

Hennepin County 2040 Bicycle Transportation Plan

Appendix I. 2040 bikeway cost assumptions and cost calculator

2040 Bikeway Cost Assumptions and Bikeway Project Cost Calculator

The following describes the steps and methodology for developing the cost estimations for implementing the Hennepin County 2040 Bikeway System. In the development of the average annual estimated budget needs that are presented in Chapter 5 of this plan, several steps were taken to 1) estimate basic costs for various bikeway treatments, 2) estimate the variety and quantity of each type that would be implemented over the life of the plan, 3) account for the desire for the county to pursue cost saving measures whenever possible.

Estimated Construction Costs for Bikeway Treatments

The construction cost estimates were developed by identifying pay items and establishing rough quantities. Unit costs are based on 2013 dollars and were assigned based on historical cost data from FHWA, state departments of transportation and other sources. Please note that the estimates do not include any costs for design, easement or right-of-way acquisition, or the cost for ongoing maintenance. While costs have been assigned for utility relocations, these costs can vary widely depending on the exact details and nature of the relocations. The overall estimates are approximate and intended to be general and used for planning purposes only. Construction costs will vary based on the ultimate project scope (i.e. potential combination of projects, or use of county forces), context, and economic conditions at the time of construction. A more detailed breakdown of the assumptions used to develop these costs is included in the accompanying cost calculator spreadsheet under Facilities Base Costs. Tables 1 and 2 provide the estimated price per mile for the Hennepin County Bikeway Design types under a range of context for typical on-road bikeways, and protected and off-road bikeways respectively.

Table 1: Estimated Costs for Typical On-Road Bikeway Treatments

ESTIMATED COSTS FOR HENNEPIN COUNTY ON-ROAD BIKEWAY TREATMENTS				
Facility	Context	Price/Mile	Cost Range Category	Average Cost by Range
Bicycle Boulevard*	Install new; Pavement markings and signs only	\$14,800	N/A	\$14,800
Striped Shoulder	Add Striping/Marking	\$24,000	Low	\$42,200
	Lane Width Reduction	\$60,300		
	Lane Reconfiguration	\$97,700	High	\$97,700
Bike Lanes	Add Striping/Marking	\$63,200	Low	\$67,700
	Lane Width Reduction	\$72,200		
	Lane Reconfiguration	\$101,100	High	\$101,100
Buffered Bike Lanes	Lane Reconfiguration	\$101,100	N/A	\$127,500
	Lane Width Reduction	\$153,900		

*Does not include options for speed humps or traffic circles which range from \$5,000 to 10,000 each, depending on design.

Table 2: Estimated Costs for Typical Protected and Off-Road Bikeway Treatments

ESTIMATED COSTS FOR HENNEPIN COUNTY OFF-ROAD & PROTECTED BIKEWAY TREATMENTS			Cost Range Category	Average Cost by Range
Facility	Context	Price/Mile		
Protected Bike Lanes	Lane Reconfiguration	\$101,100	N/A	\$127,500
	Lane Width Reduction	\$153,900		
Cycle Track	Construct New (One Way)	\$137,500	Low	\$137,500
	Construct New (Two Way)	\$194,200	High	\$194,200
Shared Use Trail	Widen Existing Trail	\$196,700	Low	\$196,700
	Construct New Sidepath	\$680,500	High	\$680,500
	Construct New (TRPD)	\$491,600	N/A	\$491,600

Because the cost for each bikeway type can vary significantly based on context (e.g. a bike lane can be implemented for as little as \$60,000 per mile for a simple lane width reduction and restriping, or cost as much as \$100,000 a mile in the case of a lane reconfiguration), each bikeway type was further broken into cost range categories of high or low (Cost Range Category)¹, with the various treatment costs averaged within each range (Average Cost by Range column).

Estimating the variety and quantity of bikeway types to be implemented

For purposes of developing an annual budget need for implementing the network infrastructure for the Hennepin County 2040 Bikeway System, a range of additional cost considerations were evaluated. These additional considerations account for the uncertainty of what specific facilities types would be selected for each bikeway segment and gap closure. For budget estimating purposes, average costs were developed for on-street, off-street, and undesignated bikeways based on the following assumptions:

- On-street bikeways reflect a fairly even distribution of facility types, including protected bikeways (protected bike lanes and cycle tracks) over the life of the plan.
- Where possible on-street projects would include retrofits, representing lower cost range for many bikeway facility types.
- Off-street bikeways that are not part of the planned Three Rivers Park District System would be a combination of new construction of trails along roadways and trail widening projects .
- Three River Park District planned bikeways (not already existing) would all be newly constructed shared use paths not in road right-of-way.
- Undesignated bikeway costs were calculated based on the overall average annual cost for both on- and off- street bikeways (assuming a wide range of potential costs)

Based on these assumptions the following refinements were made to estimate annual costs based on each of 4 categories of planned bikeway types (on-street, off-street (not TRPD), TRPD Trails, and undesignated bikeways). Table 3 shows the Planned 2040 Bikeway System mileage for the four categories, followed by table 4 showing the annual mileage targets for building the bikeway system by 2040.

¹ The Bicycle Boulevard bikeway treatment only has a single cost assumption and thus was not further categorized by cost range.

Table 2: 2040 Planned Bikeway System mileage by planned bikeway category

PLANNED BIKEWAY SYSTEM MILEAGE TABLE	MILES
ON-STREET PLANNED FACILITY	217.5
UNDESIGNATED PLANNED FACILITY	81.4
OFF-STREET (NON-TRPD)	49.9
OFF-STREET (TRPD ONLY)	187.8
TOTAL PLANNED SYSTEM	536.6

Table 4: 2040 Planned Bikeway System annual mileage targets

	Annual Mileage Target		
	Planned Bikeway System	Hennepin County	Three Rivers Park District
OFF-STREET BIKEWAYS	9.1	1.9	7.2
ON-STREET BIKEWAYS	8.4	8.4	
UNDESIGNATED BIKEWAY FACILITY	3.1	3.1	
TOTAL PLANNED BIKEWAY SYSTEM	20.6	13.4	7.2

On-Street Bikeways

For purposes of cost estimation, it was assumed that each of the six on-street bikeway types (Bicycle Boulevard, Striped Shoulder, Bike Lanes, Buffered Bike Lanes, Protected Bike Lanes, and Cycle Tracks) would all be implemented equally over the life of the plan (See table 5)

Table 3: Allocation of on-street bikeways

Target On-Street Bikeway Mileage	By 2040	Annual
Bicycle Boulevard	36.2	1.39
Striped Shoulder	36.2	1.39
Bike Lanes	36.2	1.39
Buffered Bike Lanes	36.2	1.39
Protected Bike Lanes	36.2	1.39
Cycle Track	36.2	1.39
Total On-Street	217	8.36

Off-Street Bikeways (Not Three Rivers Park District)

For purposes of estimating costs for the off-street planned bikeways that are not part of the Three Rivers Park District System, a basic assumption was made that the county would implement shared use trails as both new construction shared use trails, and as existing trail widening projects equally.

Table 4: Allocation of off-street (non-TRPD) bikeways

Target Off-Street (not TRPD) Bikeway Mileage	By 2040	Annual
Existing Trail Widening	25.0	0.96
Construct New	25.0	0.96
Total Off-Street (not TRPD)	50	1.92

Three Rivers Park District Trails

Because Three Rivers Park District already uses a basic assumption of new trail construction for all planned new trails, the cost estimates for Three Rivers Park District bikeway implementation were calculated based on the assumption of all 188 miles of planned trails being new construction (see table 7).

Table 5: Allocation of TRPD Trails

Target TRPD New Trail Mileage	By 2040	Annual
Construct New Shared Use Trail	187.8	7.22
Total TRPD Trail	187.8	7.22

Undesignated Bikeways

Finally the 2040 Planned Bikeway System includes 81 miles of bikeways that have not been designated as on- or off-street bikeways. To estimate costs for these bikeways an average cost of both the annual on-street bikeway, and off-street (non-TRPD) bikeways was used (see table 8).

Table 6: Allocation of undesignated bikeways

Target Undesignated Bikeway Mileage	By 2040	Annual
Average of on- & off-street bikeway types	81.4	3.13
Total Undesignated	81	3.13

Additional Consideration of Cost Efficiencies

Before the annual costs were calculated for the 2040 Bikeway System, there was an additional refinement to reflect the likely desire of the county to pursue lower cost options and favor easier retrofitting over larger more complex projects wherever possible. Knowing the county has a strong history of accomplishing relatively easy bicycle projects in coordination with the pavement maintenance program, it seems reasonable to include a low cost preference assumption into the cost estimations for this plan.

The cost estimates are based on an assumption that the low cost range options are implemented two-to-one over the high-cost range option for each bikeway type. For buffered bike lanes and protected bike lanes, the difference between lower and higher cost options was relatively minor, so only one cost range category was used. Table 9 shows the target annual mileage for each bikeway type by high and low cost range categories under this assumption (see table 9).

Table 7: Allocations of on-street bikeways based on cost efficiency assumption

Target On-Street Bikeway Mileage	Annual Target Mileage by Cost Range Category	
	Lower Cost	Higher Cost
Bicycle Boulevard	1.39	N/A
Paved & Striped Shoulder	0.93	0.46
Bike Lanes	0.93	0.46
Buffered Bike Lanes	1.39	N/A
Protected Bike Lanes	1.39	N/A
Cycle Track	0.93	0.46
Total On-Street	6.04	2.32

The estimated annual budgets for building the planned bikeway system by 2040 were developed with the assumption of equal progress in each of the 26 years starting in 2015. It should be noted, that because these are very rough, “ballpark” estimates and intended to inform more near-term budgeting decisions, these estimates use 2013 costs and dollars and do not include any adjustments for inflation. Tables 10 – 13 show the estimated average annual funding needs by category for building out the Hennepin County Planned Bikeway System by 2040.

Table 8 Estimated annual average funding need for planned on-street bikeways

On-Street Planned Bikeways	Facility Type Cost Range Category	Annual Mileage Assumption	Estimated Treatment Cost/Mile	Average Annual Budget Need
<i>Bicycle Boulevard*</i>	<i>N/A</i>	<i>1.39</i>	\$14,800	\$21,000
<i>Striped Shoulder</i>	<i>Low</i>	<i>0.93</i>	\$42,200	\$40,000
	<i>High</i>	<i>0.46</i>	\$97,700	\$46,000
<i>Bike Lanes</i>	<i>Low</i>	<i>0.93</i>	\$67,700	\$63,000
	<i>High</i>	<i>0.46</i>	\$101,100	\$47,000
<i>Buffered Bike Lanes</i>	<i>N/A</i>	<i>1.39</i>	\$127,500	\$178,000
<i>Protected Bike Lanes</i>	<i>N/A</i>	<i>1.39</i>	\$127,500	\$178,000
<i>Cycle Track</i>	<i>Low</i>	<i>0.93</i>	\$137,500	\$128,000
	<i>High</i>	<i>0.46</i>	\$194,200	\$91,000
Total On-Street Planned Bikeways		8.36	\$94,300	\$789,000

Table 9 Estimated annual average funding need for planned off-street (not TRPD) bikeways

Off-Street Planned Bikeways(excluding TRPD)	Facility Type Cost Range	Annual Mileage Assumption	Estimated Treatment Cost/Mile	Average Annual Budget Need
<i>Shared Use Trail</i>	<i>Low</i>	0.96	\$196,700	\$189,000
	<i>High</i>	0.96	\$680,500	\$654,000
Total Off-Street Planned Bikeways (excluding TRPD)		1.92	\$437,900	\$843,000

Table 10: Estimated annual average funding need for planned TRPD trails

TRPD Planned Trail System	Facility Type Cost Range	Annual Mileage Assumption	Estimated Treatment Cost/Mile	Average Annual Budget Need
<i>Shared Use Trail</i>	<i>N/A</i>	7.22	\$491,600	\$3,551,000
Total TRPD Planned Trail System		7.22	\$491,600	\$3,551,000

Table 11: Estimated annual average funding need for planned undesignated bikeways

Planned Bikeways - Undesignated	Facility Type Cost Range	Annual Mileage Assumption	Estimated Treatment Cost/Mile	Average Annual Budget Need
<i>Combined annual average of on- and off-street bikeway*</i>	<i>N/A</i>	3.13	\$266,100	\$834,000
Total Undetermined Planned Bikeways		3.13	\$266,100	\$834,000

Table 12 - Estimated annual average budget for Planned 2040 Bikeway System

	Estimated Average Annual Funding Need (in millions)		
	Planned Bikeway System	Hennepin County	Three Rivers Park District
OFF-STREET BIKEWAYS	4.4	0.8	3.6
ON-STREET BIKEWAYS	0.8	0.8	
UNDESIGNATED BIKEWAY FACILITY	0.8	0.8	
TOTAL PLANNED BIKEWAY SYSTEM	6.0 Million	2.5 Million	3.6 Million