

# “Twenty Ones”

## Traffic Impact Study



Salt Lake City, UT  
February 28, 2023

Prepared by Daniel Ritter

## Executive Summary

This study examines the traffic impacts associated with a mixed-use development in Salt Lake City. The proposed project is located at the northeast corner of the 2100 South and 2100 East intersection. The purpose of this traffic study is to analyze key intersections for existing (2019) and opening day (2023) conditions and to recommend mitigation measures as needed.

The existing background scenario resulted in level of service (LOS) E for the 2100 South and 2100 East intersection, with a 95<sup>th</sup> percentile queue of almost 1500 feet for the southbound approach. Adding a dedicated southbound right turn lane and optimizing signal splits resulted in LOS C and significantly reduced queuing. These mitigations were assumed for the opening background scenario, which had had similar LOS and queuing results.

The project is expected to generate about 1,300 trips on a typical weekday, with 144 trips in the afternoon peak hour. Roughly two-thirds of these trips are expected to be captured internally. As a result, the study assumes 51 trips to the site and 45 trips from the site. The opening plus project analysis resulted in LOS F for the site access point at 2100 East, with a 95<sup>th</sup> percentile queue of almost 1200 feet. Restricting access to be right-in/right-out and reoptimizing signal splits significantly reduced vehicle delay and the average queue, although the ultimate LOS and 95<sup>th</sup> percentile queue did not change. Throughout the study, the 2100 South and 2200 East intersection and both site access points at 2100 South had acceptable levels of service and queuing.

Although the final LOS for 2100 East at the site access point is unacceptable from a technical standpoint, it represents a significant improvement over previous scenarios. Further, the specific way that Synchro models the plus project scenario likely results in a worse LOS than would be observed in real life. If left turns are restricted at the west access point (as recommended in the mitigated plus project scenario), then southbound traffic should flow similarly to the opening background scenario, which easily met LOS standards.

Intersection	Existing	Existing Mitigated	Opening	Plus Project	Plus Project Mitigated
2100 South and 2100 East	E	C	C	C	C
2100 South and 2200 East	C	C	D	D	C
Access #1 and 2100 East	–	–	–	F	F
Access #2 and 2100 South	–	–	–	C	C
Access #3 and 2100 South	–	–	–	B	B

*Table 1. The afternoon peak hour level of service (LOS) for each intersection across three scenarios, including any mitigation measures: existing (2019) background, opening (2023) background, and opening (2023) plus project. LOS is determined using the average of all movements for signalized intersections and the worst movement for unsignalized intersections.*

## **Introduction**

This study examines the traffic impacts associated with a mixed-use development in the Sugar House neighborhood in Salt Lake City. The proposed project is located on the northeast corner of the 2100 South and 2100 East intersection. The project, which is known as the Twenty Ones, consists of 99 residential units and 16,000 ft<sup>2</sup> of retail (see Exhibit A in the appendix for the site plan).

The purpose of this traffic impact study is to analyze key intersections for existing (2019) and opening day (2023) conditions with and without the proposed project and to recommend mitigation measures as needed. The study focuses on the afternoon peak hour of the adjacent street; intersection level of service is calculated from 4:30 p.m. to 5:30 p.m. The study area includes the following intersections and site access points:

- 2100 South and 2100 East
- 2100 South and 2200 East
- Access #1 (west) at 2100 East
- Access #2 (southwest) at 2100 South
- Access #3 (southeast) at 2100 South

## **Data Collection**

Weekday peak period traffic counts were performed on Wednesday, November 6, 2019, at the intersections listed below. Counts were taken from 7:00 a.m. to 9:00 a.m. and from 4:00 p.m. to 6:00 p.m. They included all through and turning movements at both intersections.

- 2100 South and 2100 East
- 2100 South and 2200 East

## Existing (2019) Background Scenario



Figure 1. Assumed existing (2019) background roadway network and traffic volumes.

Intersection level of service (LOS) and queuing for the existing background network were evaluated using SimTraffic based on traffic volume as measured in 2019. The 2100 South/2100 East intersection has a poor overall LOS as the result of significant delays and queuing on the southbound approach. This approach has delays around 225 seconds and queues around 1,500 feet, while the other approaches have delays below 25 seconds and queues below 200 feet (based on the 95<sup>th</sup> percentile queue length). The 2100 South/2200 East intersection has an appropriate LOS, with delays and queues not exceeding 20 seconds and 50 feet, respectively.

Intersection	Control	Average delay (sec/vehicle)	Level of service
2100 South and 2100 East	Signal	73.7	E
2100 South and 2200 East	NB/SB Stop	18.9	C

Table 2. Delay and LOS for each intersection in the existing (2019) background scenario. LOS is determined using the average of all movements for signalized intersections and the worst movement for unsignalized intersections.

Two mitigation measures were recommended based on these findings. First, a dedicated southbound right turn lane was added to the 2100 South/2100 East intersection and the existing northbound right turn lane was removed in order to align the through lanes. The southbound right movement was prioritized since it has more than double the volume of the northbound left movement. Second, the

signal splits were optimized for the intersection since the existing splits disproportionately favored the east- and westbound movements over the southbound movement compared to their relative volumes.

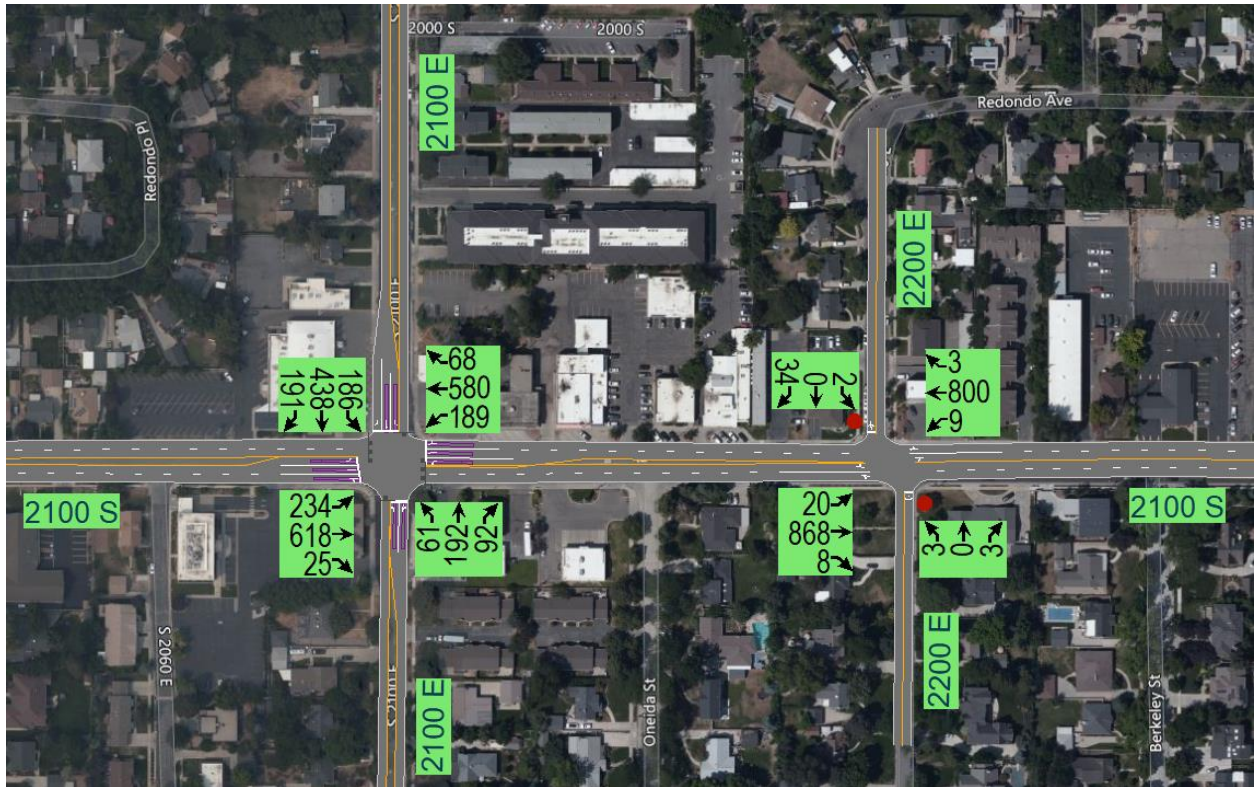


Figure 2. Assumed existing (2019) background roadway network and traffic volumes with mitigations.

As a result, the LOS for the 2100 South/2100 East intersection improved significantly, while the 2100 South/2200 East intersection was unaffected. The 95<sup>th</sup> percentile queue length for the southbound through movement is still relatively long at 500 feet, but this represents a significant improvement from the unmitigated scenario. Additionally, the average queue length is only 270 feet, which is significantly lower than the unmitigated average of 1,300 feet.

Intersection	Control	Average delay (sec/vehicle)	Level of service
2100 South and 2100 East	Signal	24.2	C
2100 South and 2200 East	NB/SB Stop	24.3	C

Table 3. Delay and LOS for each intersection in the existing (2019) background scenario after mitigation measures were taken.

## Opening Day (2023) Background Scenario

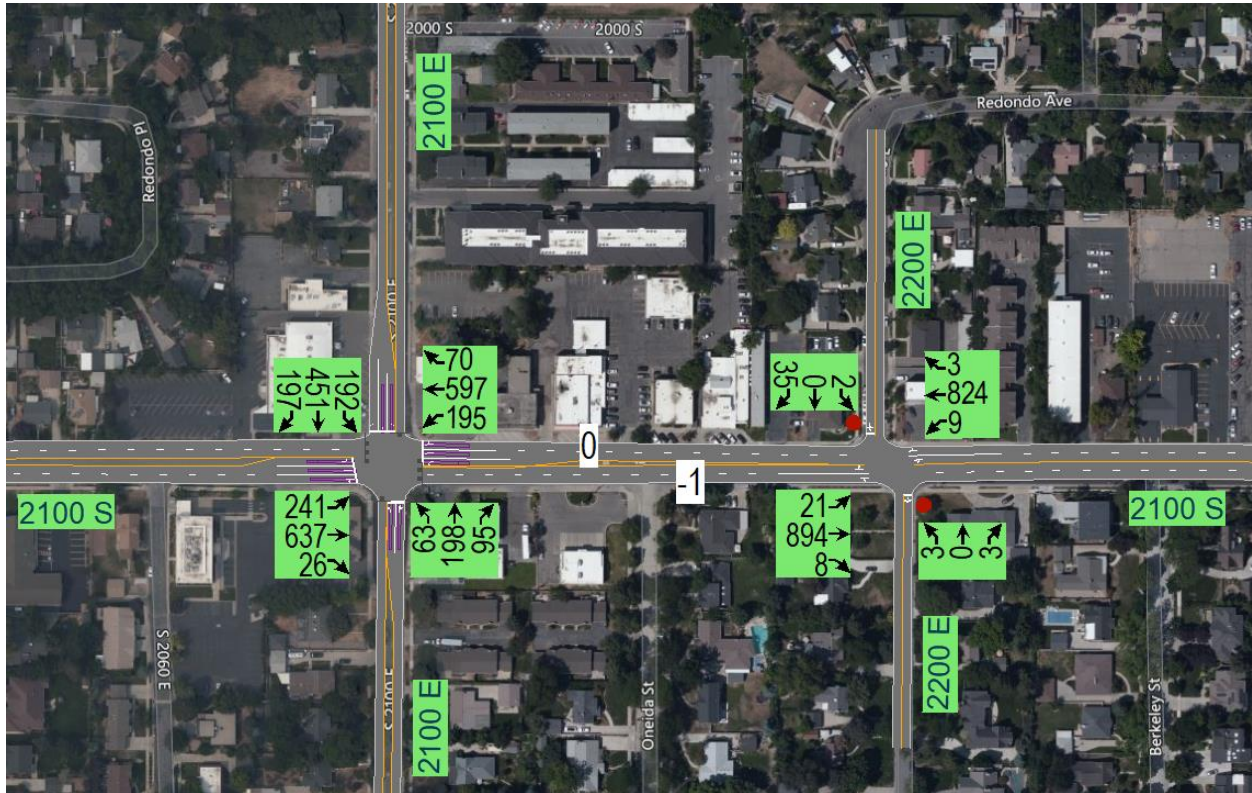


Figure 3. Assumed opening day (2023) background roadway network and volumes.

Intersection level of service (LOS) and queuing for the opening background network were evaluated using SimTraffic based on projected traffic volume in 2023. Future volume was determined using 2019 counts and a 3% growth rate based on traffic volume forecasts from the Wasatch Front Regional Council. Additionally, the SimTraffic analysis assumes the mitigation measures recommended for the existing (2019) background scenario were implemented.

The LOS for the 2100 South/2100 East intersection did not change from the existing (2019) background scenario. The 95<sup>th</sup> percentile and average queue lengths for the southbound through movement did roughly double but the delay remained within local standards. The level of service for the 2100 South/2200 East intersection was slightly worse but remained within local standards as well. No additional mitigation measures were recommended at this time since overall LOS was acceptable and some delay for certain movements is expected.

Intersection	Control	Average delay (sec/vehicle)	Level of service
2100 South and 2100 East	Signal	25.6	C
2100 South and 2200 East	NB/SB Stop	29.8	D

Table 4. Delay and LOS for each intersection in the opening (2023) background scenario. LOS is determined using the average of all movements for signalized intersections and the worst movement for unsignalized intersections.

## Project Traffic

The project is a mixed-use development with 99 residential units and 16,000 ft<sup>2</sup> of retail. Trips generated by the project were estimated using trip rates and directional distributions provided by the ITE Trip Generation Manual, 11<sup>th</sup> Edition, for multi-family low-rise housing and strip retail plaza land uses.

The development is expected to generate about 1,321 trips on a typical weekday, with 144 trips in the afternoon peak hour. Based on the TRB Internal Trip Capture Estimation Tool, roughly 10-20% of residential trips and 40-45% of retail trips will be capture internally (depending on trip direction). Afternoon peak hour trips are shown in greater detail in the following tables:

Land Use	Trips Generated	Trips In	Trips Out
Multifamily	39	24	16
Retail	105	53	53
<b>Total</b>	<b>144</b>	<b>77</b>	<b>69</b>

*Table 5. Expected afternoon peak hour project trip generation before internal capture.*

Land Use	Trips Generated	Trips In	Trips Out
Multifamily	35	22	13
Retail	61	29	32
<b>Total</b>	<b>96</b>	<b>51</b>	<b>45</b>

*Table 6. Expected afternoon peak hour project trip generation after internal capture.*

Project traffic was assigned to the network based on nearby land use, local and regional destinations, and major roadways. Most trips were expected to come from the east or west given the development's proximity to I-80, I-215, and the Sugar House corridor. Some trips were expected to come from residential neighborhoods or the University of Utah to the north. Few trips were expected to come from the south, since the area is low-density residential and lacks connections to major roadways or activity centers. The assumed trip distribution is shown in greater detail in the following table:

Direction	Percentage	Trips In	Trips Out
North	20%	10	9
South	5%	3	2
East	40%	20	18
West	35%	18	16

*Table 7. Expected afternoon peak hour trip distribution.*





## Opening Day (2023) Plus Project Scenario

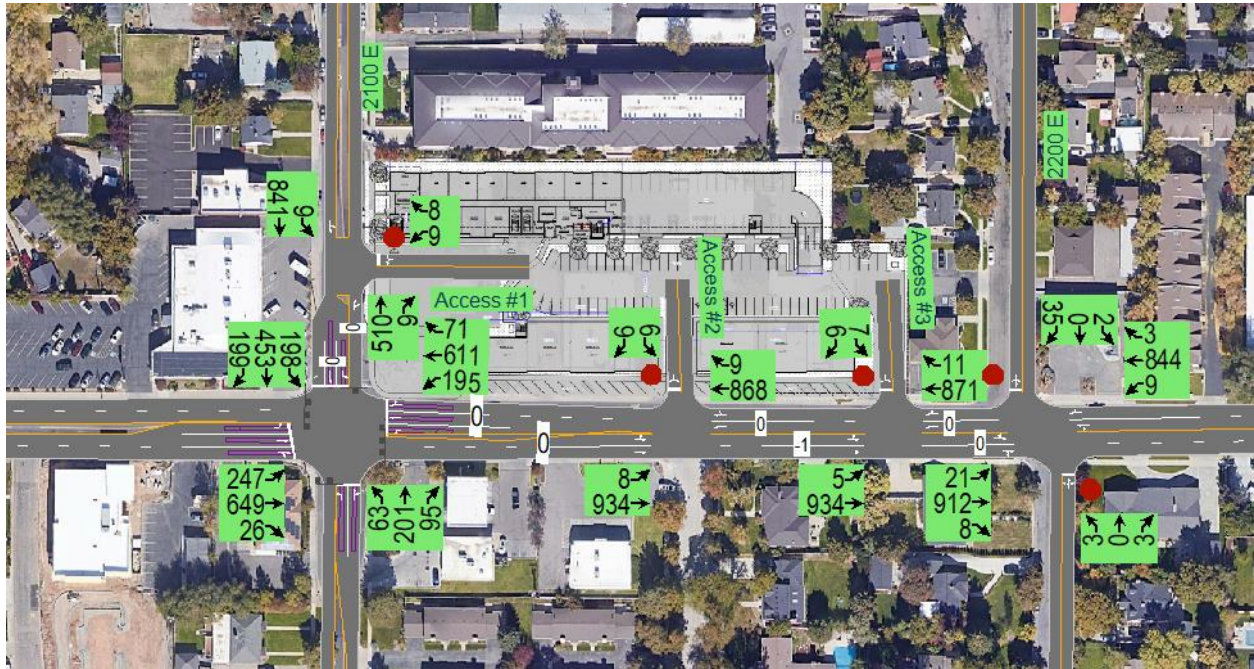


Figure 5. Assumed opening day (2023) plus project roadway network and volumes.

Intersection level of service (LOS) and queuing for the opening plus project network were evaluated using SimTraffic based on expected project trip generation, distribution, and assignment. Additionally, the SimTraffic analysis assumes the mitigation measures recommended for the existing (2019) background scenario were implemented.

The 2100 South/2100 East and 2100 South/2200 East intersections, as well as both site access points at 2100 South, had appropriate levels of service and short queues. The 95<sup>th</sup> percentile queue did not exceed 225 feet for 2100 South/2100 East or 45 feet for the other intersections. However, there were serious delays and queues at the site access point at 2100 East. The delay for westbound left and right turns from the site was 1275 seconds and 750 seconds, respectively, while the delay for southbound traffic was around 215 seconds. Additionally, 95<sup>th</sup> percentile queue for the southbound approach was almost 1200 feet.

Intersection	Control	Average delay (sec/vehicle)	Level of service
2100 South and 2100 East	Signal	21.0	C
2100 South and 2200 East	NB/SB Stop	30.4	D
Access #1 and 2100 East	WB Stop	1273.9	F
Access #2 and 2100 South	SB Stop	15.5	C
Access #3 and 2100 South	SB Stop	14.8	B

Table 8. Delay and LOS for each intersection in the opening (2023) plus project scenario. LOS is determined using the average of all movements for signalized intersections and the worst movement for unsignalized intersections.

Two mitigation measures were recommended based on these findings. First, access to and from the site at 2100 East became right-in/right-out only, which would limit delay caused by vehicles waiting to turn left across traffic. This change affected 18 project trips, which were reassigned in the network. Second, the signal length and splits at 2100 South/2100 East were reoptimized for this change and project traffic.

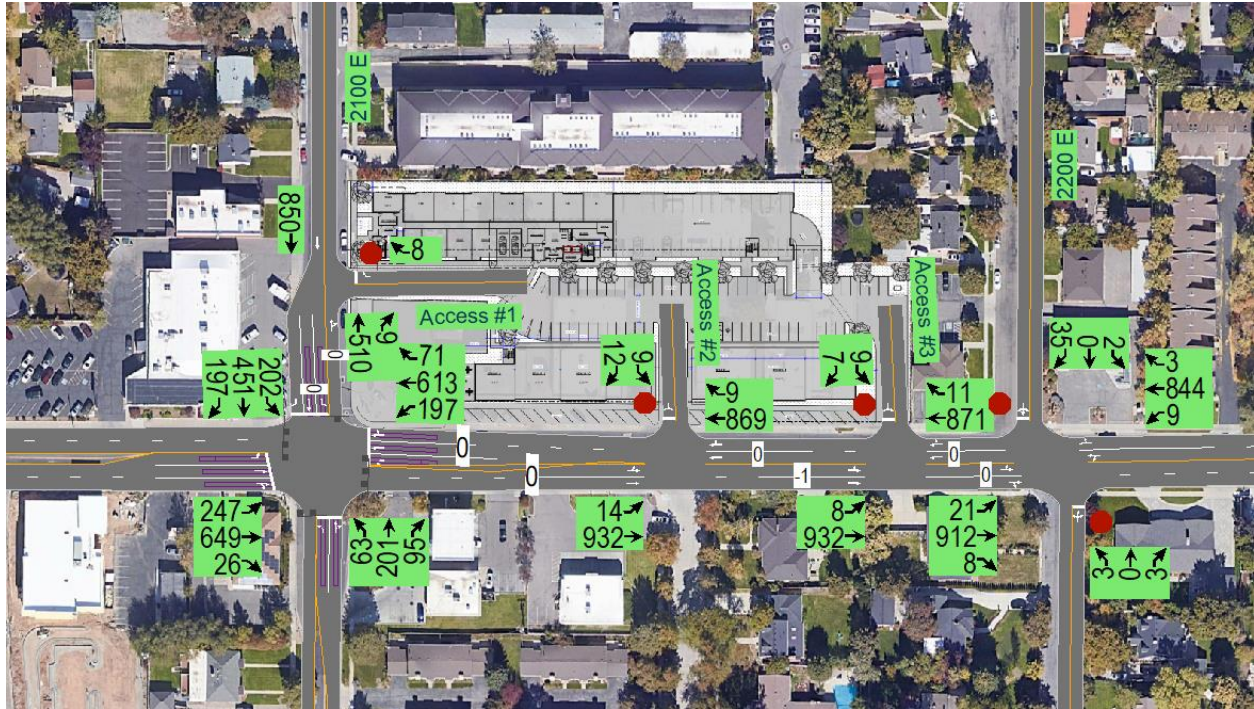


Figure 6. Assumed opening day (2023) plus project roadway network and volumes with mitigations.

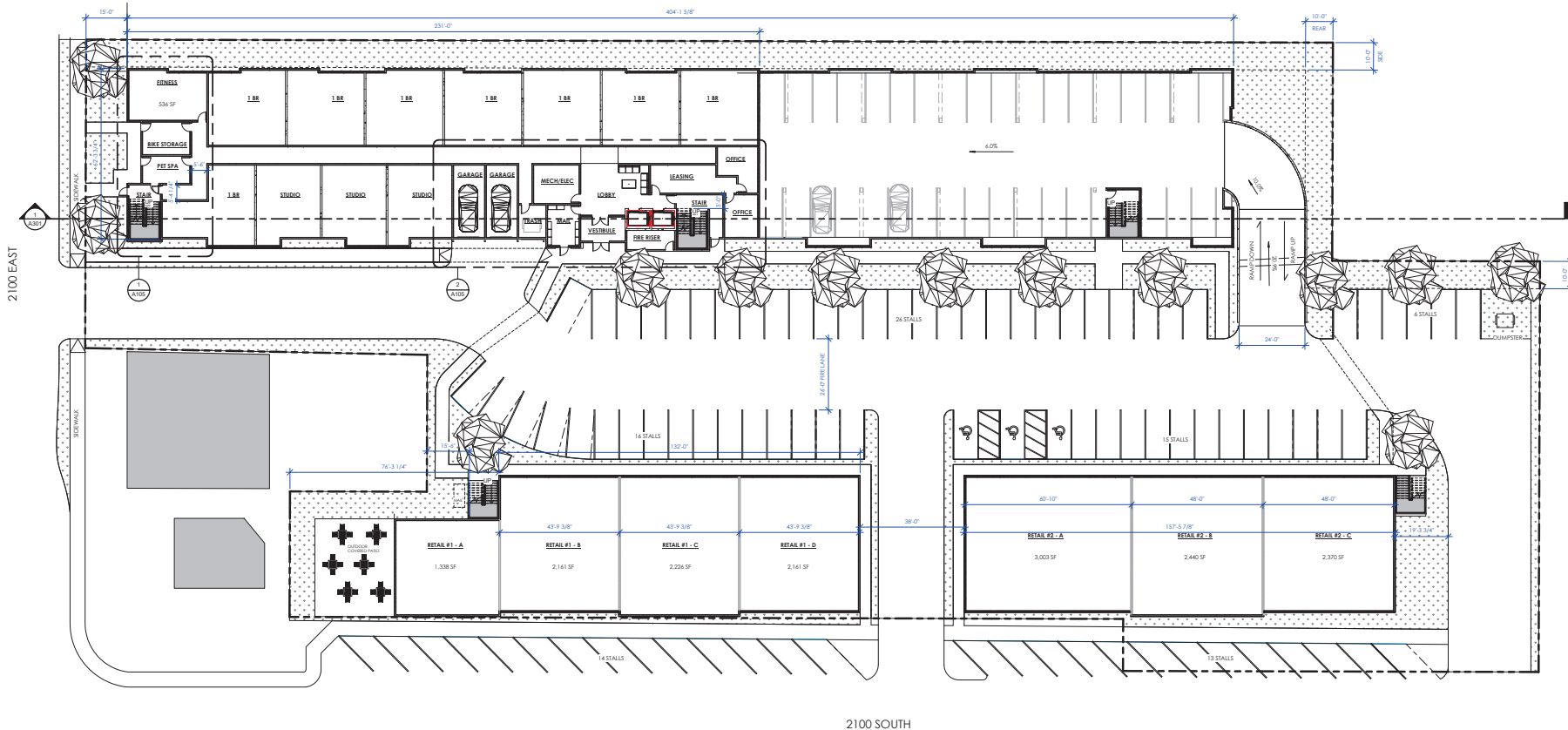
As a result, the LOS for the site access point at 2100 East improved significantly, while the other intersections and access points were unaffected. The average delay for the southbound through movement decreased from 215 seconds to 91 seconds, while the average queue length decreased from 1170 feet to 735 feet. Although neither measure would be considered good by itself, some delay for certain movements is expected and both represent significant improvements from the unmitigated scenario. Further, the specific way that Synchro models the plus project scenario likely results in a worse LOS than would be observed in real life. If left turns are restricted at the west access point (as seen in the mitigated plus project scenarios), then southbound traffic should flow similarly to the opening background scenario, which easily met LOS standards.

Intersection	Control	Average delay (sec/vehicle)	Level of service
2100 South and 2100 East	Signal	23.3	C
2100 South and 2200 East	NB/SB Stop	22.5	C
Access #1 and 2100 East	WB Stop	91.0	F
Access #2 and 2100 South	SB Stop	18.6	C
Access #3 and 2100 South	SB Stop	14.5	B

Table 9. Delay and LOS for each intersection in the opening (2023) plus project scenario after mitigation measures were taken.

## Appendix

- A. Project site plan.
- B. SimTraffic report for existing (2019) background.
- C. SimTraffic report for existing (2019) background with proposed mitigation measures.
- D. SimTraffic report for opening day (2023) background.
- E. SimTraffic report for opening day (2023) plus project.
- F. SimTraffic report for opening day (2023) plus project with proposed mitigation measures.



**21st & 21st PROJECT DATA**

**RETAIL BUILDING UNIT COUNTS & SIZES**

STUDIO	4	APPROX. 632 SF
1-BR	10	APPROX. 735 SF
2-BR	8	APPROX. 881 SF
<b>HOUSING ABOVE RETAIL</b>	<b>22</b>	<b>UNITS</b>

**HOUSING BUILDING UNIT COUNTS & SIZES**

STUDIO	13	APPROX. 686 SF
1-BR	54	APPROX. 790 SF
2-BR	10	APPROX. 1,016 SF
<b>HOUSING BUILDING</b>	<b>77</b>	<b>UNITS</b>

**TOTAL PROJECT UNIT COUNTS**

STUDIO	17	17%
1-BR	64	64%
2-BR	18	18%
<b>TOTAL UNITS</b>	<b>99</b>	

**PARKING REQUIRED**

Retail = 2/1,000  
 Restaurant = 2/1,000  
 Office = 3/1,000  
 15,949 sq ft  
 3/1,000 SF

**RETAIL STALLS REQ'D** 48

**HOUSING**

STUDIO	1 STALL/UNIT	17
1-BR	1 STALL/UNIT	64
2-BR	2 STALLS/UNIT	36
<b>HOUSING STALLS REQ'D</b>		<b>117</b>

**TOTAL STALLS REQ'D** 165

**PROVIDED PARKING**

ON-STREET PARKING	27
SURFACE STALLS	63
UNDERGROUND STALLS	77
SINGLE CAR GARAGE	2
<b>TOTAL STALLS PROVIDED</b>	<b>169</b>

**SITE INFORMATION**

TOTAL SITE:	98,954 SQ FT
LANDSCAPING	18,320 SF 19%
ASPHALT	29,971 SF 30%
BUILDINGS	38,535 SF 39%
CONC. / STREET PKG.	5,631 SF 6%

**PARKING LOT SITE:** 21,779 SF  
 LANDSCAPE: 1,104 SF  
 PERCENTAGE: 5.1%

**1 SITE PLAN**  
1/16" = 1'-0"



2100 SOUTH

**21ST & 21ST AREA CALCS - PARKING LEVEL**

Name	Area
CIRC.	467 SF
CIRC.	239 SF
CIRC.	274 SF
CIRC.	981 SF
PARKING	23,450 SF
1	23,450 SF
Grand total: 4	24,431 SF

**21ST & 21ST AREA CALCS - Level 01**

Name	Area
AMENITY	2,038 SF
AMENITY	973 SF
2	3,011 SF
CIRC.	1,485 SF
CIRC.	476 SF
2	2,161 SF
FIRE	146 SF
1	146 SF
GARAGE	668 SF
1	668 SF
RESIDENTIAL UNITS	5,696 SF
RESIDENTIAL UNITS	2,884 SF
2	8,580 SF
RETAIL	2,472 SF
RETAIL	1,374 SF
RETAIL	3,058 SF
RETAIL	2,417 SF
RETAIL	2,189 SF
RETAIL	2,255 SF
RETAIL	2,205 SF
7	15,969 SF
Grand total: 15	30,535 SF

**21ST & 21ST AREA CALCS - Level 02**

Name	Area
CIRC.	3,726 SF
CIRC.	2,972 SF
2	6,697 SF
FIRE	137 SF
1	137 SF
OUTDOOR PATIO	628 SF
1	628 SF
RESIDENTIAL UNITS	17,341 SF
RESIDENTIAL UNITS	12,405 SF
RESIDENTIAL UNITS	4,791 SF
RESIDENTIAL UNITS	4,306 SF
4	38,844 SF
Grand total: 8	46,307 SF

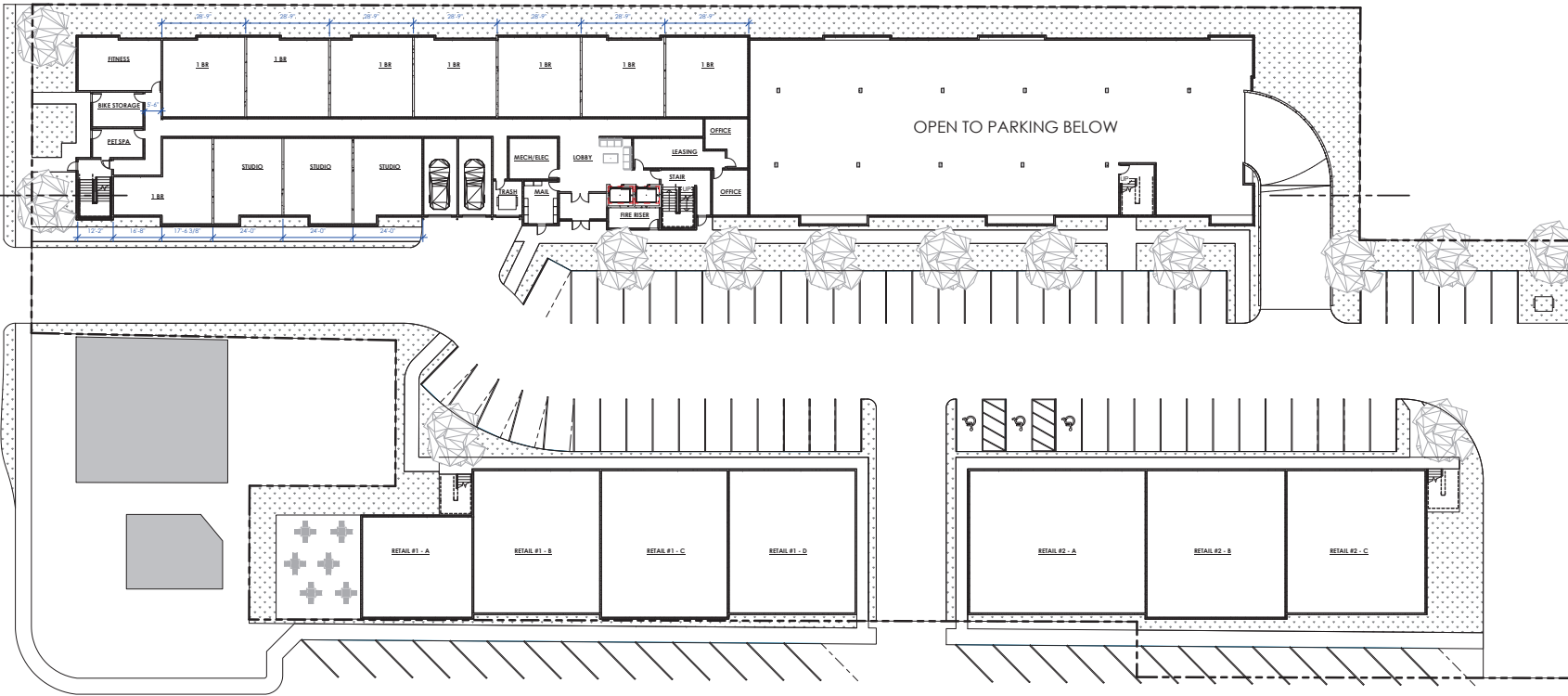
**21ST & 21ST AREA CALCS - Level 03**

Name	Area
CIRC.	3,733 SF
1	3,733 SF
FIRE	139 SF
1	139 SF
RESIDENTIAL UNITS	12,423 SF
RESIDENTIAL UNITS	4,305 SF
3	21,501 SF
Grand total: 5	25,374 SF

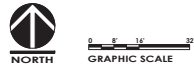
**21ST & 21ST AREA CALCS - Level 04**

Name	Area
AMENITY	1,907 SF
1	1,907 SF
CIRC.	2,614 SF
1	2,614 SF
FIRE	136 SF
1	136 SF
RESIDENTIAL UNITS	6,485 SF
RESIDENTIAL UNITS	1,011 SF
RESIDENTIAL UNITS	4,306 SF
3	11,802 SF
Grand total: 6	16,459 SF

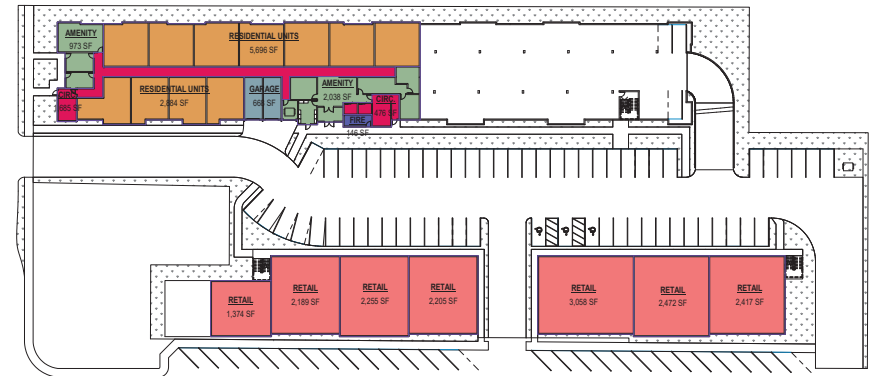




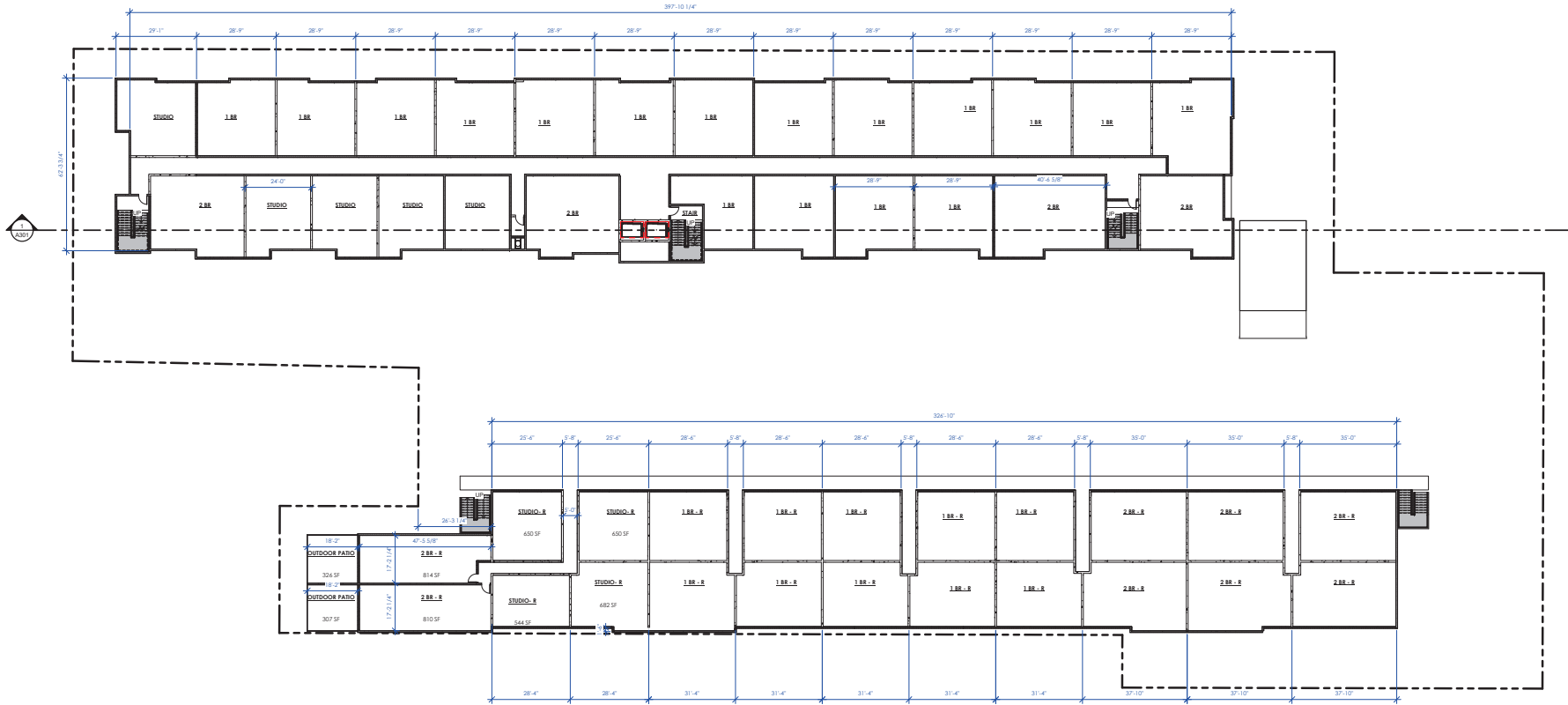
LEVEL 01  
1/16" = 1'-0"



21ST & 21ST AREA CALCS - Level 01	
Name	Area
AMENITY	2,038 SF
AMENITY	973 SF
	3,011 SF
CIRC.	1,685 SF
CIRC.	476 SF
	2,161 SF
FIRE	146 SF
	146 SF
GARAGE	448 SF
	448 SF
RESIDENTIAL UNITS	5,696 SF
RESIDENTIAL UNITS	2,884 SF
	8,580 SF
RETAIL	2,472 SF
RETAIL	1,374 SF
RETAIL	3,058 SF
RETAIL	2,417 SF
RETAIL	2,189 SF
RETAIL	2,255 SF
RETAIL	2,205 SF
	15,969 SF
Grand total: 15	30,535 SF



AREA PLAN  
1/32" = 1'-0"

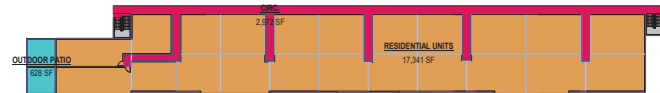
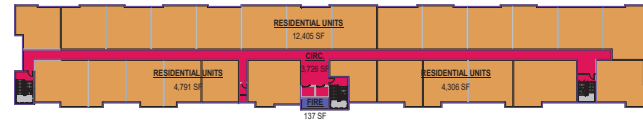


1 SECOND LEVEL FLOOR PLAN  
1/16" = 1'-0"

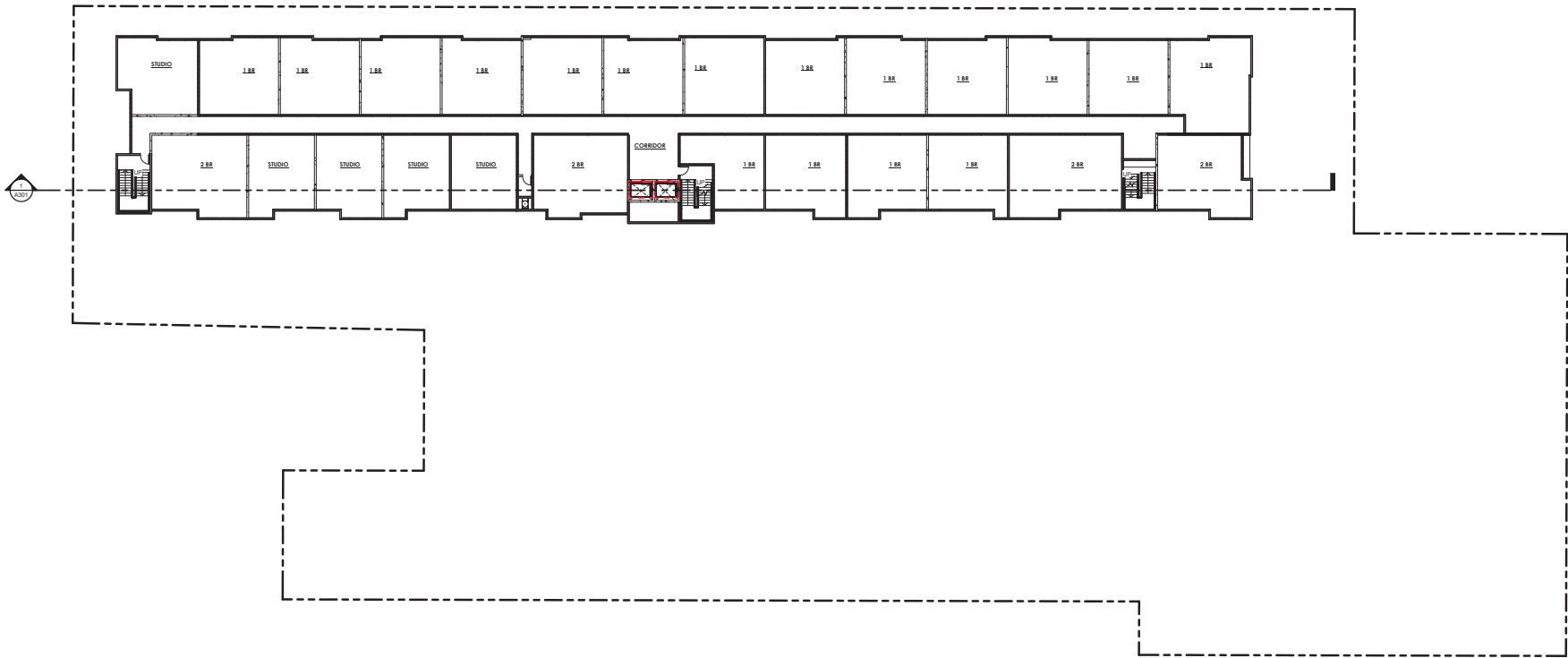


21ST & 21ST AREA CALCS - Level 02

Name	Area
CIRC.	3,726 SF
CIRC.	2,972 SF
2	6,697 SF
FIRE	137 SF
1	137 SF
OUTDOOR PATIO	428 SF
1	628 SF
RESIDENTIAL UNITS	17,341 SF
RESIDENTIAL UNITS	12,405 SF
RESIDENTIAL UNITS	4,791 SF
RESIDENTIAL UNITS	4,306 SF
4	38,844 SF
Grand total: 8	46,307 SF



2 AREA PLAN  
1/32" = 1'-0"

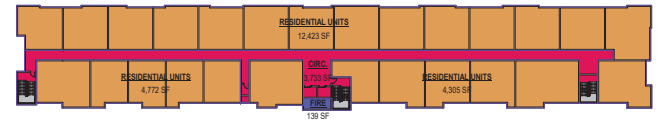


1 THIRD LEVEL FLOOR PLAN  
1/8" = 1'-0"



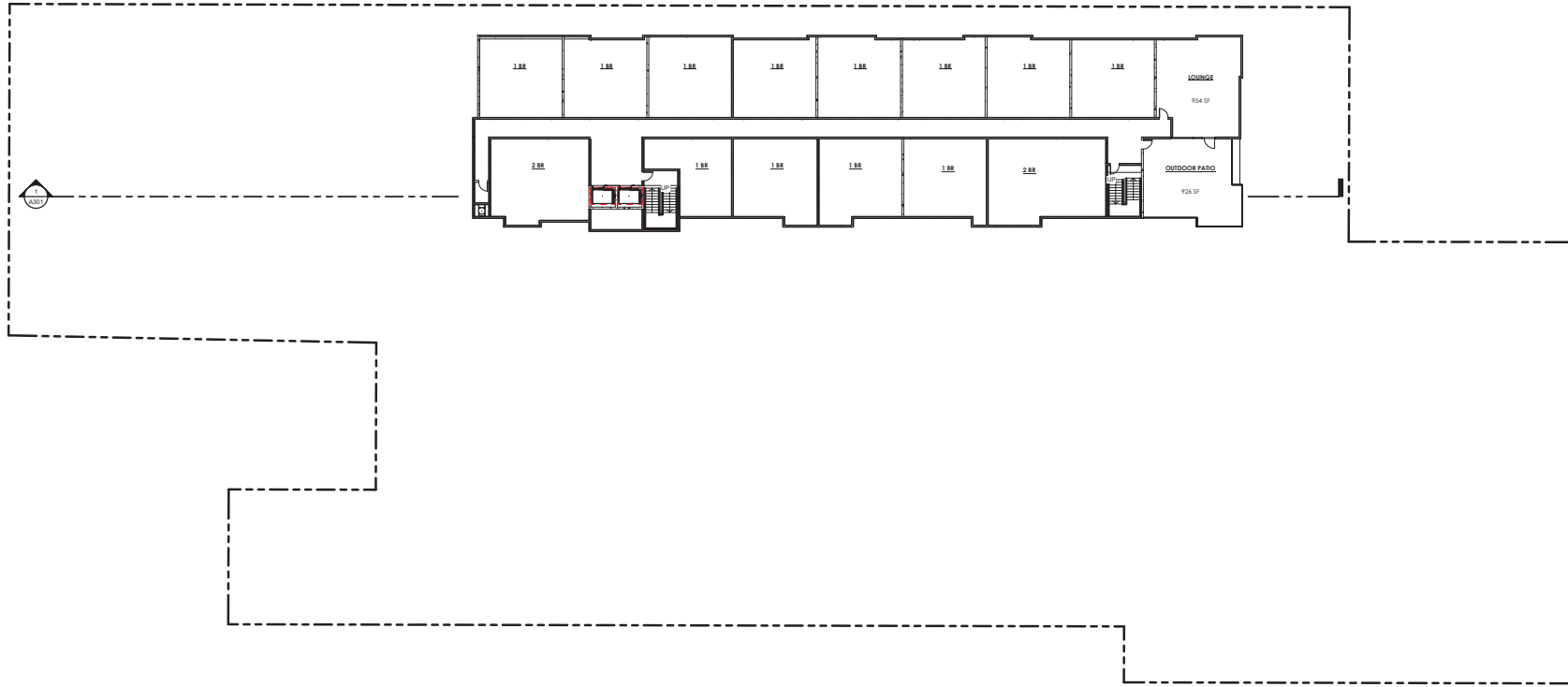
0 5 10 20'  
GRAPHIC SCALE

21ST & 21ST AREA CALCS - Level 03	
Name	Area
CIRC.	3,733 SF
1	3,733 SF
FIRE	139 SF
1	139 SF
RESIDENTIAL UNITS	12,423 SF
RESIDENTIAL UNITS	4,303 SF
RESIDENTIAL UNITS	4,772 SF
3	21,501 SF
Grand total:	25,374 SF



2 AREA PLAN  
1/32" = 1'-0"



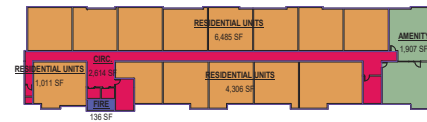


1  
A104  
FOURTH LEVEL FLOOR PLAN  
1/16" = 1'-0"

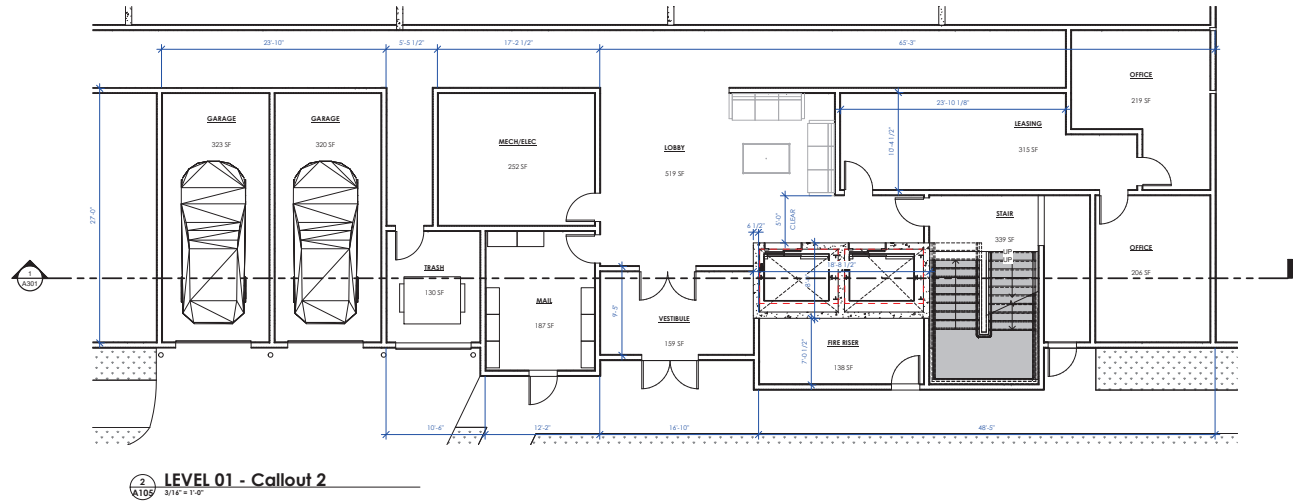
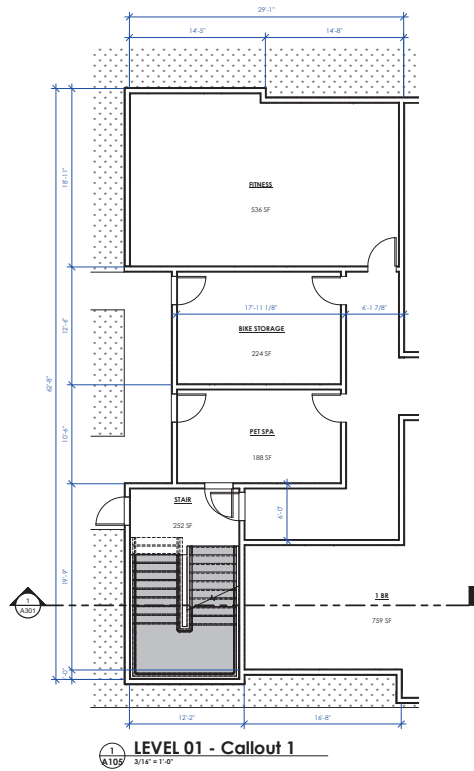


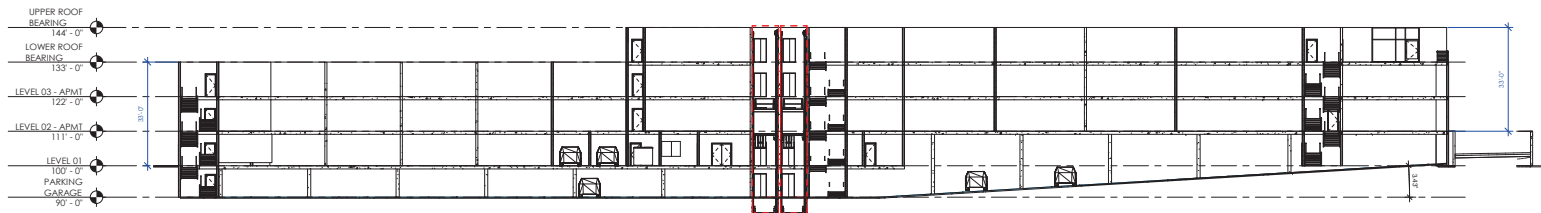
21ST & 21ST AREA CALCS - Level 04

Name	Area
AMENITY	1,907 SF
1	1,907 SF
CIRC.	2,614 SF
1	2,614 SF
FIRE	136 SF
1	136 SF
RESIDENTIAL UNITS	6,485 SF
RESIDENTIAL UNITS	1,011 SF
RESIDENTIAL UNITS	4,306 SF
3	11,802 SF
Grand total: 6	16,459 SF



2  
A104  
AREA PLAN  
1/32" = 1'-0"





1 BUILDING SECTION  
A301 1/8"=1'-0"



1: 2100 E & 2100 S Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	14.2	33.3	13.6
Denied Del/Veh (s)	1.9	0.2	0.2	0.0	0.0	0.0	3.5	0.6	3.6	272.6	269.1	260.6
Total Delay (hr)	1.6	2.6	0.1	1.1	2.7	0.2	1.4	1.2	0.2	10.8	25.2	10.3
Total Del/Veh (s)	24.3	15.2	11.4	22.0	16.7	12.3	76.5	21.6	6.9	231.7	226.0	217.9
Vehicles Entered	229	615	26	176	574	71	63	192	89	158	378	160
Vehicles Exited	229	616	26	176	573	70	62	193	89	157	369	159
Hourly Exit Rate	229	616	26	176	573	70	62	193	89	157	369	159
Input Volume	234	618	25	189	580	68	61	192	92	186	438	191
% of Volume	98	100	103	93	99	103	101	100	97	84	84	83

1: 2100 E & 2100 S Performance by movement

Movement	All
Denied Delay (hr)	61.4
Denied Del/Veh (s)	77.5
Total Delay (hr)	57.3
Total Del/Veh (s)	73.7
Vehicles Entered	2731
Vehicles Exited	2719
Hourly Exit Rate	2719
Input Volume	2876
% of Volume	95

2: 2200 E & 2100 S Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.4	0.2	0.2	0.1	0.1	0.2	0.1	0.1
Total Delay (hr)	0.0	0.5	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.8
Total Del/Veh (s)	6.0	2.0	2.2	6.5	0.9	0.2	18.9	5.8	16.9	4.7	1.7
Vehicles Entered	18	836	8	10	785	4	2	4	1	33	1701
Vehicles Exited	18	837	8	10	785	4	2	4	1	33	1702
Hourly Exit Rate	18	837	8	10	785	4	2	4	1	33	1702
Input Volume	20	869	8	9	800	3	3	3	2	34	1752
% of Volume	90	96	100	111	98	133	67	133	50	96	97

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Total Network Performance

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Denied Delay (hr)	61.5
Denied Del/Veh (s)	77.0
Total Delay (hr)	59.7
Total Del/Veh (s)	75.4
Vehicles Entered	2750
Vehicles Exited	2735
Hourly Exit Rate	2735
Input Volume	7519
% of Volume	36

Intersection: 1: 2100 E & 2100 S

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	R	L	TR
Maximum Queue (ft)	149	206	204	144	198	207	147	213	120	180	1352
Average Queue (ft)	98	113	106	73	100	110	61	92	38	162	1292
95th Queue (ft)	153	186	175	123	166	182	122	173	89	229	1490
Link Distance (ft)		1547	1547		576	576		859			1294
Upstream Blk Time (%)											89
Queuing Penalty (veh)											0
Storage Bay Dist (ft)	100			120			70		30	80	
Storage Blk Time (%)	10	9		1	4		21	42	10	25	69
Queuing Penalty (veh)	30	21		2	7		59	65	26	154	129

Intersection: 2: 2200 E & 2100 S

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	37	27	79	33	32	49
Average Queue (ft)	5	2	7	1	5	23
95th Queue (ft)	21	16	46	22	24	51
Link Distance (ft)	576	576	1053	1053	346	416
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Network Summary

Network wide Queuing Penalty: 493
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1: 2100 E & 2100 S Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1
Denied Del/Veh (s)	1.8	0.2	0.2	0.0	0.0	0.0	3.6	0.5	0.4	2.6	1.1	2.5
Total Delay (hr)	1.8	2.8	0.1	1.2	2.9	0.3	1.1	1.3	0.4	2.7	4.3	0.8
Total Del/Veh (s)	27.0	16.2	14.5	22.4	17.4	13.3	65.1	24.2	16.9	51.3	33.9	14.8
Vehicles Entered	234	624	24	189	593	67	60	193	91	188	443	188
Vehicles Exited	233	623	24	189	593	67	61	194	92	187	443	188
Hourly Exit Rate	233	623	24	189	593	67	61	194	92	187	443	188
Input Volume	234	618	25	189	580	68	61	192	92	186	438	191
% of Volume	100	101	95	100	102	98	100	101	100	100	101	98

1: 2100 E & 2100 S Performance by movement

Movement	All
Denied Delay (hr)	0.7
Denied Del/Veh (s)	0.8
Total Delay (hr)	19.7
Total Del/Veh (s)	24.2
Vehicles Entered	2894
Vehicles Exited	2894
Hourly Exit Rate	2894
Input Volume	2876
% of Volume	101

2: 2200 E & 2100 S Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.1
Total Delay (hr)	0.0	0.5	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.9
Total Del/Veh (s)	6.8	2.1	1.8	6.2	0.9	0.2	24.3	8.2	17.1	4.6	1.7
Vehicles Entered	20	873	10	8	812	4	3	4	1	33	1768
Vehicles Exited	21	874	9	8	813	4	3	4	1	33	1770
Hourly Exit Rate	21	874	9	8	813	4	3	4	1	33	1770
Input Volume	20	869	8	9	800	3	3	3	2	34	1752
% of Volume	105	101	112	89	102	133	100	133	50	96	101

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Total Network Performance

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Denied Delay (hr)	0.7
Denied Del/Veh (s)	0.9
Total Delay (hr)	22.4
Total Del/Veh (s)	26.9
Vehicles Entered	2911
Vehicles Exited	2910
Hourly Exit Rate	2910
Input Volume	7519
% of Volume	39



Intersection: 1: 2100 E & 2100 S

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	T	R
Maximum Queue (ft)	149	240	216	184	204	214	147	289	180	609	200
Average Queue (ft)	98	109	103	85	114	125	55	122	137	267	108
95th Queue (ft)	158	189	177	146	179	193	114	219	211	489	227
Link Distance (ft)		1536	1536		586	586		859		1294	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	100			120			70		80		100
Storage Blk Time (%)	9	7		2	7		14	24	33	42	1
Queuing Penalty (veh)	28	16		7	13		39	15	206	158	5

Intersection: 2: 2200 E & 2100 S

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	39	40	76	28	36	50
Average Queue (ft)	6	2	5	1	6	23
95th Queue (ft)	24	20	35	18	26	50
Link Distance (ft)	586	586	1053	1053	346	417
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Network Summary

Network wide Queuing Penalty: 487
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1: 2100 E & 2100 S Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.3	0.2
Denied Del/Veh (s)	1.9	0.2	0.3	0.0	0.0	0.0	3.5	0.5	0.4	4.3	2.6	4.1
Total Delay (hr)	1.9	3.1	0.1	1.4	2.9	0.3	1.1	1.6	0.5	4.2	6.8	1.9
Total Del/Veh (s)	27.7	17.1	12.5	24.6	17.7	13.5	61.2	26.7	18.3	76.7	51.8	33.9
Vehicles Entered	238	640	30	201	589	71	64	208	95	189	455	193
Vehicles Exited	239	639	30	200	589	71	64	209	95	192	460	194
Hourly Exit Rate	239	639	30	200	589	71	64	209	95	192	460	194
Input Volume	241	637	26	195	597	70	63	198	95	192	451	197
% of Volume	99	100	114	102	99	101	101	105	100	100	102	98

1: 2100 E & 2100 S Performance by movement

Movement	All
Denied Delay (hr)	1.0
Denied Del/Veh (s)	1.3
Total Delay (hr)	25.6
Total Del/Veh (s)	30.5
Vehicles Entered	2973
Vehicles Exited	2982
Hourly Exit Rate	2982
Input Volume	2964
% of Volume	101

2: 2200 E & 2100 S Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.5	0.2	0.2	0.2	0.1	0.1	0.1	0.1
Total Delay (hr)	0.0	0.6	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.9
Total Del/Veh (s)	7.4	2.2	2.4	8.2	1.0	0.5	29.8	9.1	22.9	5.2	1.8
Vehicles Entered	20	898	8	8	823	3	3	2	1	34	1800
Vehicles Exited	21	895	8	8	823	3	3	2	1	34	1798
Hourly Exit Rate	21	895	8	8	823	3	3	2	1	34	1798
Input Volume	21	895	8	9	824	3	3	3	2	35	1803
% of Volume	100	100	100	89	100	100	100	67	50	96	100

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Total Network Performance

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Denied Delay (hr)	1.1
Denied Del/Veh (s)	1.3
Total Delay (hr)	28.4
Total Del/Veh (s)	33.3
Vehicles Entered	2987
Vehicles Exited	2994
Hourly Exit Rate	2994
Input Volume	7746
% of Volume	39

Intersection: 1: 2100 E & 2100 S

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	T	R
Maximum Queue (ft)	149	234	211	190	210	218	169	279	180	896	200
Average Queue (ft)	102	118	110	93	114	123	62	133	145	427	128
95th Queue (ft)	160	200	182	153	181	193	129	234	220	948	249
Link Distance (ft)		1536	1536		587	587		859		1294	
Upstream Blk Time (%)											3
Queuing Penalty (veh)											0
Storage Bay Dist (ft)	100			120			70		80		100
Storage Blk Time (%)	9	9		4	6		13	29	40	46	2
Queuing Penalty (veh)	30	21		11	13		40	18	261	178	14

Intersection: 2: 2200 E & 2100 S

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	56	46	81	29	34	62
Average Queue (ft)	8	2	7	1	6	23
95th Queue (ft)	33	20	46	26	26	51
Link Distance (ft)	587	587	1053	1053	346	416
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Network Summary

Network wide Queuing Penalty: 586
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1: 2100 E & 2100 S Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	1.8	0.2	0.2	0.0	0.0	0.0	3.5	0.5	0.4	0.0	0.0	0.0
Total Delay (hr)	2.0	3.0	0.1	1.2	3.0	0.3	0.8	1.4	0.4	1.5	2.4	0.4
Total Del/Veh (s)	28.9	16.3	12.3	22.3	17.7	13.6	40.5	25.3	16.4	37.4	25.3	8.0
Vehicles Entered	246	646	27	195	607	69	66	200	97	146	340	159
Vehicles Exited	245	645	27	194	607	69	66	201	97	147	340	159
Hourly Exit Rate	245	645	27	194	607	69	66	201	97	147	340	159
Input Volume	247	649	26	195	611	71	63	201	95	198	453	199
% of Volume	99	99	103	99	99	97	104	100	102	74	75	80

1: 2100 E & 2100 S Performance by movement

Movement	All
Denied Delay (hr)	0.3
Denied Del/Veh (s)	0.3
Total Delay (hr)	16.5
Total Del/Veh (s)	21.0
Vehicles Entered	2798
Vehicles Exited	2797
Hourly Exit Rate	2797
Input Volume	3010
% of Volume	93

2: 2200 E & 2100 S Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.0	0.0	0.0	0.3	0.2	0.3	0.1	0.1	0.1	0.1	0.1
Total Delay (hr)	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.4
Total Del/Veh (s)	4.2	0.3	0.1	5.8	1.0	0.6	19.2	7.9	30.4	5.8	0.9
Vehicles Entered	19	860	8	9	840	2	3	2	2	35	1780
Vehicles Exited	19	859	9	9	840	2	3	2	2	34	1779
Hourly Exit Rate	19	859	9	9	840	2	3	2	2	34	1779
Input Volume	21	913	8	9	844	3	3	3	2	35	1841
% of Volume	90	94	112	100	100	67	100	67	100	96	97

9: 2100 E & Access #1 Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	1.4	0.9	0.0	0.0	0.9	99.6	102.8
Denied Del/Veh (s)	452.5	462.6	0.0	0.0	472.5	429.9	269.3
Total Delay (hr)	3.2	1.2	0.2	0.0	0.4	40.9	45.9
Total Del/Veh (s)	1273.9	746.0	1.3	0.9	210.4	215.3	135.2
Vehicles Entered	8	5	506	9	5	639	1172
Vehicles Exited	5	5	506	9	5	639	1169
Hourly Exit Rate	5	5	506	9	5	639	1169
Input Volume	9	8	510	9	9	841	1386
% of Volume	56	62	99	100	56	76	84

11: 2100 S & Access #2 Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Total Delay (hr)	0.0	0.4	0.1	0.0	0.0	0.0	0.5
Total Del/Veh (s)	5.6	1.6	0.4	0.1	15.5	3.9	1.1
Vehicles Entered	8	881	860	10	6	10	1775
Vehicles Exited	8	881	861	10	6	10	1776
Hourly Exit Rate	8	881	861	10	6	10	1776
Input Volume	8	934	868	9	6	9	1834
% of Volume	100	94	99	111	100	111	97

13: 2100 S & Access #3 Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Total Delay (hr)	0.0	0.1	0.1	0.0	0.0	0.0	0.2
Total Del/Veh (s)	4.7	0.3	0.2	0.1	14.8	3.8	0.4
Vehicles Entered	5	883	866	12	6	6	1778
Vehicles Exited	5	882	866	12	6	6	1777
Hourly Exit Rate	5	882	866	12	6	6	1777
Input Volume	5	935	872	11	7	6	1836
% of Volume	100	94	99	109	86	100	97

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Total Network Performance

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Denied Delay (hr)	103.1
Denied Del/Veh (s)	121.1
Total Delay (hr)	65.0
Total Del/Veh (s)	78.5
Vehicles Entered	2863
Vehicles Exited	2857
Hourly Exit Rate	2857
Input Volume	12982
% of Volume	22

Intersection: 1: 2100 E & 2100 S

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	T	R
Maximum Queue (ft)	150	247	220	188	212	216	156	287	89	152	90
Average Queue (ft)	101	118	108	87	120	124	53	128	72	110	64
95th Queue (ft)	157	209	184	149	184	191	113	225	107	139	116
Link Distance (ft)		1536	1536		258	258		859		90	
Upstream Blk Time (%)					0	0			8	52	1
Queuing Penalty (veh)					0	0			0	440	0
Storage Bay Dist (ft)	100			120			70		80		100
Storage Blk Time (%)	11	7		3	7		7	28	15	57	1
Queuing Penalty (veh)	37	18		8	13		21	18	96	225	9

Intersection: 2: 2200 E & 2100 S

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	44	48	78	28	30	59
Average Queue (ft)	6	4	7	1	5	24
95th Queue (ft)	27	24	43	21	23	53
Link Distance (ft)	66	66	1053	1053	346	417
Upstream Blk Time (%)	0	0				
Queuing Penalty (veh)	0	0				
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 9: 2100 E & Access #1

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	156	10	1201
Average Queue (ft)	101	0	1171
95th Queue (ft)	185	10	1190
Link Distance (ft)	148	90	1148
Upstream Blk Time (%)	35	0	96
Queuing Penalty (veh)	0	1	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			



Intersection: 11: 2100 S & Access #2

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	48	38
Average Queue (ft)	5	13
95th Queue (ft)	25	38
Link Distance (ft)	258	108
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: 2100 S & Access #3

Movement	EB	EB	WB	SB
Directions Served	LT	T	TR	LR
Maximum Queue (ft)	40	12	3	38
Average Queue (ft)	3	0	0	11
95th Queue (ft)	20	8	3	36
Link Distance (ft)	150	150	66	107
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 886
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1: 2100 E & 2100 S Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	1.8	0.2	0.3	0.0	0.0	0.0	3.5	0.4	0.5	0.0	0.0	0.0
Total Delay (hr)	2.2	3.4	0.1	1.4	3.1	0.3	0.9	1.4	0.5	2.5	3.2	0.6
Total Del/Veh (s)	31.1	18.4	13.7	24.6	18.6	14.3	50.5	23.9	17.0	45.4	26.4	10.5
Vehicles Entered	251	651	27	198	599	72	61	205	94	198	426	190
Vehicles Exited	253	652	28	198	600	72	62	205	94	198	426	189
Hourly Exit Rate	253	652	28	198	600	72	62	205	94	198	426	189
Input Volume	247	649	26	197	613	71	63	201	95	202	451	197
% of Volume	103	100	107	100	98	101	98	102	99	98	94	96

1: 2100 E & 2100 S Performance by movement

Movement	All
Denied Delay (hr)	0.3
Denied Del/Veh (s)	0.3
Total Delay (hr)	19.4
Total Del/Veh (s)	23.3
Vehicles Entered	2972
Vehicles Exited	2977
Hourly Exit Rate	2977
Input Volume	3014
% of Volume	99

2: 2200 E & 2100 S Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.0	0.0	0.0	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1
Total Delay (hr)	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.4
Total Del/Veh (s)	5.1	0.3	0.1	6.7	0.9	0.5	22.5	7.9	21.2	5.1	0.9
Vehicles Entered	20	913	8	9	832	3	3	3	2	37	1830
Vehicles Exited	19	913	8	9	832	3	2	3	2	37	1828
Hourly Exit Rate	19	913	8	9	832	3	2	3	2	37	1828
Input Volume	21	913	8	9	844	3	3	3	2	35	1841
% of Volume	90	100	100	100	99	100	67	100	100	105	99

9: 2100 E & Access #1 Performance by movement

Movement	WBR	NBT	NBR	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	8.0	8.0
Denied Del/Veh (s)	0.1	0.0	0.0	33.8	20.7
Total Delay (hr)	0.0	0.2	0.0	21.5	21.7
Total Del/Veh (s)	4.7	1.3	0.8	91.0	56.3
Vehicles Entered	8	519	11	829	1367
Vehicles Exited	8	519	11	813	1351
Hourly Exit Rate	8	519	11	813	1351
Input Volume	8	510	9	850	1377
% of Volume	100	102	122	96	98

11: 2100 S & Access #2 Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Total Delay (hr)	0.0	0.4	0.1	0.0	0.0	0.0	0.6
Total Del/Veh (s)	7.2	1.7	0.4	0.1	18.6	4.7	1.2
Vehicles Entered	12	933	856	11	9	11	1832
Vehicles Exited	12	934	857	11	9	11	1834
Hourly Exit Rate	12	934	857	11	9	11	1834
Input Volume	14	932	869	9	9	12	1845
% of Volume	86	100	99	122	100	92	99

13: 2100 S & Access #3 Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Total Delay (hr)	0.0	0.1	0.1	0.0	0.0	0.0	0.2
Total Del/Veh (s)	4.8	0.4	0.2	0.0	14.5	3.7	0.4
Vehicles Entered	8	934	861	11	8	7	1829
Vehicles Exited	8	933	861	11	8	7	1828
Hourly Exit Rate	8	933	861	11	8	7	1828
Input Volume	8	933	872	11	9	7	1840
% of Volume	100	100	99	100	89	100	99

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Total Network Performance

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Denied Delay (hr)	8.3
Denied Del/Veh (s)	9.7
Total Delay (hr)	44.1
Total Del/Veh (s)	50.4
Vehicles Entered	3052
Vehicles Exited	3040
Hourly Exit Rate	3040
Input Volume	12993
% of Volume	23

Intersection: 1: 2100 E & 2100 S

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	T	R
Maximum Queue (ft)	149	304	256	182	225	217	164	238	156	172	165
Average Queue (ft)	107	131	119	91	123	126	54	123	110	138	65
95th Queue (ft)	161	233	204	151	188	191	114	207	163	166	131
Link Distance (ft)		1534	1534		258	258		859	94	94	94
Upstream Blk Time (%)					0	0			31	45	2
Queuing Penalty (veh)					0	0			86	128	6
Storage Bay Dist (ft)	100			120			70				
Storage Blk Time (%)	13	9		3	7		8	27			
Queuing Penalty (veh)	43	22		11	14		24	17			

Intersection: 2: 2200 E & 2100 S

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	50	41	85	13	30	63
Average Queue (ft)	8	4	7	0	6	25
95th Queue (ft)	32	27	41	3	25	52
Link Distance (ft)	66	66	1053	1053	346	417
Upstream Blk Time (%)	0	0				
Queuing Penalty (veh)	0	0				
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 9: 2100 E & Access #1

Movement	WB	SB
Directions Served	R	T
Maximum Queue (ft)	36	1128
Average Queue (ft)	8	735
95th Queue (ft)	31	1425
Link Distance (ft)	162	1142
Upstream Blk Time (%)		29
Queuing Penalty (veh)		0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: 2100 S & Access #2

Movement	EB	EB	WB	WB	SB
Directions Served	LT	T	T	TR	LR
Maximum Queue (ft)	57	25	6	6	42
Average Queue (ft)	9	1	0	0	17
95th Queue (ft)	38	14	5	6	43
Link Distance (ft)	258	258	150	150	108
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 13: 2100 S & Access #3

Movement	EB	EB	SB
Directions Served	LT	T	LR
Maximum Queue (ft)	52	16	46
Average Queue (ft)	6	0	13
95th Queue (ft)	28	7	40
Link Distance (ft)	150	150	107
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 352
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