
Project Name: Lemmon Drive Capacity Improvement Project

Subject: Level Two Alternatives Analysis Screening Summary for Segment 2

Date: August 2, 2022

Attention: Dale Keller – RTC Project Manager

From: Kaci Stansbury – Jacobs

Copies to:

Bill Thomas – RTC	Dan Doenges – RTC
Lauren Ball – RTC	Rebecca Kapuler – RTC
Doug Maloy – RTC	Denise Thompson – RTC
Blaine Petersen – RTC	Amber Bowsmith – RTC
Walt West – Washoe County	Karen Schlichting – Tri Sage
Dwayne Smith – Washoe County	Mitchell Fink – Washoe County
Dylan Menes – Washoe County	Trina Magoon – City of Reno
John Flansberg – City of Reno	Nick Brothers – City of Reno
Kerri Koski – City of Reno	David Hutchinson – City of Reno
Khalil Wilson – City of Reno	Jon Simpson – City of Reno
Matt Brenzina – City of Reno	Angela Fuss – City of Reno
Kerri Lanza – City of Reno	Heather Manzo – City of Reno
Alex Wolfson – City of Reno	Jared Hudson – Jacobs
Kayann Jongsma – Jacobs	Zen Rookhuyzen – Jacobs
Jeff Weagel – J-U-B	Lonnie Johnson – J-U-B
Shane Dyer – J-U-B	

1.0 Project Background

The Regional Transportation Commission of Washoe County (RTC) initiated the Lemmon Drive Capacity Improvement Project, which was identified in the 2040 and updated 2050 Regional Transportation Plans (RTP). The North Valleys Multimodal Transportation Study, completed in February 2017, identified needs and long-term transportation improvements for regional roads and intersections in the North Valleys area. The study focused on traffic operation analysis and capacity improvements, safety improvements, pedestrian and bicycle connectivity, and transit service needs. By the year 2035, traffic volumes are anticipated to grow throughout the North Valleys Region, ranging from a 39% increase to a 546% increase, averaging 169%. The study acknowledged the need for long-term Lemmon Drive capacity expansion improvements. According to the study, daily traffic volumes on Lemmon Drive north of Military Road are projected to increase 243% by 2035.

To improve mobility, the RTC, in partnership with the Nevada Department of Transportation (NDOT), designed the reconfiguration of the Lemmon Drive/U.S. Highway (US) 395 interchange into a Diverging Diamond Interchange (DDI). In addition, Lemmon Drive will be increased from four to six lanes between Sky Vista Parkway/Buck Drive and Military Road, which is referred to as Segment 1. Construction of the DDI and Segment 1 improvements are substantially complete as of July 2022. Another component of improving mobility along Lemmon Drive is Segment 2, with traffic, alignment, and multimodal

improvements between Fleetwood Drive and Ramsey Way. The purpose of this alternatives analysis is to identify the long-term transportation improvements for Segment 2 of Lemmon Drive.

In the winters of 2016 to 2017 and 2017 to 2018, the North Valleys Region experienced an unusual combination of weather patterns that resulted in record-setting snowfall and rain with subsequent runoff that created localized flooding. Particularly impacted were the closed hydro-basins in Lemmon Valley. For the following several years, Washoe County erected a variety of barriers, inflatable dams, and strategically located pumps along Lemmon Drive, and provided monitoring to protect homes, maintain traffic safety, and reduce the water level of Swan Lake. The existing 8-foot-wide multi-use path along the east side of Lemmon Drive also was flooded during the weather events. Some areas of the path were still inundated with water in the fall of 2019. In late 2021, the water level of Swan Lake dropped enough to allow Washoe County to remove the last of the barriers and pumps and begin restoration of the roadside and damaged parcels. In addition, Washoe County purchased the 1.049-acre property at the northeast corner of Idaho Street and Lemmon Drive, APN 080-301-08, with the intent to revert it to open space with volumetric mitigation and maintenance activities. Improvements to Segment 2 will address the flooding, focusing on the fact that a large portion of the existing Lemmon Drive roadway is located below the 100-year floodplain, which is currently (December 2021) identified at elevation 4,924 feet.

According to the RTC's 2050 RTP, Lemmon Drive is classified as a Moderate Access Control Arterial. The posted speed limit is 35 miles per hour (mph) from US 395 to 1,000 feet north of the Sky Vista Parkway/Buck Drive intersection, where it changes to 45 mph for approximately 1 mile. At Bernoulli Street, where the neighborhoods adjoining Lemmon Drive begin, the speed limit reduces again to 35 mph. When Washoe County constructed the barriers and installed pumping facilities along Lemmon Drive in 2017, it required the speed limit to be reduced to 20 mph north of Patrician Drive. Those mitigation efforts greatly affected traffic safety and mobility along Segment 2 of Lemmon Drive.

Transit service in the North Valleys is provided by RTC Bus Route 7, which provides connectivity between downtown Reno and Stead, Nevada, along North Virginia Street, Sky Vista Parkway, and Stead Boulevard. The rest of the North Valleys Region is serviced through RTC's FlexRIDE service, an on-demand, curbside-to-curbside transit service in select areas scheduled through the RTC Washoe FlexRIDE app.

The unique location of this project within an isolated playa basin requires the elevation of the multi-use path and roadway along Lemmon Drive to be an agreed-upon elevation that considers 18 inches of freeboard for wave action in addition to standing water floodplain elevation, rather than accommodating flows generated during a certain storm event. Recent evaluation with the Federal Emergency Management Agency (FEMA) as part of the Swan Lake Mitigation Studies expects this 100-year floodplain elevation to rise, but the new elevation has not been finalized (as of December 2021). Preliminary results indicated the new floodplain elevation may rise approximately 0.6 feet to 4,924.6 feet, so this floodplain elevation will be used for the purposes of this Level 2 screening. In February 2022, Washoe County indicated that the new 100-year floodplain elevation would be set at 4,924.7 feet, an insignificant difference for the evaluations summarized in this report.

The floodplain encompasses a localized low area near Palace Drive on the east side of Lemmon Drive. Temporary, portable, pumping facilities were necessary for several months to prevent flood waters from damaging nearby residential structures. A large culvert will be incorporated into the Segment 2 design to move the large volume of water that accumulates along the east side of Lemmon Drive near Palace Drive to the west side of Lemmon Drive within Swan Lake.

Existing and 2040 projected traffic volumes along Lemmon Drive based on the raw, unrefined, RTC-adopted model outputs are summarized in Table 1. These traffic volumes are lower than those shown for a full build-out development condition in the North Valleys Multimodal Transportation Study model. However, they are from RTC's year 2040 adopted travel demand model and consistent with the approach taken for the traffic analysis Jacobs completed for Lemmon Drive, Segment 1.

Table 1. Lemmon Drive Traffic Volumes from RTC's Adopted Model

Roadway Segment	Year 2020 October Daily Volume from RTC's Adopted Model	Year 2040 October Daily Volume from RTC's Adopted Model
Lemmon Drive just north of Fleetwood Drive	5,200	12,000*
Lemmon Drive just south of Chickadee Drive	4,500	14,000*
Lemmon Drive just north of Chickadee Drive	4,500	7,100*
Future Lemmon Valley-Spanish Springs Connector	N/A	3,900

* Includes contributing traffic volume from the Lemmon Valley-Spanish Springs Connector, assumed to be completed in the 2031 through 2050 timeline per RTC's 2050 RTP.

This technical memorandum summarizes the Level 1 alternative analysis results and the Level 2 alternative analysis screening process to identify the top Segment 2 alternative alignment that addresses the purpose and need of the project to allow for future capacity, provide safe multimodal connectivity, and raise the roadway out of the proposed Washoe County established 100-year floodplain elevation.

2.0 Project Goals

To develop project goals that address the purpose and need of Segment 2, a Technical Advisory Committee (TAC) was formed with representatives from RTC, Washoe County, City of Reno, and project engineers from Jacobs and J-U-B Engineers. The TAC met monthly beginning in February 2020 and, together, has developed eight project goals:

- G1** Construct traffic improvements as outlined in the 2050 RTP to improve mobility and add safety features.
- G2** Provide a safe and reliable regional road within the 100-year floodplain by having at least one dry lane in each direction of travel.
- G3** Support the Swan Lake mitigation efforts by incorporating floodplain mitigation along Lemmon Drive that significantly reduces or eliminates future maintenance costs for Washoe County and the City of Reno. These maintenance costs include barriers and pumping facilities.
- G4** Incorporate safe access for all multi-modal users with the construction of a multi-use path, safer pedestrian crossings, and dedicated bicycle lanes.
- G5** Provide opportunities along Lemmon Drive to aid long-term flood response planning.
- G6** Upgrade Lemmon Drive to comply with current engineering design criteria (horizontal, vertical, clear zone, and so on) and eliminate any deficiencies in the existing roadway alignment.
- G7** Ensure connectivity of future road-network improvements such as the Lemmon Valley-Spanish Springs Connector and other potential projects in the updated 2050 RTP by considering logical termini suitable for the region.
- G8** Deliver a cost-appropriate solution that addresses the goals of the project.

3.0 Alternatives Screening Process

The alternatives screening process and evaluation criteria for Segment 2 were established early in the project to ensure that alternatives are assessed objectively by evaluating their ability to meet the identified project goals summarized previously. The alternatives screening process was a two-step process. The first step, known as Level 1 screening, began with brainstorming ideas with an open-minded approach, identifying all possible alignments and concepts. Through Level 1 screening, the alternatives were reduced to a maximum of three alternatives.

The second step, known as Level 2 screening, will then evaluate the 15% design of the top alternatives against the project goals, TAC input, and professional judgement to determine the preferred alternative to advance to 30% design. It is assumed that neither a Conditional Letter of Map Revision (CLOMR) or Letter of Map Revision (LOMR), the Federal Emergency Management Agency's (FEMA's) official modification to an effective Flood Insurance Rate Map (FIRM), would be necessary for any of the alternatives as this project will not change the regulatory floodway, the effective Base Flood Elevations, or the Special Flood Hazard Area.

4.0 Segment 2 Alternatives – Level 1 Screening

The development of Segment 2 alternatives occurred during the TAC workshop held on February 27, 2020. During the TAC workshop, attendees were divided into four teams to brainstorm alternative alignment ideas, and then each team presented their ideas to the rest of the TAC for discussion. Through this process, 12 alternatives (A1 through A12) were identified, including the No-Build Alternative, to carry through the Level 1 screening process.

For each alternative, except the No-Build Alternative, it is assumed that Lemmon Drive from Fleetwood Drive to Palace Drive would be widened to four lanes with the addition of bicycle lanes in both directions. Beyond Palace Drive, the roadway prism and right-of-way would allow for future paving of two additional lanes. In addition, it is assumed the profile of Lemmon Drive would be raised to ensure the roadway is above the revised 100-year floodplain elevation. Freeboard for wave action is assumed to be an additional 18 inches and was included in the determination of the profile grade but is not included in the volumetric mitigation calculations.

To assist in determining high-level construction costs for each alternative, the NDOT Cost Wizard spreadsheet tool was used. The NDOT Cost Wizard tool provides consistent calculations with standardized user input.

To determine the alternatives to advance to a 15% design level for further evaluation, each team qualitatively evaluated the 12 alternatives against the project goals using a *Consumer Reports* type evaluation of good (green), medium (yellow), and poor (red). All goals were weighted equally. When each team went through the evaluation exercise separately, the rankings were discussed with the TAC, with all agencies providing any insight they had, including identifying potential advantages and disadvantages for each alternative. The team evaluations then were averaged to determine a single grade for each alternative/goal matrix as shown in Table 2.

Table 2. Level 1 Analysis

Alternative	Goal 1 Widen 2 to 4 lanes	Goal 2 Reliable within 100- year floodplain (1-dry lane each way)	Goal 3 Support Swan Lake recovery efforts (floodplain mitigation)	Goal 4 Safe Access for multi- modal (Bike Lanes and Multi- Use Path)	Goal 5 Incorporate Opportunities To Aid Long-Term Flood Response Planning	Goal 6 Upgrade to current design criteria (eliminate any deficiencies)	Goal 7 Connectivity w/ future roadways (Eagle Canyon Ext., et al)	Goal 8 Cost-Appropriate solution	Cost Wizard Estimate	Level 1 Screening Conclusions
A1 No Build									N/A	Eliminate from further evaluation Does not address any goals
A2 Raise Existing Lemmon Drive above 100-yr. floodplain elevation			 Elevated profile allows for equalization culverts ; but places additional fill w/in floodplain		 Storage Areas can be incorporated along wider roadway corridor		 Maintains existing connectivity options	 Requires volumetric mitigation to offset additional roadway fill; Right-Of-Way impacts are minimal;	\$44.8 million	Advance to Level 2 Screening
A3 Raise one side (Northbound or Southbound) above 100-yr.		 Requires temporary change in traffic pattern during flood events	 less fill than Alt 2 placed w/in floodplain; cannot use equalization culverts		 Storage Areas can be incorporated along the newer side, but not both		 Requires intersections at both northbound and southbound connectivity locations		\$21.3 million	Eliminate from further evaluation Decreased Safety, No Cost Benefits
A4 Lake volume removal to get Lemmon out of 100-yr.							 Maintains existing connectivity options	 Ongoing volume maintenance; very high excavation cost (not including haul)	\$210.8 million	Eliminate from further evaluation Extremely high construction costs
A5 Elevated shared use path		 holds water w/in lake but high storm event waters still flood roadway from east and north	 Provides Berm if necessary for Swan Lake Recovery Solutions	 multiuse path dry but bike lanes would experience flooding w/ roadway			 Maintains existing connectivity options		\$20.3 million	Eliminate from further evaluation Fatal Flaw - Unable to Provide Dry Lanes During 100-Yr storm
A6 Natural Berm alignment							 Requires additional length to connect to realigned Lemmon Drive	 Still need to maintain a portion of Lemmon Drive for local access	\$38.8 million	Advance to Level 2 Screening
A7 Divided alignment Southbound along natural berm & northbound along existing		 Requires temporary change in traffic pattern during flood events					 Requires intersections at both northbound and southbound connectivity locations		\$34 million	Eliminate from further evaluation Decreased Safety, No Cost Benefits

Table 2. Level 1 Analysis

Alternative	Goal 1 Widen 2 to 4 lanes	Goal 2 Reliable within 100- year floodplain (1-dry lane each way)	Goal 3 Support Swan Lake recovery efforts (floodplain mitigation)	Goal 4 Safe Access for multi- modal (Bike Lanes and Multi- Use Path)	Goal 5 Incorporate Opportunities To Aid Long-Term Flood Response Planning	Goal 6 Upgrade to current design criteria (eliminate any deficiencies)	Goal 7 Connectivity w/ future roadways (Eagle Canyon Ext., et al)	Goal 8 Cost-Appropriate solution	Cost Wizard Estimate	Level 1 Screening Conclusions
A8 Deodar alignment	●	●	◐	●	●	●	○	○	A8) \$55.5 million A8a) \$44.8 million A8b) \$48.4 million	Advance to Level 2 Screening w/ subalternatives 8a and 8b
A9 Chesapeake alignment	●	●	◐	●	●	●	○	○	\$41.3 million	Eliminate from further evaluation. Much greater right of way impacts than Alt 8, and a portion of the alignment is still within the floodplain limit
A10 Align Lemmon Dr. outside 100-yr. (Hug)	●	●	○	●	●	●	◐	○	\$44.7 million	Eliminate from further evaluation. High right of way impacts, and properties to west are not adequately addressed
A11 Elevate Lemmon Dr. with structures	●	●	●	◐	○	●	○	○	\$164.0 million	Eliminate from further evaluation Extremely high construction costs
A12 Eliminate Lemmon Dr.	○	○	○	○	●	○	○	◐	No Cost Wizard Developed	Eliminate from further evaluation Reduces system network capacity; Does not address any goals;

- Negative Impact / Does Not Address Goal
- ◐ Medium Impact / Somewhat Addresses Goal / No Change From Existing
- Positive Impact / Addresses Goal

Based on the results of the Level 1 screening process, the alternatives advanced to a 15% design (refer to Figure 1) for further screening were:

- A1) No Build Alternative
- A2) On-Alignment (Raise profile and widen along the existing Lemmon Drive alignment)
- A6) Natural Berm Realignment (North of Deodar Way, realign Lemmon Drive to the west along the natural berm of Swan Lake)

Alternatives A8, A8a, A8b (refer to Figure 2), Realigning Lemmon Drive to the east along Deodar Way, Deodar Way/Fir Drive, and Deodar Way/East of Fir Drive, originally passed Level 1 screening prior to the updated 2050 RTP, when the limits of the improvements were extended from Chickadee Drive to Ramsey Way. These alternatives do not provide a viable solution for mobility, as realigning Lemmon Drive to connect into Chickadee Drive eliminates the direct through movement around Swan Lake currently provided by Lemmon Drive. Therefore, these alternatives were not advanced to a 15% design.

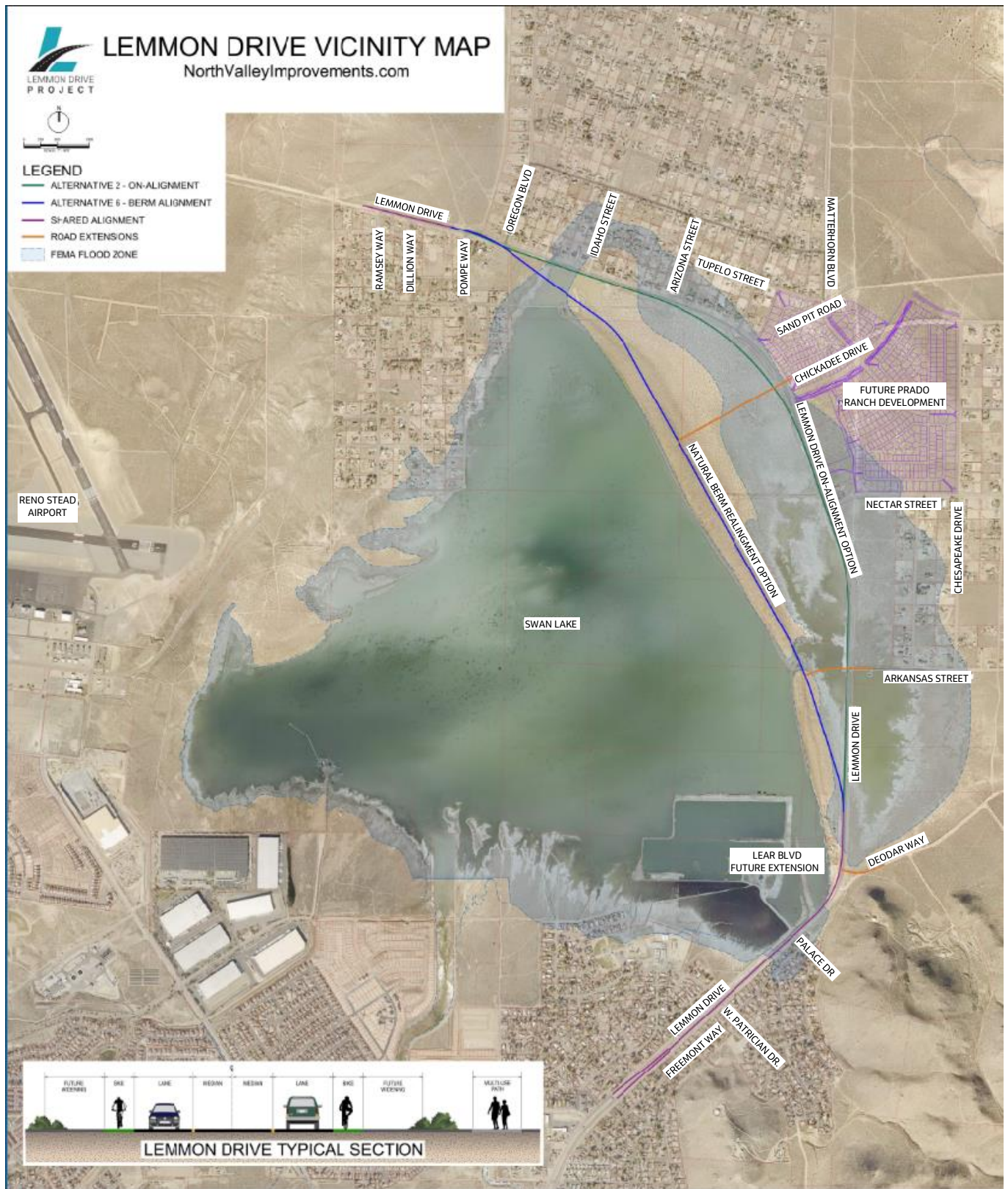


Figure 1. Alternative 2 On-Alignment and Alternative 6 Natural Berm Realignment Overview



0 0.125 0.25 Miles
Data Sources: FEMA, Jacobs, and Washoe County

Realign Lemmon Dr to the east along the Deodar Way corridor, and widening Deodar Way to four lanes



Figure 2. Alternatives 8, 8a, and 8b, Deodar Way Realignments

5.0 Segment 2 Alternatives – Level 2 Screening

The 15% design for the build alternatives included determination of typical section, profile adjustments, drainage concepts, impacts to adjoining cross streets, multi-use path alignment, floodplain impacts and mitigation measures, and striping configuration, along with early coordination with regional Swan Lake improvements and future commercial and housing developments.

The following sections summarize design assumptions and possible mitigation measures, and present a planning-level construction cost estimate using the NDOT Cost Wizard as a basis for each alternative.

5.1 Alternative 1. No Build

- Lemmon Drive remains a two-lane facility on its existing alignment as shown on Figure 3. The 100-year floodplain limits shown in Figure 1 are based on the unadjusted elevation of 4,924 feet.
- Current maintenance costs for pavement rehabilitation and flood mitigation (including pumping facilities, barriers, earthen berms, and Tiger dams) would be ongoing
- The existing geometric deficiencies, including inadequate shoulder width, lack of dedicated bicycle lanes, and a profile elevation below the 100-year floodplain, remain. Additionally, the reduced regulatory posted speed limit of 20 mph remains based on flooding mitigation measures in place until they are removed.
- Lemmon Drive will not have capacity for future connectivity to the Lemmon Valley-Spanish Springs Connector or other planned developments
- The existing multi-use path with an independent alignment along the east side of Lemmon Drive remains in place along its existing alignment. In August 2019, a 250-foot-long segment of the path remained underwater from the 2017 flooding. The path was fully accessible by spring of 2020.
- Lemmon Drive currently does not have designated bike lanes, nor is there an adequate shoulder along the existing Lemmon Drive to accommodate bicycles.
- Current pumping activities would need to be continued to get water into Swan Lake from east of Lemmon Drive.



0 0.125 0.25 Miles

Data Sources: FEMA, Jacobs,
and Washoe County

Lemmon Drive remains a
2-lane facility on its
existing alignment



Figure 3. No-Build Alternative

5.2 Alternative 2. On-Alignment. Elevate existing Lemmon Drive above the 100-year floodplain

- Figure 4 (Fleetwood Drive to Deodar Way) and Figure 5 (Deodar Way to Ramsey Way) present the 15% design.
- Widen from two to four lanes from Fleetwood Drive to Palace Drive with a continuous 16-foot-wide median.
- North of Palace Drive, provide a roadway earthwork prism for a future four-lane facility as an undivided arterial with a continuous 16-foot-wide median that develops into a left-turn lane where necessary; raise the vertical profile to ensure one lane in either travel direction remains dry (including accounting for 18 inches of wave action) to provide residents and emergency vehicles access within the 100-year floodplain (the existing profile low point is approximately at elevation 4,922.4). The entire embankment prism will be built, although only two lanes will be paved north of Palace Drive.
- This design requires approximately 111,500 cubic yards of volumetric mitigation to offset, at a 1.3:1 ratio, additional roadway fill placed in the floodplain below the estimated revised 100-year flood elevation of 4,924.6 feet. The 1.3:1 ratio for stormwater retention in closed drainage basins is per the City of Reno development standards, Chapter 18.04, updated November 2019. The wave action elevation of 4,926.1 feet is not required for volumetric mitigation calculations.
- Potential areas for volumetric mitigation include:
 - The 37-acre parcel east of Lemmon Drive between Arkansas Drive and Nectar Street (APN 080-281-01, currently owned by Lansing-Arcus LLC; same owner as future Prado Ranch Development)
 - The 123.5-acre parcel west of Lemmon Drive between Nectar Street and Oregon Boulevard specifically in the area across from Idaho Street (APN 080-722-03, currently owned by Lansing-Arcus LLC)
 - The 52.7-acre parcel west of Lemmon Drive across from Nectar Street (APN 080-671-55, currently owned by Lansing-Arcus LLC)
 - The 40-acre parcel west of Lemmon Drive between Arkansas Drive and Nectar Street (APN 080-671-56, currently owned by Lansing-Arcus LLC)
 - The 40-acre parcel west of Lemmon Drive between Deodar Way and Arkansas Drive (APN 080-671-57, currently owned by Lansing-Arcus LLC)
 - The 40-acre parcel east of Lemmon Drive adjacent to the south side of Arkansas Drive (APN 080-730-11, currently owned by Lansing-Arcus LLC)
 - The 40-acre parcel east of Lemmon Drive between Deodar Way and Arkansas Drive (APN 080-730-14, currently owned by Lansing-Arcus LLC)
 - The 40-acre parcel east of Lemmon Drive adjacent to the north side of Deodar Way (APN 080-730-16, currently owned by Lansing-Arcus LLC)
 - The 1-acre parcel recently acquired by Washoe County at the northeast corner of Idaho Street and Lemmon Drive (APN 080-301-08)
 - The southeast corner of the 61-acre parcel north of Lemmon Drive, west of Oregon Boulevard (APN 086-290-54, owned by the Reno-Tahoe Airport Authority)
- The design requires culvert extensions and new culverts to convey stormwater into Swan Lake.
- Preliminary design includes a large box culvert from the east side of Lemmon Drive in the vicinity of Palace Drive to the west side of Lemmon Drive towards Swan Lake with an approximate outlet invert elevation of 4917.0. Preliminary design for this 10' x 5' culvert includes an outlet control feature that

will prevent backwater from Swan Lake during time frames when the elevation of Swan Lake raises above 4917.

- The design includes dedicated bicycle lanes in both directions
- The existing 8-foot-wide multi-use path east of Lemmon Drive is relocated/reconstructed as a 10-foot-wide multi-use path offset from the edge of roadway pavement, as shown on Figures 4 and 5. The profile of the path is consistent with the roadway profile, maximizing the ability of the path to stay usable and provide adequate cover over culverts as needed. If chosen as the preferred alternative, the profile and location of the path can be adjusted horizontally closer to Lemmon Drive, and lowered, to a TAC agreed-upon elevation, to reduce the amount of volumetric mitigation required, with localized raising of the path for cover over culverts as needed.
- Geometrics and roadside features would be updated to meet current design standards.
- Raising the profile of Lemmon Drive will require side street profile tie-in adjustments at Patrician Drive, Palace Drive, Arkansas Street, Nectar Street, Chickadee Drive, Oregon Boulevard, and Ramsey Way. To ensure proper access management, the direct connection to Lemmon Drive of multiple driveways, Waterash Street, Arizona Street, Idaho Street, Pompe Way, and Dillon Way will be replaced with connections to frontage roads paralleling Lemmon Drive.
- A slight realignment is proposed for Deodar Way to align with the future Lear Boulevard extension intersection with Lemmon Drive.
- The 15% design includes a horizontal realignment of Lemmon Drive in the vicinity of Chickadee Drive. Providing a larger radius curve increases sight distance and roadway geometrics while also avoiding the utilities located across from the Waterash Street intersection.
- The 15% design realigns Lemmon Drive slightly to the south beginning near Arizona Street, and then slightly to the north after passing Oregon Boulevard. This slight realignment of Lemmon Drive provides room for a frontage road parallel to Lemmon Drive that the neighborhood driveways can connect into rather than connecting to Lemmon Drive directly.
- The 15% design also includes the extension of Matterhorn Boulevard to connect directly to Chickadee Drive in conjunction with the elimination of the Sand Pit Road intersection with Lemmon Drive, currently only 750 feet north of Chickadee Drive, improving access management. This reconfiguration also improves access options to and from Lemmon Drive and the nearby neighborhood, eliminating the triple turns required when using the Matterhorn Boulevard to Tupelo Street to Waterash Street to Lemmon Drive route. Sand Pit Road would terminate at the east side of the extended Matterhorn Boulevard.
- Raising the roadway profile elevation does not imply the roadway will act as a berm/levee; nor will the roadway be designed as such.
- Raising the profile grade slightly in areas already above the 100-year floodplain elevation allows reconstruction of the pavement section with less dewatering efforts than trying to reconstruct at the same profile elevation.
- Refer to Table 3 for the detailed NDOT Cost Wizard assumptions.
- Refer to Table 6 for the required permits for this alternative. It is assumed that federal funding will be used for the project and National Environmental Policy Act (NEPA) permitting will be required for this alternative. This will impact both cost and schedule. An estimated cost of 1.5% of construction cost has been assumed for a NEPA evaluation. However, this will need to be further evaluated to determine if any threatened and endangered species or historic artifacts are anticipated to be encountered.

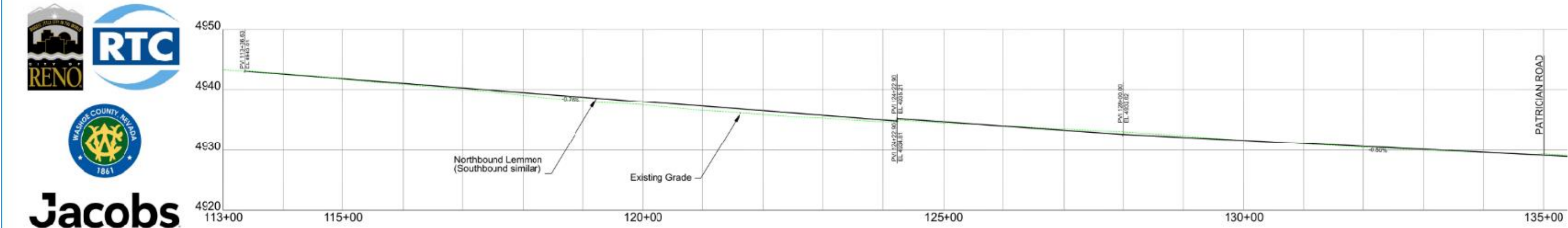
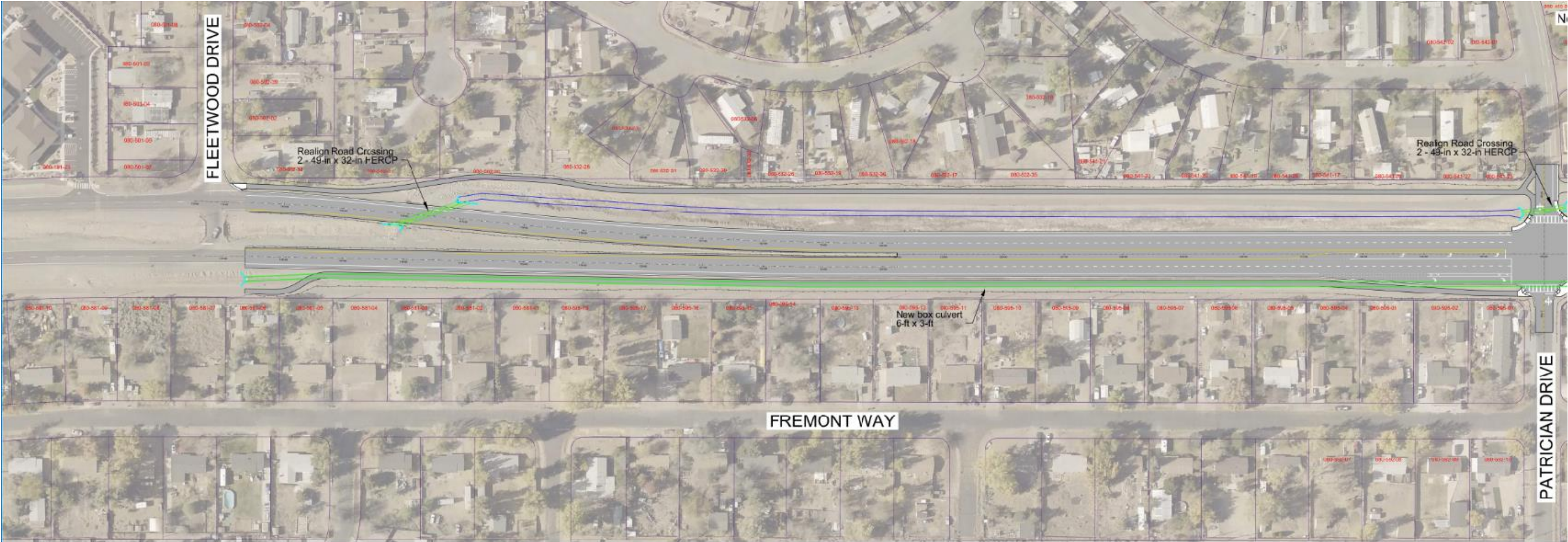


Figure 4 (1 of 3). Alternative 2 and Alternative 6 Fleetwood Drive to Deodar Way

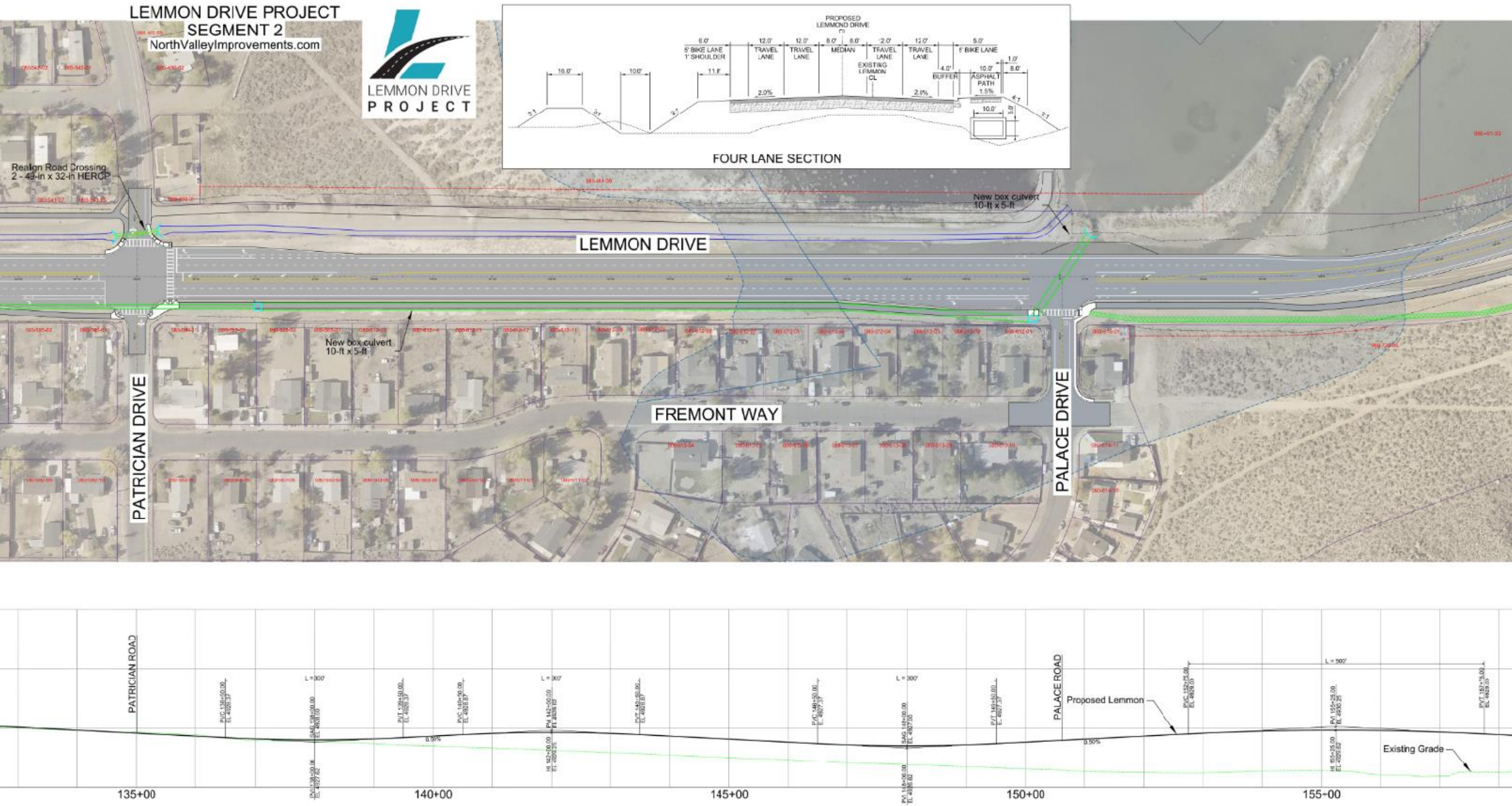


Figure 4 (2 of 3). Alternative 2 and Alternative 6 Fleetwood Drive to Deodar Way

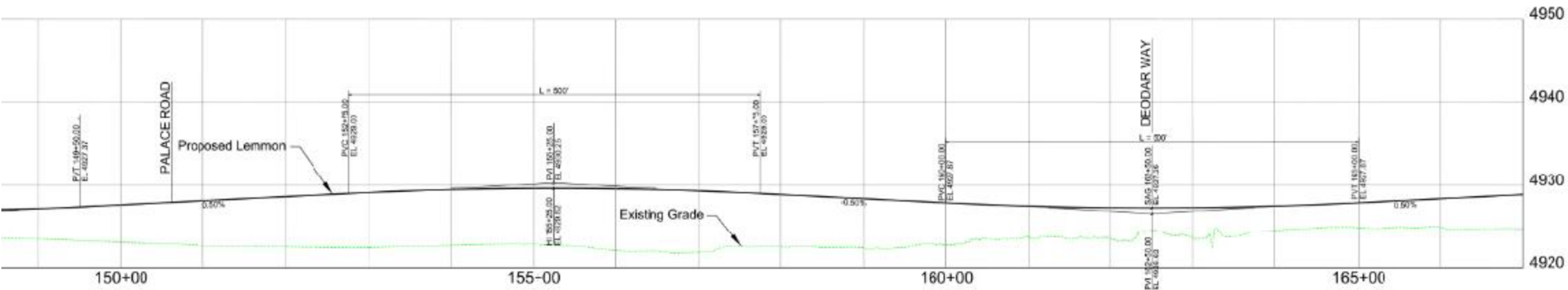


Figure 4 (3 of 3). Alternative 2 and Alternative 6 Fleetwood Drive to Deodar Way

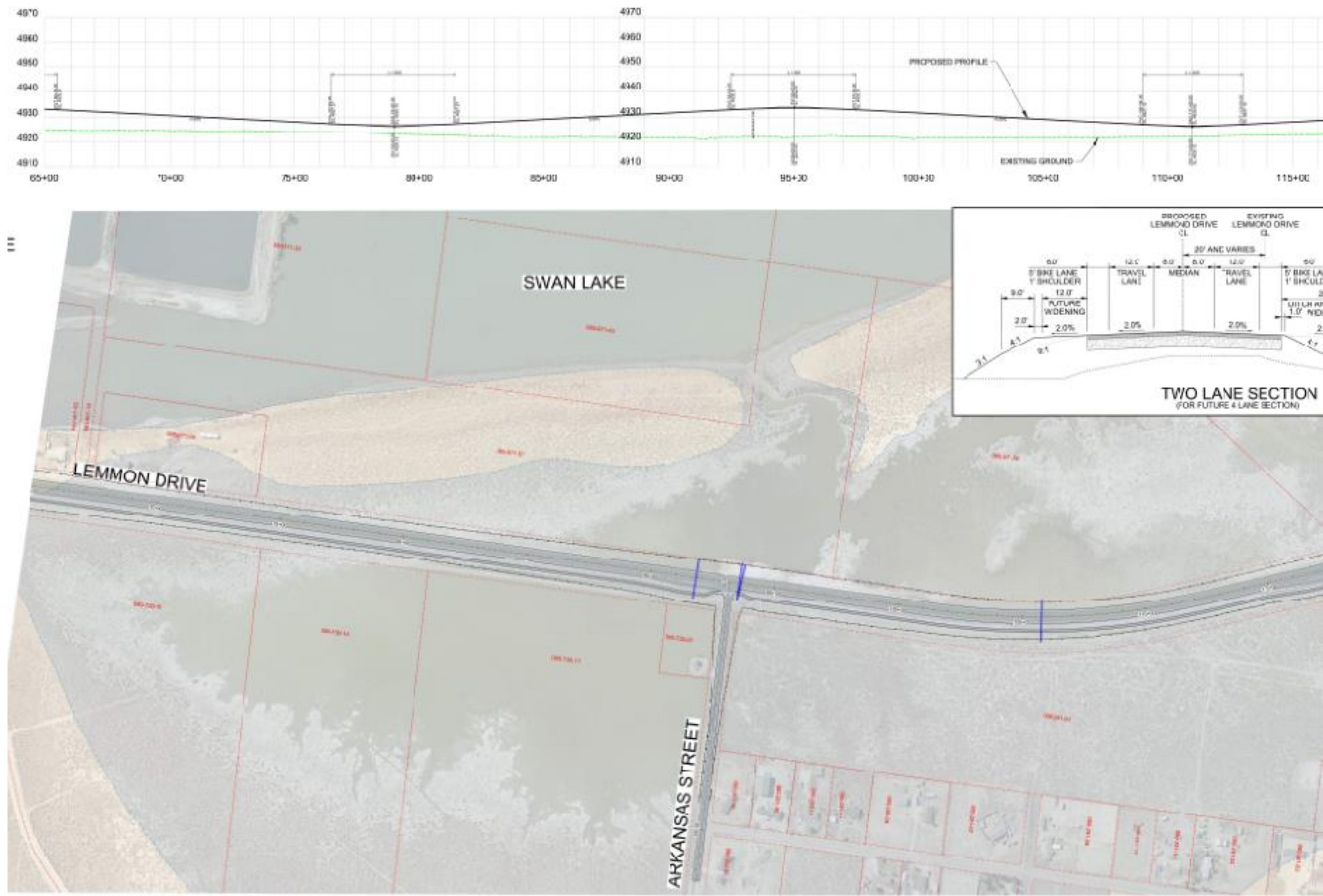


Figure 5 (1 of 3). Alternative 2 Deodar Way to Ramsey Way

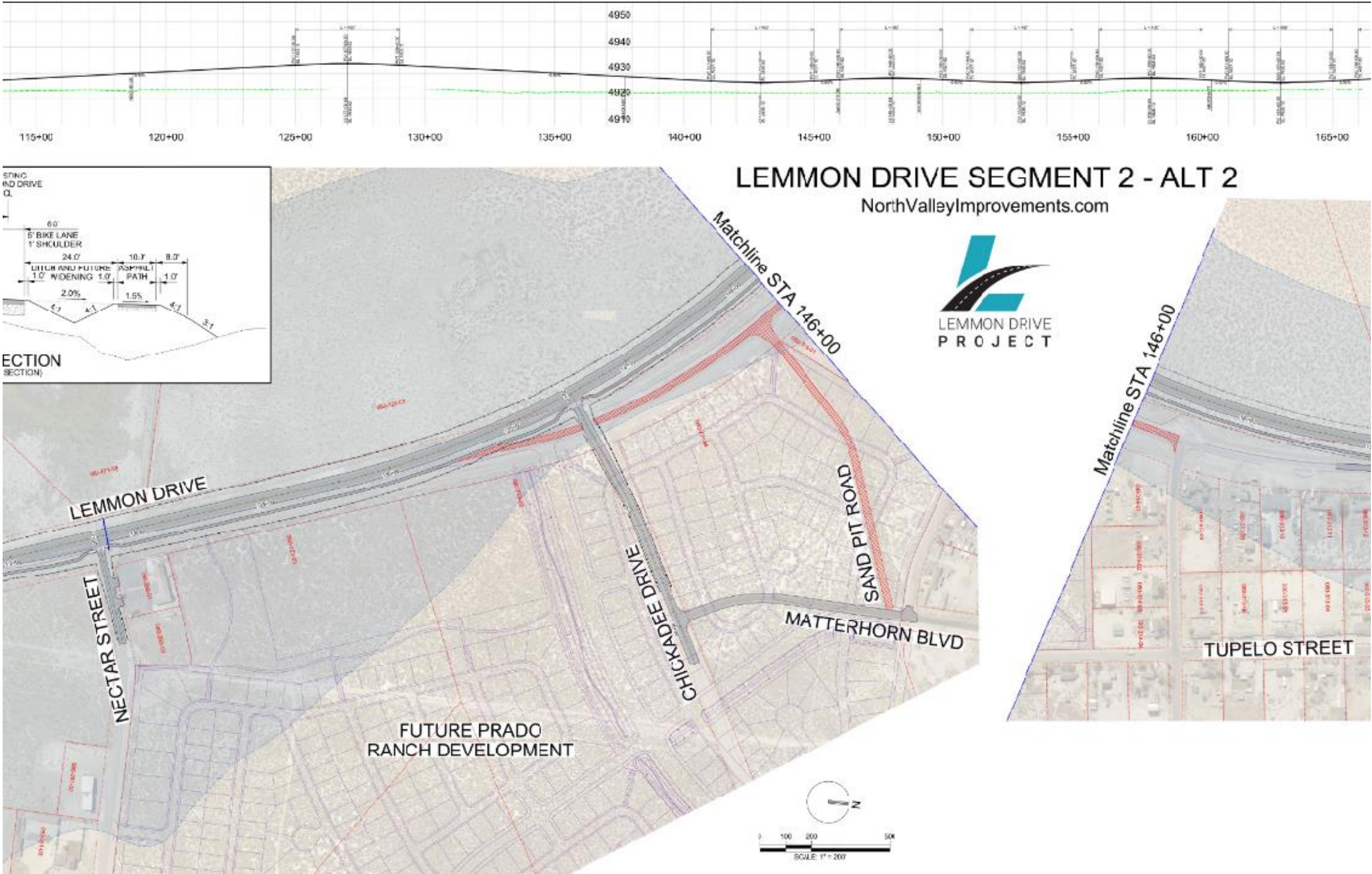


Figure 5 (2 of 3). Alternative 2 Deodar Way to Ramsey Way

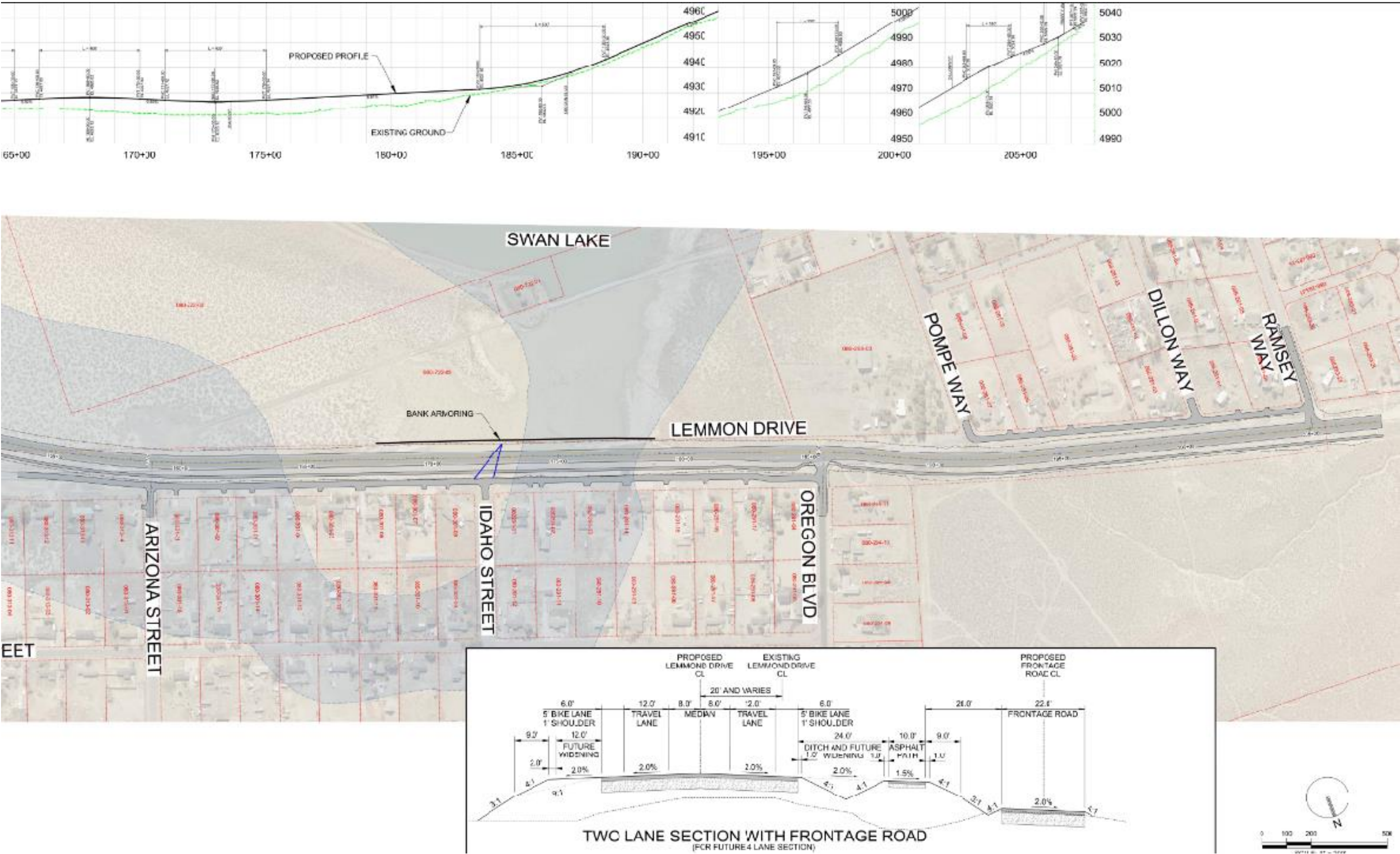


Figure 5 (3 of 3). Alternative 2 Deodar Way to Ramsey Way

Table 3. Alternative 2 NDOT Cost Wizard

Section	Quantity	Unit	Total
Section I - Roadway Construction			\$12,981,137
Borrow Embankment	376,055	CY	\$3,594,390
Roadway Excavation	23,311	CY	\$283,081
Volumetric Mitigation (Ratio of 1.3:1)	111,500	CY	\$1,354,018
Asphalt	70,286	Ton	\$5,437,259
Aggregate Base	191,435	Ton	\$2,312,389
Section II - Bridges			\$0
Section III - Walls			\$0
Section IV - Typical Interchanges			\$0
Section V - Signal Systems At Intersections			\$159,000
Patrician Dr. / Lemmon Dr. Intersection	1	Each	\$159,000
Section VI - Demolition			\$252,544
Existing Multimodal Path			\$199,621
Removal of Roadways Being Realigned			\$52,923
Section VII - Additional Items			\$2,008,902
Misc. (Signing, Striping, Lighting, Its, Utilities)	15% of Sections I Through VI and Pumping Costs		\$2,008,902
Section VIII - Standard Percentage Adders			\$3,311,340
Erosion Control / Temporary Drainage	2.5% of Sections I Through VII Costs		\$385,040
Permanent Erosion Control	5% of Sections I Through VII Costs		\$770,079
Traffic Control	10% of Sections I Through VII Costs		\$1,540,158
Roadside Safety	1% of Sections I Through VII Costs		\$154,016
Landscaping / Aesthetics	3% of Sections I Through VII Costs		\$462,047
Mobilization	7% of Sections I Through VII Costs		\$1,078,111
Section IX - Hydraulics/Storm Water Costs			\$3,742,585
Section X - Right of Way Costs			\$850,000
Developed Land	1	Acres	\$750,000
Undeveloped Land	10	Acres	\$100,000

Disclaimer: Unofficial Valuation for Estimate Purposes Only

Table 3. Alternative 2 NDOT Cost Wizard

Section	Quantity	Unit	Total
30% Preliminary Design Contingency	25% of Sections I Through X		\$5,826,377
Total Present Day Construction Cost			\$29,131,885
Total Escalated Construction Cost			\$34,763,078
Total Engineering / Administration / Legal			\$10,027,453
Preliminary Engineering (Present Day Cost)	6% of Total Escalated Construction Cost		\$2,085,785
Preliminary R/W Engineering (Present Day Cost)	0.5% of Total Escalated Construction Cost		\$173,815
Final Engineering (Present Day Cost)	7% of Total Escalated Construction Cost		\$2,433,415
Final R/W Engineering (Present Day Cost)	0.5% of Total Escalated Construction Cost		\$173,815
Environmental Assessment (Present Day Cost)	1.5% of Total Escalated Construction Cost		\$521,446
Administration (Present Day Cost)	0.5% of Total Escalated Construction Cost		\$173,815
Legal (Present Day Cost)	0.25% of Total Escalated Construction Cost		\$86,908
Construction Engineering & Inspection	10% of Total Escalated Construction Cost		\$3,476,308
Total Escalated Engineering / Administration / Legal	15.97% Escalation To Mid-Year 2025		\$902,145
Grand Total Project Cost			\$44,790,531

5.3 Alternative 6. Natural Berm Realignment

- Figure 4 shows Fleetwood Drive to Deodar Way 15% design improvements, which are the same as in Alternative 2.
- Figure 6 shows Deodar Way to Ramsey Way 15% design of the realignment of Lemmon Drive to the west along the natural berm of Swan Lake. Google Earth™ shows a dirt road labeled as Idaho Street along this natural berm. The realignment begins with the continuation of the horizontal curve near Deodar Way to align the roadway with the natural berm.
- Lemmon Drive is widened from two to four lanes from Fleetwood Drive to Palace Drive with a continuous 16-foot-wide median.
- North of Palace Drive, provide a roadway earthwork prism for the future four-lane facility as an undivided arterial with continuous 16-foot-wide median that develops into a left-turn lane where necessary. The design also would raise the vertical profile to ensure one lane in either travel direction remains dry (including accounting for 18 inches of wave action) to provide residents and emergency vehicles access within the 100-year floodplain (the existing profile low point is approximately at elevation 4,922.4 feet). The entire embankment prism will be built, although only two lanes will be paved north of Palace Drive.
- At the northern end, the realignment would end with a horizontal curve matching into the existing Lemmon Drive alignment near Pompe Way (to provide adequate distance to match back into the existing profile of Lemmon Drive).
- The existing Lemmon Drive will be repurposed as a frontage road between Waterash Street and Oregon Boulevard for the neighborhood driveways to connect to rather than connecting directly to Lemmon Drive. West of Oregon Boulevard, Lemmon Drive will be realigned slightly to the north to provide a frontage road that parallels Lemmon Drive between Pompe Way and Ramsey Way, accommodating the neighborhood driveway connections.
- The existing elevation of this natural berm allows Lemmon Drive to be constructed at-grade and be above the adjusted 100-year floodplain elevation, greatly reducing the amount of volumetric mitigation to offset fill, at a 1.3:1 ratio, below the flood elevation to 10,500 cubic yards.
- Potential areas for volumetric mitigation include:
 - The existing Lemmon Drive alignment; removal of this roadway also eliminates future maintenance
 - The 123.5-acre parcel west of Lemmon Drive between Nectar Street and Oregon Boulevard, in the area across from Idaho Street, specifically, the removal of Jean Way and focused excavation in this area (APN 080-722-03, currently owned by Lansing-Arcus LLC)
 - The 1-acre parcel recently acquired by Washoe County at the northeast corner of Idaho Street and Lemmon Drive (APN 080-301-08)
 - The 40-acre parcel west of Lemmon Drive between Deodar Way and Arkansas Drive; specifically, the triangle area between the new and old alignments of Lemmon Drive south of Arkansas Drive, and the portion of the parcel north of Arkansas Drive (APN 080-671-57, currently owned by Lansing-Arcus LLC)
 - The 37-acre parcel east of Lemmon Drive between Arkansas Drive and Nectar Street (APN 080-281-01, currently owned by Lansing-Arcus LLC)
 - The southeast corner of the 61-acre parcel north of Lemmon Drive, west of Oregon Boulevard (APN 086-290-54, owned by the Reno-Tahoe Airport Authority)

- Preliminary design includes a large box culvert from the east side of Lemmon Drive in the vicinity of Palace Drive to the west side of Lemmon Drive towards Swan Lake with an approximate outlet invert elevation of 4917.0. Preliminary design for this 10' x 5' culvert includes an outlet control feature that will prevent backwater from Swan Lake during time frames when the elevation of Swan Lake raises above 4917.
- The design includes dedicated bicycle lanes in both directions.
- The existing 8-foot-wide multi-use path east of Lemmon Drive is relocated/reconstructed as a 10-foot-wide multi-use path offset from the edge of roadway pavement. The profile of the path is consistent with the roadway profile, maximizing the ability of the path to stay usable and provide adequate cover over culverts as needed. If chosen as the preferred alternative, the profile and location of the path can be adjusted to a lower, TAC agreed-upon, elevation to reduce the amount of volumetric mitigation required, with localized raising of the path for cover over culverts as needed.
- Geometrics and roadside features would be updated to meet current design standards.
- Westward extension of Arkansas Street, Chickadee Drive, and Oregon Boulevard will be required to connect into the realigned Lemmon Drive.
- A slight realignment is proposed for Deodar Way to align with the future Lear Boulevard extension intersection with Lemmon Drive.
- To ensure proper access management, the direct connection to Lemmon Drive of multiple driveways, Waterash Street, Arizona Street, Idaho Street, Pompe Way, and Dillon Way will be replaced with connections to frontage roads.
- As in Alternative 2, the 15% design includes the extension of Matterhorn Boulevard to connect directly to Chickadee Drive in conjunction with the elimination of the Sand Pit Road intersection with Lemmon Drive, currently only 750 feet north of Chickadee Drive, improving access management. This reconfiguration also improves access options to and from Lemmon Drive and the nearby neighborhood, eliminating the triple turns required when using the Matterhorn Boulevard to/from Tupelo Street to/from Waterash Street to/from Lemmon Drive route. Sand Pit Road would terminate at the extended Matterhorn Boulevard.
- The Jean Way connection to/from the western side of Swan Lake would be eliminated, and access to the Truckee Meadows Water Authority (TMWA) parcel, APN 080-722-01, would be direct access from Lemmon Drive approximately at Station 160+00.
- The existing 3,500 feet of Lemmon Drive from Idaho Street south to Chickadee Drive would be maintained to preserve local access for the properties with frontage to Lemmon Drive. This existing segment of roadway provides access to the realigned Lemmon Drive via Chickadee Drive.
- From Sand Pit Road south to Deodar Way, the existing roadway would be removed. This eliminates the need to continue to maintain additional roadway and provides an available location within the floodplain for volumetric mitigation.
- Refer to Table 4 for the detailed NDOT Cost Wizard assumptions.
- Refer to Table 6 for the required permits for this alternative. It is assumed that federal funding will be used for the project and National Environmental Policy Act (NEPA) permitting will be required for this alternative. This will impact both cost and schedule. An estimated cost of 1.5% of construction cost has been assumed for a NEPA evaluation. However, this will need to be further evaluated to determine if any threatened and endangered species or historic artifacts are anticipated to be encountered.

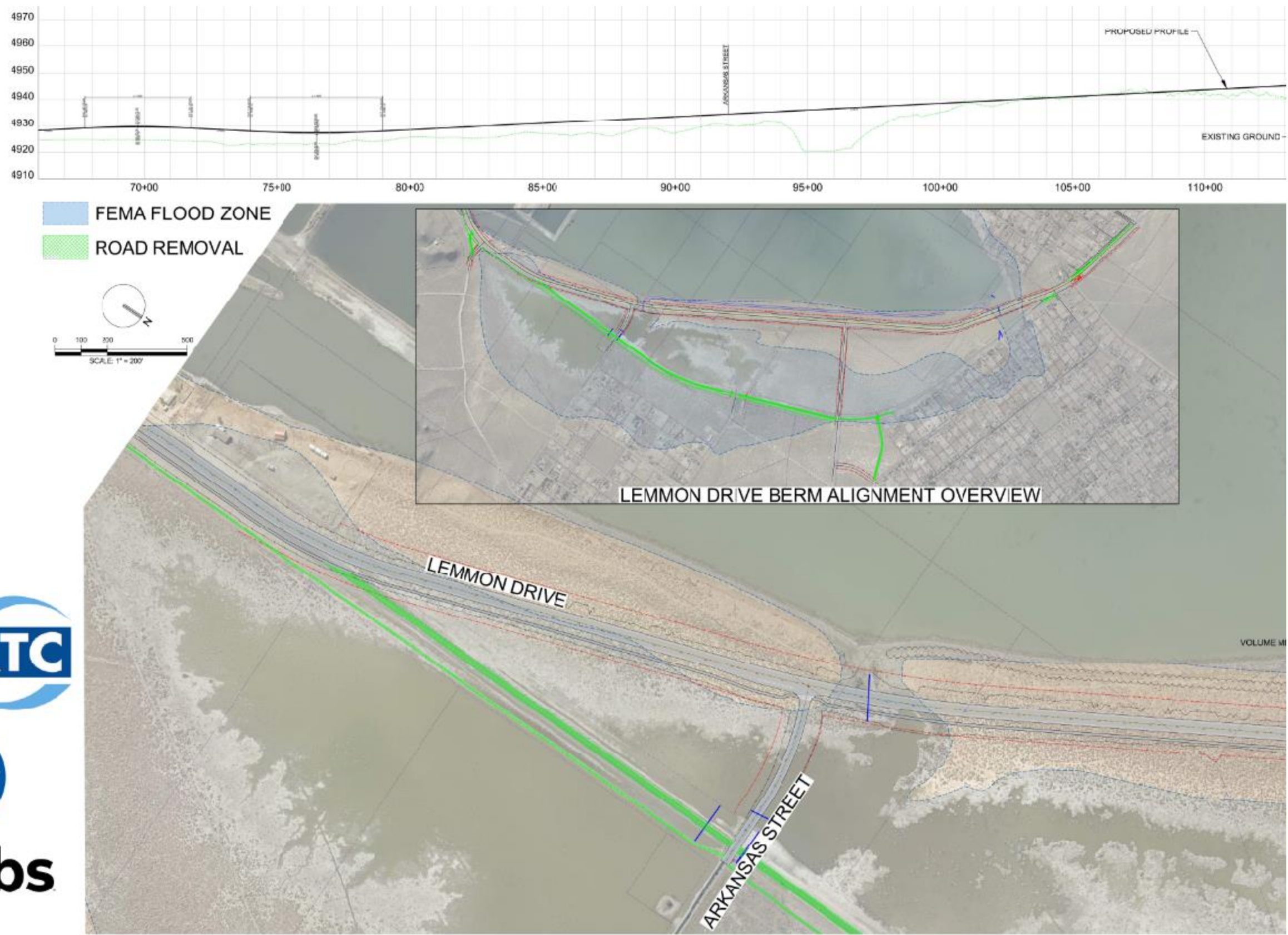


Figure 6 (1 of 3). Alternative 6 Deodar Way to Ramsey Way

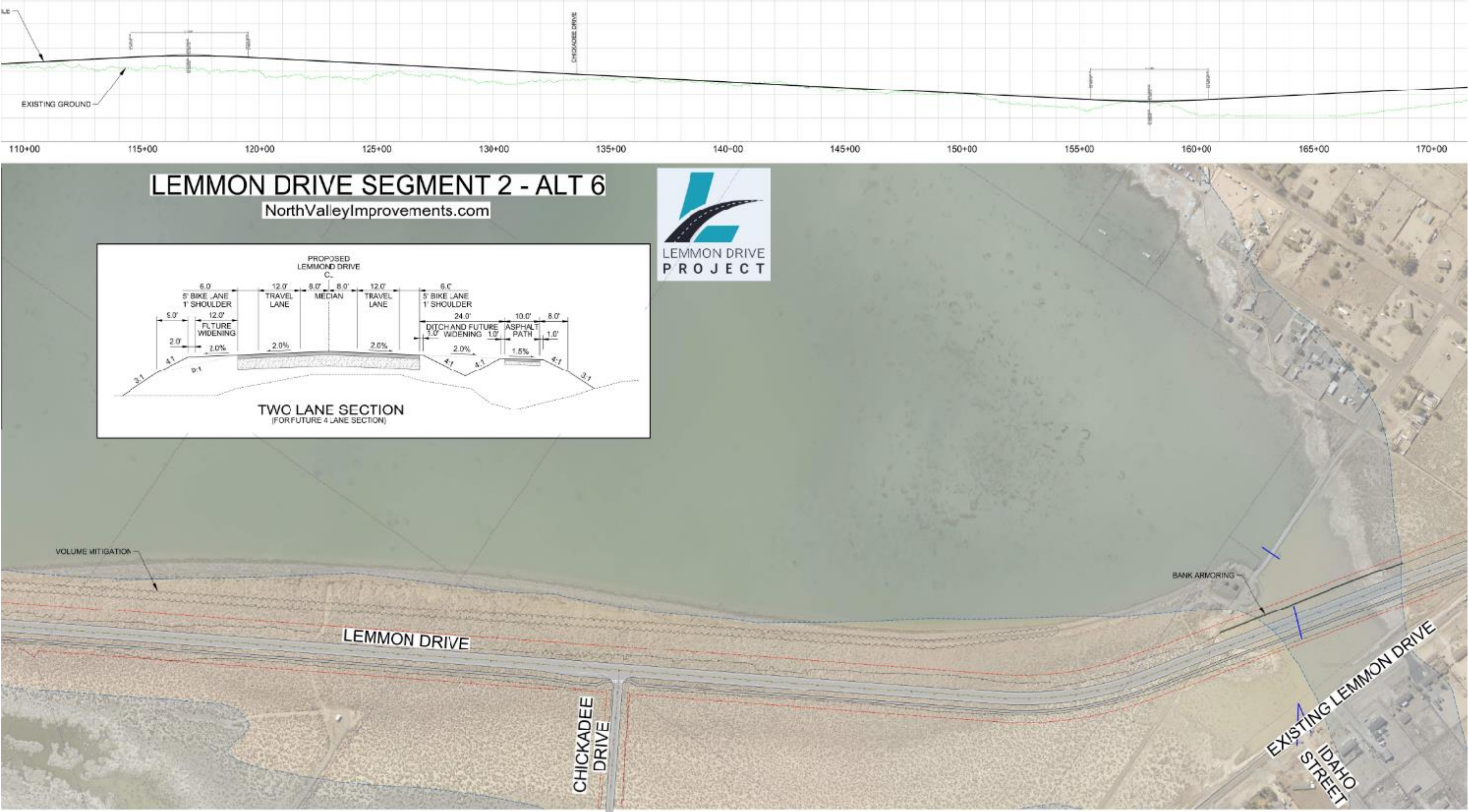


Figure 6 (2 of 3). Alternative 6 Deodar Way to Ramsey Way

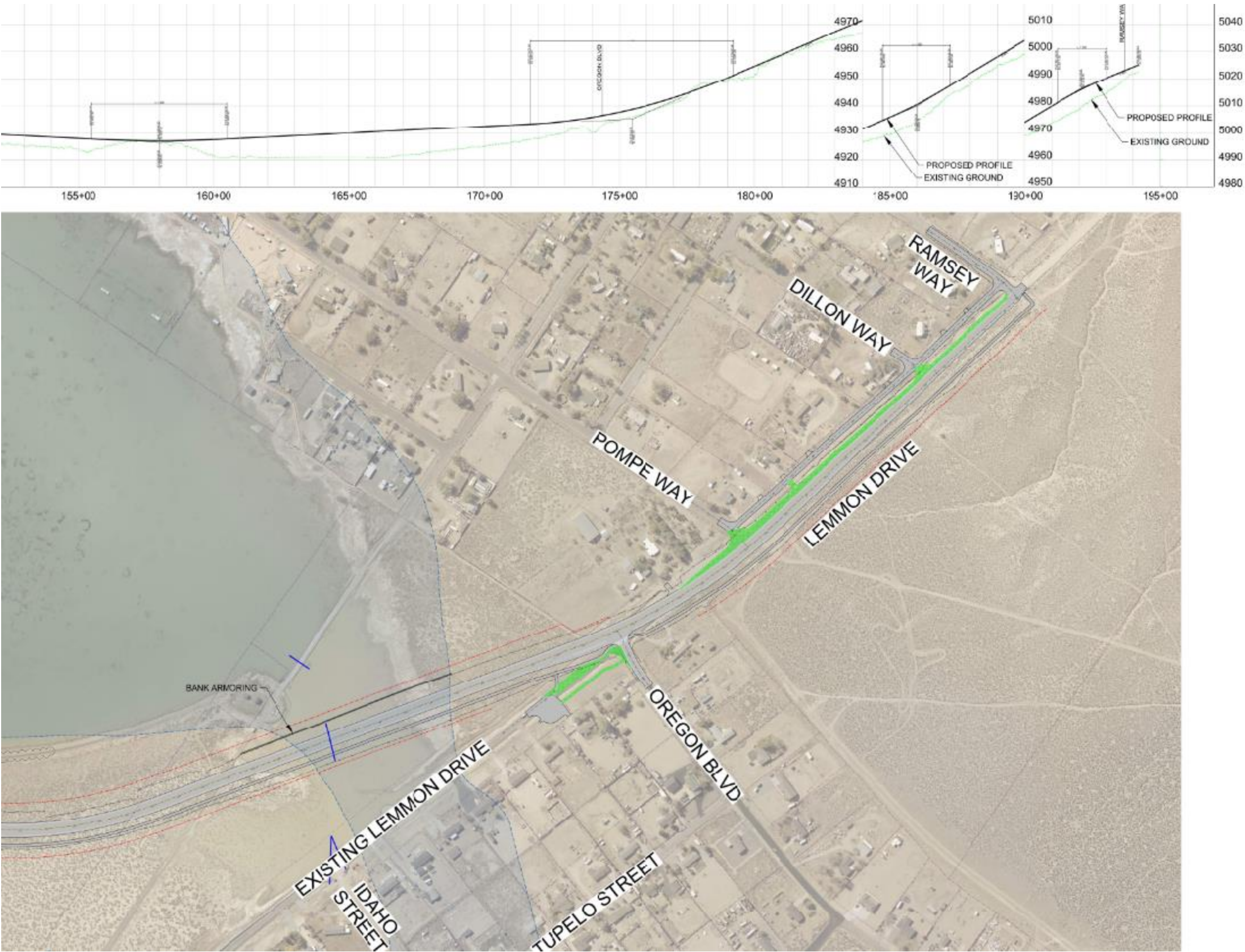


Figure 6 (3 of 3). Alternative 6 Deodar Way to Ramsey Way

Table 4. Alternative 6 NDOT Cost Wizard

Section	Quantity	Unit	Total
Section I - Roadway Construction			\$10,455,327
Borrow Embankment	268,689	CY	\$2,568,170
Roadway Excavation	44,105	CY	\$535,596
Volumetric Mitigation (Ratio Of 1.3:1)	10,500	CY	\$127,508
Asphalt	65,523	Ton	\$5,068,798
Aggregate Base	178,426	Ton	\$2,155,255
Section II - Bridges			\$0
Section III - Walls			\$0
Section IV - Typical Interchanges			\$0
Section V - Signal Systems At Intersections			\$159,000
Patrician Dr. / Lemmon Dr. Intersection	1	Each	\$159,000
Section VI - Demolition			\$516,981
Existing Multimodal Path			\$199,621
Removal of Lemmon & roadways being realigned			\$317,360
Section VII - Additional Items			\$1,669,696
Misc. (Signing, Striping, Lighting, ITS, Utilities)	15% of Sections I through VI and Pumping costs		\$1,669,696
Section VIII - Standard Percentage Adders			\$1,728,136
Erosion Control / Temporary Drainage	1.5% of Sections I through VII costs		\$192,015
Permanent Erosion Control	3% of Sections I through VII costs		\$384,030
Traffic Control	5% of Sections I through VII costs		\$640,050
Roadside Safety	1% of Sections I through VII costs		\$128,010
Landscaping / Aesthetics	3% of Sections I through VII costs		\$384,030
Mobilization	7% of Sections I through VII costs		\$896,070
Section IX - Hydraulics/Storm Water Costs			\$2,179,371
Section X - Right Of Way Costs			\$3,500,000
Developed Land	2	Acres	\$1,500,000
Undeveloped Land	80	Acres	\$2,000,000

Disclaimer: Unofficial Valuation for Estimate Purposes Only

Table 4. Alternative 6 NDOT Cost Wizard

Section	Quantity	Unit	Total
30% Preliminary Design Contingency	25% of Sections I through X		\$5,052,128
Total Present Day Construction Cost			\$25,260,639
Total Escalated Construction Cost			19.33% Escalation to Mid-Year 2026
			\$30,143,520
Total Engineering / Administration / Legal			\$8,694,936
Preliminary Engineering (Present Day Cost)	6% Of Total Escalated Construction Cost		\$1,808,611
Preliminary R/W Engineering (Present Day Cost)	0.5% Of Total Escalated Construction Cost		\$150,718
Final Engineering (Present Day Cost)	7% Of Total Escalated Construction Cost		\$2,110,046
Final R/W Engineering (Present Day Cost)	0.5% Of Total Escalated Construction Cost		\$150,718
Environmental Assessment (Present Day Cost)	1.5% Of Total Escalated Construction Cost		\$452,153
Administration (Present Day Cost)	0.5% Of Total Escalated Construction Cost		\$150,718
Legal (Present Day Cost)	0.25% Of Total Escalated Construction Cost		\$75,359
Construction Engineering & Inspection	10% Of Total Escalated Construction Cost		\$3,014,352
Total Escalated Engineering / Administration / Legal	15.97% Escalation To Mid-Year 2025		\$782,262
Grand Total Project Cost			\$38,838,456

5.4 Alternative 8, 8a, 8b Deodar Way Realignment:

- Realign Lemmon Drive to the east along the existing Deodar Way corridor.
- Eliminate the existing Lemmon Drive between Chickadee Drive and Deodar Way.
- The realignment would begin near the existing Deodar Way intersection, continuing north along the Deodar Way corridor, terminating as an intersection with Chickadee Drive.
- This realignment introduces two intersections that current traffic along Lemmon Drive does not navigate through, an intersection where the realigned Lemmon Drive intersects Chickadee Drive and a second where Chickadee Drive intersects with the existing Lemmon Drive. Realigning Chickadee Drive along a large radius horizontal curve west of Chesapeake Drive to Tupelo Street may be possible to eliminate the need for a second intersection where Chickadee Drive would intersect with the existing Lemmon Drive.
- This alignment can be built on-grade as it would be above the adjusted 100-year floodplain elevation.
- Widening of the existing Deodar Way corridor to accommodate four future lanes of traffic and a dedicated bike lane in both directions would have property impacts to approximately 40 parcels.
- The existing 8-foot-wide multi-use path would be reconstructed as a 10-foot-wide path and the profile raised to an agreed-upon elevation.
- A second option for this alternative, identified as Alternative 8a, is to realign Lemmon Drive east of Deodar Way along Fir Drive. Fir Drive would be widened to the east to accommodate the roadway and dedicated bike lanes, affecting only 8 parcels, rather than the 40 parcels required along the Deodar Way alignment.
- A third option for this alternative, identified as Alternative 8b, is to realign Lemmon Drive farther east to avoid all the developed parcels of this neighborhood. The terrain becomes very hilly just east of Fir Drive so retaining walls may be required. Connectivity to the neighborhood must be perpetuated from the realigned Lemmon Drive.
- The new profile alignment would accommodate existing drainage pathways to Swan Lake.
- Mitigation measures would still need to be employed at Nectar Street and other localized spots along the existing Lemmon Drive alignment to address flooding.
- These alternatives do not provide viable improvements north to Ramsey Way; therefore, no NDOT Cost Wizards were completed.

6.0 Level 2 Screening Results

The NDOT Cost Wizard was used to prepare cost estimates for Alternatives 2 and 6. The Cost Wizard has recommended percentage assumptions and unit prices per District. District II, which covers Washoe County, prices were used. A summary of the cost breakouts are shown in Table 5.

Table 5. NDOT Cost Wizard Summary

Estimate Section	Alternative 2	Alternative 6
<i>Section I - Roadway Construction</i>	\$12,981,137	\$10,455,327
<i>Section II - Bridges</i>		
<i>Section III - Walls</i>		
<i>Section IV - Typical Interchanges</i>		
<i>Section V - Signal Systems At Intersections</i>	\$159,000	\$159,000
<i>Section VI - Demolition</i>	\$252,544	\$516,981
<i>Section VII - Additional Items</i>	\$2,008,902	\$1,669,696
<i>Section VIII - Standard Percentage Adders</i>	\$3,311,340	\$1,728,136
<i>Section IX - Hydraulics/Storm Water Costs</i>	\$3,742,585	\$2,179,371
<i>Section X - Right Of Way Costs</i>	\$850,000	\$3,500,000
<i>Disclaimer: Unofficial Valuation for Estimate Purposes Only</i>		
30% Preliminary Design Contingency	\$5,826,377	\$5,052,128
Total Present Day Construction Cost	\$29,131,885	\$25,260,639
Total Escalated Construction Cost	\$34,763,078	\$30,143,520
Total Engineering / Administration / Legal	\$10,027,453	\$8,694,936
Grand Total Construction & Engineering	\$44,790,531	\$38,838,456

The \$6 million cost difference between Alternative 2 and Alternative 6 is attributed to:

- **Volumetric Mitigation:**
Alternative 2 requires 111,500 cubic yards vs. 10,500 cubic yards for Alternative 6. The volumetric mitigation excavation will be required to be hauled off.
- **Traffic Control:**
Alternative 2 requires construction next to live traffic along the entire alignment. Alternative 6 requires construction next to live traffic south of Deodar and at the north end where the Alternative 6 realignment ties back into the existing Lemmon Drive alignment.
- **Permanent Erosion Control:**
Alternative 2 will have more western-facing embankment surface area below the wave action elevation that will need armoring than Alternative 6.
- **Hydraulics/Stormwater:**
Alternative 2 requires more equalization of flood waters across Lemmon Drive, so the percentage is higher than Alternative 6.

Some qualitative differences/similarities between the alternatives are:

- **Safety**
 - Both Alternative 2 and Alternative 6 incorporate frontage roads at the north end of the Segment 2 limits into which multiple driveways would be connected rather than connecting directly to Lemmon Drive.
 - During construction, Alternative 6 moves much of the construction zone away from live traffic.
- **CLOMR/LOMR**
 - The natural berm realignment alternative will have smaller impacts within the floodplain allowing the avoidance of a CLOMR/LOMR.
 - The on-alignment alternative is almost completely within the floodplain and intricate design and modeling will be required with no guarantee to avoid the need for the CLOMR/LOMR.
- **Permitting**
 - Table 6 presents a summary of permitting requirements for each alternative. Note that if NEPA is required, further evaluation to narrow this cost and schedule impact will be required. However, this impact will be the same for each of the above alternatives considered.
- **National Environmental Protection Act**
 - It is assumed that the National Environmental Protection Act (NEPA) (shown as Environmental Assessment in the NDOT Cost Wizard) will be triggered for both alternatives with the future obligation of federal funding for construction and final design.
 - The presence of land under the jurisdiction of the Bureau of Land Management along the natural berm realignment alternative also will require NEPA action.

7.0 Conclusions

Based on the results of the Level 2 screening process, Alternative 6 is the Agency-endorsed alternative that will be advanced to a 30% design during the Summer of 2022. Alternative 6 will realign Lemmon Drive north of Palace Drive along the natural berm, currently identified as Idaho Street, on the eastern side of Swan Lake. The major difference between Alternative 2 and Alternative 6 is the volumetric mitigation requirements at a ratio of 1.3:1 for fill placed within the new 100-year floodplain elevation of the closed

basin. Alternative 2 requires 111,500 cubic yards of fill versus only 10,500 cubic yards for Alternative 6. The 1.3:1 ratio volumetric mitigation is required by the City of Reno development standards for stormwater retention in closed drainage basins. Other benefits Alternative 6 provides include: (1) construction away from live traffic, (2) fewer equalization culvert locations, and (3) less bank armoring for embankment within the floodplain-plus-wave-action elevation.

The Lemmon Drive Segment 2 Project was submitted to compete for up to \$25 million in RAISE Grant funding from the U.S. Department of Transportation. Awards will be announced by August 12, 2022.

Table 6. Permitting Summary

Alternative	Permitting Requirements	Permitting Strategy	Permit Duration	Requirements during Construction	Permitting Avoidance/Alternatives
A2 Raise Existing Lemmon Drive above 100-yr. floodplain elevation	NDEP Working in Waterways Permit: This permit is required to address work in drainages and work if in or near Swan Lake NDEP DeMinimis Discharge Permit, or Discharge Permit: This permit is required for any groundwater discharge that is completed. NDEP Construction Stormwater Permit: This permit is required for disturbance of more than one acre.	Working in Waterways required for Drainages: One permit can cover all drainages impacted. However, recommend considering if there is benefit to breaking these up based on construction phasing and if multiple contractors are used. Working in Waterways required for Swam Lake: Will be required if work impacts water in or near Swan Lake. If work can be completed when lake is low, this permit may not be required. DeMinimis Discharge or Full Discharge Permit: If excavation involves dewatering, then water discharge will require a discharge permit. If discharge is less than 250GPM then a DeMinimis Permit is required and less monitoring and sampling is necessary. If greater than 250GPM, then a full Discharge Permit is required and monitoring and sampling is fairly extensive. Water disposal options will need to be determined based on volumes and quality.	Working in Waterways Permit will cover 180 days of work from the time of construction start. A time reallocation may be possible otherwise additional permits and applications may be required. Discharge Permit (either full or DeMinimis will be in place as long as discharge occurs). In event you are working under a DeMinimis and the contractor exceeds 250GPM, then a full permit application will need to be submitted. This could impact timing of project.	1) BMPs during construction will be required and must be monitored for all Working in Waterways. 2) Daily visual turbidity monitoring and reporting is required if water is present during construction work. 3) A final narrative report describing the project and a series of photos documenting the project activities, including the implementation of BMPs is required. 5) If discharge permit is required, there is a wide range of sampling that could be required. This will need to be evaluated once the conditions are known. 6) Specific to the SWPPP, it is recommended that the Contractor be required to Sign on to this Permit for this project and produce a Stormwater Pollution Prevention Plan. Or, have the contractor obtain this permit.	1) If it is possible, complete all work when Swan Lake levels are low to avoid work near or in the water. 2) Complete the design to avoid groundwater if possible. 3) Require the contractor(s) to utilize means and methods of construction that do not require discharge (i.e. if possible, complete fill and compaction in groundwater to avoid discharge)
A6 Natural Berm Realignment	NDEP Working in Waterways Permit: This permit is required to address work in drainages and work if in or near Swan Lake NDEP DeMinimis Discharge Permit, or Discharge Permit: This permit is required for any groundwater discharge that is completed. NDEP Construction Stormwater Permit: This permit is required for disturbance of more than one acre. USA Lands (NEPA): Tri Sage reviewed parcels around the roadway options for this route and identified several parcels that are owned by the United States of America. Jacobs has confirmed these parcels are owned by BLM. As such, if this option is selected, the project would then be subject to NEPA. BLM Should be contacted soon to explore the possibility of a categorical exclusion. They may require biological and cultural investigations that would need to be conducted soon. We did not see any parcels belonging to the State of NV that would fall into this NVDSL jurisdiction.	Working in Waterways required for Drainages: One permit can cover all drainages impacted. However, recommend considering if there is benefit to breaking these up based on construction phasing and if multiple contractors are used. Working in Waterways required for Swam Lake: Will be required if work impacts water in or near Swan Lake. If work can be completed when lake is low, this permit may not be required. DeMinimis Discharge or Full Discharge Permit: If excavation involves dewatering, then water discharge will require a discharge permit. If discharge is less than 250GPM then a DeMinimis Permit is required and less monitoring and sampling is necessary. If greater than 250GPM, then a full Discharge Permit is required and monitoring and sampling is fairly extensive. Water disposal options will need to be determined based on volumes and quality. USA Lands (NEPA): If this route is identified as preferred, it would be a good idea to engage with BLM to determine the level of NEPA review and permitting they will require.	Working in Waterways Permit will cover 180 days of work from the time of construction start. A time reallocation may be possible otherwise additional permits and applications may be required. Discharge Permit (either full or DeMinimis will be in place as long as discharge occurs). In event you are working under a DeMinimis and the contractor exceeds 250GPM, then a full permit application will need to be submitted. This could impact timing of project. USA Lands (NEPA): There are multiple levels of NEPA that could be required. It is possible that BLM would support a categorical exclusion which would require some permitting review but would be a shortened period. It is anticipated this would take between five and six months. In the event they require an environmental assessment or impact statement, the process could add up to two to three years. As such, contact with BLM is recommended soon.	1) BMPs during construction will be required and must be monitored for all Working in Waterways. 2) Daily visual turbidity monitoring and reporting is required if water is present during construction work. 3) A final narrative report describing the project and a series of photos documenting the project activities, including the implementation of BMPs is required. 4) If discharge permit is required, there is a wide range of sampling that could be required. This will need to be evaluated once the conditions are known. 5) Specific to the SWPPP, it is recommended that the Contractor be required to Sign on to this Permit for this project and produce a Stormwater Pollution Prevention Plan. Or, have the contractor obtain this permit. 6) Specific to BLM, there is a wide range of possible requirements. All will be in the form of best management practices and will be established during the permitting process.	1) If it is possible, complete all work when Swan Lake levels are low to avoid work near or in the water. 2) Complete the design to avoid groundwater if possible. 3) Require the contractor(s) to utilize means and methods of construction that do not require discharge (i.e., if possible, complete fill and compaction in groundwater to avoid discharge) 4) It is noted that if NEPA can be avoided, that would be a good strategy.

Table 6. Permitting Summary

Alternative	Permitting Requirements	Permitting Strategy	Permit Duration	Requirements during Construction	Permitting Avoidance/Alternatives
A8 Deodar alignment	NDEP Working in Waterways Permit: This permit is required to address work in drainages and work if in or near Swan Lake NDEP DeMinimis Discharge Permit, or Discharge Permit: This permit is required for any groundwater discharge that is completed. NDEP Construction Stormwater Permit: This permit is required for disturbance of more than one acre.	Working in Waterways required for Drainages: One permit can cover all drainages impacted. However, recommend considering if there is benefit to breaking these up based on construction phasing and if multiple contractors are used. Working in Waterways required for Swam Lake: Will be required if work impacts water in or near Swan Lake. If work can be completed when lake is low, this permit may not be required. DeMinimis Discharge or Full Discharge Permit: If excavation involves dewatering, then water discharge will require a discharge permit. If discharge is less than 250GPM then a DeMinimis Permit is required and less monitoring and sampling is necessary. If greater than 250GPM, then a full Discharge Permit is required and monitoring and sampling is fairly extensive. Water disposal options will need to be determined based on volumes and quality.	Working in Waterways Permit will cover 180 days of work from the time of construction start. A time reallocation may be possible otherwise additional permits and applications may be required. Discharge Permit (either full or DeMinimis will be in place as long as discharge occurs). In event you are working under a DeMinimis and the contractor exceeds 250GPM, then a full permit application will need to be submitted. This could impact timing of project.	1) BMPs during construction will be required and must be monitored for all Working in Waterways. 2) Daily visual turbidity monitoring and reporting is required if water is present during construction work. 3) A final narrative report describing the project and a series of photos documenting the project activities, including the implementation of BMPs is required. 4) If discharge permit is required, there is a wide range of sampling that could be required. This will need to be evaluated once the conditions are known. 5) Specific to the SWPPP, it is recommended that the Contractor be required to Sign on to this Permit for this project and produce a Stormwater Pollution Prevention Plan. Or, have the contractor obtain this permit.	1) If it is possible, complete all work when Swan Lake levels are low to avoid work near or in the water. 2) Complete the design to avoid groundwater if possible. 3) Require the contractor(s) to utilize means and methods of construction that do not require discharge (i.e., if possible, complete fill and compaction in groundwater to avoid discharge)

Notes:

1 **USACE Regulatory** - It has been generally confirmed that the USACE does NOT assert jurisdiction over Swan Lake or the wetland associated with this lake. The team has obtained a copy of a previous 2016 Jurisdictional Determination for Swan Lake and the wetlands finding it non-jurisdictional. USACE generally agreed that short of them doing a formal determination for this project, that this prior referenced determination should still be correct. This confirms that there is NO 404 or Nationwide or Clean Water Act (CWA) permitting required which also clarifies that CWA discharge permits are NOT necessary and this Swan Lake water body (and its extensions around the roadway areas) falls only with the jurisdiction of the State of Nevada NDEP.

2 **Nevada Division of State Lands (NVDSL)** – It has been verified that the Nevada Division of State Lands does NOT assert jurisdiction over Swan Lake and State Lands does not consider this water body a Water of the State. This means that there is no NV DSL Permits or Easements required for work in and around the lake and its extended waters. This project can put a roadway across or through the water without NVDSL involvement.

3 **Dewatering** - Depending upon volumes and quality of dewatering (if required for construction), disposal of this water will have to be determined. There are several options, including methods of avoiding permitting. This will need to be more closely evaluated once construction approach is established to identify the required permitting.

4 **NEPA** - NEPA is triggered when a federal action occurs on a project. This can be in the form of federal funding, impacts to federal lands, or federal permitting. For this project, determination will need to be made if federal funding will occur. Also, as noted for the Natural Berm option, BLM parcels are impacted. If NEPA is required, timing of field studies will be critical to ensure seasonal plants are not missed (which could result in a full year delay just to obtain the seasonal studies). If NEPA is required, a NEPA specialist should be added to the team to initiate the effort with the agencies. This is an extensive process and will impact both cost and schedule. Note that for Alternative A2 & A8, NEPA is not highlighted under the Permitting Requirements because federal land for these alternatives have not been impacted. However, if there is project financing, NEPA will indeed apply to these alternatives as well.