	CENTRAL REGION STANDARD DETAIL DEVELOPMENT REPORT (CRSDR) **Central Region Plan No.: CR-T-1.20** **Title: Unsignalized Intersection STOP and Crossing Details** **Prepared by: Scott E. Thomas, P.E.** Scott Thomas Digitally signed by Scott Thomas Date: 2020.06.22 11:55:43 -08'00' **Date: 06-22-2020**

Use: This regional detail is used for consistent STOP bar and STOP sign placement towards meeting sight triangles standards and minimizing angle conflicts with nom-motorized traffic. Visibility is the #1 goal by putting all conflicts in the best location of minimum speed, likely motorist stopping, and full view of all users. The most common traffic conflict situation DOTPF uses is STOP sign control. This should be the most common and consistent standard plan DOTPF uses.

(Attachments are shown in ***underlined bold italics***)

Design and Application Considerations:

- ***2016 MUTCD Fig 2A-3*** (#2) and previous versions allows for significant variation in lateral placement (6-50 ft). Significant lateral offset has less observable motorist compliance, which increases speed of conflict and thus crash severity when further from the edge of traveled way (EOTW). Significant offsets are less likely to meet sight triangle requirements. Most important in any situation is STOP sign visibility – on large radii intersections the STOP sign can be too far around the curve at the mainline and could be out of the line of sight on side-street motorist approach.
- ***HPCM Fig 1190-1*** (#3) shows motorist setback for sight triangles of 14.4 to 17 feet to the driver's eye. ***2011 AASHTO Green Book 6th ed, p. 9-36*** (#4), Case B1 lists 14.5 to 18 feet with SSD minimum visibility per **Table 9-6 (#4)**. (Most driver's eye point of view is set back 9 feet from the front bumper, as measured on most sedans to pickups.)
- ***ATMS Fig 2C-101*** (#5)shows a motorist can creep forward to up to the edge of traveled way or face of curb in less desirable situations to 9 feet or greater. This is not a design standard, but an operational minimum in less feasible situations. Similar findings are cited in 2011 AASHTO Green Book 6th ed, p. 9-36, Case B1 and Table 9-6.
- ***1999 AASHTO Guide for the Development of Bicycle Facilities Fig 22*** (#6) shows pathway "sweeps" are more desirable for crossing pathways in front of the STOP bar than a pathway crossing behind the STOP bar. ***2012 AASHTO Guide to Bicycle Facilities, p. 5-43*** (#7) acknowledges the same conflicts and recommend close proximity to the main roadway, but does not show a figure for "sweeps".

- Per the ***2012 AASHTO Bicycle Guide, Tbl 5-2*** (#8), the radius of approach is 70 feet to meet design speeds of non-motorized facilities at 20 MPH maximum, not higher bicycling speeds, the same as pathways in general. This is used when approaching intersections to stay closer to the pedestrian rules of the road upon intersection crossing. This requires due care by the pathway user and stopping as needed, not riding across the intersection at 20 MPH or greater. Speed reduction at intersection conflicts are recommended by the 2012 AASHTO Guide, p. 5-43.
- ***2005 HPCM Fig 1210-4*** (#9) shows "sweeps" as intended pathway design at STOP controlled intersections.
- ***2017 CR DOTPF HSIP Memorandum 2017-06-28 CR-T-1 Pathway Sweeps and Stop Bar Review*** (#10). A 10 year area-wide crash review of "sweeps" vs further STOP bar setbacks finds no crash variation in actual sites, but retains intended purpose of "sweeps".
- ***2004 and prior*** (#11), angled STOP bars are not being recommended in this latest concept. This expects right turners to hold back, yet they are the vehicle with the most likely gap in one direction, so most likely to pull forward and enter the roadway first.

History (reverse chronological)**:**

- As of 2020, CR DOTPF continues to use "sweeps" at all intersections/driveways significant enough in conflict to require STOP signs.
- ***2017 CR DOTPF HSIP Memorandum 2017-06-28*** (#10) modified "sweeps" to be outside of road shoulder based on HSIP crash review, to balance proximity to traffic concerns and to eliminate conflicts with biking with traffic on shoulders or in future bike lanes.
- ***2010 MOA Bicycle Plan*** (#12) adopted "sweeps" in the higher use, higher crash area of the state.
- 2009 NR confirmed by email they also use "sweeps" in pathway design.
- ***2008 CR-T-1.00 CR DOTPF Memorandum 2008-10-09*** (#13) updated "sweeps" to maximize STOP bar compliance very close to the AASHTO and HPCM sight triangles.
- ***2005 DOTPF CR details*** (#14) outlined "sweeps" in Regional Detail for each project to consistently increase STOP bar compliance, such as Tudor Road 1R.
- ***2005 CR DOTPF HSIP ped/bike crash study (***#15) of Anchorage Area non-motorized crashes, coordinating with the Municipality and Anchorage Police Department. CR DOTPF noted significant occurrence of angle crashes at STOP bars – with a concern for STOP bar compliance set too far back from the curb or EOTW.
- ***2005 HPCM 1210-4*** (#9) adopted for bicycle facilities designs, including "sweeps" as desirable at STOP controlled side-streets.
- ***1990's-2004 individual designs*** (#11) used angled stop bars and did not address pathway sweeps.
- ***1999 AASHTO Guide for Bicycle Design Fig 22*** (#6) clearly showed "sweeps".
- ***1990 CR Memorandum 2-23-1990 adopted "sweeps" in relation to STOP bars.*** (#16)

1986 NR Memorandum 9-29-1986 adopted "sweeps" in relation to STOP bars. (#16)Applicable Design Standards, Codes and Specifications: Most cited above. Others include:

- ***MUTCD 3B.16 (10)*** (#17) 4 ft separation between stop bar and marked or unmarked crosswalk. Extensions of shoulder, sidewalk, or pathway are an unmarked crossing.
- ***MUTCD 3B.16 (08)*** (#17) DOTPF has consistently used 2 ft stop bars, when used. The maximum width has been combined with signalized crosswalk historically in AK rather than use two lines with one as an advance STOP bar. End result is driver's eye is a minimum of 9 ft from EOTW with no shoulder. With shoulder, driver's eye is width of shoulder (4 ft min up to 8 ft) plus 4 ft gap, 2 ft stop bar, and 9 ft setback (19+ ft from EOTW). With path, driver's eye can be width of shoulder (4-8 ft), width of path up to 10 ft, 4 ft gap, 2 ft stop bar, and 9 ft setback (or 29 feet from EOTW). It is clear that all required widths in balance can result in greater setbacks than desirable for sight triangles or STOP bar compliance, increasing pathway/sidewalk risk if not minimized. Designs submitted in the past in excess of 30 ft setbacks to driver's eye are generally revised. In some special cases, such as RR Xings, advance STOP bars may be necessary.
- Direction by ***email 05-11-24 NO MOTOR VEHICLES signs*** (#18) Central Region practice since 2005 after discussions with the Regional Director's office of frequent OHV on pathway concerns. Past experience in Anchorage was Municipal ordinance prohibited motorized vehicles on sidewalks, pathways citywide, so regulatory signs were not used. Instead, green D11-1 BIKE ROUTE guide signs were historically used. However, with concerns for rules of the road being pedestrian, and that bike routes were also on a mix of vehicular facilities, this became an identified issue in the 2010 MOA Bicycle Plan. The goal is to use D11-1 BIKE ROUTE signs where vehicular rules of the road apply, and use regulatory R9-101 PATHWAY guide signs with ped/bike symbols to show where shared used occurs, but to also demonstrate the route is subject to pedestrian rules of the road.
- To further clarify R5-103 NO MOTOR VEHICLES regulatory sign use in rural areas, R5-103P PATHWAY plates were added atop the sign. This was to address several unpaved pathways built, and to address paved pathways in close proximity to roads where concerns were they were being mistaken as roads or driveways.
- ***MUTCD Fig 3B-2, Fig 3B-7*** (#19) Left Turns – Example show dedicated LT bays are typically provided at major cross streets, not minor cross streets. While the MUTCD breaks centerlines in examples for all cross streets, Central Region finds so many cross streets that striping becomes frequently discontinuous. Instead, in CR TWLTO lanes are continued without breaks unless a dedicated LT lane is selected. Centerline and lane line striping is broken at intersections with streets with the need for a dedicated LT lane.
- State traffic code 13 AAC 02 does not have a restriction on passing within the vicinity of STOP controlled sidestreets.
- Anchorage Municipal Code ***AMC 9.16.090*** (#20) states that no lane changing is allowable within 100 feet of a signalized intersection. Similar to AAC, there are no restrictions to changing lanes in the vicinity of STOP controlled cross-streets.
- ADAAG Access: This drawing does not provide ADAAG detail for actual construction of grades, tiles, and ramp dimensions. However, it does show parallel ramps may fit better with STOP bar and pathway geometry as compared to perpendicular ramps. Perpendicular ramps too far around the cross-street radii can greatly increase STOP bar setback.

Tests or Backup Data: (to support that the plan meet standards – this is typical for roadside hardware that is tested by someone else and verifies that it meets MASH, for example) HSIP Crash review cited above.

Design Backup: Cited above. Design layout as per CR-T-1.10, both curbed and uncurbed intersections.

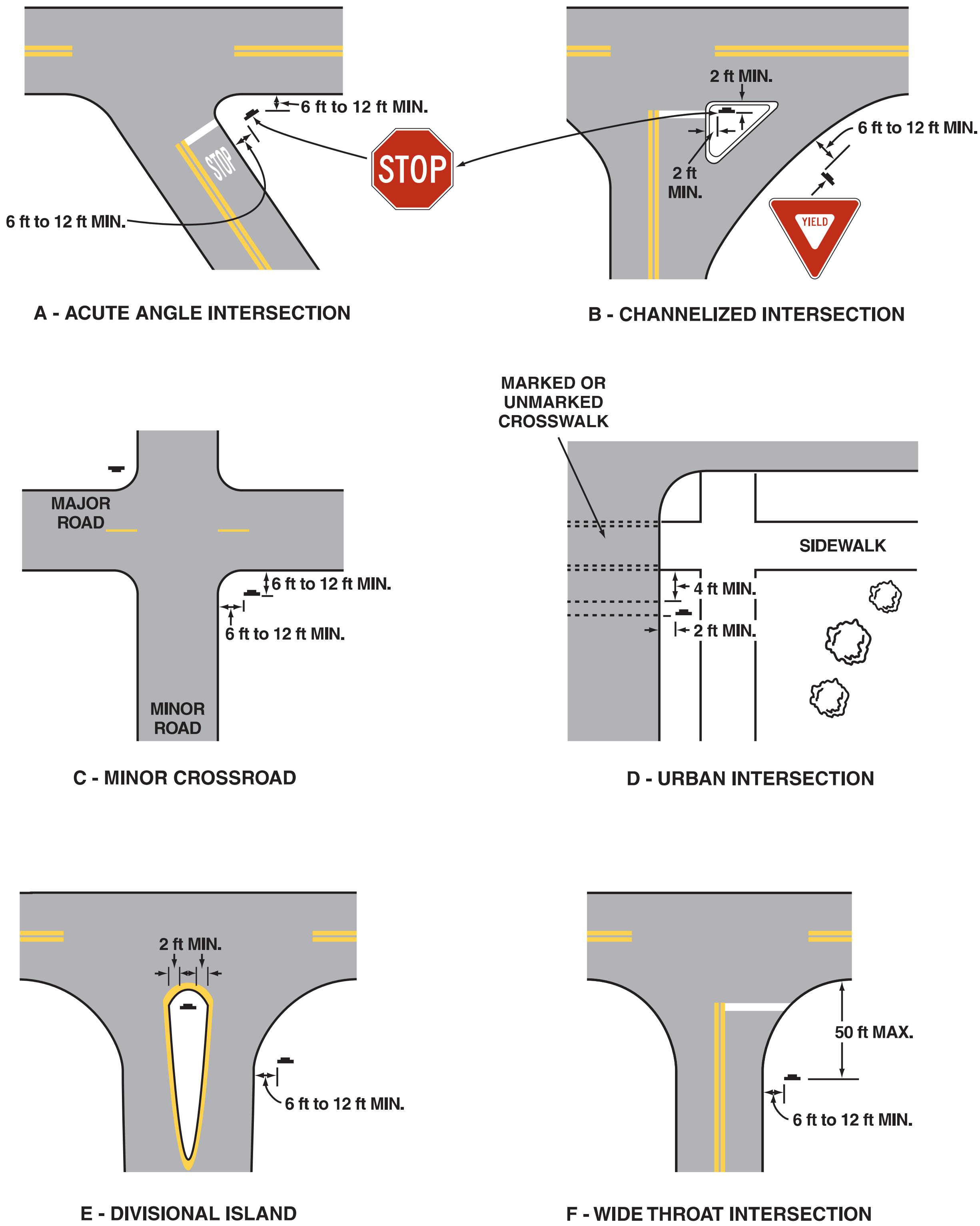
Construction Considerations: (not necessary for all plans) Regional Detail may be overridden by Design Details or specific design sheets for specific cases in the Design.

M&O Considerations: (not necessary for all plans) Pathway plowing is a common consideration, but not altered by this concept. STOP sign and STOP bar placement are simplified for easiest layout. Angled STOP bars were not recommended in this concept.

Abbreviations:

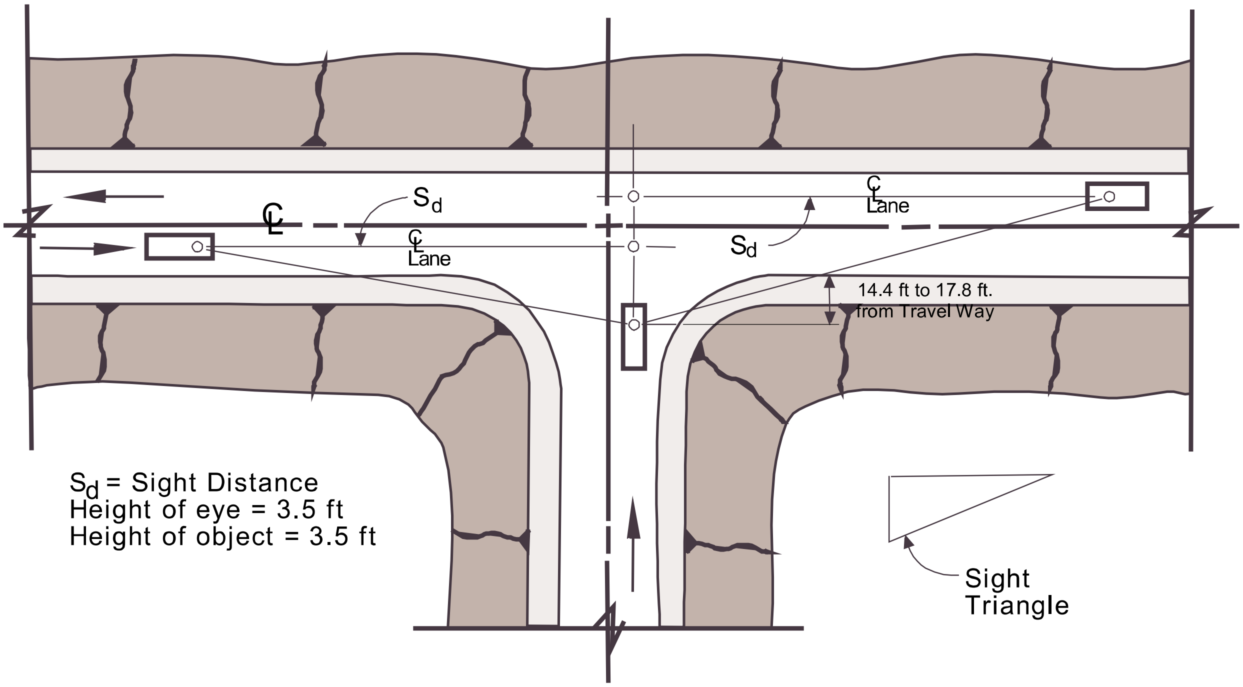
AAC	Alaska Administrative Code
AASHTO	American Association of State Highway and Transportation Officials
ADAAG	Americans with Disabilities Act Accessible Guidelines
AMC	Anchorage Municipal Code
ATMS	Alaska Traffic Manual Supplement
DOTPF	(Alaska) Department of Transportation and Public Facilities
CR	Central Region
fa	Edge of Traveled Way
HPCM	Highway Preconstruction Manual
HSIP	Highway Safety Improvement Program
MASH	AASHTO Manual for Assessing Safety Hardware
M&O	Maintenance and Operations
MPH	miles per hour
MUTCD	Manual on Uniform Traffic Control Devices
NR	Northern Region

Figure 2A-3. Examples of Locations for Some Typical Signs at Intersections



Note: Lateral offset is a minimum of 6 feet measured from the edge of the shoulder, or 12 feet measured from the edge of the traveled way. See Section 2A.19 for lower minimums that may be used in urban areas, or where lateral offset space is limited.

DRIVEWAY SIGHT DISTANCE



DESIGN SPEED or POSTED SPEED LIMIT mph	SD MINIMUM (ft)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645

Note: Minimum sight distances are stopping sight distances for level grades, between –3% and +3%. Refer to AASHTO *A Policy on the Geometric Design of Highways and Streets 2001,* for desirable intersection sight distances and for grade adjustments.

Figure 1190-1
Driveway Sight Distance

THE GREEN BOOK

A Policy on Geometric Design of Highways and Streets

2011
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very unlikely another potentially conflicting vehicle will be encountered as the first vehicle departs the intersection.

Case B—Intersections with Stop Control on the Minor Road

Departure sight triangles for intersections with stop control on the minor road should be considered for three situations:

- Case B1—Left turns from the minor road;
- Case B2—Right turns from the minor road; and
- Case B3—Crossing the major road from a minor-road approach.

Intersection sight distance criteria for stop-controlled intersections are longer than stopping sight distance to allow the intersection to operate smoothly. Minor-road vehicle operators can wait until they can proceed safely without forcing a major-road vehicle to stop.

Case B1—Left Turn from the Minor Road

Departure sight triangles for traffic approaching from either the right or the left, like those shown in Figure 9-15B, should be provided for left turns from the minor road onto the major road for all stop-controlled approaches. The length of the leg of the departure sight triangle along the major road in both directions, shown as distance b in Figure 9-15B, is the recommended intersection sight distance for Case B1.

The vertex (decision point) of the departure sight triangle on the minor road should be 4.4 m [14.5 ft] from the edge of the major-road traveled way. This represents the typical position of the minor-road driver's eye when a vehicle is stopped relatively close to the major road. Field observations of vehicle stopping positions found that, where needed, drivers will stop with the front of their vehicle 2.0 m [6.5 ft] or less from the edge of the major-road traveled way. Measurements of passenger cars indicate that the distance from the front of the vehicle to the driver's eye for the current U.S. passenger car population is nearly always 2.4 m [8 ft] or less (*12*). Where practical, it is desirable to increase the distance from the edge of the major-road traveled way to the vertex of the clear sight triangle from 4.4 m to 5.4 m [14.5 to 18 ft]. This increase allows 3.0 m [10 ft] from the edge of the major-road traveled way to the front of the stopped vehicle, providing a larger sight triangle. The length of the sight triangle along the minor road (distance *a* in Figure 9-15B) is the sum of the distance from the major road plus $^1/_2$ lane width for vehicles approaching from the left, or $1^1/_2$ lane widths for vehicles approaching from the right.

Field observations of the gaps in major-road traffic actually accepted by drivers turning onto the major road have shown that the values in Table 9-5 provide sufficient time for the minor-road vehicle to accelerate from a stop and complete a left turn without unduly interfering with major-road traffic operations. The time gap acceptance time does not vary with approach speed on the major road. Studies have indicated that a constant value of time gap, independent of approach speed, can be used as a basis for intersection sight distance determinations. Observations have also shown that major-road drivers will reduce their speed to some extent when minor-road vehicles turn onto the major road. Where the time gap acceptance values in Table 9-5 are used to determine the length of the leg of the departure sight triangle, most major-road drivers should not need to reduce speed to less than 70 percent of their initial speed (*12*).

The intersection sight distance in both directions should be equal to the distance traveled at the design speed of the major road during a period of time equal to the time gap. In applying Table 9-5, it can usually be assumed that the minor-road vehicle is a passenger car. However, where substantial volumes of heavy vehicles enter the major road, such as from a ramp terminal, the use of tabulated values for single-unit or combination trucks should be considered.

Table 9-5 includes appropriate adjustments to the gap times for the number of lanes on the major road and for the approach grade of the minor road. The adjustment for the grade of the minor-road approach is needed only if the rear wheels of the design vehicle would be on an upgrade that exceeds 3 percent when the vehicle is at the stop line of the minor-road approach.

Table 9-5. Time Gap for Case B1, Left Turn from Stop

Design Vehicle	Time Gap (t_g)(s) at Design Speed of Major Road
Passenger car	7.5
Single-unit truck	9.5
Combination truck	11.5

Note: Time gaps are for a stopped vehicle to turn left onto a two-lane highway with no median and with grades of 3 percent or less. The table values should be adjusted as follows:

For multilane highways—For left turns onto two-way highways with more than two lanes, add 0.5 s for passenger cars or 0.7 s for trucks for each additional lane, from the left, in excess of one, to be crossed by the turning vehicle.

For minor road approach grades—If the approach grade is an upgrade that exceeds 3 percent, add 0.2 s for each percent grade for left turns.

The intersection sight distance along the major road (distance *b* in Figure 9-15B) is determined by:

Metric	U.S. Customary
$ISD = 0.278\ V_{major}\ t_g$	$ISD = 1.47\ V_{major}\ t_g$ (9-1)
where:	where:
ISD = intersection sight distance (length of the leg of sight triangle along the major road) (m)	ISD = intersection sight distance (length of the leg of sight triangle along the major road) (ft)
V_{major} = design speed of major road (km/h)	V_{major} = design speed of major road (mph)
t_g = time gap for minor road vehicle to enter the major road (s)	t_g = time gap for minor road vehicle to enter the major road (s)

For example, a passenger car turning left onto a two-lane major road should be provided sight distance equivalent to a time gap of 7.5 s in major-road traffic. If the design speed of the major road is 100 km/h [60 mph], this corresponds to a sight distance of 0.278(100)(7.5) = 208.5 or 210 m [1.47(60)(7.5) = 661.5 or 665 ft], rounded for design.

A passenger car turning left onto a four-lane undivided roadway will need to cross two near lanes, rather than one. This increases the recommended gap in major-road traffic from 7.5 to 8.0 s. The corresponding value of sight distance for this example would be 223 m [706 ft]. If the minor-road approach to such an intersection is located on a 4 percent upgrade, then the time gap selected for intersection sight distance design for left turns should be increased from 8.0 to 8.8 s, equivalent to an increase of 0.2 s for each percent grade.

The design values for intersection sight distance for passenger cars are shown in Table 9-6. Figure 9-17 includes design values, based on the time gaps for the design vehicles included in Table 9-5.

No adjustment of the recommended sight distance values for the major-road grade is generally needed because both the major- and minor-road vehicle will be on the same grade when departing from the intersection. However, if the minor-road design vehicle is a heavy truck and the intersection is located near a sag vertical curve with grades over 3 percent, then an adjustment to extend the recommended sight distance based on the major-road grade should be considered.

Table 9-6. Design Intersection Sight Distance—Case B1, Left Turn from Stop

Metric				U.S. Customary			
Design Speed (km/h)	Stopping Sight Distance (m)	Intersection Sight Distance for Passenger Cars		Design Speed (mph)	Stopping Sight Distance (ft)	Intersection Sight Distance for Passenger Cars	
		Calculated (m)	Design (m)			Calculated (ft)	Design (ft)
20	20	41.7	45	15	80	165.4	170
30	35	62.6	65	20	115	220.5	225
40	50	83.4	85	25	155	275.6	280
50	65	104.3	105	30	200	330.8	335
60	85	125.1	130	35	250	385.9	390
70	105	146.0	150	40	305	441.0	445
80	130	166.8	170	45	360	496.1	500
90	160	187.7	190	50	425	551.3	555
100	185	208.5	210	55	495	606.4	610
110	220	229.4	230	60	570	661.5	665
120	250	250.2	255	65	645	716.6	720
130	285	271.1	275	70	730	771.8	775
—	—	—	—	75	820	826.9	830
—	—	—	—	80	910	882.0	885

Note: Intersection sight distance shown is for a stopped passenger car to turn left onto a two-lane highway with no median and grades 3 percent or less. For other conditions, the time gap should be adjusted and the sight distance recalculated.

Sight distance design for left turns at divided-highway intersections should consider multiple design vehicles and median width. If the design vehicle used to determine sight distance for a divided-highway intersection is larger than a passenger car, then sight distance for left turns will need to be checked for that selected design vehicle and for smaller design vehicles as well. If the divided-highway median is wide enough to store the design vehicle with a clearance to the through lanes of approximately 1 m [3 ft] at both ends of the vehicle, no separate analysis for the departure sight triangle for left turns is needed on the minor-road approach for the near roadway to the left. In most cases, the departure sight triangle for right

Section 2C.118 DOG TEAM CROSSING Sign (W11-108)

Option:

01 This sign may be used, at a trail crossing location, where dog teams cross regularly.

Guidance:

02 *If used, the DOG TEAM CROSSING sign should be installed in advance of the trail crossing using Section 2C.05, Table 2C-4, Condition B of the MUTCD and 0 mph as the speed at the condition of concern.*

Section 2C.119 MOOSE CRASH AREA Sign (W16-115)

Option:

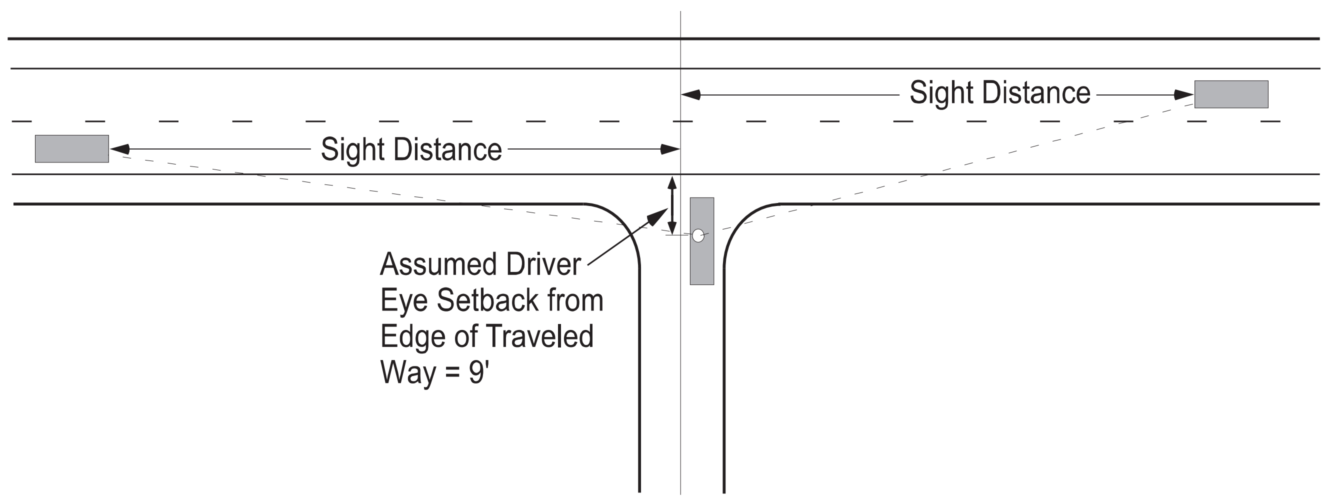
01 The MOOSE CRASH AREA (W16-115) signs may be installed in areas of high Moose-Vehicle Crashes (MVC). W16-115 signs may be installed on one or more routes in an area where moose population and traffic volumes contribute to high incidence of MVC.

Guidance:

02 *MOOSE CRASH AREA (W16-115) signs should only be installed on road segments in the top 5% for MVC in the state as ranked by DOT&PF Traffic and Safety staff or in consultation with the Alaska Department of Fish and Game.*

03 *The number posted on W16-115 signs should be the same on all such signs in a high MVC area.*

Figure 2C-101. Sight Distance Measurement for HIDDEN DRIVEWAY Signs



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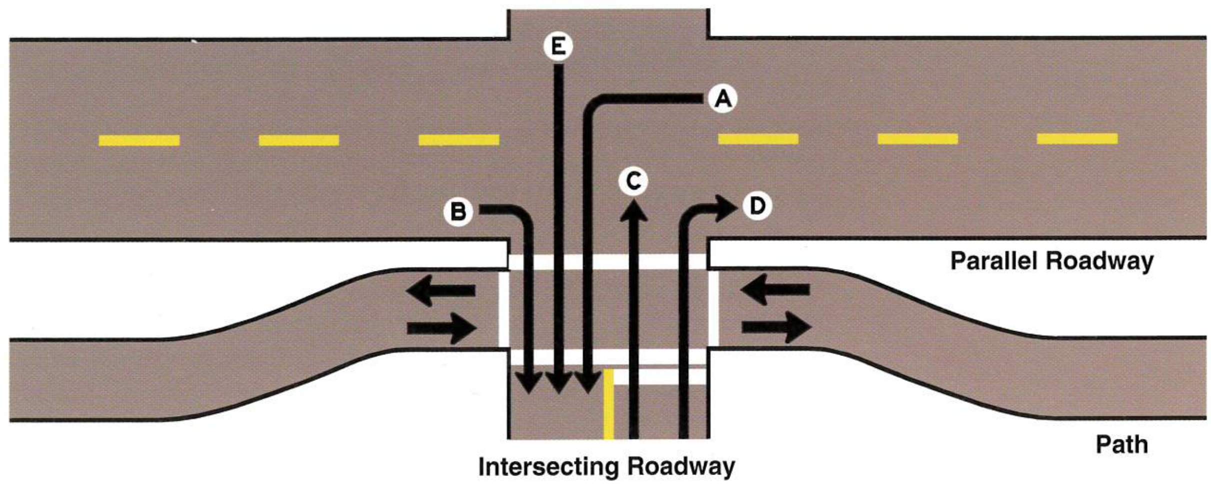

Figure 22. Example of Adjacent Path Intersection

Complex Intersection Crossings

Complex intersection crossings constitute all other path-roadway or driveway junctions. These may include a variety of configurations at which the path crosses directly through an existing intersection between two (or more) roadways and there may be any number of motor vehicle turning movements.

Improvements to complex crossings must be considered on a case-by-case basis. Some suggested treatments which may be considered include: (1) move the crossing, (2) install a signal, (3) change signalization timing, or (4) provide a refuge island and make a two-step crossing for path users. Particularly for complex intersection crossings, it is critical that the designer treat each situation as a unique challenge which requires creativity as well as sound engineering judgment. The safe passage of all modes through the intersection is the goal to be achieved.

Assigning Right of Way

Volume, speed and highway classification should not be the only criteria to consider when assigning right of way at a path crossing. The comfort and convenience of the path user, and the unique behavioral characteristics of the path user and motorist alike, must also be taken into

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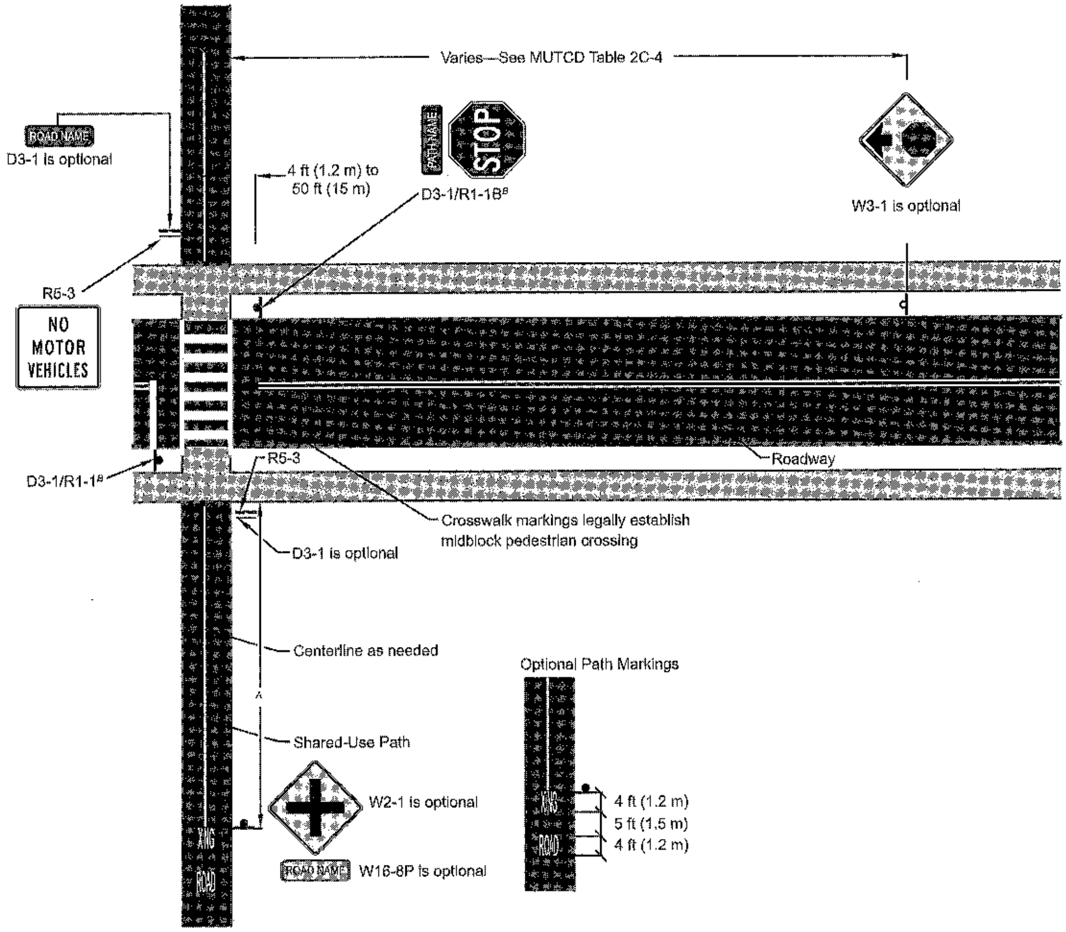

Notes:

[A] Advance warning signs and solid centerline striping should be placed at the required stopping sight distance from the roadway edge, but not less than 50 ft (15 m).

[B] D3-1 sign is optional, R1-2 sign is required. At multilane road crossings, the R1-5 series (Yield Here To/Stop Here for Pedestrians signs and markings, placed in advance of the crosswalk to reduce muliple-threat crashes) may be a more appropriate solution.

Figure 5-20. Example Mid-Block Path–Roadway Intersection—Roadway is Stop Controlled

5.3.4 Sidepath Intersection Design Considerations

This section presents several design measures that may be considered when designing sidepath intersections. Depending upon motor vehicle and pathway user speeds, the width and character of the adjacent roadway, the amount of separation between the pathway and the roadway, and the characteristics of conflict points, sidepath travel may involve lesser or greater likelihood of motor vehicle collisions for bicyclists than roadway travel. This section concludes with additional details on the operational challenges of sidepath intersections, building upon the challenges described in Section 5.2.2.

The first and most important step in the design of any sidepath is to objectively assess whether the location is a candidate for a two-way sidepath. Guidance on this issue is given in Section 5.2.2. At-grade intersections of roadways and driveways with sidepaths, especially those with two-way sidepaths, have inherent conflicts that may result in bicycle–motor vehicle crashes. When approaching an intersection, drivers focus their attention in certain specific directions, depending on the planned maneuver through the intersection. If planning to turn left from the parallel roadway, drivers focus their attention ahead to watch for a gap in oncoming traffic and to the left to watch for potentially conflicting traffic on the side road. When turning right from the parallel roadway, drivers focus their attention ahead and to the right, as this is the direction from which they expect conflicting traffic. When turning onto the parallel roadway (or crossing the parallel roadway) from a side road or a driveway, drivers almost exclusively focus on traffic approaching from the left, in order to look for a gap and to avoid conflicting traffic. Figure 5-4 illustrates the typical scanning behavior of drivers when turning or approaching an intersection or driveway near a sidepath.

Sidepaths, especially two-way sidepaths, insert path users into intersections at locations that do not match with the ingrained scanning behaviors of motorists, which can in effect create virtual "blind spots," even in locations with no actual restrictions on sight distance or visibility. For example, a driver turning left from the parallel roadway across the sidepath might do a very conscientious job of looking for potentially conflicting traffic from the parallel road and crossroad, but completely miss a path user approaching from behind and to the driver's left, a location from which a driver is not conditioned or trained to expect conflicting traffic. It is nearly impossible for a driver turning left from the parallel roadway across the sidepath to accurately monitor the presence, location, or speed of sidepath traffic approaching from behind and to the left without compromising the ability to look for potential conflicts from other directions. Similar mismatches between scanning behavior of roadway traffic and arrival locations of sidepath traffic can be found with right turns from the parallel roadway and movements from the crossing roadway. On multilane streets with higher speed limits, the situation can be more challenging, due to narrowing field of vision, shorter reaction times, and the screening effect of other traffic in adjacent lanes.

Sidepath users typically take their right of way cues from either the pedestrian signalization or the signals controlling the parallel roadway. Path users typically enter the intersection when the parallel roadway has a green indication. Some path users, mainly pedestrians, observe the pedestrian signal and enter under the walk phase, but bicyclists often continue to enter and cross the intersection well into the "DONT WALK" phase. Conflicts between roadway traffic and sidepath users can be complicated by the perception among some path users that turning and crossing drivers will yield to sidepath traffic when the path user has the right of way (e.g., when given a green signal or "WALK" signal) and the potentially conflicting vehicle is visible to the path user; however, due to scanning patterns, the vehicle driver may not look in the direction of the path user. Conventional signalization may not be effective in mitigating these conflicts.

Assuming that the location has been determined to be a candidate for a two-way sidepath, pathway width and separation from roadway at intersections and driveways should be determined with respect to roadway speeds and number of lanes. Motorists on multilane roadways with higher speeds are more distracted by driving conditions, and are less likely to notice the presence of bicyclists on the sidepath during turning movements. On roads with speed limits of 50 mph (80 km/h) or greater, increasing the separation from roadway is recommended to improve path user comfort and potentially reduce crashes. At lower speeds, greater separation does not reduce crashes; therefore the sidepath should be located in close proximity to the parallel roadway at intersections, so motorists turning off the roadway can better detect sidepath riders (*11*).

Three countermeasures that may reduce crash frequency and severity at driveways and intersections are: (1) reduce the speeds of both path users and motorists at conflict points; (2) increase

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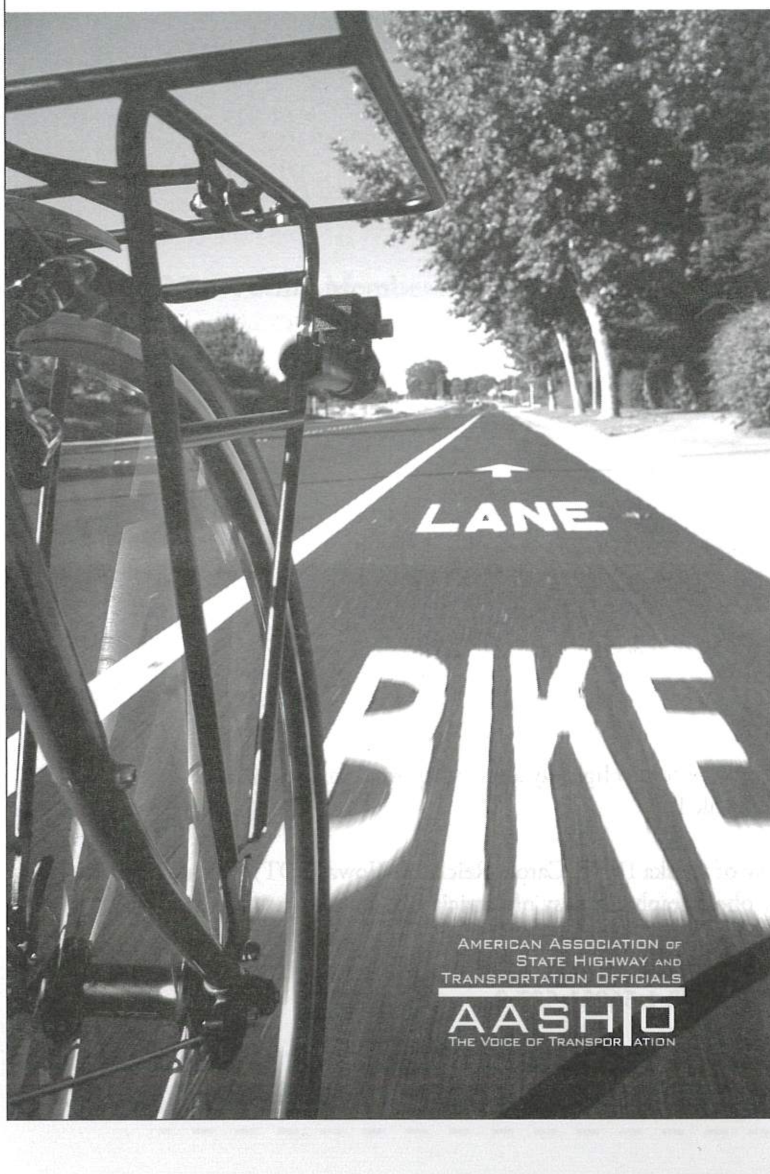

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Table 5-1. Minimum Radius of Curvature Based on Lean Angle

U.S. Customary		
$R = \frac{0.067V^2}{\tan\theta}$		
where:		
R	=	minimum radius of curvature (ft)
V	=	design speed (mph)
θ	=	lean angle from the vertical (degrees)

Metric		
$R = \frac{0.0079V^2}{\tan\theta}$		
where:		
R	=	minimum radius of curvature (m)
V	=	design speed (km/h)
θ	=	lean angle from the vertical (degrees)

As described in Section 5.1.1, shared use paths should meet accessibility guidelines, which restrict the steepness of cross slopes. One percent slopes are recommended on shared use paths where practical, because they are easier to navigate for people using wheelchairs. In most cases the lean angle formula should be used when determining the minimum radius of a horizontal curve, due to the need for relatively flat cross slopes and the fact that bicyclists lean when turning (regardless of their speed or the radius of their turn). The curve radius should be based upon various design speeds of 18 to 30 mph (29 to 48 km/h) and a desirable maximum lean angle of 20 degrees. Lower design speeds of 12 to 16 mph (19 to 26 km/h) may be appropriate under some circumstances (e.g., where environmental or physical constraints limit the geometrics). Minimum radii of curvature for a paved path can be selected from Table 5-2.

Table 5-2. Minimum Radii for Horizontal Curves on Paved, Shared Use Paths at 20-Degree Lean Angle

U.S. Customary		Metric	
Design Speed (mph)	Minimum Radius (ft)	Design Speed (km/h)	Minimum Radius (m)
12	27	19	8
14	36	23	11
16	47	26	15
18	60	29	18
20	74	32	22
25	115	40	35
30	166	48	50

Calculating Minimum Radius Using Superelevation

The second method of calculating minimum radius of curvature negotiable by a bicycle uses the design speed, the superelevation rate of the pathway surface, and the coefficient of friction between the bicycle tires and the surface, as shown in Table 5-3:

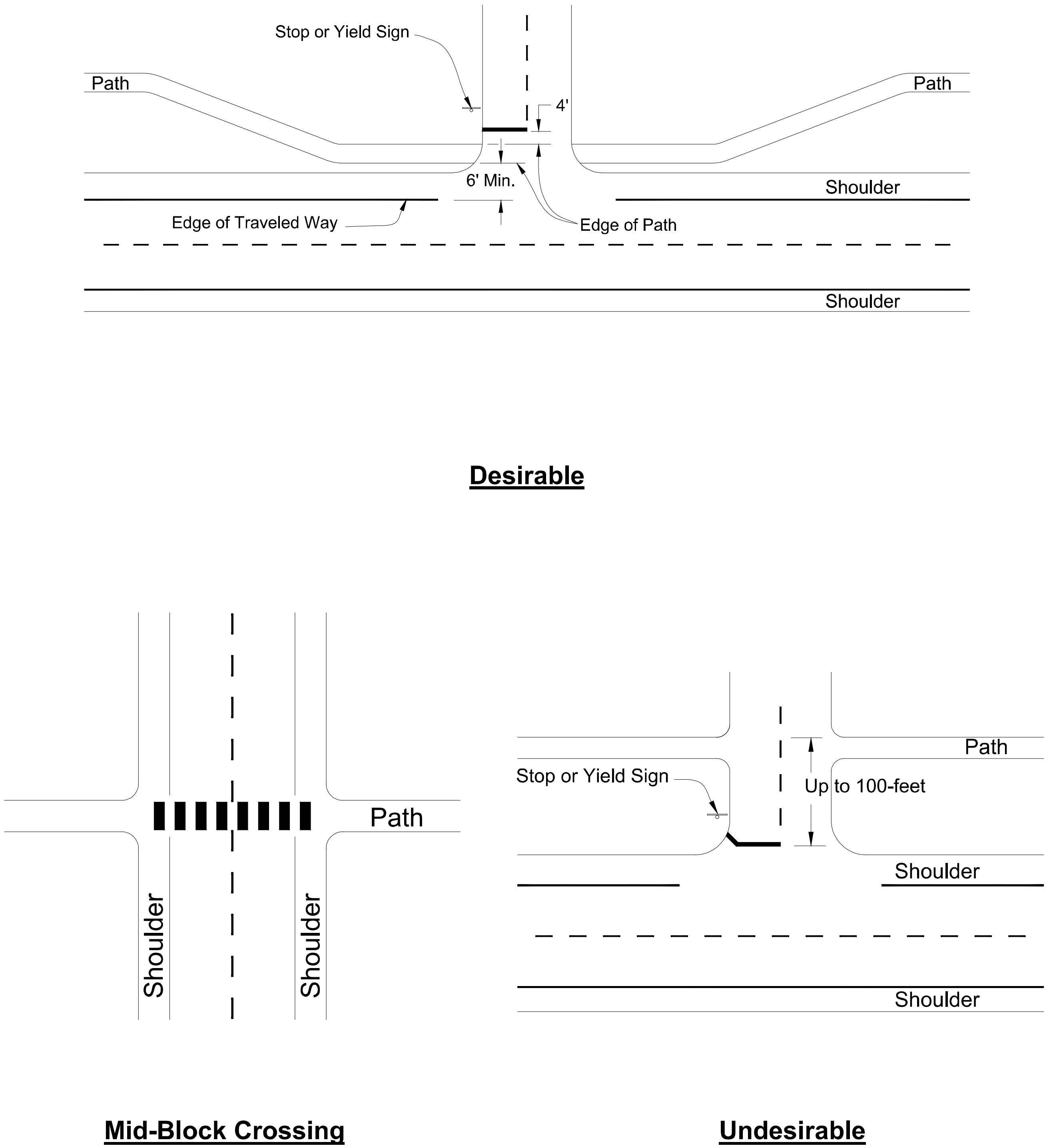


Figure 1210-4
Path Configurations
At Crossings

MEMORANDUM

STATE OF ALASKA

Department of Transportation and Public Facilities
Central Region-Division of Design and Engineering Services
Highway Design Section

To: **Jim Amundsen, Chief**
Highway Design Section

Date: June 28, 2017

Thru:

Phone No.: 269-0639

From: **Scott E. Thomas, P.E.**
Central Region Traffic Engineer

Subject: CR-T-1 Pathway Sweeps and Stop Bar Review

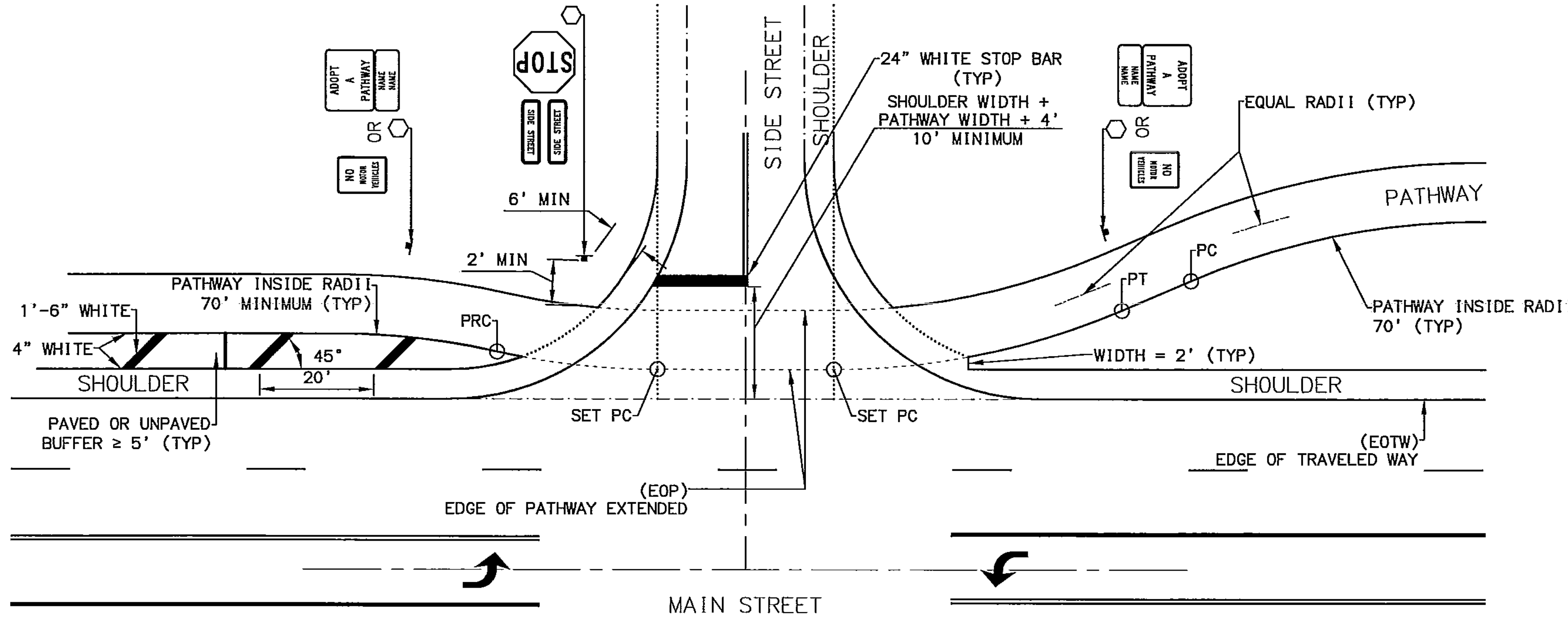
In 1986 and 1990, DOT/PF managers formally implemented pathway "sweeps" closer to main roads, in front of stop bars (attached). This is a safety measure to minimize crashes that are primarily due to sidestreet approach vehicles and right turning vehicles from the mainline. This method was illustrated in the 1990 AASHTO Bicycle Design Guide (Fig 22) and remains similar in the 2011 AASHTO Bicycle Design Guide (Fig 5-4) and Chapter 1210 of the Highway Preconstruction Manual (Fig 1210-4).

Staff conducted a decade long crash review of bicycle crashes at various STOP controlled crossing types. The final results still do not have enough data to show significant benefits or disbenefits. However, it remains obvious sight triangles are improved at sweeps, sidestreet vehicles are more likely to be stopped, and the speed at the point of conflict is reduced for all parties. Even so, projects with sweeps occasionally result in calls of concern for bicycling close to traffic, especially children. This is the same concern as for sidewalks next to major arterials. Buffers are preferred by casual and less experienced users. Regardless of the design solution, ITE best practice findings are that younger children (<=10 yrs) need to be supervised near traffic.

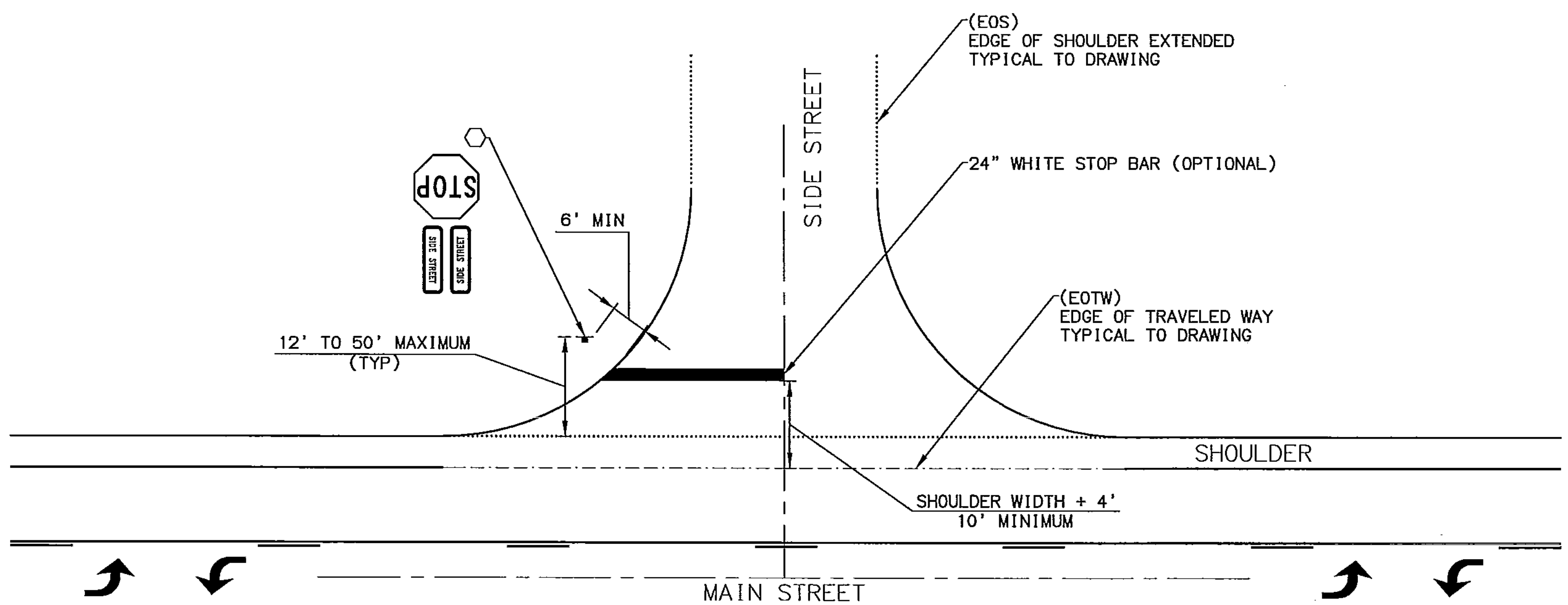
Based on the information above, CR-T-1.03 is significantly modified to place sweeps adjacent to the road shoulder rather than into part of the shoulder (as has been done since at least 2004). This separates uses into dedicated independent "lanes" and avoids shared use between conflicting parties. It allows future bike lanes or shoulder bikeways to be easily retrofitted. This does result in pushing the stop bar and driver's eye further back than the AASHTO design guideline of 14.4 to 17 feet from edge of traveled way. There is no apparent or strong crash increase is observable in the data when the stop bar is an additional 5 to 8 feet back. It is still desirable to keep stop bars as close to AASHTO guidelines as possible. Vehicles can stop at the stop bar first, then creep forward as needed to clear the pathway in order to see further down a roadway.

CR-T-1.10 is the new version and still conforms with the original 1986 recommendations.

Attached: CR-T-1.10 Unsignalized Intersection STOP and Crossing detail
Feb 23, 1990 Sidewalk/Pathway Intersection Features Memo
June 27, 2017 Bicycle-Vehicle Crashes at Approach Type (2003-2012)



TYPICAL UNCURBED RETURN WITH PATHWAY



TYPICAL UNCURBED RETURN WITHOUT SIDEWALK

UNCURBED INTERSECTION NOTES: (IN PRIORITY ORDER)

SIGNING:

1. LOCATE STOP SIGN SO IT IS VISIBLE TO APPROACHING TRAFFIC AND NEAR THE STOP BAR.
2. PROVIDE 2' OF CLEARANCE BETWEEN EDGE OF STOP SIGN PANEL AND EDGE OF PATHWAY OR SIDEWALK.
3. PROVIDE 6' OF CLEARANCE BETWEEN EDGE OF STOP SIGN PANEL AND EDGE OF SIDE STREET.
4. PLACE PATHWAY REGULATORY SIGNS AT COLLECTOR OR ARTERIAL ROADWAY JUNCTIONS, TYPICALLY GREATER THAN 1000 VEHICLES A DAY, OR SIDE STREETS CONNECTING THROUGH TRAFFIC TO OTHER COLLECTORS OR ARTERIALS.
5. "NO MOTOR VEHICLES" SIGNS ARE NOT REQUIRED WITHIN THE MUNICIPALITY OF ANCHORAGE.
6. SEE PLANS FOR PATHWAY SIGNING REQUIRED AT SIDE STREETS.

STRIPING:

1. STOP BARS ARE NOT REQUIRED WHEN NO PATHWAY OR SIDEWALK IS PRESENT. SEE PLANS.
2. LOCATE STOP BAR 4' MINIMUM BEHIND THE WIDTH OF PATHWAY.
3. BREAK CENTERLINE STRIPING WITHIN INTERSECTIONS WHICH HAVE DEDICATED TURN LANES.
4. CONTINUE CENTERLINE STRIPING THROUGH INTERSECTIONS WITH CENTER TWO-WAY-LEFT-TURN-ONLY LANES OR WHEN THERE ARE NO LEFT TURN LANES.
5. CONTINUE LANE "SKIP" STRIPING THROUGH INTERSECTIONS.
6. DELETE OUTERMOST EDGE OF TRAVELED WAY STRIPING AT INTERSECTIONS OR WRAP EOTW STRIPING TO SIDE STREET EOTW.
7. MATCH SIDE STREET STRIPING IF STRIPING IS PRESENT.

REVISIONS

Date	Description	By
09/16/13	NOTES ADDED	SET
12/10/14	RADII/REVISED NOTES	SET
06/23/15	CED: ADA TILES NOT REQ	SET
06/10/17	XWALK BUFFER	SET

SHEET 1 OF 2

State of Alaska
Department of Transportation
& Public Facilities

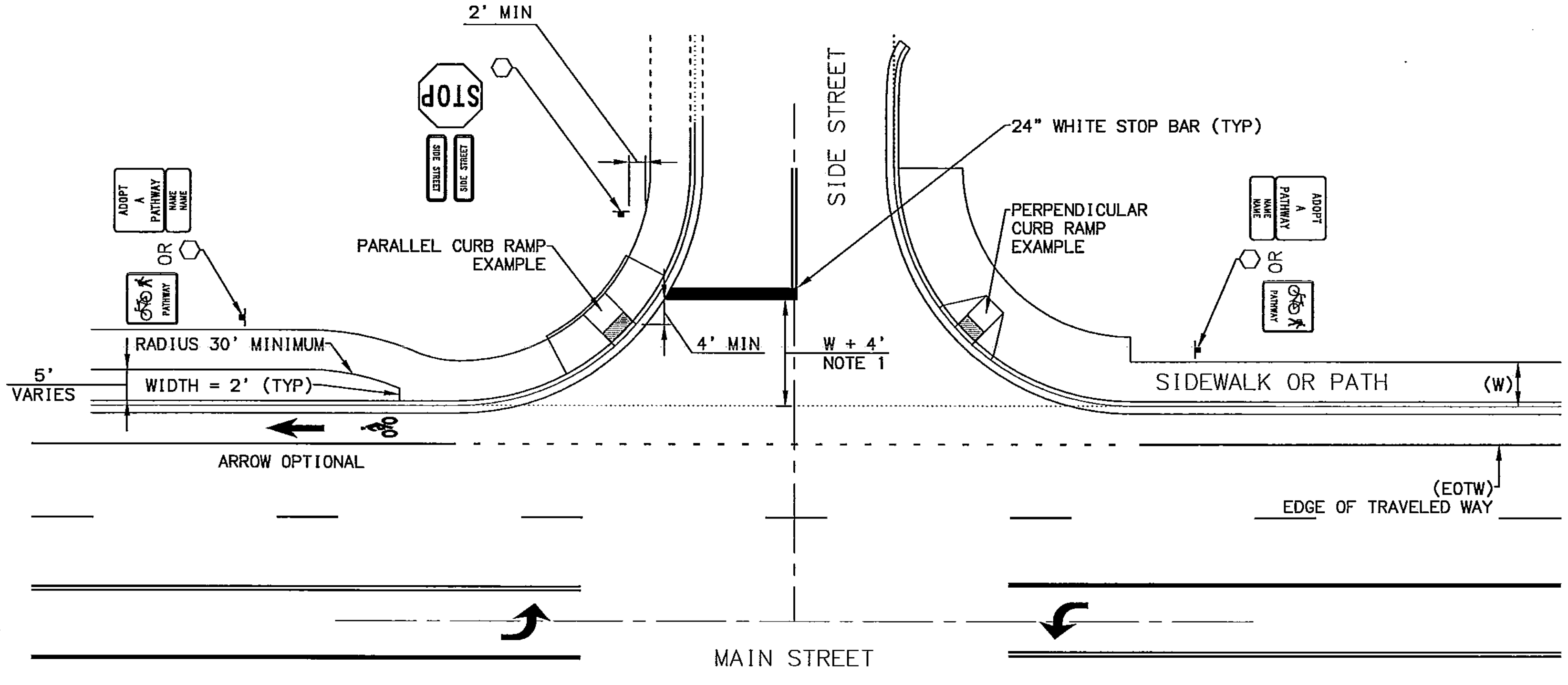
UNSIGNALIZED INTERSECTION
STOP AND CROSSING

APPROVED

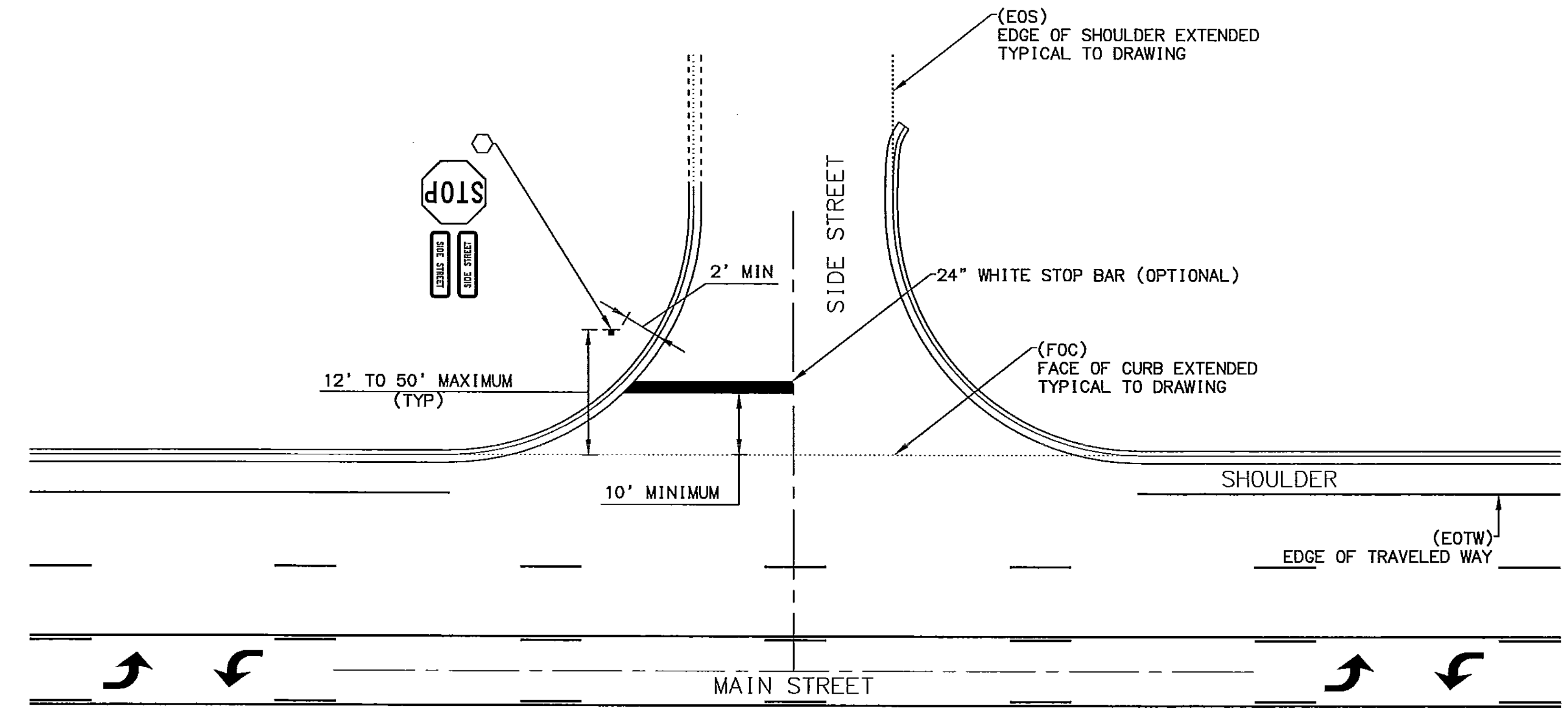
STATE OF ALASKA 49TH SCOTT E. THOMAS CE 8602 REGISTERED PROFESSIONAL ENGINEER

Date 06/10/17

CR-T-01.10



TYPICAL CURBED RETURN WITH SIDEWALK



TYPICAL CURBED RETURN WITHOUT SIDEWALK

CURBED INTERSECTION NOTES:

SIGNING:

1. LOCATE STOP SIGN SO IT IS VISIBLE TO APPROACHING TRAFFIC AND NEAR THE STOP BAR.
2. PROVIDE 2' OF CLEARANCE BETWEEN EDGE OF STOP SIGN PANEL AND EDGE OF PATHWAY OR SIDEWALK.
3. PROVIDE 6' OF CLEARANCE BETWEEN EDGE OF STOP SIGN PANEL AND SIDE STREET FACE OF CURB.
4. PLACE PATHWAY REGULATORY SIGNS AT COLLECTOR OR ARTERIAL ROADWAY JUNCTIONS, TYPICALLY GREATER THAN 1000 VEHICLES A DAY, OR SIDE STREETS CONNECTING THROUGH TRAFFIC TO OTHER COLLECTORS OR ARTERIALS.
5. "NO MOTOR VEHICLES" SIGNS ARE NOT REQUIRED WITHIN THE MUNICIPALITY OF ANCHORAGE.
6. SEE PLANS FOR PATHWAY SIGNING REQUIRED AT SIDE STREETS.

STRIPING:

1. STOP BARS ARE NOT REQUIRED WHEN NO PATHWAY OR SIDEWALK IS PRESENT. SEE PLANS.
2. 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'.
3. BREAK CENTERLINE STRIPING WITHIN INTERSECTIONS WHICH HAVE DEDICATED TURN LANES.
4. CONTINUE CENTERLINE STRIPING THROUGH INTERSECTIONS WITH CENTER TWO-WAY-LEFT-TURN-ONLY LANES OR WHEN THERE ARE NO LEFT TURN LANES.
5. CONTINUE LANE "SKIP" STRIPING THROUGH INTERSECTIONS.
6. DELETE OUTERMOST EDGE OF TRAVELED WAY STRIPING AT INTERSECTIONS OR WRAP EOTW STRIPING TO SIDE STREET EOTW.
7. MATCH SIDE STREET 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
6/10/17	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

Date 06/10/17

TECHNICAL MEMORANDUM

STATE OF ALASKA

Department of Transportation and Public Facilities
Central Region-Division of Design and Engineering Services
Highway Design Section

To: File

Date: June 27, 2017

Thru: Scott E. Thomas, P.E. SET
Central Region Traffic Engineer

Phone No.: 269-0648

From: Sarah Salvucci, Eng. Asst. SS
Highway Design-Traffic and Safety

Subject: Bicycle-Vehicle Crashes at Approach Type (2003-2012)

Per 1986 memorandum, Central Region of the Alaska Department of Transportation and Public Facilities established sweep type approaches as standard practice at stop sign controlled intersections. A study exploring the relationship between approach type at intersections and frequency of crashes was conducted to examine the effects of those guidelines over time. Findings indicate the density of intersections may be more influential than approach type. Otherwise the type of design used is currently inconclusive in Alaska.

Police reported bicycle-vehicle crashes at stop sign controlled intersections from 2003-2012 were categorized as one of five sidewalk approach types in terms of distance from the roadway at the intersection. If inadequate information was available, the crash was labeled as unknown. The five classifications were buffer, minimal buffer, no buffer, sweep, and other. In this paper sidewalk refers to both pathways and sidewalks; no distinction was made to limit unnecessary variables.

The term buffer was applied to a sidewalk located more than five feet from the edge of the roadway with no change on approach to an intersection. Minimal buffer was used to describe when the sidewalk was less than five feet, but not adjacent, to the roadway. No buffer was the case when the sidewalk was adjacent to the roadway. Sweep was used when the sidewalk was farther from the roadway between intersections and then swept with the edge flush to the roadway at intersections. The term other denoted those intersections not possible to place in any of the above four classifications.

Google Earth was used to categorize intersection corners at the time of crash occurrence by utilizing the historic feature. A total of 169 bicycle-vehicle crashes were classified at stop sign intersections in Central Region from 2003-2012. Of those, 159 occurred within the Municipality of Anchorage. In order to compare the crash results with the relative occurrence of each type, all stop sign controlled intersections, regardless of crashes, on 22 arterial roads in Anchorage were classified using the same categories as the crash data. This was done by using 2016 Google Earth to ensure consistent and clear images across the city. A total of 1366 intersection corners were categorized. On the 22 selected roads, there were 131 bicycle-vehicle crashes.

Figure 1 compares bicycle-vehicle crashes from 2003-2012, to the frequency of each approach type on 22 roads in Anchorage. Crashes appear to occur at approach types at roughly the same frequency as the number of approach types occur around the city. No buffers are where crashes occur the most, but they are also the most frequent type of approach in Anchorage. No buffers appear to have a slightly higher proportional amount of crashes than approach type while buffers have slightly less crashes than proportional approach type. Sweeps and minimal buffers both have a similar crash occurrence to their physical occurrence in Anchorage.

In the scatter plot in Figure 2, there does not appear to be a clear trend for each sidewalk approach type. The overall trend seems to be the more approaches per mile, the more crashes occur per mile, regardless of individual sidewalk approach type. No buffer crashes occur most often on intersection dense roads around town and have almost all instances of more than one crash per mile.

Noticeable in Figure 3, there are few of each type of bicycle-vehicle crashes at stop sign controlled intersections with the exception of the no buffer category. Significant results are hard to derive from small sample sizes.

Due to the sample size of the bicycle-vehicle crashes it is difficult to assert one type of approach is better than another. Each approach type appears to have roughly proportional crashes to physical occurrences in Anchorage. It appears higher density of stop sign controlled intersections is a stronger indicator to crashes than sidewalk approach type. No buffers have the most crashes and occur the most frequently on intersection dense roads. Buffers have less proportional total crashes. Sweeps and minimal buffers both have few crashes, making them hard to characterize due to the lack of data.

Additional decades of data would be helpful to form significant conclusions. Furthermore, future research could expand the data set by observing relative conflict between the different user groups. Strava, an app used to track individual running and bicycling, could be useful to determine relative bicycle use. Adding data on bicycle usage levels per sidewalk type would help to compute and compare crash rates based on exposure to conflict. This would be similar to how vehicular crash rates are compared.

Attachments:

Figure 1: Bicycle-Vehicle Crashes Relative to Sidewalk Approach Occurrence on Select Roads in Anchorage
Figure 2: Bicycle-Vehicle Crashes on Sidewalk Approaches at Stop Sign Controlled Intersections
Figure 3: Severity of Bicycle-Vehicle Crashes at Stop Sign Controlled Intersections
Example of Each Sidewalk Approach Type
Bicycle-Vehicle Crash Data

Figure 1

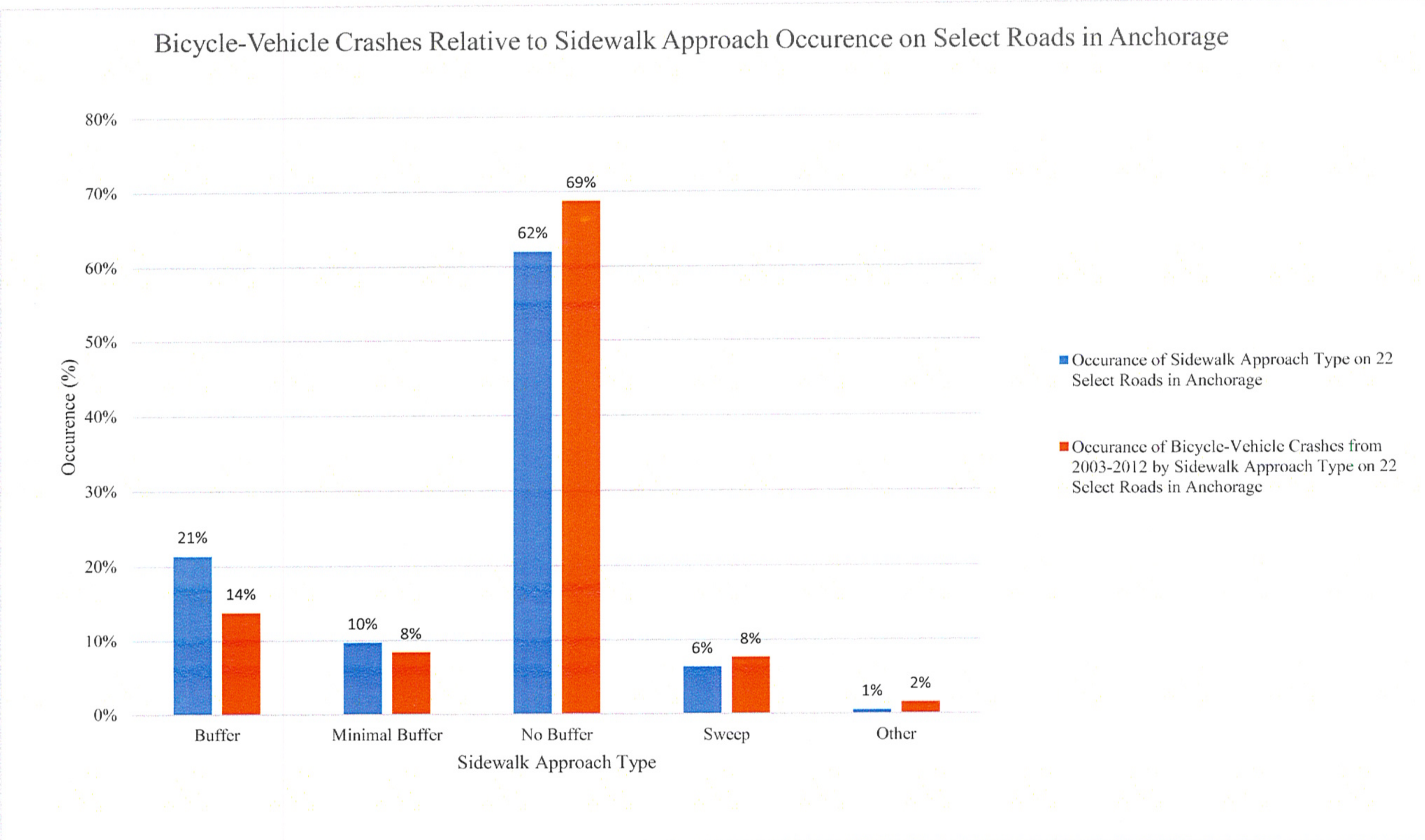
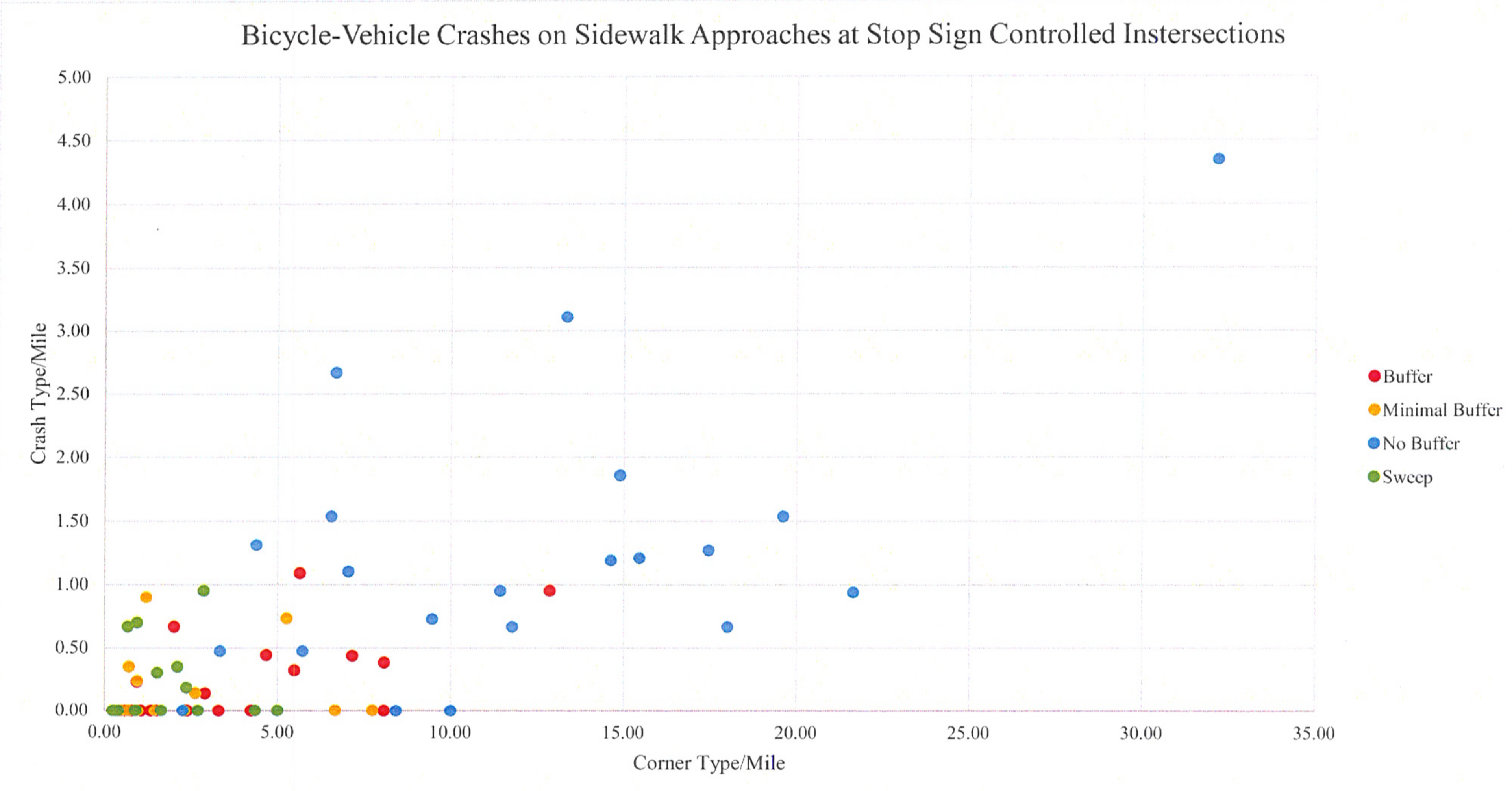
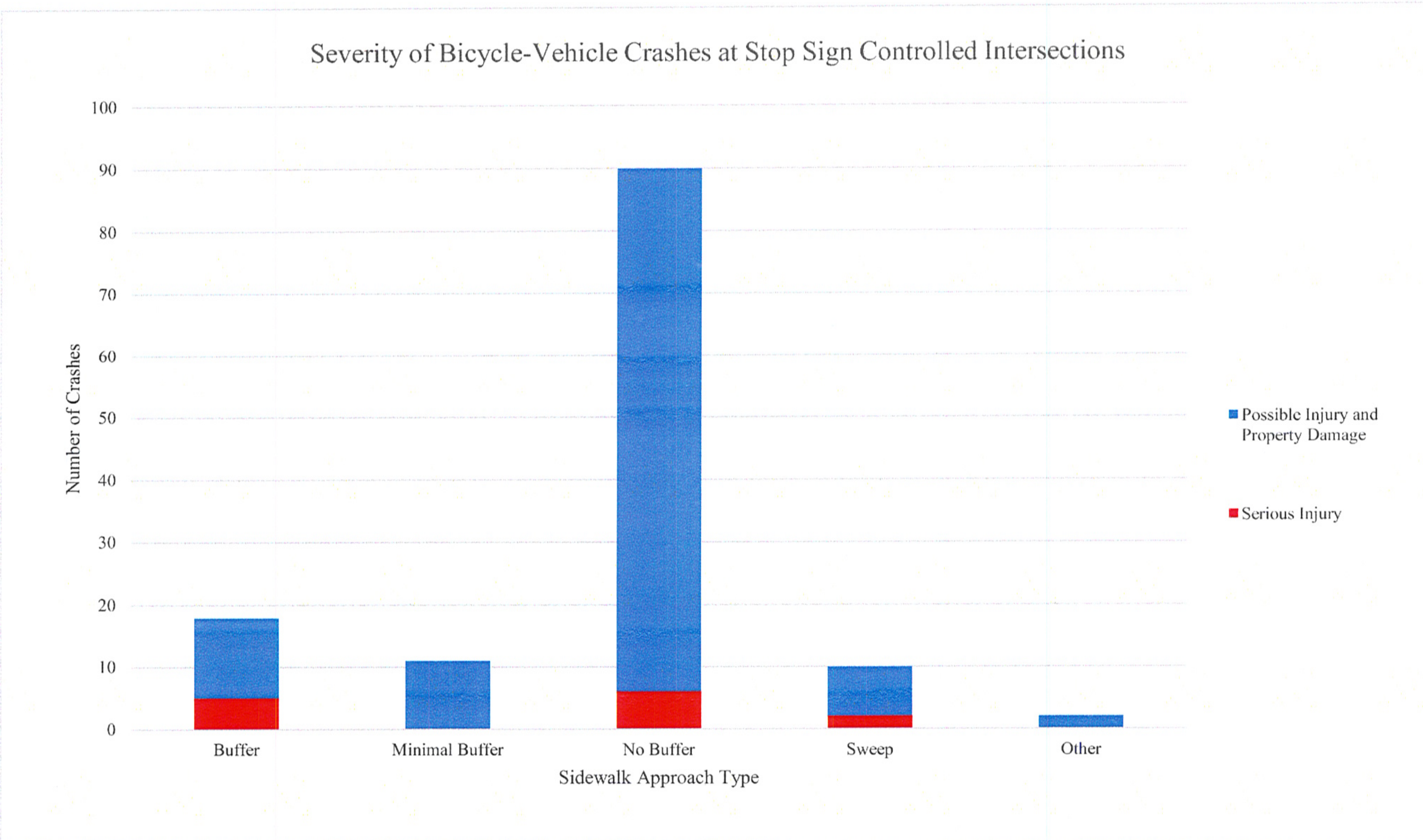

Bicycle-Vehicle Crashes Relative to Sidewalk Approach Occurence on Select Roads in Anchorage
80%
70%
60%
50%
40%
30%
20%
10%
0%
Occurence (%)
21%
14%
10%
8%
62%
69%
6%
8%
1%
2%
Buffer
Minimal Buffer
No Buffer
Sweep
Other
Sidewalk Approach Type
Occurance of Sidewalk Approach Type on 22 Select Roads in Anchorage
Occurance of Bicycle-Vehicle Crashes from 2003-2012 by Sidewalk Approach Type on 22 Select Roads in Anchorage

Figure 2

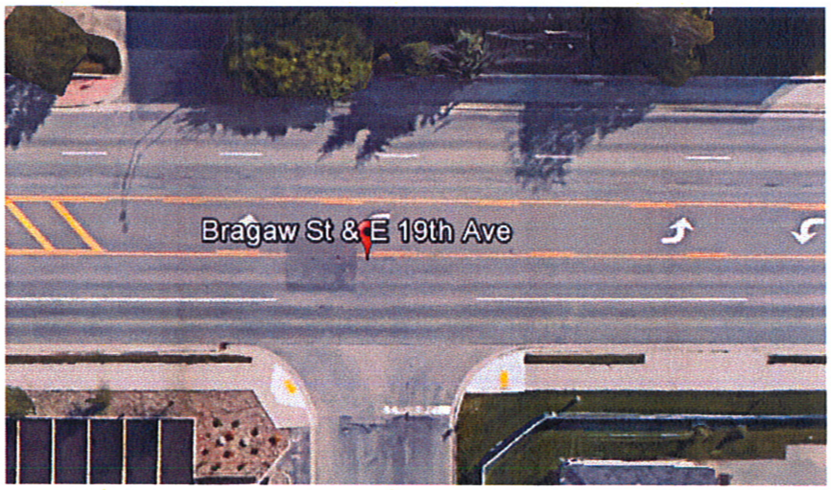
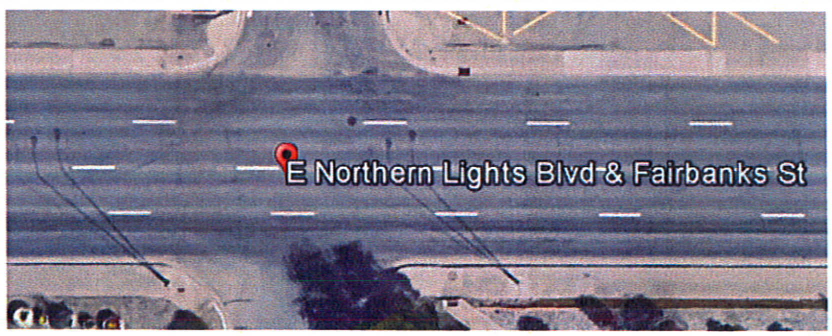
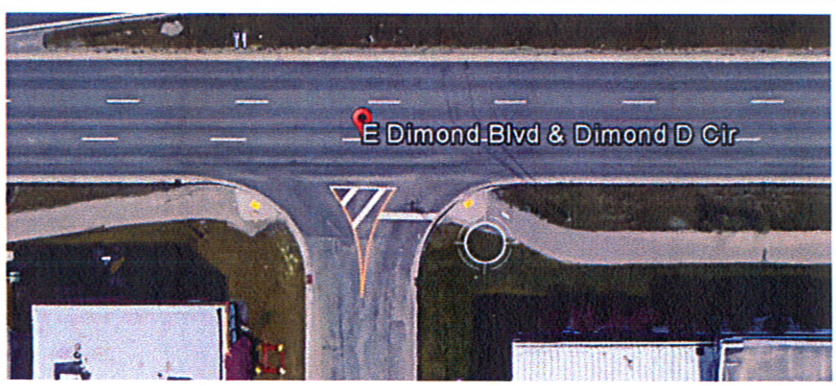


Bicycle-Vehicle Crashes on Sidewalk Approaches at Stop Sign Controlled Instersections
Crash Type/Mile
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
Corner Type/Mile
Buffer
Minimal Buffer
No Buffer
Sweep

Figure 3


Severity of Bicycle-Vehicle Crashes at Stop Sign Controlled Intersections
100
90
80
70
60
50
40
30
20
10
0
Number of Crashes
Buffer
Minimal Buffer
No Buffer
Sweep
Other
Sidewalk Approach Type
Possible Injury and Property Damage
Serious Injury

Example of Each Sidewalk Approach Type

Buffer	
Minimal Buffer	
No Buffer	
Sweep	

ACCNUM	PCASENUN	CDSRTE	ACCMI	Year	Mon	Day	ACCTIN	STREET	CROSSSTREET	INTER	REFUN	INTERDII	RDJUNCT	NU	ACCSEVERI	TO	MA	MII
200304493	317403	134542	0.74	2003	4	1	1428	10TH AVE_NB	C STREET_EB	0	AT INT	NOT APP	4-WAY INT	1	PROPERTY	0	0	0
200306911	328529	134542	0.21	2003	5	29	1655	10TH AVE EB	GAMBELL ST N	0	AT INT	NOT APP	UNKNOWN	1	NON-INCAI	1	0	1
200706262	737818	133700	0.637	2007	7	31	1714	DIMOND D CIR	DIMOND BLVD	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200961280	9053215	134552	0.35	2009	10	26	847	12TH AVE	N ST	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
201097300	10032732	134548	1.09	2010	7	13	1453	W 13TH AVE	C ST	0	AT INT	NOT APP	T - INTERSE	1	PROPERTY	0	0	0
201257232	12-022640	134548S1	0.14	2012	5	17	1700	13TH	G ST	0	AT INT. W/		4-WAY INT	2	NON-INCAI	1	0	1
201257158	12-022260	134240	0.562	2012	5	15	1315	16TH AVE.	C ST.	0	AT INT. W/		4-WAY INT	2	NON-INCAI	1	0	1
200314690	W356408	134241	0.47	2003	10	20	1706	1LTH AVE_WB	BRAGAW ST	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
200911053	9046661	134241	0.47	2009	9	18	1623	16TH	BRAGAW	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
200705755	735311	133921S4	0	2007	7	17	1458	27TH AVE WB	LAKE OTIS PKV	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
200611602	646711	133921	0	2006	9	29	1133	27TH AVE W/B	MINNESOTA D	0	AT INT	NOT APP	T - INTERSE	1	PROPERTY	0	0	0
201090578	10037802	133700	0.637	2010	8	11	1536	DIMOND BLVD	DIMOND D CIF	0	AT INT	NOT APP	T - INTERSE	1	INCAPACIT.	1	1	0
200407790	427392	134770	1.73	2004	6	15	957	36TH AVENUE	RHONE CIRCLE	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
200506254	522192	134770	0.97	2005	5	23	1758	36TH NB	A STREET WB	100	FEET	WEST	T - INTERSE	1	PROPERTY	0	0	0
201077225	10024314	134770	1.73	2010	5	26	1936	E 36TH AVE	RHONE ST	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
201097402	10030220	134770	0	2010	6	29	1245	36TH AVE	MINNESOTA D	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
201095614	10021453	133950S1	1.37	2010	5	10	1440	4TH AVE	BRAGAW ST	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200908340	9033994	134330	0.19	2009	7	7	1700	20TH AVE	ARCTIC BLVD	0	AT INT	NOT APP	4-WAY INT	1	PROPERTY	0	0	0
200607285	634095	134115	0.12	2006	7	18	1900	42ND AVE	LAKE OTIS PKV	0	AT INT	NOT APP	DRIVEWAY	1	PROPERTY	0	0	0
201097497	10024462	134115	0.12	2010	5	27	1545	42ND AVE	LAKE OTIS PKV	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
200706167	737262	134440	0.639	2007	7	28	1805	SITKA ST SB	E 5TH AVE EB	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200705405	733439	134600	0.647	2007	7	6	2237	6TH AVE WB	B STREET SB	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
200707364	743875	133835	0.56	2007	9	4	1800	76TH AVE WB	EVANDER AVE	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200707779	745832	133750	2.475	2007	9	15	1335	JEWEL ALKE RD	BLACKBERRY S	0	AT INT	NOT APP	T - INTERSE	1	PROPERTY	0	0	0
201203335	1201543	133807	0	2012	6	15	1345	AMBASADOR D	ELMORE RD	0	AT INT	NOT APP	T - INTERSE	1	PROPERTY	0	0	0
201251450	12-049681	133807	0	2012	10	17	1741	ELMORE	AMBASSADOR	0	AT INT. W/		T - INTERSE	2	INCAPACIT.	1	1	0
200408601	430824	BORO04	0	2004	7	4	1838	88TH AVENUE	WALMART	0	NOT A	NOT APP	NOT A JUN	1	PROPERTY	0	0	0
200505843	520073	BORO04	0	2005	5	10	1643	E 57TH EB	OLD SEWARD	0	AT INT	NOT APP	NOT A JUN	1	NON-INCAI	1	0	1
200505914	520571	BORO04	0	2005	5	13	1722	POTTER RD	ARCTIC BLVD	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	2	0	2
200509673	534176	BORO04	0	2005	8	1	1537	E 50TH WB	OLD SEWARD	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200811213	8025278	BORO04	0	2008	6	2	1157	CENTERPOINT	36TH	0	AT INT	NOT APP	T - INTERSE	1	PROPERTY	0	0	0
201095428	10031522	BORO04	0	2010	7	6	1405	15TH TERRACE	CORDOVA	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
201177462	11-027008	BORO04	0	2011	6	11	1825	E. NORTHERN L	NICHOLS STRE	0			T - INTERSE	2	NON-INCAI	1	0	1
201177466	11-027035	BORO04	0	2011	6	11	2103	RASPBERRY	SERVICE RD	0			T - INTERSE	2	NON-INCAI	1	0	1
201180956	11-046324	BORO04	0	2011	10	4	1730	ARCTIC SPUR R	RASPBERRY RC	0			T - INTERSE	2	NON-INCAI	1	0	1
201258108	12-028692	BORO04	0	2012	6	21	1706	34TH	C STREET	0			4-WAY INT	2	NON-INCAI	1	0	1

ACCNUM	PCASENUM	CDSRTE	ACCMI	Year	Mon	Day	ACCTIN	STREET	CROSSSTREET	INTER	REFUN	INTERDI	RDJUNCT	NU	ACCSEVERI	TO	MA	MI
200307213	330449	134330	0.13	2003	6	8	1517	ARCTIC NB	W 19TH	0	AT INT	NOT APP	4-WAY INT	1	PROPERTY	0	0	0
200408655	431191	134330	0.88	2004	7	6	1644	ARCTIC	31ST_WB	0	NOT A	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200510798	541263	134100	1.191	2005	9	12	1719	BENSON BLVD	EIDE ST S/B	0	AT INT	NOT APP	OTHER	1	INCAPACIT.	1	1	0
200708897	751055	133780	0.73	2007	10	17	603	ARLENE ST NB	W 88TH AVE E	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
200512809	545223	134140	4.092	2005	10	4	1626	LAKE OTIS PKW	79TH AVE EB	0	AT INT	NOT APP	T - INTERSE	1	PROPERTY	0	0	0
200412349	446615	134553	0.24	2004	9	30	1651	BARROW ST N/	E 6TH AVE E/B	0	AT INT	NOT APP	4-WAY INT	1	PROPERTY	0	0	0
200906629	9024600	133700	1.679	2009	5	20	734	DIMOND BLVD	CARNELIAN ST	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200806866	8037812	134750	1.64	2008	8	13	1200	NORTHERN LIG	LILY ST	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
201177980	11-030093	134779	0.38	2011	6	29	1300	UAA DR	ALUMNI DR	0	AT INT. W/		T - INTERSE	2	NON-INCAI	1	0	1
200307969	334663	134700	0.17	2003	6	30	1300	BONIFACE PKW	42ND AVE EB	0	AT INT	NOT APP	OTHER	1	PROPERTY	0	0	0
200510962	543034	134700	0.26	2005	9	22	1658	BONIFACE NB	40TH EB	0	AT INT	NOT APP	OTHER	1	NON-INCAI	1	0	1
200312127	351946	133950S1	0.49	2003	9	25	1600	BRAGAW ST SB	16TH AVE WB	0	AT INT	NOT APP	4-WAY INT	1	PROPERTY	0	0	0
200412970	448964	133900	0.787	2004	10	15	1521	MULDOON RD	LITTLE DIPPER	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200408104	428745	134771	0.28	2004	6	22	2109	36TH	LOIS__NB	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
201251398	12-037589	133950S1	0.49	2012	8	10	1333	BRAGRAW	16 TH AVE	0	AT INT. W/		4-WAY INT	2	INCAPACIT.	1	1	0
200606106	627188	133203	0	2006	6	11	1329	BRIARWOOD D	DIMOND BLVD	0	AT INT	NOT APP	T - INTERSE	1	PROPERTY	0	0	0
200309655	341304	134341	2.26	2003	8	2	1652	C STREET NB	20TH AVE WB	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200608783	635028	134341	1.58	2006	7	25	810	C STREET WB	10TH AVE	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
201098246	10045934	134341	3.19	2010	9	25	133	C STREET	34TH AVE	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
201171408	11-036910	134341	2.649	2011	8	9	1414	C STREET	FIREWEED BLV	250	FEET	SOUTH	DRIVEWAY	2	INCAPACIT.	1	1	0
200706137	737092	133916	0	2007	7	27	1814	CENTENNIAL CI	PECK AVE EB	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200806175	8034603	134810	0.1	2008	7	25	1455	COMMERCIAL I	W CHIPPERFIE	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200804339	8028075	134551S3	0.61	2008	6	17	1951	CORDOVA_ST	TUDOR RD	0	AT INT	NOT APP	OTHER	1	NON-INCAI	1	0	1
200607658	631460	134100	1.015	2006	7	5	1124	BENSON BLVD	CHEECHAKO S	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200309169	339053	134500	2.44	2003	7	22	1813	DEBARR RD WI	ATKINSON DR	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200500468	51421	134770	1.91	2005	1	10	1722	36TH WB	LOCARNO NB	0	AT INT	NOT APP	NOT A JUN	1	PROPERTY	0	0	0
201096064	10026245	134500	3.2	2010	6	6	2224	DEBARR_RD	ENTRANCE TO	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
201105390		134500	0.3	2011	8	8	2000	DEBARR RD	AK REGIONAL	0	AT INT	NOT APP	DRIVEWAY	1	PROPERTY	0	0	0
200311437	348891	133700	0.99	2003	9	10	1206	DIMOND BLVD	C STREET	150	FEET	EAST	DRIVEWAY	1	INCAPACIT.	2	2	0
201098866	10045444	134130	1.242	2010	9	22	1621	LAKE OTIS PKW	W CAMPUS DI	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	2	0	2
200706051	736529	133700	0.977	2007	7	24	1751	DIMOND BLVD	C STREET	200	FEET	EAST	DRIVEWAY	1	INCAPACIT.	1	1	0
200308819	337792	134140	1.737	2003	7	16	1434	LAKE OTIS PKW	42ND AVE WB	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200711478	739608	133700	0.936	2007	8	10	2048	300 W DIMONI	COSTCO ENT	0	AT INT	NOT APP	NOT A JUN	1	NON-INCAI	1	0	1
200803756	8024431	134140	1.737	2008	5	28	1630	LAKE OTIS PKW	42ND AVE	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
200909328	9037977	133700	0.622	2009	8	2	1147	DIMOND BLVD	KING ST	700	FEET	WEST	T - INTERSE	1	NON-INCAI	1	0	1
200909435	9038596	133700	0.124	2009	8	5	1914	DIMOND BLVD	BRIARWOOD (	0	AT INT	NOT APP	OTHER	1	NON-INCAI	1	0	1

ACCNUM	PCASENUN	CDSRTE	ACCMI	Year	Mon	Day	ACCTIN	STREET	CROSSSTREET	INTER	REFUN	INTERDII	RDJUNCT	NU	ACCSEVERI	TO	MA	MII
200911048	9046711	133700	1.008	2009	9	18	2107	DIMOND	C STREET	500	FEET	EAST	OTHER	1	NON-INCAI	1	0	1
200806274	8035117	134140	1.737	2008	7	28	1900	LAKE OTIS_PKV	E 42ND_AVE	0	AT INT	NOT APF	T - INTERSE	1	NON-INCAI	1	0	1
201178576	11-033212	133700	0.124	2011	7	18	1709	DIMOND BLVD	BRIARWOOD S	0	AT INT. W/		T - INTERSE	2	NON-INCAI	1	0	1
200709099	751874	134516	0.42	2007	10	22	1045	NORTHWAY DF	DEBARR RD W	0	AT INT	NOT APF	T - INTERSE	1	INCAPACIT.	1	1	0
200608795	6035471	134557	0.78	2006	7	27	1705	E STREET WB	6TH AVE	0	AT INT	NOT APF	T - INTERSE	1	PROPERTY	0	0	0
200509356	531962	133899	3.528	2005	7	20	641	TUDOR RD SB	FLORINA ST EE	250	FEET	WEST	DRIVEWAY	1	INCAPACIT.	1	1	0
200911137	9047142	133698	0.08	2009	9	21	1340	EIDE ST SB	BENSON BLVD	0	AT INT	NOT APF	4-WAY INT	1	PROPERTY	0	0	0
200906295	9022984	133735	3.508	2009	5	11	1706	ELMORE RD	AMBASSADOR	0	AT INT	NOT APF	4-WAY INT	1	NON-INCAI	1	0	1
201257190	12-022480	133735	3.228	2012	5	16	1743	ELMORE RD	EAST TUDOR F	300	FEET	SOUTH	DRIVEWAY	2	NON-INCAI	1	0	1
200611613	646769	134120	1.28	2006	9	29	1804	W FIREWED LA	545 FIREWEEL	0	AT INT	NOT APF	NOT A JUN	1	NON-INCAI	1	0	1
201076957	10031982	134120	1.44	2010	7	9	954	FIREWEED LN	DORBRANDT S	0	AT INT	NOT APF	T - INTERSE	1	NON-INCAI	1	0	1
200705520	734070	134116	0.27	2007	7	10	1552	FLORINA ST SB	TUDOR RD	0	AT INT	NOT APF	T - INTERSE	1	NON-INCAI	1	0	1
200806411	8035756	134100	1.077	2008	8	1	753	BENSON BLVD	DAWSON ST	0	AT INT	NOT APF	4-WAY INT	1	NON-INCAI	1	0	1
200408875	432416	134200	0.479	2004	7	12	1918	GAMBELL NB	10TH AVE EB	0	AT INT	NOT APF	4-WAY INT	1	NON-INCAI	1	0	1
200909895	9040968	134100	1.077	2009	8	18	1235	BENSON BLVD	DAWSON ST	0	AT INT	NOT APF	4-WAY INT	1	INCAPACIT.	1	1	0
200308517	336472	134140	5.724	2003	7	9	2143	LAKE OTIS PKW	RIDGEMONT D	0	AT INT	NOT APF	T - INTERSE	1	NON-INCAI	1	0	1
200606342	629004	134343	0.06	2006	6	21	1100	HOLLYWOOD D	ASH PL	0	AT INT	NOT APF	4-WAY INT	1	PROPERTY	0	0	0
200308557	336609	134105	0.25	2003	7	10	1537	HYDER ST_SB	9TH AVE	0	AT INT	NOT APF	4-WAY INT	1	NON-INCAI	1	0	1
200906022	9020895	134750	6.31	2009	4	30	1337	W NORTHERN	MINNESOTA_	400	FEET	WEST	OTHER	1	NON-INCAI	1	0	1
200805818	8032720	133750	2.393	2008	7	14	1720	JEWEL LAKE_RI	CHEVIGNY_ST	0	AT INT	NOT APF	T - INTERSE	1	NON-INCAI	1	0	1
201257072	12-021321	134117	0.19	2012	5	9	1723	FOLKER	TUDOR	0	AT INT. W/		4-WAY INT	2	NON-INCAI	1	0	1
201250968	12-020777	134730	0	2012	5	6	1433	CHECKMATE	TUDOR	0	AT INT. W/		T - INTERSE	2	INCAPACIT.	1	1	0
200906638	9024719	133950S1	0.88	2009	5	20	1740	SAN JERONIMC	BRAGAW ST	0	AT INT	NOT APF	T - INTERSE	1	NON-INCAI	1	0	1
200805679	8031930	133220	1.379	2008	7	9	2032	KLATT RD (NEV	HILLTOP	0	AT INT	NOT APF	4-WAY INT	1	NON-INCAI	1	0	1
200305015	320690	134454S2	0.11	2003	4	18	1801	KLEVIN ST_WB	MT VIEW DR	0	AT INT	NOT APF	4-WAY INT	1	NON-INCAI	1	0	1
200305760	324300	134140	0.814	2003	5	7	1733	LAKE OTIS SB	27TH WB	0	AT INT	NOT APF	T - INTERSE	1	NON-INCAI	1	0	1
201098052	10031141	133750	1.899	2010	7	4	1009	JEWEL LAKE RD	LAKEWAY ST	0	AT INT	NOT APF	T - INTERSE	1	NON-INCAI	1	0	1
200807325	8040154	134544	0.97	2008	8	27	805	11TH AVE	A STREET	0	AT INT	NOT APF	4-WAY INT	1	PROPERTY	0	0	0
200309508	340638	134140	1.737	2003	7	30	1522	LAKE OTIS PKW	42ND AVE	0	AT INT	NOT APF	T - INTERSE	1	NON-INCAI	2	0	2
200509080	535455	134140	4.313	2005	8	8	1737	LAKE OTIS EB	AZZURITE NB	0	AT INT	NOT APF	T - INTERSE	1	PROPERTY	0	0	0
200909651	9039702	135241	0.32	2009	8	11	1707	GLENN NB-N E/	NORTH EAGLE	0	AT INT	NOT APF	T - INTERSE	1	PROPERTY	0	0	0
200607602	630340	134140	1.737	2006	6	28	1729	LAKE OTIS PKW	E 42ND AVE	0	AT INT	NOT APF	4-WAY INT	1	NON-INCAI	1	0	1
200705123	732152	133700	0.222	2007	6	29	1059	DIMOND BLVD	OLD SEWARD	150	FEET	EAST	T - INTERSE	1	INCAPACIT.	1	1	0
200612173	647622	134140	2.099	2006	10	4	806	LAKE OTIS PKW	HOMESTEAD (	0	AT INT	NOT APF	T - INTERSE	1	NON-INCAI	1	0	1
200805812	8032666	133724	2.271	2008	7	14	1119	ABBOTT RD	LITTLE BROOK	0	AT INT	NOT APF	T - INTERSE	1	NON-INCAI	1	0	1
200906333	9023138	134140	0.657	2009	5	12	1154	LAKE OTIS PKW	MAPLE AVE	0	AT INT	NOT APF	T - INTERSE	1	NON-INCAI	1	0	1

ACCNUM	PCASENUN	CDSRTE	ACCMI	Year	Mon	Day	ACCTIN	STREET	CROSSSTREET	INTER	REFUN	INTERDII	RDJUNCT	NU	ACCSEVERI	TO	MA	MII
201257554	12-024821	134140	1.737	2012	5	30	1517	LAKE OTIS	42ND	0	AT INT. W/		T - INTERSE	2	NON-INCAI	1	0	1
201099168	10035925	134104	0.15	2010	7	31	1734	LOIS DR	SPENARD RD	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
200508386	531500	134300	1.24	2005	7	17	1713	MINNESOTA DI	36TH SB	0	AT INT	NOT APP	T - INTERSE	1	PROPERTY	0	0	0
200910768	9045195	134300	6.28	2009	9	10	1549	MINNESOTA	BENSON	100	FEET	NORTH	OTHER	1	NON-INCAI	1	0	1
201097445	10028157	134300	5.57	2010	6	17	2030	W 41ST AVE	MINNESOTA D	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
201099061	10024405	134300	6.34	2010	5	27	1045	MINNESOTA DI	N LIGHTS BLVI	150	FEET	SOUTH	T - INTERSE	1	PROPERTY	0	0	0
200805879	8033078	135228	0	2008	7	16	1625	CREST VIEW LN	EAGLE RIVER F	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
200605036	620353	133900	2.671	2006	5	3	1759	MULDOON RD	5TH AVE WB	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
201177542	11-027572	133900	1.595	2011	6	15	758	MULDOON	20TH	0	AT INT. W/		T - INTERSE	2	NON-INCAI	1	0	1
201238809		133900	2.402	2012	10	12	1545	MULDOON RO/	OLD HARBOR /	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
200705305	732870	134750	0.06	2007	7	3	1513	NORTHERN LIG	MULDOON RD	330	FEET	WEST	DRIVEWAY	1	NON-INCAI	1	0	1
200707110	742692	134750	7.67	2007	8	28	1854	HOWE PLACE N	NORTHERN LI(	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	3	0	3
200805956	8033438	134750	0.06	2008	7	18	1613	NORTHERN LIG	MULDOON_RI	300	FEET	WEST	T - INTERSE	1	NON-INCAI	1	0	1
200906261	9021482	135225	2.07	2009	5	3	1536	EAGLE RIVER R	CREST VIEW L/	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
200305874	324909	134500	2.56	2003	5	10	2232	DEBARR RD	EDWARD ST	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200907582	9029647	134750	2.76	2009	6	17	734	NICHOLS ST	NORTHERN LI(	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
201095158	10034524	134750	4.87	2010	7	23	1435	NORTHERN LIG	FAIRBANKS ST	0	AT INT	NOT APP	OTHER	1	NON-INCAI	1	0	1
201095219	10036582	134750	2.96	2010	8	4	1253	E NORTHERN L	ARCA DR	0	AT INT	NOT APP	CROSSOVE	1	NON-INCAI	1	0	1
201177310	11-025968	134750	0.68	2011	6	5	1754	BRITTANY	NORTHERN LI(	0	AT INT. W/		4-WAY INT	2	PROPERTY	0	0	0
200610828	643376	134140	2.704	2006	9	10	1643	LAKE OTIS PKW	PAGO PAGO A	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	2	0	2
200511537	544384	135200	0.753	2005	9	29	1852	HANSON WB	OLD GLENN H'	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200705548	734221	135200	0.603	2007	7	11	1525	OLD GLENN HV	PARK PLACE	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200706078	736700	135200	1.013	2007	7	25	1630	BOWEN CIRCLE	OLD GLENN H'	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200907565	9029530	135200	1.433	2009	6	16	1507	NORTH JUANIT	OLD GLENN A	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200805478	8030831	133200	3.609	2008	7	3	1743	OLD SEWARD_	GOLDENBERR'	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200806588	8036698	133200	2.856	2008	8	6	2021	HANES ST	OLD SEWARD	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200907389	9028446	133200	2.856	2009	6	10	1239	HANES ALLEY	OLD SEWARD	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
201076816	10036960	133200	6.974	2010	8	6	1355	OLD SEWARD H	EXIT OF 4800 (	0	AT INT	NOT APP	NOT A JUN	1	NON-INCAI	1	0	1
201090540	10031057	133200	7.004	2010	7	3	2058	48TH AVE	OLD SEWARD	0	AT INT	NOT APP	OTHER	1	INCAPACIT.	1	1	0
200406816	422477	133500	0.112	2004	5	18	1042	OMALLEY	OMALLEY CTR	0	AT INT	NOT APP	OTHER	1	NON-INCAI	1	0	1
200405757	416951	134310	0.72	2004	4	13	15	SPENARD RD E	FOREST RD NB	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200307710	333555	134140	2.704	2003	6	24	1807	LAKE OTIS PKW	PAGO PAGO D	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200806540	8036864	133917S1	0.04	2008	8	5	1838	PECK AVE	MULDOON RD	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
200507506	527469	133899	1.557	2005	6	24	1534	TUDOR RD	DENALI ST	350	FEET	EAST	T - INTERSE	1	NON-INCAI	1	0	1
200413323	449884	134452	0.38	2004	10	21	1430	PRICE ST S/B	PARSONS AVE	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
200307526	332589	133765	2.11	2003	6	19	1910	RASPBERRY RD	NB WHITEHAL	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1

ACCNUM	PCASENUM	CDSRTE	ACCMI	Year	Mon	Day	ACCTIM	STREET	CROSSSTREET	INTER	REFUN	INTERDI	RDJUNCT	NU	ACCSEVERI	TO	MA	MI
201076471	10032746	133857	0.09	2010	7	13	1604	REKA DR	KATRINA CI	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
201076239	10038854	130000	125.2	2010	8	17	1334	SEWARD HWY	22ND AVE	0	AT INT	NOT APP	OTHER	1	NON-INCAI	1	0	1
201234697		133899	1.354	2012	6	22	1715	TUDOR ROAD	CORDOVA STR	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
200506822	524185	134310	1.39	2005	6	4	1312	SPENARD RD S	WYOMING DR	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
200909943	9041215	134310	1.18	2009	8	19	1653	SPENARD RD	WOODLAND D	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
201178756	11-033949	134310	1.18	2011	7	22	2003	WOODLAND D	SPENARD RD	0	AT INT. W/		T - INTERSE	2	NON-INCAI	1	0	1
200306291	326629	133908	0	2003	5	19	1650	TELEPHONE AV	DENALI ST	0	AT INT	NOT APP	4-WAY INT	1	PROPERTY	0	0	0
200707941	746551	134463	0.13	2007	9	19	1735	THOMPSON RD	SCHODDE ST	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200312811	355203	133899	0.848	2003	10	13	1840	TUDOR WB	BERING NB	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1
200411888	445146	133745	0.38	2004	9	21	1922	VICTOR RD	OLYMPIC DR V	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
200963829		133745	0.18	2009	9	12	1900	VICTOR ROAD (	MINERVA WA'	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
201096394	10036641	133899	0.568	2010	8	4	1750	TUDOR RD	COPE STREET	0	AT INT	NOT APP	T - INTERSE	1	NON-INCAI	1	0	1
201176600	11-021106	133899	3.345	2011	5	7	1706	E. TUDOR ROA	GRUMMAN ST	0	AT INT. W/		T - INTERSE	2	PROPERTY	0	0	0
201256712	12-018677	133899	1.865	2012	4	24	1359	TUDOR	JUNEAU	0	AT INT. W/		T - INTERSE	2	NON-INCAI	1	0	1
200708943	751306	133899	3.864	2007	10	18	1558	TUDOR RD SB	TUDOR CENTE	0	AT INT	NOT APP	4-WAY INT	1	NON-INCAI	1	0	1

SCOTT T.

MEMORANDUM

State of Alaska
Department of Transportation & Public Facilities

TO: John J. Burkholder, P.E.
Gerry W. Kintz, P.E.
Frank J. Lombardo, P.E
Carl A. Nelson, P.E.
Jeanne A. Lematta, P.E.

FROM: Michael R. Tooley
Design Section Chief
Design Section III

DATE: February 23, 1990

FILE NO: 1040

TELEPHONE NO: 266-1700

SUBJECT: Sidewalk/Pathway Intersection Features

There has been considerable discussion concerning where sidewalks/pathways should cross low volume approach roadways. The primary concern is bicycles not stopping and being struck by a vehicle.

A meeting between Messrs. Steven Horn, Jim Childers and John Burkholder developed guidelines for consideration. The discussion focused on what type of approach would require the sidewalk/pathway to terminate at the radius of the intersection of a road or driveway. The Region places stop signs with stop bars at all public approaches and private approaches of major traffic generators if the development has an internal circulation network. Any low volume approach such as a private residential driveway would not normally have a stop sign/bar. It is therefore recommended that:

1. Only those approaches requiring stop signs/bars as shown on the traffic plans, will have sidewalks/pathways terminate within the radius of approaches in front of the stop bar.

2. Those approaches not requiring a stop sign/bar may have the sidewalk/pathway cross at some other location which allows good sight distance for both vehicle and bicyclist. If this cannot be provided, the sidewalk/pathway should be brought into the intersection and a stop sign/bar provided for the approach.

This procedure should be applied to new as well as existing sidewalks/pathways on all design projects.

/skm

cc: Steven R. Horn, P.E., Preliminary Design and Environmental Supervisor
Tony D. Barter, P.E., Traffic/Safety Engineer, Traffic, Safety and Utilities Section

Read & Return

10/23/86

Scotch® 7664 "Post-it" Routing-Request Pads

ROUTING - REQUEST

Please

- [x] READ
- [ ] HANDLE
- [ ] APPROVE

and

- [x] FORWARD
- [ ] RETURN
- [ ] KEEP OR DISCARD
- [ ] REVIEW WITH ME

To Don Mofield

After consulting with us Northern Region developed the attached policy for signing & marking pathway xings. I concur. Please forward to Project Managers.

Date 10/15/86 From Steve Horn

Bill 11/5/86
Al
A.C.
Doug. DHD
Bob. Ree

MEMORANDUM

TO: Ron Tanner R.T.
Senior Traffic/Safety
Northern Region

FROM: T Tim Miller
Traffic Safety Engr.
Northern Region

TELEPHONE NO: 451-2276

SUBJECT: Signing & Marking Bike Paths

All DG-3 Proj. Mngrs. x.c. 10/20/86

DATE: September 29, 1986

Policy for the signing and marking of bike paths is needed to insure consistency in application in the Region. In particular, the question of how to handle the case where a parallel bike path crosses a STOP sign controlled side street approach needs to be resolved.

After checking the AASHTO Bike Guide, MUTCD, and calling Steve Horn in Central Region I recommend the following standards be adopted.

1. Bikeway geometrics should include swinging the bikeway toward the highway so that the bike path crosses the side street approach in a location where the crosswalk would normally be located.

2. Stop bars, rather than crosswalks should be installed on the stopped approach.

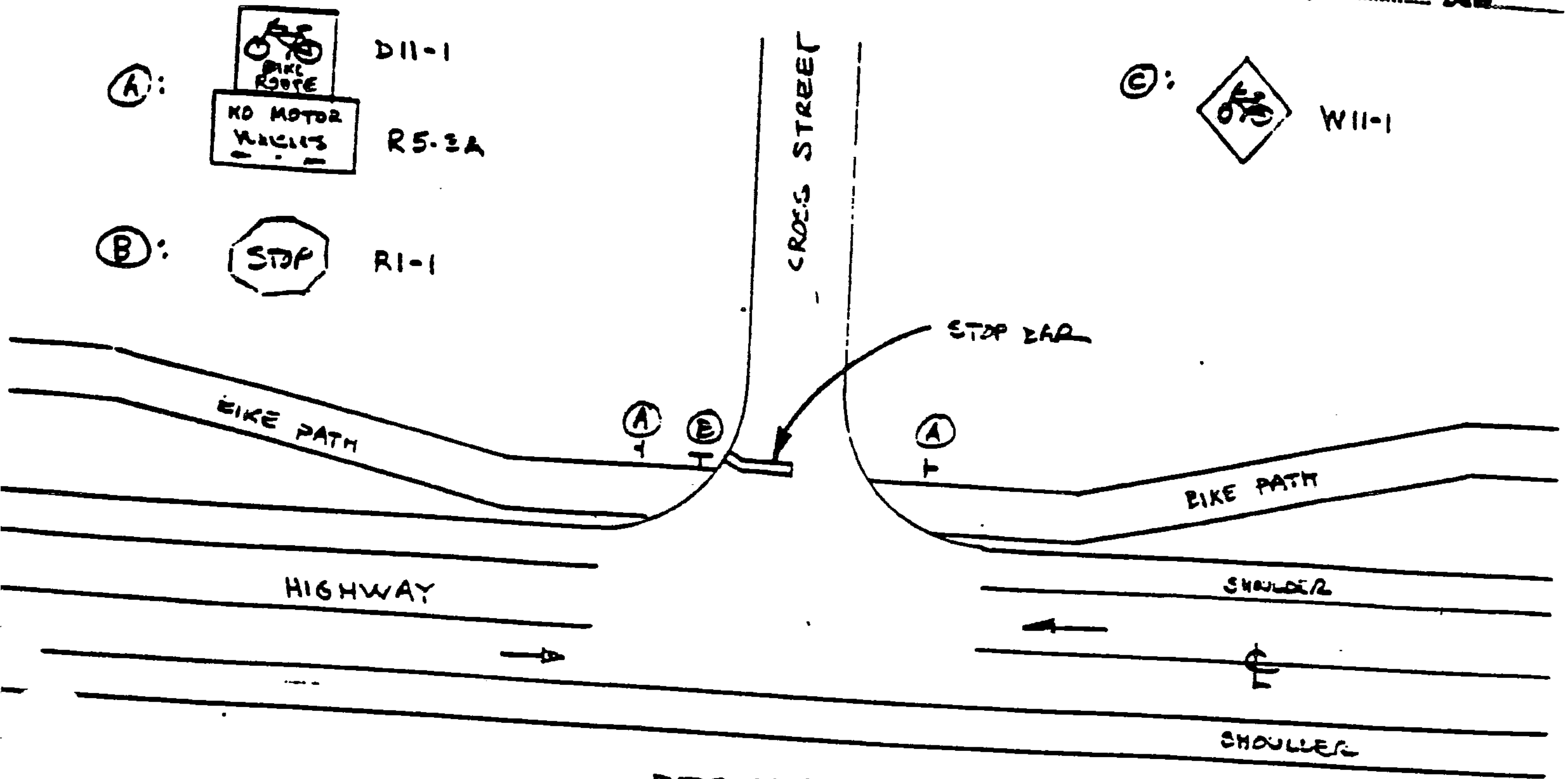
3. Except for the case where the bikeway crosses the through highway, STOP signs should not be used on the bike path unless under special conditions (i.e. inadequate sight distance, unexpected traffic conflicts, etc.).

The attached drawing summarizes the signing and markings I recommend for the desirable design, undesirable design, and mid-block cases.

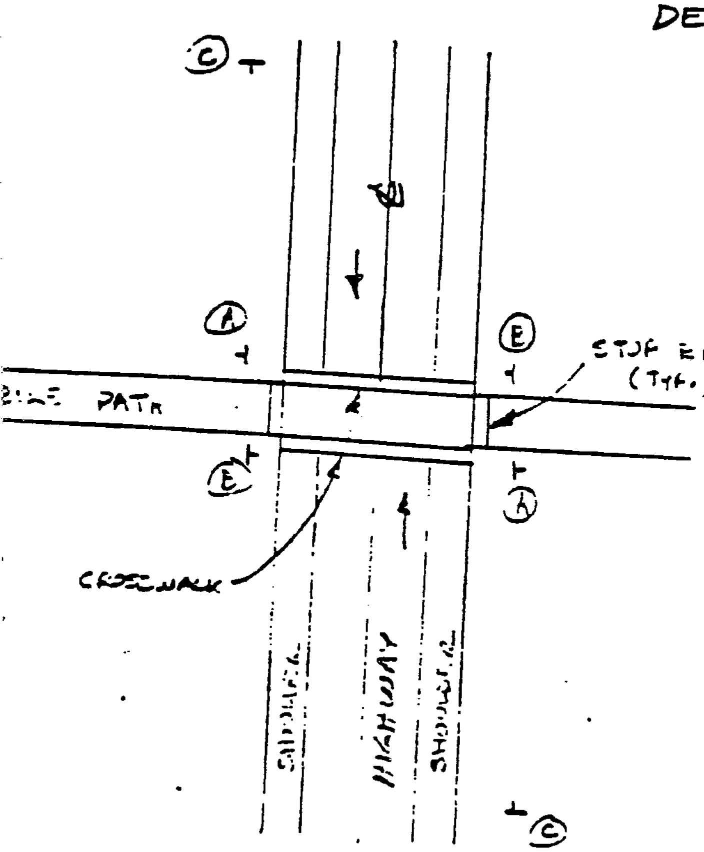
State of Alaska
Department of Highways
Computations

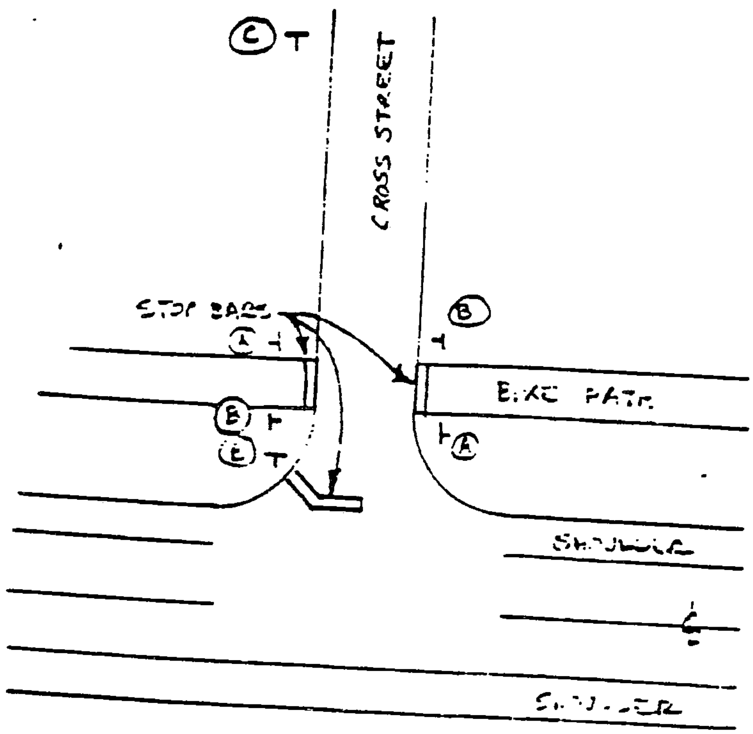
Project No. ____________
Bridge No. ____________
Calc. by T. MILLER Date 9-29
Checked by ____________ Date ____________

TYPICAL BIKE PATH SIGNING & MARKINGS



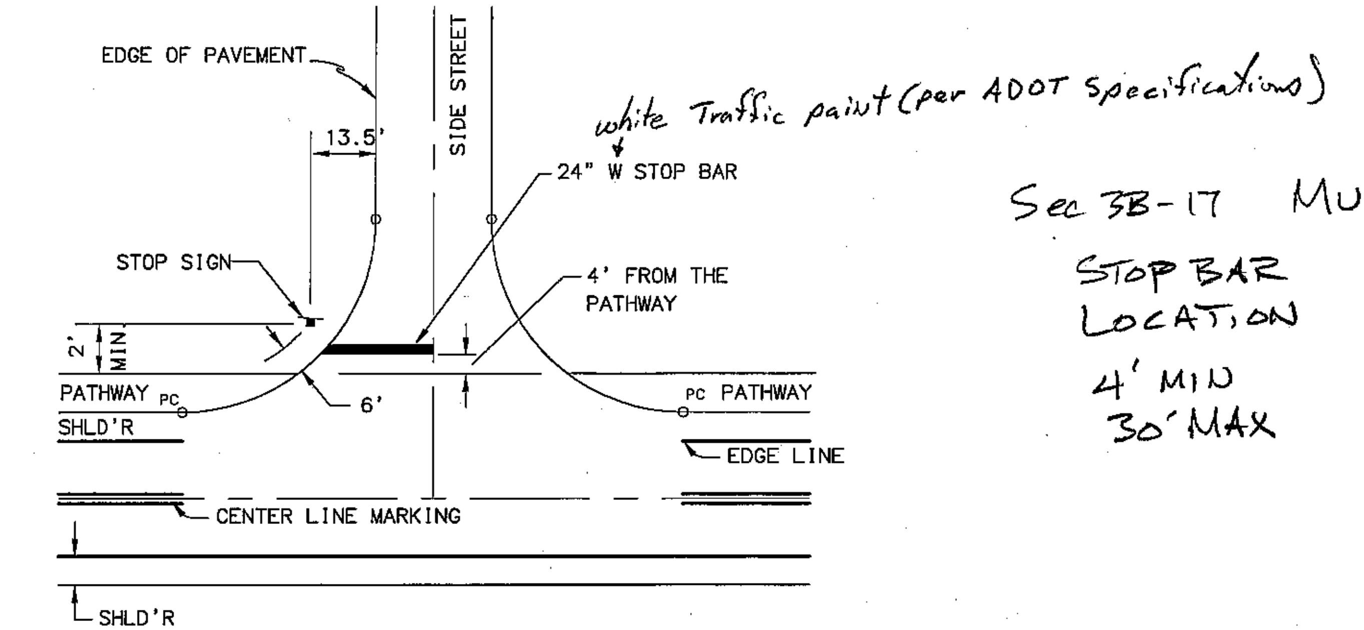
DESIREABLE





MID-BLOCK X-ING

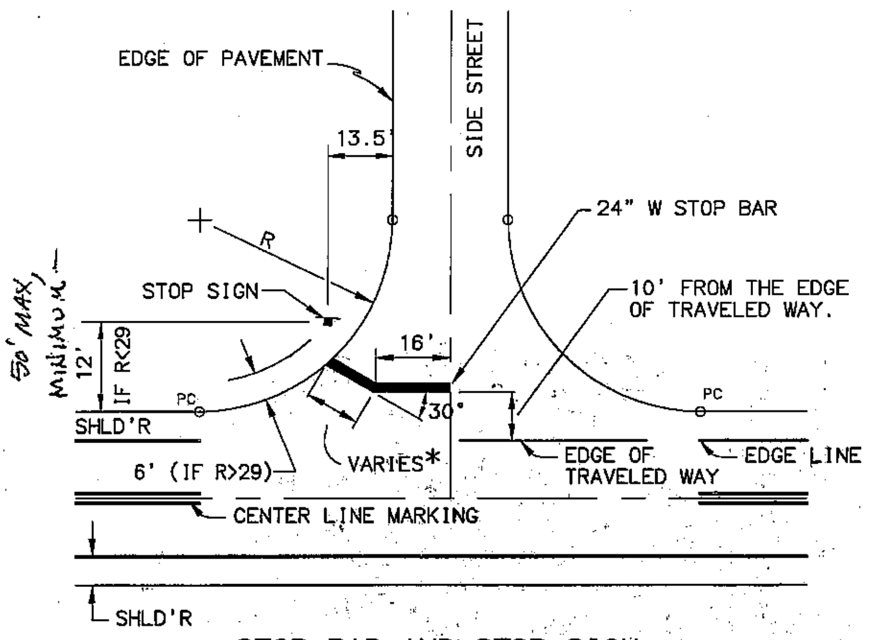
UNDESIREABLE



STOP BAR AND STOP SIGN
INSTALLATION DETAIL

(WITH PATHWAY)

Sec 3B-17 MUTCD
STOP BAR LOCATION
4' MIN
30' MAX



STOP BAR AND STOP SIGN
INSTALLATION DETAIL

(WITHOUT PATHWAY)

*OMIT ANGLE IF LESS THAN 8'

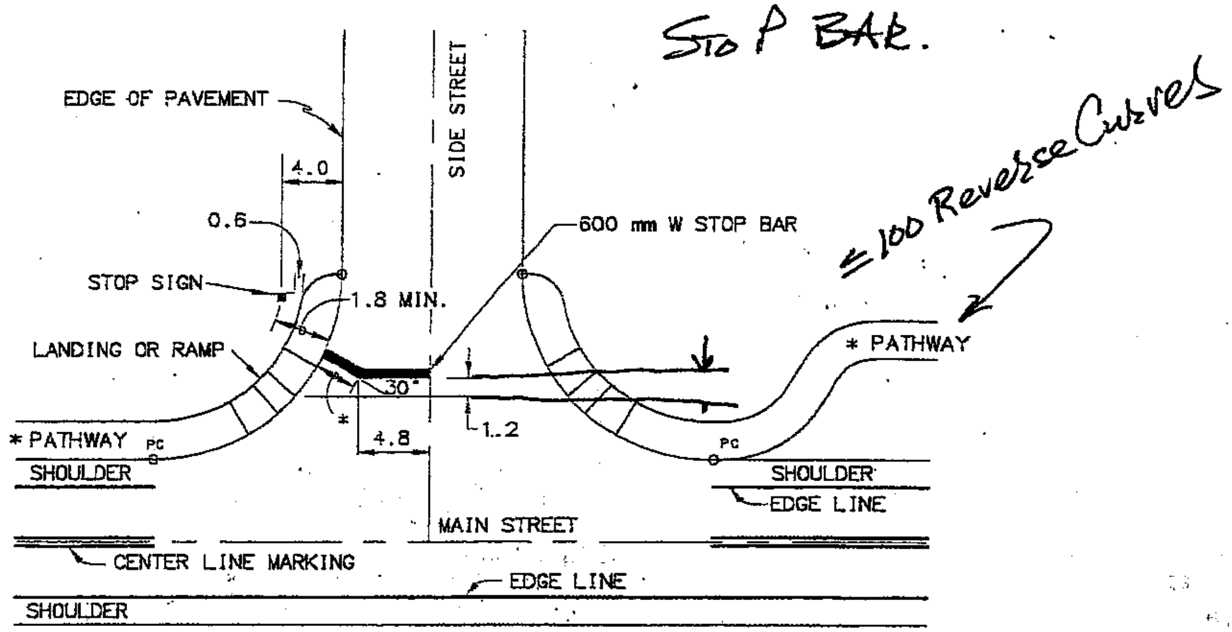
PLACE STOP SIGN AS NEAR AS POSSIBLE TO STOP BAR LOCATION.

C:\CAD\TRAF\ENGLISH\DETAILS\stopbars 9-10-97 2:16:47 pmAST

9/11/01

NOTE: IF PATH GOES IN, IT MUST BE PAVED & 15' WI[DE] a ~~25~~ 3 FT STRUCTURAL SECTION. + DRAINAGE

SWEEP PATH EDGES 4' IN FRONT OF STOP BAR.



* OMIT ANGLE WHEN LESS THAN 2.4

STOP BAR AND STOP SIGN
INSTALLATION DETAIL

PATHWAY

* ADJACENT TO ROAD
* SEPARATED FROM ROAD

X:\SIGNS\METRIC\DETAILS\MSTRPAPP.DWG 3-31-00 9:50:02 pm EST

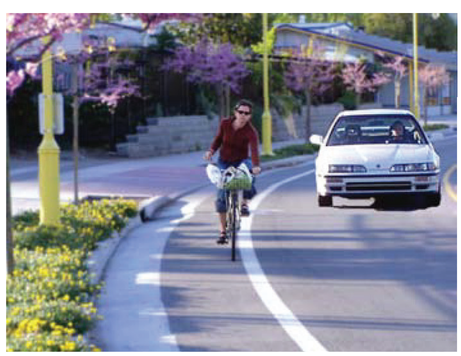
March 2010 ◆ AO2010-08

Anchorage Bicycle Plan

Bicycles as a Mode of Transportation

An element of the MOA Nonmotorized Transportation Plan

ANCHORAGE BIKE PLAN



A M A T S

Anchorage Metro Area Transportation Solutions

Anchorage Metropolitan Area Transportation Solutions

Traffic Department - Municipality of Anchorage

Winter bicyclist on separated path

These deficiencies and the associated challenges addressed by this Bicycle Plan are discussed below. Solutions to these problems are discussed in subsequent chapters, particularly in the action item recommendations in Chapter 6.

Separated Pathways

As noted above, separated pathways are two-way facilities shared by bicycles, pedestrians, in-line skaters, and others. The *Guide for Development of Bicycle Facilities* (1999) by the American Association of State Highway Transportation Officials (AASHTO) states that these pathways operate best when they offer opportunities not provided by the road network and have continuous separation from traffic. (AASHTO specifies a minimum of 5 feet and a preferred distance of 7 feet to separate the bikeway from the roadway.) AASHTO lists the following operational problems with separated pathways along roadways:

- When the path ends, bicyclists going against traffic tend to continue to travel on the wrong side of the street. Likewise, bicyclists approaching the path often travel on the wrong side of the street to get to the path. Wrong-way travel by bicyclists is a major cause of crashes.
- Bicyclists coming from the right are often not noticed by drivers who are emerging from or entering cross streets and driveways. The drivers are not expecting the bicyclists whose direction of travel is opposite the direction of the flow of vehicle traffic.
- Signs posted for roadway users are backward for bicycle riders who are traveling in a direction against traffic.
- Although users of the shared-use path should be given the same priority through intersections as users of the parallel roadway, motorists falsely expect bicyclists to stop or yield at all cross streets and driveways.
- Stopped motor traffic on cross streets or vehicles using side streets or driveways may block the separated pathway crossing.
- Many utility bicyclists use the roadway instead of the separated pathway because they have found the roadway to be safer, more convenient, or better maintained.

DOT&PF recommends implementation of design techniques to improve the safety of separated pathways. The solution incorporates "sweeps" that align separated pathways in front of stop bars at unsignalized intersections with public streets by bringing the separated pathway closer to the roadway. A sweep minimizes conflicts and reduces crashes because the bicyclists and pathway users become more visible. Sweeps are now included in new construction and are added through retrofit to existing construction. DOT&PF use of sweeps has been a standard for 18 years at unsignalized intersections with public streets.

The Alaska Railroad encourages all crossings of its tracks to be grade-separated (requiring either an underpass or overpass). When a grade-separated crossing is not possible, the network should direct bicyclists to a crossing with an automated device that warns bicyclists about approaching trains. To promote bicyclist safety, at-grade crossings at unprotected locations (with no gates or signals) should be avoided. The design details of track crossings also should be addressed to reduce hazards to bicyclists, especially on separated pathways.

Gaps in the Bicycle Network

Similar to pedestrians, bicyclists typically seek the most direct routes possible to their destinations and are reluctant to deviate far from the most direct route. However, many bicyclists will deviate from direct routes when the route is not perceived to be safe. Ideally, the bicycle network should form a grid system with connections every half mile to provide direct and continuous routes.

The Anchorage greenbelt trail system, which generally follows the major creeks and coastline of the Anchorage Bowl, does not provide direct connections to many destinations within Anchorage. In addition, these greenbelt trails are often busy with slower-moving users and should not be relied on for primary bicycle corridors. Small children, people with pets on leashes, walkers positioned two or three abreast, and in-line skaters are among the trail users who create obstacles that hinder faster-moving utility bicyclists. The greenbelt trails are primarily intended for recreational users, and the roadway bicycle infrastructure is planned for utility bicyclists and others who use bicycles as a method of transportation.

Even with the recent addition of several separated pathways built in conjunction with new road projects, many gaps in the existing network remain (see Figure 1). These gaps are particularly noticeable on the Hillside and in Chugiak-Eagle River where few facilities have been built. Other major gaps in the system include the Sand Lake area, which needs better east-west bicycle facility connections, and the Government Hill neighborhood, which lacks a single bicycle route connection to the rest of the network.

Many otherwise viable parts of the bicycle infrastructure are discontinuous. For example, short segments of multi-use pathways built on the west side of Minnesota Drive between Benson Boulevard and Tudor Road abruptly begin and end. The Campbell Trail, which has a gap at the Seward Highway, is the most glaring discontinuous trail in the system and drew the majority of public comment about a needed connection. Bikeway gaps present major difficulties for medium- and long-distance bicycle riders and utility bicyclists.

MEMORANDUM

STATE OF ALASKA

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

To: **Distribution**

Date: October 9, 2008

Phone No.: 269-0588

From: **K. Kim Rice, P.E.** KKR
Regional Preconstruction Engineer

Subject: Regional Detail Drawings
CR-01.00, CR-02.00

Attached are Regional Detail Drawings which show basic traffic control layout for unsignalized stop controlled intersections, our most common intersection. This shows how stops and pedestrian crossings come together at unsignalized intersections at a location intended to minimize conflicts. An example cover sheet for a project is provided. Please include these drawings and modify the cover sheet of all advertised projects in the future, where these details apply.

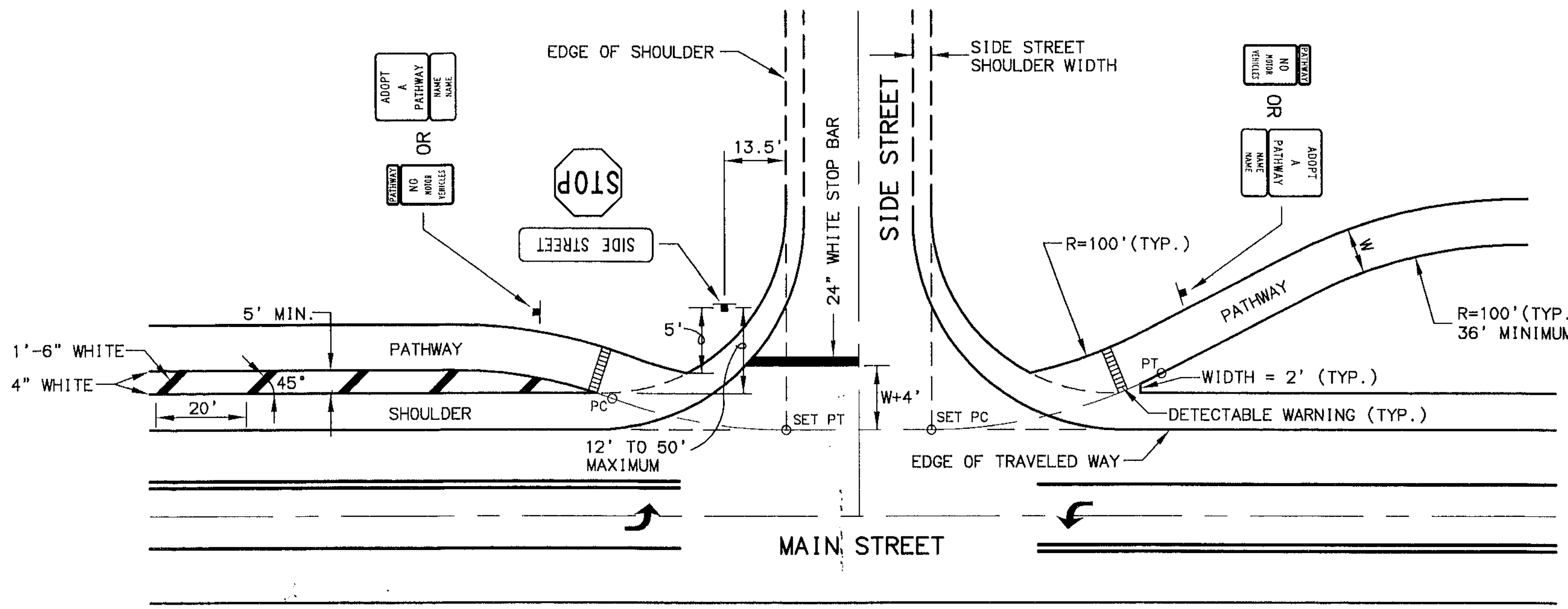
Revisions to these drawings are to be only through the Chief of Highway Design, who maintains all Regional Highway Standard drawings. Consultants and lead design engineers will not have to seal these Regional Details. Changes from project to project are not the goal. The intent is to provide consistent DOT/PF regional details for all projects and reduce the number of sheets to be modified by designers, or to be cross-checked for changes in each review. The plan sheet does not have to be included in a plan review set. Instead, it will be added by the Contracts Section at the time of advertisement, along with the Statewide Standard Drawings.

Distribution:

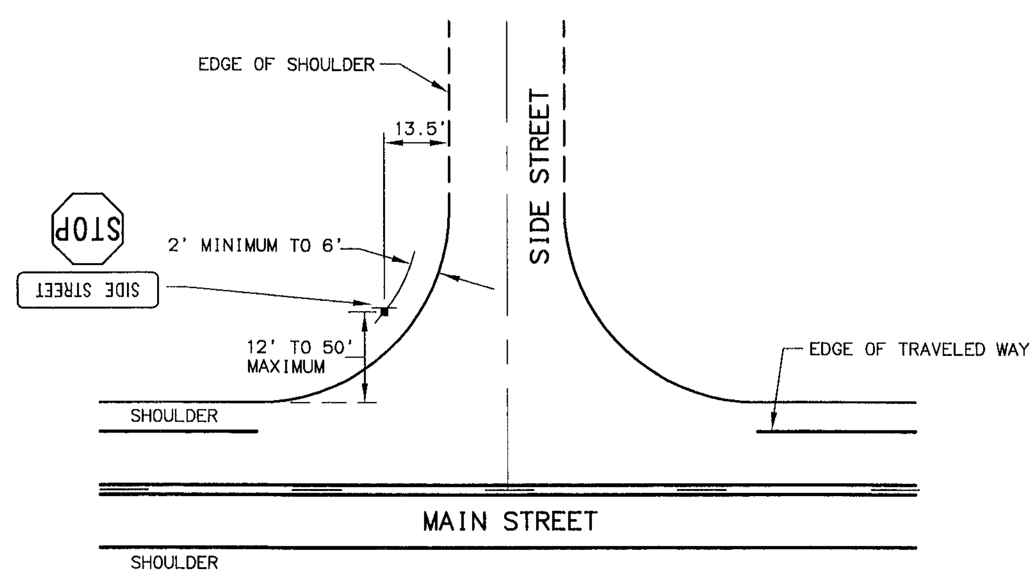
Judy Dougherty, P.E., Chief, Highway Design Section
Kim Stricklan, P.E., Chief, Preliminary Design & Environmental Section
Tom Dougherty, P.E., Chief, Highway Construction
Pat Wittrock, P.E., Chief of Construction
Steve Ryan, P.E., Chief, Aviation Construction
Butch Douthit, Chief of Aviation
Mike Hartman, Chief, Right-of-Way Section
Sharon Smith, Chief of Contracts
Bob Adler, P.E., Contracts Review Engineer
Rob Campbell, P.E., Director, Design & Construction
Ken Morton, P.E., Chief, Utilities
Scott Thomas, P.E., Regional Traffic Engineer

REVISIONS		
NO.	DATE	DESCRIPTION

STATE	REGIONAL DETAIL	YEAR
ALASKA	CR-01.00	2008



TYPICAL UNCURBED RETURN WITH PATHWAY



TYPICAL UNCURBED RETURN WITHOUT PATHWAY

UNCURBED INTERSECTION NOTES:

1. INSTALL YELLOW DETECTABLE WARNING TILES IN ¼ INCH DEEP RECESSES GROUND OR ROLLED INTO THE ASPHALT PATHWAYS. FURNISH TILES THAT CONFORM TO THOSE DETAILED ON STANDARD DRAWING I-21.
2. LOCATE STOP SIGNS SO THEY ARE:
   A) VISIBLE TO APPROACHING TRAFFIC
   B) AS NEAR TO THE STOP BAR AS PRACTICABLE.
   C) REDUCE THE STOP SIGN OFFSET TO FIT THE SIGN WITHIN THE RIGHT OF WAY.
3. AVOID JUNCTIONS BOXES, STORM DRAIN INLETS, AND MANHOLE FRAMES WITHIN THE RAMPS AND LANDINGS. ADJUST JUNCTION BOXES LOCATED WITHIN RAMPS AND LANDINGS FLUSH WITH FINISHED SURROUNDING SLOPE.
4. SEE PLANS FOR WHEN PATHWAY SIGNING IS REQUIRED AT SIDE STREETS.

STATE OF ALASKA 49TH SCOTT E. THOMAS CE 8602 REGISTERED PROFESSIONAL ENGINEER

DATE 10-8-08

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

UNCURBED
STOPS AND CROSSINGS
UNSIGNALIZED INTERSECTION

CR-01.00

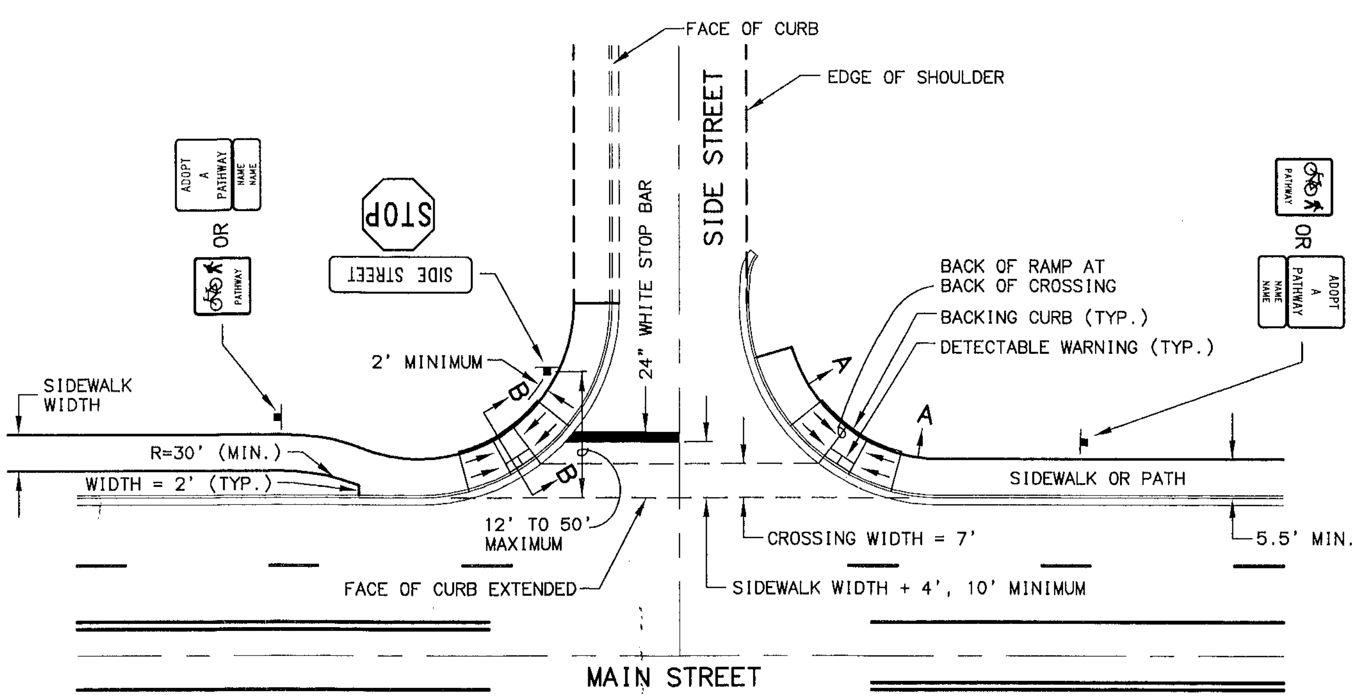
DRAWING LOCATION W:\Projects\Regional Details\dwg\E_STOPBAR.dwg | DATE 10/8/2008 | TIME 12:03:10 PM ADT | LAYOUT UNCURBED | SCALE 1:20 | XREFS N/A | SET SET WEF/CJ

REVISIONS		
NO.	DATE	DESCRIPTION

STATE	REGIONAL DETAIL	YEAR
ALASKA	CR-02.00	2008

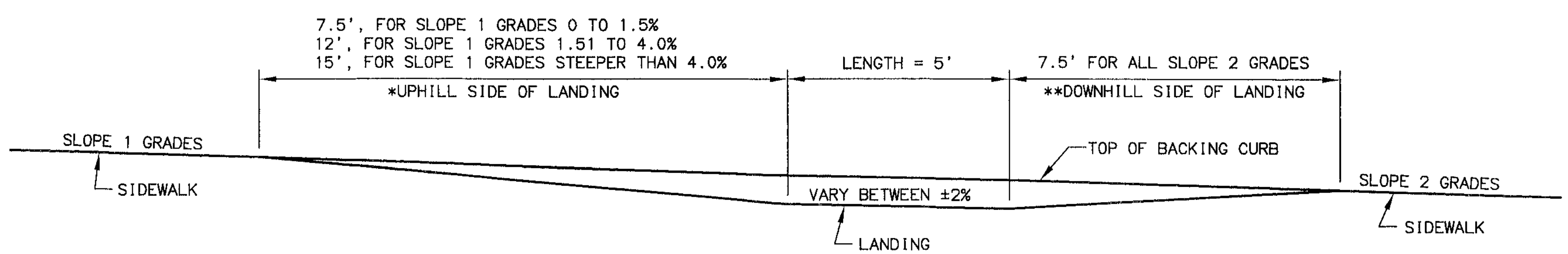
CURBED INTERSECTION NOTES:

1. INSTALL YELLOW DETECTABLE WARNING TILES IN THE LANDINGS ALONG EACH BACK OF CURB. FURNISH TILES THAT CONFORM TO THOSE DETAILED ON STANDARD DRAWING I-21.
2. LOCATE STOP SIGNS SO THEY ARE:
   A) VISIBLE TO APPROACHING TRAFFIC
   B) AS NEAR TO THE STOP BAR AS PRACTICABLE.
   C) REDUCE THE STOP SIGN OFFSET TO FIT THE SIGN WITHIN THE RIGHT OF WAY.
3. AVOID JUNCTION BOXES, STORM, DRAIN INLETS, AND MANHOLE FRAMES WITHIN THE RAMPS AND LANDINGS. ADJUST JUNCTION BOXES LOCATED WITHIN RAMPS AND LANDINGS FLUSH WITH THE FINISHED SURROUNDING SLOPE.
4. SEE PLANS FOR WHEN PATHWAY SIGNING IS REQUIRED AT SIDE STREETS.



TYPICAL CURBED RETURN WITH SIDEWALK

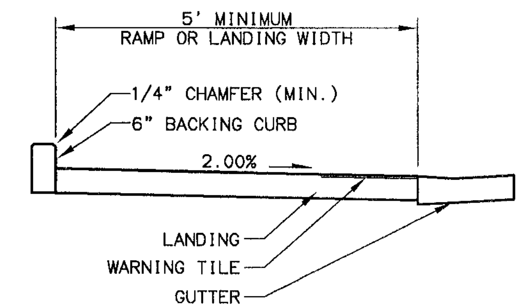
(CURB RADIUS > 20 FEET)



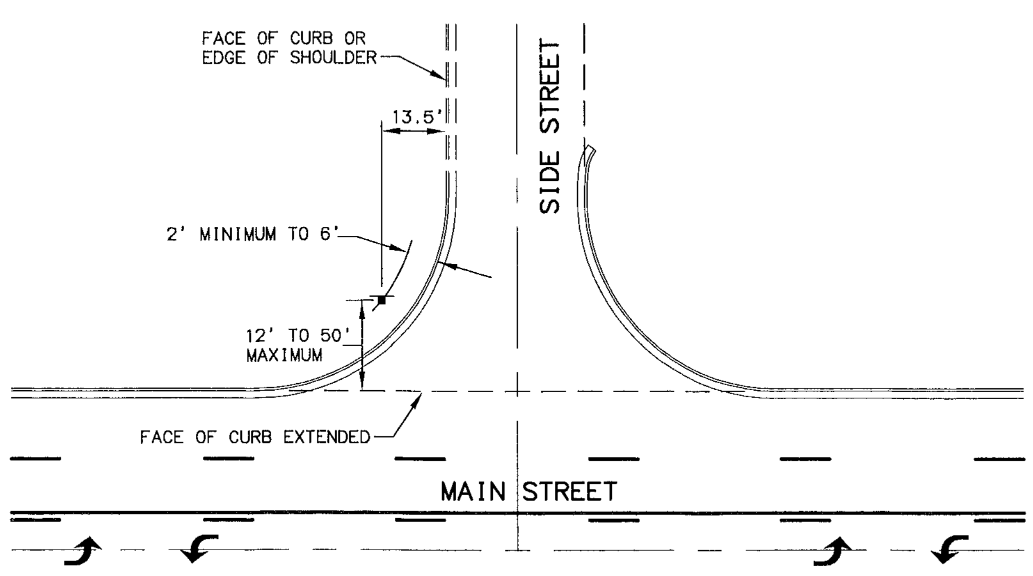
PROFILE A-A ALONG FACE OF BACKING CURB

*BOTH SIDES OF THE LANDING ARE UPHILL IN A SAG

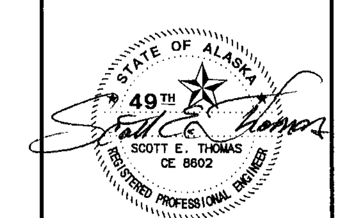
**BOTH SIDES OF THE LANDING ARE DOWNHILL ON A CREST



SECTION B-B



TYPICAL CURBED RETURN WITHOUT SIDEWALK



DATE 10-8-08

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

CURBED
STOPS AND CROSSINGS
UNSIGNALIZED INTERSECTION

CR-02.00

DRAWING LOCATION	DATE	TIME	LAYOUT	SCALE	XREFS	
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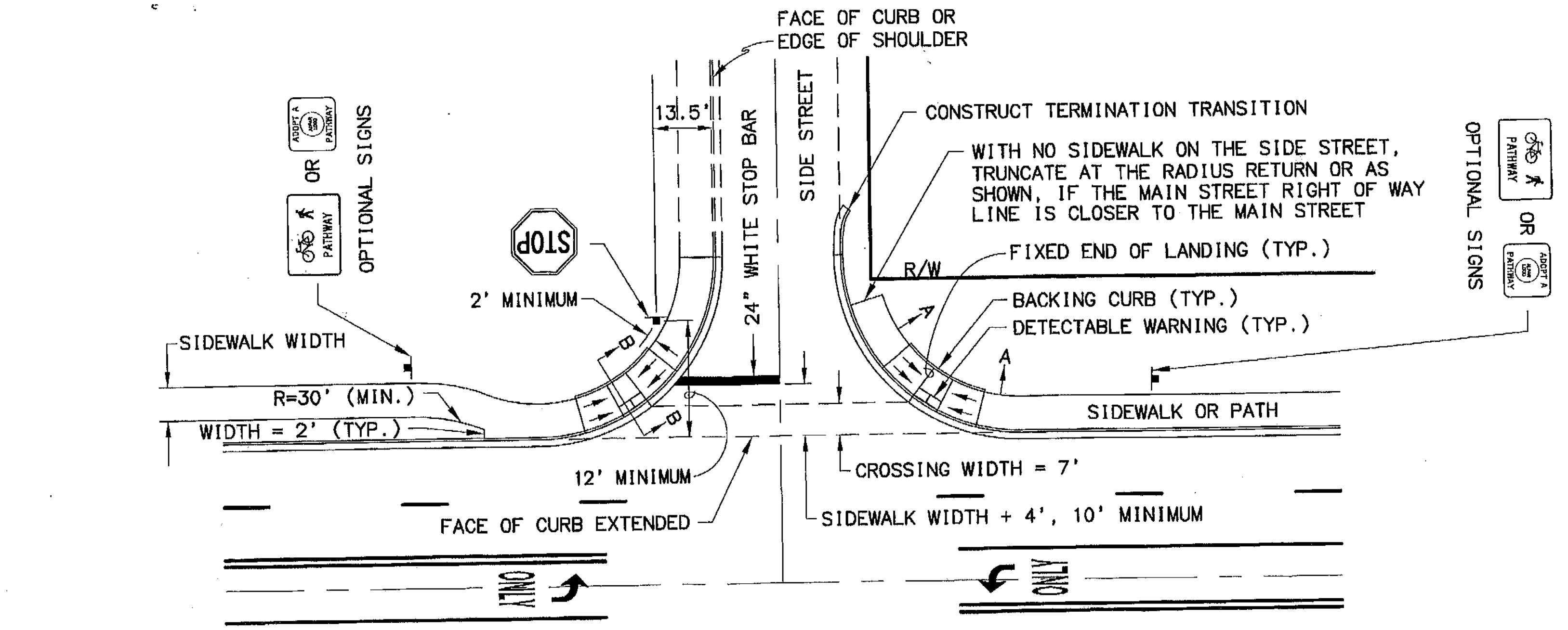
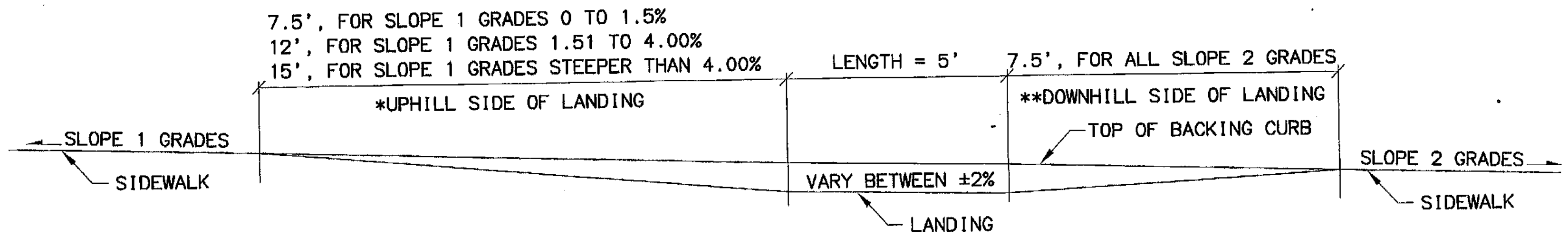
REVISIONS		
NO.	DATE	DESCRIPTION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	MGS-000S(490)/57851	2005	E11	E15

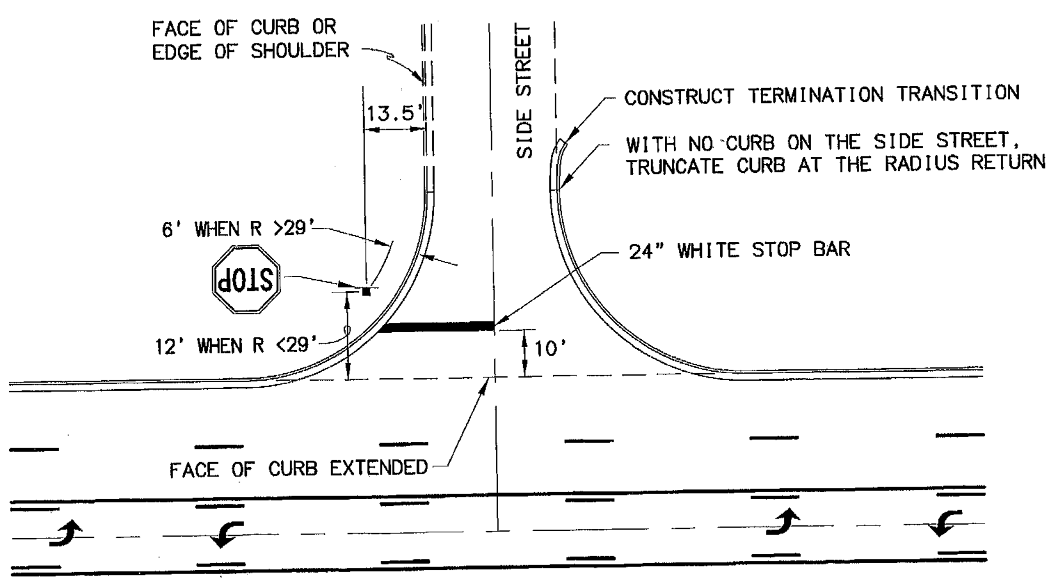


TYPICAL CURBED RETURN WITH SIDEWALK

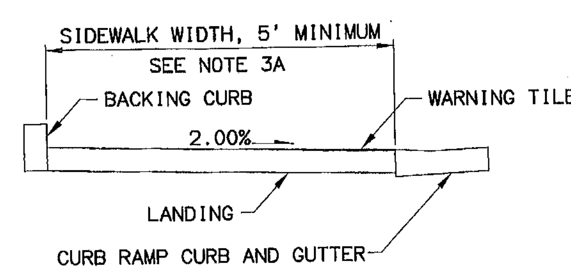


PROFILE A-A ALONG FACE OF BACKING CURB

*BOTH SIDES OF THE LANDING ARE UPHILL IN A SAG
**BOTH SIDES OF THE LANDING ARE DOWNHILL ON A CREST



TYPICAL CURBED RETURN WITHOUT SIDEWALK



SECTION B - B

CURBED INTERSECTION NOTES:

1) WHEN SIDEWALKS ARE SEPARATED FROM THE BACK OF CURB, JOIN THE TWO AS SHOWN USING A REVERSE CURVE WITH A MINIMUM RADIUS OF 30'.

2) INSTALL A 6" WIDE BACKING CURB FOR THE LENGTH OF EACH RAMP. THE PROFILE OF THE TOP OF THE BACKING CURB AND CURB HEIGHT IN THE LANDINGS MAY VARY. IN THE LANDINGS, USE ROADWAY CURB HEIGHT AS THE MINIMUM BACKING CURB HEIGHT.

3) BUILD RAMPS AND LANDINGS:
   A) EQUAL IN WIDTH TO THE MAIN STREET SIDEWALK, EXCEPT BUILD THEM 5' WIDE WHEN THE MAIN STREET SIDEWALK IS LESS THAN 5' WIDE.
   B) WITH 2% CROSS SLOPES THAT DRAIN TO THE GUTTER.

4) CONSTRUCT RAMPS AND LANDINGS USING CLASS A PORTLAND CEMENT CONCRETE ACCORDING TO SECTION 608 OF THE SPECIFICATIONS. GIVE THE RAMPS A COARSE BROOMED FINISH PERPENDICULAR TO THE CURB AND THE LANDINGS A COARSE BROOMED FINISH PARALLEL TO THE CURB.

5) INSTALL 2' WIDE STRIPS OF SAFETY YELLOW, CAST-IN-PLACE, COMPOSITE DETECTABLE WARNING TILES IN THE LANDINGS ALONG EACH BACK OF CURB. FURNISH TILES THAT CONFORM TO THOSE DETAILED ON STANDARD DRAWING I-21.XX.

6) IN NEW CONSTRUCTION, AVOID INSTALLING JUNCTION BOXES, STORM DRAIN INLETS, AND MANHOLE FRAMES WITHIN THE RAMPS AND LANDINGS.

7) WHEN RETROFITTING EXISTING ROADWAYS WITH NEW CURB RAMPS, ADJUST THE STOP BAR AND CURB RAMP LOCATIONS AWAY FROM MAIN STREET TO AVOID LEAVING TYPE 2 AND TYPE 3 JUNCTION BOXES, STORM DRAIN INLETS, AND MANHOLE FRAMES WITHIN THE RAMPS AND LANDINGS. ADJUST TYPE 1A JUNCTION BOXES LOCATED WITHIN RAMPS AND LANDINGS FLUSH WITH THE FINISHED SURROUNDING SLOPE.

8) BREAK THE MAIN STREET CENTERLINE MARKINGS AT SIDE STREET INTERSECTIONS ONLY WHEN LEFT TURN LANES ARE PROVIDED. OTHERWISE, INSTALL THEM CONTINUOUSLY THROUGH THE INTERSECTION.

9) INSTALL STOP SIGN POSTS ON A LINE OFFSET 13.5' FROM THE SIDE STREET AND CLOSE AS POSSIBLE TO THE STOP BAR, PROVIDING ONE OF THE TWO CLEARANCES AT MINIMUM VALUE.

10) WHEN THE SIDE STREET LACKS THE RIGHT OF WAY TO INSTALL THE STOP SIGN AT THE 13.5' OFFSET, REDUCE THE OFFSET TO FIT THE SIGN WITHIN THE RIGHT OF WAY.

11) WITHIN POLITICAL SUBDIVISIONS THAT HAVE AN ADOPT A BIKE PATH PROGRAM, REPLACE THE ADOPT A BIKE PATH SIGNS WITH ADOPT A PATHWAY SIGNS. INSTALL PATHWAY SIGNS ADJACENT TO SIDE STREETS THAT SERVE AS MAJOR NEIGHBORHOOD COLLECTORS WHEN THEY ARE SHOWN IN THE SIGN SUMMARY.

THE CURB RAMPS SHOWN HEREON SUPERSEDE THE ONE CROSSING DIRECTION RAMP SHOWN ON STANDARD DRAWING I-21.XX

STATE OF ALASKA
49TH
SCOTT E. THOMAS
CE 8602
REGISTERED PROFESSIONAL ENGINEER

Scott E. Thomas

3-24-05

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

TUDOR & MULDOON ROADS
RESURFACING

CURBED RETURN
UNSIGNALIZED SIDE STREET
INTERSECTION DETAILS

DESIGNED BY	VAP
CHECKED BY	JED
DRAFTED BY	UKVMZ
XREFS	N/A
SCALE	N/A
LAYOUT	CURBED
DATE	3/21/2005
TIME	4:19:15 PM AST
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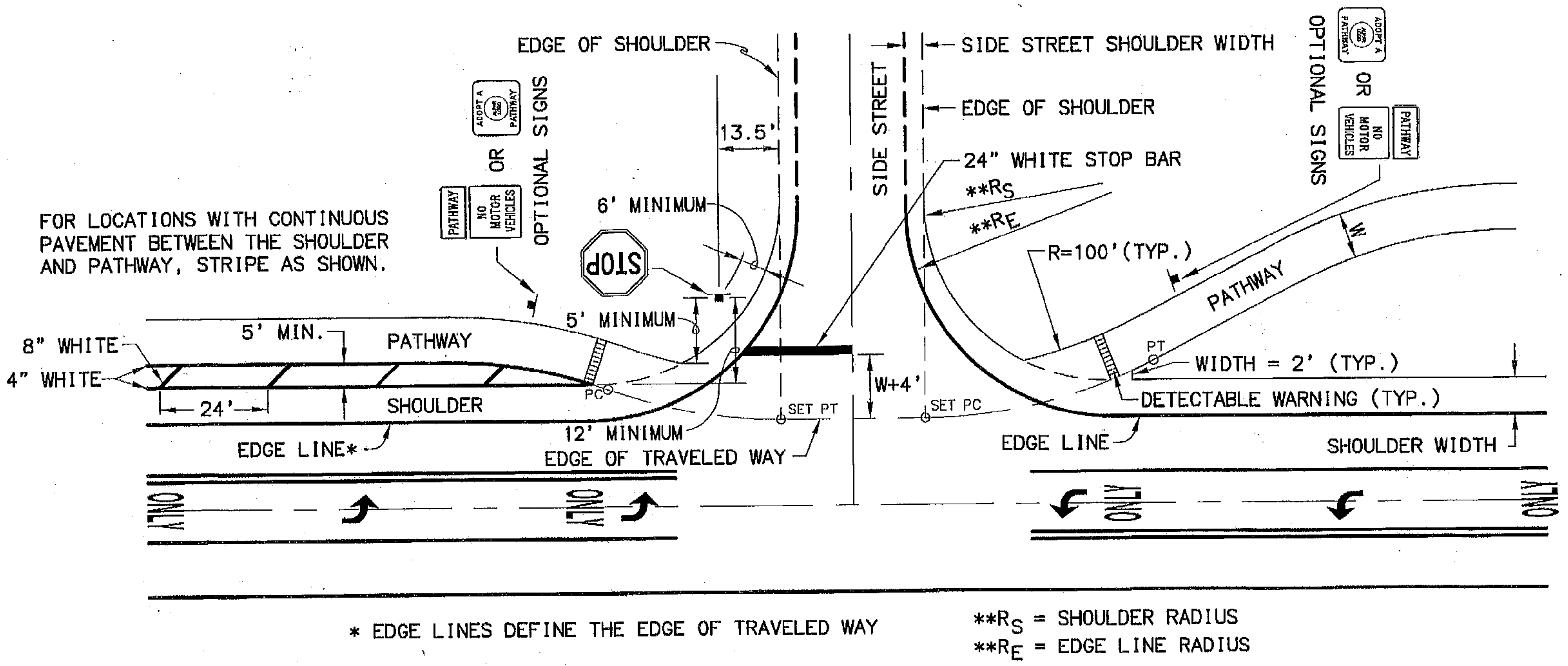
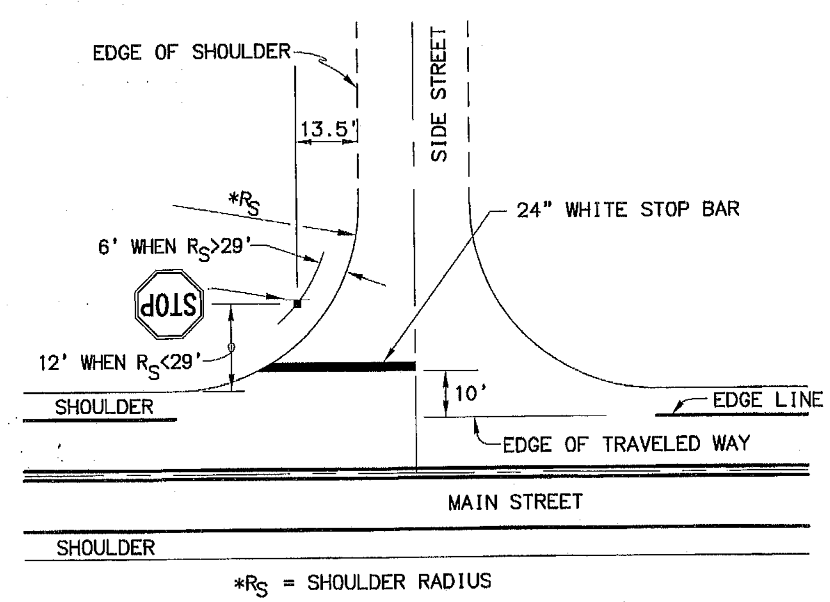


* EDGE LINES DEFINE THE EDGE OF TRAVELED WAY

$**R_S$ = SHOULDER RADIUS
$**R_E$ = EDGE LINE RADIUS

TYPICAL UNCURBED RETURN WITH PATHWAY



$*R_S$ = SHOULDER RADIUS

TYPICAL UNCURBED RETURN WITHOUT PATHWAY

UNCURBED INTERSECTION NOTES:

1) SWING PATHWAYS TOWARD MAIN STREET USING THE CONTROL POINTS AND RADII DESCRIBED IN THE FOLLOWING.
   A) SET A P.C. & P.T. IN THE PATHWAY CONTROL LINE AT THE INTERSECTION OF THE MAIN STREET EDGE OF TRAVELED WAY AND THE EXTENSION OF THE TYPICAL SIDE STREET EDGE OF SHOULDER.
   B) SET THE EDGE OF PATHWAY RADII ON THE INSIDE OF THE CURVES EQUAL TO 100'. REDUCE THE RADII AS NEEDED TO PROVIDE 2' OF CLEARANCE TO OBSTRUCTIONS. MINIMUM RADIUS IS 36'. MOVE THE PATHWAY CONTROL LINE AND STOP BAR AWAY FROM MAIN STREET WHEN IT IS IMPOSSIBLE TO AVOID AN OBSTRUCTION WITH 36' RADII.
2) WHEN THE SIDE STREET HAS EDGE LINES, CONNECT THE MAIN AND SIDE STREET EDGE LINES AS SHOWN IN THE UNCURBED RETURN WITH PATHWAY DETAIL, WHERE R_E IS DEFINED AS R_S + THE AVERAGE OF THE MAIN AND SIDE STREET SHOULDER WIDTHS.
3) WHEN THE SIDE STREET LACKS EDGE LINES, BEGIN AND END THE MAIN STREET EDGE LINES AT THE MAIN STREET PAVEMENT RETURNS AND EXTEND THE STOP BAR TO THE EDGE OF PAVEMENT AS SHOWN IN THE UNCURBED RETURN WITHOUT PATHWAY DETAIL.
4) INSTALL 2' WIDE STRIPS OF SLIP RESISTANT, YELLOW PREFORMED THERMOPLASTIC, DETECTABLE WARNING TILES IN PATHWAYS AT THE LOCATIONS SHOWN. INSTALL THE TILES IN 1/4 INCH DEEP RECESSES GROUND OR ROLLED INTO THE ASPHALT PATHWAYS. USE THE TOP MARK BRAND TILE AS MANUFACTURED BY FLINT TRADING, INC., OR AN APPROVED EQUAL, INSTALLED ACCORDING TO THE MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS, INCLUDING:
   A) SMOOTHING, CLEANING, AND PREHEATING THE RECESSES AS RECOMMENDED,
   B) APPLYING ADHESIVE SHEETS AND HEATING THE AREA RECOMMENDED UNTIL IT IS MOLTEN,
   C) POSITIONING A TILE OR TILES ON THE MOLTEN ADHESIVE AND ROLLING THEM AS RECOMMENDED.
5) BREAK THE MAIN STREET CENTERLINE MARKINGS AT SIDE STREET INTERSECTIONS ONLY WHEN LEFT TURN LANES ARE PROVIDED. OTHERWISE, INSTALL THEM CONTINUOUSLY THROUGH THE INTERSECTION.
6) INSTALL STOP SIGN POSTS ON A LINE OFFSET 13.5' FROM THE SIDE STREET AS CLOSE AS POSSIBLE TO THE STOP BAR, PROVIDING ONE OF THE TWO CLEARANCES AT MINIMUM VALUE.
7) WHEN THE SIDE STREET LACKS THE RIGHT OF WAY TO INSTALL THE STOP SIGN AT THE 13.5' OFFSET, REDUCE THE OFFSET TO FIT THE SIGN WITHIN THE RIGHT OF WAY.
8) WITHIN POLITICAL SUBDIVISIONS THAT HAVE AN ADOPT A BIKE PATH PROGRAM, REPLACE THE ADOPT A BIKE PATH SIGNS WITH ADOPT A PATHWAY SIGNS. INSTALL PATHWAY AND NO MOTOR VEHICLES SIGNS ADJACENT TO SIDE STREETS THAT SERVE AS MAJOR NEIGHBORHOOD COLLECTORS WHEN THEY ARE SHOWN IN THE SIGN SUMMARY.

Scott E. Thomas
3-24-05

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

TUDOR & MULDOON ROADS
RESURFACING

UNCURBED RETURN
UNSIGNALIZED SIDE STREET
INTERSECTION DETAILS

DRAWING LOCATION: W:\Projects\57851 Tudor Rehab 2005\cwg\E_STOPBARS.dwg | DATE: 3/21/2005 | TIME: 4:19:15 PM AST | LAYOUT: UNCURBED | SCALE: N/A | XREFS: N/A | DESIGNED BY: MAP | CHECKED BY: JED | DRAFTED BY: KRAEF

Pedestrian and Bicycle Collisions with Motor Vehicles in Anchorage: 1998-2002

November, 2005

State of Alaska
Department of Transportation & Public Facilities
Central Region Traffic & Safety Section

Prepared in conjunction with the annual Highway Safety Improvement Program

- Alaska has a higher number of bike related accidents (58%) than pedestrian related accidents (42%) & leads the country in bicycle fatality rate, despite short bicycling seasons. We may see higher accident rates involving bicycles as more wintertime bicycle riding is being observed and winter maintenance of bicycle paths has improved.
- There are significant pedestrian accidents in midtown and downtown (Approximately 35% of total Anchorage accidents.)

- There is a higher risk of injury & fatality with pedestrian and bicycle related accidents than other types of accidents. (3% fatal, 12% Major Injury, 70% Minor Injury for pedestrian & bicycle related accidents vs. 0.6%, 4% and 28% for all accidents.)

- Right angle accidents with turning vehicles are a number one pattern. That is, vehicles on a side street preparing to entering the cross street fail to look right after looking left for a gap in the traffic stream and strike a pedestrian or bicyclist on their right. (Evident in top 15 intersections for # of accidents)
- There are several sites with a continuing record of injuries and/or several fatalities. (*Northern Lights/Seward Highway had 2 fatalities during the past 10 years, Glenn/Bragaw had 3 fatalities during that same period.*)

- Alcohol involvement is a big factor, particularly in fatal pedestrian and bicycle related accidents. (Involved in 52% of fatal pedestrian/bike related accidents.)
- School related pedestrian & bicycle accidents are not a significant problem. (Anchorage School District Hazardous Transportation Committee & school walking route traffic controls and maps effective.)
- Jaywalking, mid-block Crossing (5 lane roads), and nonconformance with the rules of the road were a major observation.

MEMORANDUM

State of Alaska
Department of Transportation & Public Facilities

TO: John J. Burkholder, P.E.
Gerry W. Kintz, P.E.
Frank J. Lombardo, P.E
Carl A. Nelson, P.E.
Jeanne A. Lematta, P.E.

FROM: Michael R. Tooley
Design Section Chief
Design Section III

DATE: February 23, 1990

FILE NO: 1040

TELEPHONE NO: 266-1700

SUBJECT: Sidewalk/Pathway Intersection Features

There has been considerable discussion concerning where sidewalks/pathways should cross low volume approach roadways. The primary concern is bicycles not stopping and being struck by a vehicle.

A meeting between Messrs. Steven Horn, Jim Childers and John Burkholder developed guidelines for consideration. The discussion focused on what type of approach would require the sidewalk/pathway to terminate at the radius of the intersection of a road or driveway. The Region places stop signs with stop bars at all public approaches and private approaches of major traffic generators if the development has an internal circulation network. Any low volume approach such as a private residential driveway would not normally have a stop sign/bar. It is therefore recommended that:

1. Only those approaches requiring stop signs/bars as shown on the traffic plans, will have sidewalks/pathways terminate within the radius of approaches in front of the stop bar.

2. Those approaches not requiring a stop sign/bar may have the sidewalk/pathway cross at some other location which allows good sight distance for both vehicle and bicyclist. If this cannot be provided, the sidewalk/pathway should be brought into the intersection and a stop sign/bar provided for the approach.

This procedure should be applied to new as well as existing sidewalks/pathways on all design projects.

/skm

cc: Steven R. Horn, P.E., Preliminary Design and Environmental Supervisor
Tony D. Barter, P.E., Traffic/Safety Engineer, Traffic, Safety and Utilities Section

Read & Return

Fyl.

Scotch 7664 "Post-it" Routing-Request Pads

ROUTING - REQUEST

Don

Please
- [x] READ
- [ ] HANDLE
- [ ] APPROVE

and
- [x] FORWARD
- [ ] RETURN
- [ ] KEEP OR DISCARD
- [ ] REVIEW WITH ME

To Don Mayfield

After consulting with us Northern Region developed the attached policy for signing & marking pathway xings. I concur. Please forward to Project Managers.

Date 10/15/86

From Steve Horn

Bill 11/5/86
Al
A.C.
Doug. DHO
Bob. Ree

MEMORANDUM

TO: Ron Tanner R.T.
Senior Traffic/Safety
Northern Region

FROM: Tim Miller
Traffic Safety Engr.
Northern Region

TELEPHONE NO: 451-2276

411
DG-3
Proj. Mngrs.
x.c. 10/20/86

SUBJECT: Signing & Marking Bike Paths

DATE: September 29, 1986

Policy for the signing and marking of bike paths is needed to insure consistency in application in the Region. In particular, the question of how to handle the case where a parallel bike path crosses a STOP sign controlled side street approach needs to be resolved.

After checking the AASHTO Bike Guide, MUTCD, and calling Steve Horn in Central Region I recommend the following standards be adopted.

1. Bikeway geometrics should include swinging the bikeway toward the highway so that the bike path crosses the side street approach in a location where the crosswalk would normally be located.

2. Stop bars, rather than crosswalks should be installed on the stopped approach.

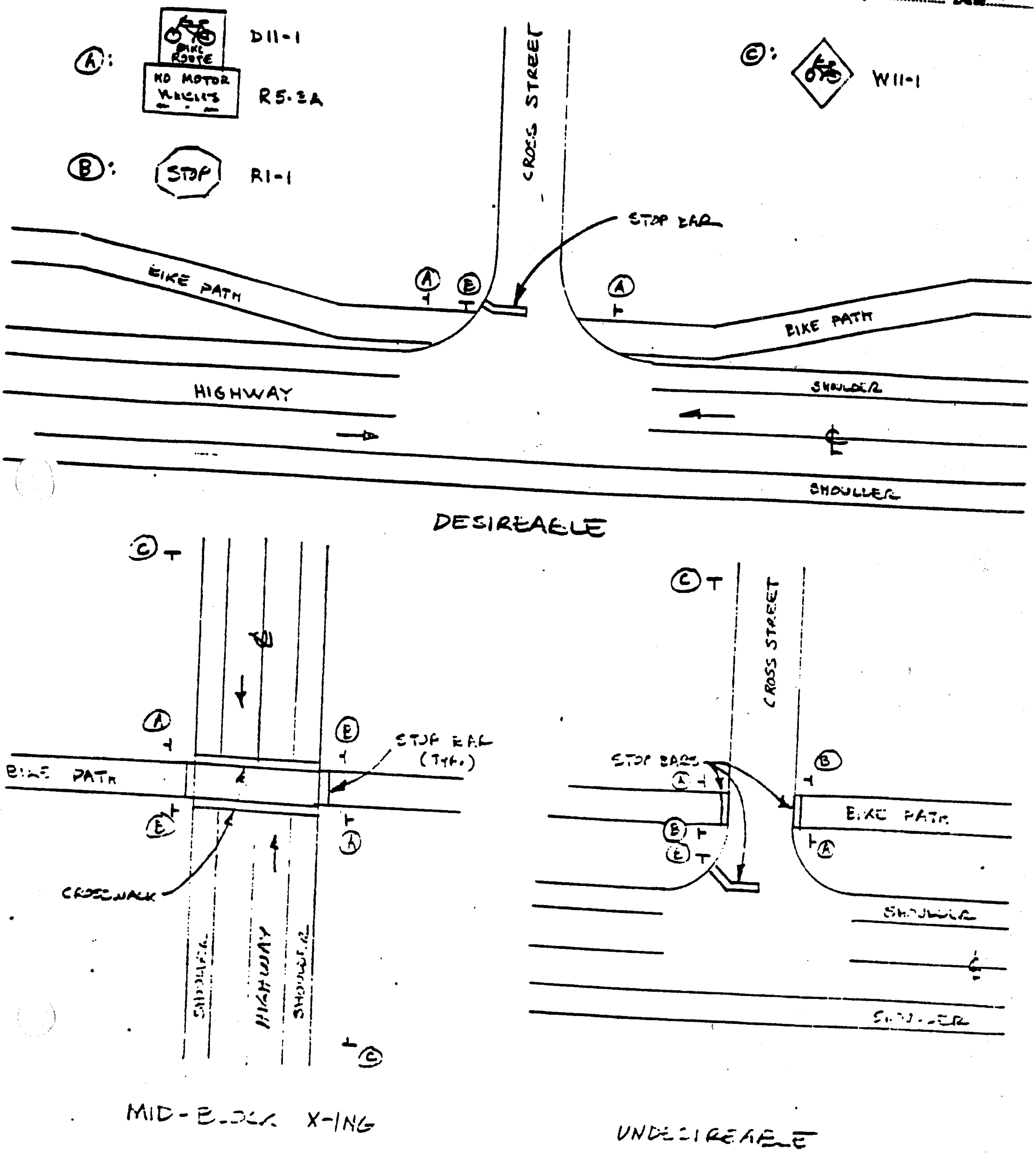
3. Except for the case where the bikeway crosses the through highway, STOP signs should not be used on the bike path unless under special conditions (i.e. inadequate sight distance, unexpected traffic conflicts, etc.).

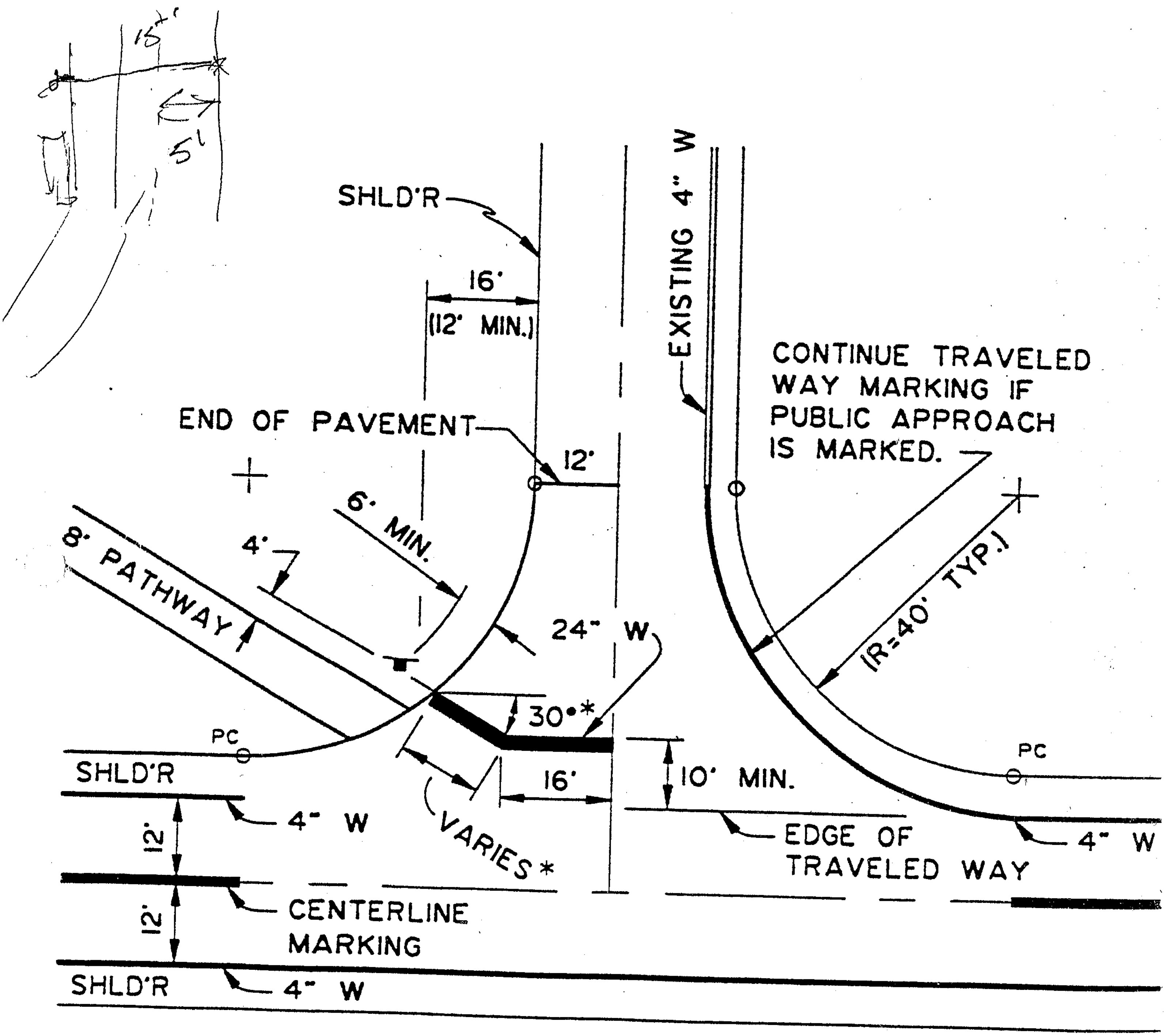
The attached drawing summarizes the signing and markings I recommend for the desirable design, undesirable design, and mid-block cases.

State of Alaska
Department of Highways
Computations

Project No. ....
Bridge No. ....
Calc. by T. MILLER Date 9-2
Checked by .... Date..........

TYPICAL BIKE PATH SIGNING & MARKING





STRIPING TYPICAL PUBLIC APPROACH

*OMIT ANGLE IF LESS THAN 8'.

Section 3B.15 Transverse Markings

Standard:

01 **Transverse markings, which include shoulder markings, word and symbol markings, arrows, stop lines, yield lines, crosswalk lines, speed measurement markings, speed reduction markings, speed hump markings, parking space markings, and others, shall be white unless otherwise provided in this Manual.**

Guidance:

02 *Because of the low approach angle at which pavement markings are viewed, transverse lines should be proportioned to provide visibility at least equal to that of longitudinal lines.*

Section 3B.16 Stop and Yield Lines

Guidance:

01 *Stop lines should be used to indicate the point behind which vehicles are required to stop in compliance with a traffic control signal.*

Option:

02 Stop lines may be used to indicate the point behind which vehicles are required to stop in compliance with a STOP (R1-1) sign, a Stop Here For Pedestrians (R1-5b or R1-5c) sign, or some other traffic control device that requires vehicles to stop, except YIELD signs that are not associated with passive grade crossings.

03 Yield lines may be used to indicate the point behind which vehicles are required to yield in compliance with a YIELD (R1-2) sign or a Yield Here To Pedestrians (R1-5 or R1-5a) sign.

Standard:

04 **Except as provided in Section 8B.28, stop lines shall not be used at locations where drivers are required to yield in compliance with a YIELD (R1-2) sign or a Yield Here To Pedestrians (R1-5 or R1-5a) sign or at locations on uncontrolled approaches where drivers are required by State law to yield to pedestrians.**

05 **Yield lines shall not be used at locations where drivers are required to stop in compliance with a STOP (R1-1) sign, a Stop Here For Pedestrians (R1-5b or R1-5c) sign, a traffic control signal, or some other traffic control device.**

06 **Stop lines shall consist of solid white lines extending across approach lanes to indicate the point at which the stop is intended or required to be made.**

07 **Yield lines (see Figure 3B-16) shall consist of a row of solid white isosceles triangles pointing toward approaching vehicles extending across approach lanes to indicate the point at which the yield is intended or required to be made.**

Guidance:

08 *Stop lines should be 12 to 24 inches wide.*

09 *The individual triangles comprising the yield line should have a base of 12 to 24 inches wide and a height equal to 1.5 times the base. The space between the triangles should be 3 to 12 inches.*

10 *If used, stop and yield lines should be placed a minimum of 4 feet in advance of the nearest crosswalk line at controlled intersections, except for yield lines at roundabouts as provided for in Section 3C.04 and at midblock crosswalks. In the absence of a marked crosswalk, the stop line or yield line should be placed at the desired stopping or yielding point, but should not be placed more than 30 feet or less than 4 feet from the nearest edge of the intersecting traveled way.*

11 *Stop lines at midblock signalized locations should be placed at least 40 feet in advance of the nearest signal indication (see Section 4D.14).*

12 *If yield or stop lines are used at a crosswalk that crosses an uncontrolled multi-lane approach, the yield lines or stop lines should be placed 20 to 50 feet in advance of the nearest crosswalk line, and parking should be prohibited in the area between the yield or stop line and the crosswalk (see Figure 3B-17).*

Standard:

13 **If yield (stop) lines are used at a crosswalk that crosses an uncontrolled multi-lane approach, Yield Here To (Stop Here For) Pedestrians (R1-5 series) signs (see Section 2B.11) shall be used.**

Guidance:

14 *Yield (stop) lines and Yield Here To (Stop Here For) Pedestrians signs should not be used in advance of crosswalks that cross an approach to or departure from a roundabout.*

Support:

15 When drivers yield or stop too close to crosswalks that cross uncontrolled multi-lane approaches, they place pedestrians at risk by blocking other drivers' views of pedestrians and by blocking pedestrians' views of vehicles approaching in the other lanes.

Thomas, Scott E (DOT)

From: Scott Thomas <scott_thomas@dot.state.ak.us>
To: John Sorenson <john_sorenson@dot.state.ak.us>
Cc: Dick Lowman <dick_lowman@dot.state.ak.us>; Paul M Roeder <paul_roeder@dot.state.ak.us>; Ron F Martindale <ron_martindale@dot.state.ak.us>; Joe D Hartley <joe_hartley@dot.state.ak.us>; Carl S High <carl_high@dot.state.ak.us>; Larry Miller <larry_miller@dot.state.ak.us>; Charles M Wagner <charles_wagner@dot.state.ak.us>
Subject: Re: Bike Path Signs
Attachments: 12x18NoMotorVehiclesSignKSpur.jpg; CentralRegionUnsignalizedCrossingsDetail9-12-05.pdf

John,

Our Regional policy per the Director's office is to install NO MOTOR VEHICLES signs on rural paved pathways. See the attached detail for rural and urban signing. We have begun to sign more and more pathways per this detail. We do not install the signs at every sidestreet every block, that would be cost prohibitive and oversigning, causing clutter. Instead, we typically sign at major collectors and through streets per the detail notes. My staff can help with designating streets that are best suited for these signs on a project if it has not already been designed.

I recommend R5-3 NO MOTOR VEHICLES signs at the following locations not already covered by the project:

Sheet, Project 56567, N. Kenai Spur Road MP 22-29.7

F2 Sta 572+00 Lt Opposite Tesoro Road, back to back signs, facing north and south
F4 Sta594+00 Lt Facing north, just below Chevron Road
F4 Sta 598+50 Lt Facing south, just north of Malaitna Ave
F7 Sta 631+00 Lt Facing north, just below Cherilyn Ave
F7 Sta 632+50Lt Facing south, just above Cherilyn Ave
F7 Sta 636+50 Lt Facing north, just below Poolside Ave
F8 Sta 643+50 Lt Facing south, just above the second school entrance north of Poolside Ave
F10 Sta 663-+50 Lt Facing north, just below Tustamena St
F10 Sta 665+00 Lt Facing south, just above Tustamena St
F13 Sta 701+50 Lt Facing north, just below Foreland Ave
F13 Sta 703+00 Lt Facing south, just above Foreland Ave
F15 Sta 734+00 Lt Back to back signs, facing north and south, Opposite Nikiski Ave
F18 Sta 759+00 Lt Facing north, just south of Wik Rd
F18 Sta 760+50 Lt Facing south, just north of Wik Rd
F19 Sta 777+50 Lt Back to Back signs, facing north and south
F21 Sta 797+00 Lt Opposite Fish Ave, Back to back signs, facing

north and south
F22 Sta 817+50 Lt Facing north, just below McGahan
F23 Sta 819+50 Lt Facing south, just above McGahan
F24 Sta 836+00 Lt Facing north, just south of Agate Dr
F24 Sta 838+00 Lt Facing south, just north of Agate Dr
F25 Sta 844+00 Lt Back to back signs, next to pathway, not blocking highway signs for speed limits.
F27 Sta 866+00 Lt Opposite Sunset St, back to back signs, facing north and south

Total Signs: 27

The standard sign is larger than necessary for pathway use. R3-5 NO MOTOR VEHICLES signs should be downsized for pathway use, to 12x18. Letters must be downsized, see attached picture of signs used on Kenai Spur repaving MP 3-8.
Use series B letters, black on white, as small as 2" letters for VEHICLES, 3" if it will fit in fabrication.

These signs should be topped with a Special sign, black on white, that states PATHWAY. Sign size is 12x6, using 2" letters.

All stations are approximate. Signs can be adjusted per attached detail intent.
All signs can be mounted on 2.5" PT posts. They should not be posted underneath warning signs and STOP signs. Instead, they require their own post.

Per Larry's request, we are still discussing the NO ATV's on shoulder signing with Headquarters.

Scott Thomas

John Sorenson wrote:

> Anyway, Larry Miller of DOT/PF asked if he could install "No Motorized
> Vehicles on Bike Path." I said I had built bike paths without signs
> and he wanted me to check. As I understand it from talking to you
> that you would like them installed.

Figure 3B-2. Examples of Four-or-More Lane, Two-Way Marking Applications

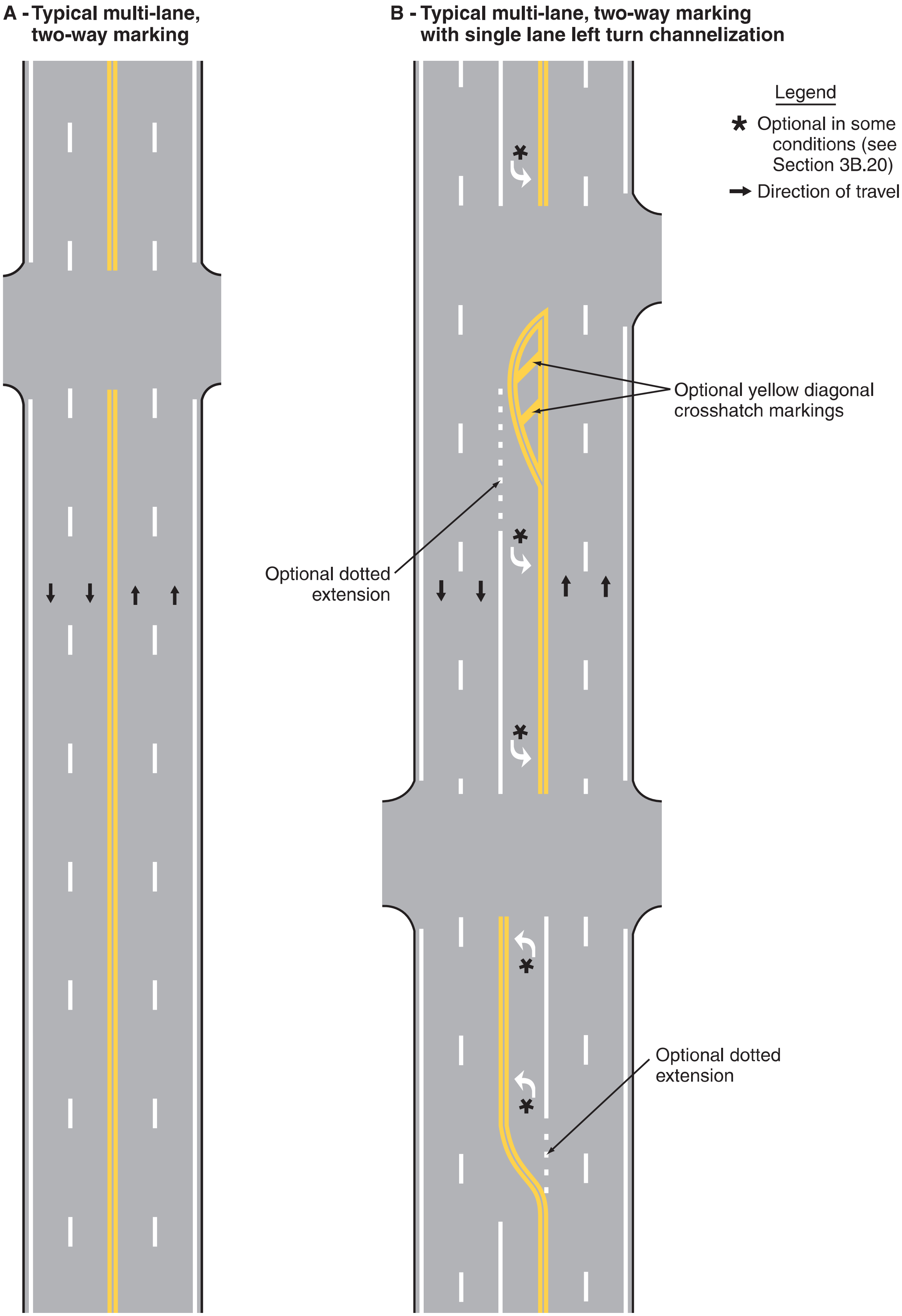
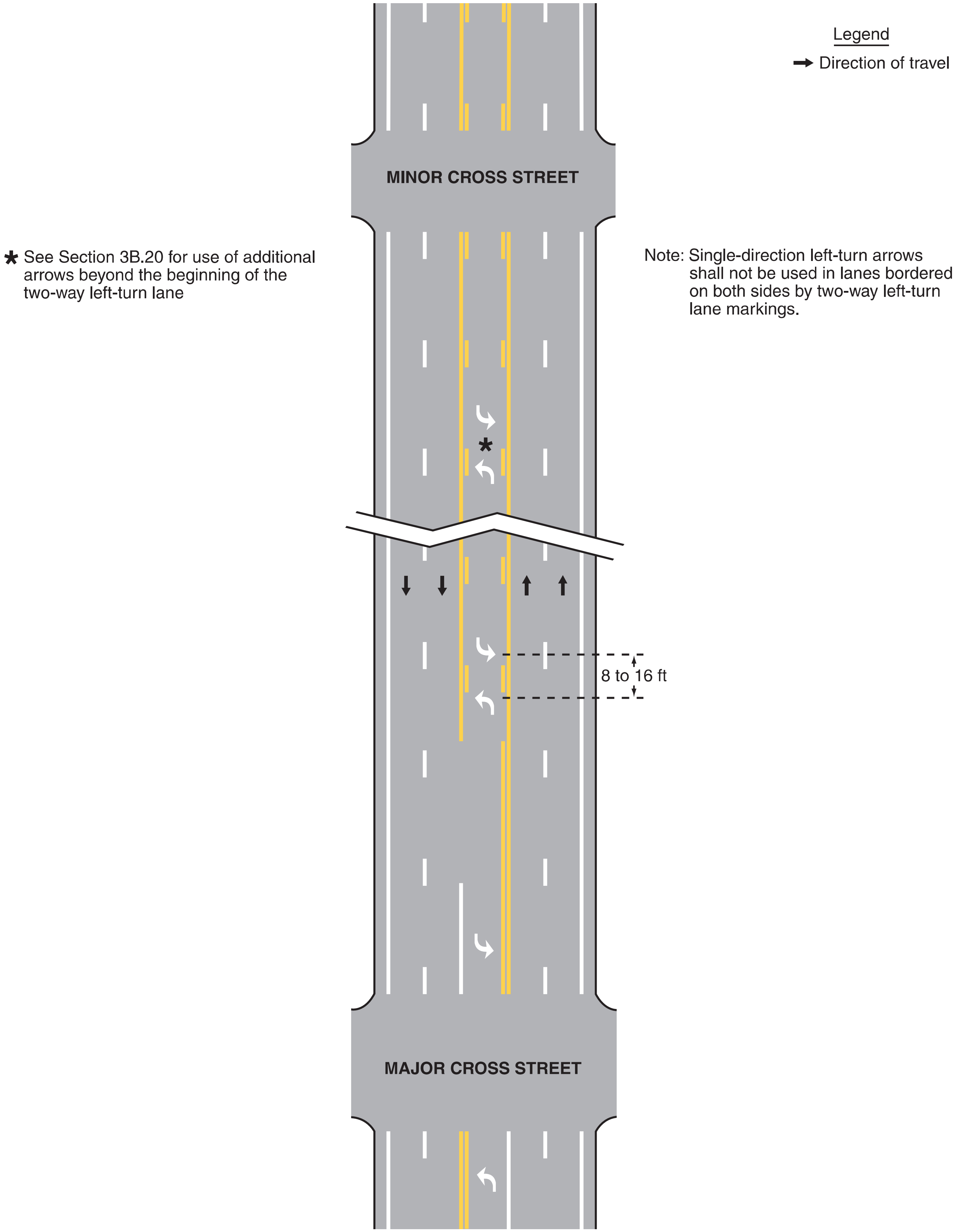


Figure 3B-7. Example of Two-Way Left-Turn Lane Marking Applications



9.16.090 - Driving on roadways laned for traffic.

Whenever a roadway is divided into two or more clearly marked lanes for traffic in one direction, the following rules shall apply:

A. A vehicle shall be driven as nearly as practicable within a single lane and shall not be moved from the lane until such movement may be made with reasonable safety, and properly signaled as required by section 9.22.040.

B. A single solid white line separating lanes of travel in the same direction may be crossed when such movement may be made with reasonable safety.

C. Crossing a double white line is prohibited.

D. Official signs approved by the traffic engineer may be erected directing slow-moving traffic to use a designated lane or allocating specified lanes to traffic moving in the same direction, and drivers of vehicles shall obey the directions of the traffic device.

E. Official signs approved by the traffic engineer may be erected directing vehicles in specified lanes to make specific turns or movements. Vehicles in these lanes shall make the turn or movement indicated by the device and shall not be moved right or left upon the roadway except to make the movement indicated by the traffic device.

F. Drivers of vehicles shall remain entirely within one lane and shall not initiate a lane change when approaching within 100 feet of or while traversing a signalized intersection.

(CAC 9.16.090; AO No. 78-72; AO No. 89-52; AO No. 94-68(S), § 6, 8-11-94; AO No. 2011-113(S), § 34, 11-22-11, eff. 12-22-11)

Anchorage Municipal Code (AMC)

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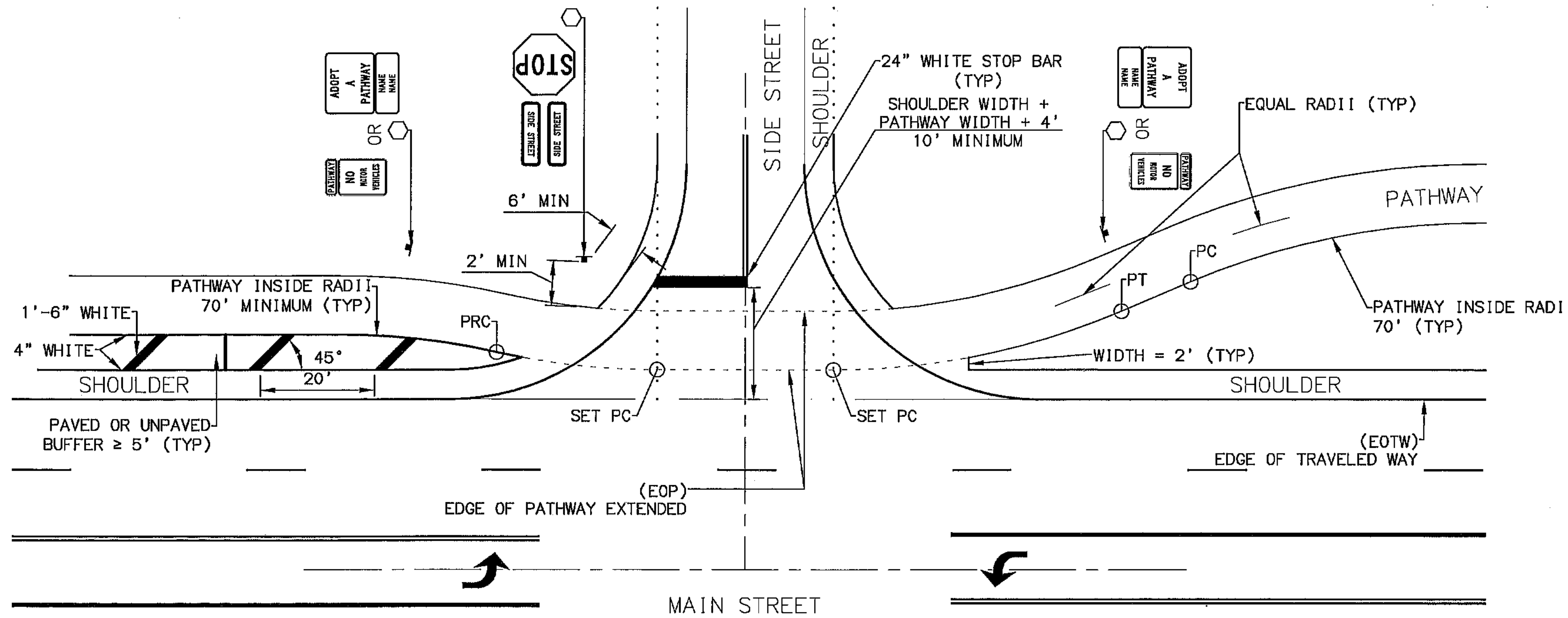
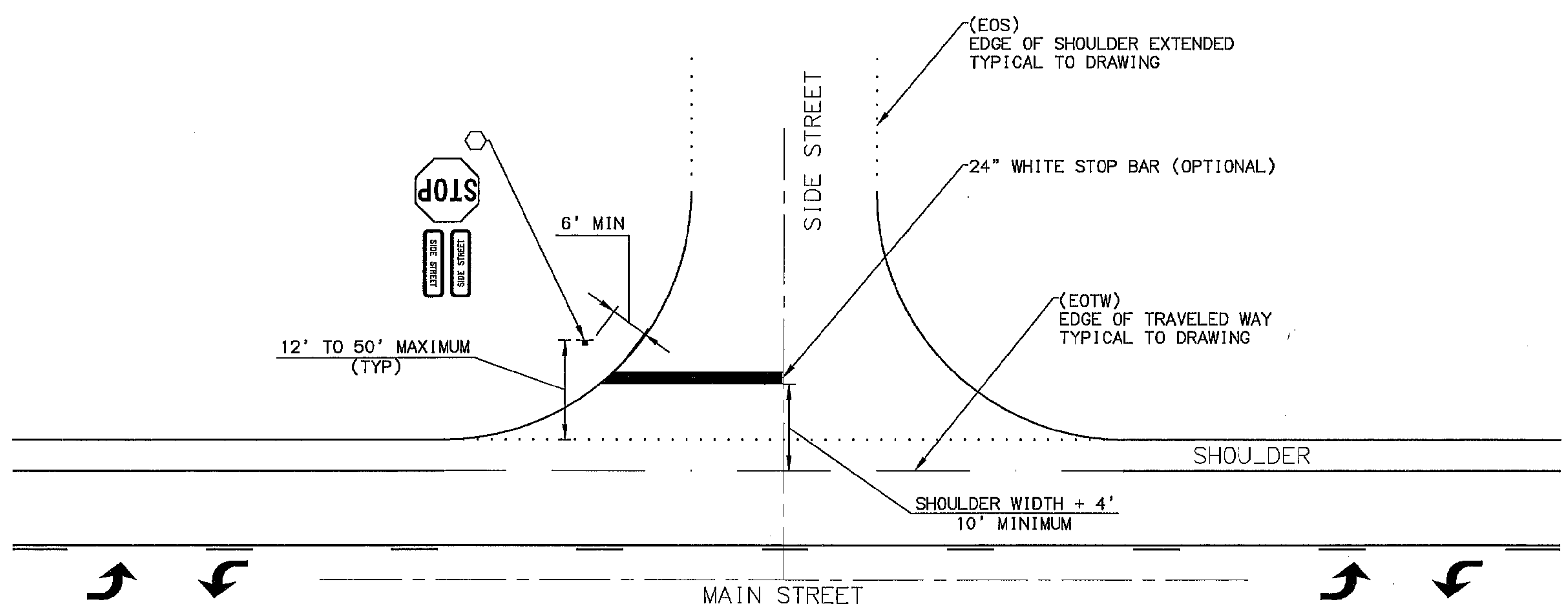
NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
			ALASKA	0549004/Z587610000	2019	E8	E9



TYPICAL UNCURBED RETURN WITH PATHWAY



TYPICAL UNCURBED RETURN WITHOUT SIDEWALK

UNCURBED INTERSECTION NOTES: (IN PRIORITY ORDER)

SIGNING:

1. LOCATE STOP SIGN SO IT IS VISIBLE TO APPROACHING TRAFFIC AND NEAR THE STOP BAR.
2. PROVIDE 2' OF CLEARANCE BETWEEN EDGE OF STOP SIGN PANEL AND EDGE OF PATHWAY OR SIDEWALK.
3. PROVIDE 6' OF CLEARANCE BETWEEN EDGE OF STOP SIGN PANEL AND EDGE OF SIDE STREET.
4. PLACE PATHWAY REGULATORY SIGNS AT COLLECTOR OR ARTERIAL ROADWAY JUNCTIONS, TYPICALLY GREATER THAN 1000 VEHICLES A DAY, OR SIDE STREETS CONNECTING THROUGH TRAFFIC TO OTHER COLLECTORS OR ARTERIALS.
5. "NO MOTOR VEHICLES" SIGNS ARE NOT REQUIRED WITHIN THE MUNICIPALITY OF ANCHORAGE.
6. SEE PLANS FOR PATHWAY SIGNING REQUIRED AT SIDE STREETS.

STRIPING:

1. STOP BARS ARE NOT REQUIRED WHEN NO PATHWAY OR SIDEWALK IS PRESENT. SEE PLANS.
2. LOCATE STOP BAR 4' MINIMUM BEHIND THE WIDTH OF PATHWAY.
3. BREAK CENTERLINE STRIPING WITHIN INTERSECTIONS WHICH HAVE DEDICATED TURN LANES.
4. CONTINUE CENTERLINE STRIPING THROUGH INTERSECTIONS WITH CENTER TWO-WAY-LEFT-TURN-ONLY LANES OR WHEN THERE ARE NO LEFT TURN LANES.
5. CONTINUE LANE "SKIP" STRIPING THROUGH INTERSECTIONS.
6. DELETE OUTERMOST EDGE OF TRAVELED WAY STRIPING AT INTERSECTIONS OR WRAP EOTW STRIPING TO SIDE STREET EOTW.
7. MATCH SIDE STREET STRIPING IF STRIPING IS PRESENT.

STATE OF ALASKA 49TH SCOTT E. THOMAS CE 8602 REGISTERED PROFESSIONAL ENGINEER

Scott E. Thomas 10-14-19

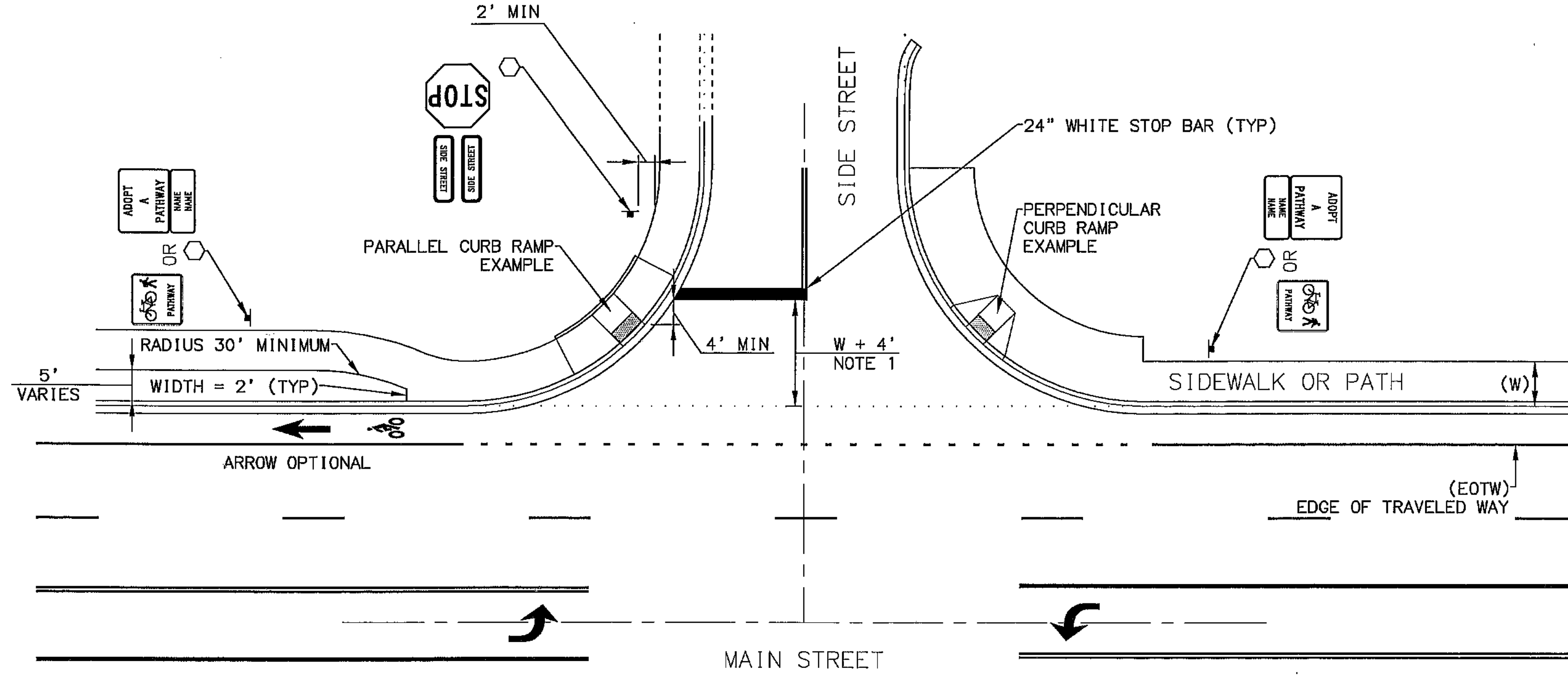
STATE OF ALASKA DOT&PF
4111 AVIATION AVENUE
ANCHORAGE, AK 99502
(907) 269-0590

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

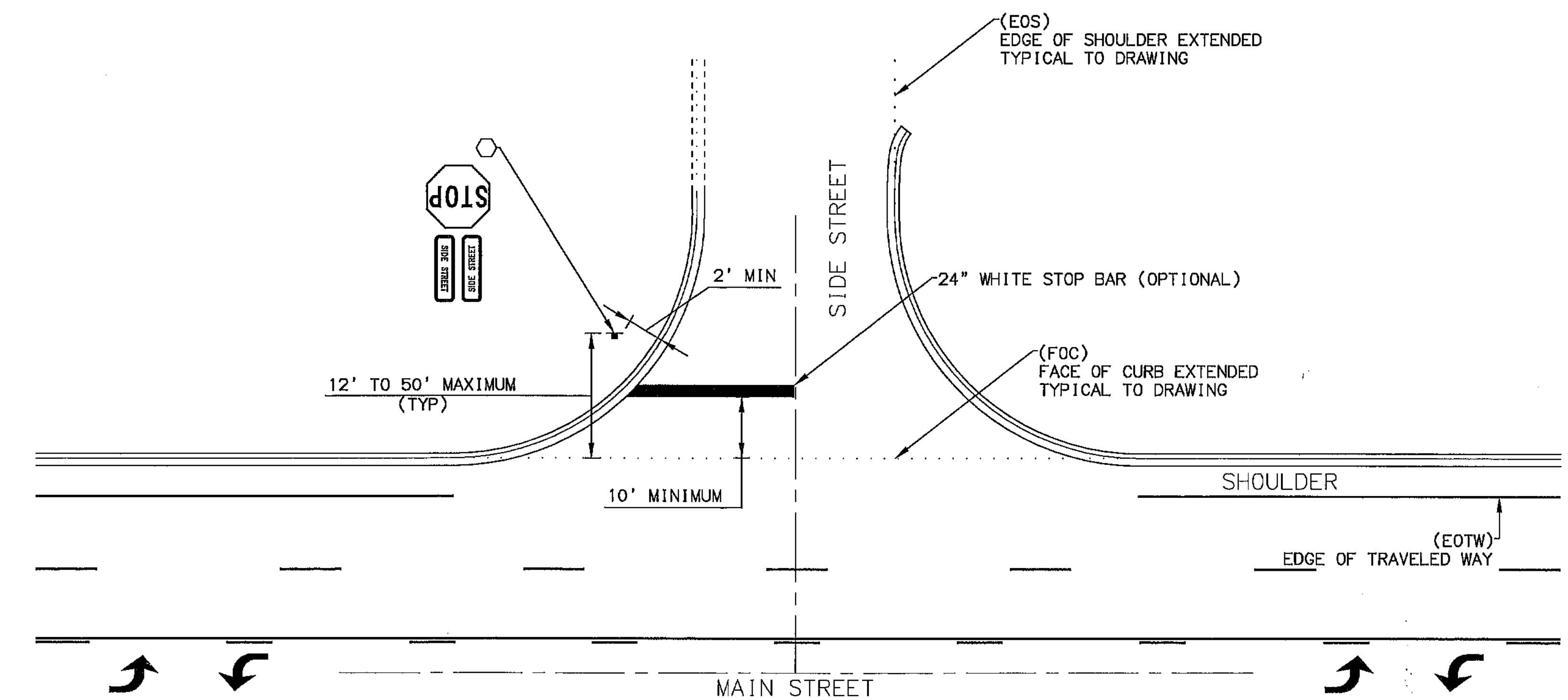
AMATS: POST RD: 3RD AVE TO REEVE BLVD PAVEMENT PRESERVATION

UN-SIGNALIZED INTERSECTION: NONCURBED STOP AND CROSSING TRAFFIC SAFETY DETAILS

NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
			ALASKA	0549004/Z587610000	2019	E9	E9



TYPICAL CURBED RETURN WITH SIDEWALK



TYPICAL CURBED RETURN WITHOUT SIDEWALK

CURBED INTERSECTION NOTES:

SIGNING:

1. LOCATE STOP SIGN SO IT IS VISIBLE TO APPROACHING TRAFFIC AND NEAR THE STOP BAR.
2. PROVIDE 2' OF CLEARANCE BETWEEN EDGE OF STOP SIGN PANEL AND EDGE OF PATHWAY OR SIDEWALK.
3. PROVIDE 6' OF CLEARANCE BETWEEN EDGE OF STOP SIGN PANEL AND SIDE STREET FACE OF CURB.
4. PLACE PATHWAY REGULATORY SIGNS AT COLLECTOR OR ARTERIAL ROADWAY JUNCTIONS, TYPICALLY GREATER THAN 1000 VEHICLES A DAY, OR SIDE STREETS CONNECTING THROUGH TRAFFIC TO OTHER COLLECTORS OR ARTERIALS.
5. "NO MOTOR VEHICLES" SIGNS ARE NOT REQUIRED WITHIN THE MUNICIPALITY OF ANCHORAGE.
6. SEE PLANS FOR PATHWAY SIGNING REQUIRED AT SIDE STREETS.

STRIPING:

1. STOP BARS ARE NOT REQUIRED WHEN NO PATHWAY OR SIDEWALK IS PRESENT. SEE PLANS.
2. 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'.
3. BREAK CENTERLINE STRIPING WITHIN INTERSECTIONS WHICH HAVE DEDICATED TURN LANES.
4. CONTINUE CENTERLINE STRIPING THROUGH INTERSECTIONS WITH CENTER TWO-WAY-LEFT-TURN-ONLY LANES OR WHEN THERE ARE NO LEFT TURN LANES.
5. CONTINUE LANE "SKIP" STRIPING THROUGH INTERSECTIONS.
6. DELETE OUTERMOST EDGE OF TRAVELED WAY STRIPING AT INTERSECTIONS OR WRAP EOTW STRIPING TO SIDE STREET EOTW.
7. MATCH SIDE STREET STRIPING IF STRIPING IS PRESENT.

STATE OF ALASKA 49TH SCOTT E. THOMAS CE 8602 REGISTERED PROFESSIONAL ENGINEER

Scott E. Thomas 10-14-19

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4111 AVIATION AVENUE
ANCHORAGE, AK 99502
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STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

AMATS: POST RD: 3RD AVE TO REEVE BLVD PAVEMENT PRESERVATION

UN-SIGNALIZED INTERSECTION: CURBED STOP AND CROSSING TRAFFIC SAFETY DETAILS

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