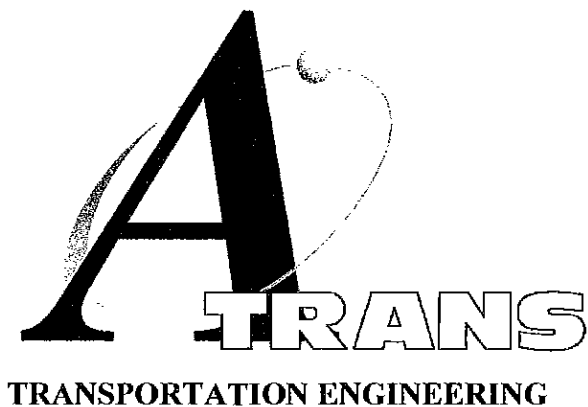


Traverse Mountain
Internal Traffic Analysis
Traffic Impact Study

Lehi, UT

June 2012



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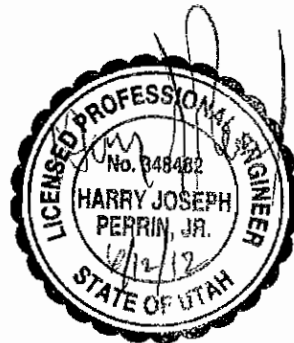
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TRAFFIC STUDY

Traverse Mountain Internal Traffic Analysis Traffic Impact Analysis

Lehi, Utah

June 2012 Update



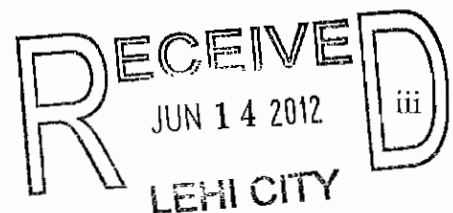
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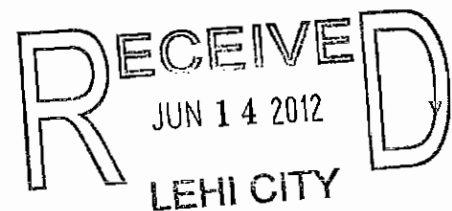
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I. Introduction and Summary

Traverse Mountain Traffic Impact Executive Summary – Internal Roadway Sizing 2011 Update

Purpose of Report and Study Objectives

The following is an update to the April 2008 Traverse Mountain Traffic Study. This traffic study is to analyze the internal roadway system only and to determine the size of internal roadways and intersections to achieve a Level of Service (LOS) C or better throughout Traverse Mountain. The main changes to the previous study are the location and density of residential and commercial land use.

The northern interchange at 4000 North is scheduled in Phase II, Year 2021-2030, which provides a distribution of traffic to the north and south on the frontage road.

Executive Summary

Site Location and Study Area

Traverse Mountain is located north of SR 92 from I-15 to Micron, a distance of almost 1.5 miles of frontage. The area is developing as a Master Planned Community that will include residential, commercial and office space. Traverse Mountain is located on more than 2,770 acres.

Development Description

Traverse Mountain is a planned community with an ultimate build-out of 5,812 units, 1,200 of which already exist with 700 more platted. At build-out, 2,313 units are planned as single family homes and 3,499 are multi-family/condo/town homes. The commercial includes the Lifestyle and Neighborhood Commercial Centers. This includes up to 2.7 million square feet of which 175,000 sf is already in place via Cabelas. Approximately 1,000,000 sf of office space is also planned. The commercial and office are planned along the SR 92 corridor between SR 92 and Traverse Boulevard, which parallels SR 92, approximately 1,200 feet to the north.

Principal Findings

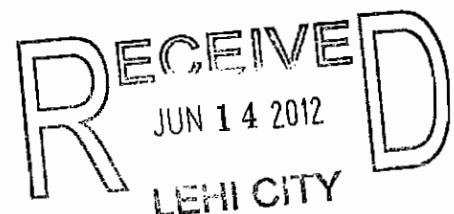
Based on the projected traffic volumes and recommended geometry, all internal intersections are projected to operate at a LOS C or better. The roadway sections require the following lanes to provide sufficient capacity for a LOS C on the roadway segments.

Conclusions / Recommendations

Based on the analysis, the following recommendations should be taken into consideration as the site is developed.

- The internal roads must conform to Lehi City standards and revert to AASHTO and MUTCD where Lehi design standards are not specified.
- Accesses located within 350 feet of the signalized intersections should be limited to right-in / right-out operation, unless additional traffic analysis demonstrates that other access options are available.

For residential locations, a minimum of two accesses should be provided for each pod greater than 50 units as defined in Lehi design Code 2.02I. It is recommended that a third access be provided for pods with greater than 300 units.



- Internal roads are sized for the development as a whole with roads and intersections operating at a LOS C or better.
- Many internal intersections will require future traffic signals as warranted. It is estimated that up to 5 intersections in the residential development will require traffic signals. In addition, mid-block signal will likely be necessary for ingress and egress to the commercial and office developments from the connector roads between SR 92 and Traverse Mountain Blvd, similar to the Cabelas Blvd. signal on Triumph. Depending on where the density is assigned, dual northbound and westbound left turn lanes maybe necessary at the mid-block intersections on Triumph (at Cabelas Blvd) and Morning Glory. This will need to be considered once the commercial to the east develops near full build and Triumph / Cabelas become a four way intersection. ROW preservation for this expansion should occur on the east side of the intersection.
- All internal intersection in the residential zones could provide a similar LOS C or better rating by providing roundabouts instead of traffic signals or stop signs. This is only true for the residential areas. All Commercial intersection will need traffic signals as roundabouts are insufficient.

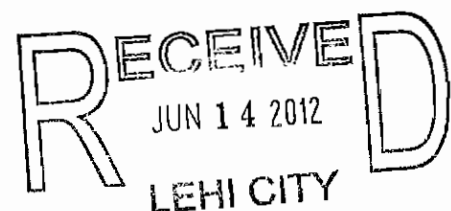
Assumptions

1. SR 92 is being constructed with Commuter Lanes to allow the Traverse Mountain Connections to operate at acceptable Levels of Service. The Commuter Lanes will provide additional capacity on SR 92 at the Traverse Mountain signalized Intersections.
2. The connection between Chapel Ridge road and Fox Canyon Road, northeast of Traverse Mountain Elementary School, has been eliminated. This redirects the Central Canyon traffic to Fox Canyon Road via Traverse Mountain Blvd.
3. It must be noted that this analysis and subsequent recommendations are based on projected traffic demand as of the August 2011 land use plan. As the development occurs, the traffic recommendations should be re-evaluated based on the actual traffic demand experienced on the roadways.
4. Throughout the analysis, the ITE rate is applied to the future residential development.

Road Designation Changes

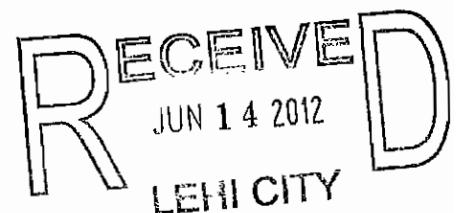
Another change from the April 2008 study is that many of the roadway names have changed.

- Frontage Road → Digital Drive
- Cabelas → Adobe Way
- Grand Terrance → Cabelas Blvd

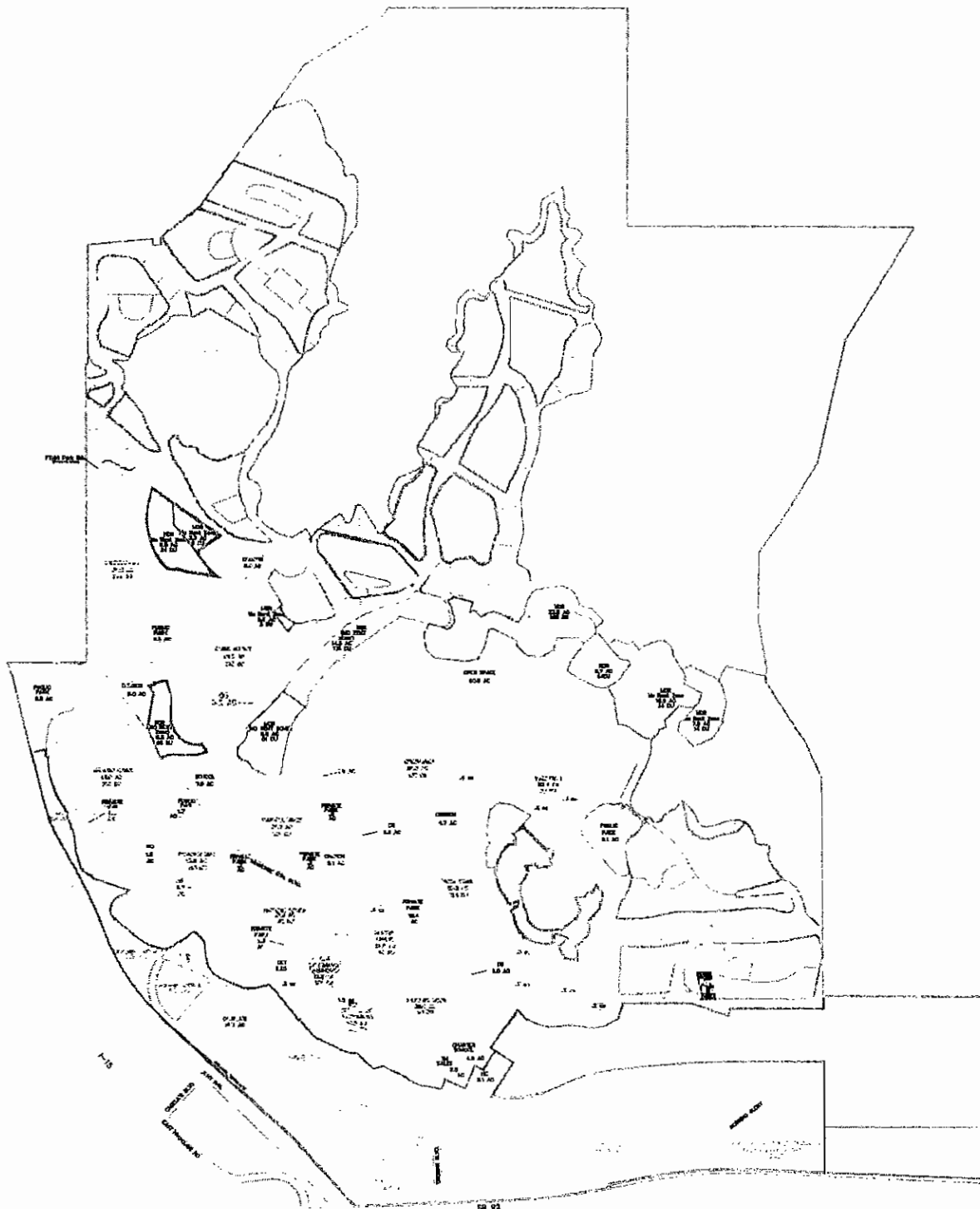


Specifically, in response to City comments, a sensitivity analysis was completed and if all traffic was assumed to leave the site, with no internal traffic, then once West and Central Canyons reach 90% development, the LOS at Chapel / Traverse drops to a LOS D and the connection to Digital Drive, or a restriping of this area is needed to again maintain a LOS C. Similarly, assuming no internal traffic capture, the main commercial intersections drop to a LOS D on the Saturday peak. This includes; Cabelas/Adobe, Cabelas/Triumph, Morning Glory/Commercial Intersection. The Chapel / Traverse intersection is the critical intersection for the residential community.

Figure 1 shows the conceptual site plan of the development. Figure 2 shows the intersection and roadway names and labels used throughout the analysis.



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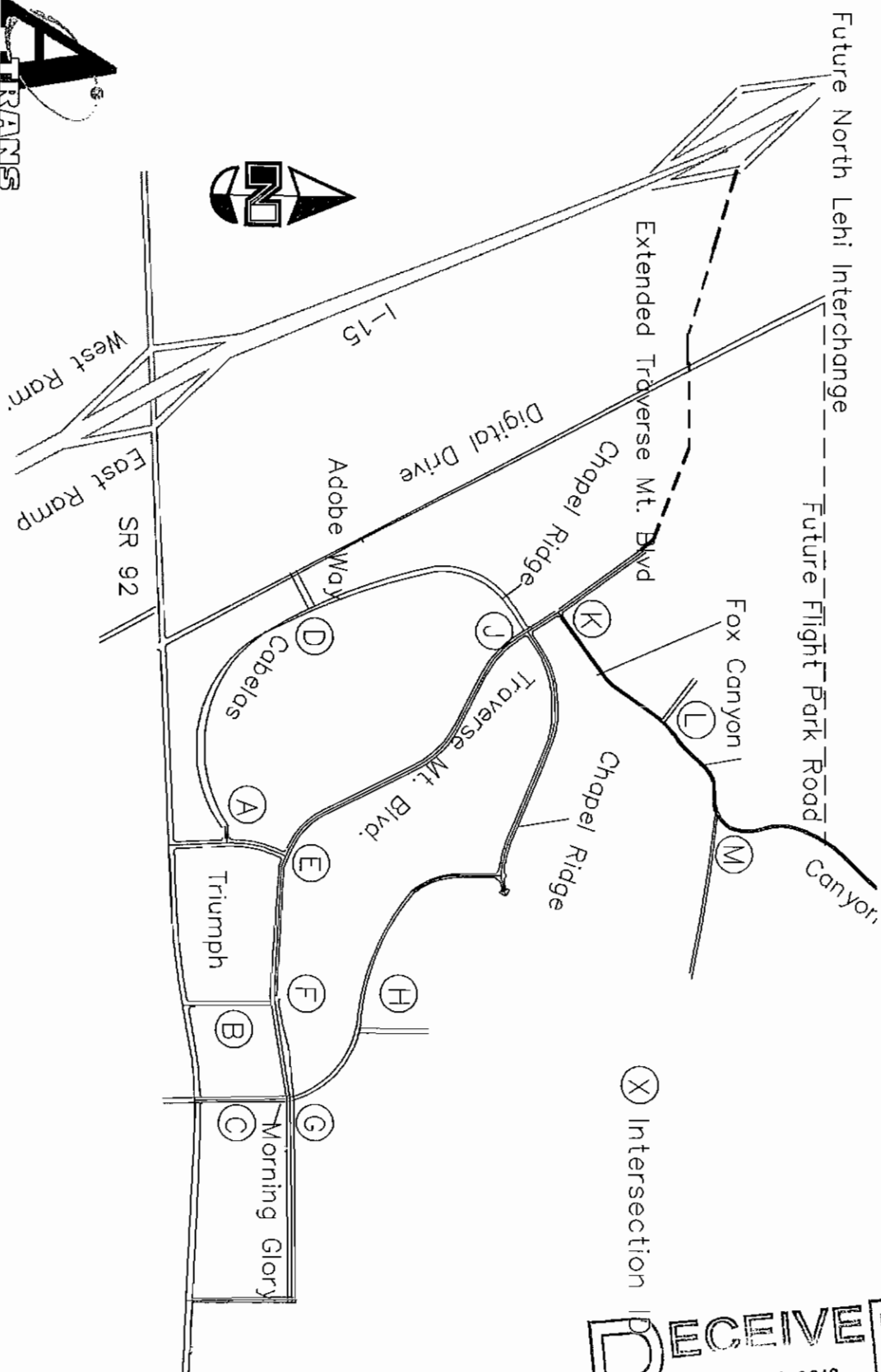
Figure 1 Conceptual Site Plan



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Figure 2

Road and Intersection Labels



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II. Land Use

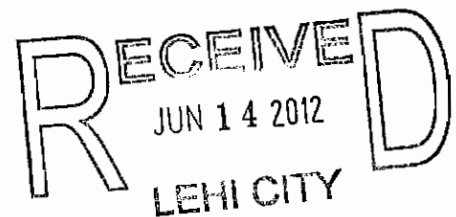
The trip generation for these land use densities is projected to be 4,286 peak PM trips for the residential developments and 4,254 peak PM trips for the commercial development. The land use planned for Traverse Mountain development is shown in Table 1. The residential will develop slower than the Commercial and Office Space which will grow as the economy allows. Therefore, the roadway plans should develop as the areas develop internally but the Main Entrances from SR 92 and the Digital Drive are being reconstructed now with the installation of the SR 92 Commuter Lanes and widening project.

Table 1: Planned Land Use

Residential Units Total	1,200	3,506	5,812
Year	2011	2020	2030
Single Family	1,200	1,757	2,313
Multi-Family	0	1,750	3,499
Commercial	200,000	1,350,000	2,700,000
Office	0	500,000	1,000,000

Multi-Family/ town homes/ condos (Units)*	Single family (Units)*	Commercial (SF)	Office (SF)
3,499	2,313	2.7 Million	1 Million

* Includes 5,812 Total Units



III. Existing Traffic Data

Traffic counts were collected at intersections A (Cabelas and Triumph) and D (Cabelas and Adobe) for the AM and PM peak periods. This allowed a trip generation rate for the site to be determined for the 1,200 units currently built.

A. Intersection Counts

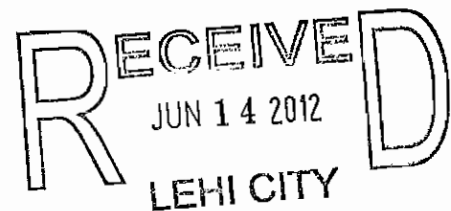
Intersection counts were done August 30, 2011. Counts were made from 7 AM to 9 AM and 4 PM to 6 PM for the weekday peak.

B. Roadway Geometry

The developer has requested that the roadways be minimized in order to provide a more residential appealing and pedestrian friendly environment. By providing multiple access points, the traffic flows at any particular point can be accommodated and allow the majority of locations in Traverse Mountain Development in the residential areas to utilize 3-lane roadway facilities as requested. Based on the projected traffic, 3-lane major collectors provide sufficient capacity for the majority of the proposed land uses internal to the site. Through the commercial areas, five-lane roadways are recommended and multiple turn lanes are recommended at key intersections.

The Fox Canyon Road ROW preservation should include sufficient width for a future 5-lane cross-section from Traverse Mountain Blvd to the Central/West Canyon turn-off where the roadway can be reduced to a 3-lane cross section northeast of that location.

The entrance roadways at all SR 92 intersections should be 5 lanes (2 in each direction and a center median) due to the high traffic volumes between SR 92 and these land uses and also to accommodate multiple left turn ingress and egress lanes. Recommended road geometry is shown in Figure 3.



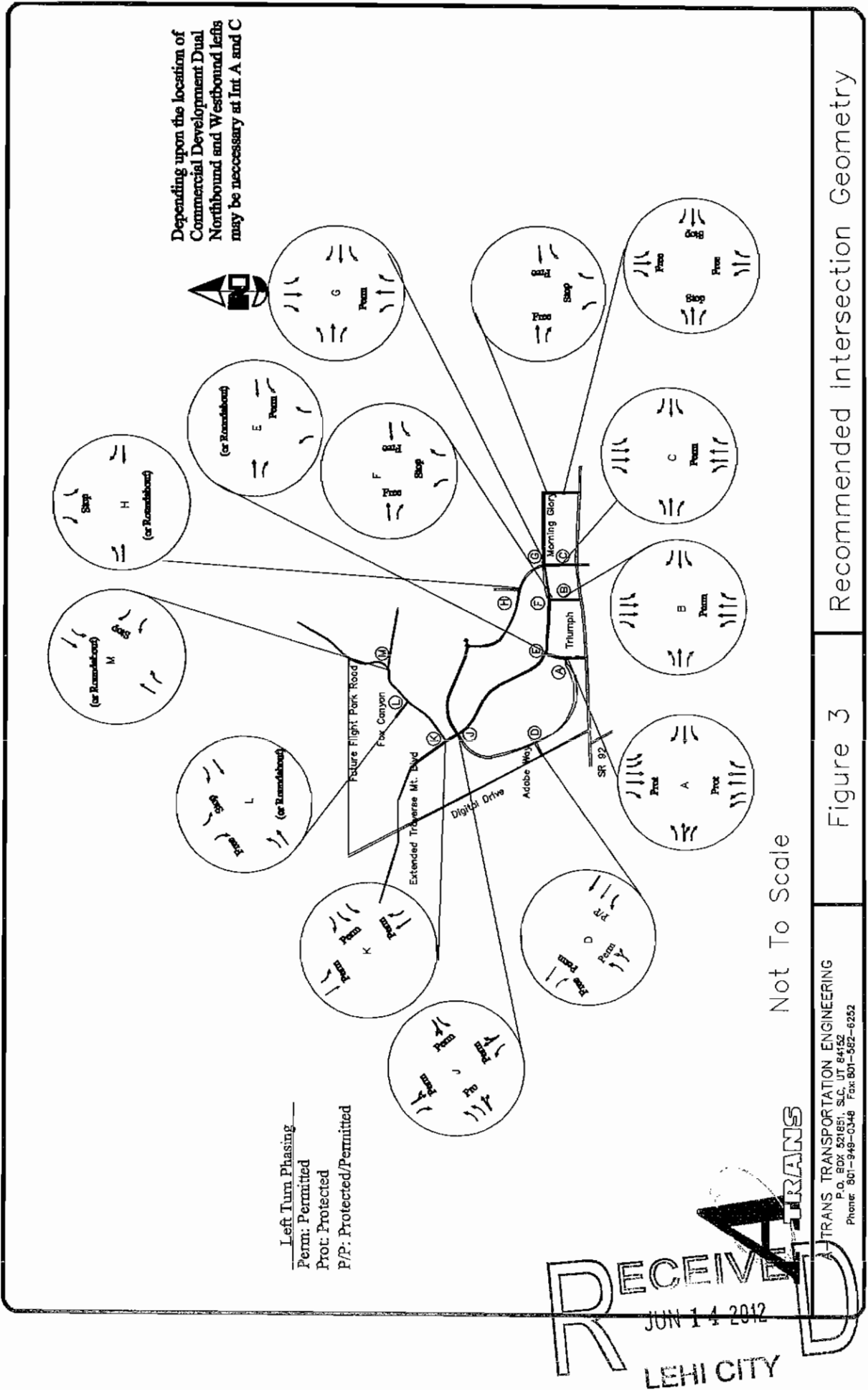


Figure 3 Recommended Intersection Geometry

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IV. Trip Generation

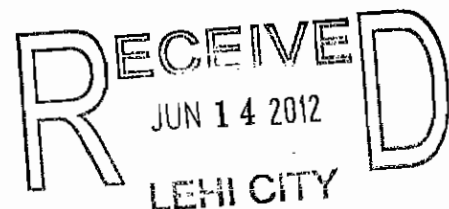
The Institute of Transportation Engineers (ITE) Trip Generation (8th Edition) handbook was used to estimate trips for the land uses throughout the Traverse Mountain Development. In addition, to the trip generation, factors such as internal trips are considered. Because this is such a large development, once developed sufficiently, a portion of the traffic generated by the development never exits the site onto SR 92. Internal schools, churches, parks, retail, commercial and even inter-residential trips are estimated to occur within the development. This must be considered if accurate estimates are made about projected traffic demand.

A. Internal Capture Rates

There are two forms of internal capture estimated for the site. Within the residential areas are trip for internal schools, churches, parks, retail, and inter-residential trips which are never projected to access any of the main roads in the development. This would also include walking trips between residences, commercial and office. The other are commercial and office trips which stay within the commercial zones and travel to multiple locations within the commercial area. There are key assumptions in the trip generation analysis;

1. 20% of the residential traffic never leaves the Traverse Mountain residential area. That is for local neighborhood trips.
2. The commercial area is so large that there is an inherent internal capture rate of traffic traveling from one commercial to another in trip chaining activities. The ITE recommends an internal rate of between 15% and 45% for this level of commercial and office development. A-Trans Engineering has conservatively estimated 20% internal trip capture for the commercial areas.
3. As a sensitivity analysis, if these reductions did not occur, and 100% traffic was projected to be generated, the AM and PM peak periods still maintain a LOS C with the exception of Chapel and Traverse Mountain. With only the current 3-lane cross-section for Traverse Mountain, the Saturday peak functions at a LOS D. At 90% of the Central and West Canyon development, the intersections still operate at a LOS C. The remaining 10% will need either a restriped Traverse Mountain, or a secondary connection to Digital Drive via a northern connection of Traverse Mountain. The Chapel / Traverse intersection is the critical intersection for the residential community.
4. Without any internal traffic capture assumptions, in the commercial areas, the LOS for the Saturday peak would be reduced to a LOS D.

Trip generation estimates for the AM, PM, and SAT peak hours are comprised of trip generation rates, parcel size, and internal capture. The existing and future location of the development dictates where traffic will travel to access SR 92. This includes the existing Cabelas, the proposed Outlets and the remaining retail and office space



V. Origin/Destination and Trip Distribution

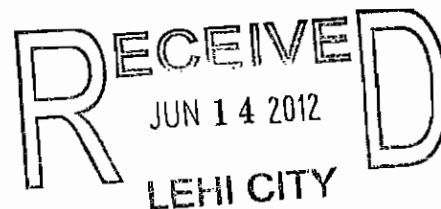
The trip origin/destination (O-D) for the site was estimated from evaluating the existing traffic along SR 92. The assignment of traffic by direction is based on the information provided by the traffic counts and access from the development leading to the following O-D assumptions in Table 2.

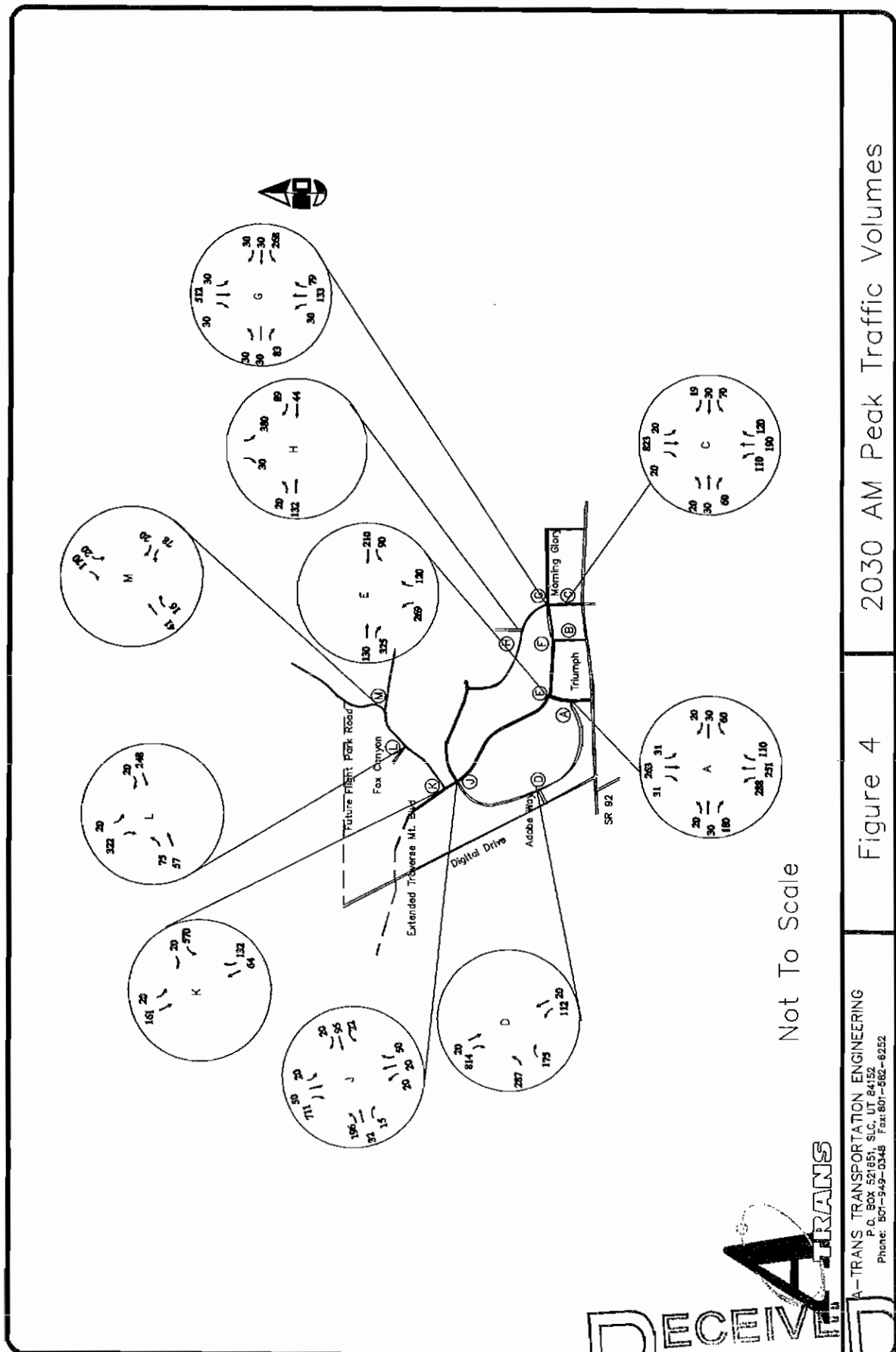
Table 2: Origin-Destination Estimates

Location	From/To West (SR 92)	From/To East (SR 92)	From/To South (Morning Glory Rd)
SR 92	70%	10%	20%

- This is based on the regional nature of the commercial and office as attractors for the area and these are the projected 2030, build-out conditions.

The additional build-out connections to SR 92 will connect in those areas as they develop and serve that area but it is not anticipated that these connections will influence the existing traffic patterns as most traffic is oriented toward I-15. The factor of commercial and office oriented to the south (1200 West) and to the east (Highland, etc.) has been considered in the analysis. The only influence that will cause a significant change in O-D is the connection of Traverse Mountain to the Digital Drive when a northern interchange is constructed. This would result in an increase in traffic towards the north on Traverse Mountain Blvd, which will reduce the need for traffic demands on the other intersections except the intersections on Traverse Mountain Blvd from Chapel and north. Assignment of the traffic to intersections is based on the likely exit point to the development for external traffic and likely internal paths within the development for the internal traffic. Combining the trip generation, origin-destination and assignment (both internal and external) provides traffic estimates throughout the development along roadways and at intersections. Figures 4 through 6 show the 2030 total traffic projections for the AM, PM, and SAT peak periods, respectively. These figures identify the projected traffic with the proposed infrastructure.



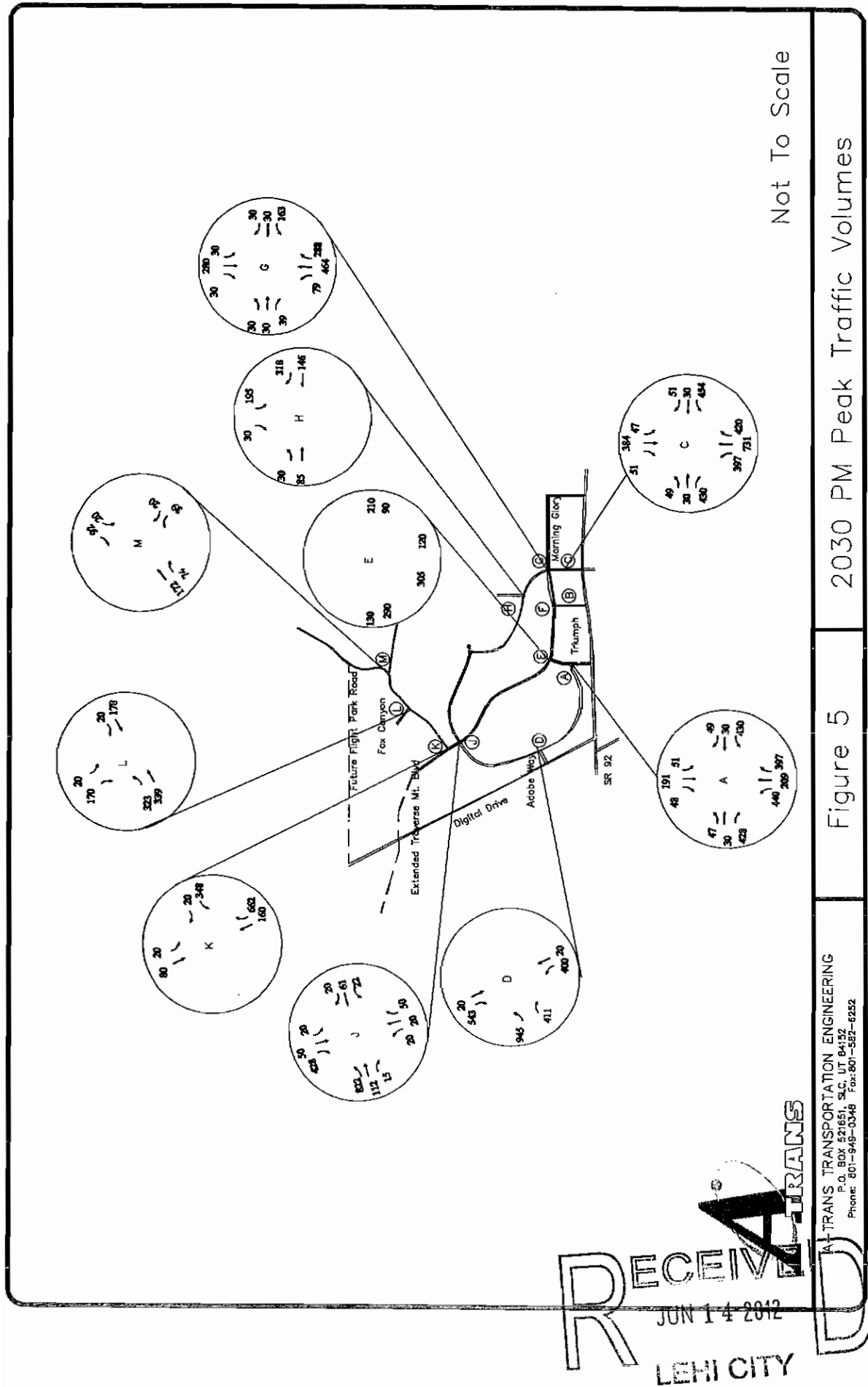


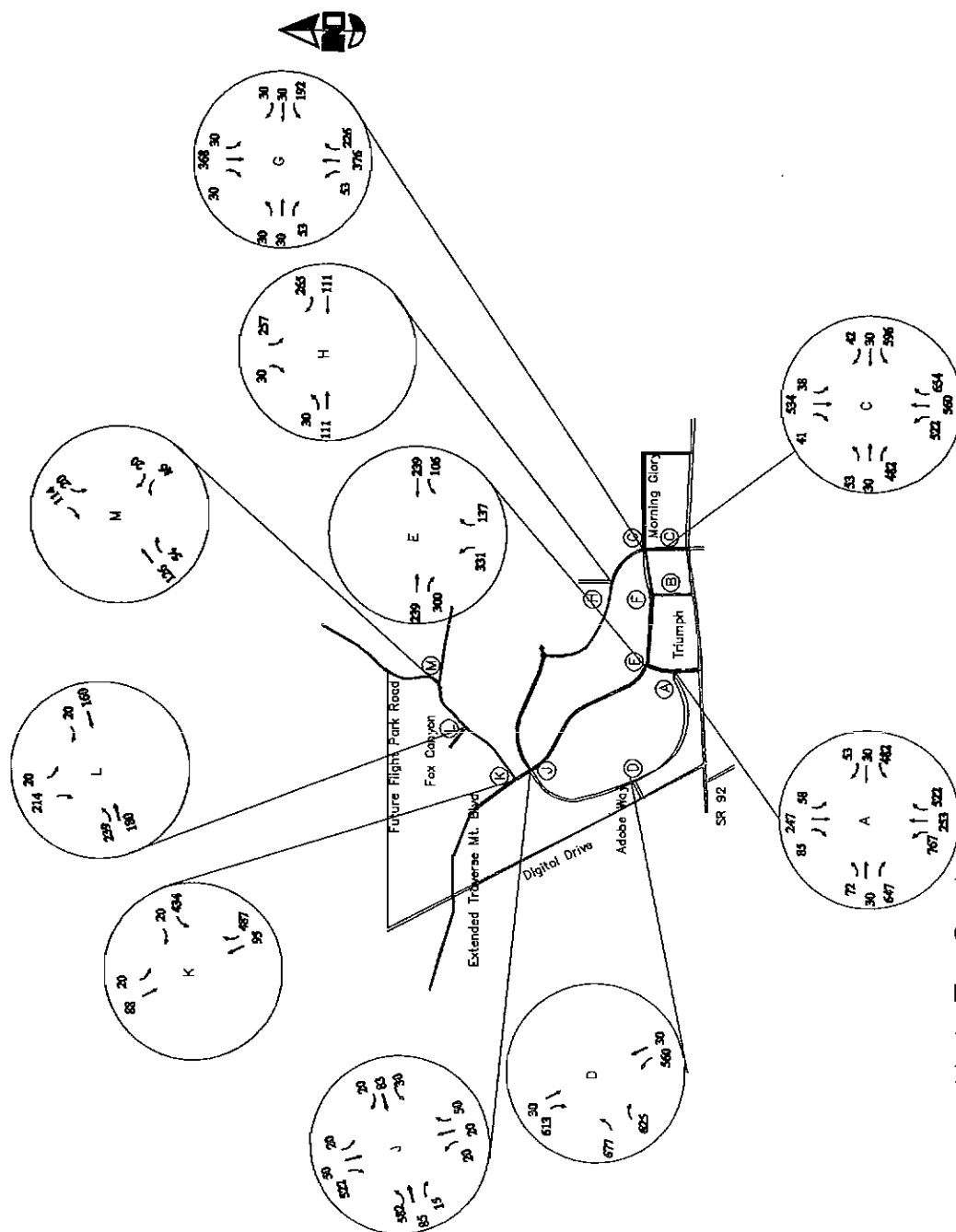
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Figure 4 2030 AM Peak Traffic Volumes





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2030 SAT Peak Traffic Volumes

Figure 6

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VI. Traffic Analysis

The traffic analysis is based on the traffic projections shown in Figures 4 through 6. The analysis of each intersection is based on the Highway Capacity Manual methodology. Geometry shown in Figure 3 is assumed.

A. Signalized Intersection Analysis

The 2010 Highway Capacity Manual (HCM) defines the Level of Service (LOS) for signalized intersections as a range of average experienced stopped delay. LOS is a qualitative rating of traveler satisfaction from A to F whereby LOS A is good and LOS F poor. Table 3 shows the LOS range by delay for signalized and unsignalized intersections.

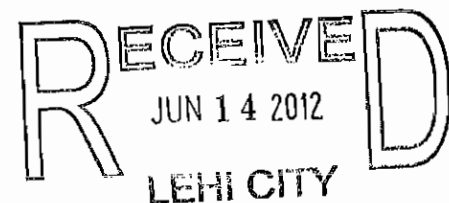
Table 3: Intersection LOS-Delay Relationship

	Unsignalized	Signalized
Level of Service	Total Delay per Vehicle (sec)	Total Delay per Vehicle (sec)
A	≤ 10.0	≤ 10.0
B	> 10.0 and ≤ 15.0	> 10.0 and ≤ 20.0
C	> 15.0 and ≤ 25.0	> 20.0 and ≤ 35.0
D	> 25.0 and ≤ 35.0	> 35.0 and ≤ 55.0
E	> 35.0 and ≤ 50.0	> 55.0 and ≤ 80.0
F	> 50.0	> 80.0

As defined in the HCM 2010

Table 4 shows the analysis results by approach for the AM peak period. The analysis indicates all of the intersections operate at a LOS C or better. Table 5 shows the analysis results by approach for the PM peak period. The analysis indicates all of the intersections operate at a LOS C or better. Table 6 shows the analysis results by approach for the SAT peak period. The analysis again indicates all of the intersections operate at a LOS C or better. While the AM and PM peak determine the internal residential critical geometry, the Saturday peak period determines the critical geometry for the commercial areas.

Appendix B shows the analysis using Synchro.



Note that the intersection designations have changed from the previous study as intersections were eliminated and therefore the labeling was reconsolidated.

Table 4: AM Peak Period

INTERSECTION (Delay/ LOS)	CONTROL	EB	WB	NB	SB	INT
A	Signalized	5.4/A	13.9/B	4.6/A	7.6/A	6.3/A
C	Signalized	12.4/B	14.2/B	5.6/A	9.9/A	9.3/A
D	Signalized	6.4/A	-	6.9/A	1.7/A	3.7/A
E	Signalized	6.1/A	12.3/B	5.9/A		7.7/A
G	Signalized	6.4/A	17.8/B	5.3/A	11.6/B	11.5/B
H	Unsignalized	7.6/A	0.1/A	-	16.1/C	9.7/A
J	Signalized	6.0/A	7.3/A	12.8/B	14.7/B	8.4/A
K	Signalized	-	7.3 / A	4.9/A	9.4/A	7.1/A
L	Unsignalized	14.3/B	0.0/A	-	10.1/B	7.4/A
M	Unsignalized					A

All Internal intersections within the residential zone can also be accommodated with roundabouts and maintain a LOS C or better.

Table 5: PM Peak Period

INTERSECTION (Delay/ LOS)	CONTROL	EB	WB	NB	SB	INT
A	Signalized	4.0/A	43.6/D	27.9/C	13.8/B	24.4/C
C	Signalized	17.2/B	35.2/D	16.4/B	26.9/C	21.5/C
D	Signalized	17.0/B	-	43.4/D	1.6/A	18.0/B
E	Signalized	6.2/A	12.4/B	6.3/A	-	7.9/A
G	Signalized	6.3/A	10.6/B	5.0/A	7.0/A	6.4/A
H	Unsignalized	8.5/A	0.0/A	-	12.6/B	3.8/A
J	Signalized	8.3/A	9.8/A	14.5/B	16.1/B	12.5/B
K	Signalized	-	9.5/A	4.7/A	5.8/A	6.1/A
L	Unsignalized	8.6/A	0.0/A	-	12.9/B	5.0/A
M	Unsignalized					A

All Internal intersections within the residential zone can also be accommodated with roundabouts and maintain a LOS C or better.

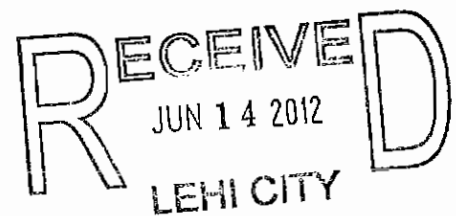


Table 6: SAT Peak Period

INTERSECTION (Delay/ LOS)	CONTROL	EB	WB	NB	SB	INT
A	Signalized	35.5/D	67.8/E	22.8/C	28.2/C	34.2/C
C	Signalized	24.2/C	53.3/D	25.8/C	41.3/D	33.3/C
D	Signalized	20.8/C	-	55.9/E	12.7/B	26.9/C
E	Signalized	5.4/A	10.4/B	9.0/A	-	7.9/A
G	Signalized	5.8/A	11.1/B	5.3/A	8.4/A	7.2/A
H	Unsignalized	8.2/A	0.0/A	-	18.0/C	6.7/A
J	Signalized	8.3/A	9.4/A	14.1/B	16.9/B	11.8/B
K	Signalized	-	7.9/A	4.6/A	6.9/A	6.1/A
L	Unsignalized	8.2/A	0.0/A	-	11.7/B	5.6/A
M	Unsignalized					A

All Internal intersections within the residential zone can also be accommodated with roundabouts and maintain a LOS C or better.

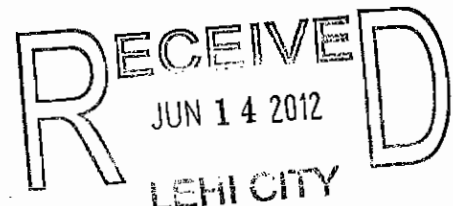
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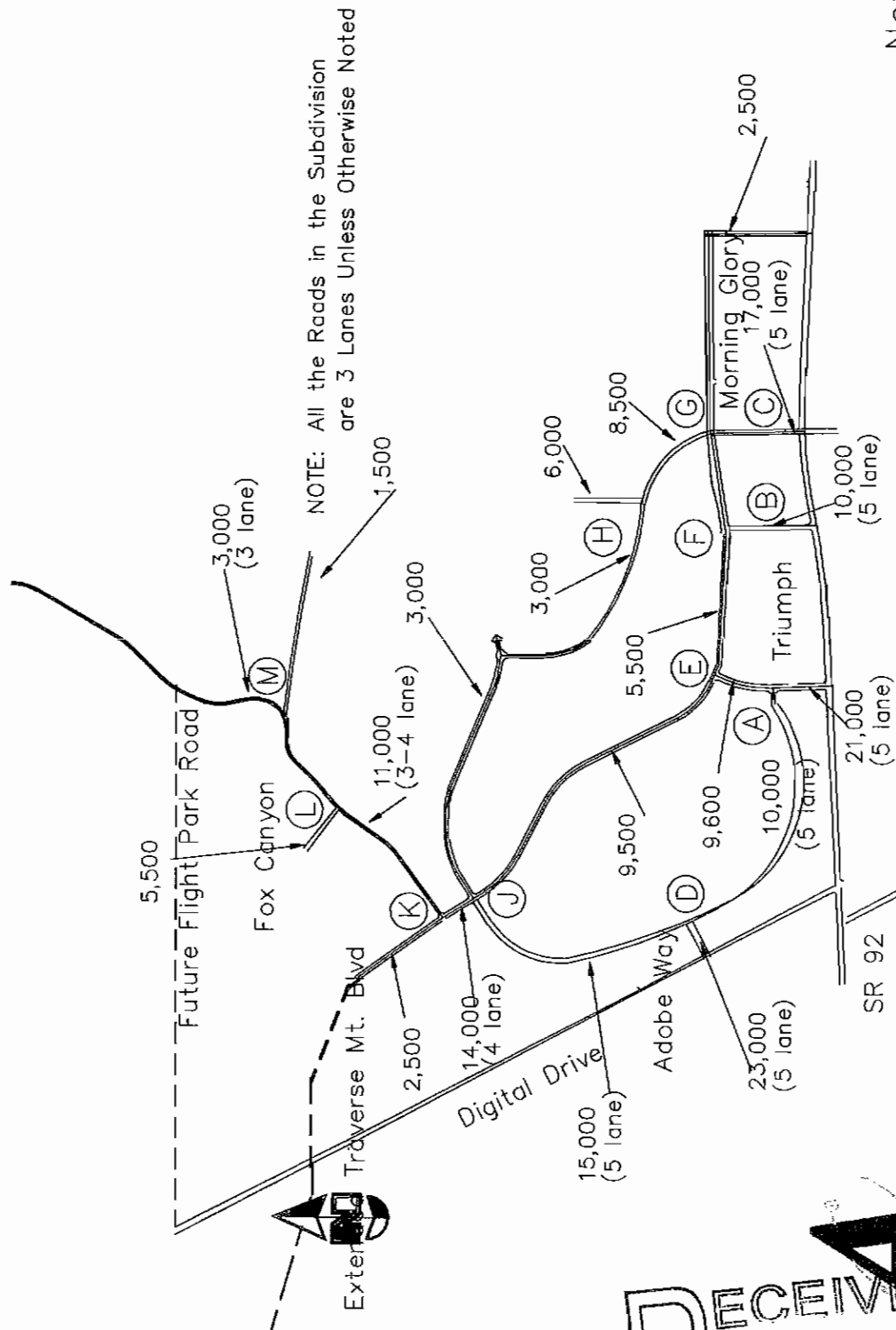
It should be noted that this does assume the internal capture of trips. If 100% of the trips are assumed to leave Traverse Mountain boundaries, then the commercial intersections at Intersections A, C, and D are projected to function at a LOS D on the Saturday Peak.

An assumed 8% internal capture allows all intersections to maintain a LOS C or better with the current geometry.

All roads are planned to be built at full width with the exception of the existing section of Fox Canyon which is currently built approximately 2,000 ft from Traverse Mountain Boulevard, but not at the ultimate recommended width. The current Fox Canyon roadway can support 900 equivalent single family home units and maintain a LOS C.

Figure 7 identifies the projected Average Annual Daily Traffic (AADT) by road segment at full build-out. Note that the estimated daily ADT was estimated by using the rates provided by the trip generation handbook. Figure 8 shows the recommended intersection control for the principal connections throughout Traverse Mountain.





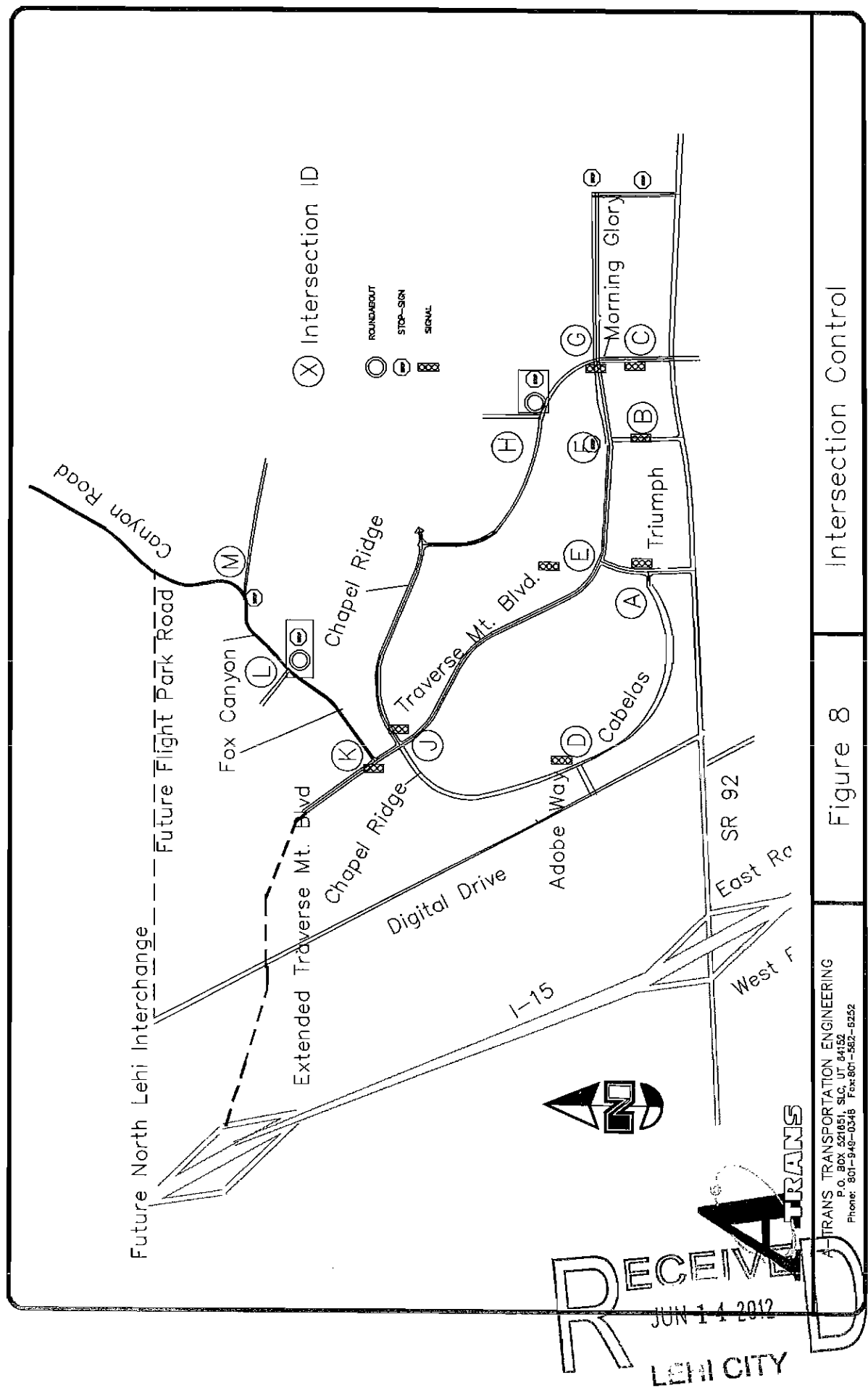
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Estimated Full Development AADT

Figure 7

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Intersection Control

Figure 8

C. Access Analysis

Several accesses and local roads will be located throughout the development along the main roads. These will operate as two-way stop controlled intersections to provide access to the individual residential pods. The spacing recommendations are based on road type. Table 7 shows the recommended minimum spacing between private accesses and public roads based on typical access management guidelines. While these should be used as general guidelines, the mountainous conditions of the Traverse Mountain Development may require exceptions. A minimum 350 feet should be maintained from signalized intersections.

Table 7: Recommended Minimum Spacing Requirements

Road Type	Minor Access	Major Public Road
Arterial	250'	1,320'
Major Collector	150'	1,320'
Minor Collector	150'	660'

D. Queue Analysis

Based on the projected traffic, queue storage length requirements can be determined. The analysis is for the signalized intersections to determine the necessary storage space to accommodate the projected demand. The queue lengths are provided by the Synchro analysis. Once the storage length is determined, this can typically be compared to the available storage length within the provided turn pockets or between intersections. A minimum 50-foot storage at unsignalized intersections and 100 feet at signalized intersection is applied. Table 8 shows the minimum recommended queue storage lengths that should be provided based on the calculation and projected traffic demand.



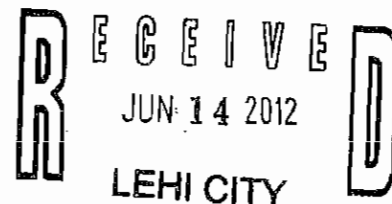
Table 8: Queue Storage Length Requirements

Intersection	Left Lane			
	EBL	WBL	NBL	SBL
A	100'	500'	*350'	100'
C	150'	300'	*300'	150'
D	450'	-	*450'	-
E	-	100'	200'	-
G	100'	200'	200'	100'
H	100'		-	200'
J	100'	100'	*325'	100'
K	100'	-	-	*100'
L	200'	-	-	100'
M	-	100'	100'	-

A minimum of 100 feet is required even if volume does not calculate to need that much storage
 Values represent required length based on projected demand for the 95th percentile.

* indicates dual left turn lanes of this length

At intersection A and C dual north and westbound lefts may be needed. ROW should be preserved but constructing dual turn lanes is not recommended at this time. Intersection D is a restriping for dual north-eastbound left turn once signalized



Key Geometric Needs

Based on this latest modeling, the following geometric needs are recommended to accomplish the operational level of service described in the analysis:

- When dual left-turn lanes are required from northeast-bound Chapel Ridge Road to northwest-bound Traverse Mountain Blvd, Chapel Ridge Road will need to be a four-lane cross section. There currently appears to be approximately 44 feet of pavement in this area, so this improvement may be possible by re-striping as four 11-foot lanes. However, if additional pavement is required (for a wider acceptance lane or a larger radius), some right-of-way may be required from the linear park
- Southbound from the West and Central to Fox Canyon, a free southbound right turn lane is needed with its own acceptance lane. Therefore, Fox Canyon should be a 3-lane facility above (northeast) the West/Central road and a 3-lane facility below until such a time when it will need to be restriped to four lanes. The second downhill lane will be the free SE right turn lane from West/Central Canyon.
- While any of the internal residential intersections can be controlled by a roundabout, the most benefit in placing a roundabout instead of a traffic signal are at the following locations.
 - Morning Glory / East Canyon
 - Fox Canyon / West Canyon
- Saturday traffic determines the necessary geometry for the mid-block Commercial intersections on Triumph and Morning Glory. ROW should be preserved for the possible need for dual northbound left turn lanes at Triumph and Cabelas and at the mid-block commercial intersection on Morning Glory.
- Increase the length of the NBL at Cabelas and Adobe Way. There is a projected 250 feet of queue space needed and only 150 feet is currently available. This will require modifying the landscaped center raised median on Cabelas.



VII. Conclusions

The following summarizes the findings of the traffic analysis for Traverse Mountain in relation to the internal intersections and roadways based on the latest land uses from the August 2011 concept plan. At full development, Traverse Mountain will include 5,812 dwelling units and 3.7 million square feet of commercial/office space. There is an estimated 1,200 units currently occupied/under construction. The commercial and office are planned along the SR 92 corridor between SR 92 and Traverse Boulevard, which parallels SR 92, approximately 1,200 feet to the north. The purpose of the study was to size the internal roadways and intersections based on this latest land use layout.

In the initial development of Traverse Mountain, both the City and developer have requested that the roadways be minimized in order to provide a more residential appealing and pedestrian friendly environment. By providing multiple access points, the traffic flows at any particular point can be accommodated and allow most of the Traverse Mountain Development in the residential areas to primarily utilize 3-lane roadway facilities as requested. Recommended geometry is shown in the study and while the road width should be constructed for the ultimate need, the traffic control will be phased in as signalized intersections are warranted. However, it is prudent to put the underground facilities in when the road is constructed. The projected AADT and road size for each segment throughout the development are also shown in the study. Based on the analysis, the following recommendations should be taken into consideration as the site is developed.

Internal Intersections

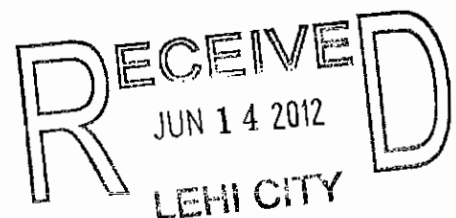
- Internal roads are sized for the development as a whole with roads and intersections operating at a LOS C or better.

The internal roads must conform to Lehi City standards and revert to AASHTO and MUTCD where Lehi design standards are not specified.

Accesses located within 350 feet of the signalized intersections should be limited to right-in / right-out operations, unless additional traffic analysis demonstrates that other access options are available.

For residential locations, a minimum of two accesses should be provided for each pod greater than 50 units. A third access is recommended for units counts above 300.

- Many internal intersections will require future traffic signals as warranted. It is estimated that up to 5 intersections in the residential development will require traffic signals. These locations can utilize roundabouts in lieu of the traffic signals, however, three of them have already been constructed and no right-of-way was preserved. Therefore, the remaining two intersections where roundabouts could be used include:
 - Morning Glory / East Canyon
 - Fox Canyon / West Canyon



- In addition, mid-block signal will likely be necessary for ingress and egress to the commercial and office developments from the connector roads between SR 92 and Traverse Mountain Blvd, similar to the Cabelas Blvd signal on Triumph. Depending on where the density is assigned, dual northbound and westbound left turn lanes may become necessary.

These roadways are planned in the overall Lehi Master Plan but will be constructed at the appropriate time through City funds and/or impact fees. To provide a more conservative analysis, it was assumed these roads may not be in place by the development build-out and therefore the analysis was provided on the controllable infrastructure. If these additional connections do occur, they will further distribute traffic to these new locations:

1. Flight Park Road
2. Traverse Mountain Blvd to Digital Drive
3. Northern interchange on I-15

A sensitivity analysis indicates that with a minimum 8% internal capture, all intersection function at a LOS C or better.

Flight Park Road would carry a minimal traffic load, supporting less than 300 units indicating less than 2,000 vehicles a day. Traverse Mountain Blvd. connection is prudent once the northern interchange is constructed as that would represent a shift in internal traffic to the north. Until then, it provides little infrastructure support and traffic relieve.

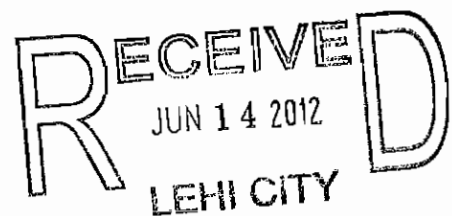


Table 9: Roadway Sizing

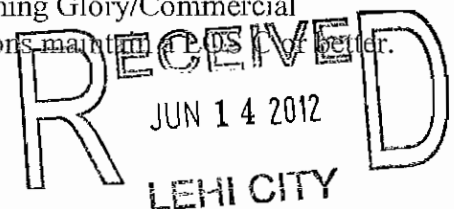
Roadway	Roadway	Section	# lanes	Projected AADT	ADT for LOS C	LOS C	Projected LOS
					Cap	v/c	
Arterial	Triumph	SR 92 to Traverse	5	21,000	26500	79%	C
Arterial	Road B	SR 92 to Traverse	5	10,000	26500	38%	B
Arterial	Morning Glory	SR 92 to Traverse	5	17,000	26500	64%	B
Collector	Road D	SR 92 to Traverse	3	2,500	10000	25%	A
Collector	Traverse	Road D to Triumph	3	5,500	10000	55%	B
Arterial	Traverse	Triumph to Chapel	3	9,500	10000	95%	C
Collector	Fox Canyon	Above West/Central Canyon Road	3	5,000	10000	50%	B
Collector	Fox Canyon	Below West/Central Canyon Road	3/4	11,000	10K/19K	58%	B
Collector	Homestead/Greyhawk	Above Traverse Mountain	2	2,500	9000	27%	A
Collector	Chapel Ridge	East of Traverse Mountain	3	3,000	10000	30%	B
Arterial	Cabelas	Between Triumph and Adobe	5	10,000	26500	38%	B
Arterial	Adobe	Southwest of Cabelas	5	23,000	26500	87%	C

Based on assumed average ITE trip rates and internal traffic capture

The future residential traffic is likely to use Adobe and Morning Glory based on the proposed infrastructure layout. The commercial traffic will be distributed between the 4 entrances of Adobe, Triumph, Morning Glory and Road B (a SR 92 intersection located between Triumph and Morning Glory). All intersections and roadways are projected to operate at a LOS C or better at full-build conditions. It should be noted that the roadways are anticipated to be built to their full width during construction. The only current roadway that is not built to the recommended width is Fox Canyon. That current roadway can support 900 equivalent single family homes and still maintain a LOS C.

As modeled in this traffic study, all intersections and roadways within the Traverse Mountain at build-out operate at a LOS C or better until Central and West Canyons develop to the 90% level, then Chapel / Traverse Mountain will function at a LOS C after the capacity improvements or additional access is provided.

A sensitivity analysis was completed and if all traffic was assumed to leave the site, with no internal traffic, then once West and Central Canyons reach 1,350 units (90% of proposed development), the LOS at Chapel /Traverse drops to a LOS D and an alternative connection, or a restriping of this area is needed to again maintain a LOS C. Similarly, assuming no internal traffic capture, the main commercial intersections at A, C and D drop to a LOS D on the Saturday peak. This includes the Cabelas/Adobe, Cabelas/Triumph, Morning Glory/Commercial Intersections. With the internal capture rate of 8%, all intersections maintain a LOS C or better.

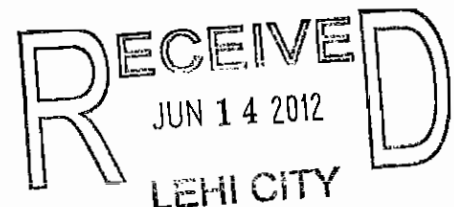


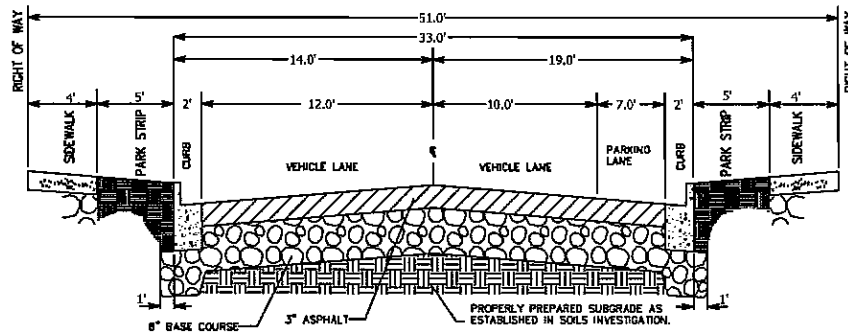
The Chapel / Traverse intersection is the critical intersection for the residential community. It is recommended that this intersection be monitored to identify when the intersection will need signalization and restriping.

External Intersections

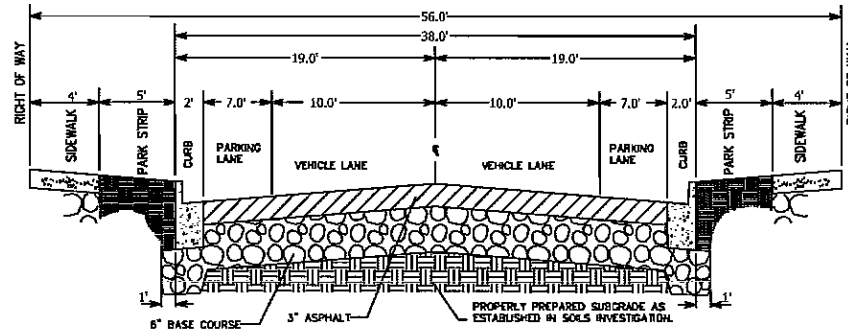
This study was specific to the internal intersections of Traverse Mountain. In response to City requests, some comparison analysis was provided for some of the external intersections. Adobe is developing on the western boundary of Traverse Mountain and will share capacity at Digital Drive and Adobe Way. The evaluation of the 2030 conditions of this intersection with Traverse Mountain in place at full build-out, indicates that the intersection will operate at a LOS B, with 11.3 seconds of average delay per vehicle in the PM peak period. This is due primarily to the free right turn lane onto Adobe Way from Digital Drive. In the AM peak, it's projected to be a LOS A. By adding the Adobe Traffic from the Horrocks September 2010 Traffic Study, Figure 7, only 80 AM and 106 PM peak vehicles are added to the Adobe Drive. The primary traffic is sent further north on Digital Drive. In the critical PM peak, the intersection still maintains a LOS B with an average vehicle delay of 13.4 seconds per vehicle.

Figure 10 of the SR 92 Environmental Assessment indicates the projected turning movements at each of the SR 92 intersections along the Traverse Mountain frontage. According to the EA projections, Triumph will experience 2,155 vph, our projections indicate this will be 2,095 vph. At Morning Glory, the SR 92 EA projects 1,320 which our projections indicate 2,816 vph. The other locations are under 1,000 vph as we've also projected. Morning Glory is the largest difference and our projections are the more conservative ones based on more detailed information than was likely available to the Environmental Assessment team. .

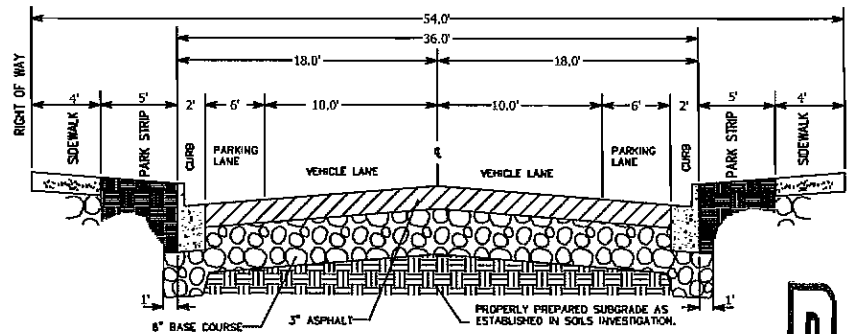




(A) TYPICAL LOCAL STREET W/PARKING ONE SIDE (A)
NOT TO SCALE

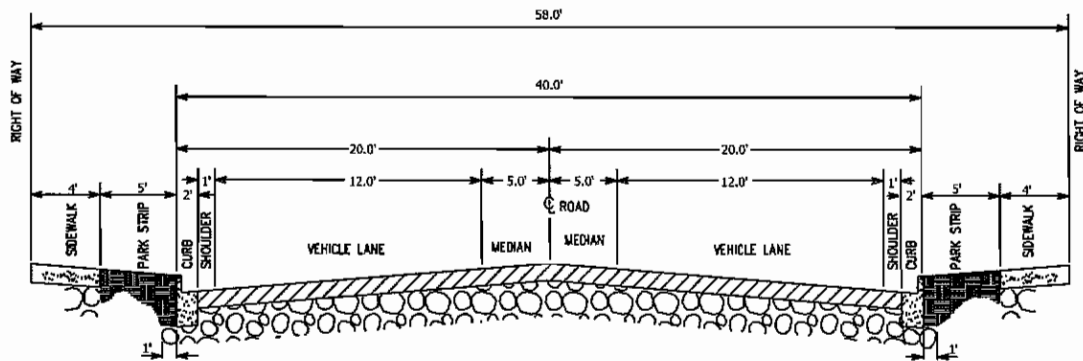


(B) TYPICAL LOCAL STREET W/PARKING BOTH SIDES (B)
NOT TO SCALE

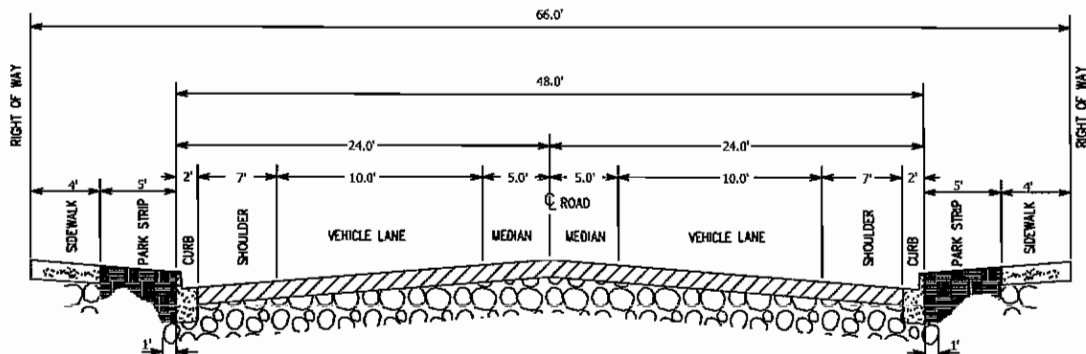


(C) TYPICAL NEIGHBORHOOD COLLECTOR (C)
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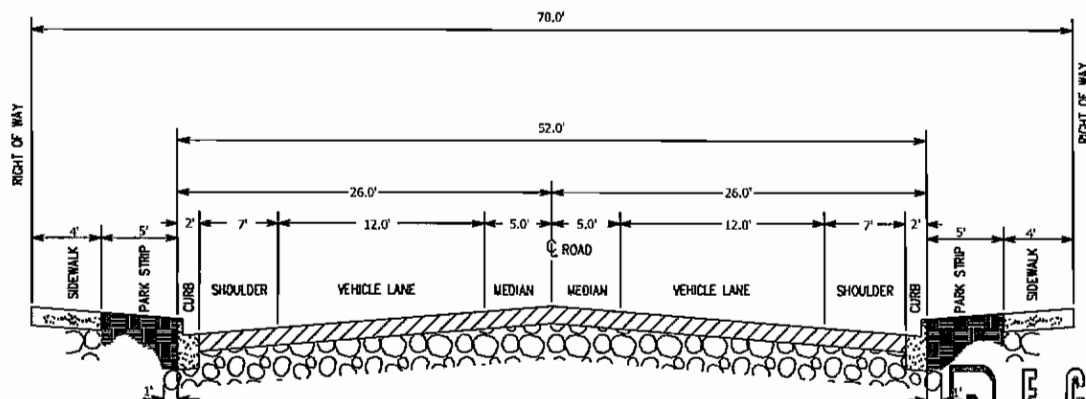
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ⓓ TYPICAL MINOR COLLECTOR ⓓ
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ⓔ TYPICAL MAJOR COLLECTOR ⓔ
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ⓕ TYPICAL MINOR ARTERIAL ⓕ
NOT TO SCALE

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ENGINEERING, INC.

Office: (801) 372-4100 Fax: (801) 372-4179
275 East 700 South, Suite 100, Salt Lake City, UT 84119

DESIGNED BY: J.M. SIVERS
CHECKED BY: J.M. SIVERS
DRAWN BY: M.W. BROWN
DATE: 06-28-2012

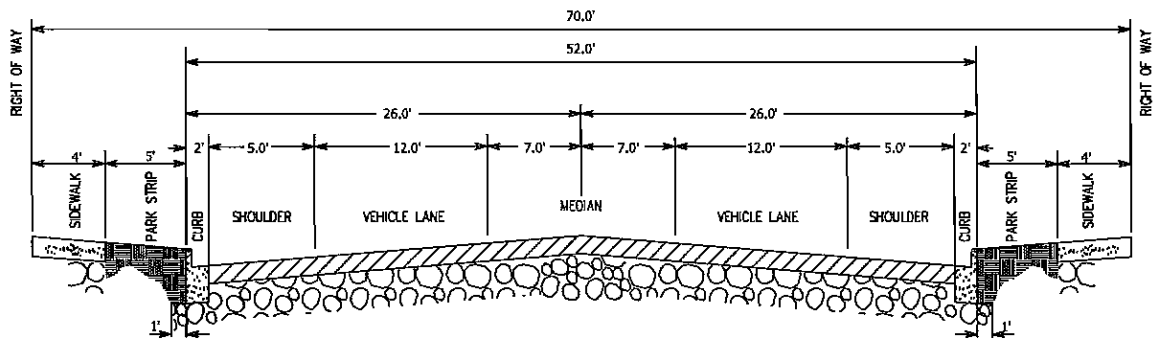
TRAVERSE MOUNTAIN AREA PLAN TYPICAL ROAD SECTIONS

PROJECT NO.

2010.037

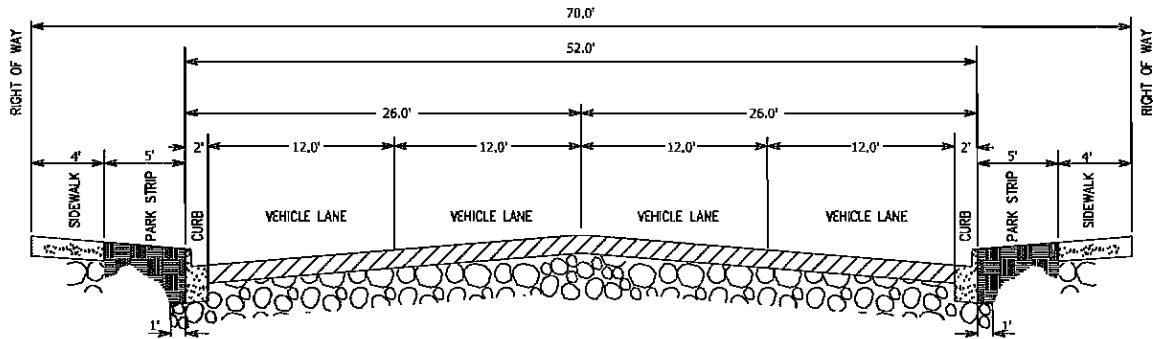
SHEET NO.

2

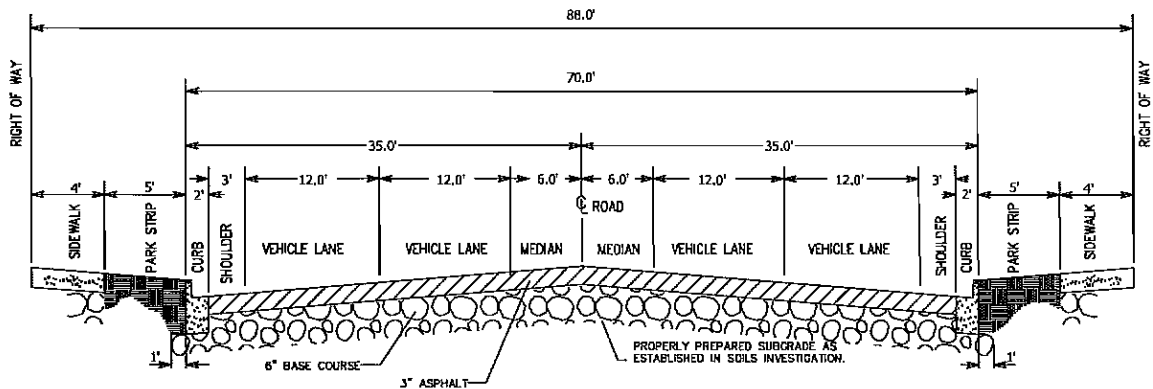


(GA) TYPICAL MINOR ARTERIAL (GA)
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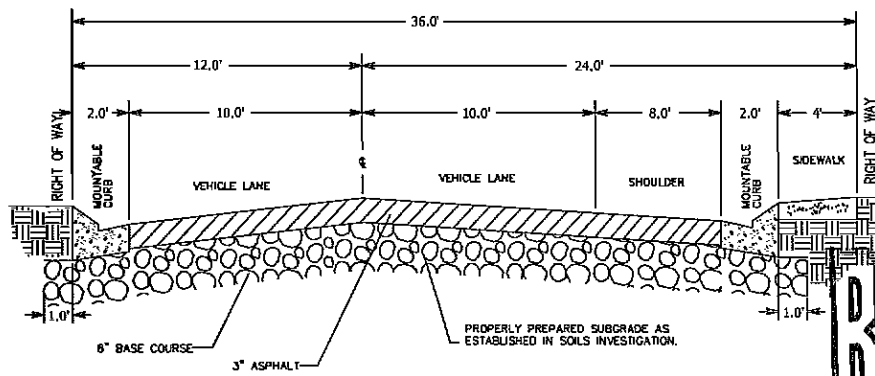
NOTE: RE-STRIPPING OF FOX CANYON RD TO A 4-LANE ROAD (BETWEEN TRAVERSE MOUNTAIN BLVD. & WEST CANYON ACCESS ROAD) WILL BE NECESSARY AT FULL BUILDOUT TO PROVIDE FOR ADEQUATE TRAFFIC CAPACITY.



(GB) TYPICAL MINOR ARTERIAL (GB)
NOT TO SCALE

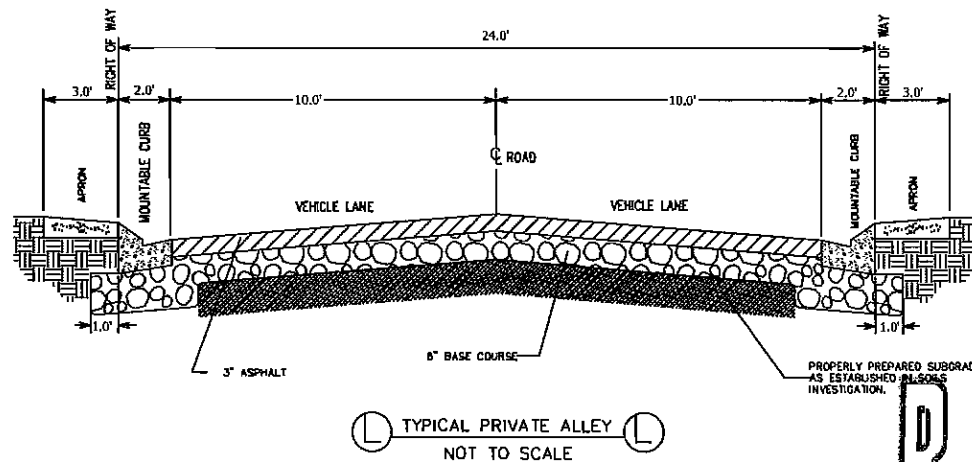
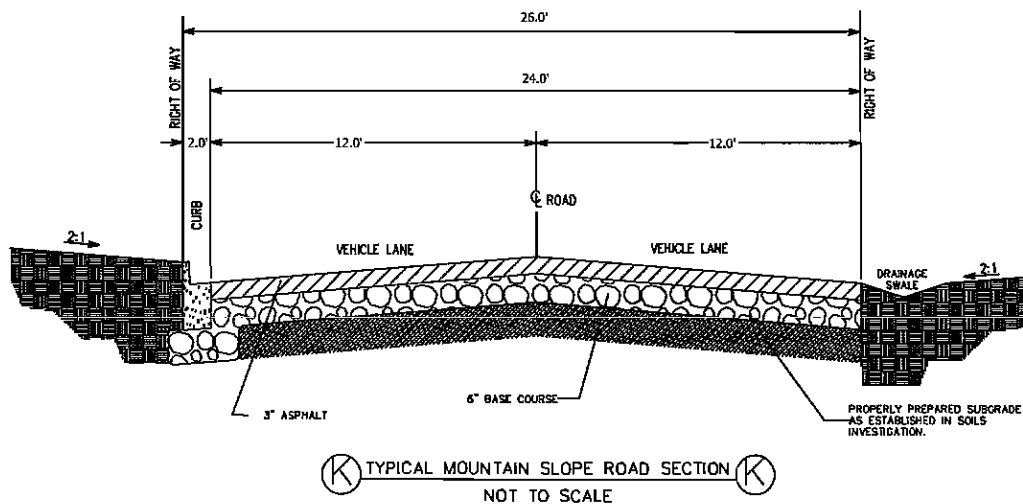
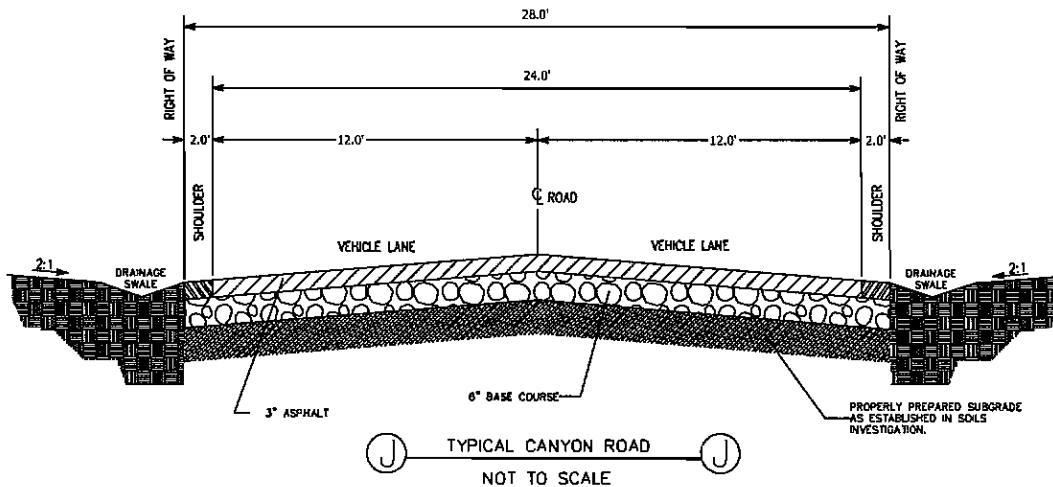


(H) TYPICAL PRINCIPLE ARTERIAL (H)
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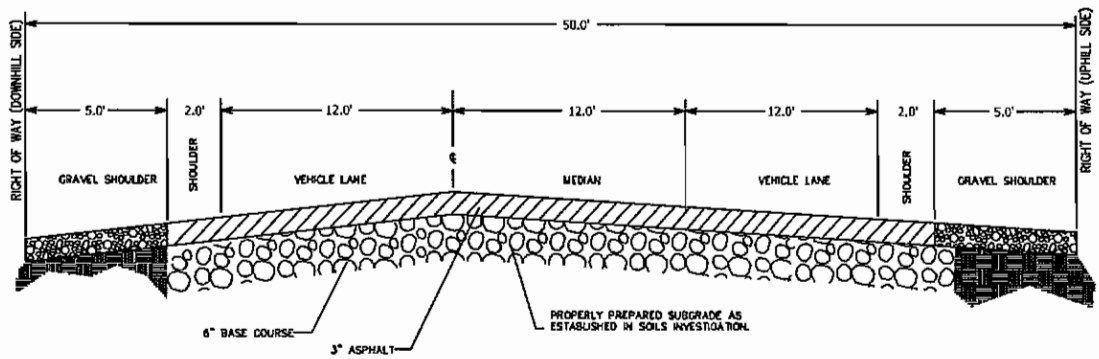


(I) TYPICAL PRIVATE STREETS WITH PARKING ONE-SIDE (I)
NOT TO SCALE

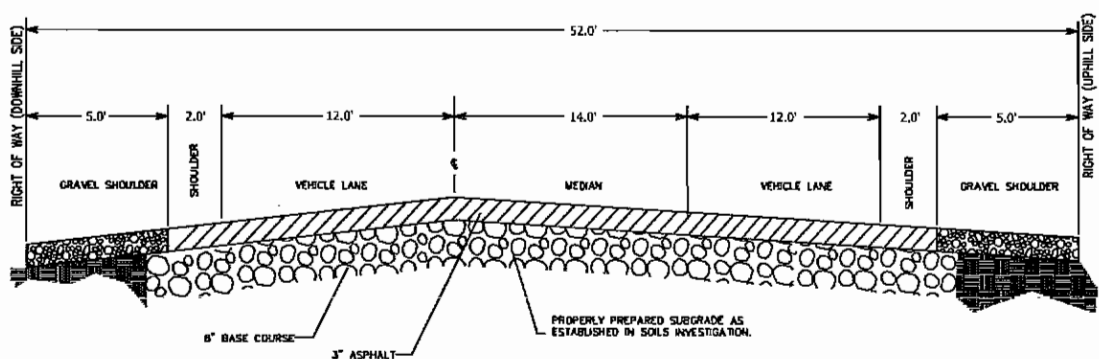
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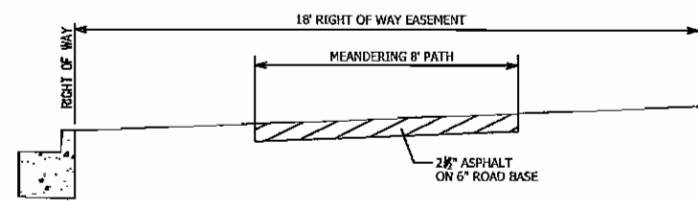
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Ⓜ FLIGHT PARK ROAD Ⓜ
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Ⓝ FRONTAGE ROAD Ⓝ
NOT TO SCALE



OPTION TWO (8' PATH)
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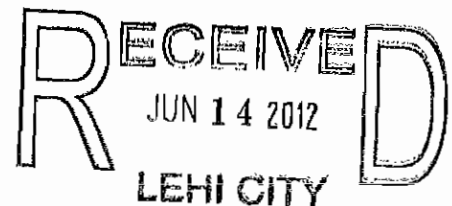
Prepared by: J.M. MYERS
Checked by: J.M. MYERS
Designed by: M.W. DRYDEN
Date: 6-15-2012

TRAVERSE MOUNTAIN AREA PLAN
TYPICAL ROAD SECTIONS

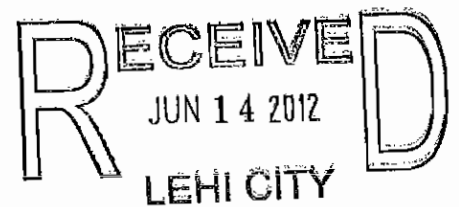
PROJECT NO.
2010.037
SHEET NO.
5

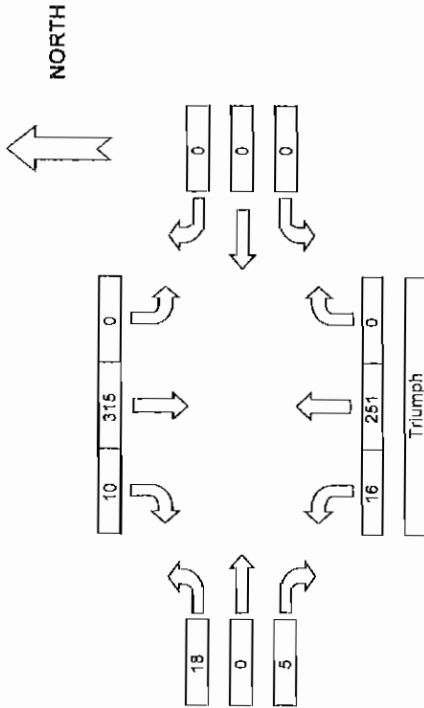
APPENDICES

Appendix A	Traffic Counts and Projections
Appendix B	Intersection Analyzes
Appendix C	Sensitivity Analysis
Appendix D	Chapel to Fox Canyon Connector



Appendix A Traffic Counts and Projections





COUNT DATA INPUT:															Name: Kory			Name: Kory			Name: Kory			Name:		
TIME PERIOD		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL 5'		TOTAL 15'										
FROM:	TO:	NBL	NBT	NBR	EBL	EBT	EBR	SBL	SST	SBR	WBL	WBT	WBR	TOTAL 5' VOLUMES	TOTAL 15' VOLUMES											
7:00 AM	7:05 AM	1	7		0		2	2	23	0				33	86											
7:05 AM	7:10 AM		8		0		2			13				24	76											
7:10 AM	7:15 AM	0	6		0		1		21	1				29	77											
7:15 AM	7:20 AM	0	6		0		0		17	0				23	86											
7:20 AM	7:25 AM	0	9		0		1		15	0				25	97											
7:25 AM	7:30 AM	0	13		0		0		25	0				38	103											
7:30 AM	7:35 AM	0	8		0		1		25	0				34	104											
7:35 AM	7:40 AM	1	3		1		1		25	0				31	100											
7:40 AM	7:45 AM	1	16		0		0		22	0				39	111											
7:45 AM	7:50 AM	2	14		0		0		14	0				30	113											
7:50 AM	7:55 AM	3	13		3		1		20	2				42	136											
7:55 AM	8:00 AM	1	20		2		1		17	0				41	143											
8:00 AM	8:05 AM	1	36		1		0		15	0				53	209											
8:05 AM	8:10 AM	2	24		5		0		18	0				49	226											
8:10 AM	8:15 AM	0	43		3		0		58	3				107	236											
8:15 AM	8:20 AM	2	22		1		1		43	1				70	179											
8:20 AM	8:25 AM	1	28		1		0		27	2				59	153											
8:25 AM	8:30 AM	4	22		0		0		26	1				50	121											
8:30 AM	8:35 AM	1	10		1		1		30	1				44	101											
8:35 AM	8:40 AM	1	4		1		0		19	2				37	90											
8:40 AM	8:45 AM	2	8		0		0		19	1				30	93											
8:45 AM	8:50 AM	2	8		0		0		23	0				33	0											
8:50 AM	8:55 AM	2	12		2		2		12	0				30	60											
8:55 AM	9:00 AM	0	13		0		0		17	0				30	30											

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A diagram of a 3D coordinate system. The vertical axis is labeled 'Triumph'. The horizontal axis has labels 7, 164, and 0. The depth axis has labels 20, 290, and 0. A large arrow points North. The origin is marked with a 0. The axes are represented by lines with arrows at the ends.

PK HR VOLUME: 553
PHF: 0.88
PEAK HOUR:
FROM: 4:35 PM TO: 5:35 PM

INTERSECTION: Triumph
N-S STREET: Grand Terrace
E-W STREET:

COUNT DATE: August 30, 2011
Day of the Week: Tuesday

Grand Terrace

COUNT TIME:
FROM: 4:00 PM
TO: 6:00 PM

[illegible]

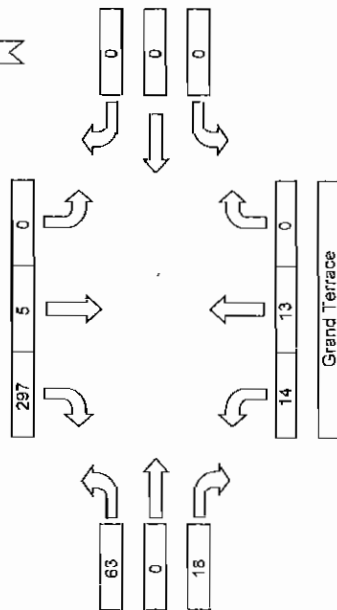
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Cycle Length	90
	124
	116

INTERSECTION: Grand Terrace
N-S STREET: Cabelas
E-W STREET:

COUNT DATE: August 25, 2011
Day of the Week: Thursday

COUNT TIME:
FROM: 7:00 AM
TO: 9:00 AM

[illegible]

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D

D

		Acres	DU	SF	Town	Apart	Retail	Office	Hotel	Sit Down
Existing	Homes		1900	1434	122	344				
	Cabelas	31.7					?			
Total		31.7	1900	1434	122	344	0	0	0	0
Frontage	HC	11.2					112000			
	Garden Office	21.8						218000		
	Retail Plaza	5					50000			
	Outlet Center	35.5					370322			
	Hotel	2.5							300	
	Restaurant	14.8								23700
	Commercial	114.6					1146000			
	Flex Commercial	27.3					273000			
	Perry Homes	153.9	968	425	543					
Total		386.6	968	425	543	0	1951322	218000	300	23700
East Canyon	C1 MDR	14.4	64	64						
	D1 HDR1	8.5	68			68				
	D2 MDR	3.2	19		19					
	D3 MDR	13.6	65	65						
	D5 MDR	12.5	73		73					
	B HDR3	9	135			135				
	A3 HDR	3.2	58			58				
	A1 HDR	10	180			180				
	A2 HDR	10.1	202			202				
	E LDR	78.6	50	50						
Total		163.1	914	179	92	643	0	0	0	0
Central Canyon	Flex A-H	84	500	250	250					
	L	4	80			80				
	K1	12.5	225			225				
	J1	7.9	79			79				
	I1	12.9	141			141				
Total		121.3	1025	250	250	525	0	0	0	0
West Canyon	Q1	11	176			176				
	R1	5.7	103			103				
	S1	8.7	44		44					
	S2	7.6	61			61				
	P1	10.3	41	41						
	P3	3.2	16	16						
	O1	1.9	10		10					
	O2	3.2	16		16					
	N1	6.5	78			78				
	N2	7	56			56				
Total		65.1	601	57	70	474	0	0	0	0
Medium Density	MDR	7.9	14	14						
	MDR	18.9	34	34						
	MDR	9.8	51		51					
	MDR	3.3	6	6						
	MDR		3	3						
Total		39.9	108	57	51	0	0	0	0	0
High Density	HDR	6.7	64			64				
	HDR	23.8	180			180				
	HDR	14.5	176			176				
	HDR	6.5	66			66				
	HDR	8.8	24			24				
Total		60.3	510	0	0	510				
Total			4126	543	463	2152	1951322	218000	300	23700

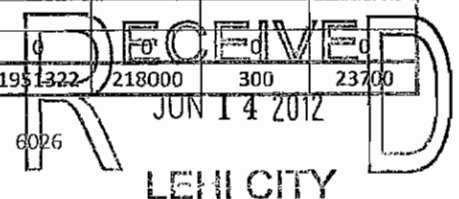
6026

2402

1128

2496

6026



	Size	Land Use	Trip Rate				Saturday	AM	PM	Trips		Daily	Saturday	Internal (disappear)			AM
			AM	PM	Saturday Peak	Daily				Sat Peak	AM			PM	Saturday		
East	2000																
	179	210	0.75	1.01	0.94	9.57	10.1	134	181	168	1713	1808	20%	20%	20%	107	
	736	230	0.44	0.52	0.47	5.86	5.67	323	382	345	4307	4167	20%	20%	20%	259	
West																	
	57,000	210	0.75	1.01	0.94	9.57	10.1	43	58	54	545	576	20%	20%	20%	34	
	544,000	230	0.44	0.52	0.47	5.86	5.67	239	283	256	3188	3084	20%	20%	20%	191	
Central																	
	250,000	210	0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	-
	775,000	230	0.44	0.52	0.47	5.86	5.67	188	263	235	2393	2525	20%	20%	20%	150	
Total																	
	218,000	710	1.55	1.49	0.41	11.01	2.37	338	325	89	2400	517	20%	20%	20%	273	
			0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	338
Total																	
	2758,000						Total	1,608	1,984	1,512	19,088	17,071				1,352	

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Vehicles		In / Out %				Land Use		New Traverse				New External				Sat OUT			
PM	Saturday	AM IN	AM Out	PM IN	PM OUT	Sat IN	Sat OUT	AM IN	AM Out	PM IN	PM OUT	Sat IN	Sat OUT	AM IN	AM Out	PM IN	PM OUT	Sat IN	Sat OUT
145	135	25%	75%	63%	37%	50%	50%	27	80	91	54	68	68	16	48	55	32	41	41
305	275	17%	83%	67%	33%	50%	50%	44	215	205	101	138	138	26	129	123	61	83	83
-	-	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0	0	0	0	0
-	-	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0	0	0	0	0
45	43	25%	75%	63%	37%	54%	46%	9	26	29	17	23	20	7	20	23	14	19	16
225	205	17%	83%	67%	33%	54%	46%	32	159	151	75	111	94	32	159	151	75	111	94
-	-	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0	0	0	0	0
-	-	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0	0	0	0	0
-	-	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0	0	0	0	0
202	188	25%	75%	63%	37%	50%	50%	38	113	127	75	94	94	26	79	89	52	66	66
322	291	17%	83%	67%	33%	54%	46%	46	227	216	106	157	134	21	102	97	48	71	60
-	-	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0	0	0	0	0
325	89	88%	12%	17%	83%	54%	46%	59	8	11	54	10	8	238	32	44	216	38	33
-	-	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0	0	0	0	0
-	-	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0	0	0	0	0
1,572	1,227							255	826	831	481	601	555	366	569	582	498	429	393
Total																			

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	Size	Land Use	Trip Rate			AM	PM	Saturday	Trips Sat Peak	Daily	Saturday	Internal (disappear)			AM
			AM	PM	Daily							AM	PM	Saturday	
Fox	2000														
SF	9	210	0.75	1.01	9.57	10.1	9	86	8	299	91	20%	20%	20%	5
MF	51	230	0.44	0.52	5.86	5.67	27	24	24	289	289	20%	20%	20%	18
MF Morning	48,000	230	0.44	0.52	5.86	5.67	25	23	23	281	272	20%	20%	20%	17
MF Morning	244,000	230	0.44	0.52	5.86	5.67	127	115	115	1430	1383	20%	20%	20%	86
MF Fox	286,000	230	0.44	0.52	5.86	5.67	138	125	125	1559	1508	20%	20%	20%	94

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Vehicles		Land Use						New Traverse						New External						
PM	Saturday	AM IN	AM Out	PM IN	PM OUT	In / Out %	Sat IN	Sat OUT	AM IN	AM Out	PM IN	PM OUT	Sat IN	Sat OUT	AM IN	AM Out	PM IN	PM OUT	Sat IN	Sat OUT
7	7	25%	75%	63%	37%	50%	50%	50%	1	4	4	3	4	4	1	2	3	2	2	2
21	19	17%	83%	67%	33%	50%	50%	50%	3	15	14	7	10	10	2	9	8	4	6	6
-	-	0%	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0	0	0	0	0
-	-	0%	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0	0	0	0	0
20	16	17%	83%	67%	33%	54%	54%	46%	3	14	13	7	10	8	2	11	11	5	8	7
102	92	17%	83%	67%	33%	54%	54%	46%	15	71	66	34	50	42	15	71	68	34	50	42
111	100	17%	83%	67%	33%	54%	54%	46%	16	78	74	37	54	46	16	78	74	37	54	46

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	Size	Land Use	Trip Rate				AM	PM	Trips Sat Peak	Daily	Saturday	Internal (disappear)				AM
			AM	PM	Saturday Peak	Daily						AM	PM	Saturday	AM	
Perry	2000		0	0	0	0	0	0	0	0	0	20%	20%	0	20%	-
North			0.44	0.52	0.47	5.86	125	147	133	1658	1605	20%	20%	1605	20%	100
MF	283	230														-
SF	425,000	210	0.75	1.01	0.94	9.57	319	429	400	4067	4293	20%	20%	4293	20%	255
MF	260,000	230	0.44	0.52	0.47	5.86	114	135	122	1524	1474	20%	20%	1474	20%	92

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Vehicles PM	Saturday	In / Out %				Land Use		New Traverse				New External							
		AM IN	AM Out	PM IN	PM OUT	Sat IN	Sat OUT	AM IN	AM Out	PM IN	PM OUT	Sat IN	Sat OUT	AM IN	AM Out	PM IN	PM OUT	Sat IN	Sat OUT
-	-	0%	0%	0%	0%	50%	50%	0	0	0	0	0	0	0	0	0	0	0	0
118	106	17%	83%	67%	33%	50%	50%	17	83	79	39	53	53	10	50	47	23	32	32
-	-	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0	0	0	0	0
-	-	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0	0	0	0	0
343	320	25%	75%	53%	37%	54%	45%	64	191	216	127	173	147	51	153	173	102	138	118
108	98	17%	83%	67%	33%	54%	45%	16	76	72	36	53	45	16	76	72	36	53	45

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Appendix B Intersection Analyzes



Timings

7: Triumph Blvd &

Int A

9/23/2011

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SEB	SEB	SEB
Lane Configurations	↖	↑	↗	↖	↑	↗	↖	↑	↗	↖	↑	↗
Volume (vph)	20	30	180	60	30	20	288	251	110	31	263	31
Turn Type	Perm		pm+ov	Perm		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases		4	5		8		6	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	5	8	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	20.0	20.0	10.0	20.0	20.0	20.0	10.0	22.0	22.0	8.0	20.0	20.0
Total Split (%)	40.0%	40.0%	20.0%	40.0%	40.0%	40.0%	20.0%	44.0%	44.0%	16.0%	40.0%	40.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lead				Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?			Yes				Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	Max	None	Max	Max
Act Effct Green (s)	7.3	7.3	12.9	7.4	7.4	7.4	27.3	28.1	28.1	21.5	17.4	17.4
Actuated g/C Ratio	0.19	0.19	0.34	0.19	0.19	0.19	0.71	0.73	0.73	0.56	0.45	0.45
v/c Ratio	0.07	0.09	0.30	0.21	0.09	0.07	0.41	0.11	0.10	0.05	0.17	0.05
Control Delay	14.3	14.4	2.9	15.7	14.4	7.8	5.5	4.7	2.2	4.0	8.4	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.3	14.4	2.9	15.7	14.4	7.8	5.5	4.7	2.2	4.0	8.4	4.4
LOS	B	B	A	B	B	A	A	A	A	A	A	A
Approach Delay		5.4			13.9			4.6			7.6	
Approach LOS		A			B			A			A	

Intersection Summary

Cycle Length: 50

Actuated Cycle Length: 38.5

Natural Cycle: 50

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.41

Intersection Signal Delay: 6.3

Intersection LOS: A

Intersection Capacity Utilization 43.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 7: Triumph Blvd &

01	02	04
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Timings

30: Morning Glory Rd &

Int c

9/23/2011



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	30	60	70	30	19	110	190	120	20	823	20
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	8.0	20.0	20.0	8.0	20.0	20.0	8.0	24.0	24.0	8.0	24.0	24.0
Total Split (%)	13.3%	33.3%	33.3%	13.3%	33.3%	33.3%	13.3%	40.0%	40.0%	13.3%	40.0%	40.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Min	Min	None	Min	Min
Act Effct Green (s)	7.9	7.0	7.0	9.2	9.6	9.6	25.9	27.9	27.9	24.6	25.3	25.3
Actuated v/c Ratio	0.20	0.17	0.17	0.23	0.24	0.24	0.65	0.70	0.70	0.61	0.63	0.63
v/c Ratio	0.07	0.10	0.20	0.22	0.07	0.05	0.28	0.09	0.12	0.03	0.39	0.02
Control Delay	13.4	19.8	8.3	14.6	16.4	9.3	7.1	6.6	2.7	5.7	10.2	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.4	19.8	8.3	14.6	16.4	9.3	7.1	6.6	2.7	5.7	10.2	5.2
LOS	B	B	A	B	B	A	A	A	A	A	B	A
Approach Delay		12.4			14.2			6.6			9.9	
Approach LOS		B			B			A			A	

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 40.1

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.39

Intersection Signal Delay: 9.3

Intersection LOS: A

Intersection Capacity Utilization 49.4%

ICU Level of Service A

Analysis Period (min): 15

Splits and Phases: 30: Morning Glory Rd &

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ø5	ø6	ø7	ø8
ø9	ø10	ø11	ø12

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Timings

15: Chapel Ridge & Cabella's Drive

Int D

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Lane Group	SEF	SEB	NWT	NWLT	NEE
Lane Configurations	↑	↑	↑	↑↑	↑↑
Volume (vph)	20	814	112	20	287
Turn Type		Free	pm+pt		
Protected Phases	6		5	2	4
Permitted Phases		Free	2		
Detection Phase	6		5	2	4
Switch Phase					
Minimum Initial (s)	4.0		4.0	4.0	4.0
Minimum Split (s)	20.0		8.0	20.0	20.0
Total Split (s)	21.0	0.0	8.0	29.0	21.0
Total Split (%)	42.0%	0.0%	16.0%	58.0%	42.0%
Yellow Time (s)	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5		0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag		Lead		
Lead-Lag Optimize?	Yes		Yes		
Recall Mode	Min		None	Min	None
Act Effct Green (s)	6.3	27.3	10.4	10.4	8.5
Actuated g/C Ratio	0.23	1.00	0.38	0.38	0.31
v/c Ratio	0.05	0.56	0.26	0.02	0.43
Control Delay	11.2	1.4	7.2	5.3	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	11.2	1.4	7.2	5.3	6.4
LOS	B	A	A	A	A
Approach Delay	1.7			6.9	6.4
Approach LOS	A			A	A

Intersection Summary

Cycle Length: 50
 Actuated Cycle Length: 27.3
 Natural Cycle: 50
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.56
 Intersection Signal Delay: 8.7
 Intersection LOS: A
 Intersection Capacity Utilization 33.2%
 ICU Level of Service A
 Analysis Period (min): 15

Splits and Phases: 15: Chapel Ridge & Cabella's Drive

02	04
05	06

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Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Volume (vph)	130	325	90	210	269	120
Turn Type		Perm	Perm			Perm
Protected Phases	4			8	2	
Permitted Phases		4	8			2
Detector Phase	4	4	8	8	2	2
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None	None	Max	Max
Act Effct Green (s)	9.5	9.5	9.5	9.5	17.0	17.0
Actuated v/c Ratio	0.28	0.28	0.28	0.28	0.49	0.49
v/c Ratio	0.28	0.51	0.29	0.45	0.33	0.15
Control Delay (s)	10.5	4.4	11.4	12.7	7.6	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.5	4.4	11.4	12.7	7.6	2.3
LOS	B	A	B	B	A	A
Approach Delay	6.1			12.3	5.9	
Approach LOS	A			B	A	

Intersection Summary

Cycle Length: 40

Actuated Cycle Length: 34.5

Natural Cycle: 40

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.51

Intersection Signal Delay: 7.7









Intersection LOS: A

Intersection Capacity Utilization 36.7%

ICU Level of Service A

Analysis Period (min): 15

Splits and Phases: 9: Traverse Mountain Blvd &

 02	 04
 20	 20
 02	 08
 20	 20

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Timings

54: Traverse Mountain Blvd &

Int G

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	30	83	268	30	30	20	133	79	30	512	30
Turn Type	Perm		Perm	Perm		Perm	Perm		Perm	custom		custom
Protected Phases		4			8			2				
Permitted Phases	4		4	8		8	2		2	6	6	6
Detector Phase	4	4	4	8	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	25.0	25.0	25.0	25.0	25.0	25.0
Total Split (%)	44.4%	44.4%	44.4%	44.4%	44.4%	44.4%	55.6%	55.6%	55.6%	55.6%	55.6%	55.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	Min	Min	Min	Min	Min	Min
Act Effct Green (s)	12.6	12.6	12.6	12.6	12.6	12.6	18.9	18.9	18.9	18.9	18.9	18.9
Actuated g/C Ratio	0.32	0.32	0.32	0.32	0.32	0.32	0.48	0.48	0.48	0.48	0.48	0.48
v/c Ratio	0.08	0.06	0.16	0.67	0.06	0.06	0.08	0.09	0.11	0.06	0.63	0.04
Control Delay	10.0	9.6	3.9	20.2	9.6	4.8	7.5	6.6	2.5	6.9	12.4	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.0	9.6	3.9	20.2	9.6	4.8	7.5	6.6	2.5	6.9	12.4	3.2
LOS	A	A	A	C	A	A	A	A	A	A	B	A
Approach Delay		6.4			17.8			5.3			11.6	
Approach LOS		A			B			A			B	

Intersection Summary

Cycle Length: 45
 Actuated Cycle Length: 39.6
 Natural Cycle: 45
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.67
 Intersection Signal Delay: 11.5
 Intersection Capacity Utilization 56.9%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service B

Splits and Phases: 54: Traverse Mountain Blvd &

02	04
06	08

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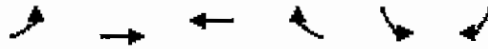
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HCM Unsignalized Intersection Capacity Analysis

2: Int

Int H

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Movement	EBL	EBT	WBL	WBR	SEB	SEB
Lane Configurations	↰	↑	↑	↰	↰	↰
Volume (veh/h)	30	132	44	89	380	30
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	143	48	97	413	33
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						6
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)			907			
pX, platoon unblocked						
VC, conflicting volume	145				257	48
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	145				257	48
IC, single (s)	4.1				6.4	6.2
IC, 2 stage (s)						
IF (s)	2.2				3.5	3.3
p0 queue free %	98				42	97
cM capacity (veh/h)	1438				716	1021

Direction Lane #	EB 1	EB 2	WB 1	WB 2	SE 1
Volume Total	33	143	48	97	446
Volume Left	33	0	0	0	413
Volume Right	0	0	0	97	33
cSH	1438	1700	1700	1700	772
Volume to Capacity	0.02	0.08	0.03	0.06	0.58
Queue Length 95th (ft)	2	0	0	0	94
Control Delay (s)	7.6	0.0	0.0	0.0	16.1
Lane LOS	A				C
Approach Delay (s)	1.4		0.0		16.0
Approach LOS					C

Intersection Summary	
Average Delay	9.7
Intersection Capacity Utilization	36.0%
Analysis Period (min)	15
ICU Level of Service	A

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Timings

19: Traverse Mountain & Morning Glory Rd

Int J

6/12/2012

Lane Group	SEL	SET	SEB	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations		↖	↗	↖	↗	↖	↗	↖	↗
Volume (vph)	20	50	711	20	20	196	32	22	95
Turn Type	Perm		Perm	Perm		Prot		Perm	
Protected Phases		6			2	7			8
Permitted Phases	6		6	2			4	8	
Detector Phase	6	6	6	2	2	7	4	8	8
Switch Phase									
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	40.0	20.0	20.0
Total Split (%)	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	66.7%	33.3%	33.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						Lead		Lag	Lag
Lead-Lag Optimize?									
Recall Mode	Min	Min	Min	Min	Min	None	None	None	None
Act Effect Green (s)		16.2	16.2	16.2	16.2	8.3	14.7	8.0	8.0
Actuated g/C Ratio		0.45	0.45	0.45	0.45	0.23	0.41	0.22	0.22
v/c Ratio		0.10	0.68	0.04	0.10	0.27	0.07	0.06	0.29
Control Delay		11.3	5.5	11.4	6.1	14.7	4.6	14.9	14.7
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		11.3	5.5	11.4	6.1	14.7	4.6	14.9	14.7
LOS		B	A	B	A	B	A	B	B
Approach Delay		6.0			7.3		12.8		14.7
Approach LOS		A			A		B		B

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 35.8

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 8.4

Intersection Capacity Utilization 64.4%

Analysis Period (min) 15

Intersection LOS: A

ICU Level of Service C

Splits and Phases: 19: Traverse Mountain & Morning Glory Rd

↖ 20 s	↗ 40 s	↖ 20 s	↗ 20 s
↖ 20 s	↗ 20 s	↖ 20 s	↗ 20 s

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Timings

34: Fox Canyon & Traverse Mountain

Intk

6/12/2012

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Volume (vph)	570	20	20	161	64	132
Turn Type		Perm	Perm			Perm
Protected Phases	8			6	2	
Permitted Phases		8	6			2
Detector Phase	8	8	6	6	2	2
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	Min	Min	Min	Min
Act Effct Green (s)	10.4	10.4	8.0	8.0	8.0	8.0
Actuated g/C Ratio	0.39	0.39	0.30	0.30	0.30	0.30
v/c Ratio	0.45	0.03	0.06	0.31	0.13	0.25
Control Delay	7.3	3.1	7.9	9.5	8.1	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.3	3.1	7.9	9.5	8.1	3.4
LOS	A	A	A	A	A	A
Approach Delay	7.2			9.4	4.9	
Approach LOS	A			A	A	

Intersection Summary

Cycle Length: 40

Actuated Cycle Length: 26.6

Natural Cycle: 40

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.45

Intersection Signal Delay: 7.1

Intersection Capacity Utilization 31.4%

Analysis Period (min) 15

Intersection LOS: A

ICU Level of Service A

Splits and Phases: 34: Fox Canyon & Traverse Mountain

	ø2		
20 s			
	ø6		
20 s		20 s	

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HCM Unsignalized Intersection Capacity Analysis

21: Central Canyon &

Int L

9/23/2011



Movement	SEL	SER	NEL	NEI	SWI	SWR
Lane Configurations	↰	↱	↰	↱	↱	↱
Volume (veh/h)	20	322	75	57	248	20
Sign Control	Stop			Free	Free	
Grade	0%			5%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	350	82	62	270	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		8				
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	464	270	291			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	464	270	291			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
IF (s)	3.5	3.3	2.2			
p0 queue free %	96	52	94			
cM capacity (veh/h)	493	728	1267			

Direction/Lane	SE1	NE1	NE2	NE3	SW1	SW2
Volume Total	372	82	31	31	270	22
Volume Left	22	82	0	0	0	0
Volume Right	350	0	0	0	0	22
cSH	774	1267	1700	1700	1700	1700
Volume to Capacity	0.48	0.06	0.02	0.02	0.16	0.01
Queue Length 95th (ft)	66	5	0	0	0	0
Control Delay (s)	14.3	8.0	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	14.3	4.6			0.0	
Approach LOS	B					

Intersection Summary						
Average Delay		7.4				
Intersection Capacity Utilization		39.7%		ICU Level of Service		A
Analysis Period (min)		15				

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Timings

7: Triumph Blvd &

Int A

9/23/2011



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑	↱	↰	↑	↱
Volume (vph)	47	30	428	430	30	49	440	209	397	51	191	48
Turn Type	Perm		pm+ov	Perm		Perm	Prot		Perm	pm+pt		Perm
Protected Phases		4	5		8		5	2		1	6	
Permitted Phases	4		4	8		8			2	6		6
Detector Phase	4	4	5	8	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	26.0	26.0	13.0	26.0	26.0	26.0	13.0	26.0	26.0	8.0	21.0	21.0
Total Split (%)	43.3%	43.3%	21.7%	43.3%	43.3%	43.3%	21.7%	43.3%	43.3%	13.3%	35.0%	35.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag (s)			Lead				Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?			Yes				Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	Max	None	Max	Max
Act Effct Green (s)	21.6	21.6	34.6	21.6	21.6	21.6	9.0	25.3	25.3	21.0	17.0	17.0
Actuated g/C Ratio	0.36	0.36	0.58	0.36	0.36	0.36	0.15	0.42	0.42	0.35	0.29	0.29
v/c Ratio	0.10	0.05	0.42	0.94	0.05	0.09	0.94	0.16	0.48	0.12	0.20	0.10
Control Delay	13.3	12.6	2.4	50.2	12.6	4.8	57.1	12.2	3.7	9.2	16.9	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.3	12.6	2.4	50.2	12.6	4.8	57.1	12.2	3.7	9.2	16.9	6.2
LOS	B	B	A	D	B	A	E	B	A	A	B	A
Approach Delay		4.0			48.6			27.9			13.8	
Approach LOS		A			D			C			B	

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 59.6

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 24.4

Intersection Capacity Utilization 65.6%

Analysis Period (min) 15

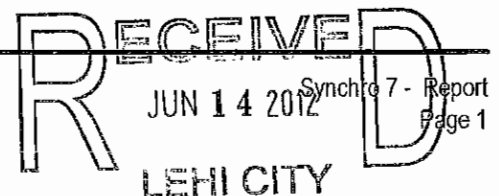
Intersection LOS: C

ICU Level of Service C

Splits and Phases: 7: Triumph Blvd &

↰ ø1	↑ ø2	↱ ø4
↱ ø5	↓ ø6	↰ ø8

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Timings

30: Morning Glory Rd &

Int C

9/23/2011

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	49	30	430	454	30	151	397	731	420	47	384	51
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	8.0	20.0	20.0	8.0	30.0	30.0	21.0	34.0	34.0	8.0	21.0	21.0
Total Split (%)	10.0%	25.0%	25.0%	22.5%	37.5%	37.5%	26.3%	42.5%	42.5%	10.0%	26.3%	26.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Min	Min	None	Min	Min
Act Effct Green (s)	13.4	9.3	9.3	27.5	23.0	23.0	33.8	29.3	29.3	17.0	13.0	13.0
Actuated g/C Ratio	0.19	0.13	0.13	0.40	0.33	0.33	0.49	0.42	0.42	0.24	0.19	0.19
v/c Ratio	0.18	0.13	0.81	0.89	0.05	0.10	0.79	0.55	0.50	0.22	0.62	0.16
Control Delay	16.6	27.8	16.6	39.5	18.7	6.4	26.2	18.3	4.0	14.9	30.8	9.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.6	27.8	16.6	39.5	18.7	6.4	26.2	18.3	4.0	14.9	30.8	9.2
LOS	B	C	B	D	B	A	C	B	A	B	C	A
Approach Delay		17.2			35.2			16.4			26.9	
Approach LOS		B			D			B			C	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 69.4

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 21.5

Intersection LOS: C

Intersection Capacity Utilization 74.4%

ICU Level of Service D

Analysis Period (min): 15

Splits and Phases: 30: Morning Glory Rd &

01	02	03	04	05	06
07	08	09	10	11	12
01	02	03	04	05	06
07	08	09	10	11	12

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Timings

15: Chapel Ridge & Cabella's Drive

INT D

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Lane Group	SET	SER	NWT	NWT	NEL
Lane Configurations	↑	↑	↑	↑↑	↑↑
Volume (vph)	20	543	400	20	945
Turn Type		Free	pm+pt		
Protected Phases	6		5	2	4
Permitted Phases		Free	2		
Detector Phase	6		5	2	4
Switch Phase					
Minimum Initial (s)	4.0		4.0	4.0	4.0
Minimum Split (s)	20.0		8.0	20.0	20.0
Total Split (s)	21.0	0.0	16.0	37.0	38.0
Total Split (%)	28.0%	0.0%	21.3%	49.3%	50.7%
Yellow Time (s)	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5		0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag		Lead		
Lead-Lag Optimize?	Yes		Yes		
Recall Mode	Min		None	Min	None
Act Effct Green (s)	6.3	62.6	22.4	22.4	32.2
Actuated v/c Ratio	0.10	1.00	0.36	0.36	0.51
v/c Ratio	0.12	0.37	0.90	0.02	0.83
Control Delay	27.8	0.7	44.9	13.8	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	27.8	0.7	44.9	13.8	17.0
LOS	C	A	D	B	B
Approach Delay	116			43.4	17.0
Approach LOS	A			D	B

Intersection Summary

Cycle Length: 75

Actuated Cycle Length: 62.6

Natural Cycle: 75

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 18.0

Intersection LOS: B

Intersection Capacity Utilization 75.4%

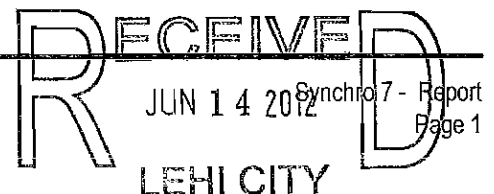
ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 15: Chapel Ridge & Cabella's Drive

02	04
05	06

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Timings

9: Traverse Mountain Blvd &

Int E

9/23/2011



Lane Group	FBT	FBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Volume (vph)	130	290	90	210	305	120
Turn Type		Perm	Perm			Perm
Protected Phases	4			8	2	
Permitted Phases		4	8			2
Detector Phase	4	4	8	8	2	2
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None	None	Max	Max
Act Effct Green (s)	9.5	9.5	9.5	9.5	17.4	17.4
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.50	0.50
v/c Ratio	0.28	0.48	0.29	0.45	0.38	0.15
Control Delay	10.5	4.2	11.5	12.8	7.9	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.5	4.2	11.5	12.8	7.9	2.3
LOS	B	A	B	B	A	A
Approach Delay	6.2			12.4	6.3	
Approach LOS	A			B	A	

Intersection Summary

Cycle Length: 40

Actuated Cycle Length: 35

Natural Cycle: 40

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.48

Intersection Signal Delay: 7.9

Intersection LOS: A

Intersection Capacity Utilization 38.7%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 9: Traverse Mountain Blvd &

<p>ø2</p>	<p>ø4</p>
<p>ø2</p>	<p>ø4</p>
<p>ø2</p>	<p>ø4</p>
<p>ø2</p>	<p>ø4</p>

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Timings

54: Traverse Mountain Blvd &

Int G

9/23/2011



Lane Group	FBL	FBT	FBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↑	↱	↰	↑	↱
Volume (vph)	30	30	89	163	30	30	79	464	288	30	280	30
Turn Type	Perm		Perm	Perm		Perm	Perm		Perm	custom		custom
Protected Phases		4			8			2				
Permitted Phases	4		4	8		8	2		2	6	6	6
Detector Phase	4	4	4	8	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	Min	Min	Min	Min	Min	Min
Act Effct Green (s)	9.3	9.3	9.3	9.3	9.3	9.3	17.1	17.1	17.1	17.1	17.1	17.1
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.30	0.30	0.55	0.55	0.55	0.55	0.55	0.55
v/c Ratio	0.08	0.06	0.08	0.43	0.06	0.07	0.15	0.26	0.31	0.07	0.30	0.04
Control Delay	8.0	7.7	3.8	12.4	7.7	4.0	7.2	6.3	2.2	6.8	7.4	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.0	7.7	3.8	12.4	7.7	4.0	7.2	6.3	2.2	6.8	7.4	3.2
LOS	A	A	A	B	A	A	A	A	A	A	A	A
Approach Delay		6.3		10.6			5.0			7.0		
Approach LOS		A		B			A			A		

Intersection Summary

Cycle Length: 40
 Actuated Cycle Length: 31.2
 Natural Cycle: 40
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.43
 Intersection Signal Delay: 6.4
 Intersection Capacity Utilization 44.8%
 Analysis Period (min) 15

Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 54: Traverse Mountain Blvd &

02	04
06	08

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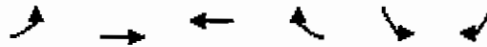
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HCM Unsignalized Intersection Capacity Analysis

2: Int

Int #

9/23/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	←	↑	↑	↑	↑	↑
Volume (veh/h)	30	85	146	318	195	30
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	92	169	346	212	33
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)					6	
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)			907			
pX, platoon unblocked						
vC, conflicting volume	504				316	159
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	504				316	159
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				68	96
cM capacity (veh/h)	1060				656	887

Direction/Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	33	92	169	346	245
Volume Left	33	0	0	0	212
Volume Right	0	0	0	346	33
cSH	1060	1700	1700	1700	757
Volume to Capacity	0.03	0.05	0.09	0.20	0.32
Queue Length 95th (ft)	2	0	0	0	35
Control Delay (s)	8.5	0.0	0.0	0.0	12.6
Lane LOS	A				B
Approach Delay (s)	2.2	0.0	0.0	12.6	
Approach LOS				B	

Intersection Summary		
Average Delay	3.8	
Intersection Capacity Utilization	31.8%	ICU Level of Service A
Analysis Period (min)	15	

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Timings

19: Traverse Mountain & Morning Glory Rd

Int 2

6/12/2012

Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations		↖	↗	↖	↗	↖	↗	↖	↗
Volume (vph)	20	50	428	20	20	822	112	22	61
Turn Type	Perm		Perm	Perm		Prot		Perm	
Protected Phases		6			2	7			8
Permitted Phases	6		6	2			4	8	
Detector Phase	6	6	6	2	2	7	4	8	8
Switch Phase									
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	8.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	40.0	20.0	20.0
Total Split (%)	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	66.7%	33.3%	33.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						Lead		Lag	Lag
Lead-Lag Optimize?									
Recall Mode	Min	Min	Min	Min	Min	None	None	None	None
Act Effct Green (s)		8.6	8.6	8.6	8.6	16.8	23.0	7.3	7.3
Actuated g/C Ratio		0.21	0.21	0.21	0.21	0.42	0.57	0.18	0.18
v/c Ratio		0.21	0.66	0.08	0.19	0.64	0.13	0.07	0.25
Control Delay		15.8	7.1	14.8	8.3	16.1	4.4	17.6	15.7
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		15.8	7.1	14.8	8.3	16.1	4.4	17.6	15.7
LOS		B	A	B	A	B	A	B	B
Approach Delay		8.3			9.8		14.5		16.1
Approach LOS		A			A		B		B

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 40.1

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 12.5

Intersection Capacity Utilization 47.2%

Analysis Period (min) 15

Intersection LOS: B

ICU Level of Service A

Splits and Phases: 19: Traverse Mountain & Morning Glory Rd

↖ 20 s	↗ 40 s	↖ 20 s	↗ 20 s
↖ 20 s	↗ 20 s	↖ 20 s	↗ 20 s

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Timings

34: Fox Canyon & Traverse Mountain *Intk*

6/12/2012

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Volume (vph)	348	20	20	80	160	662
Turn Type		Perm	Perm			Perm
Protected Phases	8			6	2	
Permitted Phases		8	6			2
Detector Phase	8	8	6	6	2	2
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	25.0	25.0	25.0	25.0
Total Split (%)	44.4%	44.4%	55.6%	55.6%	55.6%	55.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	Min	Min	Min	Min
Act Effct Green (s)	8.7	8.7	12.2	12.2	12.2	12.2
Actuated g/C Ratio	0.30	0.30	0.42	0.42	0.42	0.42
v/c Ratio	0.36	0.04	0.04	0.11	0.22	0.67
Control Delay	9.7	5.3	5.5	5.8	6.5	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.7	5.3	5.5	5.8	6.5	4.2
LOS	A	A	A	A	A	A
Approach Delay	9.5			5.8	4.7	
Approach LOS	A			A	A	

Intersection Summary

Cycle Length: 45

Actuated Cycle Length: 29.2

Natural Cycle: 45

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 6.1

Intersection Capacity Utilization 51.0%

Analysis Period (min) 15

Intersection LOS: A

ICU Level of Service A

Splits and Phases: 34: Fox Canyon & Traverse Mountain

	ø2		
25 s			
	ø6		
25 s		20 s	

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HCM Unsignalized Intersection Capacity Analysis

21: Central Canyon &

Int L

9/23/2011



Movement	SEL	SER	NEL	NET	SWL	SWR
Lane Configurations	↰	↱	↰	↱	↱	↰
Volume (veh/h)	20	170	323	339	178	20
Sign Control	Stop			Free	Free	
Grade	0%			5%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	185	351	368	193	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		8				
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vO, conflicting volume	1080	193	215			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1080	193	215			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	86	77	74			
cM capacity (veh/h)	158	815	1352			

Direction/Lane	SE1	NE1	NE2	NE3	SW1	SW2
Volume Total	207	351	184	184	193	22
Volume Left	22	351	0	0	0	0
Volume Right	185	0	0	0	0	22
cSH	911	1352	1700	1700	1700	1700
Volume to Capacity	0.23	0.26	0.11	0.11	0.11	0.01
Queue Length 95th (ft)	22	26	0	0	0	0
Control Delay (s)	12.9	8.6	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	12.9	4.2			0.0	
Approach LOS	B					

Intersection Summary						
Average Delay		5.0				
Intersection Capacity Utilization		40.6%		ICU Level of Service	A	
Analysis Period (min)		15				

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Timings
7: Triumph Blvd &

Int A

9/23/2011

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SEB	SEB	SBR
Lane Configurations												
Volume (vph)	72	30	647	482	30	53	767	253	522	58	247	85
Turn Type	Perm		pm+ov	pm+pt		Perm	Prot		Perm	Prot		Perm
Protected Phases		4	5	3	8		5	2		1	6	
Permitted Phases	4		4	8		8		2		2		6
Detector Phase	4	4	5	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	20.0	20.0	28.0	21.0	41.0	41.0	28.0	41.0	41.0	8.0	21.0	21.0
Total Split (%)	22.2%	22.2%	31.1%	23.3%	45.6%	45.6%	31.1%	45.6%	45.6%	8.9%	23.3%	23.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lead	Lead			Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	Max	None	Max	Max
Act Effct Green (s)	10.0	10.0	35.9	28.8	28.8	28.8	24.2	39.1	39.1	4.0	17.1	17.1
Adjusted v/c Ratio	0.12	0.12	0.44	0.35	0.35	0.35	0.29	0.48	0.48	0.05	0.21	0.21
v/c Ratio	0.47	0.15	0.91	1.04	0.05	0.10	0.85	0.17	0.55	0.37	0.35	0.22
Control Delay	43.7	34.0	34.7	78.0	16.9	5.3	38.4	14.6	3.8	46.2	30.7	8.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.7	34.0	34.7	78.0	16.9	5.3	38.4	14.6	3.8	46.2	30.7	8.6
LOS	D	C	C	E	B	A	D	B	A	D	C	A
Approach Delay		35.5			67.8			22.8			28.2	
Approach LOS		D			E			C			C	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 82.2

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 34.2

Intersection LOS: C

Intersection Capacity Utilization 83.6%

ICU Level of Service E

Analysis Period (min): 15

Splits and Phases: 7: Triumph Blvd &

20s	20s	20s	20s
20s	20s	20s	20s

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Timings

30: Morning Glory Rd &

Int c

9/23/2011



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↑	↱	↰	↑↑	↱
Volume (vph)	53	30	482	596	30	42	522	560	654	38	534	41
Turn Type	pm+pt		Perm	Prot		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4			8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	8.0	20.0	20.0	21.0	33.0	33.0	28.0	41.0	41.0	18.0	21.0	21.0
Total Split (%)	8.9%	22.2%	22.2%	23.3%	36.7%	36.7%	31.1%	45.6%	45.6%	8.9%	23.3%	23.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Min	Min	None	Min	Min
Act Effct Green (s)	15.5	11.4	11.4	17.1	27.9	27.9	44.4	39.8	39.8	20.3	16.3	16.3
Actuated v/c Ratio	0.18	0.13	0.13	0.20	0.33	0.33	0.52	0.47	0.47	0.24	0.19	0.19
v/c Ratio	0.22	0.13	0.88	0.94	0.05	0.08	1.00	0.38	0.65	0.17	0.83	0.13
Control Delay	20.3	32.9	24.1	58.2	21.4	7.3	62.0	16.9	4.7	16.2	45.5	10.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.3	32.9	24.1	58.2	21.4	7.3	62.0	16.9	4.7	16.2	45.5	10.7
LOS	C	C	C	E	C	A	E	B	A	B	D	B
Approach Delay		24.2			53.3			25.8			41.3	
Approach LOS		C			D			C			D	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 85

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 33.3

Intersection Capacity Utilization 77.4%

Analysis Period (min): 15

Intersection LOS: C

ICU Level of Service D

Splits and Phases: 30: Morning Glory Rd &

↰ 01	↑ 02	↱ 03	↱ 04
↰ 05	↓ 06	↱ 07	↱ 08

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Timings

15: Chapel Ridge & Cabella's Drive

Int D

9/23/2011



Lane Group	SET	SER	NWL	NWT	NEL
Lane Configurations	↑	↑	↑	↑↑	↑↑
Volume (vph)	30	613	560	30	677
Turn Type		Perm	pm+pt		
Protected Phases	6		5	2	4
Permitted Phases		6	2		
Detector Phase	6	6	5	2	4
Switch Phase					
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0
Total Split (s)	20.0	26.0	19.0	45.0	35.0
Total Split (%)	32.5%	32.5%	23.8%	56.3%	43.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes	Yes		
Recall Mode	Min	Min	None	Min	None
Act Effct Green (s)	10.3	10.3	29.5	29.5	30.1
Actuated g/C Ratio	0.15	0.15	0.44	0.44	0.44
v/c Ratio	0.12	0.83	1.00	0.02	0.86
Control Delay	24.5	12.1	58.4	10.6	20.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	12.1	58.4	10.6	20.8
LOS	C	B	E	B	C
Approach Delay	12.7			55.9	20.8
Approach LOS	B			E	C

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 67.7	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.00	
Intersection Signal Delay: 26.9	Intersection LOS: C
Intersection Capacity Utilization 83.4%	ICU Level of Service E
Analysis Period (min): 15	

Splits and Phases: 15: Chapel Ridge & Cabella's Drive

 45	 45
 19	 26

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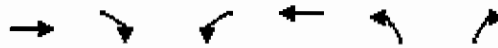
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Timings

9: Traverse Mountain Blvd &

Int E

9/23/2011



Lane Group	EBL	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Volume (vph)	130	390	190	210	378	120
Turn Type		Perm	Perm			Perm
Protected Phases	4			8	2	
Permitted Phases		4	8			2
Detector Phase	4	4	8	8	2	2
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None	None	Min	Min
Act Effct Green (s)	9.3	9.3	9.3	9.3	12.1	12.1
Actuated g/C Ratio	0.31	0.31	0.31	0.31	0.41	0.41
v/c Ratio	0.24	0.54	0.25	0.39	0.57	0.18
Control Delay	9.2	4.2	9.9	10.6	11.0	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.2	4.2	9.9	10.6	11.0	12.6
LOS	A	A	A	B	B	A
Approach Delay	5.4			10.4	9.0	
Approach LOS	A			B	A	

Intersection Summary	
Cycle Length: 40	
Actuated Cycle Length: 29.7	
Natural Cycle: 40	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.57	
Intersection Signal Delay: 7.9	Intersection LOS: A
Intersection Capacity Utilization 42.8%	ICU Level of Service A
Analysis Period (min): 15	

Splits and Phases: 9: Traverse Mountain Blvd &

02	04
20	20
08	08
20	20

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Timings

54: Traverse Mountain Blvd &

Int G

9/23/2011



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↑	↗	↖	↑↑	↗	↖	↑	↗
Volume (vph)	30	30	53	192	30	30	53	376	226	30	368	30
Turn Type	Perm		Perm	Perm		Perm	Perm		Perm	custom		custom
Protected Phases		4			8			2				
Permitted Phases	4		4	8		8	2		2	6	6	6
Detector Phase	4	4	4	8	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time/Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	Min	Min	Min	Min	Min	Min
Act Effct Green (s)	10.0	10.0	10.0	10.2	10.2	10.2	17.1	17.1	17.1	17.1	17.1	17.1
Actuated g/C Ratio	0.31	0.31	0.31	0.32	0.32	0.32	0.54	0.54	0.54	0.54	0.54	0.54
v/c Ratio	0.08	0.06	0.11	0.48	0.06	0.06	0.12	0.22	0.26	0.06	0.40	0.04
Control Delay	7.9	7.6	3.6	12.8	7.6	3.9	7.6	6.7	2.3	7.2	8.9	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.9	7.6	3.6	12.8	7.6	3.9	7.6	6.7	2.3	7.2	8.9	3.5
LOS	A	A	A	B	A	A	A	A	A	A	A	A
Approach Delay			15.8			11.1			5.3			8.4
Approach LOS			A			B			A			A

Intersection Summary

Cycle Length: 40

Actuated Cycle Length: 31.9

Natural Cycle: 40

Control Type: Actuated Uncoordinated

Maximum v/c Ratio: 0.48

Intersection Signal Delay: 7.2

Intersection LOS: A

Intersection Capacity Utilization 50.0%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 54: Traverse Mountain Blvd &

02 20s	04 20s
06 20s	08 20s

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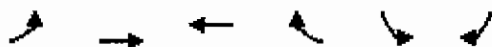
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HCM Unsignalized Intersection Capacity Analysis

2: Int

Int #

9/23/2011



Movement	EBL	EBT	WBL	WBR	SBL	SBR
Lane Configurations	↰	↑	↑	↱	↰	↱
Volume (veh/h)	30	111	111	265	257	30
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	121	121	288	279	33
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)					6	
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)			907			
pX, platoon unblocked						
vC, conflicting volume	409				307	121
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	409				307	121
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	97				58	96
cM capacity (veh/h)	1150				666	931

Direction/Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	33	121	121	288	312
Volume Left	33	0	0	0	279
Volume Right	0	0	0	288	33
cSH	1150	1700	1700	1700	744
Volume to Capacity	0.03	0.07	0.07	0.17	0.42
Queue Length 95th (ft)	2	0	0	0	52
Control Delay (s)	8.2	0.0	0.0	0.0	13.7
Lane LOS	A				B
Approach Delay (s)	1.7		0.0		13.7
Approach LOS					B

Intersection Summary					
Average Delay		5.2			
Intersection Capacity Utilization		29.2%		ICU Level of Service	A
Analysis Period (min)		15			

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Timings

19: Traverse Mountain & Morning Glory Rd

Int J.

6/12/2012

Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations		↕	↗	↖	↗	↖	↗	↖	↗
Volume (vph)	20	50	522	20	20	582	85	30	83
Turn Type	Perm		Perm	Perm		Prot		Perm	
Protected Phases		6			2	7			8
Permitted Phases	6		6	2			4	8	
Detector Phase	6	6	6	2	2	7	4	8	8
Switch Phase									
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	8.0	20.0	20.0	20.0
Total Split (s)	21.0	21.0	21.0	21.0	21.0	19.0	39.0	20.0	20.0
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%	31.7%	65.0%	33.3%	33.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						Lead		Lag	Lag
Lead-Lag Optimize?						Yes		Yes	Yes
Recall Mode	Min	Min	Min	Min	Min	None	None	None	None
Act Effct Green (s)		9.3	9.3	9.3	9.3	12.8	21.7	8.0	8.0
Actuated g/C Ratio		0.23	0.23	0.23	0.23	0.32	0.54	0.20	0.20
v/c Ratio		0.19	0.71	0.07	0.18	0.59	0.11	0.12	0.29
Control Delay		15.4	7.3	14.4	8.0	15.8	4.5	18.0	16.6
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		15.4	7.3	14.4	8.0	15.8	4.5	18.0	16.6
LOS		B	A	B	A	B	A	B	B
Approach Delay		8.3			9.4		14.1		16.9
Approach LOS		A			A		B		B

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 39.9

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 11.8

Intersection Capacity Utilization 52.0%

Analysis Period (min) 15

Intersection LOS: B

ICU Level of Service A

Splits and Phases: 19: Traverse Mountain & Morning Glory Rd

↖ a2	a4
21 s	39 s
↖ a6	↗ a7
21 s	19 s
	↖ a8
	20 s

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





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Timings

34: Fox Canyon & Traverse Mountain

Int K

6/12/2012

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Volume (vph)	434	20	20	88	95	487
Turn Type		Perm	Perm			Perm
Protected Phases	8			6	2	
Permitted Phases		8	6			2
Detector Phase	8	8	6	6	2	2
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	Min	Min	Min	Min
Act Effct Green (s)	9.2	9.2	9.2	9.2	9.2	9.2
Actuated g/C Ratio	0.34	0.34	0.34	0.34	0.34	0.34
v/c Ratio	0.39	0.04	0.05	0.15	0.16	0.59
Control Delay	8.0	4.1	6.5	7.0	7.1	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.0	4.1	6.5	7.0	7.1	4.1
LOS	A	A	A	A	A	A
Approach Delay	7.9			6.9	4.6	
Approach LOS	A			A	A	

Intersection Summary

Cycle Length: 40

Actuated Cycle Length: 26.7

Natural Cycle: 40

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 6.1




Intersection Capacity Utilization 40.2%

Analysis Period (min) 15

Intersection LOS: A

ICU Level of Service A

Splits and Phases: 34: Fox Canyon & Traverse Mountain

 ø2	
20 s	
 ø6	
20 s	 ø8
	20 s

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HCM Unsignalized Intersection Capacity Analysis

21: Central Canyon &

Int L

9/23/2011



Movement	SEL	SER	NEL	NET	SWL	SWR
Lane Configurations	↰	↱	↰	↰↱	↱	↰
Volume (veh/h)	20	214	239	180	160	20
Sign Control	Stop			Free	Free	
Grade	0%			5%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	233	260	196	174	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		8				
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	791	174	196			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	791	174	196			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
IF (s)	3.5	3.3	2.2			
p0 queue free %	92	72	81			
cM capacity (veh/h)	265	839	1375			

Direction Lane #	SE 1	NE 1	NE 2	NE 3	SW 1	SW 2
Volume Total	254	260	98	98	174	22
Volume Left	22	260	0	0	0	0
Volume Right	233	0	0	0	174	22
cSH	918	1375	1700	1700	1700	1700
Volume to Capacity	0.28	0.19	0.06	0.06	0.10	0.01
Queue Length 95th (ft)	28	17	0	0	0	0
Control Delay (s)	11.7	8.2	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	11.7	4.7			0.0	
Approach LOS	B					

Intersection Summary						
Average Delay		5.6				
Intersection Capacity Utilization		35.0%		ICU Level of Service		A
Analysis Period (min)		15				

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



















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Appendix B-2 Intersection Analyzes at 1.15 (8% Internal Capture)

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Timings
7: Triumph Blvd &

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






												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	72	30	647	482	30	53	767	253	522	58	247	85
Turn Type	pm+pt		pm+ov	Prot		Perm	Prot		pm+ov	Prot		Perm
Protected Phases	7	4	5	3	8		5	2	3	1	6	
Permitted Phases	4		4			8			2			6
Detector Phase	7	4	5	3	8	8	5	2	3	1	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	8.0	20.0	20.0	8.0	20.0	8.0	8.0	20.0	20.0
Total Split (s)	9.0	20.0	29.0	20.0	31.0	31.0	29.0	41.0	20.0	9.0	21.0	21.0
Total Split (%)	10.0%	22.2%	32.2%	22.2%	34.4%	34.4%	32.2%	45.6%	22.2%	10.0%	23.3%	23.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	None	None	Max	Max
Act Effct Green (s)	14.5	9.5	38.6	16.0	22.4	22.4	25.1	39.0	59.0	5.0	17.0	17.0
Actuated g/C Ratio	0.17	0.11	0.46	0.19	0.27	0.27	0.30	0.47	0.70	0.06	0.20	0.20
v/c Ratio	0.34	0.82	0.57	0.91	0.08	0.14	0.96	0.20	0.51	0.34	0.42	0.26
Control Delay	23.6	19.8	16.5	54.9	24.0	7.1	50.7	15.0	2.1	43.9	31.8	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.6	19.8	16.5	54.9	24.0	7.1	50.7	15.0	2.1	43.9	31.8	8.4
LOS	C	B	B	D	C	A	D	B	A	D	C	A
Approach Delay		18.7			48.8			28.4			28.5	
Approach LOS		B			D			C			C	

Intersection Summary

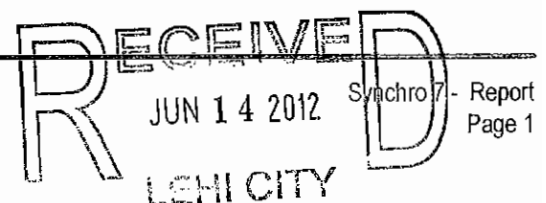
Cycle Length: 90
 Actuated Cycle Length: 83.7
 Natural Cycle: 90
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.96
 Intersection Signal Delay: 29.7
 Intersection Capacity Utilization 79.3%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service D

Splits and Phases: 7: Triumph Blvd &

			
9 s	41 s	20 s	20 s
			
29 s	21 s	9 s	31 s

























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Timings

46: Traverse Mountain Blvd &

2/20/2012

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	106	30	368	370	30	106	86	84	29	66	14	66
Turn Type	Perm		Perm	Perm		Perm	Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	25.0	25.0	25.0	25.0	25.0	25.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (%)	55.6%	55.6%	55.6%	55.6%	55.6%	55.6%	44.4%	44.4%	44.4%	44.4%	44.4%	44.4%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	Min	Min	Min	Min	Min	Min
Act Effct Green (s)	15.8	15.8	15.8	15.8	15.8	15.8	8.3	8.3	8.3	8.3	8.3	8.3
Actuated g/C Ratio	0.49	0.49	0.49	0.49	0.49	0.49	0.26	0.26	0.26	0.26	0.26	0.26
v/c Ratio	0.20	0.04	0.46	0.70	0.04	0.16	0.31	0.12	0.09	0.25	0.02	0.17
Control Delay	5.7	4.7	2.4	13.5	4.7	1.9	13.9	10.8	5.5	13.1	10.5	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.7	4.7	2.4	13.5	4.7	1.9	13.9	10.8	5.5	13.1	10.5	4.7
LOS	A	A	A	B	A	A	B	B	A	B	B	A
Approach Delay		3.2			10.6			11.4			9.0	
Approach LOS		A			B			B			A	

Intersection Summary

Cycle Length: 45

Actuated Cycle Length: 32.5

Natural Cycle: 50

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.70

Intersection Signal Delay: 7.8





Intersection Capacity Utilization 63.1%

Analysis Period (min) 15

Intersection LOS: A

ICU Level of Service B

Splits and Phases: 46: Traverse Mountain Blvd &

	ø2		ø4
20 s		25 s	
	ø6		ø8
20 s		25 s	

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



















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Timings

30: Morning Glory Rd &

2/20/2012

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	53	30	482	596	30	42	522	560	654	38	534	41
Turn Type	pm+pt		pm+ov	Prot		Perm	Prot		pm+ov	pm+pt		Perm
Protected Phases	7	4	5	3	8		5	2	3	1	6	
Permitted Phases	4		4			8			2	6		6
Detector Phase	7	4	5	3	8	8	5	2	3	1	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	8.0	20.0	20.0	8.0	20.0	8.0	8.0	20.0	20.0
Total Split (s)	8.0	20.0	22.0	25.0	37.0	37.0	22.0	37.0	25.0	8.0	23.0	23.0
Total Split (%)	8.9%	22.2%	24.4%	27.8%	41.1%	41.1%	24.4%	41.1%	27.8%	8.9%	25.6%	25.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Min	None	None	Min	Min
Act Effct Green (s)	13.2	9.1	31.2	21.1	27.9	27.9	18.1	35.7	60.8	22.3	18.3	18.3
Actuated g/C Ratio	0.16	0.11	0.38	0.26	0.34	0.34	0.22	0.43	0.74	0.27	0.22	0.22
v/c Ratio	0.28	0.76	0.55	0.85	0.06	0.09	0.89	0.47	0.61	0.19	0.83	0.13
Control Delay	20.4	19.3	23.5	41.3	19.7	6.2	48.9	19.5	2.7	16.2	41.8	9.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.4	19.3	23.5	41.3	19.7	6.2	48.9	19.5	2.7	16.2	41.8	9.6
LOS	C	B	C	D	B	A	D	B	A	B	D	A
Approach Delay		21.3			38.1			22.0			38.1	
Approach LOS		C			D			C			D	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 82.6

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 27.6









Intersection Capacity Utilization 80.2%

Analysis Period (min) 15

Intersection LOS: C

ICU Level of Service D

Splits and Phases: 30: Morning Glory Rd &

			
8 s	37 s	26 s	20 s
			
22 s	29 s	8 s	37 s

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Timings

15: Chapel Ridge & Cabella's Drive

2/20/2012

Lane Group	SET	SER	NWL	NWT	NEL
Lane Configurations	↑	↑	↑	↑	↑
Volume (vph)	30	613	560	30	677
Turn Type		Free	pm+pt		
Protected Phases	6		5	2	4
Permitted Phases		Free	2		
Detector Phase	6		5	2	4
Switch Phase					
Minimum Initial (s)	4.0		4.0	4.0	4.0
Minimum Split (s)	20.0		8.0	20.0	20.0
Total Split (s)	21.0	0.0	36.0	57.0	53.0
Total Split (%)	19.1%	0.0%	32.7%	51.8%	48.2%
Yellow Time (s)	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5		0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag		Lead		
Lead-Lag Optimize?	Yes		Yes		
Recall Mode	Min		None	Min	None
Act Effct Green (s)	7.5	100.5	43.5	43.5	49.0
Actuated g/C Ratio	0.07	1.00	0.43	0.43	0.49
v/c Ratio	0.27	0.48	1.05	0.05	0.94
Control Delay	48.7	1.1	76.8	16.6	32.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	48.7	1.1	76.8	16.6	32.3
LOS	D	A	E	B	C
Approach Delay	3.3			73.7	32.3
Approach LOS	A			E	C

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 100.5

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.05

Intersection Signal Delay: 34.6





Intersection Capacity Utilization 93.9%

Analysis Period (min) 15

Intersection LOS: C

ICU Level of Service F

Splits and Phases: 15: Chapel Ridge & Cabella's Drive

 <p>ø2</p>	 <p>ø4</p>
57 s	53 s
 <p>ø5</p>	 <p>ø6</p>
36 s	21 s

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Timings

9: Traverse Mountain Blvd &

2/20/2012

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↙	↑	↖	↗
Volume (vph)	130	390	90	210	378	120
Turn Type		Perm	Perm			Perm
Protected Phases	4			8	2	
Permitted Phases		4	8			2
Detector Phase	4	4	8	8	2	2
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None	None	Min	Min
Act Effct Green (s)	10.0	10.0	10.0	10.0	12.7	12.7
Actuated g/C Ratio	0.32	0.32	0.32	0.32	0.41	0.41
v/c Ratio	0.27	0.58	0.29	0.44	0.65	0.20
Control Delay	9.6	4.4	10.6	11.3	13.5	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.6	4.4	10.6	11.3	13.5	2.7
LOS	A	A	B	B	B	A
Approach Delay	5.7			11.1	10.9	
Approach LOS	A			B	B	

Intersection Summary

Cycle Length: 40

Actuated Cycle Length: 31.1

Natural Cycle: 40

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.65

Intersection Signal Delay: 8.9

Intersection Capacity Utilization 47.7%

Analysis Period (min) 15

Intersection LOS: A

ICU Level of Service A

Splits and Phases: 9: Traverse Mountain Blvd &

↖ ø2	→ ø4
20 s	20 s
	↖ ø8
	20 s

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Timings

35: Traverse Mountain Blvd &

2/20/2012

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↙	↑	↖	↗
Volume (vph)	227	102	44	244	173	65
Turn Type		Perm	Perm			Perm
Protected Phases	4			8	2	
Permitted Phases		4	8			2
Detector Phase	4	4	8	8	2	2
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None	None	Min	Min
Act Effct Green (s)	9.8	9.8	9.8	9.8	12.5	12.5
Actuated g/C Ratio	0.37	0.37	0.37	0.37	0.47	0.47
v/c Ratio	0.42	0.19	0.14	0.45	0.26	0.10
Control Delay	8.8	2.6	7.0	9.1	8.4	3.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.8	2.6	7.0	9.1	8.4	3.0
LOS	A	A	A	A	A	A
Approach Delay	6.8			8.8	6.9	
Approach LOS	A			A	A	

Intersection Summary

Cycle Length: 40

Actuated Cycle Length: 26.7

Natural Cycle: 40

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.45

Intersection Signal Delay: 7.5

Intersection Capacity Utilization 38.1%

Analysis Period (min) 15

Intersection LOS: A

ICU Level of Service A

Splits and Phases: 35: Traverse Mountain Blvd &

↖ ø2	→ ø4
20 s	20 s
	↖ ø8
	20 s

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Timings

54: Traverse Mountain Blvd &

2/20/2012

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	30	53	192	30	30	53	376	226	30	368	30
Turn Type	Perm		Perm	Perm		Perm	Perm		Perm	custom		custom
Protected Phases		4			8			2				
Permitted Phases	4		4	8		8	2		2	6	6	6
Detector Phase	4	4	4	8	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	Min	Min	Min	Min	Min	Min
Act Effct Green (s)	10.6	10.6	10.6	10.8	10.8	10.8	17.3	17.3	17.3	17.3	17.3	17.3
Actuated g/C Ratio	0.33	0.33	0.33	0.33	0.33	0.33	0.53	0.53	0.53	0.53	0.53	0.53
v/c Ratio	0.09	0.06	0.12	0.53	0.06	0.07	0.15	0.25	0.29	0.08	0.47	0.04
Control Delay	8.1	7.8	3.4	13.8	7.8	3.8	8.4	7.1	2.4	7.6	9.8	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.1	7.8	3.4	13.8	7.8	3.8	8.4	7.1	2.4	7.6	9.8	3.5
LOS	A	A	A	B	A	A	A	A	A	A	A	A
Approach Delay		5.8			11.9			5.6			9.2	
Approach LOS		A			B			A			A	

Intersection Summary

Cycle Length: 40

Actuated Cycle Length: 32.6

Natural Cycle: 40

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.53

Intersection Signal Delay: 7.8





Intersection Capacity Utilization 54.5%

Analysis Period (min) 15

Intersection LOS: A

ICU Level of Service A

Splits and Phases: 54: Traverse Mountain Blvd &

	
20 s	20 s
	
20 s	20 s

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HCM Unsignalized Intersection Capacity Analysis

2: Int

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Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑	↑	↰	↰	↰
Volume (veh/h)	30	111	111	265	257	30
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	139	139	331	321	38
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						6
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)			907			
pX, platoon unblocked						
vC, conflicting volume	470				352	139
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	470				352	139
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				48	96
cM capacity (veh/h)	1092				623	909
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	38	139	139	331	359	
Volume Left	38	0	0	0	321	
Volume Right	0	0	0	331	38	
cSH	1092	1700	1700	1700	696	
Volume to Capacity	0.03	0.08	0.08	0.19	0.52	
Queue Length 95th (ft)	3	0	0	0	75	
Control Delay (s)	8.4	0.0	0.0	0.0	16.0	
Lane LOS	A				C	
Approach Delay (s)	1.8		0.0		16.0	
Approach LOS					C	
Intersection Summary						
Average Delay			6.0			
Intersection Capacity Utilization			36.4%	ICU Level of Service		A
Analysis Period (min)			15			

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Timings

19: Traverse Mountain & Morning Glory Rd

2/20/2012

	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Group									
Lane Configurations	↖	↗	↖	↗	↖	↗	↗	↖	↗
Volume (vph)	20	50	20	20	50	582	85	30	83
Turn Type	Perm		Perm		Perm	D.P+P		Perm	
Protected Phases		6		2		7			8
Permitted Phases	6		2		2	8	4	8	
Detector Phase	6	6	2	2	2	7	4	8	8
Switch Phase									
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	8.0	20.0	20.0	20.0
Total Split (s)	23.0	23.0	23.0	23.0	23.0	27.0	47.0	20.0	20.0
Total Split (%)	32.9%	32.9%	32.9%	32.9%	32.9%	38.6%	67.1%	28.6%	28.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						Lead		Lag	Lag
Lead-Lag Optimize?						Yes		Yes	Yes
Recall Mode	Min	Min	Min	Min	Min	None	None	None	None
Act Effct Green (s)	11.9	11.9	11.9	11.9	11.9	27.9	30.8	9.0	9.0
Actuated g/C Ratio	0.23	0.23	0.23	0.23	0.23	0.54	0.60	0.17	0.17
v/c Ratio	0.08	0.82	0.17	0.06	0.15	0.84	0.12	0.17	0.38
Control Delay	18.1	12.3	21.2	17.7	6.6	20.1	4.7	24.0	23.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.1	12.3	21.2	17.7	6.6	20.1	4.7	24.0	23.6
LOS	B	B	C	B	A	C	A	C	C
Approach Delay		12.5		12.3			17.9		23.7
Approach LOS		B		B			B		C

Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 51.5

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 16.0

Intersection Capacity Utilization 90.5%

Analysis Period (min) 15

Intersection LOS: B

ICU Level of Service E

Splits and Phases: 19: Traverse Mountain & Morning Glory Rd

↖ ø2	ø4	
23 s	47 s	
↗ ø6	↖ ø7	↗ ø8
23 s	27 s	20 s

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Timings

34: Fox Canyon & Traverse Mountain

2/20/2012

	WBL	WBR	SEL	SET	NWT	NWR
Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations	↖	↗	↖	↗	↖	↗
Volume (vph)	434	20	20	88	95	487
Turn Type		Perm	Perm			Perm
Protected Phases	8			6	2	
Permitted Phases		8	6			2
Detector Phase	8	8	6	6	2	2
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	Min	Min	Min	Min
Act Effct Green (s)	13.2	13.2	9.2	9.2	9.2	9.2
Actuated g/C Ratio	0.43	0.43	0.30	0.30	0.30	0.30
v/c Ratio	0.69	0.04	0.07	0.20	0.21	0.68
Control Delay	15.0	3.7	8.3	9.2	9.4	5.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.0	3.7	8.3	9.2	9.4	5.5
LOS	B	A	A	A	A	A
Approach Delay	14.5			9.1	6.1	
Approach LOS	B			A	A	

Intersection Summary

Cycle Length: 40

Actuated Cycle Length: 30.8

Natural Cycle: 45

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 9.7

Intersection Capacity Utilization 44.7%

Analysis Period (min) 15

Intersection LOS: A

ICU Level of Service A

Splits and Phases: 34: Fox Canyon & Traverse Mountain

↖ w2		
20 s		
↗ w6		↖ w8
20 s		20 s

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





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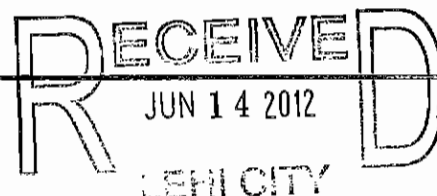
HCM Unsignalized Intersection Capacity Analysis

21: Central Canyon &

2/20/2012

						
Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Volume (veh/h)	20	214	239	180	160	20
Sign Control	Stop			Free	Free	
Grade	0%			5%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	268	299	225	200	25
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		8				
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	910	200	225			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	910	200	225			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	88	67	78			
cM capacity (veh/h)	213	808	1341			
Direction/Lane #	SE 1	NE 1	NE 2	NE 3	SW 1	SW 2
Volume Total	292	299	112	112	200	25
Volume Left	25	299	0	0	0	0
Volume Right	268	0	0	0	0	25
cSH	883	1341	1700	1700	1700	1700
Volume to Capacity	0.33	0.22	0.07	0.07	0.12	0.01
Queue Length 95th (ft)	36	21	0	0	0	0
Control Delay (s)	12.7	8.5	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	12.7	4.8			0.0	
Approach LOS	B					
Intersection Summary						
Average Delay			6.0			
Intersection Capacity Utilization			38.2%	ICU Level of Service		A
Analysis Period (min)			15			

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Intersection Sign configuration not allowed in HCM analysis.

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Appendix C Sensitivity Analysis



January 23, 2012



RE: Traverse Mountain Internal Traffic Analysis – LOS D Discussion

As part of the City's review of the Traverse Mountain Traffic Analysis, a request was made to provide an analysis of no internal traffic capture, i.e., all trip ends; residential, office and commercial originated to and from outside to inside Traverse Mountain and therefore no internal traffic capture would be considered.

The result was that once West and Central Canyons reach 90% development, the LOS at Chapel / Traverse drops to a LOS D and an alternative connection, or a restriping of this area is needed to again maintain a LOS C. Similarly, assuming no internal traffic capture, the main commercial intersections drop to a LOS D on the Saturday peak. This includes; Cabelas/Adobe, Cabelas/Triumph, and the Morning Glory/Commercial Intersection.

Since zero internal capture is unrealistic, a request for what internal capture rate is needed to maintain a LOS C for each of the intersections. Using a 1.15 growth applied to the existing model, this represents an 8% internal capture rate and this would allow all intersections to maintain a LOS C. This includes:

- Cabelas/Adobe
- Cabelas/Triumph
- Morning Glory/Commercial
- Chapel / Traverse Mountain

The only striping change is that at Cabelas / Adobe and Morning Glory / Adobe, the eastbound direction will be modified from a separate left, through and right turn lane to a left, shared through/right and right turn lane. This allows for dual right turn lanes for the eastbound direction which is expected to be a high volume movement. This is an easy striping and signage change once needed.

Please contact me with any questions.

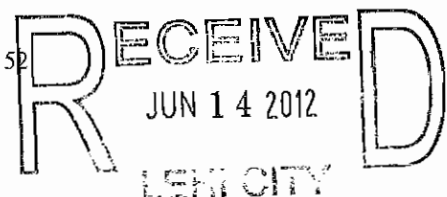
Sincerely,
A-Trans Engineering

A handwritten signature in black ink, appearing to read 'Joseph Perrin, Jr.'.

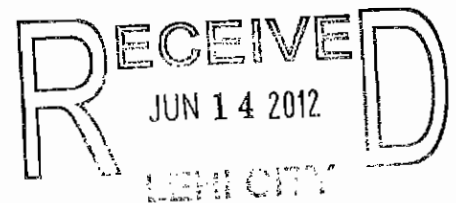
Joseph Perrin, PhD, PE, PTOE
Principal



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atrans@comcast.net



Appendix D Chapel to Fox Canyon Connector



May 18, 2012



RE: Traverse Mountain Chapel Ridge Roundabout to Fox Canyon

A request to clarify and discuss the elimination of the connector road from Chapel Ridge to Fox Canyon, east of the new elementary school has been made. In the April 2008 Traffic Study, there was a roundabout on Chapel Ridge that allowed a connector road between Fox Canyon and Chapel Ridge. The intent was to provide a more continuous flow from Fox Canyon to Chapel Ridge and then down to Cabellas Way out to the Frontage Road. This also allowed a roadway (lower Fox Canyon) to be more dedicated to the school and allow the circulation to be developed specifically for the school.

From the April 2008 Study, page 19.

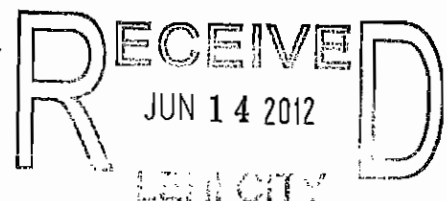
"Figure 11 shows a conceptual concept for the configuration of Intersection K, M, and P surrounding the elementary school. As this site plan is developed, this will be refined but access should be from the minor street and not the major roadway of Chapel Ridge or near the roundabout connection of Chapel Ridge and Fox Canyon. This is to minimize conflicts during the peak traffic times which results in improved safety for the area. This should be examined once the school begins developing a specific site plan."

This report also assumed a northern I-15 connection via the North Lehi Interchange or a minimum of a second frontage road connection at a certain unit level in Fox Canyon. Due to the high costs of the connection, the developer asked that the January 2012 Report include a unit counts under the amount required in Fox Canyon to trigger the secondary connection and therefore would still meet the City LOS requirements with the existing connections. Further, by the 2012 study, the school had already been built and had already developed with a connection to Chapel Ridge, thus negating the safety /one-way benefit discussion for Fox Canyon.

Therefore, a connector between Chapel Ridge and Fox Canyon will have the following impacts to traffic:

- Create two new intersections, one at each end of the connector, unless the one-way concept from the 2008 study is reconsidered.
- Focus the traffic onto Chapel Ridge and therefore the southwest and northeast movements will be maximized at Chapel Ridge and Traverse Mountain Blvd intersection. This will also maximize traffic passing the school on the south side.
- Places traffic on four sides of the school instead of three
- Would allow Fox Canyon / Traverse Mountain Blvd. to function better because of less traffic but that is already a T-intersection and therefore not as critical as Chapel Ridge / Traverse Mountain Blvd.
- A positive on the connector is connectivity. If there is a route blocking accident between the connector and Traverse Mountain Blvd. (~1,500 feet) then the connector provides an alternative route.

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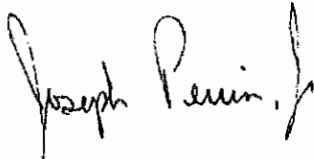


Unless the one-way concept is reconsidered on lower Fox Canyon, the concern is that between the connector on Fox Canyon and the Chapel Ridge / Traverse Mountain Blvd intersection. The only purpose would be to diverge traffic (allow two paths) only to merge the traffic back together 1,600 feet away, but at the creation of two new intersections.

As the City reviews this, it is recommended to think of this as the key issue being one of conflict and capacity. The connector creates more conflict but does not substantially increase capacity and therefore, our recommendation is the elimination of the roundabout and connector reduces conflict points and improves relative safety for the area.

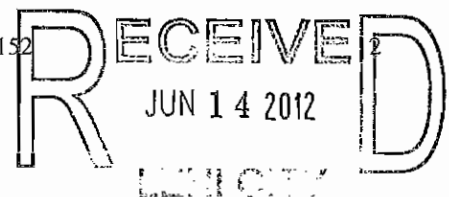
Please contact me with any questions.

Sincerely,
A-Trans Engineering

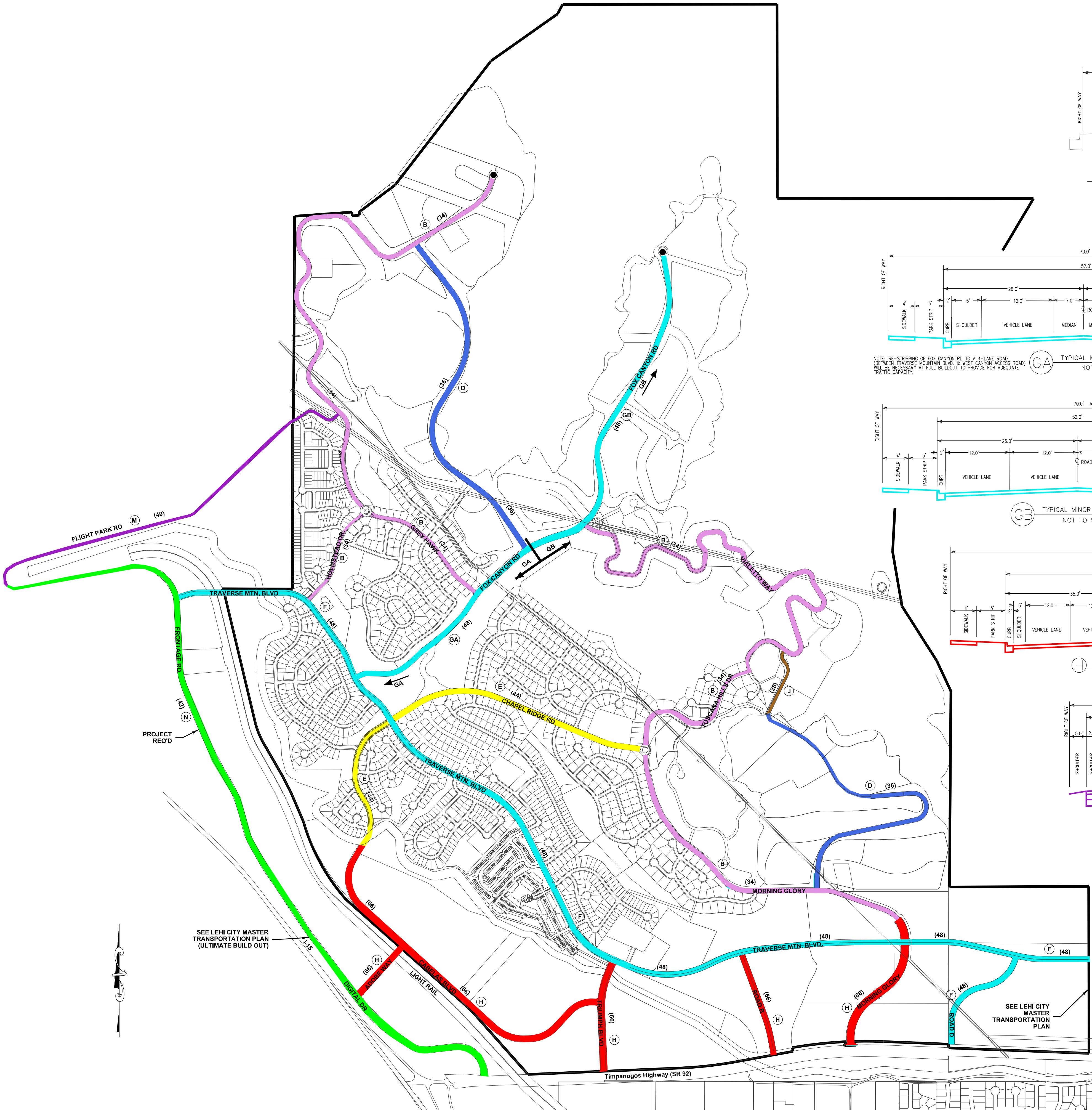
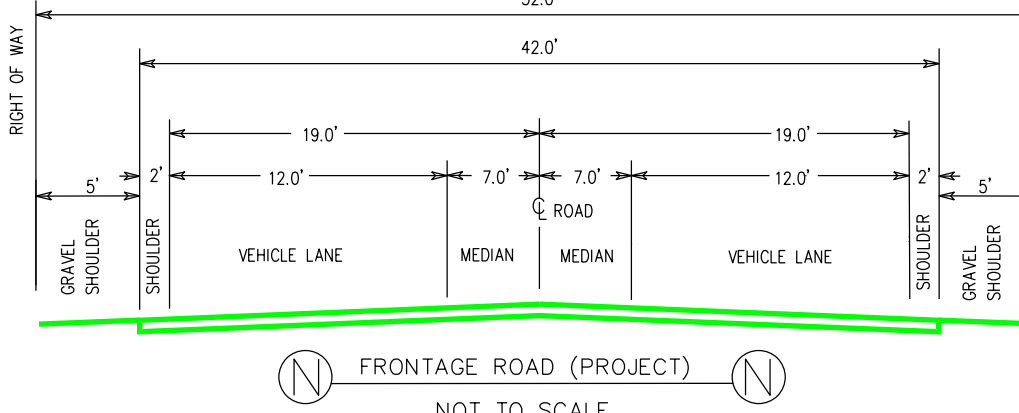
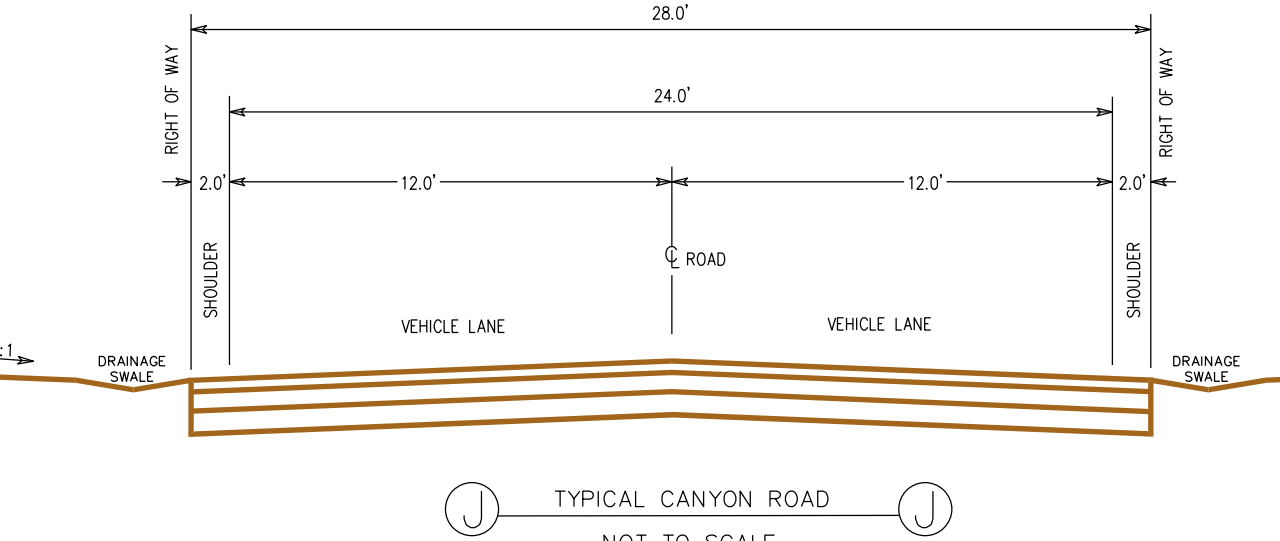
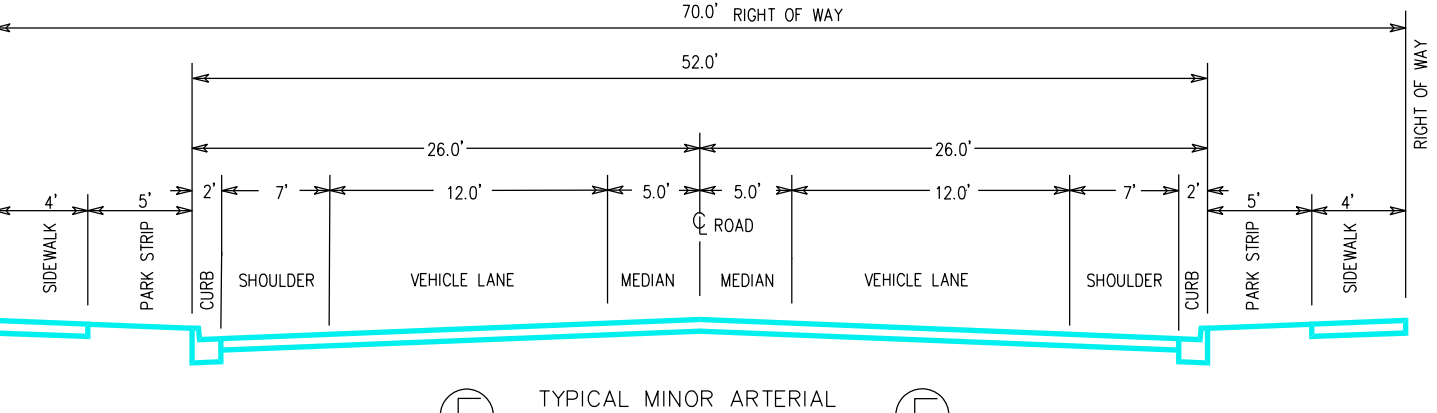
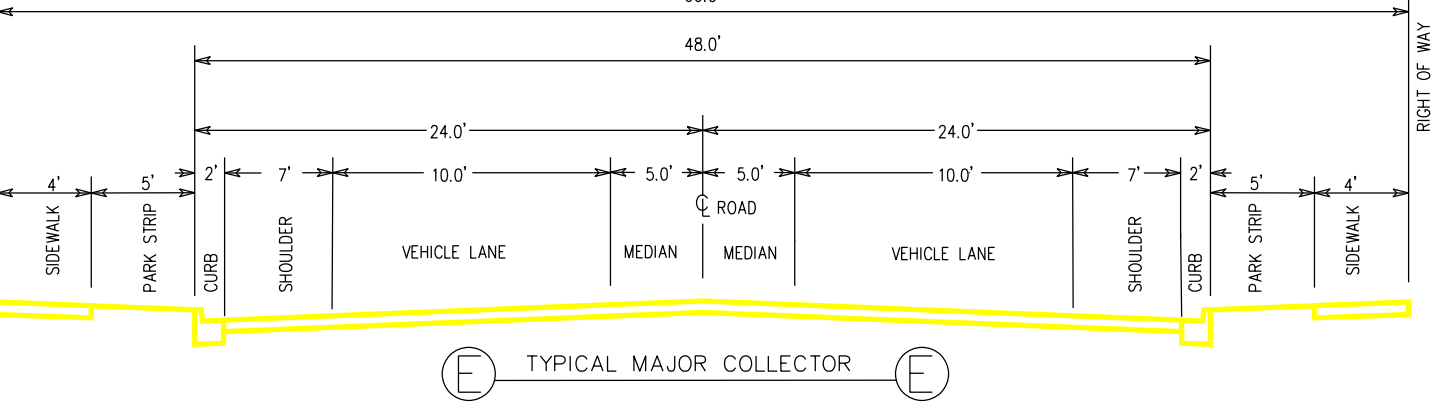
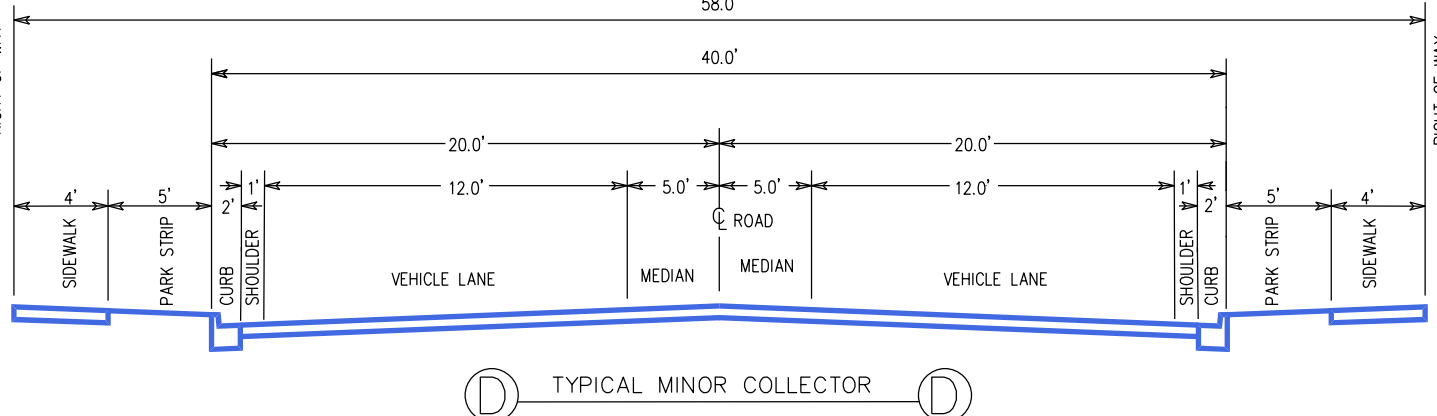
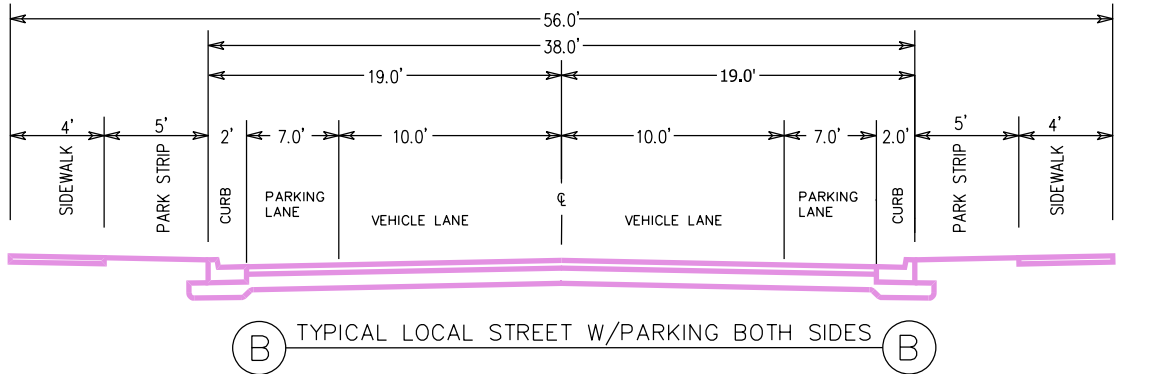
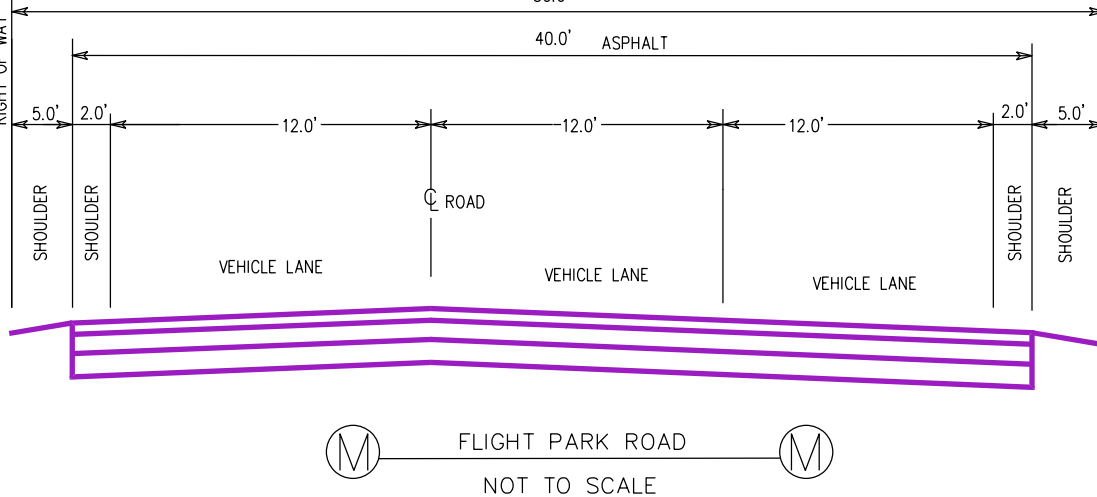
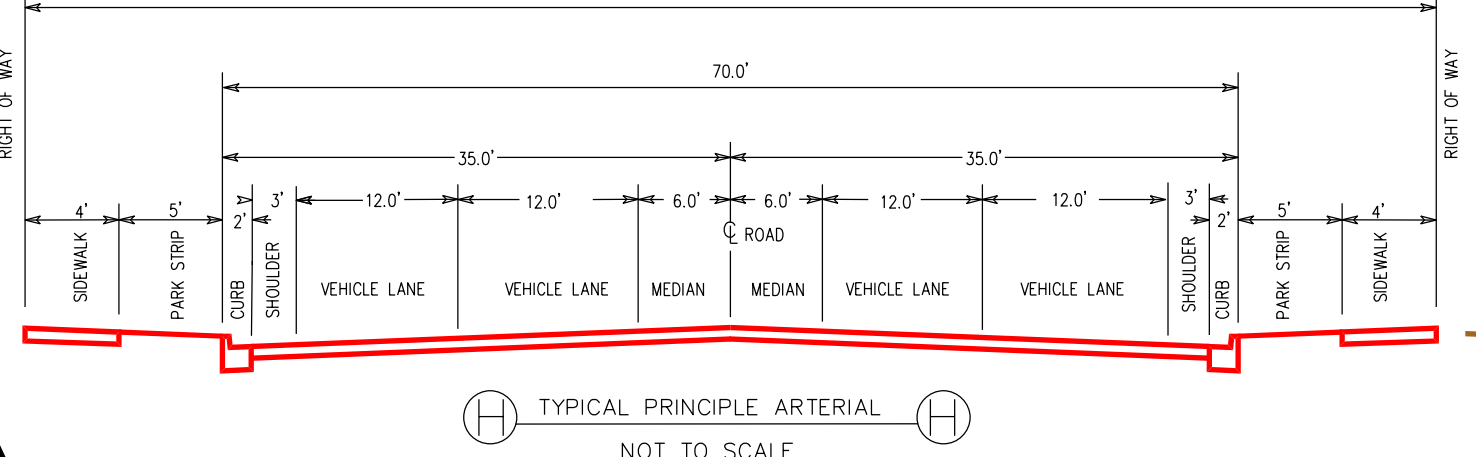
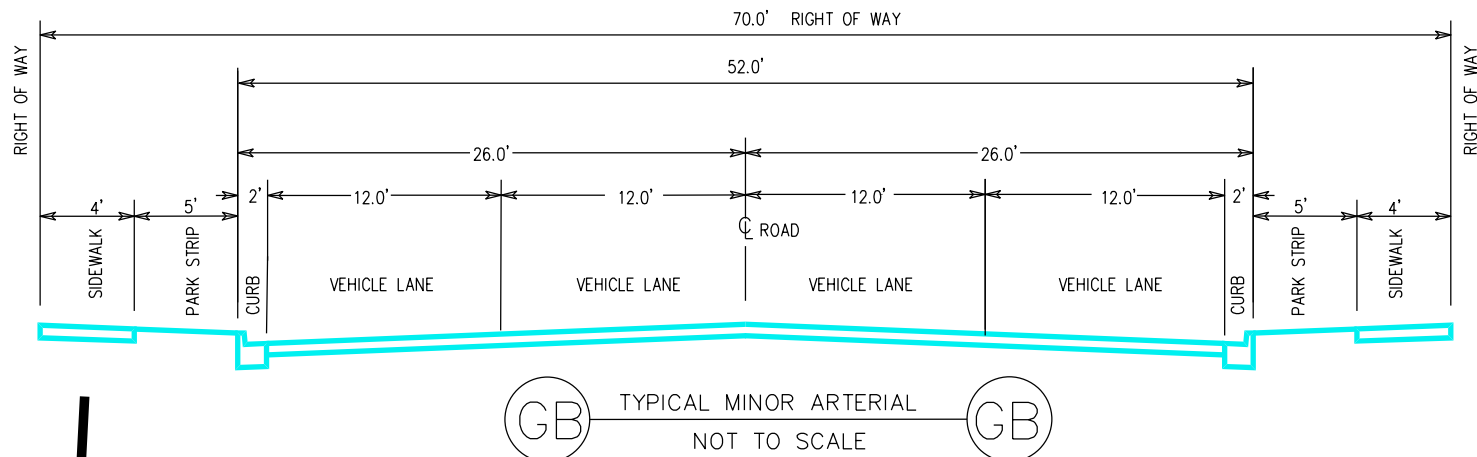
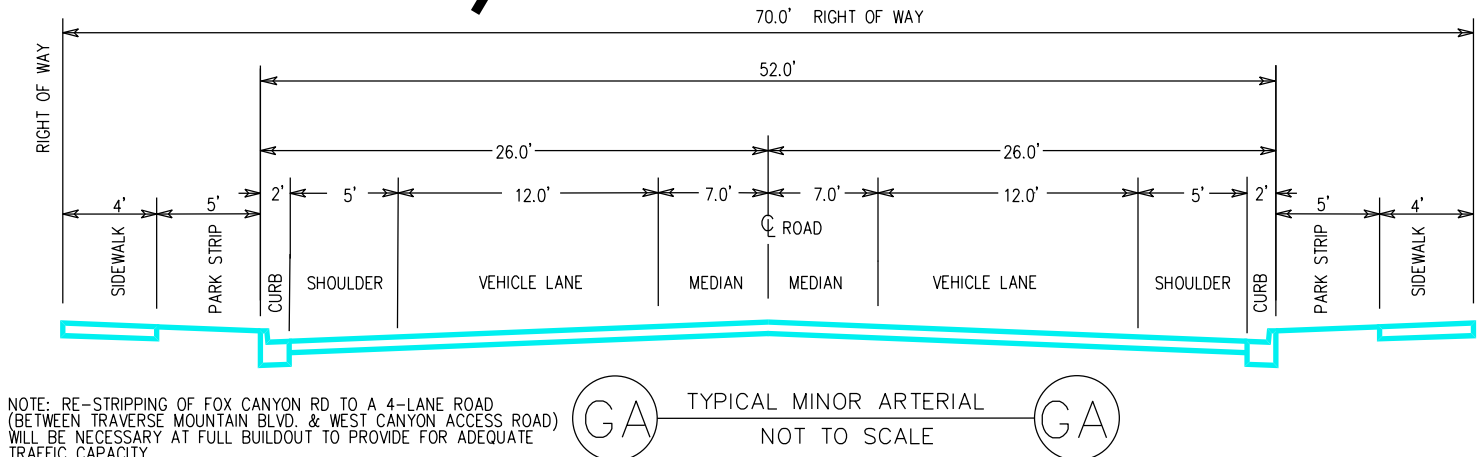
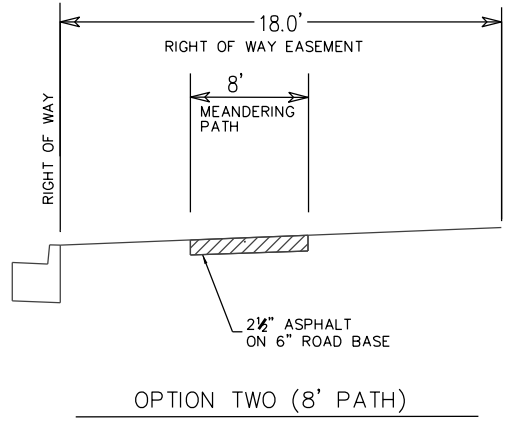


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TRAVERSE MOUNTAIN TYPICAL STREET SECTIONS



Traverse Mountain Master Transportation Plan

- Legend**
- ROAD CLOSED (CUL-DE-SAC)
 - MAJOR ARTERIAL
 - MAJOR COLLECTOR
 - MINOR ARTERIAL
 - MINOR COLLECTOR
 - PRINCIPAL ARTERIAL
 - ASPHALT WIDTH (XX)

TRAVERSE MOUNTAIN AREA PLAN - PUBLIC PARKS FISCAL CALCULATIONS

ANTICIPATED FUTURE IMPACT FEES GENERATED

	Detached 1993	Attached 2619	Total 4612	
Number of Units				
Impact Fee	\$ 2,600	\$ 2,170	\$2,355.82	(Blended Impact fee)
Total Impact Fee Revenue	\$ 5,181,800	\$ 5,683,230	\$10,865,030.00	\$10,865,030.00

ANTICIPATED PUBLIC PARK DEVELOPMENT COSTS & UNITS REQUIRED TO TRIGGER CONSTRUCTION					
Phase	Park Description	Acreage ^a	Anticipated onsite public park costs (Including amenities)	Anticipated offsite regional park costs	Public Park Triggers (based upon 4612 Units ^b)
1	Canal Park	9.6	\$ (2,136,514)	\$ (393,536.45)	25%
	Chapel Ridge / TM Blvd. Park	1.7	\$ (256,551)	\$ (47,255.57)	
2	East Canyon (D6) - Phase I (Some grass, Pool, Changing Areas)	13	\$ (2,221,399)	\$ (409,171.89)	50%
3	Central Canyon (K2)	2	\$ (209,916)	\$ (38,665.59)	55%
4	Perry Homes	5	\$ (528,759)	\$ (97,395.04)	60%
5	East Canyon (D6) - Phase II Park Imp. \$465,868.23 *Recreation Ctr. \$1,870,429.77	13	\$ (465,868) \$ (1,870,430)	\$ (85,810.87) \$ (344,524.91)	85%
6	Central Canyon (F1)	3	\$ (490,983)	\$ (90,436.90)	90%
7	Bonneville Trail Improvements	n/a	\$ (114,040)	\$ (21,005.66)	95%
	Trailhead Parks	n/a	\$ (178,295)	\$ (32,841.15)	
8	West Canyon (F2)	5	\$ (702,275)	\$ (129,355.95)	100%
			\$ (9,175,030)	\$ (1,690,000)	
Total onsite and offsite regional park costs			\$	(10,865,030)	

ASSUMPTIONS:

- ^a Public park acreages are deeded to Lehi City at no cost
- ^b Only permitted (not platted) units are to be counted within "Trigger" calculations
- * Recreation Center Building costs is the difference between projected Park Impact Fees to be collected with 4612 units and the projected estimated costs of all Park Improvements found in the line item breakdown in this fiscal analysis
- The distribution of impact fee revenue and sequencing of parks may be adjusted based on timing of developments within the Traverse Mountain Area
- Impact fees are not districted and must be expended within a six-year period, which may affect the timing and construction of the above-planned facilities
- Amenities planned within the park areas are conceptual and will be finalized at the time of development
- Impact fee revenues of approximately \$1.69 M are to be used by City for offsite regional park improvements. These fees are shown within the "Anticipated offsite regional park costs" column above, and may be expended at a different rate, at the discretion of the City
- Public Park property will be deeded unencumbered to Lehi City when a final plat is recorded to create the legal lot.
- This Park Fiscal Analysis is based on 4612 residential dwelling units



ITEM	DESCRIPTION	PRICE	QTY	ITEM TOTAL
Amplifier		\$40,000.00 LUMP	1	\$40,000.00
Design Fees		\$35,000.00 PER EACH	1	\$35,000.00
Soccer Field ***		\$100,000.00 PER EACH	1	\$100,000.00
Tennis Court ***		\$17,500.00 PER EACH	0	\$0.00
Basketball Court (Full Court) ***	includes concrete pad, seating, and standard	\$17,500.00 PER EACH	5	\$17,500.00
Basketball Court (1/2 Court) ***	includes concrete pad, seating, and standard	\$400.00 PER EACH	7	\$2,800.00
Public Toilet ***	free standing	\$1,500.00 PER EACH	2	\$3,000.00
Trash Receptacle*		\$1,500.00 PER EACH	4	\$6,000.00
Cycling Foreman ***		\$1,500.00 PER EACH	20,000	\$40,000.00
Bike Rack ***		\$15.00 PER LIN FT	700	\$10,500.00
Asphalt Parking Lot (40 Stalls) **	capitol surface, striping	\$400.00 PER EACH	1	\$400.00
Curb and Gutter **		\$220,000.00 PER EACH	0	\$0.00
Per Comfort Station *		\$80,000.00 PER EACH	1	\$80,000.00
Restroom ***		\$50,000.00 PER EACH	1	\$50,000.00
Playground (large) ***	includes monorail, soft surface and structure	\$40.00 PER SQ FT	1	\$20,000.00
Playground (small) ***	includes monorail, soft surface and structure	\$20,000.00 PER EACH	1	\$20,000.00
Pavilion (small) *		\$0.46 PER SQ FT	159,126	\$73,197.72
Sodascope (lawn) **	sodascope square footages consist of 65% lawn, 15% planter area, includes installed roof @ \$0.38 per sq ft, five wiring @ \$0.08 per sq ft	\$19.50 PER CU YD	1,473	\$28,723.50
Imported topsoil (lawn) **	4" depth	\$55.00 PER CU YD	260	\$14,300.00
Sodascope (planter) **	sodascope square footages consist of 65% lawn, 15% planter area, 3" elevated base, much	\$19.50 PER CU YD	693	\$13,503.75
Imported topsoil (planter) **	8" depth	\$285.00 PER EACH	90	\$25,650.00
Decorative Trees **	1 1/2" Caliper (20 inch caliper trees per acre)	\$330.00 PER EACH	45	\$14,850.00
Evergreen Trees **	7-8" height (10 evergreen trees per acre)	\$34.00 PER EACH	255	\$8,670.00
Shrub **	5 gallon (50 shrubs per acre)	\$0.50 PER SQ FT	187,207	\$93,603.25
Irrigation **	Robbed 5,500 heads or equivalent in lawn areas, drip in planter areas	\$10,000.00	6	\$60,000.00
Security Lighting ***	1 Per Acre 2 per restroom	\$4.00 Per sq ft	9,022	\$41,501.20
Concrete Pkg work ***		\$1.00 PER EACH	18,500	\$18,500.00
Park Drainage		\$1,500.00 PER EACH	17	\$18,000.00
Benches ***		\$1,650,000.00	1	\$1,650,000.00
Pool / Restroom / Changing Facilities				
PARK TOTAL:				\$2,231,977.42

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PARK NAME

D6 Public - Phase II

13 Acres

ANALYSIS	DESCRIPTION	PRICE	QTY	ITEM TOTAL
Design Fees		\$40,000.00 LUMP	0	\$40,000.00
Soccer Field ***		\$35,000.00 PER EACH	1	\$35,000.00
Tennis Court ***		\$100,000.00 PER EACH	2	\$200,000.00
Baseball Court (Full Court) ***	includes concrete pad, seating, and finished	\$35,000.00 PER EACH	0	\$0.00
Baseball Court (1/2 Court) ***	includes concrete pad, seating, and standard	\$17,500.00 PER EACH	1	\$17,500.00
Park Trail ***		\$1,500.00 PER EACH	5	\$7,500.00
Trash Receptacle*		\$400.00 PER EACH	5	\$2,000.00
Drinking Fountain ***	free standing	\$1,500.00 PER EACH	1	\$1,500.00
Bike Rack ***		\$1,500.00 PER EACH	0	\$0.00
Asphalt Parking Lot (40 Stalls) ***	asphalt surface, striping	\$100 PER SQ FT	0	\$0.00
Curbs and Gutter ***		\$15.00 PER LIN FT	0	\$0.00
Pet Comfort Station*		\$400.00 PER EACH	2	\$800.00
Restroom ***		\$220,000.00 PER EACH	0	\$0.00
Playground (large) ***	includes structure, safety surface and seating	\$80,000.00 PER EACH	0	\$0.00
Playground (small) ***	includes structure, safety surface and structure	\$50,000.00 PER EACH	0	\$0.00
Logging Path ***	8" wide asphalt	\$40.00 PER LIN FT	1,935	\$77,240.00
Pavillion (small) *		\$20,000.00 PER EACH	1	\$20,000.00
Seedscape (small) ***	seedscape square footings consist of 85% lawn, 15% planter rock	\$9.46 PER SQ FT	159,126	\$72,197.77
Seedscape (large) ***	4" depth	\$19.50 PER CU YD	1,473	\$26,723.25
Seedscape (planter) ***	seedscape square footings consist of 85% lawn, 15% planter rock	\$55.00 PER CU YD	260	\$14,300.00
Imported topsoil (planter) ***	8" depth	\$19.50 PER CU YD	693	\$13,503.75
Deciduous Trees ***	1 1/2" Caliper (20 deciduous trees per acre)	\$285.00 PER EACH	92	\$26,220.00
Evergreen Trees ***	7-8" height (10 evergreen trees per acre)	\$330.00 PER EACH	46	\$15,180.00
Grass ***	3 species (50 blades per acre)	\$34.00 PER EACH	200	\$6,800.00
Irrigation ***	Reinforced 5500 brooks or equivalent in lawn areas, drip in planter areas	\$0.50 PER SQ FT	189,207	\$93,603.25
Security Lighting ***	1 Per Acre 2 per restroom	\$10,000.00	6	\$60,000.00
Concrete Flat work ***		\$6.60 Per sq ft	0	\$0.00
Park Drainage		\$1.00 PER EACH	18,500	\$18,500.00
Benches ***		\$1,500.00 PER EACH	12	\$18,000.00
Pool / Restroom / Changing Facilities		\$1,650,000.00 PER EACH	0	\$0.00
PARK TOTAL				\$449,846.23

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PARK NAME
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K2 PubliC

5207.915.94

DESCRIPTION	PRICE	QTY	ITEM TOTAL
Design Fees	\$11,000.00 LUMP	1	\$11,000.00
Baseball Court (1/2 Court) ***	\$17,500.00 PER EACH	1	\$17,500.00
Tennis Court ***	\$100,000.00 PER EACH	1	\$100,000.00
Per Comfort Station *	\$400.00 PER EACH	2	\$800.00
Picnic Table ***	\$3,500.00 PER EACH	7	\$24,500.00
Trash Receptacle *	\$400.00 PER EACH	4	\$1,600.00
Drinking Fountain ***	\$3,500.00 PER EACH	2	\$7,000.00
Ball Rack ***	\$1,500.00 PER EACH	2	\$3,000.00
Playground (Area) ***	\$50,000.00 PER EACH	1	\$50,000.00
Perillon (Area) *	includes mowing, topsoil surface and structure	1	\$20,000.00
Softscape (awn) ***	softscape square footage consist of 85% lawn, 15% planter rock	180,988	\$8,324.48
Softscape (planter) ***	4' depth	1,809	\$18,275.50
Softscape (planter) ***	softscape square footage consist of 85% lawn, 15% planter rock	296	\$14,280.00
Deciduous Trees **	8" depth	777	\$14,171.50
Deciduous Trees **	1 1/2" Caliper (20 deciduous trees per acre)	100	\$28,500.00
Evergreen Trees **	7-8 height (10 evergreen trees per acre)	50	\$16,500.00
Concrete Pile work ***	\$4.60 Per sq ft	3,470	\$16,000.00
Park Drainage			\$14,230.00
Security Lighting ***	1 Per Acre 2 per restroom	2	\$20,000.00
Shrubs **	5 gallon (50 shrubs per acre)	250	\$8,500.00
Perk Station **	Perk Station 5500 needs or equivalent in lawn area, deep in planter area	212,927	\$108,483.50
Benches ***		5	\$7,500.00
Restroom ***	1/2 size of city standard	1	\$100,000.00
PARK TOTAL			\$702,274.98

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PERRY HOMES

A Public		DESCRIPTION	PRICE	QTY	TOTAL
2 Acres					
Amusement					
Design Fees			\$5,000.00 LUMP	1	\$5,000.00
Baseball Court (1/2 Court)		includes concrete pad, striping, and standard	\$17,500.00 PER EACH	1	\$17,500.00
Bench			\$1,500.00 PER EACH	2	\$3,000.00
Picnic Table			\$3,500.00 PER EACH	2	\$7,000.00
Trash Receptacle			\$400.00 PER EACH	1	\$400.00
Drinking Fountain		free standing	\$3,500.00 PER EACH	1	\$3,500.00
Playground (small)		includes mowedge, softfall surface and structure	\$1,500.00 PER EACH	1	\$1,500.00
Playground (small)		includes mowedge, softfall surface and structure	\$50,000.00 PER EACH	1	\$50,000.00
Pet Comfort Station			\$400.00 PER EACH	1	\$400.00
Softscape (lawn)		softscape square footages consist of 85% lawn, 15% planter ratio, includes installed sod @ \$0.38 per sq. ft., fine kneeling @ \$0.08 per sq. ft.	\$0.46 PER SQ FT	73,364	\$33,747.44
Softscape (lawn)					
Softscape (planter)		softscape square footages consist of 85% lawn, 15% planter ratio, 3" shredded bark mulch	\$55.00 PER CU YD	120	\$6,600.00
Imported coprol (planter)		6" depth	\$19.50 PER CU YD	287	\$3,862.50
Concrete Flat work			\$4.60 PER SQ FT	1,388	\$6,500.00
Park Drainage					
Deciduous Trees		1 1/2" Caliper (20 deciduous trees per acre)	\$285.00 PER EACH	40	\$11,400.00
Evergreen Trees		7-8" height (10 evergreen trees per acre)	\$350.00 PER EACH	20	\$7,000.00
Shrubs		5 gallon (50 shrubs per acre)	\$34.00 PER EACH	100	\$3,400.00
Benches		Installed \$500 benches or equivalent in lawn areas, 49 in planter areas	\$0.50 LUMP	68,311	\$34,155.50
PARK TOTAL:					\$72,693.14

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B Public		DESCRIPTION	PRICE	QTY	TOTAL
3 Acres					
Amusement					
Design Fees			\$6,000.00 LUMP	1	\$6,000.00
Baseball Court (1/2 Court)		includes concrete pad, striping, and standard	\$12,500.00 PER EACH	1	\$12,500.00
Picnic Table			\$3,500.00 PER EACH	3	\$10,500.00
Trash Receptacle			\$400.00 PER EACH	2	\$800.00
Drinking Fountain		free standing	\$3,500.00 PER EACH	1	\$3,500.00
Playground (small)		includes mowedge, softfall surface and structure	\$50,000.00 PER EACH	1	\$50,000.00
Pet Comfort Station			\$400.00 PER EACH	1	\$400.00
Softscape (lawn)		softscape square footages consist of 85% lawn, 15% planter ratio, includes installed sod @ \$0.38 per sq. ft., fine kneeling @ \$0.08 per sq. ft.	\$0.46 PER SQ FT	109,115	\$50,192.90
Softscape (lawn)					
Softscape (planter)		softscape square footages consist of 85% lawn, 15% planter ratio, 3" shredded bark mulch	\$55.00 PER CU YD	178	\$9,790.00
Concrete Flat work			\$4.60 PER SQ FT	2,082	\$9,500.00
Park Drainage					
Imported topsoil (planter)		6" depth	\$19.50 PER CU YD	470	\$9,165.00
Deciduous Trees		1 1/2" Caliper (20 deciduous trees per acre)	\$285.00 PER EACH	60	\$17,100.00
Evergreen Trees		7-8" height (10 evergreen trees per acre)	\$350.00 PER EACH	30	\$10,500.00
Shrubs		5 gallon (50 shrubs per acre)	\$34.00 PER EACH	150	\$5,100.00
Benches		Installed \$500 benches or equivalent in lawn areas, 49 in planter areas	\$0.50 PER SQ FT	128,270	\$64,135.00
PARK TOTAL:					\$301,844.90

EXISTING COMMUNITY PROPOSED PARK IMPROVEMENTS

PARK NAME

West End of TM Bl

9.6 Acres
Public

Item #	DESCRIPTION	PRICE	QTY	ITEM TOTAL
1	Asphalt	\$60,000.00 LUMP	1	\$60,000.00
2	Design Fees	\$80,000.00 PER EACH	1	\$80,000.00
3	Baseball Fields *** Includes bleachers, dugout, and backing	\$17,500.00 PER EACH	3	\$525,000.00
4	Basketball Court (1/2 Court) *** Includes concrete pad, striping, and standard	\$4,000.00 PER EACH	1	\$4,000.00
5	Trash Table ***	\$2,400.00 PER EACH	6	\$14,400.00
6	Trash Receptacle *	\$3,500.00 PER EACH	2	\$7,000.00
7	Drinking Fountain *** Free standing	\$1,500.00 PER EACH	4	\$6,000.00
8	Bike Rack ***	\$100.00 PER SQ FT	21414	\$2,141,400.00
9	Asphalt Parking Lot *** (60 stalls) curb and gutter	\$15.00 PER LIN FT	790	\$11,850.00
10	Benches ***	\$220,000.00 PER EACH	1	\$220,000.00
11	Restroom ***	\$10,000.00 PER EACH	1	\$10,000.00
12	Playground (large) *** Includes mowedge, softfall surface and structure	\$50,000.00 PER EACH	1	\$50,000.00
13	Playground (small) *** 8' wide softfall	\$40,000.00 PER LIN FT	2202	\$880,000.00
14	Walking Path ***	\$20,000.00 PER EACH	1	\$20,000.00
15	Pavilion (small) *	\$6.46 PER SQ FT	315715	\$1,995,281.90
16	Softscape (awn) *** Softscape square footage consists of 85% lawn, 15% power pole includes mulch and @ \$0.18 per sq ft, fine mulch @ \$0.08 per sq ft	\$19.50 PER CU YD	3,508	\$68,406.00
17	Imported topsoil (awn) *** 4" depth	\$35.50 PER CU YD	516	\$18,100.00
18	Softscape (planter) *** Softscape square footage consists of 85% lawn, 15% power pole 3" mulched lawn mulch	\$19.50 PER CU YD	1,374	\$26,793.00
19	Imported topsoil (planter) *** 8" depth	\$4.60 Per sq ft	6,662	\$30,000.00
20	Concrete Flat work ***	\$27,000.00		\$27,000.00
21	Park Drainage	\$100,000.00	10	\$1,000,000.00
22	Security Lighting *** 1 Per Acre 2 per restroom	\$385.00 PER EACH	192	\$74,920.00
23	Deciduous Trees *** 1 1/2" Caliper (10 deciduous trees per acre)	\$310.00 PER EACH	96	\$31,680.00
24	Evergreen Trees *** 7-8" height (10 evergreen trees per acre)	\$400.00 PER EACH	371,429	\$1,485,714.50
25	Shrubs *** 5 gallon (50 shrubs per acre)	\$1,200.00	3	\$3,600.00
26	Irrigation *** Robbed 5500 heads or equivalent in lawn areas, drip in planter areas	\$400.00 PER EACH	3	\$1,200.00
27	Pet Comfort Station *	\$1,200.00		\$1,200.00
28	1 LUMP	\$590,000		\$590,000.00
PARK TOTAL				\$21,135,164.40

MVA estimates for infrastructure, half width improvement of TM Bl, and grading (cost est plus 20% contingency)



Item	DESCRIPTION	PRICE	QTY	ITEM TOTAL
Asphalt				
Drain Fees		\$5,000.00 LUMP	1	\$5,000.00
Barbed Wire (1/2" Core) ***	Includes concrete post, strapping, and staples	\$12,500.00 PER EACH	1	\$12,500.00
Plastic Table ***		\$3,500.00 PER EACH	2	\$7,000.00
Trash Receptacle ***		\$400.00 PER EACH	2	\$800.00
Drinking Fountain ***	Free standing	\$3,500.00 PER EACH	1	\$3,500.00
Blue Bench ***		\$1,500.00 PER EACH	1	\$1,500.00
Playground (small) ***	Includes monkey, softfall surface and structure	\$50,000.00 PER EACH	1	\$50,000.00
Jogging Path ***	6' wide asphalt	\$40.00 PER LF	1,449	\$157,560.00
Pavillion (small) *		\$20,000.00 PER EACH	1	\$20,000.00
Softscape (awn) **	softscape above footings consist of 85% lawn, 15% planter rock, includes mulch @ \$0.25 per sq ft, plus watering @ \$0.05 per sq ft	\$0.46 PER SQ FT	50,911	\$23,419.06
Imported topsoil (awn)	4" depth	\$19.50 PER CU YD	566	\$11,037.00
Softscape (patent) **	softscape above footings consist of 85% lawn, 15% planter rock, 3" divided lawn rock	\$33.00 PER CU YD	34	\$2,970.00
Imported topsoil (patent) **	8" depth	\$19.50 PER CU YD	145	\$2,827.50
Deciduous Trees **	1 1/2" Caliper (20 deciduous trees per acre)	\$285.00 PER EACH	34	\$7,980.00
Evergreen Trees **	7'-8' height (10 evergreen trees per acre)	\$330.00 PER EACH	17	\$5,610.00
Shrub **	5 gallon (50 shrubs per acre)	\$34.00 PER EACH	85	\$2,890.00
Irrigation **	Robber 5500 heads or equivalent in lawn areas, drip in planter areas	\$0.50 LUMP	59,895	\$29,947.50
Bench ***		\$1,500.00 PER EACH	3	\$4,500.00
Pet Comfort Station *		\$400.00 PER EACH	1	\$400.00
PARK TOTAL				\$324,357.06

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TRAILHEAD PARKS

PARK NAME

East Trailhead Park

AMENITIES	DESCRIPTION	PRICE	QTY	ITEM TOTAL
Design Fees		\$500.00 LUMP	1	\$500.00
Asphalt Parking Lot ** (10 stalls)	asphalt surface, striping	\$3.00 PER SQ FT	2340	\$7014.00
Boulder Boulders **	3'-4' diameter, average source	\$55.00 PER EACH	6	\$330.00
Shrubbery (planters) **	3" shredded bark mulch	\$55.00 PER SQ FT	11	\$605.00
Deciduous Trees **	1 1/2" Caliper	\$285.00 PER EACH	3	\$855.00
Park Drainage				\$2,800.00
Evergreen Trees **	7'-8' height	\$330.00 PER EACH	4	\$1320.00
Timber Fence		\$15.00 PER LF	150	\$2,250.00
Irrigation **	drip only	\$4.50 PER SQ FT	1200	\$5400.00
PARK TOTAL:				\$14,984.00

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West Trailhead Park

AMENITIES	DESCRIPTION	PRICE	QTY	ITEM TOTAL
Design Fees		\$400.00 LUMP	1	\$400.00
Asphalt Parking Lot ** (20 stalls)	asphalt surface, striping	\$3.00 PER SQ FT	7107	\$21321.00
Restroom ***	1/2 size of city standard	\$100,000.00 PER EACH	1	\$100,000.00
Boulder Boulders **	3'-4' diameter, average source	\$55.00 PER EACH	6	\$330.00
Shrubbery (planters) **	3" shredded bark mulch	\$55.00 PER CU YD	15	\$825.00
Concrete Flat work ***		\$4.60 PER SQ FT	695	\$3200.00
Park Drainage				\$2,800.00
Security Lighting ***	1 Per Area 2 per restroom	\$10,000.00	3	\$30,000.00
Deciduous Trees **	1 1/2" Caliper	\$285.00 PER EACH	1	\$285.00
Evergreen Trees **	7'-8' height	\$330.00 PER EACH	4	\$1320.00
Timber Fence		\$15.00 PER LF	200	\$3000.00
Irrigation **	drip only	\$0.50 PER SQ FT	1600	\$800.00
PARK TOTAL:				\$163,441.00

BONNEVILLE SHORELINE TRAIL IMPROVEMENTS

East Portion	Segment Length	2 Miles	Amenities	DESCRIPTION	PRICE	QTY	ITEM TOTAL
			Asphalt Trail ***	8' wide	\$40.00 PER LF	1,056	\$42,240.00
SEGMENT TOTAL							\$42,240.00
West Portion	Segment Length	2.4 Miles	Amenities	DESCRIPTION	PRICE	QTY	ITEM TOTAL
			Asphalt Trail ***	8' wide	\$40.00 PER LF	1,795	\$71,800.00
SEGMENT TOTAL							\$71,800.00

**TRAVERSE MOUNTAIN
ROAD IMPROVEMENTS
PRELIMINARY ENGINEER'S ESTIMATE
12/8/2011**

2011 Area Plan					
Item	Quantity	Unit	Unit Cost	Total Cost	
Additional Road Improvements Needed To Meet 5812 Units					
500 West (Half Width Equals 40')					
Pavement (3" Asphalt over 6" Road Base)(29' Pavement)	43,500	Square Feet	\$ 3.13	\$	(135,938)
Curb, Gutter, and Sidewalk (one side)	1,500	Linear Feet	\$ 37.50	\$	(56,250)
Frontage Road					
Pavement (3" Asphalt & 6" Road Base)(Upsize from 22' to 42' Pavement)(7,500 LF)	150,000	Square Feet	\$ 3.13	\$	(468,750)
Overlay (24')	180,000	Square Feet	\$ 1.56	\$	(281,250)
Flight Park Road					
Pavement (3" Asphalt & 6" Road Base)(40' Pavement)(4,500 LF)	180,000	Square Feet	\$ 3.13	\$	(562,500)
Traverse Mountain Blvd Extension to East Frontage Road (North of Pilgrim's Landing Facility)					
Pavement (3" Asphalt & 6" Road Base)(66' Pavement)(1500 LF)	99,000	Square Feet	\$ 3.13	\$	(309,375)
Curb, Gutter, and Sidewalk (Both Sides)	1,500	Linear Feet	\$ 75.00	\$	(112,500)
Railroad Crossing	1	Lump Sum	\$ 1,625,000.00	\$	(1,625,000)
Regionally Significant Improvements (1200 West, 2300 West, etc...)	1	Lump Sum	\$ 1,716,000.00	\$	(1,716,000)
Onsite Signals/Round-Abouts	9	Each	\$ 260,000.00	\$	(2,340,000)
Total Roadway Improvements for Oversizing & Overlays				\$	(7,607,563)

ROADWAY IMPACT FEE					
Item	Quantity	Unit	ERU	Fee/Unit	Total Impact Fee
Residential	4,612	Units		\$ 1,435.00	\$ 6,618,220
Commercial Area	270	Acres	728	\$ 1,435.00	\$ 1,044,178
Total Impact Fee					\$ 7,662,398
Net Impact Fee					\$ 54,835

Notes:

1. Costs include all engineering, surveying, and contingency fees.
2. It is assumed that the above improvements can be built as development occurs.
3. Costs do not include Right Of Way.
4. There is no oversizing reimbursement to be paid by Lehi City.



TRAVERSE MOUNTAIN
SANITARY SEWER IMPROVEMENTS
 PRELIMINARY ENGINEER'S ESTIMATE
 12/8/2011

2011 Area Plan				
Item	Quantity	Unit	Unit Cost	Total Cost
The Existing Sewer discharges into the West Side Sewer at Thanksgiving Point. The Existing Sewer consists of: A bore under I-15 and sewer lines along the East frontage road and SR-92				

1700 West Outfall

Additional Sewer Improvements Needed To Meet 5812 Units

1900 So. To 300 No. Upsizing & Dewatering (24" RCP)	9,500	Linear Feet	\$ 81.25	\$ (771,875)
5' Diameter Manholes (12' Deep)	32	Each	\$ 6,250.00	\$ (200,000)
Main Street Bore	200	Linear Feet	\$ 450.00	\$ (90,000)
Pioneer Crossing Bore	200	Linear Feet	\$ 450.00	\$ (90,000)
Dry Creek Crossing	1	Lump Sum	\$ 37,500.00	\$ (37,500)
Road Repair	9,500	Linear Feet	\$ 62.50	\$ (593,750)
Remove Material	9,500	Linear Feet	\$ 8.75	\$ (83,125)
Import Material	9,500	Linear Feet	\$ 8.75	\$ (83,125)
300 No. to 900 No. Upsizing & Dewatering (24" RCP)	2,700	Linear Feet	\$ 81.25	\$ (219,375)
5' Diameter Manholes (12' Deep)	10	Each	\$ 6,250.00	\$ (62,500)
Waste Ditch Crossing	1	Lump Sum	\$ 37,500.00	\$ (37,500)
Road Repair	2,700	Linear Feet	\$ 62.50	\$ (168,750)
Remove Material	2,700	Linear Feet	\$ 8.75	\$ (23,625)
Import Material	2,700	Linear Feet	\$ 8.75	\$ (23,625)
1500 No. to Ashton Blvd. & Dewatering (New 24" pipe)	2,080	Linear Feet	\$ 81.25	\$ (169,000)
5' Diameter Manholes (12' Deep)	7	Each	\$ 6,250.00	\$ (43,750)
Road Repair	2,080	Linear Feet	\$ 62.50	\$ (130,000)
Remove Material	2,080	Linear Feet	\$ 8.75	\$ (18,200)
Import Material	2,080	Linear Feet	\$ 8.75	\$ (18,200)
Ashton Blvd. Along West Frontage Road (12" RCP)	3,280	Linear Feet	\$ 50.00	\$ (164,000)
5' Diameter Manholes (12' Deep)	12	Each	\$ 6,250.00	\$ (75,000)
Road Repair	3,280	Linear Feet	\$ 50.00	\$ (164,000)
Remove Material	3,280	Linear Feet	\$ 8.75	\$ (28,700)
Import Material	3,280	Linear Feet	\$ 8.75	\$ (28,700)
Total Sanitary Sewer Costs				\$ (3,324,300)

SANITARY SEWER IMPACT FEE				
Item	Quantity	Unit	ERU	Total Impact Fee
Residential	4,612	Units		\$ 460.00 \$ 2,121,520
Commercial Area	270	Acres	728	\$ 460.00 \$ 334,719
Private Recreational Area			11	\$ 460.00 \$ 5,060
Total Estimated Impact Fees				\$ 2,461,299
Net Impact Fee				\$ (863,001)

Notes:

1. Costs include all engineering, surveying, and contingency fees.
2. Base pipe costs (dry) include manholes, laterals, and bedding.
4. Road repair includes 12" subbase, 8" base, 3" asphalt, 20' wide.
5. Road repair in wet includes 18" subbase.
6. See Map/Report for Master plan Upsizing.
7. It is assumed that existing facilities will be adequate until 1700 West system is built. The additional dollars required to build along 1700 W should be resolved through other developments along the line.



**TRAVERSE MOUNTAIN
CULINARY WATER IMPROVEMENTS
PRELIMINARY ENGINEER'S ESTIMATE**

12/8/2011

2011 Area Plan				
Item	Quantity	Unit	Unit Cost	Total Cost
Existing Facilities Include:				
Oak Hollow Tank & Well				
Oak Hollow Booster Station				
Vialeto Tank				
Pilgrim's Landing Booster				
Additional Culinary Water Improvements Needed To Meet 5812 Units				
Wells				
Flight Park Well (1400 GPM)	1 each		\$ 1,125,000.00	\$ (1,125,000)
14" Transmission Line	400 Linear Feet		\$ 50.00	\$ (20,000)
Vialeto Well (1200 GPM)	1 each		\$ 1,500,000.00	\$ (1,500,000)
14" Transmission Line	400 Linear Feet		\$ 50.00	\$ (20,000)
Tanks				
West Canyon Tank (250,000 Gal)	250,000 Gallon		\$ 2.19	\$ (546,875)
18" Culinary Transmission Line	600 Linear Feet		\$ 75.00	\$ (45,000)
Access Road	600 Linear Feet		\$ 31.25	\$ (18,750)
Flight Park Tank (750,000 Gal)	750,000 Gallon		\$ 1.40	\$ (1,050,000)
16" Culinary Transmission Line (Flight Park To West Canyon)	3,500 Linear Feet		\$ 62.50	\$ (218,750)
Property from State of Utah	1 Lump Sum		\$ 100,000.00	\$ (100,000)
Zone Transmission Lines				
12" Culinary Transmission line (upper central canyon)	3,000 Linear Feet		\$ 37.50	\$ (112,500)
8" Culinary Transmission line (central canyon)	2,900 Linear Feet		\$ 31.25	\$ (90,625)
16" Culinary Transmission line (West Canyon)	4,984 Linear Feet		\$ 62.50	\$ (311,500)
12" Culinary Transmission line (East Canyon)	1,100 Linear Feet		\$ 35.00	\$ (38,500)
8" Culinary Transmission line (East Canyon)	3,500 Linear Feet		\$ 31.25	\$ (109,375)
Prv (East Canyon to Morning Glory)	1 each		\$ 100,000.00	\$ (100,000)
Outstanding Certificates*				
Oak Hollow			\$ 1,680.00	\$ (1,680)
Vialeto			\$ 992,823.94	\$ (992,824)
Total Water Improvements				\$ (6,401,379)

CULINARY WATER IMPACT FEE				
Item	Quantity	Unit	ERU	Total Impact Fee
Residential	4,612	Units		\$ 5,534,400
Commercial Area	270	Acres	728	\$ 873,180
Private Recreational Area			11	\$ 13,200
Total Estimated Impact Fees				\$ 6,420,780
Net Impact Fee				\$ 19,401

*Outstanding Certificates are water system improvements that have all ready been constructed. (Booster Station, PI Reservoir, & Vialeto Water Tank)

Notes:

1. Costs include all engineering, surveying, and eontingency fees.
2. There is no over sizing reimbursement to be paid by Lehi City.
3. Only the transmission lines are included in this cost analysis.
4. New facilities will be built as needed. Funds to be provided by developer with reimbursement through certificates that can only be used on Traverse Mountain Development.
5. The Developer will dedicate property without cost to the city for tank, booster station, & well Facilities.



**TRAVERSE MOUNTAIN
PRESSURE IRRIGATION IMPROVEMENTS
PRELIMINARY ENGINEER'S ESTIMATE**

12/8/2011

2011 Area Plan				
Item	Quantity	Unit	Unit Cost	Total Cost
Existing Facilities				
Oak Hollow Reservoir				
Additional Pressurized Irrigation Improvements Needed To Meet 5812 Units				
Reservoirs				
Reservoir - (Vialeto)	5 Acre-feet		\$ 125,000.00	\$ (625,000)
Reservoir - (West Canyon)	2.1 Acre-feet		\$ 150,000.00	\$ (315,000)
Reservoir - (Flight Park)	5 Acre-feet		\$ 115,000.00	\$ (575,000)
20" Pressure Irrigation Transmission Line (Flight Park to Oak Hollow Zone)	3,500	Linear feet	\$ 75.00	\$ (262,500)
Booster Pumps				
Booster Pump Station (Murdock Canal to Oak Hollow) (1500 GPM)	1	Each	\$ 312,500.00	\$ (312,500)
14" Pressure Irrigation Transmission Line (Murdock Canal to Oak Hollow)	2,450.0	Linear feet	\$ 50.00	\$ (122,500)
14" Pipe Through 24" Bore Under Murdock Canal	50	Linear Feet	\$ 437.50	\$ (21,875)
Booster Pump Station @ Pilgrims Landing Reservoir (1,200 GPM)	1	Each	\$ 187,500.00	\$ (187,500)
16" Pressure Irrigation Transmission Line	4,300	Each	\$ 62.50	\$ (268,750)
16" Pipe Through 24" Boring Under Railroad	80	Linear Feet	\$ 437.50	\$ (35,000)
16" Pipe Through 24" Boring Under Murdock Canal	50	Linear Feet	\$ 437.50	\$ (21,875)
Booster Pump Station (Flight Park to West Canyon) (1200 GPM)	1	Each	\$ 187,500.00	\$ (187,500)
12" Pressure Irrigation Transmission Line	3,200	Linear Feet	\$ 37.50	\$ (120,000)
Install Booster Pump in Exist. Facility (Oak Hollow to Vialeto Reservoir)	1	Each	\$ 100,000.00	\$ (100,000)
Wells				
Equip & Improve Pilgrim's Landing Well (1,200 GPM) (50%)	1	Each	\$ 170,000.00	\$ (170,000)
12" Pressure Irrigation Transmission Line (50%)	400	Linear Feet	\$ 18.75	\$ (7,500)
Flight Park Well (1,200 GPM)	1	Each	\$ 480,000.00	\$ (480,000)
12" Pressure Irrigation Transmission Line	400	Linear Feet	\$ 37.50	\$ (15,000)
Morning Glory Well (1,200 GPM)	1	Each	\$ 480,000.00	\$ (480,000)
12" Pressure Irrigation Transmission Line	400	Linear Feet	\$ 37.50	\$ (15,000)
Zone Transmission Lines				
18" Pressure Irrigation Transmission Line (West Canyon)	4,984	Linear Feet	\$ 68.75	\$ (342,650)
14" Pressure Irrigation Transmission Line (Central Canyon)	2,900	Linear Feet	\$ 50.00	\$ (145,000)
12" Pressure Irrigation Transmission Line (Central Canyon)	2,900	Linear Feet	\$ 37.50	\$ (108,750)
Outstanding Certificates*				
Fox Hollow			\$ 44,440.00	\$ (44,440)
Vialeto			\$ 338,397.50	\$ (338,398)
Total Water Improvements				\$ (5,301,738)

PRESSURIZED IRRIGATION IMPACT FEE					
Item	Quantity	Unit	ERU	Impact Fee	Total Impact Fee
Residential	4,612	Units		\$ 1,067.50	\$ 4,923,310
Commercial Area	54	Acres		\$ 5,338.00	\$ 287,718
Private Recreational Area	17	Acres		\$ 5,338.00	\$ 90,746
Total Estimated Impact Fees					\$ 5,301,774

Net Impact Fee **\$ 37**

*Outstanding Certificates are water system improvements that have all ready been constructed. (Booster Station, PI Reservoir, & Vialeto Water Tank)

Notes:

1. Costs include all engineering, surveying, and contingency fees.
2. There is no over sizing reimbursement to be paid by Lehi City.
3. Only the transmission lines are included in this cost analysis.
4. New facilities will be built as needed. Funds to be provided by developer with reimbursement through certificates that can only be used on Traverse Mountain Development.
5. The Developer will dedicate property without cost to the city for reservoir, booster station, & well etc. facilities.



**TRAVERSE MOUNTAIN
STORM DRAIN IMPROVEMENTS
PRELIMINARY ENGINEER'S ESTIMATE**

6/13/2012

2012 Area Plan

Item	Quantity	Unit	Unit Cost	Total Cost
Storm Drain Improvements Needed To Meet 5812 Units				
Bypass Chapel Ridge to Fox Canyon 24" Trunkline	820.0	Linear Feet	\$ 50.00	\$ (41,000)
Parallel Line From Triumph to Adobe Way (Constructed with Removal of Temp. Pond A)				
36" Trunkline To Traverse Mnt Blvd to Fashion Outlet	2,400	Linear Feet	\$ 100.00	\$ (240,000)
42" Trunkline	2,700.0	Linear Feet	\$ 120.00	\$ (324,000)
Morning Glory to Triumph Along Traverse Mountain blvd. 30" Trunkline	3,600.0	Linear Feet	\$ 80.00	\$ (288,000)
Road C to Morning Glory Road 36" Trunkline	1,400.0	Linear Feet	\$ 100.00	\$ (140,000)
Parallel Fox Canyon to Pond B 48" Trunkline	2,650.0	Linear Feet	\$ 140.00	\$ (371,000)
Pond B Disconnect (By Pass Piping) 48" Trunkline	730.0	Linear Feet	\$ 150.00	\$ (109,500)
60" Trunkline	1,320.0	Linear Feet	\$ 215.00	\$ (283,800)
60" Bore Under Canal	50	Linear Feet	\$ 600.00	\$ (30,000)
Lambert Basin Connections 60" Connection from Pond B to Lambert Basin	700	Linear Feet	\$ 215.00	\$ (150,500)
60" Connection from Lambert To Existing I-15 Crossing	1,400	Linear Feet	\$ 215.00	\$ (301,000)
Lehi Offsite Piping Pilgrims Landing 72" Participation	1	Lump Sum	\$ 210,000.00	\$ (210,000)

Total Storm Drain Improvements	\$ (2,488,800)
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STORM DRAIN IMPACT FEE

Item	Quantity	Unit	ERU	Impact Fee	Total Impact Fee
Residential	1,632	Acres		\$ 1,300.00	\$ 2,122,185
Commercial Area	269	Acres		\$ 1,300.00	\$ 349,700
Private Recreational Area	17	Acres		\$ 1,300.00	\$ 22,100
Total Estimated Impact Fees					\$ 2,493,985
Net Impact Fee					\$ 5,185

Notes:

1. Costs include all engineering, surveying, and contingency fees.
2. There is no reimbursement to be paid by Lehi City for piping systems not shown above.
3. New facilities will be built as needed. Funds to be provided by developer with reimbursement through certificates that can only be used on Traverse Mountain

