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FINAL TECHNICAL MEMORANDUM

October 29, 2024

MEMORANDUM TO: Zachary Howard, EIT
Project Management Engineer I
NCDOT Highway Division 3

FROM: John Burris, PTP
HNTB North Carolina, PC

SUBJECT: Traffic Forecast New Development Addendum for STIP Project R-5899
Intersection Improvements at NC 210 and Watts Landing Road (SR 1560)
Pender County

STIP Project R-5899 traffic forecast New Development Addendum was reviewed by the North Carolina Department of Transportation (NCDOT) Transportation Planning Division (TPD) and approved on October 29, 2024.

NCDOT State Transportation Improvement Program (STIP) Project R-5899 includes intersection improvements at NC 210 and Watts Landing Road (SR 1560), near the town of Surf City in Pender County, NC. It proposes to rearrange two intersections at NC 210 and Watts Landing Road (SR 1560) / Watts Landing Road Extension and construct a roundabout to facilitate steady movement through.

The traffic forecast study area for R-5899 includes a total of 2 intersections, where one intersection is an existing 3-leg intersection, and the other intersection is a combination of two 3- leg intersections that is merged for the study purposes.

This traffic forecast update serves as an addendum to the previously submitted traffic forecast R-5899 (and addendum) by HNTB. The selected AADT values assume that a new development will exist south of Watts Landing Road. (SR 1560).

All traffic design data for design hourly volumes (K-factors), directional distribution percentages (D-factors), and heavy vehicle percentages (single-unit trucks, tractor-trailer-semi-trailers) remain the same as the previous forecast scenarios that were developed apart from Watts Landing Road (SR 1560).

Trip Generation Methodology

The ITE Trip Generation 11th Edition was used for assumed development south of Watts Landing Road (SR 1560). Based on the number of trips generated, the design factors changed for this leg. Refer to **Table 1** for trip generation output and updated design factors.

Forecast Methodology

The 2023 BY volumes were estimated based on field collected 2023 count data, followed by comparing project specific count data with recent historical AADT, historical trend line estimates, extrapolating historical AADT volumes to 2023 using 10-year historic growth rates (2010 – 2019) and 20-year historic growth rates (2000 – 2019), and engineering judgement.

The 2050 FY volume numbers were based on comparison of BY to FY model daily volumes and growth rates, followed by historical trend line estimates, model TAZ data, regional population and employment projections, knowledge of future land use, and engineering judgment.

For this update, the trip generation output was applied on top of previously submitted traffic forecast scenarios. Refer to **Table 1** for updated design factors along Watts Landing Road (SR 1560). Refer to **Table 2** for updated forecast AADTs. See attached files for Traffic Forecast Line Diagrams and IAB Breakouts.

If it is determined that any of these assumptions have become inconsistent with the project and surrounding area activity, please request updated projections. If you have any questions or I can be of further assistance, please do not hesitate to call me at (919) 424-0483 or e-mail me at jburris@hntb.com.

cc: Keith Dixon (trafficforecast@ncdot.gov), NCDOT Transportation Planning Division

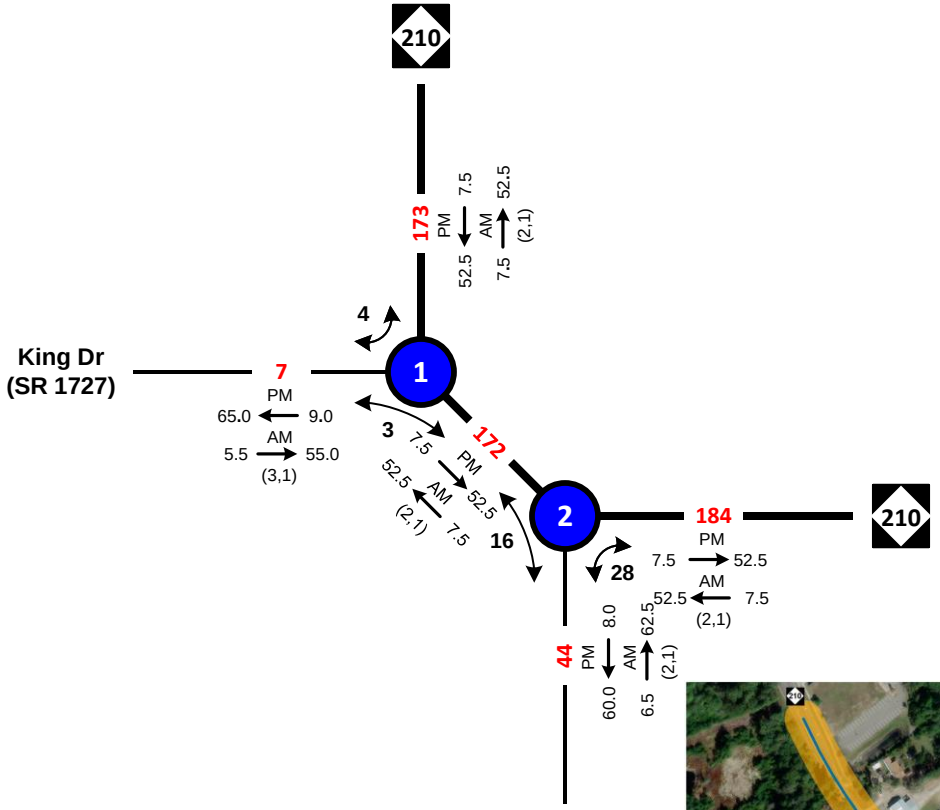
Table 1 – ITE Trip Generation for New Development along Watts Landing Road (SR 1560)

Development	ITE Land Use (Code)	Density	Average Daily Traffic (vpd)	Weekday AM Peak Hour (vph)		Weekday PM Peak Hour (vph)	
				Entering (SB) →	Exiting (NB) ←	Entering (SB) →	Exiting (NB) ←
Watts Landing Development	Single-Family Residential (210)	262 Units	2,448	45	134	155	91
Peak Hour (K) and Directional (D) Factors derived from Trip Generation:				75.0 ← 7.2		9.8 → 63.0	
Original Watts Landing Road (SR 1560) Peak Hour (K) and Directional (D) Factors:				6.0 → 52.5		6.5 → 55.0	
Selected Watts Landing Development Total (vpd)						**2,500**	
Selected Watts Landing Development Peak Hour (K) and Directional (D) Factors:				**62.5 ← 6.5**		**8.0 → 60.0**	

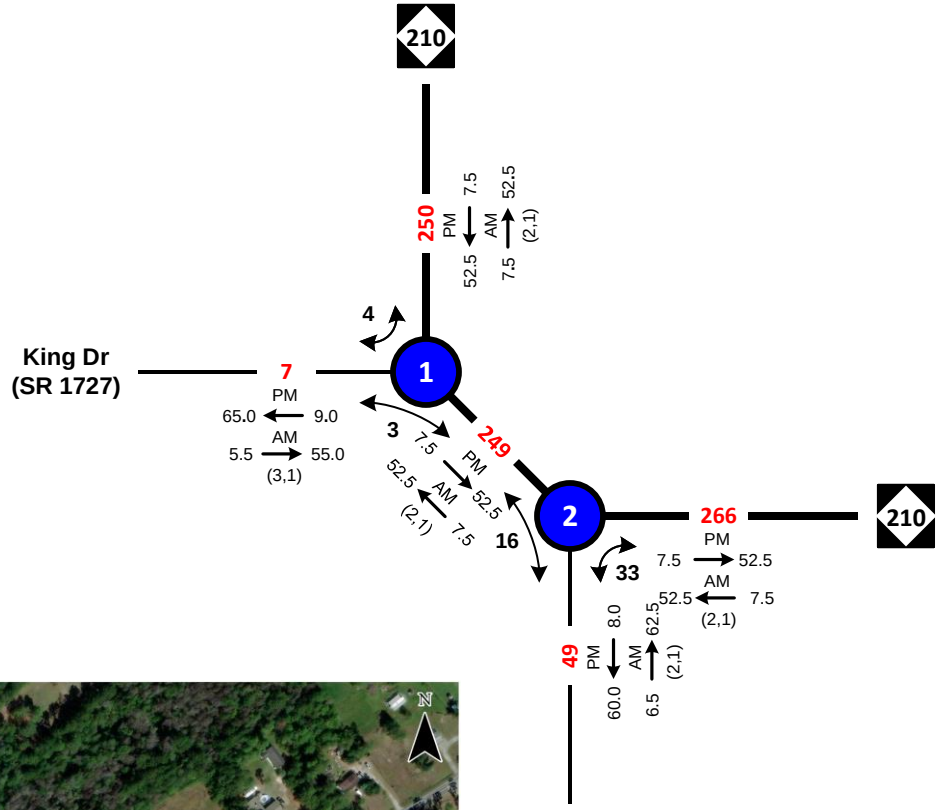
Table 2 –2023 BY & 2050 FY Daily & Summer Weekend Selected AADT with New Development

Roadway	2023 BY Selected AADT	2050 FY Selected AADT	2023 BY Summer Weekend Selected AADT	2050 FY Summer Weekend Selected AADT
NC 210 - W of King Dr (SR 1727)	**17,300**	**25,000**	**20,000**	**29,400**
NC 210 - King Dr (SR 1727) to Watts Landing Rd (SR 1560)	**17,200**	**24,900**	**19,800**	**29,200**
NC 210 – E of Watts Landing Rd (SR 1560)	**18,400**	**26,600**	**21,100**	**30,500**
Watts Landing Rd (SR 1560) - S of NC 210 **[New Development]**	**4,400**	**4,900**	**5,100**	**5,700**
King Dr (SR 1727)	**700**	**700**	**800**	**800**

2023 Scenario



2050 Scenario



FINAL

NOT TO SCALE

Note: The AADTs are assuming the completion of the Watts Landing Development

2023 / 2050

AVERAGE ANNUAL DAILY TRAFFIC

NO-BUILD / BUIILD

LEGEND

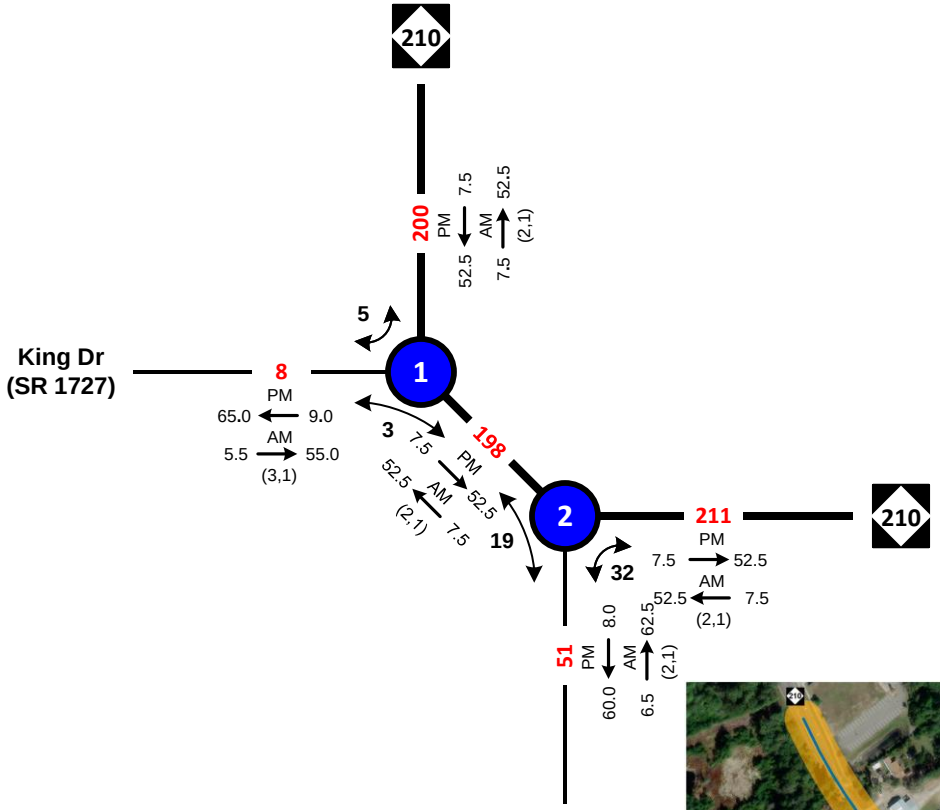
#	Study Area Intersection ID
###	No. of Vehicles Per Day (VPD) in 100s
1-	Less than 50 VPD
X	Movement Prohibited

K PM → D
D AM ← K
(d,t)

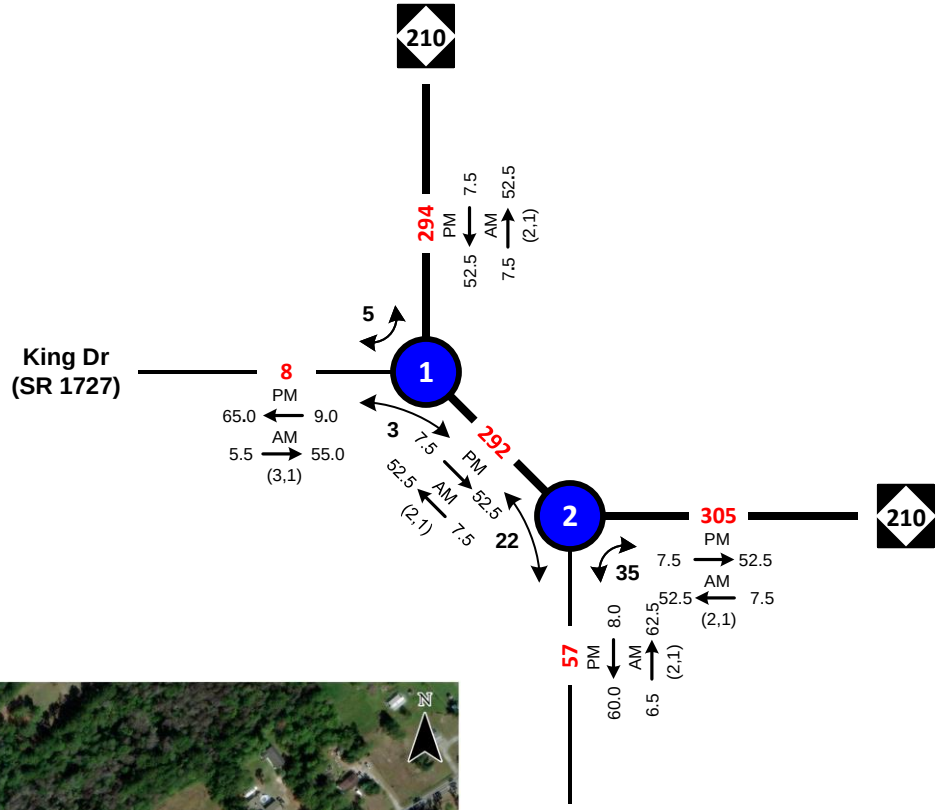
K	Design Hour Factor (%)
PM	PM Peak Hour
AM	AM Peak Hour
D	Peak Hour Directional Split (%)
→	Indicates Direction of D
(d,t)	Duals, TT-STs (%)

SPOT ID: R-5899	**WBS:** 48355.1.1
COUNTY: Pender	**DIVISION: 3**
PREPARED BY: HNTB North Carolina, PC	
PROJECT: NC 210 at Watts Landing Rd (SR 1560) Intersection Improvement	
DATE: October 2024	**Sheet 1 of 1**

2023 Scenario



2050 Scenario



FINAL

NOT TO SCALE

Note: The AADTs are assuming the completion of the Watts Landing Development

2023 / 2050

SUMMER WEEKEND DAILY TRAFFIC

NO-BUILD / BUIILD

LEGEND

#	Study Area Intersection ID
###	No. of Vehicles Per Day (VPD) in 100s
1-	Less than 50 VPD
X	Movement Prohibited

K PM → D
D AM ← K
(d,t)

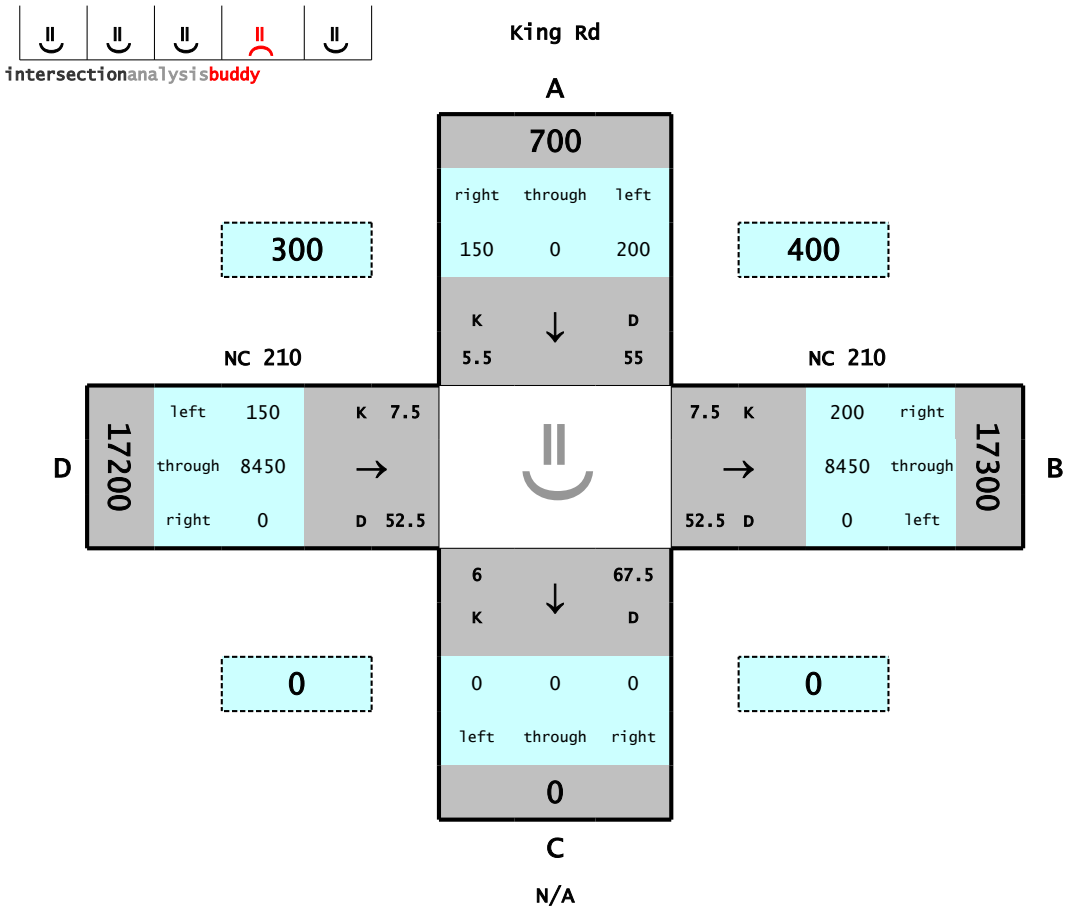
K	Design Hour Factor (%)
PM	PM Peak Hour
AM	AM Peak Hour
D	Peak Hour Directional Split (%)
→	Indicates Direction of D
(d,t)	Duals, TT-STs (%)

SPOT ID: R-5899	**WBS:** 48355.1.1
COUNTY: Pender	**DIVISION: 3**
PREPARED BY: HNTB North Carolina, PC	
PROJECT: NC 210 at Watts Landing Rd (SR 1560) Intersection Improvement	
DATE: October 2024	**Sheet 1 of 1**

IAB Reports

2023 BY AM AADT

intersectionanalysisbuddy



INPUT:

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		0	Change NE & SW		
A	700	5.5	55		3500
B	17300	7.5	52.5		4900
C	0	6	67.5		2800
D	17200	7.5	52.5		4600
leg	*current aadt*	*K*	*D*	*dir. parity*	*projected aadt*

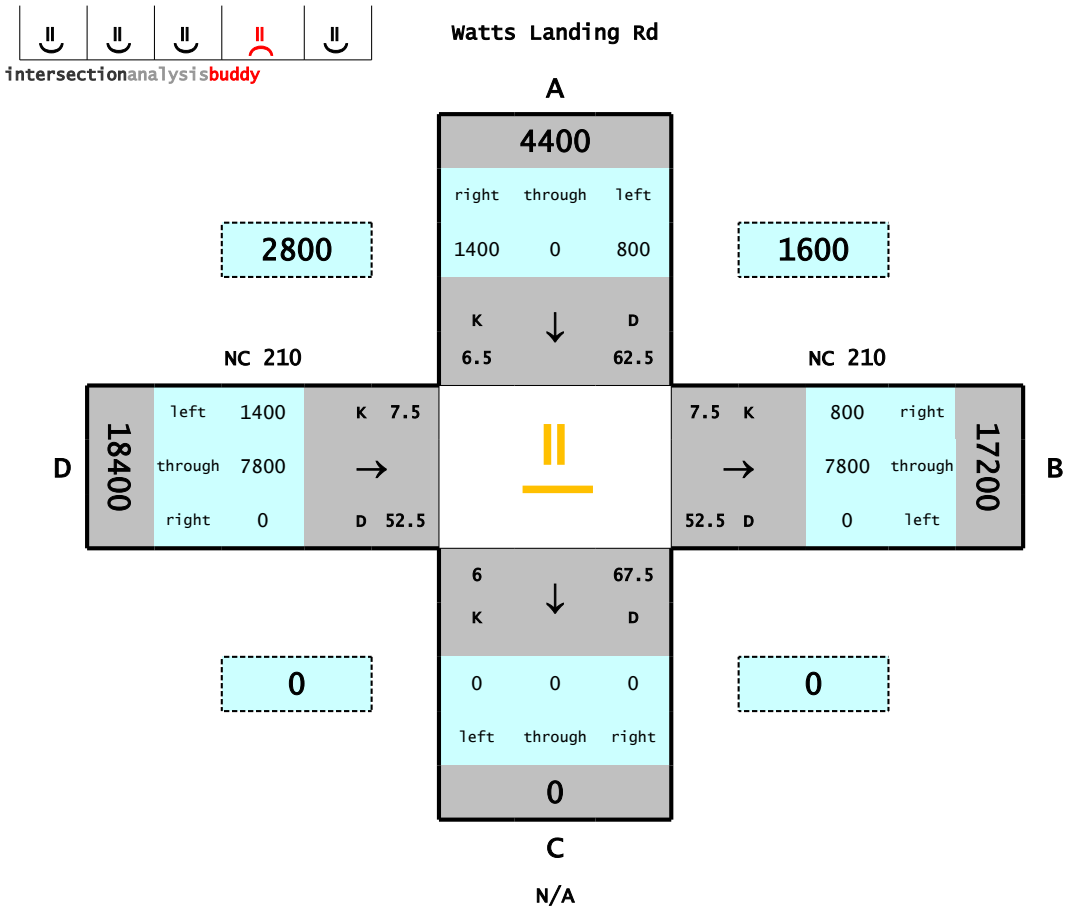
(use AADT = 0 to disregard an intersection leg)

VALIDATION RESULTS:

	score:
FACTORS ACCEPTABLE	0.05
TURNS ARE VALID	
CURRENT AADTs ARE VALID	
PROJ. AADTs ARE VALID	

2023 BY AM AADT

intersectionanalysisbuddy



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B	17200	7.5	52.5		4900
C	0	6	67.5		2800
D	18400	7.5	52.5		4600
leg	*current aadt*	*K*	*D*	*dir. parity*	*projected aadt*

(use AADT = 0 to disregard an intersection leg)

VALIDATION RESULTS:

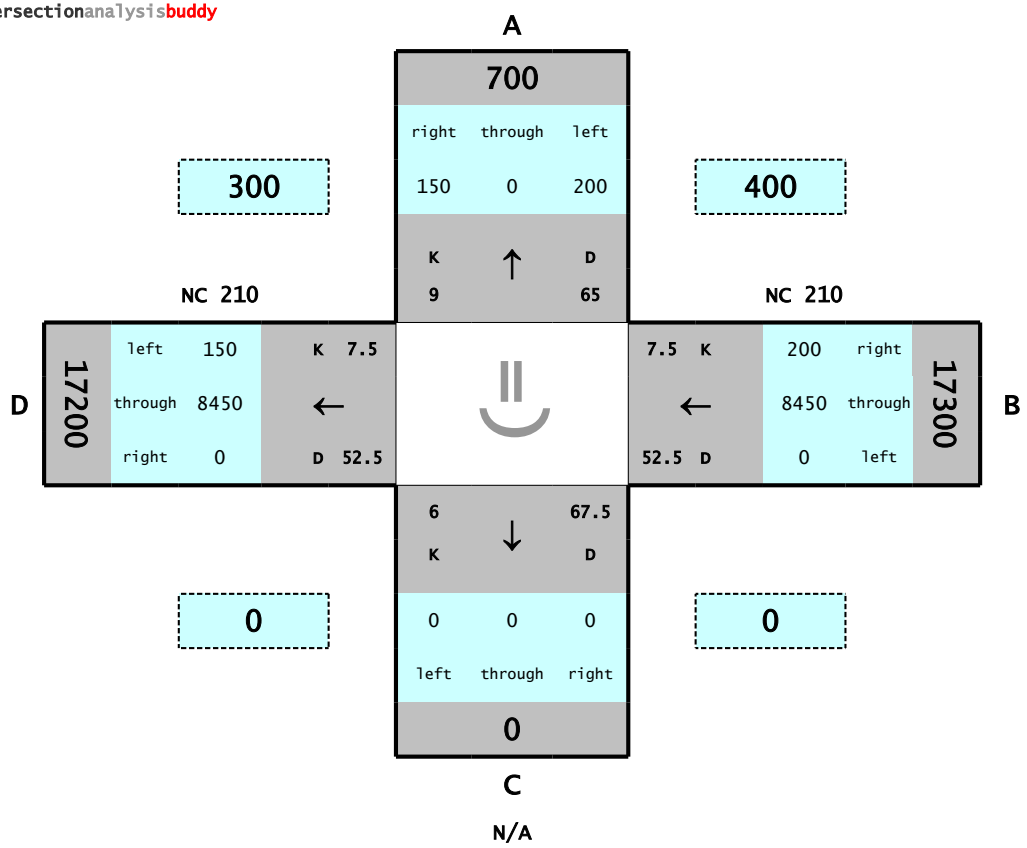
	score:
FACTORS ACCEPTABLE	1.10
TURNS ARE VALID	
CURRENT AADTs ARE VALID	
PROJ. AADTs ARE VALID	

Review factors when 1.0 < SCORE < 2.0

2023 BY PM AADT

intersectionanalysisbuddy

King Rd



INPUT:

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A	700	9	65		3500
B	17300	7.5	52.5		4900
C	0	6	67.5		2800
D	17200	7.5	52.5		4600
leg	*current aadt*	*K*	*D*	*dir. parity*	*projected aadt*

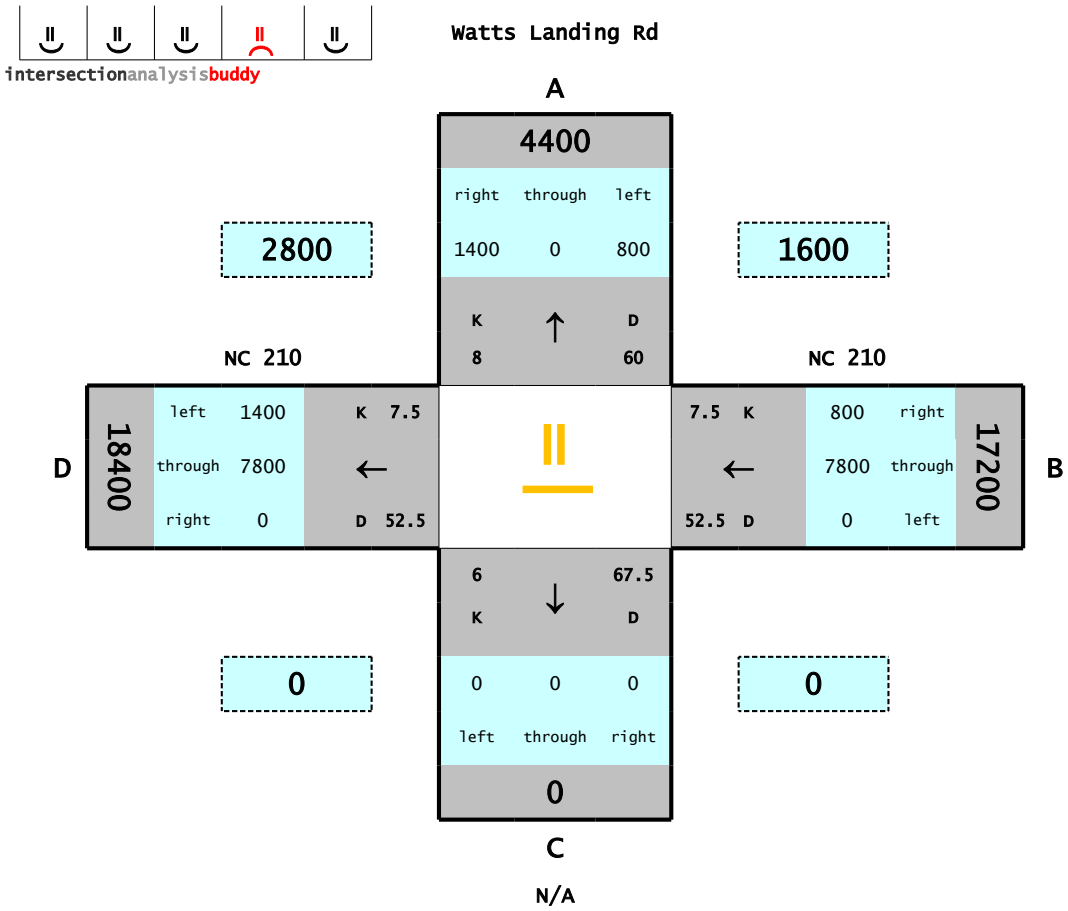
(use AADT = 0 to disregard an intersection leg)

VALIDATION RESULTS:

	score:
FACTORS ACCEPTABLE	0.29
TURNS ARE VALID	
CURRENT AADTs ARE VALID	
PROJ. AADTs ARE VALID	

2023 BY PM AADT

intersectionanalysisbuddy



INPUT:

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A	4400	8	60		3500
B	17200	7.5	52.5		4900
C	0	6	67.5		2800
D	18400	7.5	52.5		4600
leg	*current aadt*	*K*	*D*	*dir. parity*	*projected aadt*

(use AADT = 0 to disregard an intersection leg)

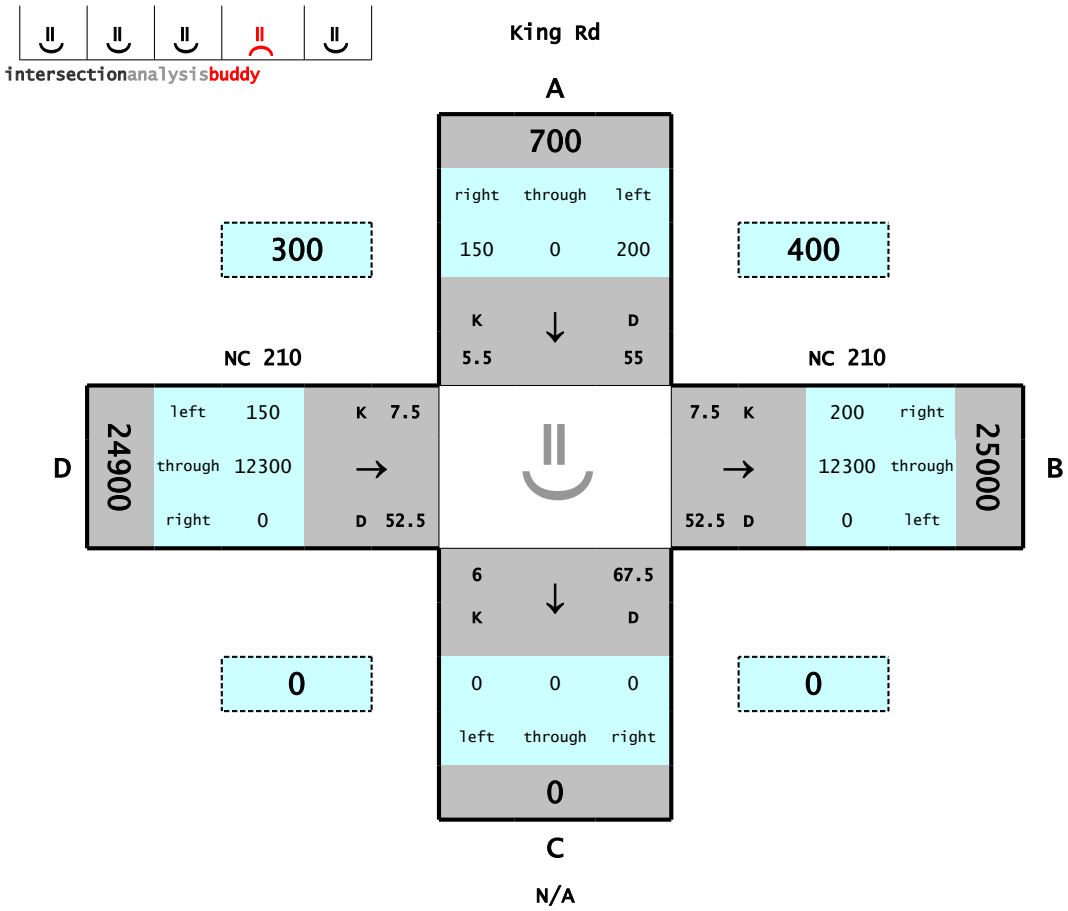
VALIDATION RESULTS:

	score:
FACTORS ACCEPTABLE	1.09
TURNS ARE VALID	
CURRENT AADTs ARE VALID	
PROJ. AADTs ARE VALID	

Review factors when 1.0 < SCORE < 2.0

2050 FY AM AADT

intersectionanalysisbuddy



INPUT:

		0	Change NW & SE		
		0	Change NE & SW		
A	700	5.5	55		3500
B	25000	7.5	52.5		4900
C	0	6	67.5		2800
D	24900	7.5	52.5		4600
leg	*current aadt*	*K*	*D*	*dir. parity*	*projected aadt*

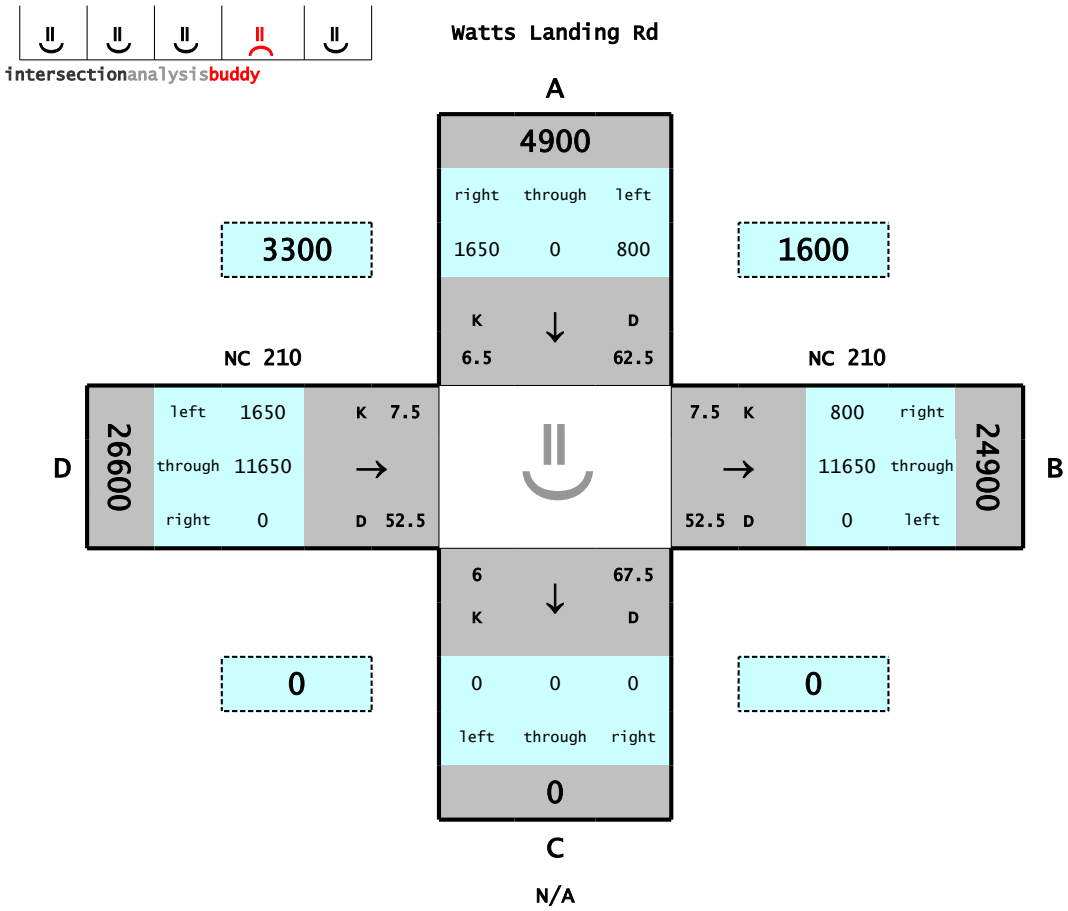
(use AADT = 0 to disregard an intersection leg)

VALIDATION RESULTS:

	score:
FACTORS ACCEPTABLE	0.04
TURNS ARE VALID	
CURRENT AADTs ARE VALID	
PROJ. AADTs ARE VALID	

2050 FY AM AADT

intersectionanalysisbuddy



INPUT:

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		0	Change NE & SW		
A	4900	6.5	62.5		3500
B	24900	7.5	52.5		4900
C	0	6	67.5		2800
D	26600	7.5	52.5		4600
leg	*current aadt*	*K*	*D*	*dir. parity*	*projected aadt*

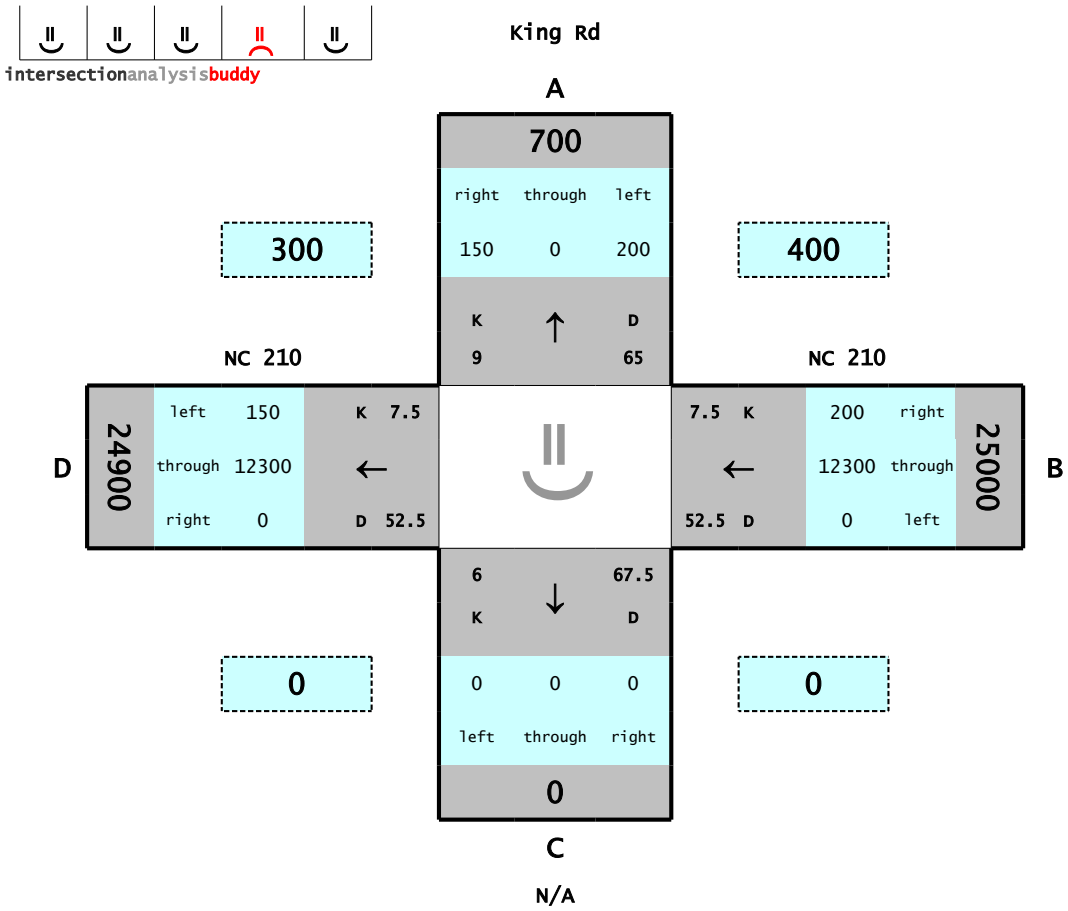
(use AADT = 0 to disregard an intersection leg)

VALIDATION RESULTS:

	score:
FACTORS ACCEPTABLE	0.86
TURNS ARE VALID	
CURRENT AADTs ARE VALID	
PROJ. AADTs ARE VALID	

2050 FY PM AADT

intersectionanalysisbuddy



INPUT:

		0	Change NW & SE		
		0	Change NE & SW		
A	700	9	65		3500
B	25000	7.5	52.5		4900
C	0	6	67.5		2800
D	24900	7.5	52.5		4600
leg	*current aadt*	*K*	*D*	*dir. parity*	*projected aadt*

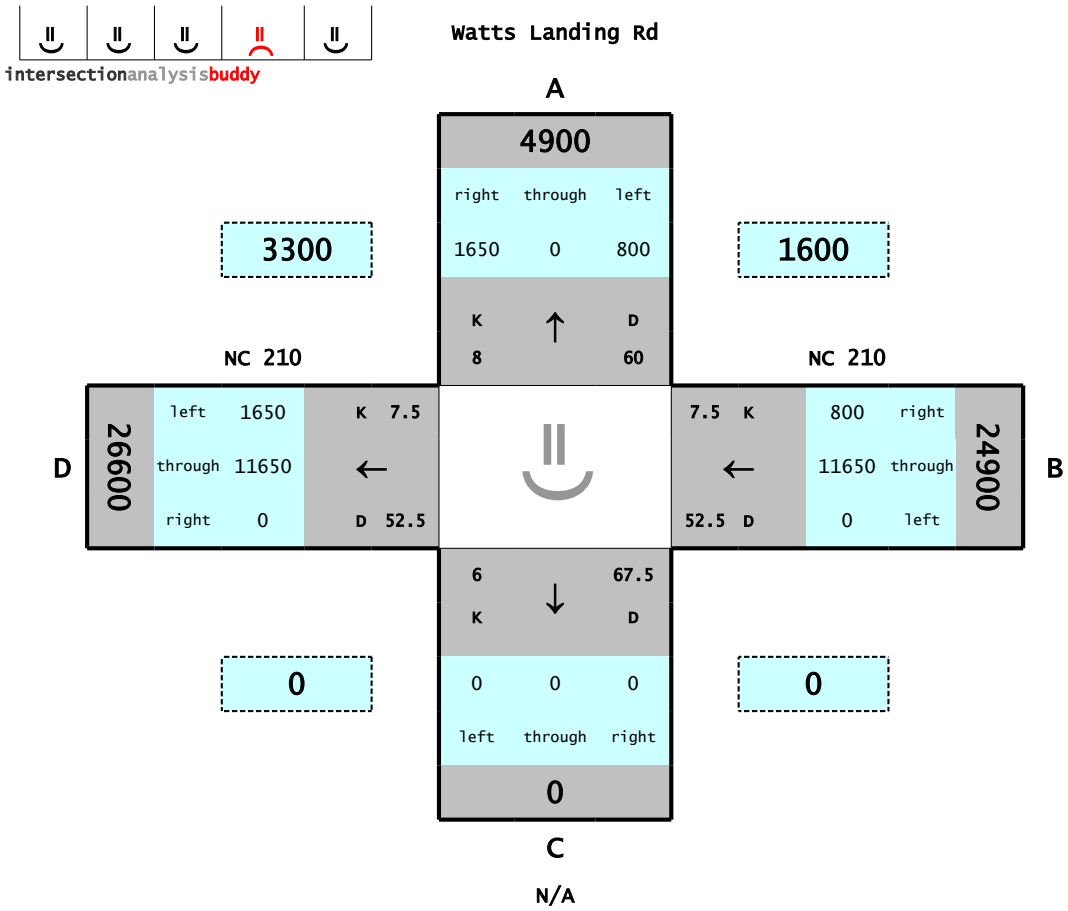
(use AADT = 0 to disregard an intersection leg)

VALIDATION RESULTS:

	score:
FACTORS ACCEPTABLE	0.20
TURNS ARE VALID	
CURRENT AADTs ARE VALID	
PROJ. AADTs ARE VALID	

2050 FY PM AADT

intersectionanalysisbuddy



INPUT:

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A	4900	8	60		3500
B	24900	7.5	52.5		4900
C	0	6	67.5		2800
D	26600	7.5	52.5		4600
leg	*current aadt*	*K*	*D*	*dir. parity*	*projected aadt*

(use AADT = 0 to disregard an intersection leg)

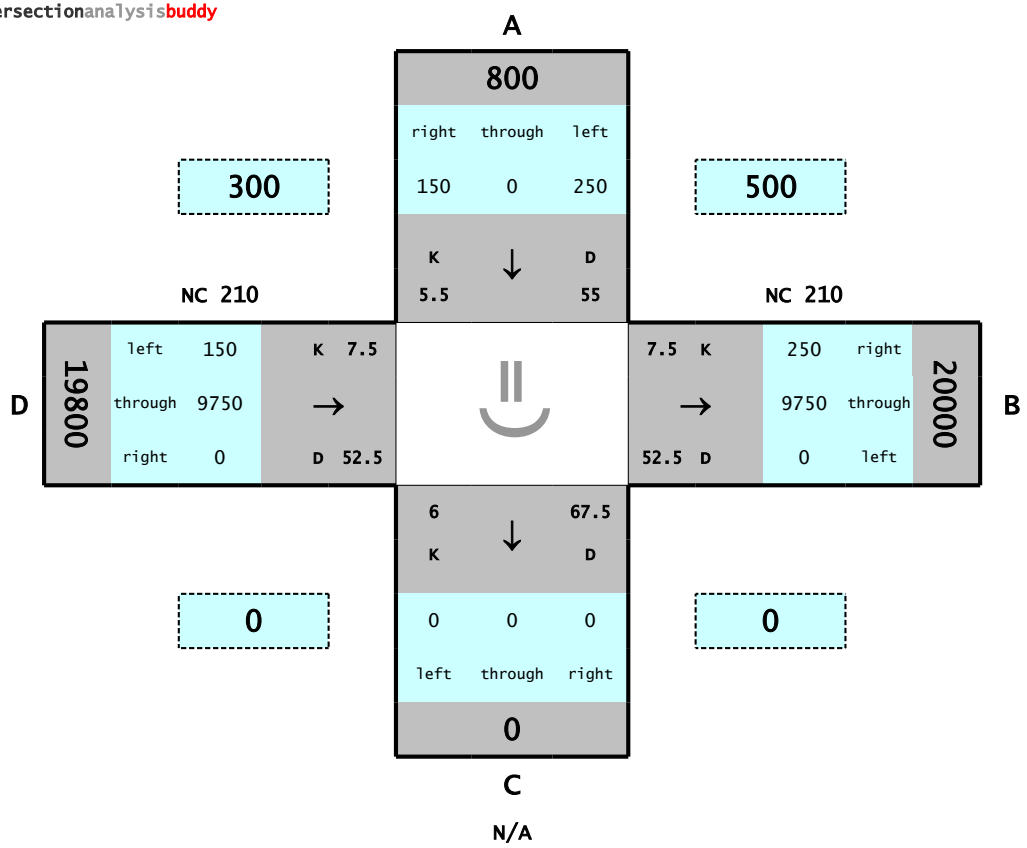
VALIDATION RESULTS:

	score:
FACTORS ACCEPTABLE	0.85
TURNS ARE VALID	
CURRENT AADTs ARE VALID	
PROJ. AADTs ARE VALID	

2023 BY AM SWDT

intersectionanalysisbuddy

King Rd



INPUT:

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		0	Change NE & SW		
A	800	5.5	55		3500
B	20000	7.5	52.5		4900
C	0	6	67.5		2800
D	19800	7.5	52.5		4600
leg	*current aadt*	*K*	*D*	*dir. parity*	*projected aadt*

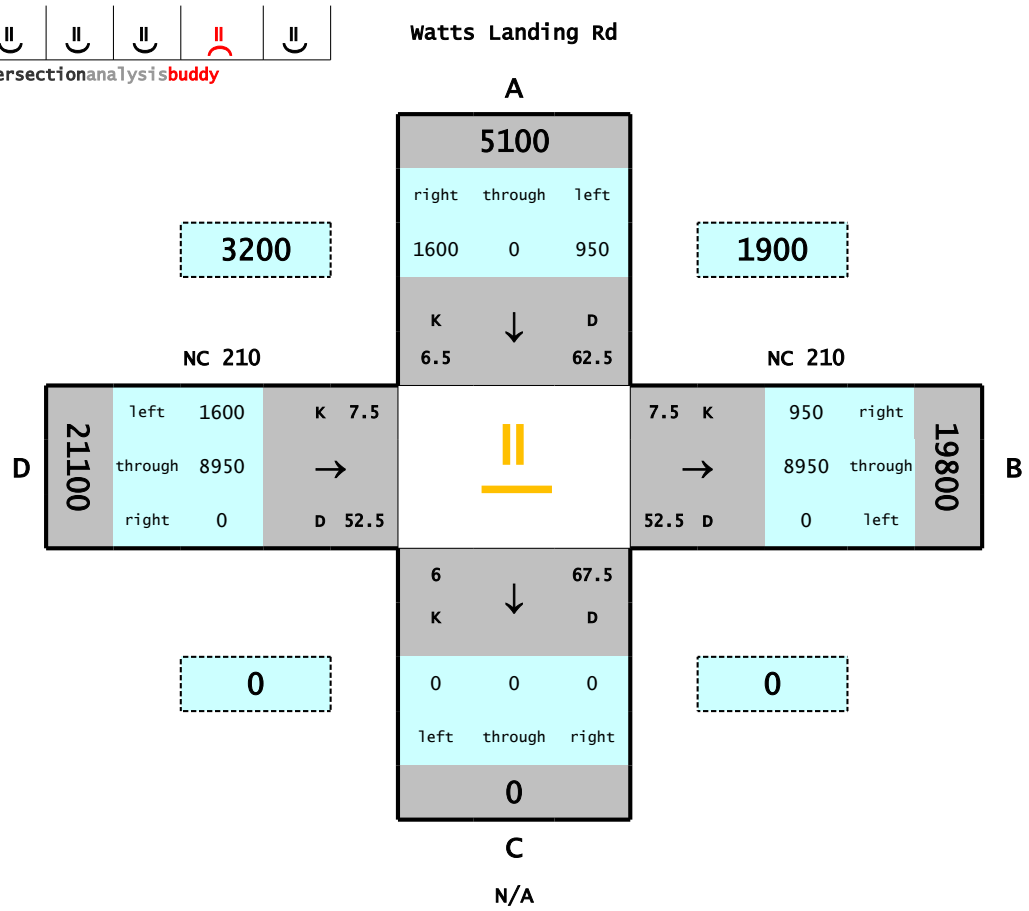
(use AADT = 0 to disregard an intersection leg)

VALIDATION RESULTS:

	score:
FACTORS ACCEPTABLE	0.05
TURNS ARE VALID	
CURRENT AADTs ARE VALID	
PROJ. AADTs ARE VALID	

2023 BY AM SWDT

intersectionanalysisbuddy



INPUT:

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		0	Change NE & SW		
A	5100	6.5	62.5		3500
B	19800	7.5	52.5		4900
C	0	6	67.5		2800
D	21100	7.5	52.5		4600
leg	*current aadt*	*K*	*D*	*dir. parity*	*projected aadt*

(use AADT = 0 to disregard an intersection leg)

VALIDATION RESULTS:

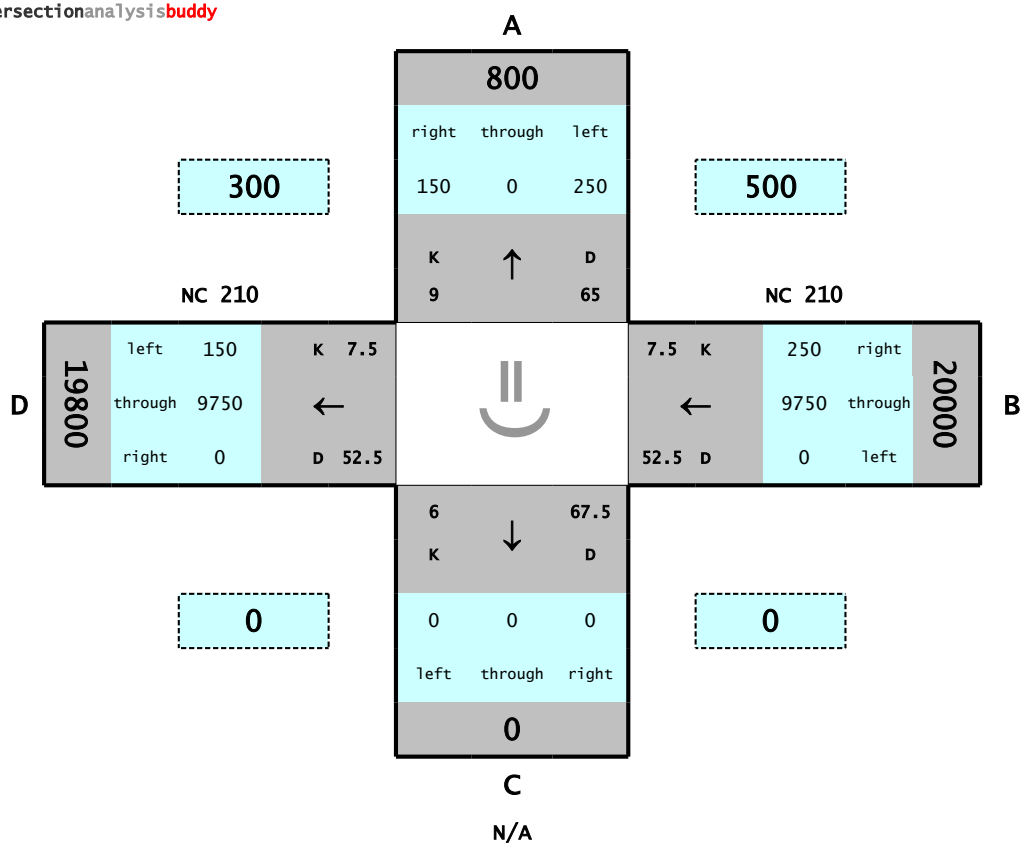
	score:
FACTORS ACCEPTABLE	1.11
TURNS ARE VALID	
CURRENT AADTs ARE VALID	
PROJ. AADTs ARE VALID	

Review factors when 1.0 < SCORE < 2.0

2023 BY PM SWDT

intersectionanalysisbuddy

King Rd



INPUT:

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		0	Change NE & SW		
A	800	9	65		3500
B	20000	7.5	52.5		4900
C	0	6	67.5		2800
D	19800	7.5	52.5		4600
leg	*current aadt*	*K*	*D*	*dir. parity*	*projected aadt*

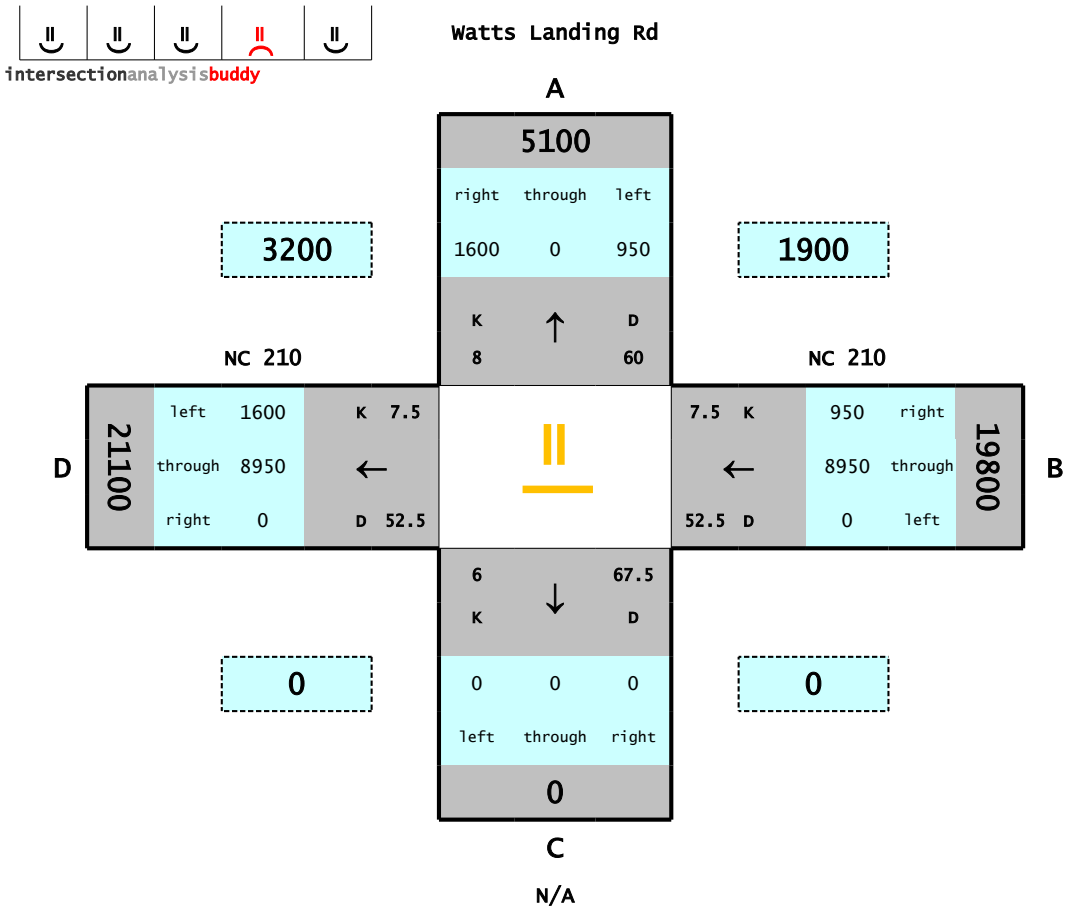
(use AADT = 0 to disregard an intersection leg)

VALIDATION RESULTS:

	score:
FACTORS ACCEPTABLE	0.28
TURNS ARE VALID	
CURRENT AADTs ARE VALID	
PROJ. AADTs ARE VALID	

2023 BY PM SWDT

intersectionanalysisbuddy



INPUT:

		0	Change NW & SE		
		0	Change NE & SW		
A	5100	8	60		3500
B	19800	7.5	52.5		4900
C	0	6	67.5		2800
D	21100	7.5	52.5		4600
leg	*current aadt*	*K*	*D*	*dir. parity*	*projected aadt*

(use AADT = 0 to disregard an intersection leg)

VALIDATION RESULTS:

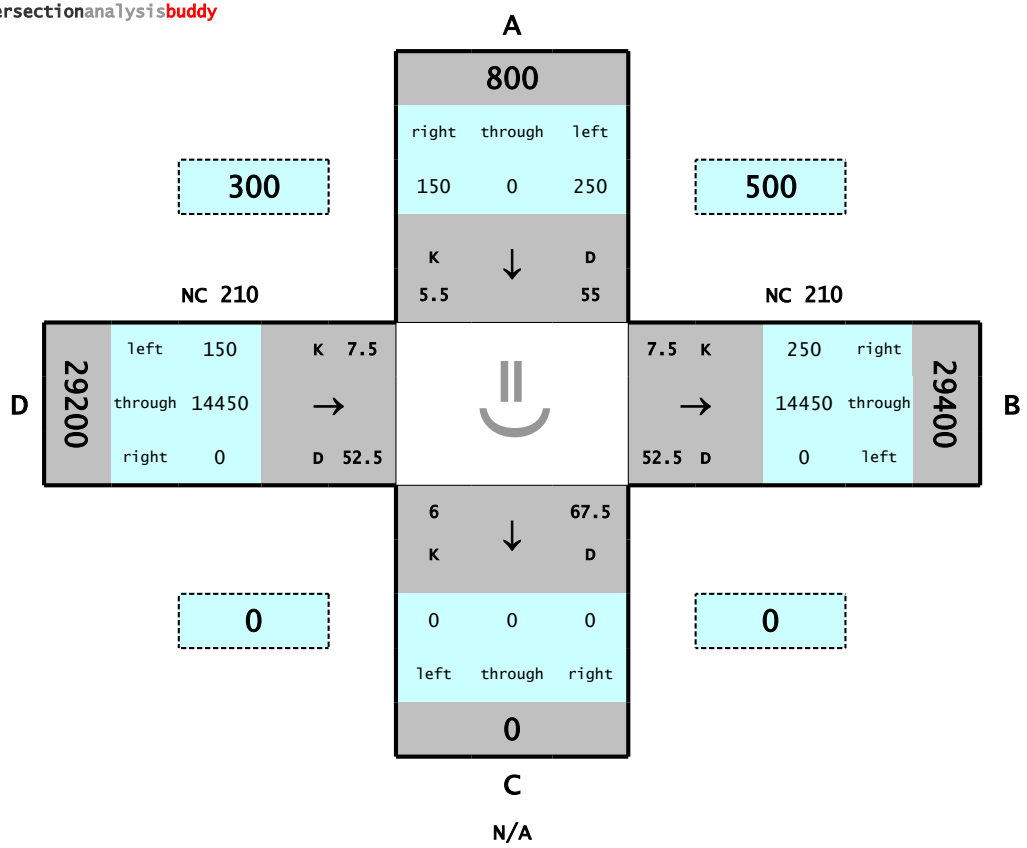
	score:
FACTORS ACCEPTABLE	1.09
TURNS ARE VALID	
CURRENT AADTs ARE VALID	
PROJ. AADTs ARE VALID	

Review factors when 1.0 < SCORE < 2.0

2050 FY AM SWDT

intersectionanalysisbuddy

King Rd



INPUT:

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		0	Change NE & SW		
A	800	5.5	55		3500
B	29400	7.5	52.5		4900
C	0	6	67.5		2800
D	29200	7.5	52.5		4600
leg	*current aadt*	*K*	*D*	*dir. parity*	*projected aadt*

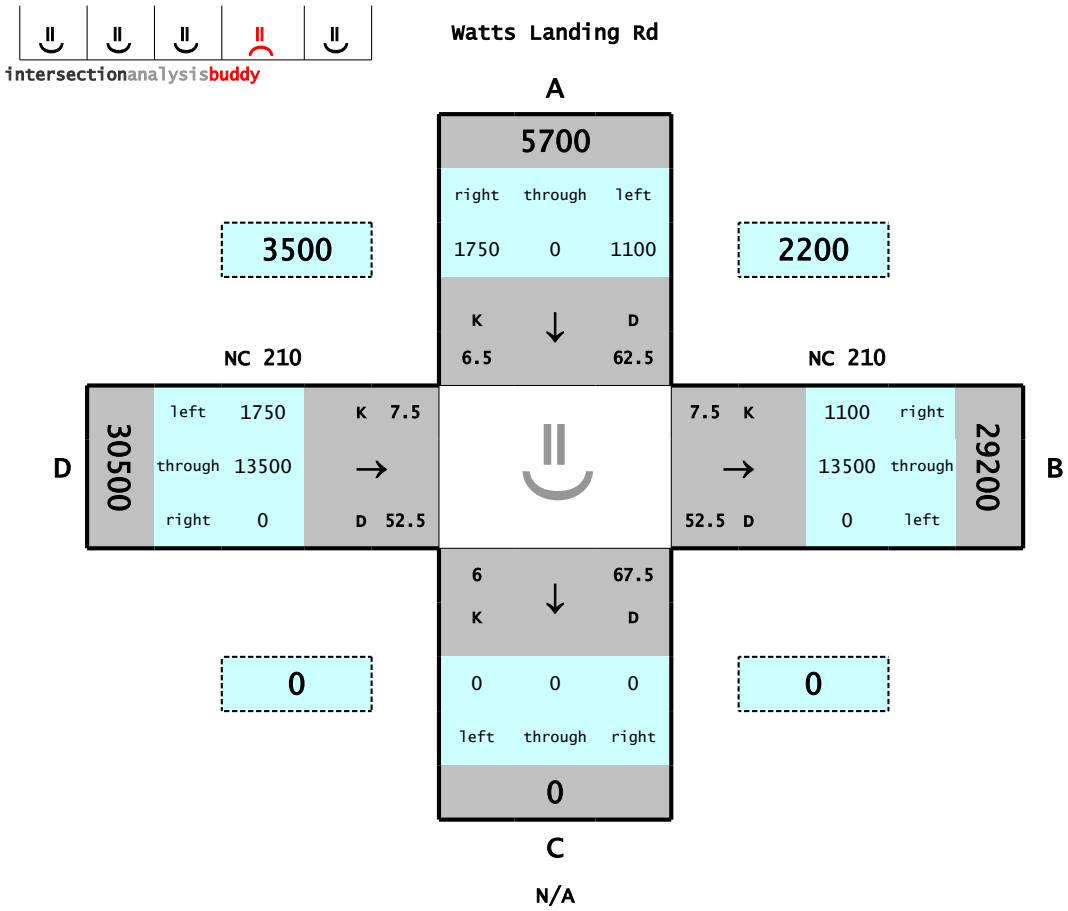
(use AADT = 0 to disregard an intersection leg)

VALIDATION RESULTS:

	score:
FACTORS ACCEPTABLE	0.03
TURNS ARE VALID	
CURRENT AADTs ARE VALID	
PROJ. AADTs ARE VALID	

2050 FY AM SWDT

intersectionanalysisbuddy



INPUT:

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		0	Change NE & SW		
A	5700	6.5	62.5		3500
B	29200	7.5	52.5		4900
C	0	6	67.5		2800
D	30500	7.5	52.5		4600
leg	*current aadt*	*K*	*D*	*dir. parity*	*projected aadt*

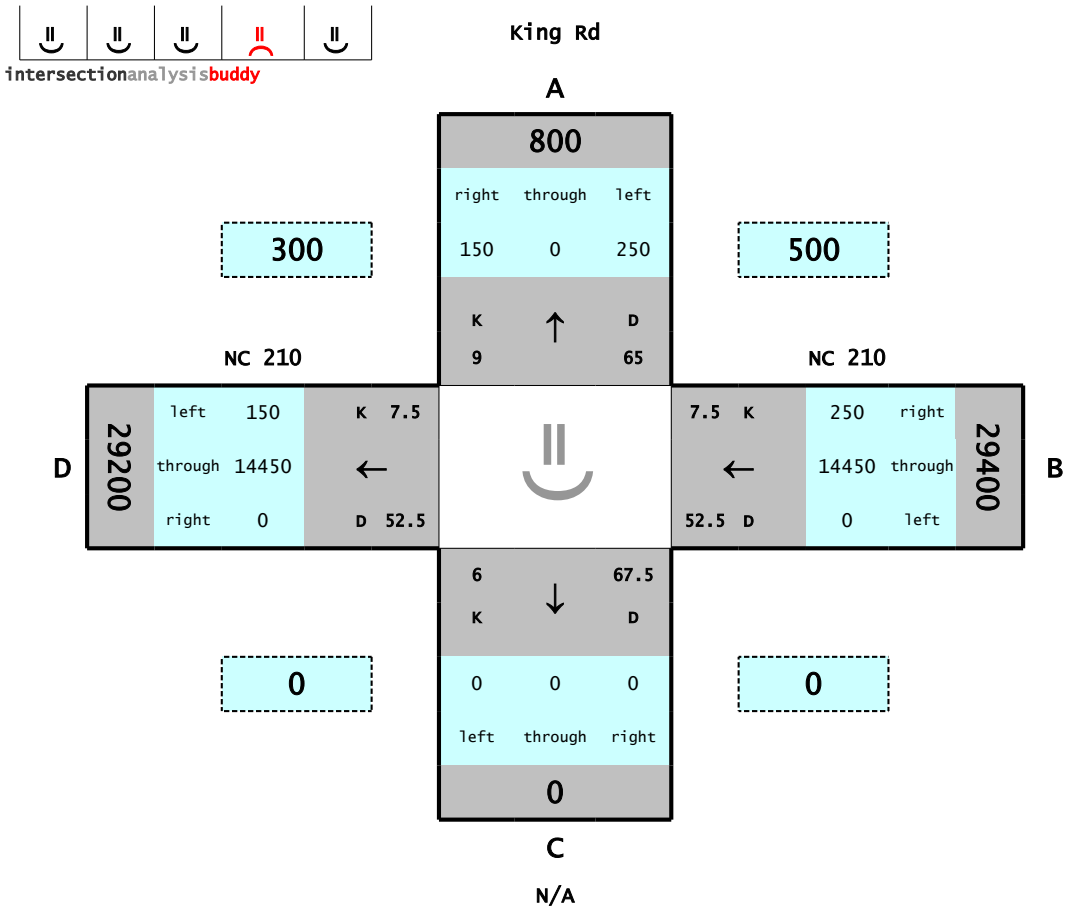
(use AADT = 0 to disregard an intersection leg)

VALIDATION RESULTS:

	score:
FACTORS ACCEPTABLE	0.85
TURNS ARE VALID	
CURRENT AADTs ARE VALID	
PROJ. AADTs ARE VALID	

2050 FY PM SWDT

intersectionanalysisbuddy



INPUT:

		0	Change NW & SE		
		0	Change NE & SW		
A	800	9	65		3500
B	29400	7.5	52.5		4900
C	0	6	67.5		2800
D	29200	7.5	52.5		4600
leg	*current aadt*	*K*	*D*	*dir. parity*	*projected aadt*

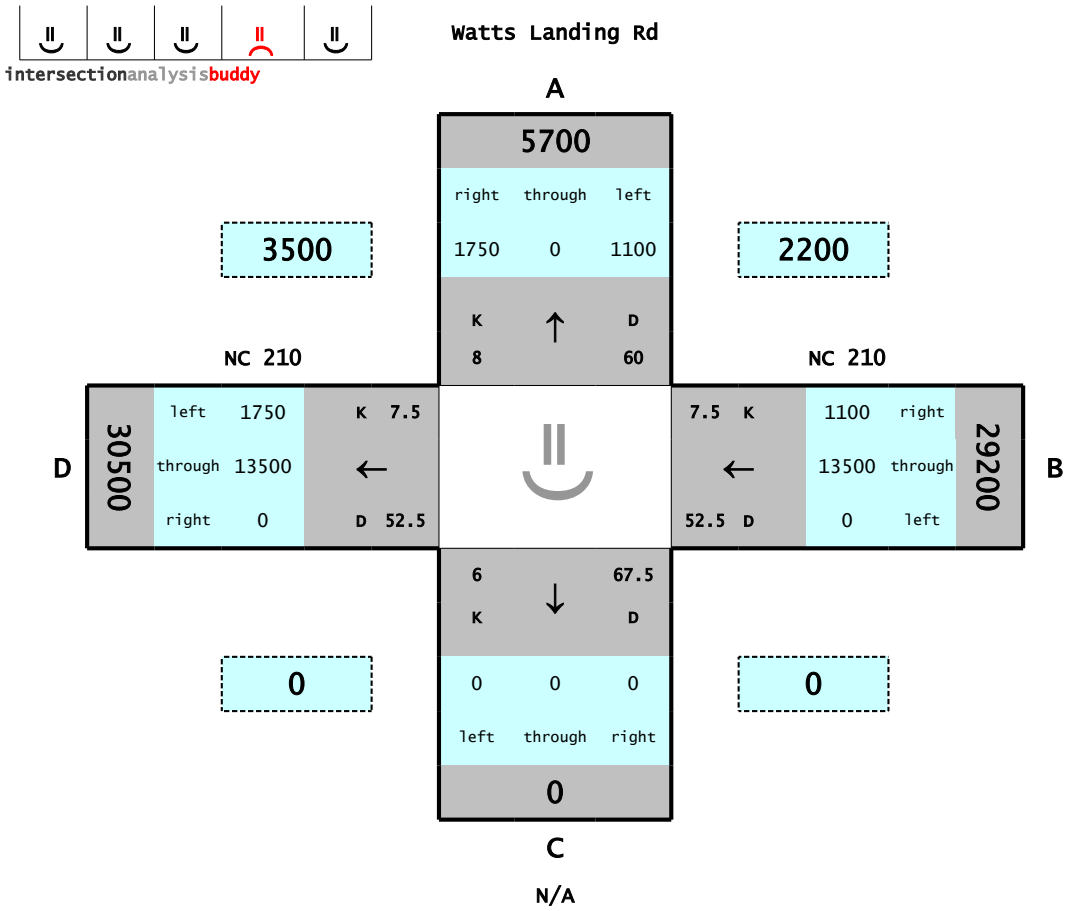
(use AADT = 0 to disregard an intersection leg)

VALIDATION RESULTS:

	score:
FACTORS ACCEPTABLE	0.19
TURNS ARE VALID	
CURRENT AADTs ARE VALID	
PROJ. AADTs ARE VALID	

2050 FY PM SWDT

intersectionanalysisbuddy



INPUT:

		0	Change NW & SE		
		0	Change NE & SW		
A	5700	8	60		3500
B	29200	7.5	52.5		4900
C	0	6	67.5		2800
D	30500	7.5	52.5		4600
leg	*current aadt*	*K*	*D*	*dir. parity*	*projected aadt*

(use AADT = 0 to disregard an intersection leg)

VALIDATION RESULTS:

	score:
FACTORS ACCEPTABLE	0.84
TURNS ARE VALID	
CURRENT AADTs ARE VALID	
PROJ. AADTs ARE VALID	