VAIL TRANSPORTATION

MASTER PLAN UPDATE

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ACKNOWLEDGEMENTS

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PREFACE

Purpose of the Master Plan

The purpose of the Vail Transportation Master Plan is to consolidate and update the transportation planning and design efforts that have been on-going for the past 20 years. This most recent document, which is based on the existing conditions of Vail's transportation system, current trends and the anticipated growth, will guide the implementation of Vail's transportation system for the next 20 years. In order to keep the plan a viable document over this time period, continuous monitoring of the transportation system and periodic updates of the plan are needed, including periodic traffic counts and formal master plan updates.

Previous transportation documents are referenced and summarized in the appendices of this document. These referenced documents remain relevant and provide additional insight and guidance for transportation planning and design purposes. The scope of each of these referenced documents focus on various transportation related topics with some overlapping subjects. The redundancy in this is deliberate to create a historical base and provide the necessary background information to predict accurate trends. It is implied that all overlapping, inconsistent information between documents shall be superseded by the most recent and relevant document.

This master plan is intended to provide direction for a period of time over the next 20 years. It does not convey approval for any one particular improvement, development, project, or facility. Assumptions made within this report (i.e. trip generation reductions, transit use, etc.) must be justified at the time of application for any one particular improvement/development and may or may not be supported by the town or applicable agency at time of application. Every improvement/development shall go through the town and other applicable agency review process prior to implementation.

Adoption and Amendment of the Master Plan

The Vail Transportation Master Plan was adopted by Resolution No.12, Series of 2009, on May 5, 2009, by the Vail Town Council following a recommendation to approve by the Planning and Environmental Commission. Future amendments to this master plan must be approved by resolution or motion by the Town Council following a formal recommendation by the Planning and Environmental Commission. Implementation activities and ordinances will be approved in accordance with the Town of Vail Municipal Code.

EXECUTIVE SUMMARY

The Town of Vail continues to experience growth through new development and the redevelopment of older commercial and residential buildings. Recently, the Town has been involved in planning significant redevelopment projects including West Vail, Ever Vail, the Lionshead Parking Structure, and Timber Ridge. Numerous other developments have been recently completed, recently approved, are under construction, or have made application to the Town. In addition, Town staff has assessed the redevelopment potential for numerous other sites; the culmination of all these development and redevelopment projects will collectively add noticeable demand (approximately 2,800 trips per hour at peak times) on the Town's transportation system.

This study was initiated by the Town to assess the nature of the increased transportation demands placed on the Town's systems by all potential development/redevelopment as well as that from other regional growth. The study focuses on the Town's Frontage Road System, but considerations for transit service and parking are also addressed towards the development of a comprehensive plan. This study also serves to provide the following:

- Establishment of a Frontage Road improvements plan from which to develop appropriate transportation improvement projects for the Town's primary road system.
- Develop transportation demand management measures to reduce peak traffic flows during the winter.
- Develop a Frontage Road Access Management Plan with support from CDOT for all future access points along the North and South Frontage Roads.
- Identify a strategy and establish direction towards developing a Town parking plan and a transit plan given potential growth.

Existing Conditions

A significant amount of traffic data has been collected in support of developing this plan. The data was collected over a host of holidays and spring break time periods to reflect peak conditions. Further, roadway/intersection capacity analyses (LOS calculations) accounted for conditions indicative of mild snow and wet pavement. The analyses of existing traffic conditions led to the following findings:

- The interchanges tend to be the most critical components in the Town's system. Besides providing access to/from I-70, the interchanges are also the only points within Town where traffic can cross I-70. This concentration of traffic through these bottleneck areas negatively effect travel time for drivers and for transit service.
- At peak times, drivers are challenged to turn left onto the Frontage Road (either north or south) from a side street. The nature of the challenge varies by cross-street and section of Frontage Road, but there are numerous locations where drivers attempting such a left turn experience delay. Again, this effects transit operations where bus routing is required to make such turns.

Parking in Vail has been a high profile issue for many years during peak times. The Town operates two parking structures capable of accommodating 2,500 vehicles. In addition, the

Town has established Ford Park for permit parking and allows parking on the South Frontage only when overflow conditions occur. Frontage Road parking tends to occur 25 to 40 times per winter season depending on conditions (the Town's goal is to achieve 15 days or less per season). Additional parking is needed to better accommodate the frequency of peak days during ski season.

The transit service provided by Vail is heavily used. The Town has some of the highest ridership in the state with six outlying routes and a central "spine" route referred to as the In-Town shuttle. The East Vail outlying route often experiences capacity conditions in the morning (inbound) and in the evening (outbound) due to high demand. The two West Vail routes, which travel in a clockwise and counter-clockwise fashion through the West Vail area, provide needed mobility for areas along both sides of I-70, but the interstate is a barrier in providing efficient service to all areas in West Vail. The In-town route is by far the busiest route on the system and it provides frequent service between and within the Lionshead and Vail Village areas. Busy times see this route at capacity as the Town adds buses to maintain frequent service and increase capacity. Delays are often experienced at the Golden Peak area and at the Frontage Road within Lionshead Village (due to the need to turn left onto the Frontage Road).

The location of parking areas with respect to commercial uses and ski portal usage is not in a precise balance. Much of the skiing terrain lies toward the eastern end of central Vail (Lionshead and the Village), yet over half of the parking is located in the western portion of Central Vail. Similarly, there is far more commercial use in Vail Village than in Lionshead, further adding to the unbalanced situation of parking demand and supply.

Projected Conditions

The Town is anticipating a significant amount of growth in the next five to ten years. Considering approved development, submitted development proposals, and potential redevelopment proposal in the future, the Town could experience an additional net 3,000 new units and an additional net new 700,000 square feet of commercial uses. The combination of this additional development is projected to add approximately 2,800 PM peak hour trips onto Vail's roadway system during peak times in the winter.

The consequences of the combined traffic impact of the development will significantly impact mobility within Vail, particularly during snowy weather. Transit will also be affected negatively as buses travel along the same roadways and will pass through the same congested intersections as other traffic.

Specifically, the following issues are anticipated during the peak hours of peak season:

- Long delays and long lines of vehicles stacked along the westbound off-ramp at the Main Vail interchange (attempting to enter the north roundabout), particularly during the AM peak hour
- Long delays and long lines of vehicles stacked along the westbound South Frontage Road approach at the South Main Vail interchange intersection (attempting to enter the south roundabout)
- Significant delays for motorists turning left onto the Frontage Road at numerous cross streets in the Main Vail area and in the West Vail area.

- Significant delay for motorists turning left from the Frontage Road onto Vail Valley Drive due to the peculiar stop sign configuration. (Frontage Road approaches stop while Vail Valley Drive approach does not.)
- Long delays and long lines of vehicles stacked along the westbound North Frontage Road approach at the West Vail interchange intersection (attempting to enter the north roundabout).

Numerous options were considered to correct these issues. Some options were intended to address a localized issue whereas other options could address a myriad of issues. A consideration of pros and cons for options as well as other analyses, have led to the recommended plan shown in **Figure ES-1** and **ES -2** and the general frontage road widening scheme shown in **Figures ES-3 and ES-4**.

One of the most crucial improvements recommended in this plan is the proposed Simba Run underpass of I-70. There are numerous mobility benefits that this improvement would provide to the Town including:

- Traffic congestion relief of the West Vail interchange roundabouts.
- Traffic congestion relief of the Main Vail interchange roundabouts.
- Increased flexibility and efficiency to provide transit service to West Vail including a potential for a "line haul" rapid service connecting the Town's major activity centers.
- Accommodation of a trail connection to serve bicycle and pedestrian activity between areas north and south of I-70 safely.
- Improved efficiency for emergency and operations vehicles relative to response times and plow routes.
- Overall community connectivity.
- Encouraging some to walk or utilize transit over driving given the underpass proximity to residential and commercial uses.
- Provides direct connectivity to Timber Ridge, an employee housing community.

Other needed improvement considerations as part of the plan include:

- Construction of roundabouts along the North and South Frontage Road at strategic locations to accommodate minor street left turn movements onto the Frontage Road at peak times.
- Lane additions as well as signing and roadway lane striping to establish two northbound lanes under I-70 at the West Vail and Main Vail interchanges (lanes would each be 11 feet wide).
- Expansion of the north roundabout at the Main Vail interchange.

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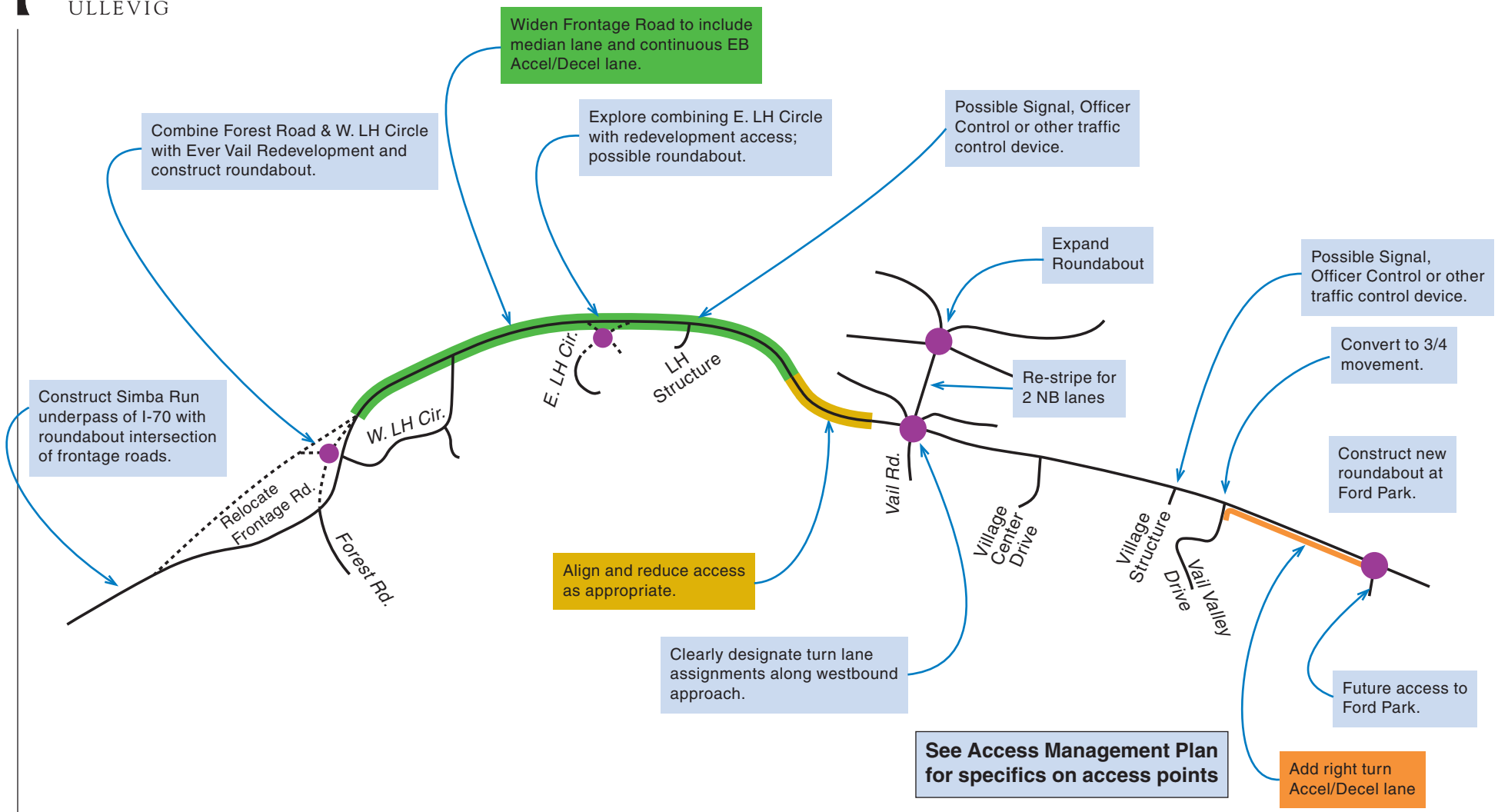

Note: Travel demand management measures also need to be incorporated into the plan. Of significance in the need to encourage I-70 traffic coming from the east to exit at East Vail rather than the MainVail interchange during the AM peak hour.

North

Figure ES-1

Recommended Frontage Road Improvements Plan - Central Vail

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See Access Management Plan for specifics on access points

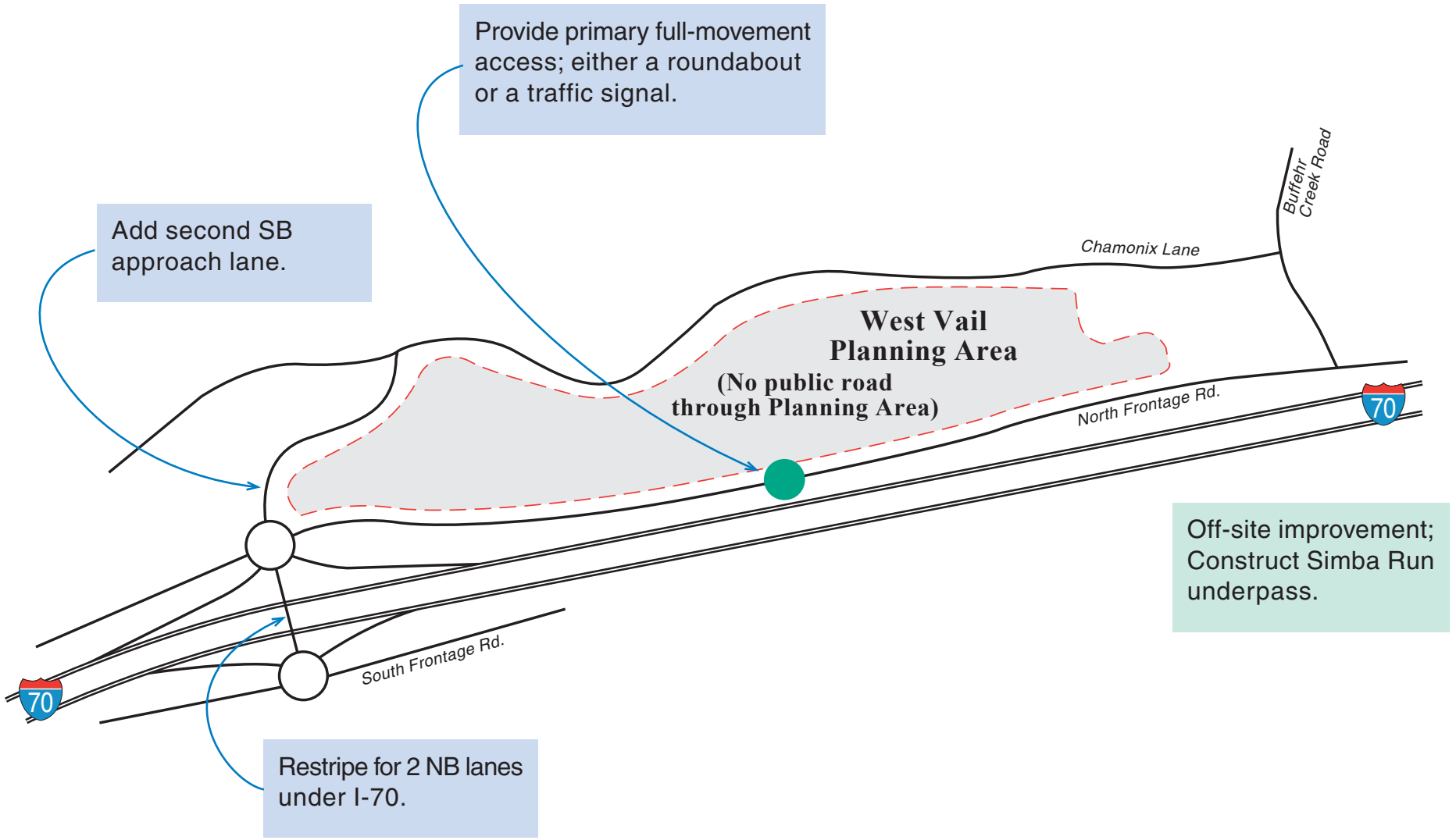

Figure ES-2

Recommended Frontage Road Improvements Plan - West Vail

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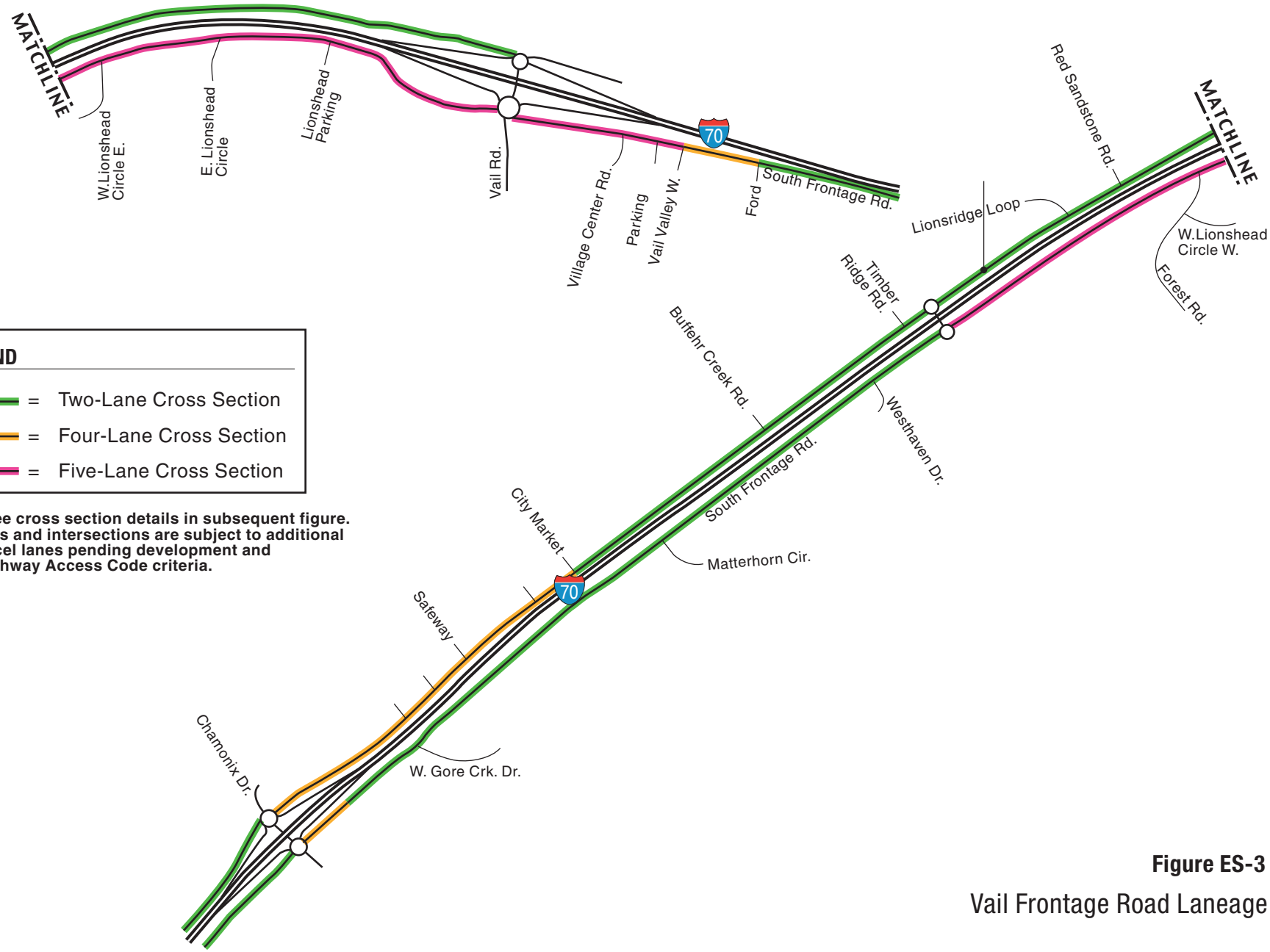

LEGEND

= Two-Lane Cross Section

= Four-Lane Cross Section

= Five-Lane Cross Section

NOTE: See cross section details in subsequent figure. All access and intersections are subject to additional accel/decel lanes pending development and State Highway Access Code criteria.

Figure ES-3

Vail Frontage Road Laneage

North

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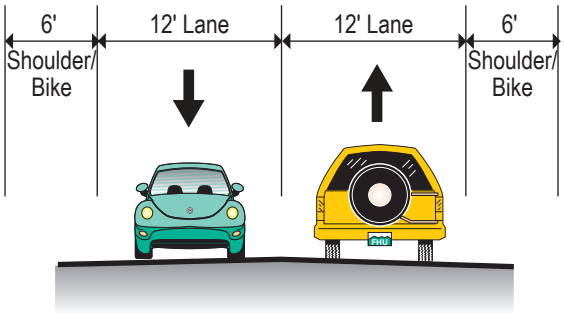
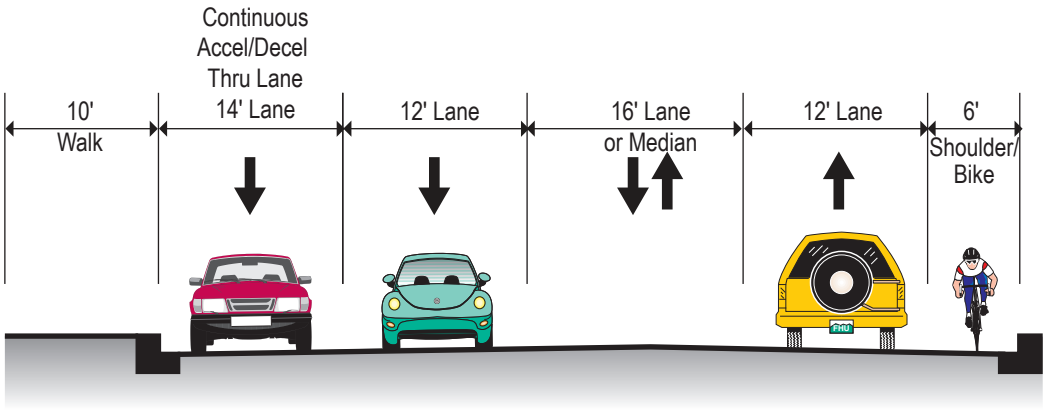
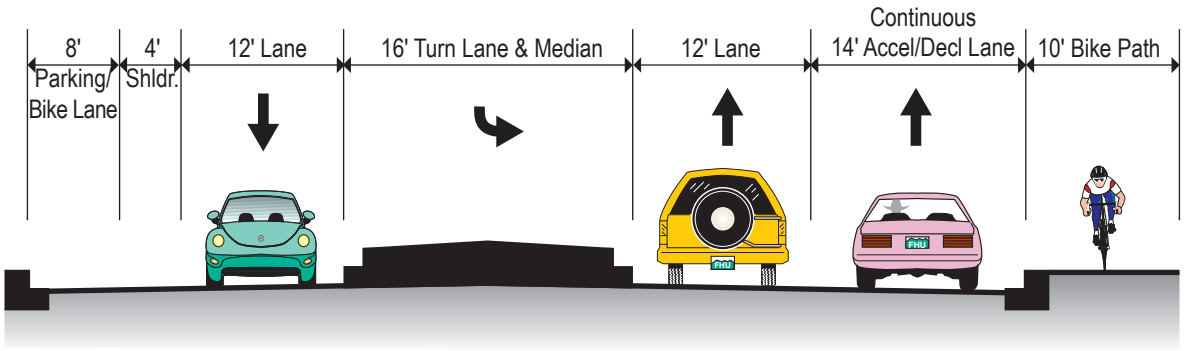


2-LANE CROSS-SECTION



4-LANE CROSS-SECTION



5-LANE CROSS-SECTION

NOTE: All cross sections are subject to additional laneage with respect to turn lanes. Some adjustment may be necessary for certain locations.

Figure ES-4

Vail Frontage Road Cross Sections

I. INTRODUCTION

The Town of Vail continues to experience growth through new development and the redevelopment of older commercial and residential buildings. Recently, the Town has been involved in planning significant redevelopment projects including West Vail, Even Vail ,Timber Ridge, and the Lionshead Parking Structure Redevelopment. Numerous other developments have been recently completed, recently approved, are under construction, or are in the development review process (**Appendix E** shows the list of developments and redevelopments). In addition, Town staff has assessed the redevelopment potential for numerous other sites; the culmination of all these development and redevelopment projects will collectively add noticeable demand on the Town's transportation system.

This study was initiated by the Town to assess the nature of the increased transportation demands placed on the Town's systems by all potential development/redevelopment as well as demand from regional growth. The study focuses on the Town's Frontage Road System, but considerations for transit service and parking are also addressed towards the development of a comprehensive plan. This study also serves to provide the following:

- Establishment of a Frontage Road improvements plan from which to develop appropriate transportation improvement projects for the Town's primary road system.
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This study addresses existing and future conditions for the North and South Frontage Road extending from the West Vail interchange to Ford Park including the West Vail and Main Vail Interchanges. The focus of this effort has been on the South Frontage Road along the Villages (Vail and Lionshead Village), but areas such as the West Vail commercial area and the two primary interchanges were analyzed in a bit more detail than other areas within town. The study area is generally shown in **Figure 1**.

Vail recently completed a planning effort, Vail 20/20, in which the community developed a strategic plan to improve the community. Transportation considerations were a big piece of the overall strategic plan, and the community authored a paper outlining a strategic direction for the Town's transportation system. The five-page paper summarizes current practices/strategies, future goals, and potential actions to achieve their vision and values. Summary "bullets" from this effort include:

- Maintaining mobility through out Town such that peak hour traffic operations are at LOS C during ideal conditions and LOS D during snowy conditions.
- Discourage use of the automobile.
- Manage parking demand/supply to reduce overflow parking along the Frontage Road.
- Provide necessary support to maintain and embellish the area's transit services.

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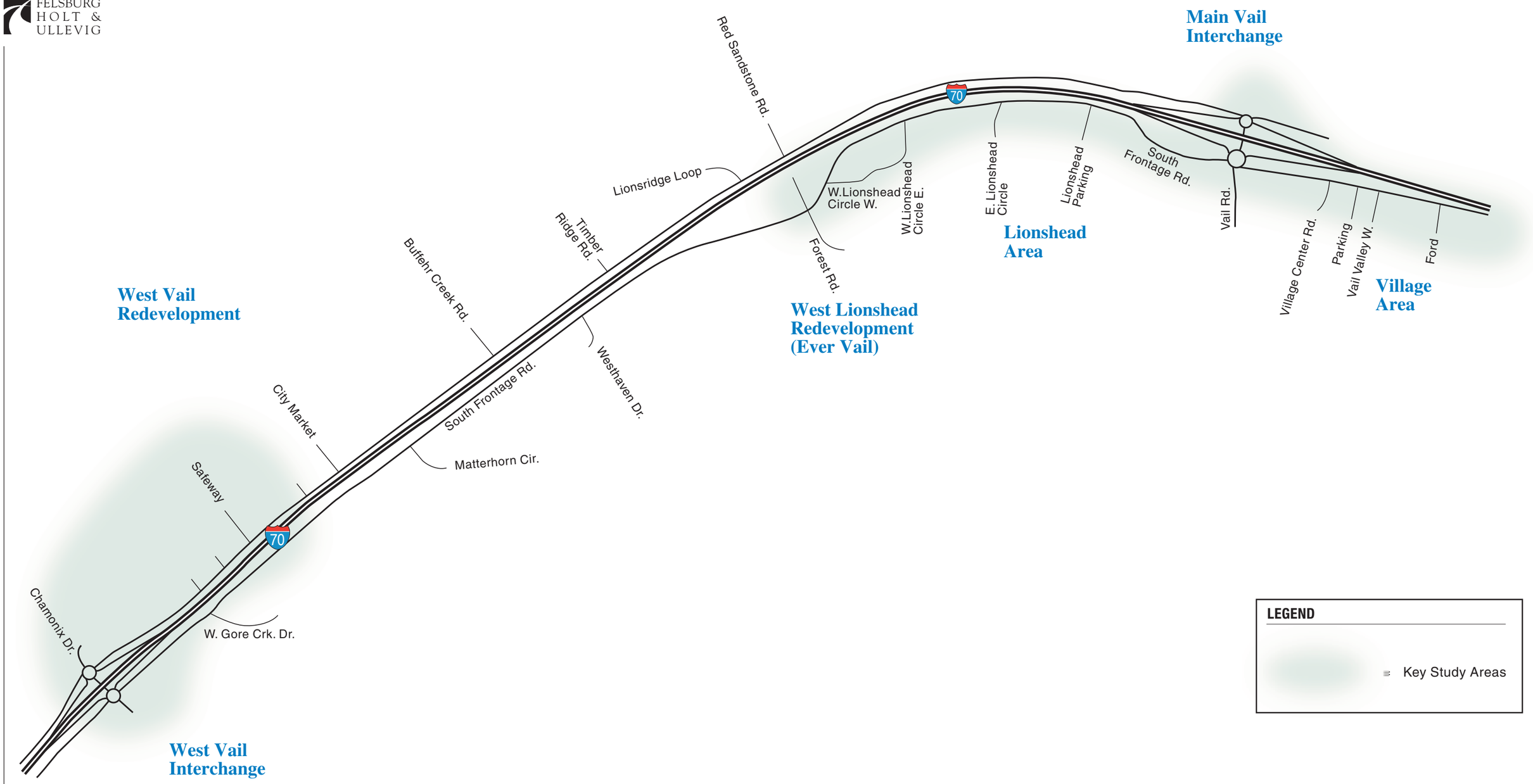

Figure 1

Town of Vail Study Area

North

- Accommodate pedestrian and bicycle activity throughout town.
- Reduce the negative impacts of I-70 on the Town such as noise.

For this Master Plan effort, progress meetings were held on a regular basis with Town staff, and CDOT was involved in many of the progress meetings as well. The conduct of this study coincided with other major planning efforts within the Town of Vail. These included:

- West Lionshead Redevelopment (referred to as Ever Vail)
- West Vail Redevelopment planning
- Potential redevelopment of the Lionshead Parking Structure

Regionally, other transportation planning efforts were occurring as well including:

- Interstate 70 Central Mountain Transportation Corridor Coalition, Draft Recommendations for the I-70 Mountain Corridor on Travel Demand Management prepared by the Northwest Colorado Council of Governments. The document outlines a series of travel demand management strategies designed to shift travel to outside peak times and encourage transit and high occupancy vehicle travel.
- Intermountain 2035 Regional Transportation Plan recognizes the need for the Simba Run underpass, Frontage Road improvements, an inter-modal facility, West Vail Interchange modifications, trail/pedestrian improvements, noise barriers, and various transit items on the preferred plan. However, only transit-related items were listed in the Region's Fiscally Constrained Plan.
- Eagle County Regional Transportation Authority's (ECO) Transit Vision 2030 which encourages appropriate land use patterns, local supplemental bus services, and the potential for an eventual fixed guideway service extending from Gypsum to Vail.
- I-70 Mountain Corridor Programmatic EIS which considered alternatives along I-70 from C-470 to Glenwood Springs. Within Vail, the effort recognizes the potential for a new underpass of I-70 as well as an intermodal site, and widening of I-70 at Dowd Junction. The current draft PEIS also recognizes preservation for future rail service between Denver and Vail's Transportation Center.

II. EXISTING CONDITIONS

Developing a plan to solve future transportation issues first requires a solid foundation of understanding where Vail is today relative to transportation. This chapter describes current conditions.

A. Traffic Conditions

1. Traffic Volumes – Peak Season

Peak hour turning movement counts have been collected at numerous locations throughout Town at various peak time periods; the peak winter time periods were the focus of the collection effort. Intersection turning movement counts were collected over a variety of times including the Christmas holiday, Martin Luther King weekend, Presidents Day weekend, and Spring Break times in 2005 and 2006. AM and PM intersection turning movement counts were collected, and adjustments were made for balancing reasons between successive intersections.

Figure 2 shows the existing peak season AM and PM peak hour traffic flows. These represent reconciled traffic counts which were collected over a series of peak times, raw traffic data are shown in **Appendix A**. The PM peak hour traffic demands tend to be greater than the AM peak hour traffic, but some of the predominant patterns are reversed. During the morning peak hour, movements tend to be oriented toward the parking structures. The interchanges experience far more traffic exiting I-70 than entering during the AM peak hour, and vice-versa during the PM peak hour. Other characteristics from the data are described as follows:

- The greatest point of traffic concentration within Vail is at the Main Vail South Ramps/South Frontage Road/Vail Road roundabout intersection. During the AM peak hour, approximately 2700 vehicles per hour pass through this intersection and 3200 vehicles per hour pass through it during the PM peak hour making it the busiest intersection in town. Of the peak hour traffic passing under I-70 at this interchange, over one-half of the AM traffic is from I-70 East. During the PM peak hour, over 40% is oriented to I-70 West. Between 30 and 40 percent is estimated to simply cross I-70 (both peak hours).
- The West Vail interchange serves a relatively significant pattern of traffic to/from Down Valley. Given this traffic pattern combined with the traffic generated by the West Vail commercial development, the West Vail north roundabout serves about 2500 vehicles per hour during the PM peak hour (only 1,150 during the AM peak hour), making it the second busiest intersection within Town. Of the PM peak hour traffic passing under I-70 at this point, approximately 10 percent is oriented to/from I-70 east, 45 percent to/from I-70 west, and 45 percent is estimated to simply be crossing I-70.
- The South Frontage Road carries far more traffic than the North Frontage Road. East of the Main Vail Interchange, the South Frontage Road serves nearly 2000 vehicles per hour at peak times. This is the heaviest traveled roadway segment within Town (other than I-70). Of the 2,000 vehicles per hour, approximately 30 percent are comprised of trips between the Main Vail roundabout and the Vail Village parking structure.

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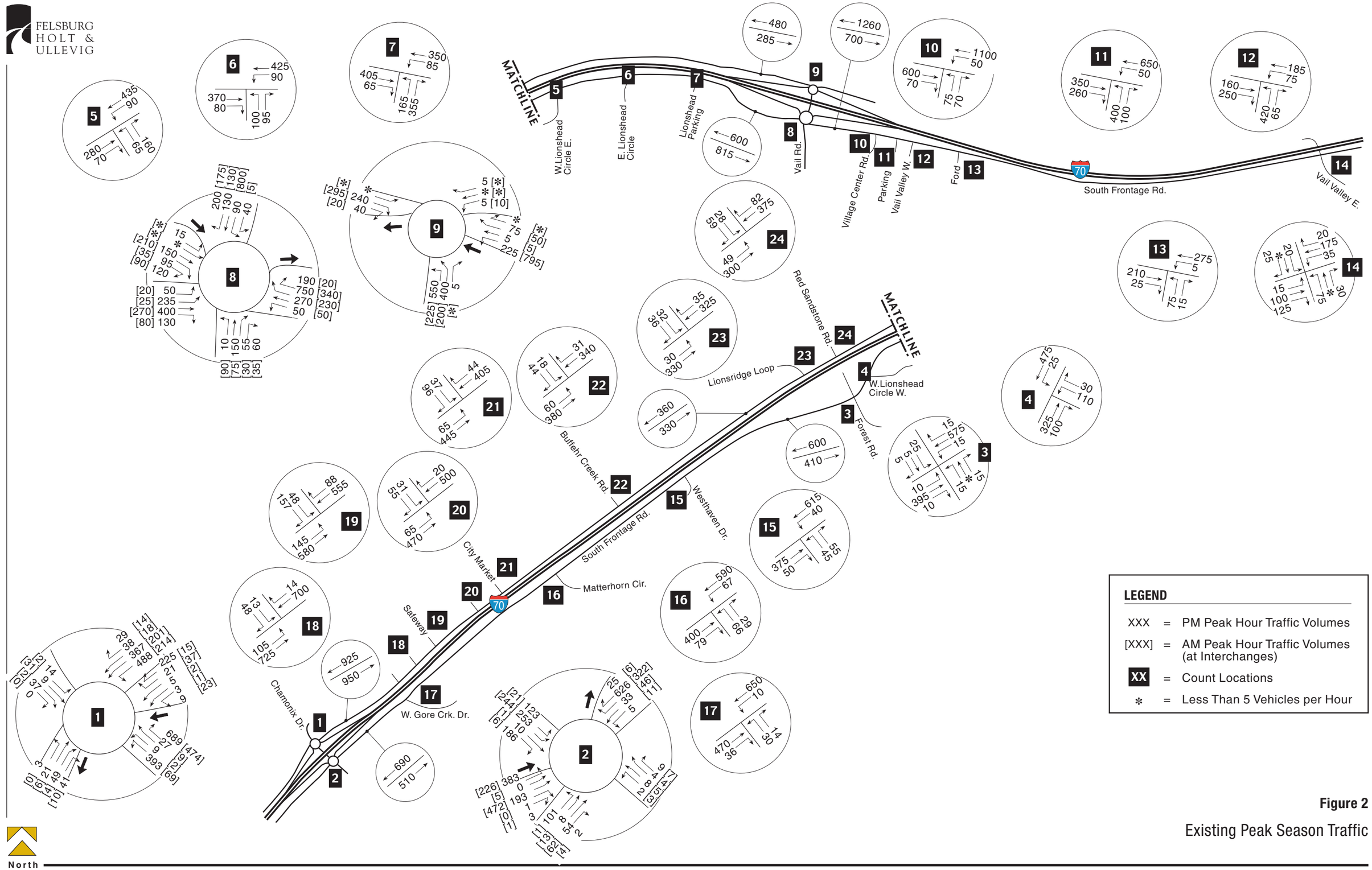

Figure 2

Existing Peak Season Traffic

North

Vail Transportation Service 05-168 12/4/08

The interchanges, West and Main Vail, are locations of significant traffic concentration because they serve as the access to/from I-70 and they are the only means of crossing I-70. As roundabout intersections, the ramp terminal intersections also serve through movements along the Frontage Roads which further contributes to the traffic concentration that takes place at these points.

Along the Frontage Road, the other notable heavier-traveled cross-streets during peak times including:

- **Lionshead Parking Structure Access** – Heavier demand is due to this being a major parking facility within Town.
- **Village Parking Structure Access** – Heavier demand is due to this being a major parking facility within Town.
- **Vail Valley Drive** – Heavy demand can be attributed to activity associated with the Golden Peak lift area and associated programs that based there.
- **West Vail Commercial** – Numerous driveways serve the shopping area in West Vail. Individually, the traffic levels served by each driveway is less than the three heavy cross-streets stated just above, but collectively they represent a major generating center within town.

Numerous other cross-streets intersect with the Frontage Roads, but many of these serve localized areas and do not carry significant levels of traffic. The Frontage Roads serve as Vail's arterial system serving the vast majority of the vehicle-miles traveled within the Town.

The traffic data shown in **Figure 2** approximately represent the 15th busiest day of the ski season. From past transportation planning efforts conducted in Vail, the 15th highest day represents a "low" of the peak days. Subsequent days of magnitude (16th, 17th, etc.) are not dramatically lower than the 15th day as demands levels in order tend to flatten out. Preceding days of magnitude (14th, 13th, etc.) are not as flat, and transportation demands for these days are noticeably higher. When plotted on a graph, the 15th highest day is approximately the "turning point" between peak days and average days. Typical transportation planning will attempt to accommodate the 30th highest hour of a year, and the 15th highest day is a bit more conservative than this in attempt to maintain a quality guest experience. The finding from previous efforts and the notion of maintaining the guest experience has led the Town to adopt the 15th highest day as the appropriate design level for transportation considerations, and all subsequent analyses presented in this report approximately represent that level of demand.

2. Intersection Levels of Service (LOS)

Intersection Levels of Service (LOS) were calculated for numerous intersections including the roundabouts at the interchanges and many of the cross-street intersections and access points along the North and South Frontage Road. For nearly every case, the PM peak hour traffic was the focus of the LOS analyses. The exceptions include the Main Vail interchange and West Vail interchange intersections where the AM peak hour was also analyzed. LOS is a traffic qualitative measure described by a letter designation ranging from A to F. LOS A represents minimal or no delay while LOS F represents excessive delay. The calculations are geared toward estimating the delays for traffic movements and then converting the results to a LOS measure (based on the Highway Capacity Manual published by the transportation Board) with the following:

- **LOS A**, 0-10 seconds for STOP-sign controlled movements, 0-10 for roundabouts
- **LOS B**, 10-15 seconds for STOP-sign controlled movements, 10-20 for roundabouts
- **LOS C**, 15-25 seconds for STOP-sign controlled movements, 20-35 for roundabouts
- **LOS D**, 25-35 seconds for STOP-sign controlled movements, 35-55 for roundabouts
- **LOS E**, 35-50 seconds for STOP-sign controlled movements, 55-80 for roundabouts
- **LOS F**, greater than 50 seconds for STOP-sign controlled movements, 80 for roundabouts

The roundabout intersections are located at the Main Vail and West Vail interchanges, and their operation has an impact on the ease of access to/from I-70 as well as the ability to cross I-70. If the roundabout intersections don't function well, the Town's entire transportation system suffers. Because they are critical junctures, the levels of service were calculated for inclement weather conditions. Results for all of the LOS calculations are shown in **Figure 3**, and worksheets are presented in **Appendix B**.

For the roundabouts, the software package Sidra was used to estimate the LOS's. Parameters in this software package were adjusted in attempt to calibrate delay results against delays that were observed in the field at the West Vail interchange. Further, adjustments were made to try and account for poor weather. The following adjustments were made to SIDRA as part of a roundabout calibration process:

- Lane storage lengths and diameters were adjusted to match field conditions
- Approach speeds were reduced from the default of 40 MPH to 25 MPH
- The North American Driver "environmental factor" was used (1.2)
- A peak hour factor of 0.79 was used for ideal conditions, 0.68 for snowy conditions (approximately representing a 20% loss in capacity due to snow). The lower-than-normal (15% less) peak hour factor for ideal conditions was based on the Highway Capacity Manual statement that a roundabout is at its capacity when V/C = 85%

For Vail, acceptable operations were established at a LOS C or better. Typical LOS threshold objectives in larger busy urban areas are usually LOS D, sometimes LOS E, during peak hours of the day. In extreme cases, LOS F is tolerated. Smaller rural communities will tend to establish LOS C as their criterion objective relative to traffic operations along their streets. A LOS C/LOS D threshold, for peak hours during peak seasons, was chosen as the appropriate threshold for Vail given its resort stature and the desire to provide a highly functional transportation system to enhance the guest experience. Exceptions for poorer LOS that would be acceptable include inclement weather in which a LOS D/LOS E is considered acceptable. In addition, a LOS D or even worse is acceptable for a movement with extremely low traffic flows. The LOS's for the STOP-controlled intersections were calculated using the Highway Capacity Manual procedures per HCS software; no inclement weather factors were used to evaluate the stop-controlled intersections.

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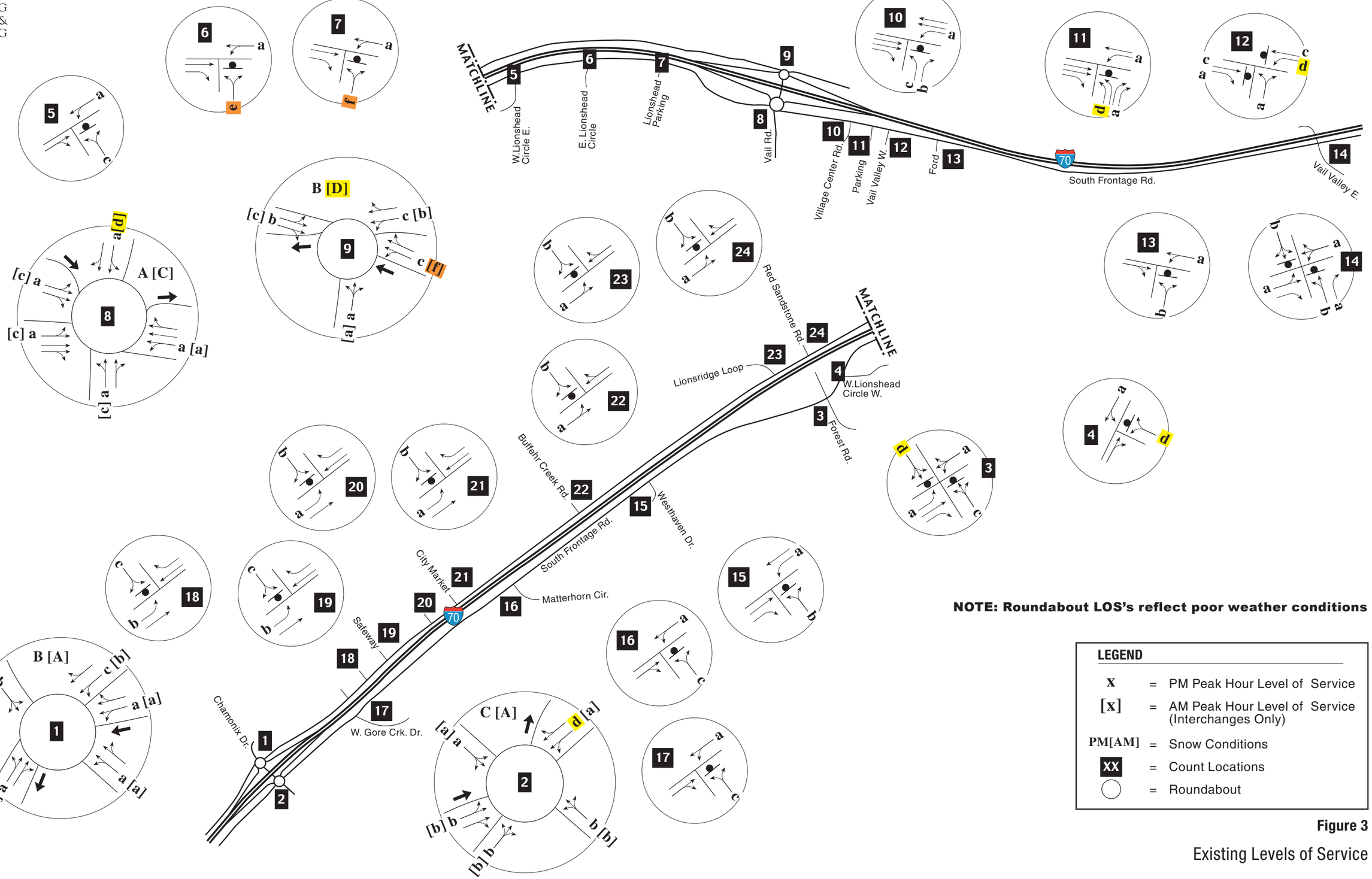

Figure 3

Existing Levels of Service

North

Figure 3 shows the LOS results for existing conditions. The roundabout intersections all currently operate at acceptable LOS's with each approach being at a LOS C or better. Several of the Frontage Road cross-street intersection movements operate poorer than LOS C. Intersections with a LOS E or LOS F include:

- **Village Structure Access** – The specific traffic operation issue here is the ability to turn left out of the structure onto the South Frontage Road. The LOS estimate at peak times is LOS E. The delay incurred by these drivers exiting the parking structure is above and beyond the delay that these drivers incur within the structure to pay the parking fee. In fact, the fee booths inside the structure tend to meter outbound traffic. Otherwise, the outbound peak hour traffic demand counts would likely be greater.
- **Lionshead Structure Access** – The outbound movement from the structure experiences a LOS D during peak times. Similar to the Village Structure Access intersection, these drivers are incurring additional delay beyond the LOS D due to waiting in the structure to pay the fee.
- **East Lionshead Circle** – The East Lionshead Circle approach to the South Frontage Road operates at LOS E during peak times. This movement includes In-Town shuttle vehicles, and this intersection's poor operations has a negative impact on the Town's transit system.
- **Safeway Access** – In West Vail, there are numerous access points onto the North Frontage Road serving retail uses. The access in front of the Safeway is the heavier-used access based on the traffic count data. This access approach onto the North Frontage Road operates at a LOS E during peak times.

The East Lionshead Circle access operation has an effect on the In-Town Shuttle bus routes as this bus is required to turn left onto the Frontage Road as part of its normal scheduled route. The Vail Valley Drive intersection does not have any movements operating in LOS E or LOS F, but interestingly this intersection is characterized with a greater number of movements subject to delay. Total vehicular delay at this intersection is greater than many of the other intersections in Town due to the unique stop configuration. (Frontage Road approaches both stops, Vail Valley Drive approach is given the right-of-way due to grade).

In addition to intersection LOS calculations, Town staff has also recorded travel times between activity areas. Staff made numerous runs between activity areas during peak and non-peak times, as well as under varying weather conditions. **Table 1** summarizes average travel times between the key activity areas, and the detailed data collected are presented in **Appendix C**.

Table 1. 2005-2006 Season Travel Time Summary

Origin/ Destination/Route		Peak Season		Non-Peak Season	
		Non-Peak Hour	PM Peak Hour	Non-Peak Hour	PM Peak Hour
Village Structure to Safeway					
South Frontage Road	-Clear	7:11			
	-Wet		8:01		
	-Snowpack	7:21	12:08		
North Frontage Road	-Clear			5:32	5:47
	-Wet		8:52		
	-Snowpack	5:57	8:33		
I-70	-Clear			4:57	
	-Wet	4:32			
	-Snowpack				
Safeway to Village Structure					
North Frontage Road	-Clear		5:40		5:56
	-Wet				
	-Snowpack				
Lionshead Parking Structure to Safeway					
South Frontage Road	-Clear		4:45	4:57	5:19
	-Wet		5:25		
	-Snowpack	4:59	4:52		
North Frontage Road	-Clear			5:53	
	-Wet		6:23		
	-Snowpack	10:49	6:55		
I-70	-Clear			4:50	
	-Wet	5:17			
	-Snowpack				
Safeway to Lionshead Parking Structure					
South Frontage Road	-Clear		4:45		5:50
	-Wet				
	-Snowpack				
Red Sandstone Road to Cascade					
WB Frontage Route	-Clear			5:31	
	-Wet		7:25		
	-Snowpack	5:40			
EB Frontage Route	-Clear			5:32	
	-Wet		6:45		
	-Snowpack	5:51			

3. Accident Data

Approximately six years worth of traffic accident data were compiled from the Town of Vail Police Department's records which identified 288 accidents occurring between 1999 and 2005. CDOT data were also explored, but the Town's accident records identified more accidents than CDOT's database along the Frontage Roads. It is likely that many of the accidents recorded by the Town along the Frontage Roads do not reach CDOT for inclusion in their database. As such, the Town's Police Department records were used in this analysis.

The data are summarized in **Table 2**. Collision diagrams of each intersection are shown in **Appendix D**. Observations of interest generally included:

- **South Frontage Road/Matterhorn Circle** – Recently, this intersection was improved to include an exclusive turn lane. This widening is thought to have provided a significant benefit to any safety issues at this intersection since the data show that most of the accidents at this location occurred in 2002 or earlier.
- **West Vail Interchange, North roundabout intersection** – A fairly pronounced pattern of rear-end collisions along the I-70 westbound off-ramp show up in the data. Many of these occurred with a slick roadway surface, and the downgrade of the ramp may be a contributor to this pattern of collisions as well as the shading patterns caused by the I-70 embankment.
- **Vail Valley Drive** – A noticeable pattern (approximately two-thirds of the accidents) at this intersection includes collisions with eastbound through movement vehicles. The collision diagram suggests that eastbound Frontage Road drivers do not always understand that they are subject to stopping and that the side-street approach has the right-of-way.
- **The Main Vail Interchange** experienced a fair number of accidents within the study period, but when compared against the "exposure" of traffic, the accident occurrence at this interchange is not alarming.
- Approximately 40 percent of all traffic accidents recorded along the Frontage Roads, including the roundabouts and the cross-street intersections, occurred on slick roadway surfaces.

The Colorado Department of Transportation maintains accident statistics along all of its roadway facilities and typically produces average accident rate statistics stratified by facility type. The rates are determined by segment rather than by intersection and the Department typically calculates the number of accidents per million-vehicle-miles of travel for a given segment of road. As such, it is not possible to directly compare the results in **Table 2** to industry standards.

However it is possible to convert the data in **Table 2** into segment data to allow for a comparison to CDOT data. Assumptions have been made with respect to daily traffic from the peak hour traffic counts. In addition, continuous traffic data from CDOT's files were used to estimate seasonal variations in daily traffic data toward estimating the total annual traffic served by each segment. Of the state highway locations with continuous traffic count data, US 6 near Keystone was used for this assessment with respect to seasonal variations. While a counter on I-70 near Down Junction is available and was reviewed, the I-70 traffic demands at that location peak during the summer months, whereas Vail roadways are busiest in the winter months. The US 6 permanent counter near Keystone displays seasonal patterns that are more in line with traffic demand fluctuations experienced along Vail's Frontage Roads. Therefore, the US 6

counter was used for only gauging seasonal fluctuations with respect to calculating annual accident rates for roadway segments.

The following shows the converted accident data and how it compares with CDOT data for urban minor arterial road facilities.

- N. Frontage Road, Chamonix to Buffehr Creek – 3.5 accidents/million vehicle-miles
- N. Frontage Road, Buffehr Creek to Main Vail – 3.0 accidents/million vehicle-miles
- S. Frontage Road, W. Vail Roundabout to Forest Road – 2.5 accidents/million vehicle-miles
- S. Frontage Road, Forest Road to Vail Road - 3.5 accidents/million vehicle-miles
- S. Frontage Road, Vail Road to Vail Valley Drive – 4.0 accidents/million vehicle miles

Based on the most recent CDOT data available (2004), urban minor arterial state highways have experienced 3.45 accidents per million vehicle-miles of travel in 2003 and 2004. The accident rates listed above for the Frontage road segments are close to this or are less, except for the segment between Vail Road and Vail Valley Drive which is slightly higher than the CDOT data. This segment of roadway is the busiest road section in Town (other than I-70), and increased traffic increases the exposure and correspondingly the accident rate.

Table 2. Vail Frontage Road Accident Summary – Six Years

Intersection	Rear-End	Broadside	Run Off Road	Other	Total	Percentage due to Slick Roads	Accidents per Million Vehicles Entering	Comments
South Frontage Road								
West Vail South Roundabout	2	3	0	0	5	20%	0.5	
W. Gore Creek Drive	2	5	3	1	11	55%	1.3	
Matterhorn	13	4	7	1	25	36%	2.8	Lane improvements may have already alleviated accident occurrences.
Westhaven Drive	1	4	4	0	9	56%	1.0	
Forest Road	5	1	1	1	8	38%	1.0	
W. Lionshead Circle	8	4	0	3	15	33%	1.9	
E. Lionshead Circle	10	4	2	1	17	53%	2.0	
Lionshead Parking	4	1	3	1	9	22%	0.9	
Main Roundabout	8	5	2	5	20	15%	0.9	
Village Center Drive	0	1	0	2	3	67%	0.2	
Vail Transportation Center Access	10	7	0	2	19	16%	1.4	
Vail Valley Drive	4	9	0	2	15	13%	1.6	2/3 accidents involve EB vehicle (perhaps not stopping)
Ford Park East Parking Lot	1	2	0	0	3	33%	0.7	
Vail Valley East Drive	1	1	1	5	8	25%	1.8	
Aspen Lane	0	0	6	7	13	31%		Possible speeding and/or lighting issues in this area

Table 2. Vail Frontage Road Accident Summary – Six Years (Continued)

Intersection	Rear-End	Broadside	Run Off Road	Other	Total	Percentage due to Slick Roads	Accidents per Million Vehicles Entering	Comments
North Frontage Road								
Arosa Road	0	1	3	0	4	75%		All on outside of curve - 75% in adverse weather
West Vail North Roundabout	14	19	1	1	35	34%	2.5	Large % of accidents at I-70 off ramp - possibly speed
Buffehr Creek	2	3	1	0	6	83%	0.5	
Post Office	10	2	0	0	12	83%		Nearly all involve outbound vehicle on slick surface.
Lions Ridge Loop	6	2	1	0	9	44%	0.9	
Red Sandstone Road	13	4	4	1	22	73%	2.0	7 rear ends occur on Southbound approach
Main Vail Roundabout	13	10	1	1	25	40%	2.2	

B. Parking

Currently, the Town owns and maintains two large parking structures in Main Vail. The Village Structure, located east of the Main Vail interchange, provides 1300 spaces for skiers and activity at Vail Village. During ski season, a fee is assessed to park during the day if a vehicle stays at least an hour and a half. Employees and residents have an option of purchasing seasonal parking passes, each providing a different set of privileges. Without a pass, an all-day fee is currently $25.00. This structure generally fills between 50 and 70 times per season and occasionally during summer activities (when parking is free). When full, drivers are directed to the Lionshead Parking Structure. The Village Structure also serves as the Town's Transportation Center serving as a hub for a variety of bus and transportation services.

The Lionshead parking structure is located approximately one-half mile west of the Main Vail interchange. It can accommodate 1200 vehicles. During winter season, the Lionshead Structure generally fills only after the Village Structure fills. The structure fills an estimated 20 to 40 times per season, and once full, vehicles are directed to parallel-park along the South Frontage Road. An extreme peak day can sometimes see over 1000 vehicles parked along the South Frontage Road.

The location of the parking supply within the Main Vail area (Lionshead and Vail Village) is not entirely in alignment with the parking demand generators. The Lionshead parking structure contains only slightly less than the Village Structure, but there is considerably more parking demand generation in the Village area. The following illustrates the imbalance:

- **Village Structure**
  - 1300 spaces of supply
  - 300,000 square feet of commercial services being served
  - Approximately 55 percent of the lift capacity
  - 85 percent of the skiable terrain (east of Vail Road)

- **Lionshead Structure**
  - 1200 spaces of supply
  - 150,000 square feet of commercial services being served
  - Approximately 45 percent of the lift capacity
  - 15 percent of the skiable terrain (west of Vail Road)

The ski area is oriented easterly from the Main Vail interchange. The Vail Village parking structure is located approximately at a central point to the ski area on the mountain. The Lionshead parking structure is skewed to the west of the ski area. Because of their relative locations, skiers tend to fill the Village Structure before the Lionshead Structure. General parking demand for the Village Structure is further highlighted by the fact that there is more commercial space nearby and that the lift usage is greater than that in Lionshead (even though lift capacity is approximately balanced). The commercial space produces additional parking demand by virtue of the need to accommodate these visitors who only want to shop and the employees needed to operate the commercial activity.

Other parking areas are also provided throughout town, but most are relatively small providing up to 15 spaces. Other locations such as Ford Park and the Soccer Fields (located east of Golden Peak) can accommodate more vehicles, but these are restricted to permitted vehicles only. The Town of Vail has continued to explore means of adding public parking to the supply within the central areas of Lionshead and Vail Village. A current need of at least 400 additional spaces has been identified by the Town in attempt to reduce the number of days that the Frontage Road is pressed into service to accommodate overflow parking. The 400 spaces are needed to maintain a supply accommodating 90 percent of the demand days, a Town parking objective. This is based on many seasons of collected Frontage Road parking data. However, 1,000 additional spaces would accommodate 99 percent of the current demand days. Over the long-term (20 years), the 1,000 spaces are estimated to accommodate 90 percent of the future demand days. More detail with respect to further parking needs is described later in this report, but the Town's ultimate goal is to add 1,000 spaces for general public use to meet their 90 percent objective.

C. Transit

The Town of Vail operates a free bus service for residents and guests. The service is among the busiest in the state serving approximately three million riders per year. It is estimated that approximately 14 percent of Vail's residences use the transit system as a means to commute to work, based on 2000 census data, which ranks higher than most major metropolitan areas. The heaviest used route is the In-Town shuttle which continuously travels between Lionshead and Vail Village; this route makes up 60 to 70 percent of the Towns bus service ridership, and it typically is served with five to seven buses; peak times can see 8 to 10 buses traveling along this route depending on time of day with headways ranging from 5 to 7 minutes.

Outlying bus routes each serve a different area of Vail. The East Vail and West Vail bus routes experience the most ridership outside the In-Town Shuttle. West Vail, having a frontage road along the north and south side of I-70, is served by opposing loop services in which one West Vail route runs clockwise along the South and North Frontage Road and the other runs counter-clockwise. While these two routes have offset start times from the Transportation Center, buses along these two opposing routes cross in the Meadow Creek/Intermountain area, and this area receives relatively infrequent service (because two opposing buses drive by at the same time). Most outlying areas are provided service every 15 to 20 minutes; the Meadow Creek/Intermountain area, in which the opposing West Vail bus routes cross, experiences service every 30 minutes, albeit with two buses. This quirk in the service is the result, in part, of limited I-70 crossings and the need to serve both sides of I-70 with transit.

Existing Transit routes are presented in **Figure 4**. Other characteristics of the Town's bus system include:

- Heavy end-of-the-day-use of the In-Town shuttle as skiers utilize this service to return to their parked vehicle or residence.
- Congestion at the Golden Peak portal; this creates delay to the In-Town shuttle. This is most prevalent on Saturdays.
- Challenges with the In-Town shuttle serving the western-most reaches of Lionshead due to delays associated with turning left onto the Frontage Road (from East Lionshead Circle).
- Outlying bus routes that serve Main and West Vail are subject to passing through the interchanges which can add delay to the service due to traffic congestion.
- West Vail routes experience overloading mostly at Timber Ridge during morning hours. The West Vail Green route (which is clockwise) also experiences overloading in the evening between the West Lionshead Plaza and the residential areas west of Cascades.
- The East Vail bus route is overloaded during peak hours with inbound riders in the morning peak hours and outbound riders during the afternoon peak hours.

The Transportation Center, located atop the Village Parking Structure, is at its capacity. Besides Town routes, this Center also serves the Eagle County bus system, charter services, regional services as well as other transportation providers. The Center also serves as a location to switch out buses during the day and as a place for drivers to take a break. The increase in ridership amongst all providers has maxed-out the facility's capacity, and potential increases in transit use in the future has the Town considering a second transportation center facility somewhere. This is discussed in a later chapter of this report.

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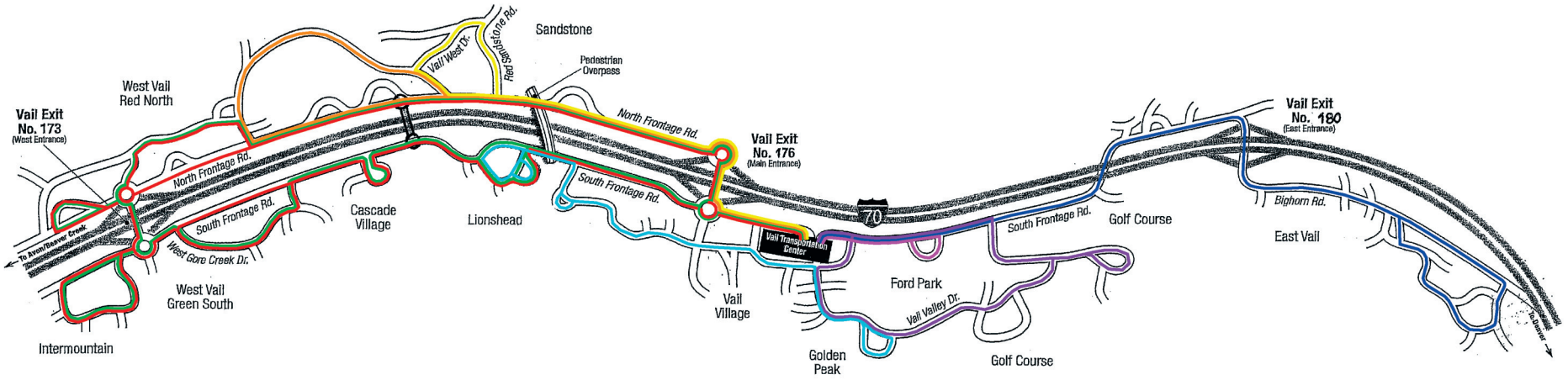

LEGEND

- = East Vail
- = Golf Course
- = Ford Park (Winter Only)
- = In-Town Shuttle
- = Sandstone
- = Lionsridge Loop
- = West Vail Loop, North to South
- = West Vail Loop, South to North

Figure 4

Existing Vail Bus Routes

North

III. ANTICIPATED GROWTH

A. Development

As mentioned, the Town initiated this effort to ascertain the impacts of foreseen and potential growth throughout the Vail Valley. The growth includes the following:

- Development that is currently under construction,
- Development that has been approved by the Town, but had not yet been constructed,
- Development that has been submitted to the Town for consideration, but not yet approved, and
- Parcels of land that have the potential for redevelopment for more density.

Town staff have carefully considered parcels throughout town subject to being developed or redeveloped. While these land uses are intended to represent year 2025 conditions, the expectation is that much of the development and redevelopment assumed in this report will occur within the next five years. **Appendix E** shows the specific details, but overall anticipated growth can be characterized as follows:

- Approximately 3000 net new residential and hotel units
- Over 1500 replaced residential units
- Approximately 700,000 net square feet of retail development

Areas within Town that are anticipated to experience the greatest amount of growth include the following:

- **West Vail** – The existing shopping center has the potential of being redeveloped to include approximately 130,000 square feet of additional commercial space than currently exists and a net increase of approximately 210 units. This is estimated to take place within ten years.
- **West Lionshead (currently referred to as Ever Vail)** – This includes redeveloping the Vail Resorts maintenance yards and relocating the South Frontage Road up against I-70. Current plans are still evolving, but the potential exists for approximately 590 units (although the latest proposal only includes 425), 165,000 square feet of commercial space (including 35,000 square feet of office space) and additional access to the mountain (including a new gondola). The proposal would also include additional public parking (400 spaces). This is estimated to take place within five years.
- **Timber Ridge** – This is a redevelopment of an employee housing complex located on the north side of I-70 approximately just west of the Post Office. This complex could include 325 new units and the redevelopment of another 198 units. This is estimated to take place within five years.

- **Lionshead Parking Structure** – The Town is currently considering to entirely replace the Lionshead Structure with a larger structure (adding 300 more public spaces), approximately 365 units, 70,000 square feet of commercial space, and 20,000 square feet for a conference center. This is anticipated to take place within five years.

Most of the other development considered in this report is comprised of numerous smaller parcels, many of which are located within the Lionshead area and the Vail Village area.

B. Parking

The additional needed parking supply is based on historic parking counts (along the Frontage Road during peak days) and on projected demands tied to growth within the region and along the Front Range. Since the 2000-2001 ski season, the 15th highest parking day (Vail's objective design level) has produced anywhere from 214 to 541 number of vehicles parked along the Frontage Road (when it is pressed into service). The annual average has ranged from 325 vehicles to 483 with an overall average of about 350 vehicles. The 10th highest day has averaged approximately 465 vehicles of overflow parking since the 2000-2001 ski season. From this, the Town has identified the need to establish another 400 spaces over the short-term planning horizon. The Ever Vail development project may fulfill this need, but these additional spaces would be west of the primary parking "desire" locations.

Over the longer term, the expectation is that an increase in population and employment (locally, regionally, and state-wide) will only add to the parking demands that Vail will need to accommodate. The following describes, given rough assumptions, the nature of additional parking demand in Vail over the long-term.

- **Local Skier Merchant Passes** – The Town estimates that jobs within Eagle County could approximately double by the year 2030, but that merchant pass holders may increase at a rate less than this, say 60%. This would produce 3000 more merchant pass holders. Assuming 30 percent use their pass on a peak day, approximately 900 new pass holder skiers would visit Vail on a peak day. Assuming 50 percent use their car at two persons per vehicles, an additional demand of **225 parked vehicles would be generated**.
- **Eagle County Part Time Resident** – Approximately 12,000 additional units are planned throughout Eagle County; approximately 2000 of these will be affordable homes. Of the other 10,000, it is estimated that 30 percent of the homes would be occupied at peak times with an average occupancy of three people per unit. Assuming 10 to 12 percent of these people ski at Vail and 50 percent utilize their automobile with three people per vehicle, an additional demand of **175 parked vehicles would be generated**.
- **Front Range Visitors** – The Front Range population is projected to increase by one million persons in the next 20 years or so, and 10 to 15 percent of this increase is estimated to be skiers. This could add 125,000 prospective skiers to the Colorado market. Currently, a peak day could see Vail serving 0.5 percent of this market, or the equivalent of 600 to 700 additional skiers. Assuming 95 percent reach Vail via automobile at three people per car, this component would generate an **additional demand of 200 parked vehicles**.

- **Employees** – The number of jobs within Eagle County is projected to increase significantly by 2030. Within Vail, new development is estimated to add 3600 jobs. With 30 percent of these employees being housed within town, 2520 employees would be out of town needing transportation. Employees are also subject to shifts and do not work everyday. As such, they do not generate the concentrated parking demand that other users above might. Further, assuming 50 percent drive at two persons per vehicle, an estimated **additional parking demand of approximately 325 vehicles would be generated**.

In considering the combination of the above four components, an estimated 925 spaces would be needed to accommodate growth over the next 20 to 25 years. When adding in the 400 spaces needed to address current parking shortfalls, a total of 1325 spaces could potentially be necessary. However, a planning level of 1000 spaces is considered appropriate when considering:

- The managing of parking may be more aggressive in the future
- Some of the employee-generated parking demand may be served on-site (at the place of employment)
- A portion of the part-time residents may participate in "parking clubs"
- The potential of some double counting in the four components above.

The long-term "target" of providing an additional 1000 spaces is appropriate for the Main Vail area. Areas where this supply may be increased are described as follows:

- **Ever Vail Redevelopment**. A range of 300 to 500 public spaces have been identified for this area. The analysis presented herein assumes 400 public spaces (which is consistent with current development plans). To the extent possible, the Town should pursue as much as is reasonably possible, realizing that access to/from the Frontage Road (roundabout intersection desired) and bus stop facilities will also be necessary.
- **Lionshead Structure**. If this is redeveloped, a total of over 2,000 parking spaces will be provided as part of this development. Over 600 of these spaces will be dedicated to the development, but over 1,400 would be available for public use (a 200 to 300 space increase). This too, along with a possible transit center, will drive the need for one or two major intersections onto the Frontage Road, perhaps being served via a roundabout.
- **Ford Park**. Potentially, 300 to 600 net new spaces could be provided in a structure at Ford Park. Transit service connecting it to the Village would be necessary during winter, but the parking could also be used for various events at the park during other times of the year.

Between these three areas, the potential exists for the Town to add far more than the minimum 400 spaces in a manner that allows the parking supply to be spread around the Main Vail area. However, most of the new spaces would be located in Lionshead or the western side of the Main Vail area. As mentioned, most skiers vie to access the mountain through Vail Village since the vast majority of the ski area's acreage is oriented to the east of the Villages. While the additional parking supply in the Main Vail area would be a boon to the Main Vail area, it may better serve the Main Vail area if most of the new supply was located in Vail Village rather than Lionshead (east rather than west). A map showing parking locations in relation to other activities is presented later in this report.

C. Inter-Relationship of the Various Modes

Clearly, a cohesive transportation system requires integration of all modes of travel. Public parking areas, for example, naturally attract traffic and can experience heavy concentrations of traffic depending on size and location. In addition, the parking areas are also candidates for transit service, especially where parking areas are located away from prime uses. Because Vail's "base" area is large and spread across multiple villages, parking areas are also spread across the villages along the Frontage Road. So the planning for one mode affects another; parking attracts traffic and requires frequent transit service at peak times. Areas that can accommodate large amounts of parking are limited at Main Vail, so their locations are somewhat predetermined. This, in turn, shapes the traffic and transit patterns and service that is needed.

The modes are also interrelated in that roadway improvements to alleviate traffic delays and congestion also help transit service as buses are part of the traffic mix. Also, the policy to manage parking and skier-drop-off activity can affect traffic and transit demands and the trade-off thereof. Vail's Transportation and Parking Committee continuously monitor parking trends and develop strategies to help alleviate parking problems within town. These strategies can have an impact on how many users are willing to drive versus utilize transit or another mode. As such, parking policy, management, and location directly impact traffic demands and transit demands. The process is dynamic.

Traffic, transit, skier drop-off and parking, while inter-related, also need to be appropriately planned with respect to the ski-area terrain location, access to the ski area, and proximity to the commercial development. Future plans for Main Vail will increase commercial space as follows:

- **Vail Village** – from 300,000 to 350,000 square feet
- **Lionshead Village** – from 150,000 to 250,000 square feet
- **West Lionshead** (**Ever Vail)** - approximately 165,000 square feet (retail and office)

In addition, West Lionshead is anticipated to be served by a new ski lift onto the mountain and this development is being planned to accommodate skier drop-off activity, particularly for charter buses and shuttles. Additional parking areas are possible at Ford Park, Lionshead Parking Structure (as part of potential redevelopment), and West Lionshead. The new lift and the new parking areas have the potential of attracting traffic to that localized area and each warrant consideration for transit service embellishments. In essence, the addition of parking, commercial space, and skier access to Main Vail and the fact that each of these will be more spread out than current conditions requires embellishments to the transportation system with respect to carrying traffic and providing transit service.

IV. PROJECTED 2025 PM PEAK HOUR TRAFFIC CONDITIONS

A. Traffic Volume Forecasts

Projected traffic demands along the Frontage Road system are key to assessing and mitigating future transportation conditions. As mentioned, the PM peak hour traffic is generally heavier than the AM peak hour, with a few pattern exceptions. As such, year 2025 traffic forecasts have focused on the PM peak hour time period for analysis, with exceptions being the Main Vail and West Vail Roundabout Interchanges where cursory-level AM peak hour forecasts were developed as well.

The total PM peak hour forecasts were developed with the use of a travel demand model utilizing the TRAFFIX software package. The model was developed by estimating the amount of additional PM peak hour trips for each development and redevelopment proposal, and then assigning these new trips to the street system. Forecasts then resulted from the additive nature of the new trips in combination with the existing traffic which was increased modestly (0.5% per year) to year 2025. The AM peak hour traffic was developed by applying an approximate 35 percent flat growth factor to the existing AM peak hour; the 35 percent was based on the level of growth resulting from the 2025 PM peak hour projections (as compared to existing traffic levels).

Table 3 shows the trip generation rates that were used, and **Figure 5** shows the trip distribution assumptions that were used in this analysis. Trip rates were based on a combination of sources including the Institute of Transportation Engineers' (ITE) Trip Generation and the Lionshead Transportation Master Plan. ITE trips rates were primarily applied to development located away from the Vail base areas. Because of the heavy transit use and the fact that much of the development is mixed and close-in (lending itself to trips made via walking), the trip generation rates used in this study are less than the ITE rates because the ITE data are intended for more typical suburban settings where commuter activity is prominent. At peak times in Vail, tourist activity is prominent. The close-in trip generation rates used in this analysis are in line with ITE's Recreational/Home category. Areas where the close-in residential trip rates were applied are shown in **Figure 6**. A 20 percent reduction in trip generation rates was applied for the close-in areas.

The increased retail uses within the villages were also subject to reduced trip generation rates as compared to ITE's shopping center category data. A PM peak hour trip reduction of 65 percent was applied due to the following reasons:

- The retail and commercial activity, being located at the base of the ski area, is heavily dependent upon people who are already in the village for skiing purposes.
- There are many units located close to the new retail uses which tends to induce walking trips rather than vehicular trips.
- Many of the employees of the retail uses are typically discouraged to drive themselves to work, in part due to the parking fee at the structures.
- Provision of free transit service by the Town of Vail.

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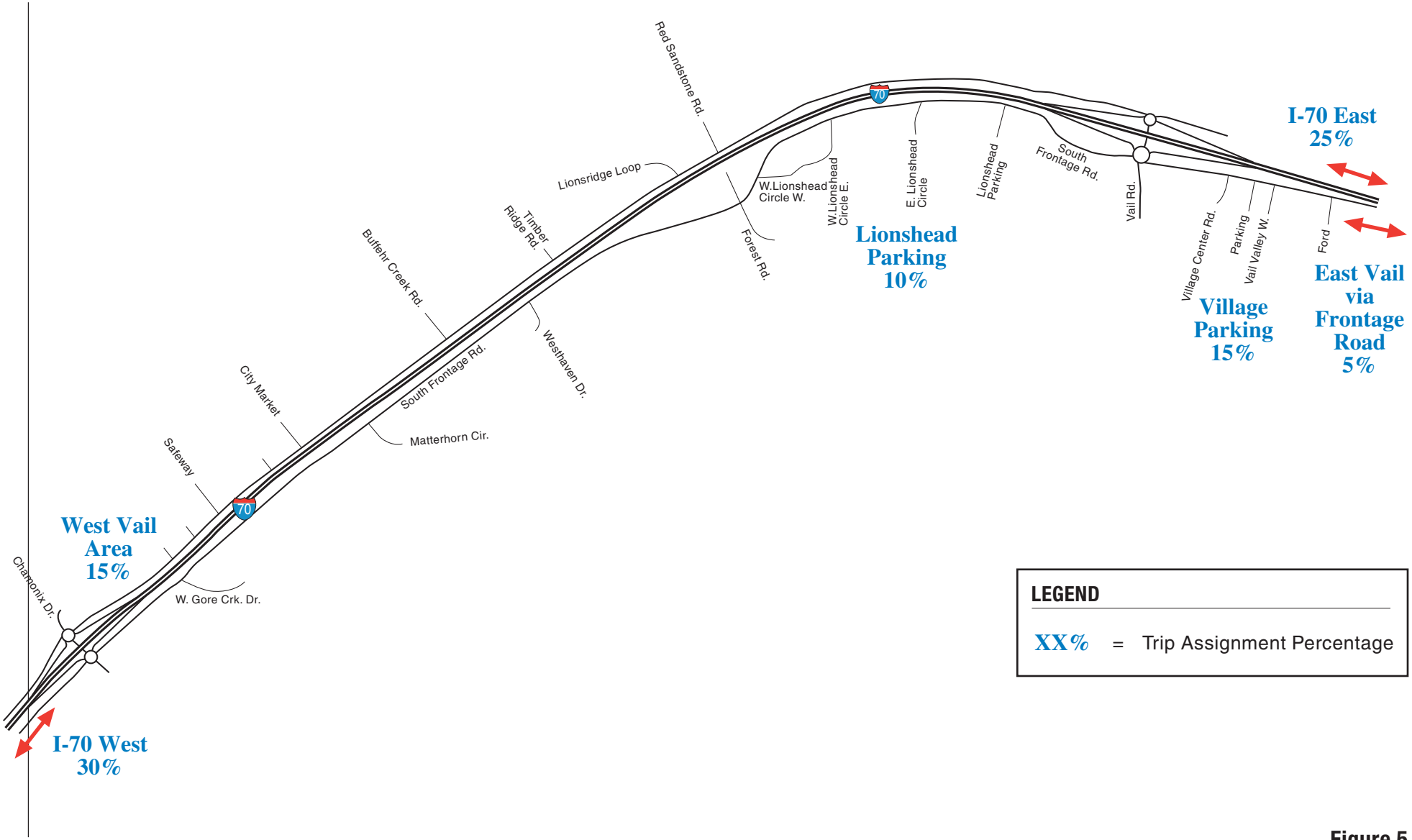

Figure 5

Trip Assignment Distribution

North

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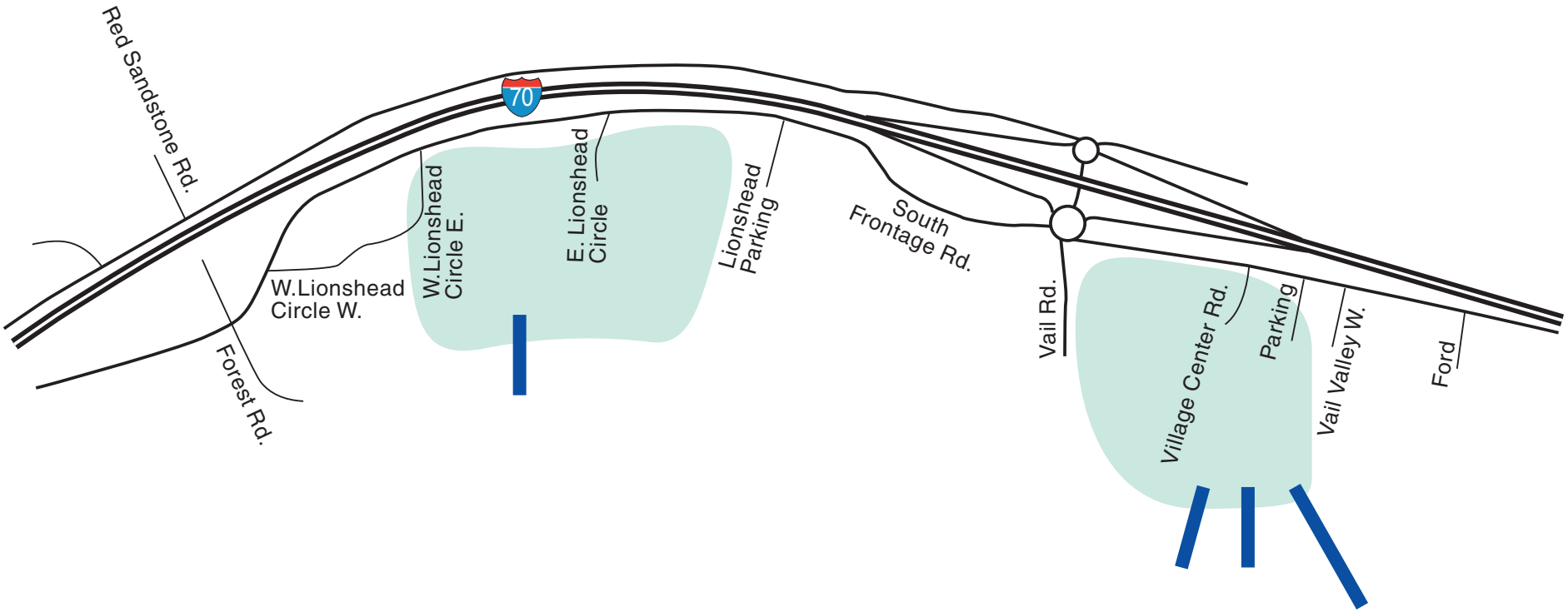


LEGEND

= Ski Lift / Gondola

North

Figure 6

Residential "Close-in" Areas for Trip Generation

A cursory-level evaluation of existing retail trips was conducted by reviewing the level of traffic turning into the structures today. During the PM peak hour, the outbound traffic contains a significant amount of skier trips, so it is not appropriate to include these outbound traffic with respect to gauging trip generation rates. Inbound PM peak hour traffic contains trips associated with retail and some other uses, so while it is not 100 percent retail traffic, it does serve as an upper limit. At the Lionshead Parking Structure,150 inbound PM peak hour trips exist current; the Lionshead Village contains approximately 150,000 square feet of retail-related use. At the Village Structure, 310 vehicles entered during the PM peak hour; that village contains approximately 300,000 square feet of retail/commercial. These traffic numbers represent a 45 to 50 percent reduction in ITE shopping center trip rates **if they were all retail-related,** but they are not.

Other trip types that are part of the inbound movements to the structures include:

- Library trips (which is open until 6:00 PM on weekends, later on weekdays)
- Dobson Ice Arena trips (which typically has a full schedule including hockey events, figure skating, lessons, and public skating)
- Adventure Center trips. The Adventure Center provides other recreation including tubing, ski biking, snowmobiling, snowshoeing, and a trampoline, and it is remains open until 9:00 PM on weekend nights.
- Residential uses. Several residential complexes within the villages are not able to adequately park their own overnight guests, so the parking structures are used instead. At Lionshead, staff estimates that approximately 100 vehicles are parked overnight at peak times related to selected residential uses. At the Village Structure, between 200 and 300 vehicles are parked overnight related to some of the residential uses there.
- Special events. Both villages routinely host evening events such as concerts, festivals, exhibits, and other attractions.

All of these attract trips beyond the retail/commercial attraction. As such, the true retail trip rate is even less that the 45 to 50 reduction quoted above. As such, using rates that equate to a 65 to 70 percent reduction for the new retail development is not inconsistent with current trip-making trends in Vail. However, using these reductions in traffic impact studies for an individual development should be used with caution and only be done in coordination with Town staff and CDOT.

Again, **Appendix E** shows the trip estimates for each of the development areas. In total, all of the considered development could generate an additional 2,800 trips per hour during the PM peak hour. The following summarize some of the bigger trip generators (4,350 trips per hour if "pure" ITE trip generation rates were used).

- **West Vail** – the net increase in square footage and residential units could generate a total of 470 additional trips during the PM peak hour. This would be above and beyond the estimated 800 to 1000 trips per hour generated by the West Vail development today.
- **Timber Ridge** is estimated to generate an additional 180 trips per hour during the PM peak hour.
- **West Lionshead (Ever Vail)** has the potential of generating an additional 580 trips per hour during the PM peak hour.

- **Lionshead Parking Structure** redevelopment is estimated to generate 275 trips during the PM peak hour.
- **The Lionshead Village** area (excluding the Lionshead parking structure) is projected to generate an additional 490 PM peak hour trips given the collective development.

The Vail Village area redevelopment is projected to generate an additional 260 PM peak hour trips given the collective development potentials.

Table 3. Trip Generation Rates

Use	Trip Generation Rates (per DU for Res, per 1000 SF otherwise)					
	ITE		Vail-Remote		Vail-Close In	
	Daily	PM Peak	Daily	PM Peak	Daily	PM Peak
Residential – New	5.86	0.54	5	0.5	4	0.4
Residential – Replace	NA	NA	0.75	0.08	0.6	0.06
Commercial - Office	11.01	1.49	11	1.49	11	1.49
Commercial – Retail	42.94	3.75	42.94	3.75	15	1.3
Hospital	17.6	1.18	17.6	1.1	NA	NA

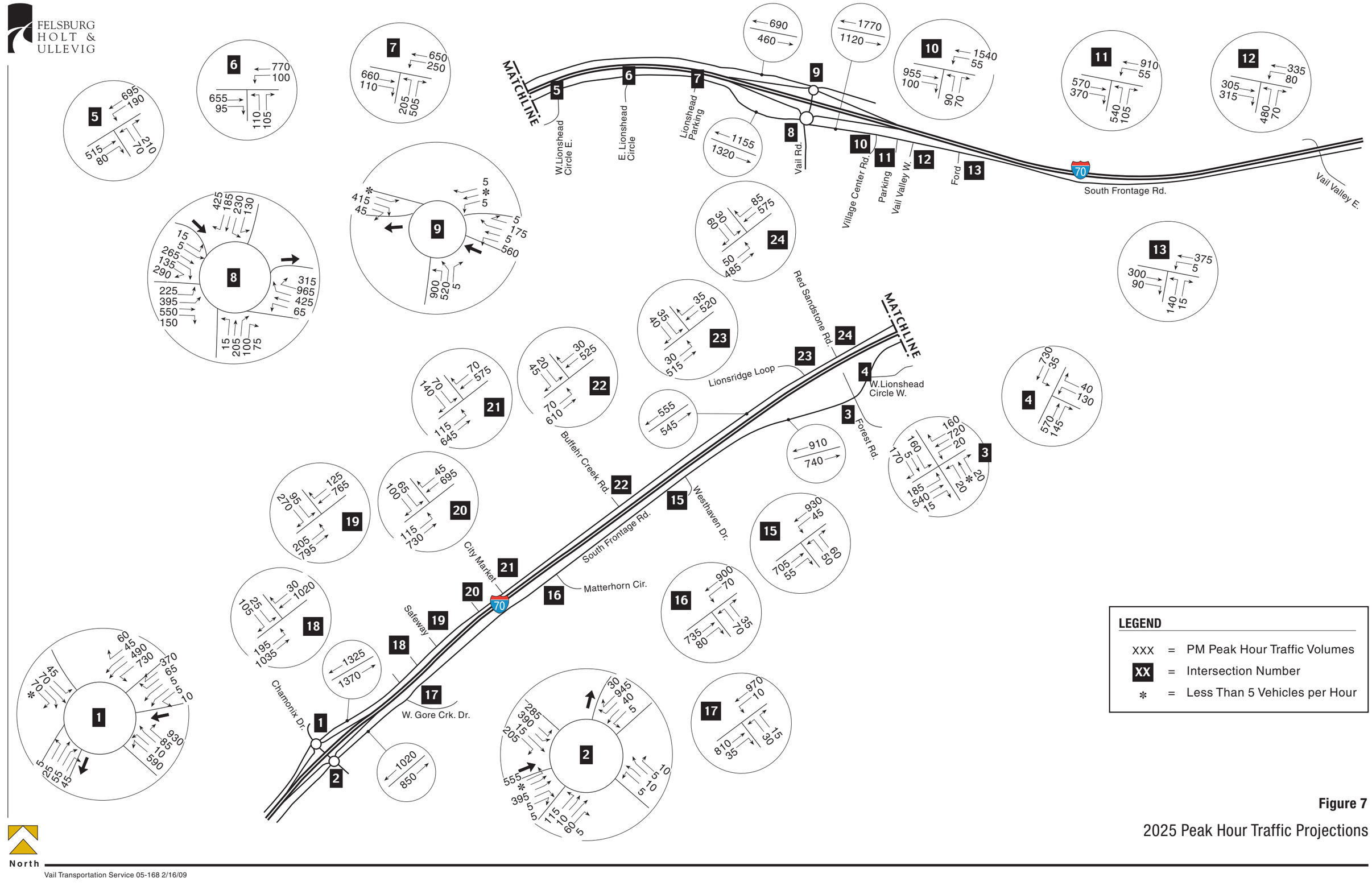
Figure 7 shows the 2025 total PM peak hour traffic projections at the Town's roundabout intersections and many of the Frontage Road cross-streets. In general, future PM peak hour traffic flows along busiest segments of the frontage roads are projected to increase an estimated 40 to 50 percent over existing traffic flow levels at peak times. Some segments will experience as much as a 60 to 70 percent increase. The interchanges will experience a greater concentration in traffic with the additional trips. Major cross-streets will still include Vail Valley Drive, both parking structure access points, and West Vail accesses (if access modifications are not constructed). Moderately traveled cross-streets include all of the Lionshead Circles, Village Drive, and Forest Road (given Ever Vail redevelopment and if left intact).

B. Traffic Operations

Similar to the existing conditions LOS analysis, the roundabout intersections were analyzed for ideal conditions as well as for snow conditions using the same factors and adjustments mentioned before. **Figure 8** shows the results of the PM peak hour analyses. Noticeable capacity deficiency highlights include:

- **Main Vail Interchange** – The north roundabout is projected to operate at a LOS F during the PM peak hour. The south roundabout is projected to function at LOS D, but several approaches are expected to operate at LOS E or LOS F.
- **West Vail Interchange** – Both roundabouts are projected to operate at LOS F during the PM peak hour.

FELSBURG HOLT & ULLEVIG



LEGEND

XXX	=	PM Peak Hour Traffic Volumes
XX	=	Intersection Number
*	=	Less Than 5 Vehicles per Hour

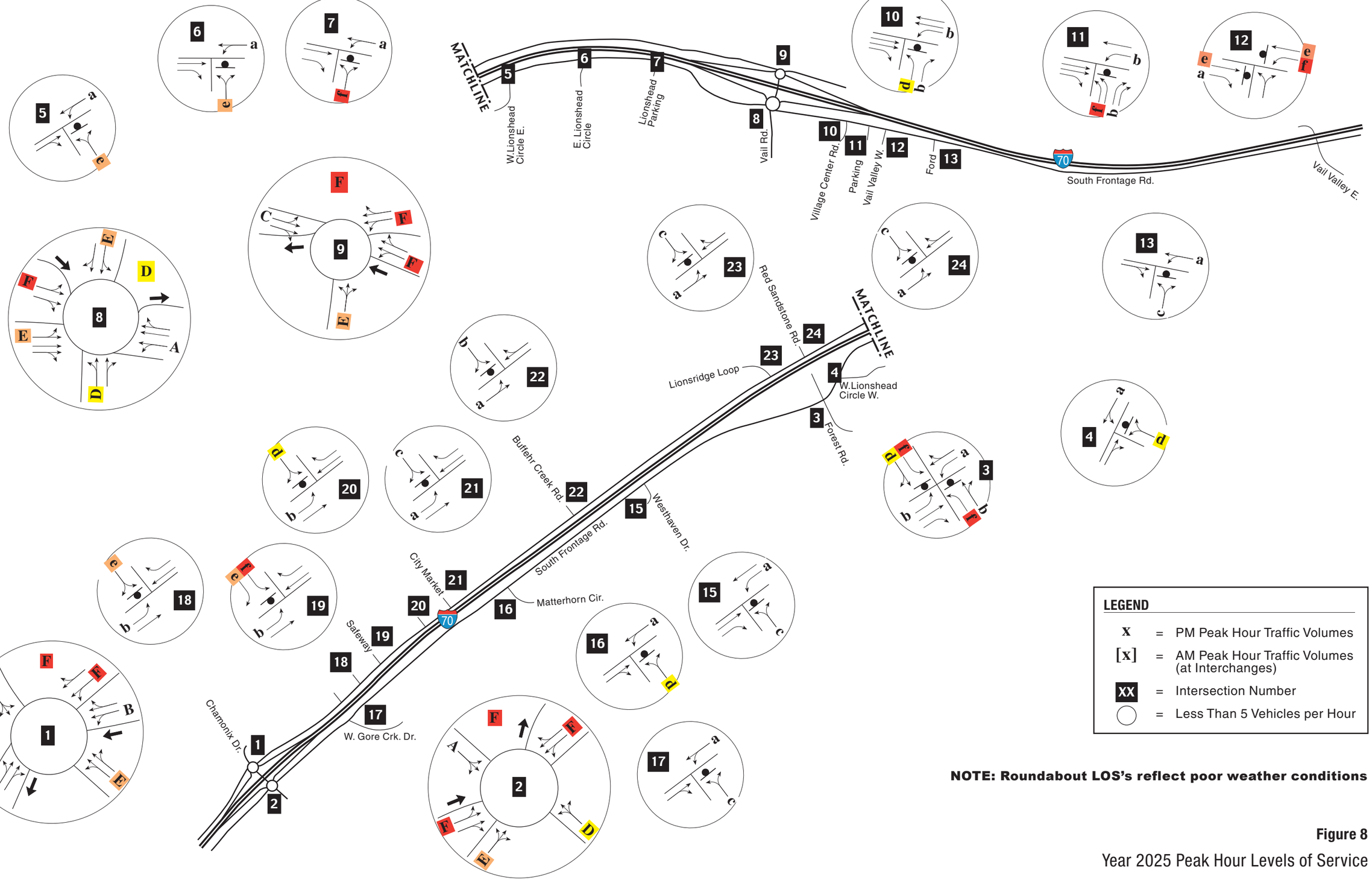
Figure 7

2025 Peak Hour Traffic Projections

North

Vail Transportation Service 05-168 2/16/09

FELSBURG HOLT & ULLEVIG



LEGEND

X	=	PM Peak Hour Traffic Volumes
[X]	=	AM Peak Hour Traffic Volumes (at Interchanges)
XX	=	Intersection Number
◯	=	Less Than 5 Vehicles per Hour

NOTE: Roundabout LOS's reflect poor weather conditions

Figure 8

Year 2025 Peak Hour Levels of Service

North

- Cross-street intersections that are projected to have a LOS F left turn movement include:
  - Village Parking Structure Access
  - Lionshead Parking Structure Access
  - Vail Valley Drive (left FROM the Frontage Road)
- Cross-street intersections that are projected to have a LOS E left turn movement include:
  - West Vail commercial accesses
  - East Lionshead Circle (which impacts the heavily-traveled In-Town shuttle bus service)
  - Village Center Drive
  - West Lionshead Circle

LOS E and LOS F were described in Chapter Two with respect to corresponding motorist delay levels. These poor LOS's indicate that mobility within Vail will be severely limited during busy times. This impacts not only private automobile users within town, but it also will have a significant impact on the Town's ability to provide transit service. Given poor weather conditions, many drivers will be frustrated traveling within Vail, thereby exacerbating a visitor's resort experience.

In addition to intersection LOS's, travel time estimates between Safeway and the Village Parking Structure, as well as Safeway and the Lionshead Structure, have been developed for the PM peak hour of projected Year 2025 conditions as follows in **Table 4**.

Table 4. Travel Time Comparison – Year 2025 Peak Season, PM Peak Hour

	Safeway to Village Structure		Village Structure to Safeway		Safeway to LH Structure	LH Structure to Safeway	Cascade to Red Sandstone	Red Sandstone to Cascade
	North Route	South Route	North Route	South Route				
Existing								
Ideal	5:30	6:30	6:00	8:00	5:00	5:00	5:30	5:30
Snowy	7:30	9:00	8:30	10:30	5:00	5:00	6:30	6:45
2025 (without any improvements)								
Ideal	6:30	7:30	8:30	10:00	7:00	13:00	6:00	6:00
Snowy	9:00	12:30	15:00	14:00	10:00	17:00	8:45	7:15

As shown, travel time within Vail during peak times could increase by as much as 12 minutes depending on conditions and routing. Much of the additional delay will occur at the intersections where LOS's are anticipated to be poor

Beyond the comparisons shown in **Table 4**, travel time estimates were also developed between Cascade Village and West Vail. Given the LOS results of **Figure 8** (and corresponding delays), year 2025 snowy conditions would require 8 to 10 minutes of travel between these two areas. These trips would experience significant travel delay incurred at the West Vail interchange roundabouts and through turning onto the Frontage Road. The LOS worksheets are shown in Appendix F.

In addition to the peak hour projections, daily traffic projections were developed along the frontage roads which is shown on **Figure 9**. The daily traffic is shown as a means of quickly comparing the order of magnitude changes in traffic due to growth, as well as the resulting demands due to implementing the recommended plan (discussed later in this report).

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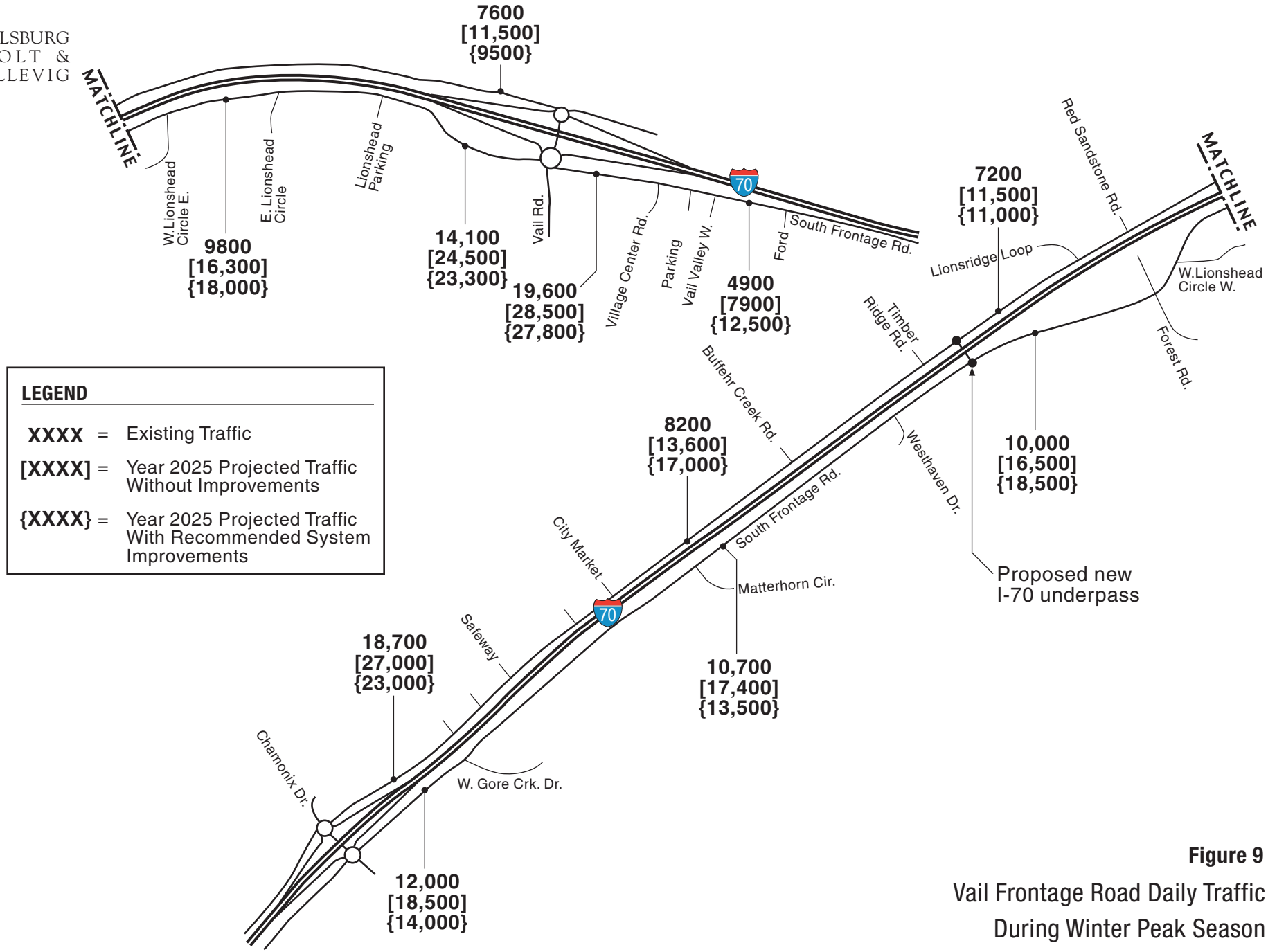

LEGEND

XXXX	=	Existing Traffic
[XXXX]	=	Year 2025 Projected Traffic Without Improvements
{XXXX}	=	Year 2025 Projected Traffic With Recommended System Improvements

Figure 9

Vail Frontage Road Daily Traffic During Winter Peak Season

North

V. IMPROVEMENT ALTERNATIVES

Based on the traffic operations presented in the previous section, improvement alternatives were developed and analyzed relative to their impact on the critical street system components within Town. The critical consideration areas include the following:

- Main Vail Interchange
- West Vail Interchange
- South Frontage Road from Vail Road to Ford Park (Village Frontage)
- South Frontage Road from Vail Road to Forest Road (Lionshead Frontage)
- West Vail Redevelopment Area

Alternatives were identified and analyzed for each of these critical areas to determine the most appropriate alternative (or combination of alternatives) to mitigate projected traffic demands.

A. Main Vail Interchange

Numerous peak hour traffic patterns are served by this interchange, and many are in direct conflict with each other. The predominant PM peak hour traffic pattern consists of movements from the Village Structure Frontage Road "leg" to the westbound I-70 on-ramp. But other noticeably heavy patterns during the PM peak hour include movements between the Lionshead leg and the eastbound on ramp, the westbound off ramp and the South Frontage Road (both directions) and movements simply crossing I-70. Additionally, a major pattern during the AM peak hour is westbound I-70 traffic exiting the freeway and turning south heading to the parking structure. Alternatives that were considered to alleviate poor LOS's can be categorized as either capacity improvements, travel demand measures, or provision for alternative routes.

Tables 5 and 6 were developed to clarify the issues associated with each of the interchange's roundabouts during the PM peak hour. The tables show realistic improvements as well as supplemental mitigation considerations to achieve acceptable LOS's. **Table 5** presents material associated with the north roundabout and **Table 6** presents information relative to the south roundabout.

Table 5. Main Vail Interchange North Roundabout – Alternatives Assessment

Main Vail Interchange, North Roundabout		
Primary Issue(s):	LOS F projected along WB off-ramp and Spraddle Creek Approach (Snowy and Ideal Conditions)	
	Major traffic conflict is between NB left turn movement (to WB I-70 and Frontage Road) and WB left turn movement from WB I-70 off-ramp.	
Realistic Capacity Improvement(s):	Expand to a full two lane roundabout; add northbound approach lane from under I-70 (possibly reversible lane); add bypass lane from Frontage Road to WB I-70.	
Supplemental Traffic Reduction Still Needed for LOS D on otherwise poor operating approaches(Snowy):	Still need to reduce PM peak hour forecasts by **50 to 100 vehicles per hour, or 2 to 4 percent.**	
2025 Traffic Composition:	30% is from proposed development.	
Potential Measure	**Traffic Flow Effect (as Isolated Measure)***	**Relative Cost**
1. Add Simba Run underpass.	Total traffic reduced by 150 to 200 vph (6 to 8%).	High, but measure would provide other benefits as well.
2. Encourage use of East Vail Interchange	Estimated ramp traffic removed is between 100 and 150 vph (4 to 6%).	Low; would require VMS along I-70 and along Bighorn Road.
3.Parking Management Measures	Estimated traffic removed is between 100 and 150 vph (3 to 5%).	Low; would impact parking policy.
4. Express Bus Service linking West Vail, Lionshead, and Vail Village	Estimated traffic removed is between 50 and 100 vph (2 to 4%).	Medium.
5. Extended Skiing Hours	Estimated traffic removed is between 25 and 50 vph (1 to 2%).	Low.
6. Metering of Outbound Structure Traffic (toll booths)***	Estimated traffic removed is between 50 and 75 vph (2 to 3%).	Low; toll booths already in place.
7. Expand Regional Transit Service (e.g. Summit County Front Range)	Estimated traffic reduction of 1% per every three to four peak hour bus trips.	Medium to High
Other Considerations		
Mixed Use Trip Gen Reduction (WV)**	Could reduce intersection's PM peak hour traffic by another 25 vph (1%)	
Employee housing auto disincentive (Timber Ridge)	Could reduce intersection's PM peak hour traffic by another 25 to 50 vph (1 to 2%)	

* Combining measures will reduce the effect of certain measures as some mitigation measures target the same traffic "group".

** This consideration entails redeveloping the West Vail area to better balance uses and incite internal trip-making.

***Potentially, improvements in parking control equipment over time may allow for a more rapid exit flow rate. While this will be advantageous to those attempting to exit, it will contribute to the peak traffic concentration along Town roads. Metering this outbound flow would provide a little benefit to traffic operations.

Table 6. Main Vail Interchange South Roundabout – Alternatives Assessment

Main Vail Interchange, South Roundabout		
Primary Issue(s):	LOS F projected along WB Frontage Road Approach and along Vail Road approach (snowy).	
	Major movement is WB right turn to under I-70 (much of which is oriented to WB I-70). Largest conflict with this movement includes the combination of movements onto the EB on-ramp.	
Realistic Capacity Improvement(s):	Incorporate second northbound lane under I-70 and re-designate WB Frontage Road lanes to utilize it (right, through/right, and left/through).	
Supplemental Traffic Reduction Still Needed for LOS D (Snowy):	Still need to reduce PM peak hour forecasts by **50 to 100 vehicles per hour, or 1 to 2 percent.** Additional reduction may be desirable to provide excess capacity for U-turns from/to the west (due to right-in/right-out access restrictions nearby).	
2025 Traffic Composition:	25% is from proposed development.	
Potential Measure	**Traffic Flow Effect (as Isolated Measure)***	**Relative Cost**
1. Add Simba Run underpass.	Total traffic reduced by 150 to 200 vph (3 to 4%).	High, but measure would provide other benefits as well.
2. Encourage use of East Vail Interchange	Estimated ramp traffic removed is between 50 and 100 vph (1 to 2%). This measure would also create some "shifts" in traffic entering the roundabout.	Low; would require VMS along I-70 and along Bighorn Road.
3. Parking Management Measures	Estimated traffic removed is between 125 and 200 vph (2 to 4%).	Low; would impact parking policy.
4. Express Bus Service linking West Vail, Lionshead, and Vail Village	Estimated traffic removed is between 50 and 100 vph (1 to 2%).	Medium.
5. Extended Skiing Hours	Estimated traffic removed is between 25 and 50 vph (1%).	Low.
6. Metering of Outbound Structure Traffic (toll booths)***	Estimated traffic removed is between 100 and 150 vph (2 to 3%).	Low; toll booths already in place.
7. Expand Regional Transit Service (e.g. Summit County Front Range)	Estimated traffic reduction of 1% per every three to four peak hour bus trips.	Medium to High
Other Considerations		
Mixed Use Trip Gen Reduction (WV)**	Could reduce intersection's PM peak hour traffic by 25 (<1%).	
Employee housing auto disincentive (Timber Ridge)	Could reduce intersection's PM peak hour traffic by another 25 to 50 vph (1%)	
Hospital Access onto Fr. Road		

* Combining measures will reduce the effect of certain measures as some mitigation measures target the same traffic "group".

** This consideration entails redeveloping the West Vail area to better balance uses and incite internal trip-making.

***Potentially, improvements in parking control equipment over time may allow for a more rapid exit flow rate. While this will be advantageous to those attempting to exit, it will contribute to the peak traffic concentration along Town roads. Metering this outbound flow would provide a little benefit to traffic operations.

Improvements that show promise for the Main Vail interchange's PM peak hour operation include:

- Simba Run Underpass. This improvement is estimated to attract 3 to 4 percent of the traffic passing through the south roundabout and 6 to 8 percent of the traffic traveling through the north roundabout. The Simba Run Underpass would provide some needed relief to the Main Vail interchange by giving local drivers another option to cross I-70. This is a relatively expensive improvement, and the relief it provides to the Main Vail Interchange alone is probably not enough justification for its construction. However, the Simba Run underpass would provide other benefits such as:
- Traffic congestion relief of the West Vail interchange roundabouts.
- Traffic congestion relief of the Main Vail interchange roundabouts.
- Increased flexibility and efficiency to provide transit service to West Vail including a potential for a "line haul" rapid service connecting the Town's major activity centers.
- Accommodation of a trail connection to serve bicycle and pedestrian activity between areas north and south of I-70 safely.
- Improved efficiency for emergency and operations vehicles relative to response times and plow routes.
- Overall community connectivity.
- Encouraging some to walk or utilize transit over driving given the underpass proximity to residential and commercial uses.
- Provides direct connectivity to Timber Ridge, an employee housing community.

- Widening/enhancing the roundabouts (particularly the north roundabout) to establish continuous double lanes carrying traffic from the Village South Frontage Road "leg" to the I-70 West on-ramp "leg". Signing will be crucial with this improvement to clearly guide motorists through the interchange. The roadway below I-70 would need to be striped and signed to clearly show two northbound lanes and one southbound lane. There is 34 feet of width allowing for three 11-foot lanes. A potential embellishment could be the provision for the center lane to be reversed during the AM peak hour through dynamic traffic control planning involving temporary barriers and signs, but both roundabouts will need to be properly designed to accommodate this potential. Providing a full four lanes under I-70 would be an ideal long-term consideration when the I-70 bridges are replaced by CDOT (which may not be for many years given CDOT's favorable Sufficiency Rating of these bridges being in the low 90's).
- Alternatives that involve parking management could collectively make a difference as well. With the Town "core" located right at the interchange and much of the public parking associated with "core" activity (skiing, dining, shopping, etc.), the ability to manage afternoon traffic spikes generated from the parking structures can lessen some of the concentration of traffic experienced at the Main Vail interchange. Management could also include providing real-time information to guests with respect to travel conditions along I-70 and/or existing the structures. Guests may opt to stay in town longer after a day of skiing if they learn about real time congestion problems prior to reaching their vehicle. There may be other parking policy and/or economic consequences in applying these management techniques, but properly managing the parking could have an impact on peak traffic demands.

- Encourage use of the East Vail interchange via dynamic signing can also remove an element of the traffic from the Main Vail interchange. The primary means of conveying information to drivers would be via dynamic signing upon exit of the Village Parking Structure and along westbound I-70 prior to the East Vail interchange. The one drawback of this alternative is that it would place more traffic along the Frontage Road east of Ford Park, but this section of Frontage Road has excess capacity as a two-lane road given that it carries less than one-half of the traffic the other Frontage Road segments carry. This alternative would be most effective to relieve the AM peak hour time period by intercepting traffic arriving from Vail Pass (which is significant during the AM Period) and will be essential to accommodating AM peak hour concentrations of traffic exiting I-70 from the east. Intelligent Transportation System (ITS) mitigation measures should be implemented to the extent possible to optimize existing transportation infrastructure. Providing public parking at Ford Park would complement the notion of encouraging usage of the East Vail interchange.

Another consideration listed in **Table 6**, but not specifically quantified, is the modification of the Hospital's access. The Vail Valley Medical Center is currently served by Meadow Drive via Vail Road. As such, nearly all of its traffic impacts the south roundabout intersection along the Vail Road (south) leg. The Center is in the planning process to reconfigure its facility such that it might have an access directly onto the Frontage Road west of the roundabout, across from the Municipal Center. This would "shift" some of this facility's traffic out of the south roundabout and off of the south roadway "leg" which is projected to operate at a poor LOS. This scheme requires coordination with the other nearby uses' access points, but it could offer a small dose of traffic relief to the heavily-used south roundabout.

B. West Vail Interchange

The predominant movements through this interchange during the PM peak hour include movements from the North Frontage Road and from the South Frontage Road to westbound I-70. AM peak hour traffic patterns illustrate the reflection, but the magnitude of traffic during the AM peak hour is much less than that of the PM peak hour based on the existing counts. Part of this phenomenon is due to the commercial activity in West Vail (north side of I-70) which is a more significant generator during the PM peak hour than during the AM peak hour. The PM peak hour major movements all merge within the north roundabout, and the north roundabout intersection is the most challenging component of the interchange complex. Like the Main Vail interchange bridges, the West Vail I-70 bridges have a very high Sufficiency Rating, and CDOT is not likely to replace these any time soon.

Tables 7 and 8 show the effectiveness of various alternatives on the PM peak hour operations of this interchange. A key improvement for this interchange is the establishment of two northbound lanes under I-70 from the south side and maintaining two continuous lanes to westbound I-70 (through the roundabout). Like the Main Vail interchange, there is adequate width to accommodate these (35 feet, allowing for three 11-foot lanes), but striping and signing enhancements will be necessary to clearly convey this lane configuration to drivers. Also, the southbound Chamonix approach into the roundabout should be widened to include two entering lanes.

The nature of the West Vail area being removed from the skiing "core" of Vail results in less effectiveness of the travel demand measures considered in the Main Vail interchange alternatives analysis (including managing traffic demand from the parking structures). The most effective mitigation measure for West Vail would be the construction of a Simba Run underpass. This improvement would remove 10 to 12 percent of the PM peak hour traffic utilizing the interchange complex.

Table 7. West Vail Interchange North Roundabout – Alternatives Assessment

West Vail Interchange, North Roundabout		
Primary Issue(s):	LOS F projected along WB Frontage Road Approach and LOS E along SB Chamonix Drive approach (snowy).	
	Major movement is WB left turn to under I-70, to WB I-70, and NB approach to EB Frontage Road and onto WB I-70. Largest conflict involves NB left turn onto WB I-70 with the left turns from WB Frontage Road.	
Realistic Capacity Improvement(s):	Add northbound approach lane from under I-70. Should also add SB Chamonix approach lane.	
Supplemental Traffic Reduction Still Needed for LOS D (Snowy):	Still need to reduce PM peak hour forecasts by **200 to 250 vehicles per hour, or 6 to 8 percent.**	
2025 Traffic Composition:	21% is from proposed development.	
Potential Measure	**Traffic Flow Effect (as Isolated Measure)***	**Relative Cost**
1. Add Simba Run underpass.	Total traffic reduced by 400 to 450 vph (10 to 12%).	High, but measure would provide other benefits as well.
2. Parking Management Measures	Estimated traffic removed is between 25 to 50 vph (less than 1%)	Low; would impact parking policy.
3. Express Bus Service linking West Vail, Lionshead, and Vail Village	Estimated traffic removed is between 75 and 100 vph (2 to 3%).	Medium.
4. Extended Skiing Hours	Estimated traffic removed is less than 25 vph (<1%).	Low.
5. Metering of Outbound Structure Traffic (Village and LH toll booths)***	Estimated traffic removed is between 25 and 50 vph (1 to 2%).	Low; toll booths already in place. Metering outbound West Vail commercial traffic may be beneficial.
6. Expand Regional Transit Service (e.g. Summit County Front Range)	Estimated traffic reduction of 1% per every three to four peak hour bus trips.	Medium to High
Other Considerations		
Mixed Use Trip Gen Reduction (WV)**	Could reduce intersection's PM peak hour traffic by 25 to 50 vph (1%)	
Employee housing auto disincentive (Timber Ridge)	Could reduce intersection's PM peak hour traffic by less than 25 vph (<1%)	
Less West Vail Development	Could reduce intersection's PM peak hour traffic by 25 vph per 10,000 SF reduction in retail.	

* Combining measures will reduce the effect of certain measures as some mitigation measures target the same traffic "group".

** This consideration entails redeveloping the West Vail area to better balance uses and incite internal trip-making.

***Potentially, improvements in parking control equipment over time may allow for a more rapid exit flow rate. While this will be advantageous to those attempting to exit, it will contribute to the peak traffic concentration along Town roads. Metering this outbound flow would provide a little benefit to traffic operations.

Table 8. West Vail Interchange South Roundabout – Alternatives Assessment

West Vail Interchange, South Roundabout		
Primary Issue(s):	LOS F projected along EB Frontage Road Approach (relative minor) and along EB Off-ramp (snowy).	
	Major movement is WB right turn to under I-70. This movement's largest conflict includes the eastbound off-ramp left turn to under I-70.	
Realistic Capacity Improvement(s):	Add northbound approach lane from under I-70 (extended back to the south roundabout)	
Supplemental Traffic Reduction Still Needed for LOS D (Snowy):	Still need to reduce PM peak hour forecasts by **100 to 150 vehicles per hour, or 3 to 5 percent.**	
2025 Traffic Composition:	21% is from proposed development.	
Potential Measure	**Traffic Flow Effect (as Isolated Measure)***	**Relative Cost**
1. Add Simba Run underpass.	Total traffic reduced by 400 to 450 vph (14 to 16%).	High, but measure would provide other benefits as well.
2. Parking Management Measures	Estimated traffic removed is between 25 and 50 vph (1 to 2%).	Low; would impact parking policy.
3. Express Bus Service linking West Vail, Lionshead, and Vail Village	Estimated traffic removed is between 75 and 100 vph (3 to 4%).	Medium.
4. Extended Skiing Hours	Estimated traffic removed is less than 25 vph (<1%).	Low.
5. Metering of Outbound Structure Traffic (toll booths)***	Estimated traffic removed is between 25 and 50 vph (1 to 2%).	Low; toll booths already in place.
6. Expand Regional Transit Service (e.g. Summit County Front Range)	Estimated traffic reduction of 1% per every three to four peak hour bus trips.	Medium to High
Other Considerations		
Mixed Use Trip Gen Reduction (WV)**	Could reduce intersection's PM peak hour traffic by 25 to 50 vph (1 to 2%)	
Employee housing auto disincentive (Timber Ridge)	Could reduce intersection's PM peak hour traffic by less than 25 vph (<1%)	
Less West Vail Development	Could reduce intersection's PM peak hour traffic by 25 vph per 10,000 SF reduction in retail.	

* Combining measures will reduce the effect of certain measures as some mitigation measures target the same traffic "group".

** This consideration entails redeveloping the West Vail area to better balance uses and incite internal trip-making.

***Potentially, improvements in parking control equipment over time may allow for a more rapid exit flow rate. While this will be advantageous to those attempting to exit, it will contribute to the peak traffic concentration along Town roads. Metering this outbound flow would provide a little benefit to traffic operations.

As mentioned, the Simba Run underpass would be an expensive improvement. It would provide some benefit to the Main Vail interchange, but it would provide far more traffic operations benefit to the West Vail interchange. In addition, this underpass's provision for a third crossing of I-70 provides more flexibility for transit service and bus routing as well as provision for pedestrians and bicycles. A more detailed Simba Run Feasibility Study should be considered to fully flush out all pros, cons, and impacts associated with this potential improvement project.

C. South Frontage Road – Vail Road to Ford Park

This stretch of the South Frontage Road is characterized as being the heaviest traveled segment of Frontage Road in Town (just east of Vail Road) and by having heavy cross-street movements, namely the Village Parking Structure and Vail Valley Drive (also known as Blue Cow Chute). Further, the Vail Valley Drive intersection is characterized by a unique stop-sign configuration in which approaches along the Frontage Road are stopped and Vail Valley Drive traffic approaching the intersection is provided the right-of-way. This is unique in that it is the only Frontage Road intersection in Town with this traffic control configuration. As mentioned, some of the accidents that have occurred at this intersection appear to be caused in part by this unique configuration and the fact that drivers traveling along the Frontage Road do not expect the need to stop. Other intersections which exist within this stretch of roadway include bus and top-level parking access points to the Village Structure as well as Village Center Road located just west of the Village Structure. Much of the Frontage Road is five lanes wide, but it narrows to a two-lane section east of Vail Valley Drive.

Numerous alternatives (and sub-alternatives) were considered to better accommodate traffic demands along this stretch of Frontage Road. Some of the alternatives were intended to mitigate localized deficiencies like tough-to-make left turn movements onto the Frontage Road. Others are intended to mitigate forecasted deficiencies like traffic generated by a potential major parking area at (or under) Ford Park. Also, the considered concepts look to alleviating some of the difficult left turn movements from the side streets by allowing (or forcing) these drivers to turn right, travel a short distance, and then make use of a new roundabout to u-turn back west, effectively making a left turn onto the Frontage Road.

Table 9 shows the alternatives and intersection sensitivity LOS results for each alternative. From the table, it can be seen that 2-lane roundabouts would function well along this stretch of the South Frontage Road. However, this size of roundabout requires a significant amount of space (150 feet minimum diameter). Preliminary roundabout layouts showed that this concept would not properly fit between I-70 and the Parking Structure unless allowance was made to encroach into I-70. Potentially, grade adjustments could be made to I-70 and/or the Frontage Road to accommodate vertical design issues, but the horizontal encroachment of a roundabout into the I-70 mainline would likely not be accepted by CDOT or FHWA officials. The notion of encroaching into the "development side" of the frontage road also offers challenges by virtue of the existing parking structure. This would not be an easy facility to move to allow for more space. Other locations along the frontage roads have similar challenges in that the freeway constrains widening on one side and development on the other. The development side of the frontage roads can also pose grade challenges with respect to the served cross-street. But in light of the freeway, all improvements along the frontage roads should not encroach beyond the "B" line of I-70.

Table 9. South Frontage Road Alternatives Analysis – East of Main Vail Interchange – 2025 Traffic

Alternative	Intersection PM Peak Hour Level of Service			
	Village Center	Village Structure	Blue Cow Chute	New Vail Valley Dr.
No Action	**E**	**F**	**F**	**na**
Signal or Manual Traffic Control at Village Structure	**E**	**B**	**F**	**na**
Alt 1a- Roundabout at Vail Valley Drive	**E**	**F**	**D**	**na**
Alt 1b- Same as 1a, but make Village Structure 3/4 movement (forcing left outs to turn right and u-turn through roundabout)	**E**	**C**	**F (A if 2 lane roundabout)**	**Na**
Alt 1c- Same as 1a, but make Village Center Drive 3/4 movement (forcing left outs to turn right and u-turn through roundabout)	**C**	**F**	**E (A if 2 lane roundabout)**	**Na**
Alt 2a- One Way Vail Valley Drive with new connection onto Frontage Road near Ford Park (new bridge over Gore Creek with one way eastbound circulation)	**E**	**F**	**A**	**F**
Alt 2b- Same as 2a but with one-lane roundabout intersection for the new one-way out intersection near Ford Park	**E**	**F**	**A**	**D**
Alt 3a- Roundabout at Village Structure (2-lane)	**E**	**A**	**F**	**Na**
Alt 3b- Same as 3a, but make Village Center Drive 3/4 movement (forcing left outs to turn right and u-turn through roundabout)	**C**	**A**	**F**	**Na**
Alt 3d- Same as 3b, but also make Vail Valley Drive 3/4 movement and add another roundabout at west end of Ford Park to accommodate U-turns.	**C**	**A**	**F * (NB right Turn only)**	**F * (A if 2 lane roundabout)**
Recommended Alternative (see below)– Ford Park Roundabout, ¾ quarter movement of Vail Valley Drive with Lane Addition to Ford Park, Police Control at Village Structure Access	**C**	**B**	**A**	**N/A**

Other considerations for this stretch of Frontage Road include:

- Heavy left turn movements from the Village Structure
- Unique traffic control configuration for the Frontage Road/Vail Valley Drive intersection, due in part to the steep upward grade to the Frontage Road (and eliminating a high flow of traffic stopped on a slick roadway approach slope).

The potential that Ford Park may be the site of additional parking supply in the future.

Given the host of considerations, constraints, and projected traffic operations, the following plan components are recommended relative to the South Frontage Road, east of Vail Road:

- Roundabout at Ford Park to serve as a means of "u-turning" (eastbound to westbound) and to potentially serve a future parking structure.
- Restrict the Vail Valley Drive to three-quarter movement (no left out) and add a continuous right turn lane along the South Frontage Road (along the Wren's frontage) allowing for free-flow right turn movements from Vail Valley Drive onto the Frontage Road and extending to Ford Park (and the new roundabout).
- Provide police officer traffic control at the Village Parking Structure during the PM peak hours on peak days of activity. This would effectively serve as a manual traffic signal (but without lights, poles, mast arms, etc.).
- Leave the Village Center Drive intersection as it exists. Drivers attempting to turn left onto the Frontage Road at this location might experience some delay at peak times, but there is the option to instead turn right and travel to the roundabout at Ford Park to "U-turn". This left turn movement is not anticipated to be heavy.

This recommended alternative creates "out of the way travel" for motorists attempting to go westbound along the South Frontage Road from Vail Valley Drive or any other access between Vail Valley Drive and the recommended Ford Park roundabout. Though the perception of this additional travel time inconvenience may seem to be onerous, it is outweighed by the safety and traffic operations improvements. The majority of accidents which occur at this intersection are due to the odd configuration at this intersection and driver expectation. Due to the high volume of thru movement traffic crossing the Frontage Road, requiring Frontage Rd traffic to stop, the LOS for the Frontage Road during peak times is currently at a C and D with the future expected to worsen to D and F. The recommended alternative improves the existing and future LOS for the Frontage Road to an A and lowers the LOS on Vail Valley Drive from an A to a B.

The need to travel out of the way is not new to Vail. Vail is a community divided by the interstate with only two points for crossing; and therefore today it is the norm for many motorists to have to backtrack and drive out of the way to get from one side of the interstate to the other (i.e. traveling from Red Sandstone area to Lionshead area). This new imposed movement at Vail Valley Drive will be similar, yet on a much lesser scale. It may be expected to cause frustration at first, but become the norm within time. It is estimated that the additional length of travel is approximately 1800 feet or 60 seconds of additional travel time assuming an average speed of 20 mph.

Options 2a and 2b consider a new traffic pattern allowing only one way traffic along Vail Valley Drive, exiting to the east via a new bridge over Gore Creek at the east end of Ford Park. This option minimizes the conflicts at the current Vail Valley Drive and S. Frontage Road intersection, however these options incur far more "out of the way travel". It is estimated that the additional travel would be approximately 4800 feet or an additional 2 minutes and 40 seconds. These options also require a long span bridge over Gore Creek that would double or triple the cost of the improvements. The recommended plan is estimated to be approximately $3 million, with the majority of these costs being burdened by any expansion of Ford Park (i.e. Parking, Recreational or Cultural facilities).

This plan provides the benefits of:

- Converting the South Frontage Road/Vail Valley Drive intersection into a more conventional type of intersection that would provide for free flow along the Frontage Road approaches (and a potentially safer intersection).
- Alleviating the poor LOS of turning left out of the parking structure.
- Providing a major access point for Ford Park to serve its activities including events and potentially increased parking (for skiers).

D. South Frontage Road – Vail Road to West Lionshead (Ever Vail)

This stretch of roadway is also heavily traveled at peak times, especially the segment just west of Vail Road. The major access onto this stretch of road serves the Lionshead Structure. The cross-section of the road at the Vail Road roundabout is five lanes, but this transitions to two lanes west of the Municipal Center (approximately 1000 feet west of Vail Road). As part of the Lionshead Master Plan adopted by the Town in 1998, the section of frontage road west of the Municipal Center is planned to be widened to include a westbound bike lane (also to be used for overflow parking), a center median for left turn movements, and a continuous accel/decel eastbound right turn lane (although two continuous westbound lanes are included as far west as Lionshead Parking Structure). Projected traffic levels along this stretch of the South Frontage Road are on the order of 14,000 to 15,000 vehicles per day during peak times (as was shown in **Figure 9**). Between the daily traffic projections and the peak hour projections, widening of much of the frontage road system is required as the traffic demand levels would support the need for four or five lanes of traffic. Further, adequate width is needed to accommodate snow storage during the winter. The planned frontage road cross-section within the Lionshead area is discussed later in the report.

Moderately traveled cross-streets in this stretch of roadway include both West Lionshead Circle intersections as well as East Lionshead Circle. The intersection at East Lionshead Circle is also a critical consideration in the master planning of the Frontage Road because it serves Vail's busiest bus route; the In-Town shuttle. These buses are required to turn left onto the Frontage Road from East Lionshead Circle to cover the western Lionshead area, but this can be a difficult left turn movement to make during peak times due to heavy traffic flows along the Frontage Road.

Other considerations that play into developing a plan for this stretch of the Frontage Road include the potential redevelopment of the West Lionshead area and associated realignment of the Frontage Road adjacent to I-70. The Ever Vail development proposal is currently under consideration by the Town and it includes this Frontage Road realignment. Further, the Lionshead Parking Structure is proposed to be redeveloped to include more parking, residential uses, commercial, and potentially community uses, as mentioned.

As part of the Ever Vail development proposal, a section of the South Frontage Road is planned to be realigned up against I-70. Discussions between Town and CDOT staff have revealed the need to recognize a legally established Barrier Line (B-Line) along the south side of I-70. With the realignment and the widening of the remainder of the South Frontage Road, the ultimate Frontage Road width cannot impede beyond the B-Line. All future planning and engineering of the South Frontage Road expansion needs to recognize this. The north-side South Frontage Road right-of-way line could coincide with the B-Line, but it cannot extend beyond it.

Given these considerations and all of the past planning, improvement alternatives were not specifically considered for this stretch. Rather, the following guidance has been provided to development planners:

- **West Lionshead Area (Ever Vail)** – With the Frontage Road likely being realigned adjacent to I-70 (in the Forest Road area), the potential exists to incorporate a major intersection in the form of a roundabout. This intersection could be located such that it connects Forest Road and West Lionshead Circle into a common intersection. Potentially, the Forest Road leg could also be a major access for the West Lionshead redevelopment. This would help mitigate that redevelopment's traffic impacts and at the same time better serve the difficult left turn movement onto the South Frontage Road from West Lionshead Circle. Two existing intersections could be consolidated into one, served by a roundabout.
- **Lionshead Structure Redevelopment** – If this entails a total demolition and reconstruction of the current structure, the potential exists to combine its primary access with East Lionshead Circle as a roundabout intersection. This design would better serve the Lionshead Structure in terms of accommodating left turn movements onto the South Frontage Road. This design would also better accommodate left turn movements from East Lionshead Circle onto the Frontage Road, including In-Town shuttle bus movements. The fact that this redevelopment entails an entire "re-do" of the facility could also lend itself to explore grade-separating movements into or out of the parking area from/to the Frontage Road. The exact configuration of the roundabout at the East Lionshead Circle intersection should be defined at the time the precise redevelopment plan is considered.
- **Hospital Redevelopment** – Specific plans are continuing to take shape for the Hospital. The facility is currently located along West Meadow Street which provides all of its access. The site does have frontage onto the South Frontage Road, but there are grade difference challenges. Redevelopment plans may include the incorporation of an access onto the South Frontage Road which would at least require an assessment of the Frontage Road width at that location. This access would relieve traffic from Vail Road and reduce the amount of peak hour trips entering the Main Vail Roundabout.

These concepts have been forwarded to the appropriate development design teams for possible integration into their respective plans.

E. West Vail Redevelopment

Numerous access options were considered during the planning of the West Vail redevelopment located on the north side of I-70 just east of the West Vail Interchange. A few alternatives that were considered and their dispositions were as follows:

- **Access Chamonix Lane along the north side of the development**. This concept would rely on other intersections to access the North Frontage Road, namely Chamonix Road into the northern leg of the West Vail roundabout and Buffehr Creek Road. However, encouraging most of the redevelopment's traffic onto Chamonix Lane (located along the backside of the West Vail commercial development) will change that roadways local character. Analysis has also revealed that focusing too much West Vail redevelopment traffic into the roundabout via the north leg (Chamonix Road) would be problematic. As mentioned, the two major traffic streams from the South Frontage Road and from the North Frontage Road to I-70 west merge at this point within the roundabout creating very few gaps for traffic entering the roundabout from the north.

- **A series of access points along the West Vail Frontage**. This would be similar as exists today for this center. Analysis has indicated that the South Frontage Road's increase in traffic over time will create greater difficulty for drivers attempting to turn left onto the South Frontage Road. Because of this increased difficulty and the potential for increased left turn movements onto the Frontage Road, this option was not pursued.

The option that is being recommended includes the establishment of a major access intersection, perhaps in the form of a roundabout. A traffic signal has been raised as a possibility for this major intersection, but the overall community has maintained that traffic signals should not be used in Vail. The precise location of the roundabout can be made in concert with the redevelopment program as needed. Beyond this, a right-in/right out access could possibly be provided on either side of the roundabout intersection, subject to intersection spacing and the closure of the existing access points. The final plan should be clearly coordinated with redevelopment planning efforts and it would likely result in fewer access points onto the North Frontage Road than exist today.

F. Other Improvements

Sub-sections A through E in this chapter provided analytic information for mitigation measures for the critical sections with Vail. Beyond these, other cross-street intersection improvements are needed as well based on the projected traffic volumes. These are described as follows:

- Simba Run Underpass Roundabouts – As mentioned, there would be a benefit of providing another crossing of I-70. Several intersection configuration options were assessed for the Simba Run underpass intersections onto the Frontage Roads. Options included straight tee intersections as well as an angled crossing that would favor a continuous traffic flow between the North Frontage Road west leg and the South Frontage Road east leg (with the two frontage Road legs "teeing" into this continuous frontage road). LOS analyses clearly favored roundabout intersections as minor street left turn movements in the other two options were projected to operate at a LOS F. As single-lane roundabouts, the Simba Run intersections are projected to operate at a LOS D under snowy conditions during the PM peak hour. While single-lane roundabouts would be appropriate, certain movements should be provided with a by-pass lane to ensure adequate operation at peak times. These assessments should be pursued further as part of a Simba Run underpass feasibility study.
- Based on the State Highway Access Code, turn lanes should be added at the intersections of:
    - North Frontage Road/Red Sandstone Road – right turn lane and center left turn lane.
    - North Frontage Road/Lionsridge Loop – center left turn lane
    - North Frontage Road/Buffehr Creek – center left turn lane

One other consideration in Frontage Road improvements is the access into Red Sandstone Elementary School. The Frontage Road is two lanes at this location, and there is a concentration of turning movements before and after school. This condition is prevalent when school is in session and involves bus turning activity as well as private vehicles. Because the turning movements are fairly concentrated due to school activity, a center left turn lane should also be considered at the school's entrance.

G. Frontage Road Cross Section

Some of the frontage roads segments will need to be widened to accommodate higher concentrations of traffic and other activities. The fundamental characteristics of these cross-sections involve the following (see **Figure 14**):

A minimum 6' paved shoulders along two lane sections of the Frontage Road to accommodate adequate shoulders to meet CDOT minimum standards and to function as shared bicycle lanes.

- A continuous auxiliary lane along the developed side of the roadway, where required in high density areas, the commercial cores. This lane will serve as a continuous right-turn acceleration and deceleration lane for high traffic access points.
- A left turn lane for access points where necessary, along with raised medians in the high density commercial core areas to provide access control and provide landscape areas for signage, wayfinding and aesthetics.
- A combined 10-foot at-grade paved shoulder/shared bicycle/overflow parallel parking lane on the freeway side of the frontage road in the village commercial core areas. This will provide safe accommodations for multiple uses including; break down lane, maintenance bypass lane, bicycle lane, and for emergency overflow parking in the near term; designed so that it may be converted into an additional thru lane if needed in the future, if traffic warrants and overflow parking is no longer an issue. Parking on the development side of the roadway should be prohibited as it will create sight distance problems for vehicles pulling out of the side-streets attempting to turn onto the Frontage Road. Further, the clear zones required along the development-side of the frontage roads to accommodate an access and provide for some sight distance would greatly reduce the amount of parallel parking that could be provided.
- A 10' raised and separated multi-use recreational path along the development side of the Frontage Road.

This wide cross-section is intended to accommodate winter conditions when spill-over parking occurs most frequently as well as summer conditions when bicycling (and not spill-over parking) is more prevalent. Later in the report, these characteristics are "captured" as part of a 5-lane cross-section prototype.

H. Transit

Growth within Vail, Eagle County, the "Front Range", and Colorado as a whole will require transit enhancements to maintain the existing percentage of transit ridership and to encourage additional transit usage in the future. This study assumes transit usage will generally maintain its existing levels. This is reflected in the reduction taken in the number of future trips generated. The total number of future trip projected is 2800 per hour, this takes into account multi-use trips as well as multi-modal uses. This is an overall 36% reduction from the standard ITE projection of the approximately 4350 trips.

Transit enhancements can be generally be categorized as follows;

- Local Transit Enhancements
    - Bus Capacity – Increase number of buses and service routes
    - Bus Service – Increase bus service, by reducing headways
    - Shuttle services
- Regional Transit Enhancements
    - "Front Range" bus service
    - Charter buses
    - Eagle (ECO), Summit and Lake County bus service
- Other Transit Mode Enhancements
    - Railways (Light, High-Speed)
- Transit Incentives
    - Making transit
        - Easier
        - Faster
        - Cheaper

The Town is currently coordinating with the I-70 PEIS, the RMRA Study, the I-70 Coalition and the Eagle County Collaborative to consider Regional Transit Enhancements and Railways. The Town will need to continue collaboration with these groups and provide input to process and study.

The enhancement to Vail's local transit can be directly implemented by the Town to increase service levels for guests and residents.

In addition, the construction of certain roadway improvements, such as the Simba Run underpass of I-70, provides increased routing options for Town buses. The areas of Town that could experience the most growth, and hence the most potential for transit demand increases, are West Vail, Timber Ridge, West Lionshead, throughout the Lionshead Village, and throughout Vail Village. Realizing all of this, options for service could include the following:

- Establishment of a ”line-haul” service entailing the routing of buses between the West Vail commercial center, Timber Ridge, West Lionshead, Lionshead, and the Village (and possibly Ford Park). The Simba Run Underpass would be key for this service, and then the complementary bus routes would “feed” those riders to the Line Haul route, thus providing those who reside away from the Line Haul route.
- Service to West Vail and to outlying areas north of I-70 could be focused around a new transit center at Lionshead. As mentioned, the Village Transportation Center is at its capacity, and the Town is pursuing another site within Lionshead as a means of relief. The Lionshead Transit Center could be that site in which the Sandstone route, the Lionsridge Loop route, and potential opposing-loop West Vail routes are based. Riders served by these routes destined to the Village or Golden Peak could transfer to the In-Town shuttle at the Lionshead Transportation Center. To supplement the additional demand placed on the In-Town Shuttle, a high frequency express route could be provided connecting the two transportation centers as well as West Lionshead given the parking and new ski lift planned in that area; this could effectively be referred to as a Village Express route.
- With the possibility of four bus routes terminating at the Lionshead Transportation Center rather than the Village Transportation Center and with the potential for significant parking supply taking place at Ford Park, supplemental service to the already heavily used In-Town Shuttle makes sense. During the day, the In-Town shuttle could run from the Lionshead Mall (on the southwest corner of the Lionshead Parking Structure) to Golden Peak. In addition, a separate “extension” shuttle service between Ford Park and Golden Peak could be provided given the potential of additional parking spaces that may be provided at Ford Park. An “extension” service route could also be provided at the west end connecting West Lionshead (Ever Vail) to the Lionshead Mall. In the evening, both of these “extension” services could be discontinued, and the routing of the In-Town shuttle could be extended from West Lionshead to Ford Park. Golden Peak could be served via the golf course route in the evening.

Without the Simba Run underpass, transit service within Vail will continue to be similar as it exists today; there is limited routing flexibility in serving future demands. A line-haul system is not possible without omitting at least one of the major interstate crossing bottlenecks and adding travel time by forcing buses to pass through interchanges. The Lionshead Transportation Center would be more effective with the Simba Run underpass as the Center would be better suited to serve West Vail, both sides of I-70. The better suited that the Lionshead Transportation Center can be, the more relief it can provide to the Village Transportation Center. A Simba Run feasibility study should be pursued to better understand the pros and cons of this improvement, but one advantage includes the synergy it helps build with a new Transportation Center at Lionshead.

There will be a genuine need to establish a transportation center in Lionshead. Today, Lionshead is a major hub including a gondola and ski lift, a major parking structure, and tourist-oriented commercial space, and condominium units. Recent redevelopment such as the Arrabelle and planned redevelopment, as described in the Lionshead Master Plan and contemplated redevelopment at the Lionshead Parking Structure will establish Lionshead as a near equal rival to the activity in Vail Village. Currently, the Lionshead Village area is anticipated to see approximately 1500 net new units and 290,000 additional square feet of non-residential development given current plans. With the potential to construct a new underpass of I-70 at Simba Run, a Lionshead Transportation Center will be in a much better position than the VTC to serve as the ski-area access hub for western Vail with respect to transit; the

synergy that could be developed by a Lionshead transit center and the Simba Run Underpass together will be an extraordinary enhancement to transit service in West Vail

A Lionshead Transportation Center will also provide needed redundancy to VTC. Today, it is not uncommon for the VTC to experience more buses on-site than bus-spaces. The VTC is also a designated area for bus drivers to take a break. Regulations require drivers to park their vehicle and rest at minimum specified intervals, and the VTC has historically served in this capacity. Vail is ideal for ECO service driver breaks given that Vail is the terminus of many ECO routes. With the potential of more service, regionally and locally, there will be greater demand for a dedicated driver break area. The VTC will not be able to accommodate all services, all routes, and all driver break activity in the future. Another means is necessary to relieve the VTC; a Lionshead Transportation Center would be able to provide this relief to the VTC. So, the need for a Lionshead Transportation Center is driven by:

- The need to provide a high level of transit service to a dense area of activity within Vail.
- The intent to leverage the future Simba Run underpass to vastly improve the nature of transit service connecting western Vail to Central Vail.
- The need to relieve the VTC of some of its transit-related demands with respect to regional routes and driver break areas.
- The need to "clean up" significant conflicts which occur at the Lionshead Mall/Lionshead Parking Structure entry area, particularly with pedestrian activity.
- The desire to better accommodate hotel shuttles.
- The desire to better establish an official, organized skier drop off area.

The Town may also want to explore the possibility of using different sized buses. Some routes clearly experience major spikes in demand that might be better served with higher-capacity buses. Increased frequency could also be a consideration, but too many buses along a particular route eventually results in dimensioning returns and becomes a waste of resources.

With an additional Transportation Center at Lionshead and an additional means of crossing I-70 (Simba Run Underpass), there are numerous options for the Town. As is the case today, routing will be dynamic and adjustments will need to be made every season in response to changing conditions within the Town.

The Eagle County bus system (ECO) would also make use of the Lionshead Transportation Center. It is anticipated that demand served by ECO will grow in the future given the strong potential for growth Down Valley within Eagle County. Potential routing of this service within Vail could also be enhanced with a Simba Run underpass.

I. Parking

Currently, the town-owned Village Structure and the Lionshead Structure provide 2500 total spaces of public parking. Ford Park offers parking for an additional 250 vehicles during ski season supplemented with transit service to the Village; this parking is restricted to permitted vehicles only. As previously mentioned, the Town has set a goal to establish 400 additional public parking spaces for the near-term planning horizon and a total of 1000 additional public parking spaces for the long-term. These objectives are based on parking demand projections completed in 2001 that include a reduction of 44 to 48 percent for parking need due to carpooling and transit usage and also based on winter season parking data relative to the frequency of using the Frontage Road to serve overflow parking demands. The additional parking is intended to reduce how often the Town's supply is exceeded. Frontage Road parking statistics are collected nearly every time the Frontage Road is pressed into service. The Town has established an objective to accommodate the 90th percentile design day, which is approximately equal to the 15th busiest day during winter ski season; the 400 and 1000 space increase would meet this goal for the short-term and long-term time-frames, respectively.

Location options to place the increased parking supply include the following:

- **West Lionshead (Ever Vail)** as part of that area's redevelopment. Between 300 and 500 additional public parking spaces are being considered as part of the West Lionshead plan (beyond parking to be dedicated to development uses). In association with this and the new lift planned for West Lionshead is the potential for a roundabout intersection onto the Frontage Road and transit facilities.
- **Lionshead Structure** as part of its possible redevelopment. The redevelopment of the Lionshead Structure could incorporate an additional 200 to 300 public spaces for public use (beyond the parking needed to support the proposed uses).
- **Ford Park** - Preliminary study conducted by the Town has yielded the possibility of adding 300 to 600 spaces at Ford Park, likely below the playing fields. The potential of constructing a roundabout at Ford Park would support the additional of parking in this area relative to access onto the Frontage Road, and transit service providing connectivity to the Village would be necessary to support this concept. Besides serving parking demands during ski season, the provision of parking at Ford Park would support event activity during the summer.

The future location of the parking supply within the Main Vail area (Lionshead and Vail Village) may remain a bit out of alignment with the parking demand generators. If the development and redevelopment of Vail comes to fruition as described in this report, there will be a bit of a mismatch with respect to the placement of the parking versus the demand for the parking. **Figure 10** illustrates the imbalance.

As mentioned, the ski area is oriented easterly from the Main Vail interchange. The Vail Village parking structure is approximately located at a central point to the ski area on the mountain. The Lionshead parking structure is skewed to the west of the ski area, and the West Lionshead (Ever Vail) is skewed to the west even more-so. Because of their relative locations, skiers tend to fill the Village Structure before the Lionshead Structure.

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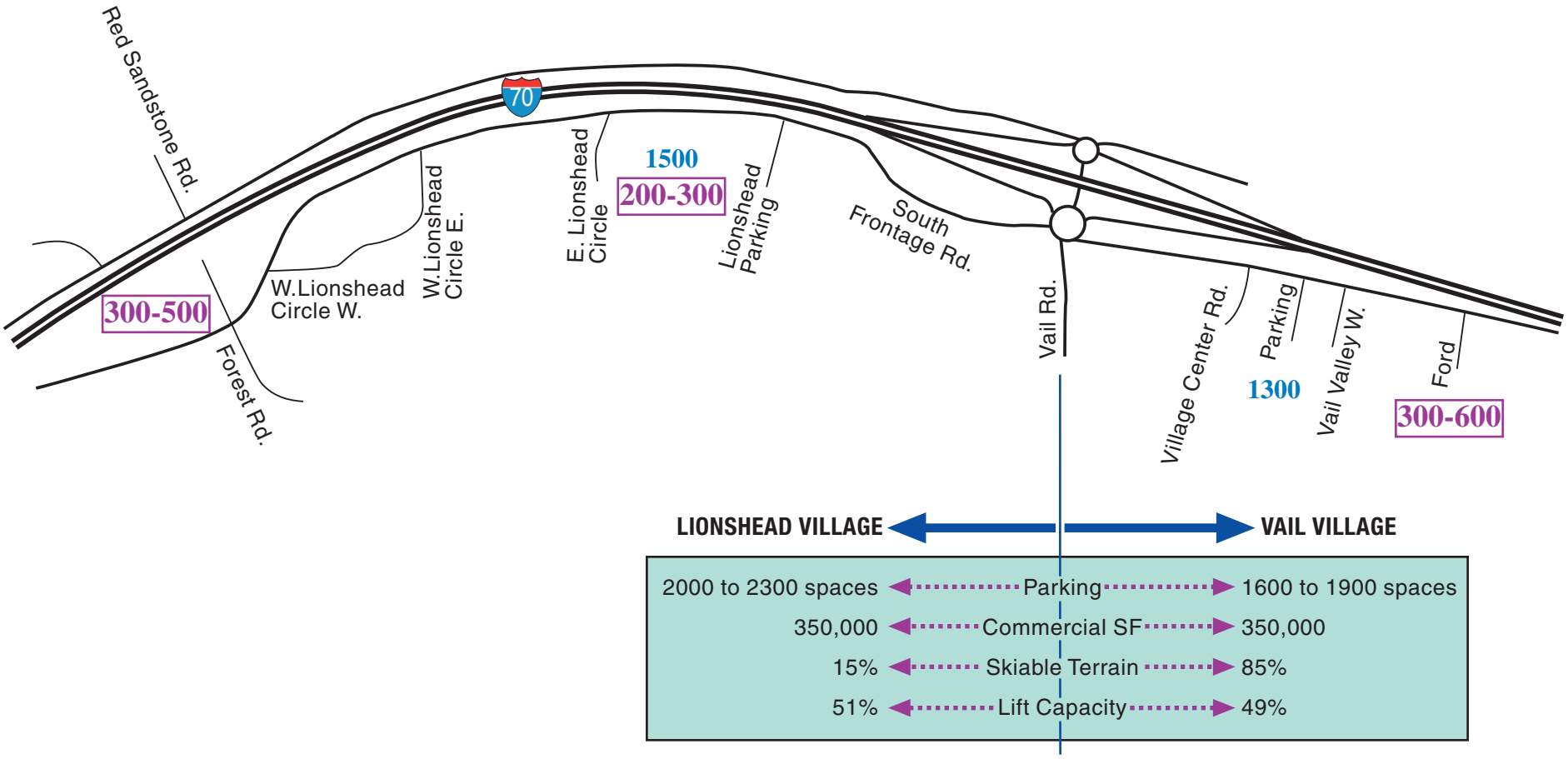

LEGEND

xxx-xxx = Existing Public Parking Spaces

XXXX = Additional Parking spaces Proposed

North

Figure 10

Central Vail Parking Imbalance - Buildout

Additional parking provided in the Main Vail area would better serve the Town if it can be located to the east. However, the location of parking must also be balanced with site opportunities to provide it. Currently, the most promising opportunities to gain parking supply is via the Lionshead Parking Structure redevelopment, Ever Vail and Ford Park. Two of these three are located to the west, a bit aside from the skiable terrain. While the Town should look to capitalize on these opportunities, the Town should also pursue parking opportunities in the eastern area of Main Vail to better balance supply and demand locations. An improved balance translates into less travel within and between the Vail areas (much of which would need to be served by transit service). The provision of additional parking supply in the eastern reaches of Central Vail would also support a travel demand recommendation that entails encouraging usage of the East Vail interchange and the Main Vail interchange (discussed more later in report).

VI. FRONTAGE ROAD ACCESS MANAGEMENT PLAN

As the Town's Transportation Plan was being developed through this process, CDOT and the Town agreed to develop an Access Management Plan (AMP) for the North and the South Frontage Road. The AMP will serve as a planning tool for CDOT and for the Town in that it defines allowable access from which proposed development can plan. The AMP is a document that CDOT and Town staff agree to in principal; it is not subject to a formal IGA and agency adoption.

The plan is intended to show the long-term access onto the Frontage Roads. It is NOT the intent to use the plan as a means of closing access to an existing thriving use. Rather, the plan is used as a framework for new development and redevelopment of properties or possibly when a frontage road construction project (like widening takes place). If development or redevelopment does not occur, then access will continue as it exists today, barring a safety issue. Further, the access locations are not meant to be precise. The plan shows potential access locations that are plus/minus 50 feet or so, and shifts larger than this might be possible as well.

Besides showing access onto the roadway, the plan also shows each parcel's access if it is not onto the Frontage Road. Examples of this include a parcel accessing a cross-street (rather than the frontage road) or gaining access through an adjacent parcel. Further, the AMP is based on the assumption that individual parcels will remain under individual ownership. In the event that a development plan incorporates numerous individual parcels as part of a common proposal, then the access scheme needs to be carefully evaluated and could be different than what the AMP shows.

The AMP is shown in **Appendix I** and it recognizes the elements of the plan that have been described to this point. Many of the existing access points are recognized in the plan. The most notable intersection/access change is the Simba Run underpass of I-70. This will create two major intersections onto the frontage road system. Other areas of anticipated change include the following:

- A new access to serve the Vail Valley Medical Center is shown along the South Frontage Road approximately 900 feet west of Vail Road. Additional coordinating with the Medical Center may be needed as their plans continue to evolve. Potential access consolidation should be pursued.
- The redevelopment of the Lionshead Parking Structure will alter the access for this site. Specifically, a "front door" access is being proposed as well as a major access to the parking area at approximately the current location. One the major differences is that the parking access may include a grade-separated ramp for the westbound left turn in movement. A planned roundabout at the East Lionshead Circle intersection onto the South Frontage Road will also serve access needs for this redevelopment.
- West Vail commercial uses are potential candidates for redevelopment at the future time. However, a master plan has not been finalized and there are numerous land owners in this area that still need to coordinate. However, the AMP is showing a roundabout access and additional partial movement accesses. This would eliminate other access points along the North Frontage Road.

- Timber Ridge is a planned affordable housing project located along the North Frontage Road approximately equidistant between Lions Ridge Loop and Buffehr Creek Road. Its potential access scheme includes two accesses onto the Frontage Road.

It should further be noted that the Ever Vail development proposal is being proposed by the Town. Located in Lionshead at Forest Road, the Ever Vail development includes relocating the South Frontage Road up against I-70. This will require a modification to the AMP.

VII. RECOMMENDED TRANSPORTATION PLAN

From the analysis shown in the previous chapters, a Town Transportation Plan has been developed and is presented in this chapter. The Plan is comprised of several elements including:

- Roadway Improvements
- Parking
- Transit
- Travel Demand Management Considerations
- Access Management Plan
- Cost Estimates and Potential Funding Sources

A. Roadway Improvements

Figure 11 conceptually shows recommended roadway improvements needed to accommodate travel demands within the Main Vail area and **Figure 12** conceptually presents improvements that would be planned for West Vail. The major components include the following:

1. The Simba Run Underpass

This is a critical component to serve Vail's traffic needs in that it provides some relief to the Main Vail Interchange and a fair amount of relief to the West Vail interchange. Additional benefits realized from this improvement include the provision for an additional pedestrian crossing of I-70 and a dramatic increase in bus routing flexibility within Town.

This underpass of I-70 will greatly improve mobility within Vail and it benefits all modes of travel. Traffic-wise, this improvement will provide moderate relief to the Main Vail interchange approximately improving operations by one-half a LOS (some approaches more than others). It's most significant traffic operations benefit is realized at the West Vail Interchange in which peak hour operations have the potential of improving by up to two Levels of Service at peak times. The grade-separation of I-70 will provide for crossing capability without relying on the interchanges where traffic concentrations occur due to I-70 access. This underpass is anticipated to reduce traffic by approximately five percent and 12 percent, respectively, at the Main Vail and West Vail interchanges. Further, the increased ease of crossing I-70 would reduce total travel along the Frontage Road system.

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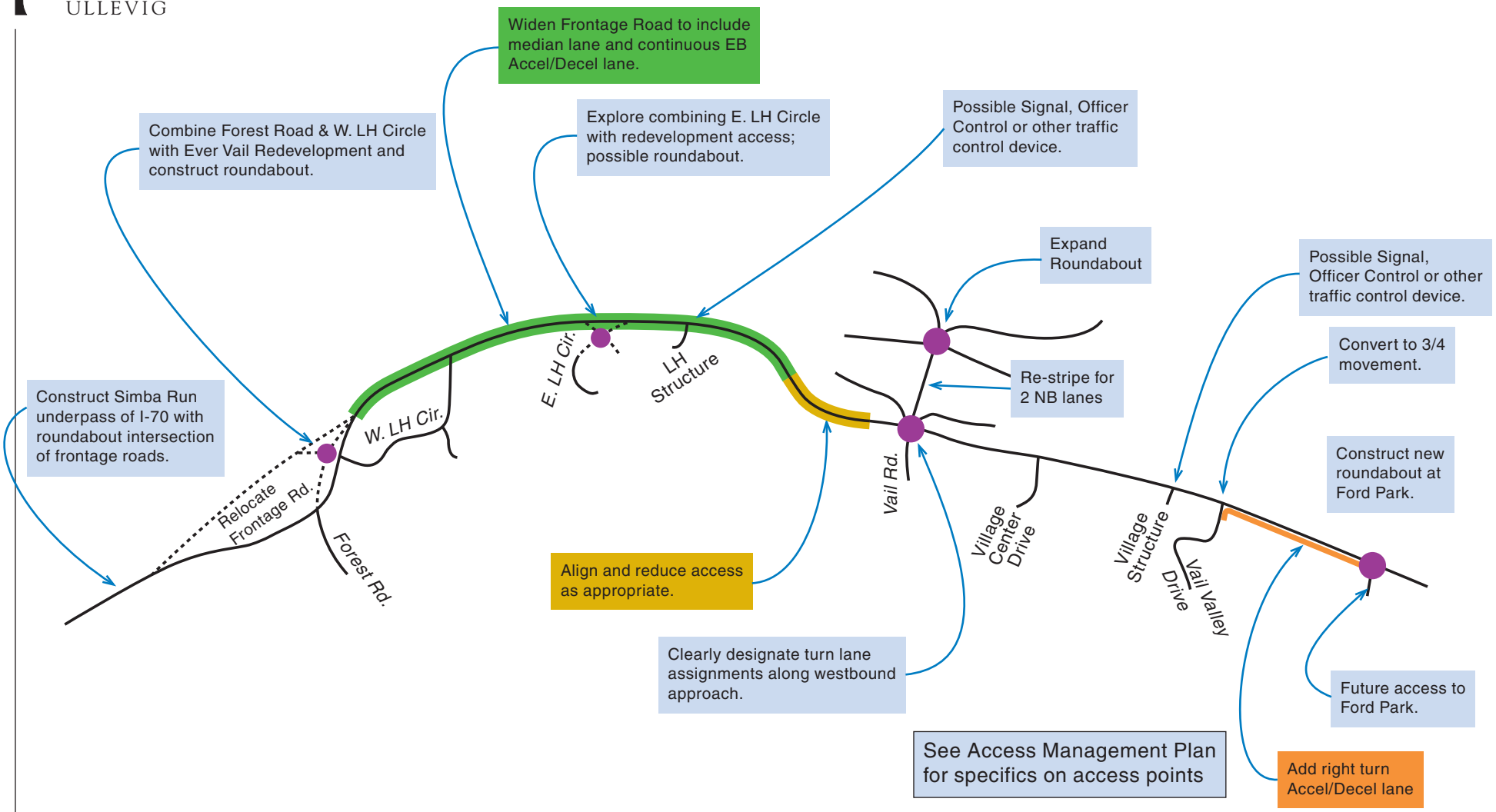

Note: Travel demand management measures also need to be incorporated into the plan. Of significance in the need to encourage I-70 traffic coming from the east to exit at East Vail rather than the MainVail interchange during the AM peak hour.

North

Figure 11

Recommended Frontage Road Improvements Plan - Central Vail

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See Access Management Plan for specifics on access points

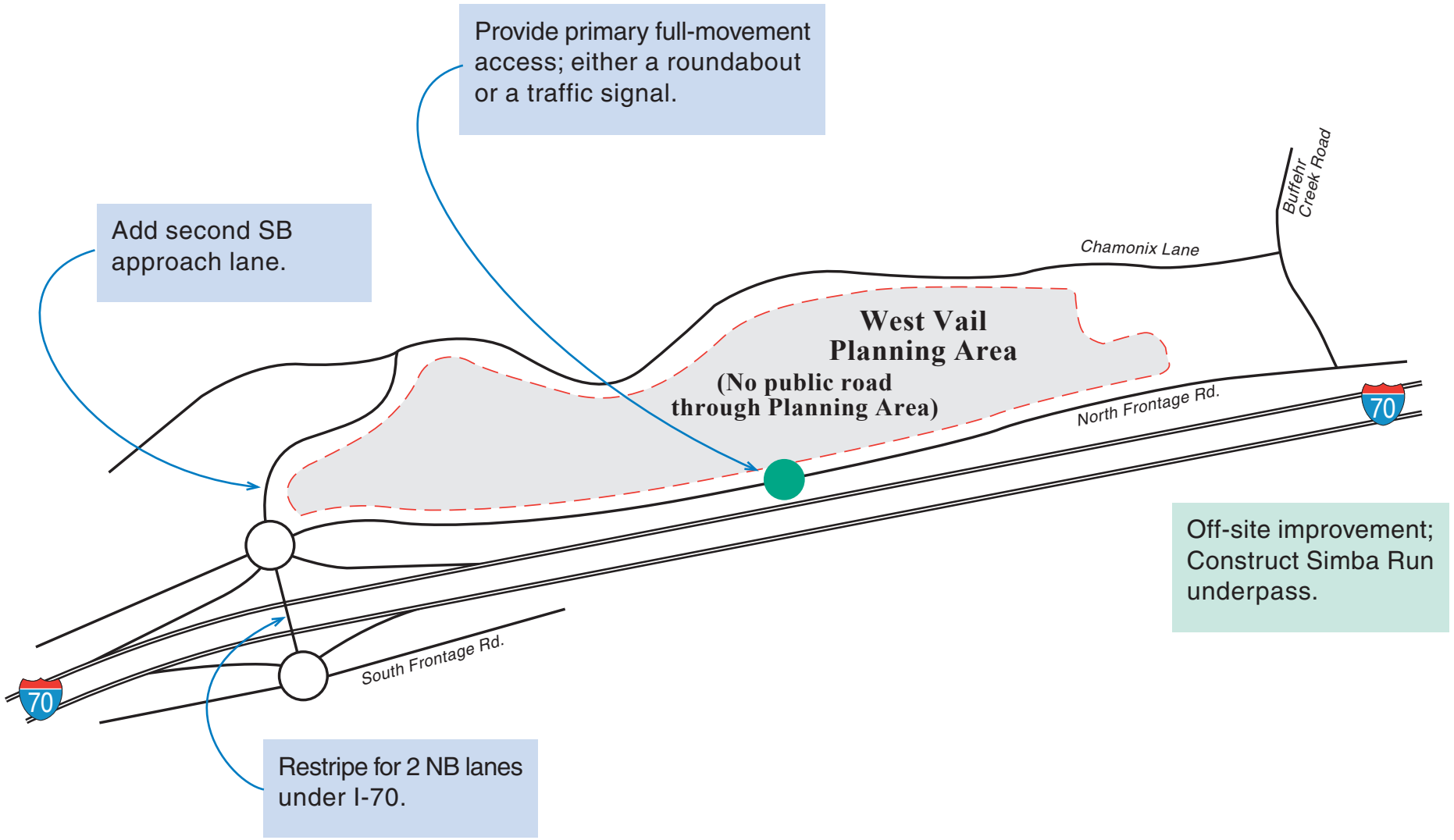

Figure 12

Recommended Frontage Road Improvements Plan - West Vail

North

Transit-wise, the Simba Run underpass would provide an excellent opportunity to enhance service and increase efficiency. The areas served by the West Vail routes are awkward given major origins and destinations along both sides of I-70. Buses, like all traffic, are forced to cross I-70 at the Main Vail and the West Vail interchanges, and the circular routing through town is cumbersome. The underpass would allow for a host of route revisions resulting in far fewer vehicle-miles of bus travel required for service level (or better). With major activity centers possible along the North Frontage Road west of the new underpass as well as along the South Frontage Road east of the new underpass, the potential exists to establish a "spine" or line-haul" service connecting all of these centers. Other routes within town would then "feed" into the line-haul service.

Pedestrian-wise, the Simba Run underpass would provide a crucial link between the north and south sides of I-70. Pedestrian activity has been known to take place across I-70 at-grade near the Simba Run location. It is an extremely unsafe situation when pedestrians are crossing the high-speed freeway. Fencing barrier exists along both sides of I-70, but openings in the fences are often created (illegally) allowing pedestrian activity to cross the interstate. The Simba Run underpass would mitigate this issue. Further, the Simba Run underpass would provide an excellent means for bicyclists to cross I-70, allowing riders an alternative to pedaling through the roundabout interchanges. The crossing could reduce bicycle/pedestrian travel by as much as four miles (depending on the specific origin/destination along either side of I-70).

The one drawback of the Simba Run underpass is it's expense. This is the most costly element in the Transportation Plan. However, it is also an improvement that provides a significant level of benefit to the Town's mobility for all modes of travel. As a next step, the Town should undertake a more detailed feasibility study to fully appreciate the impacts, costs, benefits, and potentially identify a means of funding. A schematic layout of the Simba Run underpass is shown as part of **Appendix H**.

2. Main Vail Interchange Roundabout Enhancements.

The key enhancement at this interchange is to establish two continuous lanes from the east leg of the South Frontage Road to the I-70 west on-ramp. Signing, striping for two northbound lanes under I-70, and enlargement of the north roundabout are the primary elements to this improvement. These improvements would greatly alleviate poor Levels of Service improving the overall LOS to LOS E from LOS F during snowy conditions. This improvement alone is not adequate to mitigate traffic impacts, but it serves as a piece of the ultimate transportation plan in attempt to achieve acceptable conditions at this interchange.

3. West Vail Interchange Roundabout Enhancements

These improvements include establishing two northbound lanes under I-70 and entering the north roundabout. Also, a desirable improvement addition to this includes adding a second southbound entry lane along Chamonix Road subject to acquiring right-of-way. These improvements would help alleviate poor Levels of Service (improving to LOS E from LOS F during snowy conditions) for the westbound North Frontage Road approach along the south roundabout and the westbound off-ramp approach at the north roundabout as well as the southbound Chamonix approach into the north roundabout. These improvements alone are not adequate to mitigate traffic impacts given future traffic demands, but they serve as a piece of the ultimate transportation plan an in attempt to achieve acceptable conditions.

4. Other Frontage Road Roundabouts

Roundabouts should be constructed at strategic cross-street locations where volumes are relatively high and poor minor-street left-turn movements level of service are projected (if left under stop-sign control). The roundabouts alleviate the poor left-turn operations. Locations include:

- Ford Park (in association with parking additions)
- Lionshead Parking Structure redevelopment
- West Lionshead redevelopment (Ever Vail)
- Simba Run Underpass (both intersections, one onto the North Frontage Road and one onto the South Frontage Road)
- West Vail commercial redevelopment

These roundabouts should be adequate with one circulating lane provided that bypass lanes are provided to serve the heavier movements.

5. Roadway Widening

Roadway widening is also needed at selected locations to accommodate projected volumes and/or improve safety. Locations include:

- **Vail Valley Drive to Ford Park** - This widening, to a 4-lane section, entails adding a second eastbound lane and is in conjunction with the three-quarter movement restriction at South Frontage Road/Vail Valley Drive and the roundabout at Ford Park.
- **Municipal Center to West Lionshead** – This widening, to a 5-lane section, is consistent with current plans by the Town and would better tie Lionshead activity areas with the Main Vail interchange.
- **Turn-lane additions** at North Frontage Road/Buffehr Creek Road, North Frontage Road/ Lionsridge Loop, and North Frontage Road/Red Sandstone Road. Turn lane additions may also be appropriate at development accesses pending the development's precise nature. Timber Ridge may be one example. Also, there is a need for a left turn lane at the Red Sandstone Elementary School. As part of these improvements, it may be desirable to incorporate raised islands for reasons of aesthetics.
- **Shoulder widening** along existing/future 2-lane sections of Frontage Road should occur to bring the Frontage Road up to current CDOT safety standards and provide for a shared bicycle lane.

Given the improvements presented as part of this plan, intersection levels of service should be at acceptable levels.

Figure 13 shows a color-coded map of the frontage road system symbolizing general widening needs based on a number of considerations and **Figure 14** shows the prototypical cross-section of each. Traffic loading was one such consideration in which sections anticipated to serve less than 12,000 vpd were prime candidates to be left as two lanes with cross-street/drive way turn lanes at necessary. Four lane roads were identified as those of segments serving volumes greater than 12,000 vpd and/or needing additional width to accommodate short sections of additional lanes. An example of this includes the South Frontage Road segment between Vail Valley Drive and Fort Park, where an additional auxiliary lane is provided. The five-lane cross-section is intended for the highest traveled segments in Town where there is also other activity, like the need to provide

overflow parking and the need to accommodate relatively high cross-street traffic loadings. The five-lane category is intended for the segments adjacent to the active Lionshead and Vail Village areas. **Figure 15** shows the projected PM peak hour traffic given the recommended plan improvements, and **Figure 16** shows the corresponding LOS results, LOS worksheets are shown in Appendix G, and all improvements are schematically shown in **Appendix H**.

Table 10 shows a summary of the LOS changes for the interchange intersections given the growth to 2025 and growth with recommended improvements. The table shows that the interchanges would be congested with the anticipated growth, but that implementing the recommended improvements plan would help alleviate much of it.

Table 10. Vail Interchange PM Peak Hour Levels of Service (LOS)

Scenario	Main Vail North	Main Vail South	West Vail North	West Vail South
Existing (Ideal) Existing (Snow)	B B	A A	B B	B C
2025 Do Nothing (Ideal) 2025 Do Nothing (Snow)	F F	B D	C F	F F
2025 w/Improvements (Ideal) 2025 w/Improvements (Snow)	B D	B D	B C	B D

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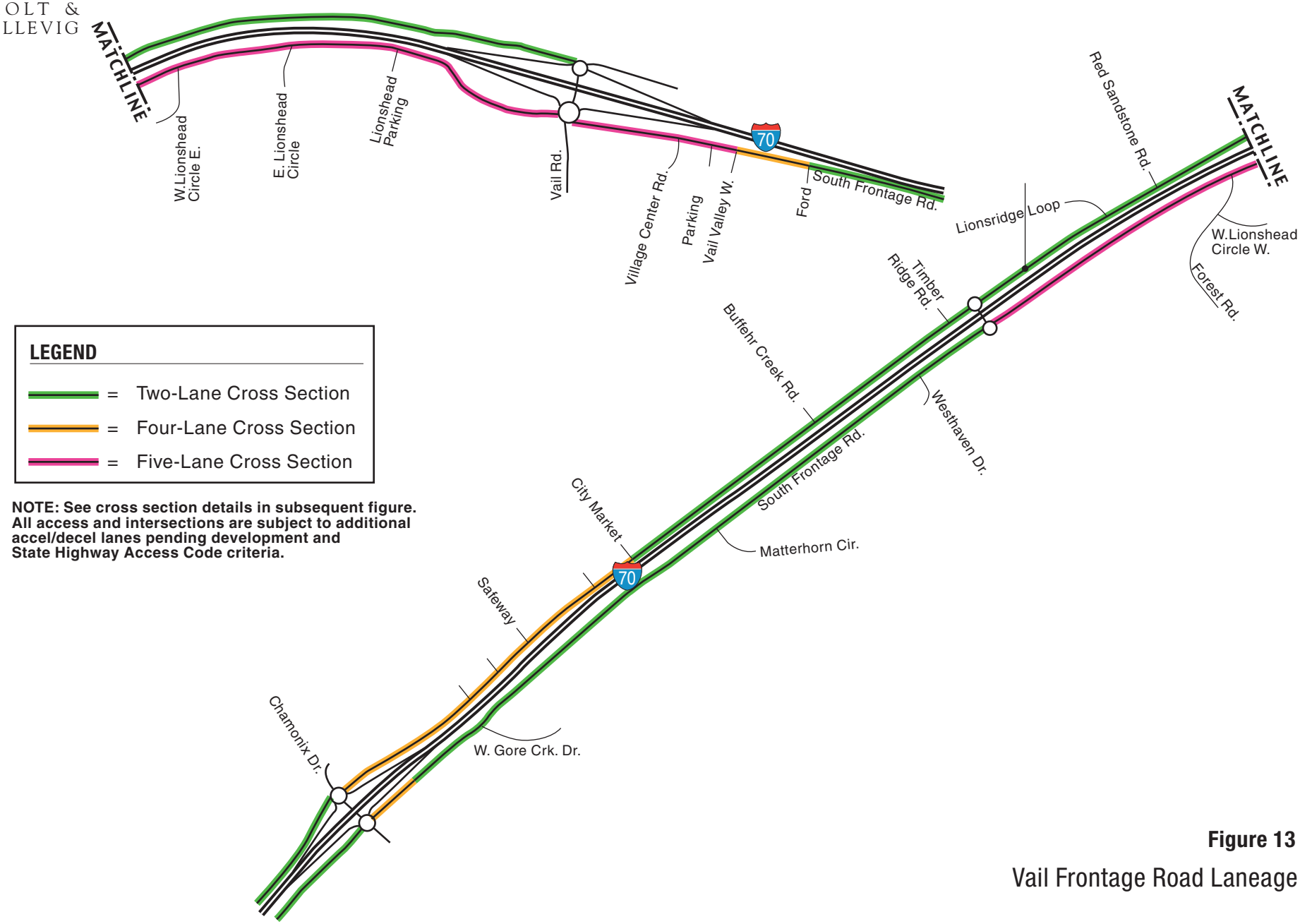
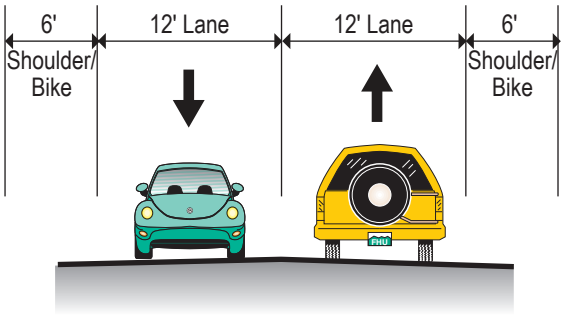


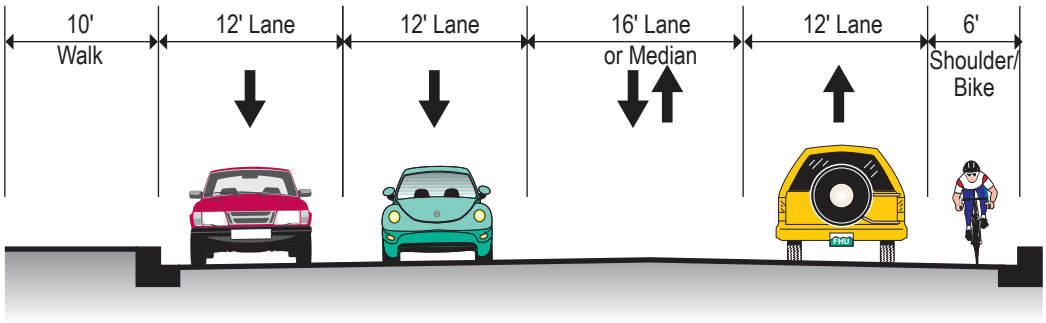
Figure 13

Vail Frontage Road Laneage

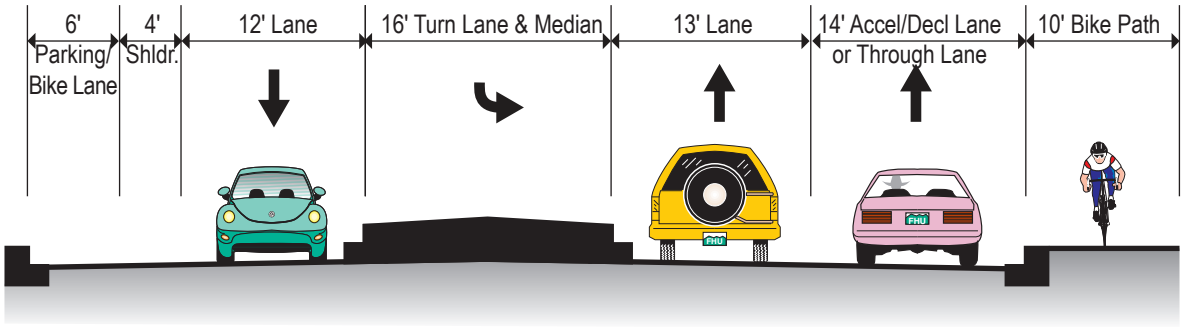
North



2-LANE CROSS-SECTION



4-LANE CROSS-SECTION



5-LANE CROSS-SECTION

NOTE: All cross sections are subject to additional laneage with respect to turn lanes. Some adjustment may be necessary for certain locations.

Figure 14

Vail Frontage Road Cross Sections

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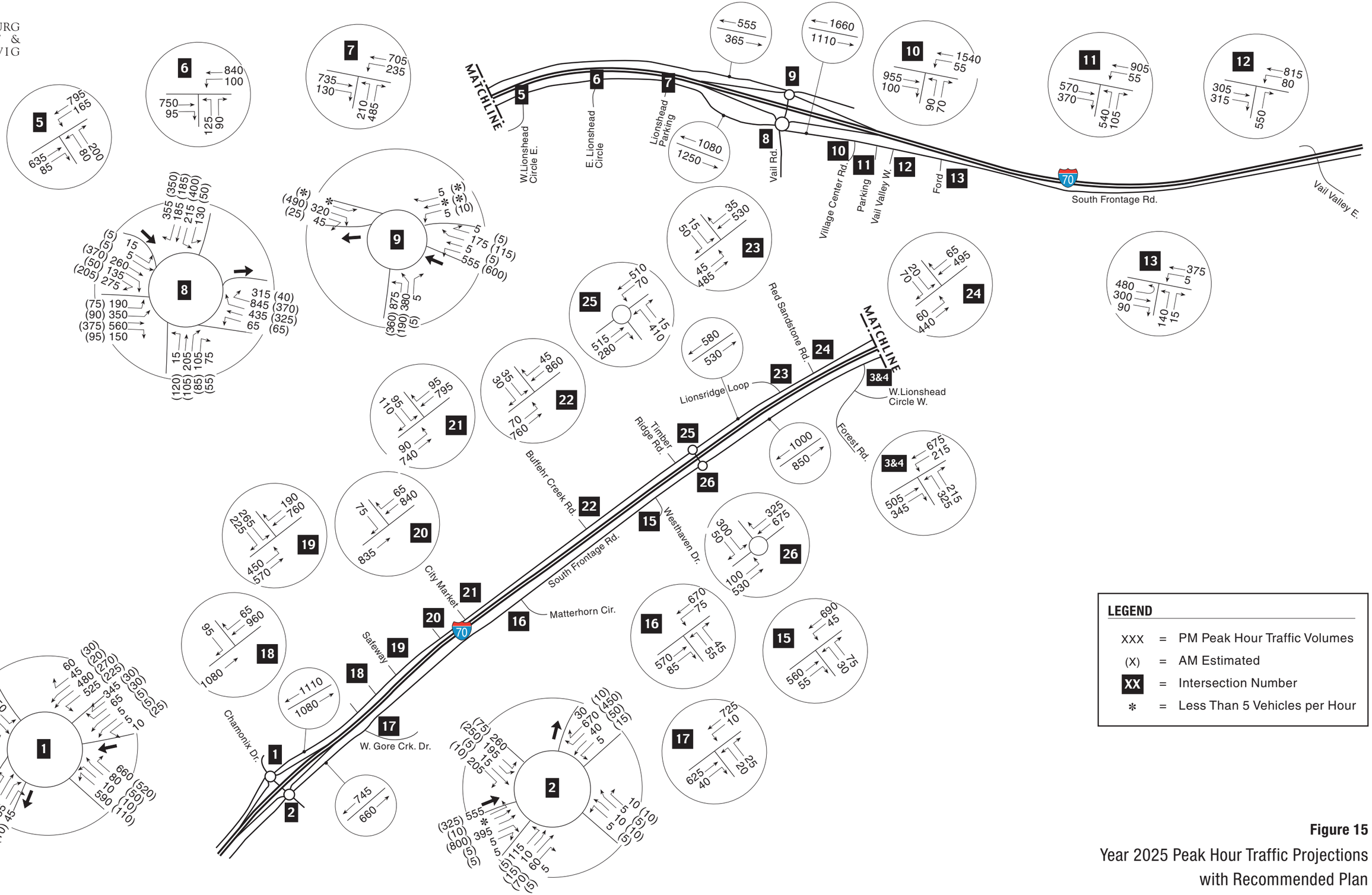

LEGEND

XXX	=	PM Peak Hour Traffic Volumes
(X)	=	AM Estimated
XX	=	Intersection Number
*	=	Less Than 5 Vehicles per Hour

Figure 15

Year 2025 Peak Hour Traffic Projections with Recommended Plan

North

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7 Officer Control

7-With Roundabout

B [E] 1-Lane overall

A [B] 2-Lane overall

A[C] overall 1-Lane

MATCHLINE

W.Lionshead Circle E.

E.Lionshead Circle

Lionshead Parking

Vail Rd.

Village Center Rd.

Parking

Vail Valley W.

Ford

South Frontage Rd.

Vail Valley E.

Officer Control

1-Lane

Red Sandstone Rd.

Lionsridge Loop

W.Lionshead Circle W.

Forest Rd.

ByPass

Buffehr Creek Rd.

Westhaven Dr.

City Market

Safeway

Matterhorn Cir.

Chamonix Dr.

W. Gore Crk. Dr.

2-Lane

LEGEND

X	=	Optimum Conditions
[X]	=	Snowy Conditions
XX	=	Intersection Number
◯	=	Roundabout
(X)	=	Estimated AM, Snowy Conditions

Figure 16

Year 2025 Peak Levels of Service
With Recommended Plan

North

B. Travel Demand Management

Measures should also be pursued to reduce spikes in traffic demands, especially for the Main Vail Interchange. Considerations include:

- Encouragement of drivers to use the East Vail interchange, through dynamic signing, when the Main Vail interchange is operating at its capacity. This will be critical toward alleviating operational issues during the AM peak hour.
- Look to meter outbound traffic from the Parking Structures. This occurs some today in the form of toll booths with drivers needing to stop and pay upon exit. Assuming this continues, the outbound metering will continue as well.
- Ski passes can also be used to help control demand on peak days. The Town should work closely with Vail Resorts on this so as to not encourage inexpensive skiing at times when high travel demands are anticipated.
- Provision of real-time information to skiers about conditions along I-70 and/or within town (such as how long of a wait to exit the parking structure) could also help manage traffic demand during the afternoon. Again, the Town and Vail Resorts should coordinate to determine an efficient and effective means to inform skiers at the end of the day as to current conditions. If drivers are forewarned about congested conditions, they may tend to naturally "spread out" over time and be less concentrated at peak times.
- Explore parking management options in which potential fee incentives are applied for drivers who avoid entering and leaving during peak hours.
- Encouraging all potential ride-sharing services including van pools, bus pools, and any other specialized transit to serve major travel "markets " including employees, clubs, Front Range areas, and Down Valley.

C. Transit

With Growth occurring in West Vail, Timber Ridge, West Lionshead, Lionshead Village, Vail Village, and potentially Ford Park (in the form of parking supply), establishing a line-haul transit system that directly connects these major activity centers with frequent service would be beneficial. The In-Town Route would essentially remain as-is with the potential for some adjustment at the east end and the west end with variations pending time of day. Other outlying routes would be geared toward moving people to and from the primary line-haul route.

A key consideration for this line-haul concept to function is the Simba Run underpass. This construction improvement is essential to the line-haul concept by routing buses past each of the key activity centers without the need for back-tracking. This improvement also builds synergy with a future proposed Lionshead Transportation Center. This would then be best situated to serve Lionshead and West Vail with this underpass. As the ability of the Lionshead Transportation Center is increased to serve as a transit hub for the west half of Vail, more relief can be provided to the heavily-used Village Transportation Center. Other routing options can be developed, but the provision of the Simba Run underpass provides routing flexibility within town and would result in service efficiencies.

Figure 17 shows a potential bus routing system map of Vail. As previously suggested, the plan would take advantage of the new Simba Run underpass of I-70. A brief description of each potential route follows:

- **In-Town Shuttle** – This route would be similar to the current routing, but one key, and time saving, change would include eliminating the western-most leg to West Lionshead Circle. This would eliminate the need to turn onto the Frontage Road; the In-town shuttle would be entirely off of the Frontage Road during peak times. West Lionshead Circle could be served by an exclusive shuttle extension route until a roundabout at East Lionshead Circle onto the South Frontage Road is completed. Time-of-day routing adjustments could be made such that the In-town shuttle's eastern terminus is Ford Park (given additional parking that would be provided there) once ski activity is completed for the day and Golden Peak is no longer a high-demand area (in the evening).
- **East Vail and Golf Course** – Both of these routes would remain similar as they exist today. The Vail Transportation Center would continue to serve as the hub terminus for these routes. Additional overflow service should be considered for East Vail at peak times.
- **Ford Park** – This route is intended to transport users parked at Ford Park to the Vail Transportation Center. This route would remain as it exists today, but the frequency of service may be increased pending the construction of additional parking supply at this area. After peak hours, this route could be served by a re-routing of the In-Town shuttle. A variation could include a shuttle to Golden Peak.
- **West Vail/Main Vail Frontage Road** – This route would be the "Line Haul" previously referenced in this report. Buses along this route would simply travel directly between the Vail Transportation Center and the West Vail commercial area. Major stops along the route would include the planned Transportation Center at Lionshead, West Lionshead (Ever Vail), and Timber Ridge. The Simba Run underpass is a crucial improvement needed for this route to make sense and be efficient.
- **West Vail South** – This route would run along the South Frontage Road from the Vail Transportation Center west with stops at the redeveloped Lionshead Parking Structure, North Day Lot, and West Lionshead. Further west, this route would stay on the south side of I-70 also serving Cascade Village, West Gore Creek Drive, and Intermountain. To provide transit service across I-70, this route would cross at the West Vail interchange and terminate at the West Vail commercial area before turning around and back-tracking to the Vail Transportation Center (or the Lionshead Transportation Center) via the South Frontage Road.
- **West Vail North** – This route would parallel the West Vail South route in that it would utilize the North Frontage Road. However, it would also utilize the South Frontage for a portion of its travel. This too would stop at the redeveloped Lionshead Parking Structure, North Day Lot, West Lionshead, Timber Ridge, and the West Vail commercial area. However, it would also serve the Lionsridge area and the residential areas in West Vail on the north side of I-70. This route also requires the Simba Run underpass to efficiently connect with the major stop areas.
- **Sandstone** – This route would be remain as it exists today which includes service between the Vail Transportation Center and the Red Sandstone Road area.

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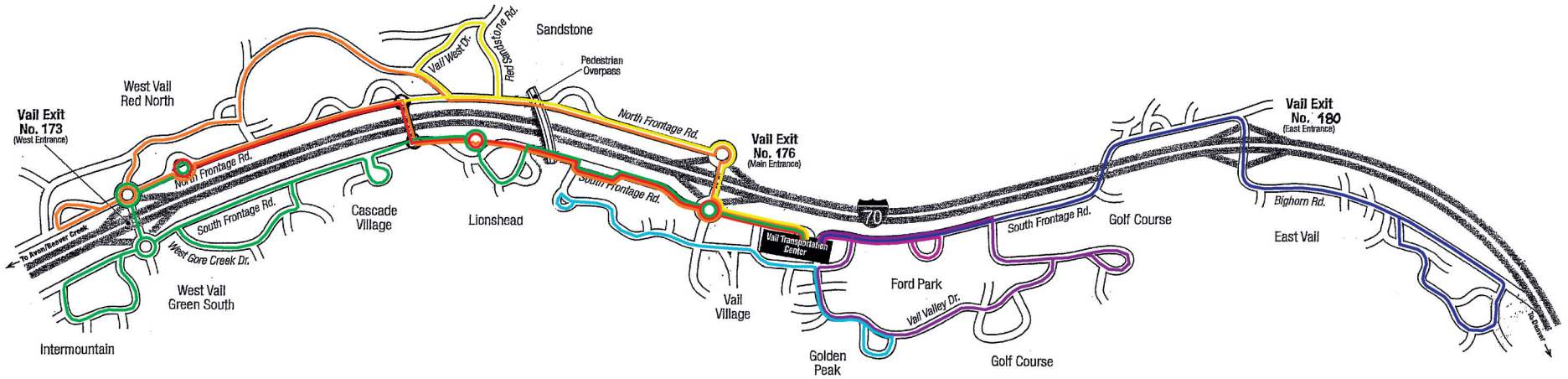

LEGEND

- = East Vail
- = Golf Course
- = Ford Park (Winter Only)
- = In-Town Shuttle
- = Sandstone
- = West Vail North
- = West Vail Express
- = West Vail South

Figure 17

Proposed Vail Bus Routes

North

The ECO service to Vail would also be able to take advantage of the Simba Run underpass. Potentially, ECO routes could access the Town via the West Vail interchange with programmed stops at the West Vail commercial area, Timber Ridge, West Lionshead, the redeveloped Lionshead Structure, and the Vail Transportation Center. This potential ECO routing would mimic the "line haul" concept previously described.

In addition to regular transit service, charter bus, private shuttle and van services, and general passenger drop-off and pick up facilities need to be enhanced to handle the current need and future growth. Each of these types of services will need to be accommodated at the new Lionshead Transit Center, and at appropriate future Mountain/ Major Destination Portal hubs. Portal hub recommendations include;

- **West Vail Commercial Redevelopment:** Hub shall accommodate three Town of Vail bus routes, ECO bus routes, two or three shuttle/vans, four to six passenger vehicle drop-offs
- **Cascade Ski Lift:** Hub shall accommodate 1 TOV bus route, ECO bus routes, one or two shuttle/vans, three passenger vehicle drop-offs
- **West Lionshead Development** (**Ever Vail**): Hub shall accommodate the In-Town Bus, two or three TOV bus routes, ECO bus routes, accommodate 15-20 charter buses during a typical day, three to five shuttle/vans, 20-25 passenger vehicle drop-offs. This location should provide premier charter bus services, providing arrival services, restrooms, lockers, a meet & greet location, guest information, etc.
- **E. Lionshead Circle / Concert Hall Plaza**: Hub shall compliment the new recommended transit center accommodating the In-Town Bus, TOV bus routes, and four to six shuttle/vans.
- **Gold Peak**: Hub shall maintain existing services including the In-Town bus, 1 TOV bus route, one or two Charter buses when needed, two or three shuttles and 20-27 passenger vehicle drop-offs. Currently DEVO drops off in this location, the Town should continue to work with Vail Resorts in providing a better location or a better managed operation to accommodate the influx of passenger vehicle drop-offs and pick –up that occur in this location. The congestion it causes creates significant delay along Vail Valley Drive during the AM and PM peak drop-off times.
- **Ford Park**: Hub shall accommodate three TOV bus routes, two or three Charter Buses, two or three shuttle/vans, and 10-15 passenger vehicle drop-offs

A more detailed study to verify the above Portal Hub recommendations at these locations will need to be completed by the Town prior to any implementation. The study will need to take into account the aforementioned potential recommendations in conjunction with transit service frequency as well as look at other configurations that may accommodate the transit demand.

D. Parking

The Town should look to expand the public parking supply within Main Vail to reduce the frequency of Frontage Road use for overflow parking. Based on accommodating a 90th percentile and based on Frontage Road parking data over the past few ski seasons, 400 new spaces should be developed over the short term. Over the long term, 1000 additional spaces (600 more) should be developed in Main Vail. To the extent possible, more new public spaces should be located in the eastern sections of the Main Vail area.

Potential locations include:

- West Lionshead (up to 400 additional spaces)
- Lionshead Parking Structure (as part of its redevelopment; possible net gain of 300 spaces)
- Ford Park (at least 300 additional spaces, and possibly more if the above-mentioned locations do not include an increase)

The addition of these parking areas, along with additional commercial and skier access would "spread out" Vail's base area to approximately 1.6 miles of frontage. Because of the increased density, activity, and distance, the Town's transportation system within and to the Main Vail area clearly needs to be enhanced to support these activities through the combination of roadway improvements and transit service enhancements.

A more detailed parking study to verify these locations and the associated number of additional spaces will need to be completed by the Town prior to any implementation. The study will need to take into account the aforementioned potential recommendations as well as looking at alternative locations, transit incentives, in combination with parking management solutions that may alleviate the parking situation, which may include outlying lots with bus service.

E. Pedestrians and Trails

Vail maintains a system of trails to accommodate pedestrian and bicycle activity throughout town. Multi-use routes are provided along the 12-mile long Gore Valley Trail (GVT) on the south side of town, the 2.75mile long North Recreation Path (NRP) along the north side of town as well as several short "spur" trails. These trails combine detached recreation paths, attached bike lanes and residential streets to provide pedestrian and bicycle friendly routes to most areas of the town. In the spirit of maintaining a multi-modal transportation system, a goal of the trail system is to offer safe and efficient non-motorized routes for both recreational and commuting purposes. The recommended Simba Run underpass will provide an important pedestrian and bicycle connection across I-70. In particular, the connection will serve pedestrian activity between the Timber Ridge employee housing development and the ski area.

The Town's Recreational Master Plan recommends bike lanes along all Frontage Roads in the town. The following recommended roadway guidelines (**Figure 14**) accommodate this goal:

- Widened paved shoulders along all two-lane sections of roadways to provide a shared bicycle lane in each direction.
- Continuous auxiliary lanes in the four and five-lane sections of roadways to be used as shared bicycle ways. Vail's peak biking season, the spring, summer and Fall, falls opposite of the peak traffic season, winter, when the auxiliary lanes are most used by vehicles and least by bicyclists. This helps minimize bicycle/vehicular conflicts in the auxiliary lanes. A well defined signage program will need be installed to make bicyclists and motorists aware of the "Share the Road" policy.
- A ten-foot wide shared shoulder/parking/bicycle lane along the I-70 side of the Frontage Roads in the proposed 5-lane sections of Frontage road to provide a shared bike way. Similar to the auxiliary lanes the parking/motorists conflicts are minimized as the peak seasons of each are opposite. Again a visible "Share the Road" signage program should be installed.
- A ten-foot wide multi-use recreational raised and/or separated path shall be provided along the entire lengths of the highest traffic volume sections of the Frontage Roads, specifically from the Dowd Junction path at the west most end of town to Ford Park along the South Frontage Road and from the north West Vail Roundabout to the north Main Vail Roundabout along the North Frontage Road.

VIII. IMPROVEMENT TRIP THRESHOLDS

The preceding analysis and resulting Transportation Plan is based on future development throughout Town. The total PM peak hour trip generation of all new development is estimated to be 2,800 trips. The recommended plan was based on the premise of achieving acceptable Levels of Service at the critical locations within town. This chapter of the report is intended to provide a sense as to the effectiveness of each improvement toward alleviating a projected poor Level of Service measured against an equivalent trip generation associated with new development.

Three critical operational traffic components are considered here including:

- Main Vail interchange, North roundabout, WB I-70 Off-ramp approach
- Main Vail interchange, South roundabout, WB Frontage Road approach
- West Vail interchange, North roundabout, WB Frontage Road approach

The effectiveness is measured in terms of the equivalent offset in total PM peak hour trip generation. In other words, each improvement can offset a certain amount of traffic impact from new development measured in total trip generation.

Estimates of the effectiveness were based on a series of sensitivity LOS analyses given varying degrees of trip generation from the new developments (i.e. portions of the 2800 new trips estimated). **Table 11** shows the effectiveness of each improvement, and the bottom row of the table shows the needed trip offset to achieve a LOS D under snowy conditions. The structure of **Table 11** is a menu allowing one to pick and choose measures, summing the effectiveness offset values to achieve the figures in the bottom row. All values are given in terms of ranges as these are gross estimates. It should also be noted that actual values will vary depending on where within town development takes place. In addition, values may decrease as more improvements are considered.

The north roundabout at the Main Vail interchange is a component requiring the greatest amount of trip “offset” to achieve a LOS D. Only 200 to 300 total PM peak hour trips from new development could occur before LOS E is reached, so 1700 to 1800 new PM peak hour trips need to be offset by improvements (given that all new development will generate nearly 2,800 PM peak hour trips). From **Table 11**, improving the roundabout and establishing two northbound lanes under I-70 at this interchange would be the single most effective measure for the WB I-70 off-ramp approach. But this alone would not offset enough impact to achieve LOS D; other measures would also be required such as the Simba Run underpass and/or a combination of other items listed.

Table 11. Mitigation Measure Offset; Total New Trips Equivalent

Potential Measure	Effective PM Peak Hour Trip Generation Offset [1]		
	Main Vail Interchange		West Vail Interchange
	North Roundabout WB I-70 Off-Ramp Approach	South Roundabout WB Frontage Road Approach	North Roundabout WB Frontage Road Approach
1. Expand Main Vail North Roundabout	1400-1500	0	0
2. Add NB Lane Under I-70 (at both interchanges)	(Incorporated in Measure 1)	500-600	300-400
3. Simba Run Underpass	500-600	200-300	1200-1300
4. Encourage Use of East Vail Interchange	300-400	100-200	0
5. Parking Management Measures	300-500	250-350	100-200
6. Express Bus Service [2]	200-250	100-150	200-300
7. Extend Ski Hours	100-150	50-100	<50
8. Meter Outbound Parking Structure Traffic	150-200	150-200	100-150
Target – Number of Trips from New Development to Offset to Maintain LOS D During Snowy Conditions [3]	1700-1800	600-700	1000-1100

(1) Values in columns represent the effectiveness of the improvement in terms of total generated PM peak hour trips from new development. Values will vary for each of the three critical traffic approaches listed below depending on the specific location of a new development proposal and based on how many of the improvements are packaged together (the effectiveness of each improvement will lessen as the number of measures/improvements to be implemented increase).

(2) Measure requires Simba Run underpass for best results.

(3) Values in this row show the objective amount of PM peak hour trips that need to be offset by the improvements above or through reducing the level of planned development. Total PM peak hour trips from new development are estimated to be 2,800 when built out.

At the Main Vail South Roundabout, establishing the second northbound lane under I-70 (and installing appropriate striping and signing to take full advantage this improvement) would be the most effective offsetting measure, but again at least one other measure would also be needed. At West Vail, the Simba Run underpass is really the only measure that would produce enough effectiveness to alleviate a LOS E. Based on operations at the West Vail north roundabout, **Table 11** indicates that the Simba Run underpass should be in place by the time that three-eighths of the proposed development is completed (bottom row shows the need to offset 1,000 to 1,100 trips out of the 2,800 total peak hour trips projected).

As an example in applying **Table 11**, suppose a development/redevelopment proposal is estimated to generate a total of 400 PM peak hour trips. If mitigation measures were to be applied so as to offset the impact of these trips on the interchange roundabouts listed in the table, then one would select the appropriate mitigation measures such that the offset values sum to 400. **Table 11** would suggest that the impact of these 400 total trips could be offset at the Main Vail North roundabout via encouraging other traffic to use the East Vail interchange (Number 4, 300-400 trip offset effectiveness). However, this measure would only offset about one-half the impact at the South Roundabout intersection, so one may also choose to provide Express Bus Service (Number 6, 100-150 trip equivalent) and extend ski hours (Number 7, 50-100 trip offset equivalent) to fully mitigate the traffic impact of the development at the south roundabout.

With respect to these three offsetting measures for the West Vail roundabout, Numbers 3, 6, and 8 would fall just short of offsetting the impact of a 400-trip development. One other measure would be required, perhaps Parking Management Measures (Number 5, 100-200 trip offset).

Another application of the table is to use it in assessing a particular improvement, say the Simba Run Underpass. If the Town is able to advance this improvement, then enough trip offset would be in place to offset the impacts of 1200 to 1300 trips per hour from new development at the West Vail Roundabout. However, this improvement would "buy" less impact offset at the Main Vail roundabouts.

The table is intended to be guide. Clearly, the location of the development will have an effect on the relative impact to the roundabouts listed, so some engineering judgment is required in the table's application. Also, the table only addresses the PM peak hour. As previously shown, there is one notable operational issue anticipated during the AM peak hour in 2025; the north roundabout intersection at the Main Vail interchange. The crucial mitigation measure to alleviate this issue is to encourage approximately one-half of these trips to exit I-70 at East Vail (rather than Main Vail) through the use of variable message signs placed along I-70.

IX. IMPROVEMENT COST ESTIMATES

Planning level construction cost estimates have been developed for the Frontage Road improvements. These have been grouped into Frontage Road sections and include the improvement recommendations presented here as well as other maintenance activities such as overlays.

Figures 18 and **19** show the improvements, their cost, potential funding sources and a rough estimate as to the appropriate timing. These figures were developed by Vail's Public Works staff. The figures break the frontage road system up into numerous segments, and the improvements called out also include other enhancements to such has recreational paths and medians to be integrated into the overall improvement. Center roadway medians are only shown adjacent to the commercial core areas, West Vail, Lionshead and Vail Village where:

- Traffic volumes tend to be highest
- Cross-street movements are most significant
- Delineation and direction are most critical to motorist

Raised medians can provide safety and aesthetic benefits to the traveling public, but they also create increased challenges with respect to maintenance including snow removal. As such, their application is limited to those segments in which tourist activity is the greatest (and so are the traffic loadings).

Besides costs, the figures also identify potential participation by nearby development as well as to a general timing for the improvement as to the time frame of when it should be built. This time frame is based partially on need and partially on the timing of development, when the development participation can be realized. The total cost for the program improvements is approximately $70 million in 2007 dollars. The Simba Run underpass would be the single most costly improvement. However, this improvement would deliver significant benefit to the Town as this report has identified.

The nomenclature in **Figures 18** and **19** can be further generally defined as the following;

- **Cost:** Estimated cost based on 2007 construction costs seen in Vail. Estimates are provided by the Town of Vail staff, with supporting information being provided by FHU
- **Development Funding:** Provides potential funding sources other than the Town of Vail or CDOT budgets
- **Improvement:** Provides a brief description of general type of Improvement that is recommended by this plan:
    - *Safety*: Recommends a safety type of improvement (i.e. shoulder widening, guardrail)
    - *Rec. Path*: Recommends a recreational path improvement (i.e. bike lane / adjacent path)
    - *Min. Std*: Recommends the road to be brought up to Minimum CDOT standards (shoulders)
    - *Turn Lanes*: Requires additional turn lanes
    - *Capacity*: Requires capacity improvements (additional lanes / roundabout)

- *Roundabout*: Roundabout recommended
- *Access*: Recommended access improvements
- *Medians*: Recommends medians for access control and aesthetics
- *Underpass*: Recommends a new underpass
- *Interchange Improvements*: Recommends interchange improvements

- **Timing:** Provides an estimate timeframe that the recommended improvements should be implemented

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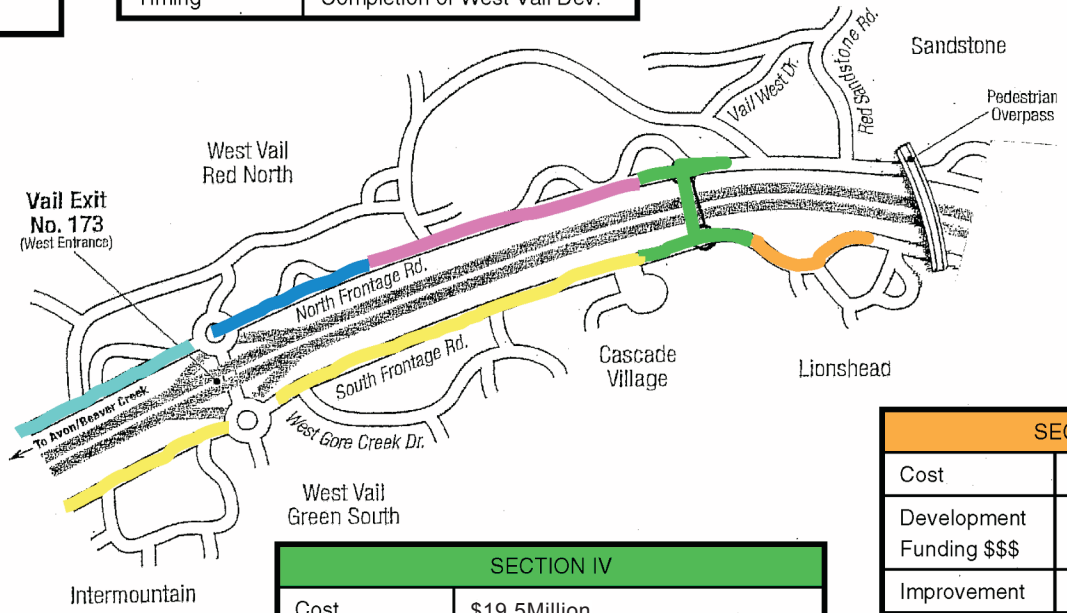
SECTION I	
Cost	$0.8 Million
Development Funding $$$	n/a
Improvement	Safety / Rec. Path Min Stds
Timing	CDOT Overlay

SECTION II	
Cost	$4.3 Million
Development Funding $$$	West Vail Dev. / Holiday Inn
Improvement	Capacity / Roundabout Access/ Medians / Safety
Timing	Completion of West Vail Dev.

SECTION III	
Cost	$ 3.3 Million
Development Funding $$$	West Vail Dev. / Roost / Timber Ridge
Improvement	Turn Lanes/ Safety / Rec. Path
Timing	Completion of Roost & Timber Ridge



SECTION V & VI	
Cost	$5.3 / 2.8 Million
Development Funding $$$	n/a
Improvement	Safety / Rec. Path
Timing	CDOT Overlay

SECTION IV	
Cost	$19.5Million
Development Funding $$$	Indirectly through traffic impact fees and/or TIF
Improvement	Underpass / Capacity
Timing	Completion of 2 of the following: West Lionshead, Lionshead Parking Structure, Timber Ridge, West Vail Dev.

SECTION VII	
Cost	$4.5 Million
Development Funding $$$	West LH / Ritz
Improvement	Capacity / Medians
Timing	Completion of West Lionshead and the Ritz

Figure 18

NOTE: Cost estimates are in 2007 dollars.
Accel/Decel lanes may also be needed at select locations.

West Vail Frontage Road Improvements

North

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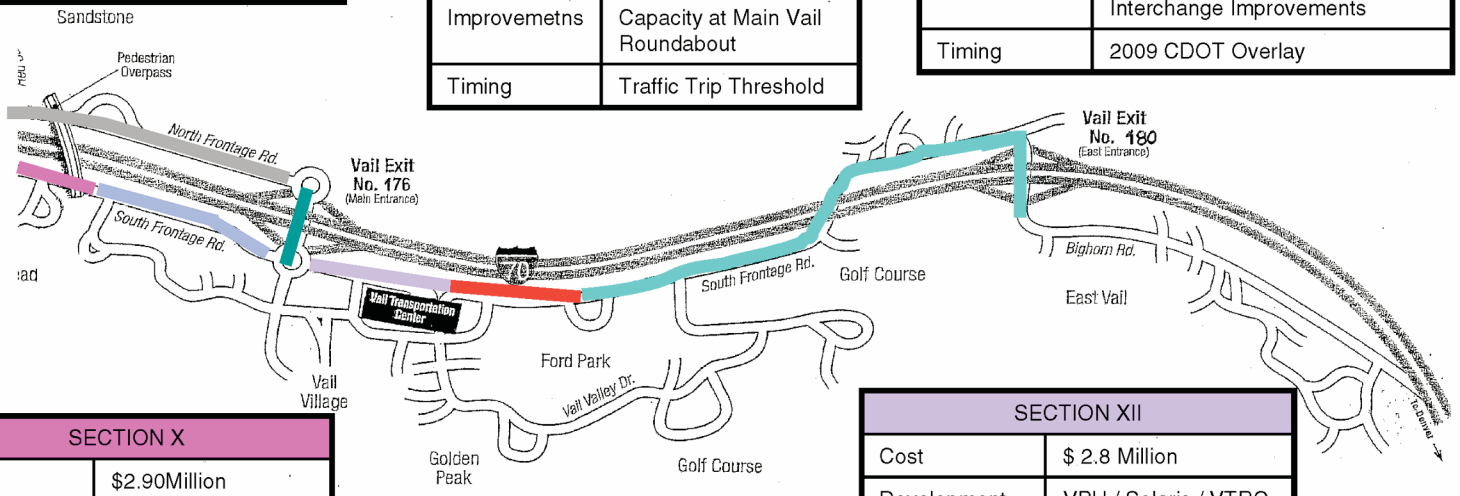
SECTION VIII	
Cost	$2.8 Million
Development Funding $$$	n/a
Improvements	Safety / turn Lanes / Rec. path
Timing	CDOT Overlay

SECTION IX	
Cost	$3.6 Million
Development Funding $$$	Indirectly through traffic impact fees and or TIF
Improvemetns	Capacity at Main Vail Roundabout
Timing	Traffic Trip Threshold

SECTION XIV	
Cost	$ 6.2 Million
Development Funding $$$	n/a
Improvements	Safety / Turn Lanes / Rec. Path / Interchange Improvements
Timing	2009 CDOT Overlay



SECTION X	
Cost	$2.90Million
Development Funding $$$	Antlers / LSL / N. Day / Landmark / Concert Hall / LH Inn
Improvements	Capacity / Safety
Timing	LH Parking Structure

SECTION XI	
Cost	$ 8.3 Million
Development Funding $$$	LH Parking / Vail International / Evergreen / Four Seasons / Municipal Bldg.
Improvements	Capacity / Safety Round about access
Timing	LH Parking Structure

SECTION XII	
Cost	$ 2.8 Million
Development Funding $$$	VPH / Solaris / VTRC
Improvements	Safety / Roundabout access / Medians
Timing	VPH / Solaris (~2009)

SECTION XIII	
Cost	$2.9 Million
Development Funding $$$	East Village / Ford Park
Improvments	Roundabout / Capacity / Medians
Timing	Completion of Ford Park Parking Structure

Figure 19

Main Vail Frontage Road Improvements

NOTE: Cost estimates are in 2007 dollars.
Accel/Decel lanes may also be needed at select locations.

North

X. OTHER CONSIDERATIONS

A. Priorities

Improvements in this plan may require time to implement as funding becomes available. Roadway construction including the underpass will take time to fund. As such, the lower cost travel demand management measures should be pursued first. These include parking pricing policies and encouragement to use the East Vail Interchange. These should be the simplest measures to implement and "test" for effectiveness.

Relative to improvement priorities, the Simba Run underpass provides a wide variety of benefits to Vail's Transportation system. Traffic-wise, this improvement relieves both interchanges, provides an option to cross I-70, provides for a pedestrian crossing of I-70, provides greater flexibility in routing Town buses, allows emergency response agencies to react quicker, and it allows for a planned Lionshead Transportation Center to better serve the community and relieve the heavily-used Village Transportation Center. Also, securing funding, obtaining necessary approvals, design, and eventual construction will take time. As such, the Town should consider moving ahead with the approval and clearance processes for the Simba Run underpass. This may best be done by first conducting a more detailed Simba Run Underpass Feasibility Study to better understand and quantify all of the benefits, disadvantages, impacts, and costs associated with this project

B. Other Planning Efforts

Additional planning studies may be required for various pieces of this plan. Improvements or actions that impact any portion of I-70 or the right-of-way thereof may be subject to State and Federal approval procedures. Modifications to the interchanges are subject to CDOT's Policy Directive 1601 which may require a feasibility study. Environmental clearance will also likely be required for interchange modifications as defined in CDOT's Policy Directive 1601 and in the National Environmental Policy Act (NEPA). Transportation Improvements that impact Ford Park may also be subject to 4F regulations and procedures.

Longer term, the ideas have been raised to perhaps dramatically change I-70 through Town. The thought is based on the potential of utilizing the space that I-70 currently occupies for development as the value of this property may more than offset the costs of reconfiguring I-70. Two ideas have been raised. One includes "cut and cover" in which I-70 would be depressed in its current alignment and structural decking would be placed atop of I-70. The other idea includes the potential of re-routing I-70 under Vail Mountain south of Town. Far more study is needed to determine if either of these is feasible, but in the event that one of these options is approved and funding is identified, the Town's transportation plan should be updated. Under either one of these scenarios, I-70 would no longer be the barrier that it is currently, allowing a host of options transportation-wise. In addition, an assessment should be made to determine if, and what, type of east-west roadway would be needed through the Town. If either of these ideas becomes eminent, any improvement recommended in this plan should be reviewed carefully before implementation to ensure it would still be warranted.

C. I-70 PEIS

CDOT has issued a draft of the I-70 PEIS document for public review. This effort considers an extended length of I-70 from C-470 to Glenwood Springs including through the Town of Vail. Results of the effort identify the potential for rail service from Denver to the Vail Transportation Center. In addition, the Town of Vail is a member of the I-70 Coalition and is in full support of the Coalitions actions with respect to the PEIS and the future of I-70. Their latest activity can be found at http://www.i70solutions.org. A Record of Decision (ROD) is anticipated in year 2011. Further, the Town is a member of the Rocky Mountain Rail Authority and is participating in their high speed Rail Feasibility Study which is expected to be completed by Summer of 2009. Currently the rail study has identified Vail as a potential rail station site. The addition of a high speed rail from Denver, thru Vail and beyond will have a dynamic effect on transportation and transit in Vail. An additional study will be required to determine the impacts on Vail of such an improvement.

D. Implementation of Recommended Plan

The recommended plan is mainly driven by the anticipated growth and development of Vail. The timeline for implementation also is driven by development. The major infrastructure improvements; i.e. The Frontage Road widenings, the construction of roundabouts and roundabout improvements, and the Simba Run Underpass, will need to occur along side the anticipated developments.

Other ancillary improvements, noted as safety, minimum standards, or recreational path improvements should be done regardless of development in a timely fashion, as these types of improvements are not necessarily development driven and are existing needs.

A preliminary prioritization and implementation plan is provided in **Table 12**. It should be noted that this figure assumes all of the major anticipated development occurs and occurs in a timeframe as outlined. The cost estimates provided in **Figures 18** and **19** have been transferred to this chart and further broken down into the major funding sources; Town of Vail capital budget, Town of Vail RETT budget, Tax Increment Financing, traffic impact fees, developer required improvements, and CDOT funding. These funding sources are generalized and limited. Each project, or section of road system, will have a detailed in depth funding scenario completed prior to implementation. The detailed funding scenario will finalize exactly how the projects will be funded, analyze the master plan assumptions, and look at any additional funding mechanisms.

Table 12. Transportation Master Plan Preliminary Prioritization and Implementation Plan

Capital Road System Improvements	Potential Funding Mechanism (Millions $) [5]						Total Funding	Total Cost	Balance	Implementation Time Frame	Benefits	Implementation Timeline [4]			
	TOV Capital Budget	RETT	TIFF	Traffic Impact Fees [1]	Development Required Improvement [2]	CDOT [3]						0-3 Years	3-6 Years	6-10 Years	10+ Years
Section I – ***N. Frontage-Arosa to Roundabout***		$0.70				$0.10	$0.80	$0.80	$	As funding is available	Widened shoulder for safety and bicycle lanes			$0.80	
Section II – ***N. WV Roundabout to Zermatt Ln***					$4.30		$4.30	$4.30	$	Major West Vail Commercial Redevelopment	Capacity, access roundabout, medians, bicycle lanes				$4.30
Section III ***N. Frontage-Zermatt Ln to Simba***	$1.00	$0.50			$1.65	$ 0.15	$3.30	$3.30	$	Completion of the Roost and Timber Ridge Dev.	Turn lanes and bicycle lanes		$3.30		
Section IV ***Simba Run Underpass***			$4.50	$5.00	$5.00	$5.00	$19.50	$19.50	$	Completion of EverVail/Timber Ridge	Capacity, transit improvement, connectivity	Feasibility Study	$19.50		
Section V ***S. Frontage Rd.-DJ Path to Roundabout***		$4.80				$0.50	$5.30	$5.30	$	As funding is available	Bicycle lanes and recreational path				$5.30
Section VI ***S. WV Roundabout to Simba***		$2.00				$0.80	$2.80	$2.80	$	As funding is available	Widened shoulder for safety and bicycle lanes			$1.40	$1.40
Section VII ***S. Frontage Rd.-Simba to Strata***					$4.50		$4.50	$4.50	$	Completion of Ever Vail Infrastructure	Capacity, turn lanes, bicycle lanes, medians, parking lane	$4.50			
Section VIII ***N. Frontage-Simba to MV Roundabout***	$0.80	$1.50				$0.50	$2.80	$2.80	$	As funding is available	Turn lanes and bicycle lanes		$2.80		
Section IX ***MV Roundabout Improvements***			$1.00	$2.60			$3.60	$3.60	$	Completion of Ever Vail/ Timber Ridge	Capacity	Feasibility Study	$3.60		
Section X ***S. Frontage Rd-Strata to E. LH Circle***			$0.50	$2.40			$2.90	$2.90	$	Completion of EverVail Infrastructure	Capacity, turn lanes, bicycle lanes, medians, parking lane	$2.90			
Section XI ***S. Frontage-E. LH Circle to MV Roundabout***			$2.00	$2.00	$4.30		$8.30	$ 8.30	$	Completion of LH Transit Car, Parking Reed., Evergreen, Four Seasons	Capacity, turn lanes, bicycle lanes, medians, parking lane	$1.00		$7.30	
Section XII ***S. Frontage Rd-MV Roundabout to VVD***		$0.40		$0.40	$2.00		$2.80		$	Completion of Solaris	Medians	$2.80			
Section XIII ***S. Frontage Rd.-VVD to Ford Park***					$2.90		$2.90	$2.90	$	Completion of Ford Park Parking Structure	Safety, medians roundabout at west end of Ford Park	Feasibility Study	$2.90		
Section XIV ***Frontage Rd.-Ford Park to East Vail***	$1.50	$4.70					$6.20	$6.20	$	Construction of Bike Lanes to East Vail	Turn lanes and bicycle lanes	$3.10	$3.10		
Totals	**$3.30**	**$14.60**	**$8.00**	**$12.40**	**$24.65**	**$7.05**	**$70.00**	**$70.00**	**$**			**$14.30**	**$35.20**	**$9.50**	**$11.00**
Town of Vail Totals (Capital)	**$3.30**											**$0.75**	**$2.55**	**$**	**$**
Town of Vail Totals (RETT)		**$14.60**										**$2.75**	**$4.35**	**$1.70**	**$5.80**

Parking & Transit System Improvements	TOV Budget	Potential Funding Mechanism (Millions $) [5]					Total Funding	Total Cost	Balance	Implementation Time Frame	Benefits	Implementation Timeline [4]			
		RETT	TIFF	Traffic Impact Fees [1]	Development Required Improvement [2]	Grant Funding						0-3 Years	3-6 Years	6-10 Years	10+ Years
Parking - Ever Vail ***400 Spaces***					$20.00		$20.00	$20.00	$	Completion of Ever Vail Parking Structure	Provides additional skier parking		$20.00		
Parking - Lionshead ***300 Spaces***					$15.00		$15.00	$15.00	$	Completion of LH Parking Reed.	Provides additional skier parking			$15.00	
Parking - Ford Park ***# of Spaces-TBD based on feasibility study***	$5.00	$5.70			$4.30		$15.00	$15.00	$	Estimate based on 300 spaces. Completion of Ford Park Study	Parking for Cultural and Rec. facility and skier parking	Feasibility Study	$15.00		
Lionshead Transit Center - ***E. LH Circle/Concert Hall***			$7.50			$2.50	$10.00	$10.00	$	Completion of Transit Center Study	Provide better bus service and relieves VVTRC	$10.00			
Town of Vail Bus Expansion - ***4-6 Buses (Hybrid/Articulated)***	$2.66					$1.34	$4.00	$4.00	$	Completion of Simba Run Underpass, Ever Vail, Timber Ridge	Provide better service, including "Line Haul" route WV to VV		$1.33	1.33	
Enhanced ECO Bus Service							$		$	Requires county vote to increase ECO funding	Increase down valley service				
Totals	**$7.66**	**$5.70**	**$7.50**	**$**	**$39.30**	**$3.84**	**$64.00**	**$64.00**	**$**			**$10.00**	**$36.33**	**$16.33**	**$**
Town of Vail Totals (Capital)	**$7.66**											**$**	**$6.33**	**$1.33**	**$**
Town of Vail Totals (RETT)		**$5.70**										**$**	**$5.70**	**$**	**$**

	Potential Funding Mechanism (Millions $)						Total Funding	Total Cost	Balance			Implementation Timeline			
	TOV Budget	RETT	TIFF	Traffic Impact Fees	Development Required Improvement	CDOT/ Grant Funding						0-3 Years	3-6 Years	6-10 Years	10+ Years
Grand Totals	**$10.96**	**$20.30**	**$15.50**	**$12.40**	**$63.95**	**$10.89**	**$134.00**	**$134.00**	**$**			**$24.30**	**$71.53**	**$25.83**	**$11.00**
Grand Town of Vail Totals (Capital)	**$10.96**	**$**										**$0.75**	**$8.88**	**$1.33**	**$**
Grand Town of Vail Totals (RETT)	**$**	**$20.30**	**$20.30**									**$2.75**	**$10.05**	**$1.70**	**$5.80**

PARKING & TRAFFIC MANAGEMENT MEASURES

1. Encourage use of East Vail interchange at peak times with VMS and CDOT coordination
2. Ski pass management at peak times, coordinate with VR
3. Real time information disbursement throughout town
4. Parking fee management with incentives and disincentives
5. Ride-share incentives

NEXT STEPS:

1. Complete Nexus study for Traffic Impact Fee and codify
2. Simba Run & Main Vail Roundabout Feasibility Studies
3. Lionshead Transit Center Design Study
4. Ford Park Parking Feasibility Study
5. Install permanent traffic counters to monitor trip trends
6. Implement parking and traffic management measures
7. Continue to participate in the RMRA study
8. Continue to coordinate transportation planning with ECO and Eagle County
9. Expand the Urban Renewal boundaries as appropriate
10. Lobby for funding and have "shovel ready" projects

NOTES:

1. Requires updating and codifying the Town's Traffic Impact Fees
2. Improvements required by a development to mitigate site traffic over and above Traffic Impact Fees.
3. CDOT and Federal transportation funding is unreliable at this time due to significant reductions in revenues, compounded by an increase of project need.
4. The preliminary timeline provided is relevant to the pace of development
5. All cost estimates are in 2007 construction dollars.

E. Funding Sources

To fund these transportation system improvements, the Town must rely on some of the following funding mechanisms and sources.

- Colorado Department of Transportation (CDOT)
- Federal Agencies (Federal Transit Administration, Federal Highway Administration)
- Private Developers
- Town of Vail Traffic Impact Fees (revised and codified)
- Tax Increment Financing (TIF) – Town has a $15 Million Bonding capacity at this time
- Real Estate Transfer Tax (RETT) – for landscaped areas and paths
- Town's Capital Budget
- Vail Resorts Inc. $4.3 million parking commitment
- Conference Center Fund of $9.3 million for possible reallocation if approved by voters
- Selling or leasing development rights on Town of Vail land identified in the Lionshead Master Plan and the western south side of the Village Parking Structure
- Required voter approved initiatives
    - Tax Increases
    - Improvement Districts
    - Bonding or refinance the Town debt after 2012

CDOT

All of the roadways & interchanges discussed in this memo are under the jurisdiction of the Colorado Department of Transportation. The Vail Frontage Roads are the number –five - priority of the Intermountain Transportation Planning area for Region 3;. However, only the first four projects are currently scheduled to be funded between 2005-2035 given all the other regional priorities.

Simba Run is listed as a project in the I-70 PEIS. In addition, interchange improvements may be cleared independently of the overall project if there is no mainline roadway improvements associated around them, similar to the Edwards roundabout scheduled interchange project. Once the overall PEIS record of decision is released in ~2011, individual projects may apply for funding. The cost of the PEIS in 2005 was estimated in excess of $4 billion and to date only $1.8 billion is earmarked for the next 25 years.

CDOT schedules asphalt overlays for the frontage roads approximately every 15 years. The next overlay was scheduled for 2009 but has since been pushed out to 2013. It is advantageous to the Town of Vail to widen shoulders for vehicular and bicycle safety and make other frontage road improvements prior to any overlay to take advantage of a CDOT funded overlay of the whole road. When the overlay is completed the overall project will have a finished look and be a better road in the long run.

CDOT has recently proposed we accept $11 million to take over the 11 miles of Frontage roads that run thru Vail. This would give ownership to Vail, making the Town responsible for all the maintenance and capital costs going forward. Currently the Town receives $115,000 per year from CDOT to perform snow removal and minor pothole maintenance. CDOT is currently responsible for all capital improvements, including maintenance overlays and reconstruction costs.

Federal Agencies

The Town of Vail has been awarded $ 2.4 million in 2008 and $ 235,000 in 2009 for a Lionshead Transit Center. It is unlikely the remaining $4 million will be awarded in 2010 which would complete the town's three year requested and funded amount of $7 million dollars.

The Town of Vail is in line to collect an estimated $2-4 million for the proposed Lionshead transit center. It was originally scheduled to be released over a three year period starting in Federal FY 2008, however since no specific project was designated it will now have to be completely released to a viable project in 2010. The Town is obligated to contribute a match of at least 20%, or $0.4 to $0.8 million. Mike Rose, Transit Manager, went to Washington D.C. as part of the Colorado Association Transit Agencies delegation to finalize the request.

Private Developers

It is anticipated that all of the developer impacted roads will be constructed by a consortium of developers over time. The main contributors will be the Lionshead Parking Structure, West Lionshead (Ever Vail) development, Strata, Evergreen, Four Seasons, Solaris, Arrabelle, and the Ritz. As well as, the Timberline Lodge (Roost) and West Vail commercial.

Traffic Impact Fees

The Town to date has assessed traffic impact fees in excess of over $3.5 million. Many developers have constructed improvements in lieu of paying fees to the Town . The Town has available $584,000 of unallocated dollars for traffic impact mitigation. If they continue to follow the current approach, the Town will end up with few dollars to fund the cost of a Simba Run or Main Vail interchange improvements. Increasing the traffic impact fee would allow the Town to collect additional dollars to offset the cost of the future improvements. Relying on traffic impact fees to offset the cost of the improvements is relative to timing. Both the Lionshead Parking Structure and West Lionshead (Ever Vail) developments are expected to create significant transportation improvements. The value of the fee would be significantly less than the value of the improvements. Additionally, these developments will greatly influence the need for Simba Run and Main Vail.

West Vail on the other hand would not have to construct significant improvements relative to the size of project that could be developed and therefore could generate more impact fee dollars to be used elsewhere. However, this would most likely be the last place for significant development, again thus causing a timing issue. The Town is currently under contract for a traffic fee Nexus study, however it is currently on hold until the recommended improvements are adopted. The nexus study is critical for two reasons: one to determine if any adjustment should be made to the current fee, and two, to officially codify the traffic impact fee requirements.

Tax Increment Financing (TIF)

Using Tax Increment Financing to bond the cost of the projects meets the needs we have addressed above and most of the projects fall under legitimate use of Tax Increment Financing. Again, timing is critical as bonds can only be let with a payback period that expires in 2025. For each year that passes, the payback period is shortened by one year. There may be a need to modify the boundaries of the current Urban Renewal District. There are also streetscape costs not included in the above that may also need to be funded by a portion of TIF.

The Town Finance Department has estimated the town's TIF bonding capacity at approximately $15 million at this time

Real Estate Transfer Tax (RETT)

RETT has and will continue to be used to make improvements to the trail system along all of the frontage roads. In addition, the Town has used RETT for landscaping the medians along the frontage roads. A large percentage of the cost of the work outside the development area can be attributed to the cost of the recreational enhancement to the roadway. In addition, the cost of providing parking for park and recreation uses is a use of RETT. The RETT can also be bonded against. A significant portion of streetscape has been funded with RETT in the past. There are current and future projects planned for the use of RETT funds for recreation enhancement projects.

Capital Budget

Previous presentations have shown little or no ability to fund projects from the capital account beyond the capital maintenance to extend the life of existing infrastructure. In 2012, the town makes its final debt payment on its current bonds. The payments have been about $ 2.5 million per year.

F. Next Steps

- Complete the Nexus study in 2009 for a traffic impact fee to codify the current practice and adjust the fee if desired based on the new transportation need and cost information
- Complete the Lionshead Transit study in 2009
- Prepare a Simba Run and Main Vail interchange feasibility study in 2009.
- Prepare a Ford Park Parking Feasibility Master Plan study in 2009
- Implement appropriate travel and parking demand management measures
- Continue to participate and complete the Rocky Mountain Rail Authority Rail Study
- Continue to coordinate long term transportation planning effort with ECO and Eagle County (Expansion of ECO transit / Regional Rail study)
- Present a comprehensive list of all the projected costs for all projects and begin to compare this to a comprehensive list of funding sources
- Expand the Urban Renewal boundaries to allow tax increment financing to be used from West Vail to Main Vail along the frontage roads, interchanges and the location of Simba Run underpass

- Lobby the Department of Transportation to participate in the funding of these roadway improvements. The ability to have “shovel ready” projects, as funding scenarios are always changing, is a proactive step in competing for funding. This allows completion of the Vail’s master transportation improvements plan to be more of a reality.
- Install permanent traffic counters at the roundabout interchanges to monitor trip trends