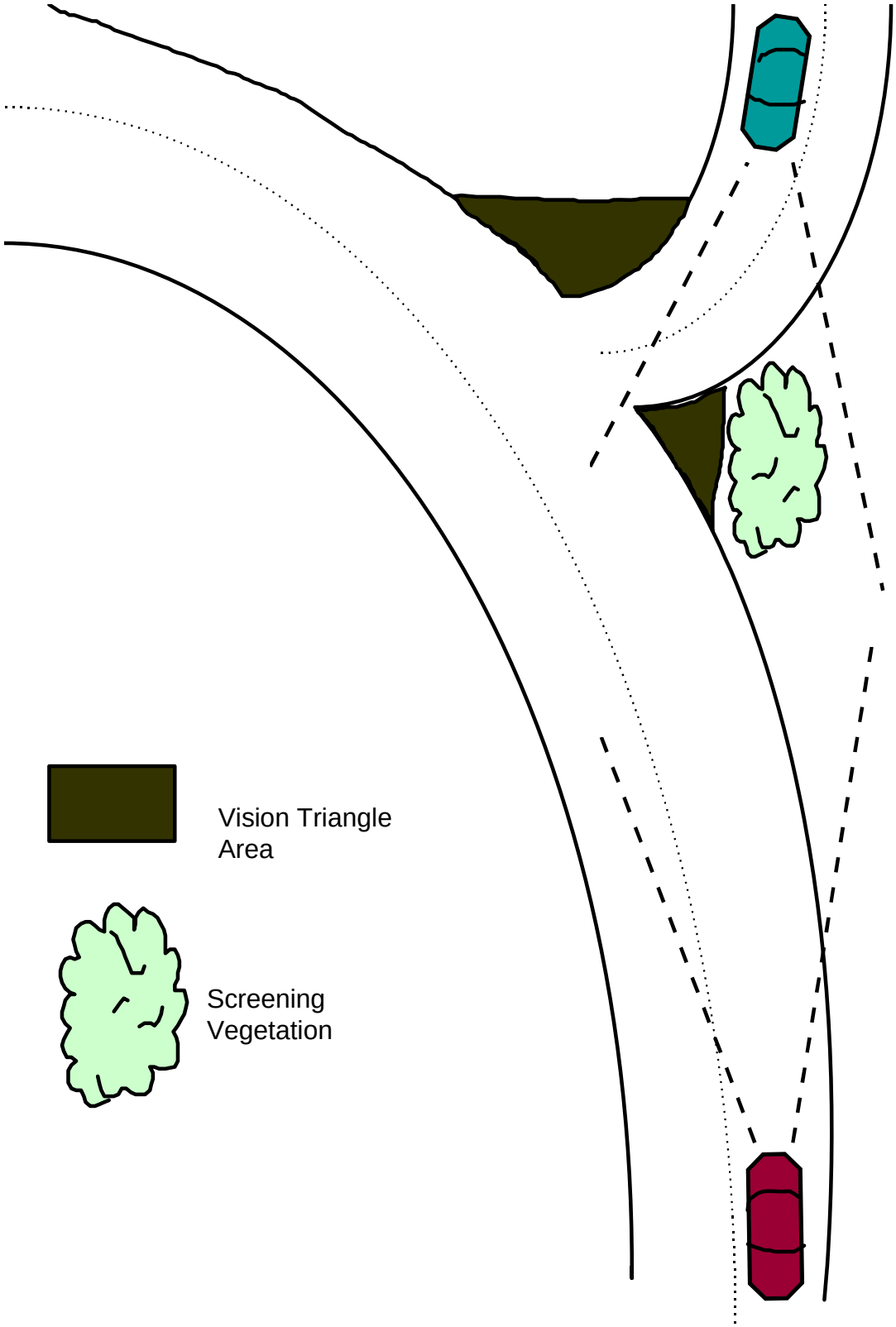
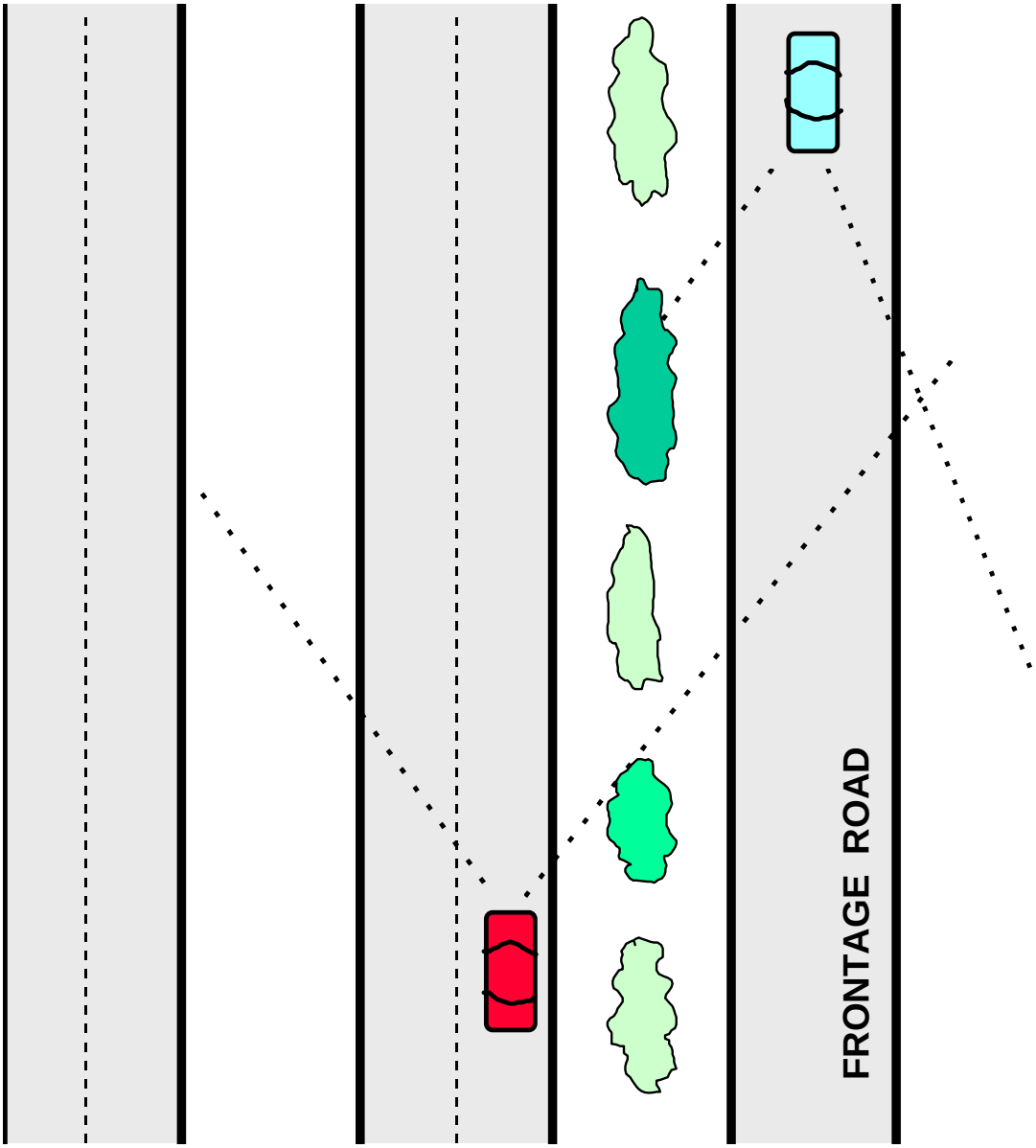
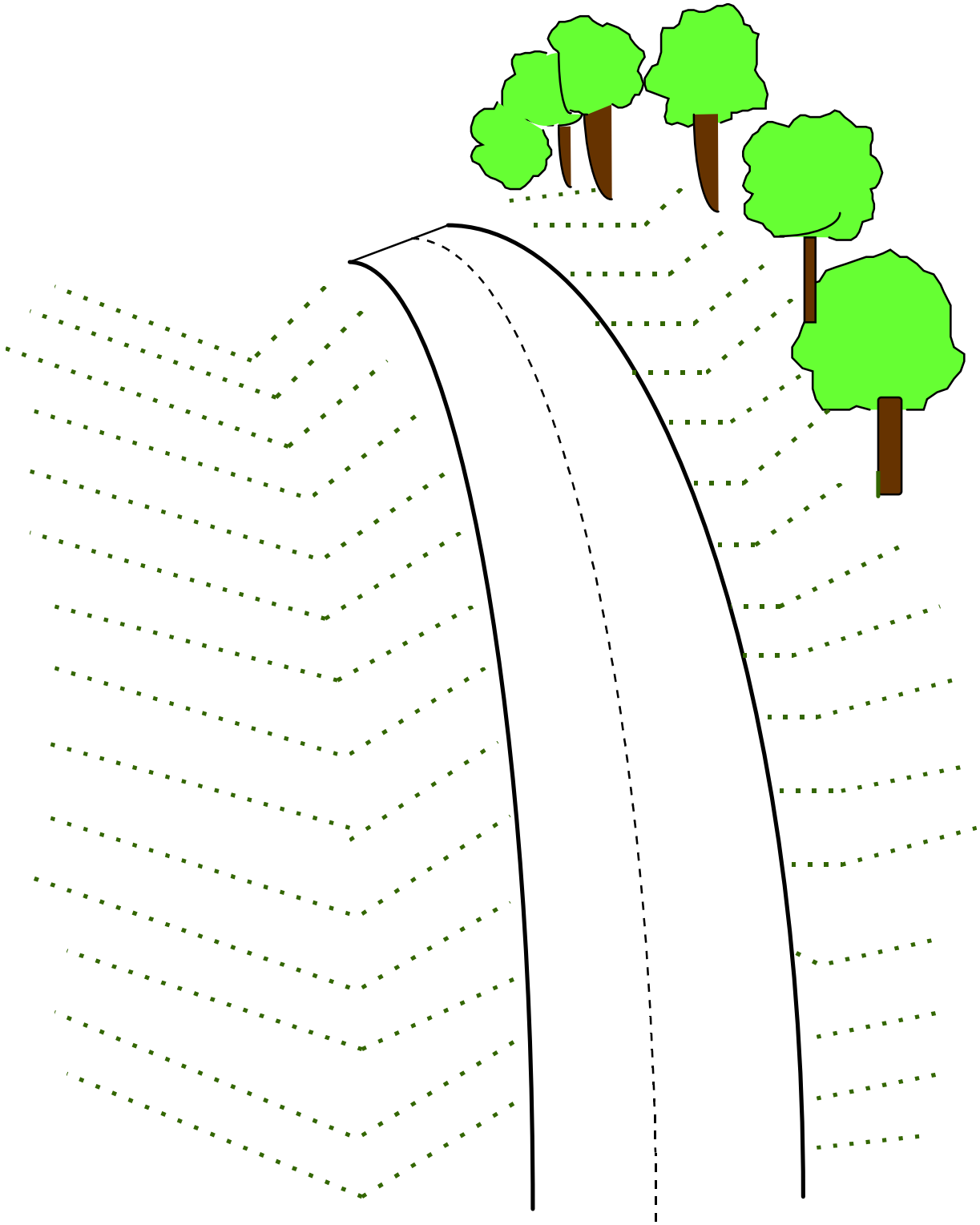
# Plantings as Glare Screens



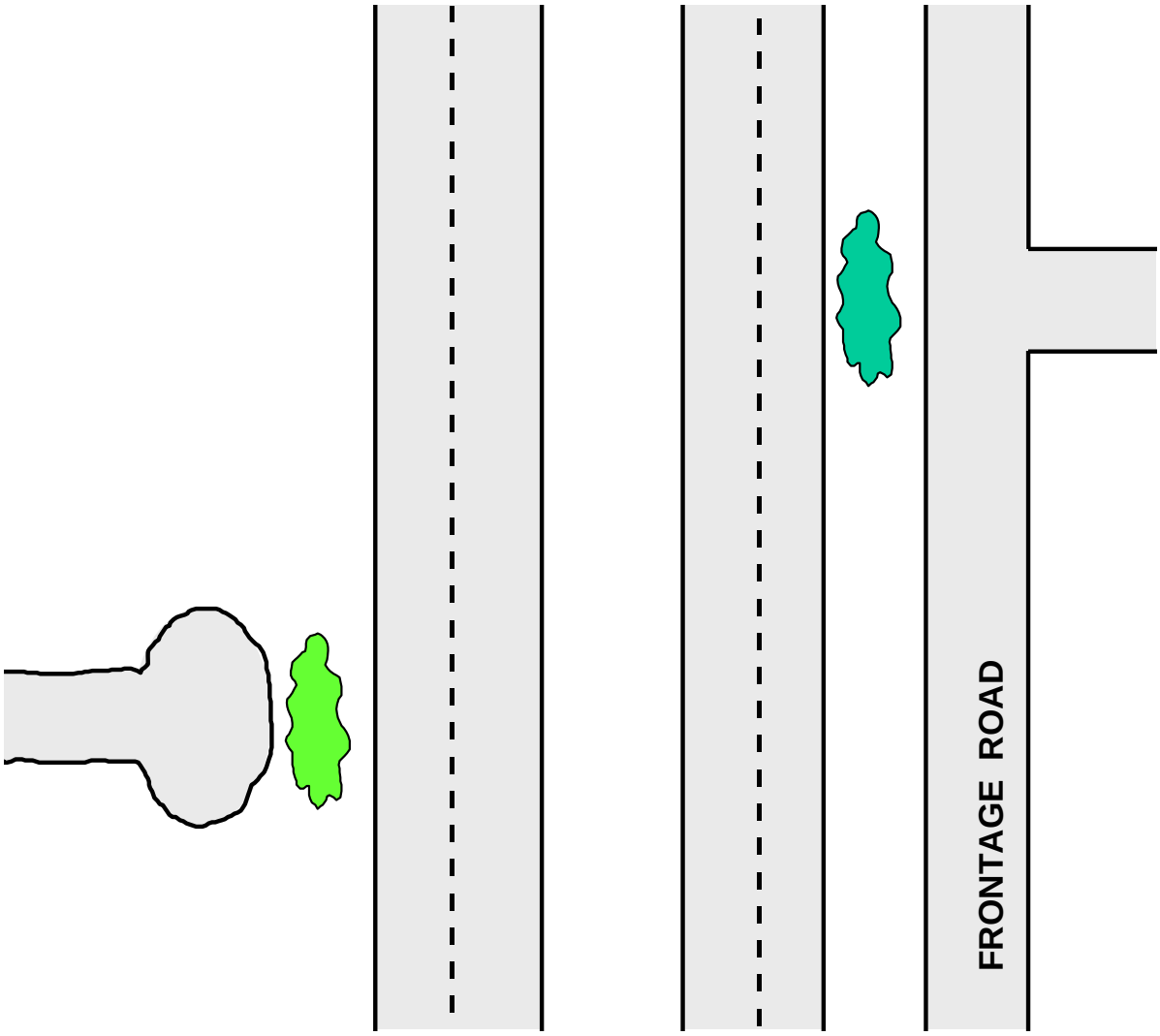
# Partial Plant Screening



# Plantings as Delineators



**Delineating Cut-off Roads**



**Deciduous Woody Shrubs Suitable for Snowdrift Control**

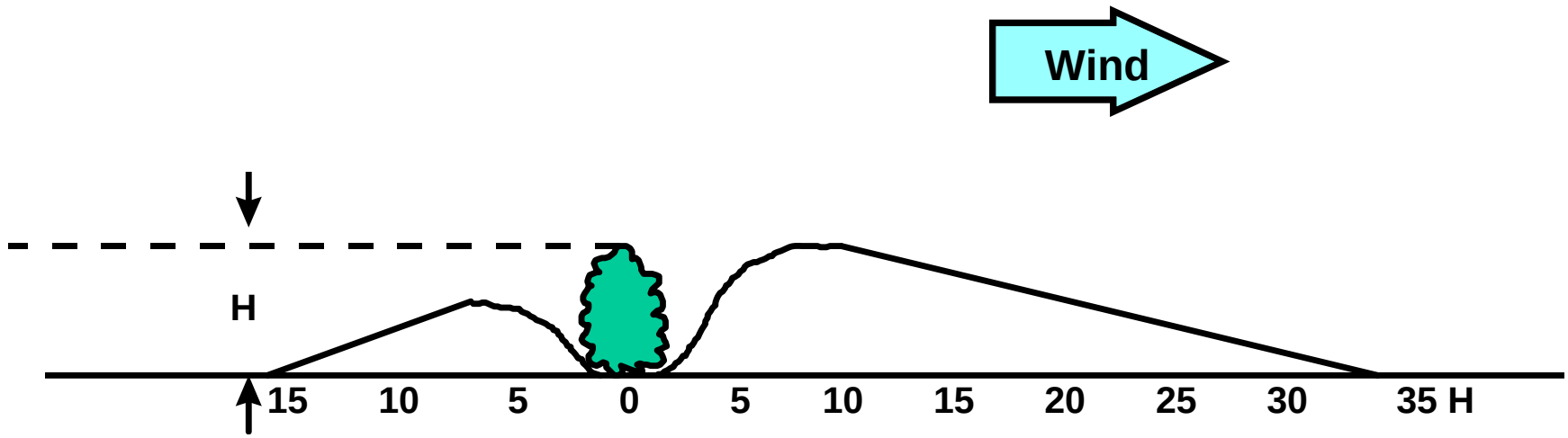
| Common Name | Latin Name | Mature Height | Soil Moisture Tolerance | Winter Hardiness |
|---|---|---|---|---|
| Dogwood, Silky | Cornus amomum | 10' **(3 m)** | Wet to dry mesic | South half of the state |
| Dogwood, Grey | Cornus racemosa | 10' **(3 m)** | Wet mesic to dry | Statewide |
| Dogwood, Redosier | Cornus sericea | 8' **(2.5m)** | Wet to dry mesic | Statewide |
| Filbert, American | Corylus americana | 8' **(2.5m)** | Wet mesic to dry | Statewide |
| Ninebark, Common | Physocarpus opulifolius | 10' **(3 m)** | Wet to dry | Statewide |
| Plum, American | Prunus americana | 15' **(4.5 m)** | Mesic to dry | South half of the state |
| Viburnum, Nannyberry | Viburnum lentagp | 30' **(9 m)** | Wet mesic to dry mesic | Statewide |
| Viburnum, American Cranberrybush | Viburnum trilobum | 12' **(4 m)** | Wet to dry mesic | Statewide |

**Evergreen Trees Suitable for Snowdrift Control**

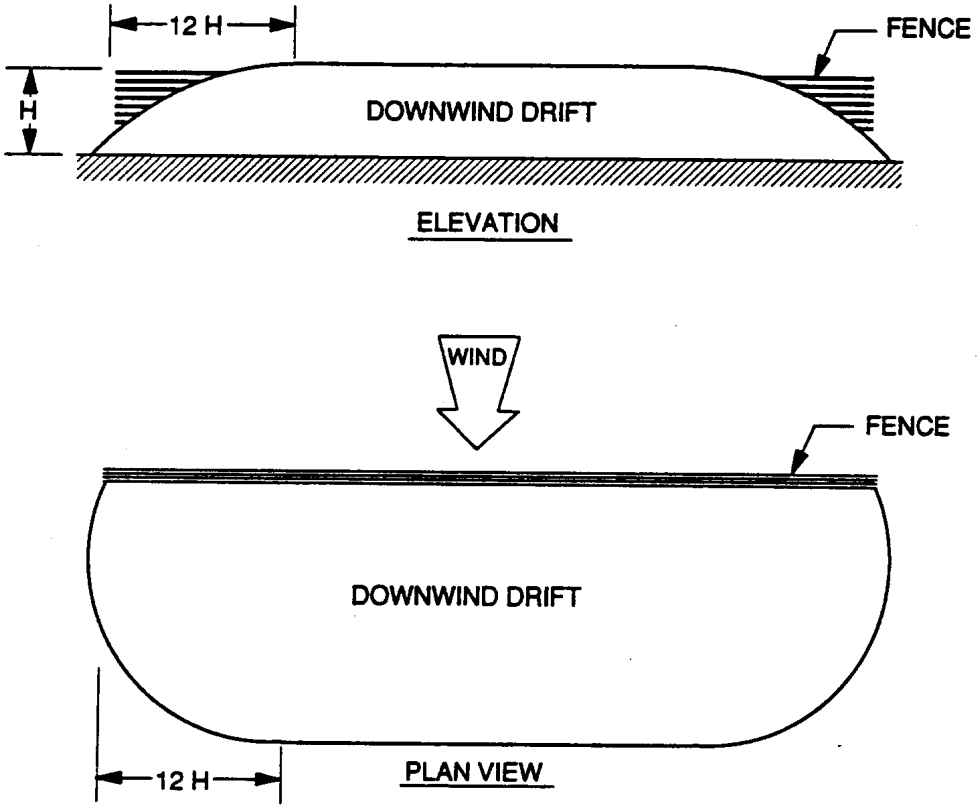
| Common Name | Latin Name | Mature Height | Soil Moisture Tolerance | Winter Hardiness |
|---|---|---|---|---|
| Spruce, White | Picea glauca | 50' **(15 m)** | Wet mesic to mesic | North half of the state |
| Pine, Red | Pinus resinosa | 80' **(24.4 m)** | Mesic to dry | North half of the state |
| Pine, White | Pinus strobus | 100'+ **(30.5 m)** | Wet mesic to dry mesic | * North half of the state |

* White pine is susceptible to salty spray and other types of pollution. Use only on the side of the road upwind for the prevailing wind direction. Plant a minimum of 75' from the near edge of the roadway.

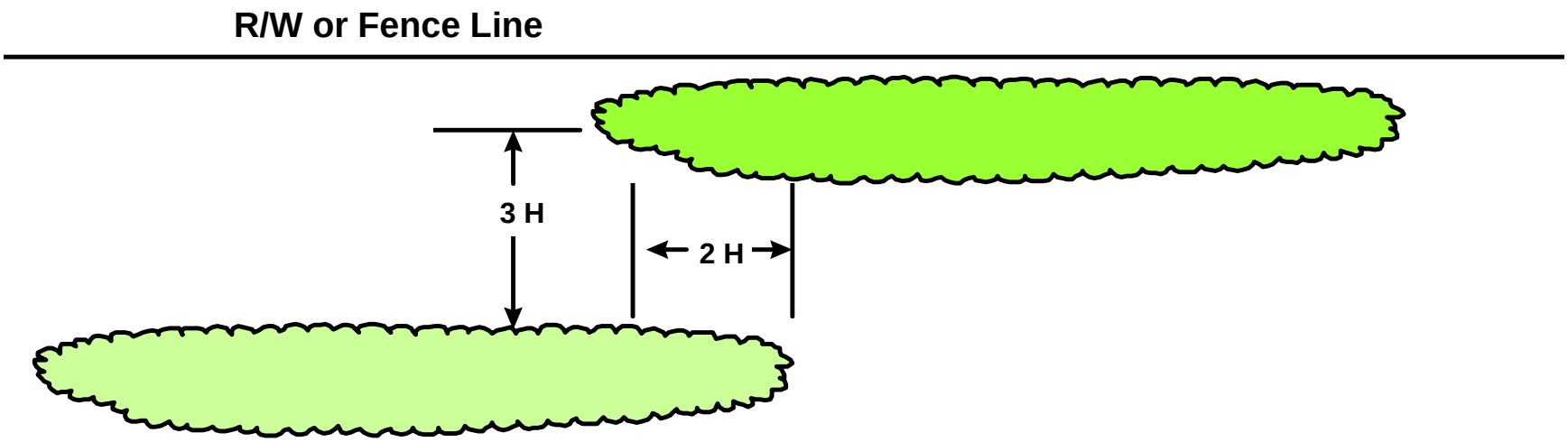
# Snowfence Size and Drift Distance



**Snowdrift End Effect**

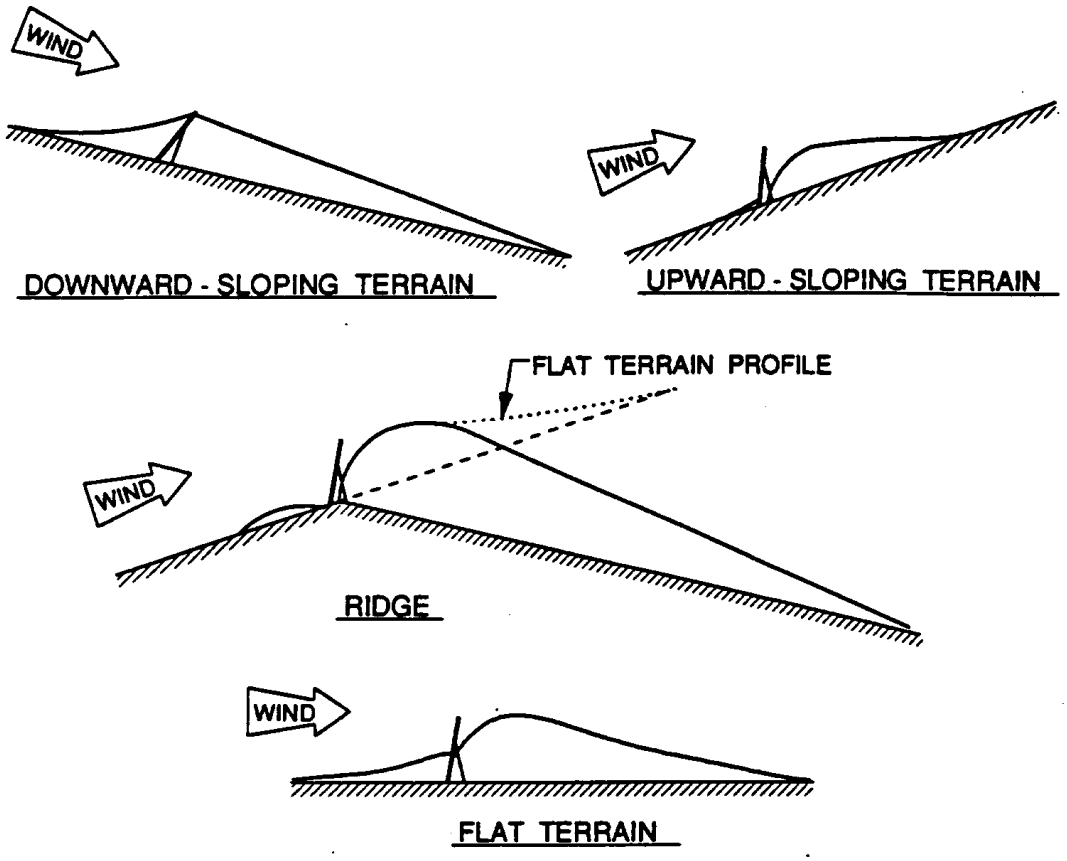


# Snowfence Overlap

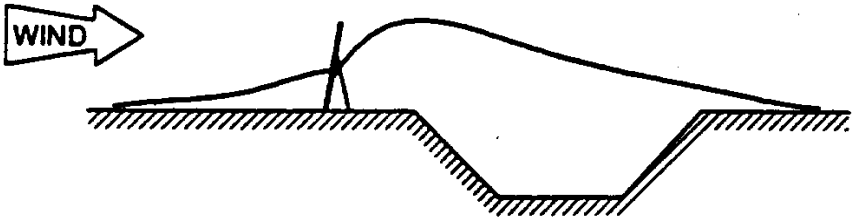



**H = Height of Mature Plants**

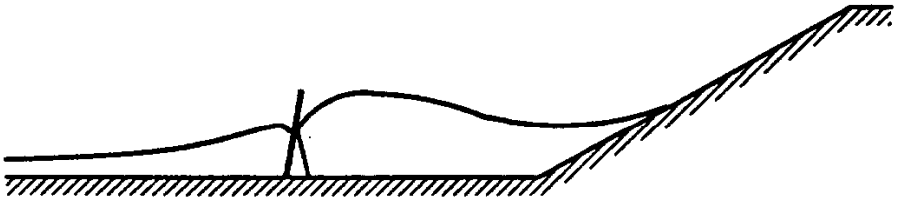
**Topography and Drift Shape**



**Topography and Snow Storage**




DEPRESSION UNDER DRIFT



FOOT OF EMBANKMENT

FLAT TERRAIN

# Guidelines for Planting Trees Near Overhead Power Lines

**Distribution Lines**

| Planting Distance From Line Center | Low-growing Trees (Less than 20' tall) | Medium Height Trees (20' - 40' tall) | Tall Trees (Over 40' tall) |
|---|---|---|---|
| | Underneath line is okay | 25' **(8 m)** | 40' **(12 m)** |

* Distribution lines serve residential, rural, commercial and small industrial customers

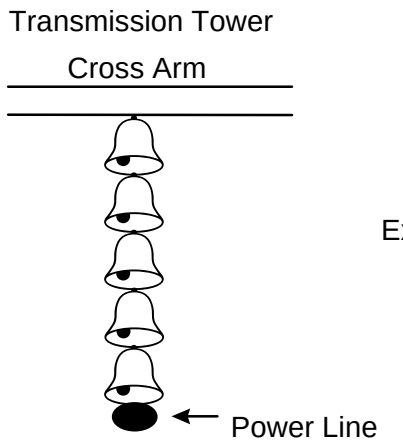
**Transmission Lines**

| Planting Distance From Line Center | Low-growing Trees (Less than 20' tall) | Medium Height Trees (20' - 40' tall) | Tall Trees (Over 40' tall) |
|---|---|---|---|
| 69 KV Line | Underneath line is okay | 40' **(12 m)** | 40' **(12 m)** |
| 115 KV Line | Underneath line is okay | 50' **(15 m)** | 50' **(15 m)** |
| 138 KV Line | Underneath line is okay | 50' **(15 m)** | 50' **(15 m)** |
| 161 KV Line | Underneath line is okay | 60' **(18 m)** | 60' **(18 m)** |
| 230 KV Line | Underneath line is okay | 75' **(23 m)** | 75' **(23 m)** |
| 345 KV Line | Underneath line is okay | 75' **(23 m)** | 75' **(23 m)** |

** Transmission lines serve large industrial customers and tie sources of power supplies

**How to Identify Transmission Line KV Ratings (Length of Insulators)**

69 KV = 5 Bells
115 KV = 8 Bells
138 KV = 10 Bells
161 KV = 12 Bells
230 KV = 15 Bells
345 KV = 20 Bells




Example of a 5 - Bell Configuration

## Aerial Salt Spray Tolerance of Deciduous Trees

| Intolerant (I) | Intermediate (M) | Tolerant (T) |
|---|---|---|
| **Acer palmatum** (Japanese Maple)+ | **Acer campestre** (Hedge Maple) + | **Acer platanoides** (Norway Maple) *^+ |
| **Carpinus betulus** (European Horbeam)+ | **Acer ginnala** (Amur Maple) *(^I)+ | **Acer saccharinum** (Silver Maple) *(^M)+ |
| **Carpinus caroliniana** (Blue Beech, Ironwood) *^+ | **Acer rubrum** (Red Maple) *^+ | **Aesculus hippocastanum** (Horsechestnut) *^+ |
| **Carya ovata** (Shagbark Hickory) *^(+M) | **Acer saccharum** (Sugar Maple) *^+ | **Caragana arborescens** (Siberian Pea Tree) ^+ |
| **Cercis canadensis** (Redbud) *+ | **Alnus incana** (White Alder) *^+ | **Elaeagnus angustifolia** (Russian-olive) *^+ |
| **Corylus avellana** (European Filbert) ***+** | **Alnus rugosa** (Speckled Alder) *(^I)+ | **Fraxinus americana** (White Ash) *^(+M) |
| **Crataegus crusgalli** (Cockspur Hawthorn) ***^+** | **Amelanchier** spp. (Serviceberry ) *(^I)(+I) | **Gleditsia triacanthos** (Honeylocust) *(^I)(+I) |
| **Celtis occidentalis** (Hackberry) ***^+** | **Betula alleghaniensis** (Yellow Birch) *(^T) | **Gymnocladus dioica** (Kentucky Coffeetree) + |
| **Fagus grandifolia** (Beech) ***+** | **Betula lenta** (Sweet Birch) *(^T) | **Juglans nigra** (Black Walnut) *(+M) |
| **Fagus sylvatica** (European Beech) **+** | **Betula nigra** (River Birch) * | **Morus** spp. (Mulberry) *(^I)(+I) |
| **Gingko biloba** (Gingko) * | **Betula papyrifera** (Paper Birch) *^+ | **Populus alba** (Silver-leaved Poplar) *^+ |
| **Liriodendron tulipifera** (Tuliptree) *+ | **Betula populifolia** (Grey Birch) *(^T)+ | **Populus deltoides** (Eastern Cottonwood) *^+ |
| **Malus spp.** (Flowering Crabapple) *^+ | **Catalpa speciosa** (Catalpa) *+ | **Populus grandidentata** (Bigtooth Aspen) *^+ |
| **Ostrya virginiana** (American Hophornbeam) * | **Cladrastis lutea** (American Yellowwood) + | **Populus nigra** (Black Poplar) *^+ |
| **Prunus serotina** (Black Cherry) ***^+** | **Fraxinus pennsylvanica** (Green Ash) *^+ | **Populus tremuloides** (Quaking Aspen) *^+ |
| **Prunus virginiana** (Chokecherry) *(+M) | **Pyrus** spp. (Ornamental Pear) *+ | **Robinia pseudoacacia** (Black Locust) *^+ |
| **Quercus alba** (White Oak) *^+ | **Quercus macrocarpa** (Bur Oak) *^+ | **Sorbus** spp. (Mountain Ash) *(^I)(+M) |
| **Quercus bicolor** (Swamp White Oak) ^+ | **Quercus robur** (English Oak) *(+I) | **Syringa reticulata** (Japanese Tree Lilac) *(+M) |
| **Quercus palustris** (Pin Oak) *^+ | **Salix alba** (White Willow) *^+ | |
| **Quercus rubra** (Red Oak) *^+ | **Salix nigra** (Black Willow) *+ | |
| **Tilia cordata** (Littleleaf Linden) *(^T)+ | **Tilia americana** (American Linden) *(^I)+ | |
| | **Ulmus americana** (American Elm) *^+ | |
| | **Ulmus pumila** (Siberian Elm) *+ | |

* from UWEX bulletin A2970 "Salt Injury to Landscape Plants", Ed Hasselkus and K.A. Delahaut
^ from Technical Bulletin 303-Forestry Series 20 "Effect of Deicing Salts on Woody Vegetation Along Minnesota Roads", Edward Sucoff
+ from "Yard and Garden" HO-142, a publication of the Horticulture Dept., Cooperative Extension Service, Purdue University, Ruth Kvaalen
If information is missing from one or more of the three sources for a particular plant, the source had no information for the plant in question
I= Intolerant of salt spray, M= Intermediate tolerance of salt spray, T = Tolerant of salt spray.

## Aerial Salt Spray Tolerance of Deciduous Shrubs and Vines

| Intolerant (I) | Intermediate (M) | Tolerant (T) |
|---|---|---|
| **Berberis thunbergii** (Barberry) *^+ | **Berberis koreana** (Korean Barberry) *^(+I) | **Euonymus alatus** (Winged Euonymus ) *+ |
| **Chaenomeles speciosa** (Japanese Flowering Quince) *+ | **Forsythia** X **intermedia** (Forsythia) *+ | **Parthenocissus quinquefolia** (Virginia Creeper)*^+ |
| **Cornus** spp. (Dogwood) *^+ | **Ligustrum vulgaris** (Common Privet) *^(+I) | **Philadelphus** spp. (Mockorange) *^ |
| **Corylus** spp. (Filbert) *^+ | **Physocarpus opulifolius** 'nanus' (Dwarf Ninebark) ^ | **Potentilla fruticosa** 'Jackmanni' (Jackman P.) ^ |
| **Euonymus europaea** (European Spindletree) *^+ | **Spiraea bumalda** 'Froebeli' (Froebel Spiraea) ^ | **Rhus aromatica** (Fragrant Sumac) * |
| **Kolkwitzia amabilis** (Beauty Bush) + | **Syringa vulgaris** (Common Lilac) *(^I)(+I) | **Rhus glabra** (Smooth Sumac) *(^M) |
| **Prunus besseyi** (Sand Cherry) * | **Viburnum dentatum** (Arrowood Viburnum) *(+I) | **Rhus trilobata** (Skunkbush) + |
| **Rosa virginiana** (Virginia Rose)^+ | **Viburnum lentago** (Nannyberry Viburnum) *(+I) | **Rhus typhina** (Staghorn Sumac) *+ |
| **Sambucus canadensis** (American Elder) *^+ | **Vib. opulus** (European Cranberrybush Vib.) *(^I)(+I) | **Ribes alpinum** (Alpine Currant) *^+ |
| **Sambucus racemosa** (European Red Elder) *^+ | **Vib. trilobum** (American Cranberrybush Vib.)*(^I)(+I) | **Rosa rugosa** (Rugosa Rose) *(^I)(+I) |
| **Symphoricarpos orbiculatus** (Indiancurrant Coralberry)*^+ | | **Symphoricarpos albus** (Snowberry) *(^M)(+M) |
| **Viburnum lantana** (Wayfaringtree Viburnum) *^+ | | **Tamarix ramosissima** (Five-stamen Tamarisk) ^+ |
| **Weigela** spp. (Weigela) * | | |

* from UWEX bulletin A2970 "Salt Injury to Landscape Plants", Ed Hasselkus and K.A. Delahaut
^ from Technical Bulletin 303-Forestry Series 20 "Effect of Deicing Salts on Woody Vegetation Along Minnesota Roads", Edward Sucoff
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## Aerial Salt Spray Tolerance of Evergreen Trees

| Intolerant (I) | Intermediate (M) | Tolerant (T) |
|---|---|---|
| **Abies balsamea** (Balsam Fir) *^+ | **Pinus ponderosa** (Ponderosa Pine)*^ | **Abies concolor** (White Fir) + |
| **Metasequoia glyptostroboides** (Dawn Redwood) ***+** | **Pseudotsuga menziesii** (Douglasfir) *(^I)(+I) | **Juniperus virginiana** (Eastern Redcedar) *(^M)+ |
| **Picea abies** (Norway Spruce) *^+ | | **Larix decidua** (European Larch) *^+ |
| **Picea glauca** (White Spruce) *+ | | **Larix leptolepis** (Japanese Larch) ^+ |
| **Pinus resinosa** (Red Pine) *^+ | | **Picea pungens** (Colorado Spruce) *^ |
| **Pinus strobus** (White Pine) *^+ | | **Pinus banksiana** (Jack Pine) *+ |
| **Pinus sylvestris** (Scots Pine) *^+ | | **Pinus mugo** (Mugo Pine) *+ |
| **Thuja occidentalis** (Arborvitae) *(^M)+ | | **Pinus nigra** (Austrian Pine) *(^M)+ |
| **Tsuga canadensis** (Eastern Hemlock) *^+ | | |

## Aerial Salt Spray Tolerance of Broadleaf and Needled Evergreen Shrubs

| Intolerant (I) | Intermediate (M) | Tolerant (T) |
|---|---|---|
| **Buxus sempervirens** (Boxwood) * | **Juniperus horizontalis** (Creeping Juniper) * | **Juniperus chinensis** (Chinese Juniper) * |
| **Rhododendron** spp. (Rhododendron) * | | |
| **Taxus** spp. (Yew) *+ | | |

* from UWEX bulletin A2970 "Salt Injury to Landscape Plants", Ed Hasselkus and K.A. Delahaut
^ from Technical Bulletin 303-Forestry Series 20 "Effect of Deicing Salts on Woody Vegetation Along Minnesota Roads", Edward Sucoff
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I= Intolerant of salt spray, M= Intermediate tolerance of salt spray, T = Tolerant of salt spray

**To Determine Shadow Length for a Given Date and Hour:**

1. Find the date at the bottom of the chart.
2. Move up the chart to the solid line representing the hour in question.
3. Move left or right to the Shadow Factor scale (the inside scale on each side of the chart).
4. Shadow Length = (Height of Tree) x Shadow Factor.

Example

Given: A tree with a mature height of 40 feet.

Find: The length of shadow it will cast at 9:00 a.m. on January 25.

Solution:

Find 25 January on the bottom of the chart and move up to the 9 o'clock line, then move left to the shadow factor scale on the left side of the chart. The shadow factor is about 3.75. The length of shadow on this date would then be calculated as:

25 January, 40 ft x 3.75 = 150 ft

**To Determine the Direction in Which the Shadow will be Cast:**

1. Select a date at the bottom of the chart.
2. Move up the chart to the dashed line representing the hour in question* .
3. Move left for a morning hour and right for an afternoon hour to the outside vertical scales for shadow direction.

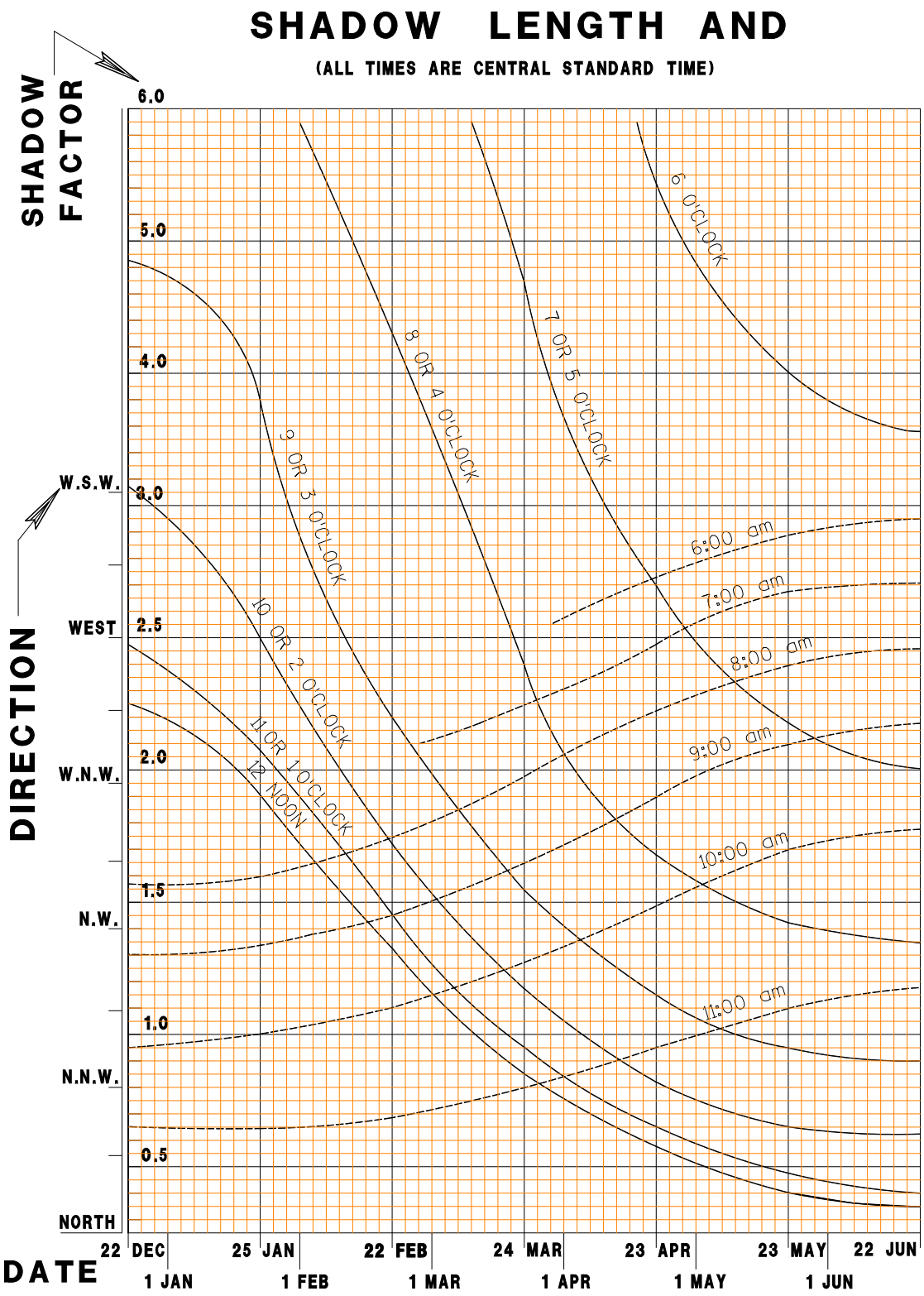
Example

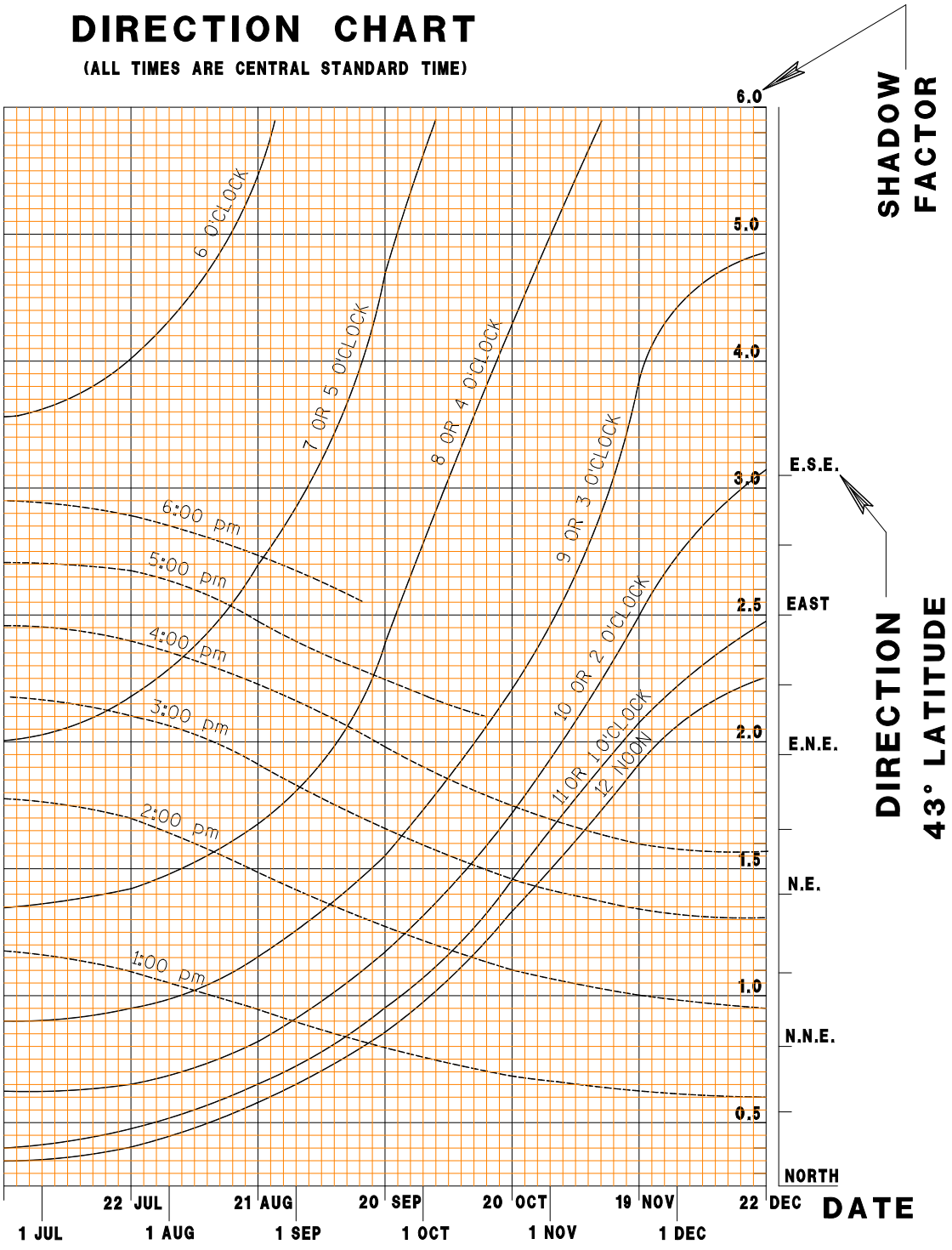
Given: The example started above.

Find: The shadow direction.

Solution: Find January 25 then read up to the dashed line labeled 9 o'clock. Since this is in the morning, read left to the outside scale. The shadow is being cast to the northwest. If you wanted the shadow direction for 3:00 pm then you would go to the same point on the same dashed line but you would read to the right to get a direction of northeast in this case.

*Note: Each dashed line represents a pair of hours (one on either side of noon). For example, the 9:00 am line is the same as the 3:00 pm line (3 hours either side of noon). If you wanted to determine the shadow direction at 3:00 pm on January 25 you would go to the dashed line that represents both 9:00 am and 3:00 pm but this time you would read to the right to get a direction of northeast.


SHADOW LENGTH AND
(ALL TIMES ARE CENTRAL STANDARD TIME)
SHADOW FACTOR
6.0
5.0
4.0
3.0
2.5
2.0
1.5
1.0
0.5
DIRECTION
W.S.W.
WEST
W.N.W.
N.W.
N.N.W.
NORTH
DATE
22 DEC
25 JAN
22 FEB
24 MAR
23 APR
23 MAY
22 JUN
1 JAN
1 FEB
1 MAR
1 APR
1 MAY
1 JUN
6 O'CLOCK
7 OR 5 O'CLOCK
8 OR 4 O'CLOCK
9 OR 3 O'CLOCK
10 OR 2 O'CLOCK
11 OR 1 O'CLOCK
12 NOON
6:00 am
7:00 am
8:00 am
9:00 am
10:00 am
11:00 am


DIRECTION CHART
(ALL TIMES ARE CENTRAL STANDARD TIME)
SHADOW FACTOR
6.0
5.0
4.0
3.0
2.5
2.0
1.5
1.0
0.5
E.S.E.
EAST
E.N.E.
N.E.
N.N.E.
NORTH
DIRECTION
43° LATITUDE
6 O'CLOCK
7 OR 5 O'CLOCK
8 OR 4 O'CLOCK
9 OR 3 O'CLOCK
10 OR 2 O'CLOCK
11 OR 1 O'CLOCK
12 NOON
6:00 pm
5:00 pm
4:00 pm
3:00 pm
2:00 pm
1:00 pm
22 JUL
21 AUG
20 SEP
20 OCT
19 NOV
22 DEC
1 JUL
1 AUG
1 SEP
1 OCT
1 NOV
1 DEC
DATE