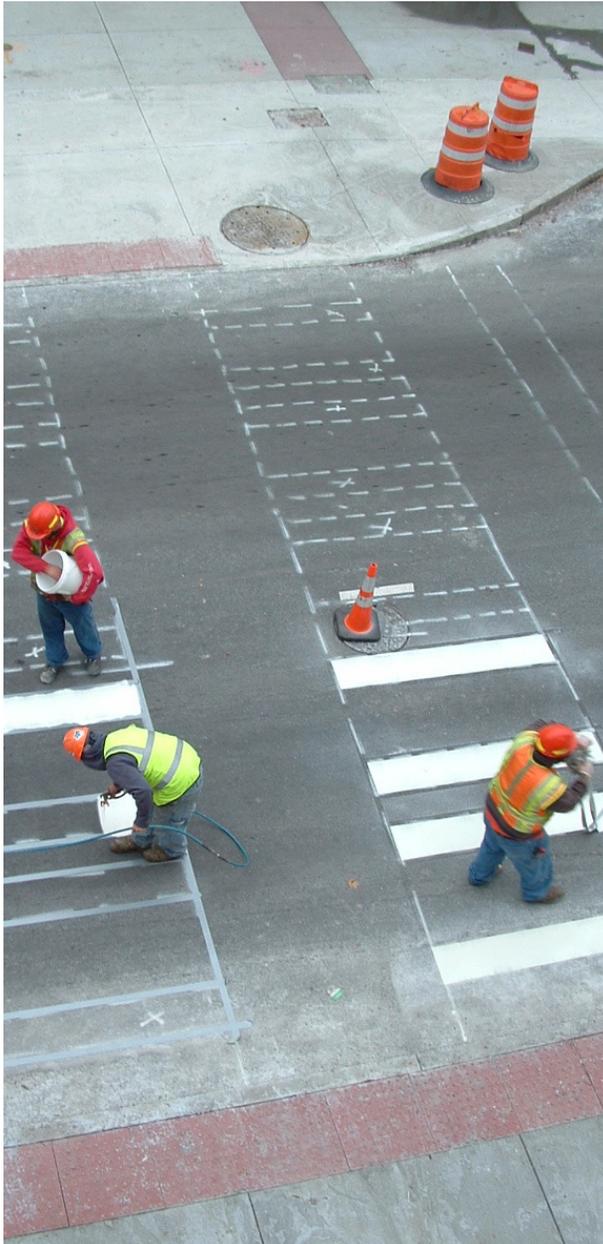


APPENDIX B

MAG ATP Cost Estimates

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MAG ATP Cost Estimates

This memo is intended to document draft cost estimates prepared by Lee Engineering in support of the MAG Active Transportation Plan.

The cost estimates generated as part of this plan are intended as planning-level costs. Specifics of each corridor, such as utility impacts, detailed constructability issues, and environmental needs, were not investigated; rather, unit costs were developed to reflect average conditions. Improvements on some corridors are likely to be more expensive than estimated, while others are likely to be less expensive than estimated. The cost estimates do not include right-of-way acquisition because of the uncertainty in individual projects' right-of-way needs and the wide variability in costs both geographically across the MAG region and over time. However, the cost estimates are intended to include both design and construction phases of projects.

Costs are presented in 2019 dollars.

Cost estimates were determined using a four-step process, as follows:

- Identify corridors
- Determine appropriate active transportation accommodations on each corridor
- Identify unit costs for each accommodation type
- Calculate cost estimate for each corridor as the product of the length and the unit cost

Corridor Identification

Cost estimates were prepared for the highest-scoring alignment alternative within each corridor. For example,

the Downtown Phoenix Loop includes four corridors (Southern, Northern, Western and Eastern). Within each of these corridors there are two or three route alternatives; the highest ranking of each route within a corridor was used for cost estimating. (See Appendix A.) Costs are subdivided into Tier 1 and Tier 2 corridors. As discussed in the MAG ATP and Appendix A, Tier 1 corridors connect activity centers having a high level of demand/propensity for active transportation while Tier 2 corridors connect activity centers with a level of demand/propensity lower than Tier 1, and therefore may be a lower priority.

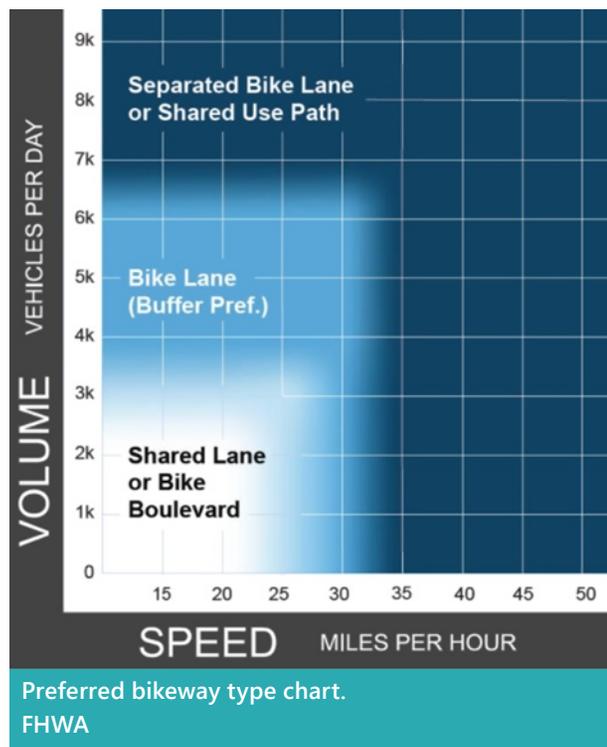
Cost estimates were also prepared for Regional Conduits where infrastructure improvements are needed. Regional Conduits are existing and planned shared use paths, and in some cases, on-street connections that connect activity centers outside of the Tier 1 and Tier 2 corridors. Some existing Regional Conduits do not require any additional improvements and were not included in the estimate, while others are currently unpaved or undeveloped, or simply lack arterial crossings – all of which are accounted for in the cost estimates.

Active Transportation Accommodations

For Tier 1 and Tier 2 corridors, the appropriate active transportation accommodation was usually taken from our previous investigation of the corridors, documented in an earlier memo to you. In some cases where new corridors were identified or modified, we assumed changes in accommodation type.

Recommended bikeway type for Tier 1 and Tier 2 corridors were based on the figure below, which is taken from the [Federal Highway Administration’s Bikeway Selection Guide](#). This figure is intended to identify accommodations that are suitable for high-comfort, low-stress bicycle facilities that a broader spectrum of bicyclists would feel comfortable using.

Information on planning level costs for several active transportation treatments can be found in the [Active Transportation Toolbox](#).



Unit (Per-Mile) Costs

Unit costs for active transportation accommodations were gathered from several sources:

- Previous plans in the region that identified costs of improvements
- Information received from MAG member agencies about actual costs expended for particular projects, converted to appropriate unit costs and adjusted for inflation
- Research on typical project costs from agencies and sources outside the MAG region

In general, unit costs can vary considerably even for projects to construct the same active transportation accommodation. Where costs vary considerably, unit cost values are intended to represent roughly average conditions.

Following are the unit costs used in the study and our assumptions about each accommodation. A summary of unit costs is shown in Table 1.

Shared lane means a local neighborhood street with low speeds and volumes that is already largely conducive to high-comfort cycling. Improvements included in the cost estimate are wayfinding signs for cyclists, pavement markings, and other ancillary improvements.

Bike boulevard means a low-speed local street configured to accommodate high-comfort cycling with improved crossing treatments and traffic calming where needed. Improvements included in the cost estimate are wayfinding signs, pavement markings, minor traffic calming treatments where needed, and reasonable grade crossing treatments (such as a pedestrian hybrid beacon or Bike HAWK) where the corridor crosses arterials.

Bike lanes, widening required involves widening a street to make room for bike lanes where bike lanes

Table 1: Unit Costs

Accommodation	Assumed Unit Cost	
Shared Lane	\$10,000	per mile
Bike Boulevard	\$ 350,000	per mile
Bike Lanes, Widening Required	\$ 3,500,000	per mile
Bike Lanes, No Widening Required	\$ 95,000	per mile
Separated Bike Lanes, No Widening Required	\$ 520,000	per mile
Separated Bike Lanes, Widening Required	\$ 3,500,000	per mile
New Off-Street Paved Path	\$ 2,000,000	per mile
Upgrade Paved Path	\$ 1,000,000	per mile
Upgrade Unpaved Path Surface	\$ 1,500,000	per mile
Overpass	\$ 3,500,000	per crossing

are the designated high-comfort accommodation. Improvements included in the cost estimate are removal and reconstruction of curbs, addition of asphalt pavement, relocation of sidewalk where required, and other ancillary work. The estimate also includes new bike lane pavement marking and signing, as well as grade crossing treatments where required. Projects could involve either work on either the curbside or a raised median.

Bike lanes, no widening required involves projects where bike lanes are the preferred accommodation but where they can be installed on existing pavement, usually where a very wide curb lane already exists or where other lanes can be reduced in width. Improvements included in the cost estimate are bike lane signing and marking along with ancillary adjustments to other pavement markings where needed.

Separated bike lanes are bike lanes separated from travel lanes by a physical treatment such as a raised island or vertical delineators. In many cases, separated bike lanes

may be built within existing curbs by removing travel lanes where there is excess vehicle capacity (i.e., accepting lower level of service during peak travel times in order to better utilize infrastructure for all travel modes throughout the day). In other cases, widening may be required in order to add bike lanes and separation in each direction. Corridors have been assessed at a high-level to determine where widening may or may not be required. Roadways with seven lanes (including median/two-way left turn lane) and less than 35,000 Average Annual Weekday Traffic (AADT) and five (including median/two-way left turn lane) or four lanes and less than 20,000 AADT are assumed to be able to accommodate separated bike lanes within existing curbs. Where widening is required due to constraints, the unit cost includes removal and reconstruction of curbs, addition of a physical buffer and new asphalt pavement, signing and pavement marking, crossing treatments, and other ancillary work

Off-street paved paths, are similar improvements that involve locating a new off-street shared use path facility on a parcel where a path does not currently exist. Improvements included in the estimate are locating, grading, providing drainage, paving, grade crossing treatments (such as a pedestrian hybrid beacon or Bike HAWK), and installing accompanying improvements such as lighting, seating, and signing.

Upgrade path is applicable to portions of corridors that use an existing paved shared use path, but the path is not designed to accommodate two-way bicycle traffic in addition to pedestrian uses. Improvements included in the estimate are widening the paved portion of the path, adjusting horizontal and vertical curvature and other design criteria to be suited for bicycle traffic, and making appropriate connections with other infrastructure.

Upgrade path surface is applicable to an existing unpaved shared use path that is already well suited for bicycle traffic in width and curvature. Improvements included in the estimate are installing new pavement, lighting, grade crossing treatments, and amenities such as seating and signing.

Underpass/overpass means a new bicycle connection across a freeway, either above or below. Detailed investigation was not undertaken to determine whether the bicycle connection should be over or under the freeway. In some cases, the overpass is on an independent alignment and in other cases it is parallel and adjacent to another street. Improvements include structure and path surface across the overpass and appropriate connections to infrastructure on either side.



Separated bike lane in Phoenix.
Photo courtesy of the City of Phoenix



Indian Bend Wash Path in Scottsdale.
Photo courtesy of Reed Kempton



Grade-separated connection.

Cost Estimates

The ATP includes a total of 319.9 miles of bicycle accommodations in Tier 1, Tier 2, and Regional Conduits. (This figure does not include Regional Conduits where the existing path does not require any infrastructure improvements.) Of the 319.9 miles, 23.9 miles along Tier 1 and Tier 2 corridors are already suitable for high-comfort cycling and no improvements are needed. Improvements are needed along the remaining 296 miles.

Cost estimates for the full improvements are shown in the table below. In summary, implementing the high

comfort bikeways and key crossings included in the ATP's AT Grid and Regional Conduits is expected to cost about \$684 million, subject to the cost caveats mentioned earlier. Achieving high comfort pedestrian facilities within the AT Grid is not fully accounted for in this cost estimate. Improving pedestrian comfort within these corridors will be achieved through a combination of roadway reconstruction projects, localized street crossing improvements, and managing vehicle speeds.

Table 2: Cost Estimates

Jurisdiction	Regional Conduit	Tier 1	Tier 2	Grand Total
Apache Junction	\$ 12,180,000			\$ 12,180,000
Avondale	\$ 4,200,000			\$ 4,200,000
Carefree	\$ 8,050,000			\$ 8,050,000
Cave Creek	\$ 11,200,000			\$ 11,200,000
Chandler	\$ 2,100,000		\$ 6,048,000	\$ 8,148,000
Gilbert	\$ 5,550,000		\$ 23,800,000	\$ 29,350,000
Glendale	\$ 16,000,000			\$ 16,000,000
Mesa	\$ 66,900,000	\$ 29,715,000		\$ 96,615,000
Paradise Valley	\$ 8,800,000			\$ 8,800,000
Peoria	\$ 800,000			\$ 800,000
Phoenix	\$ 179,050,000	\$ 106,040,000	\$ 18,532,000	\$ 303,622,000
Queen Creek	\$ 3,600,000			\$ 3,600,000
Salt River Pima-Maricopa Indian Community	\$ 19,350,000			\$ 19,350,000
Scottsdale	\$ 8,400,000	\$ 27,795,000		\$ 36,195,000
Tempe	\$ 5,110,000	\$ 85,632,000	\$ 35,165,000	\$ 125,907,000
Grand Total	\$ 351,290,000	\$ 249,182,000	\$ 83,545,000	\$ 684,017,000



Green bike lane on Grand Ave. in Phoenix.
Photo courtesy of the Maricopa Association of Governments