

The Implications and Results of Protected-only Left Turn Signals

**Priorities Committee Meeting
July 11, 2017**

Transportation Planning and Engineering

Protected-only left turn signals

Speed on green at intersections

Neighbourhood shortcutting

Protected-only Left Turn Signals

- 2017 left turn signal assessment guidelines
- Nationally-accepted best practices in North America
- Typical traffic signal solution - A win-lose situation
- Always aim for a safe and efficient signal solution
- Vision Zero "Safety" outweighs "Efficiency"
- Install protected-only left turn signal only when absolutely necessary

Warrant Criteria

- Intersection design and characteristics
 - High speed corridors, intersection size and geometry
- Sightline Issues
 - Dual left turn lanes, vertical curve, and obstructions
- Record of historical crash data

Warrant Comparison

Jurisdiction	<u>Geometry</u> Opposing Through lanes	<u>Sightline</u> Dual Left Turn Lanes	<u>Safety</u> Left Turn Across Path
Strathcona County	4 or more through lanes with posted speed 70km/h or greater	YES (in the process of converting left turn signals)	5 or more per year 8 or more in any consecutive 2-year period within last 3 years
Alberta Transportation	3 or more through lanes with posted speed 70km/h or greater	YES	Left turn movements with high collision records
City of Edmonton	3 or more through lanes with posted speed 70km/h or greater	YES (in the process of converting left turn signals)	15 or more over a 3-year period
City of St. Albert	1 or more opposing through lanes with posted speed 100km/h or greater 2 or more opposing through lanes with posted speed 90km/h or greater 3 or more opposing through lanes with posted speed 80km/h or greater	YES (all signals are protected-only)	2 or more over a 2-year period
City of Calgary	1 or more opposing through lanes with posted speed 100km/h or greater 2 or more opposing through lanes with posted speed 90km/h or greater 3 or more opposing through lanes with posted speed 80km/h or greater	YES (all left turn signals are protected-only)	4 left turn collisions per year over 3 years
City of Red Deer	3 or more opposing through lanes with posted speed 80km/h or greater 4 or more opposing through lanes of traffic	YES Monitoring if the opposing through traffic is extremely low	7 or more over a 3-year period
City of Lethbridge	Through lanes with posted speed 80km/h or greater	YES for newly opened dual left turn lanes. Monitoring the collision statistic on existing dual left turn lanes	4 or more per year
FHWA	3 or more opposing through lanes with posted speed 80km/h or greater	YES	4 or more per year 6 or more over a 2-year period 8 or more over a 3-year period

Collision History

Left Turn Across Path

Intersection	Movement	Collisions per Year				% Reduction
		Before		After		
Baseline Road and Broadmoor Boulevard	EBL/WBL	5 Years (2001-05)	6.0	11 Years (2006-16)	2.5	59.1%
Baseline Road and Sherwood Drive	EBL/WBL	5 Years (2001-05)	5.0	11 Years (2006-16)	2.2	56.0%
Baseline Road and Clover Bar Road	EBL/WBL	11 Years (2001-11)	10.6	5 Years (2012-16)	0.2	98.1%
Wye Road and Sherwood Drive	EBL/WBL	14 Years (2001-14)	9.4	2 Years (2015-16)	2.0	78.6%
Baseline Road and Chippewa Road	EBL/WBL	14 Years (2001-14)	2.1	2 Years (2015-16)	0.5	76.7%
Sherwood Drive and Brentwood Boulevard	WBL	5 Years (2011-15)	5.0	1 Year 2016	0.0	100.0%
Average Crash Reduction						78.1%

Dual Left Turn Lane Operational Issues in Alberta

- Inadequate sight distance between
 - The two left turning vehicles
 - The alignment of two opposing left turn lanes
- Left turn across path collisions
- Failing to yield to oncoming traffic

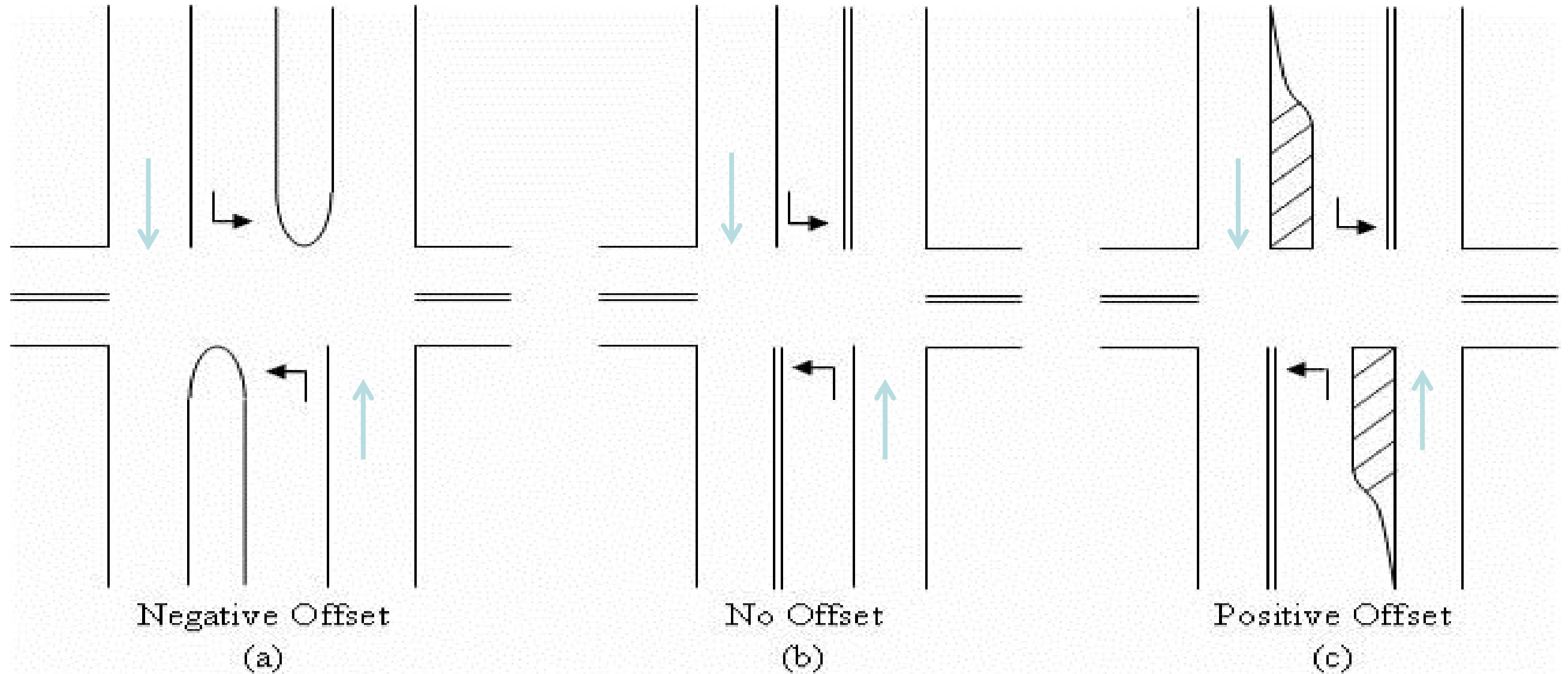
Baseline Road and Sherwood Drive



Wye Road and Ash Street



Left Turn Bay Offsets



Scotford North Signal Fail to Yield



Strategies of Managing Left Turn Movements

1. Change left turn signals to protected-only
 - To prevent conflicts and crashes
 - Conduct proper traffic signal engineering before signal changes
2. Close one of the dual left turn lanes
 - To improve sightlines
 - To maintain permissive left turn signals
3. Review and change the sequencing of the opposing left turn signals

Speed on Green

- Speed on Green
 - ISD (Intersection Safety Device)
- Driver Behaviour
- Before and After Review

Shortcutting Traffic

- Neighbourhood Shortcutting
 - would not improve travel times
- Studies do not show an increase

Conclusions

- Consistent left turn operation guidelines in Alberta
- Protected-only left turn signals should be implemented
 - On dual left turn lanes
 - If the left-turn movement has a high crashes records
- Significant improvement (78%) on safety upon implementing protected-only signals
- Recognize negative impacts on signal efficiency
- Implement protected-only left turn signals when absolutely necessary
- No indications of speed on green and neighbourhood shortcutting
- 2017 signal re-timing