

**DATE:** February 11, 2014

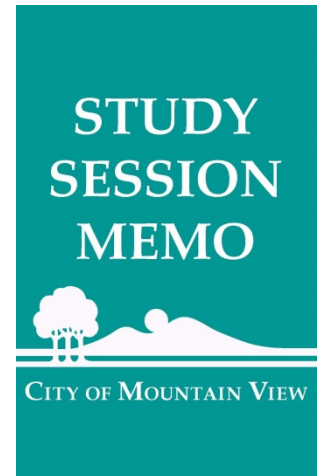
**TO:** Honorable Mayor and City Council

**FROM:** Shilpa Mehta, Associate Civil Engineer  
Lisa Au, Principal Civil Engineer  
Michael A. Fuller, Public Works Director

**VIA:** Daniel H. Rich, City Manager

**TITLE:** **Rengstorff Avenue Grade Separation Study,  
Multimodal Concepts, Project 09-28**

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### **PURPOSE**

The purpose of the Study Session is to receive feedback and direction from Council on Rengstorff Avenue grade-separation concepts to improve pedestrian and bicycle access and connectivity in association with the Council-adopted Rengstorff Avenue Grade-Separation Policy.

### **BACKGROUND**

The Rengstorff Avenue at-grade crossing of Central Expressway and the Caltrain railway is a barrier to efficient pedestrian and bicycle travel and contributes to significant traffic delays on Rengstorff Avenue. The intersection is adjacent to both commercial and residential land uses as well as Rengstorff Park (Exhibit 1). In 2004, Parsons Transportation Group completed a feasibility study for a grade-separated crossing at the intersection. The City Council-supported alternative depressed the intersection of Rengstorff Avenue and Central Expressway below grade and left the Caltrain tracks at approximately existing grade (Exhibit 2).

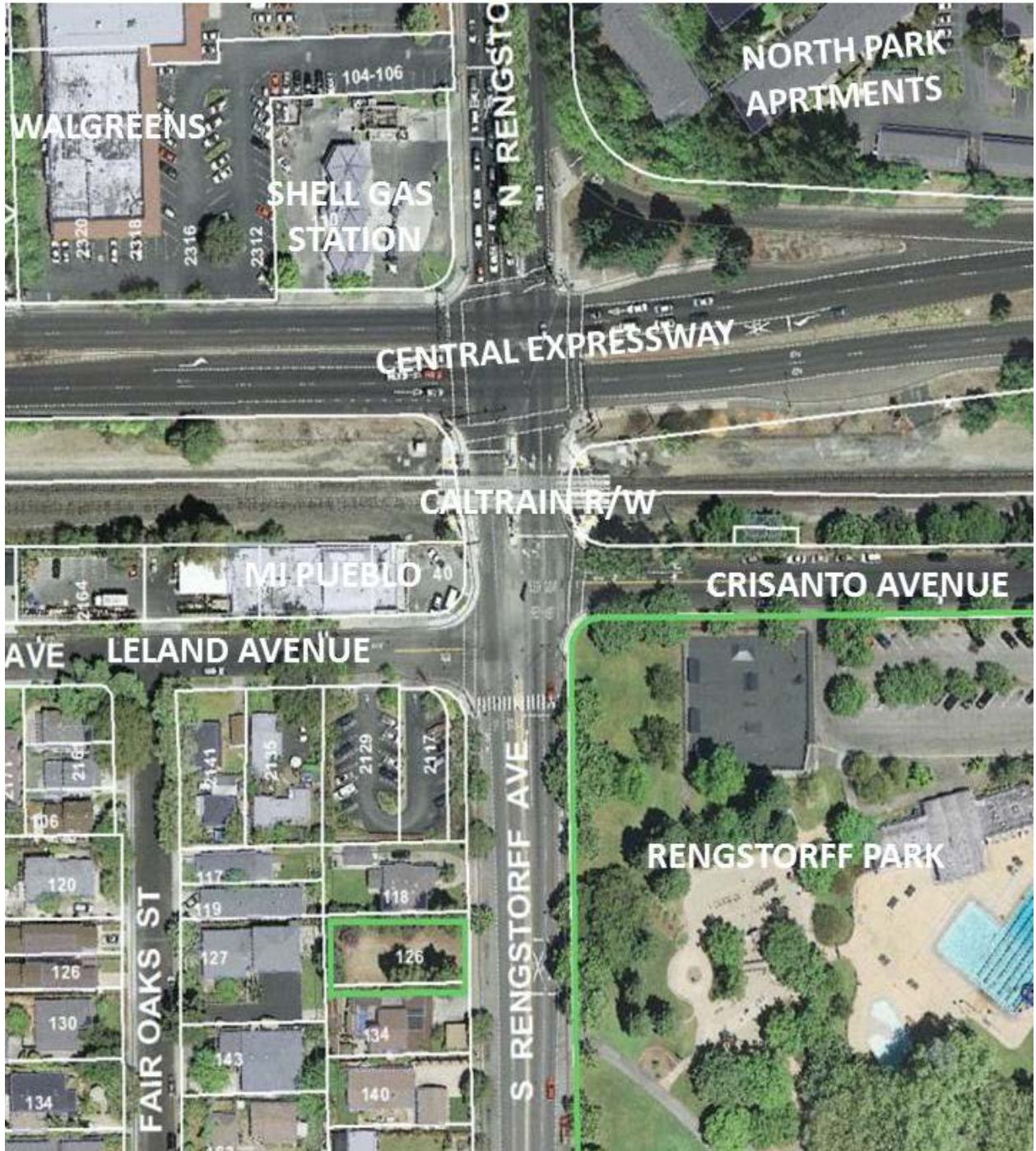


Exhibit 1 – Rengstorff Grade Separation Locality Map



**Exhibit 2 – 2004 Study – Rengstorff Avenue  
Looking North at Central Expressway**

In May 2012, the Council adopted the following grade-separation policy:

“The City of Mountain View supports grade separation of the rail crossing at Rengstorff Avenue. The grade separation shall be designed to support improved connectivity across the rail tracks for all modes of transportation, pedestrians, bicyclists, and drivers alike.

The design shall focus on:

1. Minimizing disruption to the neighborhood context
2. Improving the sense of place
3. Encouraging multimodal use
4. Improving the safety of all users.”

Council directed staff to revise the 2004 Rengstorff Avenue feasibility study to better address urban design considerations and pedestrian and bicycle use. Council also included the Rengstorff Avenue grade-separation project as one of the City’s major priorities.

## **DISCUSSION**

In 2012, the City retained Alta Planning + Design to refine the Council-endorsed alternative from the 2004 feasibility study. The refinements focus on pedestrian and bicycle access and connectivity; transitions to adjacent land uses; and incorporating guidance from the City’s Pedestrian Master Plan, the draft Rengstorff Park Master Plan, and General Plan objectives. Three concepts have been prepared for Council’s review. While developing the concepts, feedback was obtained from Santa Clara County, the Peninsula Corridor Joint Powers Board (JPB), and the California Public Utilities Commission (CPUC). The City has sent a letter to the adjacent property owners.

Elements common to all concepts include:

- Approximately 11 on-street parking spaces between Leland Avenue and Stanford Avenue would be eliminated.

- Each alternative would require the removal of Heritage trees, though the impacts vary. More information is provided with the description of each alternative. The project area and Rengstorff Park provide ample opportunity for planting trees to mitigate for those removed.
- As identified in the 2004 study, surrounding properties at this intersection will be impacted by the project. The driveway access to 10 properties located on the southwest corner, south of the Caltrain right-of-way and bisected by Leland Avenue, and one parcel located at the northwest corner of Central Expressway and North Rengstorff Avenue would be impacted. Two of the properties are owned by the City, seven are owned by the owner of Mi Pueblo Market, and the remaining two have separate owners (Exhibit 3).

The 2004 study presumed that the Mi Pueblo Market would be acquired to construct the grade separation. The alternatives presented in this report show a Leland Avenue connector roadway with right-in and right-out turns permitted at Rengstorff Avenue and to provide access to the Mi Pueblo site. The Leland Avenue connector roadway allows a limited viable access option to Mi Pueblo Market through Leland Avenue. The connector roadway also allows either on-street parallel parking spaces cut out into the curb or the connector would need to be straightened to establish a small parking area. On-street parking along this connector could be incorporated during the design development phase. While shown in all plans, this optional feature was not part of the 2004 study and implementation will be dependent on public outreach outcomes.

- Two-stage turn boxes help bicyclists make left turns at the Central Expressway/Rengstorff Avenue intersection. Currently, this treatment is not included in the California Manual of Uniform Traffic Control Devices (CA-MUTCD). If implemented today, this treatment would require a request to experiment to Caltrans.
- Advanced (staggered) stop lines for bicyclists on approaches to Central Expressway and Rengstorff Avenue intersection are provided. These help improve the visibility of bicyclists and reduce the likelihood of right-turn conflicts on Rengstorff Avenue.
- Wheeling channels along stairs to enable strollers and bicycles to be pushed alongside.

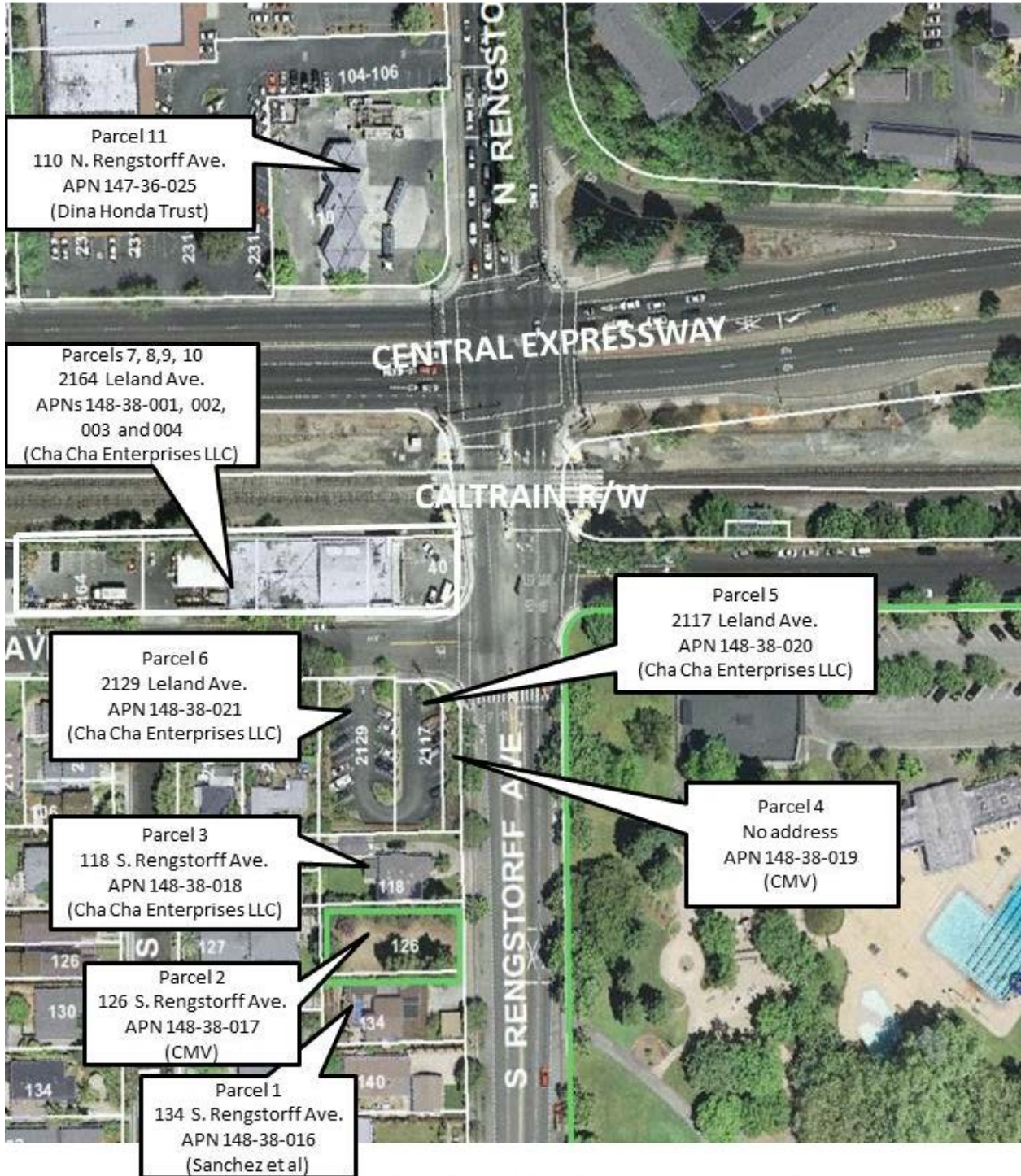


Exhibit 3 – Rengstorff Grade-Separation Impacted Parcels

Each concept presented is for the southerly side of Rengstorff Avenue and includes a plan view, a cross-sectional view of northbound Rengstorff Avenue, a bird's-eye view from the northwest, and a bird's-eye view from the southwest. The common elements to all three concepts described previously will not be highlighted. The final alternative can be a combination of components from the three concepts and will be determined based on Council direction. A summary of the three concepts is provided below:

### **Concept A: Complete Street**

The Concept A design features a bike and pedestrian overcrossing over Rengstorff Avenue with planted median, cycle track, landscaped medians, and terracing. It incorporates urban design features like a switchback ramp at the northwest corner, a serpentine ramp at the southwest and southeast corners, an 8' wide planted median north of Central Expressway permitting all turning movements, a longer 8' wide planted median south of the proposed overcrossing, and deep planter terraces along the south sides of Rengstorff Avenue.

#### *Pedestrian Crossing Over Rengstorff Avenue*

Concept A includes a 22' wide two-way bike and pedestrian overcrossing with an 8' wide path on each side of a 6' wide planted median. Planter boxes along the sides of the overcrossing provide visual interest for road users on Rengstorff Avenue and keep overcrossing users further away from the edge for safety (Exhibit 4 – Concept A, Plan View).

#### *Pedestrian and Bicycle Provisions and Right-of-Way Impacts Along Rengstorff Avenue*

Exhibit 5 – Concept A, Northbound Rengstorff Avenue Cross-Section, displays a 6' wide sidewalk, a raised 8' wide cycle track above the roadway to cater to all skill levels of bicyclists, and a rolled curb to minimize vehicle intrusion while providing for easy street sweeping. The proposed right-of-way is 126' wide, approximately 46' wider than the existing right-of-way, to accommodate pedestrian and bicycle elements. The wider right-of-way encroaches into Rengstorff Park further than Concepts B and C; however, the deep planter terraces with serpentine ramps facilitate the transitions into the Park.

#### *Railroad Undercrossing*

Under the railroad crossing, the features on the east (Rengstorff Park) side include wider pathways with two rows of piers, colored translucent concrete detailing, a 3' high shade garden/planter, and a sidewalk between the garden and east piers. The west

side (Mi Pueblo) includes one row of piers with colored translucent concrete detailing, a 3' high shade garden/planter, and a sidewalk.

#### *Transition to Adjacent Properties*

This concept features 20' wide, deep terraced walls with plantings and a parallel Americans with Disabilities Act (ADA) serpentine ramp for access into Rengstorff Park. It also includes stairs with a wheel trough from the Rengstorff Avenue sidewalk leading into Rengstorff Park. As a result of the deep terraces and the wider right-of-way, the maintenance costs for Concept A are greater than Concepts B and C.

The west side will be lined with similar landscaped terraces and a separate ADA serpentine shared path leading to the higher grade of the railroad tracks and the pedestrian overcrossing.

#### *Right-Turn Configuration from Central Expressway to Rengstorff Avenue*

Exhibit 6—Concept A, Bird's-Eye View from Northwest, shows the right-turn lane integrated into the traffic signals, removing a potential bike and pedestrian conflict point.

The following four exhibits provide various views of Concept A—Plan View, Northbound Rengstorff Avenue Cross-Section, Bird's-Eye View from Northwest, and Bird's-Eye View from Southwest.



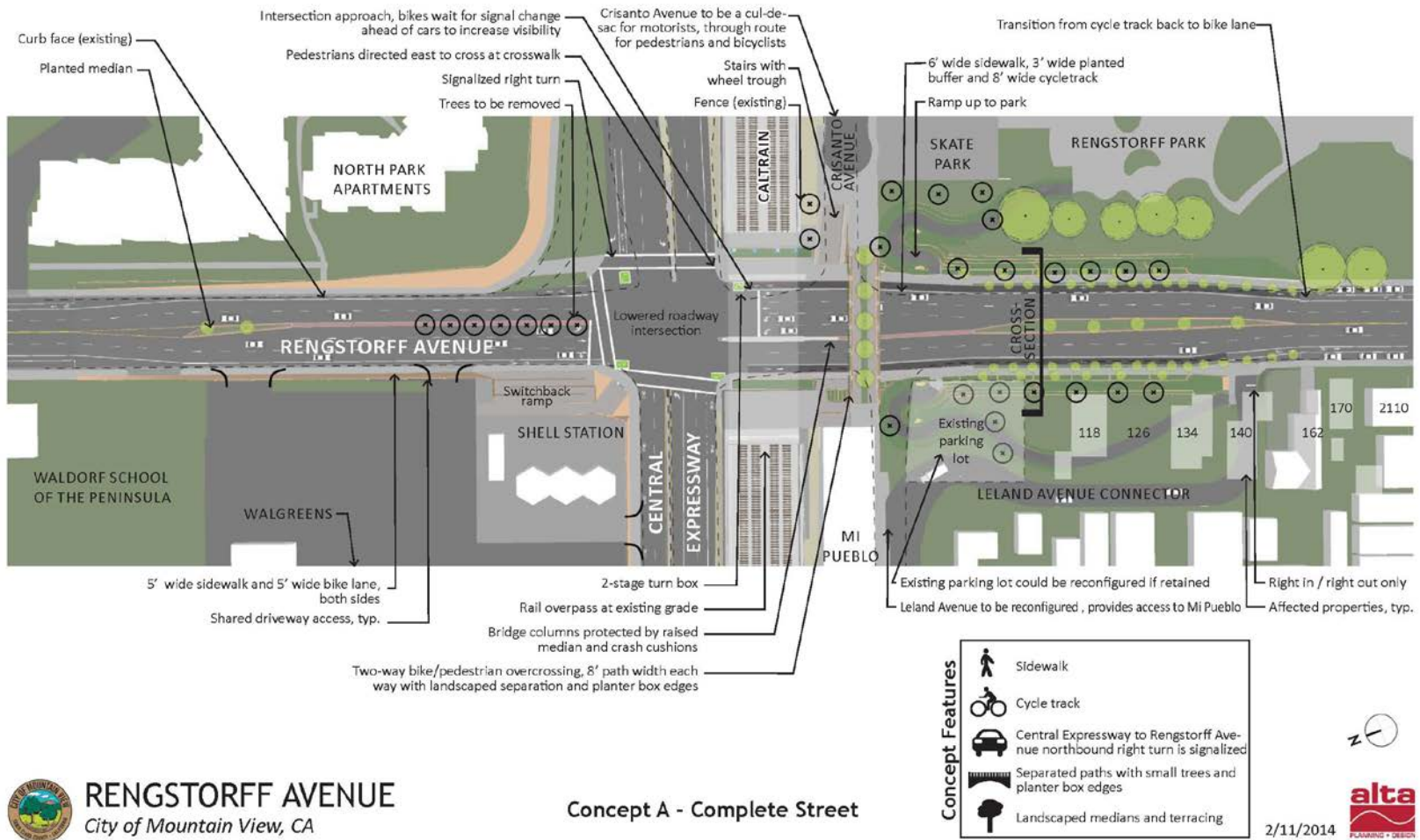
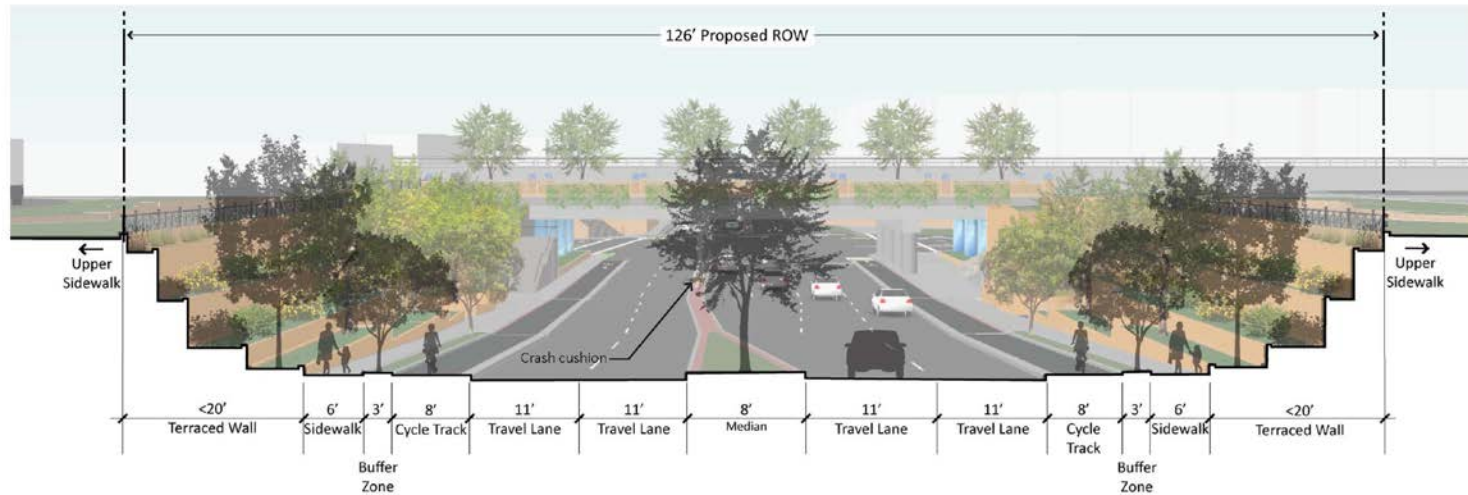


Exhibit 4 – Concept A, Plan View



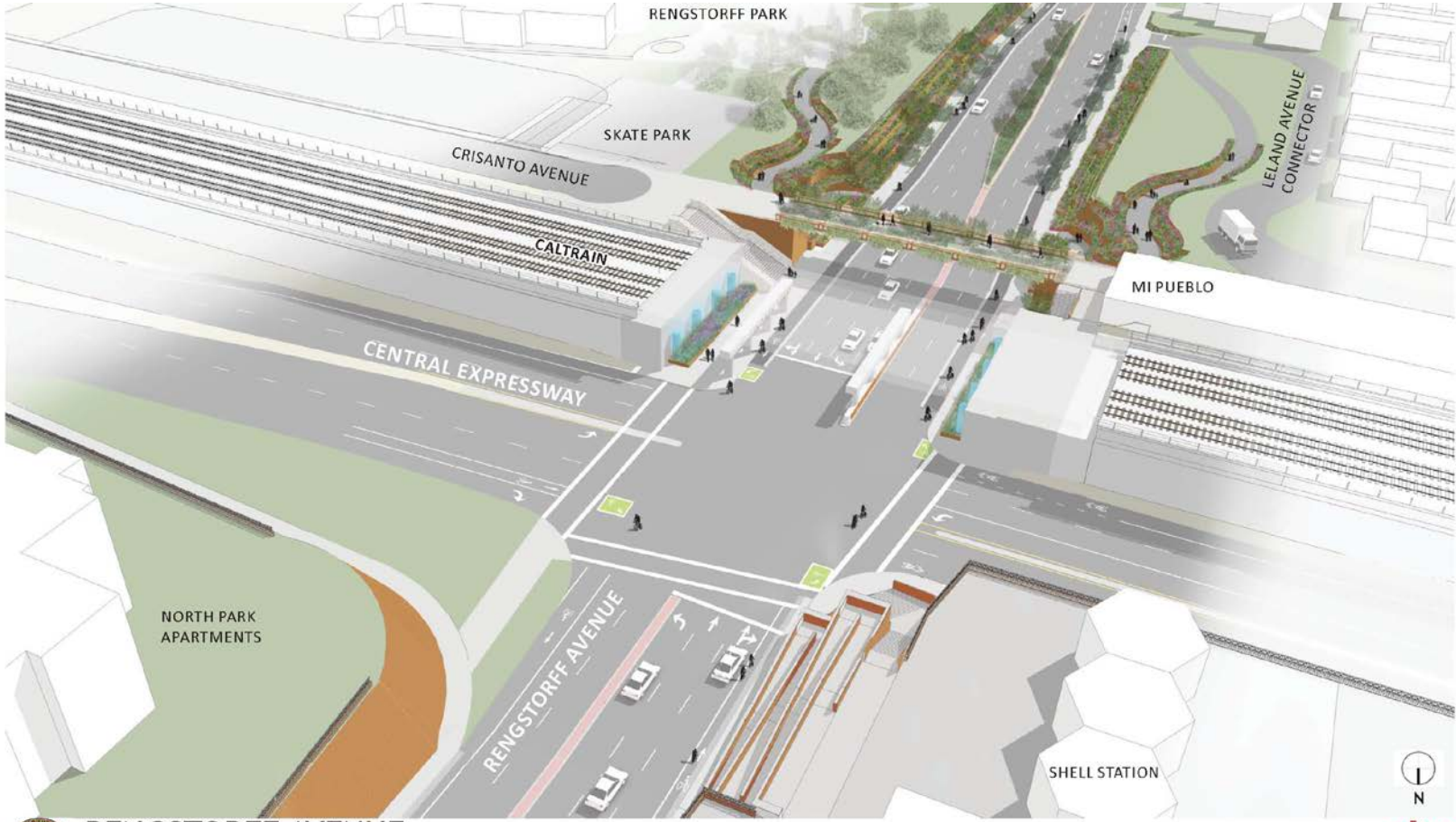
**RENGSTORFF AVENUE**  
 City of Mountain View, CA

Concept A - Complete Street

2/11/2014



**Exhibit 5 – Concept A, Northbound Rengstorff Avenue Cross-Section**



 **RENGSTORFF AVENUE**  
City of Mountain View, CA

Concept A - Complete Street

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PLANNING • DESIGN

Exhibit 6 – Concept A, Bird’s-Eye View from Northwest



 **RENGSTORFF AVENUE**  
City of Mountain View, CA

Concept A - Complete Street

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Exhibit 7 – Concept A, Bird’s-Eye View from Southwest

## **Concept B: Enhanced Active Transportation**

The Concept B design features a similar bike and pedestrian overcrossing path as Concept A; however, it is narrower and does not have a median. Concept B incorporates urban design features like switchback ramps at the northwest, southwest, and southeast corners, and terracing along Rengstorff Avenue.

### *Pedestrian Crossing Over Rengstorff Avenue*

The bike and pedestrian overcrossing is a 16' wide, two-way shared-use bike and pedestrian path framed by planter boxes. The planter boxes along the sides of the overcrossing provide visual interest for road users on Rengstorff Avenue, keeping overcrossing users further away from the edge for safety (Exhibit 8—Concept B, Plan View).

### *Pedestrian and Bicycle Provisions and Right-of-Way Impacts Along Rengstorff Avenue*

Concept B features a 12' wide, shared-use path along the Rengstorff Park frontage to minimize the impact of the grade change northbound to accommodate less-confident bicyclists who may not wish to be in the roadway. The 8' painted and buffered bike lane is designed for more-confident bicyclists. The proposed right-of-way is 120', approximately 40' wider than the existing right-of-way. The planted terracing facilitates a wider right-of-way which will encroach into Rengstorff Park.

### *Railroad Undercrossing*

This concept carries the same undercrossing features as Concept A. On the east side, there are wider pathways and two rows of piers, colored translucent concrete detailing, 3' elevated shade garden, and a sidewalk between a garden and east piers. The west side includes one row of piers with colored translucent concrete detailing and a 3' high shade garden/planter and a sidewalk.

### *Transition to Adjacent Properties*

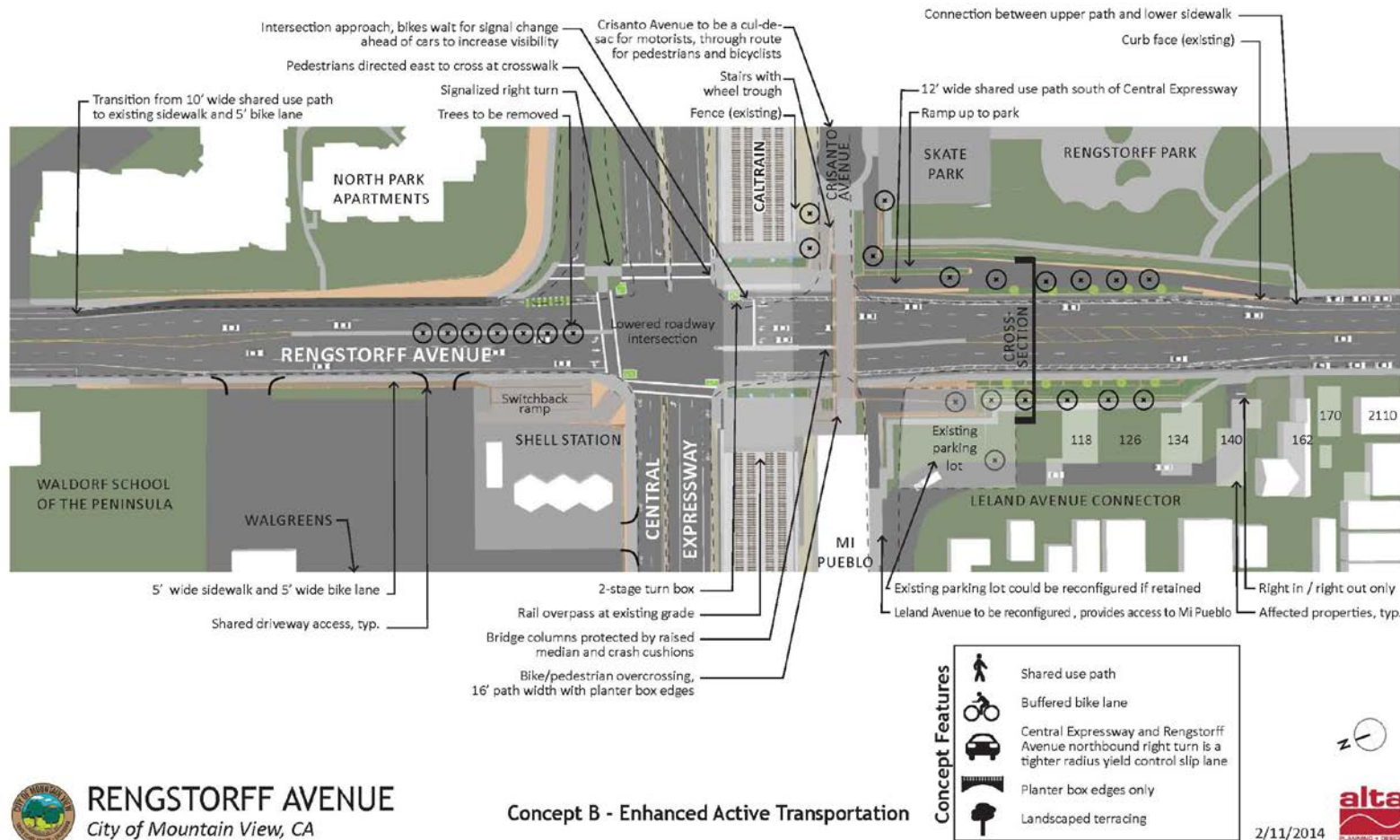
This concept offers 12' wide switchback ramps and terraced planting areas transitioning into Rengstorff Park. The transitioning also introduces a shared-use path for park users and stairs with a wheel trough from the Rengstorff Avenue sidewalk to Rengstorff Park.

The west (Mi Pueblo) side will be lined with similar landscaped terraces and a shared-use path/ramp leading to the higher grade of the railroad tracks and the pedestrian overcrossing.

*Right-Turn Configuration from Central Expressway to Rengstorff Avenue*

Concept B has a “squared-up” right-turn lane from westbound Central Expressway to northbound Rengstorff Avenue to reduce turning speeds and enhance safety at this potential bike and pedestrian conflict point.

The following four exhibits show Concept B—Plan View, Northbound Rengstorff Avenue Cross-Section, Bird’s-Eye View from Northwest, and Bird’s-Eye View from Southwest.

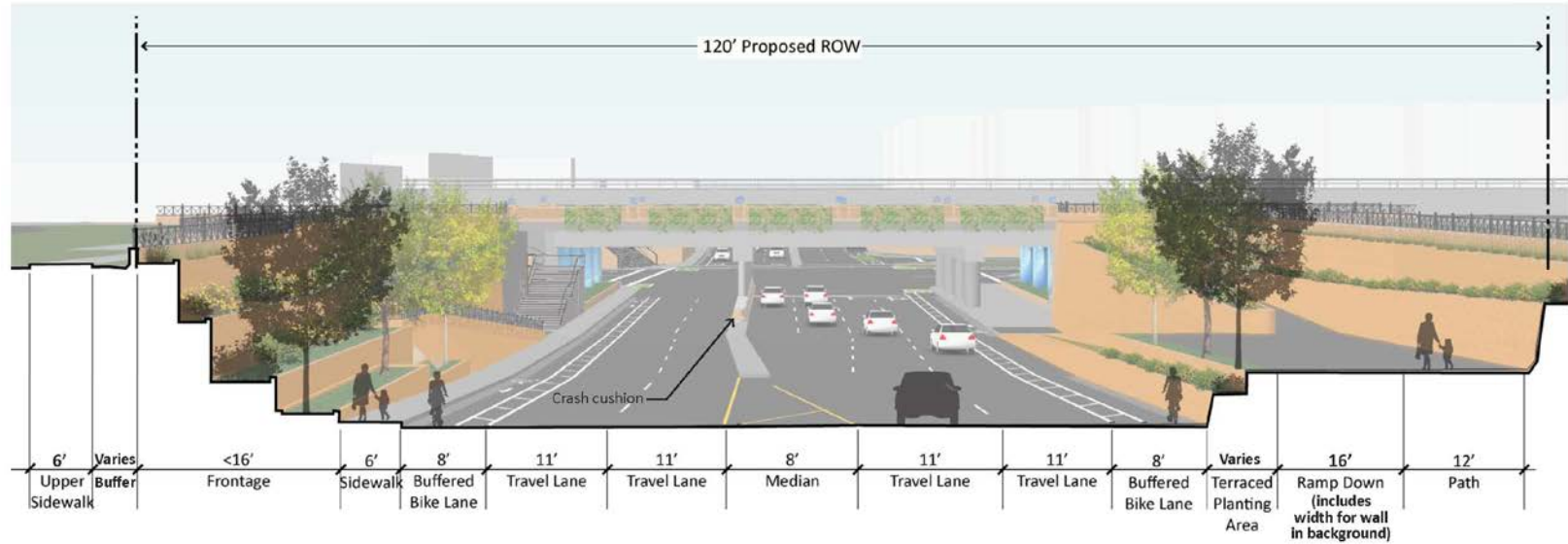


Concept B - Enhanced Active Transportation

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Exhibit 8 – Concept B, Plan View



**RENGSTORFF AVENUE**  
 City of Mountain View, CA

Concept B - Enhanced Active Transportation



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**Exhibit 9 – Concept B, Northbound Rengstorff Avenue Cross-Section**



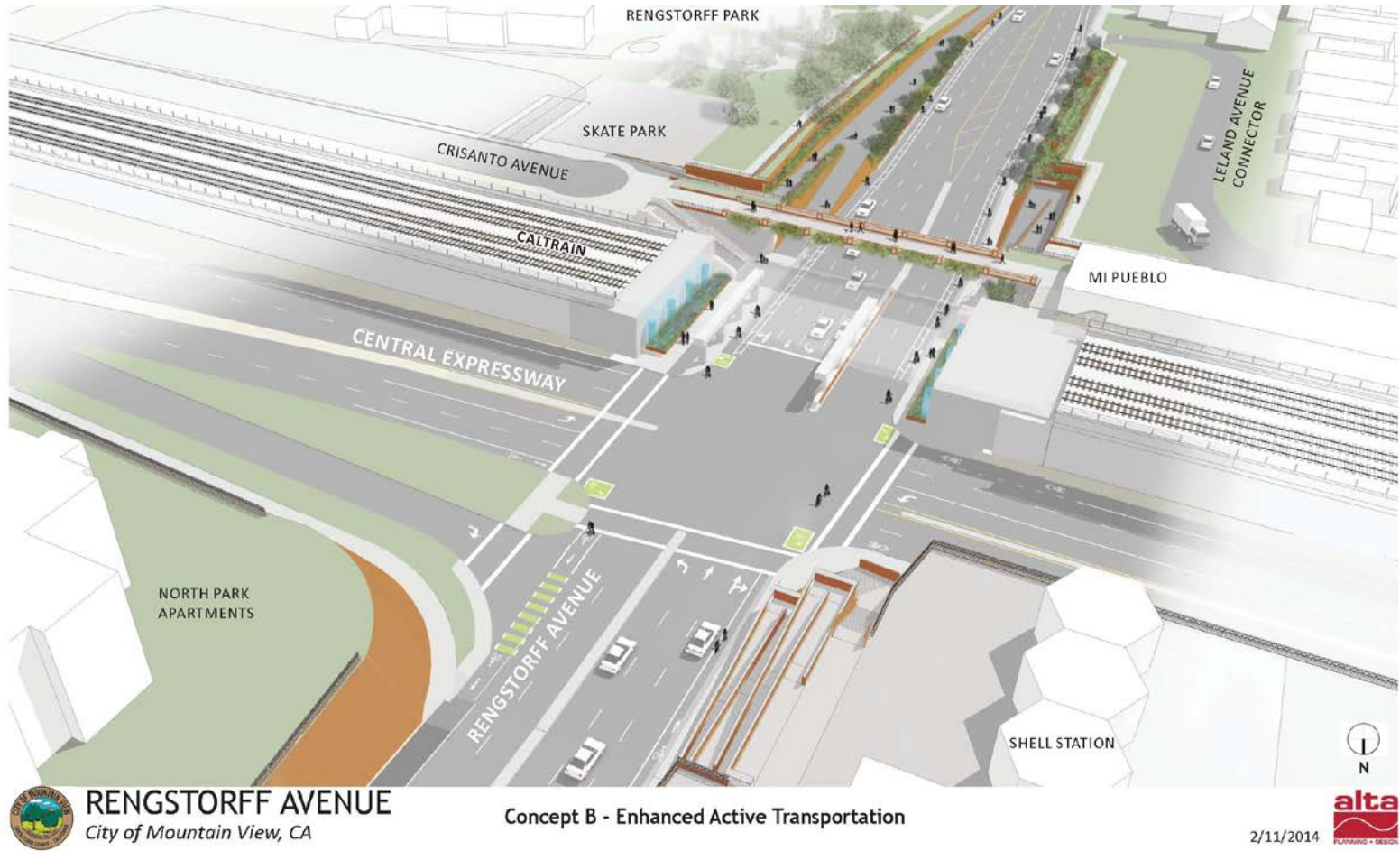


Exhibit 10 – Concept B, Bird’s-Eye View from Northwest



 **RENGSTORFF AVENUE**  
City of Mountain View, CA

Concept B - Enhanced Active Transportation

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Exhibit 11 – Concept B, Bird’s-Eye View from Southwest

## **Concept C: Updated 2004 Plan**

Concept C design is an enhancement of the concept from the 2004 study. It features minimum encroachment into adjacent properties while incorporating urban design features like the switchback ramps at the northwest, southwest, and southeast corners. In addition, the design provides for slightly terraced retaining walls along Rengstorff Avenue.

### *Pedestrian Crossing Over Rengstorff Avenue*

Concept C features a 10' two-way, shared-use overcrossing path contained between architectural safety railings. There are no medians and no planter boxes along the sides of the overcrossing; hence, the higher railing is incorporated.

### *Pedestrian and Bicycle Provisions and Right-of-Way Impacts Along Rengstorff Avenue*

Concept C features a 6' wide sidewalk and 5' wide bike lanes to meet the minimum pedestrian and bike lane requirements. The proposed right-of-way is 91' wide, which is approximately 11' wider than the existing right-of-way.

### *Railroad Undercrossing*

This concept features a narrow undercrossing at Rengstorff Avenue with only median piers. The sidewalk is located between the roadway curb and mural-adorned abutment.

### *Transition to Adjacent Properties*

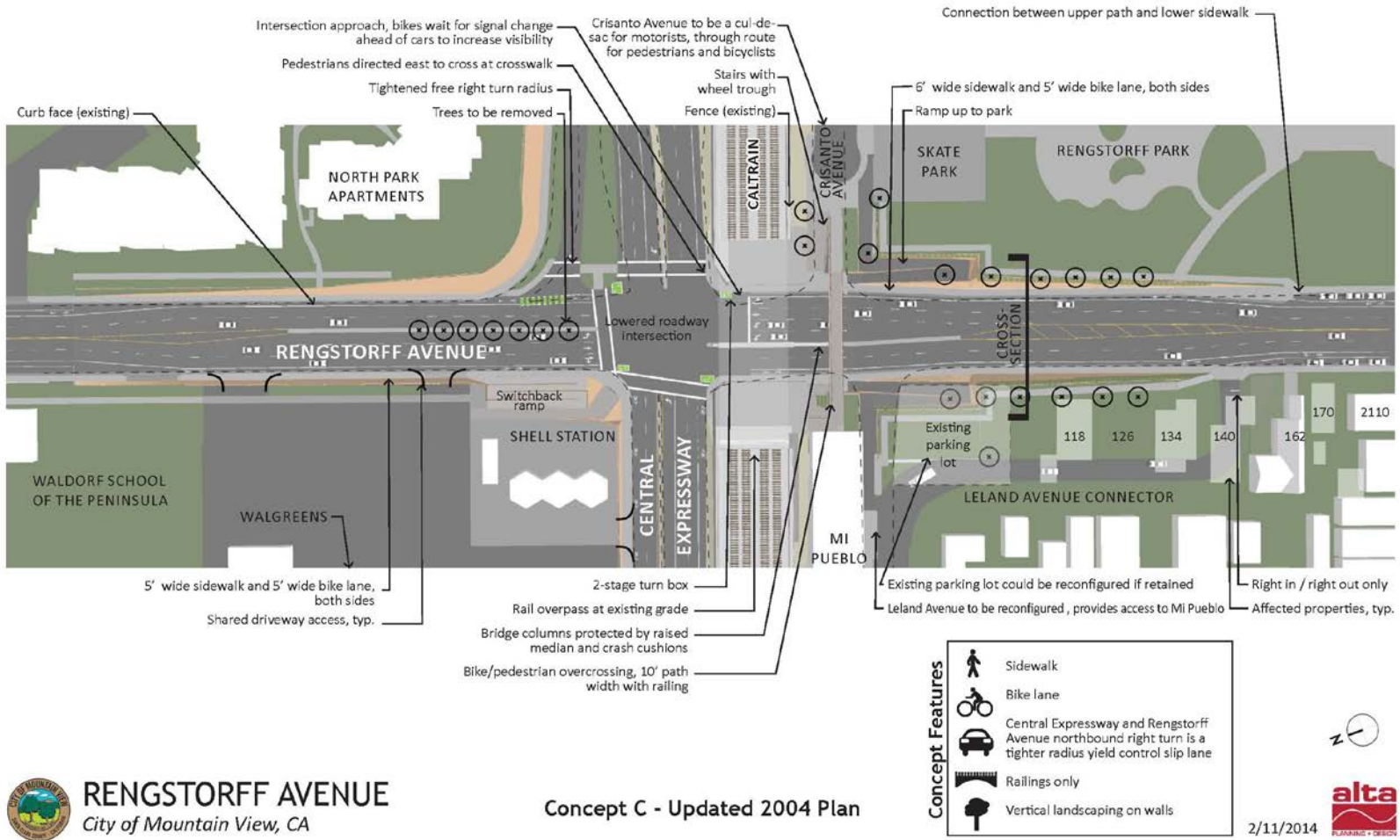
This concept offers 12' wide switchback ramps and terraced planting areas transitioning into Rengstorff Park. The transitioning also introduces an ADA shared-use path for park users and a stairway from the Rengstorff Avenue sidewalk to Rengstorff Park. There are varieties of aesthetic treatments that can be used to soften the retaining walls.

### *Right-Turn Configuration from Central Expressway to Rengstorff Avenue*

Concept C shows the same configuration as Concept B with a "squared-up" right-turn lane from westbound Central Expressway to northbound Rengstorff Avenue to reduce turning speeds and enhance safety at this potential bike and pedestrian conflict point.

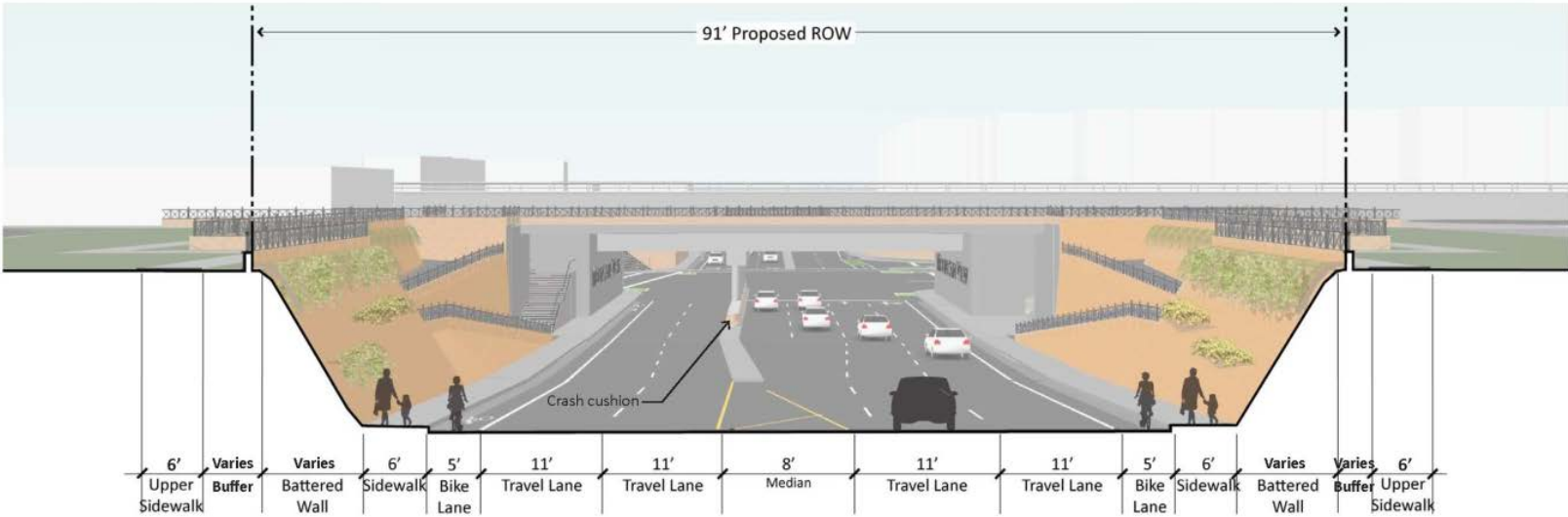
This concept encroaches the least onto adjacent properties to provide the minimum right-of-way in meeting Council's adopted Rengstorff Avenue grade-separation policy as compared to the other two concepts.

The following four exhibits show Concept C—Plan View, Northbound Rengstorff Avenue Cross-Section, Bird’s-Eye View from Northwest, and Bird’s-Eye View from Southwest.



Concept C - Updated 2004 Plan

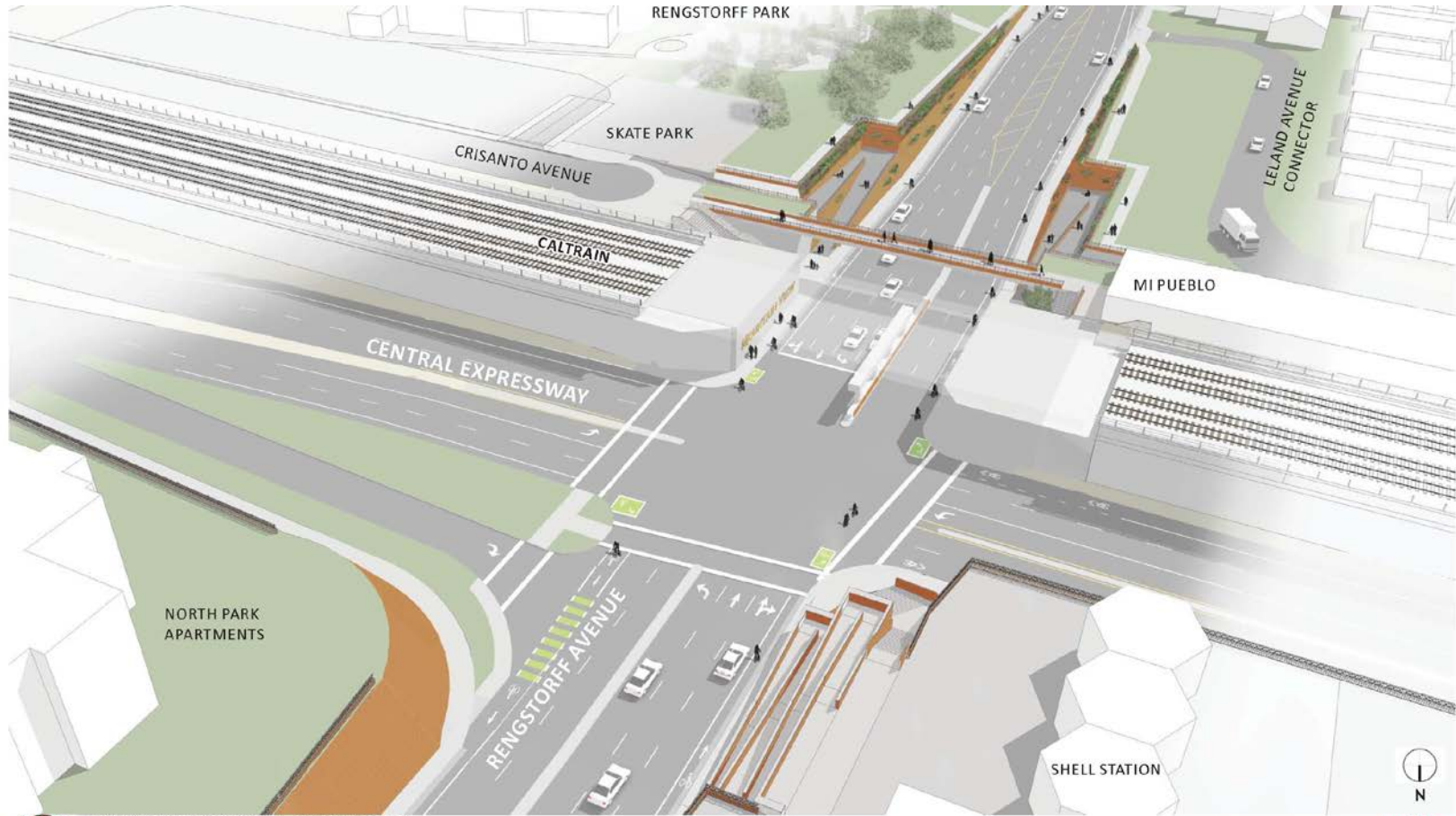
Exhibit 12 – Concept C, Plan View



Concept C - Updated 2004 Plan



Exhibit 13 – Concept C, Northbound Rengstorff Avenue Cross-Section



**RENGSTORFF AVENUE**  
City of Mountain View, CA

Concept C - Updated 2004 Plan

2/11/2014



**Exhibit 14 – Concept C, Bird’s-Eye View from Northwest**



**RENGSTORFF AVENUE**  
City of Mountain View, CA

Concept C - Updated 2004 Plan



**Exhibit 15 – Concept C, Bird’s-Eye View from Southwest**



Concept	Pedestrian and Bicycle Overcrossing <i>Note: This could be constructed later as part of a phased project</i>	Undercrossing Features	Pedestrian and Bicycle Provisions Along Rengstorff Avenue	Central Expressway to Rengstorff (NB) Right Turn	Placemaking/Urban Design
A. Complete Streets	22' two-way bike/pedestrian overcrossing with 8' path width on each side of a 6' wide planted median. Planter box edges provide visual interest for road users on Rengstorff Avenue, keeping overcrossing users farther away from the edge.	Concepts 1 and 2 feature wider undercrossing with two rows of piers, colored translucent concrete detailing, 3' elevated shade garden, and sidewalk between garden and east piers.	6' sidewalk, 8' cycle track elevated above the roadway with a rolled curb (minimizes vehicle intrusion while providing for easy street sweeping) caters to all skill levels of bicyclists.	The right turn lane is integrated into the traffic signals, removing a potential bike/pedestrian conflict point	Switchback ramp at NW corner, serpentine ramp at SW and SE corners. Short 8' wide planted median north of Central Expressway permits all turning movements—future study may rationalize the driveways or limit turning movements to lengthen the median. Longer 8' wide planted median south of overcrossing. Deep terracing along Rengstorff Avenue.
B. Enhanced Active Transportation	16' two-way shared-use path is framed by planter box edges along the safety barrier.	Narrow undercrossing with median piers only; sidewalk between roadway curb and mural-adorned abutment.	12' shared-use path on Rengstorff Park frontage minimizes grade change for northbound less-confident bicyclists 8' paint-buffered bike lane for confident bicyclists.	Concepts 2 and 3 have a "squared up" right-turn lane to reduce turning speeds and enhance safety at a potential bike/pedestrian conflict point.	Switchback ramps at NW, SW, and SE corners. Terracing along Rengstorff Avenue.
C. Updated 2004 Plan	10' two-way shared-use path contained between architectural safety railings. Without the planter box edges providing horizontal separation, the railing will need to be higher.		6' sidewalk, 5' bike lane for confident bicyclists.		Switchback ramps at NW, SW, and SE corners. Slightly terraced retaining wall along Rengstorff Avenue.

**Exhibit 16 – All Concepts Summary Table**

The northerly side of Rengstorff Avenue is not developed in the concept designs. The northeast and northwest corner design constraints are defined below:

### *North Park Apartments*

The North Park Apartments property is located at the northeast corner of the Rengstorff Avenue and Central Expressway intersection. Terracing similar to that proposed for the south side of the intersection is not possible at this corner due to the proximity of the new apartments to the roadway. Aesthetic treatments to retaining walls can be used to soften the appearance of this quadrant of the intersection, and will be developed further.



**Exhibit 17 – Existing North Park Apartments at the Northeast Corner of Rengstorff Avenue and Central Expressway**

### *Shell Gas Station*

The Shell gas station site is located at the northwest corner of the Rengstorff Avenue and Central Expressway intersection. The concepts propose relocated driveways at both Rengstorff Avenue and Central Expressway to the shopping center. It only features switchback ramps. Similar terracing proposed on the south side of Rengstorff Avenue is not possible at this corner due to the existing Shell gas station layout. If the City were to purchase and demolish the Shell station at an estimated cost of \$4 million, terracing similar to that proposed on the south side of Central Expressway would be possible.



**Exhibit 18 – Existing Shell Gas Station at the Northwest Corner of Rengstorff Avenue and Central Expressway**

The following is a summary of the pros and cons for each concept:

<b>Concept A Complete Streets</b>		<b>Concept B Enhanced Active Transportation</b>		<b>Concept C Updated 2004 Plan</b>	
<b>Pros</b>	<b>Cons</b>	<b>Pros</b>	<b>Cons</b>	<b>Pros</b>	<b>Cons</b>
Wide bike/ped overcrossing with landscaped median and planter boxes along sides.	Greater impact to right-of-way.	Less encroachment to park as compared to Concept A due to switchback ramp design.	Narrower ped/bike overcrossing compared to Concept A; no median.	Right-of way is least impacted.	Narrow overcrossing – no median or planter boxes.
Central Expressway to Rengstorff Avenue north-bound right turn signalized.	Greater maintenance cost due to deep landscaped terraced wall.	Central Expressway to Rengstorff Avenue north-bound squared-up right-turn lane.		Least expensive – capital and O&M costs.	Needs aesthetic treatment to soften design of retaining walls.
Undercrossing feature with two rows of piers, sidewalk, garden, and colored detailing concrete.	Most expensive.	Good urban design – combination of switchback ramp and terracing.			
Elevated cycle track with rolled curb.		Combination of 12' shared-use path and 8' bike lane			
Great urban design – combining switchback and serpentine ramp with deep terracing.					

*Fiscal Impact*

The design and construction of Concept A is estimated to be \$120 million and the cost differences between the alternatives is relatively small. Concept A is estimated to cost approximately \$2 million more than Concept B and approximately \$5 million more than Concept C. The estimate includes the estimated cost of acquiring 11 parcels as noted in

the analysis. Costs are very preliminary and include contingencies to reflect the early stage of design. Costs would be refined with any future study or detailed design. Cost will escalate over time. No funding is allocated or identified for this project.

### **RECOMMENDATION**

Staff seeks feedback and direction from Council to select one of the concepts or combination of the elements from the concepts relating to the development of Rengstorff Avenue grade separation concepts to improve pedestrian and bicycle access and connectivity in association with the Council-adopted Rengstorff Avenue Grade Separation Policy.

### **NEXT STEPS**

The preferred concept and/or project elements will be evaluated in further detail to complete the current study, and the results of the study will be shared with other agencies and used for planning future Capital Improvement Program (CIP) projects.

### **PUBLIC NOTICING**

Agenda posting and letters were sent to 11 affected residents and businesses within the project area.

SM-LA-MAF/7/CAM/922-02-11-14SS-E

cc: Mr. Ananth Prasad  
Ms. Janice Spuller  
County of Santa Clara  
Roads and Airport Department – Infrastructure Development

Mr. Felix Ko  
Public Utility Commission  
CPSD – Rail Crossing Section

Mr. Richard McIntosh  
JPB  
Resident Engineer

APWD – Solomon, PCE – Au, RPPA, POSM, F/c