

Draft

*TRAFFIC EVALUATION*

***Kihei High School Intersection***

*Kihei, Maui, HAWAII*

*June 2020*



**EXHIBIT 8**

Draft

## **TRAFFIC EVALUATION**

### **Kihei High School Intersection**

Kihei, Maui, Hawaii

**June 2020**

Prepared For:  
State of Hawaii  
Department of Transportation  
Highways Division, Planning Branch  
869 Punchbowl Street, Room 301  
Honolulu, HI 96813

Prepared By:  
WSP USA  
American Savings Bank Tower  
1001 Bishop Street Suite 2400  
Honolulu, HI 96813  
(808) 531-7094

### Project Description

HDOT is proposing to install a roundabout at the future Kihei High School access at the Piilani Highway/Kulanihako'i Street intersection. The intersection is currently an unsignalized tee-intersection with stop control at Kulanihako'i Street approach which is located on the west leg of the intersection. Kulanihako'i Street is an east-west collector roadway that provides access to single- and multi-family residential.

The roundabout will be a 2-lane roundabout. At-grade pedestrian crossing will be provided at the south Piilani Highway leg of the roundabout along with the Kulanihako'i Street and Kihei High School driveway approaches. Pedestrian and bicycle crossings will occur at these crosswalks. Two lanes will be provided at all approaches. Right turn bypass lanes are being considered for the Piilani Highway approaches and the eastbound Kulanihako'i Street approaches. The roundabout will be able to accommodate WB-67 design vehicles.

### Project Purpose

The purpose of the project is to provide traffic control at the entrance to the Kihei High School access and traffic calming measures at the roundabout by slowing down motorists while improving pedestrian and bicycle safety at this intersection. The posted speed limit along Piilani Highway is 40 miles per hour. The installation of the roundabout will help to lower vehicle speed on Piilani Highway. The slower speeds and horizontal deflection at the roundabout will enhance pedestrian/bicycle safety at conflict points with vehicles. The at-grade pedestrian crossing will replace the previously-proposed grade-separated pedestrian crossing which will be underutilized.

### Traffic Analysis Results

The Piilani Highway/Kulanihako'i Street intersection was analyzed with the two-lane roundabout configuration for two analysis years:

- 2021 – Kihei High School's initial opening year with 800 student enrollment
- 2031 – Enrollment of 1650 students

Two roundabout configurations were examined:

- 2-lane roundabout with 2-lane approaches and no bypass lanes and with at-grade pedestrian crossings; and
- Optimized 2-lane roundabout with 2-lane approaches and bypass lanes at the Piilani Highway approaches and the eastbound Kulanihako'i Street approaches and with at-grade pedestrian crossings.

HCM 6 methodologies were used in SIDRA 9. At opening in 2021, the 2-lane approach roundabout is projected to operate at LOS E/D during the AM and PM peaks, respectively, with LOS F conditions at the Kulanihako'i Street approach without bypass lanes. The optimized roundabout is projected to operate at LOS C overall during both peaks. In 2031, the roundabout is projected to operate at LOS F during both peaks, with or without bypass lanes. It should be noted that while both roundabout configurations result in LOS F conditions, the bypass lanes help to lower anticipated delays.

### Conclusions

The two-lane approach roundabout minimizes right-of-way needs with lower construction costs and minimizes pedestrian crossings distances at the cost of higher delay. The optimized alternative with bypasses requires additional right-of-way on the east side of Piilani Highway, has a larger footprint, and would require a longer stretch of Piilani Highway to be shifted east but would provide lower traffic delays. Pedestrians would have longer crossing distances and bypass lane motorists would have higher operating speeds.

**Summary Table, Delay/LOS, Year 2021 HCM6**

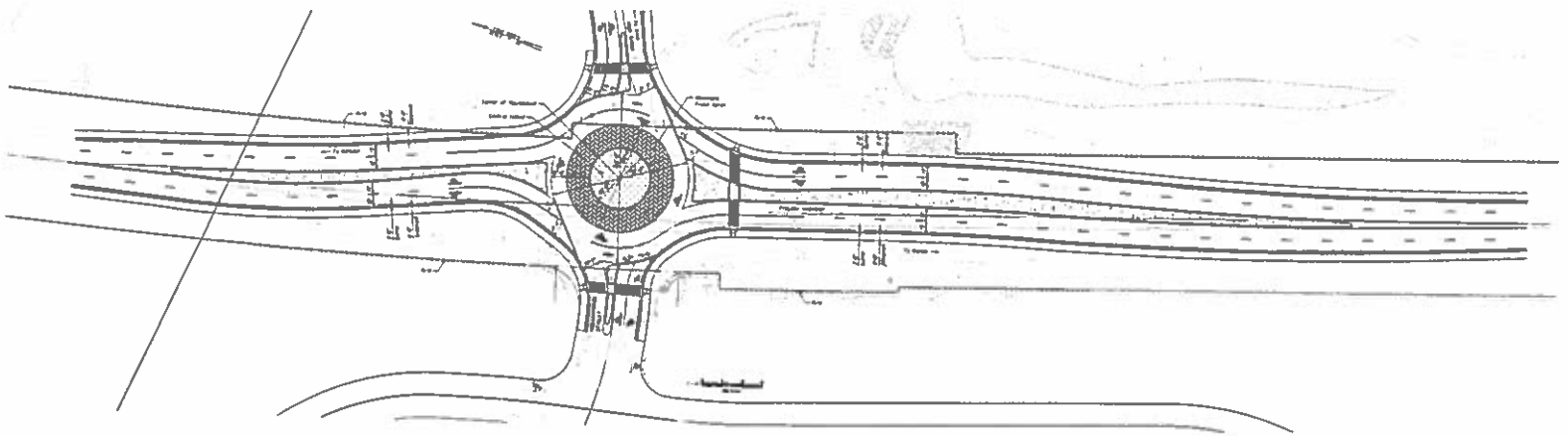
Piilani Hwy/Kulanihakoi St	Piilani Hwy - South		Kihei HS Drwy		Piilani Hwy - North		Kulanihakoi St		Overall	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Year 2021 - Single Lane - AM	19.8	C	17.2	C	31.8	D	409.9	F	57.2	F
Year 2021 - Single Lane - PM	28.6	D	26.6	D	26.3	D	166.9	F	35.2	E
Year 2021 - Two Lane - AM	22.5	C	15.3	C	31.8	D	142.0	F	36.6	E
Year 2021 - Two Lane - PM	29.2	D	24.2	C	26.3	D	78.4	F	30.5	D
Year 2021 - Two Lane w/ West Bypasses - AM	22.5	C	15.3	C	28.1	D	18.2	C	24.8	C
Year 2021 - Two Lane w/ West Bypasses - PM	29.2	D	24.2	C	20.8	C	9.5	A	24.1	C
Year 2021 - Two Lane w/ East Bypasses - AM	16.4	C	12.6	B	31.8	D	142.0	F	34.2	D
Year 2021 - Two Lane w/ East Bypasses - PM	26.9	D	19.3	C	26.3	D	78.4	F	29.4	D
Year 2021 - Two Lane Optimized - AM	16.4	C	15.3	C	28.1	D	18.2	C	22.4	C
Year 2021 - Two Lane Optimized - PM	26.9	D	24.2	C	20.8	C	9.5	A	23.1	C

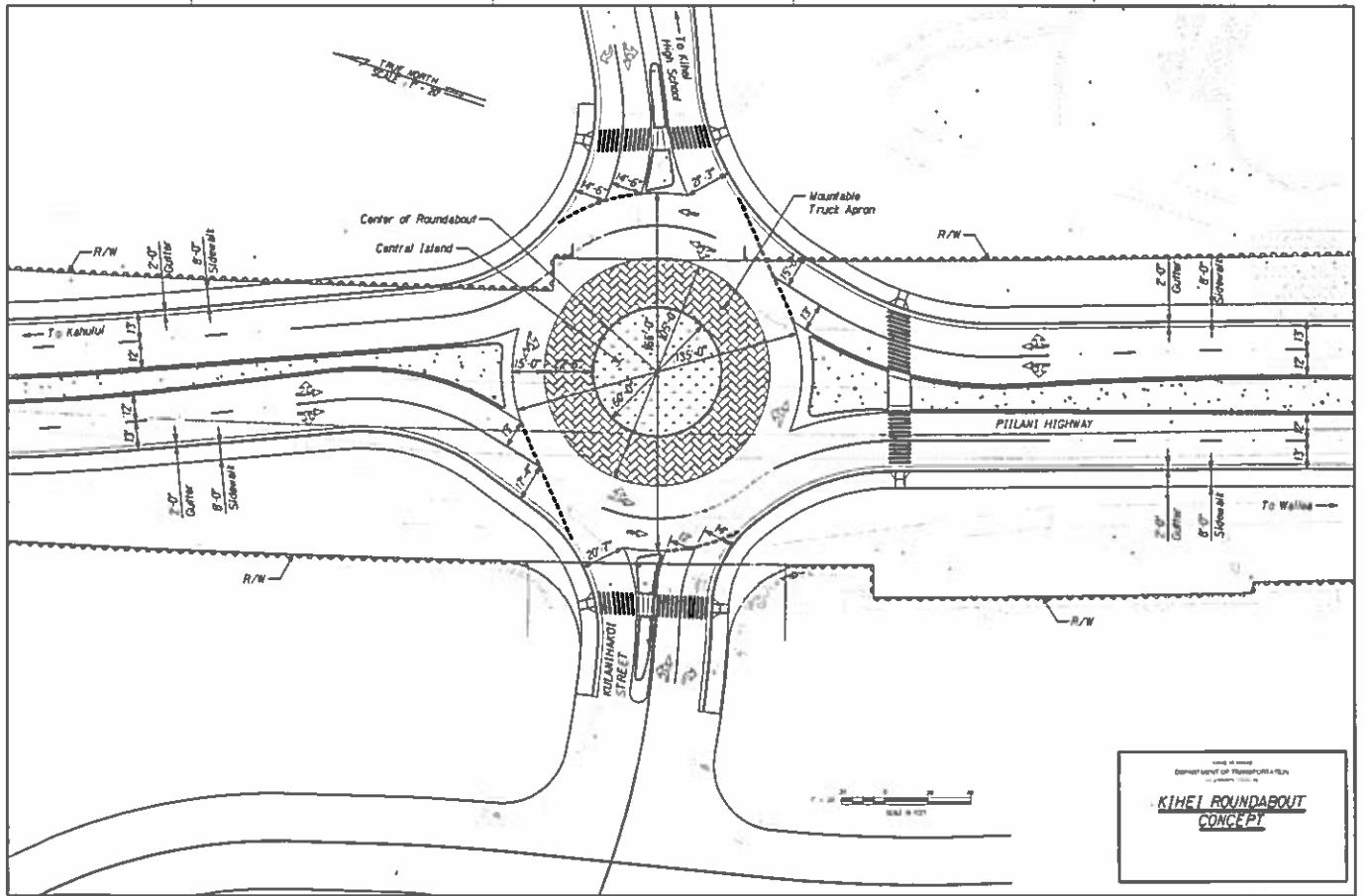
- Notes:
- 1) Model results from SYDRA with HCM 6 Delay, v/c, and LOS method
  - 2) HCM 6 Unsignalized intersection delays for LOS.
  - 3) All options have two approach lanes on Piilani Highway and two circulating lanes in roundabout.
  - 4) Single Lane is one combined approach lane on Kulanihakoi St and Kihei HS approaches.
  - 5) Two Lane is two approaches, one for left turn and through, and second for right-turns.
  - 6) Two lane with west bypass has right-turn lanes with bypass on to neighborhood.
  - 7) Two lane with east bypass has right-turn lanes with bypass to the highschool.
  - 8) Two lane optimized, has right-turn bypasses to neighborhood and northbound right-turn to highschool.

**Summary Table, Delay/LOS, Year 2031 HCM6**

Piilani Hwy/Kulanihakoi St	Piilani Hwy - South		Kihei HS Drwy		Piilani Hwy - North		Kulanihakoi St		Overall	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Year 2031 - Single Lane - AM	86.9	F	<b>39.2</b>	E	118.8	F	671.8	F	148.2	F
Year 2031 - Single Lane - PM	93.3	F	<b>46.9</b>	E	75.6	F	270.0	F	92.7	F
Year 2031 - Two Lane - AM	116.5	F	22.2	C	117.1	F	236.9	F	122.5	F
Year 2031 - Two Lane - PM	100.7	F	32.8	D	75.2	F	120.8	F	88.4	F
Year 2031 - Two Lane w/ West Bypasses - AM	125.6	F	22.0	C	105.9	F	<b>47.3</b>	E	105.1	F
Year 2031 - Two Lane w/ West Bypasses - PM	101.2	F	32.7	D	54.7	F	<b>13.2</b>	B	73.9	F
Year 2031 - Two Lane w/ East Bypasses - AM	50.1	F	29.4	D	121.9	F	228.4	F	98.4	F
Year 2031 - Two Lane w/ East Bypasses - PM	87.1	F	29.3	D	75.9	F	119.9	F	82.2	F
Year 2031 - Two Lane Optimized - AM	54.7	F	33.4	D	110.3	F	<b>45.5</b>	E	79.8	F
Year 2031 - Two Lane Optimized - PM	87.5	F	<b>35.4</b>	E	55.2	F	<b>13.2</b>	B	67.8	F

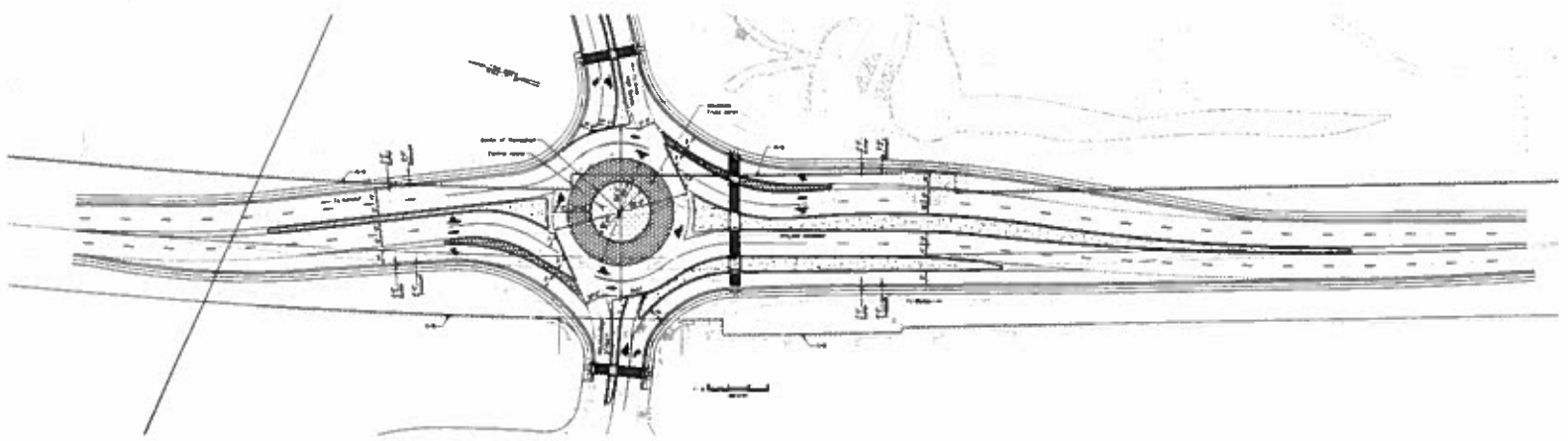
- Notes:
- 1) Model results from SYDRA with HCM 6 Delay, v/c, and LOS method
  - 2) HCM 6 Unsignalized intersection delays for LOS.
  - 3) All options have two approach lanes on Piilani Highway and two circulating lanes in roundabout.
  - 4) Single Lane is one combined approach lane on Kulanihakoi St and Kihei HS approaches.
  - 5) Two Lane is two approaches, one for left turn and through, and second for right-turns.
  - 6) Two lane with west bypass has right-turn lanes with bypass on to neighborhood.
  - 7) Two lane with east bypass has right-turn lanes with bypass to the highschool.
  - 8) Two lane optimized, has right-turn bypasses to neighborhood and northbound right-turn to highschool.





HOKU ENGINEERING  
 DEPARTMENT OF TRANSPORTATION  
 HONOLULU, HAWAII  
**KIHEL ROUNDABOUT  
 CONCEPT**







**Summary Table, Delay/LOS, Year 2031 SIDRA**

Piilani Hwy/Kulanihakoi St	Piilani Hwy - South		Kihei HS Drwy		Piilani Hwy - North		Kulanihakoi St		Overall	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Year 2031 - Single Lane - AM	53.6	E	31.2	C	89.1	F	589.0	F	113.6	F
Year 2031 - Single Lane - PM	63.1	E	29.6	C	42.1	D	231.9	F	60.9	E
Year 2031 - Two Lane - AM	88.9	F	16.1	B	86.5	F	68.4	E	82.8	F
Year 2031 - Two Lane - PM	70.3	F	19.0	B	41.8	D	32.4	C	54.2	E
Year 2031 - Two Lane w/ West Bypasses - AM	94.3	F	15.9	B	18.6	B	39.6	D	49.8	D
Year 2031 - Two Lane w/ West Bypasses - PM	71.2	F	19.0	B	7.1	A	15.1	B	37.7	D
Year 2031 - Two Lane w/ East Bypasses - AM	8.7	A	13.7	B	89.0	F	66.1	E	52.3	E
Year 2031 - Two Lane w/ East Bypasses - PM	6.0	A	19.9	B	45.1	D	31.4	C	25.6	C
Year 2031 - Two Lane Optimized - AM	9.2	A	15.0	B	19.8	B	40.0	D	17.1	B
Year 2031 - Two Lane Optimized - PM	6.1	A	21.9	C	7.6	A	15.2	B	7.6	A

- Notes:
- 1) Model results from SIDRA Standard with SIDRA Delay and LOS method
  - 2) SIDRA Roundabout LOS delays for roundabout LOS.
  - 3) All options have two approach lanes on Piilani Highway and two circulating lanes in roundabout.
  - 4) Single Lane is one combined approach lane on Kulanihakoi St and Kihei HS approaches.
  - 5) Two Lane is two approaches, one for left turn and through, and second for right-turns.
  - 6) Two lane with west bypass has right-turn lanes with bypass on to neighborhood.
  - 7) Two lane with east bypass has right-turn lanes with bypass to the highschool.
  - 8) Two lane optimized, has right-turn bypasses to neighborhood and northbound right-turn to highschool.