

To: Eric Anderson, City of Berkeley
 From: Cindy Zerger, Craig Schoenberg, Toole Design
 Date: January 5, 2022
 Project: Berkeley Southside Complete Streets
 Subject: Preferred Design Recommendation Memo

PREFERRED DESIGN RECOMMENDATION MEMO

This memorandum presents the options analysis process and resulting preferred designs for Bancroft Way, Dana Street, Fulton Street, and Telegraph Avenue. The purpose of this memo is to document the Toole Design team’s approach to alternatives analysis and ranking, taking into consideration street character, hardscape and landscape evaluation, traffic conditions, multimodal level of service, crashes and safety, construction feasibility and right-of-way, and conceptual construction costs while considering equity, fiscal impacts, economic vitality, and public support.

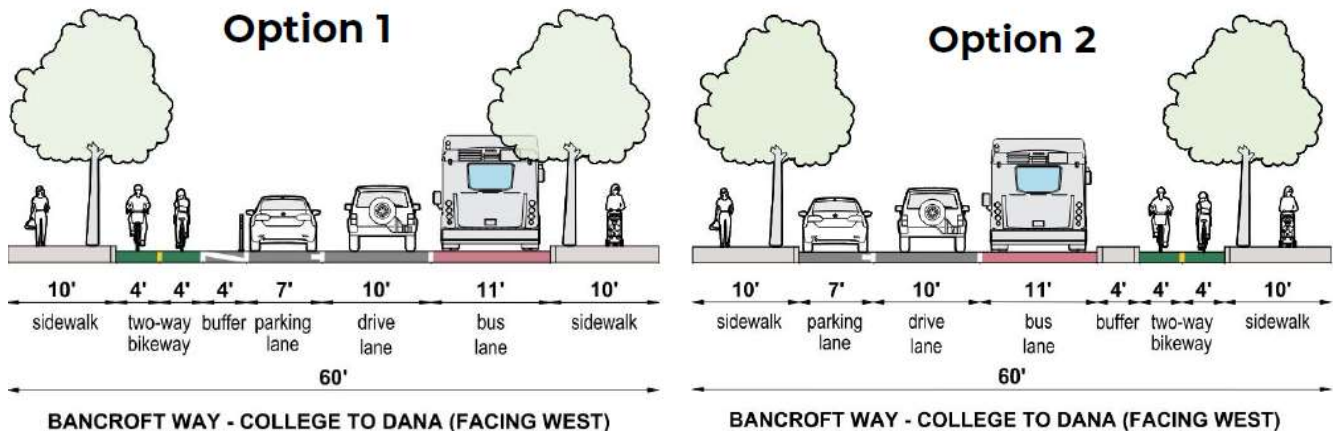
Preferred Option Selection Process

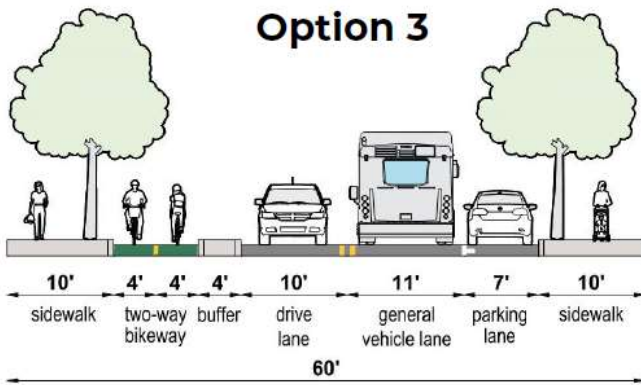
The selection of the preferred option is based upon public and stakeholder feedback, and rating of the options based on performance evaluation criteria. The next section of this memo is organized by corridor and is intended to provide high-level overview of public feedback and preferences for the various options and summarize as how each option rated using a performance metric evaluation matrix.

Design Options

Design options were developed for each corridor (larger images are located in Appendix B):

Bancroft Way:

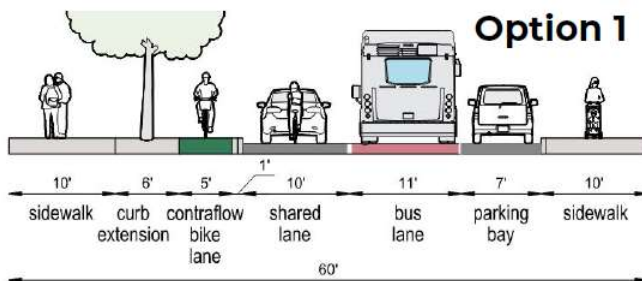




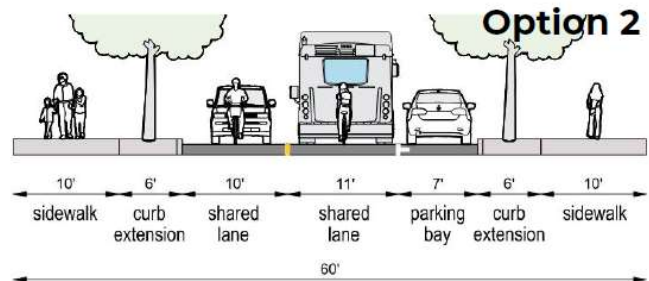
BANCROFT WAY - COLLEGE TO DANA (FACING WEST)

- Option 1: one westbound travel lane with a two-way parking-protected bike lane on the south side and a curbside bus-only lane on the north side
- Option 2: one westbound travel lane with a parking lane on the south side and a two-way curbside separated bike lane on the north side, next to a bus-only lane
- Option 3: one travel lane in each direction with a two-way separated bike lane on the south side and a parking lane on the north side

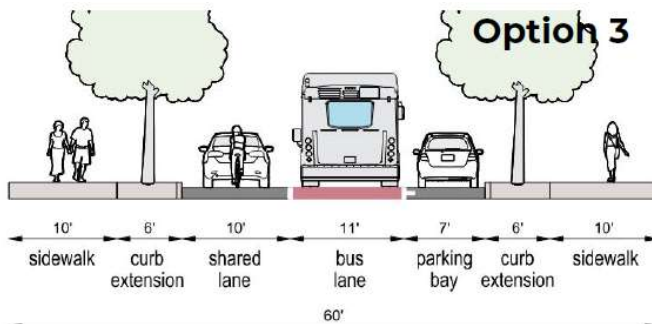
Telegraph Ave:



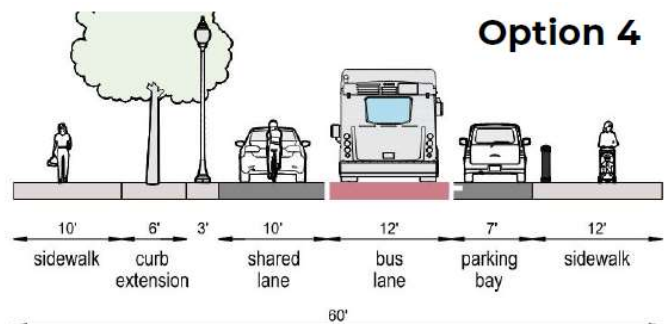
TELEGRAPH AVE - DURANT AVE TO BANCROFT WAY (FACING NORTH)



TELEGRAPH AVE - DURANT AVE TO BANCROFT WAY (FACING NORTH)



TELEGRAPH AVE - DURANT AVE TO BANCROFT WAY (FACING NORTH)

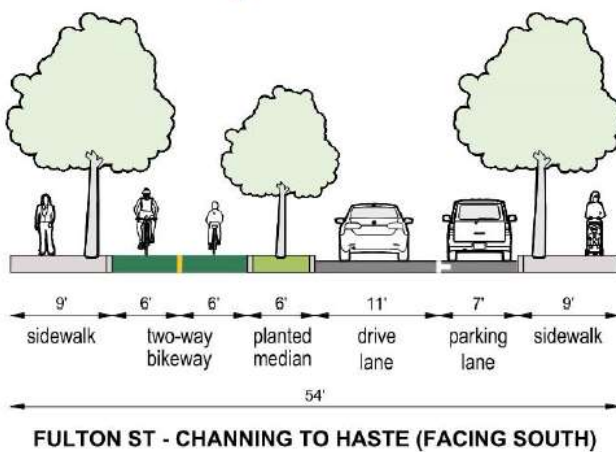


TELEGRAPH AVE - DURANT AVE TO BANCROFT WAY (FACING NORTH)

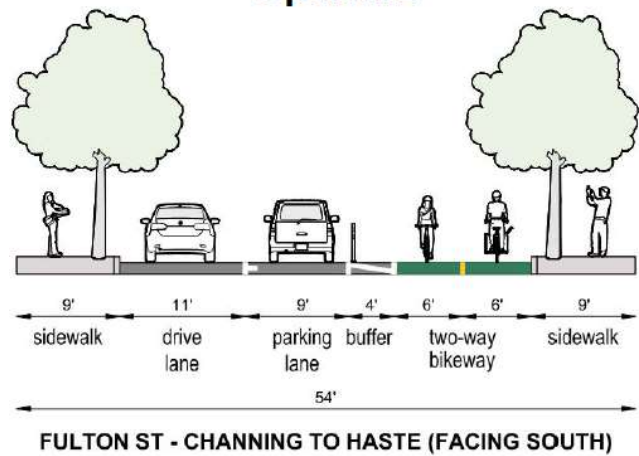
- Option 1: one northbound travel lane (shared with bikes) with a contraflow raised southbound bike lane on the west side and a bus-only lane on the east side, with alternating bulb-outs and parking on the east side
- Option 2: one travel lane in each direction (shared with bikes) with alternating bulb-outs, parking on the east side, and slight chicanes of travel lanes
- Option 3: one northbound travel lane (shared with bikes) with a bus-only lane on the east side; alternating bulb-outs and parking on both sides of the street result in a chicane
- Option 4: a shared northbound street at sidewalk level with pedestrian-scale lighting, bollards, a bus-only lane, and parking on alternating sides of the street

Fulton Street:

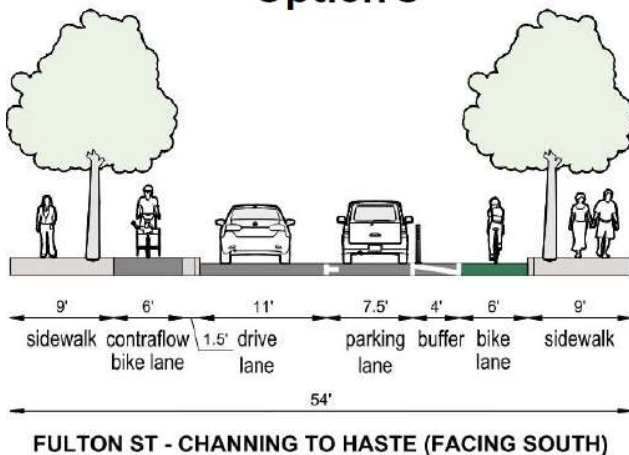
Option 1



Option 2

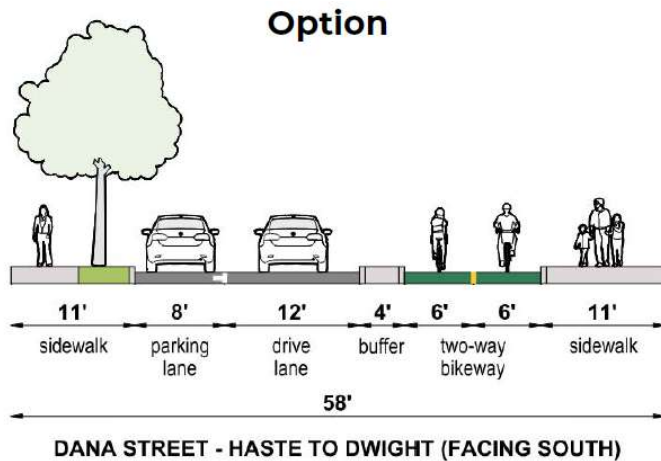


Option 3



- Option 1: one southbound travel lane with a two-way separated bike lane on the east side and parking on the west side
- Option 2: one southbound travel lane with a two-way parking-protected bike lane on the west side
- Option 3: one southbound travel lane with a parking-protected southbound bike lane on the west side and a contraflow raised northbound bike lane on the east side

Dana Street:



- Upgrade AC Transit's Dana Street pilot project, scheduled for installation in Spring 2022, from paint and post installation to contain additional concrete protection.

Public and Stakeholder Feedback

To gather public and stakeholder feedback on the design options, a public virtual meeting, online public survey, and a number of stakeholder meetings with vested parties were conducted. The feedback gathered during this process was synthesized and a preference is summarized in each section. A summary of this feedback can be found in Appendix C. Appendix C also contains detailed comments from the Berkeley Fire Department.

Evaluation Matrix

Concurrent to public and stakeholder engagement, the project team (consultant and City staff) developed a performance evaluation matrix to evaluate each of the design options based on metrics relating to three project goals: Vision Zero, transit performance, and economic development, as well as baseline metrics. An explanation of the traffic (baseline performance), transit (Goal 2), and person throughput (baseline performance) analyses conducted is presented in the following appendices:

- *Appendix E – Traffic Analysis*
 - *Appendix E1 – Traffic Analysis Framework* contains graphics depicting lane configurations and signal phasing diagrams that were modeled for each design option
 - *Appendix E2 – Traffic Analysis Summary* summarizes traffic operations and queue analyses
 - *Appendix E3 – Traffic Analysis Results* presents detailed traffic operations and queue analysis results
- *Appendix F – Transit Analysis* presents assumptions in the analysis of bus travel times
- *Appendix G – Person Throughput Analysis* presents assumptions in the person throughput analysis

The design options were rated “good”, “fair”, or “poor” by the project team, including the consultants and City staff, on each performance metric. The evaluation matrix and scoring criteria can be found in Appendix A.

Ranking

The proposed ranking included at the summary of each corridor is based on a combination of the performance metric rating and the public and stakeholder feedback.

Bancroft Way

As stated above, three design options were considered for Bancroft Way:

- Option 1: one westbound travel lane with a two-way parking-protected bike lane on the south side and a curbside bus-only lane on the north side
- Option 2: one westbound travel lane with a parking lane on the south side and a two-way curbside separated bike lane on the north side, next to a bus-only lane
- Option 3: one travel lane in each direction with a two-way separated bike lane on the south side and a parking lane on the north side

Option 1

While Option 1 was not the preferred option in either the public virtual meeting or the online public survey, it ranked a close second in the latter. Specifically, some participants noted that the presence of floating parking would provide more opportunities for street activation and landscape improvements.

AC Transit and the Lawrence Berkeley National Laboratory shuttle operator both preferred Option 1 due to the minimal impacts to existing transit infrastructure. The Berkeley Fire Department expressed concerns that the floating parking in Option 1 might decrease aerial ladder access to buildings on the south side of the street, but this concern can be mitigated via strategic parking restrictions.

In the evaluation matrix, Option 1 was rated the highest across the board, with “good” noted in most metrics and “fair” in all others except for *expanded boarding areas, additional transit shelters, and platform level boarding*, which scored “poor” due to the option’s expected maintenance of the existing curbside bus-only lane.

Option 2

The majority of public virtual meeting and survey participants preferred Option 2, given the resulting increased bicycle access to the UC Berkeley campus; it should be noted that many of the participants in the public virtual meeting were self-identified students at UC Berkeley.

Some stakeholder groups, including AC Transit and UC Berkeley, were opposed to Option 2 due to the expected increase in interactions between bicyclists and people at transit locations. The requirement to rebuild portions of the Sproul Plaza transit plaza, which was recently completed, was also seen as undesirable from these stakeholders. The City right-of-way is not clear at this location, with some ownership agreements between UC Berkeley and the City going back many decades; rebuilding this plaza would carry some risk for this reason as well. Generally, Berkeley Fire Department had fewer concerns with this option, as there is no floating parking; it is expected that the use of mountable curb buffers would acceptably address comments regarding building access.

In the evaluation matrix, Option 2 ranked closely behind Option 1, with “good” or “fair” noted in all metrics except for *concept impacts and costs*, due to the curb reconstruction that would result from placing the separated bike lane and multiple floating bus stops on the north side of the street.

Option 3

Stakeholders and community members emphasized the importance of transit operations and priority on all corridors, but particularly on Bancroft Way, meaning that Option 3 was generally opposed by all, given the lack of a dedicated transit lane. Specifically, the Berkeley Fire Department had concerns about the narrow travel and parking lanes in this scenario due to the introduction of opposing traffic.

In the evaluation matrix, Option 3 scored “poor” in most performance metrics, including costs, where converting the existing street to two-way motor vehicle operation would be expected to carry high costs due to the necessary modifications to existing signal infrastructure.

Error! Not a valid bookmark self-reference. presents the evaluation matrix summary for the Bancroft Way design options. The full table presenting the detailed evaluation matrix can be found in Appendix D.

Table 1: Bancroft Way Evaluation Matrix Summary

	Performance Metrics	Option 1	Option 2	Option 3
Goal 1 - Vision Zero	Pedestrian comfort, safety, and convenience	Fair	Fair	Poor
	Bicycle comfort, safety, convenience	Good	Good	Fair
	Pedestrian/Bicyclist Conflict Points with Vehicles (intersection crossings, driveways, etc.)	Fair	Good	Poor
Goal 2 - Transit Performance	Change in Bus Travel Time	Good	Good	Poor
	Expanded boarding areas, additional transit shelters, and platform level boarding	Poor	Good	Poor
Goal 3 - Economic Development	Enhances business and amenity access for the most common travel modes identified by the intercept survey (walking & transit) and provides new access for bicyclists (including space for bike racks)	Good	Fair	Poor
	Provides dynamic space to best serve adjacent businesses (loading zones to accommodate commercial delivery, food delivery, and/or rideshare)	Good	Good	Poor
	Provides space to ease operational considerations along the corridor (trash, recycling, compost collection)	Good	Fair	Good
	Provides area for placemaking & opportunity for roadway flexibility (festival streets, streetery space)	Good	Fair	Good
Baseline Performance Information	Traffic Analysis: Volume-to-capacity ratio (V/C), vehicular queue length, and level of service (LOS)	Fair	Fair	Poor
	Person Throughput	Good	Good	Poor
	Parking inventory	Fair	Good	Poor
	Universal Design	Good	Fair	Poor
	Concept Impacts & Costs	Good	Poor	Poor
	Fire marshal requirements	Fair	Fair	Fair
	Street Maintenance	Fair	Good	Good

The resulting ranking of design options for Bancroft Way are:

- Option 1: one westbound travel lane with a two-way parking-protected bike lane on the south side and a curbside bus-only lane on the north side**
- Option 2: one westbound travel lane with a parking lane on the south side and a two-way curbside separated bike lane on the north side, next to a bus-only lane

3. Option 3: one travel lane in each direction with a two-way separated bike lane on the south side and a parking lane on the north side

Telegraph Avenue

Four design options were considered for Telegraph Avenue:

- Option 1: one northbound travel lane (shared with bikes) with a contraflow raised southbound bike lane on the west side and a bus-only lane on the east side, with alternating bulb-outs and parking on the east side
- Option 2: one travel lane in each direction (shared with bikes) with alternating bulb-outs, parking on the east side, and slight chicanes of travel lanes
- Option 3: one northbound travel lane (shared with bikes) with a bus-only lane on the east side; alternating bulb-outs and parking on both sides of the street result in a chicane
- Option 4: a shared northbound street at sidewalk level with pedestrian-scale lighting, bollards, a bus-only lane, and parking on alternating sides of the street

Option 1

Community members and stakeholders generally indicated equal preference for Options 1 and 4. Given the high density of commercial destinations on Telegraph Avenue and the regional bicycle connectivity of the corridor south of the study area, many public virtual meeting and online survey participants indicated preference for Option 1 due to the provision of a dedicated southbound bike lane. This is the only option would result a dedicated space for bicyclists to travel both northbound and southbound on Telegraph Avenue. The inclusion of a southbound bike lane somewhat limits the available space for pedestrian realm improvements and loading activity when compared to other options.

Berkeley Fire Department had concerns about the presence of the contraflow bicycle lane and its impact to access of existing buildings. The design team believes this issue, and others, can be addressed using mountable curb and other strategies previously used in the City.

In the evaluation matrix, Option 1 ranked third, primarily due to its impact on dynamic and operational curb use, and lower placemaking and roadway flexibility when compared to other options.

Option 2

Option 2 was the least-preferred by community members in the public virtual meeting and online survey. Stakeholders and community members expressed concern around merchant access and accommodation of loading, pick-up, and drop-off for deliveries and rideshare on all corridors, but particularly on Telegraph Avenue, with Option 2.

While not explicitly noted by Berkeley Fire Department, the design team believes the two-way conversion of Telegraph Avenue in this option would make minimum lane widths more difficult to approve. AC Transit and the Lawrence Berkeley National Laboratory shuttle operator did not support this option due to the lack of dedicated transit lanes.

In the evaluation matrix, all options were noted as “fair” in the *provides dynamic space* metric except for Option 2, which was noted as “poor” due to the increased difficulties in loading that would result from two-way vehicular travel. While Option 2 does provide space for bidirectional bicycle travel via shared lanes, the restoration of two-way vehicular travel on Telegraph Avenue negatively impacts transit and traffic operations and provides less flexible space on the roadway, resulting in it scoring the lowest in the options evaluation matrix. Additionally, it is likely to be a higher cost option due to the necessary signal modifications.

Option 3

Community members indicated that Option 3 was the second least preferred during the public virtual meeting and the online survey.

Berkeley Fire Department, and other key stakeholders, did not have input that was specific to this option. Transit operators support the option as it includes a dedicated transit lane.

Option 3 ranked second in the evaluation matrix. The shifting of the roadway along the block face may somewhat reduce the amount of curb space that is available for loading when compared to some of the other options, but it may also increase the amount of space available for pedestrian realm improvements, including transit stop opportunities. This option provides a continuous bus only lane, and may pair well with Option 4 in the event that a single option for the entire four-block corridor is not feasible due to available construction funding.

Option 4

Community members and stakeholder groups both indicated approximately equal preference of Option 1 and Option 4. Community members and the Transportation Commission both indicated support for pedestrians to be the most highly prioritized mode on Telegraph Avenue, and many community members expressed a desire to close Telegraph Way to vehicles completely.

The Transportation Commission indicated a preference for Option 4 due to the design continuity with the shared street proposed in the Telegraph Avenue Public Realm Plan. AC Transit voiced support for this option as well. Berkeley Fire Department did not have specific concerns regarding the curbless street; the design team notes that this option may provide more flexibility in building access when compared to other options. Lastly, the Commission on Disability noted that curbless streets present unique challenges and that common design practice hasn't solved them yet; additional coordination with this Commission will be necessary.

Option 4 ranked the highest across the board in the evaluation matrix, noting "good" in most metrics and "fair" in all others, except for *bicyclist comfort, safety, convenience* and *concept impacts and costs*, which was noted as "poor." Option 4 was the only design option on Telegraph Avenue that was noted as "poor" in *concept impacts and costs*, due to the likely curb reconstruction, drainage reconfiguration, utility impacts, and overall cost implications that would result from reconstructing the roadway to create a flush street; there are strategies to mitigate some of these costs and still provide a similar option, which may allow this option to be applied to a greater length of the corridor if construction funding is limited.

Table 2 presents the evaluation matrix summary for the Telegraph Avenue design options. The full table presenting the detailed evaluation matrix can be found in Appendix D.

Table 2: Telegraph Avenue Evaluation Matrix Summary

	Performance Metrics	Option 1	Option 2	Option 3	Option 4
Goal 1 – Vision Zero	Pedestrian comfort, safety, and convenience	Poor	Fair	Fair	Good
	Bicycle comfort, safety, convenience	Fair	Poor	Poor	Poor
	Pedestrian/Bicyclist Conflict Points with Vehicles (intersection crossings, driveways, etc.)	Poor	Poor	Good	Good

	Performance Metrics	Option 1	Option 2	Option 3	Option 4
Goal 2 – Transit Performance	Change in Bus Travel Time	Fair	Poor	Fair	Fair
	Expanded boarding areas, additional transit shelters, and platform level boarding	Fair	Fair	Good	Fair
Goal 3 – Economic Development	Enhances business and amenity access for the most common travel modes identified by the intercept survey (walking & transit) and provides new access for bicyclists (including space for bike racks)	Fair	Poor	Fair	Good
	Provides dynamic space to best serve adjacent businesses (loading zones to accommodate commercial delivery, food delivery, and/or rideshare)	Poor	Poor	Fair	Fair
	Provides space to ease operational considerations along the corridor (trash, recycling, compost collection)	Poor	Good	Good	Good
	Provides area for placemaking & opportunity for roadway flexibility (festival streets, streetery space)	Poor	Fair	Fair	Good
Baseline Performance Information	Traffic Analysis: Volume-to-capacity ratio (V/C), vehicular queue length, and level of service (LOS)	Fair	Poor	Fair	Fair
	Person Throughput	Good	Poor	Good	Good
	Parking inventory	Poor	Fair	Fair	Good
	Universal Design	Poor	Fair	Fair	Good
	Concept Impacts & Costs	Fair	Fair	Fair	Poor
	Fire marshal requirements	Fair	Fair	Fair	Fair
	Street Maintenance	Fair	Fair	Fair	Good

The resulting ranking of design options for Telegraph Avenue are:

1. **Option 4: a shared northbound street at sidewalk level with pedestrian-scale lighting, bollards, a bus-only lane, and parking on alternating sides of the street**
2. Option 3: one northbound travel lane (shared with bikes) with a bus-only lane on the east side; alternating bulb-outs and parking on both sides of the street result in a chicane
3. Option 1: one northbound travel lane (shared with bikes) with a contraflow raised southbound bike lane on the west side and a bus-only lane on the east side, with alternating bulb-outs and parking on the east side
4. Option 2: one travel lane in each direction (shared with bikes) with alternating bulb-outs, parking on the east side, and slight chicanes of travel lanes

Fulton Street

Three design options were considered for Fulton Street:

- Option 1: one southbound travel lane with a two-way separated bike lane on the east side and parking on the west side
- Option 2: one southbound travel lane with a two-way parking-protected bike lane on the west side
- Option 3: one southbound travel lane with a parking-protected southbound bike lane on the west side and a contraflow raised northbound bike lane on the east side

Option 1

Option 1 was the most-preferred by community members. Public virtual meeting participants indicated a preference for Option 1 due to the additional landscaping opportunity that it could provide in the bikeway buffer. Community members also indicated a preference because it could provide continuity with a future bicycle facility on Oxford Street north of the study area (a UC Berkeley study of the Oxford street corridor recommended a two-way separated bike lane on the east side of Oxford Street).

UC Berkeley Staff preferred Option 1 due to its potential to provide continuity with a future Oxford Street two-way separated bike lane. Berkeley Fire Department had concerns with how the bicycle lane would change access along the east side of Fulton Street, where existing aerial utilities are present; the design team anticipates that using previously approved construction methods, such as mountable concrete bike lane buffers, will alleviate these concerns.

In the evaluation matrix, Option 1 ranked approximately equally to Option 2, noting “fair” in most metrics and “good” in all others, except *provides area for placemaking & opportunity for roadway flexibility (festival streets, streetery space)*, where all three options were noted as “poor” in due to the lack of flexible space in the Fulton Street designs. The preliminary traffic analysis indicates that Option 1 performs poorly compared to Option 2, due to the signal phase revisions that would be necessary at Durant Ave and Dwight Way intersections; however, it should be noted that the design supports a City goal of providing signal phase separation between the east leg crosswalk on Durant Ave and the southbound vehicular left turn from Fulton.

Option 2

Community members noted Option 2 as the least-preferred option on Fulton Street, mostly due to the lack of a concrete buffer island adjacent to the bicycle facility.

Based on Berkeley Fire Department comments, the project team anticipates that Option 2 will require more coordination and result in more extensive parking restrictions given existing aerial utility locations and building heights, when compared to Option 1.

Option 2 ranked approximately equally with Option 1 in the evaluation matrix. In addition to the *provides area for placemaking & opportunity for roadway flexibility (festival streets, streetery space)* metric where all three options were noted as “poor”, Option 2 is also “poor” in *parking inventory* due to the parking restrictions necessary to implement a parking-protected two-way bike lane. Regarding preliminary traffic analysis, Option 2 performed better than Option 1, but it is important to note that signal phase separation between the east leg crosswalk of Durant Ave and the southbound vehicular left turn from Fulton was not modeled; a similar performance to Option 1 at this intersection would be expected for the project to meet the City goal of improving this crossing.

Option 3

Community members indicated that they preferred Option 3 nearly the same as Option 1, with a general desire for a bike facility that would provide a connection to Oxford Street north of the study area.

Although Oxford Street today has one-way bike lanes in each direction, which would align with the Option 3 cross section, there is a current discussion to consider a two-way separated bike lane on the east side of Oxford Street,

which will align more closely with the Option 1 cross section; for this reason, UC Berkeley Staff did not prefer this option. Based on Berkeley Fire Department comments, the project team anticipates that Option 3 will require more coordination and result in more extensive parking restrictions given existing aerial utility locations and building heights, when compared to Option 1.

Option 3 ranked the lowest in the evaluation matrix, mostly due to the additional bicycle conflicts points that would be present along the corridor by virtue of having turns across a bike lane at every intersection, and the additional cost associated with providing a sidewalk level bicycle lane and signalization changes to support the contraflow bike lane.

Table 3 presents the evaluation matrix summary for the Fulton Street design options. The full table presenting the detailed evaluation matrix can be found in Appendix D.

Table 3: Fulton Street Evaluation Matrix Summary

	Performance Metrics	Option 1	Option 2	Option 3
Goal 1 - Vision Zero	Pedestrian comfort, safety, and convenience	Fair	Fair	Fair
	Bicycle comfort, safety, convenience	Good	Good	Fair
	Pedestrian/Bicyclist Conflict Points with Vehicles (intersection crossings, driveways, etc.)	Fair	Good	Poor
Goal 2 - Transit Performance ¹	Change in Bus Travel Time	n/a	n/a	n/a
	Expanded boarding areas, additional transit shelters, and platform level boarding	n/a	n/a	n/a
Goal 3 - Economic Development	Enhances business and amenity access for the most common travel modes identified by the intercept survey (walking & transit) and provides new access for bicyclists (including space for bike racks)	Fair	Fair	Fair
	Provides dynamic space to best serve adjacent businesses (loading zones to accommodate commercial delivery, food delivery, and/or rideshare)	Fair	Fair	Fair
	Provides space to ease operational considerations along the corridor (trash, recycling, compost collection)	Fair	Fair	Fair
	Provides area for placemaking & opportunity for roadway flexibility (festival streets, streetery space)	Poor	Poor	Poor
Baseline Performance Information	Traffic Analysis: Volume-to-capacity ratio (V/C), vehicular queue length, and level of service (LOS)	Poor	Fair	Poor
	Person Throughput	Good	Good	Good
	Parking inventory	Good	Poor	Fair
	Universal Design	Fair	Good	Poor
	Concept Impacts & Costs	Fair	Good	Poor
	Fire marshal requirements	Fair	Fair	Fair

	Performance Metrics	Option 1	Option 2	Option 3
	Street Maintenance	Good	Fair	Poor

¹ Transit performance metrics are not applicable on Fulton Street due to the lack of bus service along the corridor.

The resulting ranking of design options for Fulton Street are:

- Option 1: one southbound travel lane with a two-way separated bike lane on the east side and parking on the west side**
- Option 2: one southbound travel lane with a two-way parking-protected bike lane on the west side
- Option 3: one southbound travel lane with a parking-protected southbound bike lane on the west side and a contraflow raised northbound bike lane on the east side

Dana Street

Only one option is being studied and advanced on Dana Street as part of the Southside Complete Streets Project. This option will upgrade AC Transit's Dana Street pilot project, scheduled for installation in Spring 2022, from paint and post installation to contain additional concrete protection. This design includes one southbound travel lane with a two-way separated bike lane on the west side and a parking lane on the east side. Community members and stakeholders both indicated support of moving forward with this design option on Dana Street.

The Berkeley Fire Department (BFD) provided detailed feedback on the design option, including concerns around access limitations that they anticipated might result from the implementation of the permanent design option. The project does not propose any parking protected bicycle lanes, so it is anticipated that previously approved methods of achieving access to existing structures, such as mountable curb buffer along the bicycle lane, will mitigate concerns. Additional coordination with BFD will be needed during the design phase.

Overall Network Recommendations

The preferred network recommendations resulting from the ranked design options for each corridor are:

- Bancroft Way Option 1: one westbound travel lane with a two-way parking-protected separated bike lane on the south side and a curbside bus-only lane on the north side
- Telegraph Avenue Option 4: a shared northbound street at sidewalk level with pedestrian-scale lighting, bollards, a bus-only lane, and parking on alternating sides of the street
- Fulton Street Option 1: one southbound travel lane with a two-way separated bike lane on the east side and parking on the west side
- Dana Street: one southbound travel lane with a two-way separated bike lane on the west side and a parking lane on the east side

The preferred options for each corridor will be presented for City Council approval, upon which the project will move into the final design stage.

Attachments

- Appendix A – Final Evaluation Matrix
- Appendix B – Corridor Design Options
- Appendix C – Public and Stakeholder Feedback on Options
- Appendix D – Detailed Evaluation Matrix Results
- Appendix E – Traffic Analysis
 - Appendix E1 – Traffic Analysis Framework
 - Appendix E2 – Traffic Analysis Summary
 - Appendix E3 – Traffic Analysis Results
- Appendix F – Transit Analysis
- Appendix G – Person Throughput Analysis