

Ham Lake Cover Requirements

Residential Section - 1" wear, 2" base, 4" class 5, 24' G/G, D312

Required cover: 1" + 2" + 4" + 11' x 2.75% crown + 1/4" Bit to Lip + 3/4" x gutter width + 1" from gutter to rim + 1' cover

Nominal Pipe Size	Distance from Invert to Outside top of pipe (inches)	Minimum Cover from Centerline Elevation to invert (feet)	Minimum Cover from Rim to invert (feet)*
12"	14.75	3.31	2.81
15"	18	3.58	3.08
18"	21.25	3.85	3.35
21"	24.5	4.13	3.63
24"	27.75	4.40	3.90
27"	31	4.67	4.17
30"	34.25	4.94	4.44
36"	40.75	5.48	4.98
42"	47.25	6.02	5.52
48"	53.75	6.56	6.06

Residential Section - 1" wear, 2" base, 4" class 5, 26' G/G, D312

Required cover: 1" + 2" + 4" + 12' x 2.75% crown + 1/4" Bit to Lip + 3/4" x gutter width + 1" from gutter to rim + 1' cover

Nominal Pipe Size	Distance from Invert to Outside top of pipe (inches)	Minimum Cover from Centerline Elevation to invert (feet)	Minimum Cover from Rim to invert (feet)*
12"	14.75	3.34	2.81
15"	18	3.61	3.08
18"	21.25	3.88	3.35
21"	24.5	4.15	3.63
24"	27.75	4.42	3.90
27"	31	4.69	4.17
30"	34.25	4.97	4.44
36"	40.75	5.51	4.98
42"	47.25	6.05	5.52
48"	53.75	6.59	6.06

Residential Section - 1" wear, 2" base, 4" class 5, 28' G/G, D312

Required cover: 1" + 2" + 4" + 13' x 2.75% crown + 1/4" Bit to Lip + 3/4" x gutter width + 1" from gutter to rim + 1' cover

Nominal Pipe Size	Distance from Invert to Outside top of pipe (inches)	Minimum Cover from Centerline Elevation to invert (feet)	Minimum Cover from Rim to invert (feet)*
12"	14.75	3.37	2.81
15"	18	3.64	3.08
18"	21.25	3.91	3.35
21"	24.5	4.18	3.63
24"	27.75	4.45	3.90
27"	31	4.72	4.17
30"	34.25	4.99	4.44
36"	40.75	5.53	4.98
42"	47.25	6.08	5.52
48"	53.75	6.62	6.06

Residential Section - 1.5" wear, 2" base, 6" class 5, 24' G/G, D312

Required cover: 1.5" + 2" + 6" + 11' x 2.75% crown + 1/4" Bit to Lip + 3/4" x gutter width + 1" from gutter to rim + 1' cover

Nominal Pipe Size	Distance from Invert to Outside top of pipe (inches)	Minimum Cover from Centerline Elevation to invert (feet)	Minimum Cover from Rim to invert (feet)*
12"	14.75	3.52	3.02
15"	18	3.79	3.29
18"	21.25	4.06	3.56
21"	24.5	4.33	3.83
24"	27.75	4.60	4.10
27"	31	4.88	4.38
30"	34.25	5.15	4.65
36"	40.75	5.69	5.19
42"	47.25	6.23	5.73
48"	53.75	6.77	6.27

MSA Section - 1.5" wear, 2" base, 6" class 5, 32' G/G, B618

Required cover: 1.5" + 2" + 6" + 14.5' x 2.75% crown + 1/4" Bit to Lip + 3/4" x gutter width + 1" from gutter to rim + 1' cover

Nominal Pipe Size	Distance from Invert to Outside top of pipe (inches)	Minimum Cover from Centerline Elevation to invert (feet)	Minimum Cover from Rim to invert (feet)*
12"	14.75	3.62	3.02
15"	18	3.89	3.29
18"	21.25	4.16	3.56
21"	24.5	4.43	3.83
24"	27.75	4.70	4.10
27"	31	4.97	4.38
30"	34.25	5.24	4.65
36"	40.75	5.78	5.19
42"	47.25	6.33	5.73
48"	53.75	6.87	6.27

MSA Section - 1.5" wear, 2" base, 6" class 5, 36' G/G, B612

Required cover: 1.5" + 2" + 6" + 17' x 2.75% crown + 1/4" Bit to Lip + 3/4" x gutter width + 1" from gutter to rim + 1' cover

Nominal Pipe Size	Distance from Invert to Outside top of pipe (inches)	Minimum Cover from Centerline Elevation to invert (feet)	Minimum Cover from Rim to invert (feet)*
12"	14.75	3.66	3.02
15"	18	3.93	3.29
18"	21.25	4.20	3.56
21"	24.5	4.47	3.83
24"	27.75	4.74	4.10
27"	31	5.01	4.38
30"	34.25	5.28	4.65
36"	40.75	5.82	5.19
42"	47.25	6.36	5.73
48"	53.75	6.91	6.27

Commercial Section - 2" wear, 2" base, 6.5" class 5, 32' G/G, B618

Required cover: 2" + 2" + 6.5" + 14.5' x 2.75% crown + 1/4" Bit to Lip + 3/4" x gutter width + 1" from gutter to rim + 1' cover

Nominal Pipe Size	Distance from Invert to Outside top of pipe (inches)	Minimum Cover from Centerline Elevation to invert (feet)	Minimum Cover from Rim to invert (feet)*
12"	14.75	3.70	3.10
15"	18	3.97	3.38
18"	21.25	4.24	3.65
21"	24.5	4.51	3.92
24"	27.75	4.78	4.19
27"	31	5.06	4.46
30"	34.25	5.33	4.73
36"	40.75	5.87	5.27
42"	47.25	6.41	5.81
48"	53.75	6.95	6.35

Commercial Section - 2" wear, 2" base, 6.5" class 5, 36' G/G, B612

Required cover: 2" + 2" + 6.5" + 17.0' x 2.75% crown + 1/4" Bit to Lip + 3/4" x gutter width + 1" from gutter to rim + 1' cover

Nominal Pipe Size	Distance from Invert to Outside top of pipe (inches)	Minimum Cover from Centerline Elevation to invert (feet)	Minimum Cover from Rim to invert (feet)*
12"	14.75	3.74	3.10
15"	18	4.01	3.38
18"	21.25	4.28	3.65
21"	24.5	4.55	3.92
24"	27.75	4.82	4.19
27"	31	5.09	4.46
30"	34.25	5.36	4.73
36"	40.75	5.91	5.27
42"	47.25	6.45	5.81
48"	53.75	6.99	6.35

Residential Section - 1" wear, 2" base, 4" class 5, 24' G/G, D312

ARCH PIPE

Required cover: 1" + 2" + 4" + 11' x 2.75% crown + 1/4" Bit to Lip + 3/4" x gutter width + 1" from gutter to rim + 1' cover

Nominal Pipe Size	Distance from Invert to Outside top of pipe (inches)	Minimum Cover from Centerline Elevation to invert (feet)	Minimum Cover from Rim to invert (feet)*
15"ø	14.25	3.27	2.77
18"	16.875	3.49	2.99
24"	21.75	3.90	3.40
30"	26.75	4.31	3.81
36"	31.37	4.70	4.20
42"	36.5625	5.13	4.63
48"	41.75	5.56	5.06
54"	46.25	5.94	5.44
60"	51.75	6.40	6.40

Residential Section - 1" wear, 2" base, 4" class 5, 26' G/G, D312

ARCH PIPE

Required cover: 1" + 2" + 4" + 12' x 2.75% crown + 1/4" Bit to Lip + 3/4" x gutter width + 1" from gutter to rim + 1' cover

Nominal Pipe Size	Distance from Invert to Outside top of pipe (inches)	Minimum Cover from Centerline Elevation to invert (feet)	Minimum Cover from Rim to invert (feet)*
15"ø	14.25	3.30	2.77
18"	16.875	3.55	3.02
24"	21.75	3.95	3.42
30"	26.75	4.37	3.84
36"	31.37	4.75	4.23
42"	36.5625	5.19	4.66
48"	41.75	5.62	5.09
54"	46.25	5.99	5.47
60"	51.75	6.42	5.87

Residential Section - 1" wear, 2" base, 4" class 5, 28' G/G, D312

ARCH PIPE

Required cover: 1" + 2" + 4" + 13' x 2.75% crown + 1/4" Bit to Lip + 3/4" x gutter width + 1" from gutter to rim + 1' cover

Nominal Pipe Size	Distance from Invert to Outside top of pipe (inches)	Minimum Cover from Centerline Elevation to invert (feet)	Minimum Cover from Rim to invert (feet)*
15"ø	14.25	3.33	2.77
18"	16.875	3.55	2.99
24"	21.75	3.95	3.40
30"	26.75	4.37	3.81
36"	31.37	4.75	4.20
42"	36.5625	5.19	4.63
48"	41.75	5.62	5.06
54"	46.25	5.99	5.44
60"	51.75	6.45	5.90

MSA Section - 1.5" wear, 2" base, 6" class 5, 32' G/G, B618

ARCH PIPE

Required cover: 1.5" + 2" + 6" + 14.5' x 2.75% crown + 1/4" Bit to Lip + 3/4" x gutter width + 1" from gutter to rim + 1' cover

Nominal Pipe Size	Distance from Invert to Outside top of pipe (inches)	Minimum Cover from Centerline Elevation to invert (feet)	Minimum Cover from Rim to invert (feet)*
15"ø	14.25	3.58	2.98
18"	16.875	3.79	3.20
24"	21.75	4.20	3.60
30"	26.75	4.62	4.02
36"	31.37	5.00	4.41
42"	36.5625	5.44	4.84
48"	41.75	5.87	5.27
54"	46.25	6.24	5.65
60"	51.75	6.70	6.10

MSA Section - 1.5" wear, 2" base, 6" class 5, 36' G/G, B612

ARCH PIPE

Required cover: 1.5" + 2" + 6" + 17.0' x 2.75% crown + 1/4" Bit to Lip + 3/4" x gutter width + 1" from gutter to rim + 1' cover

Nominal Pipe Size	Distance from Invert to Outside top of pipe (inches)	Minimum Cover from Centerline Elevation to invert (feet)	Minimum Cover from Rim to invert (feet)*
15"δ	14.25	3.61	2.98
18"	16.875	3.83	3.20
24"	21.75	4.24	3.60
30"	26.75	4.66	4.02
36"	31.37	5.04	4.41
42"	36.5625	5.47	4.84
48"	41.75	5.91	5.27
54"	46.25	6.28	5.65
60"	51.75	6.74	6.10

Commercial Section - 2" wear, 2" base, 6.5" class 5, 32' G/G, B618

ARCH PIPE

Required cover: 2" + 2" + 6.5" + 14.50' x 2.75% crown + 1/4" Bit to Lip + 3/4" x gutter width + 1" from gutter to rim + 1' cover

Nominal Pipe Size	Distance from Invert to Outside top of pipe (inches)	Minimum Cover from Centerline Elevation to invert (feet)	Minimum Cover from Rim to invert (feet)*
15"δ	14.25	3.66	3.06
18"	16.875	3.88	3.28
24"	21.75	4.28	3.69
30"	26.75	4.70	4.10
36"	31.37	5.09	4.49
42"	36.5625	5.52	4.92
48"	41.75	5.95	5.35
54"	46.25	6.33	5.73
60"	51.75	6.78	6.19

Commercial Section - 2" wear, 2" base, 6.5" class 5, 36' G/G, B612

ARCH PIPE

Required cover: 2" + 2" + 6.5" + 17.0' x 2.75% crown + 1/4" Bit to Lip + 3/4" * gutter width + 1" from gutter to rim + 1' cover

Nominal Pipe Size	Distance from Invert to Outside top of pipe (inches)	Minimum Cover from Centerline Elevation to invert (feet)	Minimum Cover from Rim to invert (feet)*
15"δ	14.25	3.70	3.06
18"	16.875	3.92	3.28
24"	21.75	4.32	3.69
30"	26.75	4.74	4.10
36"	31.37	5.12	4.49
42"	36.5625	5.56	4.92
48"	41.75	5.99	5.35
54"	46.25	6.36	5.73
60"	51.75	6.82	6.19

* Rim elevation is 1" below gutter

δ 11x18 span not typically found in Mn