

Date: April 30, 2019

To: Anne Hersh, AICP, City of Albany

From: Kenneth Loen, PE; Joel Shaffer, EIT and Brooke DuBose, AICP

Project: Solano Avenue Complete Streets Plan

Subject: Evaluation of Bicycle Facility Options for Mid-Solano Avenue

The purpose of this memorandum is to provide summary information about accommodating bicycle facilities on Solano Avenue. The 2012 Albany Active Transportation Plan did not designate Solano Avenue as part of the citywide bike network; however, it did identify supportive bicycling safety improvements for the corridor. If the City reconsiders this policy decision at any point, there are several design options for including bike facilities along Solano Avenue. Given the multiple demands on the corridor as the City's main street, each option will have trade-offs. Several options are presented in this memo, including the Albany Traffic and Safety Commission recommendation that was introduced and acted on at the February 28, 2019 Commission meeting.

The option developed by the Traffic & Safety Commission recommends high-comfort bicycle facilities in one direction and lower comfort sharrows in the other direction, Option 1. Options 2-5 were developed by civil engineering staff from Toole Design. These were developed in consideration of the existing conditions along the corridor, including the street grade (which is relatively shallow at typically <3% running grade, with some locations approaching 5%), street widths, parking layouts, and traffic control features. These options include various facility types that span the range of low-cost, basic facilities to high cost, high comfort facilities. All four Toole options provide equivalent bicycle facilities in both directions.

The options evaluated in this memo are:

1. Separated bike lane with downhill shared lane (Albany T&S Commission)
2. Conventional bike lanes with back in angled parking
3. Buffered bike lanes with both angled and parallel parking
4. Buffered bike lanes with parallel parking on both sides of the street
5. Separated bike lanes with parallel parking on both sides of the street

The outcomes of the various options differ in several key measures:

Measures	Low Impact/ Desired outcome	Medium	High Impact/ Less desirable outcome
Bicycle Safety Enhancement	The option would be expected to offer the highest level of safety enhancements	The option would be expected to offer additional safety enhancements	The option would be expected to offer some safety enhancement compared to existing conditions
Bicycle Level of Comfort	Yes		No
A high comfort bicycle facility provides significant separation from motorized traffic, and clear assignment of right-of-way at intersections. It can be envisioned as one in which people of all bicycling ages and abilities would be comfortable riding along the corridor.			
Parking (approximate number of on-street parking stalls)	Preserves a high number of existing stalls (>90%)	Preserves 60%-90% of existing stalls	Preserves less than 60% of existing stalls
Construction Cost	Baseline costs for all projects; the work consists solely of removing existing striping, installing new paint stripes, and some pavement repair. For angled parking the parking stalls are converted to a back-in parking configuration. Assumes new ADA curb ramps constructed at all intersections.	In addition to the baseline costs, additional work may include signing changes, curbside use reassignment, and more extensive pavement repairs.	In addition to the Low and Medium costs, work may include major civil reconstruction efforts, including removing curb bulbs, reconstruction of sidewalks and curb ramps, grinding and paving intersections, moving signal and light poles, etc. The differential in cost associated with this category is significantly higher than the differential between Low and Medium costs.

Option details are presented on the following pages.

OPTION 1: UPHILL SEPARATED BIKE LANE WITH DOWNHILL SHARED LANE

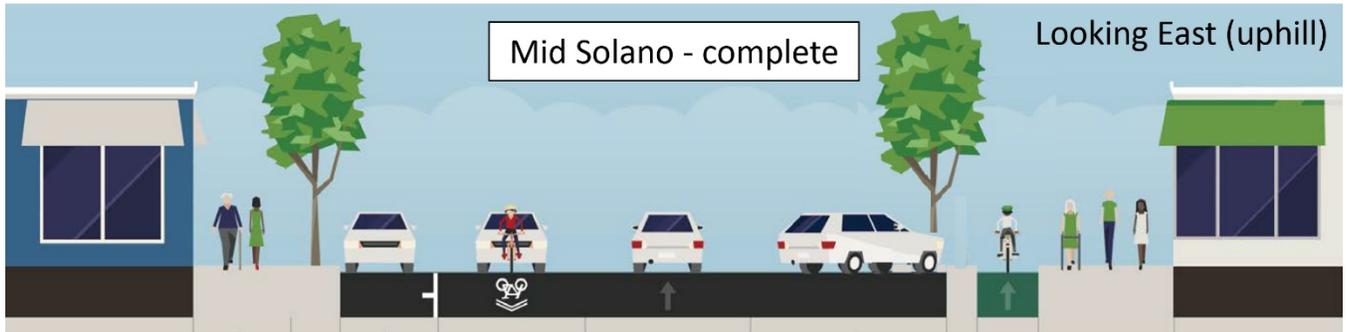
This option, put forth and supported by the Albany Traffic and Safety Commission, provides a protected bike lane along with back-in angled parking on the south side of the street and shared lane markings with parallel parking on the north side of the street. Impacts to on-street parking loss would be moderate (10-40% loss) as a result of changing one side of the street from angled parking to parallel parking. The remaining angled parking would be converted from the existing “front-in” parking configuration to a new “back-in” configuration. Given the reconfigured parking, this option has the ancillary pedestrian benefit of enabling people to load the backs of their vehicles from the sidewalk or within the parking lane (for the back-in parking and parallel parking configurations, respectively) instead of from the street. In addition, the one-way separated bike lane further separates pedestrian space from vehicle space, serving as a de facto buffer that creates a more attractive pedestrian realm on the south side of the street.

Physical work would include removing existing pavement markings (primarily parking stall striping) and installing new pavement markings (sharrow markings and new parking stall striping). Additional work on the south side of the street would consist of, but would not be limited to: removal of existing curb bulbs, reconstruction of existing sidewalks at all intersection corners, construction of new ADA curb ramps at all intersection corners, removal of existing planters and trees at certain locations, grind and overlay pavement at all intersections, construct new full depth pavement where curb bulbs are removed, adjustments and potential replacement of existing drainage features, moving light poles, moving signal poles, signal revisions, etc.

The costs associated with this option would be high and construction impacts would be significant. Traffic detours would likely be in effect for the duration of construction, and sidewalk closures would be required.

In addition, it is important to create a consistent user experience and comfort level along a bicycle corridor, regardless of the direction of travel. Without consistency, less confident bicyclists may find themselves “stranded” at one end of a corridor because they are not comfortable returning on a shared street after riding on a high-comfort bicycle facility for the original outbound trip. This effect is particularly concerning for children, older adults, and slower riders who will be comfortable in a fully separated bikeway but would never consider riding their bicycle in lane with motorized traffic. While some jurisdictions have implemented uphill conventional bike lanes paired with downhill sharrow treatments in highly constrained locations, that approach can be successful because the conventional bike lane and sharrow treatments are relatively similar in comfort and appeal to similar bicycle rider groups. That design approach is typically only considered in constrained locations on relatively steep streets (>5%), where uphill riders may be considerably slower than motorized traffic.

This option presents a different scenario of a “High Comfort” facility in only one direction. Shared lane markings are not considered bicycle facilities and create no benefit to cyclist comfort in the westbound direction. Because of the slope of Solano Avenue is less than five percent, and due to the sizable imbalance of bicyclist comfort levels in opposing directions, this arrangement faces the challenges identified above and is not considered “all ages and abilities” option for the corridor.



Loss of Parking	Cost	Const. Impacts	Safety Enh.	High Comfort
Medium	High	High	Medium	No

Note that the Safety Enhancement and High Comfort measures are based on the fact that the high-comfort facility is provided in only one direction on the corridor, with no accompanying high-comfort facility to provide a return trip.

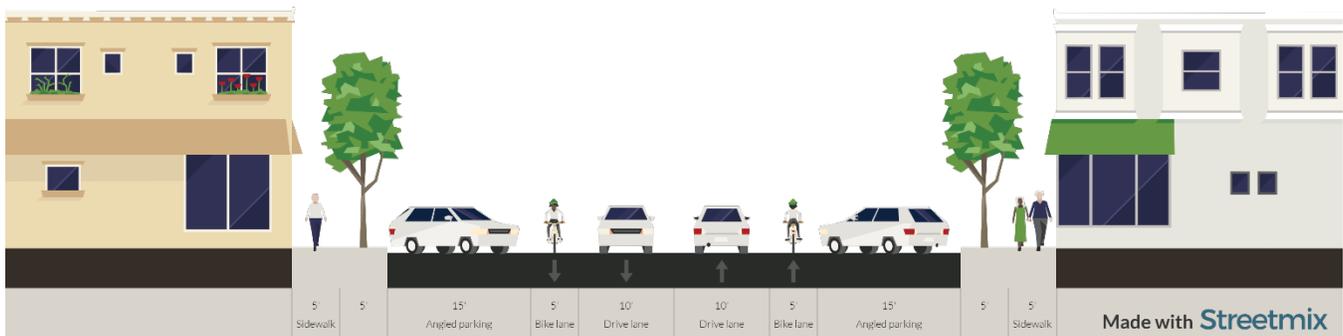
OPTION 2: CONVENTIONAL BIKE LANE WITH BACK IN ANGLED PARKING

This option provides plain (conventional) bike lanes along with back-in angled parking on both sides of the street. Parking retention would be high and impacts would be expected to be minimal—the only substantive change would be converting from the existing “front-in” parking configuration to a new “back-in” configuration. This conversion is recommended because of the safety concerns related to bike lanes adjacent “front-in” angled parking, since drivers backing out of angled parking spaces have very poor visibility of bicyclists in the bike lane¹. Given the reconfigured parking, this option has the ancillary pedestrian benefit of enabling people to load the backs of their vehicles from the sidewalk instead of the street.

Physical work would include removing existing pavement markings (primarily parking stall striping) and installing new pavement markings (bike lane striping and new parking stall striping). Due to the poor condition of the existing pavement, which could result in bicyclists swerving unexpectedly into traffic to avoid compromised pavement seams and potholes, pavement repair would be necessary to ensure a safe riding lane for bicycles. New ADA ramps would be constructed at all intersections.

The costs associated with this option would be low and the design could be installed more quickly than options requiring reconstruction of the curb line. Minor sidewalk closures may be required for ADA ramp construction. However, the resulting bicycle facilities would be basic and would provide only minimal safety enhancements. These facilities would not be considered “High Comfort” facilities because the bike lanes include no physical separation from moving traffic, and place bicyclists between moving traffic and parked cars. This arrangement is not considered “low stress” for bicyclists.

Conventional Bike Lanes & Back-In Angle Parking



Loss of Parking	Cost	Const. Impacts	Safety Enh.	High Comfort
Low	Low	Low	Low	No

¹ AASHTO “Guide for the Development of Bicycle Facilities”, 2012; p.4-17

OPTION 3: BUFFERED BIKE LANE WITH COMBINED PARKING

This option provides buffered bike lanes along with back-in angled parking on one side of the street and parallel parking on the other. Parking impacts would be expected to be higher than Option 2 (and the same as Option 1) as a result of changing one side of the street from angled parking to parallel parking. The remaining angled parking would be converted from the existing “front-in” parking configuration to a new “back-in” configuration. Given the reconfigured parking, this option has the ancillary pedestrian benefit of enabling people to load the backs of their vehicles from the sidewalk or within the parking lane (for the back-in parking and parallel parking configurations, respectively) instead of from the street.

Physical work would include removing existing pavement markings (primarily parking stall striping) and installing new pavement markings (bike lane striping and new parking stall striping). New ADA ramps would be constructed at all intersections. Signage related to parking configurations would be changed. Additional pavement repair would be necessary to ensure a safe riding lane for bicycles. This option would not change any of the existing curb or sidewalk extents.

The costs associated with this option would be somewhat higher than Option 2. This option could be installed more quickly than options requiring extensive reconstruction of the curb line. Minor sidewalk closures may be required for ADA ramp construction. However, the resulting bicycle facilities would be only marginally better than conventional bike lanes and would provide only minimal safety enhancements. The resulting bicycle facilities would not be considered “low stress” for bicyclists.

Buffered Bike Lanes & Combination Parking



Loss of Parking	Cost	Const. Impacts	Safety Enh.	High Comfort
Medium	Medium	Medium	Medium	No

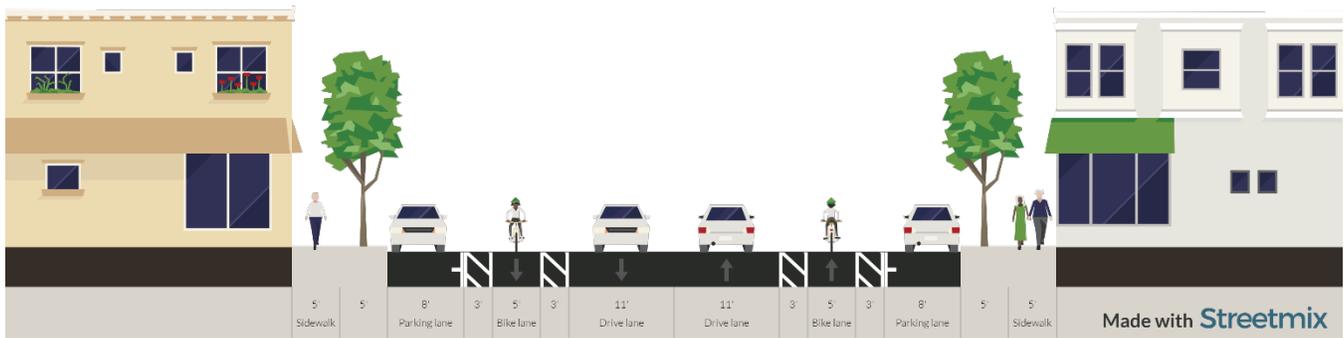
OPTION 4: BUFFERED BIKE LANE WITH PARALLEL PARKING

This option provides buffered bike lanes along with parallel parking on both sides of the street. It is anticipated that less than 60 percent of on-street parking would be preserved as a result of changing both sides of the street from angled parking to parallel parking. Given the reconfigured parking, this option has the ancillary pedestrian benefit of enabling people to load the backs of their vehicles from within the parking lane instead of the street.

Physical work would include removing existing pavement markings (primarily parking stall striping) and installing new pavement markings (bike lane striping and new parking stall striping). New ADA ramps would be constructed at all intersections. Signage related to parking configurations would be changed. Additional pavement repair would be necessary to ensure a safe riding lane for bicycles. This option would not change any of the existing curb or sidewalk extents.

The costs associated with this option would be similar to Option 3. This option could be installed more quickly than options requiring extensive reconstruction of the curb line. Minor sidewalk closures may be required for ADA ramp construction. The resulting bicycle facilities would provide additional safety enhancements, though still would not be considered “low stress” facilities because of the parking vehicles crossing over the bike lanes, and the use of only paint stripes for buffers between the bike lanes and motorized traffic.

Buffered Bike Lanes & Parallel Parking



Loss of Parking	Cost	Const. Impacts	Safety Enh.	High Comfort
High	Medium	Medium	Medium	No

OPTION 5: SEPARATED BIKE LANE WITH PARALLEL PARKING

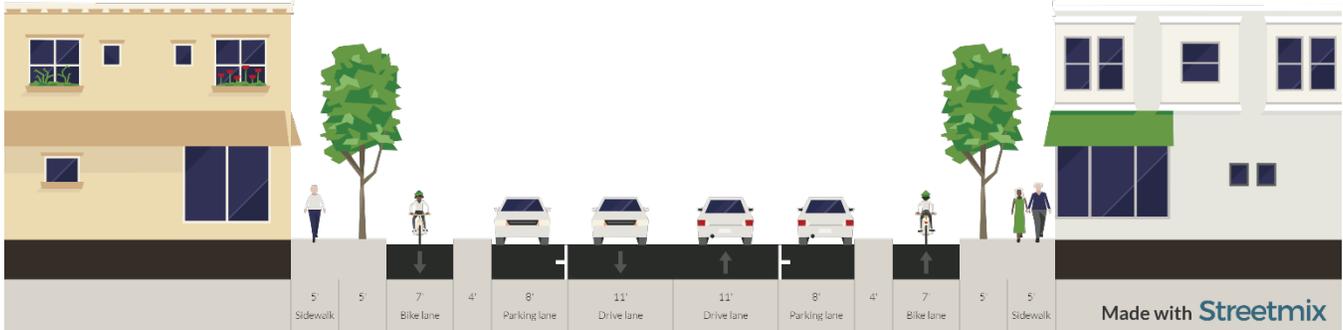
This option provides separated bike lanes along with parallel parking on both sides of the street. It is anticipated that less than 60 percent of on-street parking would be preserved as a result of changing both sides of the street from angled parking to parallel parking. Given the reconfigured parking, this option has the ancillary pedestrian benefit of enabling people to load the backs of their vehicles from within the parking lane instead of the street. In addition, the one-way separated bike lanes further separate pedestrian space from vehicle space, serving as a de facto buffer that creates a more attractive pedestrian realm.

Physical work would be extensive and costs would be very high due to the need to remove all curb bulbs along the corridor. The existing curb bulbs are very wide, typically the full width of the angled parking. Because of this width, it would not be possible to design a separated bike lane that wraps around the curb bulbs in a manner that a bicyclist could comfortably navigate. If the bike lanes were allowed to transition around the curb bulbs on shallower, more comfortable tapers, the result would be to eliminate the vast majority of parking. For these reasons, the only practicable way to design a separated bike lane facility would be to remove the curb bulbs to allow the separated bike lanes to proceed along a straight path, thus providing a safe and comfortable bicycle facility while at the same time allowing full parallel parking utilization.

This option would also include the baseline work of removing existing pavement markings, installing new pavement markings, changing signage related to parking configurations, and spot pavement repairs. Additional work would consist of, but would not be limited to: removal of existing curb bulbs, reconstruction of existing sidewalks at all intersection corners, construction of new ADA curb ramps at all intersection corners, removal of existing planters and trees at certain locations, grind and overlay pavement at all intersections, construct new full-depth pavement where curb bulbs are removed, adjustments and potential replacement of existing drainage features, moving light poles, moving signal poles, signal revisions, etc. Construction impacts would be significant in order to accomplish this work. Traffic detours would likely be in effect for the duration of construction, and sidewalk closures would be required.

This option can be expected to add a minimum of approximately \$350,000 to the cost of each non-signalized intersection, and a minimum of approximately \$550,000 to the cost of signalized intersections, in addition to the base costs associated with the previous options. Note that these cost estimates are planning-level only and may be found to be higher during design. This option does, however, provide the highest quality bicycle facilities, with significant safety enhancements and very high comfort facilities. This is the only option of those listed in this memo that would be considered a “low stress” facility.

Separated Bike Lanes & Parallel Parking



Loss of Parking

High

Cost

High

Const. Impacts

High

Safety Enh.

High

High Comfort

Yes