

**Table 1: Clear zone distances (in feet from edge of traveled way).**

design speed (mph)	design ADT	fill slope (fs)			out slope (cs)		
		fs ≥ 6:1	4:1 ≤ fs < 6:1	fs < 4:1	cs < 4:1	4:1 ≤ cs < 6:1	cs ≥ 6:1
speed < 40	ADT < 750	7-10	7-10	—**	7-10	7-10	7-10
	750 ≤ ADT < 1500	10-12	12-14	—**	10-12	10-12	10-12
	1500 ≤ ADT < 6000	12-14	14-16	—**	12-14	12-14	12-14
	ADT ≥ 6000	14-16	16-18	—**	14-16	14-16	14-16
40 ≤ speed < 50	ADT < 750	10-12	12-14	—**	8-10	8-10	10-12
	750 ≤ ADT < 1500	12-14	16-20	—**	10-12	12-14	14-16
	1500 ≤ ADT < 6000	16-18	20-26	—**	12-14	14-16	16-18
	ADT ≥ 6000	18-20	24-28	—**	14-16	18-20	20-22
50 ≤ speed < 60	ADT < 750	12-14	14-18	—**	8-10	10-12	10-12
	750 ≤ ADT < 1500	16-18	20-24	—**	10-12	14-16	16-18
	1500 ≤ ADT < 6000	20-22	24-30	—**	14-16	16-18	20-22
	ADT ≥ 6000	22-24	26-32*	—**	16-18	20-22	22-24
60 ≤ speed < 65	ADT < 750	16-18	20-24	—**	10-12	12-14	14-16
	750 ≤ ADT < 1500	20-24	26-32*	—**	12-14	16-18	20-22
	1500 ≤ ADT < 6000	26-30	32-40*	—**	14-18	18-22	24-26
	ADT ≥ 6000	30-32*	36-44*	—**	20-22	24-26	26-28
speed ≥ 65	ADT < 750	18-20	20-26	—**	10-12	14-16	14-16
	750 ≤ ADT < 1500	24-26	28-36*	—**	12-16	18-20	20-22
	1500 ≤ ADT < 6000	28-32*	34-42*	—**	16-20	22-24	26-28
	ADT ≥ 6000	30-34*	38-46*	—**	22-24	26-30	28-30

\*Where a site specific investigation indicates a high probability of continuing accidents, or such occurrences are indicated by accident history, the designer may provide clear zone distances greater than 30 feet as indicated. Clear zones may be limited to 30 feet for practicality and to provide a consistent roadway template if previous experience with similar projects or designs indicates satisfactory performance.

\*\*Since recovery is less likely on the unshielded, traversable 3:1 slopes, fixed objects should not be present in the vicinity of the toe of these slopes. Recovery of high-speed vehicles that encroach beyond the edge of the shoulder may be expected to occur beyond the toe of slope. Determination of the width of the recovery area at the toe of slope should take into consideration right-of-way availability, environmental concerns, economic factors, safety needs, and accident histories. Also, the distance between the edge of the travel lane and the beginning of the 3:1 slope should influence the recovery area provided at the toe of slope.

Adjustments for horizontal curves should be applied at selected locations. The clear zone should be considered for widening at curves, using Table 2, when an accident history suggests the need for additional clear zone width or when all of the following criteria are met:

- the radius of the curve is less than 2860 feet
- the curve occurs on a high-speed roadway (design speed of 55 mph or greater)
- the curve occurs on a normally tangent alignment (one where the curve is preceded by a tangent more than a mile in length).

Use the following equation to determine the clear zone distance when widening at horizontal curves:

$$CZ_c = (L_c)(K_{cz}) \text{ where:}$$

$CZ_c$  = clear zone on outside of curvature, in feet

$L_c$  = clear zone distance, in feet (from Table 1)

$K_{cz}$  = curve correction factor (from Table 2)

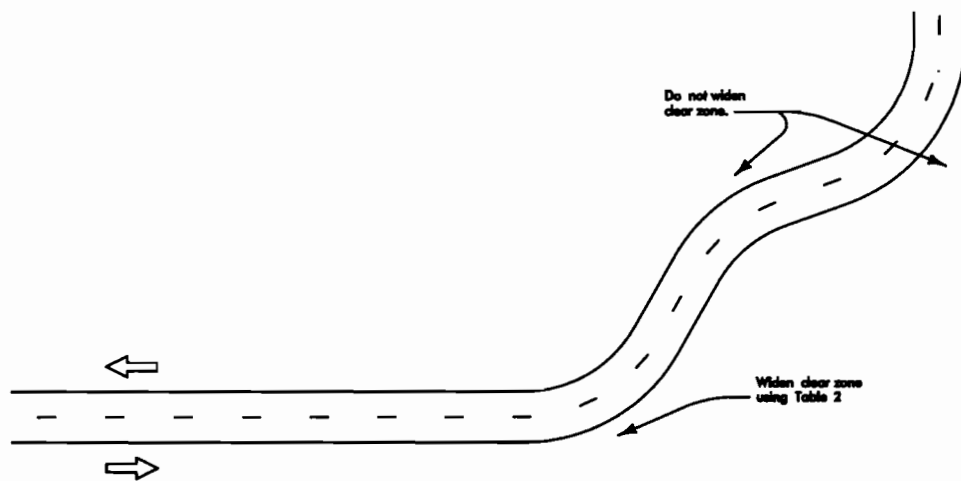
<sup>1</sup> AASHTO Roadside Design Guide, 3-4.

**Table 2: Horizontal curve adjustments.**

**$K_{cz}$  (English curve correction factor)**

radius (ft.)	design speed (mph)						
	40	45	50	55	60	65	70
2860	1.1	1.1	1.1	1.2	1.2	1.2	1.3
2290	1.1	1.12	1.2	1.2	1.2	1.3	1.3
1910	1.1	1.2	1.2	1.2	1.3	1.3	1.4
1640	1.1	1.2	1.2	1.3	1.3	1.4	1.5
1430	1.2	1.2	1.3	1.3	1.4	1.4	
1270	1.2	1.2	1.3	1.3	1.4	1.5	
1150	1.2	1.2	1.3	1.4	1.5		
950	1.2	1.3	1.4	1.5	1.5		
820	1.3	1.3	1.4	1.5			
720	1.3	1.4	1.5				
640	1.3	1.4	1.5				
570	1.4	1.5					
380	1.5						

As Figure 1 shows, the clear zone should be adjusted only on the outside of the first curve following the tangent. If the alignment is generally curvilinear, no adjustment factor should be applied. Similarly, if the alignment is curvilinear preceding the curve in question, then no adjustment factor should be applied. Generally, the added clear zone width called for by the horizontal curve adjustment factor should be thought of as a desirable clear zone rather than a minimum. If the minimum width called for by Table 1 can be achieved, but the added width cannot be, a barrier would not normally be needed. The horizontal curve adjustment factor should be applied to projects where grading is a significant part of the project and available right-of-way allows for a wider clear zone.



**Figure 1: Clear zone adjustment at horizontal curves.**

**"CLEAR ZONE (in feet)"**  
**Foreslope 3:1 or steeper**  
**(DESIGN SPEED 60 MPH)**

Traffic Volume, ADT

Under 750

\*16'-18'  
beyond the  
toe of  
foreslope  
or 20'-24'  
from edge of  
traveled way,  
whichever is  
greater

750-1500

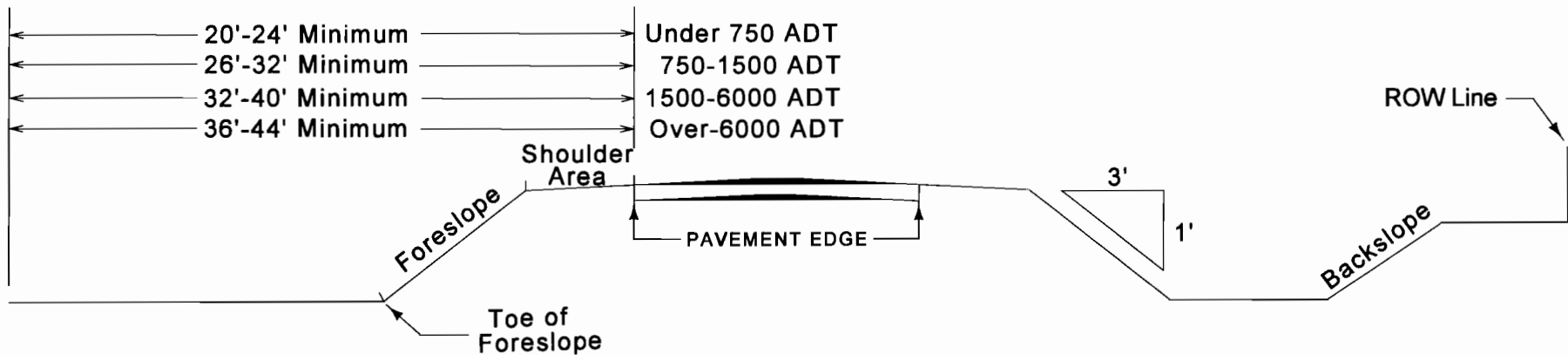
\*20'-24'  
beyond the  
toe of  
foreslope  
or 26'-32'  
from edge of  
traveled way,  
whichever is  
greater

1500-6000

\*26'-30'  
beyond the  
toe of  
foreslope  
or 32'-40'  
from edge of  
traveled way,  
whichever is  
greater

Over 6000

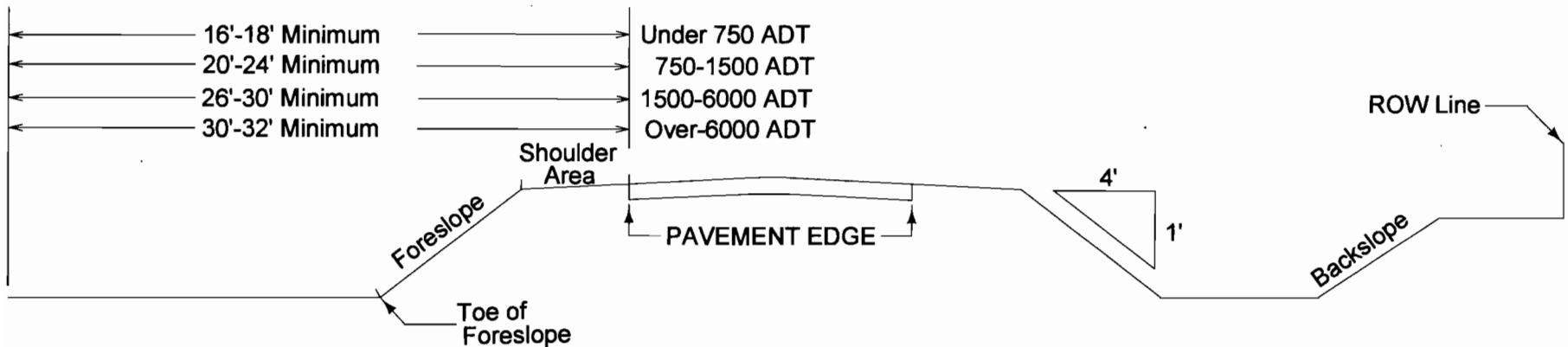
\*30'-32'  
beyond the  
toe of  
foreslope  
or 36'-44'  
from edge of  
traveled way,  
whichever is  
greater



- \* Since recovery is less likely on foreslopes that are 3:1 or steeper, fixed objects should not be present in the vicinity of the toe of these slopes. Recovery of errant vehicles may be expected to occur beyond the toe of the slope. Determination of the width of the recovery area at the toe of a slope that is 3:1 or steeper should take into consideration right-of-way availability, environmental concerns, economic factors, safety needs and accident histories. The distance beyond the toe of foreslope may be reduced by the width of the existing shoulder.

**"CLEAR ZONE (in feet)"**  
**Foreslope 4:1 or steeper**  
 (DESIGN SPEED 60 MPH)

Traffic Volume, ADT			
Under 750	750-1500	1500-6000	Over 6000
*16'-18' beyond the toe of foreslope or 16'-18' from edge of traveled way, whichever is greater	*20'-24' beyond the toe of foreslope or 20'-24' from edge of traveled way, whichever is greater	*26'-30' beyond the toe of foreslope or 26'-30' from edge of traveled way, whichever is greater	*30'-32' beyond the toe of foreslope or 30'-32' from edge of traveled way, whichever is greater



\* Since recovery is less likely on foreslopes that are 4:1 or steeper, fixed objects should not be present in the vicinity of the toe of these slopes. Recovery of errant vehicles may be expected to occur beyond the toe of the slope. Determination of the width of the recovery area at the toe of a slope that is 4:1 or steeper should take into consideration right-of-way availability, environmental concerns, economic factors, safety needs and accident histories. The distance beyond the toe of foreslope may be reduced by the width of the existing shoulder.

# "CLEAR ZONE (in feet)"

## Foreslope 6:1 or steeper

(DESIGN SPEED 60 MPH)

Traffic Volume, ADT

Under 750

\*16'-18'  
beyond the  
toe of  
foreslope  
or 16'-18'  
from edge of  
traveled way,  
whichever is  
greater

750-1500

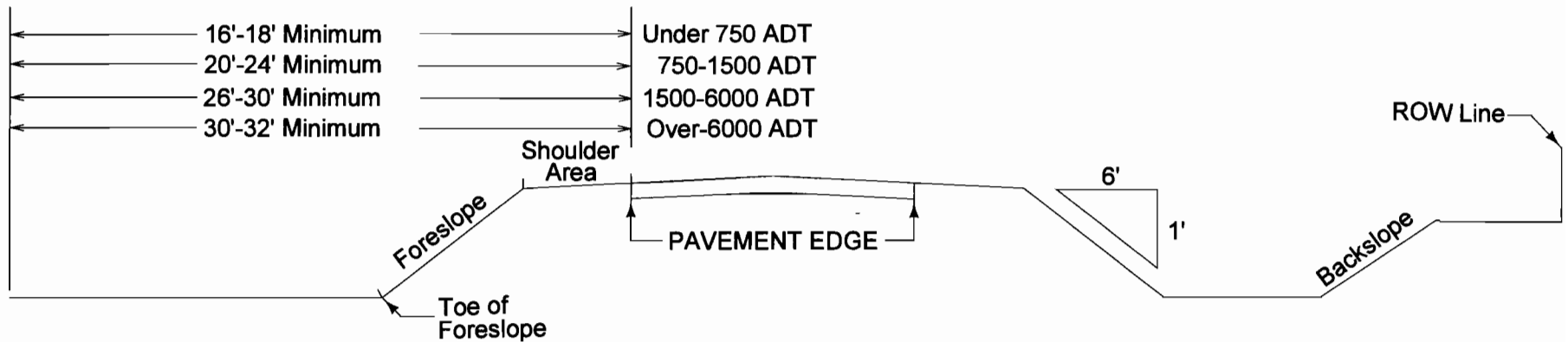
\*20'-24'  
beyond the  
toe of  
foreslope  
or 20'-24'  
from edge of  
traveled way,  
whichever is  
greater

1500-6000

\*26'-30'  
beyond the  
toe of  
foreslope  
or 26'-30'  
from edge of  
traveled way,  
whichever is  
greater

Over 6000

\*30'-32'  
beyond the  
toe of  
foreslope  
or 30'-32'  
from edge of  
traveled way,  
whichever is  
greater



\* Since recovery is less likely on foreslopes that are 6:1 or steeper, fixed objects should not be present in the vicinity of the toe of these slopes. Recovery of errant vehicles may be expected to occur beyond the toe of the slope. Determination of the width of the recovery area at the toe of a slope that is 6:1 or steeper should take into consideration right-of-way availability, environmental concerns, economic factors, safety needs and accident histories. The distance beyond the toe of foreslope may be reduced by the width of the existing shoulder.