{PROJ})]$$

### 2018 FORMULA

$$B_{CM} = (B_{TTS} + B_{SAF}) / C_{PROJ} \quad [Scaled]$$