A Quarter Century of Low Cost Safety Improvements, Winston-Salem's Experience

PIEDMONT TRANSPORTATION PROFESSIONALS

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SUMMARY OF PROBLEMS AND TREATMENTS WITH 5 OR MORE COMPLETED STUDIES

Signalized Locations

Problem	Treatment	Studies	% Change Targeted	% Change Total
Angle Crashes	Change 8" Signals to 12"	102	-47.4%	-12.7%
"	Add Backplates	24	-42.4%	-10.5%
"	Install 1 sec. All Red	7	+1.2%	+4.5%
"	Add Auxiliary Signal Heads	17	-51.4%	+3.4%
"	Install Signal Ahead Sign	12	-36.1%	-6.3%
"	Red "T" Display	15	-34.1%	-0.3%
"	Change to Farside Display	5	+24.9%	-14.9%
"	Install LED Signal Indications	5	-12.9%	-30.7%
"	Change 8" to 12" Signals + Signal Ahead Signs	6	-35.5%	-11.2%
"	Change 8" to 12" Signals + Change to Farside Display	8	-48.4%	-31.4%
"	Install Directional Signs	6	+20.0%	-5.2%

SUMMARY OF PROBLEMS AND TREATMENTS WITH 5 OR MORE COMPLETED STUDIES

Signalized Locations

(continued)

Problem	Treatment	Studies	% Change Targeted	% Change Total
Night Angle Crashes	Remove Signals from Late Night/Early A.M. Flash Program	45	-82.4%	-28.8%
Left-Turn Crashes	Create Left-Turn Lane Within Existing Roadway Width	9	-69.4%	-19.1%
"	Add Left-Turn Signal Phase(s)	33	-74.6%	-11.3%
"	Replace Protected/Permissive Phase with Protected Only	12	+96.8%	-6.9%
Rear-End Crashes	Add Auxiliary Signal Head	6	+21.4%	+9.7%
Sideswipe Crashes	Advanced Signing	5	-44.6%	-8.9%

SUMMARY OF PROBLEMS AND TREATMENTS WITH 5 OR MORE COMPLETED STUDIES

Non-Signalized Locations

Problem	Treatment	Studies	% Change Targeted	% Change Total
Angle Crashes	Install Centerlines & Stop Bars on Stop Approaches + Change 24" Stop Signs to 30"	6	-67.4%	-44.9%
"	Install Centerlines & Stop Bars on Stop Approaches	38	-53.7%	-34.7%
"	Install All-Way Stop	56	-85.9%	-73.8%
"	Add Left Side Stop Sign	25	-34.5%	-7.1%
"	Add Stop Ahead Message on Pavement	8	-27.1%	-6.4%
"	Replace Yield with Stop	8	-76.6%	-26.9%
"	Move Stop Bars to Extended Curb Line + Left Side Stop Sign	32	-33.6%	-16.2%

SUMMARY OF PROBLEMS AND TREATMENTS WITH 5 OR MORE COMPLETED STUDIES

Non-Signalized Locations

(continued)

Problem	Treatment	Studies	% Change Targeted	% Change Total
Angle Crashes	Move Stop Bars to Extended Curb Line	40	-33.6%	-1.8%
"	Install Traffic Signal	39	-71.9%	-23.1%
"	Install Centerlines & Stop Bars on Stop Approaches + Stop Ahead Message on Pavement	6	-24.1%	+6.1%
"	Install Median	5	-87.5%	-63.9%
"	Add Left Side Stop Sign + Install Centerlines & Stop Bars on Stop Approaches	10	-64.4%	-40.4%

SUMMARY OF PROBLEMS AND TREATMENTS WITH 5 OR MORE COMPLETED STUDIES

Non-Signalized Locations

(continued)

Problem	Treatment	Studies	% Change Targeted	% Change Total
Angle Crashes	Realign Intersection to 90 Degrees	6	-13.3%	+67.3%
"	Trim Trees	8	-25.9%	+6.2%
"	Install Stop Bar	5	-66.8%	-37.2%
Left-Turn Crashes	Create Left-Turn Lane within Existing Roadway Width	5	-52.9%	+23.2%

SUMMARY OF PROBLEMS AND TREATMENTS WITH 5 OR MORE COMPLETED STUDIES

Non-Signalized Locations

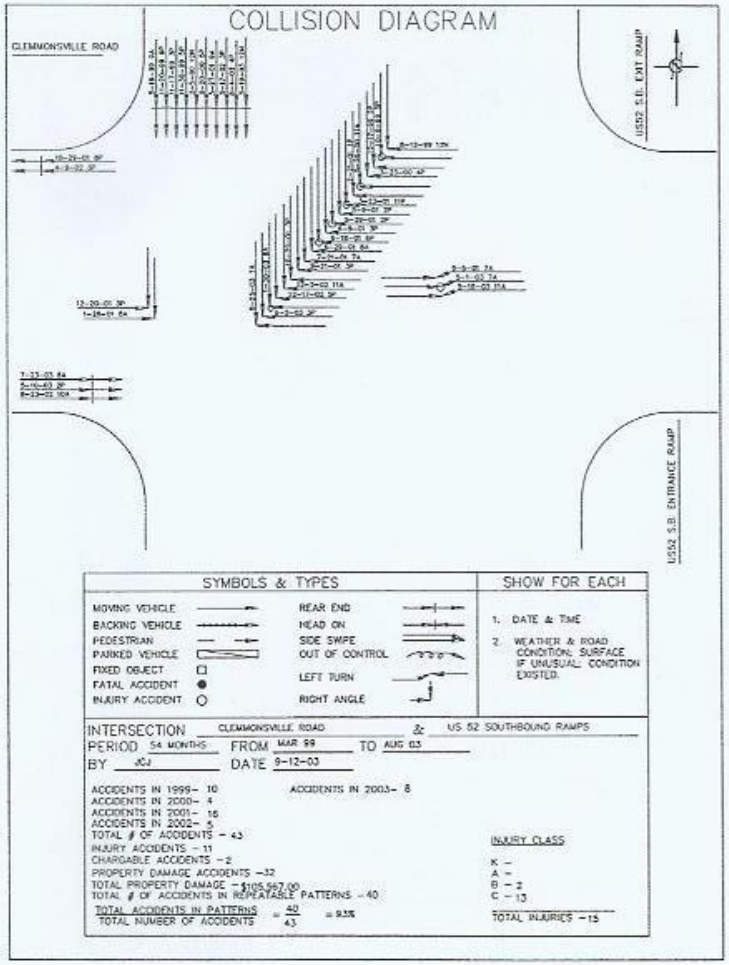
(continued)

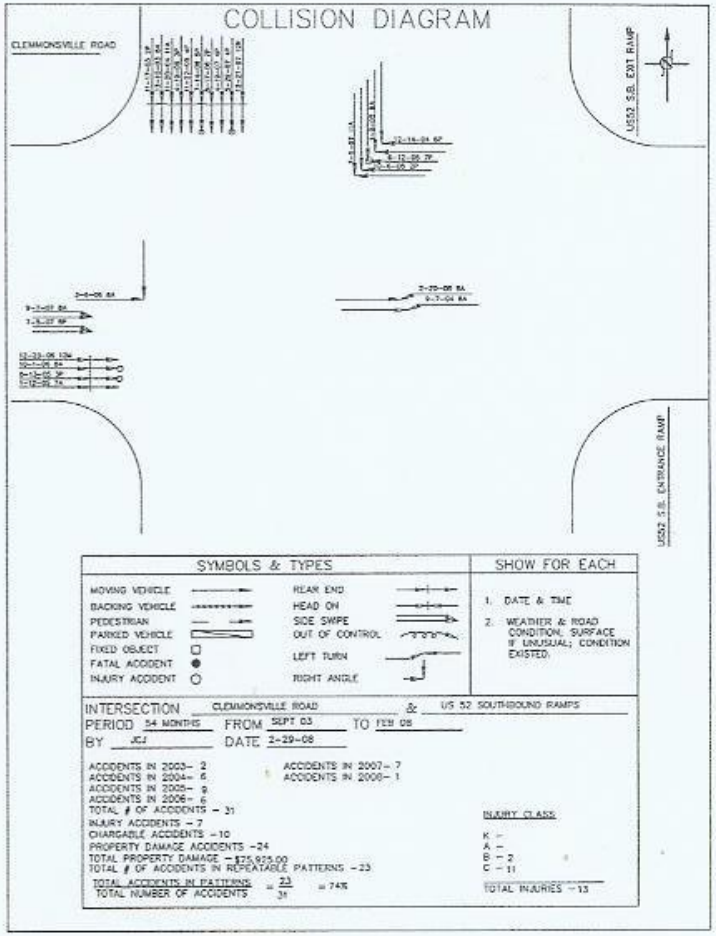
Problem	Treatment	Studies	% Change Targeted	% Change Total
Rear End Crashes	Create Left-Turn Lane within Existing Roadway Width	11	-91.2%	-28.2%
"	Build Left-Turn Lane	5	-96.8%	-44.9%
"	Build/Improve Acceleration Lane	9	-96.8%	-83.2%
"	Replace Yield w/ Stop	5	-3.3%	-8.9%
Ran off Road Hit Fixed Object	Install Chevrons	8	-67.9%	-10.8%
"	Move Fixed Object	5	-46.7%	-24.0%
"	Vertical Clearance Signs	5	+10.7%	+28.4%
"	Double Arrow Panel	5	-91.6%	-29.7%

Program's Operation

- When a question about a location arises, prepare collision diagram. (use 3+ years of data)
- If there are patterns of crashes visit site, note existing conditions.
- Collect any other relevant data.
- If countermeasure is available, deploy.
- Finalize before collision diagram, open after diagram.

Before & After Accident Diagram

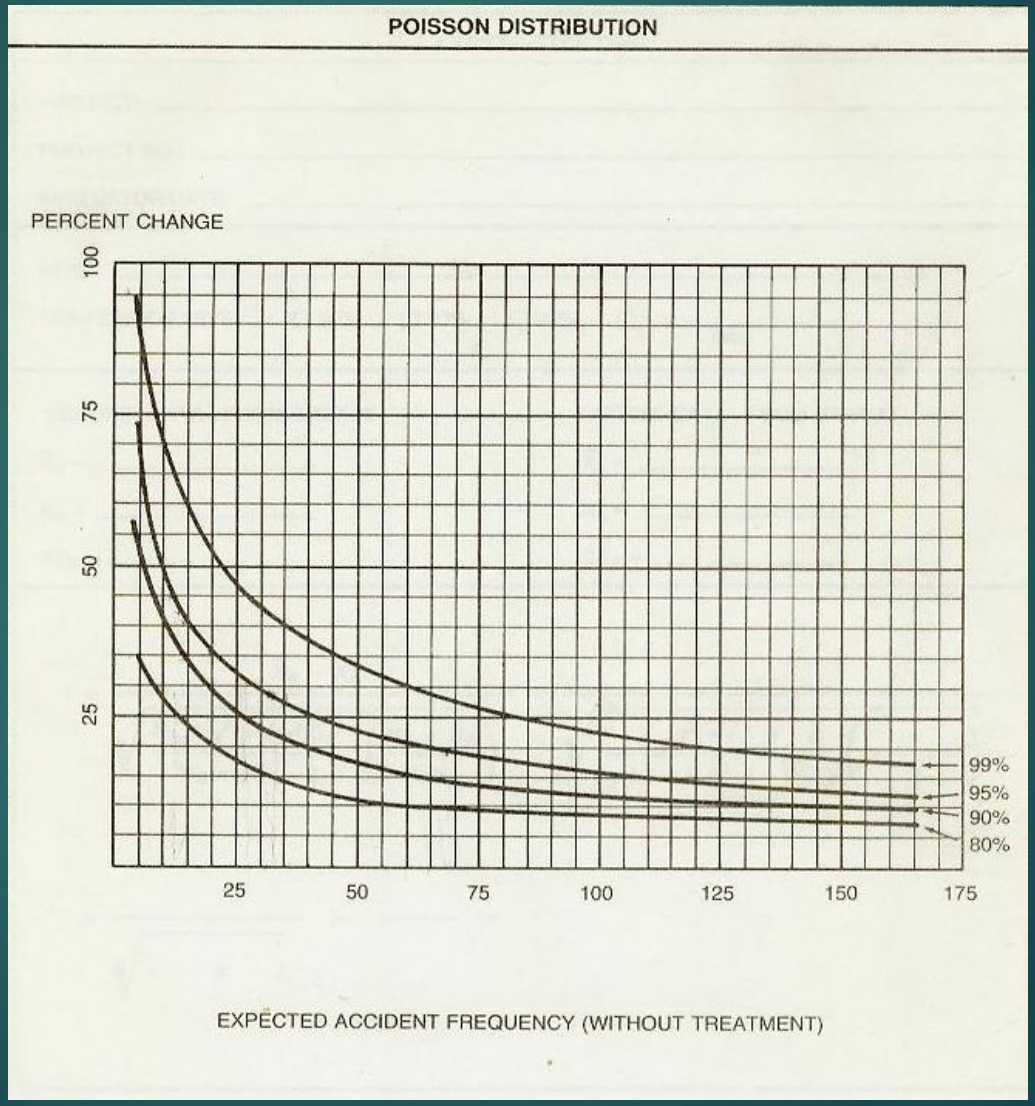




Evaluation- When before/after period equalize, compare:

- Targeted Crashes- Patterns countermeasure was designed to impact.
- Total Crashes
- # of injured
- $ value of property damage

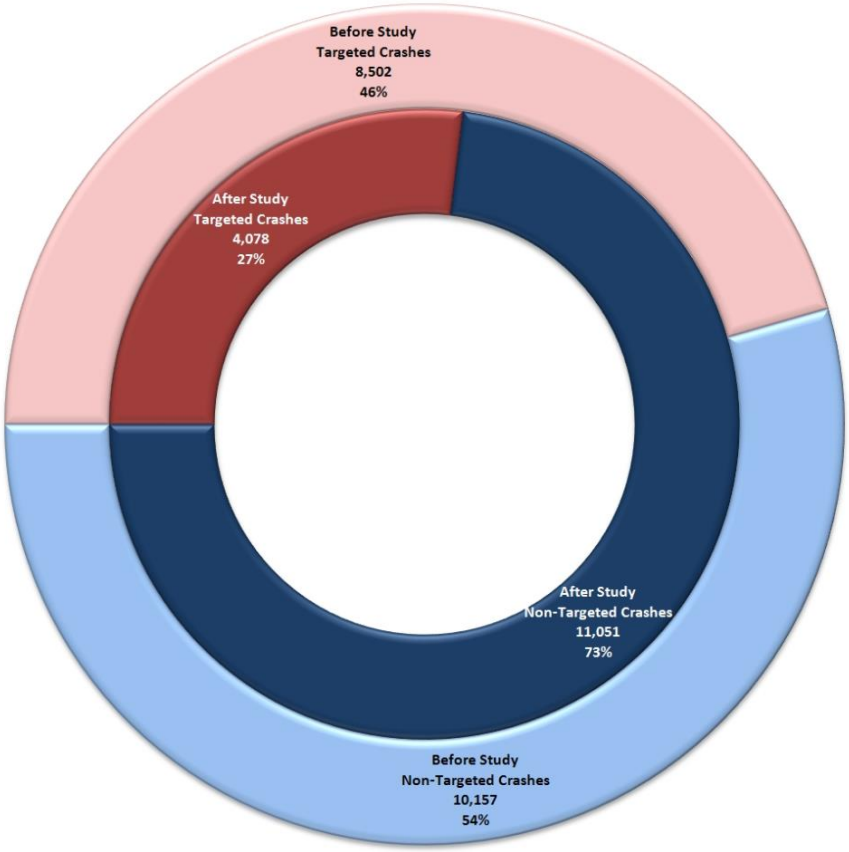
Graph of Poisson Distribution (Luenfleld, 1980)



SUMMARY OF CHANGES FOR 858 COMPLETED BEFORE & AFTER STUDIES

	BEFORE	AFTER	%CHANGE
TARGETED CRASHES	8,502	4,078	-51%
TOTAL CRASHES	18,659	15,129	-18%
# OF INJURIES	11,058	7,578	-31%
PROPERTY DAMAGE	$52,297,979	$41,916,241	-19%

Before & After Study Results



SUMMARY OF CHANGES FOR 858 COMPLETED BEFORE & AFTER STUDIES

	# DECLINES	# INCREASES	# TIES	% DECLINE
TARGETED CRASHES	726	95	36	84.6%
TOTAL CRASHES	588	231	39	68.5%
# OF INJURIES	578	229	42	67.4%
PROPERTY DAMAGE	541	270	5	66.8%

Traditional Traffic Engineering Safety Program

- A list of crash locations that meet or exceed some threshold is developed and ranked in some priority order.
- Locations are studied, countermeasures designed and implemented in the order of their rankings.
- List is worked until allocations are treated or money runs out.
- Process first set out in the Highway Safety Program Manual (FHWA 1969)
- Process designed for states; funds and staff designated specifically for safety.

Traditional Approach doesn't transfer well to local agencies

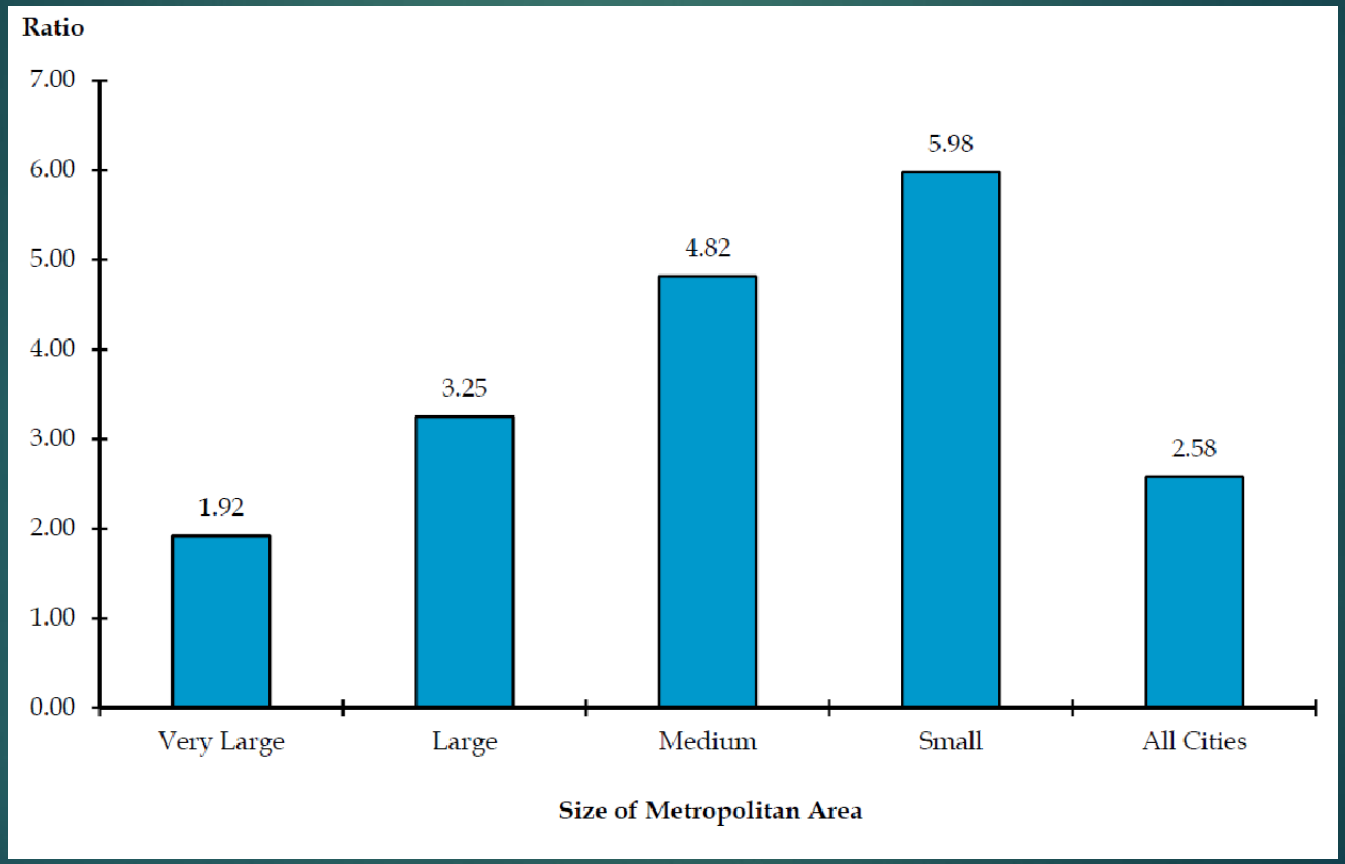
- Few, if any, funds assigned only to safety
- Without funds, problem identification/priority ranking, which is often seen as cumbersome, complicated and confusing, is also pointless.
- Congestion is often the focus of most local activities.
- Safety often viewed as compliance with standards.
- Responses to perceived safety issues.

Safety is a Local Problem

- 75% of road and street mileage is local.
- Local efforts are necessary to impact the problem.

(Wilson 03)

Graph Crash Costs Compared to Congestion Costs (AAA, 2009)



Low-Cost Approach - A simple, straightforward solution

- Uses available tools – signs, signals, markings, etc and traffic maintenance forces.
- If a location shows a pattern or patterns of crashes susceptible to treatment, location is treated then treatment is evaluated.
- Locations identified in a variety of ways: inquires from citizens or press; other traffic studies; complaint; computerized lists.

Traffic crashes are rare events

- To most of us they're a statistic
- To some an inconvenience
- To a few a tragedy

Questions?