APPENDIX A. PURPOSE AND NEED STATEMENT MEMORANDUM

Memorandum of Understanding

Between the

Washington State Department of Transportation and the

City of Pasco

for substituting a prior planning study for a Non-Access Feasibility Study for the Broadmoor Interchange Access Revision Report

This Memorandum of Understanding (MOU) between the Washington State Department of Transportation (WSDOT) and the City of Pasco (City) serves as the agreement to substitute the **Non-Access Feasibility Study** related to the Broadmoor Interchange Access Revision Report (ARR) with the **Broadmoor Interchange Analysis Study**. The justification for this substitution is included in the **Justification for Bypassing Non-Access Feasibility Study** section of the **Broadmoor Interchange Project Purpose and Need** memorandum.

In Witness Whereof, the parties hereto, having read this Memorandum of Understanding, do agree to adhere to the terms stated in this document.

City of Pasco

Steve M. Worley 11/24/21

Steve M. Worley, P.E. Date

Public Works Director

WSDOT

Rick Keniston Digitally signed by Rick K Keniston Date: 2021.12.13 07:26:37 -08'00'

Rick Keniston, P.E. Date

Assistant State Design Engineer

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PURPOSE AND NEED STATEMENT

DATE: December 3, 2021

TO: Rick Keniston | WSDOT

FROM: Steve Worley | City of Pasco

SUBJECT: Broadmoor Interchange: Purpose and Need Memorandum Project #21292

INTRODUCTION

The purpose of this memorandum is to define a Purpose and Need Statement for the Broadmoor Interchange Project. The following sections highlight the importance of the Broadmoor Interchange, outline the development of the Purpose and Need statement based on prior planning studies, provides the project Purpose statement, and summarizes existing and future needs at the interchange for safety, traffic operations, and active transportation.

This document will also provide the justification to allow this projects' previously developed studies to serve as an equitable substitute for WSDOT's Non-Access Feasibility Study (NAFS), per WSDOT Design Manual Chapter 550.05, and allow the project to proceed directly to an Access Revision Report (ARR).

IMPORTANCE OF THE BROADMOOR INTERCHANGE

The Broadmoor Boulevard and I-182 interchange was constructed in the early 1980's as a simple diamond interchange. The interchange was designed to accommodate loop ramps in the northeast and southeast quadrants, anticipated to be added at a future date to serve growth in the west side of Pasco. The loop ramp in the northeast quadrant of the interchange was constructed in 2009, providing additional capacity to the northbound Broadmoor Boulevard to westbound I-182 movement.

The City of Pasco has continued to experience steady and substantial growth over the last 10-15 years, particularly in areas west of US 395. This growth has led to increased traffic on both the I-182 Columbia River bridge and along Broadmoor Boulevard. Bridge volumes increased by 2.7% annually between 2010 and 2019, with average daily volumes exceeding 70,000 vehicles in 2019.

While the COVID-19 pandemic reduced traffic throughout the state, traffic volumes in February 2021 on the bridge are back to 98% of 2019 (pre-pandemic) levels. Broadmoor Boulevard has also experienced significant growth, with daily traffic volumes reaching 22,000 vehicles by 2018.

The existing interchange configuration has provided sufficient capacity to serve growth to date, however, more than 7,000 new dwelling units and 3,000 new jobs are planned for in the greater Broadmoor Area in the City of Pasco's Comprehensive Plan over the next twenty years. This is expected to further increase traffic on both Broadmoor Boulevard and at the I-182 interchange, exceeding the current capacity of the system within the next five years.

Over the past six years, the City of Pasco has led several studies that included traffic analysis of the Broadmoor Interchange. A **Feasibility Study of Interchanges** conducted in 2015-2016 recommended capacity enhancements to the Broadmoor Boulevard Interchange, predicting that the current interchange configuration would near capacity around the year 2020. More recently (in 2019), the City led traffic analysis efforts to support the **Preliminary Broadmoor Area Environmental Impact Statement (EIS)**, focusing on identifying future transportation needs and solutions on Broadmoor Boulevard. Further transportation analysis performed during the City's **2018 Comprehensive Plan Update** and on-going **Transportation System Master Plan (TSMP)** project also included the Broadmoor Interchange. In 2021, the City led a traffic analysis study to determine the full scope of Broadmoor Boulevard improvements needed to meet future growth needs over the next 20 years. This effort included a **Broadmoor Interchange Analysis** (included as Attachment 1), focusing on existing service and safety levels as well as near and long-term gaps and needs at the interchange, along with some preliminary interchange improvement concepts. The existing and future needs identified in these studies, in particular the Broadmoor Interchange Analysis, are summarized in the following sections of this memorandum. Note that the methods and assumptions and future alternatives analysis and recommendations from the Broadmoor Interchange Analysis will be superseded by the documentation from this Broadmoor Interchange ARR.

DEVELOPING THE PURPOSE AND NEED FOR THE BROADMOOR INTERCHANGE PROJECT

One of the first and most important steps of any major project is to define why the project has been initiated, and what problem(s) it seeks to address. The Purpose and Need statement provides this definition for all projects complying with the National Environmental Policy Act (NEPA) and serves as the basis for defining how alternatives will be developed and measured. A reasonable alternative must address the needs specified in the Purpose and Need statement for the alternative to be considered, making the Purpose and Need an influential statement that guides all future development of the project.

PROJECT PURPOSE

The purpose of this project is to **reduce congestion** at the I-182 off-ramp diverges and terminal on Broadmoor Boulevard, caused by the growth of the Broadmoor Area identified in the City of

Pasco Comprehensive Plan. Additionally, this project is intended to **improve traffic safety** on the I-182 off-ramps and ramp terminals at Broadmoor Boulevard. The project will also **improve the active transportation facilities** along Broadmoor Boulevard through the I-182 interchange which currently is a critical gap in the City's active transportation network.

PROJECT NEED

This section summarizes the specific needs to be addressed by the Broadmoor Interchange Project. These needs were identified through in the **Broadmoor Interchange Analysis** project and during the on-going **Pasco Transportation System Master Plan**. Note that the analysis efforts for both these projects were conducted using data collected prior to the onset of the COVID-19 pandemic.

- ***Operations:*** As discussed in the **Broadmoor Interchange Analysis**, the eastbound ramp terminal is expected to operate at LOS F under both 2025 and 2040 PM peak period conditions, with intersection v/c ratio exceeding 1.0. The PM peak hour vehicle demand for the eastbound left turn and southbound left turn movements are expected to increase over present day conditions due to the expected land uses in the Broadmoor Area included in the City's Comprehensive Plan. The impact of these volume increases at the eastbound off-ramp terminal would increase queuing, particularly on the off-ramps, as well as increasing diverge congestion on eastbound I-182. The eastbound off-ramp queues currently extend more than 1,200 feet during the PM peak hour, and these degraded operations would further increase these queues onto I-182. Lengthening queues on southbound Broadmoor Boulevard would ultimately impact the I-182 westbound off-ramp terminal as well.
- ***Safety:*** As described in the **Broadmoor Interchange Analysis**, under present day conditions, PM peak period vehicle queues on the I-182 eastbound off-ramp to Broadmoor Boulevard extend into the safe stopping distance from the I-182 gore, leading to heightened rear end crash risk at this location. Vehicles also currently use the right-hand shoulder as a de facto extension of the northbound right turn lane, to bypass the eastbound left turn queues. The I-182 eastbound off-ramp and ramp terminal have a history of rear-end collisions, highlighting the concern raised by the PM peak period vehicle queues.
- ***Active Transportation:*** As noted in the on-going City of Pasco **Transportation System Master Plan** and described in the **Broadmoor Interchange Analysis**, the Broadmoor Boulevard overpass currently presents a significant barrier to north/south bicycle and pedestrian movement. There are no sidewalks between the eastbound and westbound ramp terminals, forcing pedestrians to use the shoulder. The facilities and gaps on Broadmoor Boulevard through the interchange are summarized by direction as follows:
    - Northbound: The shoulder narrows to about 5 feet on the interchange overpass structure. Pedestrians and bicyclists must cross the northbound Broadmoor Boulevard to westbound I-182 movement on a striped crosswalk without signalization. At the westbound ramp terminal, bicyclists are forced into vehicle travel lanes north of the intersection as the shoulder drops off completely.
    - Southbound: At the westbound ramp terminals, bicyclists and pedestrians must cross the southbound Broadmoor Boulevard to westbound I-182 movement using a striped crosswalk without signalization. The southbound shoulder is slightly wider on the overpass than northbound, with approximately 6 feet on the structure, but also contains wide grate drop inlets that are dangerous for both cyclists and pedestrians. Southbound bicyclists have to cross the unsignalized free eastbound right turn at the eastbound ramp terminal using a striped crosswalk as well, with no downstream facilities.

JUSTIFICATION FOR SUBSTITUTING ANOTHER STUDY FOR THE NON-ACCESS FEASIBILITY STUDY

Per section 550.05 of the WSDOT Design Manual, a **Non-Access Feasibility study** is typically performed as a first step in the **Access Revision Report** process to determine whether the performance gaps identified can be addressed with solutions that do not impact the gore points to/from the mainline of the freeway. As noted in Section 550.05 of the WSDOT Design Manual, a local planning study can be used to replace the **Non-Access Feasibility Study** if the study meets the requirements of a non-access feasibility study. The **Broadmoor Interchange Analysis** clearly identified the I-182 eastbound off-ramp as an existing safety gap and a future traffic need and explored a wide enough range of solutions to indicate that improvements to the local system alone will not address the future traffic congestion and safety issues at the eastbound off-ramp. Therefore, the City of Pasco proposes that the **Broadmoor Interchange Analysis** be substituted as the **Non-Access Feasibility Study** for the Broadmoor Interchange Project.

ATTACHMENTS

CONTENTS

Attachment 1. Broadmoor Interchange Analysis Memorandum and Support Materials

ATTACHMENT 1. BROADMOOR INTERCHANGE ANALYSIS MEMORANDUM AND SUPPORTING MATERIALS

BROADMOOR INTERCHANGE ANALYSIS

DATE: June 30, 2021

TO: Dan Ford | City of Pasco

FROM: Aaron Berger, PE, Garth Appanaitis, PE (OR), Ilana Burstein, Veronica Sullivan | DKS Associates

SUBJECT: Broadmoor Interchange Traffic Summary Memorandum

INTRODUCTION

The City of Pasco expects to experience significant growth in the currently undeveloped northwest portion of the City known as the "Broadmoor Area". The City's 2018 Comprehensive Plan Update includes more than 7,000 new dwelling units and more than 3,000 new jobs in this area within the next 20 years. Several significant development applications are currently in process to spur this growth. Broadmoor Boulevard (Road 100) is the primary arterial connection between the regional freeway system (I-182) and this new growth area (located west of Broadmoor Boulevard). The City of Pasco is currently identifying improvements to Broadmoor Boulevard to serve both the short and long-term needs of the Broadmoor Area. These efforts have focused on improvements both north and south of the Road 100 and I-182 interchange.

This memorandum summarizes traffic analysis conducted for Broadmoor Boulevard (Road 100) at the I-182 Interchange. The purpose of this traffic analysis is to supplement prior analysis of the Broadmoor Boulevard corridor, defining existing traffic conditions at the interchange ramp terminals and identify potential short-term (year 2025) and long-term (year 2040) solutions. This memo includes the following:

- Methods and Assumptions
- Data Summary
- Existing Interchange Conditions
  - Traffic operations
  - Safety analysis
  - Pedestrian and bicycle facilities summary
  - Summary
- Future Interchange Conditions

- Short-term (year 2025) PM peak hour traffic operations and improvement concepts
- Long-term (year 2040) PM peak hour traffic operations and improvement concepts

- Summary of proposed local system improvement benefits to the interchange

METHODS AND ASSUMPTIONS

This project is focused on the Broadmoor Boulevard (Road 100) and I-182 interchange. The project study area is highlighted in Figure 1.

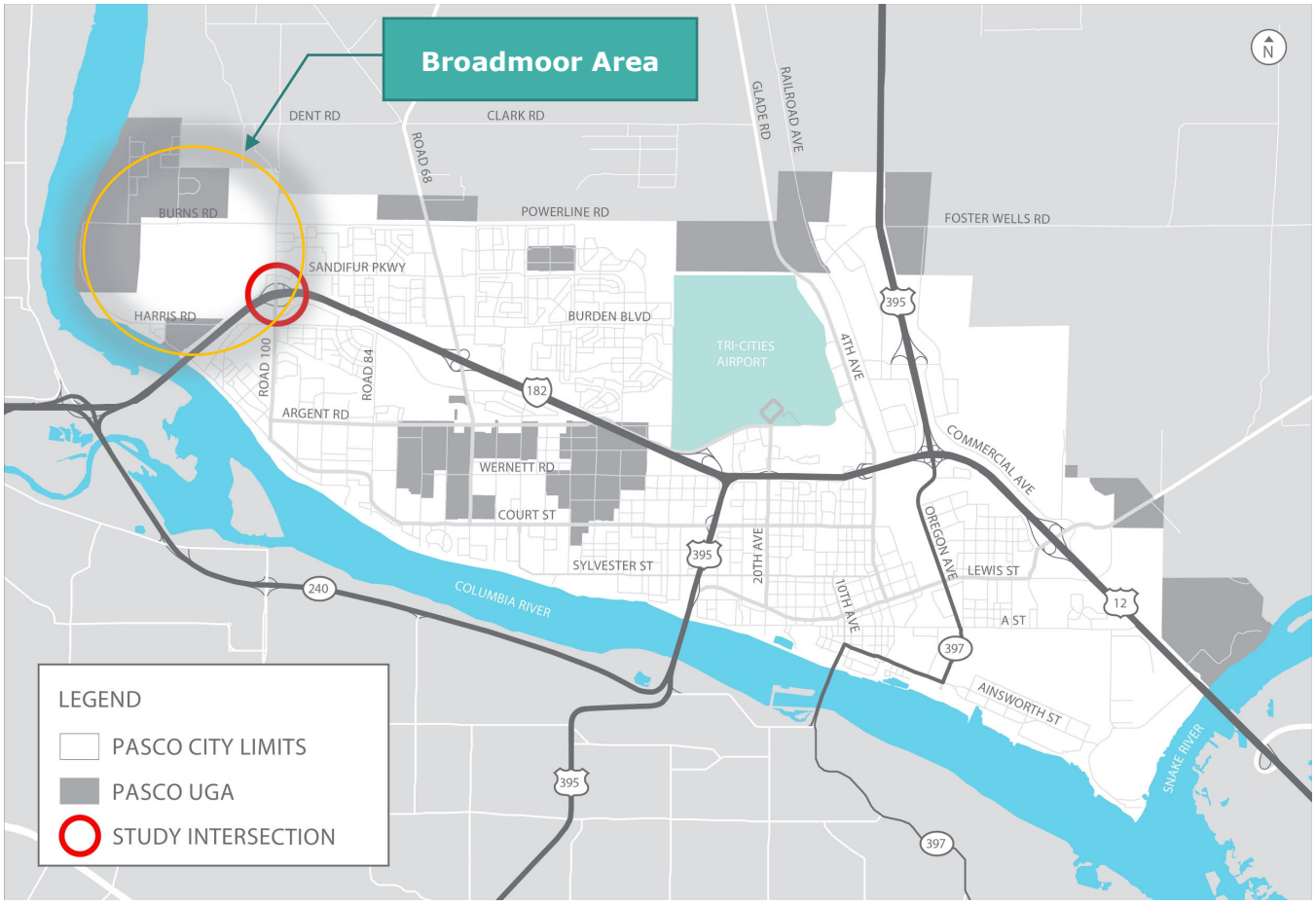


FIGURE 1. PROJECT STUDY AREA

As noted previously, other analysis efforts have recommended improvements to the City of Pasco facilities both to the north and south of the interchange. This analysis is focused on the interchange.

CRASH DATA

The most recent five years of crash records (2016-2020) for the study area were obtained from the Washington State Department of Transportation Crash Portal[1]. Crash rates were calculated using the data from the following WSDOT and Benton-Franklin Council of Governments (BFCG) sites:

- WSDOT PTR Site R081 2016-2020 daily traffic counts (I-182 Columbia River Bridge)
- WSDOT Route ID 182P100695 2019 AADT Count (I-182 eastbound off-ramp to Road 100)
- WSDOT Route ID 182Q100791 2019 AADT Count (I-182 eastbound on-ramp from Road 100)
- WSDOT Route ID 182R100764 2019 AADT Count (I-182 westbound off-ramp to Road 100)
- WSDOT Route ID 182S500672 2019 AADT Count (I-182 westbound on-ramp (loop) from northbound Road 100)
- WSDOT Route ID 182S100672 2019 AADT Count (I-182 westbound on-ramp (slip) from southbound Road 100)
- BFCG Broadmoor Boulevard between St Thomas Dr and I-182 2018 72-hour count
- BFCG Broadmoor Boulevard between I-182 and Sandifur Parkway 2018 72-hour count

TRAFFIC OPERATIONS AND QUEUING

Existing conditions analysis was performed to determine whether either of the interchange ramp terminals fail to meet WSDOT mobility standards. Intersection operations were analyzed for both the AM and PM peak hours using Synchro (version 10) software and the Highway Capacity Manual 6th Edition (HCM 6) methodologies. The analysis was conducted at both ramp terminal intersections using March 2019 (pre-COVID) traffic counts. Performance measures used for this analysis include volume-to-capacity (V/C) ratios, seconds of control delay and levels of service (LOS). The WSDOT mobility standard for ramp terminals is LOS D. In addition, SimTraffic was used to estimate 95th Percentile queue lengths at the ramp terminals to identify potential safety needs. Safety risks were defined as vehicle queues either extending beyond storage lanes on Broadmoor Boulevard, or extending down an off-ramp into the Safe Stopping Distance (SSD) from the gore point. These ramp safe queue distances are listed in Table 1.

TABLE 1: I-182 RAMP SAFE STOPPING AND QUEUEING DISTANCES AT ROAD 100

RAMP	RAMP LENGTH (STRIPED GORE TO STOP BAR)	SAFE STOPPING DISTANCE [A]	SAFE QUEUE DISTANCE
I-182 EASTBOUND OFF-RAMP	1470 ft	570 ft (from 60 mph)	900 ft
I-182 WESTBOUND OFF-RAMP	1600 ft	570 ft (from 60 mph)	1,030 ft

[1] https://www.wsdot.wa.gov/mapsdata/crash/crashdatarequest.htm

[A] Assumes 10 mph reduction from mainline speed at gore point

Both the Synchro and SimTraffic models were developed using parameters thresholds included in the WSDOT Synchro and SimTraffic Protocol - August 2018 document. The SimTraffic model includes the following additional intersections to capture traffic platoons approaching the interchange:

- Broadmoor Boulevard and Chapel Hill Boulevard
- Broadmoor Boulevard and St Thomas Drive
- Broadmoor Boulevard and Harris Road
- Broadmoor Boulevard and Sandifur Parkway
- Broadmoor Boulevard and Buckingham Drive
- Broadmoor Boulevard and Burns Road

TRAFFIC VOLUME DEVELOPMENT

Short-term (year 2025) PM peak hour traffic volumes were developed using an assumed one percent annual background growth rate of 1% along trip generation estimates for on-going development applications adjacent to Broadmoor Boulevard.

Long-term (year 2040) PM peak hour traffic volumes were forecasted at the ramp terminal intersections using volume forecasts from the Benton-Franklin Council of Governments (BFCG) model used for the Pasco Transportation Master Plan (TMP). These model volumes were combined with the interchange count data to estimate future year turn movements using the NCHRP Report 765[2] methodology. The BFCG model land use assumptions are consistent with the Pasco Comprehensive Plan as well as the on-going development applications for the area.

FUTURE CONCEPT ANALYSIS

The future conditions traffic operations analysis was conducted at the ramp terminal intersections using the year 2025 and year 2040 traffic volumes. Short- and long-term improvement concepts targeted operations at LOS D or better, along with managing queues within the safe stopping sight distance on the freeway off-ramps.

[2] National Cooperative Highway Research Program (NCHRP) Report 765: *Analytical Forecasting Approaches for Project-Level Planning and Design.*

DATA SUMMARY

As stated in the methods and assumptions section, both daily and peak hour counts were used for the existing conditions safety and traffic operations analysis. The average daily traffic data for the study area is summarized in Table 2, and the peak hour traffic counts are summarized in Table 3.

TABLE 2: AVERAGE DAILLY TRAFFIC DATA IN THE STUDY AREA

LOCATION	DIRECTION	VOLUME	VOLUME TYPE	SOURCE
I-182 MAINLINE AT COLUMBIA RIVER	Eastbound	33,000	AADT (2016-2020)	WSDOT PTR Station
	Westbound	33,570		
I-182 EB OFF-RAMP TO RD 100	Eastbound	12,000	AADT (2019)	WSDOT Count
I-182 WB OFF-RAMP TO RD 100	Westbound	4,700	AADT (2019)	WSDOT Count
I-182 EB ON-RAMP FROM RD 100	Eastbound	5,200	AADT (2019)	WSDOT Count
I-182 WB LOOP ON-RAMP FROM NB RD 100	Westbound	4,700	AADT (2019)	WSDOT Count
I-182 WB SLIP ON-RAMP FROM SB RD 100	Westbound	7,100	AADT (2019)	WSDOT Count
BROADMOOR BLVD BETWEEN I-182 AND SANDIFUR PKWY	Northbound	11,200	Daily Avg. from 72-hour 2018 weekday count	BFCG Count
	Southbound	11,240		
BROADMOOR BLVD BETWEEN I-182 AND ST THOMAS DR	Northbound	11,080	Daily Avg. from 72-hour 2018 weekday count	BFCG Count
	Southbound	11,080		

TABLE 3: PEAK HOUR INTERSECTION TURNING MOVEMENT COUNTS (2019)

MOVEMENT	I-182 EASTBOUND RAMPS AND RD 100		I-182 WESTBOUND RAMPS AND RD 100	
	PM PEAK HOUR	AM PEAK HOUR	PM PEAK HOUR	AM PEAK HOUR
NBT	645	769	351	631
NBR	281	345	1294	559
SBL	194	210	-	-
SBT	595	512	463	500
SBR	-	-	655	839
EBL	1002	409	-	-
EBR	716	319	-	-
WBL	-	-	325	220
WBR	-	-	238	185
Intersection Peak Hour Factor	*0.88*	*0.85*	*0.86*	*0.88*

The intersection turn movement counts were collected on March 26 (PM) and 27 (AM) of 2019, and the full count data is included in Appendix A. Note that for the traffic analysis, the traffic counts were balanced between the interchange ramp terminals.

During the Pasco Transportation Master Plan (TMP) project field visit in January of 2020, the project team noted queues of 15 to 25 vehicles on the eastbound I-182 off-ramp to Road 100, along with slowing on the off-ramp back to the I-182 mainline. These observations were made during a peak hour of the lowest volume season (winter), as indicated by the PTR data on the I-182 Columbia River Bridge. City of Pasco staff have noted significantly longer queues during spring and summer peak hours, likely due to higher volumes caused seasonal workers traveling to and from the agricultural land uses to the north.

Signal timing data for the interchange ramp terminals was provided by WSDOT during the Pasco TMP, and was verified through field observations.

EXISTING CONDITIONS

This section summarizes the present-day conditions of the Road 100 and I-182 interchange, including traffic operations, safety conditions, and pedestrian and bicycle facilities.

EXISTING (2019) TRAFIC OPERATIONS

The interchange ramp terminals and surrounding intersections were analyzed using Synchro / SimTraffic (version 10 of the software) model using the 2019 AM and PM peak hour traffic counts summarized in the previous section. As discussed in the Methods and Assumptions section, HCM 6th Edition methodology was used to determine the intersection delay, Level of Service (LOS), and volume to capacity (v/c) ratio for the ramp terminals. The HCM results are summarized in Table 4, and the full Synchro reports are included in Appendix B.

TABLE 4: EXISTING (2019) INTERSECTION OPERATIONS RESULTS

INTERSECTION	MOBILITY STANDARD	TIME PERIOD	DELAY (S)	LOS	V/C
I-182 WESTBOUND RAMPS AND RD 100	LOS D	AM	8	A	0.41
		PM	9	A	0.70
I-182 EASTBOUND RAMPS AND RD 100	LOS D	AM	14	B	0.69
		PM	18	B	0.82

As listed in Table 4, the ramp terminals currently meet WSDOT mobility targets of LOS D. To better understand the operations of the ramp terminals, the SimTraffic model was run for 10 iterations using random seeds and the 95th percentile queue results are summarized in Table 5. The full SimTraffic queuing results are included in Appendix C.

TABLE 5: EXISTING (2019) 95TH PERCENTILE QUEUE RESULTS

MOVEMENT	95TH PERCENTILE QUEUE		AVAILABLE STORAGE
	PM PEAK HOUR	AM PEAK HOUR	
I-182 WESTBOUND RAMPS AND RD 100			
NBT	530 ft	180 ft	1,110 ft[A]
SBT	450 ft	500 ft	750 ft[A]
SBR	<10 ft	80 ft	750 ft[A]
WBL	370	720	1,030 ft[C]
WBR	230	250	1,030 ft[C]
I-182 EASTBOUND RAMPS AND RD 100			
NBT	750 ft	**1,730 ft**	920 ft[A]
NBR	**270 ft**	**270 ft**	175 ft[B]
SBL	850 ft	820 ft	1,110 ft[A]
SBT	**1,560 ft**	**1,610 ft**	1,110 ft[A]
EBL	**1,210 ft**	**920 ft**	900 ft[C]
EBR	**1,210 ft**	**920 ft**	900 ft[C]

[A] Storage measured to nearest upstream signalized intersection.

[B] Storage measured based on effective turn bay length

[C] Storage measured based on off-ramp length (striped gore to stop bar) minus the safe stopping distance for a vehicle traveling 60 mph.

Bold = queue length exceeds available storage

As listed in Table 5, significant queueing persists through and around the interchange, especially during the PM peak hour. The 95th percentile vehicle queues on southbound Broadmoor Boulevard do not extend to Sandifur Parkway, although they do extend from the eastbound ramp terminal through the westbound ramp terminal, impacting the westbound off-ramp operations. During the AM peak hour, northbound vehicle queues from the eastbound ramp terminal can extend back through the Chapel Hill Boulevard intersection.

The most concerning vehicle queue is the PM peak hour queue on the I-182 eastbound off-ramp. Even with a free right turn movement, the ramp queues from the eastbound left turns spill back down the ramp, with the 95th percentile queues extending to only 260 feet from the striped off-ramp gore, 310 feet into the ramp safe stopping distance. This causes a safety hazard on the off-ramp and eastbound I-182, as vehicles must slow below normal exit ramp speeds, which are much

higher (close to 60 mph) than local street speeds, due to congestion on the ramp, increasing the risk of rear end collisions.

The free eastbound right turn at the eastbound ramp terminal is forced into a short awkward merge with southbound Broadmoor Boulevard traffic. This issue is further complicated by vehicles entering and queuing in the southbound left turn onto St Thomas Dr, creating a crash risk on the Broadmoor corridor as well as queues in the eastbound right turn lane on the off-ramp.

EXISTING CONDITIONS SAFETY ANALYSIS

The most recent five years of crash records (2016-2020) for the study area were obtained from the Washington State Department of Transportation Crash Portal, as noted in the Data Summary section. The crash records were summarized by study intersection for intersection-related crashes in Table 6 and non-intersection related crashes were summarized in Table 7. In total, 182 crashes were studied for this analysis and are mapped in Figure 2 by crash severity. The following key findings are summarized below:

- No fatal crashes were reported within the study period.
- The most common crash type throughout the study area is rear-end crashes. In particular, along Rd 100 from Sandifur Pkwy to Chapel Hill Blvd, 49% of all crashes resulted in a rear-end, which is likely related to intersection congestion along the study corridor.
- There are several run-off-the road crash reports located for the westbound on-ramp curve (entrance from northbound Rd 100).
- Nine crashes were reported near the diverge area of the eastbound off-ramp exit.

TABLE 6: STUDY INTERSECTION CRASH RECORDS (2016-2020)

INTERSECTION	TOTAL CRASHES [A]	SEVERITY		TYPE			CRASH RATE [D]
		INJURY	PDO	REAR END	TURNING [B]/ ANGLE [C]	OTHER	
CHAPEL HILL BLVD	26	9	17	8	12 LT, 2 RT, 3 Angle	1 Linear Curb	0.679
ST THOMAS DR	6	2	4	3	3 LT	0	0.147
SANDIFUR PKWY	20	8	12	3	11 LT, 4 Angle	2 Sideswipe	0.414
WESTBOUND RAMP TERMINAL	9	2	7	6	3 Angle	0	0.148
EASTBOUND RAMP TERMINAL	58	17	41	39	2 LT, 9 Angle	6 Sideswipe 1 Fence 1 Overturned	0.925

[A] Intersection crashes were filtered to crashes that were only intersection related. Crashes that were "not intersection related" were omitted.

[B] Turning crashes are labelled as LT (Left Turning Vehicle Involved) and RT (Right Turning Vehicle Involved).

[C] Angle crashes are recorded as "entering at an angle".

[D] Crash rate is calculated based on FHWA intersection crash rate calculation: https://safety.fhwa.dot.gov/local_rural/training/fhwasa1210/s3.cfm

Source: WSDOT Crash Portal.

TABLE 7: STUDY AREA CRASH RECORDS (2016-2020)

SEGMENT	TOTAL CRASHES [A]	SEVERITY		TYPE			
		INJURY	PDO	REAR END	SIDE-SWIPE	OVER-TURNED	OTHER
EASTBOUND OFF-RAMP	9	2	7	0	2	3	4
EASTBOUND ON-RAMP	0						
WESTBOUND OFF-RAMP	9	4	5	2	2	1	4 [B]
WESTBOUND ON-RAMP (ENTRANCE FROM RD 100 NORTHBOUND)	8	3	5	0	0	2	3 Barrier 3 Ledge
WESTBOUND ON-RAMP (ENTRANCE FROM RD 100 TERMINAL WESTBOUND)	11	5	6	6	2	1	2
RD 100 (FROM SANDIFUR PKWY TO CHAPEL HILL BLVD)	26	7	18	16	6	0	4

[A] Total crashes that are non-intersection related.

[B] Three vehicles were involved in a collision with the light pole located at the entrance of the westbound off-ramp. It was also reported that these three drivers were exceeding reasonable safe speed.

Source: WSDOT Crash Portal.

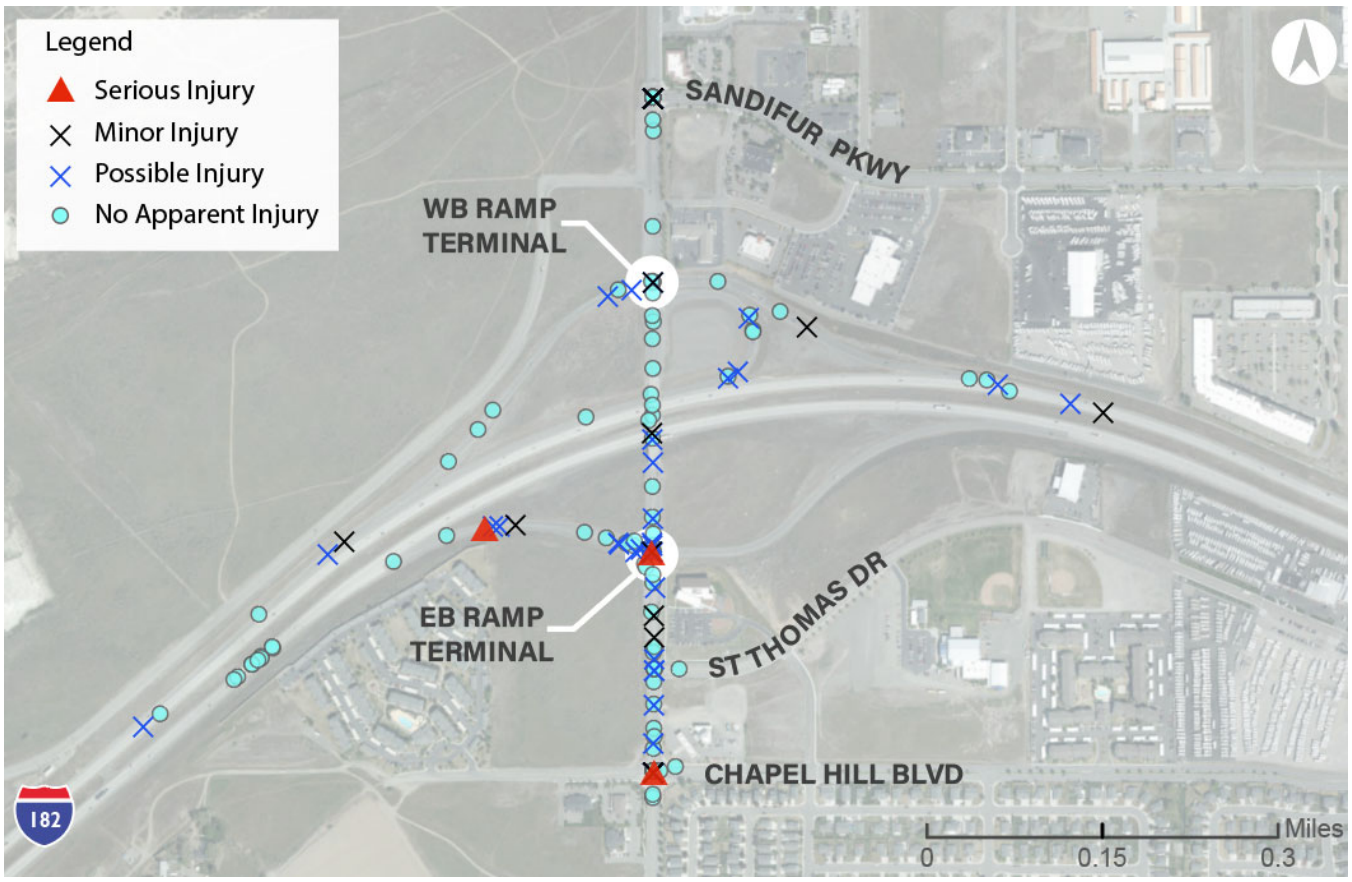


FIGURE 2: CRASH SEVERITY FOR ALL COLLISIONS ANALYZED ALONG STUDY CORRIDOR.

The following summarizes the main conclusions from the safety analysis:

- The westbound loop on-ramp (entrance from NB Rd 100) has horizontal curvature that has resulted in roadway departure collisions
- The westbound on-ramp (entrance from RD 100 terminal westbound) merging geometry contributes to sideswipe crashes
- The eastbound ramp terminal intersection existing conditions include both safety and operational concerns.
  - Based on Table 2, the existing eastbound ramp operations results indicate that there is queueing on the main line. This queueing on the main line leads to rear-end collisions on the eastbound ramp.
  - The eastbound ramp has horizontal curvature that results in roadway departure collisions.

PEDESTRIAN AND BICYCLE FACILITIES SUMMARY

The Road 100 overpass currently presents a significant barrier to north/south bicycle and pedestrian movement. There are no sidewalks between the eastbound and westbound ramp terminals, forcing pedestrians to use the shoulder. The facilities and barriers through the interchange are summarized by direction as follows:

Northbound: The shoulder narrows to about 5 feet on the interchange overpass structure. Pedestrians and bicyclists must cross the northbound Broadmoor Boulevard to westbound I-182 movement only protected by a striped crosswalk without any signalization. At the westbound ramp terminal, bicyclists are forced into vehicle travel lanes north of the intersection as the should drops off completely and the parallel multi-use path is not readily accessible.

Southbound: At the westbound ramp terminals, bicyclists and pedestrians must cross the southbound Broadmoor to westbound I-182 movement using a striped crosswalk without signalization. The southbound shoulder is slightly wider on the overpass than northbound, with approximately 6 feet on the structure. Southbound bicyclists have to cross the unsignalized free eastbound right turn at the eastbound ramp terminal using a striped crosswalk as well, with no downstream facilities.

EXISTING CONDITIONS CONCLUSIONS

Based on the existing conditions analysis, the following key issues are present today at the Road 100 and I-182 interchange:

1. The eastbound ramp PM peak period vehicle queues extend into the safe stopping distance from the I-182 gore, leading to heightened rear end crash risk at this location.
2. The I-182 eastbound off-ramp and ramp terminal has a high crash frequency, driven mainly by rear-end collisions, highlighting the concern raised by the PM peak period vehicle queues.
3. The current pedestrian and bicycle facilities at the interchange create a north/south barrier to these modes for transportation, exacerbated by the free turn movements at the ramp terminals.

Based on these key findings, the current interchange is in need of safety and operational upgrades.

FUTURE INTERCHANGE CONDITIONS

Significant development is expected to occur within the greater Broadmoor area by the year 2025. As noted in the volume development section of this memorandum, both 2025 and 2040 PM peak hour traffic volumes were forecasted for the interchange. These volumes were used to assess a variety of potential short and long-term solutions at the interchange.

SHORT-TERM (YEAR 2025) PM PEAK HOUR TRAFFIC OPERATIONS

The land uses assumed for the short-term traffic forecasts were consistent with the City's 2018 Comprehensive Plan Update, and included development expected to occur within the next few years based on developer applications and other development planning information. The 2025 forecasted volumes for the interchange were developed as described in the volume development section of this memorandum and are shown in Figure 3.

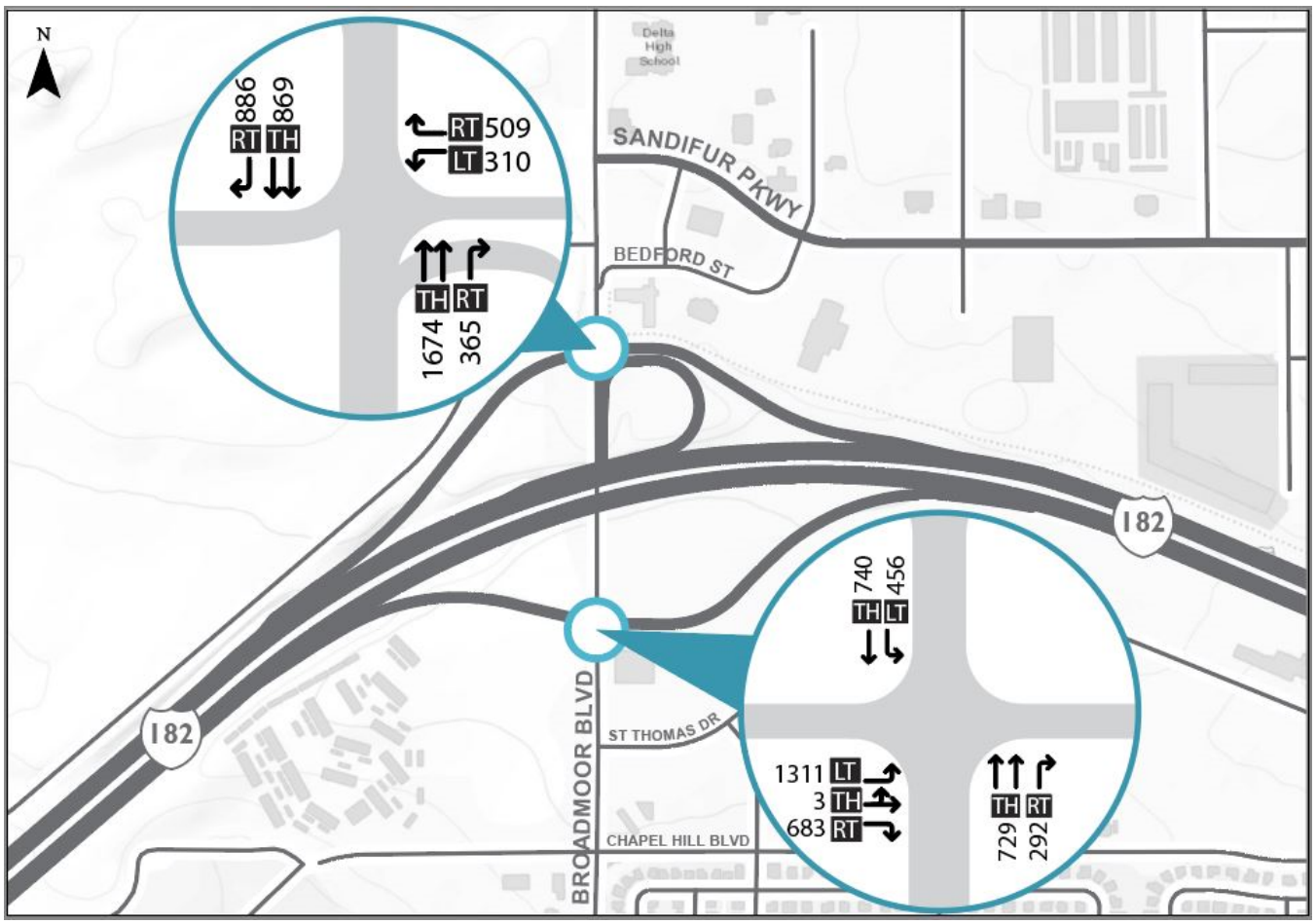


FIGURE 3: SHORT-TERM (YEAR 2025) FORECAST –PM PEAK HOUR

The HCM operations for the 2025 PM peak hour forecast at the Road 100 interchange are summarized in Table 8.

TABLE 8: SHORT-TERM (YEAR 2025) INTERSECTION OPERATIONS RESULTS

INTERSECTION	MOBILITY STANDARD	TIME PERIOD	DELAY (S)	LOS	V/C
I-182 WESTBOUND RAMPS AND RD 100	LOS D	PM	26	C	1.04
I-182 EASTBOUND RAMPS AND RD 100	LOS D	PM	98	F	1.62

As shown in Table 8, both ramp terminals would have insufficient capacity under their current configurations to serve the expected traffic demand under 2025 PM peak period conditions, with intersection v/c ratios exceeding 1.0. The LOS C at the westbound ramp terminal is masking the capacity constraints at this location due to the low delay for the free southbound right turn movement. The westbound right turn and northbound through movements would both experience LOS F conditions.

At the I-182 Eastbound off-ramp, the eastbound left turn and southbound left turn movement demands increase over present day conditions, leading to the LOS F and over capacity ramp terminal operations. The impact of these volume increases at both ramps would increase queuing, particularly at on the off-ramps. The eastbound off-ramp queues currently extend to unsafe distances (within deceleration zone), and these degraded operations would further increase these queues back onto I-182.

No additional queueing analysis was performed for the No-Build 2025 PM peak hour conditions, as the demand at both ramp terminal intersections well exceeds the capacity. Queueing analysis would show queues building on all critical intersection movements (including the off-ramps) throughout the simulation with no dissipation.

LONG-TERM (YEAR 2040) PM PEAK HOUR TRAFFIC OPERATIONS

Under 2040 conditions, trip behavior is expected to begin shifting in the Broadmoor Area and around the Road 100 Interchange. With the land use outlined in the City of Pasco Comprehensive Plan, the Broadmoor Area and the rest of Pasco are expected to experience an increase in employment, coinciding with expected decreases in the employment in the Hanford Area across the river. With additional population growth, the Broadmoor Area is expected to capture more Pasco trips, not just generate new households with jobs and shopping trips elsewhere in the Tri-Cities. When the Pasco Comprehensive Plan land use was incorporated into a year 2040 scenario for the TMP forecasts, the BFCG travel demand model showed these trends, indicating little to no traffic growth on the I-182 bridge during the PM peak period despite significant traffic growth within the City of Pasco.

Preliminary forecast results indicate similar deficiencies at the Road 100 interchange to 2025 conditions, but with more north/south traffic on Road 100. The 2040 PM peak hour forecasts are summarized in Figure 4.

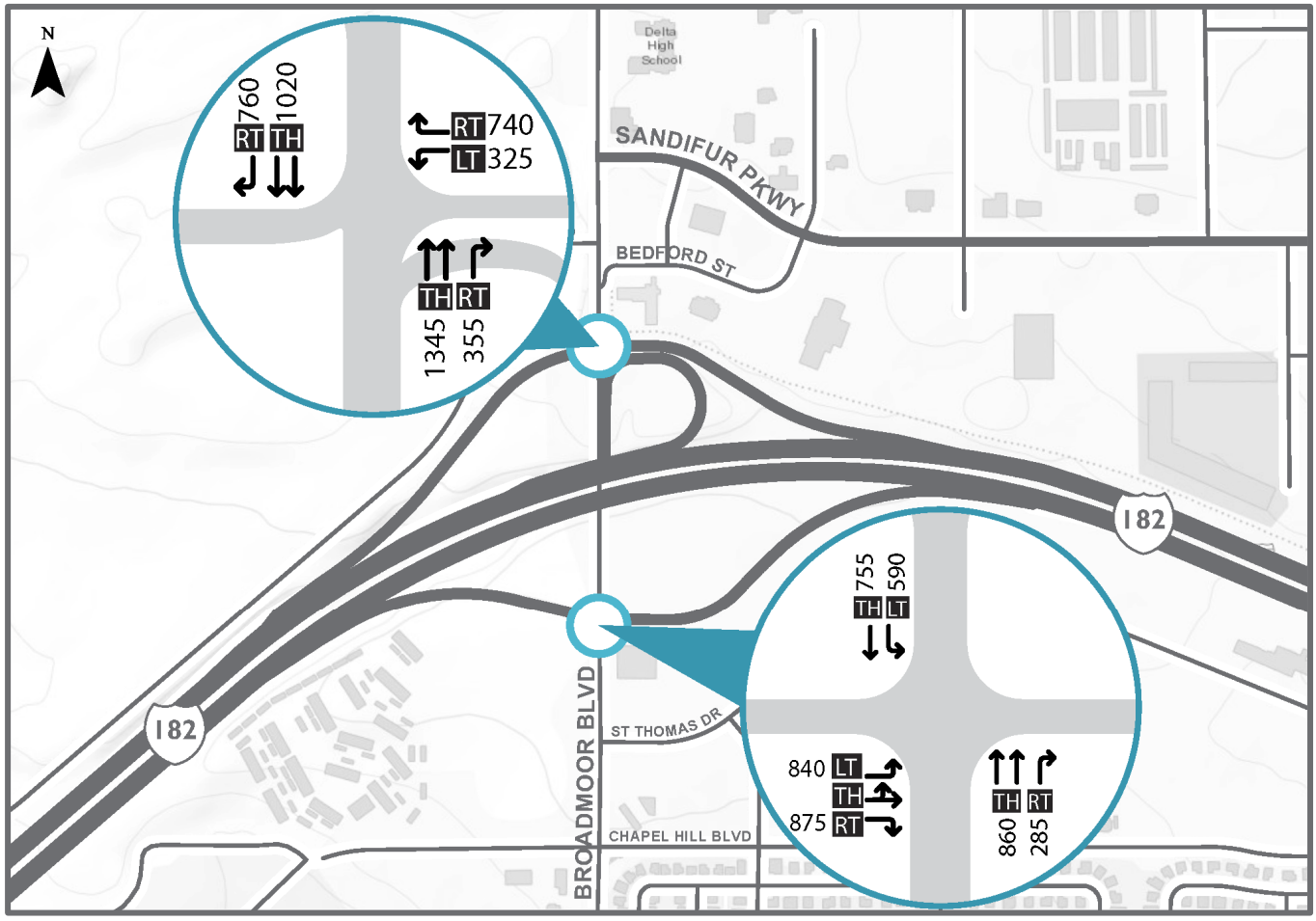


FIGURE 4: LONG-TERM (YEAR 2040) FORECAST – WEEKDAY PM PEAK HOUR

The HCM operations for the 2040 PM peak hour forecast at the Road 100 interchange are summarized in Table 9.

TABLE 9: LONG-TERM (YEAR 2040) INTERSECTION OPERATIONS RESULTS

INTERSECTION	MOBILITY STANDARD	TIME PERIOD	DELAY (S)	LOS	V/C
I-182 WESTBOUND RAMPS AND RD 100	LOS D	PM	43	D	1.11
I-182 EASTBOUND RAMPS AND RD 100	LOS D	PM	72	F	1.35

As shown in Table 9 and similar to 2025 conditions, both ramp terminals would have insufficient capacity under their current configurations to serve the expected traffic demand under 2040 PM peak period conditions, with intersection v/c ratios exceeding 1.0. The LOS D at the westbound ramp terminal is again masking the capacity constraints at this location due to the low delay for the free southbound right turn movement. The westbound right turn and northbound through movements would both continue experience LOS F conditions.

For the same reasons outline under the 2025 operations discussion, no queuing analysis was performed for the No-Build 2040 PM peak period.

PROPOSED LOCAL SYSTEM IMPROVEMENTS AND BENEFITS TO THE INTERCHANGE

The City of Pasco is currently advancing multiple capacity and safety enhancement projects on Broadmoor Boulevard. The following subset of these projects provide some level of benefit to the interchange:

- **Widen Broadmoor Boulevard from I-182 eastbound ramps to south of St Thomas Drive, adding a second southbound through lane**. This widening assumes consistency with the existing cross section on the north leg of Chapel Hill Boulevard, and that bicycle facilities would not be located on the west side of Broadmoor Boulevard.

  Benefit to Interchange: The Broadmoor Boulevard widening south of the I-182 eastbound ramp terminal would allow eastbound right turns vehicles from the off-ramp to continue south on Broadmoor Boulevard without merging into the southbound through traffic immediately, reducing the conflicts caused by the existing short merge area for this movement.

- **Close southbound left turn lane at St. Thomas Drive** with a raised median curb and re-stripe turn bay to extend southbound left turn from Chapel Hill Drive intersection to 600 feet.

  Benefit to Interchange: The closure of the St Thomas Drive southbound left turn would reduce the risk of southbound queue spillback into the through lanes on Broadmoor Boulevard, which improves traffic flow on Broadmoor Boulevard and ultimately reduces queue impact to the eastbound right turn movement at the interchange.

- **Re-align Harris Road to connect to Sandifur Parkway extension**, removing the northbound left turn on Broadmoor Boulevard.

  Benefit to Interchange: The re-alignment of Harris Road to connect to the Sandifur Parkway extension rather than Broadmoor Boulevard allows the closure of the northbound left turn into Harris Road and lessens weaving movements on both northbound and southbound Broadmoor Boulevard between the present-day location of Harris Road and I-182 westbound off-ramp terminal intersection.

In addition to these short-term projects, the land use strategy for the Broadmoor area guided by the City of Pasco Comprehensive Plan can provide significant benefit to the interchange by changing trip pattern in the area. As discussed in the Long-Term 2040 PM peak hour operations section, increasing employment and particularly commercial land uses in the Broadmoor Area provide City of Pasco residents with local options, reducing travel demand impacts on the I-182 river crossing.

IMPROVEMENT CONCEPTS

Based on the existing condition deficiencies, future traffic forecasts, and future No-Build PM peak hour operations the following potential solutions were analyzed. The solutions analyzed focus on short term needs, but also included consideration for potential phasing of longer-term projects.

The solutions are separated by ramp terminal.

WESTBOUND RAMP TERMINAL SOLUTIONS

The primary issue at the I-182 westbound ramp terminal is queuing and delay for the westbound right turn movement that conflicts with the heavy northbound movement. This issue could be mitigated with second westbound right turn lane, as shown in Figure 5. To prevent excessive weaving on northbound Broadmoor Boulevard between vehicles making a northbound left versus a northbound through or northbound right turn at Sandifur Parkway, the now dual lane westbound right turn could be fully signalized with right turn on red prohibited. Advance signage on the ramp and at the ramp terminal signal could be used to ensure vehicles destined for the northbound left turn at the Sandifur Parkway extension intersection on Broadmoor Boulevard position correctly for this movement.

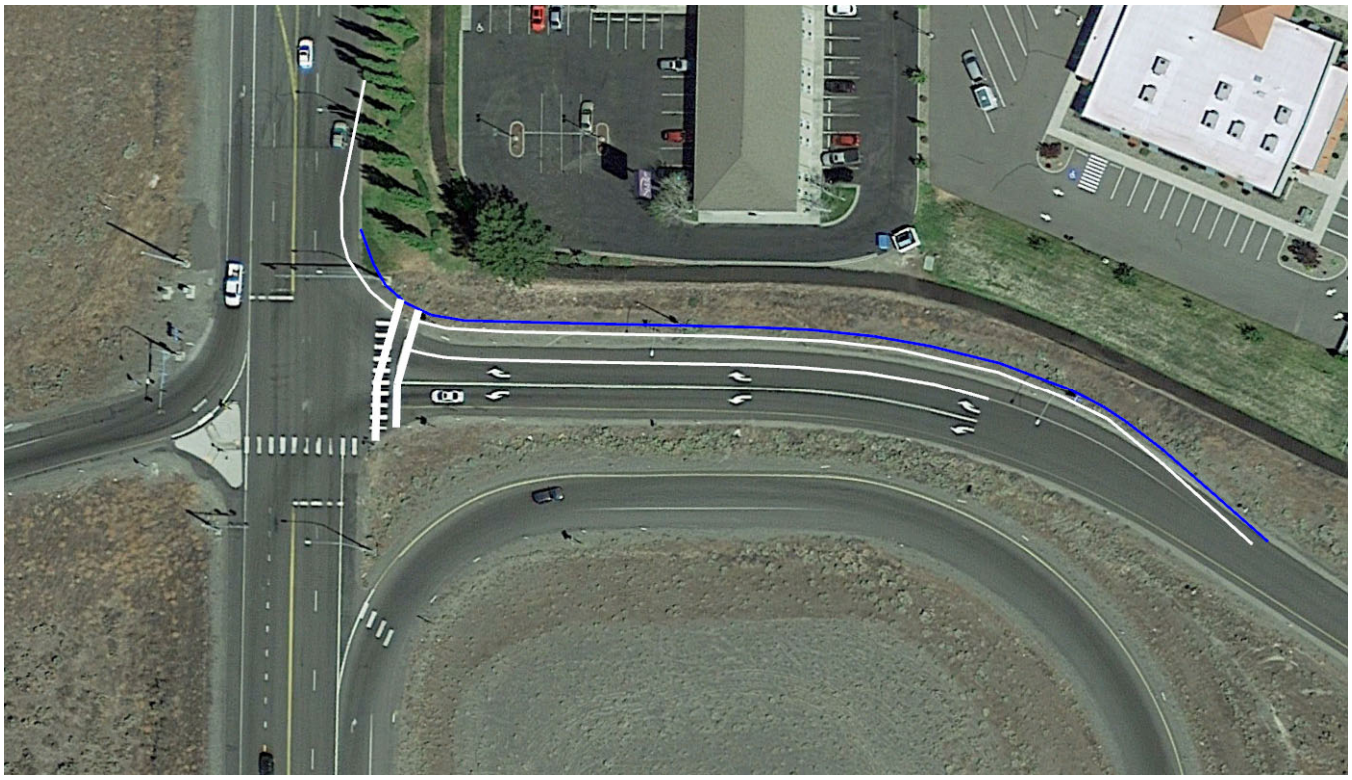


FIGURE 5: I-182 WESTBOUND RAMP WIDENING

Table 10 summarizes the PM peak hour 2025 and 2040 operations for the I-182 westbound ramps and Broadmoor Boulevard intersection.

TABLE 10: I-182 WESTBOUND RAMP TERMINAL INTERSECTION BUILD HCM OPERATIONS

INTERSECTION	MOBILITY STANDARD	TIME PERIOD	DELAY (S)	LOS	V/C
I-182 WESTBOUND	LOS D	2025 PM	16	B	0.87

RAMPS AND RD 100	2040 PM	13	B	0.80

As shown in Table 10, the added westbound right turn lane provides enough capacity to maintain an overall intersection LOS B under 2025 and 2040 PM peak hour conditions. Table 11 summarizes the 95th Percentile queues at the ramp terminal with the second westbound right turn in place for 2025 PM peak hour conditions.

TABLE 11: I-182 WESTBOUND RAMP TERMINAL INTERSECTION BUILD 95TH PERCENTILE QUEUE RESULTS

MOVEMENT	95TH PERCENTILE QUEUE	AVAILABLE STORAGE
I-182 WESTBOUND RAMPS AND RD 100 – 2025 PM Peak Hour		
NBT	940 ft	1,110 ft[A]
SBT	160 ft	750 ft[A]
SBR	<10 ft	750 ft[A]
WBL	450	1,030 ft[B]
WBR	600	1,030 ft[B]

[A] Storage measured to nearest upstream signalized intersection.

[B] Storage measured based on off-ramp length (striped gore to stop bar) minus the safe stopping distance for a vehicle traveling 60 mph.

Bold = queue length exceeds available storage

As shown in Table 11, the added westbound right turn lane on the I-182 westbound off-ramp to Broadmoor Boulevard provides enough storage to prevent queues from spilling back into the safe sight stopping distance on westbound I-182. The queues on Broadmoor Boulevard remain within the available storage.

EASTBOUND RAMP TERMINAL SOLUTIONS

The primary needs to address for the eastbound ramp terminal are eastbound off-ramp queues, as highlighted under existing conditions and exacerbated by increased demand in the future, particularly for the eastbound left turn and southbound left turn (conflicting critical movement for the eastbound off-ramp). Increased off-ramp queues could also worsen the existing safety issues on the ramp.

The first option considered at the I-182 eastbound ramp terminal focused on maintaining the existing ramp configuration while adding capacity to the high growth traffic movements, particularly the southbound left turn. This option includes the following changes to the ramp terminal:

- Widen the eastbound off-ramp to include a second eastbound right turn lane. Signalize now dual right turn and prohibit right turn on red movements to reduce weaving on southbound Broadmoor Boulevard.

- Widen the southbound Broadmoor Boulevard approach to include a second, 300’ southbound through lane, and a second 200’ southbound left turn lane. This would required widening/replacing the current bridge structure over I-182.
- Widen the eastbound on-ramp to include two lanes to receive the dual southbound left turn and merge the dual lanes to a single lane.

As noted, this option would require reconstruction of the current Broadmoor Boulevard bridge over I-182 due to the widening of the north leg of the eastbound ramp terminal intersection. The proximity of the ramp terminal intersection to the existing bridge structure does not allow enough space to add second southbound left and through lanes with sufficient storage and safe transition tapers without impacting the bridge. This option is shown in Figure 6.

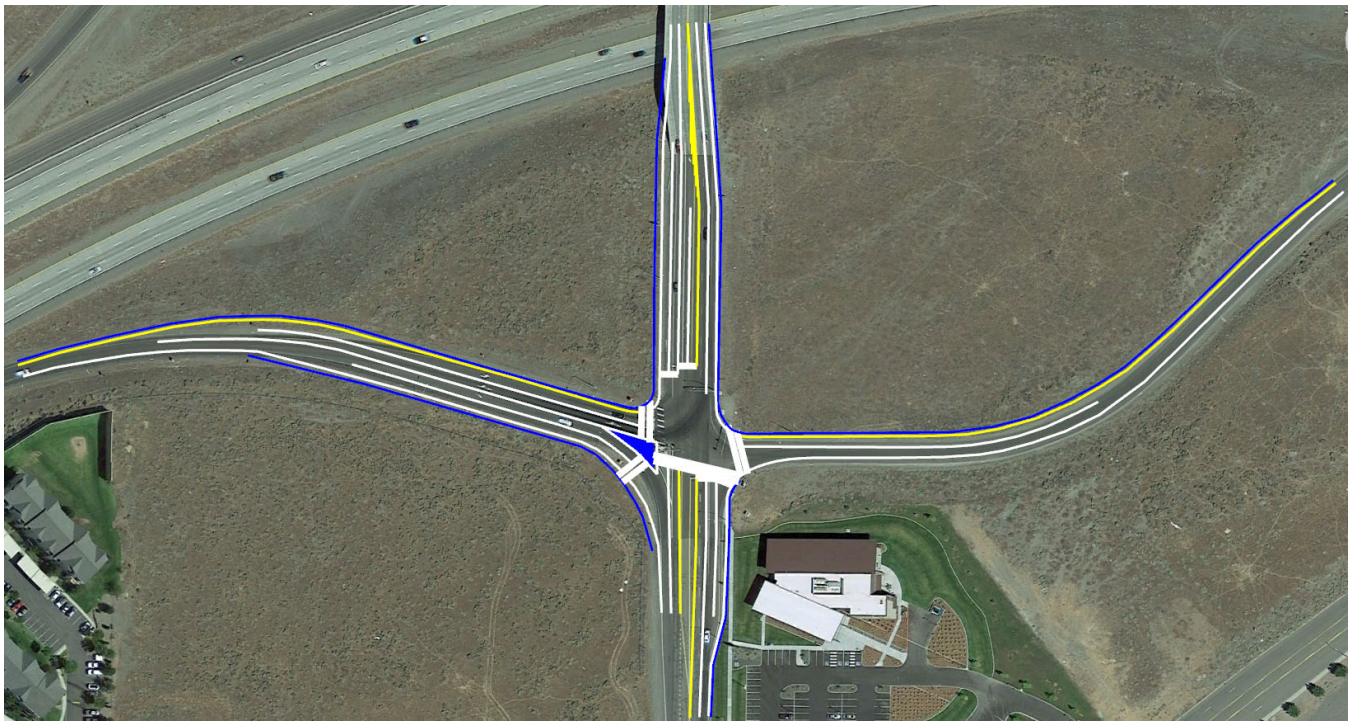


FIGURE 6: EASTBOUND RAMP TERMINAL WIDENING OPTION

The second option considered at the I-182 eastbound ramp terminal focused on maintaining as much of the exiting ramp terminal configuration as possible while also addressing the highest volume movement, the eastbound left turn. This option includes the following changes to the ramp terminal:

- Add a loop ramp from eastbound I-182 to northbound Broadmoor Boulevard. This new off-ramp would widen to a dual lane, signalized westbound right turn at the ramp terminal intersection.
- The eastbound right turn would be modified to a dual lane, fully signalized movement with right turn on red prohibited.

This option is shown in Figure 7.

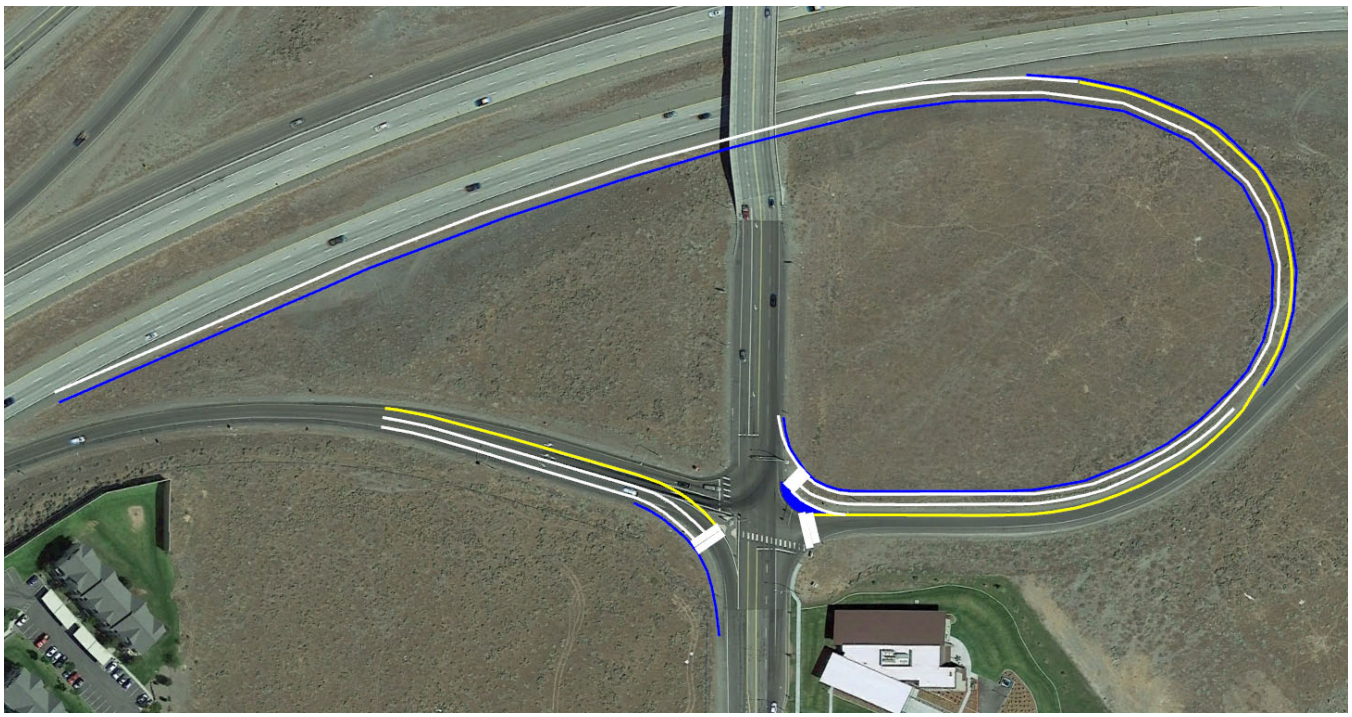


FIGURE 7: EASTBOUND RAMP TERMINAL LOOP RAMP OPTION

The loop ramp option could also include a roundabout at the ramp terminal. Two different roundabout options were considered: A simple, multi-lane roundabout (Simple Multi Option) and a roundabout with multiple slip lanes (Slip Lane Option). The geometries of these potential roundabouts are summarized in Figures 8. Note that roundabout options were considered for the widening alternative but were found to be infeasible due to the heavy westbound left turn traffic demand.

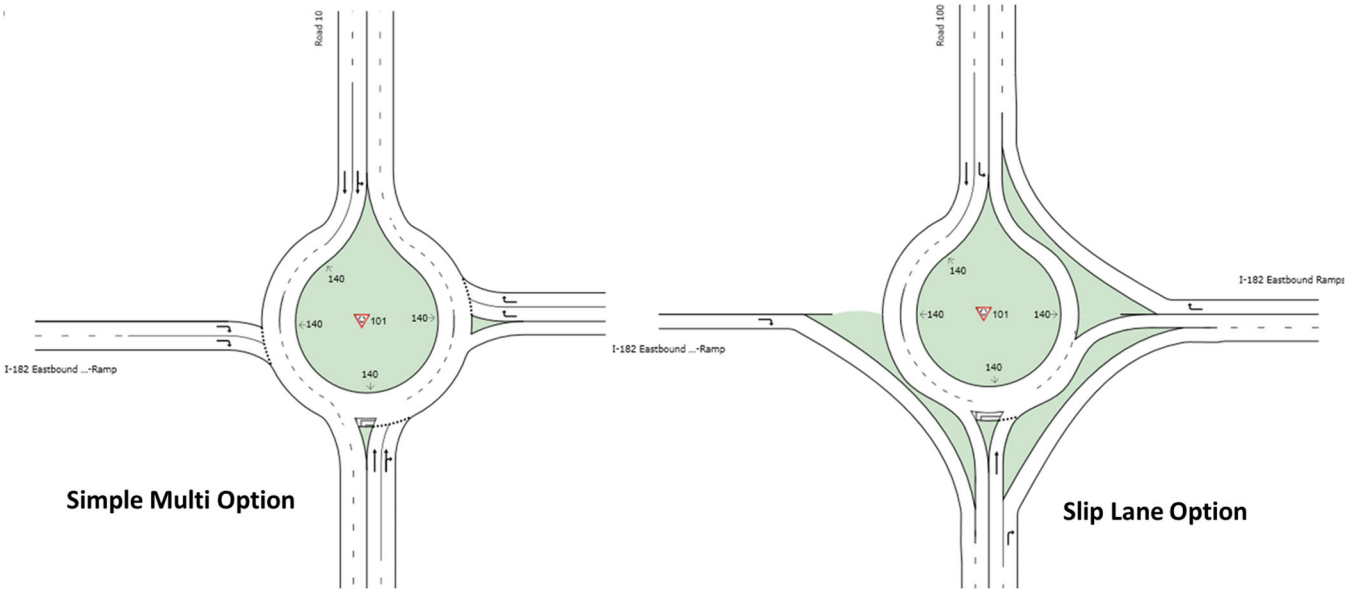


FIGURE 8: ROUNDABOUT OPTIONS

Table 12 summarizes the PM peak hour 2025 Widening option build operations for the I-182 eastbound ramps and Broadmoor Boulevard intersection.

TABLE 12: SHORT-TERM (YEAR 2025) I-182 EASTBOUND RAMP TERMINAL BUILD OPERATIONS RESULTS

INTERSECTION	MOBILITY STANDARD	DELAY (S)	LOS	V/C
2025 PM				
Widening Option	LOS D	31	C	0.94
Loop Ramp with Signal		24	C	0.91
Loop Ramp with Simple Multi Roundabout		8	A	0.81
Loop Ramp with Slip Lane Roundabout		8	A	0.90
2040 PM				
Widening Option	LOS D	35	D	0.98
Loop Ramp with Signal		25	C	0.93
Loop Ramp with Simple Multi Roundabout		8	A	0.58
Loop Ramp with Slip Lane Roundabout		28	D	1.21

As shown in Table 12, all four options provide LOS C or better operations under 2025 PM peak hour conditions, and with the exception of the widening option under 2040 conditions as well. The widening options operates closest to capacity. In addition, the widening option retains all of the I-182 eastbound exit traffic in a single lane, nearly 2,000 vehicles in the 2025 PM peak hour. This volumes at a single lane freeway diverge would likely cause congestion on eastbound I-182, regardless of the operations at the eastbound ramp terminal.

The queues at the I-182 eastbound ramp terminal were analyzed in SimTraffic for the signalized options, and in Sidra for the roundabout options under 2025 PM peak hour conditions. These queues are summarized in Table 13.

TABLE 13: SHORT-TERM (YEAR 2025) I-182 EASTBOUND RAMP TERMINAL BUILD 95TH PERCENTILE QUEUE RESULTS

MOVEMENT	2025 PM Peak Hour 95TH PERCENTILE QUEUE				AVAILABLE STORAGE	
	Widening Option	Loop Ramp with Signal	Loop Ramp with Simple Multi RAB	Loop Ramp with Slip Lane RAB	Widening	Loop
I-182 EASTBOUND RAMPS AND RD 100						
NBT	770 ft	630 ft	90 ft	550 ft	920 ft[A]	920 ft[A]

NBR	**250 ft**	**380 ft**		<10 ft	175 ft[B]	175 ft[B]
SBL	200 ft	530 ft	<10 ft	<10 ft	1,110 ft[A]	1,110 ft[A]
SBT	230 ft	860 ft		<10 ft	1,110 ft[A]	1,110 ft[A]
EBL	400 ft	-	-	-	900 ft[C]	-
EBR	250 ft	400 ft	60 ft	<10 ft	900 ft[C]	900 ft[C]
WBR	**-**	250 ft	220 ft	<10 ft	-	600 ft[B]

[A] Storage measured to nearest upstream signalized intersection.

[B] Storage measured based on effective turn bay length

[C] Storage measured based on off-ramp length (striped gore to stop bar) minus the safe stopping distance for a vehicle traveling 60 mph.

Bold = queue length exceeds available storage

As shown in Table 13, with the exception of the northbound right turn pocket, all four options provide sufficient queue storage and capacity to serve the 2025 PM peak hour demand. The roundabout options result in the shortest queues.

Preliminary planning level cost estimates were completed for each of the project, summarized as follows:

- I-182 Westbound Ramp Terminal:
  - Dual westbound right turn lane and signal modification: **$750,000**
- I-182 Eastbound Ramp Terminal:
  - Ramp Terminal Widening: **$22.6 million**
  - Loop Ramp with Signal: **$3.3 million** ($2.0 million for the loop ramp)
  - Loop Ramp with Simple Multilane Roundabout: **$5.0 million** (does not include $2 million for loop ramp)
  - Loop Ramp with Slip Lane Roundabout: **$5.0 million** (does not include $2 million for loop ramp)

With the exception of the slip lane roundabout, all the other proposed projects provide LOS D or better operations and maintain queues within the safe sight stopping distance on the freeway off-ramps. As noted previously, the widening option will not fix any freeway diverge issues at the eastbound off-ramp and is also not compatible with any of the roundabout alternatives. The eastbound left turn demand is too high for even a multi-lane roundabout to serve as a left turn.

The loop ramp options all perform well and could mitigate freeway diverge issues by splitting the eastbound I-182 to southbound Broadmoor and I-182 to northbound volumes. The signal option could be a first phase of an ultimate roundabout improvement at the eastbound ramp terminal.

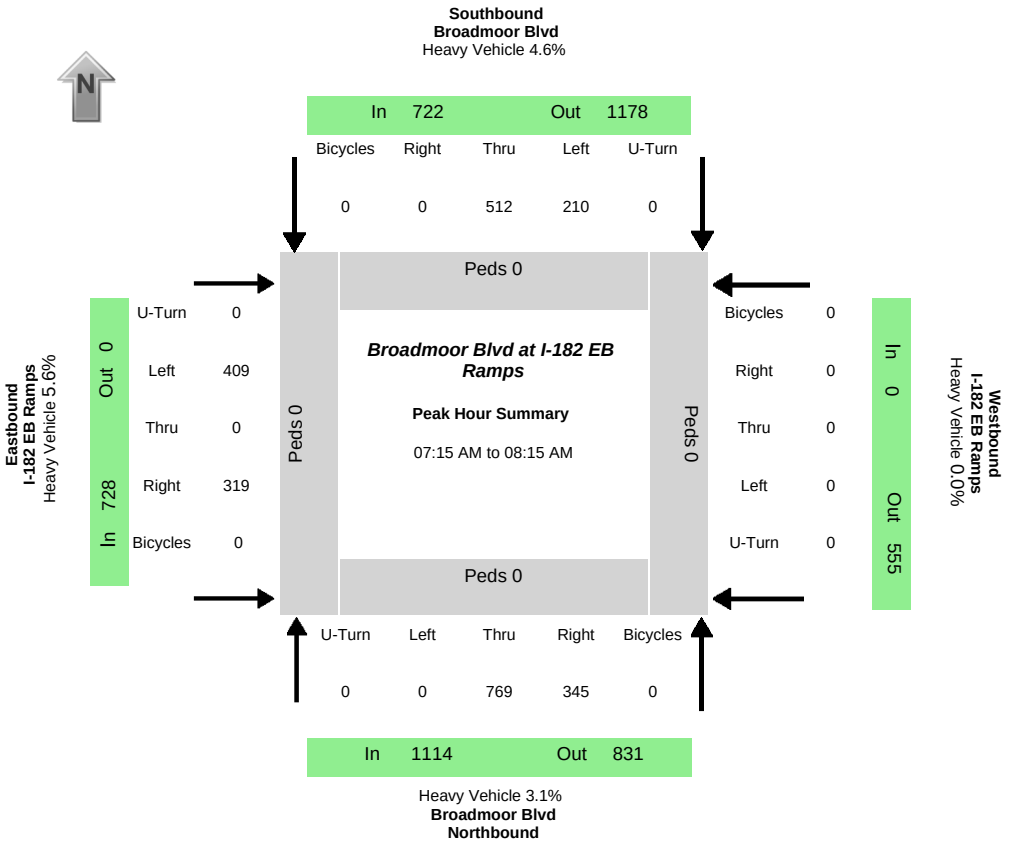
APPENDICES

CONTENTS

APPENDIX A: TRAFFIC COUNTS

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street	*Broadmoor Blvd*
E/W street	*I-182 EB Ramps*
City, State	Pasco WA
Site Notes	
Location	46.273624 - -119.221544
Start Date	Wednesday, March 27, 2019
Start Time	07:00:00 AM
Weather	
Study ID #	
Peak Hour Start	07:15:00 AM
Peak 15 Min Start	07:20:00 AM
PHF (15-Min Int)	0.85



Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	769	345	0	210	512	0	0	409	0	319	0	0	0	0	0	1114	722	728	0	831	1178	0	555

Percent Heavy Vehicles

0.0%	3.5%	2.3%	0.0%	7.1%	3.5%	0.0%	0.0%	6.8%	0.0%	4.1%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	4.6%	5.6%	0.0%	3.7%	4.7%	NaN	4.1%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PHV - Pedestrians

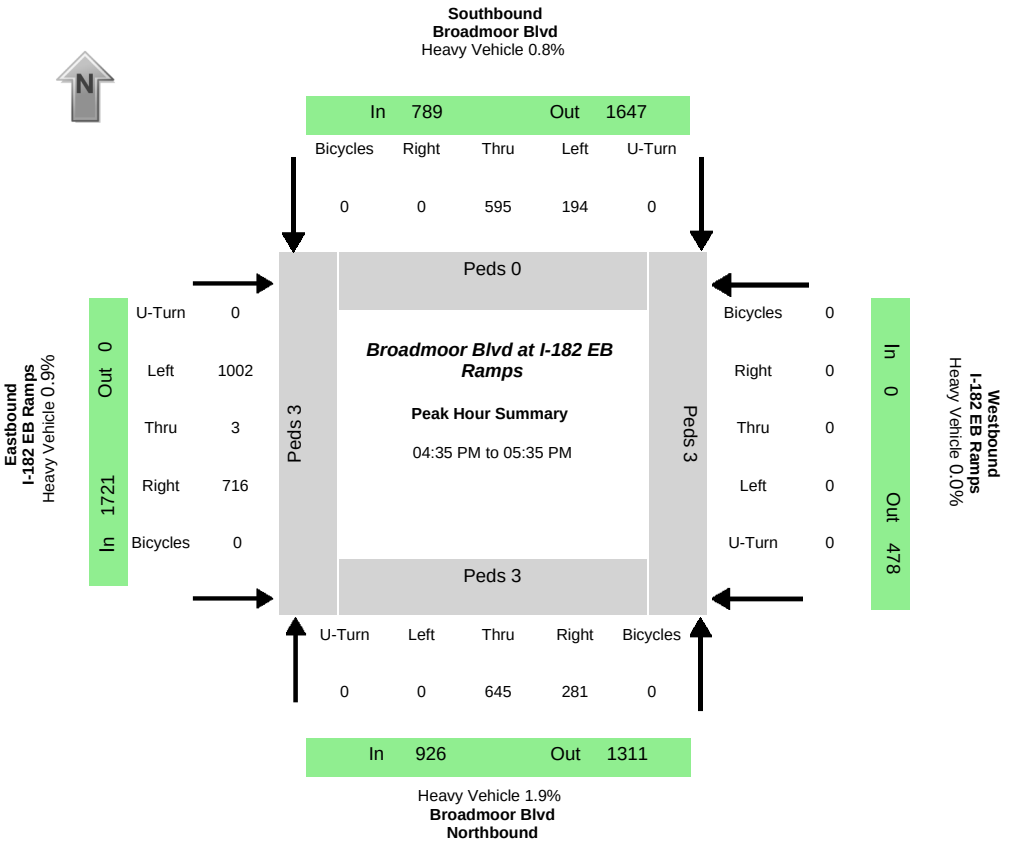
in Crosswalk				
NB	SB	EB	WB	Sum
0	0	0	0	0

All Vehicle Volumes

	Northbound Broadmoor Blvd				Southbound Broadmoor Blvd				Eastbound I-182 EB Ramps				Westbound I-182 EB Ramps				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
07:00:00 AM	0	36	15	0	8	27	0	0	21	0	23	0	0	0	0	0		
07:05:00 AM	0	48	25	0	11	28	0	0	15	0	23	0	0	0	0	0		
07:10:00 AM	0	50	24	0	13	26	0	0	18	0	28	0	0	0	0	0	439	
07:15:00 AM	0	61	17	0	20	58	0	0	22	0	31	0	0	0	0	0	518	
07:20:00 AM	0	57	27	0	19	66	0	0	33	0	40	0	0	0	0	0	610	
07:25:00 AM	0	55	24	0	15	75	0	0	24	0	34	0	0	0	0	0	678	
07:30:00 AM	0	84	33	0	25	79	0	0	34	0	29	0	0	0	0	0	753	
07:35:00 AM	0	87	41	0	12	51	0	0	20	0	22	0	0	0	0	0	744	
07:40:00 AM	0	79	36	0	23	24	0	0	35	0	23	0	0	0	0	0	737	
07:45:00 AM	0	83	48	0	23	30	0	0	37	0	30	0	0	0	0	0	704	
07:50:00 AM	0	81	35	0	16	21	0	0	37	0	20	0	0	0	0	0	681	
07:55:00 AM	0	62	25	0	16	26	0	0	50	0	23	0	0	0	0	0	663	2517
08:00:00 AM	0	44	16	0	10	22	0	0	45	0	22	0	0	0	0	0	571	2546
08:05:00 AM	0	36	21	0	14	33	0	0	37	0	21	0	0	0	0	0	523	2558
08:10:00 AM	0	40	22	0	17	27	0	0	35	0	24	0	0	0	0	0	486	2564
08:15:00 AM	0	55	18	0	20	21	0	0	38	0	23	0	0	0	0	0	502	2530
08:20:00 AM	0	46	20	0	12	27	0	0	46	0	23	0	0	0	0	0	514	2462
08:25:00 AM	0	48	14	0	13	25	0	0	45	0	17	0	0	0	0	0	511	2397
08:30:00 AM	0	41	23	0	11	30	0	0	32	0	10	0	0	0	0	0	483	2260
08:35:00 AM	0	37	16	0	12	29	0	0	31	0	10	0	0	0	0	0	444	2162
08:40:00 AM	0	42	20	0	22	17	0	0	41	1	14	0	0	0	0	0	439	2099
08:45:00 AM	0	54	16	0	6	31	0	0	42	1	25	0	0	0	0	0	467	2023
08:50:00 AM	0	41	22	0	6	20	0	0	39	0	22	0	0	0	0	0	482	1963
08:55:00 AM	0	60	16	0	14	17	0	0	29	0	17	0	0	0	0	0	478	1914

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street	*Broadmoor Blvd*
E/W street	*I-182 EB Ramps*
City, State	Pasco WA
Site Notes	
Location	46.273624 - -119.221544
Start Date	Tuesday, March 26, 2019
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.88



Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	645	281	0	194	595	0	0	1002	3	716	0	0	0	0	0	926	789	1721	0	1311	1647	0	478

Percent Heavy Vehicles

0.0%	1.9%	2.1%	0.0%	0.5%	0.8%	0.0%	0.0%	1.1%	0.0%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%	0.8%	0.9%	0.0%	0.8%	1.4%	NaN	1.5%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PHV - Pedestrians

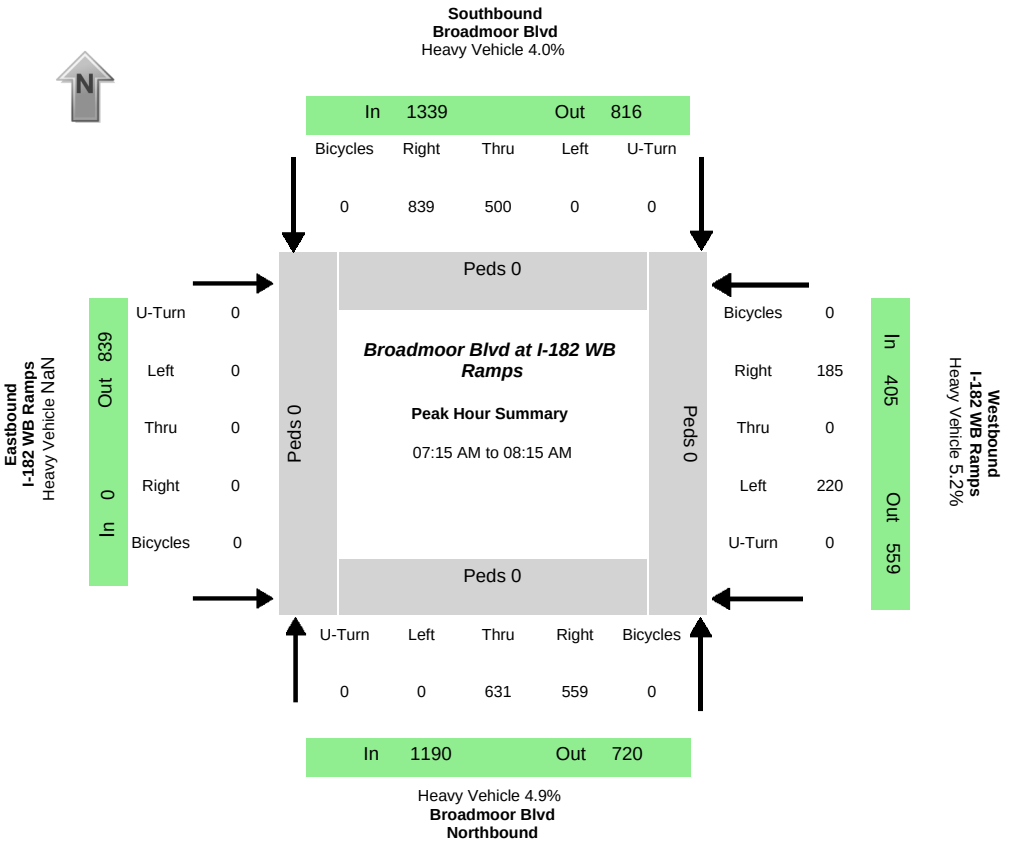
in Crosswalk				
NB	SB	EB	WB	**Sum**
3	0	3	3	9

All Vehicle Volumes

	Northbound Broadmoor Blvd				Southbound Broadmoor Blvd				Eastbound I-182 EB Ramps				Westbound I-182 EB Ramps				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:00:00 PM	0	29	19	0	11	51	0	0	55	0	36	0	0	0	0	0		
04:05:00 PM	0	45	26	0	17	39	0	0	71	1	40	0	0	0	0	0		
04:10:00 PM	0	50	17	0	13	49	0	0	64	0	43	0	0	0	0	0	676	
04:15:00 PM	0	45	16	0	15	48	0	0	81	0	43	0	0	0	0	0	723	
04:20:00 PM	0	43	33	0	19	36	0	0	69	0	47	0	0	0	0	0	731	
04:25:00 PM	0	35	15	0	15	51	0	0	68	0	54	0	0	0	0	0	733	
04:30:00 PM	0	41	19	0	10	42	0	0	63	1	51	0	0	0	0	0	712	
04:35:00 PM	0	49	18	0	12	50	0	0	81	0	56	0	0	0	0	0	731	
04:40:00 PM	0	46	21	0	19	57	0	0	81	0	63	0	0	0	0	0	780	
04:45:00 PM	0	44	22	0	17	42	0	0	72	0	61	0	0	0	0	0	811	
04:50:00 PM	0	58	25	0	11	53	0	0	77	0	63	0	0	0	0	0	832	
04:55:00 PM	0	49	20	0	13	53	0	0	96	1	58	0	0	0	0	0	835	3024
05:00:00 PM	0	54	26	0	9	37	0	0	77	0	48	0	0	0	0	0	828	3074
05:05:00 PM	0	58	28	0	27	54	0	0	74	0	53	0	0	0	0	0	835	3129
05:10:00 PM	0	72	31	0	18	57	0	0	97	0	67	0	0	0	0	0	887	3235
05:15:00 PM	0	52	29	0	18	57	0	0	105	1	76	0	0	0	0	0	974	3325
05:20:00 PM	0	51	23	0	18	38	0	0	91	0	70	0	0	0	0	0	971	3369
05:25:00 PM	0	53	22	0	18	59	0	0	70	1	53	0	0	0	0	0	905	3407
05:30:00 PM	0	59	16	0	14	38	0	0	81	0	48	0	0	0	0	0	823	3436
05:35:00 PM	0	52	23	0	13	46	0	0	76	0	52	0	0	0	0	0	794	3432
05:40:00 PM	0	47	41	0	16	49	0	0	80	0	48	0	0	0	0	0	799	3426
05:45:00 PM	0	51	22	0	12	47	0	0	59	0	43	0	0	0	0	0	777	3402
05:50:00 PM	0	48	22	0	11	42	0	0	82	0	43	0	0	0	0	0	763	3363
05:55:00 PM	0	36	18	0	15	42	0	0	56	0	51	0	0	0	0	0	700	3291

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street	*Broadmoor Blvd*
E/W street	*I-182 WB Ramps*
City, State	Pasco WA
Site Notes	
Location	46.276943 - -119.221432
Start Date	Wednesday, March 27, 2019
Start Time	07:00:00 AM
Weather	
Study ID #	
Peak Hour Start	07:15:00 AM
Peak 15 Min Start	07:40:00 AM
PHF (15-Min Int)	0.88



Peak-Hour Volumes (PHV)																								
Northbound				**Southbound**				**Eastbound**				**Westbound**				**Entering**				**Leaving**			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	631	559	0	0	500	839	0	0	0	0	0	220	0	185	0	1190	1339	0	405	720	816	839	559
Percent Heavy Vehicles																							
0.0%	8.1%	1.3%	0.0%	0.0%	6.0%	2.7%	0.0%	0.0%	0.0%	0.0%	0.0%	3.2%	0.0%	7.6%	0.0%	4.9%	4.0%	NaN	5.2%	5.1%	8.0%	2.7%	1.3%

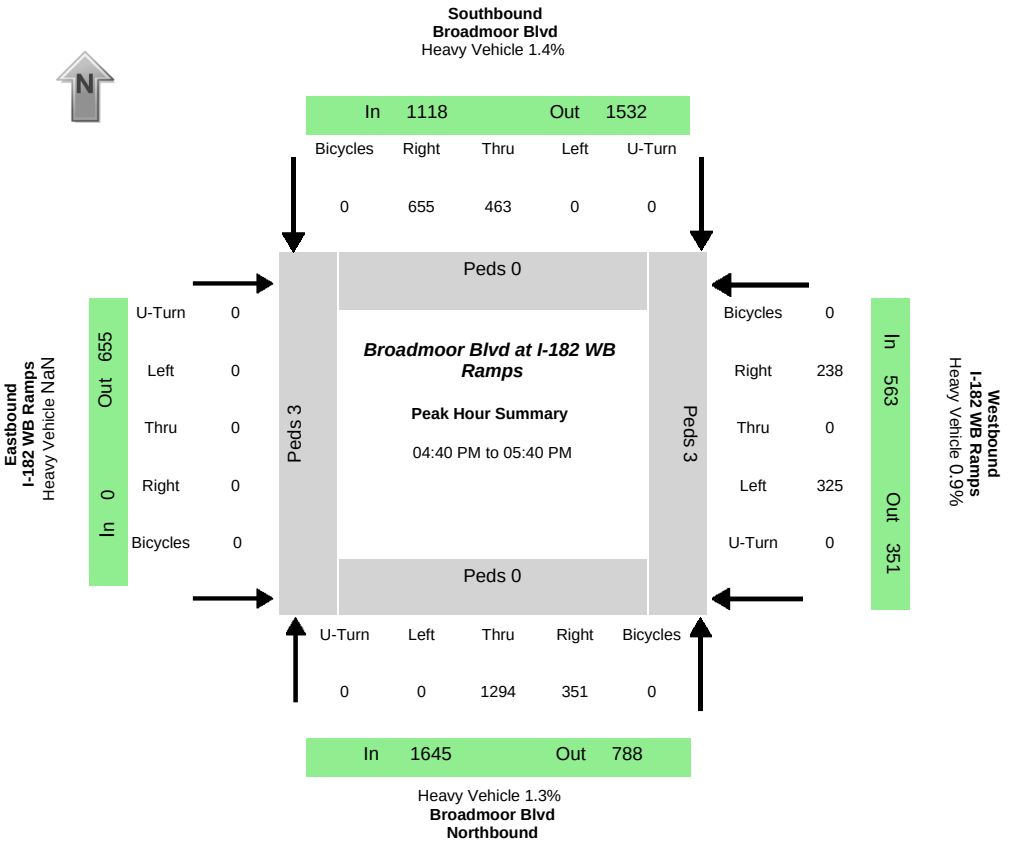
PHV- Bicycles																	PHV - Pedestrians					
Northbound				**Southbound**				**Eastbound**				**Westbound**					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

All Vehicle Volumes

	Northbound Broadmoor Blvd				**Southbound** Broadmoor Blvd				**Eastbound** I-182 WB Ramps				**Westbound** I-182 WB Ramps				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
07:00:00 AM	0	31	27	0	0	26	34	0	0	0	0	0	11	0	12	0		
07:05:00 AM	0	23	35	0	0	31	41	0	0	0	0	0	10	0	9	0		
07:10:00 AM	0	20	48	0	0	36	56	0	0	0	0	0	12	0	8	0	470	
07:15:00 AM	0	39	42	0	0	55	57	0	0	0	0	0	19	0	10	0	551	
07:20:00 AM	0	49	46	0	0	65	59	0	0	0	0	0	19	0	16	0	656	
07:25:00 AM	0	42	42	0	0	77	69	0	0	0	0	0	27	0	18	0	751	
07:30:00 AM	0	52	57	0	0	66	70	0	0	0	0	0	30	0	12	0	816	
07:35:00 AM	0	48	57	0	0	41	87	0	0	0	0	0	16	0	15	0	826	
07:40:00 AM	0	52	68	0	0	39	88	0	0	0	0	0	16	0	16	0	830	
07:45:00 AM	0	53	66	0	0	30	99	0	0	0	0	0	18	0	18	0	827	
07:50:00 AM	0	66	54	0	0	29	93	0	0	0	0	0	10	0	22	0	837	
07:55:00 AM	0	75	36	0	0	21	66	0	0	0	0	0	16	0	19	0	791	2842
08:00:00 AM	0	57	30	0	0	14	54	0	0	0	0	0	19	0	17	0	698	2892
08:05:00 AM	0	49	30	0	0	37	47	0	0	0	0	0	15	0	9	0	611	2930
08:10:00 AM	0	49	31	0	0	26	50	0	0	0	0	0	15	0	13	0	562	2934
08:15:00 AM	0	63	31	0	0	26	50	0	0	0	0	0	15	0	19	0	575	2916
08:20:00 AM	0	55	28	0	0	22	53	0	0	0	0	0	15	0	17	0	578	2852
08:25:00 AM	0	62	33	0	0	30	40	0	0	0	0	0	12	0	34	0	605	2788
08:30:00 AM	0	49	31	0	0	19	55	0	0	0	0	0	14	0	11	0	580	2680
08:35:00 AM	0	48	19	0	0	31	43	0	0	0	0	0	13	0	10	0	554	2580
08:40:00 AM	0	50	36	0	0	29	61	0	0	0	0	0	7	0	9	0	535	2493
08:45:00 AM	0	53	38	0	0	26	64	0	0	0	0	0	12	0	23	0	572	2425
08:50:00 AM	0	47	35	0	0	24	48	0	0	0	0	0	4	0	17	0	583	2326
08:55:00 AM	0	58	37	0	0	21	48	0	0	0	0	0	8	0	21	0	584	2286

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street	*Broadmoor Blvd*
E/W street	*I-182 WB Ramps*
City, State	Pasco WA
Site Notes	
Location	46.276943 - -119.221432
Start Date	Tuesday, March 26, 2019
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:40:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.86



Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	1294	351	0	0	463	655	0	0	0	0	0	325	0	238	0	1645	1118	0	563	788	1532	655	351

Percent Heavy Vehicles

0.0%	1.5%	0.9%	0.0%	0.0%	1.1%	1.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.0%	1.3%	0.0%	1.3%	1.4%	NaN	0.9%	0.9%	1.4%	1.7%	0.9%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PHV - Pedestrians

in Crosswalk				
NB	SB	EB	WB	**Sum**
0	0	3	3	6

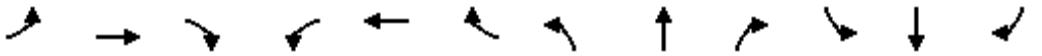
All Vehicle Volumes

	Northbound Broadmoor Blvd				Southbound Broadmoor Blvd				Eastbound I-182 WB Ramps				Westbound I-182 WB Ramps				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:00:00 PM	0	74	13	0	0	39	62	0	0	0	0	0	19	0	17	0		
04:05:00 PM	0	80	26	0	0	40	49	0	0	0	0	0	22	0	18	0		
04:10:00 PM	0	94	34	0	0	33	56	0	0	0	0	0	27	0	21	0	724	
04:15:00 PM	0	98	26	0	0	31	48	0	0	0	0	0	33	0	14	0	750	
04:20:00 PM	0	81	29	0	0	34	55	0	0	0	0	0	25	0	13	0	752	
04:25:00 PM	0	74	23	0	0	29	58	0	0	0	0	0	28	0	17	0	716	
04:30:00 PM	0	99	27	0	0	33	50	0	0	0	0	0	18	0	15	0	708	
04:35:00 PM	0	95	35	0	0	50	50	0	0	0	0	0	20	0	14	0	735	
04:40:00 PM	0	92	30	0	0	46	54	0	0	0	0	0	33	0	19	0	780	
04:45:00 PM	0	90	30	0	0	36	56	0	0	0	0	0	19	0	11	0	780	
04:50:00 PM	0	110	27	0	0	34	50	0	0	0	0	0	23	0	19	0	779	
04:55:00 PM	0	111	23	0	0	38	54	0	0	0	0	0	29	0	26	0	786	3006
05:00:00 PM	0	97	22	0	0	35	65	0	0	0	0	0	18	0	17	0	798	3036
05:05:00 PM	0	133	25	0	0	57	64	0	0	0	0	0	26	0	18	0	858	3124
05:10:00 PM	0	128	32	0	0	40	71	0	0	0	0	0	45	0	25	0	918	3200
05:15:00 PM	0	121	37	0	0	25	59	0	0	0	0	0	36	0	28	0	970	3256
05:20:00 PM	0	103	31	0	0	46	43	0	0	0	0	0	27	0	21	0	918	3290
05:25:00 PM	0	111	31	0	0	36	40	0	0	0	0	0	23	0	19	0	837	3321
05:30:00 PM	0	98	30	0	0	30	49	0	0	0	0	0	19	0	14	0	771	3319
05:35:00 PM	0	100	33	0	0	40	50	0	0	0	0	0	27	0	21	0	771	3326
05:40:00 PM	0	102	24	0	0	38	52	0	0	0	0	0	20	0	13	0	760	3301
05:45:00 PM	0	80	39	0	0	33	53	0	0	0	0	0	23	0	25	0	773	3312
05:50:00 PM	0	92	30	0	0	39	58	0	0	0	0	0	21	0	27	0	769	3316
05:55:00 PM	0	87	14	0	0	34	38	0	0	0	0	0	18	0	16	0	727	3242

APPENDIX B. EXISTING AM PEAK HOUR SYNCHRO/SIMTRAFFIC RESULTS

HCM 6th Signalized Intersection Summary
1: Road 100 & I 182 WB On Ramp/I 182 WB On/Off Ramp

04/09/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	225	0	185	0	622	559	0	500	839
Future Volume (veh/h)	0	0	0	225	0	185	0	622	559	0	500	839
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1856	0	1781	0	1781	1885	0	1811	1856
Adj Flow Rate, veh/h				256	0	192	0	707	0	0	568	0
Peak Hour Factor				0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %				3	0	8	0	8	1	0	6	3
Cap, veh/h				318	0	272	0	2209		0	2245	
Arrive On Green				0.18	0.00	0.18	0.00	1.00	0.00	0.00	0.65	0.00
Sat Flow, veh/h				1767	0	1510	0	3474	1598	0	3532	1572
Grp Volume(v), veh/h				256	0	192	0	707	0	0	568	0
Grp Sat Flow(s),veh/h/ln				1767	0	1510	0	1692	1598	0	1721	1572
Q Serve(g_s), s				7.6	0.0	6.6	0.0	0.0	0.0	0.0	3.8	0.0
Cycle Q Clear(g_c), s				7.6	0.0	6.6	0.0	0.0	0.0	0.0	3.8	0.0
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				318	0	272	0	2209		0	2245	
V/C Ratio(X)				0.80	0.00	0.71	0.00	0.32		0.00	0.25	
Avail Cap(c_a), veh/h				495	0	423	0	2209		0	2245	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.00	0.66	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				21.6	0.0	21.2	0.0	0.0	0.0	0.0	4.0	0.0
Incr Delay (d2), s/veh				2.5	0.0	1.3	0.0	0.3	0.0	0.0	0.3	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				3.0	0.0	2.2	0.0	0.1	0.0	0.0	0.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				24.1	0.0	22.4	0.0	0.3	0.0	0.0	4.2	0.0
LnGrp LOS				C	A	C	A	A		A	A	
Approach Vol, veh/h					448			707	A		568	A
Approach Delay, s/veh					23.4			0.3			4.2	
Approach LOS					C			A			A	

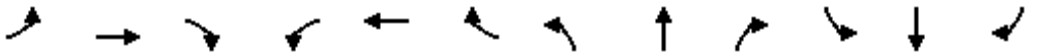
Timer - Assigned Phs	2		6		8							
Phs Duration (G+Y+Rc), s	40.5		40.5		14.5							
Change Period (Y+Rc), s	4.6		4.6		4.6							
Max Green Setting (Gmax), s	30.4		30.4		15.4							
Max Q Clear Time (g_c+I1), s	2.0		5.8		9.6							
Green Ext Time (p_c), s	4.8		3.9		0.3							

Intersection Summary												
HCM 6th Ctrl Delay	7.6											
HCM 6th LOS	A											

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	409	0	328	0	0	0	0	772	345	210	515	0
Future Volume (veh/h)	409	0	328	0	0	0	0	772	345	210	515	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1796	1900	1841				0	1841	1870	1796	1841	0
Adj Flow Rate, veh/h	481	0	0				0	908	167	247	606	0
Peak Hour Factor	0.85	0.85	0.85				0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	7	0	4				0	4	2	7	4	0
Cap, veh/h	625	0					0	1623	733	445	1196	0
Arrive On Green	0.18	0.00	0.00				0.00	0.46	0.46	0.03	0.21	0.00
Sat Flow, veh/h	3421	0	1560				0	3589	1580	1711	1841	0
Grp Volume(v), veh/h	481	0	0				0	908	167	247	606	0
Grp Sat Flow(s),veh/h/ln	1711	0	1560				0	1749	1580	1711	1841	0
Q Serve(g_s), s	7.4	0.0	0.0				0.0	10.3	3.5	3.6	16.0	0.0
Cycle Q Clear(g_c), s	7.4	0.0	0.0				0.0	10.3	3.5	3.6	16.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	625	0					0	1623	733	445	1196	0
V/C Ratio(X)	0.77	0.00					0.00	0.56	0.23	0.55	0.51	0.00
Avail Cap(c_a), veh/h	958	0					0	1623	733	656	1196	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	0.33	0.33	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	1.00	1.00	0.92	0.92	0.00
Uniform Delay (d), s/veh	21.4	0.0	0.0				0.0	10.7	8.8	8.6	13.8	0.0
Incr Delay (d2), s/veh	0.8	0.0	0.0				0.0	1.4	0.7	0.4	1.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	0.0	0.0				0.0	3.1	1.0	0.8	7.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.2	0.0	0.0				0.0	12.1	9.6	9.0	15.2	0.0
LnGrp LOS	C	A					A	B	A	A	B	A
Approach Vol, veh/h		481	A					1075			853	
Approach Delay, s/veh		22.2						11.7			13.4	
Approach LOS		C						B			B	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	10.2	30.1		14.7		40.3
Change Period (Y+Rc), s	4.6	4.6		4.6		4.6
Max Green Setting (Gmax), s	12.4	13.4		15.4		30.4
Max Q Clear Time (g_c+I1), s	5.6	12.3		9.4		18.0
Green Ext Time (p_c), s	0.2	0.7		0.6		2.9

Intersection Summary		
HCM 6th Ctrl Delay		14.4
HCM 6th LOS		B

Notes

User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.
Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	7:15	7:15	7:15	7:15	7:15	7:15	7:15
End Time	8:30	8:30	8:30	8:30	8:30	8:30	8:30
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	3	3	3	3	3	3	3
# of Recorded Intervals	2	2	2	2	2	2	2
Vehs Entered	4204	4423	4259	4275	4316	4205	4271
Vehs Exited	4209	4425	4236	4270	4349	4217	4335
Starting Vehs	158	150	151	193	211	161	242
Ending Vehs	153	148	174	198	178	149	178
Travel Distance (mi)	3642	3894	3712	3805	3801	3719	3768
Travel Time (hr)	166.9	181.9	206.7	221.7	175.7	195.4	209.4
Total Delay (hr)	54.9	62.5	93.0	105.0	59.5	81.3	94.0
Total Stops	5647	6037	7093	7629	5845	6024	6819
Fuel Used (gal)	151.6	161.5	162.2	167.2	158.1	160.9	165.1

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	7:15	7:15	7:15	7:15
End Time	8:30	8:30	8:30	8:30
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	3	3	3	3
# of Recorded Intervals	2	2	2	2
Vehs Entered	4291	4315	4301	4279
Vehs Exited	4319	4281	4280	4291
Starting Vehs	200	174	157	175
Ending Vehs	172	208	178	165
Travel Distance (mi)	3796	3796	3745	3768
Travel Time (hr)	268.3	181.9	200.2	200.8
Total Delay (hr)	151.9	65.5	85.5	85.3
Total Stops	8126	6517	6909	6661
Fuel Used (gal)	180.2	159.0	161.5	162.7

Interval #0 Information Seeding

Start Time	7:15
End Time	7:30
Total Time (min)	15

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording1

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1175	1260	1166	1185	1231	1201	1111
Vehs Exited	1131	1200	1105	1139	1238	1103	1055
Starting Vehs	158	150	151	193	211	161	242
Ending Vehs	202	210	212	239	204	259	298
Travel Distance (mi)	974	1082	967	1005	1075	987	933
Travel Time (hr)	47.1	49.8	49.6	56.4	53.0	55.0	76.9
Total Delay (hr)	17.3	16.6	19.8	25.8	20.1	24.7	48.1
Total Stops	1632	1651	1802	2001	1791	1815	2172
Fuel Used (gal)	41.4	44.4	41.3	44.3	45.6	43.4	46.5

Interval #1 Information Recording1

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	1206	1179	1226	1195
Vehs Exited	1157	1136	1173	1144
Starting Vehs	200	174	157	175
Ending Vehs	249	217	210	222
Travel Distance (mi)	1003	1004	1027	1006
Travel Time (hr)	57.9	49.8	49.4	54.5
Total Delay (hr)	27.2	19.0	17.9	23.7
Total Stops	1989	1848	1780	1846
Fuel Used (gal)	45.0	42.8	43.2	43.8

Interval #2 Information Recording2

Start Time	7:45
End Time	8:30
Total Time (min)	45

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	3029	3163	3093	3090	3085	3004	3160
Vehs Exited	3078	3225	3131	3131	3111	3114	3280
Starting Vehs	202	210	212	239	204	259	298
Ending Vehs	153	148	174	198	178	149	178
Travel Distance (mi)	2668	2812	2745	2799	2726	2731	2835
Travel Time (hr)	119.8	132.0	157.1	165.3	122.7	140.5	132.6
Total Delay (hr)	37.6	45.9	73.2	79.2	39.3	56.6	45.9
Total Stops	4015	4386	5291	5628	4054	4209	4647
Fuel Used (gal)	110.2	117.1	120.9	122.8	112.5	117.5	118.6

Interval #2 Information Recording2

Start Time	7:45
End Time	8:30
Total Time (min)	45

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	3085	3136	3075	3089
Vehs Exited	3162	3145	3107	3149
Starting Vehs	249	217	210	222
Ending Vehs	172	208	178	165
Travel Distance (mi)	2793	2792	2719	2762
Travel Time (hr)	210.4	132.1	150.8	146.3
Total Delay (hr)	124.7	46.5	67.6	61.6
Total Stops	6137	4669	5129	4816
Fuel Used (gal)	135.1	116.2	118.4	118.9

Intersection: 1: Road 100 & I 182 WB On Ramp/I 182 WB On/Off Ramp

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	T	T	T	R
Maximum Queue (ft)	386	187	124	187	89	138	55
Average Queue (ft)	143	64	50	91	30	33	2
95th Queue (ft)	421	159	104	165	77	138	38
Link Distance (ft)	1578		1120	1120		296	296
Upstream Blk Time (%)	0					2	0
Queuing Penalty (veh)	0					12	0
Storage Bay Dist (ft)		350			100		
Storage Blk Time (%)	2				1	2	
Queuing Penalty (veh)	5				3	6	

Intersection: 2: Road 100 & I 182 EB Off Ramp/I 182 EB On Ramp

Movement	EB	EB	EB	NB	NB	NB	SB	SB
Directions Served	L	LT	R	T	T	R	L	T
Maximum Queue (ft)	250	352	643	282	306	200	688	745
Average Queue (ft)	103	144	72	122	266	175	166	278
95th Queue (ft)	217	295	504	259	355	260	614	823
Link Distance (ft)			1642	244	244		1120	1120
Upstream Blk Time (%)			0	1	31		2	5
Queuing Penalty (veh)			0	5	176		6	17
Storage Bay Dist (ft)	230	230				175		
Storage Blk Time (%)	3	3	5		34	2		
Queuing Penalty (veh)	9	11	22		118	9		

Intersection: 4: Road 100 & St Thomas Dr

Movement	WB	NB	NB	SB	SB
Directions Served	R	T	TR	L	T
Maximum Queue (ft)	175	304	390	222	90
Average Queue (ft)	55	54	147	114	15
95th Queue (ft)	139	240	413	228	104
Link Distance (ft)	297	377	377	184	184
Upstream Blk Time (%)	0	0	4	18	2
Queuing Penalty (veh)	0	0	23	73	8
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Road 100 & Bedford St

Movement	NB	NB	SB	SB
Directions Served	T	TR	T	T
Maximum Queue (ft)	3	9	24	29
Average Queue (ft)	0	0	3	1
95th Queue (ft)	3	6	36	15
Link Distance (ft)		296	60	60
Upstream Blk Time (%)			1	0
Queuing Penalty (veh)			9	2
Storage Bay Dist (ft)	130			
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Road 100 & Harris Rd

Movement	EB	NB	SB	SB
Directions Served	LR	L	T	TR
Maximum Queue (ft)	95	79	46	89
Average Queue (ft)	33	31	5	10
95th Queue (ft)	75	67	62	82
Link Distance (ft)	425	60	306	306
Upstream Blk Time (%)		3	1	1
Queuing Penalty (veh)		6	4	4
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9: Road 100 & Vincenzo Dr

Movement	WB	NB	SB
Directions Served	LR	TR	L
Maximum Queue (ft)	84	8	35
Average Queue (ft)	35	0	3
95th Queue (ft)	68	5	20
Link Distance (ft)	560	118	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Road 100 & Buckingham Dr

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	53	13
Average Queue (ft)	21	1
95th Queue (ft)	51	8
Link Distance (ft)	542	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		150
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Road 100 & Nottingham Dr

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	58	30
Average Queue (ft)	26	2
95th Queue (ft)	56	17
Link Distance (ft)	355	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		75
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Road 100 & Delta HS South Leg

Movement	SB	SB	SB
Directions Served	L	T	T
Maximum Queue (ft)	56	26	27
Average Queue (ft)	15	2	2
95th Queue (ft)	46	32	31
Link Distance (ft)		288	288
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)	75		
Storage Blk Time (%)	0	0	
Queuing Penalty (veh)	0	0	

Intersection: 17: Road 100 & Delta HS North Leg

Movement	WB	WB	WB	SB
Directions Served	L	L	R	T
Maximum Queue (ft)	52	51	9	3
Average Queue (ft)	8	11	0	0
95th Queue (ft)	34	39	5	3
Link Distance (ft)	333	333	333	118
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 20: Road 100 & Burns Rd

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	R	L	LTR
Maximum Queue (ft)	152	109	28	61	27
Average Queue (ft)	73	47	3	19	1
95th Queue (ft)	124	88	17	49	11
Link Distance (ft)	1421	2006	2006		1392
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)				95	
Storage Blk Time (%)				0	
Queuing Penalty (veh)				0	

Intersection: 21: Road 100 & Sandifur Parkway

Movement	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	T	T	R	L	T	T
Maximum Queue (ft)	120	374	55	145	135	5	84	193	197
Average Queue (ft)	103	177	17	70	54	0	25	91	110
95th Queue (ft)	143	323	47	127	108	5	66	160	182
Link Distance (ft)		302	302	306	306	306		239	239
Upstream Blk Time (%)		3						0	1
Queuing Penalty (veh)		11						2	2
Storage Bay Dist (ft)	100						100		
Storage Blk Time (%)	7	15					0	4	
Queuing Penalty (veh)	25	51					0	1	

Intersection: 22: Road 100 & Chapel Hill Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	T	TR	L	TR
Maximum Queue (ft)	142	98	46	60	233	644	464	524	325	370
Average Queue (ft)	70	11	12	17	18	312	215	301	144	148
95th Queue (ft)	133	70	39	50	145	746	521	582	275	308
Link Distance (ft)		333	333		2646	2646	807	807		377
Upstream Blk Time (%)							2	3	0	1
Queuing Penalty (veh)							0	0	0	4
Storage Bay Dist (ft)	135			250					300	
Storage Blk Time (%)	4						9		1	1
Queuing Penalty (veh)	0						0		5	2

Intersection: 26: Sandifur Parkway

Movement	WB	WB	WB	NB
Directions Served	L	T	T	LR
Maximum Queue (ft)	32	85	56	114
Average Queue (ft)	7	16	13	36
95th Queue (ft)	29	159	146	102
Link Distance (ft)		551	551	298
Upstream Blk Time (%)		1	1	1
Queuing Penalty (veh)		3	2	0
Storage Bay Dist (ft)	100			
Storage Blk Time (%)		2		
Queuing Penalty (veh)		0		

Intersection: 27: Sandifur Parkway

Movement	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	T	TR	L	TR	L	TR
Maximum Queue (ft)	59	42	57	58	48	55	44	70
Average Queue (ft)	20	9	8	8	15	23	13	32
95th Queue (ft)	48	34	111	104	46	52	41	60
Link Distance (ft)			1133	1133		396		386
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	100	100			100		100	
Storage Blk Time (%)		0	1		1	0		0
Queuing Penalty (veh)		0	0		0	0		0

Intersection: 34: Road 100

Movement	NB	NB	SB	SB	SB
Directions Served	T	T	T	T	R
Maximum Queue (ft)	209	291	36	285	225
Average Queue (ft)	44	171	8	57	32
95th Queue (ft)	166	368	36	246	190
Link Distance (ft)	184	184		244	244
Upstream Blk Time (%)	1	21		9	5
Queuing Penalty (veh)	5	117		38	19
Storage Bay Dist (ft)			25		
Storage Blk Time (%)			11	2	
Queuing Penalty (veh)			45	8	

Intersection: 35: Chapel Hill Rd

Movement	WB	NB
Directions Served	L	LTR
Maximum Queue (ft)	10	35
Average Queue (ft)	0	14
95th Queue (ft)	6	40
Link Distance (ft)		120
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	50	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

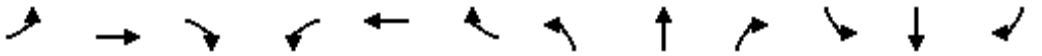
Network Summary

Network wide Queuing Penalty: 869

APPENDIX C. EXISTING PM PEAK HOUR SYNCHRO/SIMTRAFFIC RESULTS

HCM 6th Signalized Intersection Summary
1: Road 100 & I 182 WB On Ramp/I 182 WB On/Off Ramp

04/09/2021



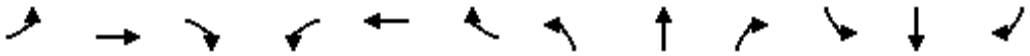
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	325	0	238	0	1296	351	0	464	655
Future Volume (veh/h)	0	0	0	325	0	238	0	1296	351	0	464	655
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1885	0	1885	0	1885	1885	0	1885	1870
Adj Flow Rate, veh/h				378	0	258	0	1507	0	0	540	0
Peak Hour Factor				0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %				1	0	1	0	1	1	0	1	2
Cap, veh/h				429	0	382	0	2255		0	2255	
Arrive On Green				0.24	0.00	0.24	0.00	1.00	0.00	0.00	0.63	0.00
Sat Flow, veh/h				1795	0	1598	0	3676	1598	0	3676	1585
Grp Volume(v), veh/h				378	0	258	0	1507	0	0	540	0
Grp Sat Flow(s),veh/h/ln				1795	0	1598	0	1791	1598	0	1791	1585
Q Serve(g_s), s				14.2	0.0	10.3	0.0	0.0	0.0	0.0	4.6	0.0
Cycle Q Clear(g_c), s				14.2	0.0	10.3	0.0	0.0	0.0	0.0	4.6	0.0
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				429	0	382	0	2255		0	2255	
V/C Ratio(X)				0.88	0.00	0.68	0.00	0.67		0.00	0.24	
Avail Cap(c_a), veh/h				651	0	580	0	2255		0	2255	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.00	0.56	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				25.7	0.0	24.2	0.0	0.0	0.0	0.0	5.7	0.0
Incr Delay (d2), s/veh				6.3	0.0	0.8	0.0	0.9	0.0	0.0	0.3	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				6.4	0.0	3.7	0.0	0.3	0.0	0.0	1.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				32.0	0.0	25.0	0.0	0.9	0.0	0.0	5.9	0.0
LnGrp LOS				C	A	C	A	A		A	A	
Approach Vol, veh/h					636			1507	A		540	A
Approach Delay, s/veh					29.1			0.9			5.9	
Approach LOS					C			A			A	

Timer - Assigned Phs	2		6		8							
Phs Duration (G+Y+Rc), s	48.7		48.7		21.3							
Change Period (Y+Rc), s	4.6		4.6		4.6							
Max Green Setting (Gmax), s	35.4		35.4		25.4							
Max Q Clear Time (g_c+I1), s	2.0		6.6		16.2							
Green Ext Time (p_c), s	13.8		3.8		0.5							

Intersection Summary		
HCM 6th Ctrl Delay	8.6	
HCM 6th LOS	A	

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1002	3	716	0	0	0	0	645	281	194	595	0
Future Volume (veh/h)	1002	3	716	0	0	0	0	645	281	194	595	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1885	1900	1885				0	1870	1870	1885	1885	0
Adj Flow Rate, veh/h	1141	0	0				0	733	88	220	676	0
Peak Hour Factor	0.88	0.88	0.88				0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	1	0	1				0	2	2	1	1	0
Cap, veh/h	1286	0					0	1215	540	402	962	0
Arrive On Green	0.36	0.00	0.00				0.00	0.34	0.34	0.21	1.00	0.00
Sat Flow, veh/h	3591	0	1598				0	3647	1578	1795	1885	0
Grp Volume(v), veh/h	1141	0	0				0	733	88	220	676	0
Grp Sat Flow(s),veh/h/ln	1795	0	1598				0	1777	1578	1795	1885	0
Q Serve(g_s), s	20.9	0.0	0.0				0.0	12.0	2.7	5.3	0.0	0.0
Cycle Q Clear(g_c), s	20.9	0.0	0.0				0.0	12.0	2.7	5.3	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	1286	0					0	1215	540	402	962	0
V/C Ratio(X)	0.89	0.00					0.00	0.60	0.16	0.55	0.70	0.00
Avail Cap(c_a), veh/h	1611	0					0	1215	540	407	962	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	1.00	1.00	0.88	0.88	0.00
Uniform Delay (d), s/veh	21.1	0.0	0.0				0.0	19.1	16.0	11.6	0.0	0.0
Incr Delay (d2), s/veh	4.7	0.0	0.0				0.0	2.2	0.6	0.7	3.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.7	0.0	0.0				0.0	4.6	1.0	1.5	1.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.8	0.0	0.0				0.0	21.3	16.7	12.3	3.8	0.0
LnGrp LOS	C	A					A	C	B	B	A	A
Approach Vol, veh/h		1141	A					821			896	
Approach Delay, s/veh		25.8						20.8			5.9	
Approach LOS		C						C			A	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	11.8	28.5		29.7		40.3
Change Period (Y+Rc), s	4.6	4.6		4.6		4.6
Max Green Setting (Gmax), s	7.4	17.4		31.4		29.4
Max Q Clear Time (g_c+I1), s	7.3	14.0		22.9		2.0
Green Ext Time (p_c), s	0.0	1.6		1.9		4.5

Intersection Summary	
HCM 6th Ctrl Delay	18.1
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.
Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	4:15	4:15	4:15	4:15	4:15	4:15	4:15
End Time	5:30	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	3	3	3	3	3	3	3
# of Recorded Intervals	2	2	2	2	2	2	2
Vehs Entered	4833	4767	4864	4802	4765	4898	4875
Vehs Exited	4859	4653	4841	4764	4746	4893	4808
Starting Vehs	218	200	211	213	186	226	191
Ending Vehs	192	314	234	251	205	231	258
Travel Distance (mi)	4456	4348	4521	4431	4375	4504	4506
Travel Time (hr)	335.3	486.5	390.0	422.9	407.8	354.6	403.4
Total Delay (hr)	198.9	352.8	251.5	287.0	273.3	216.4	265.3
Total Stops	7325	9152	8090	7559	7497	8276	8463
Fuel Used (gal)	212.3	241.7	225.1	230.5	226.1	217.4	228.4

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	4:15	4:15	4:15	4:15
End Time	5:30	5:30	5:30	5:30
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	3	3	3	3
# of Recorded Intervals	2	2	2	2
Vehs Entered	4674	4692	4835	4795
Vehs Exited	4643	4659	4836	4769
Starting Vehs	211	238	231	207
Ending Vehs	242	271	230	232
Travel Distance (mi)	4287	4349	4495	4427
Travel Time (hr)	477.1	378.7	382.1	403.8
Total Delay (hr)	345.3	245.3	243.8	268.0
Total Stops	7064	7244	7432	7810
Fuel Used (gal)	238.3	219.6	224.5	226.4

Interval #0 Information Seeding

Start Time	4:15
End Time	4:30
Total Time (min)	15

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording1

Start Time	4:30
End Time	4:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1296	1277	1360	1277	1286	1335	1327
Vehs Exited	1271	1211	1291	1221	1201	1314	1236
Starting Vehs	218	200	211	213	186	226	191
Ending Vehs	243	266	280	269	271	247	282
Travel Distance (mi)	1161	1136	1179	1131	1131	1194	1172
Travel Time (hr)	70.2	96.1	82.8	93.6	79.8	92.6	92.3
Total Delay (hr)	34.6	61.0	46.7	58.9	45.0	55.8	56.3
Total Stops	1916	2056	2235	1872	1842	2456	2504
Fuel Used (gal)	51.8	56.5	54.5	56.0	52.8	57.1	56.2

Interval #1 Information Recording1

Start Time	4:30
End Time	4:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	1239	1282	1300	1296
Vehs Exited	1241	1257	1250	1247
Starting Vehs	211	238	231	207
Ending Vehs	209	263	281	255
Travel Distance (mi)	1108	1163	1188	1156
Travel Time (hr)	86.1	81.6	89.2	86.4
Total Delay (hr)	51.9	46.0	52.8	50.9
Total Stops	1749	2097	1982	2063
Fuel Used (gal)	52.9	54.1	56.7	54.9

Interval #2 Information Recording2

Start Time	4:45
End Time	5:30
Total Time (min)	45

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	3537	3490	3504	3525	3479	3563	3548
Vehs Exited	3588	3442	3550	3543	3545	3579	3572
Starting Vehs	243	266	280	269	271	247	282
Ending Vehs	192	314	234	251	205	231	258
Travel Distance (mi)	3295	3211	3342	3300	3244	3310	3334
Travel Time (hr)	265.1	390.4	307.2	329.3	328.0	262.0	311.1
Total Delay (hr)	164.2	291.8	204.8	228.0	228.3	160.6	209.0
Total Stops	5409	7096	5855	5687	5655	5820	5959
Fuel Used (gal)	160.5	185.2	170.6	174.5	173.3	160.3	172.2

Interval #2 Information Recording2

Start Time	4:45
End Time	5:30
Total Time (min)	45

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	3435	3410	3535	3502
Vehs Exited	3402	3402	3586	3518
Starting Vehs	209	263	281	255
Ending Vehs	242	271	230	232
Travel Distance (mi)	3180	3186	3307	3271
Travel Time (hr)	391.0	297.1	292.9	317.4
Total Delay (hr)	293.3	199.4	191.1	217.1
Total Stops	5315	5147	5450	5735
Fuel Used (gal)	185.4	165.5	167.8	171.5

Intersection: 1: Road 100 & I 182 WB On Ramp/I 182 WB On/Off Ramp

Movement	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	R	T	T	R	T	T
Maximum Queue (ft)	376	233	362	450	121	105	135
Average Queue (ft)	179	112	96	162	10	37	35
95th Queue (ft)	370	224	268	358	101	87	121
Link Distance (ft)	1591		1108	1108			295
Upstream Blk Time (%)							1
Queuing Penalty (veh)							3
Storage Bay Dist (ft)		350			230	100	
Storage Blk Time (%)	2			3		1	2
Queuing Penalty (veh)	5			11		2	4

Intersection: 2: Road 100 & I 182 EB Off Ramp/I 182 EB On Ramp

Movement	EB	EB	EB	NB	NB	NB	SB	SB
Directions Served	L	LT	R	T	T	R	L	T
Maximum Queue (ft)	355	479	1866	287	320	200	483	840
Average Queue (ft)	241	301	386	139	251	156	158	362
95th Queue (ft)	379	485	1482	278	373	261	457	872
Link Distance (ft)			1842	258	258		1108	1108
Upstream Blk Time (%)			5	2	23		0	2
Queuing Penalty (veh)			0	10	105		1	8
Storage Bay Dist (ft)	230	230				175		
Storage Blk Time (%)	14	22	1		29	1		
Queuing Penalty (veh)	98	158	11		83	4		

Intersection: 4: Road 100

Movement	WB	NB	NB	SB	SB
Directions Served	R	T	TR	L	T
Maximum Queue (ft)	245	194	307	102	232
Average Queue (ft)	69	12	43	39	75
95th Queue (ft)	177	106	198	82	240
Link Distance (ft)	297	377	377	184	184
Upstream Blk Time (%)	1	0	1		7
Queuing Penalty (veh)	0	0	3		45
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Road 100

Movement	NB	SB	SB
Directions Served	TR	T	T
Maximum Queue (ft)	25	17	14
Average Queue (ft)	1	1	1
95th Queue (ft)	13	19	12
Link Distance (ft)	295	60	60
Upstream Blk Time (%)		0	0
Queuing Penalty (veh)		2	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Road 100

Movement	EB	NB	NB	SB	SB
Directions Served	LR	L	T	T	TR
Maximum Queue (ft)	100	51	54	25	71
Average Queue (ft)	29	14	2	1	3
95th Queue (ft)	77	44	23	25	35
Link Distance (ft)	425	60	60	306	306
Upstream Blk Time (%)		0	0		
Queuing Penalty (veh)		1	0		
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 9: Road 100

Movement	WB	SB
Directions Served	LTR	L
Maximum Queue (ft)	93	26
Average Queue (ft)	34	2
95th Queue (ft)	69	14
Link Distance (ft)	560	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		150
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: Road 100

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	35	10
Average Queue (ft)	9	0
95th Queue (ft)	33	6
Link Distance (ft)	542	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		150
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Road 100

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	48	20
Average Queue (ft)	13	1
95th Queue (ft)	41	11
Link Distance (ft)	355	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		75
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Road 100

Movement	SB
Directions Served	L
Maximum Queue (ft)	10
Average Queue (ft)	0
95th Queue (ft)	6
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	75
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 17: Road 100

Movement	WB	WB	WB	SB
Directions Served	L	L	R	T
Maximum Queue (ft)	46	49	5	5
Average Queue (ft)	8	9	0	0
95th Queue (ft)	33	35	4	4
Link Distance (ft)	333	333	333	123
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 20: Road 100 & Dent Rd/Edelman Rd

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	R	L	LTR
Maximum Queue (ft)	90	85	35	86	17
Average Queue (ft)	50	37	6	26	1
95th Queue (ft)	79	68	27	63	10
Link Distance (ft)	1421	2006	2006		1392
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)				95	
Storage Blk Time (%)				0	
Queuing Penalty (veh)				0	

Intersection: 21: Road 100 & Sandifur Parkway

Movement	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	T	T	R	L	T	T
Maximum Queue (ft)	120	383	53	246	224	143	61	129	147
Average Queue (ft)	107	192	18	127	74	9	21	59	66
95th Queue (ft)	142	338	47	209	162	86	53	109	115
Link Distance (ft)		302	302	306	306	306		239	239
Upstream Blk Time (%)		3		0		0			
Queuing Penalty (veh)		10		0		0			
Storage Bay Dist (ft)	100						100		
Storage Blk Time (%)	6	16					0	1	
Queuing Penalty (veh)	24	58					0	0	

Intersection: 22: Road 100 & Chapel Hill Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	TR
Maximum Queue (ft)	97	32	34	76	46	222	28	244	314	377	488
Average Queue (ft)	41	2	3	27	8	101	3	78	153	303	319
95th Queue (ft)	82	16	19	62	32	175	16	174	251	441	577
Link Distance (ft)		333	333		2646	2646		807	807		377
Upstream Blk Time (%)										4	10
Queuing Penalty (veh)										0	120
Storage Bay Dist (ft)	135			250			80			300	
Storage Blk Time (%)	0							5		26	3
Queuing Penalty (veh)	0							0		170	19

Intersection: 26: Sandifur Parkway

Movement	EB	WB	WB	WB	NB
Directions Served	TR	L	T	T	LR
Maximum Queue (ft)	3	53	117	9	199
Average Queue (ft)	0	12	7	0	86
95th Queue (ft)	3	41	57	7	201
Link Distance (ft)	302		551	551	298
Upstream Blk Time (%)					0
Queuing Penalty (veh)					0
Storage Bay Dist (ft)		100			
Storage Blk Time (%)			0		
Queuing Penalty (veh)			0		

Intersection: 27: Sandifur Parkway

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	55	2	46	2	51	70	48	70
Average Queue (ft)	17	0	15	0	14	26	15	32
95th Queue (ft)	47	2	42	2	43	58	44	57
Link Distance (ft)		551		1133		396		386
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	100		100		100		100	
Storage Blk Time (%)	0					0		0
Queuing Penalty (veh)	0					0		0

Intersection: 34: Road 100

Movement	NB	NB	SB	SB	SB
Directions Served	T	T	T	T	R
Maximum Queue (ft)	174	281	39	339	345
Average Queue (ft)	26	90	3	209	79
95th Queue (ft)	126	266	24	447	305
Link Distance (ft)	184	184		258	258
Upstream Blk Time (%)	0	10		13	7
Queuing Penalty (veh)	1	48		86	42
Storage Bay Dist (ft)			25		
Storage Blk Time (%)			0	6	
Queuing Penalty (veh)			0	37	

Intersection: 35: Chapel Hill Rd

Movement	WB	NB
Directions Served	L	LTR
Maximum Queue (ft)	20	35
Average Queue (ft)	1	8
95th Queue (ft)	9	32
Link Distance (ft)		120
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	50	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Network Summary

Network wide Queuing Penalty: 1171

APPENDIX D. 2025 PM PEAK HOUR NO-BUILD SYNCHRO RESULTS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	310	0	509	0	1674	365	0	869	886
Future Volume (vph)	0	0	0	310	0	509	0	1674	365	0	869	886
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6		4.6		4.6	4.0		4.6	4.0
Lane Util. Factor				1.00		1.00		0.95	1.00		0.95	1.00
Frpb, ped/bikes				1.00		1.00		1.00	0.98		1.00	0.98
Flpb, ped/bikes				1.00		1.00		1.00	1.00		1.00	1.00
Frt				1.00		0.85		1.00	0.85		1.00	0.85
Flt Protected				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)				1787		1599		3574	1565		3574	1549
Flt Permitted				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)				1787		1599		3574	1565		3574	1549
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	0	0	0	360	0	592	0	1947	424	0	1010	1030
RTOR Reduction (vph)	0	0	0	0	0	17	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	360	0	575	0	1947	424	0	1010	1030
Confl. Peds. (#/hr)							3		3	3		3
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	1%	1%	0%	1%	2%
Turn Type				Prot		Prot		NA	Free		NA	Free
Protected Phases				8		8		2			6	
Permitted Phases				8		8			Free			Free
Actuated Green, G (s)				23.6		23.6		37.2	70.0		37.2	70.0
Effective Green, g (s)				23.6		23.6		37.2	70.0		37.2	70.0
Actuated g/C Ratio				0.34		0.34		0.53	1.00		0.53	1.00
Clearance Time (s)				4.6		4.6		4.6			4.6	
Vehicle Extension (s)				1.5		1.5		3.0			3.0	
Lane Grp Cap (vph)				602		539		1899	1565		1899	1549
v/s Ratio Prot				0.20		c0.36		c0.54			0.28	
v/s Ratio Perm									0.27			0.66
v/c Ratio				0.60		1.07		1.03	0.27		0.53	0.66
Uniform Delay, d1				19.3		23.2		16.4	0.0		10.7	0.0
Progression Factor				1.00		1.00		1.21	1.00		1.00	1.00
Incremental Delay, d2				1.1		58.1		20.6	0.3		1.1	2.3
Delay (s)				20.3		81.3		40.5	0.3		11.8	2.3
Level of Service				C		F		D	A		B	A
Approach Delay (s)		0.0			58.2			33.3			7.0	
Approach LOS		A			E			C			A	

Intersection Summary			
HCM 2000 Control Delay	27.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	9.2
Intersection Capacity Utilization	85.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1314	0	683	0	0	0	0	729	292	456	740	0
Future Volume (vph)	1314	0	683	0	0	0	0	729	292	456	740	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6	4.0					4.6	4.6	4.6	4.6	
Lane Util. Factor	0.95	0.95	1.00					0.95	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.99					1.00	0.97	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1698	1698	1578					3539	1544	1787	1881	
Flt Permitted	0.95	0.95	1.00					1.00	1.00	0.17	1.00	
Satd. Flow (perm)	1698	1698	1578					3539	1544	322	1881	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	1493	0	776	0	0	0	0	828	332	518	841	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	243	0	0	0
Lane Group Flow (vph)	746	747	776	0	0	0	0	828	89	518	841	0
Confl. Peds. (#/hr)			3	3			3		3	3		3
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	0%	2%	2%	1%	1%	0%
Turn Type	Split	NA	Free					NA	Perm	pm+pt	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			Free						2	6		
Actuated Green, G (s)	32.7	32.7	70.0					18.8	18.8	28.1	28.1	
Effective Green, g (s)	32.7	32.7	70.0					18.8	18.8	28.1	28.1	
Actuated g/C Ratio	0.47	0.47	1.00					0.27	0.27	0.40	0.40	
Clearance Time (s)	4.6	4.6						4.6	4.6	4.6	4.6	
Vehicle Extension (s)	2.0	2.0						3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	793	793	1578					950	414	227	755	
v/s Ratio Prot	0.44	c0.44						0.23		c0.15	0.45	
v/s Ratio Perm			0.49						0.06	c0.76		
v/c Ratio	0.94	0.94	0.49					0.87	0.22	2.28	1.11	
Uniform Delay, d1	17.7	17.7	0.0					24.4	19.9	19.7	20.9	
Progression Factor	1.00	1.00	1.00					1.00	1.00	2.11	0.78	
Incremental Delay, d2	18.8	19.0	1.1					10.8	1.2	588.7	66.3	
Delay (s)	36.6	36.8	1.1					35.3	21.1	630.4	82.7	
Level of Service	D	D	A					D	C	F	F	
Approach Delay (s)		24.5			0.0			31.2			291.5	
Approach LOS		C			A			C			F	

Intersection Summary			
HCM 2000 Control Delay	101.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.62		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.8
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX E. 2040 PM PEAK HOUR NO-BUILD SYNCHRO RESULTS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	325	0	740	0	1345	355	0	1020	760
Future Volume (vph)	0	0	0	325	0	740	0	1345	355	0	1020	760
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6		4.6		4.6	4.0		4.6	4.0
Lane Util. Factor				1.00		1.00		0.95	1.00		0.95	1.00
Frpb, ped/bikes				1.00		1.00		1.00	0.98		1.00	0.98
Flpb, ped/bikes				1.00		1.00		1.00	1.00		1.00	1.00
Frt				1.00		0.85		1.00	0.85		1.00	0.85
Flt Protected				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)				1787		1599		3574	1565		3574	1549
Flt Permitted				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)				1787		1599		3574	1565		3574	1549
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	0	0	0	378	0	860	0	1564	413	0	1186	884
RTOR Reduction (vph)	0	0	0	0	0	14	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	378	0	846	0	1564	413	0	1186	884
Confl. Peds. (#/hr)							3		3	3		3
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	1%	1%	0%	1%	2%
Turn Type				Prot		Prot		NA	Free		NA	Free
Protected Phases				8		8		2			6	
Permitted Phases				8		8			Free			Free
Actuated Green, G (s)				31.4		31.4		29.4	70.0		29.4	70.0
Effective Green, g (s)				31.4		31.4		29.4	70.0		29.4	70.0
Actuated g/C Ratio				0.45		0.45		0.42	1.00		0.42	1.00
Clearance Time (s)				4.6		4.6		4.6			4.6	
Vehicle Extension (s)				1.5		1.5		3.0			3.0	
Lane Grp Cap (vph)				801		717		1501	1565		1501	1549
v/s Ratio Prot				0.21		c0.53		c0.44			0.33	
v/s Ratio Perm									0.26			0.57
v/c Ratio				0.47		1.18		1.04	0.26		0.79	0.57
Uniform Delay, d1				13.5		19.3		20.3	0.0		17.6	0.0
Progression Factor				1.00		1.00		1.28	1.00		1.00	1.00
Incremental Delay, d2				0.2		95.1		31.1	0.2		4.3	1.5
Delay (s)				13.7		114.4		57.1	0.2		21.9	1.5
Level of Service				B		F		E	A		C	A
Approach Delay (s)		0.0			83.7			45.2			13.2	
Approach LOS		A			F			D			B	

Intersection Summary			
HCM 2000 Control Delay	41.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	9.2
Intersection Capacity Utilization	90.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	840	0	875	0	0	0	0	860	285	590	755	0
Future Volume (vph)	840	0	875	0	0	0	0	860	285	590	755	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6	4.0					4.6	4.6	4.6	4.6	
Lane Util. Factor	0.95	0.95	1.00					0.95	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.99					1.00	0.97	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1698	1698	1578					3539	1544	1787	1881	
Flt Permitted	0.95	0.95	1.00					1.00	1.00	0.17	1.00	
Satd. Flow (perm)	1698	1698	1578					3539	1544	316	1881	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	955	0	994	0	0	0	0	977	324	670	858	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	235	0	0	0
Lane Group Flow (vph)	477	478	994	0	0	0	0	977	89	670	858	0
Confl. Peds. (#/hr)			3	3			3		3	3		3
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	0%	2%	2%	1%	1%	0%
Turn Type	Split	NA	Free					NA	Perm	pm+pt	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			Free						2	6		
Actuated Green, G (s)	25.5	25.5	70.0					19.2	19.2	35.3	35.3	
Effective Green, g (s)	25.5	25.5	70.0					19.2	19.2	35.3	35.3	
Actuated g/C Ratio	0.36	0.36	1.00					0.27	0.27	0.50	0.50	
Clearance Time (s)	4.6	4.6						4.6	4.6	4.6	4.6	
Vehicle Extension (s)	2.0	2.0						3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	618	618	1578					970	423	401	948	
v/s Ratio Prot	0.28	c0.28						0.28		c0.27	0.46	
v/s Ratio Perm			0.63						0.06	c0.57		
v/c Ratio	0.77	0.77	0.63					1.01	0.21	1.67	0.91	
Uniform Delay, d1	19.7	19.7	0.0					25.4	19.6	17.9	15.8	
Progression Factor	1.00	1.00	1.00					1.00	1.00	2.07	0.78	
Incremental Delay, d2	5.4	5.5	1.9					30.7	1.1	312.0	12.5	
Delay (s)	25.1	25.2	1.9					56.1	20.7	348.9	24.8	
Level of Service	C	C	A					E	C	F	C	
Approach Delay (s)		13.3			0.0			47.3			166.9	
Approach LOS		B			A			D			F	

Intersection Summary			
HCM 2000 Control Delay	71.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.8
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

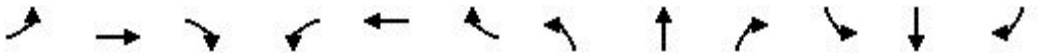
c Critical Lane Group

APPENDIX F. 2025 PM PEAK HOUR WIDENING OPTION SYNCHRO/SIMTRAFFIC RESULTS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	320	0	509	0	1674	366	0	936	869
Future Volume (vph)	0	0	0	320	0	509	0	1674	366	0	936	869
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6		4.6		4.6	4.0		4.6	4.0
Lane Util. Factor				1.00		0.88		0.95	1.00		0.95	1.00
Frpb, ped/bikes				1.00		1.00		1.00	0.98		1.00	0.98
Flpb, ped/bikes				1.00		1.00		1.00	1.00		1.00	1.00
Frt				1.00		0.85		1.00	0.85		1.00	0.85
Flt Protected				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)				1787		2814		3574	1565		3574	1549
Flt Permitted				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)				1787		2814		3574	1565		3574	1549
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	0	0	0	372	0	592	0	1947	426	0	1088	1010
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	372	0	592	0	1947	426	0	1088	1010
Confl. Peds. (#/hr)							3		3	3		3
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	1%	1%	0%	1%	2%
Turn Type				Prot		Prot		NA	Free		NA	Free
Protected Phases				8		8		2			6	
Permitted Phases				8		8			Free			Free
Actuated Green, G (s)				16.0		16.0		44.8	70.0		44.8	70.0
Effective Green, g (s)				16.0		16.0		44.8	70.0		44.8	70.0
Actuated g/C Ratio				0.23		0.23		0.64	1.00		0.64	1.00
Clearance Time (s)				4.6		4.6		4.6			4.6	
Vehicle Extension (s)				1.5		1.5		3.0			3.0	
Lane Grp Cap (vph)				408		643		2287	1565		2287	1549
v/s Ratio Prot				0.21		c0.21		c0.54			0.30	
v/s Ratio Perm									0.27			0.65
v/c Ratio				0.91		0.92		0.85	0.27		0.48	0.65
Uniform Delay, d1				26.3		26.4		10.0	0.0		6.5	0.0
Progression Factor				1.00		1.00		1.28	1.00		1.00	1.00
Incremental Delay, d2				23.9		18.4		2.4	0.2		0.7	2.1
Delay (s)				50.2		44.7		15.1	0.2		7.2	2.1
Level of Service				D		D		B	A		A	A
Approach Delay (s)		0.0			46.8			12.4			4.8	
Approach LOS		A			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	9.2
Intersection Capacity Utilization	71.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1314	0	695	0	0	0	0	729	292	456	800	0
Future Volume (vph)	1314	0	695	0	0	0	0	729	292	456	800	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5					4.6	4.6	4.6	4.6	
Lane Util. Factor	0.97		0.88					0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00		1.00					1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00		1.00					1.00	1.00	1.00	1.00	
Frt	1.00		0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3467		2814					3539	1555	3467	3574	
Flt Permitted	0.95		1.00					1.00	1.00	0.13	1.00	
Satd. Flow (perm)	3467		2814					3539	1555	461	3574	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	1493	0	790	0	0	0	0	828	332	518	909	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	217	0	0	0
Lane Group Flow (vph)	1493	0	790	0	0	0	0	828	115	518	909	0
Confl. Peds. (#/hr)			3	3			3		3	3		3
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	0%	2%	2%	1%	1%	0%
Turn Type	Prot		Prot					NA	Perm	pm+pt	NA	
Protected Phases	4		4					2		1	6	
Permitted Phases									2	6		
Actuated Green, G (s)	46.9		46.9					27.1	27.1	44.0	44.0	
Effective Green, g (s)	46.9		46.9					27.1	27.1	44.0	44.0	
Actuated g/C Ratio	0.47		0.47					0.27	0.27	0.44	0.44	
Clearance Time (s)	4.5		4.5					4.6	4.6	4.6	4.6	
Vehicle Extension (s)	3.0		3.0					3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	1626		1319					959	421	572	1572	
v/s Ratio Prot	c0.43		0.28					0.23		c0.11	0.25	
v/s Ratio Perm									0.07	c0.29		
v/c Ratio	0.92		0.60					0.86	0.27	0.91	0.58	
Uniform Delay, d1	24.8		19.6					34.7	28.7	24.6	21.0	
Progression Factor	1.00		1.00					1.00	1.00	0.89	1.00	
Incremental Delay, d2	8.6		0.7					10.2	1.6	16.2	1.3	
Delay (s)	33.4		20.3					44.9	30.3	38.0	22.4	
Level of Service	C		C					D	C	D	C	
Approach Delay (s)		28.9			0.0			40.7			28.1	
Approach LOS		C			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	31.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.7
Intersection Capacity Utilization	81.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 1: Road 100 & I 182 WB On Ramp/I 182 WB On/Off Ramp

Movement	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	R	R	T	T	R	T	T
Maximum Queue (ft)	389	266	312	247	327	30	204	227
Average Queue (ft)	212	151	187	103	160	1	102	90
95th Queue (ft)	343	239	279	200	281	30	189	182
Link Distance (ft)		1597		1107	1107		282	282
Upstream Blk Time (%)								0
Queuing Penalty (veh)								0
Storage Bay Dist (ft)	500		400			230		
Storage Blk Time (%)	0				1			
Queuing Penalty (veh)	0				5			

Intersection: 2: Road 100 & I 182 EB Off Ramp/I 182 EB On Ramp

Movement	EB	EB	EB	EB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	R	T	T	R	L	L	T	T
Maximum Queue (ft)	398	427	281	232	460	497	200	210	216	261	235
Average Queue (ft)	271	314	153	60	274	431	181	131	118	145	117
95th Queue (ft)	364	402	250	171	485	559	254	195	191	226	194
Link Distance (ft)			1463		436	436			1107	1107	
Upstream Blk Time (%)					1	26					
Queuing Penalty (veh)					6	133					
Storage Bay Dist (ft)	500	500		500			175	150			200
Storage Blk Time (%)	0	0				48	2	9	7	1	0
Queuing Penalty (veh)	0	0				141	7	21	16	5	0

Intersection: 4: Road 100

Movement	WB	NB	NB	SB	SB	SB
Directions Served	R	T	TR	T	T	T
Maximum Queue (ft)	316	249	368	262	129	39
Average Queue (ft)	203	23	121	51	11	1
95th Queue (ft)	395	142	335	198	119	39
Link Distance (ft)	302	376	376		436	436
Upstream Blk Time (%)	38	0	1		0	
Queuing Penalty (veh)	0	0	4		1	
Storage Bay Dist (ft)				200		
Storage Blk Time (%)				3	0	
Queuing Penalty (veh)				12	0	

Intersection: 5: Road 100

Movement	NB	NB	NB	SB	SB
Directions Served	T	T	TR	T	T
Maximum Queue (ft)	23	17	14	29	58
Average Queue (ft)	1	1	1	1	2
95th Queue (ft)	11	9	10	29	37
Link Distance (ft)	282	282		408	408
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			200		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 9: Road 100

Movement	WB	NB	NB
Directions Served	LTR	T	TR
Maximum Queue (ft)	76	155	53
Average Queue (ft)	28	16	2
95th Queue (ft)	63	88	30
Link Distance (ft)	560	123	123
Upstream Blk Time (%)		1	0
Queuing Penalty (veh)		6	1
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Road 100

Movement	EB	NB	NB	B23	SB	SB
Directions Served	LTR	L	TR	T	L	TR
Maximum Queue (ft)	252	124	251	322	21	332
Average Queue (ft)	130	117	192	100	0	158
95th Queue (ft)	215	139	304	287	4	277
Link Distance (ft)	373		191	246		415
Upstream Blk Time (%)			15	4		0
Queuing Penalty (veh)			115	16		1
Storage Bay Dist (ft)		100			150	
Storage Blk Time (%)		28	3			10
Queuing Penalty (veh)		125	10			0

Intersection: 13: Road 100

Movement	WB	SB	SB
Directions Served	LR	L	T
Maximum Queue (ft)	50	27	22
Average Queue (ft)	14	2	1
95th Queue (ft)	44	13	19
Link Distance (ft)	355		433
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		75	
Storage Blk Time (%)			0
Queuing Penalty (veh)			0

Intersection: 15: Road 100

Movement	EB	NB	NB	SB	SB	SB
Directions Served	R	T	TR	L	T	TR
Maximum Queue (ft)	239	9	12	23	126	193
Average Queue (ft)	209	1	1	2	7	60
95th Queue (ft)	233	14	15	12	58	158
Link Distance (ft)	190	230	230		276	276
Upstream Blk Time (%)	97					0
Queuing Penalty (veh)	0					0
Storage Bay Dist (ft)				75		
Storage Blk Time (%)					0	
Queuing Penalty (veh)					0	

Intersection: 17: Road 100

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	53	73	109	58	2	4
Average Queue (ft)	12	21	8	3	0	0
95th Queue (ft)	41	58	70	38	2	4
Link Distance (ft)	333	333	276	276	123	123
Upstream Blk Time (%)			0	0		
Queuing Penalty (veh)			1	0		
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 20: Road 100 & Dent Rd/Edelman Rd

Movement	EB	WB	WB	NB	NB	SB
Directions Served	LTR	LT	R	L	TR	LTR
Maximum Queue (ft)	118	90	34	64	14	26
Average Queue (ft)	53	36	5	24	0	1
95th Queue (ft)	90	72	24	52	14	8
Link Distance (ft)	1421	2006	2006		433	1392
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)				95		
Storage Blk Time (%)				0		
Queuing Penalty (veh)				0		

Intersection: 21: Road 100 & Sandifur Parkway

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	SB
Directions Served	L	T	R	L	L	TR	L	L	T	T	R	L
Maximum Queue (ft)	285	476	524	400	404	330	383	429	410	364	106	179
Average Queue (ft)	69	293	391	320	384	154	237	263	222	166	5	50
95th Queue (ft)	192	543	581	434	418	289	350	380	353	301	72	142
Link Distance (ft)	487	487	487	300	300	300		408	408	408		
Upstream Blk Time (%)	0	8	21	29	75	2	0	1	0	0		
Queuing Penalty (veh)	0	0	0	83	213	5	0	4	2	0		
Storage Bay Dist (ft)							300				350	100
Storage Blk Time (%)							2	6		0	0	1
Queuing Penalty (veh)							5	19		0	0	3

Intersection: 21: Road 100 & Sandifur Parkway

Movement	SB	SB
Directions Served	T	TR
Maximum Queue (ft)	309	325
Average Queue (ft)	222	304
95th Queue (ft)	305	334
Link Distance (ft)	230	230
Upstream Blk Time (%)	9	53
Queuing Penalty (veh)	31	185
Storage Bay Dist (ft)		
Storage Blk Time (%)	45	
Queuing Penalty (veh)	14	

Intersection: 22: Road 100 & Chapel Hill Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	139	58	30	89	52	260	38	411	472	477	208	250
Average Queue (ft)	67	5	2	30	7	121	3	191	285	375	81	114
95th Queue (ft)	128	52	15	72	32	215	20	390	493	553	162	206
Link Distance (ft)		334	334		2646	2646		807	807	376	376	376
Upstream Blk Time (%)										19		
Queuing Penalty (veh)										91		
Storage Bay Dist (ft)	135			250			80					
Storage Blk Time (%)	3							26				
Queuing Penalty (veh)	0							1				

Intersection: 26: Sandifur Parkway

Movement	WB	WB	WB	NB
Directions Served	T	T	T	R
Maximum Queue (ft)	368	483	400	36
Average Queue (ft)	205	287	121	11
95th Queue (ft)	457	569	452	37
Link Distance (ft)		546	546	303
Upstream Blk Time (%)		6	3	
Queuing Penalty (veh)		23	11	
Storage Bay Dist (ft)	300			
Storage Blk Time (%)	2	23		
Queuing Penalty (veh)	5	65		

Intersection: 27: Sandifur Parkway

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	T	TR	L	TR	L	TR
Maximum Queue (ft)	69	5	79	137	131	115	172	75	104
Average Queue (ft)	20	0	24	31	21	48	49	18	42
95th Queue (ft)	52	4	65	171	137	108	193	57	102
Link Distance (ft)		546		1133	1133		396		386
Upstream Blk Time (%)							4		
Queuing Penalty (veh)							0		
Storage Bay Dist (ft)	100		100			100		100	
Storage Blk Time (%)	0		0	5		12	0	0	4
Queuing Penalty (veh)	0		1	2		4	0	0	1

Intersection: 35: Chapel Hill Rd

Movement	WB	NB
Directions Served	L	LTR
Maximum Queue (ft)	16	35
Average Queue (ft)	1	10
95th Queue (ft)	8	35
Link Distance (ft)		120
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	50	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 67: Bend

Movement	NE
Directions Served	T
Maximum Queue (ft)	5
Average Queue (ft)	0
95th Queue (ft)	4
Link Distance (ft)	800
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 1397

APPENDIX G. 2025 PM PEAK HOUR LOOP WITH SIGNAL OPTION SYNCHRO/SIMTRAFFIC RESULTS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	320	0	509	0	1674	366	0	936	869
Future Volume (vph)	0	0	0	320	0	509	0	1674	366	0	936	869
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6		4.6		4.6	4.0		4.6	4.0
Lane Util. Factor				1.00		0.88		0.95	1.00		0.95	1.00
Frpb, ped/bikes				1.00		1.00		1.00	0.98		1.00	0.98
Flpb, ped/bikes				1.00		1.00		1.00	1.00		1.00	1.00
Frt				1.00		0.85		1.00	0.85		1.00	0.85
Flt Protected				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)				1787		2814		3574	1565		3574	1549
Flt Permitted				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)				1787		2814		3574	1565		3574	1549
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	0	0	0	372	0	592	0	1947	426	0	1088	1010
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	372	0	592	0	1947	426	0	1088	1010
Confl. Peds. (#/hr)							3		3	3		3
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	1%	1%	0%	1%	2%
Turn Type				Prot		Prot		NA	Free		NA	Free
Protected Phases				8		8		2			6	
Permitted Phases				8		8			Free			Free
Actuated Green, G (s)				16.0		16.0		44.8	70.0		44.8	70.0
Effective Green, g (s)				16.0		16.0		44.8	70.0		44.8	70.0
Actuated g/C Ratio				0.23		0.23		0.64	1.00		0.64	1.00
Clearance Time (s)				4.6		4.6		4.6			4.6	
Vehicle Extension (s)				1.5		1.5		3.0			3.0	
Lane Grp Cap (vph)				408		643		2287	1565		2287	1549
v/s Ratio Prot				0.21		c0.21		c0.54			0.30	
v/s Ratio Perm									0.27			0.65
v/c Ratio				0.91		0.92		0.85	0.27		0.48	0.65
Uniform Delay, d1				26.3		26.4		10.0	0.0		6.5	0.0
Progression Factor				1.00		1.00		1.28	1.00		1.00	1.00
Incremental Delay, d2				23.9		18.4		2.4	0.2		0.7	2.1
Delay (s)				50.2		44.7		15.1	0.2		7.2	2.1
Level of Service				D		D		B	A		A	A
Approach Delay (s)		0.0			46.8			12.4			4.8	
Approach LOS		A			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	9.2
Intersection Capacity Utilization	71.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	695	0	0	1314	0	729	292	456	800	0
Future Volume (vph)	0	0	695	0	0	1314	0	729	292	456	800	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.5			4.6		4.6	4.6	4.6	4.6	
Lane Util. Factor			0.88			0.88		0.95	1.00	1.00	1.00	
Frpb, ped/bikes			1.00			1.00		1.00	0.97	1.00	1.00	
Flpb, ped/bikes			1.00			1.00		1.00	1.00	1.00	1.00	
Frt			0.85			0.85		1.00	0.85	1.00	1.00	
Flt Protected			1.00			1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)			2814			2842		3539	1541	1787	1881	
Flt Permitted			1.00			1.00		1.00	1.00	0.17	1.00	
Satd. Flow (perm)			2814			2842		3539	1541	322	1881	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	0	0	790	0	0	1493	0	828	332	518	909	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	243	0	0	0
Lane Group Flow (vph)	0	0	790	0	0	1493	0	828	89	518	909	0
Confl. Peds. (#/hr)			3	3			3		3	3		3
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	0%	2%	2%	1%	1%	0%
Turn Type			Prot			Over		NA	Perm	pm+pt	NA	
Protected Phases			5			1		2		1	6	
Permitted Phases									2	6		
Actuated Green, G (s)			21.9			42.0		18.8	18.8	65.4	39.0	
Effective Green, g (s)			21.9			42.0		18.8	18.8	65.4	39.0	
Actuated g/C Ratio			0.31			0.60		0.27	0.27	0.93	0.56	
Clearance Time (s)			4.5			4.6		4.6	4.6	4.6	4.6	
Vehicle Extension (s)			3.0			2.0		3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)			880			1705		950	413	1179	1047	
v/s Ratio Prot			0.28			c0.53		0.23		0.26	c0.48	
v/s Ratio Perm									0.06	0.15		
v/c Ratio			0.90			0.88		0.87	0.22	0.44	0.87	
Uniform Delay, d1			23.0			11.8		24.4	19.9	4.4	13.3	
Progression Factor			1.00			1.00		1.00	1.00	4.09	0.83	
Incremental Delay, d2			11.8			5.2		10.8	1.2	0.1	7.7	
Delay (s)			34.8			17.0		35.3	21.1	18.3	18.8	
Level of Service			C			B		D	C	B	B	
Approach Delay (s)		34.8			17.0			31.2			18.6	
Approach LOS		C			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	23.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	9.2
Intersection Capacity Utilization	74.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 1: Road 100 & I 182 WB On Ramp/I 182 WB On/Off Ramp

Movement	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	R	R	T	T	R	T	T
Maximum Queue (ft)	480	549	400	951	1006	305	184	148
Average Queue (ft)	236	192	181	324	421	131	86	60
95th Queue (ft)	454	606	302	820	938	379	161	128
Link Distance (ft)		1602		1128	1128		280	280
Upstream Blk Time (%)		1		0	2			
Queuing Penalty (veh)		0		3	17			
Storage Bay Dist (ft)	500		400			230		
Storage Blk Time (%)	5	0	0		14	0		
Queuing Penalty (veh)	26	1	0		51	0		

Intersection: 2: Road 100 & I 182 EB Off Ramp/I 182 EB On Ramp

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	R	R	R	R	T	T	R	L	T
Maximum Queue (ft)	418	360	247	274	433	485	200	568	717
Average Queue (ft)	257	133	146	171	232	312	169	222	329
95th Queue (ft)	399	355	224	254	434	528	252	534	863
Link Distance (ft)	1504		1662		459	459		1128	1128
Upstream Blk Time (%)					1	8		0	1
Queuing Penalty (veh)					5	41		1	6
Storage Bay Dist (ft)		500		400			175		
Storage Blk Time (%)	0					29	4		
Queuing Penalty (veh)	0					86	16		

Intersection: 4: Road 100

Movement	WB	NB	NB	SB	SB	SB
Directions Served	R	T	TR	T	T	T
Maximum Queue (ft)	198	96	172	294	292	258
Average Queue (ft)	87	13	31	148	107	70
95th Queue (ft)	241	111	172	372	463	324
Link Distance (ft)	302	376	376		459	459
Upstream Blk Time (%)	10	0	1		6	0
Queuing Penalty (veh)	0	0	2		43	0
Storage Bay Dist (ft)				200		
Storage Blk Time (%)				15		
Queuing Penalty (veh)				75		

Intersection: 5: Road 100

Movement	NB	NB	NB	SB
Directions Served	T	T	TR	T
Maximum Queue (ft)	214	210	134	12
Average Queue (ft)	30	26	13	0
95th Queue (ft)	151	143	92	6
Link Distance (ft)	280	280		408
Upstream Blk Time (%)	0	0		
Queuing Penalty (veh)	4	3		
Storage Bay Dist (ft)			200	
Storage Blk Time (%)		0	0	
Queuing Penalty (veh)		3	1	

Intersection: 9: Road 100

Movement	WB	NB	NB	SB
Directions Served	LTR	T	TR	T
Maximum Queue (ft)	96	172	73	3
Average Queue (ft)	32	26	5	0
95th Queue (ft)	76	113	37	3
Link Distance (ft)	560	123	123	
Upstream Blk Time (%)		3	0	
Queuing Penalty (veh)		10	1	
Storage Bay Dist (ft)				50
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 11: Road 100

Movement	EB	NB	NB	B23	B23	SB	SB
Directions Served	LTR	L	TR	T		L	TR
Maximum Queue (ft)	276	125	257	322	26	80	322
Average Queue (ft)	131	119	209	151	2	3	159
95th Queue (ft)	221	138	306	353	37	38	275
Link Distance (ft)	373		191	246	246		415
Upstream Blk Time (%)	0		21	7	0		0
Queuing Penalty (veh)	0		159	28	0		0
Storage Bay Dist (ft)		100				150	
Storage Blk Time (%)		34	4				12
Queuing Penalty (veh)		153	13				0

Intersection: 13: Road 100

Movement	WB	SB	SB
Directions Served	LR	L	T
Maximum Queue (ft)	43	17	4
Average Queue (ft)	13	1	0
95th Queue (ft)	41	11	4
Link Distance (ft)	355		433
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		75	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 15: Road 100

Movement	EB	NB	NB	SB	SB	SB
Directions Served	R	T	TR	L	T	TR
Maximum Queue (ft)	242	51	14	22	134	205
Average Queue (ft)	212	2	1	2	7	58
95th Queue (ft)	228	36	11	12	52	159
Link Distance (ft)	190	230	230		276	276
Upstream Blk Time (%)	99					0
Queuing Penalty (veh)	0					0
Storage Bay Dist (ft)				75		
Storage Blk Time (%)					0	
Queuing Penalty (veh)					0	

Intersection: 17: Road 100

Movement	WB	WB	NB	NB
Directions Served	L	L	T	T
Maximum Queue (ft)	59	76	203	114
Average Queue (ft)	13	21	18	7
95th Queue (ft)	44	58	111	63
Link Distance (ft)	333	333	276	276
Upstream Blk Time (%)			0	0
Queuing Penalty (veh)			1	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 20: Road 100 & Dent Rd/Edelman Rd

Movement	EB	WB	WB	NB	NB	SB
Directions Served	LTR	LT	R	L	TR	LTR
Maximum Queue (ft)	105	94	35	78	15	23
Average Queue (ft)	52	38	4	26	1	1
95th Queue (ft)	86	71	23	60	15	11
Link Distance (ft)	1421	2006	2006		433	1392
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)				95		
Storage Blk Time (%)				0		
Queuing Penalty (veh)				0		

Intersection: 21: Road 100 & Sandifur Parkway

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	SB
Directions Served	L	T	R	L	L	TR	L	L	T	T	R	L
Maximum Queue (ft)	248	508	529	404	401	342	400	477	469	453	298	179
Average Queue (ft)	68	302	409	333	384	163	307	349	307	249	25	50
95th Queue (ft)	190	553	601	435	411	303	440	504	490	450	178	145
Link Distance (ft)	487	487	487	300	300	300		408	408	408		
Upstream Blk Time (%)	0	7	23	33	76	2	1	9	5	1		
Queuing Penalty (veh)	0	0	0	92	215	7	0	64	37	6		
Storage Bay Dist (ft)							300				350	100
Storage Blk Time (%)							14	25		1	0	1
Queuing Penalty (veh)							46	83		4	0	3

Intersection: 21: Road 100 & Sandifur Parkway

Movement	SB	SB
Directions Served	T	TR
Maximum Queue (ft)	307	328
Average Queue (ft)	224	301
95th Queue (ft)	295	338
Link Distance (ft)	230	230
Upstream Blk Time (%)	9	52
Queuing Penalty (veh)	32	181
Storage Bay Dist (ft)		
Storage Blk Time (%)	46	
Queuing Penalty (veh)	14	

Intersection: 22: Road 100 & Chapel Hill Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	144	86	30	93	48	258	26	318	383	477	173	211
Average Queue (ft)	66	5	3	32	9	121	2	163	208	425	80	112
95th Queue (ft)	126	53	17	75	34	207	16	274	337	576	150	191
Link Distance (ft)		334	334		2646	2646		807	807	376	376	376
Upstream Blk Time (%)										38		
Queuing Penalty (veh)										187		
Storage Bay Dist (ft)	135			250			80					
Storage Blk Time (%)	3							34				
Queuing Penalty (veh)	0							1				

Intersection: 26: Sandifur Parkway

Movement	WB	WB	WB	NB
Directions Served	T	T	T	R
Maximum Queue (ft)	390	527	440	37
Average Queue (ft)	237	314	131	10
95th Queue (ft)	485	604	472	34
Link Distance (ft)		546	546	303
Upstream Blk Time (%)		6	3	
Queuing Penalty (veh)		27	12	
Storage Bay Dist (ft)	300			
Storage Blk Time (%)	5	29		
Queuing Penalty (veh)	14	83		

Intersection: 27: Sandifur Parkway

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	T	TR	L	TR	L	TR
Maximum Queue (ft)	60	4	88	126	93	115	155	77	122
Average Queue (ft)	20	0	28	32	22	55	58	15	44
95th Queue (ft)	50	3	73	177	141	119	233	52	98
Link Distance (ft)		546		1133	1133		396		386
Upstream Blk Time (%)							8		
Queuing Penalty (veh)							0		
Storage Bay Dist (ft)	100		100			100		100	
Storage Blk Time (%)			0	5		15	0	0	4
Queuing Penalty (veh)			0	2		5	0	0	1

Intersection: 35: Chapel Hill Rd

Movement	WB	NB
Directions Served	L	LTR
Maximum Queue (ft)	10	35
Average Queue (ft)	1	12
95th Queue (ft)	8	38
Link Distance (ft)		120
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	50	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Network Summary

Network wide Queuing Penalty: 1865

APPENDIX H. 2025 PM PEAK HOUR LOOP WITH SIMPLE MULTI-LANE ROUNDABOUT OPTION SIDRA RESULTS

MOVEMENT SUMMARY

Site: 101 [Loop Sidra (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Road 100														
8	T1	729	2.0	792	2.0	0.472	6.3	LOS A	3.3	83.5	0.66	0.63	0.67	36.7
18	R2	292	2.0	317	2.0	0.472	6.1	LOS A	3.3	83.5	0.64	0.61	0.64	35.4
Approach		1021	2.0	1110	2.0	0.472	6.3	LOS A	3.3	83.5	0.65	0.62	0.66	36.3
East: I-182 Eastbound On/Off-Ramp														
16	R2	1314	1.0	1428	1.0	0.811	11.0	LOS B	8.6	216.0	0.90	1.10	1.35	33.4
Approach		1314	1.0	1428	1.0	0.811	11.0	LOS B	8.6	216.0	0.90	1.10	1.35	33.4
North: Road 100														
7	L2	456	1.0	496	1.0	0.476	10.2	LOS B	0.0	0.0	0.00	0.61	0.00	36.9
4	T1	800	1.0	870	1.0	0.476	3.3	LOS A	0.0	0.0	0.00	0.37	0.00	38.8
Approach		1256	1.0	1365	1.0	0.476	5.8	LOS A	0.0	0.0	0.00	0.46	0.00	38.1
West: I-182 Eastbound Off-Ramp														
12	R2	695	1.0	755	1.0	0.435	8.1	LOS A	2.1	53.6	0.66	0.85	0.80	35.0
Approach		695	1.0	755	1.0	0.435	8.1	LOS A	2.1	53.6	0.66	0.85	0.80	35.0
All Vehicles		4286	1.2	4659	1.2	0.811	7.9	LOS A	8.6	216.0	0.54	0.76	0.70	35.7

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
Intersection and Approach LOS values are based on average delay for all movements (v/c not used).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX I. 2025 PM PEAK HOUR LOOP WITH SLIP LANE ROUNDABOUT OPTION SIDRA RESULTS

MOVEMENT SUMMARY

Site: 101 [Loop Single Lanes v2 (Site Folder: General)]

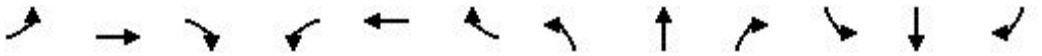
New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Road 100														
8	T1	729	2.0	792	2.0	0.898	32.2	LOS D	21.7	551.1	1.00	1.71	2.88	25.5
18	R2	292	2.0	317	2.0	0.193	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	37.9
Approach		1021	2.0	1110	2.0	0.898	23.0	LOS C	21.7	551.1	0.71	1.22	2.06	28.0
East: I-182 Eastbound Ramps														
16	R2	1314	1.0	1428	1.0	0.861	0.0	LOS D	0.0	0.0	0.00	0.00	0.00	36.8
Approach		1314	1.0	1428	1.0	0.861	1.3	LOS A	0.0	0.0	0.00	0.00	0.00	36.8
North: Road 100														
7	L2	456	1.0	496	1.0	0.353	5.7	LOS A	0.0	0.0	0.00	0.00	0.00	35.9
4	T1	800	1.0	870	1.0	0.618	9.7	LOS A	0.0	0.0	0.00	0.00	0.00	39.5
Approach		1256	1.0	1365	1.0	0.618	8.3	LOS A	0.0	0.0	0.00	0.00	0.00	38.1
West: I-182 Eastbound Off-Ramp														
12	R2	695	1.0	755	1.0	0.456	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	38.0
Approach		695	1.0	755	1.0	0.456	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	38.0
All Vehicles		4286	1.2	4659	1.2	0.898	7.9	LOS A	21.7	551.1	0.17	0.29	0.49	34.7

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
Intersection and Approach LOS values are based on average delay for all movements (v/c not used).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

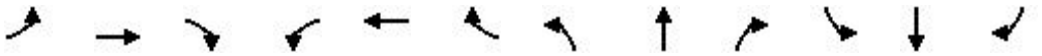
APPENDIX J. 2040 PM PEAK HOUR WIDENING OPTION SYNCHRO RESULTS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	325	0	740	0	1345	355	0	1020	760
Future Volume (vph)	0	0	0	325	0	740	0	1345	355	0	1020	760
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6		4.6		4.6	4.0		4.6	4.0
Lane Util. Factor				1.00		0.88		0.95	1.00		0.95	1.00
Frpb, ped/bikes				1.00		1.00		1.00	0.98		1.00	0.98
Flpb, ped/bikes				1.00		1.00		1.00	1.00		1.00	1.00
Frt				1.00		0.85		1.00	0.85		1.00	0.85
Flt Protected				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)				1787		2814		3574	1565		3574	1549
Flt Permitted				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)				1787		2814		3574	1565		3574	1549
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	0	0	0	378	0	860	0	1564	413	0	1186	884
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	378	0	860	0	1564	413	0	1186	884
Confl. Peds. (#/hr)							3		3	3		3
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	1%	1%	0%	1%	2%
Turn Type				Prot		Prot		NA	Free		NA	Free
Protected Phases				8		8		2			6	
Permitted Phases				8		8			Free			Free
Actuated Green, G (s)				33.8		33.8		57.0	100.0		57.0	100.0
Effective Green, g (s)				33.8		33.8		57.0	100.0		57.0	100.0
Actuated g/C Ratio				0.34		0.34		0.57	1.00		0.57	1.00
Clearance Time (s)				4.6		4.6		4.6			4.6	
Vehicle Extension (s)				1.5		1.5		3.0			3.0	
Lane Grp Cap (vph)				604		951		2037	1565		2037	1549
v/s Ratio Prot				0.21		c0.31		c0.44			0.33	
v/s Ratio Perm									0.26			0.57
v/c Ratio				0.63		0.90		0.77	0.26		0.58	0.57
Uniform Delay, d1				27.8		31.6		16.4	0.0		13.8	0.0
Progression Factor				1.00		1.00		1.37	1.00		1.00	1.00
Incremental Delay, d2				1.5		11.6		1.8	0.3		1.2	1.5
Delay (s)				29.3		43.1		24.3	0.3		15.1	1.5
Level of Service				C		D		C	A		B	A
Approach Delay (s)		0.0			38.9			19.3			9.3	
Approach LOS		A			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	20.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.2
Intersection Capacity Utilization	70.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

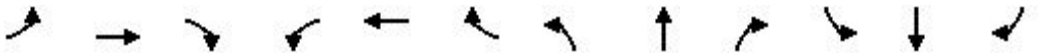


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	840	0	875	0	0	0	0	860	285	590	755	0
Future Volume (vph)	840	0	875	0	0	0	0	860	285	590	755	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5					4.6	4.6	4.6	4.6	
Lane Util. Factor	0.97		0.88					0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00		1.00					1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00		1.00					1.00	1.00	1.00	1.00	
Frt	1.00		0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3467		2814					3539	1555	3467	3574	
Flt Permitted	0.95		1.00					1.00	1.00	0.11	1.00	
Satd. Flow (perm)	3467		2814					3539	1555	391	3574	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	955	0	994	0	0	0	0	977	324	670	858	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	181	0	0	0
Lane Group Flow (vph)	955	0	994	0	0	0	0	977	143	670	858	0
Confl. Peds. (#/hr)			3	3			3		3	3		3
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	0%	2%	2%	1%	1%	0%
Turn Type	Prot		Prot					NA	Perm	pm+pt	NA	
Protected Phases	4		4					2		1	6	
Permitted Phases									2	6		
Actuated Green, G (s)	37.4		37.4					32.7	32.7	53.5	53.5	
Effective Green, g (s)	37.4		37.4					32.7	32.7	53.5	53.5	
Actuated g/C Ratio	0.37		0.37					0.33	0.33	0.54	0.54	
Clearance Time (s)	4.5		4.5					4.6	4.6	4.6	4.6	
Vehicle Extension (s)	3.0		3.0					3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	1296		1052					1157	508	707	1912	
v/s Ratio Prot	0.28		c0.35					0.28		c0.15	0.24	
v/s Ratio Perm									0.09	c0.35		
v/c Ratio	0.74		0.94					0.84	0.28	0.95	0.45	
Uniform Delay, d1	27.0		30.3					31.3	24.9	28.5	14.2	
Progression Factor	1.00		1.00					1.00	1.00	1.15	0.96	
Incremental Delay, d2	2.2		16.1					7.6	1.4	20.5	0.7	
Delay (s)	29.3		46.4					38.9	26.3	53.3	14.4	
Level of Service	C		D					D	C	D	B	
Approach Delay (s)		38.0			0.0			35.8			31.4	
Approach LOS		D			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	35.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.7
Intersection Capacity Utilization	75.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

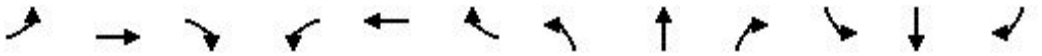
APPENDIX K. 2040 PM PEAK HOUR LOOP WITH SIGNAL OPTION SYNCHRO RESULTS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	325	0	740	0	1345	355	0	1020	760
Future Volume (vph)	0	0	0	325	0	740	0	1345	355	0	1020	760
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6		4.6		4.6	4.0		4.6	4.0
Lane Util. Factor				1.00		0.88		0.95	1.00		0.95	1.00
Frpb, ped/bikes				1.00		1.00		1.00	0.98		1.00	0.98
Flpb, ped/bikes				1.00		1.00		1.00	1.00		1.00	1.00
Frt				1.00		0.85		1.00	0.85		1.00	0.85
Flt Protected				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)				1787		2814		3574	1565		3574	1549
Flt Permitted				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)				1787		2814		3574	1565		3574	1549
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	0	0	0	378	0	860	0	1564	413	0	1186	884
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	378	0	860	0	1564	413	0	1186	884
Confl. Peds. (#/hr)							3		3	3		3
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	1%	1%	0%	1%	2%
Turn Type				Prot		Prot		NA	Free		NA	Free
Protected Phases				8		8		2			6	
Permitted Phases				8		8			Free			Free
Actuated Green, G (s)				33.8		33.8		57.0	100.0		57.0	100.0
Effective Green, g (s)				33.8		33.8		57.0	100.0		57.0	100.0
Actuated g/C Ratio				0.34		0.34		0.57	1.00		0.57	1.00
Clearance Time (s)				4.6		4.6		4.6			4.6	
Vehicle Extension (s)				1.5		1.5		3.0			3.0	
Lane Grp Cap (vph)				604		951		2037	1565		2037	1549
v/s Ratio Prot				0.21		c0.31		c0.44			0.33	
v/s Ratio Perm									0.26			0.57
v/c Ratio				0.63		0.90		0.77	0.26		0.58	0.57
Uniform Delay, d1				27.8		31.6		16.4	0.0		13.8	0.0
Progression Factor				1.00		1.00		1.37	1.00		1.00	1.00
Incremental Delay, d2				1.5		11.6		1.8	0.3		1.2	1.5
Delay (s)				29.3		43.1		24.3	0.3		15.1	1.5
Level of Service				C		D		C	A		B	A
Approach Delay (s)		0.0			38.9			19.3			9.3	
Approach LOS		A			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	20.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.2
Intersection Capacity Utilization	70.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	875	0	0	840	0	860	285	590	755	0
Future Volume (vph)	0	0	875	0	0	840	0	860	285	590	755	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.5			4.6		4.6	4.6	4.6	4.6	
Lane Util. Factor			0.88			0.88		0.95	1.00	1.00	1.00	
Frpb, ped/bikes			1.00			1.00		1.00	0.97	1.00	1.00	
Flpb, ped/bikes			1.00			1.00		1.00	1.00	1.00	1.00	
Frt			0.85			0.85		1.00	0.85	1.00	1.00	
Flt Protected			1.00			1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)			2814			2842		3539	1541	1787	1881	
Flt Permitted			1.00			1.00		1.00	1.00	0.21	1.00	
Satd. Flow (perm)			2814			2842		3539	1541	391	1881	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	0	0	994	0	0	955	0	977	324	670	858	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	98	0	0	0
Lane Group Flow (vph)	0	0	994	0	0	955	0	977	226	670	858	0
Confl. Peds. (#/hr)			3	3			3		3	3		3
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	0%	2%	2%	1%	1%	0%
Turn Type			Prot			Over		NA	Perm	pm+pt	NA	
Protected Phases			5			1		2		1	6	
Permitted Phases									2	6		
Actuated Green, G (s)			26.2			26.5		34.3	34.3	61.2	34.7	
Effective Green, g (s)			26.2			26.5		34.3	34.3	61.2	34.7	
Actuated g/C Ratio			0.37			0.38		0.49	0.49	0.87	0.50	
Clearance Time (s)			4.5			4.6		4.6	4.6	4.6	4.6	
Vehicle Extension (s)			3.0			2.0		3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)			1053			1075		1734	755	870	932	
v/s Ratio Prot			c0.35			0.34		0.28		0.29	c0.46	
v/s Ratio Perm									0.15	0.38		
v/c Ratio			0.94			0.89		0.56	0.30	0.77	0.92	
Uniform Delay, d1			21.2			20.4		12.6	10.7	9.7	16.4	
Progression Factor			1.00			1.00		1.00	1.00	1.78	0.90	
Incremental Delay, d2			15.9			8.9		1.3	1.0	3.6	13.0	
Delay (s)			37.1			29.2		13.9	11.7	20.9	27.6	
Level of Service			D			C		B	B	C	C	
Approach Delay (s)		37.1			29.2			13.4			24.7	
Approach LOS		D			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	9.2
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX L. 2040 PM PEAK HOUR LOOP WITH SIMPLE MULTI-LANE ROUNDABOUT OPTION SIDRA RESULTS

MOVEMENT SUMMARY

Site: 101 [Loop Sidra (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Road 100														
8	T1	860	2.0	935	2.0	0.581	9.3	LOS A	5.5	140.8	0.79	0.86	0.97	35.7
18	R2	285	2.0	310	2.0	0.581	8.6	LOS A	5.5	140.8	0.78	0.82	0.93	34.7
Approach		1145	2.0	1245	2.0	0.581	9.1	LOS A	5.5	140.8	0.79	0.85	0.96	35.4
East: I-182 Eastbound On/Off-Ramp														
16	R2	840	1.0	913	1.0	0.583	7.9	LOS A	4.0	101.5	0.80	0.94	0.97	35.0
Approach		840	1.0	913	1.0	0.583	7.9	LOS A	4.0	101.5	0.80	0.94	0.97	35.0
North: Road 100														
7	L2	590	1.0	641	1.0	0.510	10.2	LOS B	0.0	0.0	0.00	0.64	0.00	36.3
4	T1	755	1.0	821	1.0	0.510	3.3	LOS A	0.0	0.0	0.00	0.34	0.00	39.1
Approach		1345	1.0	1462	1.0	0.510	6.3	LOS A	0.0	0.0	0.00	0.47	0.00	37.8
West: I-182 Eastbound Off-Ramp														
12	R2	875	1.0	951	1.0	0.564	9.7	LOS A	3.4	84.8	0.72	0.93	1.01	34.1
Approach		875	1.0	951	1.0	0.564	9.7	LOS A	3.4	84.8	0.72	0.93	1.01	34.1
All Vehicles		4205	1.3	4571	1.3	0.583	8.1	LOS A	5.5	140.8	0.52	0.76	0.67	35.8

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
Intersection and Approach LOS values are based on average delay for all movements (v/c not used).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX M. 2040 PM PEAK HOUR LOOP WITH SLIP LANE ROUNDABOUT OPTION SIDRA RESULTS

MOVEMENT SUMMARY

Site: 101 [Loop Single Lanes v2 (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Road 100														
8	T1	860	2.0	935	2.0	1.211	126.2	LOS F	71.6	1817.7	1.00	3.66	8.72	12.5
18	R2	285	2.0	310	2.0	0.189	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	37.9
Approach		1145	2.0	1245	2.0	1.211	94.8	LOS F	71.6	1817.7	0.75	2.75	6.55	14.9
East: I-182 Eastbound Ramps														
16	R2	840	1.0	913	1.0	0.551	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	37.9
Approach		840	1.0	913	1.0	0.551	0.3	LOS A	0.0	0.0	0.00	0.00	0.00	37.9
North: Road 100														
7	L2	590	1.0	641	1.0	0.456	7.0	LOS A	0.0	0.0	0.00	0.00	0.00	35.9
4	T1	755	1.0	821	1.0	0.584	9.0	LOS A	0.0	0.0	0.00	0.00	0.00	39.5
Approach		1345	1.0	1462	1.0	0.584	8.1	LOS A	0.0	0.0	0.00	0.00	0.00	37.8
West: I-182 Eastbound Off-Ramp														
12	R2	875	1.0	951	1.0	0.574	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	37.8
Approach		875	1.0	951	1.0	0.574	0.3	LOS A	0.0	0.0	0.00	0.00	0.00	37.8
All Vehicles		4205	1.3	4571	1.3	1.211	28.4	LOS D	71.6	1817.7	0.20	0.75	1.78	26.7

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
Intersection and Approach LOS values are based on average delay for all movements (v/c not used).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX N. PLANNING LEVEL COST ESTIMATES

City of Pasco Cost Estimate

5/05/21 - DRAFT

Project Name: Road 100 / I-182 WB Intersection Improvements (Ramp Widening)

Project Description: Add additional westbound righ turn lane and channelize northbound recieving lane.

Construction Items and Descriptions	Unit	Qty	Unit Cost	Total Cost
Site Preparation				
Mobilization (7% of Construction Sub-Total)	LS	1	$25,647	$25,647
Erosion Control (1% of Construction Sub-Total)	LS	1	$3,664	$3,664
Clearing & Grubbing (2.5% of Construction Sub-Total)	LS	1	$9,160	$9,160
Temporary Protection & Traffic Control (3% of Contruction Sub-Total)	LS	1	$10,991	$10,991
Removal of Structures and Obstructions (4% of Construction Sub-Total)	LS	1	$14,655	$14,655
Roadway Elements				
Pavement - New Road	SF	5,700	$5	$27,281
Pavement - Resurfacing	SF	16,150	$2	$33,600
Curb and Gutter	LF	475	$25	$11,875
Sidewalk	SF	-	$7	$0
Curb Extension or Modification	EA	2	$10,000	$20,000
Shared-Use Paths	SF	-	$2	$0
Modify Driveway	EA	-	$3,025	$0
Retaining Wall	Vert SF	-	$100	$0
Bridge	SF	-	$250	$0
Street Furnishing (Bike Racks, Trash Cans, Benches)	LF	-	$15	$0
Utility and Drainage				
Utility Relocation - Overhead	LF	-	$100	$0
Drainage System Installed	LF	-	$145	$0
Drainage System Modified	LF	-	$80	$0
Stormwater Treatment Facility	SF	-	$35	$0
Right-of-Way Development				
Landscaping	LF	-	$34	$0
Traffic Elements				
Traffic Signal (Installation)	EA	-	$500,000	$0
Traffic Signal (Modification per pole)	EA	2	$100,000	$200,000
Rectangular Rapid Flash Beacons (RRFB)	EA	-	$40,000	$0
Striping	LF	475	$10	$4,750
Signage	LF	475	$15	$7,125
Street Lighting (Cobrahead)	LF	475	$130	$61,750
Street Lighting (Ornamental)	LF	-	$230	$0
Other Construction Items				
Other				$0

Construction Cost Subtotal	**$430,498**

Constuction Contingency (30% of Construction Cost Subtotal)	LS	1	$129,149	$129,149
Engineering Design and Construction Management (45% of Construction Cost Subtotal)	LS	1	$193,724	$193,724
Land Acquisition Costs				
ROW Acquisition	SF	-	$15	$0

Total Project Cost:	**$753,372**

City of Pasco Cost Estimate

5/05/21 - DRAFT

Project Name: Road 100 / I-182 EB Intersection Improvements (Widening)

Project Description: Add eastbound right turn lane, add southbound left turn lane and southbound thru lane, widen eastbound receiving to two lanes, widen southbound receiving to two lanes. Rebuild bridge to 5-lane section plus bike lanes and sidewalk.

Construction Items and Descriptions	Unit	Qty	Unit Cost	Total Cost
Site Preparation				
Mobilization (7% of Construction Sub-Total)	LS	1	$768,680	$768,680
Erosion Control (1% of Construction Sub-Total)	LS	1	$109,811	$109,811
Clearing & Grubbing (2.5% of Construction Sub-Total)	LS	1	$274,529	$274,529
Temporary Protection & Traffic Control (3% of Contruction Sub-Total)	LS	1	$329,434	$329,434
Removal of Structures and Obstructions (4% of Construction Sub-Total)	LS	1	$439,246	$439,246
Roadway Elements				
Pavement - New Road	SF	54,950	$5	$263,003
Pavement - Resurfacing	SF	85,025	$2	$176,895
Curb and Gutter	LF	1,250	$25	$31,250
Sidewalk	SF	10,000	$7	$74,000
Curb Extension or Modification	EA	4	$10,000	$40,000
Shared-Use Paths	SF	-	$2	$0
Modify Driveway	EA	-	$3,025	$0
Retaining Wall	Vert SF	-	$100	$0
Bridge	SF	38,250	$250	$9,562,500
Street Furnishing (Bike Racks, Trash Cans, Benches)	LF	-	$15	$0
Utility and Drainage				
Utility Relocation - Overhead	LF	-	$100	$0
Drainage System Installed	LF	-	$145	$0
Drainage System Modified	LF	-	$80	$0
Stormwater Treatment Facility	SF	-	$35	$0
Right-of-Way Development				
Landscaping	LF	-	$34	$0
Traffic Elements				
Traffic Signal (Installation)	EA	1	$500,000	$500,000
Traffic Signal (Modification per pole)	EA	-	$100,000	$0
Rectangular Rapid Flash Beacons (RRFB)	EA	-	$40,000	$0
Striping	LF	1,250	$10	$12,500
Signage	LF	1,250	$15	$18,750
Street Lighting (Cobrahead)	LF	2,325	$130	$302,250
Street Lighting (Ornamental)	LF	-	$230	$0
Other Construction Items				
Other				$0

Construction Cost Subtotal	**$12,902,848**

Constuction Contingency (30% of Construction Cost Subtotal)	LS	1	$3,870,854	$3,870,854
Engineering Design and Construction Management (45% of Construction Cost Subtotal)	LS	1	$5,806,282	$5,806,282
Land Acquisition Costs				
ROW Acquisition	SF	-	$15	$0

Total Project Cost:	**$22,579,984**

City of Pasco Cost Estimate

5/05/21 - DRAFT

Project Name: Road 100 / I-182 WB Intersection Improvements (Loop Ramp, Signal)

Project Description: Add eastbound right turn lane, add eastbound loop ramp

Construction Items and Descriptions	Unit	Qty	Unit Cost	Total Cost
Site Preparation				
Mobilization (7% of Construction Sub-Total)	LS	1	$112,604	$112,604
Erosion Control (1% of Construction Sub-Total)	LS	1	$16,086	$16,086
Clearing & Grubbing (2.5% of Construction Sub-Total)	LS	1	$40,216	$40,216
Temporary Protection & Traffic Control (3% of Contruction Sub-Total)	LS	1	$48,259	$48,259
Removal of Structures and Obstructions (4% of Construction Sub-Total)	LS	1	$64,345	$64,345
Roadway Elements				
Pavement - New Road	SF	69,250	$5	$331,446
Pavement - Resurfacing	SF	23,700	$2	$49,308
Curb and Gutter	LF	-	$25	$0
Sidewalk	SF	-	$7	$0
Curb Extension or Modification	EA	2	$10,000	$20,000
Shared-Use Paths	SF	-	$2	$0
Modify Driveway	EA	-	$3,025	$0
Retaining Wall	Vert SF	6,000	$100	$600,000
Bridge	SF	-	$250	$0
Street Furnishing (Bike Racks, Trash Cans, Benches)	LF	-	$15	$0
Utility and Drainage				
Utility Relocation - Overhead	LF	-	$100	$0
Drainage System Installed	LF	-	$145	$0
Drainage System Modified	LF	-	$80	$0
Stormwater Treatment Facility	SF	-	$35	$0
Right-of-Way Development				
Landscaping	LF	-	$34	$0
Traffic Elements				
Traffic Signal (Installation)	EA	-	$500,000	$0
Traffic Signal (Modification per pole)	EA	2	$100,000	$200,000
Rectangular Rapid Flash Beacons (RRFB)	EA	-	$40,000	$0
Striping	LF	2,925	$10	$29,250
Signage	LF	2,925	$15	$43,875
Street Lighting (Cobrahead)	LF	2,575	$130	$334,750
Street Lighting (Ornamental)	LF	-	$230	$0
Other Construction Items				
Other				$0

Construction Cost Subtotal	**$1,890,139**

Constuction Contingency (30% of Construction Cost Subtotal)	LS	1	$567,042	$567,042
Engineering Design and Construction Management (45% of Construction Cost Subtotal)	LS	1	$850,562	$850,562
Land Acquisition Costs				
ROW Acquisition	SF	-	$15	$0

Total Project Cost:	**$3,307,743**

Appendix B. Methods and Assumptions Memorandum

DKS 720 SW WASHINGTON STREET, SUITE 500, PORTLAND, OR 97205 • 503.243.3500 • DKSASSOCIATES.COM

BROADMOOR INTERCHANGE - ACCESS REVISION REPORT METHODS AND ASSUMPTIONS

DATE: April 6, 2022

TO: Rick Keniston, PE, ASDE | WSDOT
Todd Daley, PE | WSDOT
Brian White, PE | WSDOT

FROM: Aaron Berger, PE | DKS Associates
Sarah Keenan, PE | DKS Associates

SUBJECT: Broadmoor Interchange Project – Access Revision Report Project #21292

INTRODUCTION

This document is the methods and assumptions for the Access Revision Report (ARR) for the Broadmoor Interchange Project. After discussion with Federal Highway Administration (FHWA) staff, it was determined that the non-access feasibility study is not required for this project, as documented in the project Purpose and Need Memorandum. This Methods and Assumptions document follows the Washington State Department of Transportation (WSDOT) Design Manual section 550.05(1).

TEAM PARTICIPANTS

EXECUTIVE TEAM MEMBERS, ROLES, AND RESPONSIBILITIES

Work underway as part of this phase of the project will involve an executive advisory group that will be composed of high-level management staff from the affected jurisdictions and agencies. This team will be responsible for participating in the Executive Team meetings as representatives of their jurisdictions and agencies. They will identify key issues that the project team should consider as they outline the purpose and need of the project. In addition, the Executive Team members will designate representatives from their respective jurisdictions and agencies to participate in the project as members of the Technical Advisory Committee (TAC). The Executive Team members for the Broadmoor Interchange project are listed in Table 1.

TABLE 1: EXECUTIVE TEAM MEMBERS

AGENCY	NAME	TITLE
FHWA	Joel Barnett	Safety and Geometric Design Engineer
WSDOT HEADQUARTERS	Rick Keniston	Assistant State Design Engineer (ASDE)
	Brian Walsh	State Traffic Design Engineer
	Scott Davis	Assistant State Traffic Design Engineer
WSDOT SOUTH CENTRAL REGION	Brian White	Assistant Regional Administrator for Construction and Development
	Todd Daley	Region Traffic Engineer
	Randy Giles	Region Program Management Engineer
	Bill Sauriol	Region Environmental Manager
	Paul Gonseth	Region Planning Engineer
CITY OF PASCO	Steve Worley	Public Works Director - Project Manager
	Dave Zabel	City Manager
FRANKLIN COUNTY	Matt Mahoney	Public Works Director
BEN FRANKLIN TRANSIT (BFT)	Keith Hall	Director

TECHNICAL ADVISORY COMMITTEE MEMBERS, ROLES, AND RESPONSIBILITIES

Similar to the executive advisory group, a Technical Advisory Committee (TAC) will convene to discuss technical issues related to the project team's outline of the needs, development of the alternatives, and selection of a preferred alternative. This group will consist of staff from the jurisdictions and agencies selected by members of the Executive Team that will be able to discuss the technical methodology and outcomes. In addition, the TAC will provide input and guidance into the alternative development, screening, and selection process. The TAC members for the Broadmoor Interchange project are listed in Table 2.

TABLE 2: TAC TEAM MEMBERS

AGENCY	NAME	TITLE
FHWA	Gary Martindale	SC & SW Region Area Engineer
	Sharon Love	Environmental Program Manager
WSDOT HEADQUARTERS	Brian Wood	Multimodal Division Representative
	Rick Keniston	Assistant State Design Engineer (ASDE)
	Scott Davis	Assistant State Traffic Design Engineer
WSDOT SOUTH CENTRAL REGION	Paul Gonseth	Region Planning Engineer
	Jacob Prilucik	Transportation Engineer
	Jeff Minnick	Design Engineering Manager
	Bill Sauriol	Environmental Manager
	Kara Shute	Maintenance Superintendent
	Larry Wilhelm	Maintenance
	Todd Daley	Traffic Engineer
	Alex Sangino	Construction
	Andres Mendoza	Construction
	LisaRene Schilperoort	Assistant Traffic Engineer
CITY OF PASCO	Steve Worley	Public Works Director
	Dan Ford	City Engineer
	Maria Serra	CIP Manager
	Jacob Gonzalez	Senior Planning Manager
FRANKLIN COUNTY	Craig Erdmann	Assistant Public Works Director
BEN-FRANKLIN TRANSIT (BFT)	Kevin Sliger	Principal Planner/Capital Projects

PLANNING LINKAGE

It is essential to link the transportation planning processes, outputs, and improvements considered in this study with the planning processes in other agencies, including addressing multimodal connectivity. The improvements considered should be consistent with current approved local land use plans and local, regional, and state transportation plans.

PERTINENT PLANNING DOCUMENTS

The analysis described in this methods and assumptions document will consider the regional plans listed below to account for and ensure consistency with anticipated growth, development, and transportation network improvements described in the regional plans:

- City of Pasco 2018-2038 Comprehensive Plan – adopted June 7, 2021
- City of Pasco Transportation System Master Plan (TSMP) – On-going, anticipated adoption in December of 2021
- City of Pasco Broadmoor Interchange Analysis - Completed 2021
- City of Pasco Capital Improvement Plan – Adopted August 17, 2020
- City of Pasco Transportation Improvement Plan – Adopted June 15, 2020
- Franklin County 2018-2038 Comprehensive Plan – June 2021
- Benton-Franklin Council of Governments "Transition2040" Metropolitan Regional Transportation Plan (MRTP) – Adopted May of 2017, amended January of 2018
- BFCG Regional Active Transportation Plan - Adopted September of 2020
- BFCG 2022-2025 Transportation Improvement Plan (TIP)
- Ben Franklin Transit (BFT) 2021-2016 Transit Development Plan
- WSDOT Statewide Transportation Improvement Program (STIP)

DOCUMENT LINKAGE

The Broadmoor Interchange Access Revision Report is intended to also fulfil the requirements of the Intersection Control Evaluation (ICE) to verify the chosen ramp terminal intersection(s) control at the interchange are adequate for all modes. As stated in Section 550.06(2)(b)(i) of the WSDOT design Manual, an ICE is not required if an ARR documents the criteria required for an ICE. The process and performance measures used for screen, evaluate, and compare alternatives on this project draws from both Section 550 (ARR) and 1300 (ICE) from the WSDOT Design Manual.

ENVIRONMENTAL LINKAGE

The processes used in this study will be aligned with the environmental documentation process to reduce duplication of effort. Environmental staff will be engaged in the process to ensure compliance with the National Environmental Policy Act (NEPA)/State Environmental Policy Act (SEPA) as the project progresses and a preferred alternative is identified.

COMMUNITY ENGAGEMENT

Community engagement will be a key part of the ARR. Public participation is a dynamic process that requires effective strategies to be tailored to fit both the subject matter and the audience. Effective public involvement requires building relationships with members and organizations in the community.

A draft Public Involvement Plan (PIP) will be completed in November 2021. The document is intended to provide the City of Pasco's staff and other relevant stakeholders the variety of public involvement strategies and tactics that will be used to encourage and engage greater public involvement in the project decision-making process. The PIP document will include the following elements:

- Public involvement goals (e.g., education on the project and environmental process, effective stakeholder engagement) and public involvement schedule
- Target audiences (e.g., businesses, community groups, public agencies, Tribes, key stakeholders, active transportation users, public officials, and broader public interests)
- Identify communication tactics and tools (e.g., newsletters, posters, interactive web site, presentations, and media release content), including approaches to solicit input of those traditionally underserved by transportation (environmental justice and Title VI populations)
- The procedures for acknowledging, considering, and responding to public comments
- Coordination with the City's Communications Officer and other project stakeholders
- Demographic and behavioral analysis to ensue engagement of social economically diverse populations
- Accommodations for translation and bilingual meeting facilitation

The PIP will use a multi-faceted approach, with a goal of engaging specific stakeholders with interest in the Project. Information will also be shared with the public through the process through social media, news and other City resources (radio, e-blasts).

ALTERNATIVES SELECTION

This section describes the process for determining reasonable alternatives, including alternative development and screening. This process is intended to also meet the requirements of an ICE, and will include documentation of the following steps:

1. Background and Project Needs – captured in the project Purpose and Need memorandum as well as the Existing and Baseline conditions summary within the ARR document.

2. Feasibility – Captured in the Level 1 screening (see subsequent section). Note that cost will not be considered until the Level 2 evaluation

3. Operational and Safety Performance Analysis – Captured in the Level 2 evaluation (see subsequent section).

4. Alternatives Evaluation – Captured in the Level 2 scoring.

5. Selection – Captured by the highest scoring alternative from the Level 2 scoring.

The following sections of this memorandum summarize the performance measures, alternatives development, and alternatives screening process for this ARR.

PROJECT NEED AND PERFORMANCE MEASURES

The first step in the alternatives selection process is to establish the project need, which would then be used to identify performance measures or metrics for the transportation system. The project needs have been established through prior analysis efforts, in particular the Broadmoor Interchange Analysis study, and have been summarized in the project Purpose and Need Memorandum. These project needs will be fully quantified through an updated future No-Build analysis based on the most recent traffic forecasting information available from BFCG. Performance measures will be applied to determine the extent by which existing and future no-build conditions fall short of meeting the project need (i.e., performance gaps). The evaluation of needs will consider the following:

- Physical characteristics of the site and other existing conditions with particular focus on the ramp terminals, including:
  - Posted speeds
  - Average Annual Daily Traffic (AADT)
  - Peak hour turning movement volumes
  - Channelization and control features
  - Multimodal facilities
  - Context
  - Modal Priority
- Consideration of trip and travel characteristics of people using the Broadmoor Interchange and existing comprehensive transportation networks in the identified project impact area
- Personal vehicle, freight, and transit traffic operations
- Active transportation (bicycle, pedestrian) connectivity and access
- Safety
- Environmental impacts

ALTERNATIVES DEVELOPMENT

Reasonable non-access and access alternatives that address the performance gaps and support the project need will identified and developed through a series of workshops with the TAC. The workshop will take place over approximately three weeks, following this approximate format:

1. Kick-Off – two-hour work-session reviewing the project purpose and need, Baseline conditions, and introducing the virtual tools that the TAC members will use to develop alternative concepts

2. Concept Development – TAC members will have three days to sketch out concepts using virtual tools

3. Concept Refinement – Two-hour TAC work-session to review and consolidate alternatives into logical groupings for Level 1 screening. The outcome of this work-session will be a set of reasonable alternatives to advance to the Level 1 Screening.

4. First Level Screening – Two-hour TAC work-session to evaluate conceptual layouts of alternatives against the Level 1 Screening matrix. The outcome of this work-session will be a set of alternatives to advance to Level 2 evaluation and scoring.

Interchange improvement and active transportation improvement concepts may be developed separately but assessed for compatibility during the concept refinement work-session. Depending on the propose alternative, the Level 1 screening may be applied separately by ramp terminal to ensure all feasible intersection control options advance to the Level 2 evaluation, ensuring concurrence with the ICE process.

ALTERNATIVES SCREENING

Following the alternatives development, the alternatives screening process will be conducted so that a preferred alternative can be selected. The screening process will consist of two levels:

1. A qualitative, fatal flaw and reasonable feasibility assessment

2. A more detailed analysis and comparison of alternatives

The alternatives may be revised or redefined as they are being evaluated to better meet the purpose and need.

A matrix of performance measures used to screen alternatives will be developed with input from the TAC. This screening matrix will be created prior to the alternatives development workshop and will include full documentation of the alternatives development process, screening criteria, and performance measures used for evaluation.

FIRST LEVEL SCREENING - QUALITATIVE

The first-level screening will be used to eliminate from further consideration alternatives determined to have physical fatal flaws, or that do not meet the project need. As previously noted, proposed alternatives may be screened separately by ramp terminal intersection to ensure all feasible intersection control options advance to the Level 2 evaluation. No quantitative analysis will be performed during the first-level screening. Level 1 screening addresses the following elements:

- Right-of-Way (ROW) impacts
- Widening of existing structures
- Replacement of existing structures
- Ability to meet reasonable and sage geometric standards

- Maintenance of existing freeway entrance access points
- Limiting new access points on to I-182
- Active transportation connectivity opportunities

Environmental considerations, including displacement of EJ populations and impacts to sensitive habitats will also be considered in conjunction with the ROW impacts analysis. The full descriptions of the Level 1 screening elements will be included in the project screening matrix memorandum.

SECOND LEVEL SCREENING – QUANTITATIVE

The second level screening will be used to determine the preferred interchange and active transportation alternative. This screening will include quantitative analysis of the alternatives that pass through the Level 1 screening, using performance measures to compare alternatives and select the design that best addresses the project purpose and need. As noted with the Level 1 screening, intersection control options will be evaluated separately at each ramp terminal (when feasible) to meet ICE requirements. Freeway diverge improvements will also be evaluated independently.

The performance measures under included in the Level 2 screening are:

- Operations
  - Traffic delay and Level of Service (intersections and freeway)
  - Queue length
  - Forward Compatibility – does not preclude larger scale future interchange improvements designed to meet longer term traffic needs
- Safety
  - Expected crash rates
  - Traffic Level of Service and queueing at identified safety hot spots
  - Injury and speed minimization
- Active Transportation
  - Bike/Pedestrian Level of Traffic Stress
  - Route directness index
  - Maximum crossing distance
  - Crossing safety
- Cost

The full descriptions of the Level 2 screening performance measures and evaluation will be included in the project screening matrix memorandum. Each alternative will be evaluated and scored for all applicable performance measures. The TAC may at this point decide to weight performance measures or objectives based on stakeholder priorities, ultimately resulting in a total score for each alternative.

TRAFFIC OPERATIONAL ANALYSIS SCOPE AND SCALE

The traffic operational analysis scope and scale was determined by the purpose and need of the project.

STUDY YEARS

The study years include an existing conditions year of 2019 (Pre COVID-19 impacts), an estimated year of opening/interim year of 2025, and a horizon year of 2045. Intervening years may be evaluated for sensitivity analysis to consider practical initial design and forward compatibility. Note that given the uncertainty inherent to a 20+ year forecast, the 2045 horizon year will be used more as a guide and less as a firm view of the future. The future compatibility aspect of proposed alternatives will focus on the forecasted 2045 conditions.

STUDY AREA

The following freeway mainline/diverge areas and the following intersections will be analyzed as part of the Access Revision Report.

Freeway:

- I-182 eastbound diverge to Broadmoor Blvd
- I-182 eastbound mainline between Broadmoor Blvd diverge and merge
- I-182 westbound diverge to Broadmoor Blvd
- I-182 westbound mainline between Broadmoor Blvd diverge and merge

Intersections:

- Chapel Hill Boulevard/ Broadmoor Blvd (signalized)
- St Thomas Drive/ Broadmoor Blvd (side-street stop controlled)
- I-182 eastbound on and off-ramps / Broadmoor Blvd ramp terminal (signalized)
- I-182 westbound on and off-ramp / Broadmoor Blvd ramp terminal (signalized)
- Harris Road / Broadmoor Blvd (side-street stop controlled)
- Sandifur Parkway/ Broadmoor Blvd (signalized)
- I-182 eastbound on and off-ramps / Road 68 ramp terminal (signalized)
- I-182 westbound on and off-ramp / Road 68 ramp terminal (signalized)

DATA COLLECTION

Data collected as part of the City of Pasco Broadmoor Interchange Project and the City of Pasco Transportation System Master Plan will be used as the basis for the traffic operations analysis for this project. This previously collected data is summarized in Table 3.

TABLE 3: DATA COLLECTION SUMMARY

LOCATION	TIME PERIODS	DATA COLLECTION DATES
INTERSECTIONS		
BROADMOOR BLVD / SANDIFUR PKWY	7-9 AM, 4-6 PM	3/26/2019 (PM), 3/27/2019 (AM)
BROADMOOR BLVD / HARRIS RD	7-9 AM, 4-6 PM	3/26/2019 (PM), 3/27/2019 (AM)
BROADMOOR BLVD / I-182 WESTBOUND RAMPS	7-9 AM, 4-6 PM	3/26/2019 (PM), 3/27/2019 (AM)
BROADMOOR BLVD / I-182 EASTBOUND RAMPS	7-9 AM, 4-6 PM	3/26/2019 (PM), 3/27/2019 (AM)
BROADMOOR BLVD / ST THOMAS DR	7-9 AM, 4-6 PM	3/21/2019
BROADMOOR BLVD / CHAPEL HILL BLVD	7-9 AM, 4-6 PM	3/18/2019
ROAD 68 / I-182 WESTBOUND RAMPS	7-9 AM, 4-6 PM	12/16/2019
ROAD 68 / I-182 EASTBOUND RAMPS	7-9 AM, 4-6 PM	12/16/2019
I-182 FREEWAY MAINLINE		
I-182 PERMANENT TRAFFIC RECORDER (PTR) SITE R081 (COLUMBIA RIVER BRIDGE)	24-hour count	3/26/2019 (PM), 3/27/2019 (AM)

TRAFFIC FORECASTING METHODOLOGY

Future year traffic volumes will be forecasted using the BFCG travel demand model. Future year turn movement traffic volumes will be postprocessed using the procedures outlined in the National Cooperative Highway Research Program (NCHRP) reports 255 and 765.

The forecasted 2045 traffic demand at the I-182 river crossing from the BFCG model indicates significantly more vehicles then could feasibly cross the three-lane bridge (in each direction) during a peak hour. While additional Columbia River crossings have been studied and a preferred alternative has been identified that connects northern Richland to Franklin County, this project does not have any identified funding plan or timeline and will not add capacity to the existing I-182 bridge. Therefore, for this project the I-182 bridge is assumed to be constrained to 1,800 vehicles per hour per lane of capacity during the AM and PM peak hours, due both to the constraints of the number of lanes on the bridge and the impacts of the I-182 and SR 240 interchange on the west

side of the Columbia River. Additional demand beyond the 1800 per hour per lane is assumed to spread to the shoulder hours of the peak period, resulting in "peak spreading" driving behavior. The reduced I-182 volumes will be adjusted proportionally through the ramp terminals and project study intersections. These adjustments will ensure that interchange alternatives are not over-built to accommodate peak hour freeway traffic that is never expected to occur.

Due to the constraints of the existing freeway system at the I-182 river crossing, the Baseline (No-Build) forecasts will be assumed to remain unchanged across the Build alternatives considered, as the system bottleneck on I-182 is not expected to receive additional capacity from any proposed alternatives, per the project purpose.

TOOLS

This section describes the modeling tools that will be used to develop forecast volumes and analyze traffic operations.

TRAVEL DEMAND MODEL

The BFCG travel demand model will be used as the primary tool for traffic forecasts on this project. The project team will use TransCAD Version 8 to run or re-assign the model as needed.

The BFCG travel model scenarios for 2019 (Base year), 2025, and 2045 will be used to develop the forecasts. The project team will validate the 2025 and 2045 BFCG models to ensure that the land use assumptions remain consistent with the City of Pasco 2018-2038 Comprehensive Plan. These assumptions include close to a full build out of the Broadmoor Area by the year 2038, with approximately 7,000 new households and 3,000 new jobs added to the areas immediately surrounding the interchange.

STUDY TIME PERIODS

The traffic analysis will focus on the following study years:

- 2019 – Existing Conditions
- 2025 – Estimated Year of Opening/Interim year
- 2045 – Horizon Year

The traffic analysis will include both the AM and PM peak hours of an average weekday conditions.

BACKGROUND PROJECTS

Relevant projects will be included in the travel demand and traffic analysis models, after being reviewed and agreed upon by the project team. The background projects were identified based on the City of Pasco Capital Improvement Plan (CIP) 2021-2026, the Pasco Six-Year Transportation Improvement Program (TIP) 2021-2026, the BFCG Transportation Improvement Plan (TIP) 2022-2025, and on-going refinement of project refinement efforts led by the City of Pasco supporting incoming development along Broadmoor Boulevard.

The background projects assumed for 2025 conditions focus on improvements identified in the City of Pasco CIP and TIP likely to gain funding within the next four years, along with projects identified along Broadmoor Boulevard as part of imminent development projects. The assumed year 2025 background projects with potential impacts to the ARR analysis are summarized in Table 4 and shown in yellow in Figure 1.

TABLE 4: YEAR 2025 RELEVANT BACKGROUND PROJECTS

#	PROJECT NAME	PROJECT LOCATION	PROJECT DESCRIPTION	PROJECT SOURCE
1	Pedestrian/Bicycle Access Rd 68 Int.	Road 68 through I-182 Interchange	Bike/Pedestrian Improvements along Road 68 through the I-182 Interchange	Pasco CIP
2	Burns Road Pedestrian/Bicycle Pathway	Burns Road (Road 100 to Road 68)	Bike/Pedestrian pathway along Burns Road	Pasco CIP
3	Crescent Rd Surface Improv.	Crescent Rd (Road 108 to Chapel Hill Blvd)	Three-lane formalized paved connection	Pasco CIP
4	Road 100 Pedestrian/Bicycle Improvements	Broadmoor Blvd (I-182 Interchange to Burns Road)	New multi-use path along Broadmoor Blvd	Pasco TIP
5	Sandifur Pkwy Extension – Phase 1	Sandifur Pkwy (Broadmoor Blvd to Road 108)	New 5-lane roadway extension	Pasco TIP
6	Harris Road Re-alignment	Harris Rd (new Road 108) to Sandifur Pkwy	Close existing Harris Rd access to Broadmoor Blvd, re-align Harris Rd northbound to connect to Sandifur Pkwy Extension as Road 108	Pasco TIP
7	Broadmoor Blvd Widening	Broadmoor Blvd (I-182 Interchange to Burns Road)	Widening to 6/7 lane cross section from the interchange to Sandifur Pkwy, 5-lane from Sandifur Pkwy to Burns Rd	On-going development planning
8	Broadmoor Blvd Widening	Broadmoor Blvd (I-182 Interchange to Chapel Hill Blvd)	Widening to two southbound lane, and close southbound left turn at St Thomas Drive	On-going development planning

For the year 2045 background assumptions, all projects identified in the City of Pasco TSMP and included in the BFCG 2045 travel demand model are included. The assumed year 2045 background projects with potential impacts to the ARR analysis are summarized in Table 5 and shown in purple in Figure 1. These projects are either included on the City of Pasco TIP or must occur to connect the Comprehensive Plan expect land uses to the existing system.

TABLE 5: YEAR 2045 RELEVANT BACKGROUND PROJECTS

#	PROJECT NAME	PROJECT LOCATION	PROJECT DESCRIPTION	PROJECT SOURCE
9	Road 100 Widening	Road 100 (Chapel Hill Blvd to Court St)	Widen to 5-lanes as needed	Pasco TIP
10	Road 76 Overcrossing	Road 76 (Chapel Hill Blvd to Burden Blvd)	New roadway extension with I-182 overcrossing	Pasco TIP
11	Sandifur Pkwy Extension – Phase 2	Sandifur Pkwy (Road 108 to Shoreline Road)	New 3-lane roadway extension	Pasco TSMP
12	Road 108 Extension	Road 108 (Sandifur Pkwy to Clark Rd	New 3-lane roadway extension	Pasco TSMP
13	Road 116 Extension	Road 116 (Harris Rd to Burns Rd)	New 3-lane roadway extension	Pasco TSMP

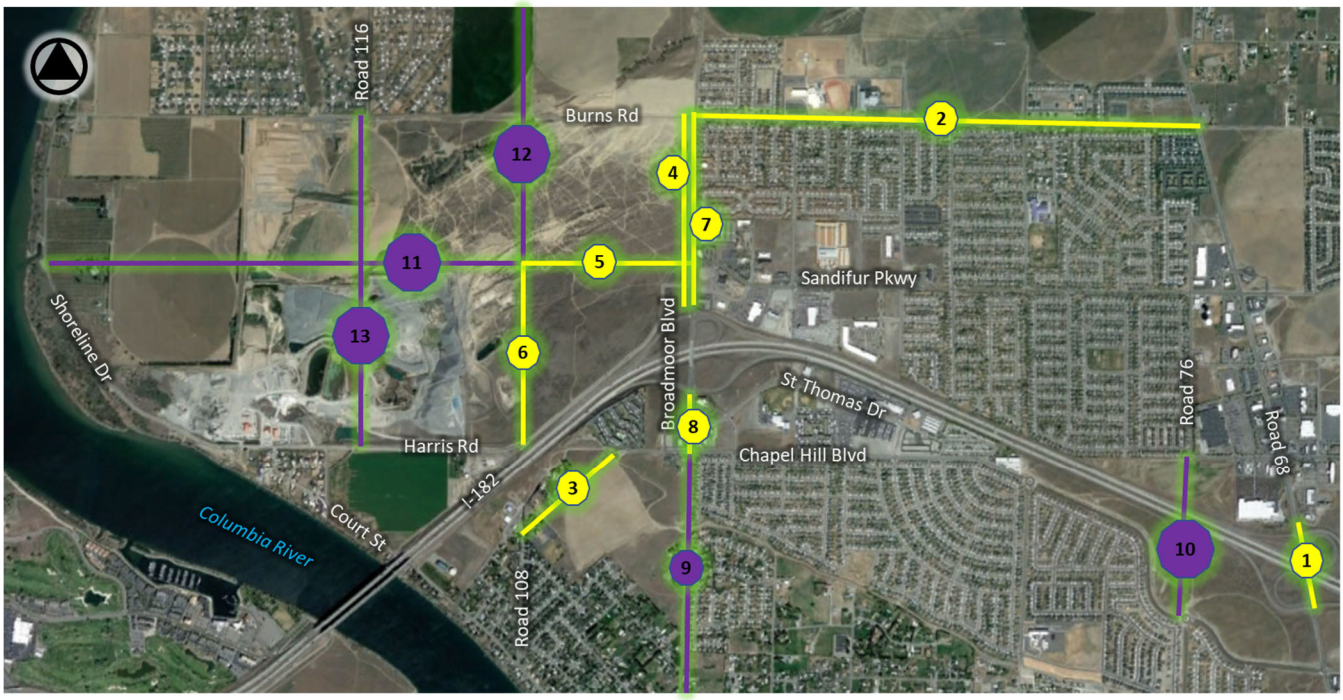


FIGURE 1: 2025 AND 2045 RELEVANT BACKGROUND PROJECTS

TRAFFIC OPERATIONS TOOLS

The following tools will be used to perform the traffic analysis for the project, including the Level 2 analysis supporting the selection of a preferred alternative.

Synchro/SimTraffic

Synchro/Sim Traffic Version 10 will be used to analyze Level of Services (LOS), delay, and queuing at signalized and unsignalized intersections.

Sidra

Sidra Version 9 will be used to analyze the LOS, delay, and queuing for any roundabouts included the interchange alternatives.

Highway Capacity Software (HCS)

HCS Version 7 will be used to analyze the LOS and delay on the freeway mainline and diverge segments on I-182.

Measures of Effectiveness

Analysis will be consistent with HCM 6th edition and follow the WSDOT design manual. The following performance metrics will be used for analysis:

- Freeway:
  - Level of Service (LOS) and delay using HCS and following HCM 6th edition methodology
- Signalized intersections:
  - 95th Percentile Queues using SimTraffic (no queuing analysis will be performed at the Road 68/I-182 ramp terminal intersections)
  - Level of Service (LOS) and delay using Synchro and following HCM 6th Edition methodology
- Stop Controlled intersections:
  - 95th Percentile Queues using SimTraffic
  - Level of Service (LOS) and delay using Synchro and following HCM 6th Edition methodology
- Roundabouts:
  - 95th Percentile Queues using Sidra
  - Level of Service (LOS) and delay using Sidra and following the Sidra Standard Roundabout Capacity Model methodology

SAFETY PERFORMANCE ANALYSIS SCOPE AND SCALE

The existing safety conditions will be analyzed using the last five full years of crash history on both the interstate and Broadmoor Boulevard. No safety analysis will be performed at the Road 68 interchange.

STUDY AREA

The safety analysis performed for this project will encompass the roadway segments and intersections shown in yellow on Figure 2.

FIGURE 2: ARR SAFETY ANALYSIS STUDY AREA

This study area includes all the study intersections on Broadmoor Blvd as well as the off-ramp diverges and mainline portions of the I-182 between the on and off-ramps at Broadmoor Blvd.

HIGHWAY SAFETY MANUAL METHODOLOGY

This section outlines the Highway Safety Manual (HSM) methodology that will be applied on this project to evaluation the safety performance of proposed project alternatives. This section includes an introduction to the HSM, a description of the HSM predictive method, and a summary of the HSM analysis tools to be used on this project.

HSM INTRODUCTION

The Highway Safety Manual First Edition was released in 2010 to provide researchers and practitioners with new quantitative information for decision making. It presents tools and methodologies for consideration of safety across the range of highway activities. The HSM is not a legal standard of care; instead, the HSM states, "The use of the HSM in alternative evaluation allows the agency to quantify the impact of safety improvements such as removing on-street parking, consolidating driveways, installing a raised median, and adding left-turn lanes and phasing. This gives the agency a tool that provides valuable information in the decision-making

process."[1] However, as noted previously, the HSM does not require that alternatives be selected based solely on the safety performance evaluation, and it is not intended to be a substitute for the exercise of sound engineering judgment. There are no quantifiable thresholds that definitively determine the safety performance of identified treatments.

THE HSM PREDICTIVE METHOD

In the HSM, "crash frequency is the fundamental basis for safety analysis, selection of sites for treatment and evaluation of the effects of treatments. The overall aim of the HSM is to reduce crashes and crash severities through the comparison and evaluation of alternative treatments and design of roadways."[2]

The chapters in HSM Part C that are most relevant to the analysis for this project are Chapter 12 (Predictive Method for Urban/Suburban Arterials), Chapter 18 (Predictive Method for Freeways) and Chapter 19 (Predictive Method for Ramps). Generally, the predictive method incorporates the following steps in calculating predicted crash frequencies for both Build and No-Build conditions:

- ***Input data:*** These include traffic volume, geometric data, roadway limits, periods of interest, and traffic control features.

- ***Safety Performance Functions (SPF):*** SPFs are the basis of the calculations used in the HSM predictive method. SPFs have been developed for use in predicting all types of vehicle collisions on roadway segments and intersections. The chapters in HSM Part C: Predictive Method have been developed for predicting the collision severity and frequency for specific base conditions. Each SPF supplied in the HSM was developed through a regression analysis using observed crash data for a set of similar sites. The SPFs are influenced by the number of lanes, presence or absence of a median, AADT, number of legs and type of traffic control at an intersection.

  Crash Modification Factors (CMFs): The analysis of intersections is refined using and CMFs, which are used to account for differences between the HSM's base conditions and the study location's conditions.

The HSM Part C provides the predictive methodology to estimate the predicted and/or expected crash frequencies for facilities with known traffic and roadway characteristics. The predicted crash frequency of an individual site is the average annual crash frequency calculated with the Safety Performance Functions (SPFs) and Crash Modification Factors (CMFs) based on the geometric design, traffic control features, and traffic volume of the site. The expected crash frequency

[1] HSM User Manual, p. 3-56

[2] HSM Chapter 3, Fundamentals (p. 3-1)

incorporates historical crash data, then applies the Empirical Bayes (EB) method to account for regression to the mean and produce a more statistically reliable measure.[3]

The predictive method is also used to estimate crash rates for future conditions scenarios, either at existing facilities (with changes in traffic volume only) or to evaluate the proposed designs for planned facilities. The same process of using SPFs and CMFs to predict future crash rates applies to future/planned scenarios, albeit without the ability to account for observed/historical crashes.

HSM ANALYSIS TOOLS

The analysis for the freeway mainline segments and ramps will be performed using the **Enhanced Interchange Safety Analysis Tool (ISATe)**, a spreadsheet tool implementing predictive methods consistent with the Chapters 18 and 19 of HSM Part C.

The analyses for ramp terminal intersections and other nearby intersections will be performed using the HSM Chapter 12: Predictive Method for Urban and Suburban Arterials smart spreadsheet.

Limitations of the HSM and ISATe tools could result in some proposed safety treatments not being included in the quantitative analysis. The HSM emphasizes that engineering judgment must be applied to fully understand the safety impacts beyond the HSM formulas and make decisions accordingly.

ACTIVE TRANSPORTATION ANALYSIS SCOPE AND SCALE

The ARR will include analysis of existing conditions of the bicycle and pedestrian facilities in the study area. This will include a level of traffic stress (LTS) analysis for bicycle and pedestrian facilities on Broadmoor Boulevard through the interchange. The analysis will compare existing conditions level of traffic stress with any planned improvements included as part of the Baseline (No-Build) and with any improvements included in the alternatives that pass Level 1 screening. LTS is a measurement on a scale 1-4, with 1 being the least stressful and 4 being the most stressful.

STUDY AREA

The analysis components of the active transportation evaluation performed for this project will encompass the portion of Broadmoor Boulevard highlighted in Figure 3.

[3] NCHRP 17-50 Lead States Initiative for Implementing the Highway Safety Manual, August 2014.

FIGURE 3: ARR ACTIVE TRANSPORTATION ANALYSIS STUDY AREA

The BLTS and PLTS will be analyzed on a segment level. Segments begin and end between intersections or where there is any major change to the roadway or non-motorized facilities. In this case, the segments under existing conditions are as follows:

- Broadmoor Boulevard between Chapel Hill Boulevard and St Thomas Drive
- Broadmoor Boulevard between St Thomas Drive and I-182 EB ramps
- Broadmoor Boulevard between I-182 EB ramps and I-182 WB ramps
- Broadmoor Boulevard between I-182 WB ramps and Harris Road
- Broadmoor Boulevard between Harris Road and Sandifur Parkway

Each of the above segments will have a separate LTS rating for northbound and southbound.

Bike LTS and Pedestrian LTS are evaluated following the methodology from Appendix D of the WSDOT Active Transportation Plan[4].

BICYCLE LEVEL OF TRAFFIC STRESS

[4] Active Transportation Plan, 2020 and Beyond, WSDOT, December 2021

Bicycle LTS for segments and intersections will be assessed following methods contained in Appendix D of the WSDOT Active Transportation Plan. The methodology considers the following factors:

- Posted speed
- Number of travel lanes
- Bicycle lane presence/width

Bike analysis will compute a different LTS for segment and intersection. The highest value of the three will be the overall LTS for the segment.

Segment BLTS

Segment BLTS will be computed for each segment between intersections. The posted speed limit of Broadmoor Boulevard is 45 mph with no on-street parking. According to WSDOT methodology, any facility over 40 mph is considered BLTS 4 unless there is a bike lane wider than 7 feet, in which case the BLTS is 3. Table 6 and Table 7 show WSDOT methodology for evaluating segment BLTS without a bike lane and with a bike lane present, respectively.

TABLE 6: BLTS SEGEMENTS WITHOUT A BIKE LANE PRESENT

SPEED LIMIT	1 LANE	2 LANES	> 2 LANES
≤ 20 MPH	BLTS 1	BLTS 3	BLTS 4
25 MPH	BLTS 2	BLTS 3	BLTS 4
30 MPH	BLTS 3	BLTS 4	BLTS 4
≥ 35 MPH	BLTS 4	BLTS 4	BLTS 4

Source: Active Transportation Plan, 2020 and Beyond, WSDOT, December 2021

TABLE 7: BLTS SEGEMENTS WITH A BIKE LANE PRESENT

	Through Lanes Per Direction				
	1 LANE			≥2 LANES	
	BICYLCE LANE WIDTH (IN FEET)				
SPEED LIMIT	≥7	5-7	≤5	≥7	<7
≤ 25 MPH	BLTS 1	BLTS 1	BLTS 2	BLTS 1	BLTS 3
30 MPH	BLTS 2	BLTS 2	BLTS 2	BLTS 2	BLTS 3
35 MPH	BLTS 2	BLTS 3	BLTS 3	BLTS 2	BLTS 3
≥ 40 MPH	BLTS 3	BLTS 4	BLTS 4	BLTS 3	BLTS 4

Source: Active Transportation Plan, 2020 and Beyond, WSDOT, December 2021

Crossings BLTS

The crossing BLTS is calculated to consider the added stress for a cyclist at an intersection. Intersection approach BLTS will be computed for each intersection based on the speed and total number of lanes crossed. Table 8 shows the BLTS for crossings.

TABLE 8: BLTS FOR INTERSECTION CROSSING

	TOTAL LANES CROSSED (BOTH DIRECTIONS)		
SPEED LIMIT	**1 Lane**	**2 Lanes**	**> 2 Lanes**
≤ 20 MPH	BLTS 1	BLTS 2	BLTS 4
25 MPH	BLTS 2	BLTS 2	BLTS 4
30 MPH	BLTS 2	BLTS 3	BLTS 4
35 MPH	BLTS 3	BLTS 4	BLTS 4
≥ 40 MPH	BLTS 4	BLTS 4	BLTS 4

Source: Active Transportation Plan, 2020 and Beyond, WSDOT, December 2021

PEDESTRIAN LEVEL OF TRAFFIC STRESS

Pedestrian LTS for crossing and segments will be assessed following methods contained in Appendix D of the WSDOT Active Transportation Plan. The methodology used by WSDOT considers the following factors:

- Posted speed
- Number of travel lanes

Like BLTS, after PLTS is calculated for the segment and the crossing, the higher value is reported.

Segment PLTS

Segment PLTS will be calculated for each segment between intersections in the study area. The posted speed limit on Broadmoor Boulevard is 45 mph. According to WSDOT methodology, any roadway with speed limit above 35 mph is considered PLTS 4, as shown in Table 9.

TABLE 9: PLTS FOR SEGEMENTS

SPEED LIMIT	1 LANE	2 LANES	> 2 LANES

≤ 20 MPH	BLTS 1	BLTS 3	BLTS 4
25 MPH	BLTS 2	BLTS 3	BLTS 4
30 MPH	BLTS 3	BLTS 4	BLTS 4
≥ 35 MPH	BLTS 4	BLTS 4	BLTS 4

Source: Active Transportation Plan, 2020 and Beyond, WSDOT, December 2021

Crossing PLTS

Crossing PLTS considers the speed limit and the number of lanes being crossed. The pedestrian crossing LTS uses the same criteria as the bike crossing LTS, as shown in Table 10.

TABLE 6: PLTS FOR CROSSING

	TOTAL LANES CROSSED (BOTH DIRECTIONS)				
	1 LANE			≥2 LANES	
	BICYLCE LANE WIDTH (IN FEET)				
SPEED LIMIT	**≥7**	**5-7**	**≤5**	**≥7**	**<7**
≤ 25 MPH	BLTS 1	BLTS 1	BLTS 2	BLTS 1	BLTS 3
30 MPH	BLTS 2	BLTS 2	BLTS 2	BLTS 2	BLTS 3
35 MPH	BLTS 2	BLTS 3	BLTS 3	BLTS 2	BLTS 3
≥ 40 MPH	BLTS 3	BLTS 4	BLTS 4	BLTS 3	BLTS 4

Source: Active Transportation Plan, 2020 and Beyond, WSDOT, December 2021

OTHER PERFORMANCE MEASURES

Some additional performance measures will be considered for comparing active transportation improvement alternatives, including the following:

- Route directness index compares the straight-line distance to the actual path distance travelled for pedestrians and bicyclists. This measure will be applied to compare alternatives based on the distance travelled by pedestrians and bicyclists through the interchange area.
- Crossing distance will be considered as a measure of vehicle exposure for pedestrians and bicyclists. This analysis will be leveraged during the Phase 2 screening process.

CHANGE MANAGEMENT

Frequent communication will limit the potential for changes that substantially impact the agreed-upon methods and assumptions and will allow the project team to anticipate possible changes and outline a strategy to move forward prior to any rework. These strategies will be developed on an ongoing basis to address issues as they are identified. Unanticipated changes will still occur and will need to be evaluated on a case-by-case basis to determine the extent of the impacts to the methods and assumptions outlined in this document. The project team will also maintain a change log throughout the project, documenting all agreed upon changes to methodology throughout the ARR process.

APPENDIX C. SCREENING MATRIX MEMORANDUM

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BROADMOOR INTERCHANGE – ALTERNATIVES SCREENING MATRIX

DATE: February 7, 2022

TO: Brian White, PE | WSDOT
Todd Daley, PE | WSDOT

FROM: Aaron Berger, PE | DKS Associates
Richard Hutchinson, PE | DKS Associates

SUBJECT: Broadmoor Interchange Project – Access Revision Report Project #21292

INTRODUCTION

This document provides the First and Second Level Screening Matrix that will be used to evaluate and ultimately select the preferred alternative for the I-182 and Broadmoor Boulevard Interchange. This document begins with a discussion of the alternative development process, followed by the screening matrix.

ALTERNATIVES DEVELOPMENT PROCESS

The alternatives development process is outlined as follows:

1. Create Screening Matrix
2. Brainstorm Alternatives
3. Refine Alternatives
4. First Level (fatal flaw) Screening of Alternatives
5. Alternatives Analysis
6. Second Level Screening (and scoring) of Alternatives – Identify Preferred Alternative

1. CREATE SCEENING MATRIX

The screening matrix is derived from project site constraints and performance measures identified in the "Methods and Assumptions" memorandum for the project. The screening matrix contains two levels of analysis: Fatal Flaw (First Level) and Scored (Second Level). Both levels of the screening matrix are discussed further in subsequent sections of this document.

2. BRAINSTORM ALTERNATIVES

Reasonable non-access and access alternative project concepts that address the performance gaps identified in the project Purpose and Need Statement as well as the Baseline Analysis will be developed by the TAC.

3. REFINE ALTERNATIVES

The project concepts developed by the TAC will be optimized and refined to eliminate redundancy and conceptually drafted (two-dimensional layouts). At this point, Active Transportation and Interchange Alternatives will be refined separately in preparation for the First Level Screening.

4. FIRST LEVEL SCREENING OF ALTERNATIVES

The First Level Screening will take the project alternative concepts and qualitatively evaluate them against a series of performance measures with fatal flaw (pass/fail) criteria developed from the project Purpose and Need. Any alternatives receiving one or more "fail" grades will not be advanced to the full Alternatives Analysis and Second Level Screening.

5. ALTERNATIVES ANALYSIS

All alternatives passing the First Level Screening criteria will be further refined and analyzed to develop project costs and the traffic operations, safety, and active transportation performance measures identified in the project "Methods and Assumptions" memorandum.

6. SECOND LEVEL SCREENING OF ALTERNATIVES

The Second Level Screening will score the refined project alternatives against each other and the Baseline (No-Build) condition using the costs and performance measures quantified by the Alternatives Analysis. The highest scoring set of non-conflicting alternatives will be selected as the Preferred Alternative for the project, with potential phasing based on the estimated project cost.

SCREENING MATRIX

As discussed in the Alternatives Development Process, the screening process will consist of two levels:

1. First Level: A qualitative, fatal flaw and reasonable feasibility assessment
2. Second Level: A more detailed analysis and comparison of alternatives

The alternatives may be revised or redefined as they are being evaluated to better meet the purpose and need.

FIRST LEVEL SCREENING - QUALITATIVE

The First Level Screening will be used to eliminate alternatives determined to have physical fatal flaws, or that do not meet the project need, from further consideration. All alternatives evaluated in the First Level Screening will be conceptually (two dimensionally) laid out, allowing for qualitative evaluation of the following:

- Interchange footprint
- Impacts to existing structures
- Ability to meet reasonable and safe geometric standards
- Identification of major utility impacts
- Right-of-way impacts
- Non-motorized connectivity opportunities
- Environmental considerations, including displacement of Environmental Justice (EJ) populations and impacts to sensitive habitats

These design elements were used to develop a series of performance measures which will be used to screen the proposed alternatives against both design constraints and the project Purpose and Need on a pass/fail basis. These criteria are noted in the descriptions below and the First Level Screening Matrix (Table 1).

1. **Significant Right-of-Way (ROW) Acquisition** – Concepts that do not requiring significant additional ROW will receive a "Pass" score, while those requiring a significant ROW purchase would receive a "Fail" score. "Significant" is defined as clear impacts to privately owned parcels (such as new travel lanes outside of current ROW) that can be identified at a conceptual design level of analysis.

2. **Widening of existing bridge structure** – Concepts that do not require significant widening on the existing Broadmoor Boulevard bridge over I-182 will receive a "Pass" score. Concepts with "significant" widening include alternatives requiring additional bridge girders to support more vehicle lanes. These concepts would receive a "Fail" score. Concepts that widen the existing structure to add facilities exclusive to active transportation users may also receive a "Pass" score.

3. **Replacement of existing bridge structure** – Concepts that maintain the existing Broadmoor Boulevard bridge over I-182 will receive a "Pass" score. Concepts requiring full replacement of the bridge will receive a "Fail".

4. **Ability to meet reasonable and safe geometric standards** – Concepts that meet WSDOT and City (where applicable) geometric design standards related to curvature, design speed, and site distance will receive a "Pass" score. Concepts unable to meet geometric design standards will receive a "Fail" score. If a concept requires a "minor" design deviation or design variance, it may receive a "Pass" score, based on a case-by-case basis, as determined by the design team.

5. **Does not add new access points <u>on</u> to the interstate** – Concepts that do not add access points <u>on</u> to I-182 (outside the limit of the existing Broadmoor Boulevard Interchange) will receive a "Pass" score. Concepts that add additional access points on to I-182 (new on-ramps) will receive a "Fail" score. This criteria does <u>not</u> fail alternatives that add additional exits (off-ramps) from the freeway to Broadmoor Boulevard.

6. **Active Transportation Connectivity and Safety Opportunities** – This measure only applies to active transportation alternatives, or interchange alternatives with integrated active transportation improvements. An active transportation concept that provides a safe connection into to the existing and short-term planned local active transportation system will receive a "Pass" score. An active transportation concept that does not provide a connection to the local system will receive a "Fail" score.

TABLE 1: FIRST LEVEL SCREENING MATRIX

#	PERFORMANCE MEASURE	SCORING CRITERIA
1	Significant Right-of-way Acquisition	Pass/Fail
2	Widening existing bridge structure	Pass/Fail
3	Replace existing bridge structure	Pass/Fail
4	Ability to meet reasonable and safe geometric standards	Pass/Fail
5	Does not add new access points on to the interstate	Pass/Fail
6	Active Transportation Connectivity and Safety Opportunities	Pass/Fail

The refined set of proposed alternatives will be scored against the First Level Screening matrix shown in Table 1. All concepts with passing scores in all applicable criteria (measure #7 will not apply to many of the interchange concepts) will move forward into the Second Level evaluation and screening. Concepts with even a single "Fail" score will not be advanced. However, concepts that only receive "Fail" score on select performance measures (listed below) will be documented as potential future interchange improvement phases and tested for 2045 traffic operations to determine whether they provide a viable solution to interchange needs beyond this project's purpose and need.

- Significant Right-of-way Acquisition
- Widening existing bridge structure
- Does not add new access points on to the interstate

These future alternatives will be considered in the Second Level Screening evaluation with the "Forward Compatibility" performance measure, as discussed in the following section.

SECOND LEVEL SCREENING – QUANTITATIVE

The Second Level Screening will be used to determine the project alternative. This screening will include quantitative analysis of the alternatives that pass through the First Level Screening, using performance measures to compare alternatives and select the design that best addresses the project Purpose and Need. In addition, the alternatives will be conceptually designed to allow for reasonable cost estimates.

As defined in the purpose and need statement, the project is focused on improving traffic operations and safety at the off-ramps and ramp terminals and improving the active transportation facilities through the Broadmoor Interchange. To achieve this purpose, several objectives have been identified to measure alternative performance against the identified project needs. These objectives are summarized as follows:

1. Improve Traffic Operations

    a. Ability to meet WSDOT and City mobility Level of Service (LOS) standard at interchange ramp terminals in 2045 under both AM and PM peak hour conditions. The mobility standard for the ramp terminals is LOS D.

    b. Reduce the 2045 AM and PM peak hour off-ramp queue lengths to provide Stopping Sight Distance (SSD) from the striped gore. The reduced queues will reduce traffic operations impacts to the I-182 mainline.

    c. Ability to meet WSDOT mobility LOS standard (LOS D) under 2045 AM and PM peak hour conditions at the I-182 freeway diverges to the Broadmoor Boulevard off-ramps.

    d. Ability to expand interchange to address other future operations needs by the year 2045

2. Improve Motorist Safety

    a. Improve traffic safety on the I-182 off-ramps and ramp terminals at Broadmoor Boulevard in 2025 and 2045 compared to No-Build conditions by reducing predicted crashes and improving queuing and traffic LOS at existing safety hot spots.

3. Active Transportation Connectivity and Safety

a. Complete an active transportation connection and improve safety through the current system gap along Broadmoor Boulevard that improves transportation equity by providing bicyclists and pedestrians with a lower Level of Traffic Stress (LTS) route through the I-182 interchange.

In addition, a "Scalability" objective is included in the evaluation. This objective is based on the ability proposed improvements to be broken down into fundable phases, with initial phases going to construction within the next two years.

The Second Level Screening performance measures will provide both quantitative and qualitative indicators of an alternative's performance against the project objectives. The performance measures are summarized as follows:

- *Traffic Operations*
  - **Intersection LOS** – Highway Capacity Manual (HCM) calculated delay measure at interchange ramp terminals for 2025 and 2045 AM and PM peak hour conditions
  - **95th Percentile Off-Ramp Queue Lengths** – measured in feet on the I-182 off-ramps for 2025 and 2045 AM and PM peak hour conditions
  - **Freeway LOS** – HCM calculated density measure at interchange diverge locations for 2025 and 2045 AM and PM peak hour conditions
  - **Forward Compatibility** – Qualitative assessment of each alternative to determine how many of the "Future" alternatives from the Level 1 Screening are compatible or at least not precluded by the concept design
- *Safety*
  - **Predicted Crash Rates** – crash frequency at the interchange ramp terminals and off-ramps predicted for 2045, determined using Highway Safety Manual and the Enhanced Interchange Safety Analysis Tool (ISATe) from the Federal Highway Administration (FHWA).
  - **Predicted Crash Severity** – crash severity at the interchange ramp terminals and off-ramps predicted for 2045, measured as a ratio of predicted injury versus predicted PDO crashes, determined using Highway Safety Manual and the Enhanced Interchange Safety Analysis Tool (ISATe) from the Federal Highway Administration (FHWA).
  - **Freeway LOS at identified safety hot spots** – Freeway LOS measure for the 2025 and 2045 AM and PM peak hours from the traffic operations analysis at any mainline or off-ramp diverge locations identified as safety hot spots.
  - **95th Percentile Queue Length –** measured on Broadmoor Boulevard between the interchange ramp terminals and on the I-182 off-ramps. This measure is identical to the queuing measure for traffic operations at the off-ramps, but also includes queues on Broadmoor Boulevard.
- *Active Transportation*
  - **Bike Level of Traffic Stress (LTS)** – Level of traffic stress for northbound and southbound bicyclists through the Broadmoor Interchange
  - **Pedestrian Level of Traffic Stress (LTS)** – Level of traffic stress for pedestrians through the Broadmoor Interchange
  - **Active Transportation Travel Time** – Estimated time need for a pedestrian and a bicyclist to traverse the interchange. This measure includes delay incurred at signalized crossings.

- **Route Directness Index** - Compares the straight-line distance to the actual path distance travelled for pedestrians and bicyclists. This measure will be applied to compare alternatives based on the distance travelled by pedestrians and bicyclists through the interchange area.
- **Maximum Exposed Crossing Distance** – longest crossing distance (measured in feet) that a pedestrian must traverse while exposed to moving traffic (i.e. unprotected refuge islands, etc.) when traveling north-south through the interchange.
- **Crossing Control** – Number of un-protected crossings a pedestrian must make to travel north-south through the interchange. Roundabout crossings will only be counted as un-protected if the pedestrian must cross more than a single lane of traffic with one crosswalk.

Each alternative evaluated will be scored for each performance measure to assess its positive, negative, or neutral impacts relative to the Future Baseline (No-Build) alternative, unless otherwise indicated. A five-step scoring system was used by assigning a value of +2, +1, 0, -1 or -2, according to the scale presented in Table 2.

TABLE 2: SECOND LEVEL SCREENING SCORING SCALE

EVALUATION SCORE	SCORE = 2	SCORE =1	SCORE = 0	SCORE = -1	SCORE = -2
LEVEL OF SUPPORT FOR PROJECT OBJECTIVES	Meets Objective	Improves over Baseline, but does not fully meet Objective	Little to no change from Baseline	Moderate degradation from Baseline	Severe degradation from Baseline

Table 3 summarizes the Second Level Screening matrix, including the needs, objectives, performance measures, measure type, and scoring range.

TABLE 3: SECOND LEVEL SCREENING MATRIX

#	NEED	OBJECTIVE	PERFORMANCE MEASURE	MEASURE TYPE	SCORING RANGE
1	Improve Traffic Operations	Meet Mobility Standards (LOS D) at interchange ramp terminals in 2045	Intersection LOS	Quantitative	-2 to +2
2		Reduce off-ramp queue length to provide SSD from the striped gore in 2045	95th Percentile Off-Ramp Queue Lengths	Quantitative	-2 to +2
3		Meet Mobility Standard (LOS D) at the freeway diverges in 2045	Freeway Level of Service	Quantitative	-2 to +2
4		Ability to expand interchange to address other future operations needs by the year 2045	Forward Compatibility	Qualitative	-2 to +2
5	Improve Safety	Improve traffic safety on the I-182 off-ramps and ramp terminals at Broadmoor Boulevard under 2025 and 2045 conditions	Predicted Crash Rates	Quantitative	-2 to +2
6			Predicted Crash Severity	Quantitative	-2 to +2
7			Freeway LOS at identified safety hot spots	Quantitative	-2 to +2
8			95th Percentile Queue Lengths	Quantitative	-2 to +2
9	Improve Active Transportation System	Complete an Active Transportation connection through the current system gap along Broadmoor Boulevard through the I-182 interchange	Bike LTS	Quantitative	-2 to +2
10			Pedestrian LTS	Quantitative	-2 to +2
11			Active Transportation Travel Time	Quantitative	-2 to +2
12			Route Directness Index	Quantitative	-2 to +2
13			Maximum Crossing Distance	Quantitative	-2 to +2
14			Crossing Control	Quantitative	-2 to +2
13	Scalability	Solution that can be broken down into fundable phases	Cost per phase	Quantitative	$

Each alternative will be evaluated and scored for all applicable performance measures. The Technical Advisory Committee may at this point decide to weight performance measures or objectives based on stakeholder priorities, ultimately resulting in a total score for each alternative. A likely outcome is several non-conflicting alternatives that each provide incremental benefits against the project needs. The highest scoring non-conflicting alternatives will become the preferred alternative package. The project costs will be combined with the Second Level evaluation

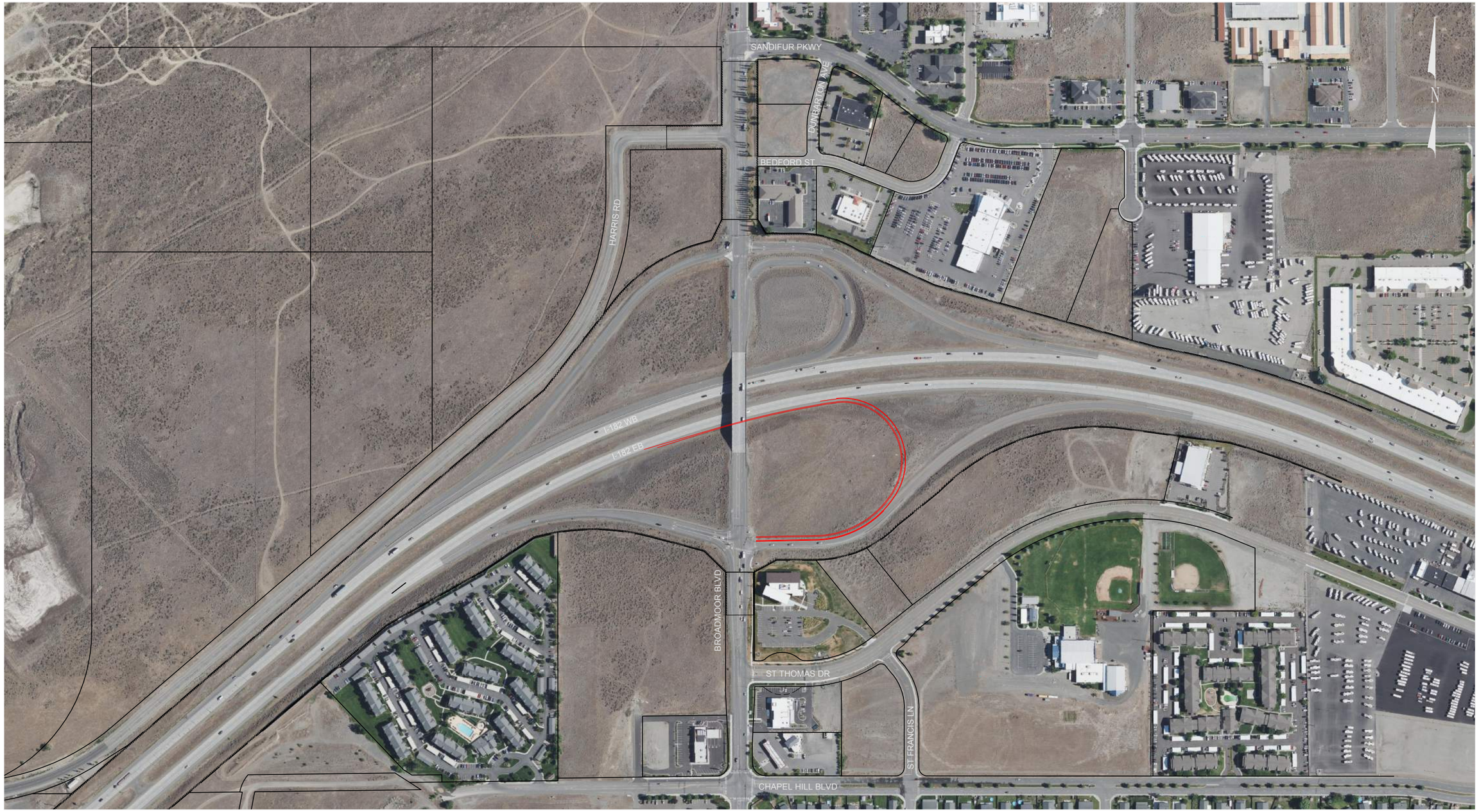
scores to determine which phases of the preferred alternative can be designed and constructed immediately, based on funds currently available to the City.

APPENDIX D. ALTERNATIVES LAYOUTS

APPENDIX D-1: FIRST LEVEL ALTERNATIVES ALIGNMENT DIAGRAMS

APPENDIX D-2: LEVEL 2 ALTERNATIVES CONCEPTUAL LAYOUTS

APPENDIX D-1. FIRST LEVEL ALTERNATIVES ALIGNMENT DIAGRAMS



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DRAFTED:

DESIGNED:

0 100' 200' 400'
1 inch = 200 feet

I-182 AND BROADMOOR INTERCHANGE

ALTERNATIVE F-E-1

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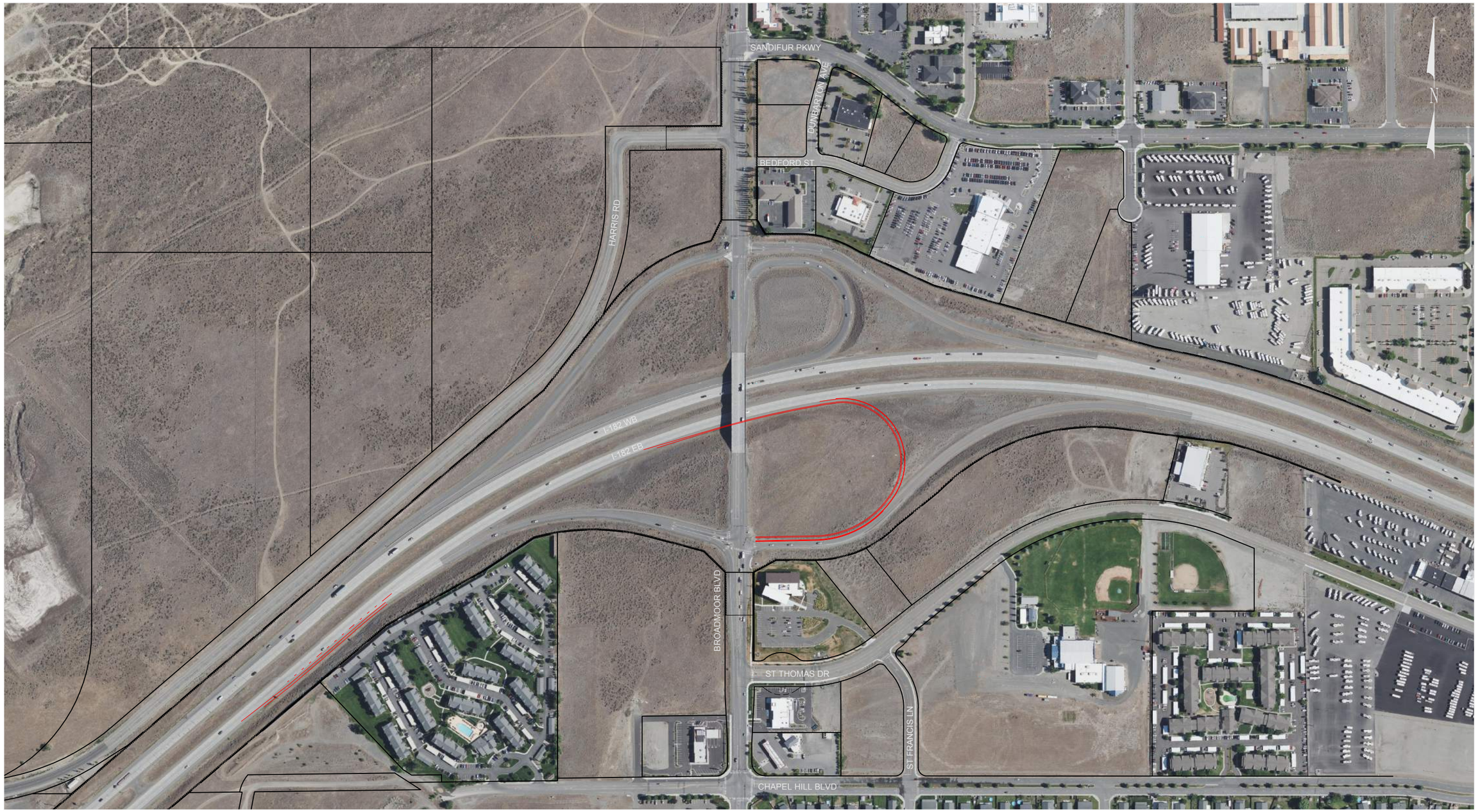

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DESIGNED:

0 100' 200' 400'
1 inch = 200 feet

I-182 AND BROADMOOR INTERCHANGE

ALTERNATIVE F-E-2

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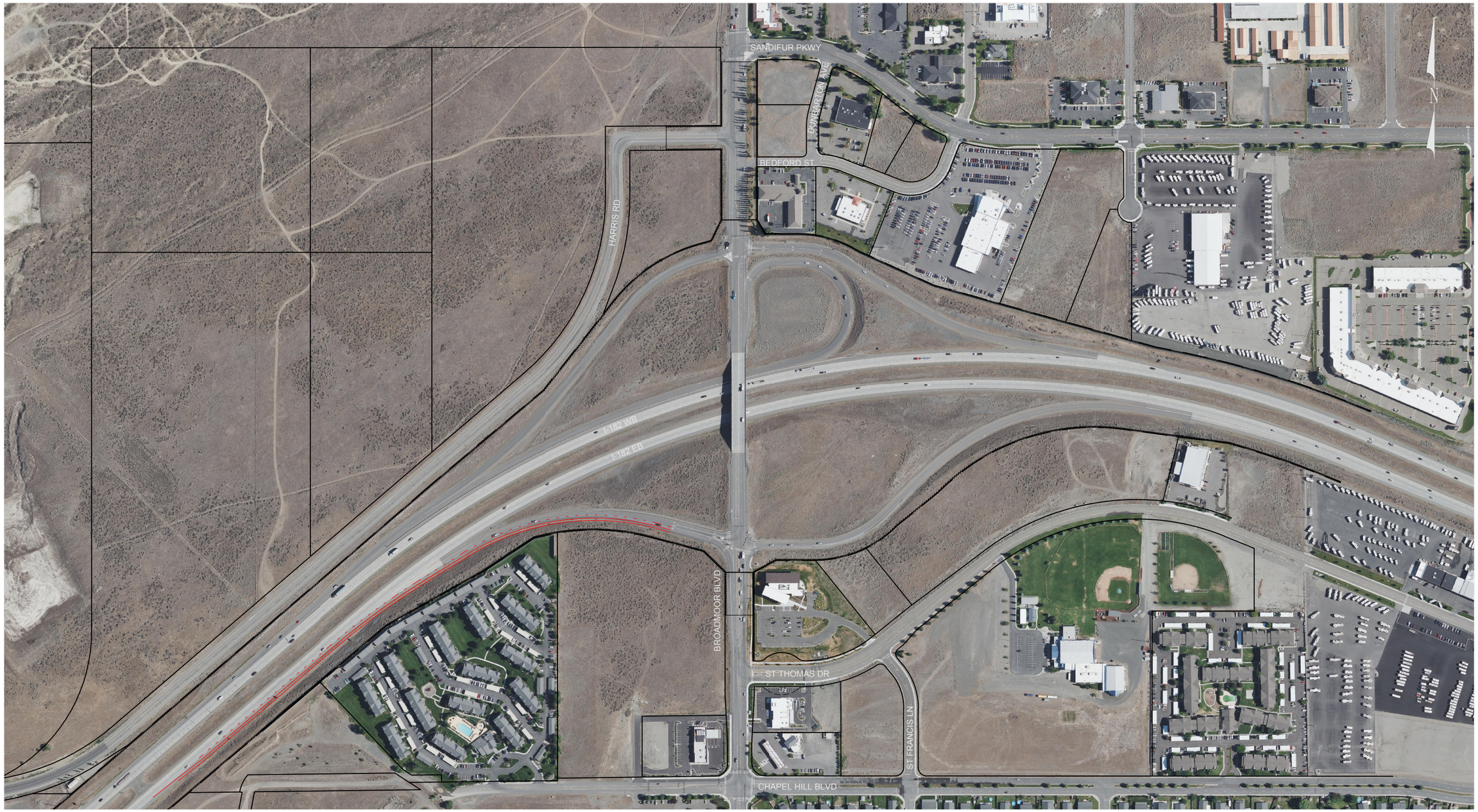

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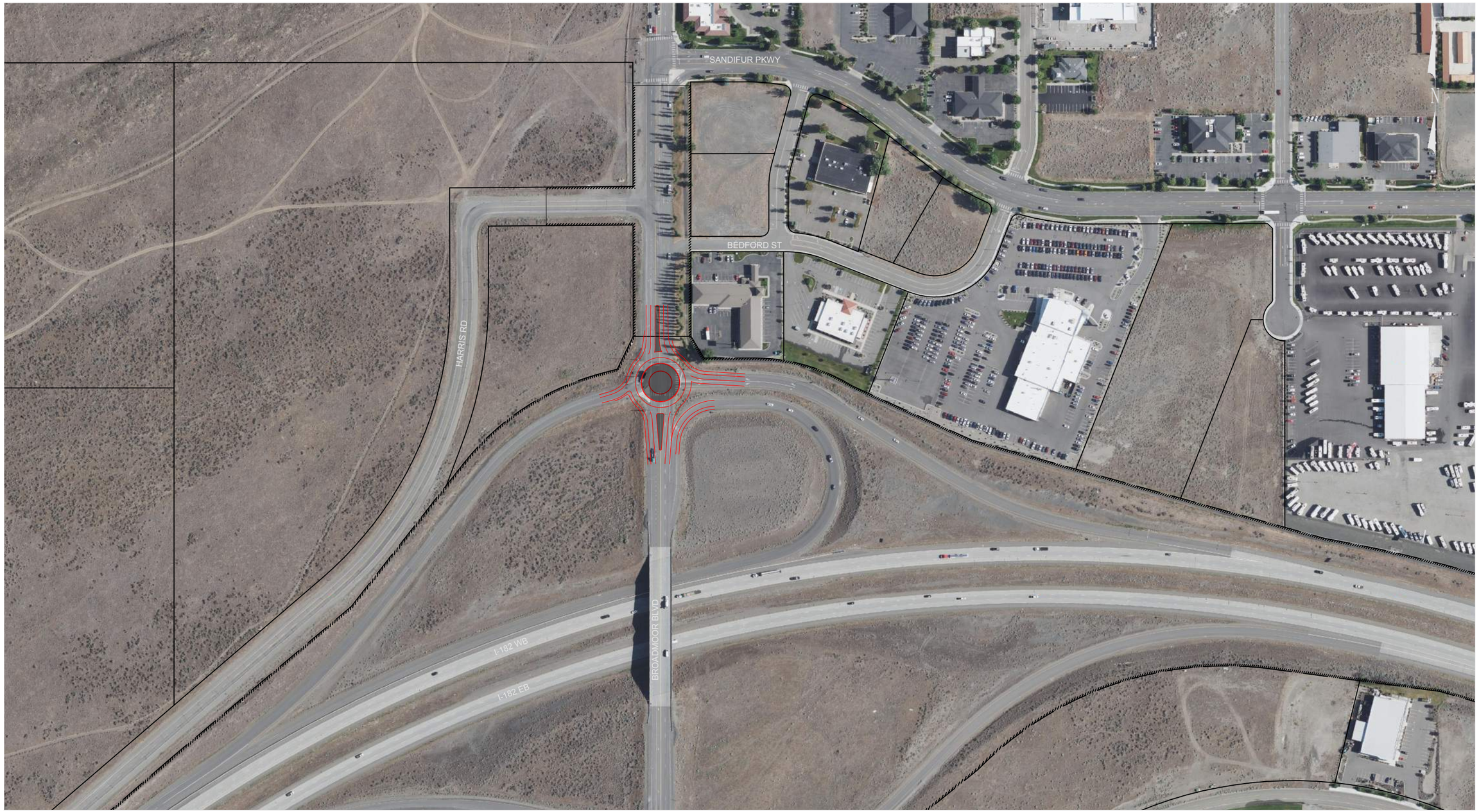
I-182 AND BROADMOOR INTERCHANGE

ALTERNATIVE F-E-4

Z:\2100001-2109999\2100616 Pasco I-182 & Broadmoor (Phase 1)\CADD\Exhibits\03_Level 1 Refined Concept Figures\01_Freeway Options\F-E-4\F-E-4 Exhibit.dwg, 2/1/2022



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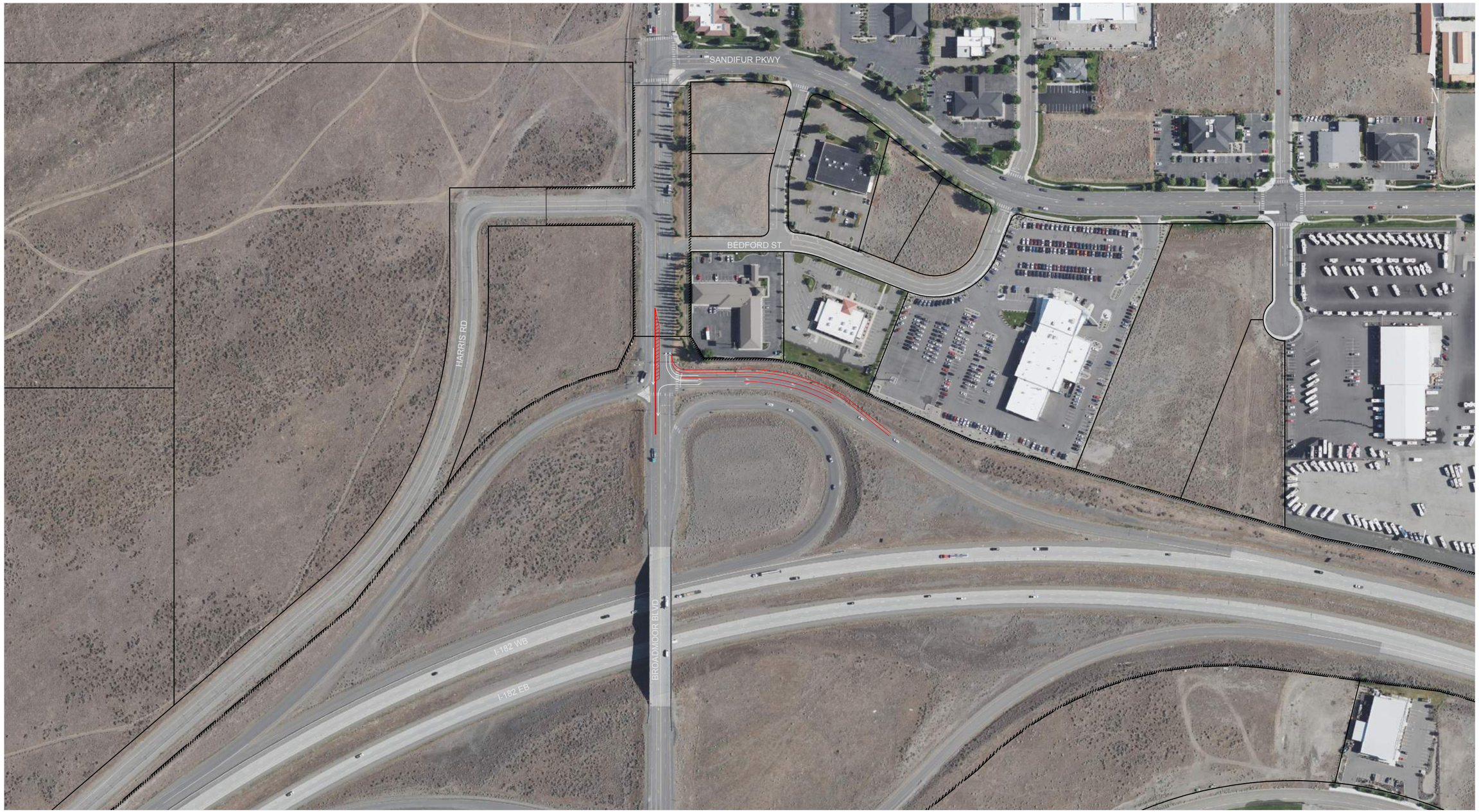
ALTERNATIVE W-R-1



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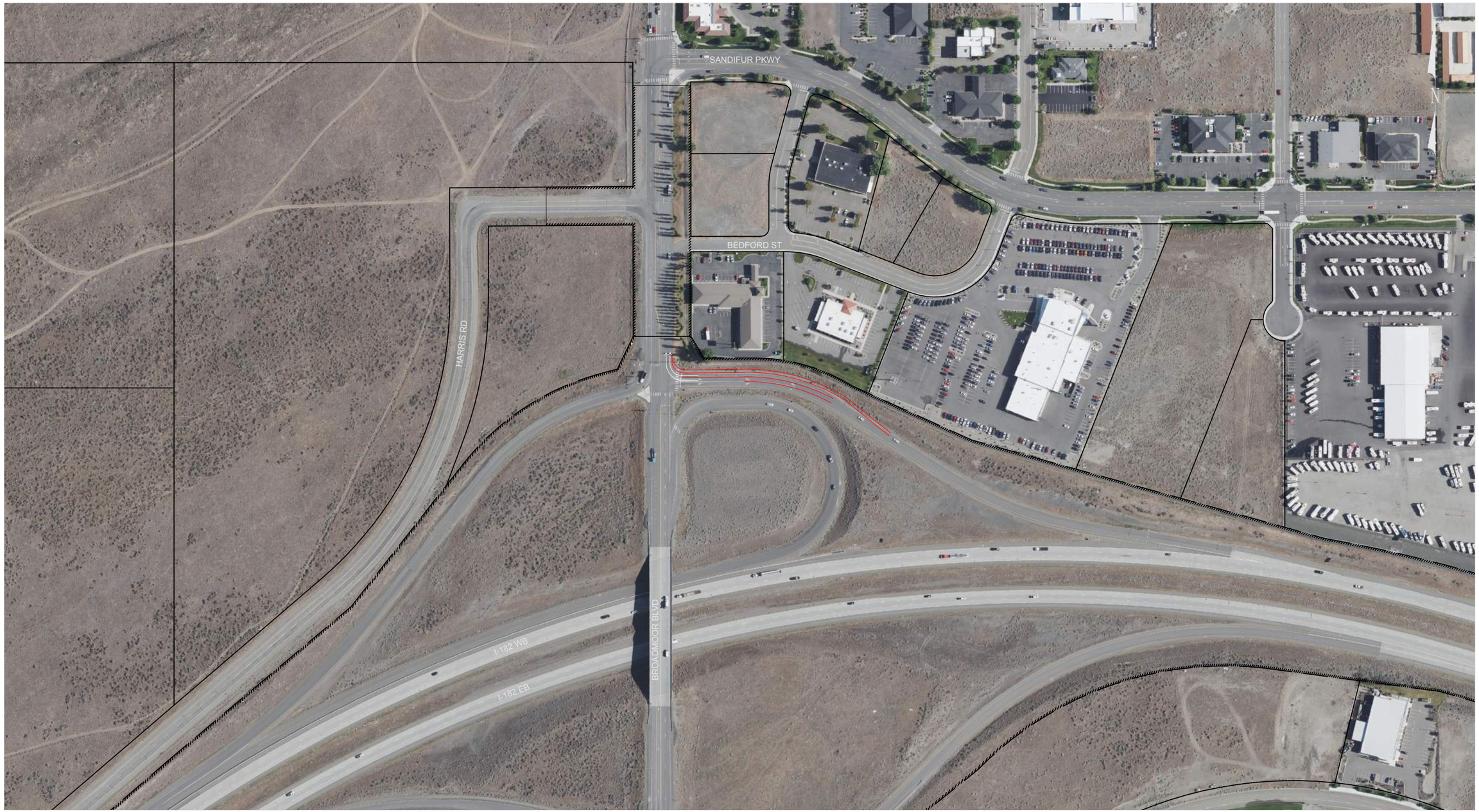
ALTERNATIVE W-S-1



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ALTERNATIVE E-R-1

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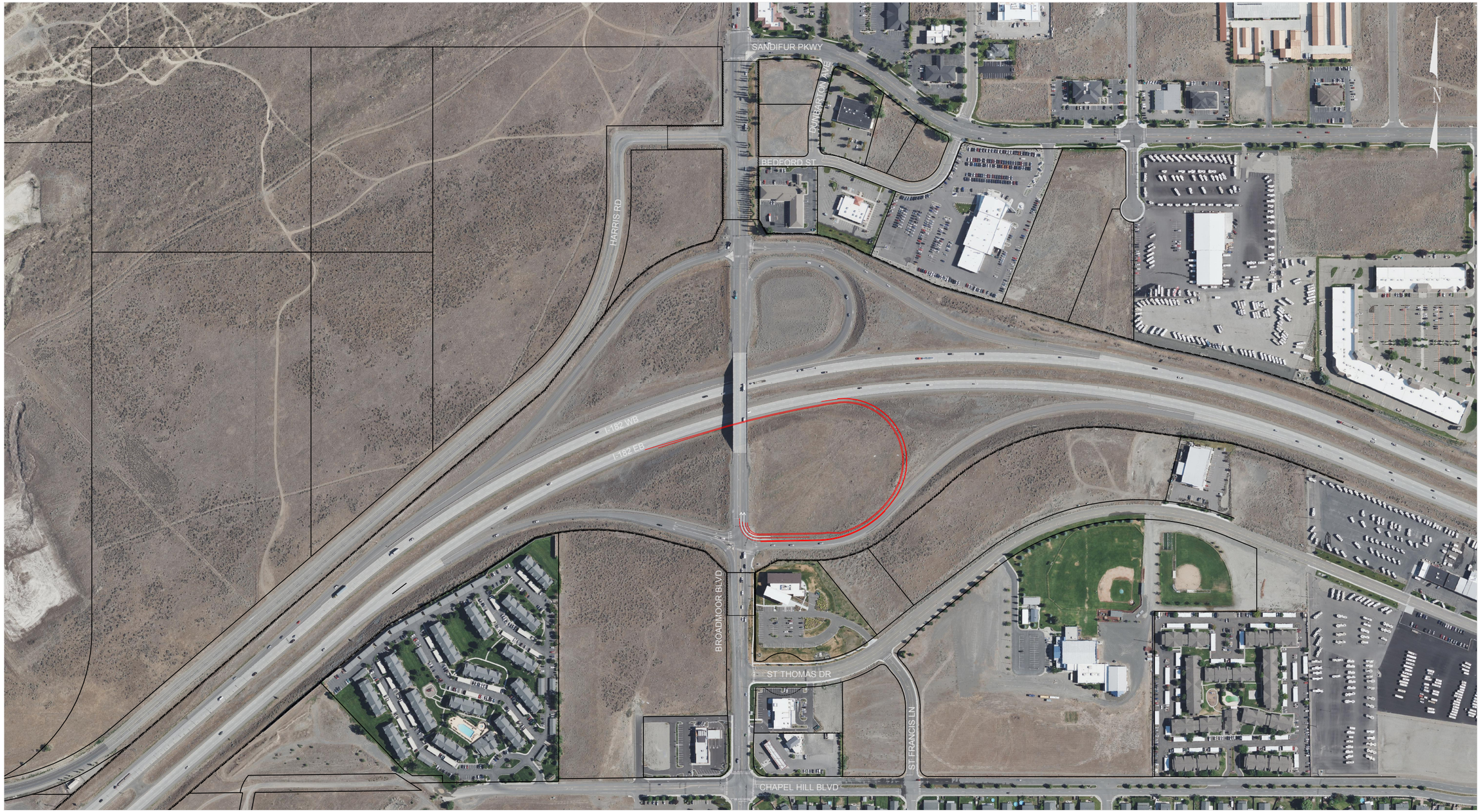
ALTERNATIVE E-R-2



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ALTERNATIVE E-S-1

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ALTERNATIVE E-S-2

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ALTERNATIVE E-S-3

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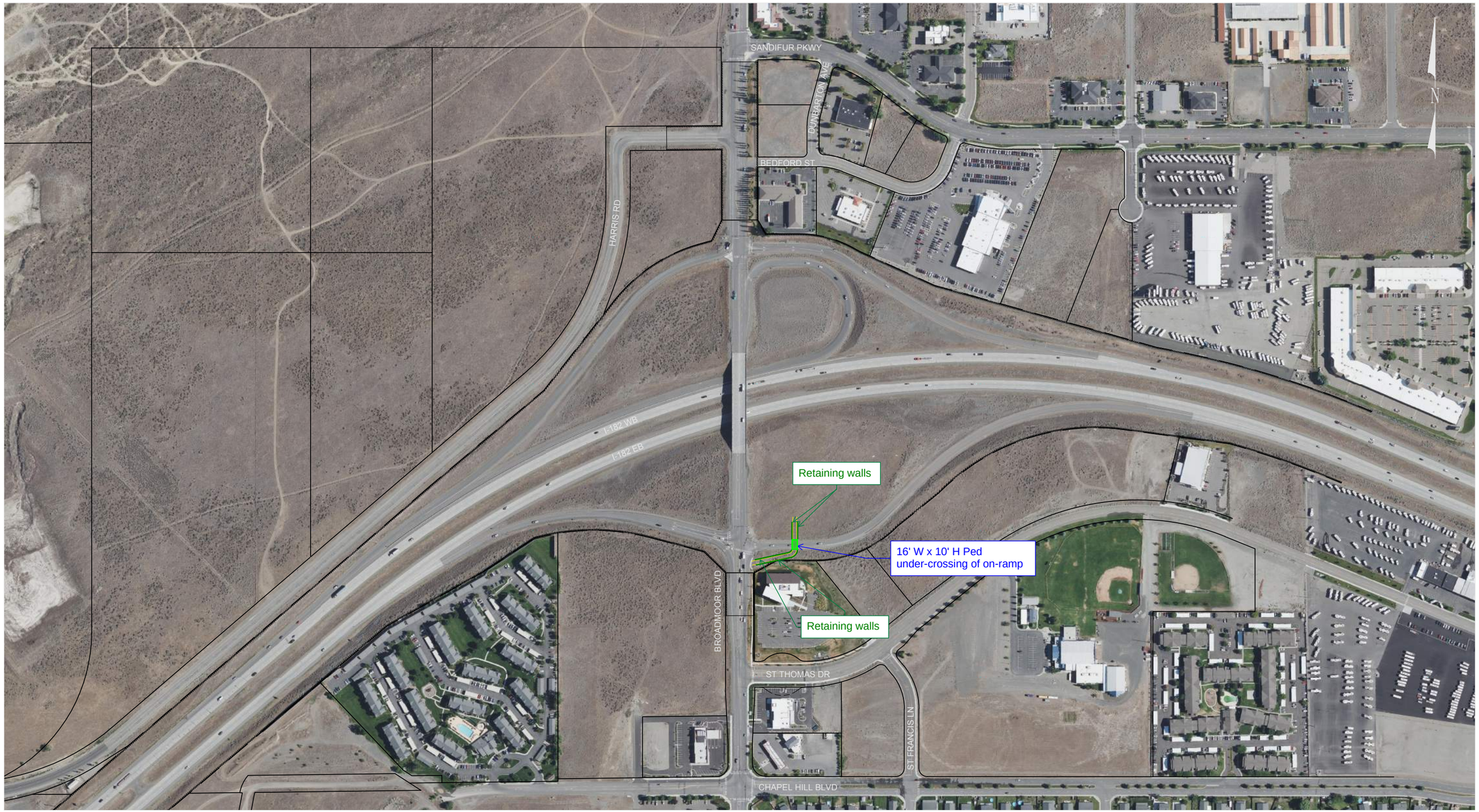

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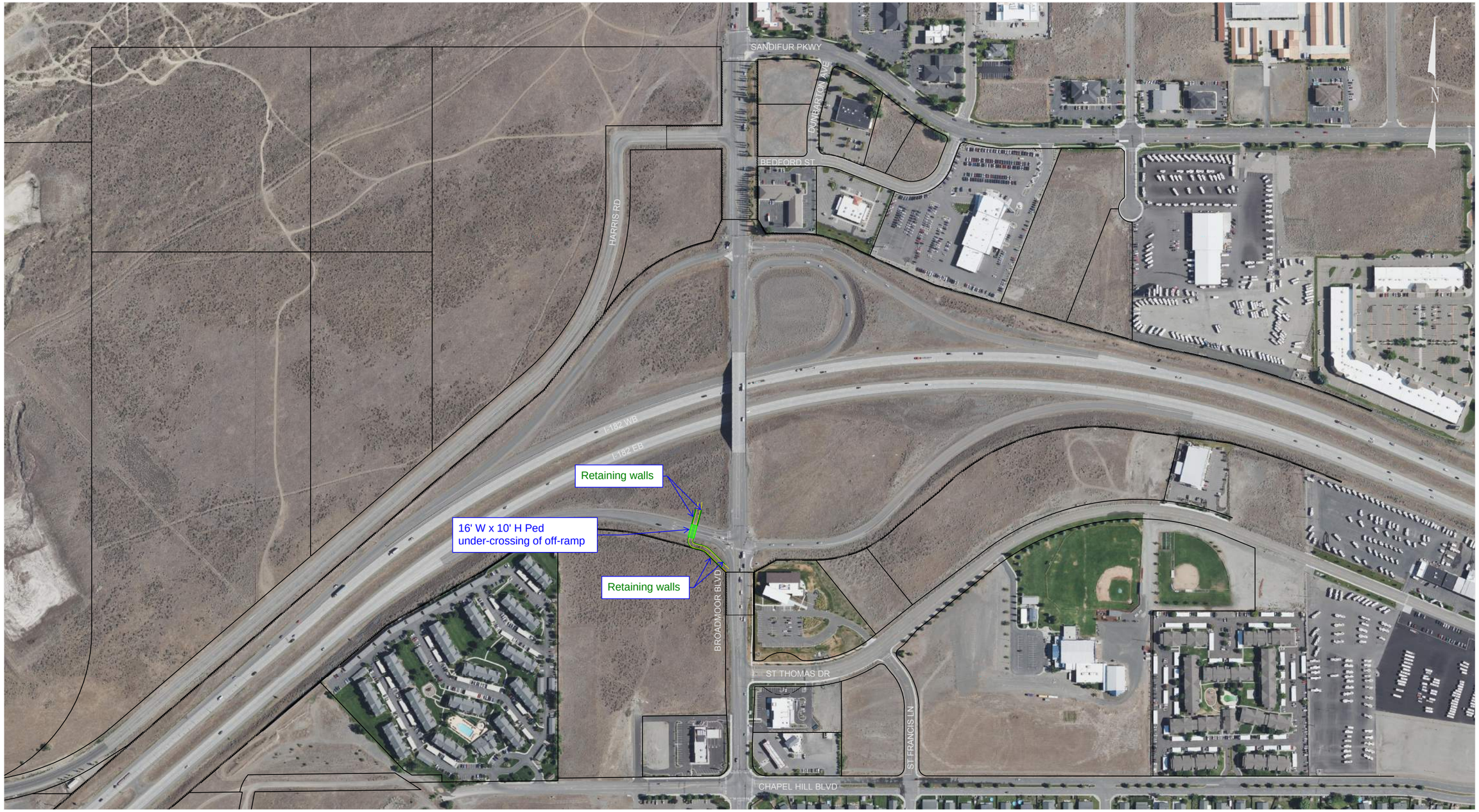
ALTERNATIVE A-E-1a



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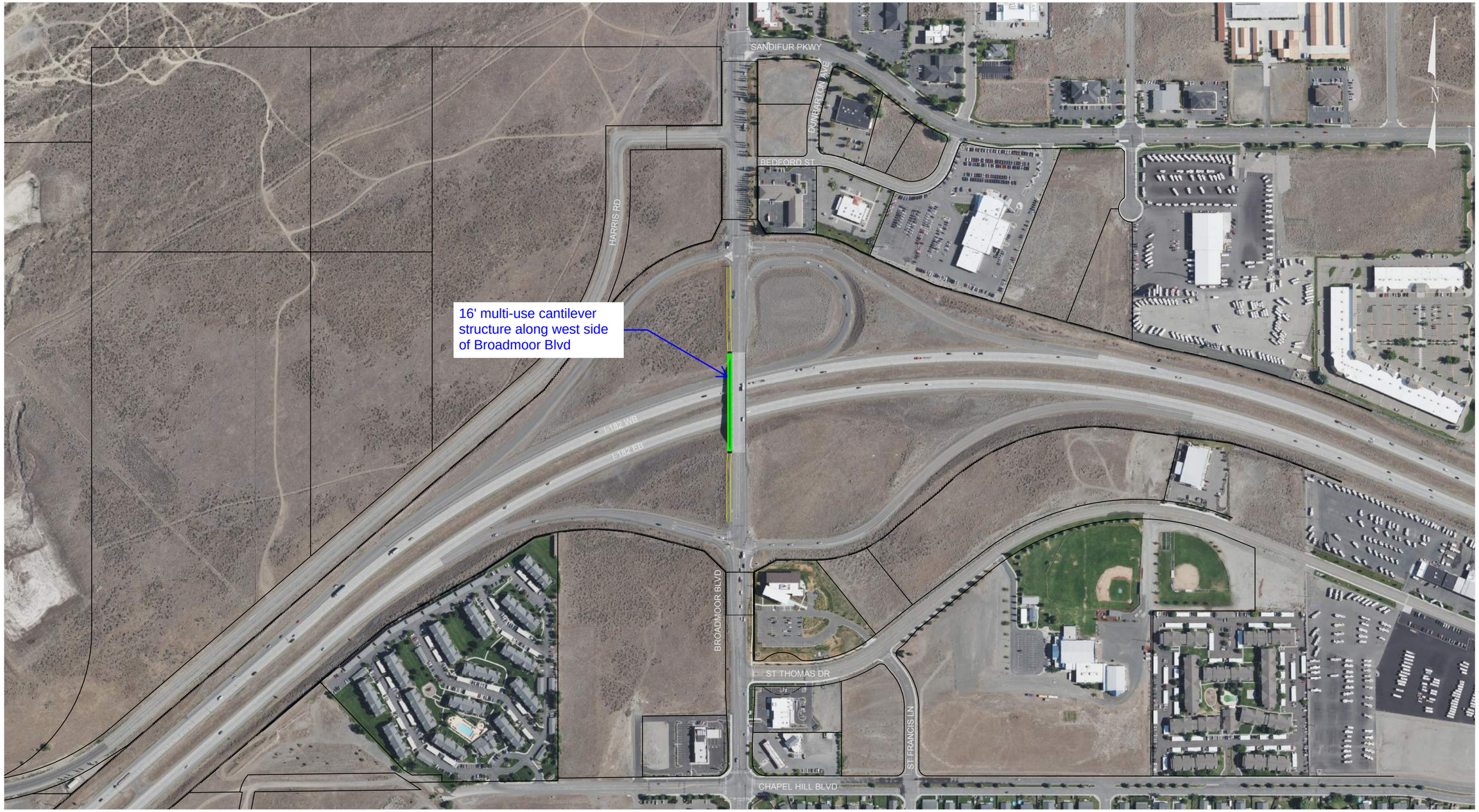
ALTERNATIVE A-E-2a



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ALTERNATIVE A-I-1

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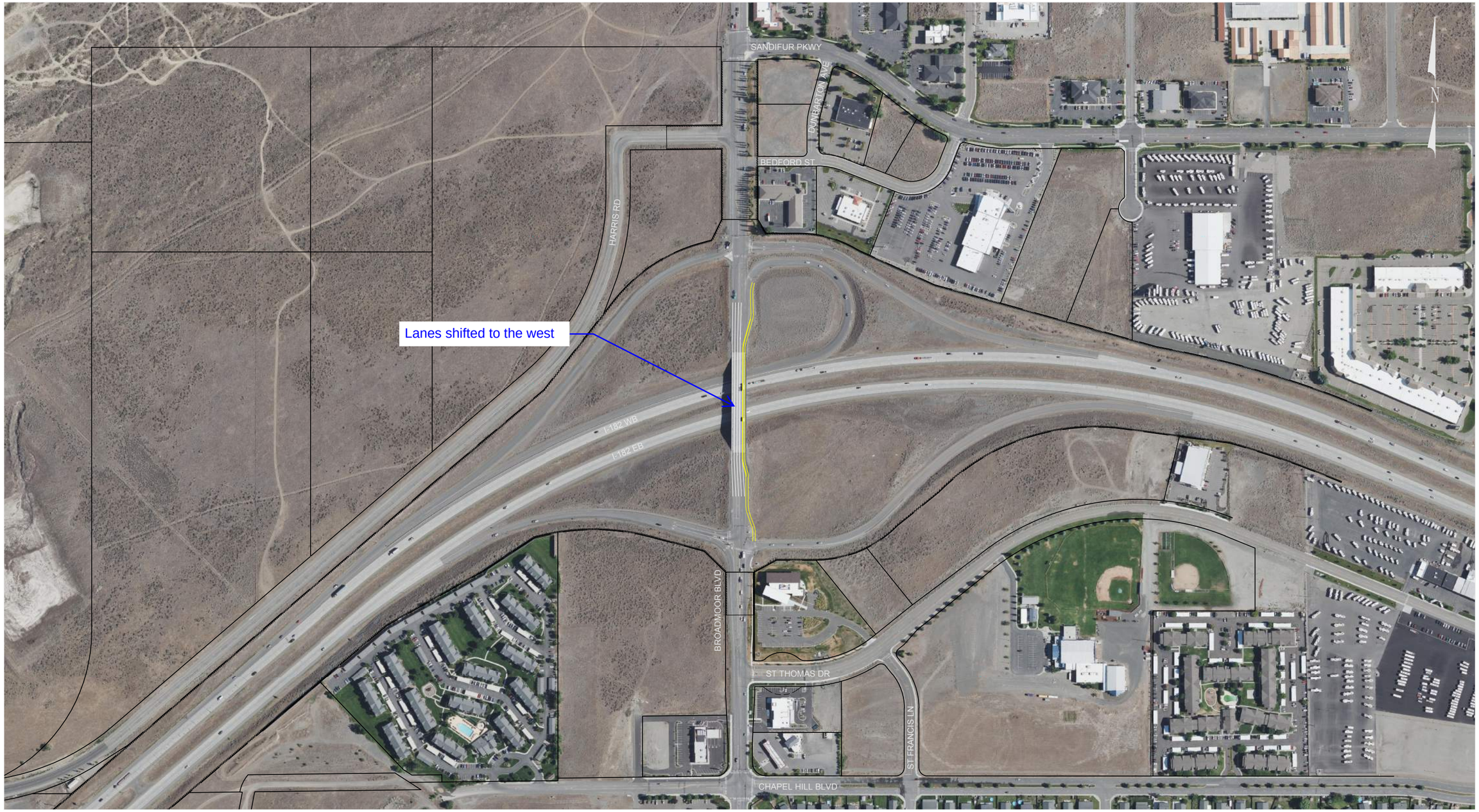
I-182 AND BROADMOOR INTERCHANGE

ALTERNATIVE A-I-2



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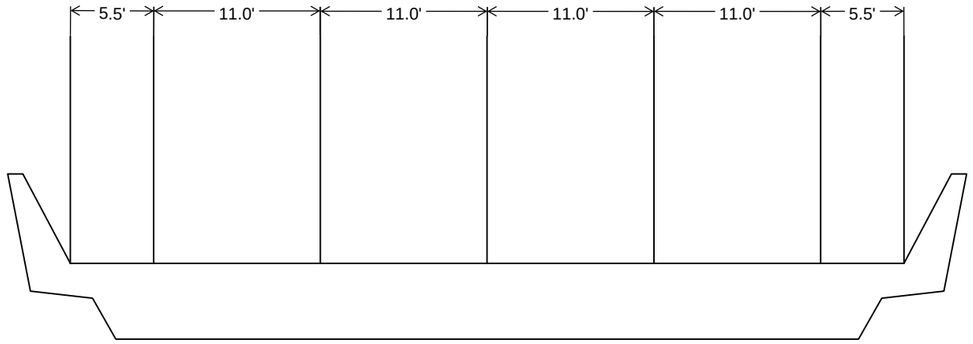
ALTERNATIVE A-I-3



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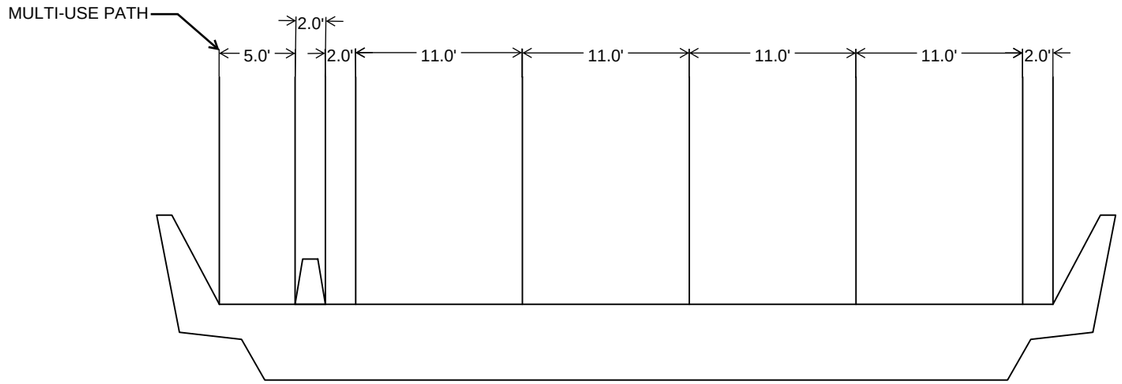
EXISTING BRIDGE SECTION



ALTERNATIVE A-I-2 BRIDGE SECTION

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ALTERNATIVE A-N-1

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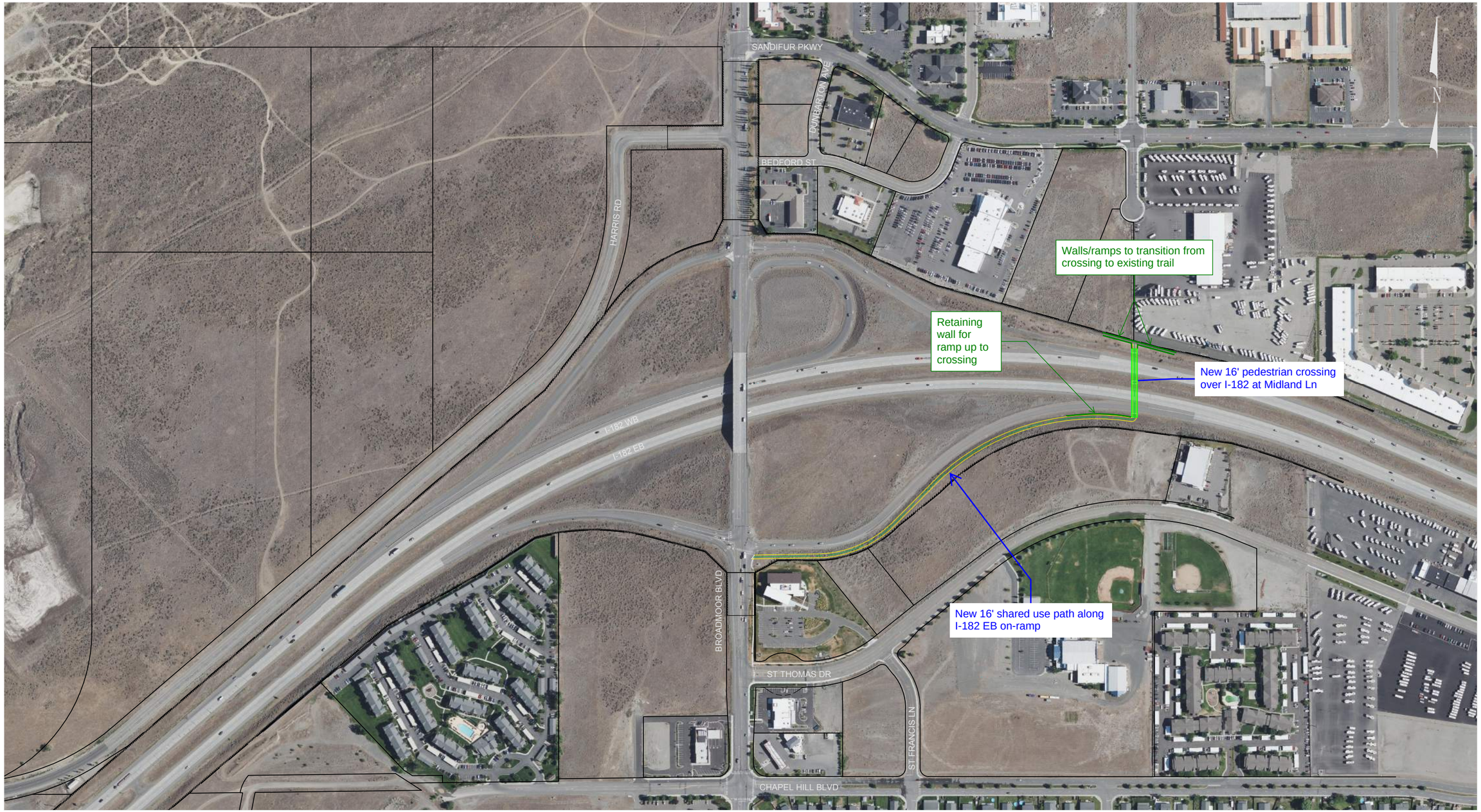
ALTERNATIVE A-N-2



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ALTERNATIVE A-N-3

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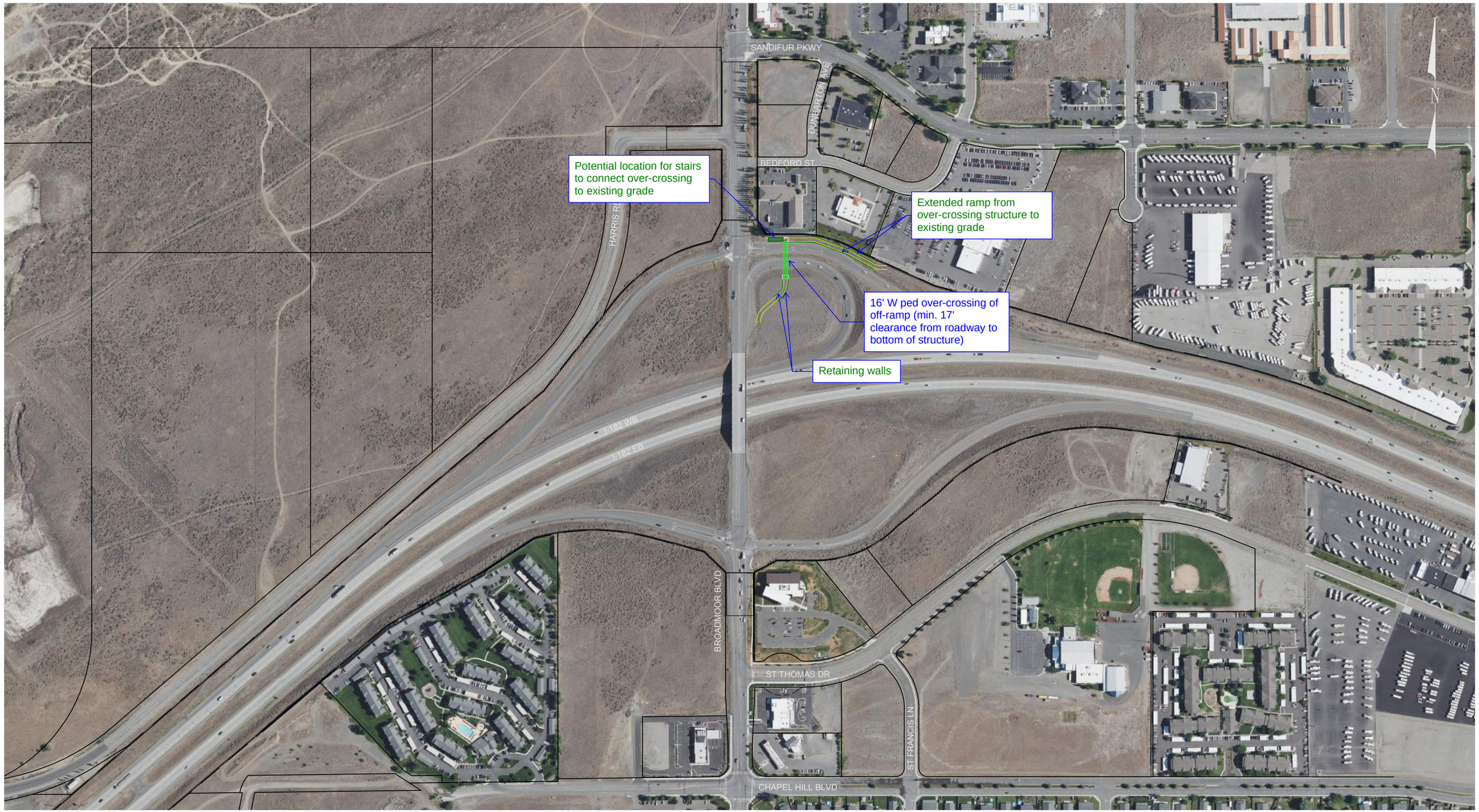
ALTERNATIVE A-W-1a



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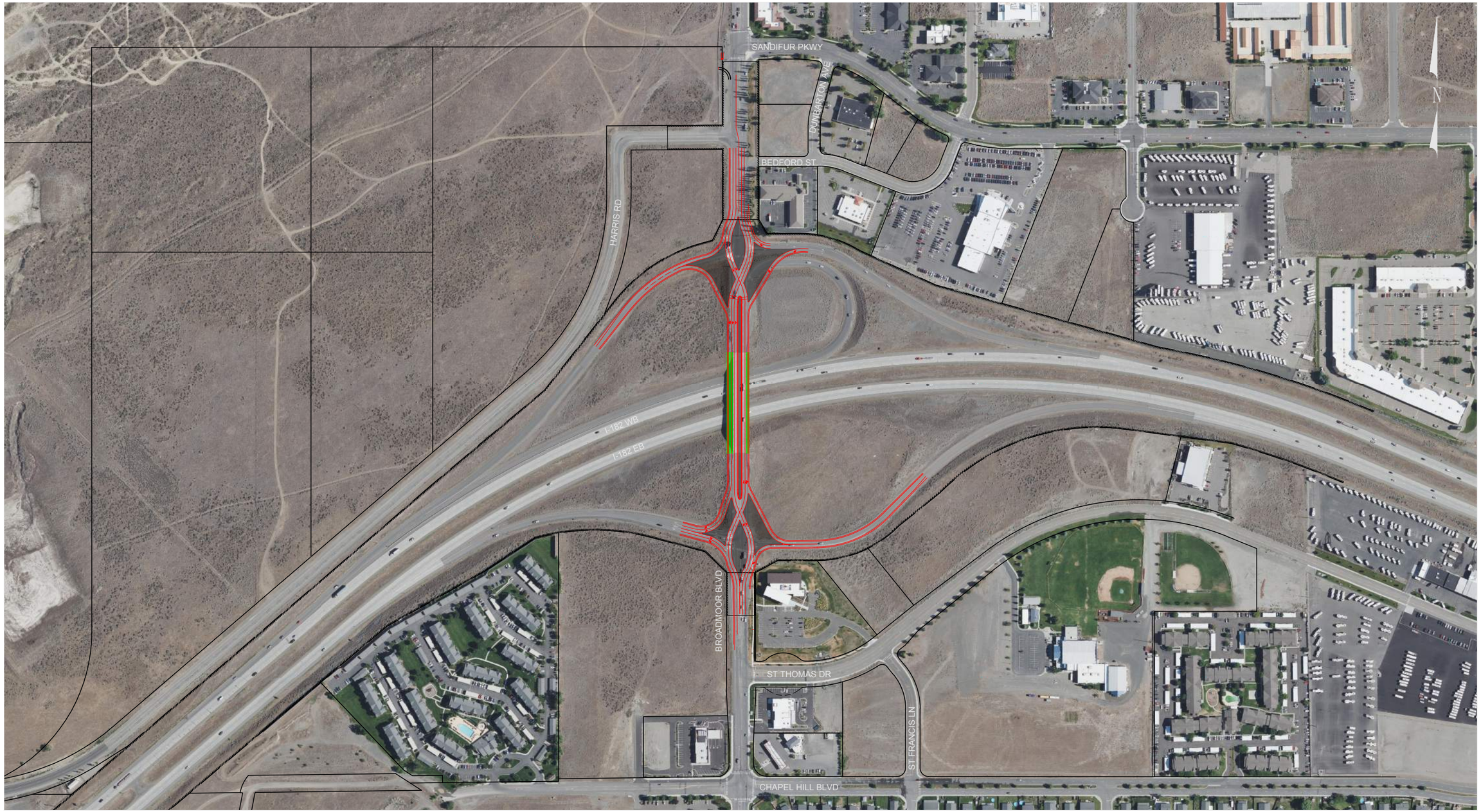
I-182 AND BROADMOOR INTERCHANGE

ALTERNATIVE A-W-2b



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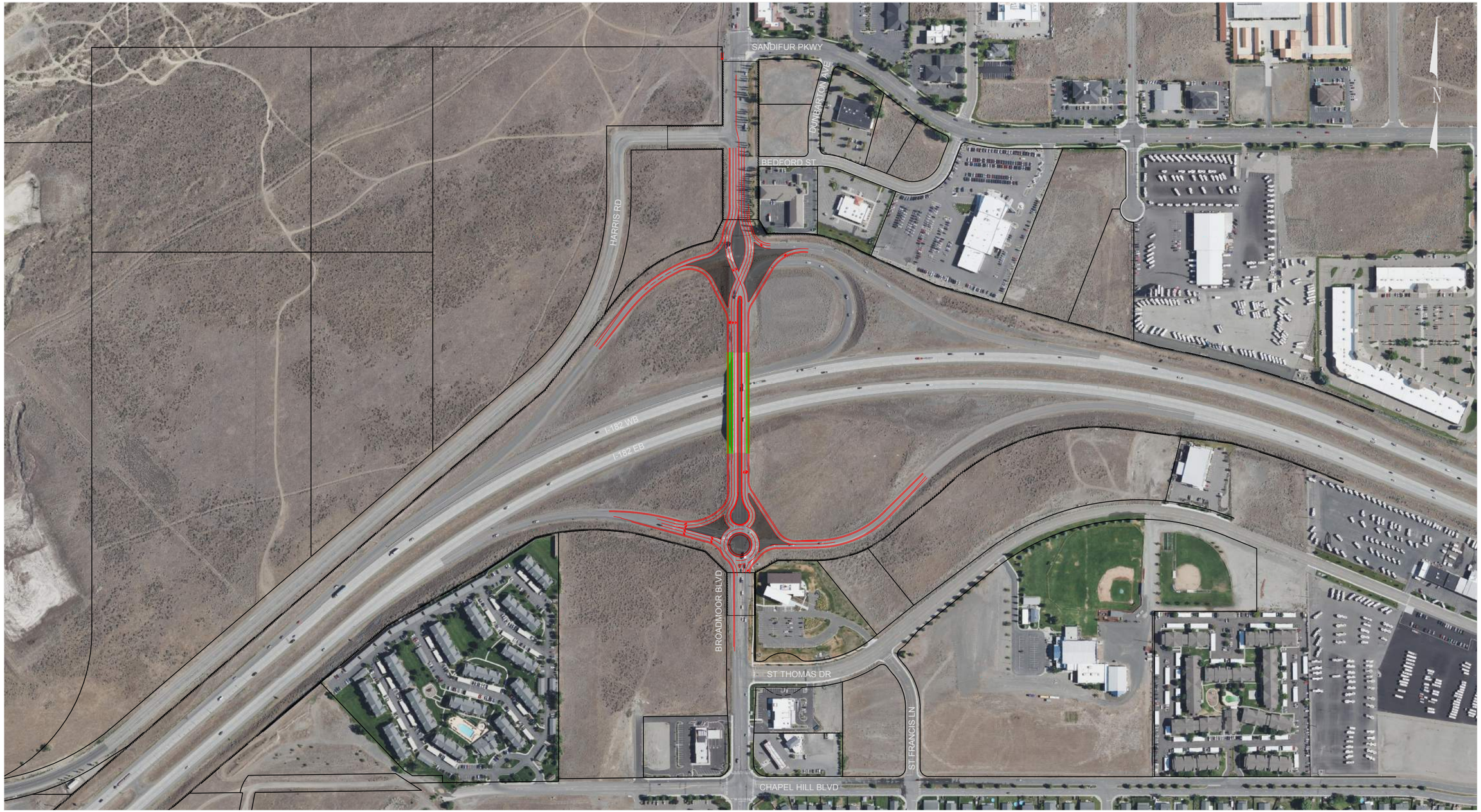
1 inch = 200 feet

I-182 AND BROADMOOR INTERCHANGE

ALTERNATIVE C-E-1



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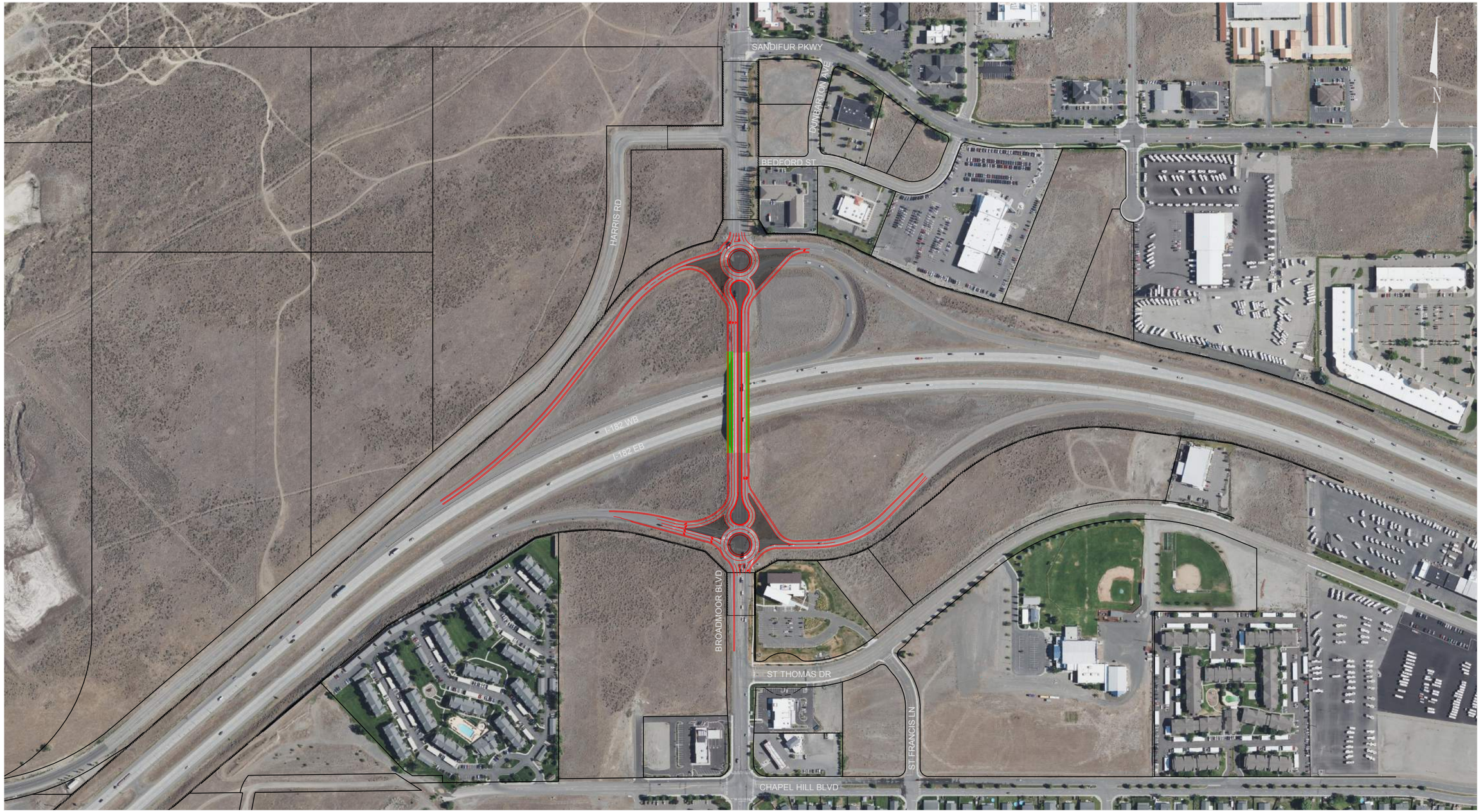
ALTERNATIVE C-E-2



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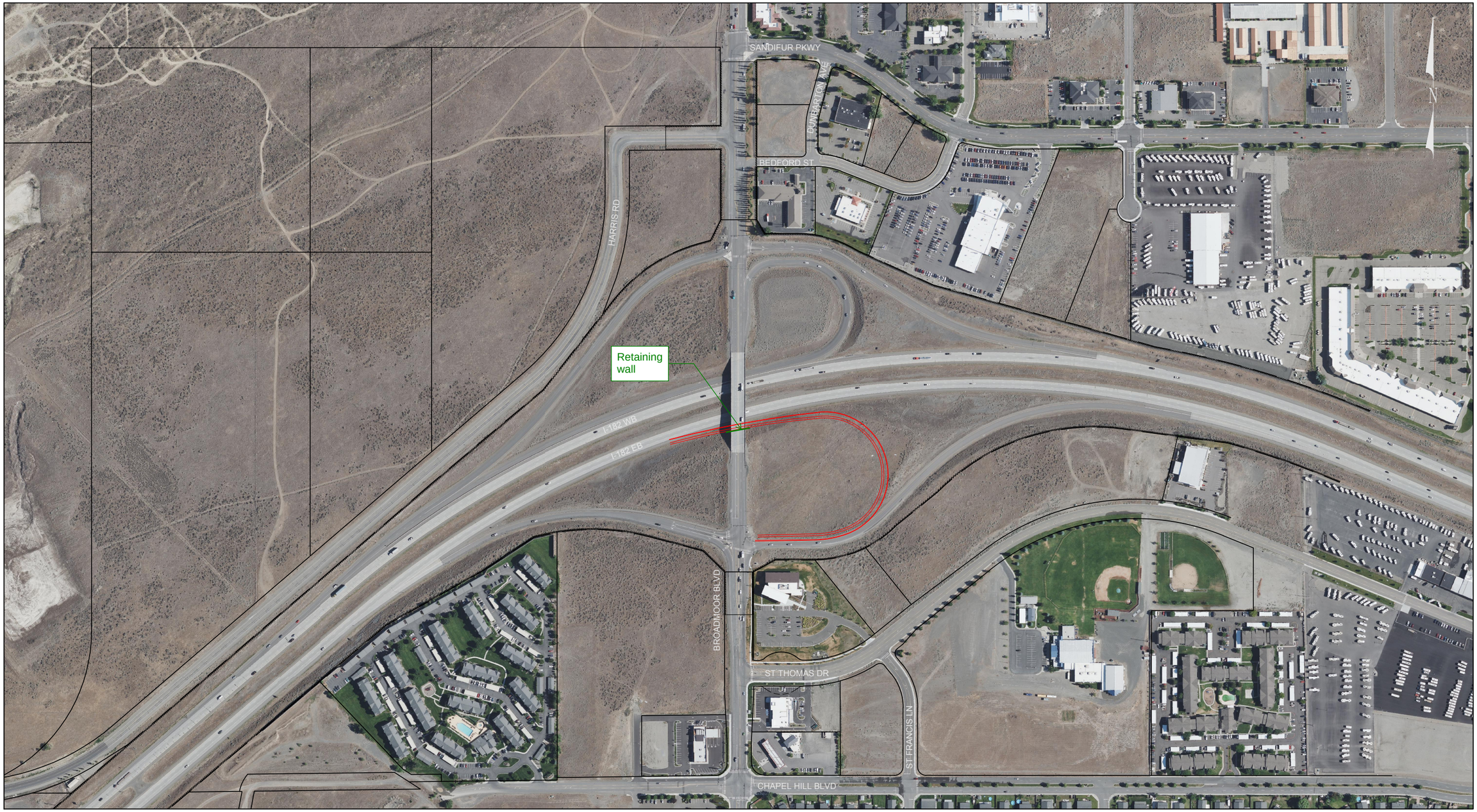
ALTERNATIVE C-E-3

APPENDIX D-2. LEVEL 2 ALTERNATIVES CONCEPTUAL LAYOUTS



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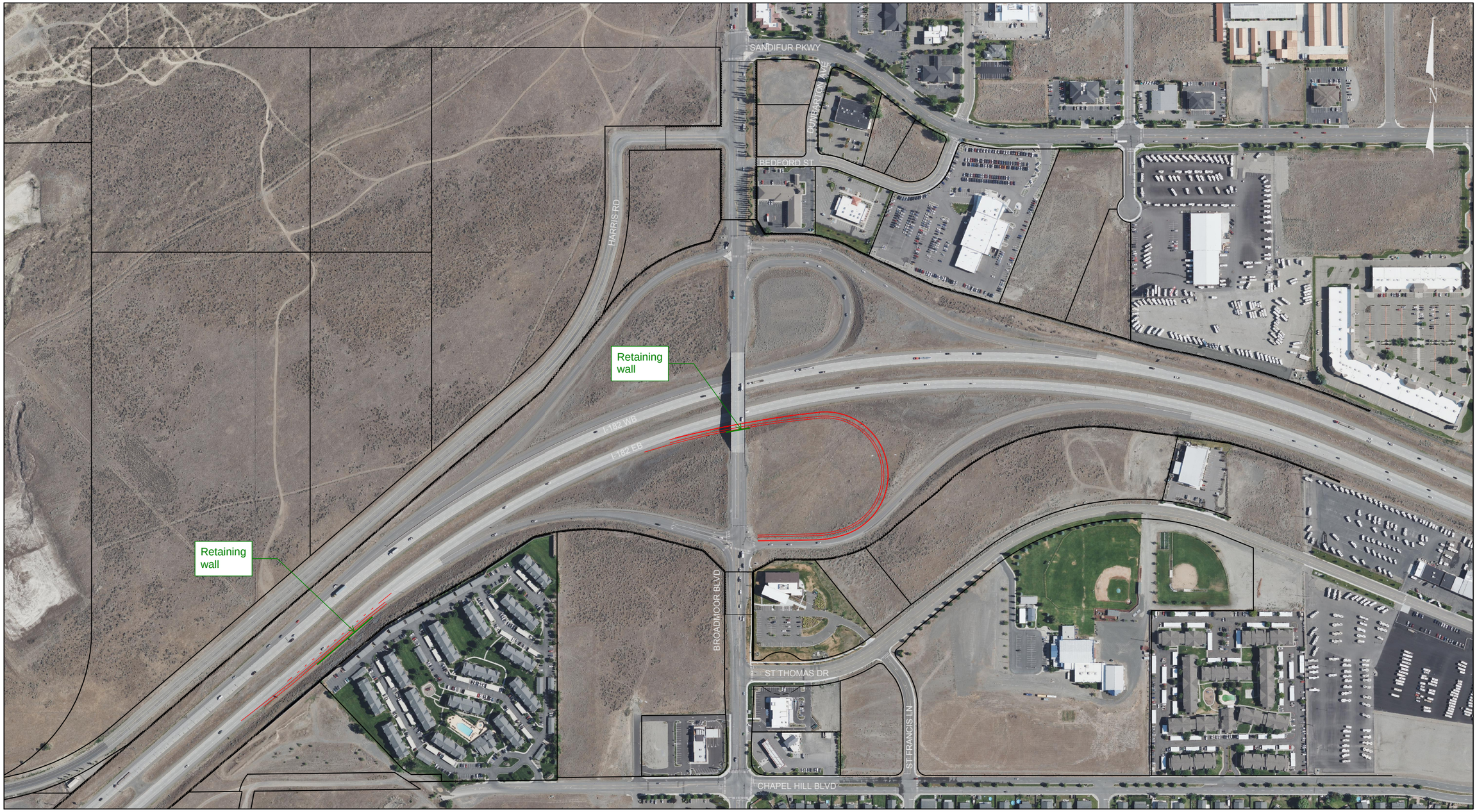
F-E-1



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F-E-2

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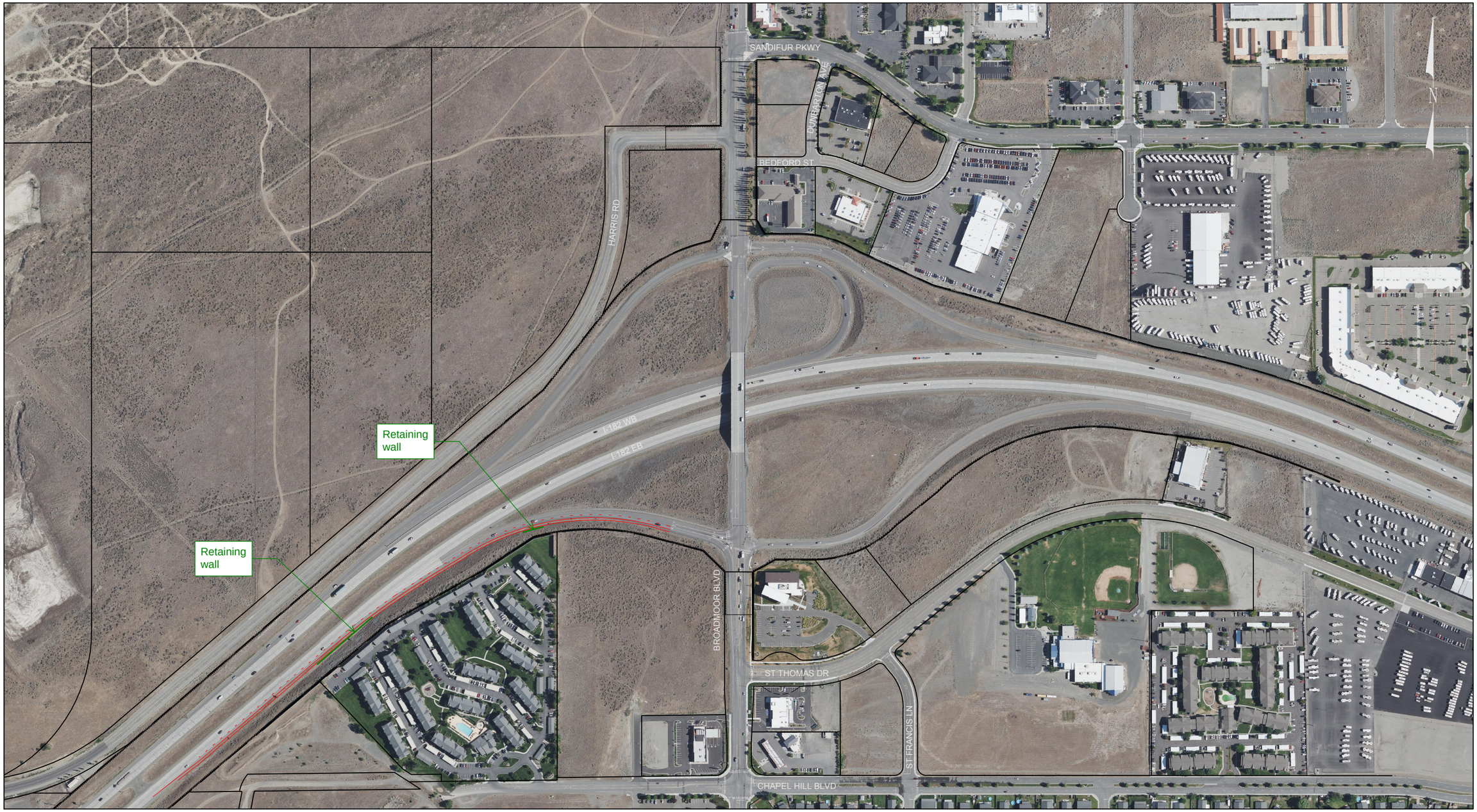

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F-E-4

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W-R-1

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ALTERNATIVE W-S-1

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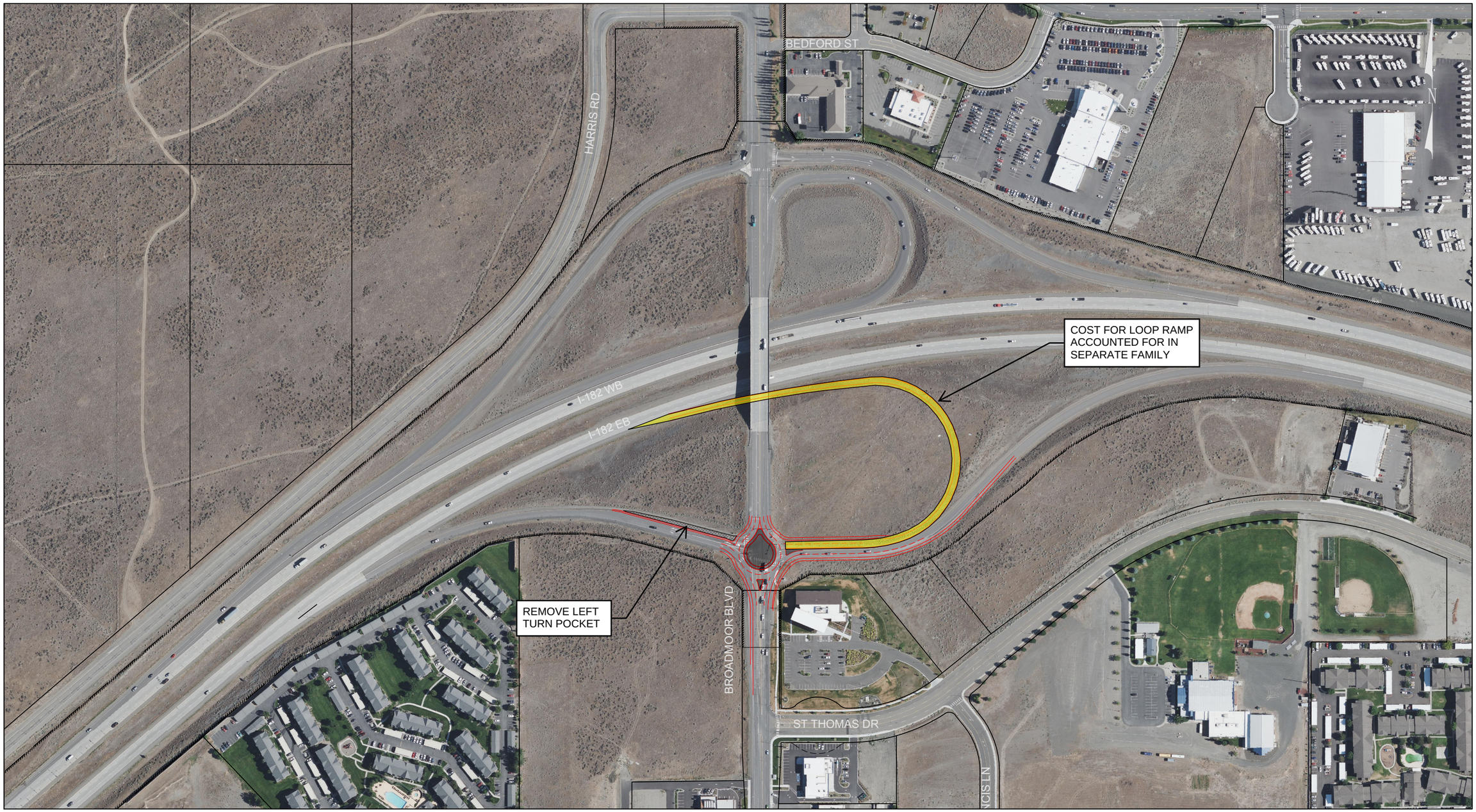
ALTERNATIVE W-S-2



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E-R-1

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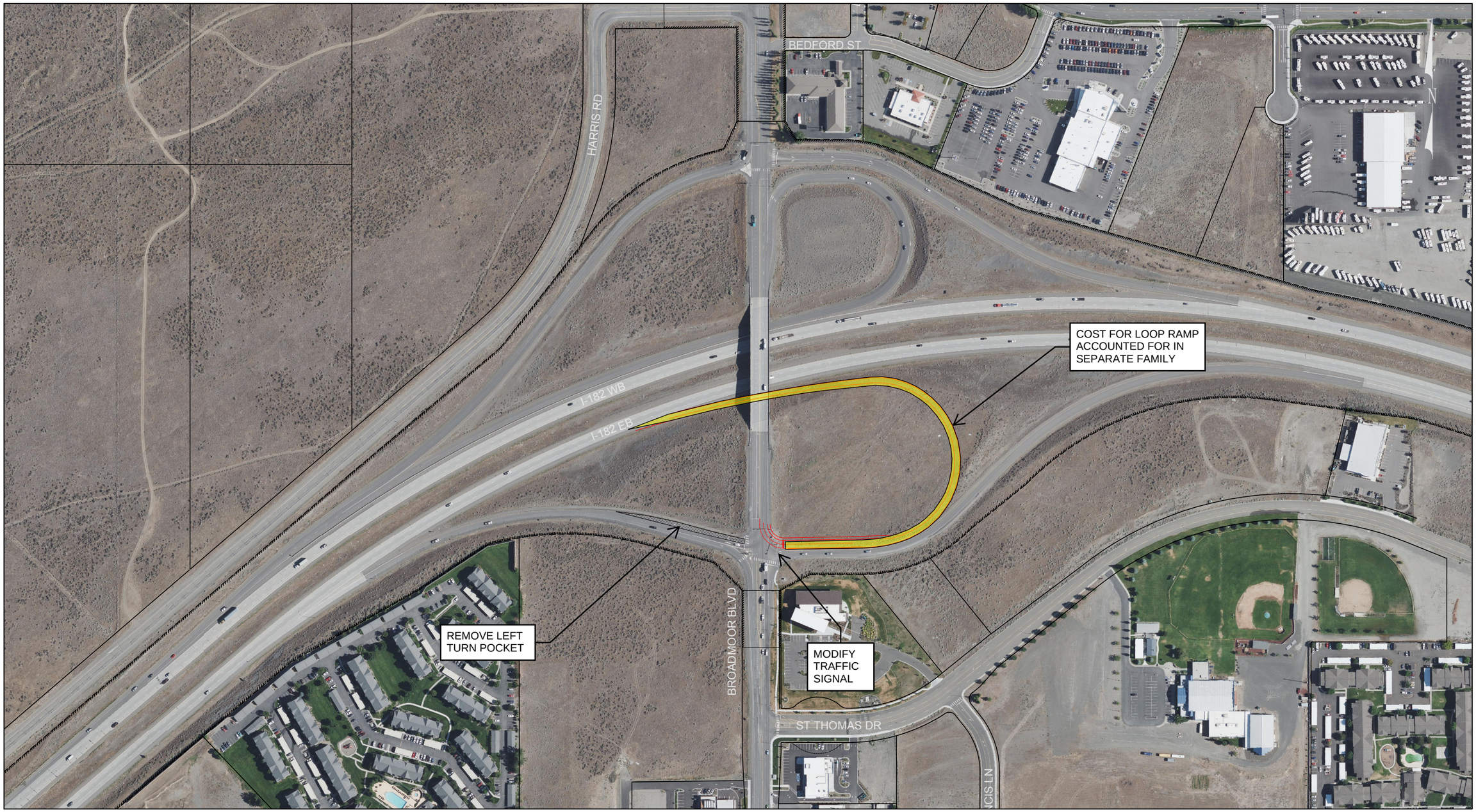
E-R-2



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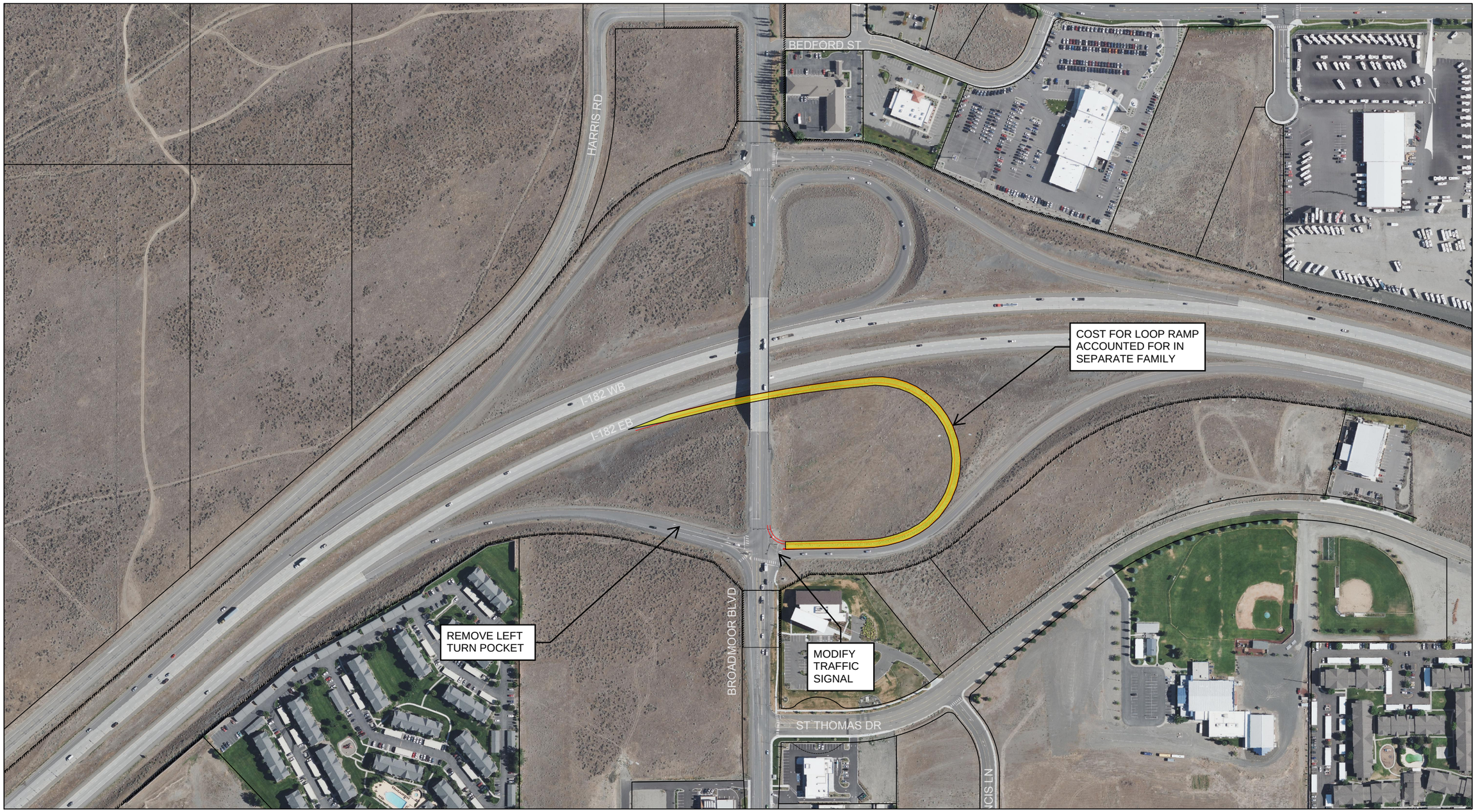
E-S-1



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E-S-1a

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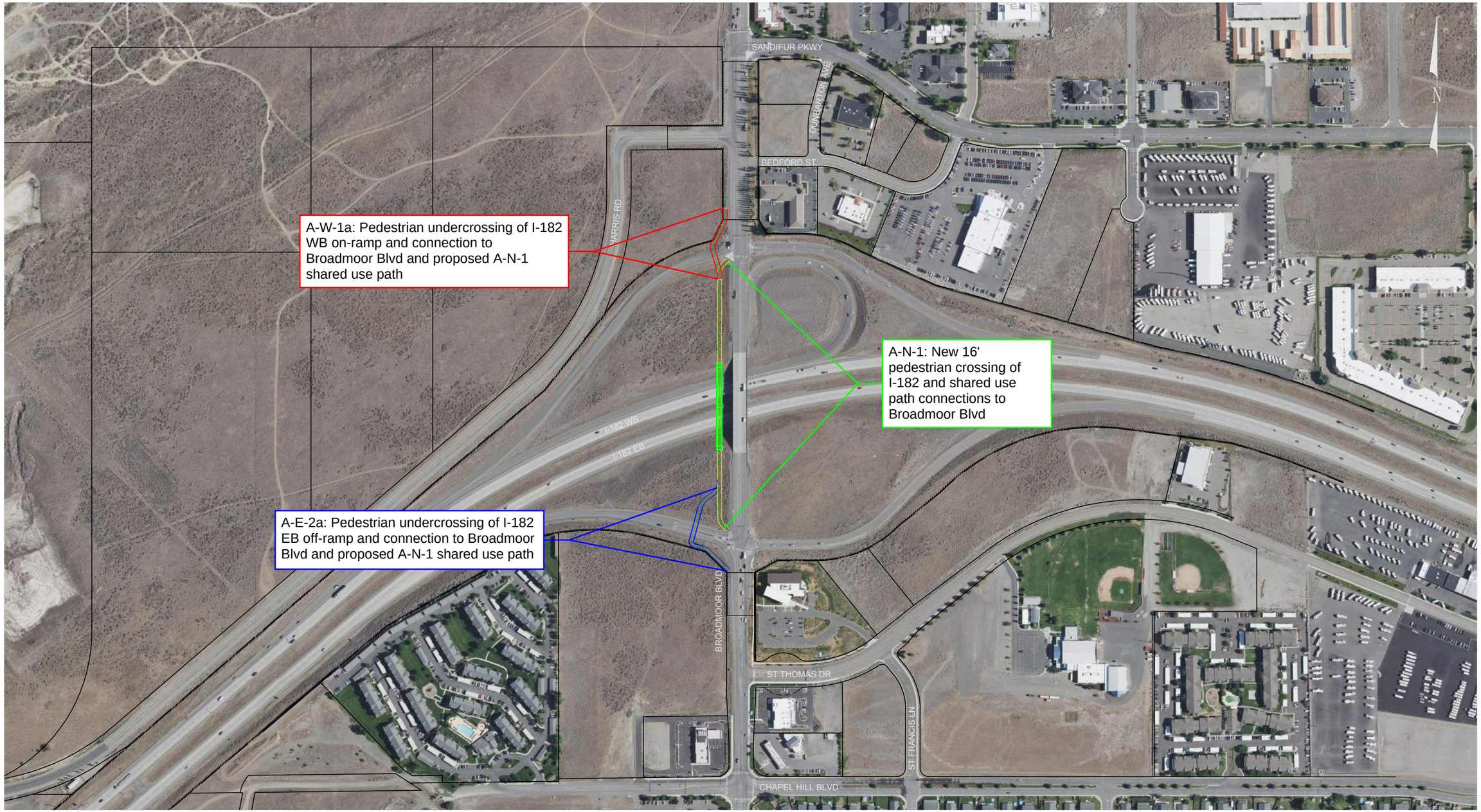

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ACTIVE TRANSPORTATION - WEST OF BROADMOOR
ALTERNATIVE A-N-1, A-W-1a & A-E-2a

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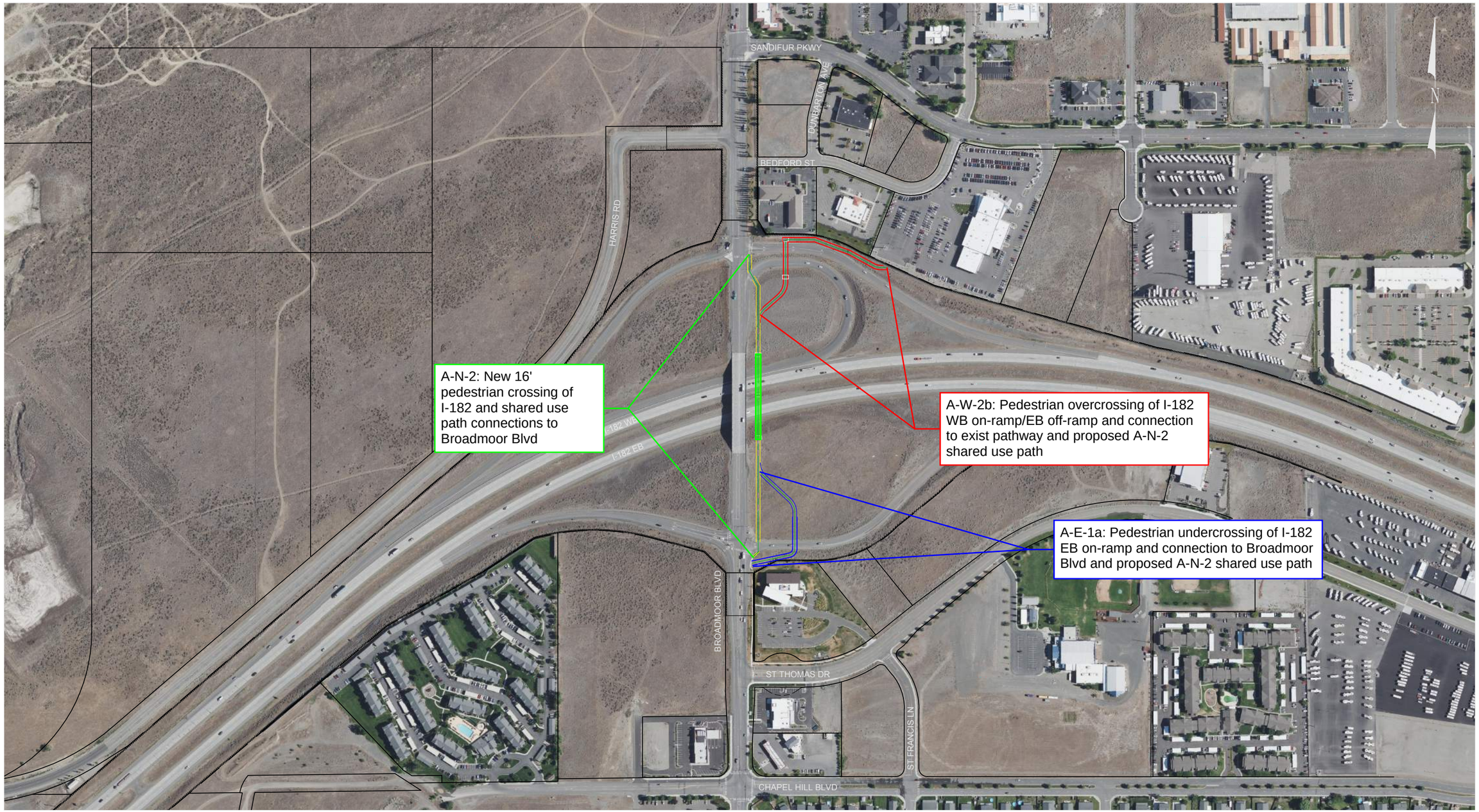

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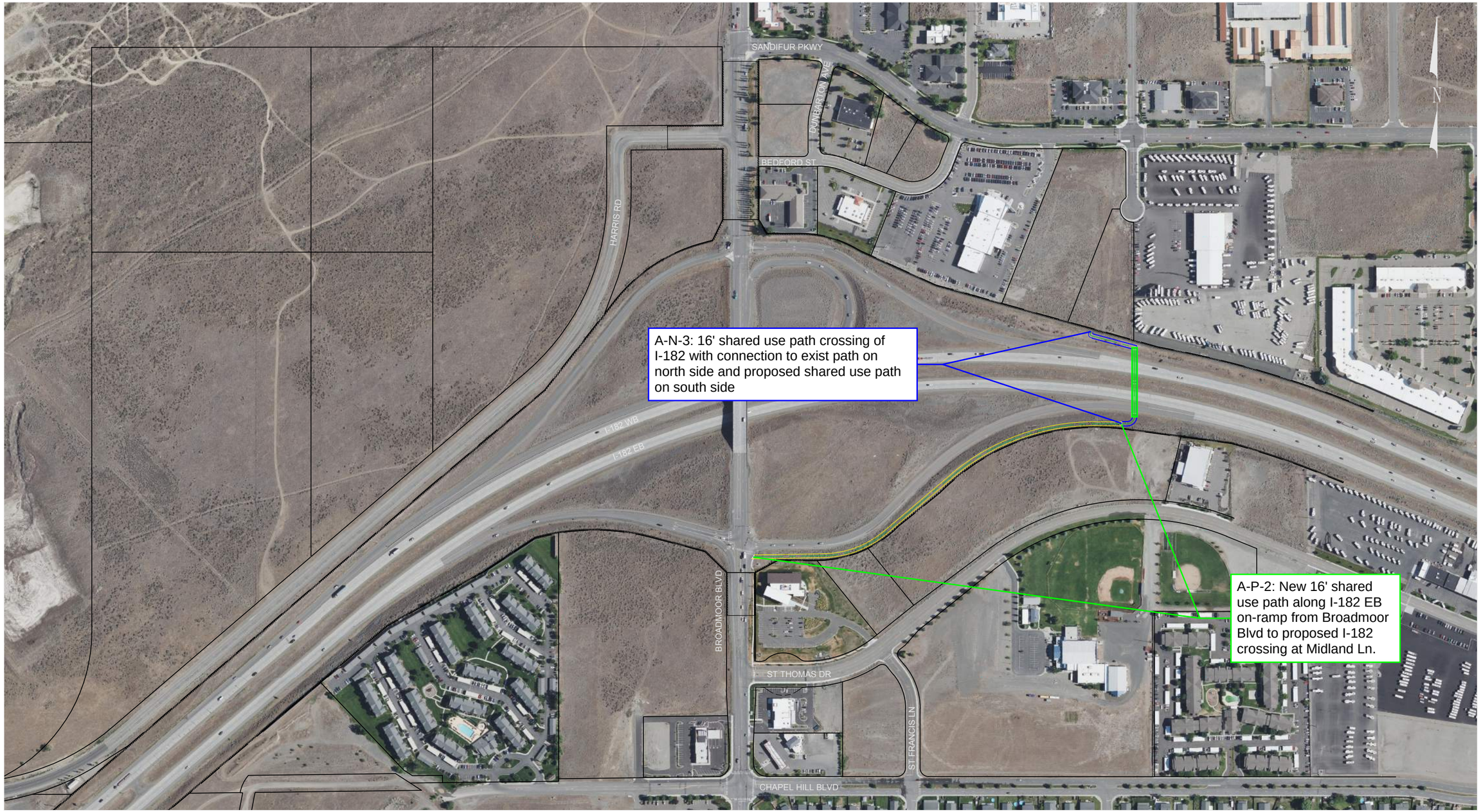
ACTIVE TRANSPORTATION - EAST OF BROADMOOR
ALTERNATIVE A-N-2, A-W-2B & A-E-1a



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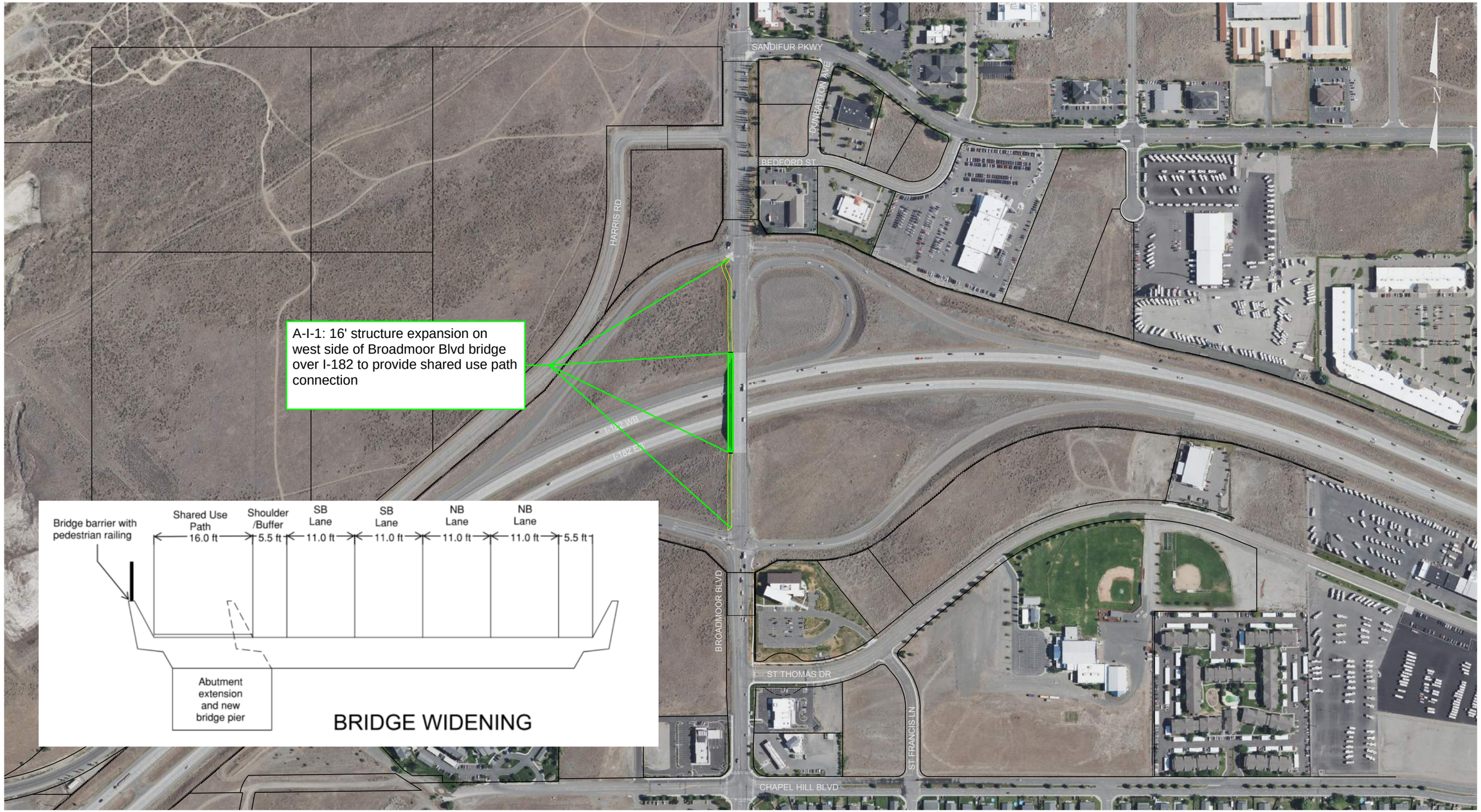
I-182 AND BROADMOOR INTERCHANGE

ACTIVE TRANSPORTATION - MIDLAND LANE CROSSING ALTERNATIVE A-N-3 & A-P-2

Z:\2100001-2109999\2106616 Pasco I-182 & Broadmoor (Phase 1)\CADD\Exhibits\04_Level 2 Final Concept Figures\04_Active Transportation\A-N-3\A-N-3 Exhibit.dwg, 2/22/2022



NOT FOR CONSTRUCTION - FOR DISCUSSION PURPOSES ONLY

kpff
1601 5th Avenue, Suite 1600
Seattle, WA 98101
206.622.5822
www.kpff.com

DRAFTED:

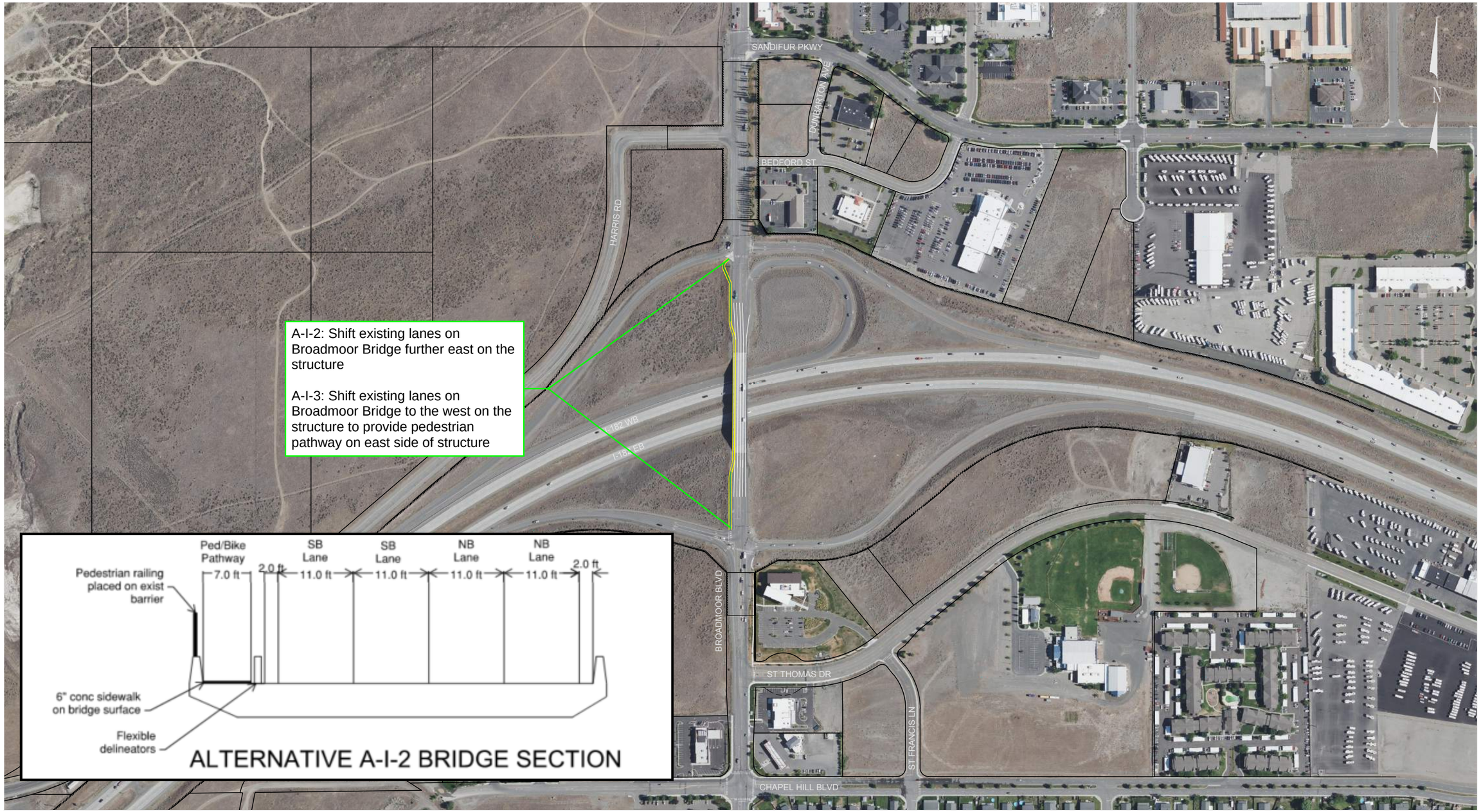
DESIGNED:

0 100' 200' 400'
1 inch = 200 feet

I-182 AND BROADMOOR INTERCHANGE

ACTIVE TRANSPORTATION - BRIDGE EXPANSION ALTERNATIVE A-I-1

Z:\2100001-2109999\2100616 Pasco I-182 & Broadmoor (Phase 1)\CADD\Exhibits\04_Level 2 Final Concept Figures\04_Active Transportation\A-I-1\A-I-1 Exhibit.dwg, 3/2/2022



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DRAFTED:

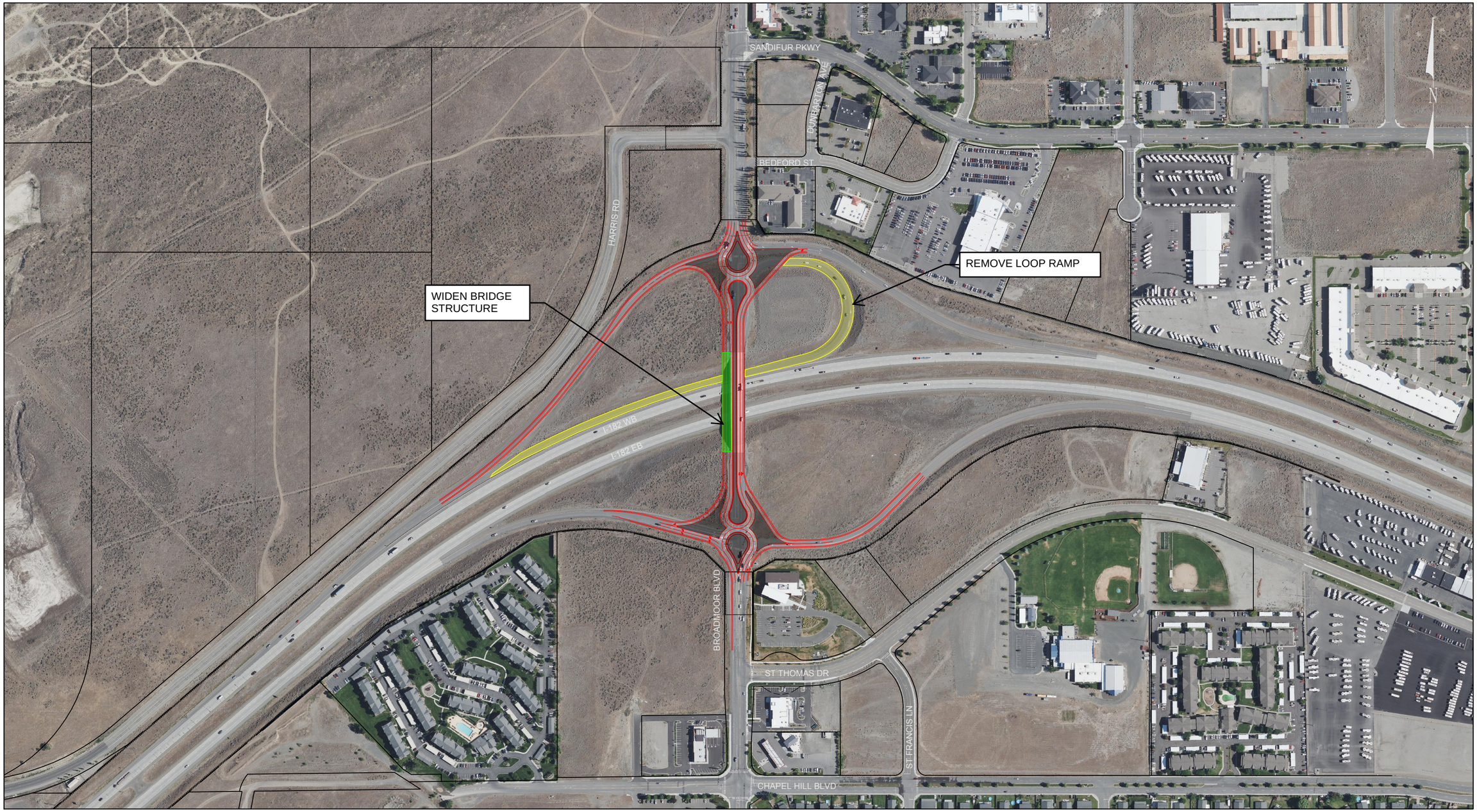
DESIGNED:

0 100' 200' 400'
1 inch = 200 feet

I-182 AND BROADMOOR INTERCHANGE

ACTIVE TRANSPORTATION - LANE SHIFTS ALTERNATIVE A-I-2 & A-I-3

Z:\2100001-2109999\2100616 Pasco I-182 & Broadmoor (Phase 1)\CADD\Exhibits\04_Level 2 Final Concept Figures\04_Active Transportation\A-I-2A-I-2 Exhibit.dwg, 3/2/2022



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DRAFTED:

DESIGNED:

0 100' 200' 400'
1 inch = 200 feet

I-182 AND BROADMOOR INTERCHANGE

C-E-3

APPENDIX E. ANALYSIS DATA

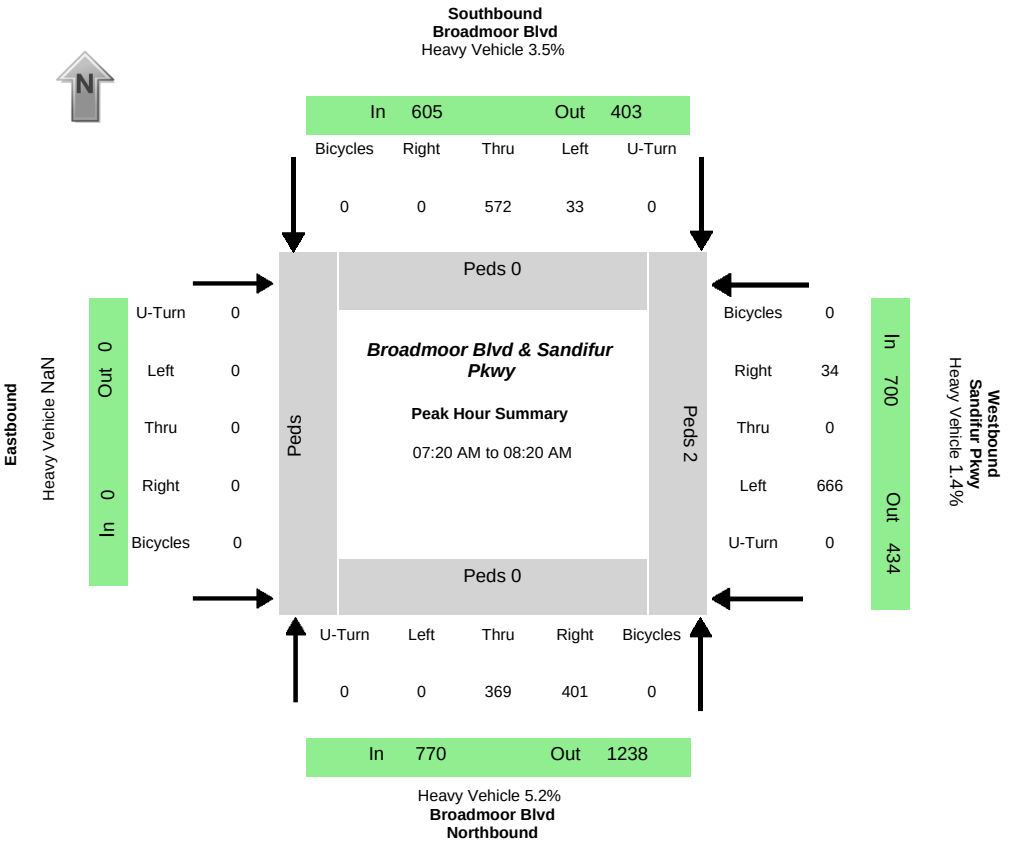
APPENDIX E-1: TRAFFIC COUNTS

APPENDIX E-2: CRASH DATA

APPENDIX E-1. TRAFFIC COUNTS

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street	*Broadmoor Blvd*
E/W street	*Sandifur Pkwy*
City, State	Pasco WA
Site Notes	
Location	46.279253 - -119.221425
Start Date	Wednesday, March 27, 2019
Start Time	07:00:00 AM
Weather	
Study ID #	
Peak Hour Start	07:20:00 AM
Peak 15 Min Start	07:25:00 AM
PHF (15-Min Int)	0.90



Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	369	401	0	33	572	0	0	0	0	0	0	666	0	34	0	770	605	0	700	1238	403	0	434

Percent Heavy Vehicles

0.0%	8.4%	2.2%	0.0%	3.0%	3.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.5%	0.0%	0.0%	0.0%	5.2%	3.5%	NaN	1.4%	2.4%	7.7%	NaN	2.3%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum
	0	0	0	0	0		0					0		0	0	0

PHV - Pedestrians

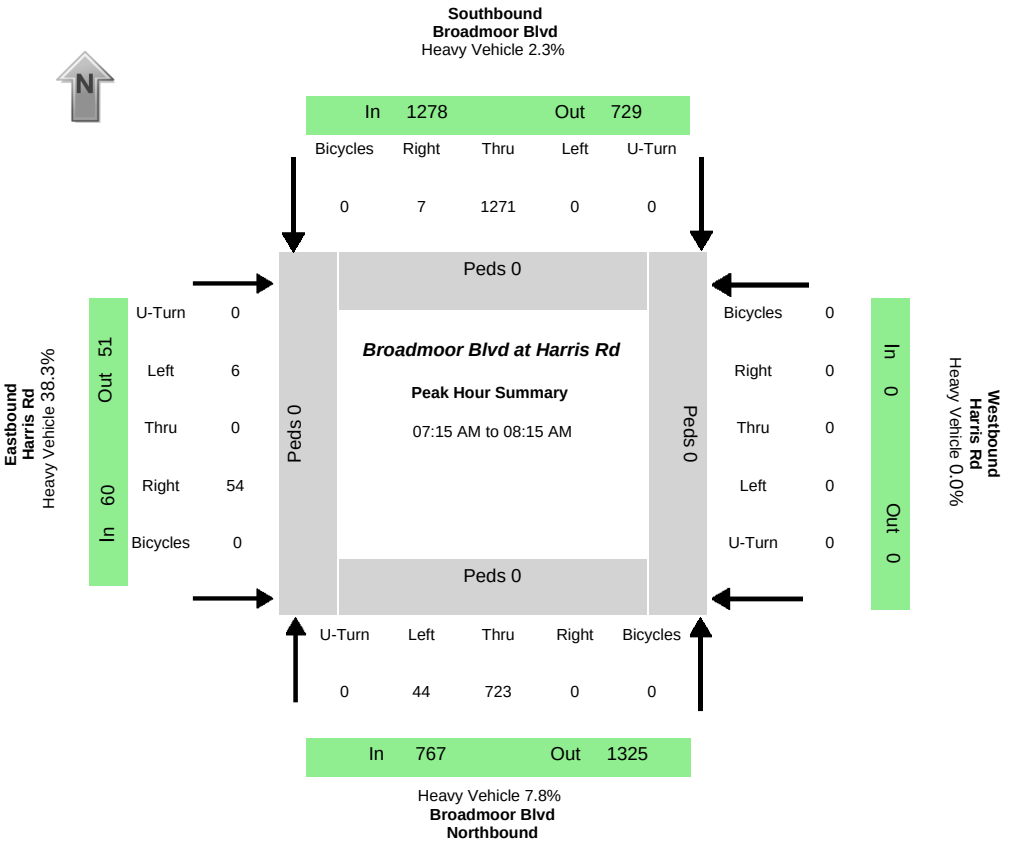
in Crosswalk				
NB	SB	EB	WB	Sum
0	0		2	2

All Vehicle Volumes

	Northbound Broadmoor Blvd				Southbound Broadmoor Blvd				Eastbound				Westbound Sandifur Pkwy				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
07:00:00 AM		18	15	0	2	26		0					30		1	0		
07:05:00 AM		18	10	0	3	30		0					47		1	0		
07:10:00 AM		14	15	0	1	36		0					53		1	0	321	
07:15:00 AM		18	17	0	2	51		0					61		1	0	379	
07:20:00 AM		28	25	0	1	55		0					64		2	0	445	
07:25:00 AM		29	29	0	2	78		0					68		3	0	534	
07:30:00 AM		34	22	0	1	50		0					77		1	0	569	
07:35:00 AM		27	31	0	2	58		0					65		2	0	579	
07:40:00 AM		26	35	0	1	56		0					74		0	0	562	
07:45:00 AM		25	39	0	1	53		0					69		2	0	566	
07:50:00 AM		31	51	0	5	48		0					52		2	0	570	
07:55:00 AM		38	45	0	4	32		0					48		4	0	549	1966
08:00:00 AM		30	43	0	4	29		0					39		4	0	509	2023
08:05:00 AM		30	20	0	4	37		0					39		7	0	457	2051
08:10:00 AM		28	28	0	6	42		0					33		4	0	427	2072
08:15:00 AM		43	33	0	2	34		0					38		3	0	431	2075
08:20:00 AM		41	34	0	2	44		0					29		4	0	448	2054
08:25:00 AM		47	43	0	4	29		0					37		5	0	472	2010
08:30:00 AM		16	44	0	1	33		0					35		3	0	451	1957
08:35:00 AM		14	37	0	1	29		0					46		0	0	424	1899
08:40:00 AM		10	44	0	1	41		0					47		1	0	403	1851
08:45:00 AM		18	42	0	2	33		0					50		1	0	417	1808
08:50:00 AM		11	47	0	2	28		0					37		0	0	415	1744
08:55:00 AM		19	46	0	2	23		0					42		1	0	404	1706

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street	*Broadmoor Blvd*
E/W street	*Harris Rd*
City, State	Pasco WA
Site Notes	
Location	46.278242 - -119.221417
Start Date	Wednesday, March 27, 2019
Start Time	07:00:00 AM
Weather	
Study ID #	
Peak Hour Start	07:15:00 AM
Peak 15 Min Start	07:40:00 AM
PHF (15-Min Int)	0.89



Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
44	723	0	0	0	1271	7	0	6	0	54	0	0	0	0	0	767	1278	60	0	1325	729	51	0

Percent Heavy Vehicles

45.5%	5.5%	0.0%	0.0%	0.0%	2.2%	14.3%	0.0%	0.0%	0.0%	42.6%	0.0%	0.0%	0.0%	0.0%	0.0%	7.8%	2.3%	38.3%	0.0%	3.8%	5.5%	41.2%	0.0%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PHV - Pedestrians

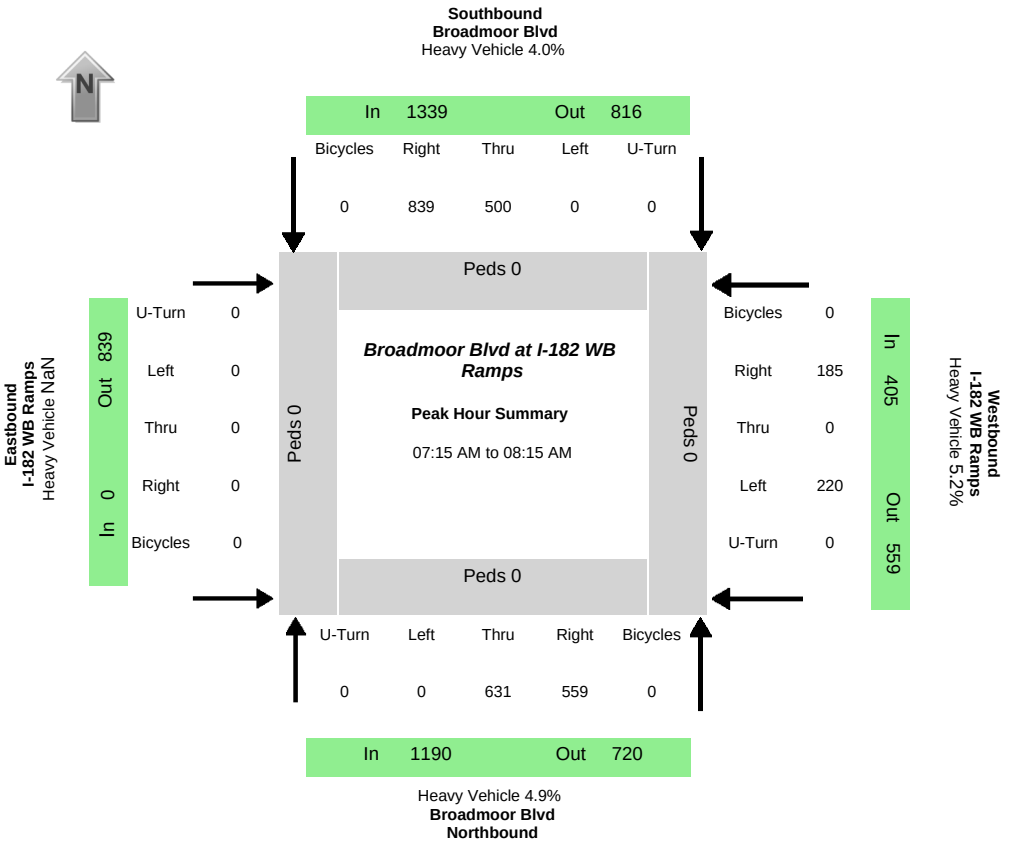
in Crosswalk				
NB	SB	EB	WB	Sum
0	0	0	0	0

All Vehicle Volumes

	Northbound Broadmoor Blvd				Southbound Broadmoor Blvd				Eastbound Harris Rd				Westbound Harris Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
07:00:00 AM	4	33	0	0	0	55	1	0	0	0	3	0	0	0	0	0		
07:05:00 AM	1	28	0	0	0	75	2	0	0	0	0	0	0	0	0	0		
07:10:00 AM	4	29	0	0	0	88	1	0	0	0	5	0	0	0	0	0	329	
07:15:00 AM	5	35	0	0	0	111	1	0	0	0	4	0	0	0	0	0	389	
07:20:00 AM	8	53	0	0	0	119	0	0	0	0	3	0	0	0	0	0	466	
07:25:00 AM	2	58	0	0	0	143	3	0	0	0	1	0	0	0	0	0	546	
07:30:00 AM	4	56	0	0	0	127	0	0	0	0	3	0	0	0	0	0	580	
07:35:00 AM	3	58	0	0	0	122	1	0	0	0	4	0	0	0	0	0	585	
07:40:00 AM	2	61	0	0	0	130	0	0	0	0	9	0	0	0	0	0	580	
07:45:00 AM	4	63	0	0	0	121	1	0	1	0	2	0	0	0	0	0	582	
07:50:00 AM	1	82	0	0	0	100	0	0	0	0	12	0	0	0	0	0	589	
07:55:00 AM	5	82	0	0	0	80	0	0	1	0	4	0	0	0	0	0	559	2014
08:00:00 AM	3	71	0	0	0	67	1	0	2	0	4	0	0	0	0	0	515	2066
08:05:00 AM	4	49	0	0	0	76	0	0	1	0	6	0	0	0	0	0	456	2096
08:10:00 AM	3	55	0	0	0	75	0	0	1	0	2	0	0	0	0	0	420	2105
08:15:00 AM	0	72	0	0	0	72	0	0	4	0	4	0	0	0	0	0	424	2101
08:20:00 AM	1	74	0	0	0	73	0	0	1	0	3	0	0	0	0	0	440	2070
08:25:00 AM	4	89	0	0	0	66	0	0	1	0	5	0	0	0	0	0	469	2028
08:30:00 AM	8	59	0	0	0	68	0	0	1	0	3	0	0	0	0	0	456	1977
08:35:00 AM	3	49	0	0	0	74	1	0	2	0	2	0	0	0	0	0	435	1920
08:40:00 AM	5	54	0	0	0	88	0	0	0	0	2	0	0	0	0	0	419	1867
08:45:00 AM	6	59	0	0	0	83	0	0	1	0	5	0	0	0	0	0	434	1829
08:50:00 AM	5	57	0	0	0	65	0	0	1	0	3	0	0	0	0	0	434	1765
08:55:00 AM	10	65	0	0	0	63	2	0	0	0	4	0	0	0	0	0	429	1737

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street	*Broadmoor Blvd*
E/W street	*I-182 WB Ramps*
City, State	Pasco WA
Site Notes	
Location	46.276943 - -119.221432
Start Date	Wednesday, March 27, 2019
Start Time	07:00:00 AM
Weather	
Study ID #	
Peak Hour Start	07:15:00 AM
Peak 15 Min Start	07:40:00 AM
PHF (15-Min Int)	0.88



Peak-Hour Volumes (PHV)																								
Northbound				**Southbound**				**Eastbound**				**Westbound**				**Entering**				**Leaving**			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	631	559	0	0	500	839	0	0	0	0	0	220	0	185	0	1190	1339	0	405	720	816	839	559
Percent Heavy Vehicles																							
0.0%	8.1%	1.3%	0.0%	0.0%	6.0%	2.7%	0.0%	0.0%	0.0%	0.0%	0.0%	3.2%	0.0%	7.6%	0.0%	4.9%	4.0%	NaN	5.2%	5.1%	8.0%	2.7%	1.3%

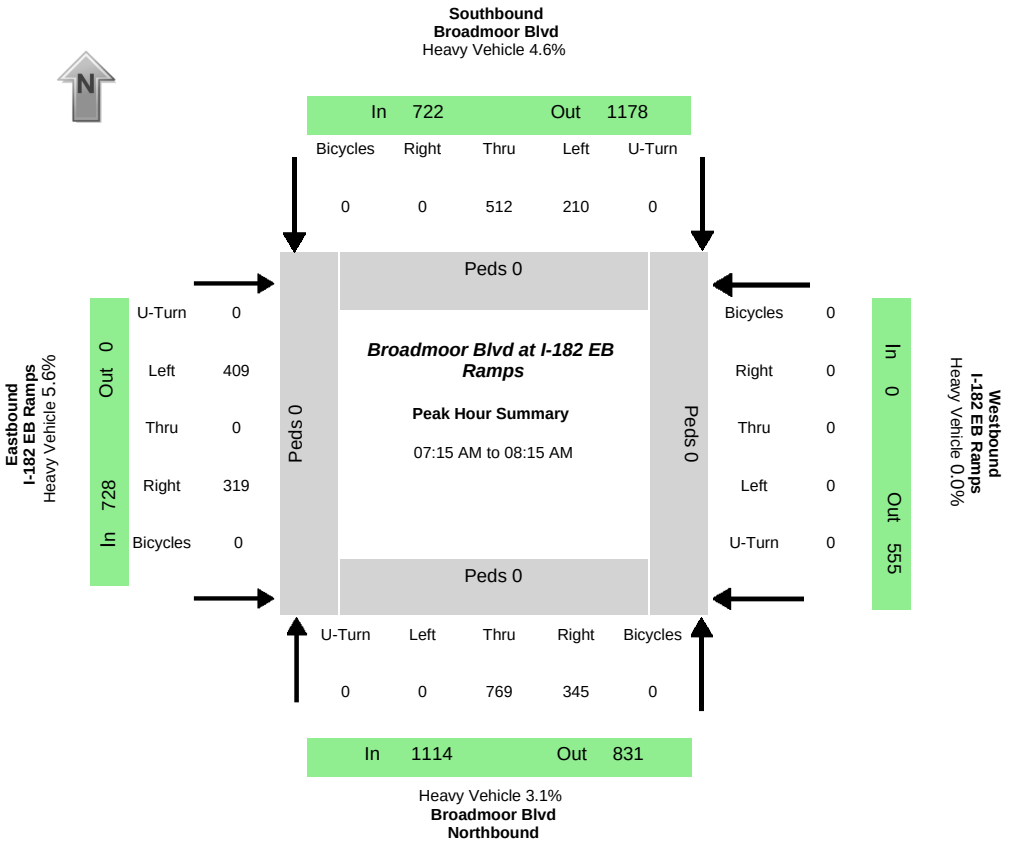
PHV- Bicycles																	PHV - Pedestrians					
Northbound				**Southbound**				**Eastbound**				**Westbound**					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

All Vehicle Volumes

	Northbound Broadmoor Blvd				**Southbound** Broadmoor Blvd				**Eastbound** I-182 WB Ramps				**Westbound** I-182 WB Ramps				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
07:00:00 AM	0	31	27	0	0	26	34	0	0	0	0	0	11	0	12	0		
07:05:00 AM	0	23	35	0	0	31	41	0	0	0	0	0	10	0	9	0		
07:10:00 AM	0	20	48	0	0	36	56	0	0	0	0	0	12	0	8	0	470	
07:15:00 AM	0	39	42	0	0	55	57	0	0	0	0	0	19	0	10	0	551	
07:20:00 AM	0	49	46	0	0	65	59	0	0	0	0	0	19	0	16	0	656	
07:25:00 AM	0	42	42	0	0	77	69	0	0	0	0	0	27	0	18	0	751	
07:30:00 AM	0	52	57	0	0	66	70	0	0	0	0	0	30	0	12	0	816	
07:35:00 AM	0	48	57	0	0	41	87	0	0	0	0	0	16	0	15	0	826	
07:40:00 AM	0	52	68	0	0	39	88	0	0	0	0	0	16	0	16	0	830	
07:45:00 AM	0	53	66	0	0	30	99	0	0	0	0	0	18	0	18	0	827	
07:50:00 AM	0	66	54	0	0	29	93	0	0	0	0	0	10	0	22	0	837	
07:55:00 AM	0	75	36	0	0	21	66	0	0	0	0	0	16	0	19	0	791	2842
08:00:00 AM	0	57	30	0	0	14	54	0	0	0	0	0	19	0	17	0	698	2892
08:05:00 AM	0	49	30	0	0	37	47	0	0	0	0	0	15	0	9	0	611	2930
08:10:00 AM	0	49	31	0	0	26	50	0	0	0	0	0	15	0	13	0	562	2934
08:15:00 AM	0	63	31	0	0	26	50	0	0	0	0	0	15	0	19	0	575	2916
08:20:00 AM	0	55	28	0	0	22	53	0	0	0	0	0	15	0	17	0	578	2852
08:25:00 AM	0	62	33	0	0	30	40	0	0	0	0	0	12	0	34	0	605	2788
08:30:00 AM	0	49	31	0	0	19	55	0	0	0	0	0	14	0	11	0	580	2680
08:35:00 AM	0	48	19	0	0	31	43	0	0	0	0	0	13	0	10	0	554	2580
08:40:00 AM	0	50	36	0	0	29	61	0	0	0	0	0	7	0	9	0	535	2493
08:45:00 AM	0	53	38	0	0	26	64	0	0	0	0	0	12	0	23	0	572	2425
08:50:00 AM	0	47	35	0	0	24	48	0	0	0	0	0	4	0	17	0	583	2326
08:55:00 AM	0	58	37	0	0	21	48	0	0	0	0	0	8	0	21	0	584	2286

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street	*Broadmoor Blvd*
E/W street	*I-182 EB Ramps*
City, State	Pasco WA
Site Notes	
Location	46.273624 - -119.221544
Start Date	Wednesday, March 27, 2019
Start Time	07:00:00 AM
Weather	
Study ID #	
Peak Hour Start	07:15:00 AM
Peak 15 Min Start	07:20:00 AM
PHF (15-Min Int)	0.85



Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	769	345	0	210	512	0	0	409	0	319	0	0	0	0	0	1114	722	728	0	831	1178	0	555

Percent Heavy Vehicles

0.0%	3.5%	2.3%	0.0%	7.1%	3.5%	0.0%	0.0%	6.8%	0.0%	4.1%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	4.6%	5.6%	0.0%	3.7%	4.7%	NaN	4.1%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PHV - Pedestrians

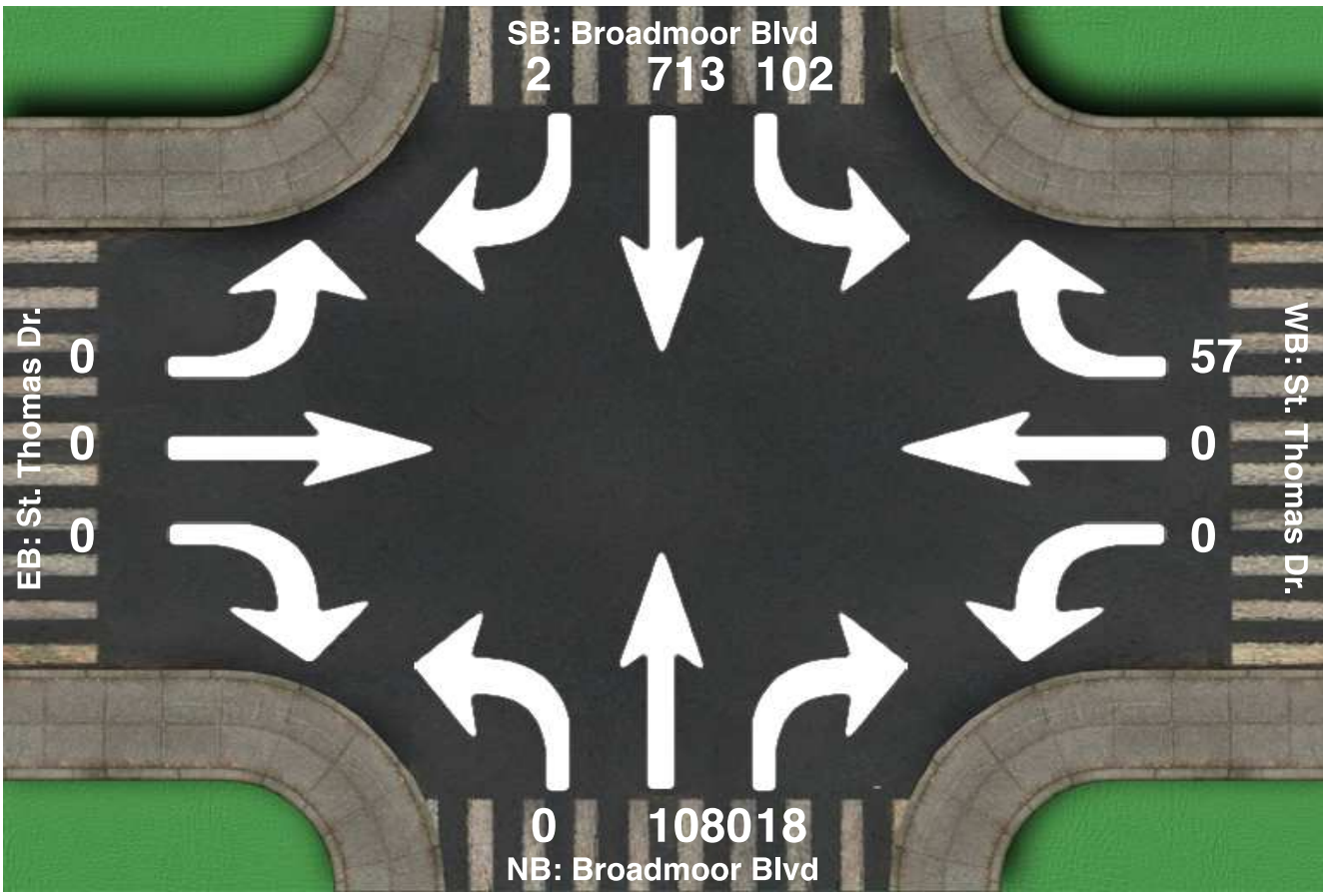
in Crosswalk				
NB	SB	EB	WB	Sum
0	0	0	0	0

All Vehicle Volumes

	Northbound Broadmoor Blvd				Southbound Broadmoor Blvd				Eastbound I-182 EB Ramps				Westbound I-182 EB Ramps				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
07:00:00 AM	0	36	15	0	8	27	0	0	21	0	23	0	0	0	0	0		
07:05:00 AM	0	48	25	0	11	28	0	0	15	0	23	0	0	0	0	0		
07:10:00 AM	0	50	24	0	13	26	0	0	18	0	28	0	0	0	0	0	439	
07:15:00 AM	0	61	17	0	20	58	0	0	22	0	31	0	0	0	0	0	518	
07:20:00 AM	0	57	27	0	19	66	0	0	33	0	40	0	0	0	0	0	610	
07:25:00 AM	0	55	24	0	15	75	0	0	24	0	34	0	0	0	0	0	678	
07:30:00 AM	0	84	33	0	25	79	0	0	34	0	29	0	0	0	0	0	753	
07:35:00 AM	0	87	41	0	12	51	0	0	20	0	22	0	0	0	0	0	744	
07:40:00 AM	0	79	36	0	23	24	0	0	35	0	23	0	0	0	0	0	737	
07:45:00 AM	0	83	48	0	23	30	0	0	37	0	30	0	0	0	0	0	704	
07:50:00 AM	0	81	35	0	16	21	0	0	37	0	20	0	0	0	0	0	681	
07:55:00 AM	0	62	25	0	16	26	0	0	50	0	23	0	0	0	0	0	663	2517
08:00:00 AM	0	44	16	0	10	22	0	0	45	0	22	0	0	0	0	0	571	2546
08:05:00 AM	0	36	21	0	14	33	0	0	37	0	21	0	0	0	0	0	523	2558
08:10:00 AM	0	40	22	0	17	27	0	0	35	0	24	0	0	0	0	0	486	2564
08:15:00 AM	0	55	18	0	20	21	0	0	38	0	23	0	0	0	0	0	502	2530
08:20:00 AM	0	46	20	0	12	27	0	0	46	0	23	0	0	0	0	0	514	2462
08:25:00 AM	0	48	14	0	13	25	0	0	45	0	17	0	0	0	0	0	511	2397
08:30:00 AM	0	41	23	0	11	30	0	0	32	0	10	0	0	0	0	0	483	2260
08:35:00 AM	0	37	16	0	12	29	0	0	31	0	10	0	0	0	0	0	444	2162
08:40:00 AM	0	42	20	0	22	17	0	0	41	1	14	0	0	0	0	0	439	2099
08:45:00 AM	0	54	16	0	6	31	0	0	42	1	25	0	0	0	0	0	467	2023
08:50:00 AM	0	41	22	0	6	20	0	0	39	0	22	0	0	0	0	0	482	1963
08:55:00 AM	0	60	16	0	14	17	0	0	29	0	17	0	0	0	0	0	478	1914

Intersection Peak Hour

Location: Broadmoor Blvd at St. Thomas Dr., Pasco, WA.
GPS Coordinates: Lat=46.271220, Lon=-119.220813
Date: 2019-03-21
Day of week: Thursday
Weather: Clear
Analyst: Mike McCluskey



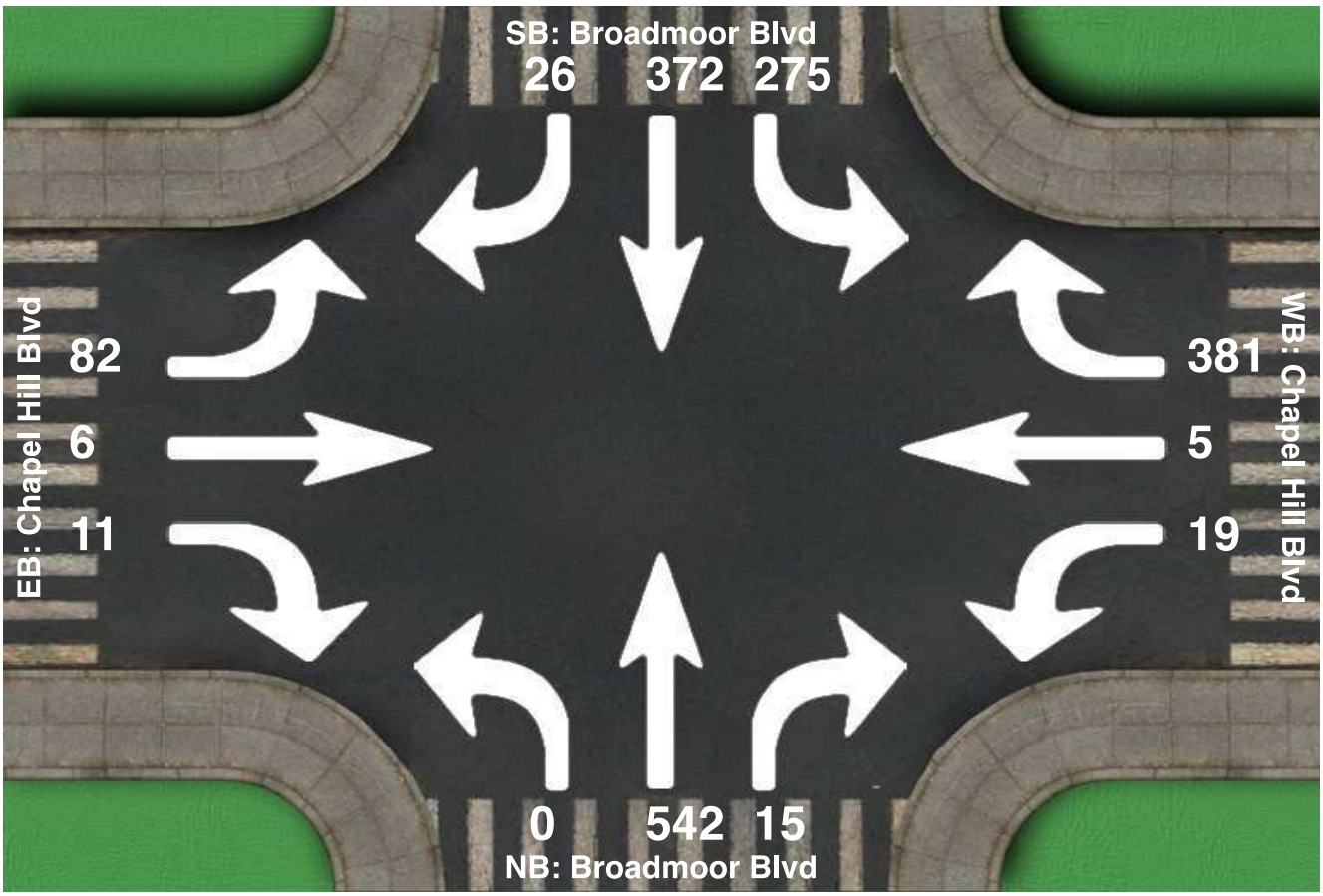
Intersection Peak Hour

07:00 - 08:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	102	713	2	0	0	57	0	1080	18	0	0	0	1972
Factor	0.77	0.66	0.25	0.00	0.00	0.71	0.00	0.77	0.41	0.00	0.00	0.00	0.82
Approach Factor	0.68			0.71			0.76			0.00			

Intersection Peak Hour

Location: Broadmoor Blvd at Chapel Hill Blvd, Pasco, WA.
GPS Coordinates: Lat=46.270362, Lon=-119.221515
Date: 2019-03-18
Day of week: Monday
Weather: Light Fog
Analyst: Mike McCluskey



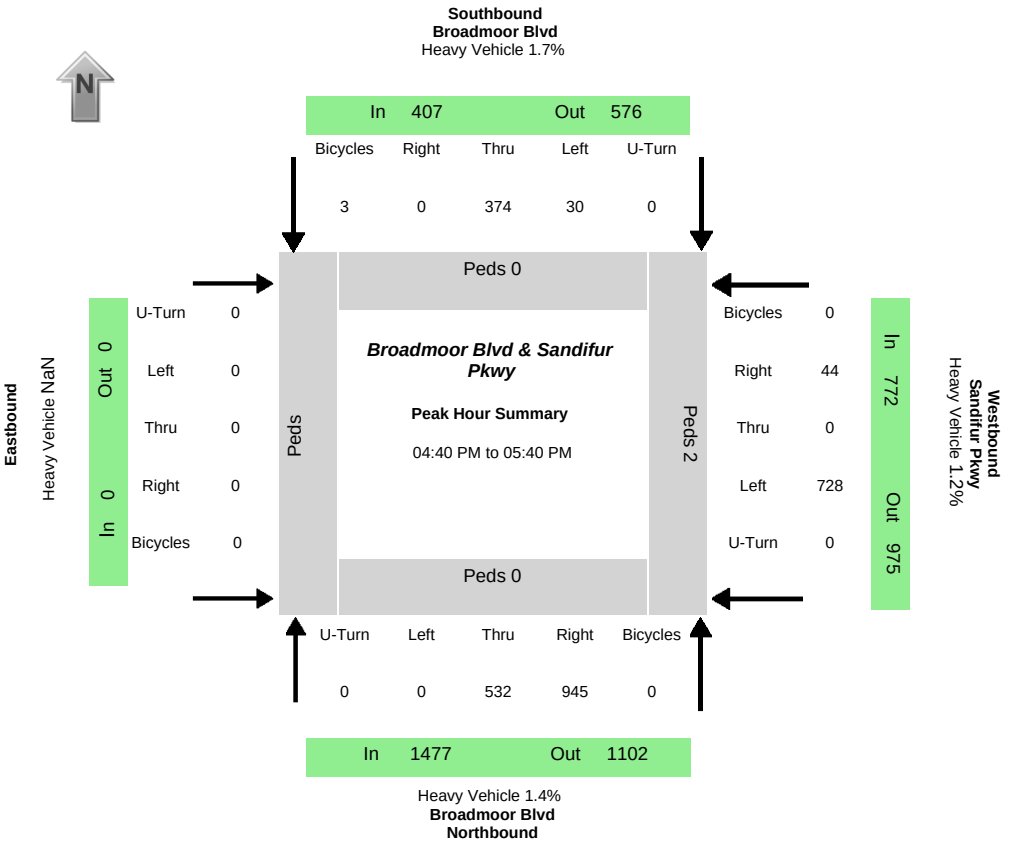
Intersection Peak Hour

07:00 - 08:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	275	372	26	19	5	381	0	542	15	82	6	11	1734
Factor	0.72	0.62	0.59	0.47	0.62	0.78	0.00	0.65	0.42	0.66	0.75	0.55	0.76
Approach Factor	0.67			0.77			0.65			0.75			

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street	*Broadmoor Blvd*
E/W street	*Sandifur Pkwy*
City, State	Pasco WA
Site Notes	
Location	46.279253 - -119.221425
Start Date	Tuesday, March 26, 2019
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:40:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.88



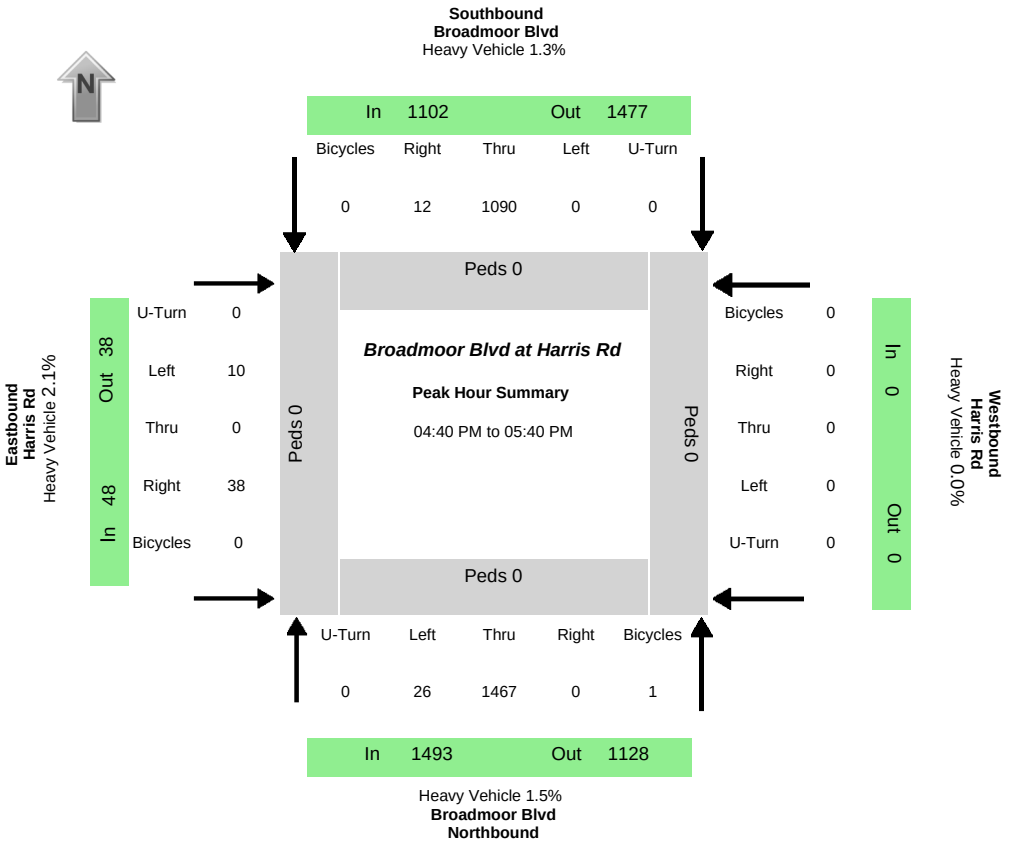
Peak-Hour Volumes (PHV)																								
Northbound				**Southbound**				**Eastbound**				**Westbound**				**Entering**				**Leaving**			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	532	945	0	30	374	0	0	0	0	0	0	728	0	44	0	1477	404	0	772	1102	576	0	975
Percent Heavy Vehicles																							
0.0%	2.1%	1.0%	0.0%	3.3%	1.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	0.0%	2.3%	0.0%	1.4%	1.7%	NaN	1.2%	1.3%	2.1%	NaN	1.0%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				**Southbound**				**Eastbound**				**Westbound**					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
	0	0	0	0	3		0					0		0	0	3	0	0		2	2

All Vehicle Volumes																		
	Northbound Broadmoor Blvd				**Southbound** Broadmoor Blvd				**Eastbound**				**Westbound** Sandifur Pkwy				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:00:00 PM		28	63	0	4	27		0					72		2	0		
04:05:00 PM		33	58	0	4	27		0					65		4	0		
04:10:00 PM		41	63	0	2	21		0					64		4	0	582	
04:15:00 PM		38	71	0	4	29		0					42		2	0	572	
04:20:00 PM		33	65	0	4	42		0					51		2	0	578	
04:25:00 PM		31	60	0	1	33		0					55		1	0	564	
04:30:00 PM		41	65	0	5	21		0					46		2	0	558	
04:35:00 PM		42	63	0	3	31		0					64		3	0	567	
04:40:00 PM		41	81	0	5	44		0					61		1	0	619	
04:45:00 PM		29	60	0	2	25		0					61		3	0	619	
04:50:00 PM		44	79	0	2	27		0					57		2	0	624	
04:55:00 PM		50	90	0	2	37		0					56		1	0	627	2392
05:00:00 PM		43	72	0	4	32		0					68		4	0	670	2419
05:05:00 PM		48	82	0	4	29		0					88		5	0	715	2484
05:10:00 PM		48	91	0	1	32		0					73		7	0	731	2541
05:15:00 PM		63	92	0	3	27		0					53		4	0	750	2597
05:20:00 PM		47	79	0	4	29		0					65		7	0	725	2631
05:25:00 PM		40	71	0	1	32		0					42		3	0	662	2639
05:30:00 PM		37	73	0	2	28		0					43		5	0	608	2647
05:35:00 PM		42	75	0	0	32		0					61		2	0	589	2653
05:40:00 PM		39	62	0	2	27		0					59		4	0	593	2613
05:45:00 PM		35	74	0	2	35		0					51		2	0	604	2632
05:50:00 PM		34	79	0	2	28		0					69		4	0	608	2637
05:55:00 PM		32	57	0	1	15		0					46		5	0	571	2557

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street	*Broadmoor Blvd*
E/W street	*Harris Rd*
City, State	Pasco WA
Site Notes	
Location	46.278242 - -119.221417
Start Date	Tuesday, March 26, 2019
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:40:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.89



Peak-Hour Volumes (PHV)																								
Northbound				**Southbound**				**Eastbound**				**Westbound**				**Entering**				**Leaving**			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
26	1467	0	0	0	1090	12	0	10	0	38	0	0	0	0	0	1493	1102	48	0	1128	1477	38	0
Percent Heavy Vehicles																							
7.7%	1.4%	0.0%	0.0%	0.0%	1.3%	0.0%	0.0%	0.0%	0.0%	2.6%	0.0%	0.0%	0.0%	0.0%	0.0%	1.5%	1.3%	2.1%	0.0%	1.3%	1.4%	5.3%	0.0%

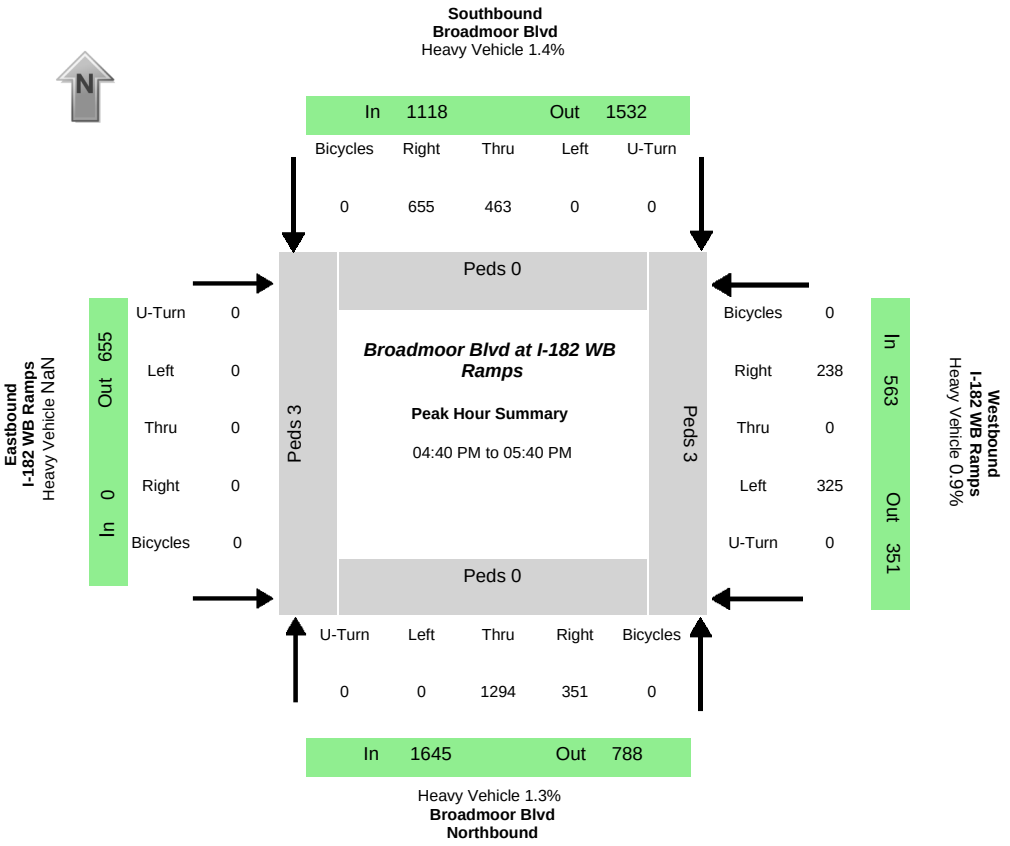
PHV- Bicycles																	PHV - Pedestrians					
Northbound				**Southbound**				**Eastbound**				**Westbound**					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

All Vehicle Volumes

	Northbound Broadmoor Blvd				**Southbound** Broadmoor Blvd				**Eastbound** Harris Rd				**Westbound** Harris Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:00:00 PM	6	88	0	0	0	98	1	0	3	0	1	0	0	0	0	0		
04:05:00 PM	5	91	0	0	0	91	1	0	0	0	2	0	0	0	0	0		
04:10:00 PM	2	103	0	0	0	84	1	0	1	0	2	0	0	0	0	0	580	
04:15:00 PM	4	108	0	0	0	69	2	0	1	0	6	0	0	0	0	0	573	
04:20:00 PM	1	98	0	0	0	93	0	0	0	0	6	0	0	0	0	0	581	
04:25:00 PM	1	90	0	0	0	88	0	0	1	0	1	0	0	0	0	0	569	
04:30:00 PM	4	105	0	0	0	67	0	0	1	0	4	0	0	0	0	0	560	
04:35:00 PM	3	105	0	0	0	94	1	0	0	0	4	0	0	0	0	0	569	
04:40:00 PM	0	121	0	0	0	104	1	0	1	0	3	0	0	0	0	0	618	
04:45:00 PM	3	88	0	0	0	85	1	0	1	0	4	0	0	0	0	0	619	
04:50:00 PM	1	122	0	0	0	83	1	0	1	0	0	0	0	0	0	0	620	
04:55:00 PM	4	139	0	0	0	91	2	0	1	0	5	0	0	0	0	0	632	2399
05:00:00 PM	1	115	0	0	0	98	2	0	0	0	6	0	0	0	0	0	672	2424
05:05:00 PM	2	129	0	0	0	116	1	0	1	0	2	0	0	0	0	0	715	2485
05:10:00 PM	2	136	0	0	0	105	0	0	3	0	5	0	0	0	0	0	724	2543
05:15:00 PM	1	154	0	0	0	78	2	0	1	0	2	0	0	0	0	0	740	2591
05:20:00 PM	1	125	0	0	0	94	0	0	1	0	2	0	0	0	0	0	712	2616
05:25:00 PM	3	111	0	0	0	74	0	0	0	0	2	0	0	0	0	0	651	2625
05:30:00 PM	5	110	0	0	0	70	1	0	0	0	3	0	0	0	0	0	602	2633
05:35:00 PM	3	117	0	0	0	92	1	0	0	0	4	0	0	0	0	0	596	2643
05:40:00 PM	2	100	0	0	0	86	0	0	1	0	4	0	0	0	0	0	599	2606
05:45:00 PM	4	108	0	0	0	85	1	0	1	0	2	0	0	0	0	0	611	2625
05:50:00 PM	3	113	0	0	0	97	0	0	0	0	2	0	0	0	0	0	609	2632
05:55:00 PM	2	89	0	0	0	61	0	0	0	0	3	0	0	0	0	0	571	2545

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street	*Broadmoor Blvd*
E/W street	*I-182 WB Ramps*
City, State	Pasco WA
Site Notes	
Location	46.276943 - -119.221432
Start Date	Tuesday, March 26, 2019
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:40:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.86



Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	1294	351	0	0	463	655	0	0	0	0	0	325	0	238	0	1645	1118	0	563	788	1532	655	351

Percent Heavy Vehicles

0.0%	1.5%	0.9%	0.0%	0.0%	1.1%	1.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.0%	1.3%	0.0%	1.3%	1.4%	NaN	0.9%	0.9%	1.4%	1.7%	0.9%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PHV - Pedestrians

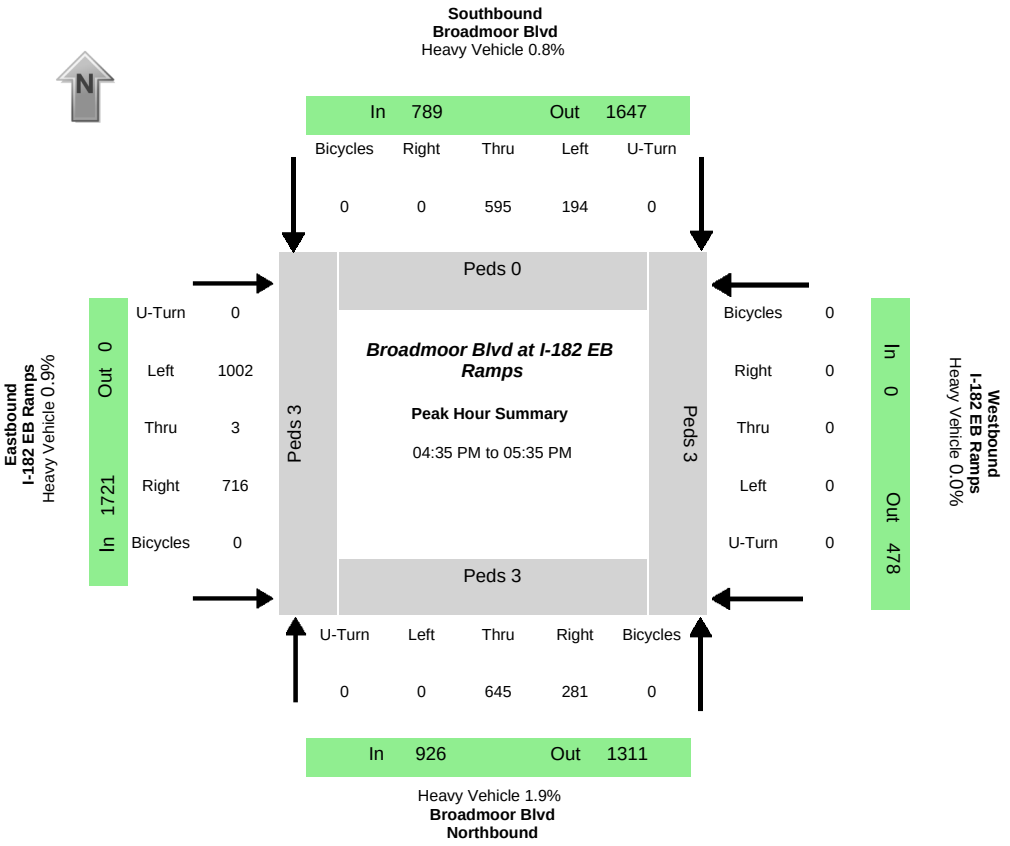
in Crosswalk				
NB	SB	EB	WB	**Sum**
0	0	3	3	6

All Vehicle Volumes

	Northbound Broadmoor Blvd				Southbound Broadmoor Blvd				Eastbound I-182 WB Ramps				Westbound I-182 WB Ramps				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:00:00 PM	0	74	13	0	0	39	62	0	0	0	0	0	19	0	17	0		
04:05:00 PM	0	80	26	0	0	40	49	0	0	0	0	0	22	0	18	0		
04:10:00 PM	0	94	34	0	0	33	56	0	0	0	0	0	27	0	21	0	724	
04:15:00 PM	0	98	26	0	0	31	48	0	0	0	0	0	33	0	14	0	750	
04:20:00 PM	0	81	29	0	0	34	55	0	0	0	0	0	25	0	13	0	752	
04:25:00 PM	0	74	23	0	0	29	58	0	0	0	0	0	28	0	17	0	716	
04:30:00 PM	0	99	27	0	0	33	50	0	0	0	0	0	18	0	15	0	708	
04:35:00 PM	0	95	35	0	0	50	50	0	0	0	0	0	20	0	14	0	735	
04:40:00 PM	0	92	30	0	0	46	54	0	0	0	0	0	33	0	19	0	780	
04:45:00 PM	0	90	30	0	0	36	56	0	0	0	0	0	19	0	11	0	780	
04:50:00 PM	0	110	27	0	0	34	50	0	0	0	0	0	23	0	19	0	779	
04:55:00 PM	0	111	23	0	0	38	54	0	0	0	0	0	29	0	26	0	786	3006
05:00:00 PM	0	97	22	0	0	35	65	0	0	0	0	0	18	0	17	0	798	3036
05:05:00 PM	0	133	25	0	0	57	64	0	0	0	0	0	26	0	18	0	858	3124
05:10:00 PM	0	128	32	0	0	40	71	0	0	0	0	0	45	0	25	0	918	3200
05:15:00 PM	0	121	37	0	0	25	59	0	0	0	0	0	36	0	28	0	970	3256
05:20:00 PM	0	103	31	0	0	46	43	0	0	0	0	0	27	0	21	0	918	3290
05:25:00 PM	0	111	31	0	0	36	40	0	0	0	0	0	23	0	19	0	837	3321
05:30:00 PM	0	98	30	0	0	30	49	0	0	0	0	0	19	0	14	0	771	3319
05:35:00 PM	0	100	33	0	0	40	50	0	0	0	0	0	27	0	21	0	771	3326
05:40:00 PM	0	102	24	0	0	38	52	0	0	0	0	0	20	0	13	0	760	3301
05:45:00 PM	0	80	39	0	0	33	53	0	0	0	0	0	23	0	25	0	773	3312
05:50:00 PM	0	92	30	0	0	39	58	0	0	0	0	0	21	0	27	0	769	3316
05:55:00 PM	0	87	14	0	0	34	38	0	0	0	0	0	18	0	16	0	727	3242

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street	*Broadmoor Blvd*
E/W street	*I-182 EB Ramps*
City, State	Pasco WA
Site Notes	
Location	46.273624 - -119.221544
Start Date	Tuesday, March 26, 2019
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.88



Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	645	281	0	194	595	0	0	1002	3	716	0	0	0	0	0	926	789	1721	0	1311	1647	0	478

Percent Heavy Vehicles

0.0%	1.9%	2.1%	0.0%	0.5%	0.8%	0.0%	0.0%	1.1%	0.0%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%	0.8%	0.9%	0.0%	0.8%	1.4%	NaN	1.5%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PHV - Pedestrians

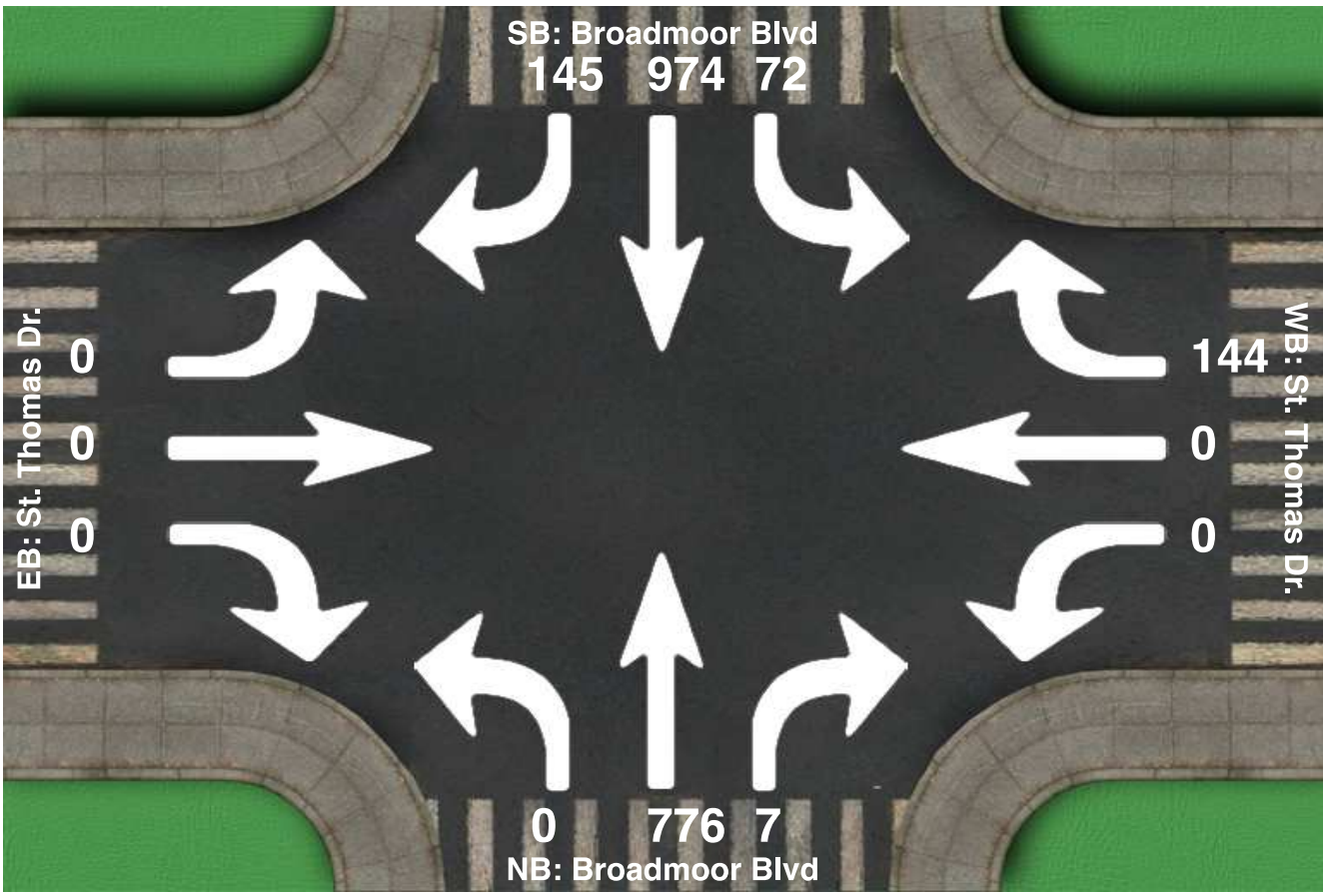
in Crosswalk				
NB	SB	EB	WB	**Sum**
3	0	3	3	9

All Vehicle Volumes

	Northbound Broadmoor Blvd				Southbound Broadmoor Blvd				Eastbound I-182 EB Ramps				Westbound I-182 EB Ramps				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:00:00 PM	0	29	19	0	11	51	0	0	55	0	36	0	0	0	0	0		
04:05:00 PM	0	45	26	0	17	39	0	0	71	1	40	0	0	0	0	0		
04:10:00 PM	0	50	17	0	13	49	0	0	64	0	43	0	0	0	0	0	676	
04:15:00 PM	0	45	16	0	15	48	0	0	81	0	43	0	0	0	0	0	723	
04:20:00 PM	0	43	33	0	19	36	0	0	69	0	47	0	0	0	0	0	731	
04:25:00 PM	0	35	15	0	15	51	0	0	68	0	54	0	0	0	0	0	733	
04:30:00 PM	0	41	19	0	10	42	0	0	63	1	51	0	0	0	0	0	712	
04:35:00 PM	0	49	18	0	12	50	0	0	81	0	56	0	0	0	0	0	731	
04:40:00 PM	0	46	21	0	19	57	0	0	81	0	63	0	0	0	0	0	780	
04:45:00 PM	0	44	22	0	17	42	0	0	72	0	61	0	0	0	0	0	811	
04:50:00 PM	0	58	25	0	11	53	0	0	77	0	63	0	0	0	0	0	832	
04:55:00 PM	0	49	20	0	13	53	0	0	96	1	58	0	0	0	0	0	835	3024
05:00:00 PM	0	54	26	0	9	37	0	0	77	0	48	0	0	0	0	0	828	3074
05:05:00 PM	0	58	28	0	27	54	0	0	74	0	53	0	0	0	0	0	835	3129
05:10:00 PM	0	72	31	0	18	57	0	0	97	0	67	0	0	0	0	0	887	3235
05:15:00 PM	0	52	29	0	18	57	0	0	105	1	76	0	0	0	0	0	974	3325
05:20:00 PM	0	51	23	0	18	38	0	0	91	0	70	0	0	0	0	0	971	3369
05:25:00 PM	0	53	22	0	18	59	0	0	70	1	53	0	0	0	0	0	905	3407
05:30:00 PM	0	59	16	0	14	38	0	0	81	0	48	0	0	0	0	0	823	3436
05:35:00 PM	0	52	23	0	13	46	0	0	76	0	52	0	0	0	0	0	794	3432
05:40:00 PM	0	47	41	0	16	49	0	0	80	0	48	0	0	0	0	0	799	3426
05:45:00 PM	0	51	22	0	12	47	0	0	59	0	43	0	0	0	0	0	777	3402
05:50:00 PM	0	48	22	0	11	42	0	0	82	0	43	0	0	0	0	0	763	3363
05:55:00 PM	0	36	18	0	15	42	0	0	56	0	51	0	0	0	0	0	700	3291

Intersection Peak Hour

Location: Broadmoor Blvd at St. Thomas Dr., Pasco, WA.
GPS Coordinates: Lat=46.270916, Lon=-119.219853
Date: 2019-03-21
Day of week: Thursday
Weather: Sunny
Analyst: Mike McCluskey



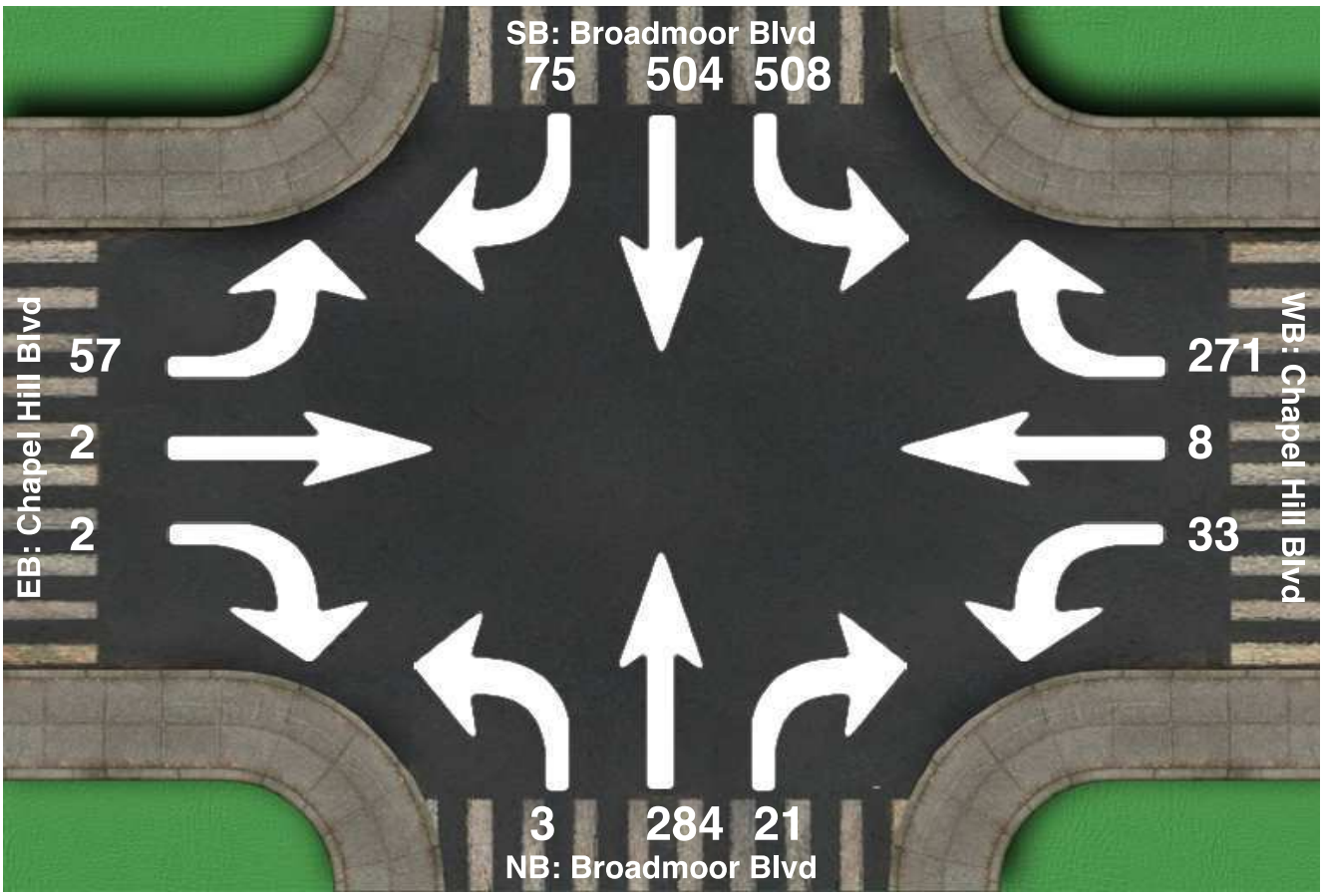
Intersection Peak Hour

16:45 - 17:45

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	72	974	145	0	0	144	0	776	7	0	0	0	2118
Factor	0.78	0.93	0.77	0.00	0.00	0.72	0.00	0.86	0.44	0.00	0.00	0.00	0.98
Approach Factor	0.94			0.72			0.87			0.00			

Intersection Peak Hour

Location: Broadmoor Blvd at Chapel Hill Blvd, Pasco, WA.
GPS Coordinates: Lat=46.271010, Lon=-119.220796
Date: 2019-03-18
Day of week: Monday
Weather: Sunny
Analyst: Mike McCluskey



Intersection Peak Hour

16:30 - 17:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	508	504	75	33	8	271	3	284	21	57	2	2	1768
Factor	0.85	0.81	0.89	0.82	0.50	0.93	0.75	0.76	0.58	0.89	0.50	0.50	0.98
Approach Factor	0.95			0.90			0.77			0.90			

APPENDIX E-2. CRASH DATA

FID	Collision_	Intersecti	Junction	Jurisdicti	Lane_Depa	Lighting_C	Primary_R	Report_Nu	Road_Surf	Severity	Veh_1_Mv	Year	Year_of_Fi	City	County	Intersec_1	Ped_or_Bil	24_Hr_Tim	FIRST_IMP	SECOND_II	Lat	Long	Total_Vehi	Wa_X	Wa_Y	Wrong_Way_
1	From same		Not at Inte	State Routi	No	Dusk	182LX0073	E776266	Wet	No Appare	Follow Too	2018	1899	Pasco	Franklin	No	Niether	0.679167	Lane 1 LX I		46.27544	-119.222	2	1963684	346169.5	0
10	From same		Not at Inte	State Routi	No	Dark-Stree	182LX0073	E961536	Dry	No Appare	Driver Inte	2019	1899	Pasco	Franklin	No	Niether	0.851389	Lane 2 LX I		46.27654	-119.221	2	1963685	346571.1	0
35	From same		Not at Inte	State Routi	No	Daylight	182LX0073	E911910	Dry	No Appare	Follow Too	2019	1899	Pasco	Franklin	No	Niether	0.697917	Lane 1 LX I		46.27557	-119.222	2	1963678	346216.9	0
39	From same		Not at Inte	State Routi	No	Dark-Stree	182LX0073	E980144	Dry	No Appare	Follow Too	2019	1899	Pasco	Franklin	No	Niether	0.727778	Lane 1 LX I		46.27589	-119.222	2	1963686	346334.6	0
77	From same		Intersectio	State Routi	No	Daylight	182LX0073	E812505	Dry	No Appare	Inattentior	2018	1899	Pasco	Franklin	Yes	Niether	0.713889	Lane 1 LX I	Lane 1 LX I	46.27572	-119.222	3	1963684	346269.6	0
79	From same		Not at Inte	State Routi	No	Daylight	182LX0073	E596134	Dry	No Appare	Inattentior	2016	1899	Pasco	Franklin	No	Niether	0.703472	Lane 1 LX I		46.27532	-119.222	2	1963685	346124.2	0
123	From same		Intersectio	State Routi	No	Daylight	182LX0073	E781174	Wet	Possible In	Follow Too	2018	1899	Pasco	Franklin	Yes	Niether	0.609722	Lane 1 LX I		46.27475	-119.222	2	1963685	345919.1	0
169	Street Ligh		Not at Inte	State Routi	Yes	Daylight	182LX0073	E434738	Dry	Unknown	Under Infl	2015	1899	Pasco	Franklin	No	Niether	0.669444	Past Right		46.27626	-119.222	1	1963685	346468	0
192	From same		Not at Inte	State Routi	No	Daylight	182LX0073	E711331	Dry	Possible In	Distraction	2017	1899	Pasco	Franklin	No	Niether	0.672917	Lane 1 LX I	Lane 1 LX I	46.27503	-119.222	3	1963685	346019.2	0
207	From same		Not at Inte	State Routi	No	Dark-No St	182LX0073	E984525	Dry	Suspected	Inattentior	2019	1899	Pasco	Franklin	No	Niether	0.7375	Lane 1 LX I		46.27512	-119.222	2	1963681	346051.6	0

FID	Collision_	Intersecti	Junction	Jurisdicti	Lane_Depa	Lighting_C	Primary_R	Report_Nu	Road_Surf	Severity	Veh_1_Mv	Year	Year_of_Fi	City	County	Intersec_1	Ped_or_Bil	24_Hr_Tim	FIRST_IMP	SECOND_II	Lat	Long	Total_Vehi	Wa_X	Wa_Y	Wrong_Way_
14	From same		At Intersec	State Routi	No	Dark-No St	182LX0073	E643543	Dry	No Appare	Driver Not	2017	1899	Pasco	Franklin	Yes	Niether	0.754167	Lane 2 LX I		46.27697	-119.221	2	1963683	346725.8	0
70	Same direc		At Intersec	State Routi	No	Dusk	182LX0073	E601210	Wet	No Appare	Follow Too	2016	1899	Pasco	Franklin	Yes	Niether	0.740278	Lane 1 LX I		46.27697	-119.221	2	1963685	346725.8	0
75	From same		At Intersec	State Routi	No	Dusk	182R1007(	E788964	Dry	No Appare	Inattentior	2018	1899	Pasco	Franklin	Yes	Niether	0.81875	Lane 1 Off		46.27695	-119.221	2	1963685	346719.4	0
76	From same		At Intersec	State Routi	No	Daylight	182LX0073	E831037	Dry	No Appare	Inattentior	2018	1899	Pasco	Franklin	Yes	Niether	0.574306	Lane 1 LX I		46.27697	-119.221	2	1963685	346725.8	0
102	Entering at		At Intersec	State Routi	No	Daylight	182LX0073	E651855	Dry	No Appare	Disregard S	2017	1899	Pasco	Franklin	Yes	Niether	0.428472	Lane 2 LX I	Past Right	46.27697	-119.222	2	1963680	346725.8	0
106	From same		Intersectio	State Routi	No	Dark-Stree	182LX0073	E875093	Dry	No Appare	Follow Too	2018	1899	Pasco	Franklin	Yes	Niether	0.720833	Lane 2 LX I	Lane 2 LX I	46.27647	-119.221	3	1963689	346544.6	0
118	From same		Intersectio	State Routi	No	Daylight	182R1007(	E981347	Dry	No Appare	Follow Too	2019	1899	Pasco	Franklin	Yes	Niether	0.563194	Lane 2 Off		46.27695	-119.22	2	1963980	346725.2	0
120	From same		Intersectio	State Routi	No	Daylight	182LX0073	E934995	Dry	No Appare	Follow Too	2019	1899	Pasco	Franklin	Yes	Niether	0.7	Lane 1 LX I		46.27682	-119.221	2	1963685	346674.3	0
215	Entering at		At Intersec	State Routi	No	Dark-Stree	182LX0073	E665977	Dry	Possible In	Driver Not	2017	1899	Pasco	Franklin	Yes	Niether	0.072917	Lane 2 LX I		46.27697	-119.221	2	1963685	346725.8	0

FID	Collision_	Intersecti	Junction	Jurisdicti	Lane_Depa	Lighting_C	Primary_Ri	Report_Nu	Road_Surfa	Severity	Veh_1_Mv	Year	Year_of_Fi	City	County	Intersec_1	Ped_or_Bil	24_Hr_Tim	FIRST_IMP	SECOND_II	Lat	Long	Total_Vehi	Wa_X	Wa_Y	Wrong_Way_
11	From same		Not at Inte	State Rout	No	Daylight	182P1006	E919876	Dry	No Appare	Other Cont	2019	1899	Pasco	Franklin	No	Niether	0.744444	Lane 2 Off	Lane 2 Off	46.27381	-119.222	3	1963475	345570.9	0
15	From same		At Intersec	State Rout	No	Daylight	182P1006	E645865	Dry	No Appare	Follow Too	2017	1899	Pasco	Franklin	Yes	Niether	0.548611	Lane 3 Off		46.27365	-119.222	2	1963683	345516.9	0
16	From same		At Intersec	State Rout	No	Dusk	182LX0073	E795468	Dry	No Appare	Follow Too	2018	1899	Pasco	Franklin	Yes	Niether	0.750694	Lane 2 LX I		46.27365	-119.222	2	1963682	345515.1	0
20	Entering at		At Intersec	State Rout	No	Dusk	182LX0073	E768147	Dry	No Appare	Improper T	2018	1899	Pasco	Franklin	Yes	Niether	0.677778	Left Turn L		46.27365	-119.222	2	1963687	345516.3	0
46	From same		At Intersec	State Rout	No	Daylight	182P1006	E504648	Dry	No Appare	Under Infl	2016	1899	Pasco	Franklin	Yes	Niether	0.455556	Lane 1 Off		46.27367	-119.222	2	1963670	345523.3	0
65	From same		At Intersec	State Rout	No	Dusk	182LX0073	E592403	Dry	No Appare	Follow Too	2016	1899	Pasco	Franklin	Yes	Niether	0.770833	Lane 1 LX I		46.27364	-119.222	2	1963682	345513.4	0
68	From same		At Intersec	State Rout	No	Dark-Stree	182LX0073	E616537	Wet	No Appare	Follow Too	2016	1899	Pasco	Franklin	Yes	Niether	0.7125	Lane 2 LX I		46.27365	-119.222	2	1963683	345515.8	0
69	Entering at		At Intersec	State Rout	No	Daylight	182LX0073	E442513	Dry	No Appare	Did Not Gr	2015	1899	Pasco	Franklin	Yes	Niether	0.486806	Lane 1 LX I		46.27371	-119.222	2	1963683	345537.8	0
72	Same direc		At Intersec	State Rout	No	Daylight	182P1006	E506327	Dry	No Appare	Inattentior	2016	1899	Pasco	Franklin	Yes	Niether	0.690278	Lane 1 Off		46.27365	-119.222	2	1963682	345515	0
73	From same		At Intersec	State Rout	No	Dark-Stree	182LX0073	E396823	Dry	No Appare	Did Not Gr	2015	1899	Pasco	Franklin	Yes	Niether	0.866667	Lane 2 LX I		46.27366	-119.222	2	1963678	345518.9	0
74	Same direc		At Intersec	State Rout	No	Daylight	182P1006	E725482	Dry	No Appare	Inattentior	2017	1899	Pasco	Franklin	Yes	Niether	0.568056	Lane 1 Off		46.27348	-119.222	2	1963649	345455.4	0
78	Entering at		At Intersec	State Rout	No	Dark-Stree	182LX0073	E875091	Dry	No Appare	Inattentior	2018	1899	Pasco	Franklin	Yes	Niether	0.740278	Lane 2 LX I		46.27364	-119.222	2	1963682	345513.4	0
80	Entering at		At Intersec	State Rout	No	Daylight	182LX0073	E570720	Dry	Possible In	Inattentior	2016	1899	Pasco	Franklin	Yes	Niether	0.416667	Lane 1 LX I		46.27364	-119.222	2	1963677	345512	0
93	From same		At Intersec	State Rout	No	Daylight	182LX0073	E527184	Dry	No Appare	Inattentior	2016	1899	Pasco	Franklin	Yes	Niether	0.717361	Lane 1 LX I		46.27363	-119.222	2	1963681	345510	0
94	From same		At Intersec	State Rout	No	Daylight	182P1006	E437103	Dry	No Appare	Inattentior	2015	1899	Pasco	Franklin	Yes	Niether	0.773611	Left Turn L		46.27376	-119.222	2	1963603	345556.9	0
103	From same		Intersectio	State Rout	No	Daylight	182LX0073	E736538	Dry	No Appare	Follow Too	2017	1899	Pasco	Franklin	Yes	Niether	0.33125	Lane 1 LX I		46.27335	-119.222	2	1963685	345408.1	0
107	Entering at		At Intersec	State Rout	No	Daylight	182LX0073	E816876	Dry	No Appare	Disregard S	2018	1899	Pasco	Franklin	Yes	Niether	0.388194	Lane 1 LX I		46.27364	-119.222	2	1963682	345513.4	0
109	From same		At Intersec	State Rout	No	Daylight	182LX0073	E482070	Dry	Possible In	Other Cont	2015	1899	Pasco	Franklin	Yes	Niether	0.665972	Lane 1 LX I		46.27363	-119.222	2	1963681	345510.6	0
119	From same		At Intersec	State Rout	No	Daylight	182LX0073	E537999	Dry	No Appare	Did Not Gr	2016	1899	Pasco	Franklin	Yes	Niether	0.508333	Left Turn L		46.27364	-119.222	2	1963682	345513.4	0
122	From same		Intersectio	State Rout	No	Daylight	182LX0073	E792735	Dry	Possible In	Follow Too	2018	1899	Pasco	Franklin	Yes	Niether	0.619444	Lane 1 LX I		46.27321	-119.222	2	1963697	345357.4	0
124	Same direc		At Intersec	State Rout	No	Daylight	182LX0073	E728479	Dry	Possible In	Follow Too	2017	1899	Pasco	Franklin	Yes	Niether	0.726389	Lane 2 LX I		46.27365	-119.222	2	1963683	345516.5	0
125	From oppo		At Intersec	State Rout	No	Dusk	182LX0073	E736968	Dry	Possible In	Improper T	2017	1899	Pasco	Franklin	Yes	Niether	0.670139	Lane 2 LX I	Lane 1 LX I	46.27364	-119.222	3	1963683	345514.1	0
144	From same		At Intersec	State Rout	No	Daylight	182P1006	E901442	Wet	No Appare	Exceeding	2019	1899	Pasco	Franklin	Yes	Niether	0.368056	Lane 2 Off		46.27364	-119.222	2	1963681	345512.8	0
149	From same		At Intersec	State Rout	No	Daylight	182LX0073	E714696	Dry	No Appare	Distraction	2017	1899	Pasco	Franklin	Yes	Niether	0.697917	Left Turn L		46.27365	-119.222	2	1963683	345515.8	0
160	From same		Intersectio	State Rout	No	Dark-Stree	182LX0073	E980028	Dry	Possible In	Inattentior	2019	1899	Pasco	Franklin	Yes	Niether	0.88125	Lane 1 LX I		46.27376	-119.222	2	1963683	345555.5	0
162	From same		At Intersec	State Rout	No	Daylight	182LX0073	E845793	Dry	No Appare	Did Not Gr	2018	1899	Pasco	Franklin	Yes	Niether	0.532639	Lane 1 LX I		46.27364	-119.222	2	1963682	345513.4	0
163	From same		At Intersec	State Rout	No	Dark-Stree	182P1006	E766694	Dry	No Appare	Follow Too	2018	1899	Pasco	Franklin	Yes	Niether	0.743056	Lane 1 Off		46.27344	-119.222	2	1963654	345440.9	0
164	Entering at		At Intersec	State Rout	No	Dark-Stree	182LX0073	E645552	Dry	No Appare	Other Cont	2017	1899	Pasco	Franklin	Yes	Niether	0.915278	Lane 1 LX I		46.27364	-119.222	2	1963682	345513.4	0
171	Same direc		At Intersec	State Rout	No	Daylight	182P1006	E443326	Dry	No Appare	Follow Too	2015	1899	Pasco	Franklin	Yes	Niether	0.683333	Lane 1 Off		46.27366	-119.222	2	1963671	345518.2	0
172	From same		At Intersec	State Rout	No	Daylight	182LX0073	E964668	Dry	No Appare	Follow Too	2019	1899	Pasco	Franklin	Yes	Niether	0.588889	Left Turn L		46.27406	-119.222	2	1963685	345664.7	0
173	From same		Intersectio	State Rout	No	Dark-No St	182P1006	E978003	Dry	No Appare	Improper F	2019	1899	Pasco	Franklin	Yes	Niether	0.863194	Lane 1 Off		46.27372	-119.222	2	1963596	345539.5	0
200	From same		At Intersec	State Rout	No	Dawn	182P1006	E610910	Wet	No Appare	Distraction	2016	1899	Pasco	Franklin	Yes	Niether	0.284722	Lane 1 Off		46.27363	-119.222	2	1963681	345509.7	0
201	From same		At Intersec	State Rout	No	Daylight	182LX0073	E535971	Dry	Possible In	Inattentior	2016	1899	Pasco	Franklin	No	Niether	0.701389	Lane 2 LX I		46.27365	-119.222	2	1963679	345516.6	0
205	From same		Intersectio	State Rout	No	Daylight	182LX0073	E964879	Dry	No Appare	Inattentior	2019	1899	Pasco	Franklin	Yes	Niether	0.6875	Lane 1 LX I		46.27289	-119.222	2	1963681	345238.6	0
211	From same		Intersectio	State Rout	No	Daylight	182P1006	E636867	Dry	Possible In	Inattentior	2017	1899	Pasco	Franklin	Yes	Niether	0.58125	Left Turn L		46.27376	-119.222	2	1963533	345552.8	0
212	From same		Intersectio	State Rout	No	Daylight	182P1006	E770078	Dry	Possible In	Inattentior	2018	1899	Pasco	Franklin	Yes	Niether	0.707639	Lane 3 Off		46.27369	-119.222	2	1963631	345528.7	0
219	Same direc		At Intersec	State Rout	No	Daylight	182LX0073	E598258	Wet	No Appare	None	2016	1899	Pasco	Franklin	Yes	Niether	0.497222	Lane 1 LX I		46.27365	-119.222	2	1963683	345516.1	0
229	From same		Intersectio	State Rout	No	Dark-Stree	182LX0073	E879433	Dry	Possible In	Follow Too	2019	1899	Pasco	Franklin	Yes	Niether	0.721528	Lane 1 LX I	Lane 1 LX I	46.27372	-119.222	3	1963685	345542.7	0
243	From same		Intersectio	State Rout	No	Daylight	182LX0073	E995503	Dry	No Appare	Operating	2019	1899	Pasco	Franklin	Yes	Niether	0.629167	Left Turn L		46.27444	-119.222	2	1963684	345803.2	0
244	From same		Intersectio	State Rout	No	Daylight	182P1006	E997137	Dry	Possible In	Exceeding	2019	1899	Pasco	Franklin	Yes	Niether	0.586111	Left Turn L	Left Turn L	46.27377	-119.222	3	1963530	345556.8	0
254	From same		Intersectio	State Rout	No	Daylight	182LX0073	E841464	Dry	Possible In	Follow Too	2018	1899	Pasco	Franklin	Yes	Niether	0.304167	Lane 1 LX I	Lane 1 LX I	46.27406	-119.222	3	1963686	345664.3	0