

STOPPING SIGHT DISTANCE (SSD)

SSD is the total distance travelled during perception-reaction time and therefore the braking distance for a selected design vehicle. Braking distance is the distance it takes to stop the vehicle once the brakes have been applied.

Braking distance ("d" shown in the formula below) depends on the type and condition of the vehicle, the gradient of the road, the available traction, and numerous other factors. Direct measurement is often the most accurate way of determining braking distance.

The following tables and formulae are taken from the Geometric Design Guide and are applicable to the general grade crossing design vehicles listed in Table 10-5. The SSD for the special vehicles listed in Table 10-6, or for any other vehicle, are to be calculated in accordance with the principles set out in the Geometric Design Guide or, as mentioned earlier, through direct measurement.

$$d = \frac{V^2}{2gf} = \frac{V^2}{2(9.81)f} \times \frac{1000^2}{3600^2} = \frac{V^2}{254f}$$

[Geometric Design Guide Formula 1.2.5.2]

where:

- d = braking distance (m)
- V = maximum road operating speed (km/h)
- f = coefficient of friction between tires and the roadway [Table 10-8]
- g = 9.81 m/s²

then,

$$SSD = (0.278 \times 2.5 \times V) + d$$

[Geometric Design Guide Formula 1.2.5.2]

where:

SSD = stopping sight distance (m)

Table 10-9 provides the minimum SSD on level grade and wet pavement for the general design vehicles listed in Table 10-5. These values are used to design road approaches and to determine SSDs for existing grade crossings, sightlines, and the placement and alignment of signs and grade crossing warning signals.

The SSDs in Table 10-9 may need to be increased or decreased for a variety of reasons, including grade, vehicle braking capability and road surface condition.

Table 10-8 Coefficient of Friction for Wet Pavements

Maximum Road Operating Speed (km/h)	Coefficient of Friction (f)
0 – 30	0.40
31 – 40	0.38
41 – 50	0.35
51 – 62	0.33
63 – 69	0.31
70 – 76	0.30
77 – 84	0.30
85 – 90	0.29
91 – 97	0.28
98 – 120	0.28

Source: *Geometric Design Guide for Canadian Roads*, Transportation Association of Canada, September 1999.

Table 10-9 Stopping Sight Distances (level grade, on wet pavement)

Road Crossing Design Speed (V) (km/hr)	Stopping Sight Distance (SSD) (m)																				
	Road Approach Gradient																				
	-10%	-9%	-8%	-7%	-6%	-5%	-4%	-3%	-2%	-1%	0%	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
10	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	
20	21	21	21	21	21	21	20	20	20	20	20	20	20	20	20	20	19	19	19	19	19
30	33	33	32	32	32	31	31	31	30	30	30	30	30	29	29	29	29	29	29	28	28
40	51	50	49	49	48	48	47	46	46	45	45	45	44	44	43	43	43	42	42	42	42
50	76	75	73	72	71	70	69	68	67	66	65	64	63	63	62	61	61	60	60	59	59
60	104	101	99	97	95	93	91	89	88	86	85	84	83	81	80	79	78	77	77	76	76
70	140	135	132	128	125	122	119	117	114	112	110	108	106	105	103	101	100	99	97	96	95
80	182	176	171	166	161	157	153	149	146	143	140	137	136	132	130	128	126	124	122	121	119
90	223	216	209	202	197	191	186	182	178	174	170	167	163	160	157	155	152	150	148	145	143
100	281	271	262	253	245	238	232	226	220	215	210	205	201	197	194	190	187	184	181	178	176
110	345	331	318	307	296	287	278	270	263	256	250	244	239	234	229	224	220	216	207	209	205

Source: Transport Canada Guideline for Determining Minimum sightlines at Grade Crossings: A Guide for Road Authorities and Railway Companies (Table 2)

ENGINEERING & CONSTRUCTION SERVICES STANDARD DRAWING

REV 0 SEP 2023



**GRADE CROSSING
LOCATION OF ADVANCE WARNING
(RAIL CROSSING AHEAD) SIGN**

T-310.045

NTS SHEET 1