

## APPENDIX B:

# DETAILED ALTERNATIVE ANALYSIS RESULTS

## DESCRIPTION

This appendix contains a summary of findings from the evaluation of alternatives. The analysis is based on the scoring of metrics, which are each associated with the project Goals and Objectives.

Element 3 of Alternative 1 was not under consideration as a standalone element at the time that this evaluation took place, and is therefore not assessed in this document. As part of the iterative process, the inception of Element 3 occurred after the detailed analysis stage. While the exact configuration of this element was not part of the detailed analysis, it is a subset of Alternative 1, Element 4, which was analyzed in detail. As such, the findings from detailed analysis of Alternative 1, Element 4 informed the decision to include Element 3 as a viable concept.

Similarly, the potential Element 3 of Alternative 2 was not under consideration at the time that this evaluation took place. Moreover, Elements 1 and 2 of Alternative 2 were evaluated as a single element and is presented as such in this appendix.

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- Findings by Metric and Alternative
- Evaluation Criteria/Evaluation
- Categories of Evaluation:
  - Prioritize Transit Operations
  - Enhance Intermodal Connectivity
  - Minimize Potential Effects to I-280
  - Develop Feasible Solutions

This appendix summarizes findings from the evaluation of alternatives conducted for the Balboa Park Circulation Study.

Note that for purposes of evaluation, the Baseline alternative (which includes a package of transportation improvements, but does not include any closure of Interstate 280 ramps) has been compared to existing conditions, while the other alternatives have been compared to the Baseline alternative. The other alternatives are:

ALTERNATIVE 1: SPLIT INTERCHANGE	
Element 1	Closure of the Geneva Avenue northbound on-ramp
Element 2	Realign Ocean Avenue southbound off-ramp into a "T" intersection
Element 3 (not studied here)	Construct a kiss-and-ride drop-off area on a new northbound frontage road between freeway ramps
Element 4	Closure of the Geneva Avenue southbound off-ramp and construction of a southbound frontage road between freeway ramps
ALTERNATIVE 2: CONSOLIDATED INTERCHANGE ON GENEVA AVE	
Element 1	Closure of both freeway ramps on Ocean Avenue

Element 3 of Alternative 1 was not under consideration as a standalone element at the time that this evaluation took place, and is therefore not assessed in this document. As part of the iterative process, the inception of Element 3 occurred after the detailed analysis stage. While the exact configuration of this element was not part of the detailed analysis, it is a subset of Alternative 1, Element 4, which was analyzed in detail. As such, the findings from detailed analysis of Alternative 1, Element 4 informed the decision to include Element 3 as a viable concept.

Findings for each metric and criterion are shown in Table B-1 on the following page. Note that the metrics and criteria are associated with project Goals and Objectives, which can be found at the start of each sub-section in the Evaluation section of this document.

The evaluation scores for each metric are composite scores for the station area as a whole and may not reflect that some proposed elements have significant benefits to one of Ocean Avenue or Geneva Avenue while simultaneously creating a disbenefit to the other roadway. The descriptions of effects included in the metric tables serve to justify the score further.

Table B-1: Findings by Metric and Alternative

SUMMARY EVALUATION							
METRIC	CRITERIA	BASELINE	ALTERNATIVE 1			ALTERNATIVE 2	
			ELEMENT 1	ELEMENT 2	ELEMENT 4		
1.1.1	Intersection configuration/geometry	Potential increase/decrease in intermodal conflicts (at each location)	1	2	2	1	2
1.1.2	Volume of conflicting users (e.g., pedestrian-vehicle volumes)	Numbers of users benefitting/impacted	1	2	2	1	2
1.1.3	Intersection operations, including delay to transit	Increase/decrease in transit travel time (select routes/segments)	1	0	-1	-1	-2
1.2.1	Existing and Future Intersection vehicle operations (v/c, average delay) that account for other development in the area	Increase/decrease in intersection LOS (various intersections)	1	0	0	-1	-2
1.3.1	On- and off-ramp peak-hour volumes	Increase/decrease in vehicle volumes (at each ramp)	0	0	0	0	0
1.3.2	Ramp intersection operations	Increase/decrease in intersection LOS (at each ramp)	1	0	0	-1	-2
1.3.3	Ramp queuing lengths	Increase/decrease in queue lengths	0	0	-1	-1	-1
1.5.1	Kiss-and-ride design	Potential increase/decrease in intermodal conflicts (at each location)	0	0	0	2	1
2.1.1	Number of types & character of conflicts, volume of conflicting movements involving buses	Peak transit/private vehicles per hour (at each location)	1	0	-1	0	-2
2.1.2	Traffic operational delay for bus movements / pace	Increase/decrease in transit travel time (select routes/segments)	1	0	-1	-1	-2
2.1.3	Maximize opportunities to support goals of near- and long-term improvements	Level of support for/consistency with Transit Effectiveness Project recommendations	2	1	-1	-2	-1
2.2.1	Number of types & character of conflicts, volume of conflicting movements involving LRT	Increase/decrease in intersection LOS (at each location)	0	-1	-1	-2	2
2.2.2	Traffic operational delay for LRT movements	Increase/decrease in intersection LOS (at each location); increase in the number of conflicts for LRVs exiting Green Yard	0	-1	-1	-2	2
3.1.1	Alternative supports pedestrian demand/patterns (informed by pedestrian volumes, key institutions near the station, and transit ridership volumes)	Potential increase/decrease in intermodal conflicts (at each location)	1	2	2	-1	0
3.1.2	Number of types & character of vehicle-pedestrian conflicts, volume of motorized movements conflicting with pedestrian crossings	Numbers of pedestrians benefitting (e.g., in crosswalk where vehicle traffic eliminated)	1	2	2	-1	2
3.3.1	Supports bicycle activity (informed by bicycle volumes)	Increase/decrease in vehicle volumes on bicycle routes	0	-2	-1	-1	2
3.3.2	Number of types & character of vehicle-bicycle conflicts, volume of motorized movements conflicting with bike routes	Increase/decrease in vehicle volumes on bicycle routes	0	-1	2	0	2
4.1.1	On- and off-ramp peak-hour volumes	Increase/decrease in vehicle volumes (at each ramp)	0	0	0	0	0
4.1.2	Ramp queuing lengths	Increase/decrease in queue lengths	0	0	-1	-2	-1
5.1.1	Ability to get through Caltrans PSR process	Qualitative assessment	0	-1	-1	-2	-1
5.1.2	Relative cost	Order-of-magnitude cost estimates	N/A	2	1	-2	2
5.1.3	Engineering feasibility	Qualitative assessment	2	2	2	2	2
5.2.1	Alternatives are cost effective ways to address identified issues	Qualitative assessment	2	1	1	1	1
5.2.2	Alternatives do not result in substantial rerouting of transit or vehicles to other ramps	Qualitative assessment	2	-1	0	0	-2
5.3.1	Ability to integrate improvements into programmed routine maintenance/construction.	Qualitative assessment	1	-1	-1	-1	-1

# 1 EVALUATION CRITERIA

Table B-2 below shows primary data used in the evaluation for each metric and criterion.

**Table B-2: Evaluation Metrics, Criteria and Data**

EVALUATION FRAMEWORK (REVISED)			
METRIC	CRITERIA	DATA	
1.1.1	Intersection configuration/geometry	Potential increase/decrease in intermodal conflicts (at each location)	Conceptual configurations, projected vehicle and existing pedestrian, bicycle and transit vehicle volumes (under TEP recommendations)
1.1.2	Volume of conflicting users (e.g., pedestrian-vehicle volumes)	Numbers of users benefitting/impacted	Projected vehicle and existing pedestrian, bicycle and transit vehicle volumes (under TEP recommendations)
1.1.3	Intersection operations, including delay to transit	Increase/decrease in transit travel time (select routes/segments)	Projected intersection LOS, projected transit delay
1.2.1	Existing and Future Intersection vehicle operations (v/c, average delay) that account for other development in the area	Increase/decrease in intersection LOS (various intersections)	Projected intersection LOS
1.3.1	On- and off-ramp peak-hour volumes	Increase/decrease in vehicle volumes (at each ramp)	Projected vehicle volumes
1.3.2	Ramp intersection operations	Increase/decrease in intersection LOS (at each ramp)	Projected intersection LOS
1.3.3	Ramp queuing lengths	Increase/decrease in queue lengths	Projected queue lengths
1.5.1	Kiss-and-ride design	Potential increase/decrease in intermodal conflicts (at each location)	Conceptual configurations
2.1.1	Number of types & character of conflicts, volume of conflicting movements involving buses	Peak transit/private vehicles per hour (at each location)	Transit vehicle volumes under TEP recommendations
2.1.2	Traffic operational delay for bus movements / pace	Increase/decrease in transit travel time (select routes/segments)	Projected intersection LOS, existing transit delay
2.1.3	Maximize opportunities to support goals of near- and long-term improvements	Level of support for/consistency with Transit Effectiveness Project recommendations	Transit vehicle volumes under TEP recommendations
2.2.1	Number of types & character of conflicts, volume of conflicting movements involving LRT	Increase/decrease in intersection LOS (at each location)	Projected intersection LOS
2.2.2	Traffic operational delay for LRT movements	Increase/decrease in intersection LOS (at each location); increase in the number of conflicts for LRVs exiting Green Yard	Projected intersection LOS (relevant intersections), conceptual configurations
3.1.1	Alternative supports pedestrian demand/patterns (informed by pedestrian volumes, key institutions near the station, and transit ridership volumes)	Potential increase/decrease in intermodal conflicts (at each location)	Existing pedestrian volumes
3.1.2	Number of types & character of vehicle-pedestrian conflicts, volume of motorized movements conflicting with pedestrian crossings	Numbers of pedestrians benefitting (e.g., in crosswalk where vehicle traffic eliminated)	Projected vehicle and existing pedestrian volumes
3.3.1	Supports bicycle activity (informed by bicycle volumes)	Increase/decrease in vehicle volumes on bicycle routes	Projected vehicle and existing bicycle volumes
3.3.2	Number of types & character of vehicle-bicycle conflicts, volume of motorized movements conflicting with bike routes	Increase/decrease in vehicle volumes on bicycle routes	Projected vehicle and existing bicycle volumes
4.1.1	On- and off-ramp peak-hour volumes	Increase/decrease in vehicle volumes (at each ramp)	Projected vehicle volumes
4.1.2	Ramp queuing lengths	Increase/decrease in queue lengths	Projected queue lengths
5.1.1	Ability to get through Caltrans PSR process	Qualitative assessment	n/a
5.1.2	Relative cost	Order-of-magnitude cost estimates	Cost estimates
5.1.3	Engineering feasibility	Qualitative assessment	n/a
5.2.1	Alternatives are cost effective ways to address identified issues	Qualitative assessment	Cost estimates
5.2.2	Alternatives do not result in substantial rerouting of transit or vehicles to other ramps	Qualitative assessment	Projected vehicle volumes
5.3.1	Ability to integrate improvements into programmed routine maintenance/construction.	Qualitative assessment	n/a

## 2 EVALUATION

### 2.1 | Reduce negative impacts on the local community resulting from vehicles accessing the regional road network

#### 2.1.1 | REDUCE MULTIMODAL CONFLICTS AT I-280 INTERCHANGE RAMP INTERSECTIONS

##### 2.1.1.1 INTERSECTION CONFIGURATION/GEOMETRY

**Table B-3: Potential increase/decrease in intermodal conflicts (at each location)**

CONCEPT	FINDINGS	RATING
Baseline	Because no ramp closures, no change in traffic volumes. However, EB bike lane and signalization of SB off-ramp on Ocean will reduce conflicts between vehicles, cyclists and pedestrians, and WB transit lane on Geneva will reduce conflicts between private and transit vehicles. (Conflicts on WB Ocean would be further reduced if the LRT lane were made transit-only and could be used by buses.)	1
Alternative 1, Element 1	Elimination of conflicts between pedestrians and automobiles at the location of the current Geneva Avenue NB off-ramp.	2
Alternative 1, Element 2	Squaring of Ocean SB off-ramp reduces severity of pedestrian and bicycle conflicts with vehicles exiting freeway.	2
Alternative 1, Element 4	Adding space for kiss-and-ride on the northbound frontage road would reduce instance of kiss-and-ride in locations that place pedestrians in conflict with vehicles.	1
Alternative 2	This option would eliminate conflicts between freeway-accessing vehicles and bicycles/pedestrians/transit on Ocean Avenue. This option would increase conflicts of this kind at the Geneva ramps where turning movement volumes would increase substantially, although the benefits of eliminating conflicts on Ocean Avenue outweigh this.	2

## 2.1.2 | VOLUME OF CONFLICTING USERS (E.G., PEDESTRIAN-VEHICLE VOLUMES)

Table B-4: Numbers of users benefitting/impacted

CONCEPT	FINDINGS	RATING
Baseline	Because no ramp closures, no change in traffic volumes. However, EB bike lane will reduce conflicts between vehicles and cyclists, and WB transit lane on Geneva will reduce conflicts between private and transit vehicles. (Conflicts on WB Ocean would be further reduced if the LRT lane were made transit-only and could be used by buses.)	1
Alternative 1, Element 1	Moderate decrease in traffic volumes on Geneva, moderate increase on Ocean would result in major benefits for pedestrians, minor impact on transit.	2
Alternative 1, Element 2	WB pedestrian and cyclist numbers on Ocean Avenue are moderate and these travelers would benefit from elimination of the freeway-ramp/Ocean Avenue merge.	2
Alternative 1, Element 4	Addition of frontage roads will add a moderate amount of vehicles turning in and out of them, but there would be a decrease in kiss-and-ride activity on surrounding streets, often in non-designated areas.	1
Alternative 2	Many transit vehicles/pedestrians/cyclists travel along Ocean Avenue and elimination of all ramp-movements will reduce conflicts for a high amount of travelers. This is somewhat offset by increase in conflicts along Geneva Avenue.	2

## 2.1.3 | INTERSECTION OPERATIONS, INCLUDING DELAY TO TRANSIT

Table B-5: Increase/decrease in transit travel time (select routes/segments)

CONCEPT	FINDINGS	RATING
Baseline	Reduction in average PM peak period delay of about 1 ½ mins for transit vehicles traveling WB on Geneva, including Rapid Network Line 8BX.	1
Alternative 1, Element 1	Minor impact on transit vehicles on Ocean and Geneva, compared to Baseline (less than 30 seconds on Ocean and Geneva in both directions).	0
Alternative 1, Element 2	Moderate impact on transit vehicles on Ocean, where there would be roughly twice as many vehicles as on Geneva during peak periods under TEP recommendations (around 1 mins EB, and about 1 mins WB).	-1
Alternative 1, Element 4	Major impact on transit vehicles on Ocean, where there would be roughly twice as many vehicles as on Geneva during peak periods under TEP recommendations (about 1 ½ mins EB, and around 1 minute WB).	-1
Alternative 2	Major impact on transit vehicles on EB Geneva (about 4 mins).	-2

## 2.2 | Do not substantially degrade operations at other key intersections in the study area

### 2.2.1 | EXISTING AND FUTURE INTERSECTION VEHICLE OPERATIONS (V/C, AVERAGE DELAY) THAT ACCOUNT FOR OTHER DEVELOPMENT IN THE AREA

Table B-6: Increase/decrease in intersection LOS (various intersections)

CONCEPT	FINDINGS	RATING
Baseline	3 intersections will improve slightly, 1 intersection will improve slightly, and one will worsen slightly.	1
Alternative 1, Element 1	2 intersections will degrade slightly, and 2 intersections will improve slightly.	0
Alternative 1, Element 2	2 intersections will degrade slightly, 1 intersection will improve slightly .	0
Alternative 1, Element 4	Mixed outcome expected compared to baseline with possible major impacts at Ocean Avenue/northbound frontage road, that requires further study.	-1
Alternative 2	2 intersections will degrade slightly, 4 intersections will degrade significantly, 1 intersection will improve greatly, and 1 intersection will improve slightly.	-2

## 2.3 | Do not substantially degrade operations at adjacent I-280 interchanges

### 2.3.1 | ON- AND OFF-RAMP PEAK-HOUR VOLUMES

The following five intersections were reviewed as part of this analysis:

- Ocean/I-280 on-ramp
- Geneva Ave/I-280 SB Off
- Geneva Ave/I-280 NB On
- Monterey/I-280 Ramps
- Alemany/I-280 On-Ramp

Table B- 7: Increase/decrease in vehicle volumes (at each ramp)

CONCEPT	FINDINGS	RATING
Baseline	No change from existing conditions.	0
Alternative 1, Element 1	There is a moderate increase in traffic volumes at Ocean/I-280 NB on-ramp. There is a moderate decrease in traffic volumes at the Geneva Ave/I-280 NB ramp.	0
Alternative 1, Element 2	There is a minor increase in traffic volumes at Ocean/I-280 SB off-ramp. There is a minor decrease in traffic volumes at the Geneva Ave/I-280 SB ramp.	0
Alternative 1, Element 4	Ramp volumes would remain largely unchanged.	0
Alternative 2	There is a significant decrease in traffic volumes at Ocean/I-280 SB off-ramp & NB on-ramp. There is a significant increase in traffic volumes at the Geneva Ave/I-280 SB and NB ramps.	0

### 2.3.2 | RAMP INTERSECTION OPERATIONS

The following five intersections were reviewed as part of this analysis:

- Ocean/I-280 on-ramp
- Geneva Ave/I-280 SB Off
- Geneva Ave/I-280 NB On
- Monterey/I-280 Ramps
- Alemany/I-280 On-Ramp

**Table B-8: Increase/decrease in intersection LOS (at each ramp)**

CONCEPT	FINDINGS	RATING
Baseline	Of the existing on and off-ramps, LOS conditions would improve slightly at 3 intersections and remain unchanged at 2 intersections.	1
Alternative 1, Element 1	Compared to baseline, one ramp would improve slightly and one would degrade slightly.	0
Alternative 1, Element 2	Compared to baseline, one ramp would degrade slightly.	0
Alternative 1, Element 4	Mixed outcome expected compared to baseline with possible major impacts at Ocean Avenue/northbound frontage road, that requires further study and a moderate impact at the Ocean Avenue/southbound frontage road .	-1
Alternative 2, Element 1	LOS would degrade significantly at Geneva ramps but improve significantly at Ocean ramps.	-2

### 2.3.3 | RAMP QUEUING LENGTHS

For Metric 1.3.3 the intersections of Geneva Ave/I-280 SB and Geneva Ave/I-280 NB were examined for all alternatives. For Alternative 1, Elements 2 and 4, the T-intersection at Ocean Avenue was also examined.

**Table B-9: Increase/decrease in queue lengths**

CONCEPT	FINDINGS	RATING
Baseline	Little change to queue lengths.	0
Alternative 1, Element 1	Little change to queue lengths.	0
Alternative 1, Element 2	Ocean SB off-ramp queue length increases.	-1
Alternative 1, Element 4	Queue lengths remain similar on Geneva but Ocean SB off-ramp queue length increases significantly.	-2
Alternative 2	Queue lengths increase substantially on Geneva SB off-ramp and remain similar on Geneva NB off-ramp. Ramps eliminated on Ocean	-1



## 2.4 | Reduce kiss-and-ride conflicts with other modes

### 2.4.1 | KISS-AND-RIDE DESIGN

**Table B-10: Potential increase/decrease in intermodal conflicts (at each location)**

CONCEPT	FINDINGS	RATING
Baseline	No change from existing conditions.	0
Alternative 1, Element 1	No change from existing conditions.	0
Alternative 1, Element 2	No change from existing conditions.	0
Alternative 1, Element 4	New Kiss & Ride area on the northbound frontage road adjacent to BART Entrance providing convenient access and reducing need for Kiss & Ride vehicles to block other traffic.	2
Alternative 2	Potential new Kiss & Rides areas on Ocean Avenue west of San Jose Avenue and on San Jose Avenue north and south of Geneva Avenue, reducing need for Kiss & Ride vehicles to block traffic near the freeway ramps.	1

## 3 Prioritize transit operations

### 3.1 | Provide efficient routing for transit service as feasible, with particular attention to conflicts at intersections and stops. Maintain consistency with goals of near- and long-term improvements (e.g. Geneva TTRP, TEP, Geneva-Harney BRT)

#### 3.1.1 | NUMBER OF TYPES & CHARACTER OF CONFLICTS, VOLUME OF CONFLICTING MOVEMENTS INVOLVING BUSES

**Table B- 11: Peak transit/private vehicles per hour (at each location)**

CONCEPT	FINDINGS	RATING
Baseline	The analysis assumes the same vehicle volumes as existing conditions. There is currently less traffic on Ocean than Geneva, so shifting some bus service from Geneva to Ocean, as recommended by the TEP, would benefit transit.	1
Alternative 1, Element 1	Traffic volumes would increase moderately on Ocean and decrease on Geneva.	-1
Alternative 1, Element 2	Traffic volumes would increase slightly on Ocean under this element compared to Baseline, impacting the greater numbers of transit vehicles on Ocean.	0
Alternative 1, Element 4	Traffic volumes would increase somewhat on Ocean under this element compared to Baseline, impacting the greater numbers of transit vehicles on Ocean. Optional transit usage of northbound frontage could reduce transit conflicts.	0
Alternative 2	Traffic volumes would slightly decrease on Ocean but significantly increase on Geneva, where Rapid Network Line 8X would continue to operate.	-2

### 3.1.2 | TRAFFIC OPERATIONAL DELAY FOR BUS MOVEMENTS / PACE

**Table B- 12: Increase/decrease in transit travel time (select routes/segments)**

CONCEPT	FINDINGS	RATING
Baseline	Reduction in average PM peak period delay of about 1 ½ mins for transit vehicles traveling WB on Geneva, including Rapid Network Line 8BX.	1
Alternative 1, Element 1	Minor impact on transit vehicles on Geneva and Ocean.	0
Alternative 1, Element 2	Moderate impact on transit vehicles on Ocean, where there would be roughly twice as many vehicles as on Geneva during peak periods under TEP recommendations (around 1 minute EB and WB). New signal is partly responsible for increased travel time.	-1
Alternative 1, Element 4	Major impact on transit vehicles on Ocean, where there would be roughly twice as many vehicles as on Geneva during peak periods under TEP recommendations (about 1 ½ mins EB, and about 1 mins WB).	-1
Alternative 2	Major impact on transit vehicles on EB Geneva (about 4 ½ mins). Transit on Ocean would quicken (½ minute in the westbound and no change in the eastbound direction).	-2

### 3.1.3 | MAXIMIZE OPPORTUNITIES TO SUPPORT GOALS OF NEAR- AND LONG-TERM IMPROVEMENTS

**Table B- 13: Level of support for/consistency with Transit Effectiveness Project recommendations**

CONCEPT	FINDINGS	RATING
Baseline	TEP/TTRP improvements are included in Baseline package.	2
Alternative 1, Element 1	There is a moderate shift of traffic from Geneva onto Ocean. Closing ramp will boost effectiveness of bus only lane on Geneva.	1
Alternative 1, Element 2	Shifting traffic from EB Geneva to EB Ocean conflicts with TEP rerouting of lines from Geneva onto Ocean.	-1
Alternative 1, Element 4	While less traffic is shifted from Geneva onto Ocean, LOS on Ocean is nonetheless degraded, with similar impacts on transit.	-1
Alternative 2	Traffic is shifted from Ocean onto Geneva; however, increased traffic on Geneva would increase delay for TEP Rapid Network Line 8X.	-1

## 3.2 | Do not increase conflicts involving LRT at key intersections

### 3.2.1 | NUMBER OF TYPES & CHARACTER OF CONFLICTS, VOLUME OF CONFLICTING MOVEMENTS INVOLVING LRT

For Metric 2.2.1, LOS was examined at the following intersections:

- Ocean/I-280 on-ramp
- Ocean and San Jose
- Seneca and San Jose
- Ocean and Phelan

**Table B- 14: Increase/decrease in intersection LOS (at each location)**

CONCEPT	FINDINGS	RATING
Baseline	There is minimal difference in intersection LOS between the Baseline and existing conditions.	0
Alternative 1, Element 1	There is a slight worsening of LOS at Ocean/I-280 NB-on ramp where Muni vehicles access the Yard.	-1
Alternative 1, Element 2	There is a slight worsening of LOS at Ocean/I-280 NB-on ramp where Muni vehicles access the Yard.	-1
Alternative 1, Element 4	The northbound frontage road would lead to a further deterioration of LOS at Ocean/I-280 NB-on ramp where Muni vehicles access the Yard.	-2
Alternative 2	There is a significant improvement in LOS at Ocean/I-280. There is no change in LOS at the other intersections.	2

### 3.2.2 | TRAFFIC OPERATIONAL DELAY FOR LRT MOVEMENTS

For Metric 2.2.2, LOS was examined at the following intersections:

- Ocean/I-280 on-ramp
- Ocean and San Jose
- Seneca and San Jose
- Ocean and Phelan

**Table B- 15: Increase/decrease in intersection LOS (at each location); increase in the number of conflicts for LRVs exiting Green Yard**

CONCEPT	FINDINGS	RATING
Baseline	There is minimal difference in intersection LOS between the Baseline and existing conditions.	0
Alternative 1, Element 1	There is a slight worsening of LOS at Ocean/I-280 NB-on ramp where Muni vehicles access the Yard. LOS worsens at San Jose/Geneva, increasing conflicts for LRVs accessing the yard at this location.	-1
Alternative 1, Element 2	There is a slight worsening of LOS at Ocean/I-280 NB-on ramp where Muni vehicles access the yard.	-1
Alternative 1, Element 4	The northbound frontage road would lead to a further deterioration of LOS at Ocean/I-280 NB-on ramp where Muni vehicles access the Yard.	-2
Alternative 2	There is a significant improvement in LOS at Ocean/I-280. There is no change in LOS at the other intersections.	2

## 4 Enhance intermodal connectivity, particularly for pedestrians and bicyclists

### 4.1 | Provide safe & accessible pedestrian facilities

#### 4.1.1 | ALTERNATIVE SUPPORTS PEDESTRIAN DEMAND/PATTERNS (INFORMED BY PEDESTRIAN VOLUMES, KEY INSTITUTIONS NEAR THE STATION, AND TRANSIT RIDERSHIP VOLUMES)

**Table B- 16: Potential increase/decrease in intermodal conflicts (at each location)**

CONCEPT	FINDINGS	RATING
Baseline	Because no ramp closures, no change in traffic volumes.	1
Alternative 1, Element 1	Decrease in traffic volumes on Geneva would result in minor benefits for pedestrians. Closure of NB-on ramp on Geneva removes a major pedestrian conflict. Slight increase of conflicts at Ocean NB on-ramp.	2
Alternative 1, Element 2	Elimination of high speed merge across crosswalk at Ocean SB off-ramp intersection.	2
Alternative 1, Element 4	Generally little change in traffic volumes from Baseline. Some increases in intermodal conflicts at the ends of the new frontage roads due to introduction of new turning movements.	-1
Alternative 2	Increase in conflicts along Geneva Avenue but decrease along Ocean Avenue, providing a clear option for people walking to/from the City College from the station .	2

#### 4.1.2 | NUMBER OF TYPES & CHARACTER OF VEHICLE-PEDESTRIAN CONFLICTS, VOLUME OF MOTORIZED MOVEMENTS CONFLICTING WITH PEDESTRIAN CROSSINGS

For Metric 3.1.2 the following intersections were examined as they have pedestrian crossing facilities:

- Ocean/1-280 On-Ramp
- Ocean/San Jose
- Geneva/San Jose
- Geneva Ave/I280 NB
- Ocean/Howth

**Table B- 17: Numbers of pedestrians benefitting (e.g., in crosswalk where vehicle traffic eliminated)**

CONCEPT	FINDINGS	RATING
Baseline	Because no ramp closures, no change in traffic volumes.	1
Alternative 1, Element 1	Decrease in traffic volumes on Geneva would result in minor benefits for pedestrians. Closure of NB-on ramp on Geneva removes a major pedestrian conflict. Slight increase of conflicts at Ocean NB on-ramp.	2
Alternative 1, Element 2	Elimination of high speed merge across crosswalk at Ocean SB off-ramp intersection.	2
Alternative 1, Element 4	Generally little change in traffic volumes from Baseline. Some increases in intermodal conflicts at the ends of the new frontage roads due to introduction of new turning movements.	-1
Alternative 2	Increase in conflicts along Geneva Avenue but decrease along Ocean Avenue, providing a clear option for people walking to/from the City College from the station .	0

## 4.2 | Avoid adding/exacerbating conflicts to key streets serving as bike routes

### 4.2.1 | SUPPORTS BICYCLE ACTIVITY (INFORMED BY BICYCLE VOLUMES)

**Table B- 18: Increase/decrease in vehicle volumes on bicycle routes**

CONCEPT	FINDINGS	RATING
Baseline	Because no ramp closures, no change in traffic volumes.	0
Alternative 1, Element 1	Moderate increase in traffic volumes on Ocean, which is the primary bike route.	-2
Alternative 1, Element 2	Minor shift of traffic from Geneva onto Ocean, which is the primary bike route.	-1
Alternative 1, Element 4	Minor shift of traffic from Geneva onto Ocean, which is the primary bike route.	-1
Alternative 2	Major shift of traffic away from Ocean to Geneva.	2

#### 4.2.2 | NUMBER OF TYPES & CHARACTER OF VEHICLE-BICYCLE CONFLICTS, VOLUME OF MOTORIZED MOVEMENTS CONFLICTING WITH BIKE ROUTES

**Table B- 19: Increase/decrease in conflicts on bicycle routes**

CONCEPT	FINDINGS	RATING
Baseline	Because no ramp closures, no change in traffic volumes.	0
Alternative 1, Element 1	Moderate increase in traffic volumes on Ocean, namely conflicting vehicles turning to enter the NB on-ramp.	-1
Alternative 1, Element 2	Elimination of conflict with high-speed merging vehicles from the SB off-ramp.	2
Alternative 1, Element 4	Little change in the presence of conflicts.	0
Alternative 2	Major shift of traffic away from Ocean to Geneva.	2

## 5 Minimize potential effects to I-280 freeway mainline operations

### 5.1 | Avoid changes to ramp volumes that would impact mainline operations

#### 5.1.1 | ON- AND OFF-RAMP PEAK-HOUR VOLUMES

For Metric 4.1.1 the projected intersection PM volumes at on and off-ramp intersection locations were evaluated. The following five intersections were reviewed as part of this analysis:

- Ocean/I-280 on-ramp
- Geneva Ave/I-280 SB Off
- Geneva Ave/I-280 NB On
- Monterey/I-280 Ramps
- Alemany/I-280 On-Ramp

**Table B- 20: Increase/decrease in vehicle volumes (at each ramp)**

CONCEPT	FINDINGS	RATING
Baseline	No change compared to Existing conditions.	0
Alternative 1, Element 1	Moderate increase in volume on Ocean NB on-ramp and elimination of traffic on Geneva NB on-ramp.	0
Alternative 1, Element 2	Minor increase in volume on Ocean SB off-ramp and commensurate decrease in volume on Geneva SB off-ramp.	0
Alternative 1, Element 4	Little change in volumes.	0
Alternative 2	There is a significant decrease in traffic volumes at Ocean/I-280 SB off-ramp & NB on-ramp. There is a significant increase in traffic volumes at the Geneva Ave/I-280 SB and NB ramps.	0

### 5.1.2 | RAMP QUEUING LENGTHS

For Metric 4.1.2 the intersections of Geneva Ave/I-280 SB and Geneva Ave/I-280 NB were examined for all alternatives. For Alternative 1, Elements 2 and 4, the t-intersection at Ocean Ave was also examined.

**Table B- 21: Increase/decrease in queue lengths**

CONCEPT	FINDINGS	RATING
Baseline	Little change to queue lengths.	0
Alternative 1, Element 1	Little change to queue lengths.	0
Alternative 1, Element 2	Ocean SB off-ramp queue length increases.	-1
Alternative 1, Element 4	Queue lengths remain similar on Geneva but major increase in Ocean NB off-ramp queue length.	-2
Alternative 2	Queue lengths increase substantially on Geneva SB off-ramp and remain similar on Geneva NB off-ramp. Ramps eliminated on Ocean	-1

## 6 Develop feasible solutions that can be implemented within ten years

### 6.1 | Develop solutions that will be feasible both in engineering and cost

#### 6.1.1 | ABILITY TO GET THROUGH CALTRANS PSR PROCESS

For this metric, any alterations to the Caltrans right-of-way (ROW) may require preparation of a Caltrans Project Initiation Document (PID). Typically, the PID used for this type of project could be a Permit Engineering Evaluation Report (PEER), Project Study Report (PSR), or a combined Project Study Report/Project Report (PSR/PR). Environmental analysis and documentation would need to be conducted, prepared, and approved prior to moving the project into the project development phase where plans, specifications, and estimates (PS&E) are developed. The ease of this process for each Alternative is considered in this metric.

**Table B- 22: Qualitative assessment**

CONCEPT	FINDINGS	RATING
Baseline	No PSR required	0
Alternative 1, Element 1	Coordination with Caltrans will be required for implementing the work, utility relocations within their ROW, and for addressing concerns with negative impacts to the freeway system.	-1
Alternative 1, Element 2	Coordination with Caltrans will be required for implementing the work, utility relocations within their ROW, and for addressing concerns with negative impacts to the freeway system.	-1
Alternative 1, Element 4	Coordination with Caltrans will be required for implementing the work, utility relocations within their ROW, and for addressing concerns with negative impacts to the freeway system. Replacing the Ocean Avenue bridge will be an extensive project, an order of magnitude larger than the other elements, and will require a large amount of careful coordination with Caltrans.	-2
Alternative 2	Coordination with Caltrans will be required for implementing the work and for addressing concerns with negative impacts to the freeway system.	-1

**6.1.2 | RELATIVE COST**

For this metric, the relative cost of the alternatives and elements is considered.

**Table B- 23: Metric 5.1.2: Relative Cost**

CONCEPT	FINDINGS	RATING
Baseline	Cost has not been calculated	N/A
Alternative 1, Element 1	Cost is around \$2.5M	2
Alternative 1, Element 2	Cost is around \$5.5M	1
Alternative 1, Element 4	Cost is around \$50M	-2
Alternative 2	Cost is around \$4.0M	2

**6.1.3 | ENGINEERING FEASIBILITY**

For this metric, the relative engineering feasibility of the alternatives and elements is considered.

**Table B- 24: Qualitative assessment**

CONCEPT	FINDINGS	RATING
Baseline	This improvement is feasible from a civil engineering standpoint and does not present any significant engineering challenges.	2
Alternative 1, Element 1	This improvement is feasible from a civil engineering standpoint and does not present any significant engineering challenges.	2
Alternative 1, Element 2	This improvement is feasible from a civil engineering standpoint and does not present any significant engineering challenges.	2
Alternative 1, Element 4	This improvement is feasible from a civil engineering standpoint and does not present any significant engineering challenges.	2
Alternative 2	This improvement is feasible from a civil engineering standpoint and does not present any significant engineering challenges.	2



## 6.2 | Develop alternative that can be constructed without substantial construction-related impacts

### 6.2.1 | ALTERNATIVES ARE COST EFFECTIVE WAYS TO ADDRESS IDENTIFIED ISSUES

**Table B- 25: Qualitative assessment**

CONCEPT	FINDINGS	RATING
Baseline	Many issues are addressed in a very cost-effective manner.	2
Alternative 1, Element 1	Many issues are addressed in a cost-effective manner.	1
Alternative 1, Element 2	Many issues are addressed in a cost-effective manner.	1
Alternative 1, Element 4	Many issues are addressed in a cost-effective manner.	1
Alternative 2	Many issues are addressed in a cost-effective manner.	1

### 6.2.2 | ALTERNATIVES DO NOT RESULT IN SUBSTANTIAL REROUTING OF TRANSIT OR VEHICLES TO OTHER RAMPS

**Table B- 26: Increase/decrease in vehicle volumes (at each ramp)**

CONCEPT	FINDINGS	RATING
Baseline	No change to existing conditions.	2
Alternative 1, Element 1	Reroute of vehicles from Geneva NB on-ramp to Ocean NB on-ramp.	-1
Alternative 1, Element 2	Minor reroute of vehicles from Geneva SB on-ramp to Ocean SB on-ramp.	0
Alternative 1, Element 4	Minor reroute of vehicles from Geneva Avenue southbound off-ramp to Ocean Avenue off-southbound ramp.	0
Alternative 2	Major rerouting of vehicles from Ocean ramps to Geneva ramps.	-2

## 6.3 | Consider State of Good Repair

### 6.3.1 | ABILITY TO INTEGRATE IMPROVEMENTS INTO PROGRAMMED ROUTINE MAINTENANCE/CONSTRUCTION.

**Table B- 27: Qualitative Assessment**

CONCEPT	FINDINGS	RATING
Baseline	No substantial construction-related impacts expected.	1
Alternative 1, Element 1	Minor construction-related impacts expected.	-1
Alternative 1, Element 2	Reconstruction of southbound ramp connection to Ocean Avenue will have major effect on traffic along Ocean Avenue during construction.	-1
Alternative 1, Element 4	Reconstruction of BART Station westside walkway will disrupt BART patrons.	-1
Alternative 2	Minor construction-related impacts expected.	-1