

Appendix 4.19-1:

Project Circulation &
Neighborhood
“Quality of Live”
Assessment Memorandum



Memorandum

October 1, 2021

To: Gwen Owens & Dorothy Kam, City of Vacaville Project: Greentree TIAR

From: Kamesh Vedula, PE Ref/Job No.: 11217227
Makinzie Clark

CC: File No.: 11217227MEM002.DOCX

Subject: Project Circulation & Neighborhood “Quality of Life” Assessment Memorandum

1. Introduction

The City of Vacaville has retained GHD to assess the effects of the proposed Greentree development project on the surrounding transportation network. The proposed mixed-use development (referred to herein as the “Project”) is located in the northeast portion of the City of Vacaville, west of Leisure Town Road. The proposed Project consists of two development areas: “North of Sequoia Drive (Sequoia)” that would be developed with high density residential homes and general commercial (retail) uses, and “South of Sequoia” that would be developed with detached, single-family senior residential homes. This memorandum has been prepared to evaluate the Project access and circulation patterns for both the “North of Sequoia” and “South of Sequoia” development areas to assess the effects of Project-generated traffic on surrounding local roadways. This memorandum addresses potential project-related impacts to “quality of life” for existing neighborhoods and provides recommendations concerning multimodal connectivity, traffic calming, and safety. The following provides an overview of the content of this memorandum.

1.1 Project Description

Information presented in this memorandum is sourced from the “Level of Service (LOS) Analysis” memorandum prepared by GHD to document Project trip generation, traffic operations analysis for Existing and Cumulative conditions, and recommended intersection improvements. An overview of the Project (circulation concepts, land use and trip generation) is provided in this memorandum. Transportation impacts resulting from the Project under the California Environmental Quality Act (CEQA) are assessed separately in the transportation chapter of the Draft EIR for the Project.

1.2 Neighborhood “Quality of Life” Assessment

Within the “South of Sequoia” development area, the Project proposes single-family residential homes within currently vacant land surrounding the residential neighborhood along White Sands Drive. Within the “North of Sequoia” development area, the Project proposes multi-family and commercial sites within the currently



vacant land surrounding the residential neighborhood at the western terminus of Sequoia Drive. The Project circulation plan proposes new connections to existing local roadways that are anticipated to increase traffic through these existing neighborhoods. The neighborhood “quality of life” assessment will focus on these existing neighborhoods.

This memorandum provides an overview of both existing and Project-generated vehicular travel patterns based on available traffic data and an assessment of potential Project-related impacts to “quality of life” for existing neighborhoods. The effect of the Project is evaluated in terms of added vehicular traffic along the following primary access roadways and their connecting roadways within the abovementioned neighborhoods:

- White Sands Drive Neighborhood
 - Yellowstone Drive
 - Teton Drive
 - Rushmore Drive
 - White Sands Drive
- Western Sequoia Drive Neighborhood
 - Sequoia Drive
 - Grand Canyon Drive
 - Monterey Drive

1.3 Vehicle Miles Traveled (VMT) & Traffic Operations

The proposed Project circulation network will affect vehicle miles traveled (VMT) in the local area. As such, VMT was evaluated and compared for internal circulation (within the Project area) for each circulation concept consistent with the policies identified in the General Plan Transportation Element (March 2021).

Key findings related to traffic operations and roadway assessment, at locations within the existing neighborhoods identified above, were prepared to evaluate the following metrics:

- Vehicular delay at study intersections with the addition of Project-generated traffic
- Vehicular queue lengths at study intersections with the addition of Project-generated traffic
- Changes in daily volume on roadway segments with the addition of Project-generated traffic

1.4 Summary & Recommendations

The Project land uses are projected to increase peak hour and daily traffic volumes along public roadways within existing neighborhoods. Therefore, additional effort should be taken to address potential “quality of life” impacts to these existing neighborhoods related to vehicular volume and traffic operations changes resulting from Project traffic. This memorandum summarizes the volume and operational assessments presented in this memorandum, and documents multimodal and traffic calming improvements proposed by the Project aimed at addressing these “quality of life” impacts. In addition, GHD provides additional recommendations based on the assessments presented in the memorandum.



2. Project Description

The term “Project” as used in this study refers to the proposed residential development located in northeastern Vacaville, south of Orange Drive, north of Green Tree Drive, east of Yellowstone Drive and Orange Drive, and west of Leisure Town Road. The proposed 182.7-acre development is comprised of two neighborhoods on either side of Sequoia Drive, described as “North of Sequoia” and “South of Sequoia”. The area north of Sequoia Drive is a mixed residential and commercial development concept comprised of seven multi-family residential blocks with a total capacity of 950 dwelling units, three commercial (retail) blocks with a total capacity of about 299,350 square feet, and a roughly 6.0-acre park. The area south of Sequoia Drive is an active adult (senior) residential concept with 199 senior detached single-family dwelling units and a roughly 2.4-acre park. Previously, the Project site existed as a golf course. The Project will consist of a mix of uses, including low, medium, medium-high, and high-density residential development, commercial development, and two parks.

2.1 Existing Traffic Volumes

Existing peak hour intersection and roadway volumes were collected in May 2019 on a typical weekday (Wednesday). Peak hour traffic refers to the highest volume of traffic at an intersection or along a roadway during a one-hour period over the course of a day. Typically, the AM peak hour occurs between the hours of 7 and 9 a.m. and the PM peak hour occurs between the hours of 4 and 6 pm.

2.2 Project Site Plan & Site Access

The Project site plan and circulation alternatives are provided in the Appendix. The Project site is primarily accessed via Leisure Town Road, Sequoia Drive, Orange Drive, and Yellowstone Drive. As part of this Project, Poplar Road is proposed to be extended west to Orange Drive via Village Way, to provide access between Leisure Town Road and Orange Drive to the “North of Sequoia” multifamily and commercial sites. In addition, Gilley Way will be closed. Proposed private streets would create a grid street pattern within the “North of Sequoia” area to provide direct access to land uses and enhance walking and bicycle circulation. The proposed Project circulation plan, referred to hereafter as the “Project circulation plan”, includes the following access points for the “North of Sequoia” and “South of Sequoia” development areas:

North of Sequoia

- Extend Yellowstone Drive (referred herein to as “Yellowstone Drive – Extension”) from Sequoia Drive north to new Village Way
- Connect Village Way (Poplar Road Extension) to Orange Drive, providing access to new Street H and Yellowstone Drive – Extension

South of Sequoia

- Provide access from Yellowstone Drive to proposed Court A/Street A via Rushmore Drive
- Provide access from Leisure Town Road via proposed Street B
- Provide access from Sequoia Drive to proposed Street D



The proposed Project has two circulation alternatives for internal roadway configurations and access points for the “North of Sequoia” development area, which are described below. It is assumed that the Project circulation plan for the “South of Sequoia” development area remains consistent across all circulation alternatives. The circulation alternative maps are provided in the Appendix. Each alternative proposes the following roadway connections as described in relation to the Project circulation plan:

- **Alternative 1: “North of Sequoia – Connection to Grand Canyon Drive”**
 - *Includes access points described above for the Project circulation plan.*
 - Provide additional access to Sequoia Drive via proposed “Sequoia Drive Connection” west of the intersection of Yellowstone Drive and Sequoia Drive, connecting Sequoia Drive and Yellowstone Drive – Extension adjacent to the “Residential 2” development area.
 - Provide access to Grand Canyon Drive via proposed “Grand Canyon Drive Connection”, connecting Grand Canyon Drive and proposed Street H between the Residential 6 and Park development areas.
- **Alternative 2: “North of Sequoia – No Connection to Sequoia Drive”**
 - *No direct connection to Sequoia Drive*
 - *Of the access points described previously, includes only the Village Way access to Leisure Town Road and Orange Drive.*
 - Provide additional access to Leisure Town Road via proposed Yellowstone Drive (referred to as “Yellowstone Drive – New”), north of the intersection of Leisure Town Road and Sequoia Drive.

2.2.1 Key Circulation Differences

Under the Project circulation plan, the “North of Sequoia” development area would be accessed via a network of proposed roadway connections, which intersect with public roads at the following locations: Village Way (Poplar Road Extension) at Orange Drive, Village Way (Poplar Road Extension) at Leisure Town Road, and Sequoia Drive at Yellowstone Drive. Under the Alternative 1 circulation plan, two additional roadway connections are proposed via the “Sequoia Drive Connection” and “Grand Canyon Drive Connection”. The “Sequoia Drive Connection” would provide an additional connection between Sequoia Drive and Yellowstone Drive – Extension near “Residential 1” and the park, and the “Grand Canyon Drive Connection” would provide additional access to proposed “Street H” via Grand Canyon Drive near “Residential 5”, “Residential 6”, and the “Park and Detention Basin”.

The Alternative 2 circulation plan would maintain proposed connections between Leisure Town Road and Orange Drive via Village Way (Poplar Road Extension) but exclude access to the “North of Sequoia” project area via Sequoia Drive (though driveway access is proposed along Sequoia Drive to the “Residential 1A” area). Additional access to the park and residential areas 1 (A and B) through 5 would be provided via a proposed circuitous roadway (Yellowstone Drive - New) connecting Leisure Town Road and Poplar Road/Village Way.

2.3 Project Trip Generation

Vehicle trip generation has been forecasted for the project based on the total number of dwelling units (assumed to be multifamily dwelling units for North of Sequoia neighborhood and senior single-family



dwelling units for South of Sequoia neighborhood), the total square footage of the general commercial (retail) development, and the total square footage of the two parks. These forecasts were achieved by utilizing the Institute of Transportation Engineers (ITE) Publication Trip Generation Manual (10th Ed.). The net new vehicle trips that would be generated by the Project are estimated at 767 trips during the AM peak hour and 1,045 trips during the PM peak hour. Table 2.1 presents the Project trip generation forecast.

Table 2.1 Project Trip Generation

Land Use Category (ITE Code)	Unit ¹	Daily Trip Rate/Unit ²	AM Peak Hour Trip Rate/Unit			PM Peak Hour Trip Rate/Unit		
			Total	In %	Out %	Total	In %	Out %
Senior Adult Housing (Detached) (251)	DU	5.18	0.35	33%	67%	0.41	61%	39%
Multifamily Housing (Low Rise) (220)	DU	7.52	0.43	23%	77%	0.46	63%	37%
Shopping Center (820)	KSF	42.33	1.01	62%	38%	4.09	48%	52%
Public Park (411)	ACRE	8.27	0.00	-	-	1.98	57%	43%
Land Use/Trip Category	Quantity (Units)	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
Residential (Senior Single Family)*	199	1,031	69	23	46	82	50	32
Residential 1-7 (Multi- Family)	950	7,141	405	93	312	438	276	162
<i>Internal Capture with Commercial</i>		-1,266	-4	-1	-3	-184	-126	-58
Total External Residential Trips		6,906	470	115	355	336	200	136
Commercial	299.35	12,671	301	186	115	1,223	587	636
<i>Internal Capture with Multi-Family</i>		-1,266	-4	-3	-1	-184	-58	-126
<i>Pass-by Trips</i>	<i>Daily: 22% / PM: 34%</i>	-2,509	0	0	0	-353	-180	-173
Total External Commercial Trips		8,896	297	183	114	686	349	337
Total Park Trips		11.6	96	0	0	23	13	10
Net New Project Trips		15,898	767	298	469	1,045	562	483

Notes:

1. 1 ksf = 1,000 square feet DU = dwelling unit

2. Trip rates based on ITE Trip Generation Manual 10th edition fitted-curve equations or average rates

3. Internal Capture rates based on ITE Trip Generation Handbook, 2nd Edition

4. Pass-by trip rates based on ITE Trip Generation Handbook, 3rd Edition, Appendix E, and SANDAG "Brief Guide to Vehicular Traffic Generation Rates for the San Diego Region" (2002)

*Internal capture is not applied to Residential (Senior Single Family) project trips due to the distance between the residential development and retail development sites.

2.4 Project Trip Distribution & Assignment

The Project-generated external trips were assigned to the study locations based on the trip distribution utilizing the City of Vacaville's 2035 travel demand model as presented in the "LOS Analysis" memorandum. The trip distribution figure is provided in the Appendix.



3. Neighborhood “Quality of Life” Assessment

Within the “South of Sequoia” development area, the Project proposes single-family residential homes within currently vacant land surrounding the residential neighborhood along White Sands Drive. Within the “North of Sequoia” development area, the Project proposes multi-family and commercial sites within the currently vacant land surrounding the residential neighborhood at the western terminus of Sequoia Drive. The neighborhood “quality of life” assessment will focus on these existing neighborhoods.

The Project circulation plan proposes new connections to existing local roadways that are anticipated to increase traffic through these existing neighborhoods. Proposed roadway connections to the single-family development sites include direct access to Sequoia Drive and Leisure Town Road, as well as proposed access to Yellowstone Drive via Rushmore Drive. The Project and Alternative 2 circulation plans do not propose new roadway connections to Sequoia Drive via local streets. Access to Sequoia Drive via Grand Canyon Drive is proposed under the Alternative 1 circulation plan.

This section provides an overview of both existing and Project-generated vehicular travel patterns based on available traffic data and an assessment of potential Project-related impacts to “quality of life” of existing neighborhoods. The effect of the Project is evaluated in terms of added vehicular traffic along primary access roadways and their connecting roadways within the following neighborhood areas:

- White Sands Drive Neighborhood
 - Yellowstone Drive
 - Teton Drive
 - Rushmore Drive
 - White Sands Drive
- Western Sequoia Drive Neighborhood
 - Sequoia Drive
 - Grand Canyon Drive
 - Monterey Drive

Project-generated vehicular travel patterns are evaluated assuming roadway connection proposed within the Project circulation plan. A discussion of Alternative 1 and Alternative 2 circulation plan travel patterns is provided at the end of this section.

3.1 White Sands Drive Neighborhood Travel Patterns

Existing roadway volumes are based on traffic counts collected in May 2019 on a typical weekday (Wednesday). Roadway volumes along Yellowstone Drive were determined by daily roadway traffic counts collected along roadway segments over a 24-hour period. Roadway volumes along Teton Drive, Rushmore Drive and White Sands Drive are based on peak hour traffic intersection traffic counts. Note: average daily traffic (ADT) roadway volumes were not collected on Teton Drive, Rushmore Drive and White Sands Drive. Daily and peak hour roadway volumes and peak hour factors along these facilities are presented in Table 3.1. Peak hour factors (PHF) represent the hourly volume divided by the peak 15-minute flow rate within the peak hour. PHFs measure traffic demand fluctuations within the peak hour and are useful in determining peak travel demand along a roadway during time increments smaller than one-hour.



Table 3.1 White Sands Drive Neighborhood – Existing Traffic Volumes

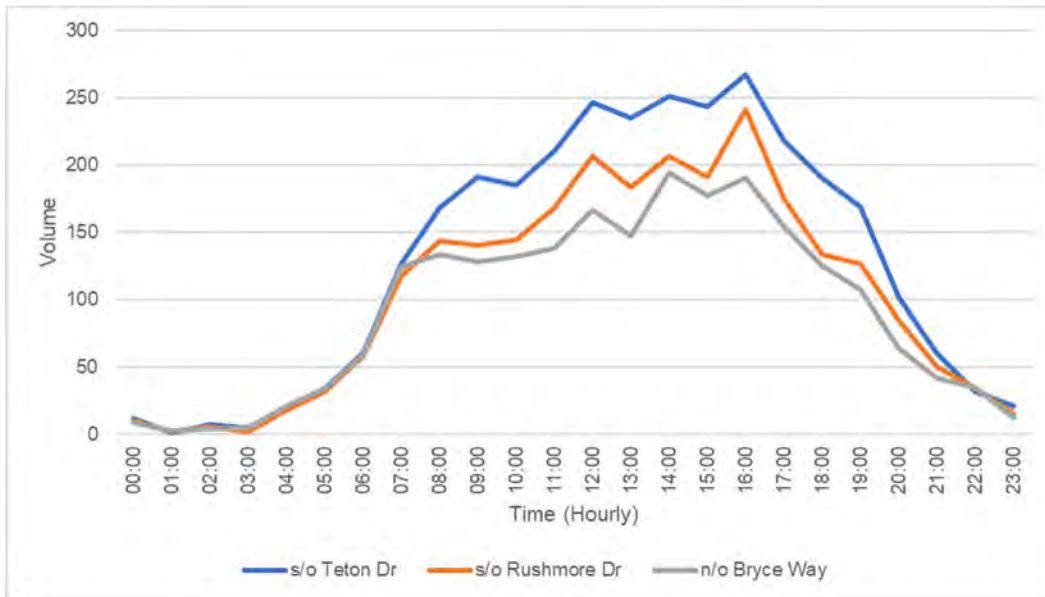
Roadway	Location	Motor Vehicle Lanes	Count Type	Existing AM Peak Hour Volume	Existing PM Peak Hour Volume	Existing Daily Volume	PM PHF
Yellowstone Drive	n/o of Bryce Way	2	Roadway	136	190	2,204	0.833
Yellowstone Drive	s/o of Rushmore Dr	2	Roadway	149	241	2,486	0.772
Yellowstone Drive	s/o of Teton Dr	2	Roadway	168	274	3,053	0.787
Rushmore Drive	between Yellowstone Dr and White Sands Dr	2	Intersection	29	32	n/a	0.861
White Sands Drive	s/o Rushmore Dr	2	Intersection	18	22	n/a	0.625
Teton Drive	between Yellowstone Dr and White Sands Dr	2	Intersection	20	41	n/a	0.862

PHF = Peak Hour Factor. Peak hour factors (PHF) represent the hourly volume divided by the peak 15-minute flow rate within the peak hour. PHFs measure traffic demand fluctuations within the peak hour and are useful in determining peak travel demand along a roadway during time increments smaller than one-hour.

3.1.1 Yellowstone Drive Daily Volumes

Bi-directional (northbound and southbound) daily volume along Yellowstone Drive ranges from 2,204 north of Bryce Way to 3,053 near Nut Tree Road, south of Teton Drive as shown in Table 3.1. Bi-directional peak hour traffic is the highest during the PM time-period, with a high of 274 vehicles south of Teton Drive. As shown in Figure 3.1, bi-directional volume along Yellowstone Drive is highest during the PM time-period, approximately between the hours of 3:00 and 5:00 PM. In addition, volume is highest along the southern segment of Yellowstone Drive, south of Teton Drive.

Figure 3.1 Yellowstone Drive 24-Hour Volume Distribution





3.1.2 Yellowstone Drive Vehicular Speeds

Speed data was collected for Yellowstone Drive over a 24-hour period during traffic volume count collection in May 2019 on a typical weekday (Wednesday). The speed limit on Yellowstone Drive between Nut Tree Road and Sequoia Drive is 25 mph. 85th-percentile speeds, which represent the prevailing speeds along a roadway, were calculated at three locations along Yellowstone Drive: south of Teton Drive, south of Rushmore Drive, and north of Bryce Way. As shown in Figure 3.2 and Figure 3.3, prevailing vehicular speeds along Yellowstone Drive exceed the posted speed limit (25 mph), ranging from 34 to 37 mph in the northbound direction, and ranging from 34 to 35 mph in the southbound direction.

Figure 3.2 Yellowstone Drive Vehicular Speeds (Northbound)

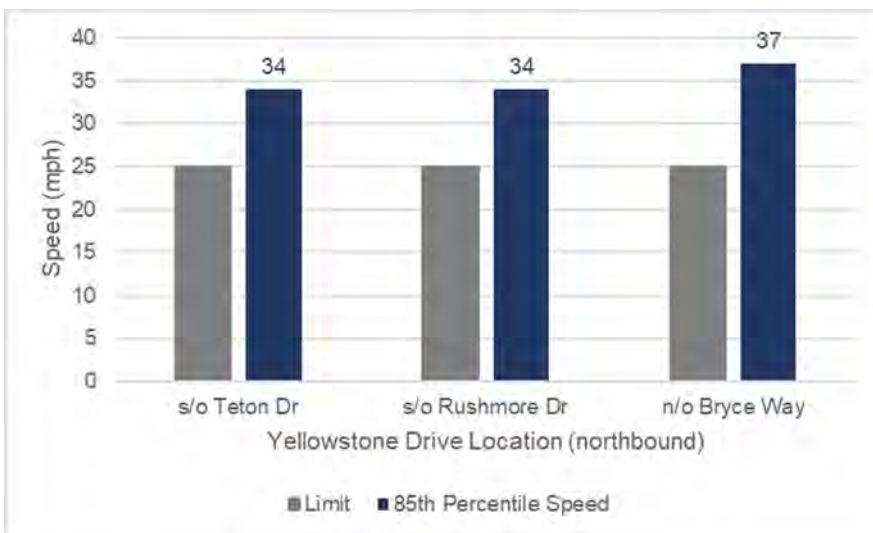
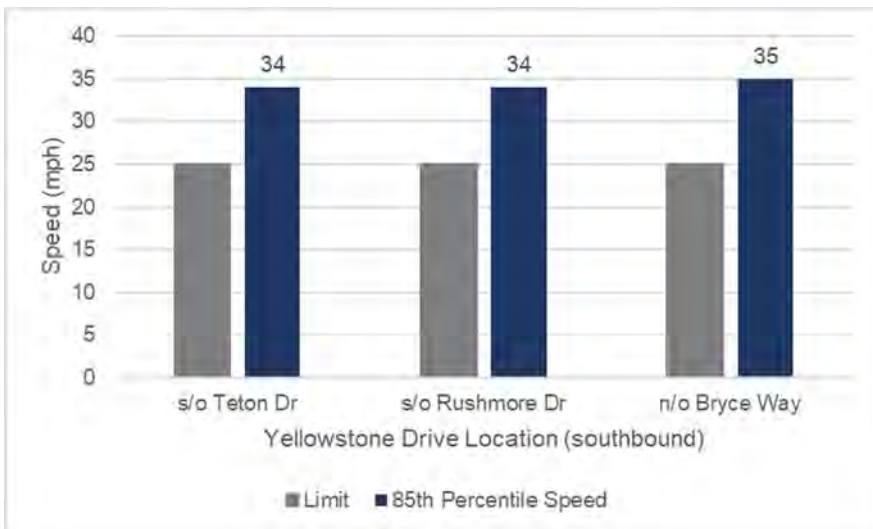


Figure 3.3 Yellowstone Drive Vehicular Speeds (Southbound)





3.2 Western Sequoia Drive Neighborhood Travel Patterns

Vehicular volumes along Sequoia Drive (west of Yellowstone Drive), Monterey Drive, and Grand Canyon Drive are based on intersection traffic counts collected in September 2020. Due to potential fluctuations in vehicular travel during the COVID-19 pandemic, these intersection volumes were adjusted upwards (increased) to reflect 2019 conditions, consistent with traffic data utilized within the Greentree TIAR. Daily and peak hour roadway volumes and peak hour factors along these facilities are presented in Table 3.2.

Table 3.2 Western Sequoia Drive Neighborhood – Existing Traffic Volumes

Roadway	Direction	Location	Lanes	Existing AM Peak Hour Volume	Existing PM Peak Hour Volume	Existing Daily Volume	PM PHF
Sequoia Drive	E-W	e/o Leisure Way	2	59	83	n/a	0.833
Grand Canyon Drive	N-S	s/o Sequoia Dr	2	9	10	n/a	0.830
Grand Canyon Drive	N-S	n/o Sequoia Dr	2	4	12	n/a	0.830
Monterey Drive	N-S	n/o Sequoia Dr	2	12	10	n/a	0.875

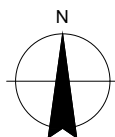
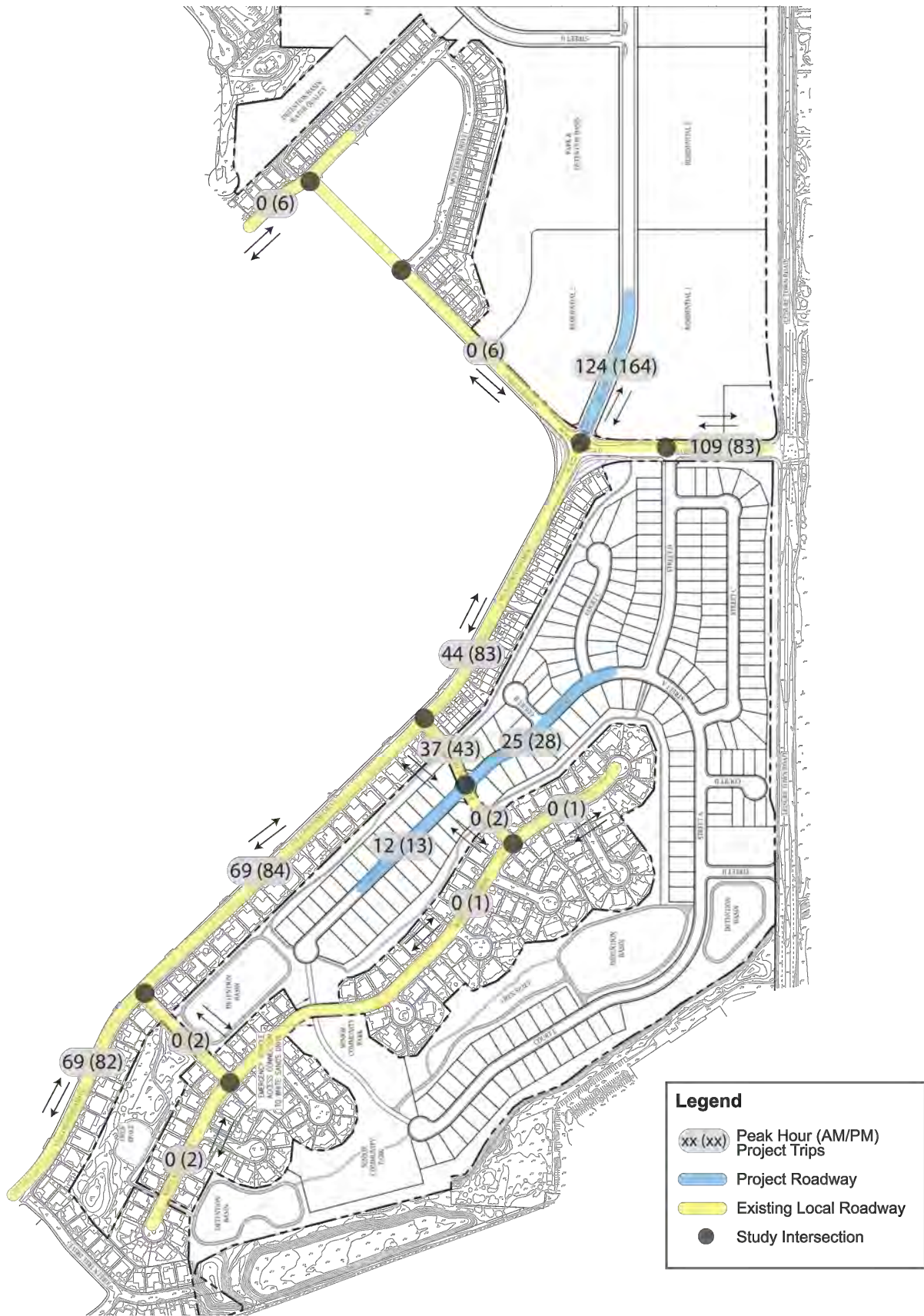
PHF = Peak Hour Factor

3.3 Project-Generated Volume through Existing Neighborhoods

As described in Section 2.3, vehicle trip generation has been forecasted for the project based on the total number of dwelling units (assumed to be multifamily dwelling units for North of Sequoia neighborhood and senior single-family dwelling units for South of Sequoia neighborhood), the total square footage of the general commercial (retail) development, and the total square footage of the two parks. These forecasts were achieved by utilizing the Institute of Transportation Engineers (ITE) Publication Trip Generation Manual (10th Ed.). The net new vehicle trips that would be generated by the Project are estimated at 767 trips during the AM peak hour and 1,045 trips during the PM peak hour.

These peak hour trips were assigned to study roadway and intersection facilities to perform the traffic analysis as presented in the “LOS Analysis” memorandum. The following section describes the anticipated volume of project-generated traffic through the existing neighborhoods and their respective local roadways. This assessment is based on anticipated project-generated vehicle trips along study roadways under the Proposed Project circulation network. Figure 3.4 presents the AM and PM peak hour project trips along study roadways connecting to the existing White Sands Drive and Western Sequoia Drive neighborhoods.

The PM peak hour represents the time of day with the highest traffic volumes for both existing and project-generated traffic. As such, the PM peak hour period was used to estimate project-generated trips for peak 15 and 1-minute periods along local roadways within the two neighborhood areas. In addition, the PM peak hour volume was used to estimate daily volumes along these roadways. Based on the forecasted project vehicle trip generation presented in Section 2.2, excluding internal capture reduction, the Project generates 18,430 daily trips and 1,413 PM peak hour trips. Therefore, the Project-generated PM peak hour volumes make up 7.67 percent of total daily volumes. This value (7.67 percent) was used to escalate Project-generated PM peak hour volumes to estimate daily volumes along these specific roadways. Note: Internal capture was not included in this calculation due to the proximity of the roadways evaluated in this memorandum to the proposed single-family development, which does not include a trip reduction for internal capture.



City of Vacaville
 GREENTREE DEVELOPMENT TIAR
**PROJECT TRIP ASSIGNMENT
 NEIGHBORHOOD STREETS**

Project No. 11217227
 Report No. MEM
 Date Sept 2021

FIGURE 3.4



3.3.1 White Sands Drive Neighborhood

Table 3.3 presents the Project-generated vehicle trips anticipated to be added to Yellowstone Drive, Rushmore Drive, White Sands Drive, and Teton Drive during the typical PM peak hour, which represents the time of day with the highest traffic demand.

Table 3.3 White Sands Drive Neighborhood – Project Vehicle Trips

Roadway	Location	PM Peak Hour Project Trips	Daily Project Trips ¹	PM Trips Per Peak 15-minutes ²	Peak PM Trips Per Peak Minute ²
Yellowstone Drive	n/o of Bryce Way	83	1,083	25	2
Yellowstone Drive	s/o of Rushmore Dr	84	1,096	27	2
Yellowstone Drive	s/o of Teton Dr	82	1,070	26	2
Rushmore Drive	between Yellowstone Drive and Street A (project only)	43	561	12	1
	between Street A and White Sands Dr (project only)	2	26	1	1
White Sands Drive	s/o Rushmore Dr	2	26	1	1
Teton Drive	between Yellowstone Dr and White Sands Dr	2	26	1	1

¹ Estimated assuming a PM peak hour to daily volume ratio of 7.67 percent.

² Calculated using the peak-hour factor (PHF) presented in Table 3.1. Peak 15-Minute and Peak-Minute trips represent anticipated maximum volume per respective time-period.

As shown above, the proposed Project is anticipated to add up to 84 PM peak hour trips (1,096 daily trips) to Yellowstone Drive. Using the PM peak hour factors (PHF) presented in Table 3.1, 84 PM peak hour trips results in a maximum of 27 trips during the max 15-minute period during the PM peak hour, or approximately 2 Project trips per minute during the peak 15-minutes of the peak hour. Project trips along Rushmore Drive during the PM peak hour are anticipated to reach 43 vehicles, which correlates to approximately 12 trips during the max 15-minute period during the PM peak hour, or approximately 1 trip per minute during the peak 15-minutes of the peak hour. Project trips along White Sands Drive and Teton Drive are not anticipated to exceed 2 trips during the PM peak hour, which correlates a maximum of 1 trip during the max 15-minute period during the PM peak hour.

3.3.2 Western Sequoia Drive Neighborhood

Table 3.4 presents the Project-generated vehicle trips anticipated to be added to Sequoia Drive, Monterey Drive, and Grand Canyon Drive during the typical PM peak hour, which represents the time of day with the highest traffic demand. Project trips along Sequoia Drive and Grand Canyon Drive during the PM peak hour are anticipated to reach 6 vehicles, which correlates to approximately 2 trips during the max 15-minute period during the PM peak hour, or approximately 1 trip per minute during the peak 15-minutes of the peak hour. Based on trip distribution patterns within the City of Vacaville’s 2035 travel demand model, under the



Project circulation plan, no Project trips are anticipated to access the Project via Grand Canyon Drive north of Sequoia Drive or Monterey Drive.

Table 3.4 Western Sequoia Drive Neighborhood – Project Vehicle Trips

Roadway	Direction	Location	PM Peak Hour Project Trips	Estimated Daily Project Trips ¹	PM Trips Per Peak 15-minutes ²	Peak PM Trips Per Peak Minute ²
Sequoia Drive	E-W	e/o Leisure Way	6	78	2	1
Grand Canyon Drive	N-S	s/o Sequoia Dr	6	78	2	1
Grand Canyon Drive	N-S	n/o Sequoia Dr	0	0	0	0
Monterey Drive	N-S	n/o Sequoia Dr	0	0	0	0

¹ Estimated assuming a PM peak hour to daily volume ratio of 7.67 percent.

² Calculated using the peak-hour factor (PHF) presented in Table 3.2. Peak 15-Minute and Peak-Minute trips represent anticipated maximum volume per respective time-period.

3.4 Alternatives 1 & 2 Circulation Plan Project Trips

Under the Alternative 1 circulation plan, additional connections are proposed to the “North of Sequoia” development area via Grand Canyon Drive (the “Grand Canyon Drive Connection”). This connection has the potential to route traffic to the Project sites through the existing neighborhood along Grand Canyon Drive and Monterey Drive, specifically for trips originating south of the development area and accessing the Project site via the intersection of Yellowstone Drive at Sequoia Drive. Under the Project circulation plan, during the PM peak hour, total trips accessing the Project at via the intersection of Yellowstone Drive at Sequoia Drive are forecasted to consist of 164 trips (87 inbound and 77 outbound). Based on the distribution of these multi-family and commercial sites, under Alternative 1 it could be anticipated that approximately 25-percent of project trips currently assigned to the “Yellowstone Drive Extension” via the Yellowstone Drive/Sequoia Drive intersection would instead utilize the “Grand Canyon Drive Connection” to access the “North of Sequoia” development area, totally 41 PM peak hour trips, which correlates to approximately 12 trips during the max 15-minute period of the peak hour, or approximately 1 trip per minute during the peak 15-minutes of the peak hour.

In addition, under Alternative 1, additional non-Project “cut-through” trips from existing traffic could utilize the “Grand Canyon Drive Connection” to travel between Orange Drive and Sequoia Drive. However, the Project circulation plan and Alternative 1 also propose a new connection between Orange Drive and Sequoia Drive via the Yellowstone Drive – Extension and Village Way that should minimize this occurrence. As presented in subsequent sections of this memorandum, there is minimal difference in trip length between Orange Drive and Sequoia Drive via these two connections.

The Alternative 2 circulation network is anticipated to result in project trips routes through existing neighborhoods consistent with the Proposed Project circulation plan as described in the previous section.



4. Vehicle Miles Travelled (VMT) & Traffic Operations

The vehicle miles traveled (VMT) metric was evaluated and compared for internal circulation (within the “North of Sequoia” development area) for each circulation concept. The proposed circulation network for the “South of Sequoia” development area is consistent between each circulation concept, so a comparison of VMT would produce the same results for all alternatives.

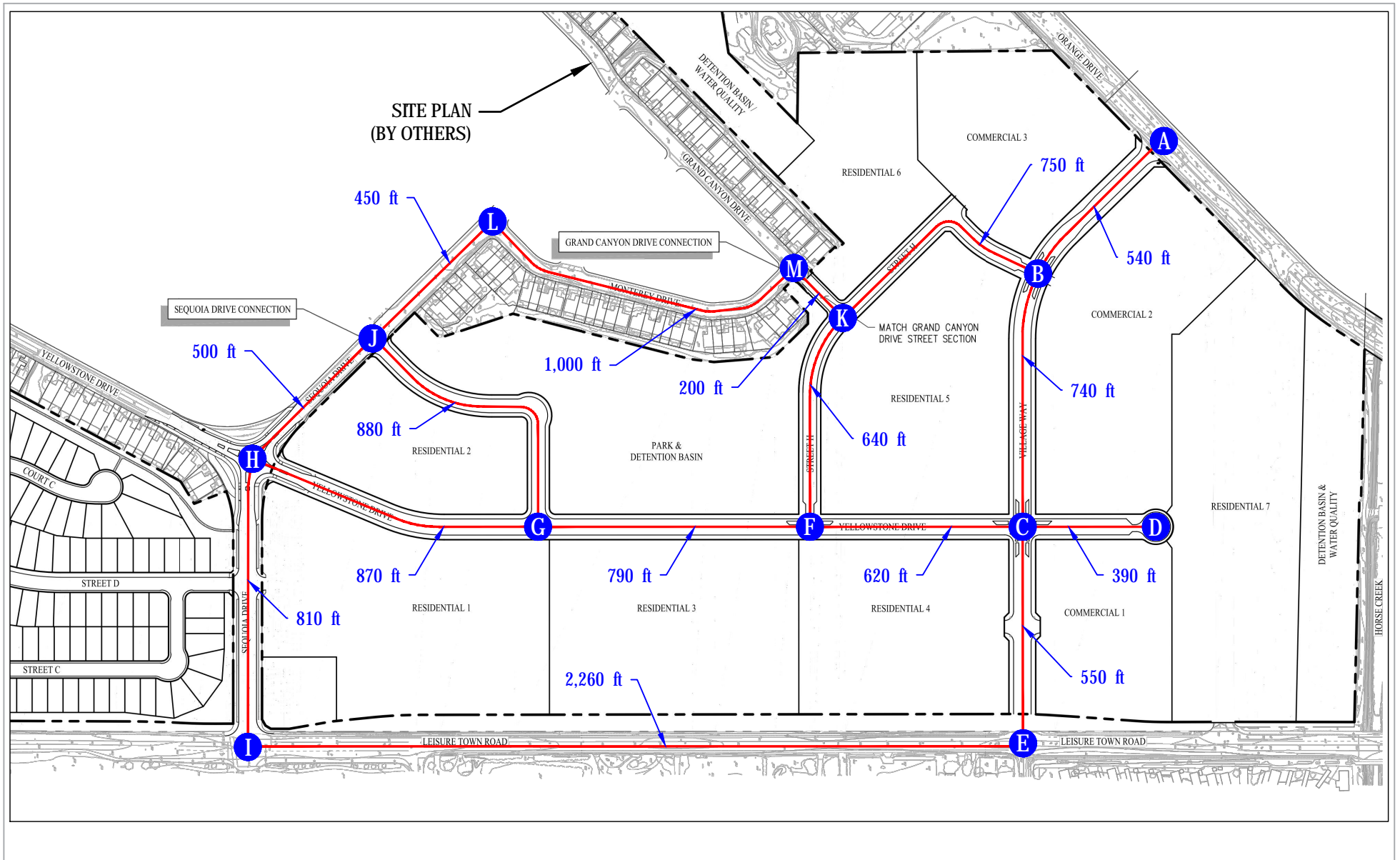
4.1 Segment Lengths

Roadway segment lengths between intersections were measured in AutoCAD using the Project circulation concept PDF maps and were rounded to the nearest ten feet. Table 4.1 presents the segments lengths between intersections (or nodes) for each circulation concept. Figure 4.1 and Figure 4.2 present the segment lengths between intersections (illustrated as “nodes”) along roadways within (internal roadways) and surrounding (public roadways) the “North of Sequoia” development area for the Proposed Project and Alternative 2 circulation concepts respectively. *Note: Segment lengths under the Alternative 1 circulation concept are assumed to be consistent with those provided for Proposed Project (Figure 4.1) for relevant connections.*

Table 4.1 Circulation Concept Segment Lengths

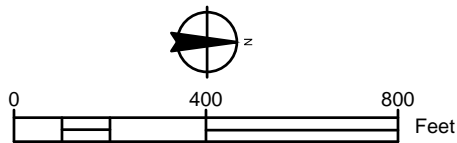
Roadway	Segment		Length (ft)		
	Node 1	Node 2	Project	Alt 1	Alt 2
Village Way	A	B	540	504	540
Village Way	B	C	740	740	740
Village Way	C	E	550	550	550
Yellowstone Drive - Extension	C	D	390	390	390
Street H	B	K	750	750	750
Street H	K	F	640	640	640
Yellowstone Drive - Extension	C	F	620	620	620
Yellowstone Drive - Extension	F	G	790	790	-
Yellowstone Drive - Extension	G	H	870	870	-
Sequoia Drive	H	I	810	810	810
Sequoia Drive	H	J	500	500	500
Sequoia Drive Connection	J	G	-	880	-
Sequoia Drive	J	L	450	450	450
Monterey Drive	L	M	1,000	1,000	1,000
Grand Canyon Drive Connection	M	K	-	200	-
Yellowstone Drive - New	N	F	-	-	2,040
Leisure Town Road	E	I	2,260	2,260	-
<i>Leisure Town Road</i>	<i>E</i>	<i>N</i>	-	-	1,350
<i>Leisure Town Road</i>	<i>N</i>	<i>I</i>	-	-	910

Note: Measurements are rounded to the nearest 10 feet



LEGEND:

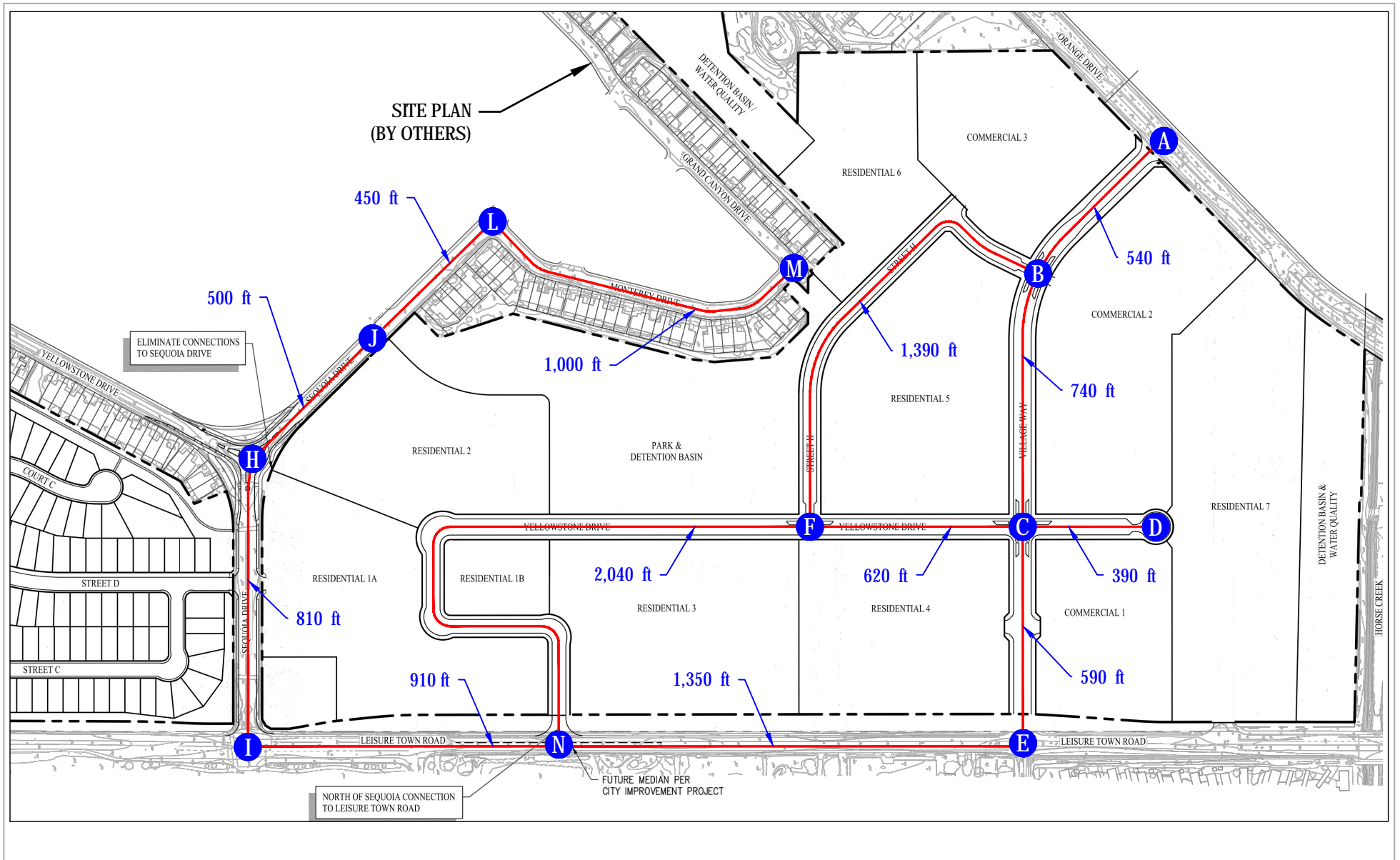
- PROPOSED ROADWAY SEGMENTS - NORTH AREA
- A INTERSECTIONS



City of Vacaville
 Greentree Development
**Project Site Roadway Segment Lengths
 Alternative 1**

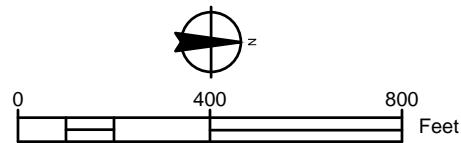
Project No. 11217227
 Report No. MEM
 Date JUL 2021

FIGURE 3.1



LEGEND:

- PROPOSED ROADWAY SEGMENTS - NORTH AREA
- INTERSECTIONS



City of Vacaville
 Greentree Development
**Project Site Roadway Segment Lengths
 Alternative 2**

Project No. 11217227
 Report No. MEM
 Date JUL 2021

FIGURE 3.2



4.2 Vehicle Routes

The three circulation concepts differ in how the proposed internal roadways connect to the existing public roadways Leisure Town Road, Sequoia Drive, Orange Drive, and Yellowstone Drive surrounding the “North of Sequoia” development area. The proposed extension of Poplar Road via Village Way will maintain an east-west connection between Leisure Town Road and Orange Drive, even with the closure of Gilley Way. As such, the circulation concepts differ primarily in how vehicles travel between Sequoia Drive, along the southern boundary of the “North of Sequoia” development area, and Orange Drive or Leisure Town Road, along the western and eastern boundaries of the development area, respectively.

To evaluate relative impacts on VMT between the three circulation concepts, several potential routes between intersections (or nodes) have been identified to reflect potential vehicle trip patterns to/from the various sites within the “North of Sequoia” development area. While many route options are possible, the following sets of routes aim to represent those travel patterns for Project-generated trips that are most likely to be affected by the variations in the Project circulation network under each circulation concept.

4.3 Project Generated Trip Routes

The first set of routes evaluates motor vehicle trip patterns to/from the existing neighborhoods along Sequoia Drive west of Yellowstone Drive (near nodes M, L, and J). These routes include potential trips between to the Project retail sites within the “North of Sequoia” development area (represented by nodes B and C) and the following intersection locations along Sequoia Drive, west of Yellowstone Drive. These routes and their respective trip lengths are shown in Table 4.2 below as “Route Scenarios”. Alternative 1 has the lowest total length for each route scenario and its relative trip length reduction percentage is provided.

- Node M: Monterey Drive at Grand Canyon Drive Connection
- Node L: Sequoia Drive at Monterey Drive
- Node J: Sequoia Drive at Sequoia Drive Connection

Table 4.2 Route Scenarios B & C Trip Lengths (Project Trips)

Route Scenario		Shortest Route - Length (ft)		
Node 1	Node 2	Project	Alt 1	Alt 2
B	M	5,780	950	6,310
	L	4,780	1,950	5,310
	J	4,330	2,400	4,860
Total		14,890	5,300	16,480
C	M	5,040	210	5,570
	L	4,230	1,400	4,760
	J	3,940	2,010	4,470
Total		13,210	3,620	14,800

The second set of routes evaluates trip patterns to/from the intersection of Yellowstone Drive at Sequoia Drive (at node H). These routes include potential trips to the Project multi-family residential and retail sites within the “North of Sequoia” development area. Several nodes were chosen to represent the center of the



“North of Sequoia” development area (nodes B, C, or F). These sets of routes and their respective trip lengths are shown below as “Route Scenarios”. Alternative 1 has the lowest total length for each route scenario and its relative trip length reduction percentage is provided.

Table 4.3 Route Scenario H Trip Lengths (Project Trips)

Route Scenario		Shortest Route - Length (ft)		
Node 1	Node 2	Project	Alt 1	Alt 2
H	B	3,020	2,900	4,360
	C	2,280	2,280	3,620
	F	1,660	1,660	4,200
Total		6,960	6,840	12,180

4.4 Non-Project Trip Routes

As mentioned above, the circulation concepts differ primarily in how vehicles travel between Sequoia Drive, along the southern boundary of the “North of Sequoia” development area, to/from Orange Drive or Leisure Town Road, along the western and eastern boundaries of the development area, respectively. Table 4.4 shows trip lengths for potential non-Project trips between Sequoia Drive (represented by node H) and both Orange Drive (at node A) and Leisure Town Road (at node E) for each circulation concept. As shown, there is minimal difference in trip lengths between the Proposed Project circulation plan and Alternative 1.

Table 4.4 Route Scenario H Trip Lengths (Non-Project Trips)

Route Scenario		Shortest Route - Length (ft)		
Node 1	Node 2	Project	Alt 1	Alt 2
H	A	3,560	3,404	4,900
	E	2,830	2,830	3,070

4.5 VMT Estimates

This section focuses on VMT calculations for Project-generated trips through the major circulation access routes within the “North of Sequoia” development area based on the route scenarios described above. This section does not quantify VMT calculations for non-Project trips; however, based on understanding of the existing land use context, a qualitative assessment is also provided for non-Project trips based on the route scenario described above.

Project-generated trips were assigned through study intersections for AM and PM peak hour periods, with the PM peak hour forecasted to generate more traffic than the AM peak hour. As such, the PM peak hour volume is utilized as a more conservated value to estimate VMT. The PM peak hour is defined as the one hour of peak traffic flow counted between 4:00 pm and 6:00 pm on a typical weekday. Since VMT is based on daily volume, PM peak hour volumes were escalated to reflect daily volumes. According to segment count data collected on Yellowstone Drive in May 2019, the PM peak hour volume on average makes up 9.1 percent of total daily traffic. However, based on the forecasted project vehicle trip generation (excluding internal capture reduction), presented in Section 2.2, the Project generates 18,430 daily trips and 1,413 PM peak hour trips. Therefore, the Project-generated PM peak hour volumes make up 7.67 percent of total daily



volumes. The more conservative value (7.67 percent) was used to escalate PM peak hour volumes to daily volumes. Note: Internal capture was not included in this calculation due to the proximity of the roadways evaluated in this memorandum to the proposed single-family development, which does not include a trip reduction for internal capture.

4.5.1 Route Scenarios B & C: Project-Generated Trips To/From Existing Neighborhoods along Sequoia Drive west of Yellowstone Drive (Nodes M, L, and J)

Minimal Project-generated traffic (fewer than 5 trips during the PM peak hour) is anticipated to access the “North of Sequoia” development area via Sequoia Drive from the existing neighborhoods west of Yellowstone Drive. Escalating PM peak hour traffic to daily traffic, approximately 65 daily Project trips are anticipated to access the Project site via Sequoia Drive west of Yellowstone Drive. Table 4.5 summarizes the estimated Project-generated VMT per route scenario.

Table 4.5 Route Scenarios A & E Estimated Project Trips and VMT

Route Scenario		Shortest Route - Length (ft)			PM Peak Hour Project Trips	Daily Project Trips	Estimated Daily VMT		
Node 1	Node 2	Project	Alt 1	Alt 2			Project	Alt 1	Alt 2
B	M	5,780	950	6,310	5	65	71	12	78
	L	4,780	1,950	5,310	5	65	59	24	66
	J	4,330	2,400	4,860	5	65	53	30	60
Total		14,890	5,300	16,480	5	65	184	65	204
C	M	5,040	210	5,570	5	65	62	3	69
	L	4,230	1,400	4,760	5	65	52	17	59
	J	3,940	2,010	4,470	5	65	49	25	55
Total		13,210	3,620	14,800	5	65	163	45	183

Although Alternative 1 provides the shortest distance for each route scenario, the distribution of land use within the “North of Sequoia” project area appears to be sufficiently accommodated by access points already planned for under the Proposed Project circulation alternative. In addition, the Alternative 1 proposed connections are not anticipated to significantly shift existing travel patterns between Yellowstone Drive and Orange Drive due to the slower speeds associated with the roadway character of Sequoia Drive, Monterey Drive, and Grand Canyon Drive.

4.5.2 Route Scenario H: Multi-Family and Retail Project-Generated Trips To/From Sequoia Drive at Yellowstone Drive and central “North of Sequoia” Development Area (Nodes B, C, and F)

During the PM peak hour, the Proposed Project multi-family residential and retail sites in the “North of Sequoia” development area generate 73 inbound trips and 67 outbound trips that travel through the intersection of Sequoia Drive at Yellowstone Drive. Escalating PM peak hour traffic to daily traffic, approximately 1,826 total inbound plus outbound daily trips are anticipated to travel to/from the Proposed Project multi-family and retail sites via Sequoia Drive at Yellowstone Drive. Under the Proposed Project circulation plan and Alternative 1, these trips are assigned to Yellowstone Drive – Extension or the Grand Canyon Drive Connection. Under Alternative 2, these trips must be rerouted to travel along Leisure Town Road, resulting in longer trip lengths. Table 4.6 summarizes the estimated Project-generated VMT per route scenario.



Table 4.6 Route Scenario H Estimated Multi-family and Retail Project Trips and VMT

Route Scenario		Shortest Route - Length (ft)			PM Peak Hour Project Trips	Daily Project Trips	Estimated Daily VMT		
Node 1	Node 2	Project	Alt 1	Alt 2			Project	Alt 1	Alt 2
H	B	3,020	2,900	4,360	140	1,826	1,045	1,003	1,508
	C	2,280	2,280	3,620	140	1,826	789	789	1,252
	F	1,660	1,660	4,200	140	1,826	574	574	1,453
Total		6,960	6,840	12,180	140	1,799	2,407	2,366	4,213

4.5.3 Route Scenario H: Single-Family Residential Project-Generated Trips To/From Sequoia Drive at Yellowstone Drive and central “North of Sequoia” Development Area (Nodes B, C, and F)

During the PM peak hour, the Proposed Project single-family residential sites in the “South of Sequoia” development area are forecasted to generate 23 inbound trips from and 13 outbound trips to the Project commercial sites in the “North of Sequoia” development area (*Note: these trips are not considered “internal capture” since they pass through public roadways; however, they are trips generated by and attracted to Project land uses*). Escalating PM peak hour traffic to daily traffic, approximately 470 total inbound plus outbound daily trips are anticipated to travel between the single-family residential sites and the central “North of Sequoia” development area. Under the Proposed Project circulation plan and Alternative 1, these trips are assigned to Yellowstone Drive – Extension or the Grand Canyon Drive Connection. Under Alternative 2, these trips must be rerouted to travel along Leisure Town Road, resulting in longer trip lengths. Table 4.7 summarizes the estimated Project-generated VMT per route scenario.

Table 4.7 Route Scenario H Estimated Single-Family Project Trips and VMT

Route Scenario		Shortest Route - Length (ft)			PM Peak Hour Project Trips	Daily Project Trips	Estimated Daily VMT		
Node 1	Node 2	Project	Alt 1	Alt 2			Project	Alt 1	Alt 2
H	B	3,020	2,900	4,360	36	470	269	258	388
	C	2,280	2,280	3,620	36	470	203	203	322
	F	1,660	1,660	4,200	36	470	148	148	374
Total		6,960	6,840	12,180	36	470	619	608	1,083

4.5.4 Non-Project Trips

Orange Drive is a major commercial corridor in the Project vicinity. There is currently an east-west connection between Orange Drive and Leisure Town Road along Gilley Way. Under each Project circulation concept, Gilley Way will be closed, and a new east-west connection (Village Way) will be built along the current Poplar Road alignment. This is not anticipated to make significant changes to existing circulation patterns for non-Project trips.

There is currently no direct connection between Sequoia Drive and Orange Drive. Non-Project trips between existing neighborhoods along Sequoia Drive and Yellowstone Drive currently access Orange Drive via Leisure Town Road or Nut Tree Road. Under the Proposed Project and Alternative 1 circulation concepts,



the proposed internal Project roadways of Yellowstone Drive – Extension and the Village Way would provide an alternative path of travel to Orange Drive through the “North of Sequoia” development area.

The Grand Canyon Drive Connection under Alternative 1 would provide a more direct route to Orange Drive via the internal Project roadways, primarily for trips to/from the existing neighborhoods along Sequoia Drive west of Yellowstone Road. However, the difference in trip lengths under the Proposed Project circulation plan and Alternative 1 are minimal for trips from Sequoia Drive (node H) and Orange Drive (node A). In addition, there is no difference in trip lengths between these two circulation concepts for trips from Sequoia Drive (node H) and Leisure Town Road (node E). As such, Alternative 1 has the potential to minimally reduce VMT for trips to/from Orange Drive and existing neighborhoods south of the “North of Sequoia” development area.

4.6 Traffic Operations

This section summarizes key traffic operations findings. The intersection level of service (LOS) and queuing analysis was conducted at the following four intersections on Yellowstone Drive and two intersections on White Sand Drive:

- Yellowstone Drive / Sequoia Drive
- Yellowstone Drive / Rushmore Drive
- Yellowstone Drive / Teton Drive
- Yellowstone Drive / Bryce Way
- White Sands Drive / Teton Drive
- White Sands Drive / Rushmore Drive

Traffic operations are evaluated based on the following metrics:

- Vehicular delay at study intersections with the addition of Project-generated traffic
- Vehicular queue lengths at study intersections with the addition of Project-generated traffic
- Changes in daily volume on roadway segments with the addition of Project-generated traffic

4.7 Intersection Level of Service (LOS) & Queuing Analysis

The “LOS Analysis” memorandum outlines the analysis parameters and methodologies that were used to quantify potential Project impacts for the analysis scenarios. LOS methodologies for intersections are used to determine if a project causes an increase in traffic that is substantial and adverse in relation to the traffic load and capacity of the existing street system, referred to as vehicular delay. The Synchro 10 (Trafficware) software program has been used to implement the HCM 6 analysis methodologies for LOS and queues for the AM and PM peak hour periods.

Table 4.8 presents the Existing and Existing Plus Project LOS results for the study intersections along Yellowstone Drive and White Sands Drive for each Project circulation concept.



Table 4.8 Existing and Existing Plus Project Circulation Concept LOS Results

AM Peak Hour											
#	Intersection	Control Type	Target LOS	Existing		Proposed Project		Project - Alternative 1		Project - Alternative 2	
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
20	Yellowstone Dr & Teton Dr	AWSC	Mid-D	7.5	A	7.7	A	7.7	A	7.6	A
21	White Sands Dr & Teton Dr	TWSC	D	8.4	A	8.4	A	8.4	A	8.4	A
22	White Sands Dr & Rushmore Dr	TWSC	D	8.7	A	8.9	A	8.9	A	8.7	A
23	Yellowstone Dr & Rushmore Dr	TWSC	D	8.9	A	9.9	A	9.9	A	9.7	A
24	Yellowstone Dr & Bryce Way	TWSC	D	9.0	A	9.1	A	9.1	A	9.1	A
25	Yellowstone Dr & Sequoia Dr	TWSC	D	9.1	A	8.3	A	8.3	A	8.0	A
PM Peak Hour											
#	Intersection	Control Type	Target LOS	Existing		Proposed Project		Project - Alternative 1		Project - Alternative 2	
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
20	Yellowstone Dr & Teton Dr	AWSC	Mid-D	7.9	A	8.4	A	8.4	A	8.3	A
21	White Sands Dr & Teton Dr	TWSC	D	8.7	A	8.7	A	8.7	A	8.7	A
22	White Sands Dr & Rushmore Dr	TWSC	D	8.6	A	8.6	A	8.6	A	8.6	A
23	Yellowstone Dr & Rushmore Dr	TWSC	D	9.6	A	10.4	B	10.4	B	10.2	B
24	Yellowstone Dr & Bryce Way	TWSC	D	9.1	A	9.5	A	9.5	A	9.4	A
25	Yellowstone Dr & Sequoia Dr	TWSC	D	9.5	A	9.4	A	9.4	A	9.0	A

Note: AWSC = All-Way Stop Control; TWSC = Two-Way Stop Control



Table 4.9 presents the Cumulative and Cumulative Plus Project LOS results for intersections along Yellowstone Drive and White Sands Drive for each Project circulation concept.

Table 4.9 Cumulative and Cumulative Plus Project Circulation Concept LOS Results

AM Peak Hour											
#	Intersection	Control Type	Target LOS	Cumulative		Proposed Project		Project - Alternative 1		Project - Alternative 2	
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
20	Yellowstone Dr & Teton Dr	AWSC	Mid-D	7.7	A	8.0	A	8.0	A	7.9	A
21	White Sands Dr & Teton Dr	TWSC	D	8.5	A	8.5	A	8.5	A	8.5	A
22	White Sands Dr & Rushmore Dr	TWSC	D	8.7	A	8.7	A	8.7	A	8.7	A
23	Yellowstone Dr & Rushmore Dr	TWSC	D	9.4	A	10.2	B	10.2	B	10.0	B
24	Yellowstone Dr & Bryce Way	TWSC	D	9.2	A	9.3	A	9.3	A	9.3	A
25	Yellowstone Dr & Sequoia Dr	TWSC	D	9.4	A	8.8	A	8.8	A	8.5	A

PM Peak Hour											
#	Intersection	Control Type	Target LOS	Cumulative		Proposed Project		Project - Alternative 1		Project - Alternative 2	
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
20	Yellowstone Dr & Teton Dr	AWSC	Mid-D	8.2	A	8.6	A	8.6	A	8.5	A
21	White Sands Dr & Teton Dr	TWSC	D	8.7	A	8.7	A	8.7	A	8.7	A
22	White Sands Dr & Rushmore Dr	TWSC	D	8.7	A	8.7	A	8.7	A	8.7	A
23	Yellowstone Dr & Rushmore Dr	TWSC	D	10.0	B	10.7	B	10.7	B	10.6	B
24	Yellowstone Dr & Bryce Way	TWSC	D	9.7	A	10.1	B	10.1	B	10.0	A
25	Yellowstone Dr & Sequoia Dr	TWSC	D	9.6	A	9.6	A	9.6	A	9.3	A

Under each circulation concept, vehicular delay at the study intersections along Yellowstone Drive or White Sands Drive does not change significantly with the addition of the Project circulation alternatives. There is no change between intersection delay or LOS between the Proposed Project and Alternative 1 circulation plans, due to the minimal number of Project trips that travel along Yellowstone Drive. Under Alternative 2, the number of Project trips that travel along Yellowstone Drive decreases, resulting in minimal delay savings.

4.7.1 Intersection Queuing Analysis

Table 4.10 presents the Existing Plus Project 95th percentile queue results for intersections along Yellowstone Drive and White Sands Drive for the circulation concept with the highest VMT (Alternative 2). Values were rounded up to the nearest whole number of vehicles.



Table 4.10 Existing Plus Project (Alternative 2) Queue Results

AM Peak Hour						
#	Intersection	Control Type	Queues (# vehicles) by Approach			
			NB	SB	EB	WB
20	Yellowstone Dr & Teton Dr	AWSC	1	1		1
21	White Sands Dr & Teton Dr	TWSC	0	0	0	
22	White Sands Dr & Rushmore Dr	TWSC	0	0	1	
23	Yellowstone Dr & Rushmore Dr	TWSC	0	0		1
24	Yellowstone Dr & Bryce Way	TWSC	1	0	1	
25	Yellowstone Dr & Sequoia Dr	TWSC	1	0	1	1
PM Peak Hour						
#	Intersection	Control Type	Queues (# vehicles)			
			NB	SB	EB	WB
20	Yellowstone Dr & Teton Dr	AWSC	1	1		1
21	White Sands Dr & Teton Dr	TWSC	0	0	1	
22	White Sands Dr & Rushmore Dr	TWSC	0	0	1	
23	Yellowstone Dr & Rushmore Dr	TWSC	0	1		1
24	Yellowstone Dr & Bryce Way	TWSC	1	0	1	
25	Yellowstone Dr & Sequoia Dr	TWSC	1	1	1	2

Table 4.11 presents the Existing Plus Project 95th percentile queue results for intersections along Yellowstone Drive and White Sands Drive for the circulation concept with the highest VMT (Alternative 2). Values were rounded up to the nearest whole number of vehicles.

Table 4.11 Cumulative Plus Project (Alternative 2) Queue Results

AM Peak Hour						
#	Intersection	Control Type	Queues (# vehicles) by Approach			
			NB	SB	EB	WB
20	Yellowstone Dr & Teton Dr	AWSC	1	1		1
21	White Sands Dr & Teton Dr	TWSC	0	0	0	
22	White Sands Dr & Rushmore Dr	TWSC	0	0	1	
23	Yellowstone Dr & Rushmore Dr	TWSC	0	0		1
24	Yellowstone Dr & Bryce Way	TWSC	1	0	1	
25	Yellowstone Dr & Sequoia Dr	TWSC	1	0	1	1
PM Peak Hour						
#	Intersection	Control Type	Queues (# vehicles) by Approach			
			NB	SB	EB	WB
20	Yellowstone Dr & Teton Dr	AWSC	1	1		1
21	White Sands Dr & Teton Dr	TWSC	0	0	1	
22	White Sands Dr & Rushmore Dr	TWSC	0	0	1	
23	Yellowstone Dr & Rushmore Dr	TWSC	0	1		1
24	Yellowstone Dr & Bryce Way	TWSC	1	0	1	
25	Yellowstone Dr & Sequoia Dr	TWSC	1	1	1	2

As shown in the tables above, there is minimal vehicular delay or queuing at the study intersections along Yellowstone Drive and White Sands Drive under Alternative 2.



5. Summary & Recommendations

The Project is anticipated to add additional vehicular traffic to public roadways and intersections. GHD has prepared memorandums to document project impacts to the existing roadway network based on City of Vacaville guidelines and CEQA requirements (see “Level of Service” and “Vehicle Miles Travelled” memorandums). The Project proposes new roadway connections through existing neighborhoods immediately adjacent to the Project, specifically those along Yellowstone Drive and Sequoia Drive. Therefore, additional effort should be taken to address potential “quality of life” impacts to these existing neighborhoods related to vehicular volume and traffic operations changes resulting from Project traffic.

This section summarizes the volume and operational assessments presented in this memorandum, and documents multimodal and traffic calming improvements proposed by the Project aimed at addressing these “quality of life” impacts. In addition, GHD provides additional recommendations based on the assessments presented in the memorandum.

5.1 Volume & Operational Assessment Summary

The following provides a summary of existing volumes within the neighborhoods along Yellowstone Drive or Sequoia Drive:

- Daily volumes along Yellowstone Drive are highest during the PM peak hour, and peak between the hours of 3:00 and 5:00 PM.
- 85th-percentile vehicular speeds along Yellowstone Drive exceed the posted speed limit by 9 to 12 mph.
- Existing AM and PM peak hour volumes along local roadways within these neighborhoods (i.e., Rushmore Drive, Teton Drive, White Sands Drive, Grand Canyon Drive, and Monterey Drive) are low.

The following provides a summary of Project volume within the neighborhoods along Yellowstone Drive or Sequoia Drive:

- Under all three circulation plans, the Project is anticipated to increase volume along Yellowstone Drive by up to 84 trips during PM peak hour (approximately 2 trips per peak minute).
- Under all three circulation plans, the Project is anticipated to increase volume along Rushmore Drive by up to 43 trips during PM peak hour (approximately 2 trips per peak minute).
- Under all three circulation plans, the Project is anticipated to minimally increase volume along Teton Drive and White Sands Drive by up to 2 trips during the PM peak hour (less than 1 trip per peak minute).
- Under the proposed Project and Alternative 2 circulation plans, the Project is anticipated to minimally increase volume along Sequoia Drive (west of Yellowstone Drive), Grand Canyon Drive, and Monterey Drive by less than 10 trips during the PM peak hour.
- Under the Alternative 1 circulation plan, the Project could increase volume along Grand Canyon Drive and Sequoia Drive by approximately 41 trips during the PM peak hour (approximately 2 trips per peak minute).

The following provides a summary of traffic operations for the study locations in this memorandum:

- Vehicular delay is minimally increased at study intersections with the addition of the Project.



- Vehicular queue lengths are minimally increased at study intersections with the addition the Project.

5.2 Proposed Multimodal Facilities

The provision of multimodal improvements can assist in providing safe routes for bicyclist and pedestrian travel to and within the Project development areas. Yellowstone Drive currently has continuous sidewalks and Class II bicycle lanes from Nut Tree Road to Sequoia Drive. The project connectivity plan (provided in the Appendix) proposes the following multimodal facilities:

- Class II bicycle lanes and enhanced sidewalks would be provided along the following roadways:
 - Sequoia Drive between Yellowstone Drive and Leisure Town Road
 - Yellowstone Drive – Extension (proposed roadway)
 - Village Way (proposed roadway)
 - Street D (proposed roadway)
- Neighborhood sidewalks would be provided along all proposed internal streets.
- Pedestrian trail network (i.e., separated walking paths) would be provided throughout the “South of Sequoia” and “North of Sequoia” development areas with connections to proposed roadways and parks.
- Traffic calming measures and pedestrian crossings would be provided at the following intersections:
 - Yellowstone Drive at Teton Drive
 - Yellowstone Drive at Rushmore Drive

5.3 Traffic Calming Recommendations

In addition to the above proposed facilities, the following additional recommendations should be further evaluated to determine compliance the City of Vacaville’s current traffic calming ordinance. These recommendations are applicable to all circulation concepts (the Project, Alternative 1, and Alternative 2).

- Consider construction of roundabouts and/or traffic circles to promote safe and efficient travel between the “North of Sequoia” and “South of Sequoia” development areas and existing neighborhoods. Roundabouts and traffic circles are frequently used as traffic calming and safety measures, due to their crash reduction potential, low vehicular entering speeds, and reduced conflict points. These intersection improvements should be considered at the following locations:
 - Roundabout at Yellowstone Drive at Sequoia Drive
 - Traffic Circle at Yellowstone Drive at Rushmore Drive (planning-level design concept is provided in the Appendix)
- Consider high-visibility pedestrian crossing features, such as rectangular rapid flashing beacons (RRFB). RRFBs are pedestrian-actuated visibility enhancements that flash with high frequency when activated to alert drivers. RRFBs should be used in combination with pedestrian crossing warning signs. High visibility crosswalks with RRFBs should be considered at the following locations:
 - Yellowstone Drive at Rushmore Drive (Note: If a roundabout is constructed at this location, the RRFB recommendation would no longer be applicable.)



- Yellowstone Drive at Teton Drive

- Recommendation for the City of Vacaville to evaluate intersections along Yellowstone Drive for All-Way Stop-Control warrants as development occurs.
- Consider installation of radar feedback signs along Yellowstone Drive to promote compliance with posted speed limits to achieve traffic calming objectives.
- Consider opportunities to construct curb extensions (bulb-outs) at intersections. Bulb-outs enhance pedestrian safety by increasing pedestrian visibility, shortening crossing distances, slowing turning vehicles, and visually narrowing the roadway (*source: sbetterstreets.org*). Bulb-outs should be evaluated for use at key locations with consideration for vehicle turning design requirements and transit operations.
- Consider painted conflict markings along bicycle lanes and through intersections to improve bicyclist visibility to motorized traffic.

5.4 Other Considerations








The following augmentations to the Project circulation concepts should be considered:

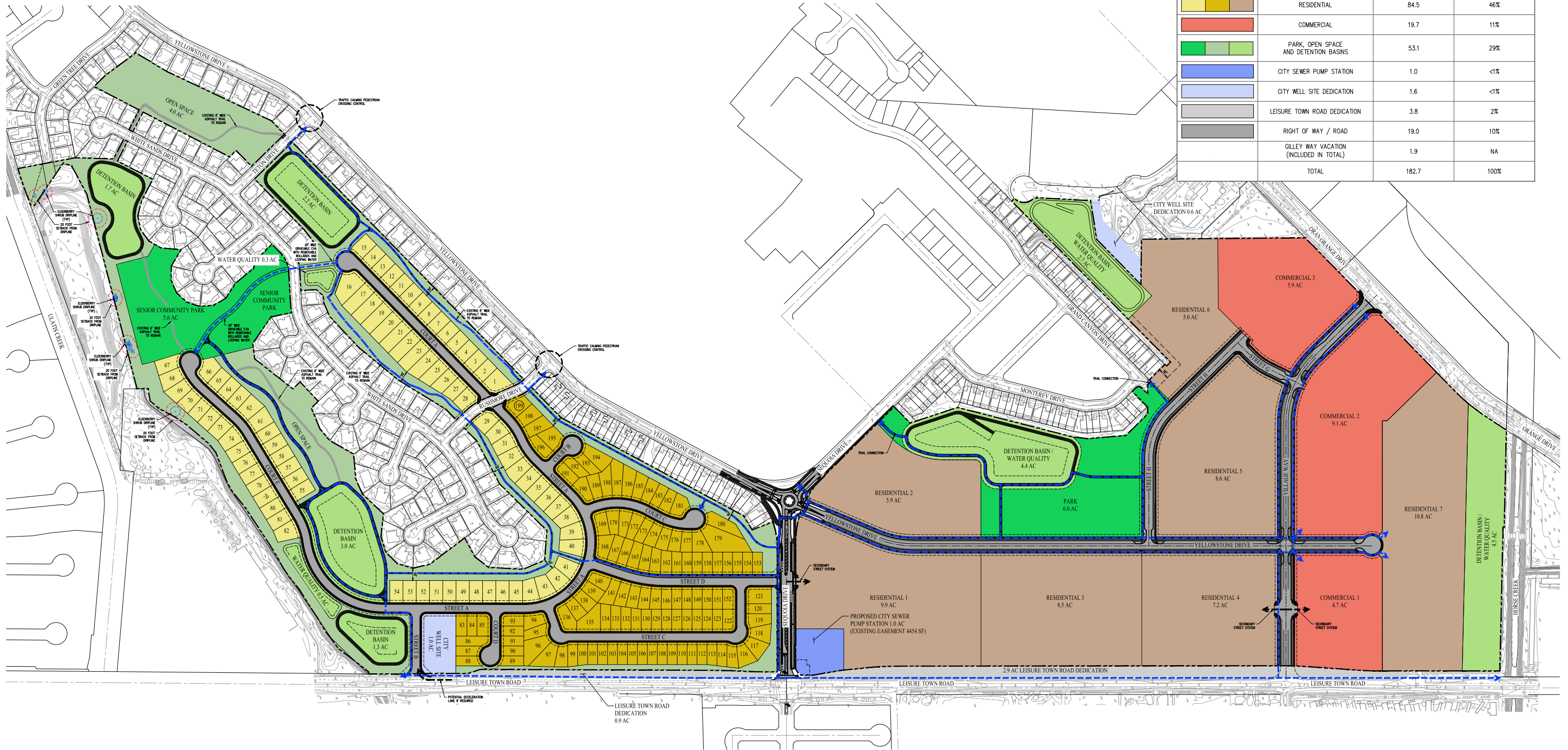
- Under all circulation concepts, consider traffic calming and pedestrian crossing along Sequoia Drive west of Yellowstone Drive.
- Under Alternative 1, align “Sequoia Drive Connection” with Leisure Way.



Appendix

Project Site Plan & Circulation Concepts
Project Connectivity Plan
Yellowstone Drive at Rushmore Drive – Traffic Circle Improvement

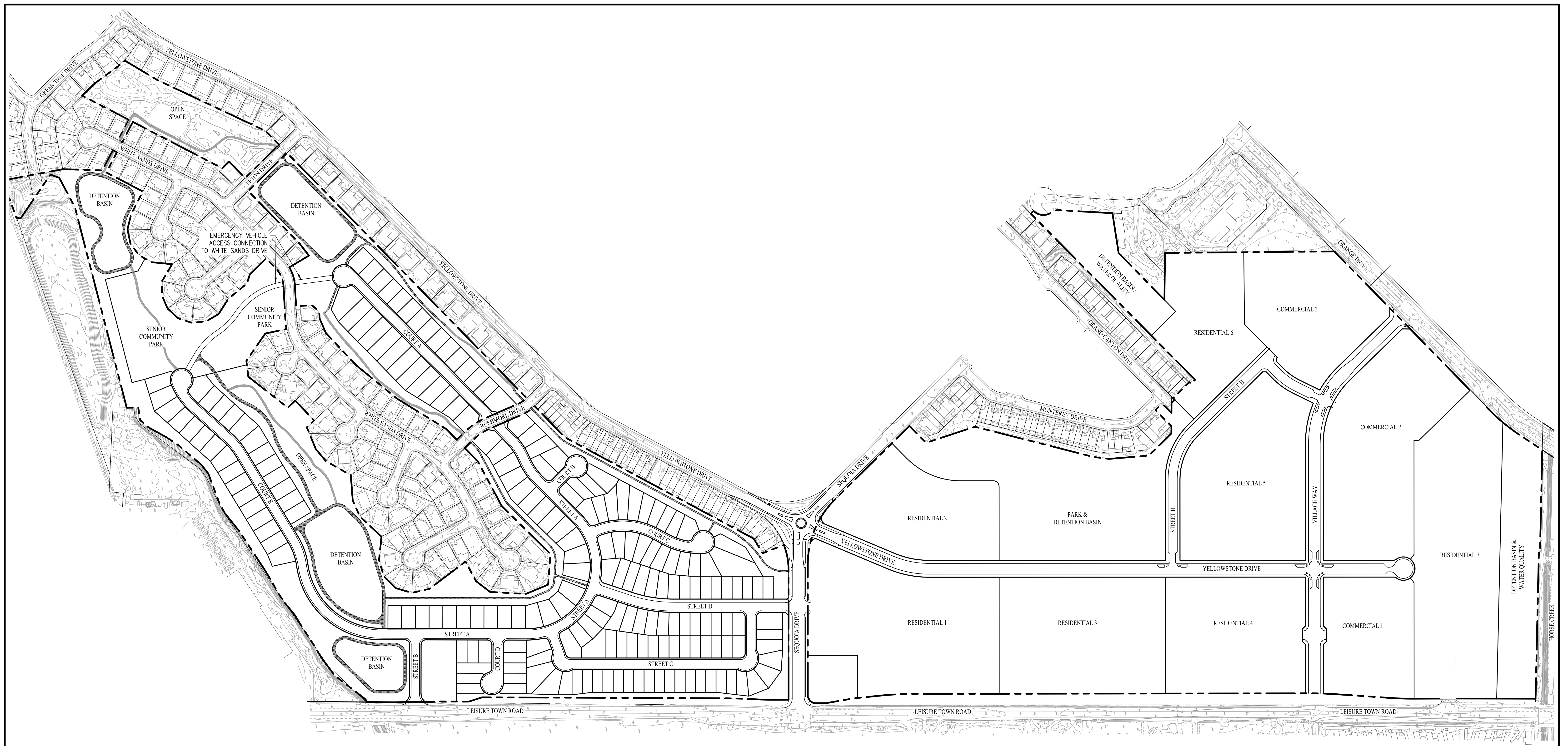
LAND USE SUMMARY - OVERALL			
	LAND USE	AREA (AC)	% OF TOTAL AREA
	RESIDENTIAL	84.5	46%
	COMMERCIAL	19.7	11%
	PARK, OPEN SPACE AND DETENTION BASINS	53.1	29%
	CITY SEWER PUMP STATION	1.0	<1%
	CITY WELL SITE DEDICATION	1.6	<1%
	LEISURE TOWN ROAD DEDICATION	3.8	2%
	RIGHT OF WAY / ROAD	19.0	10%
	GILLEY WAY VACATION (INCLUDED IN TOTAL)	1.9	NA
	TOTAL	182.7	100%



Source: CBG 2021, EMC Planning Group 2021, Google Earth 2019

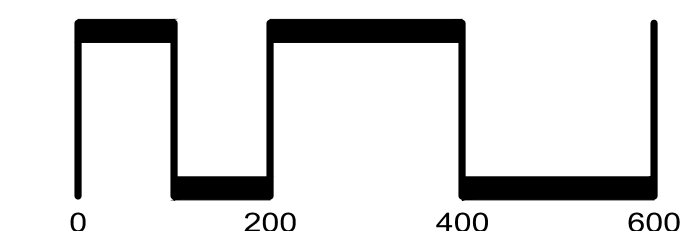
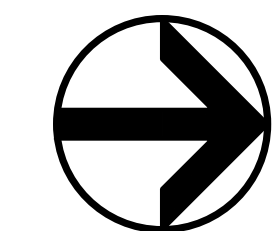
Figure 2
Overall Site Development Plan
 Greentree Development Project





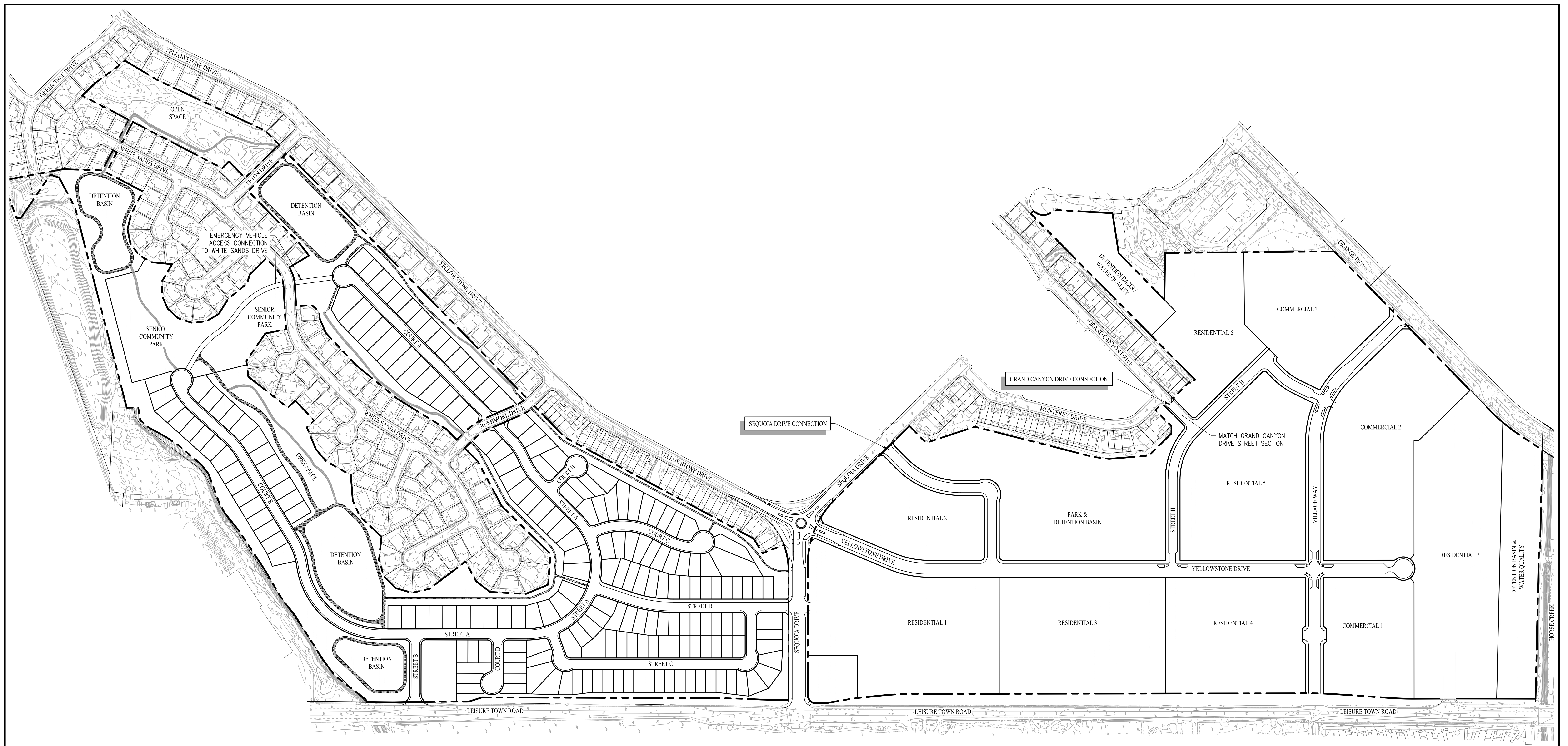
PROPOSED PROJECT
CIRCULATION ALTERNATIVES
 GREENTREE DEVELOPMENT

CITY OF VACAVILLE SOLANO COUNTY CALIFORNIA
 SCALE: 1" = 200' DATE: MARCH 17, 2021



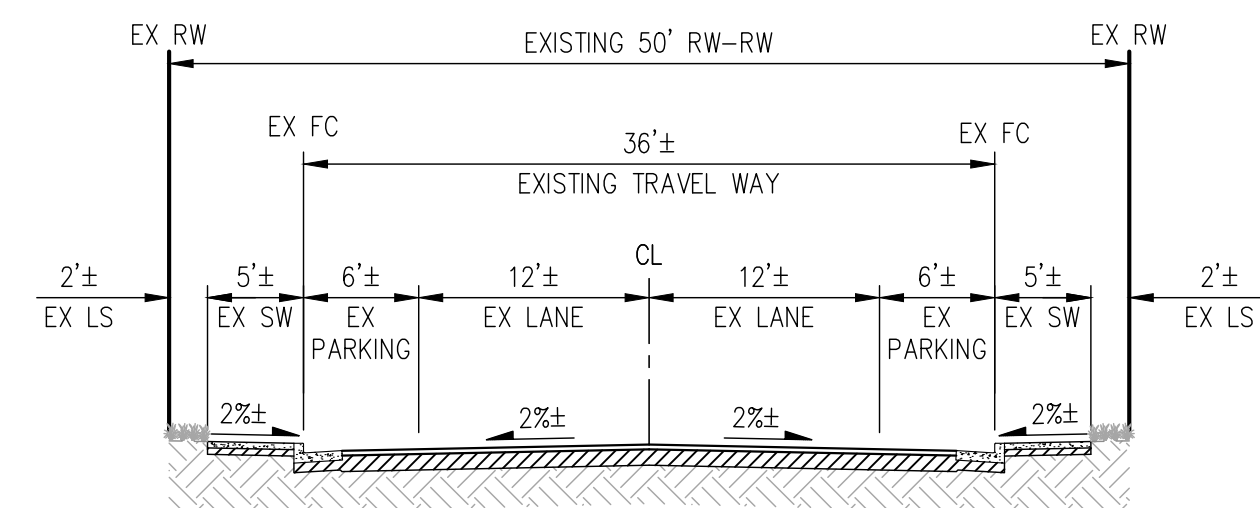
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SHEET NO.
1
 OF 3 SHEETS

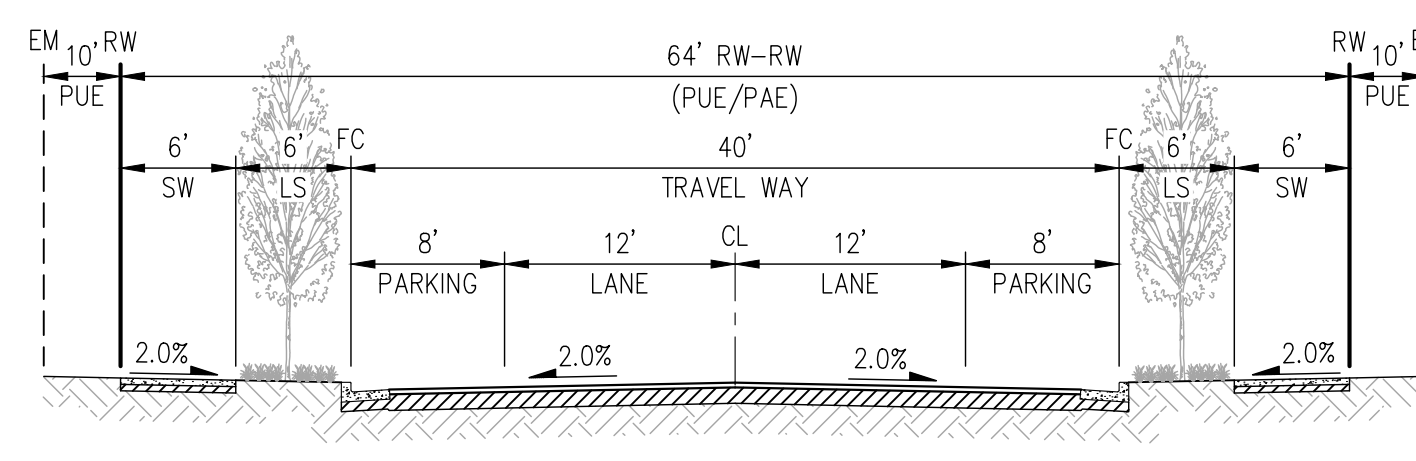


ALTERNATIVE 1 - NORTH OF SEQUOIA CONNECTION TO GRAND CANYON DRIVE CIRCULATION ALTERNATIVES GREENTREE DEVELOPMENT

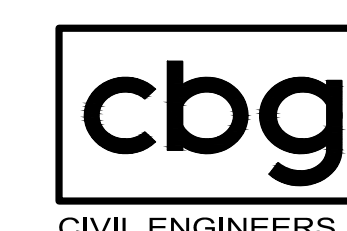
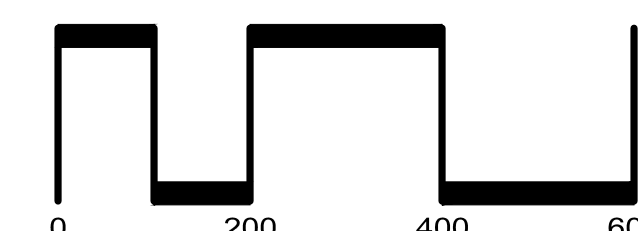
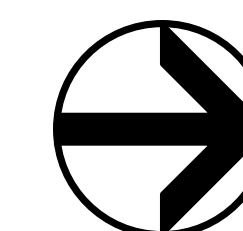
CITY OF VACAVILLE SOLANO COUNTY CALIFORNIA
SCALE: 1" = 200' DATE: MARCH 17, 2021



GRAND CANYON DRIVE (EXISTING STREET)
NOT TO SCALE

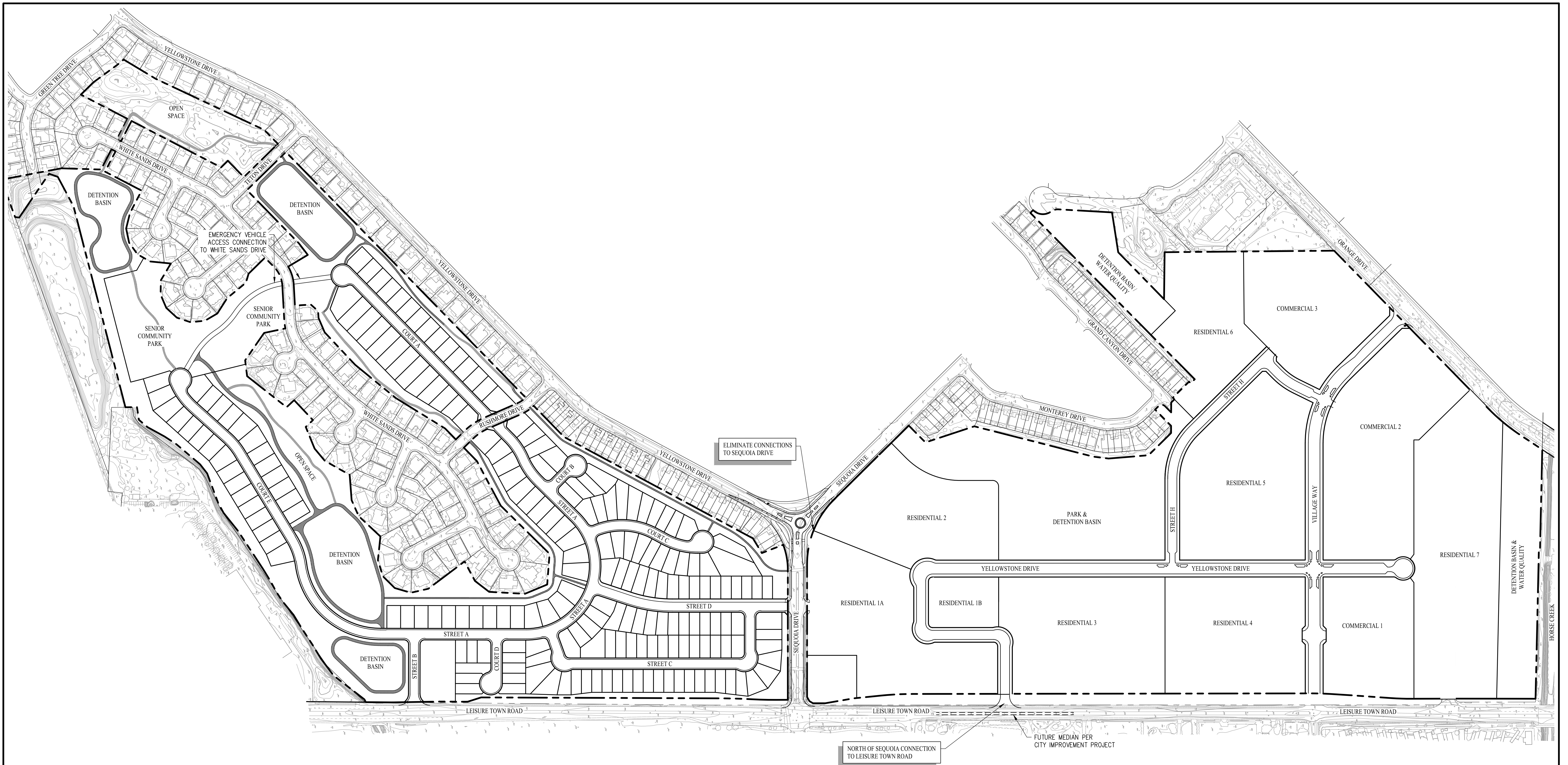


NORTH OF SEQUOIA CONNECTION TO SEQUOIA DRIVE
NOT TO SCALE



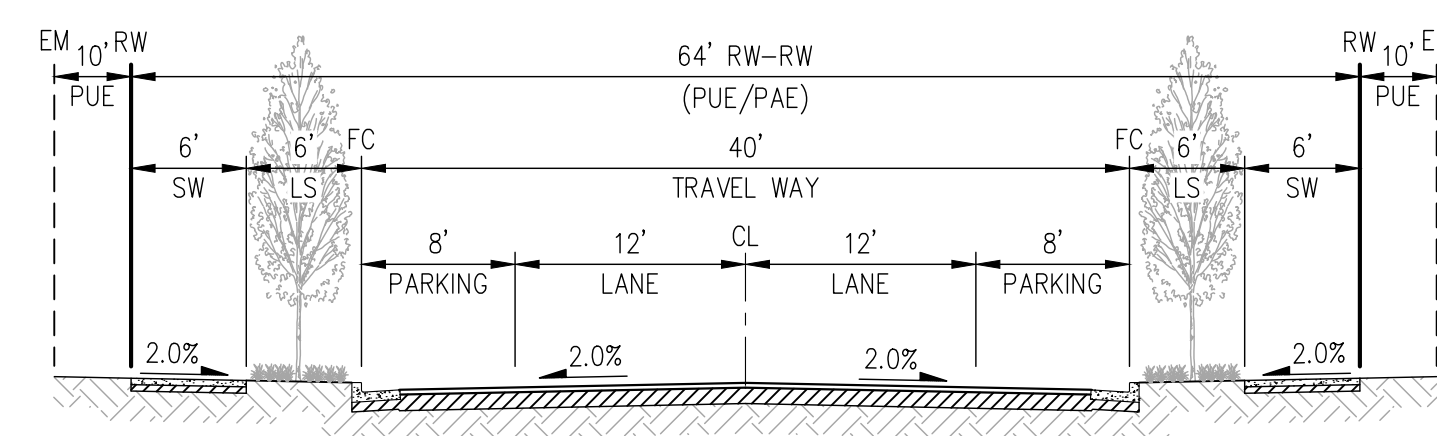
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SHEET NO.
2
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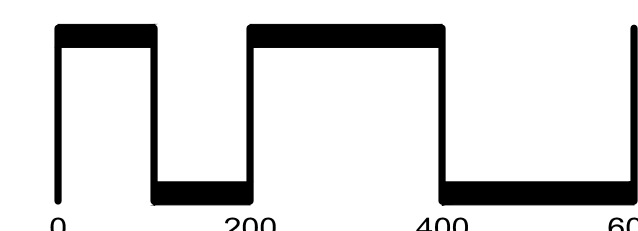
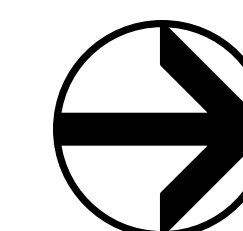


ALTERNATIVE 2 - NORTH OF SEQUOIA
 NO CONNECTION TO SEQUOIA DRIVE
CIRCULATION ALTERNATIVES
 GREENTREE DEVELOPMENT

CITY OF VACAVILLE SOLANO COUNTY CALIFORNIA
 SCALE: 1" = 200' DATE: MARCH 17, 2021



NORTH OF SEQUOIA CONNECTION TO LEISURE TOWN ROAD
 NOT TO SCALE



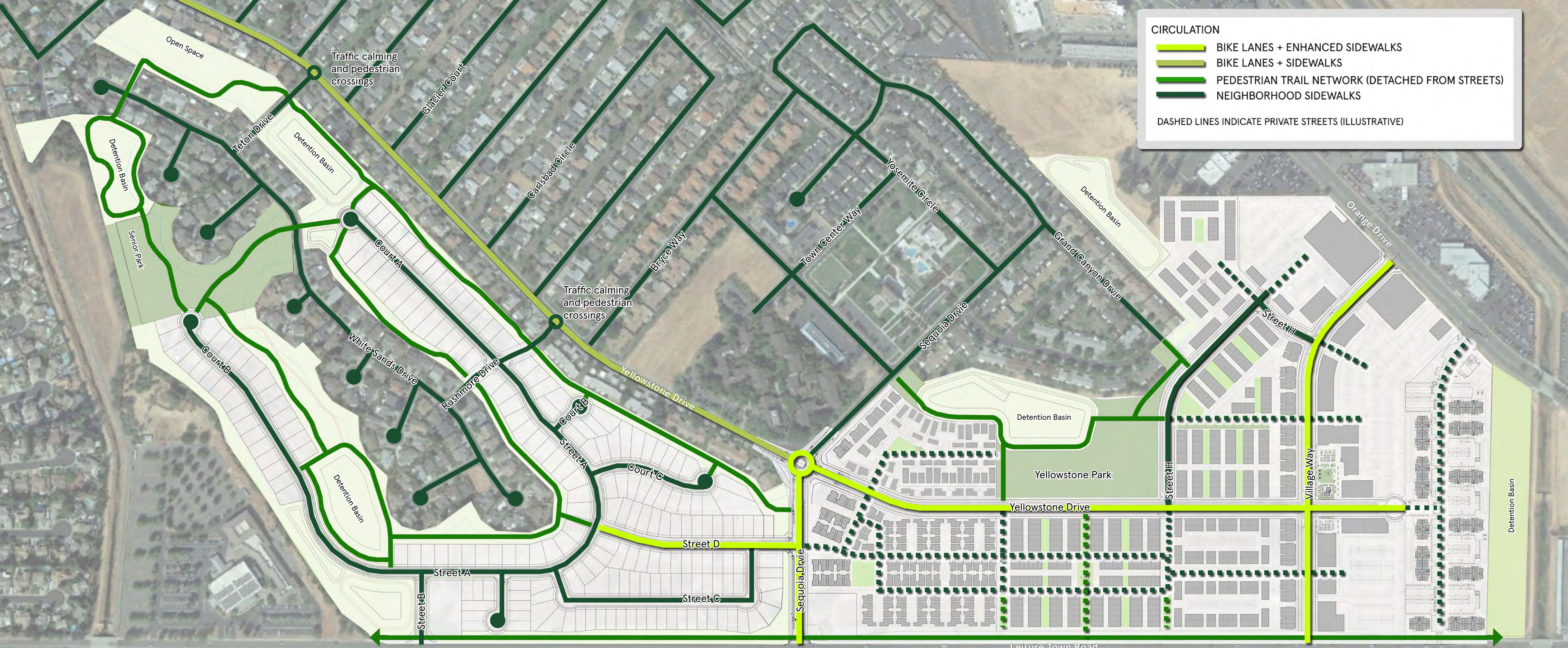
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SHEET NO.
3
 OF 3 SHEETS

CIRCULATION

-  BIKE LANES + ENHANCED SIDEWALKS
-  BIKE LANES + SIDEWALKS
-  PEDESTRIAN TRAIL NETWORK (DETACHED FROM STREETS)
-  NEIGHBORHOOD SIDEWALKS

DASHED LINES INDICATE PRIVATE STREETS (ILLUSTRATIVE)



(Building footprints north of Sequoia Drive are illustrative only and indicative of proposed densities)

CIRCULATION & CONNECTIVITY

GREENTREE DEVELOPMENT PLAN

Electrical vault could be an issue

All islands are fully mountable (3" high)

70' ICD Mini Roundabout

