

Cost Per Mile Construction Estimation Methodology for Railroads

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Objective: To develop a railway cost per mile (CPM) estimate methodology to be used for planning analysis, that is based on intended service and/or location characteristics, from which infrastructure investment estimates and cost analysis decisions can be made.

Factors & Components

The CPM depends on factors;

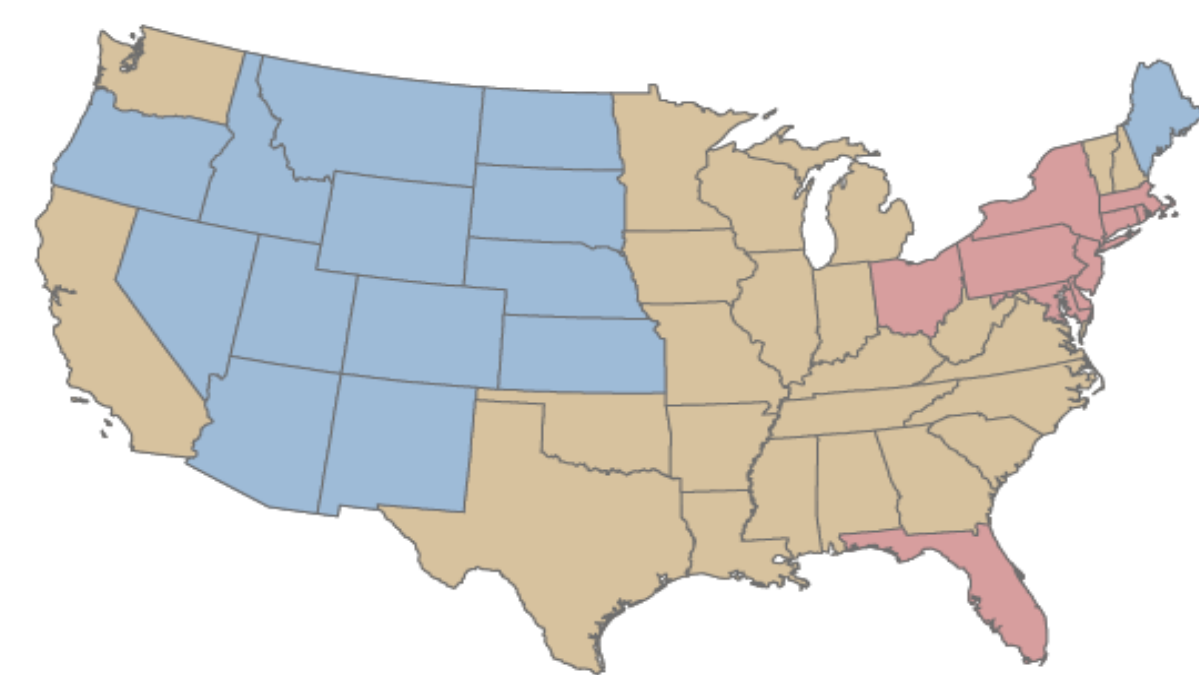
- Geography
- Land use
- Intended speed
- Motive power
- Materials
- Route Geometry
- Structures online
- Crossings & interchanges
- Labor
- Intended level of use
- Signaling system

Factors are categorized as;

Location Influences

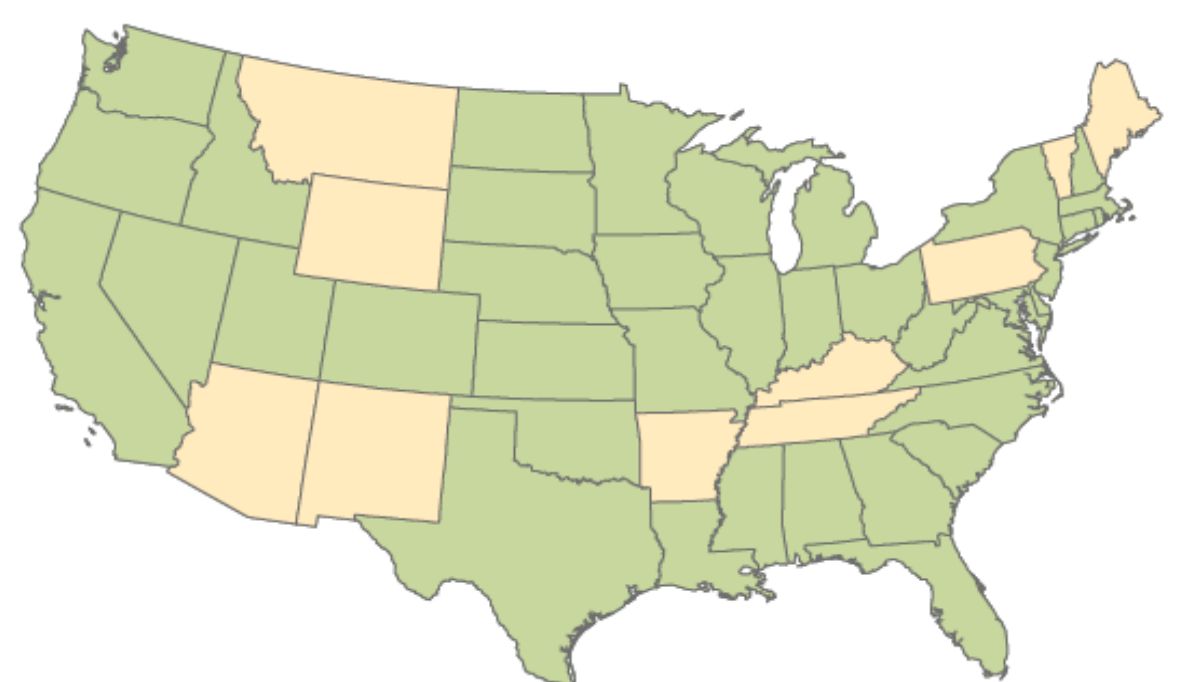
Land Use:

- Urban
- Suburban
- Rural



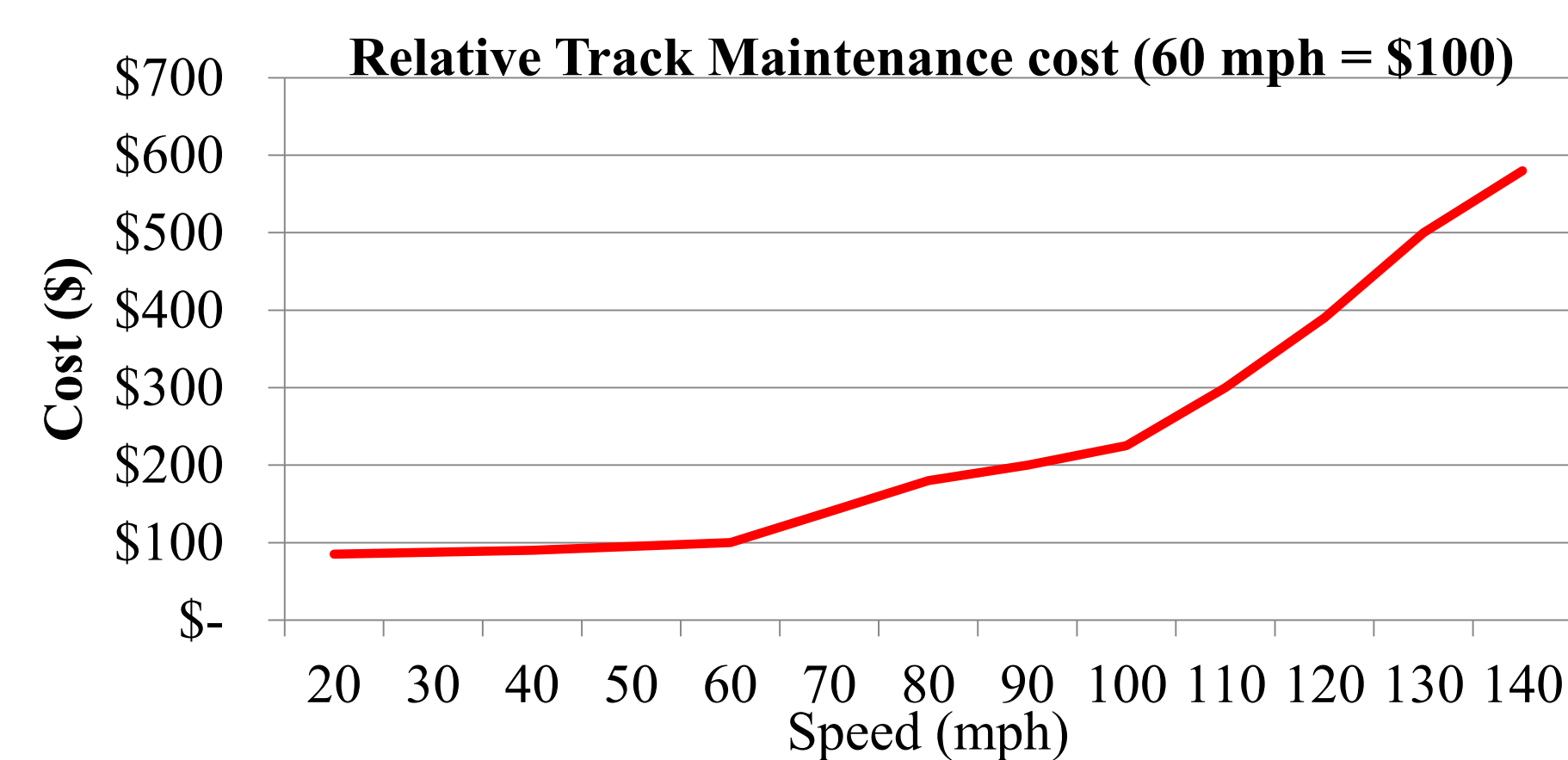
Terrain:

- Plains
- Rolling Hills
- Mountains



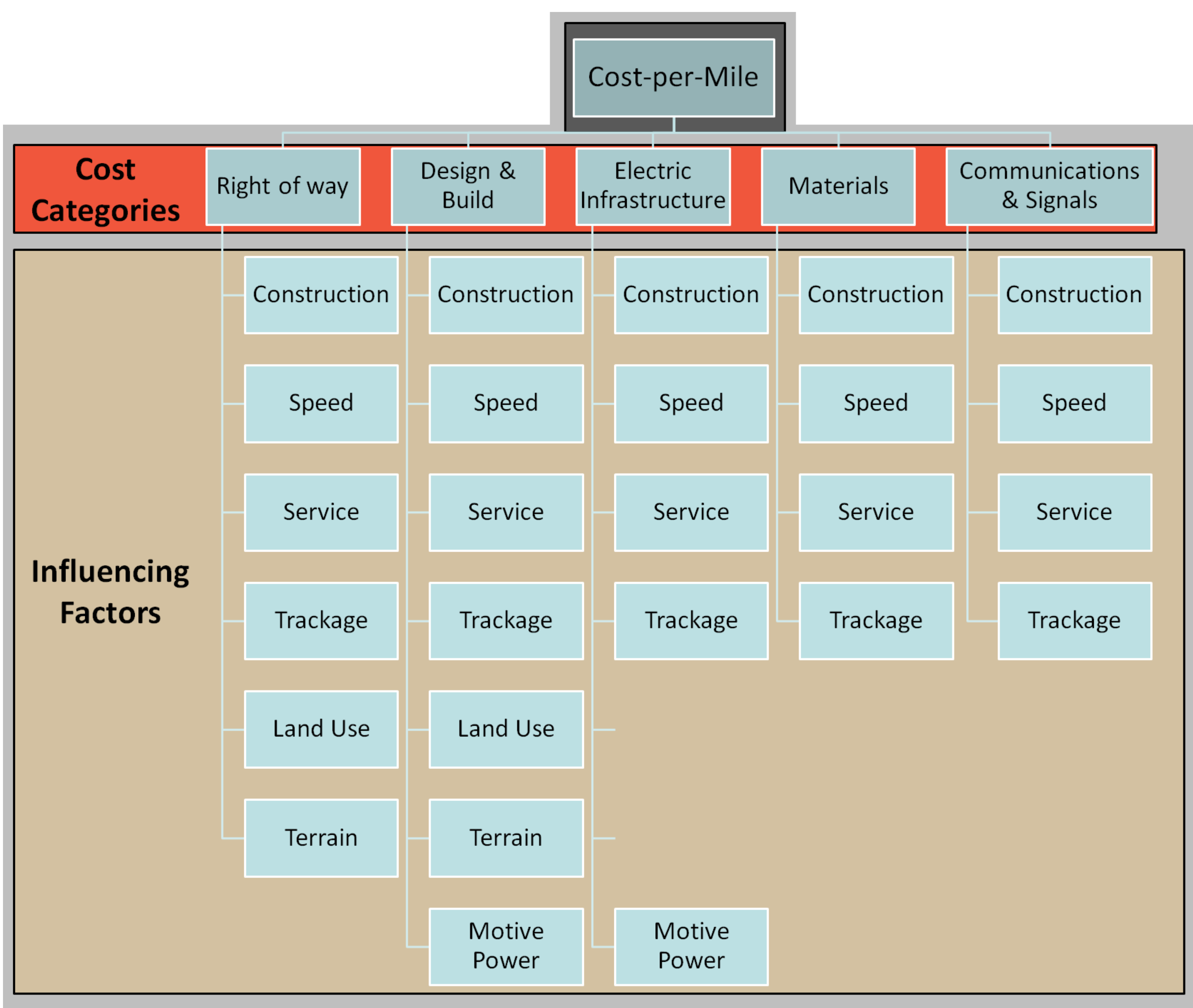
Service Influences

Speed: 79, 110, 125, 150, 220 mph



Service: Passenger, Freight, Mixed
Motive Power: Non-electric, Electric
Construction: Build, Upgrade, Additional

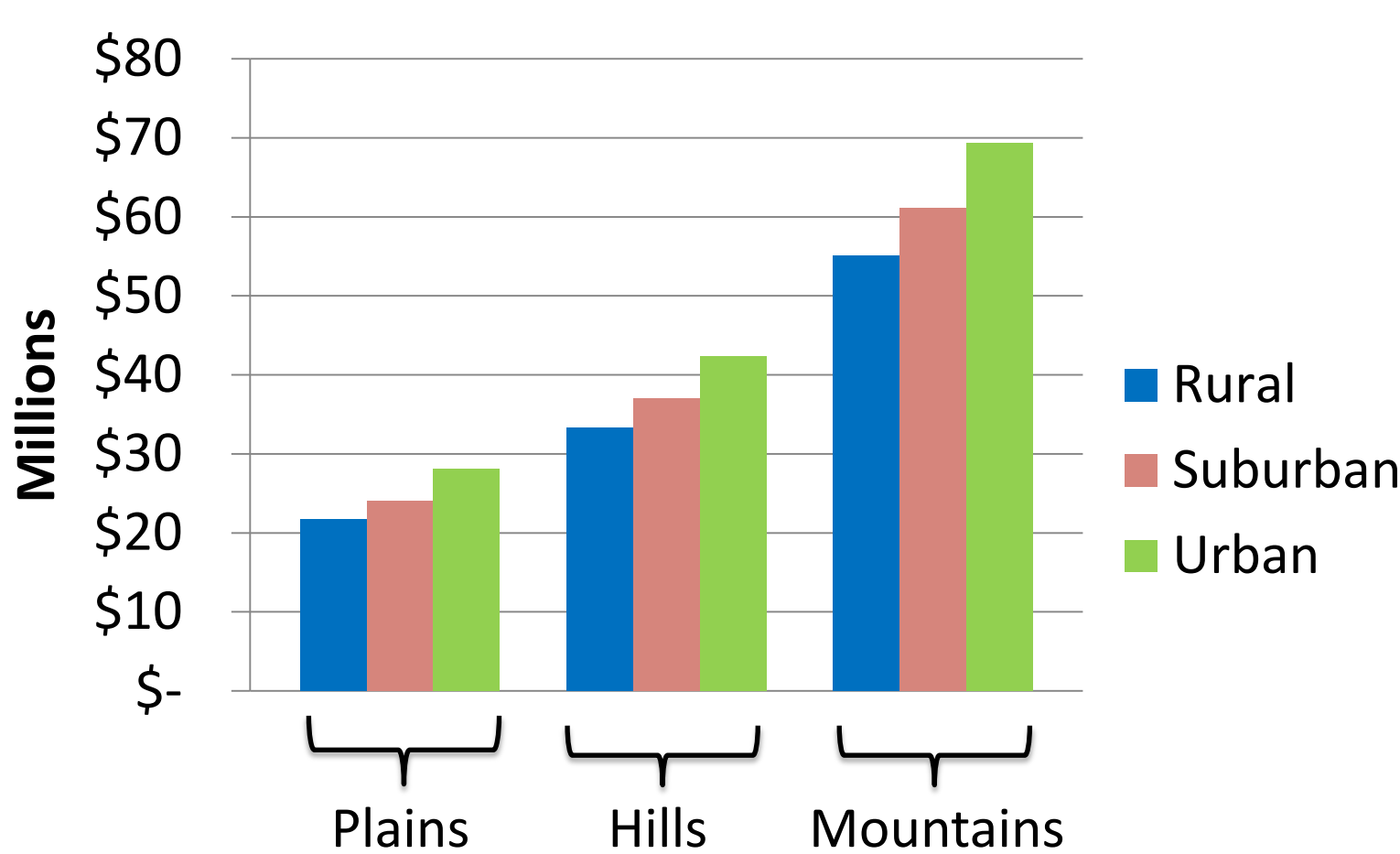
Methodology Structure



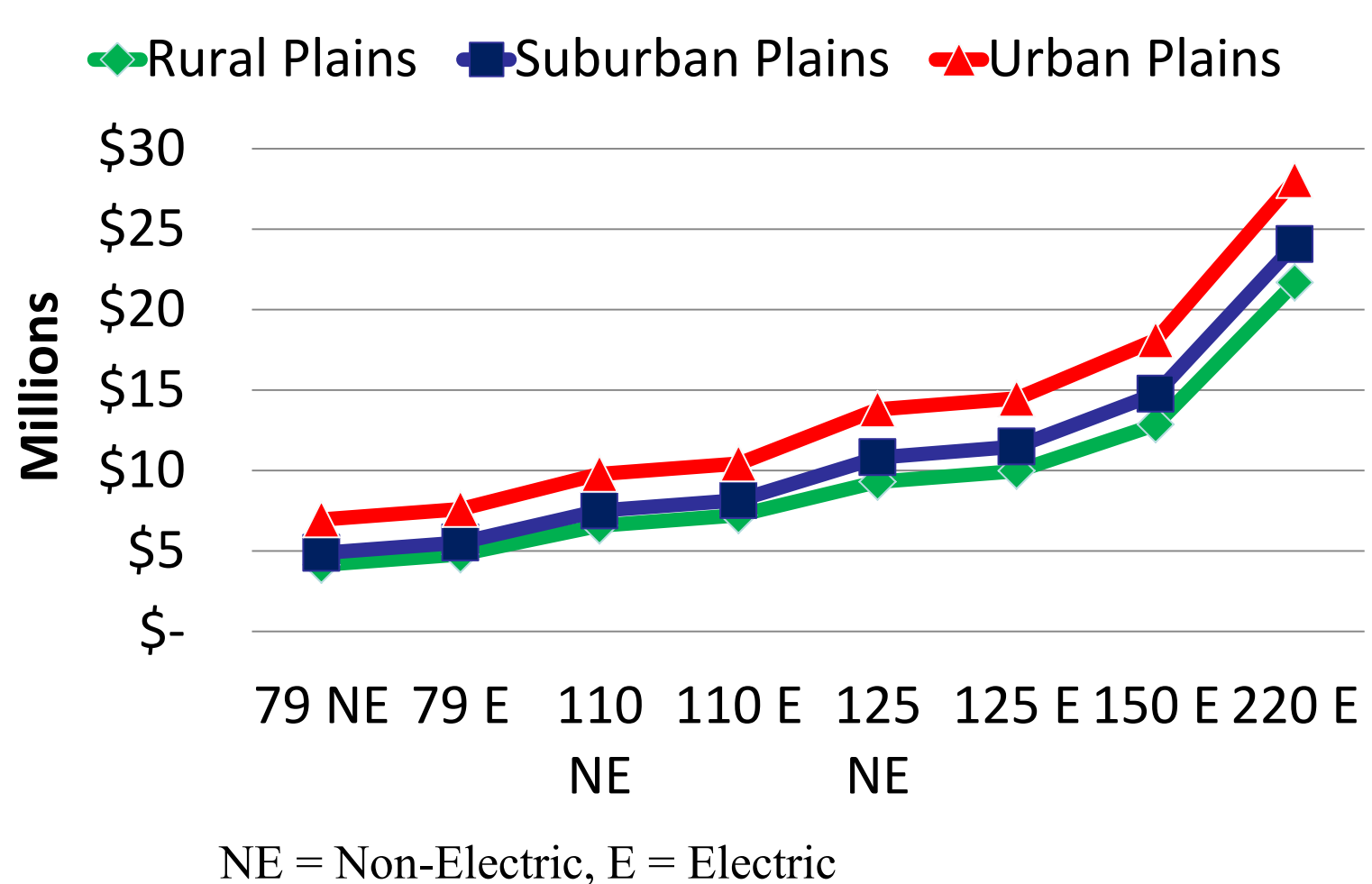
Cost per Mile examples

Costs show that costs changes as design requirements change due to restrictions or needs of terrain, land use, and speed.

220 mph Single Track to Build CPM



Double Track CPM by Service Type



Results (Selected)

Design Speed	Description	Proposed CPM estimates (Millions)	Existing CPM Estimates (Millions)
110-mph Non-Electric	Upgraded Single Suburban Hills	\$3.6	\$5.2-5.8
	Upgraded Single Suburban Plains	\$2.5-\$3.2	\$1.5-\$2.4
	Upgraded Single Rural Hills	\$3.4	\$1.9-\$2.4
125-mph Non-Electric	Upgraded Single Suburban Plains	\$3.6-\$4.7	\$1.2-\$11.7
	Upgraded Single Urban Plains	\$4.3-\$5.4	\$5.6
125-mph Electric	Upgraded Single Suburban Plains	\$4.2-\$5.3	\$3.4-\$14.2
	Upgraded Single Urban Plains	\$5.0-\$6.1	\$8.0
	Upgraded Double Urban Plains	\$7.8-\$9.5	\$7.4
150-mph Electric	Built Single Suburban Plains	\$10.4-\$14.8	\$6.4-\$16.2
	Built Double Suburban Plains	\$16.0-\$22.6	\$8.2-\$16.7
	Built Double Rural Plains	\$13.9-\$19.9	\$5.9
220-mph Electric	Built Double Suburban Plains	\$35.8	\$19.1-\$37.6
	Built Single Suburban Plains	\$24.1	\$19.3-\$23.8
	Built Single Urban Plains	\$28.1	\$14.0-\$32.0

Findings

- Results may prove useful for planning analysis and activities
- State level categorization may not be
- Right of way cost sources hard to determine
- Prior studies based on out of date assumptions or inputs
- Many studies have not begun or been finished, thus costs are unverifiable
- Fine line balancing ease of use and size of data input requirements.

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