
















Cycle Track Barrier Selection Matrix

DRAFT																
	Cost/Benefit															
	Cost per Foot of Barrier (per side of street) <small>*Costs double for barriers on both sides</small>	\$1.50-3/ft. \$8k-16k/mi.	\$3-5/ft. \$15k-30k/mi.	\$2-4/ft. \$10k-20k/mi.	\$9-18/ft. \$50k-90k/mi.	\$12-24/ft. \$60k-130k/mi.	\$4-8/ft. \$20k-40k/mi.	\$4-8/ft. \$20k-40k/mi.	\$5-15/ft. \$25k-75k/mi.	\$15-60/ft. \$80k-300k/mi.	\$15-30/ft. \$80k-160k/mi.	\$15-75/ft. \$80k-400k/mi.	\$20-40/ft. \$100k-200k/mi.	\$20-40/ft. \$100k-200k/mi.	\$70-115/ft. \$400k-600k/mi.	\$1,500-5,000/ft. \$8,000k-26,000k/mi.
Cost	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★	★★	★★	★★	★★	★	★	
Cyclist Perceived Safety	★	★★★★	★★★★	★★★★	★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	

Other Considerations															
Durability / Maintenance	★★	★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★	★★★★	★★★★	★★★★	★★★★
Sweeping	★★★★	Depends on Width	Depends on Width	Depends on Width	Depends on Width	Depends on Width	Depends on Width	Depends on Width	★★★★	Depends on Width	Depends on Width	Depends on Width	Depends on Width	Depends on Width	Depends on Width
Trash Collection	★★★★	★	★★★★	★	★★★★	★★★★	★★★★	★★★★	Depends on Time of Day	★	★	★	★★★★	★★★★	★★★★
Storm Water	★★★★	★★★★	★★★★	★★★★	★★★★	★★	★★★★	★★★★	★★★★	★★	★★	★★★★	★★	★★	★
Traffic Compatibility (Motor vehicle / barrier interactions)	★★★★	★★★★	★★	★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★	★★★★	★★★★	★★★★
Aesthetics (factoring in damage over time)	★★	★	★★	★★★★	★★	★★	★★	★★	★★	★	★★★★	★★★★	★★★★	★★★★	★★★★
Construction Impacts	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★	★★★★	★★★★	★★★★	★★	★★	★★★★	★
Width Required	1.5'	1.5'	1.5'	1.5'	1.5'	1/2'	1/2'	1/2'	8' if not existing	2'	3'	2'	1'	1'	0'

Notes															
General									Requires on-street parking						
Cost	Least expensive option	Good cost per foot	Very good cost per foot	Good cost per foot	Very good cost per foot	Good cost per foot	Good cost per foot	Good cost per foot	ADA parking changes, pedestrian refuge islands, and ADA ramp changes can affect cost		Spacing of planters affects cost	Utility conflicts could affect cost	Cast in place curbs are much less expensive due to reduced handling time	Custom precast curbs significantly increases cost over cast in place barriers	Reconstruction including storm water improvements is likely
Cyclist Perceived Safety	No physical element	Good vertical element	Good deterrent for motorist	Strong deterrent for motorist. Good vertical element.	Decent deterrent for motorists. Low contrast.	Good deterrent for motorist	Good deterrent for motorist	Good deterrent for motorist	Strong deterrent for motorist. Good vertical element.	Strong deterrent for motorist. Good vertical element.	Strong deterrent for motorist. Good vertical element.	Strong deterrent for motorist. Good vertical element.	Strong deterrent for motorist. Horizontal seperation.	Strong deterrent for motorist. Horizontal seperation.	Strong deterrent for motorist.
Durability / Maintenance	Thermo / paint needs to be maintained	Flexible bollards may require frequent replacement	Good durability	Good durability	Good durability	Good durability	Good durability	Good durability	No element to maintain	Very durable barriers	Need a maintenance partner for watering and plant upkeep.	Good durability	Very durable barriers	Good durability	Very durable design
Sweeping	No obstruction	If barrier is less than 8.5' from curb special sweeping equipment will be necessary	If barrier is less than 8.5' from curb special sweeping equipment will be necessary	If barrier is less than 8.5' from curb special sweeping equipment will be necessary	If barrier is less than 8.5' from curb special sweeping equipment will be necessary	If barrier is less than 8.5' from curb special sweeping equipment will be necessary	If barrier is less than 8.5' from curb special sweeping equipment will be necessary	If barrier is less than 8.5' from curb special sweeping equipment will be necessary	Sweeping could be done in off-peak or no parking hours if cycle track narrow	If barrier is less than 8.5' from curb special sweeping equipment will be necessary	If barrier is less than 8.5' from curb special sweeping equipment will be necessary	If barrier is less than 8.5' from curb special sweeping equipment will be necessary	If barrier is less than 8.5' from curb special sweeping equipment will be necessary	If barrier is less than 8.5' from curb special sweeping equipment will be necessary	If barrier is less than 8.5' from curb special sweeping equipment will be necessary
Trash Collection	No obstruction	Height of barrier obstructs collection vehicles. Barrier could be driven over but not optimal.	Collection vehicles can drive over barrier	Height of barrier obstructs collection vehicles	Collection vehicles can drive over barrier	Collection vehicles can drive over barrier	Collection vehicles can drive over barrier	Collection vehicles can drive over barrier	Collection could be done in off-peak or no parking hours if cycle track narrow	Height of barrier obstructs collection vehicles	Height of barrier obstructs collection vehicles	Height of barrier obstructs collection vehicles	Collection vehicles can drive over barrier	Collection vehicles can drive over barrier	Collection vehicles can drive over barrier
Storm Water	No obstruction	No / minimal obstruction	No / minimal obstruction	No / minimal obstruction	No / minimal obstruction	Barriers could be spaced to allow storm water to curb	No / minimal obstruction	No / minimal obstruction	No obstruction	Barriers could be spaced to allow storm water to curb	Barriers could be spaced to allow storm water to curb	No / minimal obstruction	Barriers could be spaced to allow storm water to curb	Barriers could be spaced to allow storm water to curb	Requires reconstruction of street to redesign stormwater system
Traffic Compatibility (Motor vehicle / barrier interactions)	No high speed motor vehicle traffic concerns	No high speed motor vehicle traffic concerns	May have concerns adjacent to higher speed traffic	May have concerns adjacent to higher speed traffic	May have concerns adjacent to higher speed traffic	May have concerns adjacent to higher speed traffic	May have concerns adjacent to higher speed traffic	No high speed motor vehicle traffic concerns	May have concerns adjacent to higher speed traffic	Compatible with higher speed traffic. Care must be given to end treatments	May have concerns adjacent to higher speed traffic	Appropriate for moderate traffic speeds	Curb profile can be yarried based on context	Appropriate for moderate traffic speeds	No high speed motor vehicle traffic concerns
Aesthetics	Neutral asthetics	Damaged barriers quickly become ragged looking	Good asthetics over barrier life	Barrier enhances street asthetics	Neutral asthetics	Neutral asthetics	Neutral asthetics	Good asthetics over barrier life	Good asthetics over barrier life	Strong visual impact on street. Can be painted for improved asthetics	Barrier enhances street asthetics	Good asthetics over barrier life	Good asthetics over barrier life	Good asthetics over barrier life	Good asthetics over barrier life
Construction Impacts	Striping changes only	Barrier installation is quick and non-invasive. Bolt/glue solution.	Barrier installation is quick and non-invasive. Bolt/glue solution.	Barrier installation is quick and non-invasive. Bolt/glue solution.	Barrier installation is quick and non-invasive. Bolt/glue solution.	Barrier installation is quick and non-invasive. Bolt/glue solution.	Barrier installation is quick and non-invasive. Bolt/glue solution.	Curbs have to be poured in place and dowled into street	Hard construction may not be required	Barrier installation is quick and non-invasive. Bolt/glue solution.	Barrier installation is quick and non-invasive.	Installation of bollards may have utility conflicts	Curbs have to be poured in place and dowled into street	Barrier installation is quick and non-invasive. Bolt/glue solution.	Complete reconstruction is likely required
Width Required	Fairly compact barrier solution	Fairly compact barrier solution	Fairly compact barrier solution	Fairly compact barrier solution	Fairly compact barrier solution	Low-profile barrier solution	Low-profile barrier solution	Low-profile barrier solution	Good if on-street parking is existing	Wider barrier solution	Wider barrier solution	Wider barrier solution	Fairly compact barrier solution	Fairly compact barrier solution	Low-profile barrier solution

Good Separation Photos
<http://www.peopleforbikes.org/blog/entry/tech-talk-19-beautiful-ways-to-protect-bike-lanes-photos>

All prices are installed

DRAFT

Item	Value	Cost/ft	Cost EA
------	-------	---------	---------

Bicycle Lane with Parking (New Stripes)

6" Line		\$	1.20
4" Line		\$	0.10
Total		\$	1.30
Notes			
Low Estimate	75%		
Mid Estimate	100%		
High Estimate	150%		

Striped Buffer

Width (ft)	3		
2x 4" Lines		\$	0.80
Gore Markings		\$	1.20
Total		\$	5.09
Notes			
Low Estimate	75%		
Mid Estimate	100%		
High Estimate	150%		

Flexible Bollards

Width (ft)	3		
Striped Buffer Total		\$	2.13
Bollard w/ Installation		\$	60.00
Total			
Notes			
Low Estimate	75%		
Mid Estimate	100%		
High Estimate	150%		

Turtle Bumps 3" Tall 10" Wide Circular

Width (ft)	3		
2x 4" Lines		\$	0.80
Bump Cost - Turtle Bumps 3" Tall 10" Wide Circular		\$	12.00
Installation (Adhesive and paint)		\$	5.00

Total

Notes	4' Spacing used on 4th Street
Low Estimate	75%
Mid Estimate	100%
High Estimate	150%

Oblong Bumps - Recycled Plastic Bolt Down 5" High 32" Long

Width (ft)	3		
2x 4" Lines	\$	0.80	
Bump Cost - Recycled Plastic 5" high 20" long		\$	70.00

Installation		\$	5.00
--------------	--	----	------

Total

Notes	4' Spacing used on 4th Street
Low Estimate	75%
Mid Estimate	100%
High Estimate	150%

Oblong Bumps - Recycled Plastic Bolt Down 3" High 30" Long

Width (ft)	3		
2x 4" Lines	\$	0.80	
Bump Cost - Recycled Plastic 5" high 20" long		\$	62.00

Installation		\$	5.00
--------------	--	----	------

Total

Notes	4' Spacing used on 4th Street
Low Estimate	75%
Mid Estimate	100%
High Estimate	150%

Seville Style Bumps 10" High 8" Wide 20" Long

Width (ft)	3		
2x 4" Lines	\$	0.80	
Bump Cost - Seville Style Bumps 10" High 8" Wide 20" Long		\$	50.00
Installation		\$	5.00

Total

Notes	4' Spacing used on 4th Street
Low Estimate	75%
Mid Estimate	100%
High Estimate	150%

Parking Stops & Linear Barrier

Width (ft)	NA
------------	----

2x 4" Lines	\$	0.80	
Parking Stop and Pins			\$ 32.00
Freight Local			\$ 1.50
Installation			\$ 5.00

Total

Notes Quoted quantity at 1000 pieces.
Local freight assumes concrete is cast near Austin
8' Parking stop with a 2' gap

Low Estimate	75%
Mid Estimate	100%
High Estimate	150%

Cast-in-Place 6" Barrier Curb

Width (ft)	NA		
2x 4" Lines	\$	0.80	
Prep, Dowling, Concrete Work			\$ 9.00

Total

Notes Quoted quantity at 1000 pieces.
Local freight assumes concrete is cast near Austin
8' Parking stop with a 2' gap

Low Estimate	50%
Mid Estimate	100%
High Estimate	150%

Curb Forming Machine

Width (ft)	2
Prep, Dowling, Concrete Work	

Total

Notes Estimate from miller curb co was 8-10/ft. Don't know cost of machine

Low Estimate	50%
Mid Estimate	100%
High Estimate	150%

Parked Cars

Width (ft)	3		
2x 4" Lines	\$	0.80	
Gore Markings	\$	1.20	\$ 5.09
ADA Parking Spaces, 2% of total pa	5		\$ 10,000.00
Pedestrian Improvements			\$ 5,000.00

Total

Notes Pedestrian improvements include refuge islands, plantings, ramp reloc

Low Estimate	50%
Mid Estimate	100%
High Estimate	200%

Jersey Barriers

Width (ft)	NA		
Jersey Barrier		\$	200.00
Freight Local		\$	4.80
Installation		\$	5.00

Total

Notes

Quoted quantity at 1000 pieces.
Local freight assumes concrete is cast near Austin
10' sections of jersey barrier
<http://www.accentbarriers.com/Pricing.html>

Low Estimate	75%
Mid Estimate	100%
High Estimate	150%

Planters

Width (ft)	3		
2x 4" Lines		\$	0.80
Planter 6'		\$	250.00
Freight Local		\$	4.80
Installation		\$	250.00

Total

Notes

6' planters spaced every 10' (4' gap)

Low Estimate	33%
Mid Estimate	100%
High Estimate	150%

Rigid Bollards

Width (ft)	3		
2x 4" Lines		\$	0.80
Bollard Installed		\$	250.00

Total

Notes

6' planters spaced every 10' (4' gap)

Low Estimate	75%
Mid Estimate	100%
High Estimate	150%

Cast-in-Place Barrier Curb

Width (ft)	2'
Height (in)	6"

Cost of Barrier Curb Installed	\$	30.00
--------------------------------	----	-------

Total

Notes	6' planters spaced every 10' (4' gap)
Low Estimate	75%
Mid Estimate	100%
High Estimate	125%

Precast Barrier Curb

Width (ft)	NA		
Barrier Curb Installed 10' segments		\$	90.00

Total

Notes	6' planters spaced every 10' (4' gap)
Low Estimate	75%
Mid Estimate	100%
High Estimate	125%

Reconstruction

Reconstruction per Block		\$	1,000,000.00
--------------------------	--	----	--------------

Total

Notes	6' planters spaced every 10' (4' gap)
Low Estimate	50%
Mid Estimate	100%
High Estimate	150%

Oblong Low Bumps

Parking Stops

Linear Barrier

6" Cast in Place Barrier Curb

Parked Cars

Jersey Barriers

Planters

Rigid Bollards

Cast in Place Barrier Curb

Precast Barrier Curb

Raised Cycle Track

Frequency	Calculated		Rounded	
	Total Cost/ft	Total Cost/mi	Total Cost/ft	Total Cost/mi in thousands

	\$	1.20				
	\$	0.10				
	\$	1.30	\$	6,864		
	\$	0.98	\$	5,148	\$	1 \$ 5
	\$	1.30	\$	6,864	\$	-
	\$	1.95	\$	10,296	\$	2 \$ 10

	\$	0.80				
40	\$	1.33				
	\$	2.13	\$	11,232		
	\$	1.60	\$	8,424	\$	1.5 \$ 8
	\$	2.13	\$	11,232	\$	-
	\$	3.19	\$	16,848	\$	3 \$ 17

	1 \$	2.13				
	40 \$	1.50				
	\$	3.63	\$	19,152		
	\$	2.72	\$	14,364	\$	3 \$ 14
	\$	3.63	\$	19,152	\$	-
	\$	5.44	\$	28,728	\$	5 \$ 30

	\$	0.80				
10	\$	1.20				
	10 \$	0.50				

\$	2.50	\$	13,200		
\$	1.88	\$	9,900	\$	2
\$	2.50	\$	13,200	\$	-
\$	3.75	\$	19,800	\$	4

\$	0.80
9 \$	7.78

9 \$	0.56				
\$	9.13	\$	48,224		
\$	6.85	\$	36,168	\$	7
\$	9.13	\$	48,224	\$	-
\$	13.70	\$	72,336	\$	14

\$	0.80
9 \$	6.89

9 \$	0.56				
\$	8.24	\$	43,531		
\$	6.18	\$	32,648	\$	6
\$	8.24	\$	43,531	\$	-
\$	12.37	\$	65,296	\$	12

\$	0.80				
5 \$	10.00				
5 \$	1.00				
\$	11.80	\$	62,304		
\$	8.85	\$	46,728	\$	9
\$	11.80	\$	62,304	\$	-
\$	17.70	\$	93,456	\$	18

	\$	0.80		
9	\$	3.56		
9	\$	0.17		
9	\$	0.56		
	\$	5.08	\$	26,811

	\$	3.81	\$	20,108	\$	4	\$	20
	\$	5.08	\$	26,811			\$	-
	\$	7.62	\$	40,216	\$	8	\$	40

	\$	0.80		
1	\$	9.00		
	\$	9.80	\$	51,744

	\$	4.90	\$	25,872	\$	5	\$	30
	\$	9.80	\$	51,744			\$	-
	\$	14.70	\$	77,616	\$	15	\$	80

	\$	10.00		
	\$	10.00	\$	52,800

and if that includes labor.

	\$	5.00	\$	26,400	\$	5	\$	30
	\$	10.00	\$	52,800			\$	-
	\$	15.00	\$	79,200	\$	15	\$	80

	\$	0.80		
40	\$	1.33		
1000	\$	10.00		
300	\$	16.67		
	\$	28.79	\$	152,032

ations

	\$	14.40	\$	76,016	\$	14	\$	80
	\$	28.79	\$	152,032			\$	-
	\$	57.59	\$	304,064	\$	58	\$	300

10	\$	20.00		
10	\$	0.48		
10	\$	0.50		
	\$	20.98	\$	110,774

	\$	15.74	\$	83,081	\$	16	\$	80
	\$	20.98	\$	110,774			\$	-
	\$	31.47	\$	166,162	\$	31	\$	170

	\$	0.80		
10	\$	25.00		
10	\$	0.48		
10	\$	25.00		
	\$	51.28	\$	270,758

	\$	16.92	\$	89,350	\$	17	\$	90
	\$	51.28	\$	270,758			\$	-
	\$	76.92	\$	406,138	\$	77	\$	410

	\$	0.80		
10	\$	25.00		
	\$	25.80	\$	136,224

	\$	19.35	\$	102,168	\$	19	\$	100
	\$	25.80	\$	136,224			\$	-
	\$	38.70	\$	204,336	\$	39	\$	200

	\$	30.00		
	\$	30.00	\$	158,400

\$	22.50	\$	118,800	\$	23	\$	120
\$	30.00	\$	158,400			\$	-
\$	37.50	\$	198,000	\$	38	\$	200

\$	90.00						
\$	90.00	\$	475,200				
\$	67.50	\$	356,400	\$	70	\$	400
\$	90.00	\$	475,200			\$	-
\$	112.50	\$	594,000	\$	110	\$	600

300	\$	3,333.33						
	\$	3,333.33	\$	17,600,000				
	\$	1,666.67	\$	8,800,000	\$	1,670	\$	8,800
	\$	3,333.33	\$	17,600,000			\$	-
	\$	5,000.00	\$	26,400,000	\$	5,000	\$	26,400

Notes

Parking one side, less pedestrian amenities

More pedestrian amenities, ADA parking cost

Parking one side, less pedestrian amenities

More pedestrian amenities, ADA parking cost

Added \$5 to the unit cost of the smaller bumps. Have quote for 10" concrete buttons at \$12 each 2x for installed.

Parking one side, less pedestrian amenities

More pedestrian amenities, ADA parking cost

Added \$5 to the unit cost of the smaller bumps. Have quote for 10" concrete buttons at \$12 each 2x for installed.

Parking one side, less pedestrian amenities

More pedestrian amenities, ADA parking cost

Added \$5 to the unit cost of the smaller bumps. Have quote for 10" concrete buttons at \$12 each 2x for installed.

Parking one side, less pedestrian amenities

More pedestrian amenities, ADA parking cost

This is an estimate based on lower concrete buttons that do not require rebar
Added \$5 to the unit cost for installation

Parking one side, less pedestrian amenities

More pedestrian amenities, ADA parking cost

Parking one side, less pedestrian amenities

More pedestrian amenities, ADA parking cost

Parking one side, less pedestrian amenities

More pedestrian amenities, ADA parking cost

Parking one side, less pedestrian amenities

More pedestrian amenities, ADA parking cost

Parking one side, less pedestrian amenities

More pedestrian amenities, ADA parking, Islands for bus stops, relocated ramps

Parking one side, less pedestrian amenities

More pedestrian amenities, ADA parking cost

Lower Density

Higher Density

Lower Density

Higher Density

Notes from Mopac Bike Bridge bid (\$12M large project) -
Austin, TX: Bid had a big split, but averaged right at
\$30/ft, but as low as \$20/lf for the 2' wide, 6" tall
version which was our most common detail.

Lower Bids

Higher Bids

Lower Density

Higher Density

Lower Density

Higher Density