Intersection Safety Analysis

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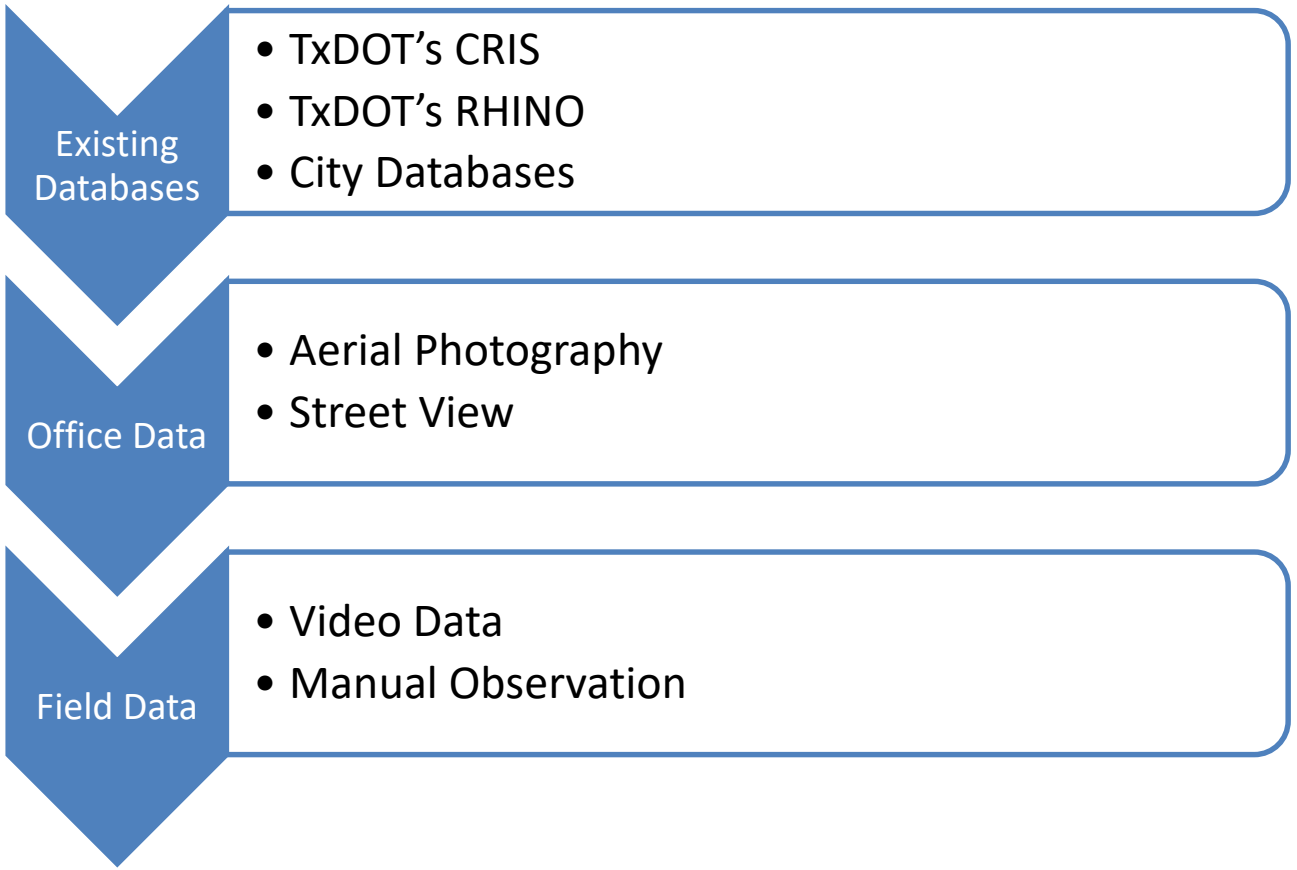
Intersection Database

TxDOT project (2015-19)

Contains all variables

- Includes pedestrian volumes

Data Collection



Field Data Worksheet

Standard

Continental

Ladder

Crosswalk Marking Types

Rectangular Rapid Flashing Beacon

Pedestrian Hybrid Beacon

Pedestrian Beacon Types

Final Data

Int num	City	Major St	Minor St	Latitude	Longitude	Onsys_fl	Tot_ped_crashes	Veh_str	Veh_lt_trn	Veh_rt_trn	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Daylight	Oth_light	Hours_meas	Date	Start_time	End_time	Daily_vol_s
1	DFW	WESTMORELAND RI	INVESTOR DR	32°39'32.92"N	96°52'58.97"W	N	2	1	0	1	0	0	0	1	0	1	0	2	0	2	5/3/2017	8:00	10:00	
2	DFW	COOPER ST	OAK VILLAGE BLVD	32°40'3.08"N	97° 8'2.70"W	Y	2	1	0	1	0	0	0	0	0	2	0	1	1	2	5/2/2017	7:25	9:25	
3	DFW	E LANCASTER RD	E LEDBETTER DR	32°41'10.59"N	96°47'23.20"W	Y	3	3	0	0	0	1	0	1	0	0	1	2	1	2	5/16/2017	15:50	17:50	
4	DFW	W COOPER ST	W MAYFIELD RD	32°41'29.72"N	97° 7'42.54"W	Y	1	1	0	0	0	0	0	0	0	1	0	1	0	2	5/2/2017	12:20	14:20	
5	DFW	ARKANSAS LN	DANIEL DR	32°42'22.50"N	97° 5'22.57"W	N	3	2	0	1	0	0	0	0	0	2	1	2	1	2	5/2/2017	15:30	17:30	
6	DFW	WOODSIDE DR	ARKANSAS LN	32°42'25.14"N	97°10'39.15"W	N	2	0	1	1	0	1	0	0	0	1	0	1	1	24	6/15/2017	0:00	0:00	
7	DFW	PIONEER PKWY	DANIEL DR	32°42'29.22"N	97° 5'22.03"W	Y	1	0	0	1	0	0	0	0	0	1	0	0	1	2	5/2/2017	17:35	19:35	

Int num	Cell-user vol	Cell-user prp	Site number	ADT_major	ADT_major_y	ADT_minor	ADT_minor_y	Signal cycle length	Lighting present	Development type	Highway-rail grade crossings	Ped generators	Main St	Direction (N/S or E/W)	Speed limit	School speed limit	School limit times AM	School limit times PM
1	12	0.02	HOU-01	74741	2011	37745	2014	135	Y	COM	N	N/A	Westheimer Rd	E/W	35	999	N/A	N/A
2	157	0.12	HOU-02	64499	2011			135	Y	RES	N	N/A	Westheimer Rd	E/W	35	999	N/A	N/A
3	0	0.01	HOU-03	19658	2012	32280	2012	90	Y	COM	N	N/A	Bellfort St	E/W	35	999	N/A	N/A
4	0	0.01	HOU-04	28160	2012			110	Y	COM	N	N/A	S Wayside Dr	N/S	40	999	N/A	N/A
5	0	0.01	HOU-05	74741	2011			135	Y	COM	N	N/A	Westheimer Rd	E/W	35	999	N/A	N/A

Int num	Ped signal heads	Leg location (N or E)	One-way / two-way	L lanes	T lanes	R lanes	LT lanes	TR lanes	LTR lanes	Left-turn mode	Right-turn mode	Median type	Median width	Pushbutton	Walk length	FDW length	Cross length	Bus stops	Rail stops	Leg location (S or W)	One-way / two-way	L lanes	T lanes	R lanes
1	COUN	E	2	2	3	0	0	1	0	Prot	Perm	Raised	2	Button/feedback	4	25	110	1	0	W	2	2	3	0
2	COUN	E	2	1	3	0	0	1	0	Prot	Perm	Raised	4	Button/feedback	4	22	100	1	0	W	2	1	2	0
3	COUN	E	2	1	1	1	0	0	0	Prot	Perm	Raised	7.5	Button	12	21	107.5	0	0	W	2	1	2	1
4	CONV	N	2	0	0	0	1	1	0	Perm	Perm	None	0	Button	5	14	52.5	1	0	S	2	0	0	0

Int num	Walk length	FDW length	Cross length	Bus stops	Rail stops	Leg location (S or W)	One-way / two-way	L lanes	T lanes	R lanes	LT lanes	TR lanes	LTR lanes	Left-turn mode	Right-turn mode	Median type	Median width	Pushbutton	Walk length	FDW length	Cross length	Bus stops	Rail stops	Notes
1	20	25	80	0	0	S	2	1	2	0	1	1	0	Prot	Perm	Raised	4	Button/feedback	20	25	100	1	0	
2	48	12	42	0	0	S	2	0	0	0	1	1	0	Perm	Perm	Raised	1.5	Button/feedback	36	12	56	0	0	
3	5	24	105	0	0	S	2	1	2	0	0	1	0	Prot	Perm	Raised	9.5	Button	5	24	125	0	0	
4	41	10	22	0	0	W	2	0	0	0	0	0	1	Perm	Perm	None	0	Button	38	10	42	0	0	
5	999	999	49.5	0	0	S	2	0	0	1	1	0	0	Prot-Perm	Perm	None	0	None	999	999	53	0	0	4 signal head

Database Size

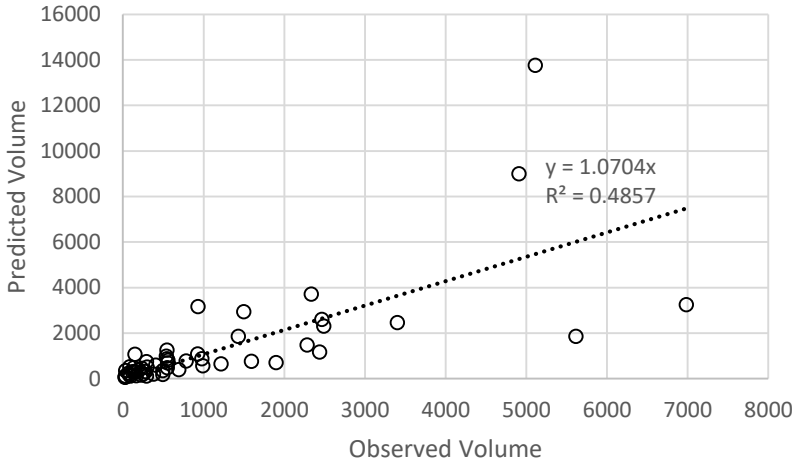
Houston	• 225 Signalized Intersections • 33 Midblock locations
San Antonio	• 225 Signalized Intersections • 31 Midblock locations
DFW	• 100 Signalized Intersections
Austin	• 75 Signalized Intersections
Total	• 625 Signalized Intersections • 64 Midblock locations

Dallas Pedestrian Safety

- Identified Hot Spots:
  - High Risk intersections (on-system)
- High Risk Intersections
  - Signals (19)
  - Stops (23)
- High Risk Intersection Investigations
  - Reviewed Crash Reports
  - Collision Diagrams in Google Earth
  - Developed potential countermeasures

Negative Binomial Model Pedestrian Volume at Signals

- Increases 4 times if in CBD
- 12% increase per school within 1 mile
- Increases 4.8 times per 1% increase in Commercial/MF residential
- Increases 4.7 times with higher education, hospitals, or malls
- 36% decrease per 5mph increase in max. speed limit

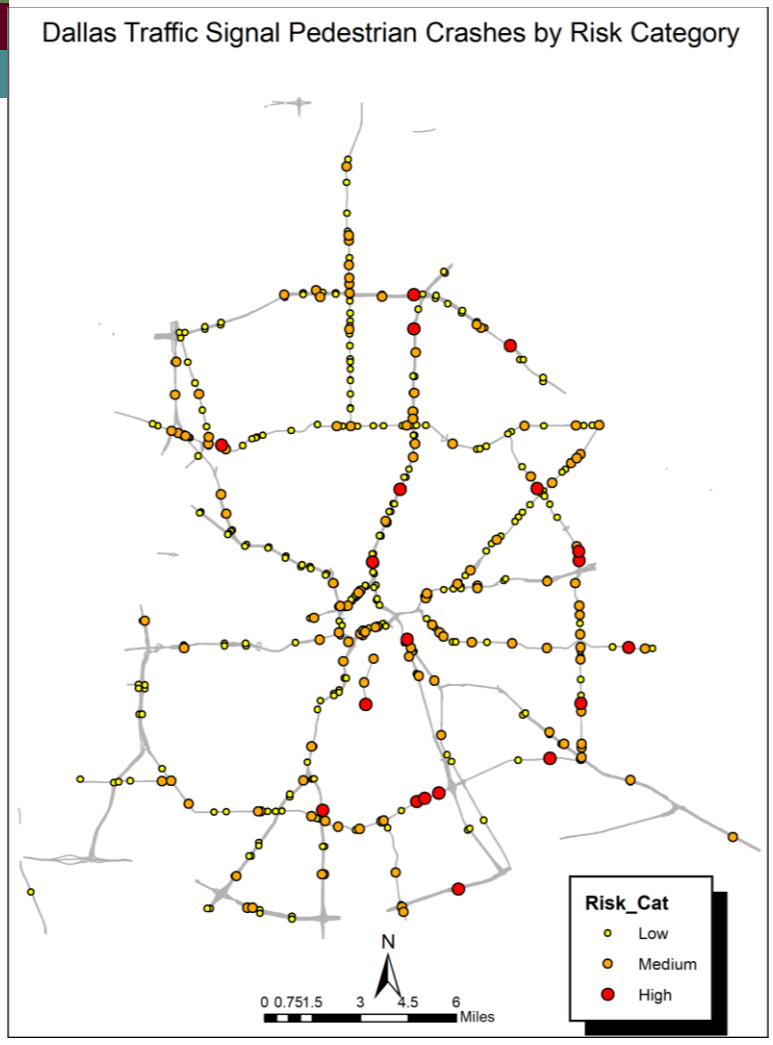


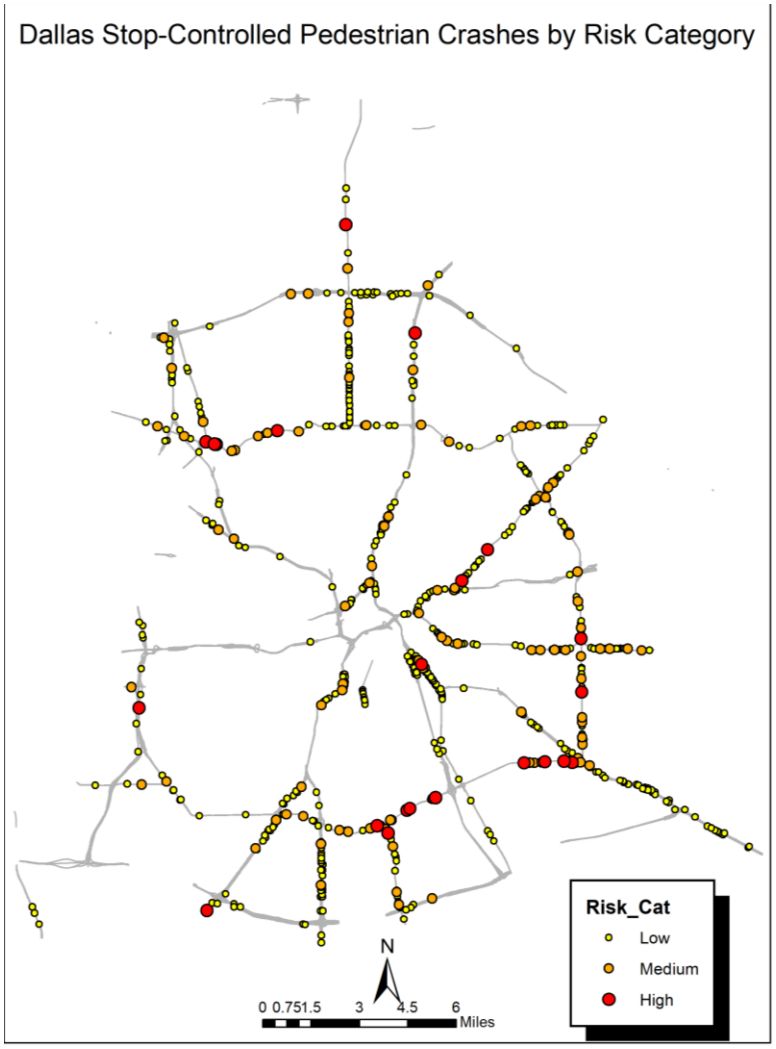
Safety Performance Function

$$N_{ped} = \exp\left(b_0 + b_{tot}\, AADT_{tot} + b_{ratio}\, \frac{AADT_{min}}{AADT_{maj}} + b_{ped}\, PedVol + b_{cmf}\, p_{comm+MF} + b_{bus}\, n_{bus}\right)$$

N_{ped}	=	**Number of pedestrian crashes**
$\boldsymbol{AADT_{tot}}$	=	Sum of major street AADT and minor street AADT.
$\boldsymbol{AADT_{min}}$	=	Minor street AADT,
$\boldsymbol{AADT_{maj}}$	=	Major street AADT,
$\boldsymbol{PedVol}$	=	Sum of daily pedestrian volumes (pedestrians/day) crossing all intersection legs,
$\boldsymbol{p_{comm+MF}}$	=	Proportion of commercial and multi-family land use,
$\boldsymbol{n_{bus}}$	=	Number of bus stops within 300ft of the center of the intersection, and
b_j	=	calibrated coefficients.

Dallas Intersections





LP 12 (NW Hwy), Starlight/Kendale to community

- @ Starlight/Kendale – 14 ped. crashes (1 fatal + 4 incapacitated)
- @ Community – 12 ped. crashes (5 incapacitated)
- Multiple crashes were “dark, not lighted”; consider roadway lighting
- Two crashes involved drivers running up onto the curb and striking pedestrians who were not in the roadway; consider roadway lighting
- The raised median there appears too narrow for a formal refuge area (5 ft. min.); consider providing refuge area
- Sidewalks are not continuous and might contribute to people crossing at places near (but not at) the intersection; consider installing sidewalks

35 mph zone; consider PHB with advanced markings/signs, Raised Ped Crosswalks

LP 12 (Buckner) @ John West

- 11 ped. crashes
- 4 minor (≤ 16) ped. crashes and 1 wheelchair
- High pedestrian activity node, comm+ MF housing, elementary & middle school
- High ADT and multiple bus stops
- 40 mph on Buckner; 35 mph on John West

Consider Leading Ped. Interval, Ext. Ped Phase, Ped Refuge Island/Raised Median on south leg, Auto Ped Detection

LP 12 (great trinity) @ jim miller

- 12 ped. crashes
- 2 fatal and 3 incapacitated ped. crashes
- Multiple crashes were “dark, not lighted” and away from intersection
- SF housing
- Sidewalks are not continuous
- 50mph on LP 12 but has a 20mph school zone without proper transition

Consider Improve Lighting (away from intersection), provide speed transition, sidewalks

Corinth @ Morrell Ave.

- 8 ped. crashes (3 incapacitated)
- 3 minor (≤ 16) ped. crashes
- Multiple crashes were “dark, not lighted”
- Faded crosswalks (especially west leg)
- Multiple bus stops
- 35mph on Corinth but changes to 40mph at ped. crossing warning beacon on south leg

Consider Improve Lighting on west leg, High-Viz Ped Crosswalks, Ped Countdown Timer

Current work

- SPF for intersection and pedestrian crashes
  - Indicator for city
- Transferability of Pedestrian volume model to other city
- An interactive map where the users can access and visualize the data

THANK YOU

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