MEMORANDUM STATE OF ALASKA

Department of Transportation & Public Facilities
Design and Engineering Services – Central Region
Highway Design Section - Traffic and Safety

TO: Ken Morton, P.E.
Regional Preconstruction Engineer

DATE: January 28, 2016

THRU: James Amundsen, P.E., Chief
Highway Design

TELEPHONE NO: 269-0639
FAX NUMBER:

FROM: Scott E. Thomas, P.E.
Central Region Traffic Engineer

SUBJECT: CR HSIP Crash Review
Bicycles 2003-2012

Use the attached crash concentration lists to consider adding new bicycle improvements on 3R, 4R, and HSIP Projects. There are two thresholds of concern. These are centered around the common ¼ mile signal grid in Anchorage, where most of Alaska's crashes occur. Analyze for cost-effective long term capital project solutions as follows:

HIGHEST CRASH AREAS – 95th percentile (12 crashes/quarter-mile/decade)

- Review sight distance at intersections, conflict points
- Gather bicycle and vehicle counts and travel direction to identify conflicts
- Review crash history pre-actions, direction of travel, time of day, time of year and other crash details to determine if there are feasible and reasonable solutions.
- Consider warrants for traffic control devices per ATM Sections 3B.18 and 4A.03
- Consider buffers and separated facilities per the HPM Chapters 1130.7 and 1210.
- Consider median refuge at >= 20,000 vpd. See P&P 05.05.050.

LARGER AREAS OF CONCERN – 75th percentile (6 crashes/quarter-mile/decade)

- Review sight distance at intersections, conflict points
- Review crash history pre-actions, direction of travel, time of day, time of year and other crash details to determine if there are feasible and reasonable solutions.
- Consider brushing, warning signing and/or striping with Traffic & Safety guidance

Attachments: CR HSIP Crash Rankings 2003-2012; HSIP Crash Trends Information

Distribution: Randy Vanderwood, P.E., Chief, Maintenance & Operations
Jennifer Witt, Chief, Planning & Administrative Services
Jim Amundsen, P.E., Chief, Highway Design Section
Wolfgang Junge, P.E., Chief, Aviation Design Section
John Linnell, P.E., Chief, Right of Way and Utilities Section
Eric Desentis, P.E., Chief, Preliminary Design & Environmental
Stephanie Mormilo, P.E., Municipal Traffic Engineer, Anchorage

Central Region DOT/PF

Bicycle-Vehicle Crash Rankings (2003-2012)

Highest Crash Segments for Evaluation using 95%ile Threshold

Highway Safety Improvement Program (HSIP) Review

(Consider benefit/cost of capital project crossing possibilities: rerouting, medians, designated facilities, traffic control devices, grade separation, etc.)

Sliding Spot using Baski Sorting Formula (BSF Formula) & 3+ crashes in 10 years

1/4 Mile Window (0.25 mi: +/-660 feet or +/-2 blocks)

									10 year totals		
			Start Crashes		End Crashes					**SORT**	Comments
Rank	CDS Route	Road Name	From MiPt	Description	To MiPt	Description	Length (mi)	Length (ft)	Total Qualifying Crashes	*Crash Density/Mi (Min Length 1/4 Mile)	
1	134140	LAKE OTIS PARKWAY * ANCHORAGE	1.614	500' North of 42ND AVE_EB	1.865	TUDOR	0.251	1325	17	68	
2	134300	MINNESOTA DRIVE * ANCHORAGE	6.17	500' South of BENSON BLVD	6.37	NORTHERN LIGHTS BLVD	0.200	1056	16	64	
3	133700	DIMOND BLVD * ANCHORAGE	0.000	NEW SEWARD_HWY	0.332	400' West of OLD SEWARD HWY	0.332	1753	21	63	
4	134750	NORTHERN LIGHTS BLVD * ANCHORAGE	5.08	CORDOVA ST	5.39	200' West of C STREET	0.310	1637	19	61	
5	133899	TUDOR ROAD * ANCHORAGE	1.861	308' West of SEWARD SB/TUDOR OFF RAMP	2.022	BRAYTON WB	0.161	850	13	52	
6	134750	NORTHERN LIGHTS BLVD * ANCHORAGE	4.71	NEW SEWARD HWY SB	4.73	100' West of NEW SEWARD HWY	0.020	106	12	48	
7	133700	DIMOND BLVD * ANCHORAGE	0.875	675' East of C ST	1.017	C ST	0.142	750	12	48	
8	133900	MULDOON ROAD * ANCHORAGE	2.09	DEBARR RD E/B	2.292	50' North of 11TH CT.	0.202	1067	12	48	

Total 1.618 miles

Sites are ranked at 95%ile collision frequency when 12 or more crashes per quarter mile per 10 years.

CDS Milepoints are DOT/PF linear references. Mileposts are historical markers and are not the same. See Descriptions for location.
Cost-effectiveness of mitigation strategies should be compared before selecting a solution.
This table overlaps with the data meeting the 75%ile threshold.

OTHER RANKING CRITERIA		NONQUALIFYING CRITERIA
Includes unsignalized locations, signalized locations, roundabouts and midblock areas		

NOTE:

The information in this report is compiled for highway safety planning purposes. Federal law prohibits its discovery or admissibility in litigation against state, tribal or local government that involves a location or locations mentioned in the collision data. 23 U.S.C. § 409; 23 U.S.C. § 148(g); *Walden v. DOT* , 27 P.3d 297, 304-305 (Alaska 2001).

*A minimum length of 1/4 Mile was used for Crash Density Calculation

Central Region DOT/PF

Bicycle-Vehicle Crash Rankings (2003-2012)

High Crash Areas of Concern for Evaluation using 75%ile Thresholds

Highway Safety Improvement Program (HSIP) Review

(Consider benefit/cost of operational possibilities: signing, striping, vegetation management)

Sliding Spot using Baski Sorting Formula (BSF Formula) & 3+ crashes

1/4 Mile Window (0.25 mi: +/-660 feet or +/-2 blocks)

											10 year totals				
				Start Crashes		End Crashes							**SORT**	****SORT Combined**	Comments
Rank	*Combined Rank	CDS Route	Road Name	From MiPt	Description	To MiPt	Description	Length (mi)	Length (ft)	*Combined Length (mi)	Total Qualifying Crashes	Total Qualifying Crashes Minus Signals	*Crash Density/Mi (Min Length 1/4 Mile)	*Crash Density/Mi (Min Length 1/4 Mile)	
1	1a	133700	DIMOND BLVD * ANCHORAGE	0.000	NEW SEWARD_HWY	0.364	at DIMOND BLVD	0.364	1922	0.873	23	10	63	55	
2	1b	133700	DIMOND BLVD * ANCHORAGE	0.508	DIMOND CENTER DR	1.017	C ST	0.509	2688	0.873	25	12	49	55	
35	2b	133200	OLD SEWARD HIGHWAY	7.755	E 36TH AVE	7.777	36TH	0.022	116	0.170	6	0	24	48	
42	2a	133200	OLD SEWARD HIGHWAY	7.123	100' South of 46TH AVE	7.271	TUDOR	0.148	781	0.170	6	2	24	48	
7	3b	134140	LAKE OTIS PARKWAY * ANCHORAGE	4.649	88TH AVE NB	4.899	ABBOTT_RD	0.250	1320	0.347	10	5	40	46	
38	3a	134140	LAKE OTIS PARKWAY * ANCHORAGE	4.313	AZURITE	4.410	E 84TH AVE	0.097	512	0.347	6	3	24	46	
4	4	134140	LAKE OTIS PARKWAY * ANCHORAGE	3.397	68TH	3.407	60' South of 68TH AVE	0.010	53	0.010	11	2	44	44	
5	5	133724	ABBOTT ROAD * ANCHORAGE	3.601	E DIMOND BLVD	3.842	NEW SEWARD HWY	0.241	1272	0.241	11	4	44	44	
3	6a	134750	NORTHERN LIGHTS BLVD * ANCHORAGE	4.710	NEW SEWARD HWY SB	4.730	100' West of NEW SEWARD HWY	0.020	106	1.380	12	1	48	43	
15	6b	134750	NORTHERN LIGHTS BLVD * ANCHORAGE	4.950	30' West of EAGLE ST	6.310	400' West of MINNESOTA__DR	1.360	7181	1.380	47	34	35	43	
8	7	134770	36TH AVENUE (E OF MINNESOTA) * ANCHORAGE	0.750	EUREKA ST	0.990	A ST	0.240	1267	0.240	10	5	40	40	
11	8a	134140	LAKE OTIS PARKWAY * ANCHORAGE	0.814	27TH WB	0.909	NORTHERN LIGHTS BLVD	0.095	502	1.034	9	5	36	40	
16	8c	134140	LAKE OTIS PARKWAY * ANCHORAGE	1.499	4100 LAKE OTIS PKWY	2.271	WALDRON ST.	0.772	4076	1.034	26	17	34	40	
43	8b	134140	LAKE OTIS PARKWAY * ANCHORAGE	1.197	DUKE DR	1.364	36TH AVE	0.167	882	1.034	6	2	24	40	
9	9	133899	TUDOR ROAD * ANCHORAGE	1.582	ALASKA ATHELIC CLUB	2.123	EAU CLAIRE PL	0.541	2856	0.541	21	6	39	39	
10	10	134750	NORTHERN LIGHTS BLVD * ANCHORAGE	2.620	BRAGAW ST	2.960	ARCA DR	0.340	1795	0.340	13	11	38	38	
6	11a	133900	MULDOON ROAD * ANCHORAGE	2.090	DEBARR RD E/B	2.411	40' North of OLD HARBOR_SB	0.321	1695	0.866	14	4	44	38	
14	11b	133900	MULDOON ROAD * ANCHORAGE	2.550	400' South of 6TH AVE_EB	3.095	BOUNDARY AVE	0.545	2878	0.866	19	11	35	38	
12	12	133724	ABBOTT ROAD * ANCHORAGE	2.770	LAKE OTIS BLVD	2.903	0.01 Miles West of 2242 GOLOVIN ST	0.133	702	0.133	9	8	36	36	
13	13	134500	DEBARR ROAD * ANCHORAGE	0.900	75' West of NICHOLS ST	1.110	RUDAKOF CIR	0.210	1109	0.210	9	5	36	36	
17	14	134341	C STREET * ANCHORAGE	1.180	20' South of 4TH AVE	1.310	6TH AVE	0.130	686	0.130	8	3	32	32	
18	15	134600	6TH AVENUE * ANCHORAGE	0.582	C STREET	0.718	A ST	0.136	718	0.136	8	2	32	32	
19	16	134310	SPENARD ROAD * ANCHORAGE	0.430	30' West of WISCONSIN	0.580	LAKESHORE DR	0.150	792	0.150	8	3	32	32	
20	17	134460	MOUNTAIN VIEW DRIVE * ANCHORAGE	0.720	PRICE ST	0.880	200' East of Bragaw St	0.160	845	0.160	8	3	32	32	
21	18	134120	FIREWEED LANE * ANCHORAGE	1.087	BLUEBERRY	1.280	545 FIREWEED LANE	0.193	1019	0.193	8	5	32	32	
22	19	134770	36TH AVENUE (E OF MINNESOTA) * ANCHORAGE	1.500	OLD SEWARD HWY	1.910	LOCARNO NB	0.410	2165	0.410	13	6	32	32	
23	20	134311	SPENARD ROAD * ANCHORAGE	1.180	WOODLAND DR	1.533	30' East of MINNESOTA BLVD	0.353	1864	0.353	11	9	31	31	
24	21b	134330	ARCTIC BLVD * ANCHORAGE	1.190	36TH AVE	1.460	DRIVEWAY TO 4300 ARCTIC BL	0.270	1426	0.460	8	8	30	30	
44	21a	134330	ARCTIC BLVD * ANCHORAGE	0.690	NORTHERN LIGHTS	0.880	31ST AVE	0.190	1003	0.460	6	3	24	30	
25	22	133899	TUDOR ROAD * ANCHORAGE	2.910	300' West of FOLKER ST	3.218	PIPER STREET	0.308	1626	0.308	9	4	29	29	
26	23	134501	DEBARR ROAD * ANCHORAGE	2.340	NUNAKA DR NB	2.620	BEAVER PL	0.280	1478	0.280	8	6	29	29	
27	24	133950S1	BRAGAW STREET * ANCHORAGE	0.000	NORTHERN LIGHTS BLVD	0.020	NORTHERN LIGHTS BLVD	0.020	106	0.020	7	0	28	28	
28	25	133200	OLD SEWARD HIGHWAY	6.186	PEARL DR	6.271	DOWLING	0.085	449	0.085	7	3	28	28	
29	26	133950S1	BRAGAW STREET * ANCHORAGE	0.350	200' South of REKA DR	0.490	16 TH AVE	0.140	739	0.140	7	6	28	28	
30	27	133700	DIMOND BLVD * ANCHORAGE	1.679	CARNELIAN ST	1.858	MINNESOTA BLVD	0.179	945	0.179	7	2	28	28	
31	28	134342	A STREET * ANCHORAGE	0.520	32ND	0.710	100' N of BENSON NB	0.190	1003	0.190	7	2	28	28	
32	29	134341	C STREET * ANCHORAGE	3.100	33RD AVE	3.540	40TH AVE	0.440	2323	0.440	12	6	27	27	
33	30	134100	BENSON BOULEVARD * ANCHORAGE	1.015	CHEECHAKO ST SB	1.401	100' East of A STREET	0.386	2038	0.386	10	7	26	26	
34	31	134100	BENSON BOULEVARD * ANCHORAGE	0.383	MINNESOTA BLVD	0.383	MINNESOTA BLVD	0.000	0	0.000	6	0	24	24	
36	32	133792	SEWARD SB - DIMOND RAMP	0.223	NEW SEWARD S/B	0.260	DIMOND BLVD	0.037	195	0.037	6	0	24	24	
37	33	134325	DENALI STREET (TUDOR) * ANCHORAGE	0.135	250' North of NORTHERN LTS BLVD	0.221	473' South of BENSON BLVD	0.086	454	0.086	6	5	24	24	
40	34	134440	5TH AVENUE * ANCHORAGE	1.419	20' West of HYDER ST	1.555	FAIRBANKS ST SB	0.136	718	0.136	6	3	24	24	
41	35	134120	FIREWEED LANE * ANCHORAGE	0.240	SEWARD HWY	0.380	FAIRBANKS__ST	0.140	739	0.140	6	2	24	24	
45	36	134700	BONIFACE PARKWAY * ANCHORAGE	0.760	32ND AVENUE	1.000	NORTHERN LIGHTS BLVD	0.240	1267	0.240	6	2	24	24	

Total 11.044 miles

Sites are ranked at 75%ile collision frequency when 6 or more crashes per quarter mile per 10 years.

CDS Milepoints are DOT/PF linear references. Mileposts are historical markers and are not the same. See Descriptions for locaion.
Cost-effectiveness of mitigation strategies should be compared berfore selecting a solution.

NOTE:

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*A minimum length of 1/4 Mile was used for Crash Density Calculation

**Combined Qualifiing Length is sum of two qualifing sections, and is not the total length.

State of Alaska

Department of Transportation & Public Facilities DOT/PF

Highway Safety Improvement Program (HSIP)

Central Region Review of Bicycle Crashes 2003-2012

ATTACHMENT: Crash Trends through Charts

FINDINGS:

Chart 1 - Shows more than half and possibly 2/3 of bicycle crashes do not occur at signals
Chart 2 – Shows that most bicycle crashes, at least more than half, are angle crashes. Very few are crashes traveling parallel to or with traffic.
Chart 3 – Of Angle crashes – ¾ occur when the bicyclist is to the right of motorists
Chart 4 – Of Angle crashes, when the bicyclist is to the right, the majority of crashes are not at signals. There is a significant amount of angle crashes where the bicyclist is to the right at signals as well.
Chart 5 – The long term trend is that bicycle crashes appear to have leveled off since 1995, when DOT/PF adopted nonmotorized consideration in all design projects. Prior to 1995, nomotorized infrastructure was less common in project scopes and budgets. Crashes may even be declining against known increases in vehicular and bicycle traffic over the past 20 years.
Chart 6 – Serious injuries and fatalities with bicyclists are also flat or declining alongside gradual increases in vehicular and bicycle traffic.

CR-T-1.02 – Regional Drawings for stop bars and pathway placement continue to "sweep" pathways in front of sidestreet stop bars to minimize angle crashes at unsignalized intersections. CR Drawings began in 2005. Prior to that, it was a project by project detail for about 10 years.

2005 HSIP Nonmotorized Crash Review - Previous mapping in 2005 HSIP review of nonmotorized crashes shows most corridors with paths/sidewalks parallel to major arterials have bike/vehicle crash problems at sidestreets. Those sidewalks and paths without sweeps appear to have the higher numbers of angle bike crashes, with the main concern being bicycles approaching from the right. Signalized crashes with right turn vehicles were also a concern.

1986, 1990 Memorandum - Prior to 2005 a memorandum in 1986 required "sweeps" at intersections at least since that time. This effort appears to be one factor in leveling off bicycle crashes with sidestreet motorists.

Chart 1: All Bicycle Crashes by Traffic Control (2003-2012)

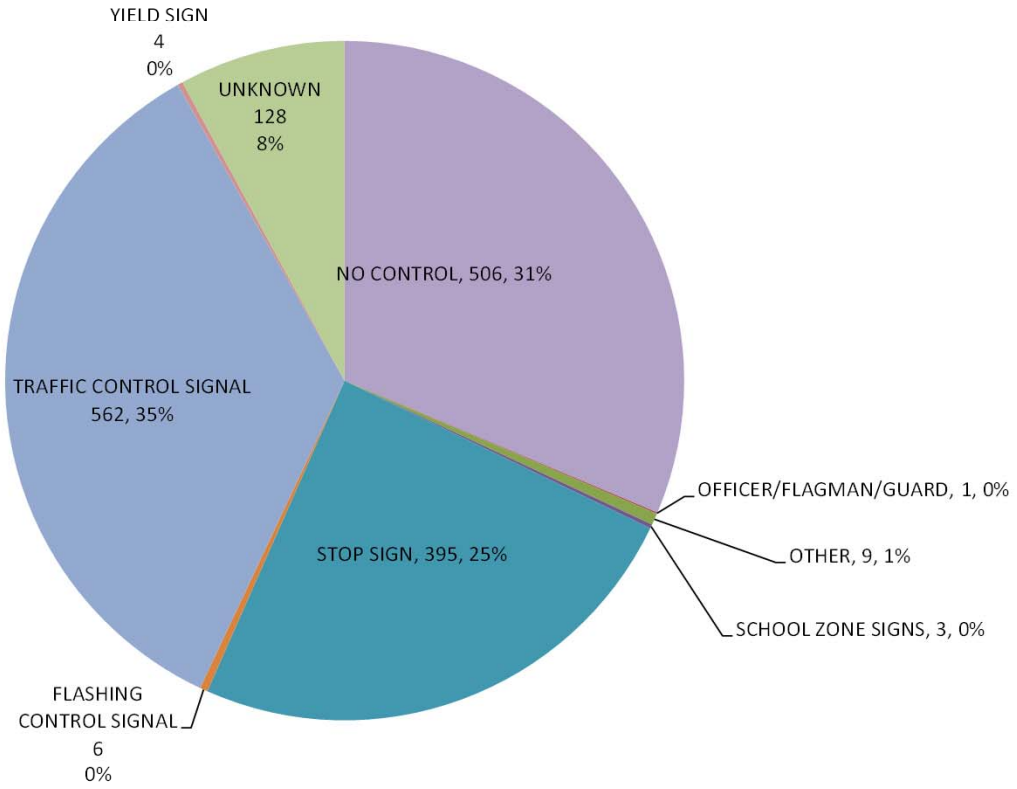
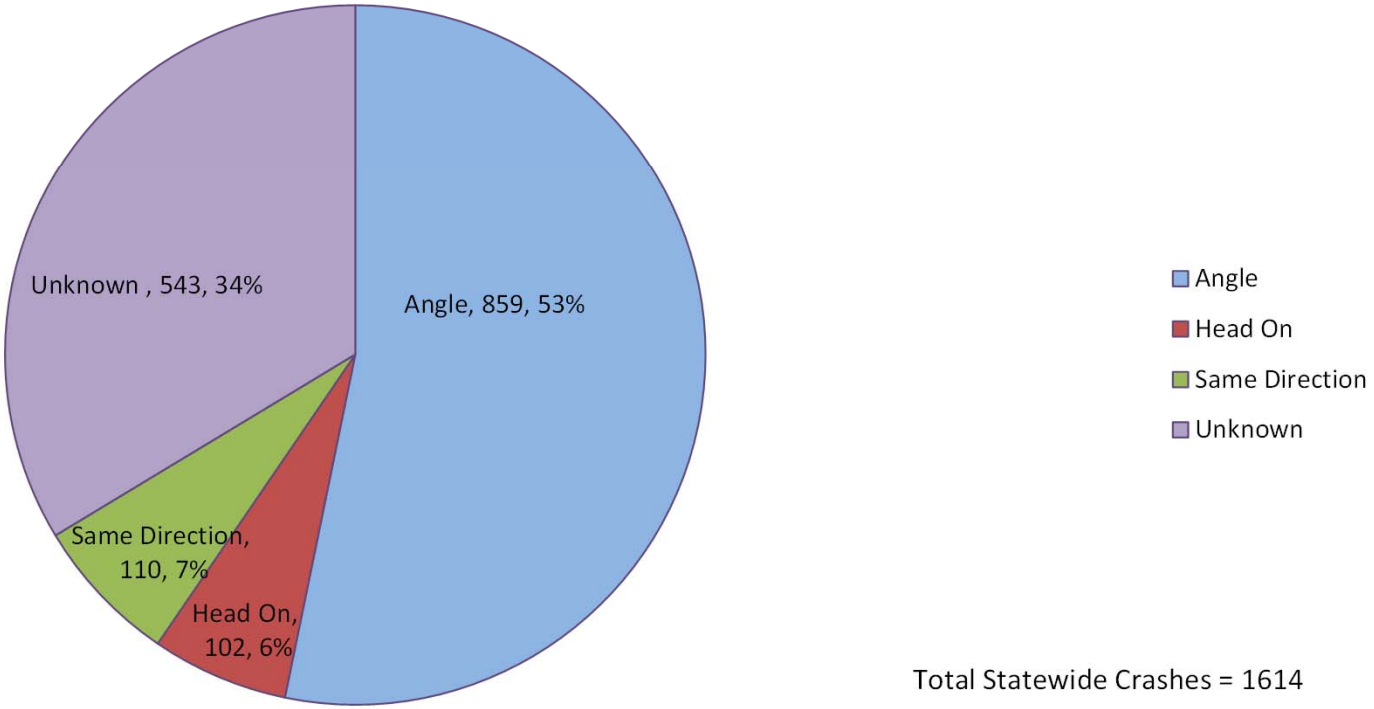
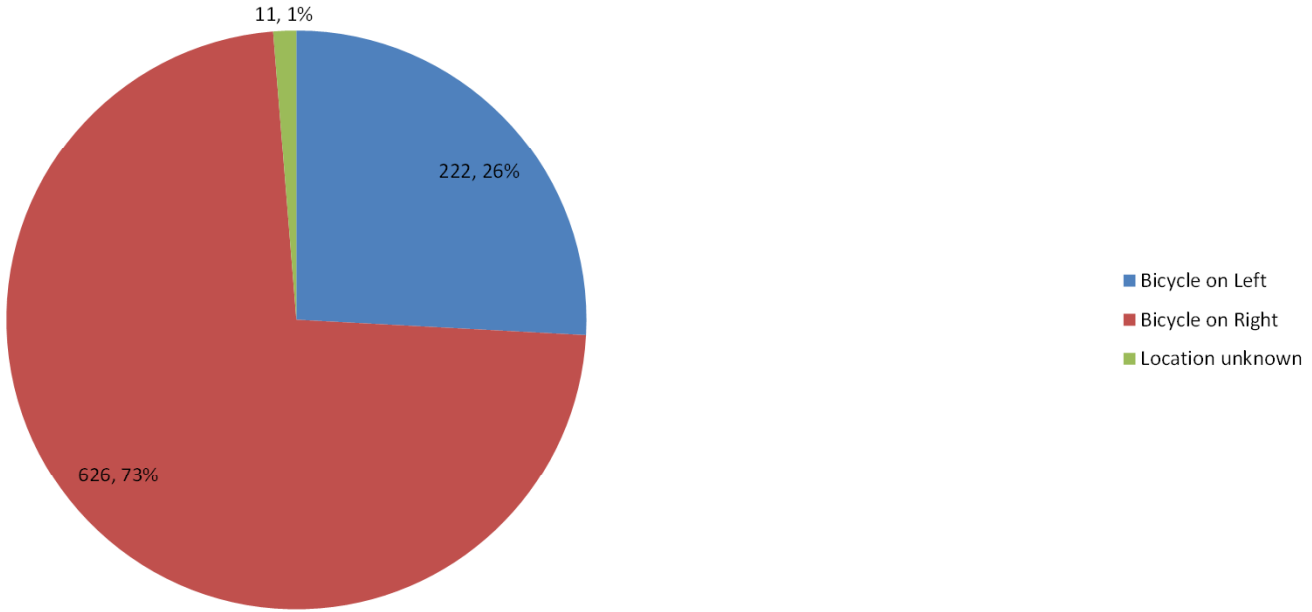


Chart 2: All Bicycle Crash Types by Subtype of Crash
2003-2012



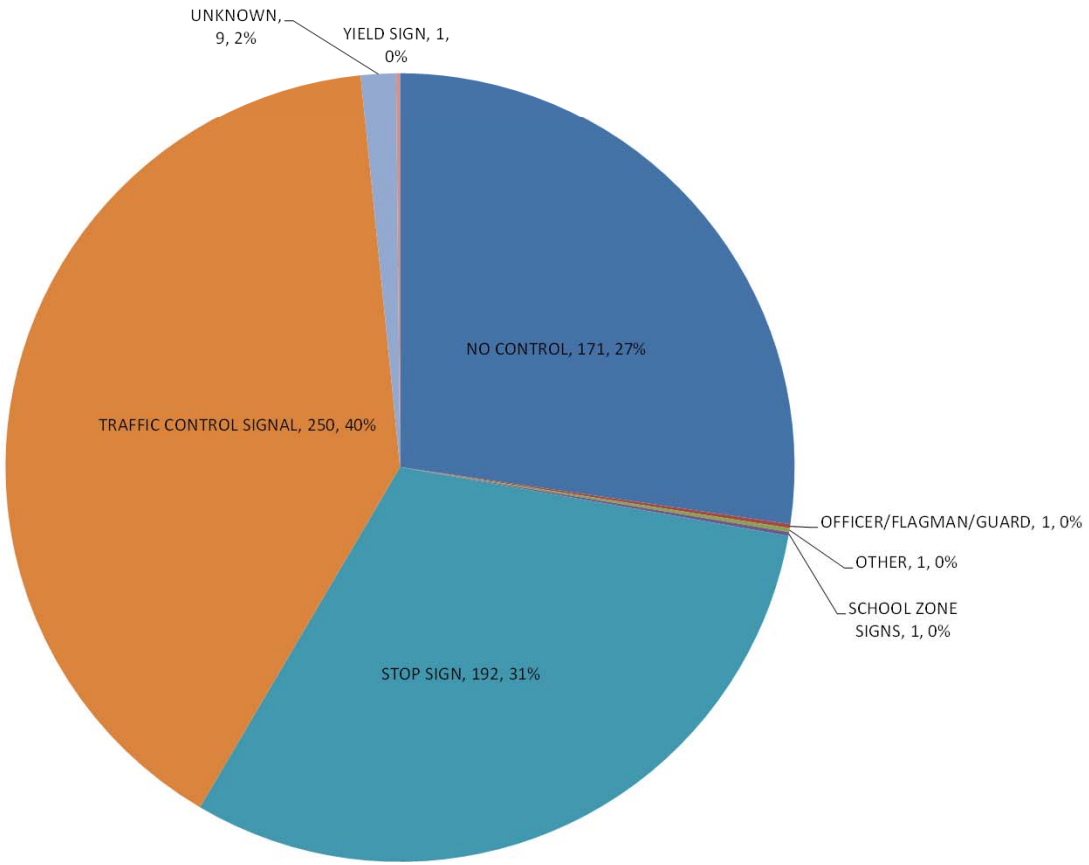
Total Statewide Crashes = 1614

Chart 3: Bicycle Angle Crash Type by Bicycle on Left or Right 2003-2012



Total Angle Crashes = 859,
out of
Total Statewide Bicycle Crashes = 1614
39% of total state wide Bicycle Crashes are with the bicycle to the Right of the motorist.
73% of Angle crashes are to the right of the motorist

Chart 4: Angle Crashes with Bicycle on Right of Motor Vehicle by Traffic Control, 2003-2012

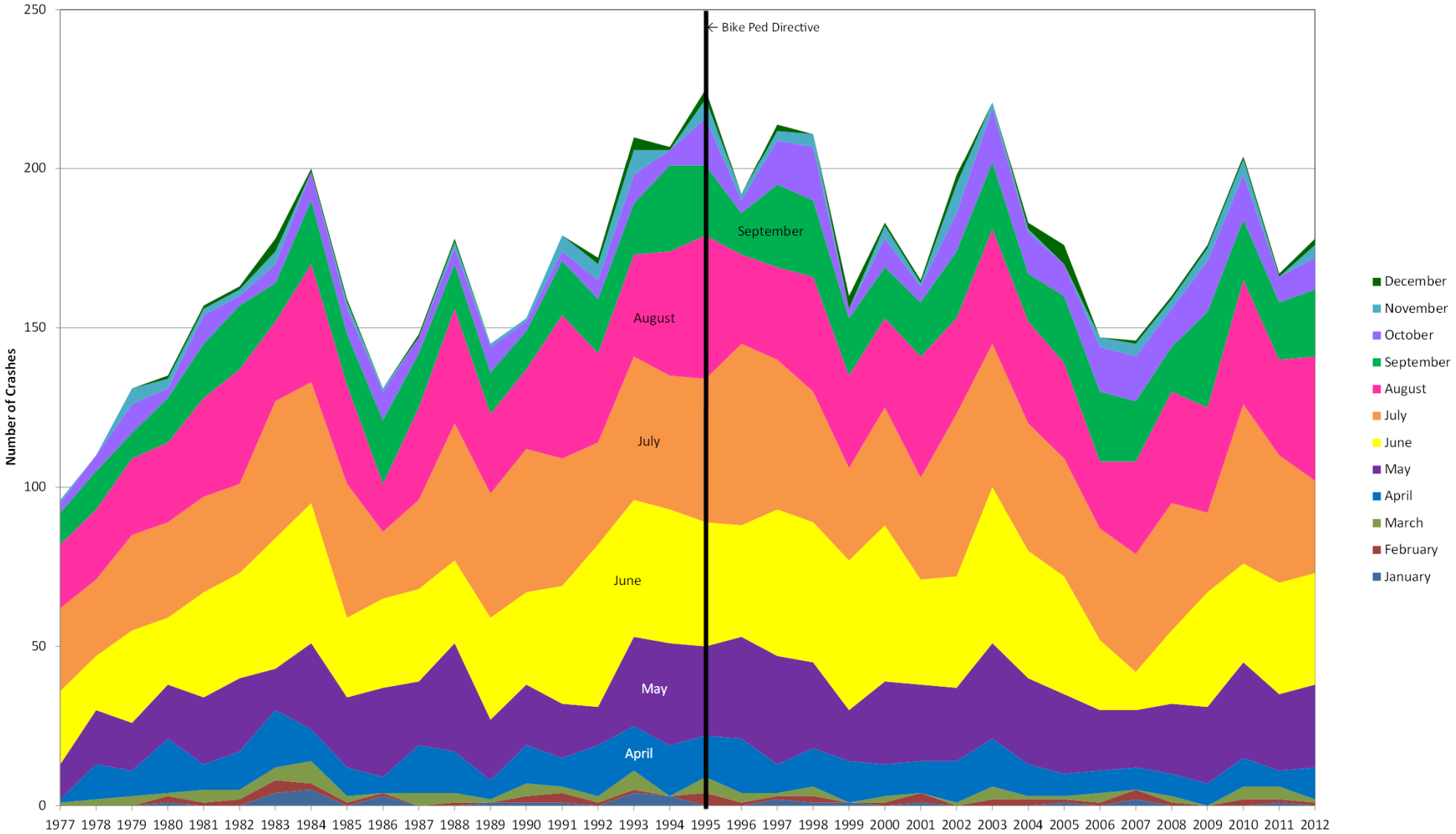


·Total Statewide Angle Crashes = 859,

·Total Statewide Bicycle Crashes = 1614

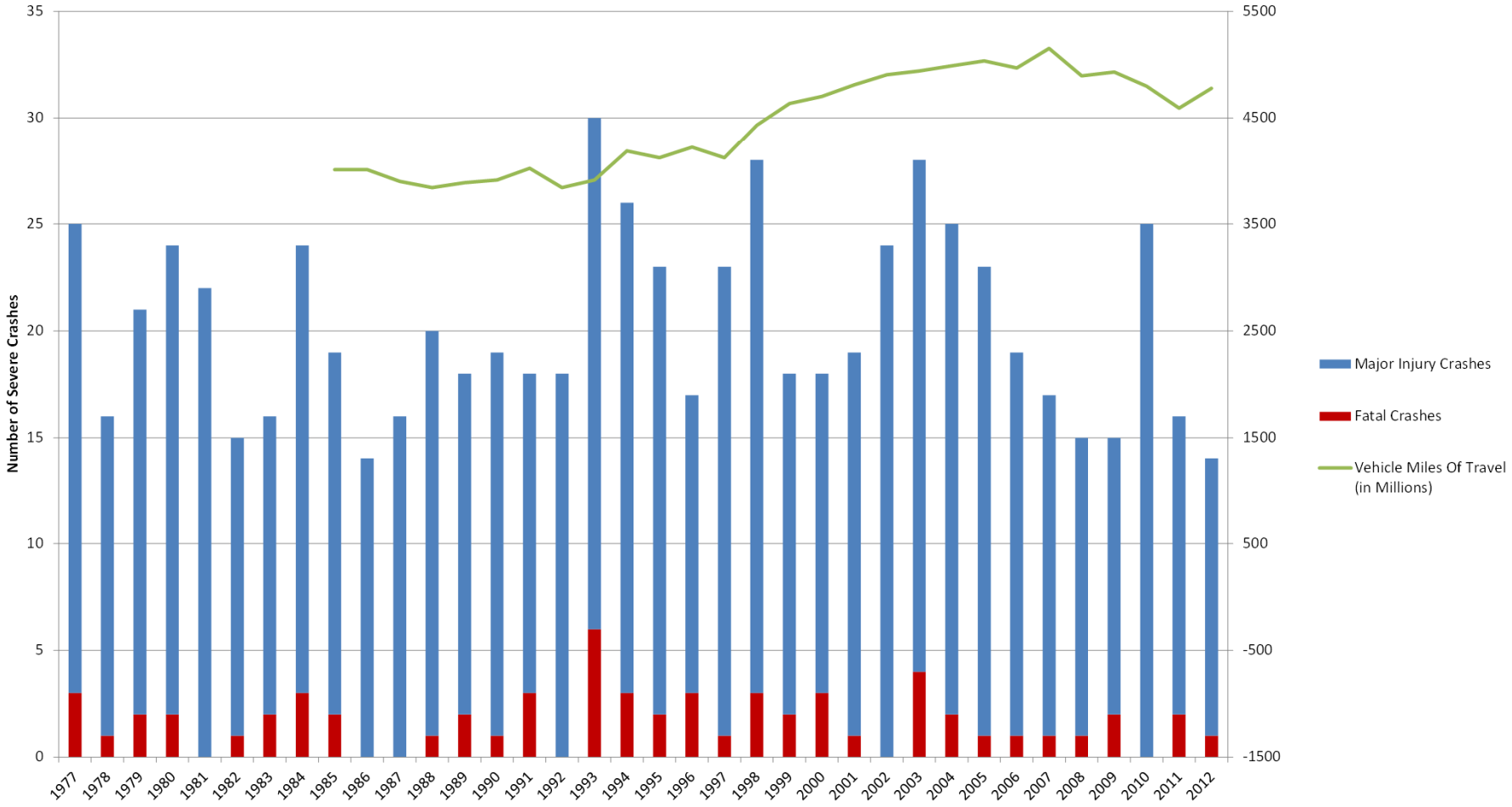
·626 of 1614 total bicycle crashes (39%) are with the bicycle to the right of the motorist. (Chart 2)

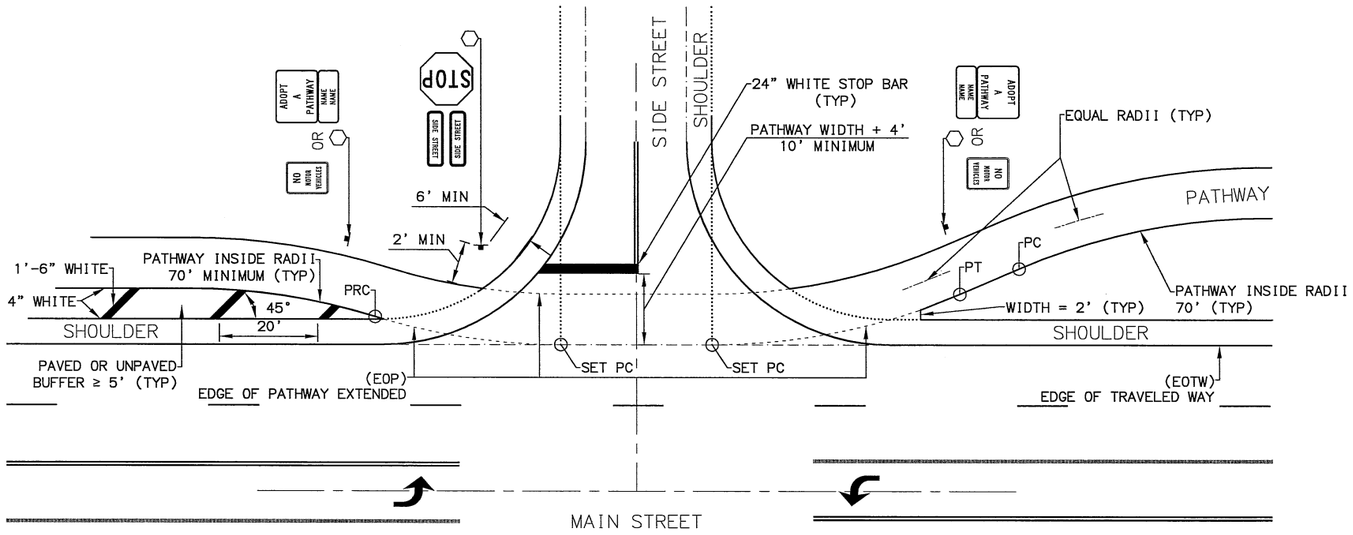
Chart 5: Statewide 1977-2012 Bicycle-Vehicle Crashes by Month & Year



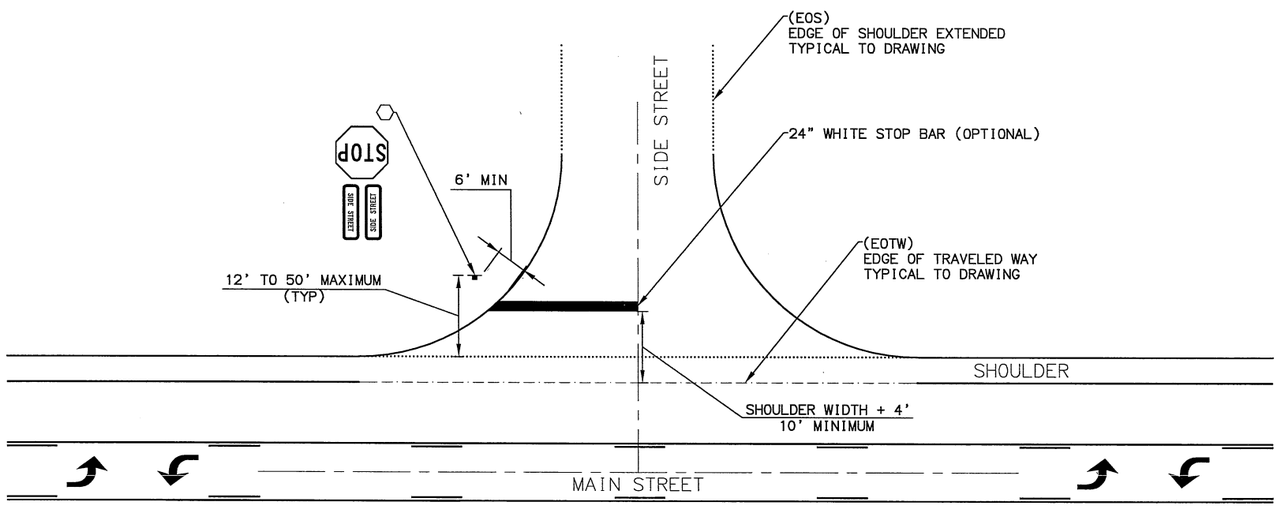
12/15/2015
HSIP Crash Analysis

Chart 6: Statewide Bicycle-Vehicle Fatal & Major Injury Crashes: 1977-2012





TYPICAL UNCURBED RETURN WITH PATHWAY



TYPICAL UNCURBED RETURN WITHOUT SIDEWALK

UNCURBED INTERSECTION NOTES: (IN PRIORITY ORDER)

1. LOCATE STOP BAR 4' MINIMUM BEHIND THE WIDTH OF PATHWAY.
2. LOCATE STOP SIGN SO IT IS VISIBLE TO APPROACHING TRAFFIC AND NEAR THE STOP BAR.
3. SEE PLANS FOR PATHWAY SIGNING REQUIRED AT SIDE STREETS.
4. BREAK CENTERLINE STRIPING WITHIN INTERSECTIONS WHICH HAVE DEDICATED TURN LANES.
5. CONTINUE CENTERLINE STRIPING THROUGH INTERSECTIONS WITH CENTER TWO-WAY-LEFT-TURN-ONLY LANES OR WHEN THERE ARE NO LEFT TURN LANES.
6. CONTINUE LANE "SKIP" STRIPING THROUGH INTERSECTIONS.
7. DELETE OUTERMOST EDGE OF TRAVELED WAY STRIPING AT INTERSECTIONS OR WRAP EOTW STRIPING TO SIDE STREET EOTW.
8. PROVIDE 2' OF CLEARANCE BETWEEN EDGE OF STOP SIGN PANEL AND EDGE OF PATHWAY OR SIDEWALK.
9. PROVIDE 6' OF CLEARANCE BETWEEN EDGE OF STOP SIGN PANEL AND EDGE OF SIDE STREET.
10. "NO MOTOR VEHICLES" SIGNS ARE NOT REQUIRED WITHIN THE MUNICIPALITY OF ANCHORAGE.
11. STOP BARS ARE NOT REQUIRED WHEN NO PATHWAY OR SIDEWALK IS PRESENT. SEE PLANS.
12. MATCH SIDESTREET STRIPING IF STRIPING IS PRESENT.

REVISIONS		
Date	Description	By
01/17/13	SHEET NUMBER AND DRAWING	SET
09/16/13	NOTES ADDED	SET
12/10/14	RADII/REVISED NOTES	SET
06/23/15	CED: ADA TILES NOT REQ	SET

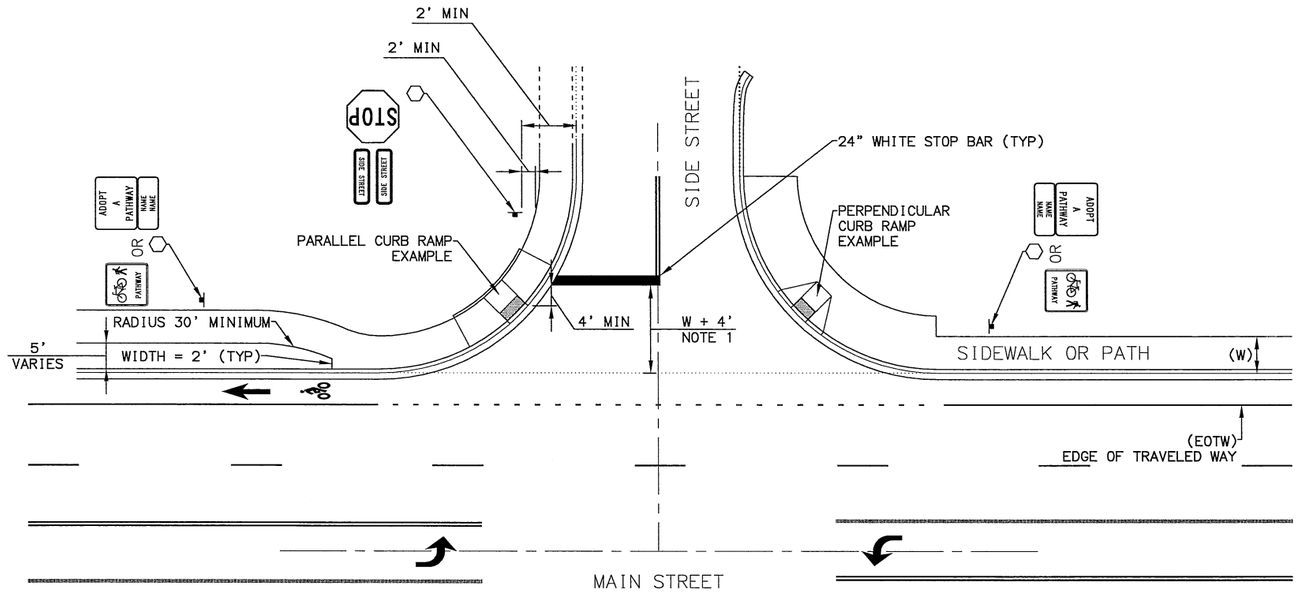
SHEET 1 OF 2

State of Alaska
Department of Transportation
& Public Facilities

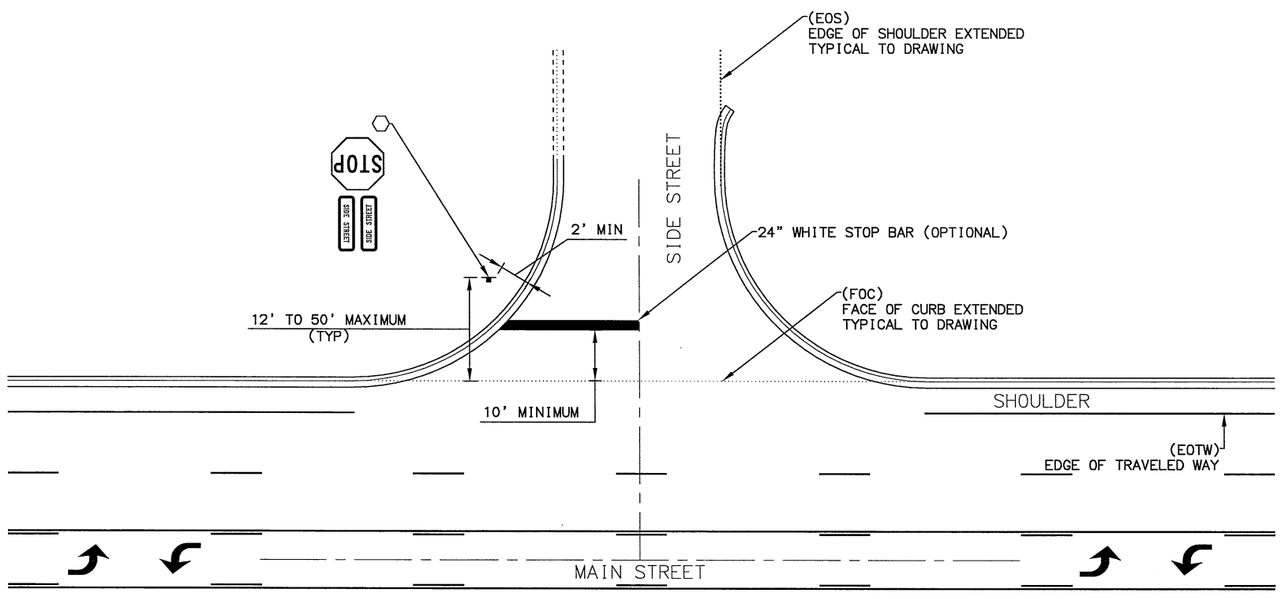
UNSIGNALIZED INTERSECTION
STOP AND CROSSING

APPROVED
STATE OF ALASKA
49TH
SCOTT E. THOMAS
CE 8602
REGISTERED PROFESSIONAL ENGINEER
Date 06/23/15

CR-T-01.02



TYPICAL CURBED RETURN WITH SIDEWALK



TYPICAL CURBED RETURN WITHOUT SIDEWALK

CURBED INTERSECTION NOTES: (IN PRIORITY ORDER)

1. LOCATE STOP BAR 4' MINIMUM BETWEEN THE TOE OF CURB RAMP AND EDGE OF STOP BAR OR A DISTANCE OF THE WIDTH OF THE SIDEWALK OR PATHWAY PLUS 4'.
2. LOCATE STOP SIGN SO IT IS VISIBLE TO APPROACHING TRAFFIC AND NEAR THE STOP BAR.
3. SEE PLANS FOR PATHWAY SIGNING REQUIRED AT SIDE STREETS.
4. BREAK CENTERLINE STRIPING WITHIN INTERSECTIONS WHICH HAVE DEDICATED TURN LANES.
5. CONTINUE CENTERLINE STRIPING THROUGH INTERSECTIONS WITH CENTER TWO-WAY-LEFT-TURN-ONLY LANES OR WHEN THERE ARE NO LEFT TURN LANES.
6. CONTINUE LANE "SKIP" STRIPING THROUGH INTERSECTIONS.
7. DELETE OUTERMOST EDGE OF TRAVELED WAY STRIPING AT INTERSECTIONS OR WRAP EOTW STRIPING TO SIDE STREET EOTW.
8. PROVIDE 2' OF CLEARANCE BETWEEN EDGE OF STOP SIGN PANEL AND EDGE OF PATHWAY OR SIDEWALK.
9. PROVIDE 6' OF CLEARANCE BETWEEN EDGE OF STOP SIGN PANEL AND SIDE STREET FACE OF CURB.
10. "NO MOTOR VEHICLES" SIGNS ARE NOT REQUIRED WITHIN THE MUNICIPALITY OF ANCHORAGE.
11. STOP BARS ARE NOT REQUIRED WHEN NO PATHWAY OR SIDEWALK IS PRESENT. SEE PLANS.
12. MATCH SIDESTREET STRIPING IF STRIPING IS PRESENT.

REVISIONS		
Date	Description	By
01/17/13	SHEET NUMBER AND DRAWING	SET
09/16/13	NOTES ADDED	SET
12/10/14	REVISED NOTES	SET

SHEET 2 OF 2

State of Alaska
Department of Transportation
& Public Facilities

UNSIGNALIZED INTERSECTION
STOP AND CROSSING

APPROVED
STATE OF ALASKA 49TH
SCOTT E. THOMAS CE 8602
REGISTERED PROFESSIONAL ENGINEER
Scott E. Thomas
Date 06/23/15