



STAFF REPORT

To: Summit County Council
From: Patrick J. Putt, Community Development Director
Date of Meeting: 1 March 2023
Type of Item: Dakota Pacific Park City Tech Center Amendment Public Hearing
Process: Legislative

A public hearing has been scheduled on Wednesday for Dakota Pacific (DPRE) to present its updated development plan for the Summit Research Park a.k.a. the Park City Tech Center property to the community. A copy of the project presentation slides from the February 1 Council work session; DPRE's update Traffic Impact Study; and the Traffic Impact Study peer review (WCG report) are attached to this memorandum. No changes or revisions to the proposed plan or Traffic Impact Study/peer review have been since the recent work sessions. Staff recommends Council conduct a public hearing and provide staff with direction at the completion of the public input. No action is requested at this meeting.

DPRE Mixed Use Development Traffic Impact Study

Prepared for:

Dakota Pacific Real Estate

October 2022

UT19-2154

FEHR & PEERS

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Appendices

Appendix A: 2022 Turning Movement Counts

Appendix B: 2019 Turning Movement Counts

Appendix C: Proposed BRT Alignment

Appendix D: Detailed Level of Service Reports – Typical Weekday

Appendix E: Detailed Level of Service Reports – Winter Weekday

Appendix F: Detailed Queue Reports – Typical Weekday

Appendix G: Detailed Queue Reports – Winter Weekday

Appendix H: Proposed Site Plan

Appendix I: 2008 Tech Center Traffic Impact Study

Appendix J: 2021 DPRE Mixed Use Development Traffic Impact Study

Appendix K: Existing Plus Project Analysis

Appendix L: Staff Report of Kimball Junction Area Plan Alternatives



EXECUTIVE SUMMARY

The purpose of this study is to provide a summary of the potential transportation-related impacts from the proposed DPRE Mixed Use Development project located in Summit County, Utah. This study analyzes the traffic operations and impacts for existing conditions, 2028, and 2033, including background and background plus project conditions for future years. Analysis periods for this study include average weekday conditions and average winter weekday conditions. This study also analyzes three Alternatives for SR-224 and I-80 currently under consideration in a UDOT study as background conditions from which to analyze project traffic impacts.

STUDY INTERSECTIONS

This study analyzes the traffic impacts of key intersections adjacent to the site. Impacts are specifically addressed at the following study intersections:

- 101) Landmark Drive / Outlet Mall
- 102) Landmark Drive / Ute Boulevard
- 103) Landmark Drive / Olympic Parkway
- 104) Landmark Drive / Tech Center Drive
- 105) Landmark Drive / Skull Candy Access
- 106) Powderwood Drive / Kilby Road
- 107) SR-224 / Ute Boulevard
- 108) SR-224 / Olympic Parkway
- 109) SR-224 / I-80 (Kimball Junction)

The following accesses to the site were also included for analysis for the plus project conditions:

- 201) Overland Drive / West Project Access
- 202) Overland Drive / Tech Center Drive
- 203) West Project Access / Tech Center Drive
- 204) Hill Drive / Tech Center Drive
- 205) East Project Access / Tech Center Drive



TRAFFIC VOLUMES

Traffic counts were recorded during the AM and PM peak periods from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM on weekdays in late April of 2022. The hours analyzed during the AM and PM peak periods were 8:00-9:00 AM and 4:15-5:15 PM, respectively. This study considered both average weekday and average winter weekday conditions. The Utah Department of Transportation's (UDOT) automatic traffic recorder (ATR) on SR-224 indicates that weekdays at the end of April typically have approximately 86% and 82% of the AM and PM peak traffic, respectively, of an average weekday of the year. The ATR data also showed that weekdays at the end of April typically have approximately 76% and 78% of the AM and PM traffic of a winter weekday. Therefore, the traffic counts collected on SR-224 were adjusted up to reflect an average weekday and an average winter weekday.

PROJECT CONDITIONS

The proposed land uses for the DPRE Mixed Use development include the following:

- 31,000 SF of retail
- 110 townhomes
- 617 multi-family units
- 235,000 SF of office

This project was analyzed in two phases. The land use information assumed for each phase is as follows:

- Phase 1 – 2028
 - Retail: 31,000 SF
 - Townhomes: 110 units
 - Multi-Family: 557 units
 - Office: 160,000 SF
- Phase 2- 2033
 - 60 multi-family units
 - 75,000 SF office

The site currently has two accesses: one on Landmark Drive and one onto Tech Center Drive. Appendix F shows the proposed site plan for the project. The proposed site plan includes:

- 1) Total of five new access points onto Tech Center Drive.
- 2) A fourth leg to the Olympic Parkway / Landmark Drive roundabout.



- 3) A new access point on Overland Drive
- 4) A new access point to the parking lot south of the county building
- 5) A new access point on Ute Blvd, south of the existing Walmart access.
- 6) Project access on newly constructed streets within project site.

Trip generation for the project was computed using trip generation rates published in the Institute of Transportation Engineers (ITE) *Trip Generation, 11th Edition, 2021*, and Fehr & Peers' mixed-use development (MXD) methodology via MainStreet, a Fehr & Peers web application that captures the traffic benefits of developments by looking at interactions among the mixture of land uses and patron usage of alternative modes (i.e. transit, bicycling, and/or walking).

The MXD trip generation methodology accurately captures the trip-reducing benefits of mixed-use development projects and is used throughout the United States to help developers, agencies, and the public to quantify these trip reductions. The MXD trip generation model is promoted by the United States Environmental Protection Agency (EPA) and has been adopted by many organizations and jurisdictions, including the American Society of Civil Engineers (ASCE), American Planning Association (APA), and many others as a recommended resource for trip generation of smart-growth developments. A recent study into the accuracy of the MXD trip generation model used a development on the east side of SR-224 in the Kimball Junction area as one of the case studies and found the results to be within 1% of recorded counts on the ground.

The net external vehicle trips expected to be generated by the DPRE Mixed Use development are shown in **Table 1**. These trip generation estimates are below the trip generation estimates for the approved 2008 version of this proposed development and the revised 2021 version, as shown in **Table 2**. Trip generation estimates from these previous studies are included in Appendix G and F, respectively. This reduced estimate for project-generated trips is due to revisions in the proposed land use program of the project.

The trip reductions shown in **Table 1** are within the range that would be expected for a well-planned mixed-use development. Internal capture represents the percentage of trips made between sites within the project. Walk, bike, and transit reduction represents the percentage of trips made via each respective mode. A total trip reduction between 9.7% and 18% is within the typical range for this type of development.



TABLE 1. DPRE MIXED USE TRIP GENERATION AND REDUCTION ESTIMATES – FULL BUILDOUT

Time Period	Project Gross Trips	Net External Vehicle Trips	Internal Capture Reduction	Walk/Bike Reduction	Additional Transit Reduction
Daily	8,293	7,488	3.5%	1.6%	4.6%
AM Peak Hour	779	656	5.9%	2.1%	7.8%
PM Peak Hour	936	767	8.5%	1.4%	8.1%

Source: Fehr & Peers, 2022.

TABLE 2. FULL BUILDOUT TRIP GENERATION ESTIMATE COMPARISON

Study Year	Daily	AM Peak Hour	PM Peak Hour
2008 Estimated Trip Generation	8,032	1,227	1,332
2021 Estimated Trip Generation	11,262	724	899
2022 (Current Plan) Estimated Trip Generation	7,488	656	767
Percent Reduction from 2008 to 2022 Proposal	7%	47%	42%
Percent Reduction from 2021 to 2022 Proposal	34%	9%	15%

Source: Fehr & Peers, 2022.

LOS SUMMARY

Tables 3 and **4** show the forecast Level of Service (LOS) at each study intersection and project access for average weekday and winter weekday conditions. Detailed descriptions of the intersection operations can be found in the subsequent chapters.



TABLE 3. AVERAGE WEEKDAY LEVEL OF SERVICE SUMMARY AT MAJOR INTERSECTIONS

ID	Intersection Location	Period	Existing Average	2028 Background	2028 Background + Project	2028 Background + Project - Mitigated ³	2033 Background	2033 Background + Project	2033 Background + Project - Mitigated ³
			LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹
101	Outlet Mall / Landmark Drive	AM	A / 3	A / 3	A / 3	A / 3	A / 3	A / 3	A / 3
		PM	A / 3	A / 3	A / 3	A / 3	A / 3	A / 4	A / 3
102	Ute Blvd/Landmark Dr.	AM	A / 3	A / 3	A / 4	A / 4	A / 3	A / 4	A / 4
		PM	A / 4	A / 6	A / 5	A / 5	A / 5	A / 6	A / 6
103	Olympic Pkwy/Landmark Dr.	AM	A / 1	A / 2	A / 3	A / 3	A / 2	A / 5	A / 5
		PM	A / 1	A / 3	A / 5	A / 6	A / 3	A / 5	A / 9
104	Tech Center Dr. / Landmark Dr.	AM	A / 9	B / 10	B / 11	B / 11	B / 11	B / 11	A / 8
		PM	B / 13	C / 22	D / 27	B / 11	C / 22	E / 37	B / 14
105	Skullcandy Access / Landmark Dr.	AM	B / 12	B / 12	B / 12	B / 12	B / 13	B / 13	B / 13
		PM	B / 13	B / 14	B / 14	B / 14	B / 14	B / 14	B / 15
106	Kilby Road / Powderwood (2200W)	AM	B / 11	B / 11	B / 11	B / 11	B / 11	B / 11	B / 11
		PM	B / 11	B / 11	B / 13	B / 13	B / 11	B / 13	B / 14
107	Ute Blvd/SR-224	AM	C / 24	C / 27	C / 30	C / 30	C / 23	C / 26	C / 26
		PM	D / 36	D / 42	D / 45	D / 43	D / 43	D / 48	D / 47
108	Olympic Pkwy/SR-224.	AM	C / 30	C / 32	D / 37	D / 37	C / 27	D / 43	D / 43
		PM	D / 52	F / 92	F / 129	F / 139	F / 134	F / 156	F / 158
109	I-80 / SR-224	AM	C / 29	D / 39	D / 48	D / 48	E / 57	E / 79	E / 79
		PM	C / 24	C / 32	C / 28	D / 42	C / 28	C / 30	C / 30
201	Overland Drive / West Project Access	AM	-	-	A / 9	A / 9	-	A / 9	A / 9
		PM	-	-	A / 9	A / 9	-	A / 9	A / 9
202	Overland Drive / Tech Center Drive	AM	-	-	A / 7	A / 7	-	A / 7	A / 7
		PM	-	-	A / 7	A / 7	-	A / 8	A / 7
203	West Project Access / Tech Center Drive	AM	-	-	A / 9	A / 9	-	A / 9	A / 9
		PM	-	-	A / 9	A / 9	-	A / 9	A / 9
204	Hill Drive / Tech Center Drive	AM	-	-	A / 10	A / 10	-	B / 11	B / 11
		PM	-	-	B / 11	B / 11	-	B / 11	B / 11
205	East Project Access / Tech Center Drive	AM	-	-	A / 1	A / 1	-	A / 1	A / 1
		PM	-	-	A / 3	A / 2	-	A / 3	A / 2

1. Worst movement LOS and average delay for the unsignalized intersections and overall average delay for the signalized intersections.
2. Bold denotes unacceptable Levels of Service
3. Assumes mitigation measure of prohibited eastbound left turns at 104: Tech Center & Landmark Drive, to be built with proposed project.



TABLE 4. AVERAGE WINTER WEEKDAY LEVEL OF SERVICE SUMMARY AT MAJOR INTERSECTIONS

ID	Intersection Location	Period	Existing Average	2028 Background	2028 Background + Project	2028 Background + Project – Mitigated ³	2033 Background	2033 Background + Project	2033 Background + Project – Mitigated ³
			LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹
101	Outlet Mall / Landmark Drive	AM	A / 2	A / 3	A / 3	A / 3	A / 3	A / 3	A / 3
		PM	A / 3	A / 3	A / 3	A / 3	A / 3	A / 4	A / 3
102	Ute Blvd/Landmark Dr.	AM	A / 3	A / 3	A / 4	A / 4	A / 3	A / 4	A / 4
		PM	A / 4	A / 5	A / 8	A / 5	A / 10	A / 8	A / 6
103	Olympic Pkwy/Landmark Dr.	AM	A / 1	A / 2	A / 3	A / 3	A / 2	A / 4	A / 4
		PM	A / 1	A / 3	A / 5	A / 5	A / 3	A / 5	B / 11
104	Tech Center Dr. / Landmark Dr.	AM	A / 9	B / 10	B / 11	B / 11	B / 11	B / 13	B / 13
		PM	B / 14	C / 24	E / 43	B / 10	E / 37	F / 63	C / 16
105	Skullcandy Access / Landmark Dr.	AM	B / 12	B / 13	B / 12	B / 12	B / 12	B / 13	B / 13
		PM	B / 13	B / 14	B / 14	B / 14	B / 14	C / 16	B / 15
106	Kilby Road / Powderwood (2200W)	AM	B / 10	B / 11	B / 12	B / 12	B / 11	B / 12	B / 12
		PM	B / 11	B / 10	B / 12	B / 13	B / 11	B / 13	B / 14
107	Ute Blvd/SR-224	AM	C / 26	B / 19	C / 21	C / 21	C / 23	C / 28	C / 28
		PM	D / 38	D / 45	D / 47	D / 43	D / 48	D / 52	D / 46
108	Olympic Pkwy/SR-224.	AM	C / 31	C / 28	C / 28	C / 28	C / 29	D / 42	D / 42
		PM	E / 66	F / 128	F / 130	F / 144	F / 137	F / 145	F / 164
109	I-80 / SR-224	AM	D / 42	F / 89	F / 127	F / 127	F / 135	F / 140	F / 140
		PM	C / 25	C / 32	E / 57	D / 44	C / 30	D / 38	C / 30
201	Overland Drive / West Project Access	AM	-	-	A / 9	A / 9	-	A / 9	A / 9
		PM	-	-	A / 9	A / 9	-	A / 9	A / 8
202	Overland Drive / Tech Center Drive	AM	-	-	A / 7	A / 7	-	A / 7	A / 7
		PM	-	-	A / 7	A / 7	-	A / 7	A / 8
203	West Project Access / Tech Center Drive	AM	-	-	A / 9	A / 9	-	A / 9	A / 9
		PM	-	-	A / 9	A / 9	-	A / 9	A / 9
204	Hill Drive / Tech Center Drive	AM	-	-	A / 10	A / 10	-	B / 10	B / 10
		PM	-	-	B / 11	B / 11	-	B / 11	B / 11
205	East Project Access / Tech Center Drive	AM	-	-	A / 1	A / 1	-	A / 1	A / 1
		PM	-	-	A / 3	A / 2	-	A / 6	A / 2

1. Worst movement LOS and average delay for the unsignalized intersections and overall average delay for the signalized intersections.
2. Bold denotes unacceptable Levels of Service
3. Assumes mitigation measure of prohibited eastbound left turns at 104: Tech Center & Landmark Drive, to be built with proposed project.



As shown in the preceding tables, all intersections currently operate at acceptable levels of service in existing average weekday conditions. However, in winter weekday conditions, the intersection of Olympic and SR-224 is currently operating at LOS E, which is considered unacceptable at UDOT intersections. Furthermore, background traffic growth is predicted to cause LOS F at the Olympic/SR-224 intersection by 2028 in both average and winter weekday PM peak periods. Background traffic growth is also shown to cause LOS F at the I-80/SR-224 interchange in winter AM peak conditions by 2028 and LOS E in average weekday AM peak conditions by 2033. The additional traffic generated from the proposed project would increase delay between 2 and 47 seconds at intersections on SR-224.

Projected traffic from the proposed project would also cause failure at the intersection of Tech Center Drive and Landmark Drive in both average and winter PM peak hour conditions by 2028. This could be mitigated by prohibiting eastbound left turn movements at the intersection. With the county's approval, DPRE would provide this mitigation in conjunction with the construction of the project. With this mitigation, the intersection would at acceptable LOS in all analyzed periods.

The background issues on SR-224 cannot be mitigated with signal timing modifications or re-striping of existing pavement. UDOT is currently completing a study to evaluate alternatives to mitigate background traffic issues on this corridor. Each of these alternatives would involve large measures (e.g., new interchanges, pedestrian tunnels, etc.) that would significantly impact transportation in the Kimball Junction area. These alternatives are discussed in detail in Chapter 8 of this report. Fehr & Peers received traffic models from UDOT of the three alternatives currently under consideration and applied this study's 2033 background and project trips to those models to analyze the network under potential 2033 configurations. The results of that analysis are shown below in **Tables 5 and 6**



TABLE 5. LOS RESULTS FROM UDOT ALTERNATIVES, AVERAGE WEEKDAY

ID	Intersection Location	Period	2033 Alt1 Background	2033 Alt1 + Project	2033 Alt3 Background	2033 Alt3 + Project	2033 Alt4 Background	2033 Alt4 + Project
			LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹
101	Outlet Mall / Landmark Drive	AM	A / 4	A / 5	A / 3	A / 3	A / 3	A / 3
		PM	A / 5	A / 5	A / 3	A / 4	A / 3	A / 4
102	Ute Blvd/Landmark Dr.	AM	A / 5	A / 6	A / 4	A / 5	A / 4	A / 5
		PM	A / 7	A / 7	A / 5	A / 6	A / 5	A / 5
103	Olympic Pkwy/Landmark Dr.	AM	A / 2	A / 5	A / 1	A / 2	A / 2	A / 4
		PM	A / 5	A / 9	A / 2	A / 6	A / 3	A / 6
104	Tech Center Dr. /Landmark Dr.	AM	C / 22	C / 24	B / 10	B / 12	B / 11	B / 13
		PM	C / 18	C / 15	C / 22	C / 23	A / 7	A / 7
105	Skullcandy Access /Landmark Dr.	AM	B / 15	C / 19	B / 13	B / 12	B / 12	B / 13
		PM	C / 21	C / 20	B / 14	C / 20	B / 14	B / 15
106	Kilby Road / Powderwood (2200W)	AM	B / 11	B / 12	B / 11	B / 12	B / 11	B / 13
		PM	B / 11	B / 13	B / 12	B / 13	B / 12	B / 13
107	Ute Blvd/SR-224	AM	C / 22	C / 25	C / 23	C / 25	C / 31	C / 32
		PM	C / 23	C / 27	D / 38	D / 43	D / 37	D / 39
108	Olympic Pkwy/SR-224.	AM	C / 26	C / 34	D / 39	D / 39	C / 32	C / 34
		PM	C / 32	D / 53	D / 38	D / 44	D / 37	D / 42
109	I-80 / SR-224	AM	C / 25	C / 33	C / 28	C / 33	C / 27	C / 32
		PM	C / 27	C / 26	C / 29	C / 32	C / 33	D / 35
201	Overland Drive / West Project Access	AM	-	A / 9	-	A / 9	-	A / 9
		PM	-	A / 8	-	A / 9	-	A / 9
202	Overland Drive / Tech Center Drive	AM	-	A / 7	-	A / 7	-	A / 7
		PM	-	A / 7	-	A / 8	-	A / 8
203	West Project Access / Tech Center Drive	AM	-	A / 9	-	A / 9	-	A / 9
		PM	-	A / 8	-	A / 9	-	A / 9
204	Hill Drive / Tech Center Drive	AM	-	B / 10	-	A / 10	-	B / 10
		PM	-	B / 11	-	B / 11	-	B / 11
205	East Project Access / Tech Center Drive	AM	-	A / 9	-	A / 1	-	A / 1
		PM	-	A / 9	-	A / 2	-	A / 2

1. Worst movement LOS and average delay for the unsignalized intersections and overall average delay for the signalized intersections.
2. Bold denotes unacceptable Levels of Service
3. Assumes mitigation measure of prohibited eastbound left turns at 104: Tech Center & Landmark Drive, to be built with proposed project.



TABLE 6. LOS RESULTS FOR UDOT ALTERNATIVES, WINTER CONDITIONS

ID	Intersection Location	Period	2033 Alt1	2033 Alt1	2033 Alt3	2033 Alt3	2033 Alt4	2033 Alt4
			Background	+ Project ³	Background	+ Project ³	Background	+ Project ³
		LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹
101	Outlet Mall / Landmark Drive	AM	A / 5	A / 6	A / 3	A / 3	A / 3	A / 3
		PM	A / 4	A / 5	A / 3	A / 4	A / 3	A / 4
102	Ute Blvd/Landmark Dr.	AM	A / 5	A / 6	A / 4	A / 5	A / 4	A / 5
		PM	A / 6	A / 7	A / 5	A / 6	A / 5	A / 5
103	Olympic Pkwy/Landmark Dr.	AM	A / 2	A / 6	A / 1	A / 3	A / 2	A / 4
		PM	A / 4	A / 9	A / 1	A / 5	A / 3	A / 8
104	Tech Center Dr. /Landmark Dr.	AM	C / 22	A / 8	B / 11	B / 12	B / 12	B / 13
		PM	B / 14	C / 15	C / 23	C / 21	A / 7	A / 7
105	Skullcandy Access /Landmark Dr.	AM	C / 16	B / 14	B / 12	B / 12	B / 12	B / 13
		PM	C / 18	C / 20	B / 14	B / 14	B / 14	B / 14
106	Kilby Road / Powderwood (2200W)	AM	B / 11	B / 12	B / 11	B / 12	B / 11	B / 13
		PM	B / 11	B / 13	B / 11	B / 13	B / 12	B / 12
107	Ute Blvd/SR-224	AM	C / 22	C / 21	C / 24	C / 27	C / 23	C / 25
		PM	C / 24	C / 27	D / 50	D / 45	D / 37	D / 38
108	Olympic Pkwy/SR-224.	AM	C / 27	C / 33	D / 39	D / 40	C / 22	C / 28
		PM	C / 33	D / 53	D / 43	D / 47	D / 37	D / 44
109	I-80 / SR-224	AM	C / 26	C / 34	C / 27	C / 26	C / 27	C / 31
		PM	C / 34	C / 26	C / 28	C / 35	D / 36	D / 38
201	Overland Drive / West Project Access	AM	-	A / 9	-	A / 9	-	A / 9
		PM	-	A / 8	-	A / 9	-	A / 9
202	Overland Drive / Tech Center Drive	AM	-	A / 7	-	A / 7	-	A / 7
		PM	-	A / 7	-	A / 7	-	A / 7
203	West Project Access / Tech Center Drive	AM	-	A / 9	-	A / 9	-	A / 9
		PM	-	A / 8	-	A / 9	-	A / 9
204	Hill Drive / Tech Center Drive	AM	-	B / 11	-	B / 10	-	B / 10
		PM	-	B / 11	-	B / 11	-	B / 11
205	East Project Access / Tech Center Drive	AM	-	A / 9	-	A / 1	-	A / 1
		PM	-	A / 9	-	A / 2	-	A / 2

1. Worst movement LOS and average delay for the unsignalized intersections and overall average delay for the signalized intersections.

2. Bold denotes unacceptable Levels of Service

3. Assumes mitigation measure of prohibited eastbound left turns at 104: Tech Center & Landmark Drive, to be built with proposed project.



As shown in the preceding tables, all intersections are projected to operate at acceptable LOS in 2033 background and plus project average weekday and winter weekday conditions in all proposed UDOT alternatives.

Fehr & Peers analyzed potential interim solutions that would help alleviate traffic congestion on SR-224 until such time as UDOT's preferred alternative is constructed. The measure with the biggest potential positive impact on traffic conditions on SR-224 would be an additional northbound lane from Olympic Parkway to Ute Boulevard. The results in **Table 7** and **Table 8** show 2028 and 2033 traffic conditions if an additional northbound through lane on SR-224 from Olympic Parkway to Ute Boulevard were to be constructed. Under this scenario, all intersections would operate at acceptable LOS in the average weekday in 2028, and all except Olympic/SR-224 and I-80/SR-224 would operate at acceptable LOS in the average weekday in 2033. The I-80/SR-224 interchange would still operate at LOS F in all winter scenarios with this mitigation. While not bringing all intersections up to acceptable LOS, the additional northbound lane on SR-224 included in these models would alleviate much of the projected background traffic issues in the corridor and should be considered as an interim measure.



TABLE 7. LOS RESULTS FOR AVERAGE WEEKDAY, ADDITIONAL SR-224 NORTHBOUND LANE

ID	Intersection Location	Period	2028	2028 Background +	2033	2033 Background +
			Background LOS ¹ / Avg. Delay ¹	Project ³ LOS ¹ / Avg. Delay ¹	Background LOS ¹ / Avg. Delay ¹	Project ³ LOS ¹ / Avg. Delay ¹
101	Outlet Mall / Landmark Drive	AM	A / 3	A / 3	A / 3	A / 3
		PM	A / 3	A / 3	A / 3	A / 4
102	Ute Blvd/Landmark Dr.	AM	A / 3	A / 4	A / 3	A / 4
		PM	A / 5	A / 6	A / 5	A / 6
103	Olympic Pkwy/Landmark Dr.	AM	A / 2	A / 3	A / 2	A / 5
		PM	A / 3	A / 6	A / 3	A / 7
104	Tech Center Dr. /Landmark Dr.	AM	B / 10	B / 11	B / 11	A / 8
		PM	C / 22	C / 15	D / 27	C / 19
105	Skullcandy Access /Landmark Dr.	AM	B / 12	B / 12	B / 13	B / 13
		PM	B / 14	B / 14	B / 14	C / 16
106	Kilby Road / Powderwood (2200W)	AM	B / 11	B / 11	B / 11	B / 11
		PM	B / 11	B / 13	B / 12	B / 13
107	Ute Blvd/SR-224	AM	B / 18	C / 30	C / 23	C / 26
		PM	C / 34	D / 36	D / 35	D / 41
108	Olympic Pkwy/SR-224.	AM	C / 22	D / 37	C / 27	D / 43
		PM	D / 44	D / 54	E / 59	E / 70
109	I-80 / SR-224	AM	D / 38	D / 48	E / 57	E / 79
		PM	C / 27	C / 28	C / 28	C / 30
201	Overland Drive / West Project Access	AM	-	A / 9	-	A / 9
		PM	-	A / 8	-	A / 9
202	Overland Drive / Tech Center Drive	AM	-	A / 7	-	A / 7
		PM	-	A / 7	-	A / 7
203	West Project Access / Tech Center Drive	AM	-	A / 9	-	A / 9
		PM	-	A / 9	-	A / 9
204	Hill Drive / Tech Center Drive	AM	-	A / 10	-	B / 11
		PM	-	B / 11	-	B / 11
205	East Project Access / Tech Center Drive	AM	-	A / 1	-	A / 1
		PM	-	A / 2	-	A / 2

1. Worst movement LOS and average delay for the unsignalized intersections and overall average delay for the signalized intersections.
2. Bold denotes unacceptable Levels of Service
3. Assumes mitigation measure of prohibited eastbound left turns at 104: Tech Center & Landmark Drive, to be built with proposed project.



TABLE 8. LOS RESULTS FOR WINTER WEEKDAY, ADDITIONAL SR-224 NORTHBOUND LANE

ID	Intersection Location	Period	2028 Background	2028 Background + Project ³	2033 Background	2033 Background + Project ³
			LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹	LOS ¹ / Avg. Delay ¹
101	Outlet Mall / Landmark Drive	AM	A / 3	A / 3	A / 3	A / 3
		PM	A / 3	A / 3	A / 3	A / 4
102	Ute Blvd/Landmark Dr.	AM	A / 3	A / 4	A / 3	A / 4
		PM	A / 5	A / 6	A / 5	A / 6
103	Olympic Pkwy/Landmark Dr.	AM	A / 2	A / 3	A / 2	A / 4
		PM	A / 3	A / 6	A / 3	A / 7
104	Tech Center Dr. /Landmark Dr.	AM	B / 12	B / 11	B / 11	B / 13
		PM	C / 22	C / 15	D / 27	C / 20
105	Skullcandy Access /Landmark Dr.	AM	B / 13	B / 12	B / 12	B / 13
		PM	B / 14	B / 14	B / 14	B / 14
106	Kilby Road / Powderwood (2200W)	AM	B / 11	B / 12	B / 11	B / 12
		PM	B / 11	B / 13	B / 11	B / 13
107	Ute Blvd/SR-224	AM	B / 19	C / 21	C / 23	C / 28
		PM	C / 35	D / 36	D / 44	D / 43
108	Olympic Pkwy/SR-224.	AM	C / 22	C / 28	C / 29	D / 42
		PM	D / 50	D / 54	E / 71	E / 76
109	I-80 / SR-224	AM	F / 94	F / 127	F / 135	F / 140
		PM	C / 28	C / 28	C / 29	C / 33
201	Overland Drive / West Project Access	AM	-	A / 9	-	A / 9
		PM	-	A / 8	-	A / 9
202	Overland Drive / Tech Center Drive	AM	-	A / 7	-	A / 7
		PM	-	A / 7	-	A / 7
203	West Project Access / Tech Center Drive	AM	-	A / 9	-	A / 9
		PM	-	A / 9	-	A / 8
204	Hill Drive / Tech Center Drive	AM	-	A / 10	-	B / 10
		PM	-	B / 11	-	B / 11
205	East Project Access / Tech Center Drive	AM	-	A / 1	-	A / 1
		PM	-	A / 2	-	A / 2

1. Worst movement LOS and average delay for the unsignalized intersections and overall average delay for the signalized intersections.
2. Bold denotes unacceptable Levels of Service
3. Assumes mitigation measure of prohibited eastbound left turns at 104: Tech Center & Landmark Drive, to be built with proposed project.



MULTIMODAL CONSIDERATIONS

Level of Service is measured in terms of delay per vehicle at an intersection. Thus, impacts of the development on those traveling in other modes is not directly captured by the LOS metric. However, pedestrians were counted in existing vehicle counts and included in the traffic models. They are given the right of way at intersections and thus pedestrian delay would not increase from increased vehicular traffic. Buses and proposed future Bus Rapid Transit were included in the models and would experience the same delay reported in the tables above.

CONCLUSION

The analysis described in this report shows that traffic congestion on the SR-224 corridor is projected to increase to unacceptable levels by 2028 with or without the proposed project. The revised land use program of the proposed project would lead to significant reductions in traffic as compared to previous proposed developments of this site. Despite this reduction in projected trips, the trips generated by the proposed project would increase delay on the SR-224 corridor between 2-47 seconds/vehicle at each intersection.

Under UDOT's proposed alternatives, all intersections would operate at acceptable LOS in average weekday and winter weekday peak hour periods in both background and plus project conditions.

An additional northbound lane on SR-224, between Olympic Parkway and Ute Boulevard, was shown as a potentially significant interim measure to alleviate much of the background congestion issues until UDOT's preferred alternative is selected and constructed. This measure could be included with other planned projects in the area, such as the proposed BRT project to be constructed by 2028. If this lane were constructed, much of the congestion issues present in background and plus project conditions could be alleviated.

KEY TAKEAWAYS

The following are the key takeaways from the report:

- Traffic is near failing LOS conditions now on SR-224 and will worsen with background growth of traffic volumes in the next 10 years. UDOT is preparing to mitigate this with a new design and reconstruction for SR-224, but the preferred alternative has not been selected.
- Daily projected traffic volumes from the proposed development are approximately 7% less than those from the previously approved 2008 study and approximately 34% less than the previously submitted 2021 study due to changes in the land use program. AM and PM peak hour projected



traffic volumes from the proposed development are approximately 47% and 42% less than those from the previously approved 2008 study, respectively, and approximately 9% and 15% less than the previously submitted 2021 study, respectively, as shown in **Table 2**.

- At those intersections that are projected to operate at “failing” LOS conditions in 2033, delay per vehicle is projected to increase between 22-47 seconds per vehicle during an average weekday peak hour period as a result of project trips. During a typical winter weekday, project trips are projected to increase delay between 2-38 seconds per vehicle at “failing” intersections.
- Under all three UDOT alternatives under consideration for the SR-224 corridor, future operating conditions at all intersections studied would meet LOS criteria in 2033 following completion of DPRE’s proposed development.
- An additional northbound lane on SR-224 would alleviate much of the background congestion issues on the SR-224 corridor as an interim measure until UDOT’s preferred alternative is selected and constructed.



Memo

Submitted To: Brandon C. Brady, PE, Summit County Transportation Engineer

Submitted By: Corey Mack, PE, Consulting Transportation Engineer

Project Name: DPRE TIS Peer Review

Date: 2 February 2023

Wall Consultant Group, Inc. (WCG) has completed a peer review of the traffic analysis for the proposed Dakota Pacific Real Estate mixed use development in Kimball Junction, Summit County, Utah. The document and supporting information under review is titled “DPRE Mixed Use Development Traffic Impact Study” (referred to throughout this peer review as “the TIS”), prepared by Fehr and Peers dated October 2022. This memorandum and the supporting attachments document our review and identify elements of the analysis that may be nonstandard, incomplete, or inaccurate.

Our role as an independent reviewer of the traffic analyses is to highlight potential discrepancies from standard or best practice to ensure safe and efficient traffic operations, with the goal of ensuring the proposed project will not cause or exacerbate any unreasonable congestion or unsafe conditions on the local roadway network and will not unnecessarily or unreasonably endanger the public's investment in any local roads, highways, or related infrastructure.

This Peer Review relies on standard procedures documented in the Institute of Transportation Engineers (ITE) Trip Generation Handbook, 3rd Edition (TGH), ITE Trip Generation Manual 11th Edition (TGM), the Utah Department of Transportation (UDOT) Traffic Impact Study Requirements, UDOT Traffic Analysis Guideline (December 2018), Summit County Planning & Zoning and Engineering standards, and transportation engineering judgement.

Summary

[Review of Trip Generation, Internal Capture, and Adjustments](#)

- WCG estimated fewer base vehicle trips and fewer new external vehicle trips associated with the proposed project.
- WCG estimated a similar number of internally captured vehicles as the TIS.
- The TIS appears to analyze a conservatively high base vehicle trip generation.
- The TIS includes a substantial transit, bicycle and pedestrian adjustment. The transit adjustment assumes the bus rapid transit (BRT) line will be completed and operational. There is no consideration of alternative transit options if the BRT project is delayed.
- The TIS does not document the inputs used for the MXD model or justify any necessary assumptions. *Please document the inputs and assumptions used in the MXD model.*

Design Hour Volumes, Seasonal Adjustments, and Analysis Scenarios

- The original, raw turning movement volumes presented in Appendix A of the TIS are undated. *Please provide the dates of the observations.*
- The seasonal adjustment along SR-224 appeared to be generally consistent with available data. The winter weekday PM peak hour adjustment factor applied in the TIS is 5% less than the estimated adjustment factor using data from CCS 605. *Please document the process for developing the adjustment factor, and/or explain the difference.*
- The TIS did not appear to evaluate the seasonal change in directional demand during the peak hours associated with the mountain operations in the winter. *Please review the winter season directional demand compared to average day directional demand during the AM and PM peak hours.*
- The TIS did not apply a seasonal adjustment to any roadways or turning movements other than through trips on SR-224. Many of the land uses and routes within the project area may be impacted by seasonal variation in traffic volumes. *Please apply a seasonal adjustment throughout the project area or document why specific movements shouldn't be adjusted.*
- Average summer weekday traffic volumes exceed average annual weekday traffic volumes, but do not exceed average winter weekday conditions. The winter season represents peak conditions.
- Based on estimated average daily and peak hour traffic volume, UDOT defines the proposed project as a Level III, requiring a traffic study to evaluate a 20-year time horizon and Saturday peak hours. The TIS did not evaluate a 20-year time horizon scenario or Saturday peak hours. *Please explain why a 20-year time horizon or the Saturday peak hours were not evaluated or add them to the TIS.*

Trip Distribution and Assignment

- The TIS modified trip distribution compared to previous versions with little explanation. In particular, fewer trips are assigned to I-80 Exit 145, and more trips are assigned along Kilby Road and to the developments east of SR-224. The proposed trip distribution is similar to the Travel Demand Model with some unexplained differences.
- The TIS distribution model did not appear to consult the travel demand model when developing trip assignments.
- There are volume balancing inconsistencies at many of the internal intersections throughout the project trip distribution figures.
- *Please explain the current trip distribution assignment approach along with how and why it differs from the earlier studies. Please review the trip distribution to ensure trips are balanced across intersections.*

Internal Roadway Capacity

- The capacity of the most roadways in the study area are limited by the closely spaced intersections. The only free flowing segments of roadway are the internal development streets along Civic Center Drive and Meadow Road.

- Both Civic Center Drive and Meadow Road are expected to operate below capacity and at acceptable levels of service (LOS).

VISSIM Modeling

- Congestion analyses were performed using VISSIM microsimulation software. The TIS does not document the development of the VISSIM model or any calibration or validation efforts. *Please provide documentation of calibration or validation procedures.*
- The model inputs appear to be appropriate for the corridor. Assuming validation and calibration were performed, the modeled results are likely representative of corridor performance under the traffic volumes presented in the TIS.
- *Please provide the following information to confirm modeling assumptions:*
 1. *Were signal timing plans requested from and provided by UDOT for the signalized intersections and interchange?*
 2. *What methods were used to calibrate the model and to what data points was the model calibrated?*
 3. *Was the UDOT template used to build this model? Were any of the UDOT settings or parameters modified for this project? If so, what was changed and why?*

Congestion Analysis

- The TIS does not define the level of service standards that determine acceptable or unacceptable operations. *Please document the standards applied to determine “acceptable” levels of service.*
- The study area did not include analysis of the Meadow Road & Olympic Parkway West intersection, although it appears to be a significant internal intersection. *Please provide justification for excluding the Olympic Parkway West & Meadow Road intersection from congestion analysis or update the report to include it.*
- There are considerable differences between the LOS results in the 2021 TIS and in the current 2022 TIS. *Please explain why the results exhibit such variation.*
- The TIS did not tabulate existing queuing, discuss how modeled queues relate to observed queues, or evaluate impacts to queuing as a result of the project. The detailed queue reports provided in the appendices indicate substantial queuing is present. *Please indicate why a queue analysis was not undertaken, or update the report to include it.*

Safety Evaluation

- The UDOT TIS Guidelines require an evaluation of safety and reported crashes in a traffic study for a proposed development of this size. The TIS did not perform a safety evaluation.
- The project area experienced a notable number of crashes. In particular, there were 8 severe crashes at SR-224 & Ute Boulevard from 2017 through 2021.
- None of the proposed mitigations addressed safety concerns. *Please perform a safety evaluation and consider if mitigation could address the number and severity of crashes within the study area.*

Proposed Mitigation

- The project proposes to construct interim improvements, primarily a third northbound lane, as mitigation, relying on the proposed UDOT SR-224 corridor improvements to address system issues. Even with mitigation, not all intersections will operate acceptably.
- Alternative measures of effectiveness, such as corridor travel time, may highlight that the proposed mitigation with the project may provide a net benefit to overall congestion.
- The proposed mitigation does not address safety deficiencies or previously recommended side street capacity improvements.
- If the project is approved, WCG recommends verification of TIS performance measures and estimated trip generation through post construction monitoring, and a phased occupancy plan based on mitigation verification, BRT construction, and UDOT project milestones.

Conclusion and Professional Opinion

From what we have reviewed, it is our opinion the TIS for the proposed project is technically sound. There are several areas in which our approach may be different (trip generation, design hour adjustments, trip distribution), but the overall result is relatively consistent with our analysis.

However, several elements of a standard transportation impact study which are necessary for a comprehensive evaluation of transportation impacts are missing. Some of the missing components are critical to ensure safe and efficient travel if the project progresses. The following components are significant gaps and should be added:

- **Safety Evaluation**
- **VISSIM Model Validation and Calibration Documentation**
- **Queueing Assessment**
- **Travel Time Estimation**

Several other elements are also missing:

- Build Year + 20 Time Horizon Analysis
- Saturday Peak Hour Assessment

Overall, the existing SR-224 corridor is above capacity and operating poorly. The proposed project will increase traffic volumes along an overcapacity roadway. The interim mitigation will still result in unacceptable traffic operations at one intersection, even without the project. However, if the proposed mitigation with the project improves operations throughout the system (reductions in travel time overall) and addresses safety deficiencies, the interim mitigation may be acceptable for project approval.

Since the long-term proposed mitigation is beyond the control of the applicant, we recommend that if approval is granted to the project, occupancy of the various buildings is phased based on verification of the TIS results such as operational performance measures and estimated trip

generation, and mitigation milestones, such as BRT completion and / or UDOT SR-224 Kimball Junction Area Plan project milestones.

Background

The applicant has prepared the TIS in support of a mixed-use development of approximately 60 acres on the site formerly known as the Summit Research Park. Two previous impact studies have been prepared for the site, including the original Summit Research Park in November 2008 and a previous iteration of the current site from March 2021. Both previous studies were included in the TIS appendices. The earliest TIS, from November 2008, references a land use development plan from 2004 which included a housing, a shopping center, office, school, and hotel with no supporting documentation.

The current site plan overlaid on an aerial image is presented in Figure 1.



FIGURE 1: 2022 PROPOSED SITE PLAN OVERLAYED ON AN AERIAL IMAGE FOR ADJACENT ROADWAY AND LAND USE CONTEXT

The development program appears to have evolved from the research and development technology park in 2008 to a primarily residential housing project in 2021 and 2022. The 2008 development program estimated trip generation using “Research Park” based on traffic characteristics at a similar development near the University of Utah. The 2021 and 2022 trip

generation are reportedly based on standard ITE land use definitions for multifamily, townhouse, office, and retail developments.

The estimated change in trip generation between development proposals is consistent and predictable with the change in land uses:

- The 2008 TIS had only two land uses: research park and residential. The large dedication of floor area to the commercial “research” land use would result in relatively high peak hour trip generation and low daily overall daily trip generation. With only two land uses, the internal capture potential between land uses is limited.
- The 2021 TIS replaces the relatively high peak hour / low daily “research park” trip generator with the relatively lower peak hour / higher daily residential trip generator. In addition, a greater variety of commercial establishments were proposed, allowing for greater internal capture potential.
- The 2022 TIS eliminated approximately 1/3 of the residential dwelling units and consolidated the commercial land uses resulting in a significant reduction in daily trip generation, but a lower decrease in peak hour trip generation.

The evolution of the development program is summarized in Table 1.

The current proposed development program includes two phases, with most construction taking place in the first phase, to be completed and occupied by 2028. The remaining proposed construction in the second phase is expected to be completed and occupied by 2033.

SR-224 through Kimball Junction is a known congested corridor. The Utah Department of Transportation (UDOT) and Summit County are undertaking the Kimball Junction and SR-224 Area Plan to evaluate transportation investments to address this congestion. The Area Plan has identified four possible alternatives and is currently evaluating the feasibility of each. Summit County has expressed a concern of the impact of continued development in Kimball Junction if no action is completed along SR-224 to address the known congestion.

TABLE 1: EVOLUTION OF THE PROPOSED SITE PLAN DEVELOPMENT PROGRAM

	Current Mixed Use Development Program (October 2022)	Past Mixed Use Development Program (March 2021)	Summit Research Park Development Program (November 2008)
Multifamily Housing, Low Rise	65 DU	1,000 DU	-
Multifamily Housing, Mid Rise	459 DU	-	-
Townhouse	110 DU	100 DU	165 DU
Senior Housing	93 DU	-	-
TOTAL RESIDENTIAL	727 DU	1,100 DU	165 DU
Hotel	-	130 Rooms	-
Office	235 KSF	160 KSF	-
Research Park	-	-	1,150 KSF
Retail	31 KSF	31 KSF	
TOTAL COMMERCIAL	266 KSF	191 KSF 130 Hotel Rooms	1,150 KSF
Daily Trip Ends (Base)	7,488	11,262	8,032
AM Peak Hour Trip Ends (Base Vehicle)	656	724	1,227
PM Peak Hour Trip Ends (Base Vehicle)	767	899	1,332

Results of Peer Review

Trip Generation, Internal Capture, and Adjustments

The TIS does not provide an estimate of entering and exiting trip generation by land use, instead reporting overall estimated trip generation for the site and identifying the Institute of Transportation Engineers (ITE) Land Use Codes used to develop the estimate. TIS Tables 19 and 29 report “Project Gross Trips”; “Project Gross Trips” is not defined in the TGM, but it is assumed the term refers to baseline vehicle trips for the proposed land uses prior to adjustment for internal capture, transit use, and bicycle and pedestrian modes. WCG prepared an independent estimate of base vehicle trip generation by land use for the site, documented in the following tables.

TABLE 2: BASE VEHICLE ENTERING AND EXITING TRIP GENERATION BY LAND USE FOR THE 2028 PARTIAL BUILD SCENARIO

2028 Full Build Trip Generation Estimate				AM Peak Hour			PM Peak Hour			Daily
				Base			Base			Base
ITE LUC	Description	Size	Unit	Enter	Exit	Total	Enter	Exit	Total	Total
220	Multifamily Units, LR	65	DU	10	33	43	31	18	49	492
221	Multifamily Units, MR	399	DU	38	126	164	95	61	156	1857
215	Townhomes	110	DU	13	39	52	37	25	62	788
252	Senior Housing	93	DU	6	13	19	13	10	23	294
822	Retail	31	KSF	44	29	73	87	87	174	1688
710	Office	160	KSF	221	30	251	42	203	245	1747
Total Site Est. Base Vehicle Trip Generation				332	270	602	305	404	709	6866
TIS "Project Gross Trips" (TIS Table 19)				643			805			7208

TABLE 3: BASE VEHICLE ENTERING AND EXITING TRIP GENERATION BY LAND USE FOR THE 2033 FULL BUILD SCENARIO

2033 Full Build Trip Generation Estimate				AM Peak Hour			PM Peak Hour			Daily
				Base			Base			Base
ITE LUC	Description	Size	Unit	Enter	Exit	Total	Enter	Exit	Total	Total
220	Multifamily Units, LR	65	DU	10	33	43	31	18	49	492
221	Multifamily Units, MR	459	DU	44	146	190	109	70	179	2143
215	Townhomes	110	DU	13	39	52	37	25	62	788
252	Senior Housing	93	DU	6	13	19	13	10	23	294
822	Retail	31	KSF	44	29	73	87	87	174	1688
710	Office	235	KSF	307	42	349	57	280	337	2440
Total Site Est. Base Vehicle Trip Generation				424	302	726	334	490	824	7845
TIS "Project Gross Trips" (TIS Table 29)				779			936			8293

In both partial build 2028 and full build 2033 trip generation scenarios, the estimated base vehicle trip generation appears to be greater in the TIS than through the process outlined in the ITE TGH.

The TIS indicated that the Fehr & Peers mixed use development model (MXD) was used to estimate internal trips compared to external trips. In addition to relationships between retail,

residential, office, and other land uses, MXD uses site specific design criteria and regional trip making characteristics to estimate the internal and walk-bike based trips. The TIS did not provide the inputs required to verify the assumptions used for the MXD analysis. The assumptions supporting the MXD analysis should be documented and justified, and the detailed inputs should be included. *Please document the inputs and assumptions used in the MXD model.*

WCG prepared an estimate of internally captured trips using the methodology outlined in NCHRP Report 8-51. The NCHRP methodology uses a simplified relationship between land uses on a site. The NCHRP methodology does not account for site density or regional characteristics. Using the NCHRP methodology, the estimated internal and external trip generation by land use type is documented in the following tables.

TABLE 4: 2028 DPRE PARTIAL BUILD TRIP CLASSIFICATION

2028 DPRE Partial Build Trip Classification Table	AM Peak Hour					PM Peak Hour					Daily		
	Base	Internal Trips		External Trips		Base	Internal Trips		External Trips		Base	Internal	External
Description	Total	Enter	Exit	Enter	Exit	Total	Enter	Exit	Enter	Exit	Total	Total	Total
Office	251	12	8	209	22	245	7	11	35	192	1747	134	1613
Retail	73	10	9	34	20	174	16	25	71	62	1688	419	1269
Residential	278	1	6	66	205	290	27	14	149	100	3431	286	3145
Total Trip Classification	602	23	23	309	247	709	50	50	255	354	6866	839	6027
		46		556			100		609			839	6027
Transit Adjustment	VAR	4.0%		12	10	4.0%		10	14	2.0%		120	
Walk-Bike Adjustment	2%			6	5			5	7			121	
Total External Vehicle Trips				291	232			240	333				
				523				573				5786	
<i>TIS "Net External Vehicle Trips" (TIS Table 19)</i>				553				676				6612	

TABLE 5: 2033 DPRE FULL BUILD TRIP CLASSIFICATION

2033 DPRE Partial Build Trip Classification Table	AM Peak Hour					PM Peak Hour					Daily		
	Base	Internal Trips		External Trips		Base	Internal Trips		External Trips		Base	Internal	External
Description	Total	Enter	Exit	Enter	Exit	Total	Enter	Exit	Enter	Exit	Total	Total	Total
Office	349	13	12	294	30	337	7	13	50	267	2440	160	2280
Retail	73	14	9	30	20	174	16	25	71	62	1688	465	1223
Residential	304	1	7	72	224	313	29	14	161	109	3717	304	3413
Total Trip Classification	726	28	28	396	274	824	52	52	282	438	7845	929	6916
		56		670			104		720			929	6916
Transit Adjustment	VAR	3.5%		14	10	3.5%		10	15	1.7%		120	
Walk-Bike Adjustment	2%			8	5			6	9			138	
Total External Vehicle Trips				374	259			266	414				
				633				680				6658	
<i>TIS "Net External Vehicle Trips" (TIS Table 29)</i>				656				767				7488	

Additional adjustments were applied to the resulting external trips to account for transit and walk-bike trips. To be consistent with the F&P approach, we estimated 5% of the 1200 estimated daily boardings at the BRT station will be originating from the DPRE development, with a corresponding number of alightings, for a total of 120 daily transit trips. The resulting percentage was doubled to account for peak hour travel. WCG estimated bicycle and pedestrian travel at 2% of overall trips: while there is a significant path network, grade differences and the

high-volume SR-224 corridor is likely to suppress a portion of the bicycle and pedestrian travel demand.

No pass-by trip adjustments appear to have been applied to the TIS trip generation estimates, and WCG agrees that a pass-by adjustment would not be applicable. The retail land use may have a small pass-by trip generation component, but the majority of the proposed development is unlikely to have meaningful pass-by traffic.

After estimating internally captured trips, transit trips, and walk-bike trips, the total external vehicle trips estimated by WCG are generally less than the net external vehicle trips estimated by Fehr & Peers, indicating the TIS analyzed a trip generation greater than our independent estimate. A summary and comparison of the 2033 trip generation estimates and adjustments are presented in Table 6.

TABLE 6: SUMMARY AND COMPARISON OF 2033 DPRE FULL BUILD TRIP GENERATION ESTIMATES AND ADJUSTMENTS

	Fehr & Peers TIS, October 2022	WCG Peer Review, January 2023	Difference (F&P compared to WCG)
2033 AM Peak Hour Base Trip Generation	779 trip ends	726 trip ends	+53 trip ends (+7%)
2033 AM Peak Hour External Veh. Trip Gen.	656 trip ends	633 trip ends	+23 trip ends (+4%)
2033 AM Internal Capture – Transit – Walk-Bike Adjustment	-123 trips (-16%)	-93 trips (-13%)	-30 trips (-3%)
2033 PM Peak Hour Base Trip Generation	936 trip ends	824 trip ends	+112 trip ends (+14%)
2033 PM Peak Hour External Veh. Trip Gen.	767 trip ends	680 trip ends	+87 trip ends (+13%)
2033 PM Internal Capture – Transit – Walk-Bike Adjustment	-169 trips (-18%)	-144 trips (-17%)	-25 trips (-1%)

In general, F&P estimated a greater number of base vehicle trips prior to adjustment to account for internal capture, transit trips, and walk-bike trips. WCG and F&P estimated a similar adjustment between base vehicle and external vehicle trips. The F&P trip generation appears to be consistent, if not conservative, with WCG's approach using the ITE Trip Generation Handbook methodology.

Design Hour Volumes, Seasonal Adjustments, and Analysis Scenarios

Turning movement counts were conducted at the study intersections in April 2022. The raw turning movement counts presented are presented in Appendix A. The counts are undated.

The existing developed area includes a mix of commercial (retail, restaurant, office, etc.) and residential land uses. The raw turning movement counts observed some pedestrians in the AM peak hour and a more substantial number in the PM peak hour (Table 7). The proposed project is adjacent to the counts and the existing developed area and is also mixed use. Therefore, it is likely to have comparable bicycling and walking activity and the 1.4% - 2.1% walk-bike adjustment used in the TIS is reasonable.

TABLE 7: OBSERVED PEDESTRIANS FROM UNADJUSTED TURNING MOVEMENT COUNTS

	Total Pedestrian Crossings	
	AM Peak Hour	PM Peak Hour
101) Landmark Drive / Outlet Mall	1	17
102) Landmark Drive / Ute Boulevard	7	46
103) Landmark Drive / Olympic Parkway	0	0
104) Landmark Drive / Tech Center Drive	4	6
105) Landmark Drive / Skull Candy Access	4	8
106) Powderwood Drive / Kilby Road	2	11
107) SR-224 / Ute Boulevard	6	27
108) SR-224 / Olympic Parkway	3	4

The TIS reported that overall traffic volumes have remained within +/-10% from the April 2019 observations cited in the 2021 TIS to the April 2022 observations cited in the current 2022 TIS. The TIS further stated that this variation is within an industry standard typical day to day fluctuation in travel demand.

WCG compared the change in volume by approach along SR-224, not just overall intersection volume (Table 8). The volumes by approach exhibited larger variations, with a reduced southbound directional demand along SR-224 and at the I-80 ramps in the PM peak hour from 2019 to 2022, a reduced westbound demand at Ute Boulevard in both analysis periods, and a reduced eastbound demand in the PM peak hour at Olympic Parkway. Without more detail on weather, mountain operations, and greater analysis, it is difficult to determine if these variations are significant, if they indicate a change in travel behavior, and if there is a need to adjust for their effect.

TABLE 8: OBSERVED INTERSECTION VOLUMES BY APPROACH, 2019 TO 2022

		Observed Intersection Volumes by Approach														
		2019 Turning Movement Counts					2022 Turning Movement Counts					% Change, 2019 to 2022				
		NB	SB	EB	WB	Total	NB	SB	EB	WB	Total	NB	SB	EB	WB	Total
SR-224	AM	908	333	1,322	569	3,132	939	301	1,411	608	3,259	3%	-10%	7%	7%	4%
& I-80 Exit 145	PM	2,073	312	951	470	3,806	1,966	329	770	444	3,509	-5%	5%	-19%	-6%	-8%
SR-224	AM	815	1,833	316	252	3,216	747	1,917	375	208	3,247	-8%	5%	19%	-17%	1%
& Ute Blvd	PM	1,437	1,320	562	548	3,867	1,400	1,163	539	485	3,587	-3%	-12%	-4%	-11%	-7%
SR-224	AM	1,055	1,391	244	284	2,974	972	1,479	253	307	3,011	-8%	6%	4%	8%	1%
& Olympic Pkwy	PM	1,677	858	387	688	3,610	1,645	757	331	634	3,367	-2%	-12%	-14%	-8%	-7%

The congestion analysis and traffic modeling were conducted under two scenarios representing an *average weekday* and an *average winter weekday*. To represent these scenarios, peak hour turning movement volumes collected in April 2022 were adjusted compared to available Automatic Traffic Recording (ATR) data along SR-224 south of the project area. The TIS cited adjustment factors with no documentation (TIS Table 10).

WCG reviewed available UDOT traffic data from Continuous Count Station (CCS) 605 on SR-224 mile point 8.92 from 2017 through 2019¹. During this period, the site was actively recording for 1047 days, or 96% of the time. Traffic data statistics from this site during this period, including the estimated adjustment factors from April to average weekday and average winter weekday, are presented in Table 9.

TABLE 9: RECORDED TRAFFIC DATA AT CCS 605 WITH APRIL ADJUSTMENT CALCULATIONS

	All Weekdays 2017-2019	Winter (Dec-Mar) Weekdays 2017-2019	April Weekdays 2017-2019
Average Daily Traffic, vpd	33,701	37,659	27,566
AM Peak Hour Volume, vph	2,362	2,658	2,047
AM Adjustment Factor	1.15	1.30	n/a
Applied AM Adjustment Factor from TIS	1.16	1.31	n/a
PM Peak Hour Volume, vph	2,738	3,054	2,262
PM Adjustment Factor	1.21	1.35	n/a
Applied PM Adjustment Factor from TIS	1.23	1.29	n/a

¹ CCS Hourly Data shared folder: <https://drive.google.com/drive/folders/1ZYy-WkICLOp1482vwEbTc5UvLItbWs4y>

The estimated factors to adjust an April count to represent average weekday and average winter weekday traffic volumes are generally in alignment to the factors applied by the TIS analysis in TIS Table 10. The one exception is the estimated winter weekday PM peak hour adjustment, for which WCG estimated an adjustment factor of 1.35, and the TIS applied an adjustment factor of 1.29. This difference of 0.06, or nearly 5%, may be significant during the analysis.

The mountain resorts south of Kimball Junction usually stop operating early- to mid-April. The TIS did not appear to evaluate the impact of mountain operations on directionality of traffic flow when adjusting to winter weekday scenarios. The TIS appears to have proportionally scaled the observed April volumes without considering the differences in directional demand during the peak hours associated with winter mountain operations.

The TIS applied the adjustment factors to the through movements on SR-224 only. This approach would be appropriate if the only development along the side roads were land uses that are relatively consistent regardless of the season, like residential or office land uses. However, the existing land uses include retail shopping centers, a variety of restaurants, and a gas station. These land uses will most likely result in pass-by trips, resulting in likely increases in turning traffic into and out of Ute Boulevard and Newpark Boulevard. Furthermore, Kilby Road may serve as an alternate route to avoid the congestion at Kimball Junction, and the resulting Kilby Road and Landmark Drive roadways may experience an increase in background traffic during peak periods. WCG would recommend applying an adjustment factor to these roadways to reflect these conditions.

WCG reviewed the monthly average weekday traffic at CCS 605, presented in Figure 2. The figure indicates that peak summer traffic volumes in July and August exceed average traffic volumes but remain below average winter weekday traffic volumes. Analysis of average winter weekday traffic volumes represents peak conditions.

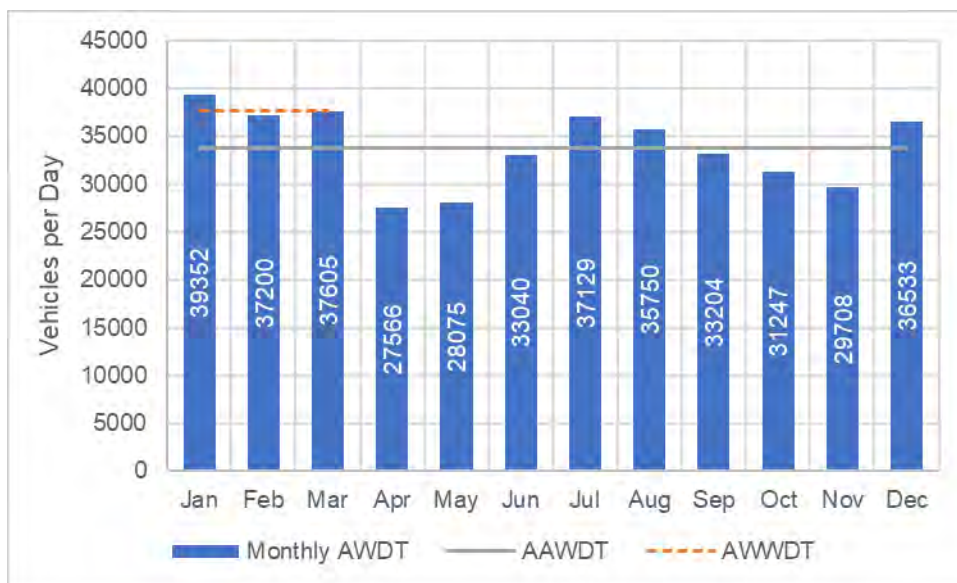


FIGURE 2: MONTHLY ADT AT CCS 605

With an estimated daily trip generation of 6600 trip ends per day, and peak hour trip generation of 676 trip ends per hour, the UDOT Traffic Impact Study Guidelines define the required level of this study for this project as a Level III study. According to the UDOT guidelines, this level of study requires analysis at opening day, five years following opening day and twenty years following opening day, during AM peak hours, PM peak hours, including Saturday peak hours. The TIS did not analyze a 20-year time horizon or the Saturday peak hour. *Please explain why a 20-year time horizon or the Saturday peak hours were not evaluated or add them to the TIS.*

Trip Distribution and Assignment

The TIS distributed the estimated trip generation based on “proximity of the development to major streets and freeways, roadway network, regional trip attractions, and existing traffic counts.” The current 2022 TIS trip distribution, compared to the 2021 and 2008 TIS trip distributions are presented in Table 10 with a corresponding direction key in Figure 3.

TABLE 10: TRIP DISTRIBUTION EVOLUTION OF DPRE SITE (SEE FIGURE 3 FOR DIRECTION LABELS)

Dir.	Desc.	2022				2021	2008
		AM		PM			
		Inbound	Outbound	Inbound	Outbound		
A	I-80 West	25%	10%	15%	25%	30%	30%
B	I-80 East	15%	10%	10%	15%	30%	30%
C	SR-224 North	5%	10%	5%	5%	0%	5%
D	Ute East	5%	10%	10%	10%	2.5%	1.5%
E	Newpark East	5%	10%	10%	10%	2.5%	1.5%
F	SR-224 South	25%	40%	35%	20%	25%	25%
G	Outlet Mall	0%	0%	5%	0%	5%	0%
H	Kilby North	20%	10%	10%	15%	5%	7%

Compared to previous versions of the TIS, the trip distribution in the current 2022 TIS is more complex, with different inbound and outbound trip distributions by direction for both AM and PM peak hours. The most notable differences include:



FIGURE 3: REPRESENTATION OF TRIP DISTRIBUTION DIRECTIONS

- The 2022 TIS distributes fewer trips to the I-80 interchange. Previous analyses assumed 60% of all trips would travel through the Exit 145 ramps; the current analyses estimate approximately 35% of all trips travel through the Exit 145 ramps.
- The 2022 TIS distributes more trips to the developments on the east side of SR-224. Previous analyses estimated 3% - 5% of all trips would travel to these developments along Ute and Newpark Boulevards; the current analysis estimates between 7% - 10% of all trips.
- The 2022 TIS distributes more trips to the northwest along Powderwood Drive and Kilby Road. Previous analyses estimated 5% - 7% of all trips would travel to the northwest along Kilby Road; the current analysis estimates between 12% - 15% of all trips.

There is no documentation or justification for the current TIS trip distribution. There is no indication that the Summit / Wasatch Travel Demand Model (TDM) was consulted when developing the trip distribution model.

WCG evaluated the estimated trip distribution using the TDM in 2030 model run. The results were similar to the TIS distribution model, with slightly more trips at I-80 (directions A and B), fewer trips at Ute Boulevard (direction D) and SR-224 South (direction F).

The application of the trip distribution through the intersections is not clear or consistent. WCG was not able to verify or replicate the volume distribution. For example, TIS Figure 12 illustrates

2033 project trips. The sum total of the vehicles entering and exiting the network was reasonably close to the external vehicle trip generation presented in TIS Table 29. However, vehicle balancing did not appear to be consistent:

- Intersection 103 indicates 51 southbound right turning vehicles originating from the site along Landmark Drive onto Olympic Boulevard in the PM peak hour. These 51 vehicles would have originated as eastbound right turning vehicles exiting from Skull Candy Drive or Tech Center Drive to head southbound on Landmark Drive, however those maneuvers only total 29 vehicles. It is unclear why the southbound right turning volume on Landmark Drive at Olympic Boulevard would equal 51 vehicles.
- Intersection 104 indicates 63 southbound through vehicles along Landmark Drive. Intersection 105, directly south and downstream from 104 indicates only 16 southbound entering vehicles, with no indication of a parking lot or other intercepting roadway.

Similar balancing inconsistencies exist throughout the Figure.

Internal Roadway Capacity

Due to the closely spaced intersections along Ute Boulevard, Olympic Parkway, and Landmark Drive, the capacity of the roadway itself is largely defined by the intersections. The only considerable segment of free-flowing urban roadway outside the area of influence of adjacent intersections within the project area are the two internal east-west roadways: Civic Center Drive and Meadow Road.

The capacity of these roads can be estimated using methodologies outlined in the HCM 6th Edition, Chapter 18: Urban Street Segments. The capacity of a single shared through / turn lane is estimated 1,800 vehicles per hour, reduced by the probability the lane is blocked by a left turning vehicle.

Reviewing Figure 14 and 15 illustrating the 2033 Plus Project scenario volumes:

- The maximum estimated hourly volume in one direction is 170 vehicles per hour (westbound Civic Center Drive at West Access in the PM peak hour)
- The maximum estimated hourly volume of left turning vehicles is 22, or 14% of the overall approach (eastbound Civic Center Drive at Hill Drive in the AM peak hour)

These estimated volumes indicate that the overall volume along Civic Center Drive and the proportion of left turning vehicles are both low. The probability of a left turning vehicle blocking a shared lane is likely low, and the roadway is likely to operate well under capacity. While no conflicting volumes are presented along Meadow Road, a similar conclusion is likely.

Vehicle Level of Service along urban street segments is defined by the free flow speed. Assuming Civic Center Drive will be designed as a low-speed, pedestrian- and bicycle-oriented roadway, the speed limit will likely continue to be 25 mph. At this speed limit, LOS C is achieved at travel speeds of 13 mph. The low overall traffic volume and small number of conflicting turning movements will be unlikely to reduce travel speeds to below 13 mph. In addition, low travel speeds appear to be encouraged by several design features evident in the site plan including on-street parking and curb extensions.

The TIS did not evaluate turn lane warrants along Civic Center Drive or Meadow Road. As noted earlier, the low volume of traffic is unlikely to result in over capacity conditions or reduced level of service. Accordingly, it is unlikely that dedicated turn lanes would be warranted. Furthermore, dedicated turn lanes will result in wider roadways and may negatively impact the desired low-speed pedestrian- and bicycle-oriented development pattern.

VISSIM Modeling

The TIS utilized VISSIM microsimulation software to evaluate traffic performance measures, reporting delay and level of service for the evaluated scenarios. WCG obtained and reviewed the VISSIM models used in the development of the delay calculations presented throughout the TIS. WCG focused our review on the calibration of the existing conditions to ensure the model is representative of corridor conditions, and that there were overall consistent model inputs between scenarios.

The model inputs appear to follow best practice for microsimulation modeling for all scenarios. We assume the model was based on the recommended UDOT standard template, however this is not confirmed by the TIS. The models appear to be constructed with appropriate parameters, including lane configurations, links and connectors, vehicles speeds, signal phasing and coordination, and pedestrian volumes. The signal phasing along SR-224 included a consistent 180-second cycle with offsets, indicating a coordinated signal system. The input volumes are consistent with the trip distribution volumes presented in the TIS.

The TIS did not report or discuss model calibration or validation efforts. Typically, model calibration is performed by the analyst to ensure the model accurately represents existing conditions, thereby validating the results of the proposed future conditions. Typical calibration and validation measurements may include the GEH statistic², volume served, queueing, travel time, and / or travel speeds.

WCG ran the model as received to estimate the GEH statistic for the exiting condition. In general, UDOT recommends that the GEH for each movement is less than 5³. The resulting GEH calculations are presented in Table 11.

² The GEH statistic is a measure of the input volume (observed) versus the volume served in the model.

³ UDOT Traffic Analysis Guidelines, December 2018, page 24

TABLE 11: GEH STATISTIC CALCULATION FOR THE EXISTING CONDITION AVERAGE WEEKDAY PM PEAK HOUR AT SR-224 & UTE BOULEVARD (TOP) AND SR-224 & OLYMPIC PARKWAY (BOTTOM); VALUES GREATER THAN 5 ARE HIGHLIGHTED

Existing Conditions - Typical Weekday - PM Peak

SR-224 & Ute Boulevard

Movement	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Total
Data	53	1271	73	287	668	208	281	168	62	30	144	311	3556
Model	54	1521	24	298	801	207	277	171	63	27	145	316	3975
GEH	0.1	6.7	7.0	0.6	4.9	0.1	0.2	0.2	0.1	0.6	0.1	0.3	6.8

SR-224 & Olympic Parkway

Movement	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Total
Data	247	1063	335	174	572	14	58	74	199	270	88	276	3370
Model	254	1274	316	171	701	14	55	75	201	257	83	279	3760
GEH	0.4	6.2	1.1	0.2	5.1	0.0	0.4	0.1	0.1	0.8	0.5	0.2	6.5

As shown in Table 11, the existing conditions model had several values greater than 5. This exceeds the UDOT recommendation. While this variance may have little effect on the model outcome, the TIS did not document any GEH statistic validation efforts.

Similarly, there was no documentation of any other model validation or calibration efforts. Documentation of calibration is standard practice. From the UDOT Traffic Analysis Guidelines:

“REQUIRED DOCUMENTS

A summary of the calibration process is required with the submission of an existing conditions model. This summary should include the calibrations methods, calibration results, and a description of any changes made to the default UDOT template values.”

Given the incomplete documentation, WCG would request answers to the following questions:

1. *Were signal timing plans requested from and provided by UDOT for the signalized intersections and interchange?*
2. *What methods were used to calibrate the model and to what data points was the model calibrated?*
3. *Was the UDOT template used to build this model? Were any of the UDOT settings or parameters modified for this project? If so, what was changed and why?*

Congestion Analysis

The TIS refers to unacceptable and acceptable levels of service multiple times throughout the study, including highlighting unacceptable Level of Service in bold in all of the summary tables. The study, however, does not define what is acceptable. The 2008 study includes reference to the 2007 Snyderville Basin Transportation Master Plan (SBTMP) and UDOT standards:

“LEVEL OF SERVICE STANDARDS

For the purposes of this study, a minimum overall intersection performance for each of the study intersections was set at LOS D for all intersections located on State roads (as stated in the SBTMP and per UDOT standards) and LOS C for all other intersections. However, if LOS E or F for an individual approach at an intersection resulted, explanation and / or mitigation measures are presented. A LOS D threshold is consistent

with “state-of-the practice” traffic engineering principles for suburban and non-CBD urbanized intersections.”⁴

Please document the standards applied to determine “acceptable” levels of service.

The study area included analysis of internal intersections along Civic Center Drive, but omitted the intersection of Olympic Parkway West & Meadow Road. No traffic volumes are presented at this intersection, and no congestion analysis was completed. The westbound and northbound approach legs are very near adjacent existing intersections. *Please provide justification for excluding the Olympic Parkway West & Meadow Road intersection from congestion analysis or add it to the study.*

The TIS reported level of service and delay results for the project area. The reported values between the 2022 TIS and the previous analysis from 2021 are considerably different. The compared values are summarized in Table 12.

TABLE 12: SUMMARY AND COMPARISON OF CONGESTION ANALYSIS LEVEL OF SERVICE AND DELAY CALCULATIONS AS REPORTED IN THE CURRENT 2022 TIS AND PREVIOUS 2021 TIS ALONG SR-224; LOS E OR WORSE ARE HIGHLIGHTED

			Existing	Build Year BG	Build Year BG + P	Build Year + 5 BG	Build Year + 5 BG + P
			LOS / Delay	LOS / Delay	LOS / Delay	LOS / Delay	LOS / Delay
SR-224 & I-80 Exit 145	Avg Weekday 2022 TIS	AM	B / 29	C / 39	C / 50	D / 57	D / 84
		PM	B / 24	C / 32	C / 46	B / 28	C / 30
	Avg Winter Weekday 2022 TIS	AM	C / 42	E / 89	E / 117	F / 128	F / 137
		PM	B / 25	C / 32	C / 50	C / 30	C / 32
	Avg Weekday 2021 TIS	AM	D / 52	D / 50	E / 65	E / 57	E / 77
		PM	C / 27	C / 27	C / 30	C / 27	C / 31
SR-224 & Ute Boulevard	Avg Weekday 2022 TIS	AM	C / 24	C / 27	C / 28	C / 23	C / 25
		PM	D / 36	D / 42	D / 45	D / 43	D / 49
	Avg Winter Weekday 2022 TIS	AM	C / 26	B / 19	C / 23	C / 24	C / 24
		PM	D / 38	D / 45	D / 45	D / 45	D / 49
	Avg Weekday 2021 TIS	AM	B / 15	B / 15	B / 14	B / 15	B / 15
		PM	E / 66	F / 82	F / 108	F / 100	F / 136

⁴ Page 3-4 Summit Research Park Development Traffic Impact Study November 2008.

			Existing	Build Year BG	Build Year BG + P	Build Year + 5 BG	Build Year + 5 BG + P
			LOS / Delay	LOS / Delay	LOS / Delay	LOS / Delay	LOS / Delay
SR-224 & Olympic Pkwy	Avg Weekday 2022 TIS	AM	C / 30	C / 32	D / 36	C / 27	D / 43
		PM	D / 52	F / 92	F / 136	F / 134	F / 159
	Avg Winter Weekday 2022 TIS	AM	C / 31	C / 28	D / 36	C / 34	D / 41
		PM	E / 66	F / 128	F / 141	F / 141	F / 159
	Avg Weekday 2021 TIS	AM	A / 9	B / 11	C / 20	B / 18	C / 21
		PM	C / 27	C / 28	C / 30	B / 12	C / 32

BG: Background; BG + P: Background plus project
 Build Year in 2022 TIS is 2028; Build Year + 5 is 2033
 Build Year in 2021 TIS is 2023; Build Year + 5 is 2028

As shown in Table 12, the 2022 analysis indicates that traffic operations will be unacceptable along SR-224 at Olympic Parkway, but generally acceptable at Ute Avenue. The 2021 analysis is generally opposite this conclusion, with traffic operations unacceptable at Ute Boulevard and generally acceptable at Olympic Parkway. Both 2022 and 2021 analyses agree that the I-80 Exit 145 interchange will operate unacceptably, however the analyses report substantially different estimates of average delay. The difference between the analyses can be between 40 seconds and 100 seconds or more.

The turning movement volumes and adjustments are different between alternatives, and the software used in the analysis is different (Synchro in 2021, VISSIM in 2022). Accordingly, some variation in the resulting delay calculations is reasonable. However, the magnitude of the differences are significant, and the reversal of the most impacted intersection from Ute Boulevard to Olympic Parkway is notable. *Please explain the variation in results, and whether the modeled queues are comparable to observed queues.*

The UDOT Traffic Impact Study Requirements for a Level III traffic study indicate that a queuing analysis should be performed. The TIS provided detailed queuing reports but did not tabulate the queuing reports into a comparable format. WCG reviewed the 2033 PM peak hour background and background plus project queues and compiled them into Table 13.

TABLE 13: 2033 MAXIMUM QUEUES MODELED ALONG SR-224 WITH AND WITHOUT THE PROJECT

		2033 BG PM Peak Hour		2033 BG+P PM Peak Hour	
		Avg Max Queue (ft)	Exceeds Storage?	Avg Max Queue (ft)	Exceeds Storage?
SR-224 & I-80 Exit 145	NB	736	Yes	726	Yes
	SB	201	Yes	214	Yes
	EB	332	No	380	No
	WB	397	No	432	No
SR-224 & Ute Blvd	NB	1,014	Yes	1,023	Yes
	SB	341	Yes	449	Yes
	EB	378	Yes	432	Yes
	WB	254	Yes	325	Yes
SR-224 & Olympic Pkwy	NB	4,591	Yes	5,107	Yes
	SB	484	Yes	578	Yes
	EB	149	No	238	Yes
	WB	562	Yes	554	Yes

BG: Background; BG + P: Background plus project

Table 13 indicates that substantial queueing is present throughout the study area even without the project. The additional trips and traffic demand added by the project will increase queues, most notably on the one approach that does not exceed the available queue storage without the project: eastbound Olympic Parkway at SR-224.

Safety Evaluation

- Safety Evaluation Requirements

Per the UDOT Traffic Impact Study Requirements (1/2004), “TIS are intended to....Recommend the need for any improvements to the adjacent and nearby roadway system to maintain a satisfactory level of service and safety and to protect the function of the highway system while providing appropriate and necessary access to the proposed development.” (page 2-3)

A Level III traffic study requires collection of traffic accident data (item 4e), an Accident and Traffic Safety Analysis (item 10), and identification of operations concerns and mitigation measures necessary “to ensure safe and efficient operation pursuant to appropriate state highway access category” (item 11).

- Collection and Analysis of Crash Data (item 4e & item 10)

The 2008 Tech Center Traffic Impact Study (2008 TIS) includes a brief review of existing crash data, using data provided by UDOT for 2003 to 2004. 86 crashes were reported between MP 12.94 and MP 14.24 along SR-224, along with the actual and expected severity and crash rates. It notes:

“As shown above, the actual rate of accidents over the two-year study period indicates that there is a higher occurrence of accidents than would be expected and an average severity rate than would be expected (sic) for a roadway similar to SR-224.” (page 10)

The 2021 TIS and the 2022 TIS do not address safety or report crashes in the study area.

- Identification of Mitigation Measures to Ensure Safe Operation (item 11)

The 2008 TIS addresses the 2003 to 2004 crash history by referring to three goals and principles from the SBTMP to improve safety (page 10).

“The SBTMP states three goals and principles to help improve safety on SR-224:

1. Work closely with UDOT to design and install needed safety improvements for SR-224.

a. Traffic accident rates are higher than anticipated on SR-224, and a continuous barrier has been identified as a needed safety improvement.

2. Establish an on-going traffic accident review process to evaluate factors contributing to accidents in Summit County.

a. Hold a quarterly interdepartmental review of all accidents on roads that occur within Summit County.

3. Complete SR-244/Landmark/Ute intersection programmed improvements to improve capacity and safety.

a. Landmark Drive phase 1 improvements are programmed and need to be implemented to improve capacity and safety on both Landmark and SR-224 (at least part of this improvement is currently under construction).”

- Review of Safety Evaluation

While the 2008 TIS did document the 2003 to 2004 crash history, neither of the two more recent studies documented crashes or evaluated safety. In addition, mitigation to ensure safe operations simply restated suggestions from the 2007 SBTMP. Specific mitigation for the project to address safety concerns was not included. The traffic study should include a thorough review of recent crash data in the study area, it should analyze the crash history to identify any patterns of concern, and it should recommend mitigation for any identified concerns.

An initial review of current crash data indicates a large number of crashes in the study area in the most recent complete 5-year period (2017-2021). As an example, 115 crashes were reported at the SR-224 & Ute Boulevard intersection in the study period, and 8 of those were severe crashes. Six of the severe crashes were left-turn related, and all involved vehicles turning left from the northbound or southbound approaches. 41 of the crashes overall involved left-turning vehicles, and these crashes were clustered in the evening hours (see Figure 4).

The 2008 and 2021 TIS noted LOS E and LOS F conditions at the SR-224 & Ute Boulevard intersection in the PM peak hour, with operations improving to LOS D with the improvements included in the 2007 SBTMP. The 2022 TIS noted the SR-224 & Ute Boulevard intersection would operate at LOS D in the PM peak hour for all scenarios. The mitigation recommended in the 2022 report is limited to support for possible UDOT improvements and an additional northbound lane along SR-224 between Olympic Parkway and Ute Boulevard. It does not recommend any mitigation that would address a concern with northbound or southbound left turns at the SR-224 & Ute Boulevard intersection.

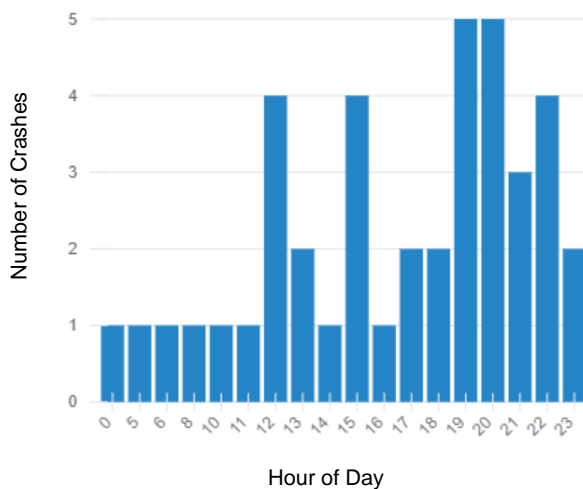


FIGURE 4: LEFT-TURN INVOLVED CRASHES BY TIME OF DAY AT THE SR-224 & UTE BOULEVARD INTERSECTION (2017-2021)

Proposed Mitigation

The TIS proposes limited mitigation to address the impacts associated with the project, particularly along the most congested segment of the project area along SR-224. As noted in the “Key Takeaways”, the TIS acknowledges the corridor operates unacceptably with and without the project. The TIS further acknowledges that the proposed project will further impair the existing traffic deficiencies. The TIS states that the corridor will operate acceptably in 2033 following completion of any of UDOT’s proposed alternatives along SR-224.

Until this time, the project proposes an interim mitigation measure to construct a third northbound through lane, from south of Olympic Parkway north through Ute Boulevard. This alternative is modeled to improve operations at Ute Boulevard and Olympic Parkway, but make little difference at the I-80 interchange. Even with this mitigation, the interchange at I-80

continues to operate at an unacceptable level *without* the project and as expected the additional traffic associated with the project will exacerbate the expected congestion with mitigation.

Recognizing that the proposed mitigation may have an overall benefit to the corridor not expressly presented in the table, we suggest that the applicant evaluate alternative measures of effectiveness to evaluate if the proposed mitigation will result in a net benefit to the corridor. Specifically, if the third northbound lane results in reduced travel times overall, the mitigation may be acceptable even if the I-80 interchange is still unacceptable. *WCG recommends the applicant review and provide travel time estimates along the corridor in the 2028 and 2033 background and background plus project PM peak hours.*

The previous analyses recommended additional measures, including recommendations for dual southbound left turn lanes and overlap phases at the Ute Boulevard and Olympic Parkway intersections. These features are no longer recommended mitigations. *Please explain why these features are not proposed or considered, particularly given the noted queue failures and safety concerns.*

Given the complex nature of the mitigation, WCG recommends that the project, if approved, would be required to conduct partial-build and post-construction monitoring to verify trip generation estimates and traffic modeling performance measures, and the project should meet milestones for implementation of the proposed mitigation prior to occupancy. This may include limiting the amount of the development that can be occupied following specific improvements.

For example, the interim mitigation should be required before any of the development can be occupied. The County may impose additional constraints, such as limiting the amount of the project that can be occupied once the interim mitigation is completed before the BRT lanes are built. Full occupancy can be conditioned on completion of the construction of the UDOT improvements, or it can be tied to milestones for the UDOT improvements, such as NEPA permit issuance, programmed funding, construction completion and / or other appropriate milestones. This will reduce the impact of the project on the I-80 interchange.