A black and white photograph of a tree-lined highway. A vintage car is driving away from the viewer down the center of the road. The road is flanked by tall, mature trees on both sides, creating a canopy effect. Long shadows from the trees are cast across the road surface. The overall scene is peaceful and well-maintained.

Roadside Planting

and the
Care of Trees and Shrubs along Highways

REPRINTED IN REVISED FORM AND WITH NEW MATERIAL,
FROM CONCRETE HIGHWAY MAGAZINE, BY

PORTLAND CEMENT ASSOCIATION

Roadside Planting

and the

Care of Trees and Shrubs Along Highways*

THE fact that many organizations aside from state, county and township highway departments are taking great interest in roadside planting makes it advisable for these departments to adopt certain standards of procedure to govern this work. Property owners, improvement associations, garden clubs, women's clubs, and other bodies are interested in making our highways more attractive as well as utilitarian and their work should be coordinated. Highway departments should have authority to compel conformity to standards, relating to roadside planting, established by them.

Ample precedent for such action by highway authorities is to be found in the states of Washington, Massachusetts, Pennsylvania and Michigan. Nearly 2 million trees will be required for complete ornamentation of the Washington state highways; Massachusetts has planted nearly 50,000 up to date; Wayne County, Michigan, has specifications governing all roadside work, which telephone and electric service companies must



Tunnels of cool shade refresh the tourist.

observe; and Kane County, Illinois, is planting the full distance of its famous Fox River Trail. El Paso County, Texas, made a beginning on this work a few years ago. On the "Ideal Section" of the Lincoln Highway roadside planting was an important contract. The Jefferson Davis Memorial Highway Association has adopted the plan of planting pecan trees as mile posts along its highway from Richmond, Va., to Vicksburg, Miss.

Pennsylvania and Michigan have appointed landscape gardeners, under whose direction new planting is planned and executed, and existing trees are preserved during highway construction. Shade trees of consider-

*The text of this pamphlet appeared as a series of articles in Concrete Highway Magazine for August, September and October, 1923, prepared by Robert Kingery, Assistant Manager, Highways Bureau, Portland Cement Association formerly with O. C. Simonds & Co., Landscape Gardeners, Chicago. Continuing demand for copies of the original articles exhausted the stock. It has therefore been reprinted, with new material, as a contribution to the general subject of highway improvement.



A tree-bordered rural avenue.

able growth may govern the location of a pavement so long as a serious disalignment is not the result. Locating engineers in Pennsylvania are instructed that "there is no excuse whatever for any trees being unnecessarily destroyed or injured during the progress of the work."

I. Location

In locating roadside trees, standard distances should be established from the edges of the pavement and from the property lines for a belt of planting, at the same time giving due regard to safety for present traffic, possible future widening of the pavement, and drainage. The planting location must also take into consideration the location of pole and wire lines, the recommended position for which is at the extreme sides of the right-of-way, preferably not more than 3 feet from the property or fence line.

It is recommended that on a 60-foot right-of-way the trees be set not less than 16 feet from the center line nor more than 22 feet, giving a minimum clearance of 6 feet from the side of a 20-foot pavement to the planting.

On a 66-foot right-of-way (the standard highway) they should be not less than 16 feet, nor more than 25 feet, from the center line. Wider highways may be treated similarly, always reserving a belt or right-of-way for roadside planting which will not encroach upon other roadside utilities. Such a belt of roadside planting is far more to be desired than straight, parallel, rows of trees.



Natural clusters of trees break the monotony of evenly spaced planting.



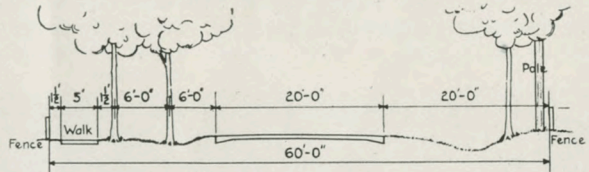
Comfort above and below: a concrete road beneath a canopy of leaves.

On the average roadway the pavement will probably never be increased to a width greater than 24 feet. In some locations, however, such as near large cities, the pavement may be widened to as much as 40 feet, or more if car lines are to be accommodated. Adjacent property may shortly be subdivided, and the planting that is done should be not less than 8 feet from the property line so as to allow for sidewalk construction.

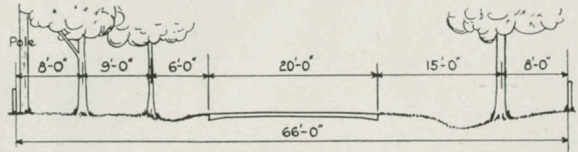
It is recognized that in many cases such future possibilities as these, together with the physical difficulties presented by topography, unusually narrow or wide rights-of-way, or special drainage requirements, may cause deviation from an adopted standard. In the main, however, the planting regulations will be followed, and the desired end will be accomplished.

When widening is to be done and trees already border the pavement an experienced forester should precede the construction operations directing the transplanting of such trees and shrubs as would otherwise be destroyed by the improvement. In this way trees of considerable size, which have taken some years to acquire their growth, may be preserved at low cost.

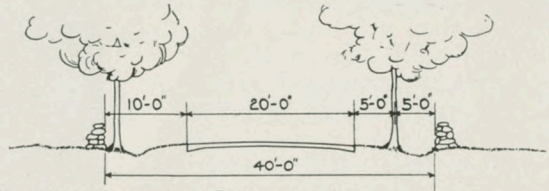
It has been characteristic of the American people to destroy much of this wonderful native growth along our highways with little thought of replacing it. Many a fine tree which has taken years to reach



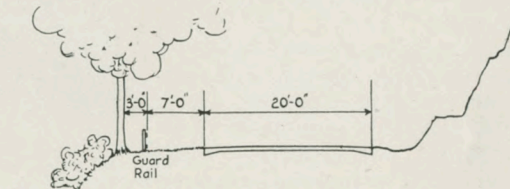
PLANTING ON 60 FT. RIGHT OF WAY.



PLANTING ON 66 FT. RIGHT OF WAY



PLANTING ON NARROW RIGHT OF WAY.



PLANTING ON HILLSIDE ROADS

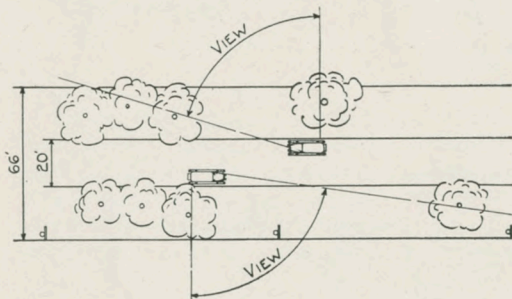
its magnificent height and graceful form has been laid low because it chanced to obstruct the highway surveyor's view or the contractor's plow. It is gratifying, therefore, to see evidence in many locations that our native trees are being preserved.

II. Spacing

Tree planting in exact parallel rows at regular intervals, with those on one side of the highway opposite or alternating with those on the other, will greatly improve the appearance of our highways and add much to the comfort of the traveler. However, mile upon mile of such planting, even though the species be varied frequently, will soon become monotonous.

It is far more desirable from the standpoint of beauty and comfort to achieve a natural effect in highway planting: spacing many of the trees at uneven intervals, avoiding soldierly rows, and making closely planted groups of three or more of a species. This arrangement will allow the individual specimens to reach their full size and typical shape, while the groups form mass effects not obtained by single trees regularly spaced.

For most species the intervals required to develop specimens will be at least 40 feet and in some cases as much as 60 or 75 feet. Such individuals will stand out in the future as typical of the species. There are no grander trees than those native to our country. And, either as specimens or in groups at the roadside, they have individual and natural beauty.



Informal planting of the naturalistic style affords views of surrounding country in an attractive frame of foliage.

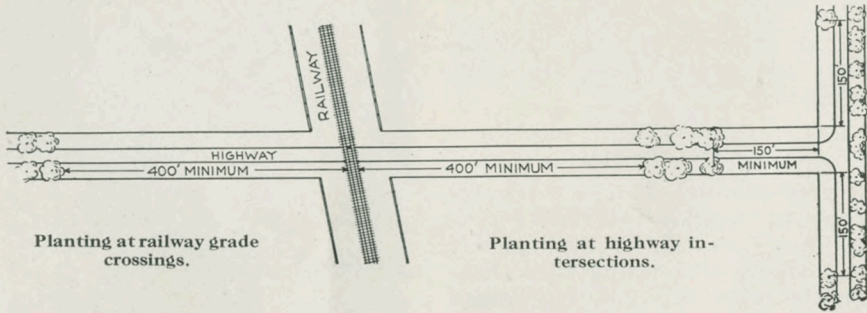


Trees must be far enough from the edge of the pavement to permit adequate drainage, and to allow future widening of the road if increased traffic makes it necessary.

In grouping trees the same species should be used, as a rule; that is, maples in a group, oaks in a group, etc. It is advisable to reproduce, so far as possible, the native growth of the district. If the road passes through an oak grove, carry the oak planting further into the open before planting another species.

III. Intersections, Curves and Railroad Crossings

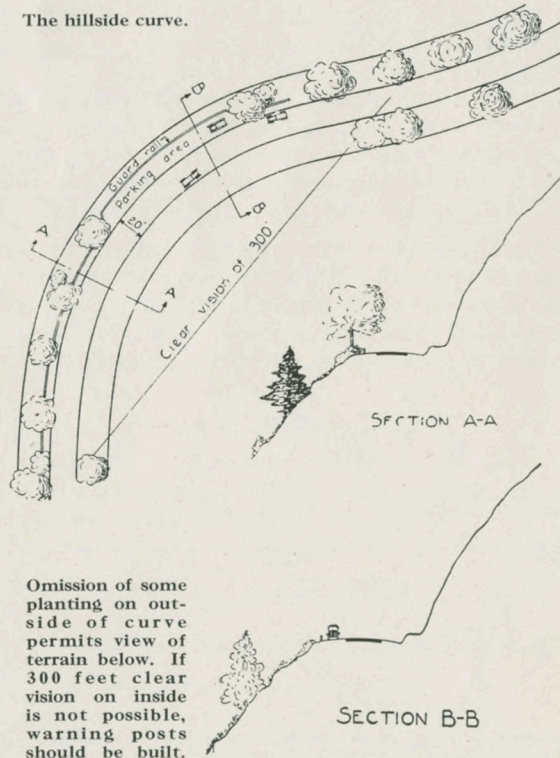
As a part of the location problem must be included the set-back of planting from road intersections, curves and railroad crossings.



While it may be safe to preserve some native trees in these locations, and make the situations safe by trimming any low branches which block clear vision of approaching traffic, it is safer not to plant any more trees in this area.

To leave the roadside treeless for 150 feet in each direction from an intersecting road may appear over-cautious, but certainly the loss of one life or even one serious accident due to imperfect vision because of such planting is not justified on the score of the slight added beauty gained. The same reasoning holds for omitting planting for 400 feet in each direction from a railroad grade crossing. Curves are a somewhat different problem, depending on the degree and length of curvature, but it is wise either to leave out planting on the inside of a curve, or at least to keep it judiciously thin.

The hillside curve.



IV. Telephone and Telegraph Poles and Wires

A right-of-way for these necessary service lines should be designated which will permit full growth of trees in their selected location. Poles should be placed as near the sides of the right-of-way as possible, preferably centering 3 feet or less from the property or fence line. This permits a fairly free space for the planting.

While existing trees have much to do with location of pole lines, it is well to adhere to a standard wherever practicable, both in clearing new rights-of-way and in planting those already in use.



Nothing shows more graphically the contrast between the barren highway and the tree-bordered road than these views of actual conditions.

Trees which have wide, spreading branches should be planted farther from the pole line than those with compact head, or of smaller habit, but never should they be less than 12 feet from a pole.

Generally, the wires should be 18 feet above all traveled portions of a road, cross-roads or entrance drives and be not lower than 10 feet from the ground outside the traveled area.

Underground location of wires will gradually come into use, but for the present, at least, the initial cost is such as to justify underground construction only in thickly populated sections.

V. Staking

The actual staking of tree and shrub locations should be done by a competent forester or landscape gardener, equipped with sufficient help and paraphernalia to make and record appropriate observations on the soil, the fertilizer needed and any necessary changes of grade. Stakes should be marked with designation of species of trees to be planted and notes on their exact location kept for the guidance of the planting crew.

Stakes should be placed within the limits prescribed as standard, with due regard to keeping the drainage ditches unobstructed, preserving



Oaks, such as these, bordering the even concrete add to the traveler's delight and comfort.

views, and safeguarding traffic. No stake should be placed nearer than 12 feet from telephone poles or closer to existing trees than the standards permit. When the existing tree is unhealthy, or short-lived, stakes should be so fixed that the new trees will thrive for a number of years before the undesirable tree is removed.

In placing stakes directly in front of buildings immediately adjacent to the highway, the consent of the owner should be obtained.

When the survey and staking are completed, the planting crew will be in possession of full information regarding the quantities of stock, size of holes to be made, amount of fertilizer needed, the number and kinds of tools, the number of men and the time required to complete the work.

VI. Planting Instructions

Select stock which is healthy, well shaped and bushy rooted.

Dig hole somewhat larger than actual spread of roots.

Have earth soft and mellow at sides and bottom of hole.

Trim back to the strong, healthy part any roots which have been broken or bruised, with a clean, slanting cut facing down.

Trim top back, proportionately or more, to the loss of root system, doing all cutting on side branches only, not the top.

No roots should be bent, or twisted into a hole. Make hole amply large, a good rule being to leave six inches open hole beyond ends of all roots.

Use only well-rotted manure or good commercial fertilizer, and place in bottom or sides of hole, not letting it come in direct contact with roots.

Set tree slightly higher than it has been growing in nursery. It will settle slightly. It is important that it be not set too deep.

Place fine earth, preferably top or black dirt, next to the roots; spade under, and rock tree or shrub back and forth slightly, or shake up and down. This causes the pulverized earth to settle in close contact with fine roots.

When roots are all covered, tamp or pack with heel until earth is compact and there are no air pockets in contact with roots.

Water copiously.

Cover to ground level with more fine earth. Leave this earth cover loose to prevent loss of moisture by capillary attraction.

Cultivate area every few weeks during the first season and do not allow weeds to grow.

A proper planting of healthy stock assures higher resistance to future attacks by pests or drought.



Years ago some far-sighted man planted these elms.

VII.

Care After Planting

Trim for only four purposes:

1. To take out dead wood,
2. For safety to traffic,
3. To give way for wires, and
4. To obtain views.



Roadsides in the Gulf states and California have their distinctive plantings of palms or pepper trees.

For the sake of beauty it is better to leave trees untrimmed; let them take their natural shape, and not "head" them or "trim them up" as many inexperienced tree trimmers want to do. A good rule is to trim out only dead or unhealthy branches.

Low branches that hinder clear vision of all traffic should be removed, usually to a height of 10 feet above the road. Trim carefully to give wires an unobstructed right-of-way. Branches should not interfere with the wires in a windstorm.

In trimming, the cut should be made flush with the parent branch or trunk, leaving no stub. This assures the quickest possible healing and the least opportunity for rot or infection. A cut should be made on the under side of the branch first to prevent stripping bark from the parent branch. Paint cut with good tree paint or creosote stain.

Unless there is a well-organized department for planting and



caring for trees and shrubs, it is well to have both planting and maintenance work done by a reputable nursery, under contract, guaranteeing replacement of defective stock, or of failures within one year or other suitable period.

Nature herself framed this view across the valley to the blue hills in the distance.

VIII. Plant Materials

In selecting trees and shrubs for a given location, a survey of the existing native growth will indicate the species to plant, and the other kinds that can be used. Soil conditions are important and should be carefully studied. A list of suggested material for roadside planting is to be found in this booklet beginning on this page. In this list the scientific names are given as well as the common names, and key letters are included which refer to the regions, outlined on the accompanying United States map, in which the species will grow.

Boundaries of these regions or zones are approximate only and must not be considered as sharp limits of territory in which a given species may thrive. Such divisions can be made only in a general way.

Not all available trees are listed, by any means; many of the soft-wooded species, quick-growing and liable to produce dead wood rapidly are omitted in the interest of more lasting and satisfactory planting.

LIST OF TREES AND SHRUBS FOR HIGHWAY PLANTING

Shade Trees			Small Trees—Continued		
Region	Common Name	Scientific Name	Region	Common Name	Scientific Name
NMP	Alder	<i>Alnus glutinosa</i>	CS	Red Bud	<i>Cercis canadensis</i>
NMCP	White Ash	<i>Fraxinus americana</i>	NCP	Thorn Apple	<i>Crataegus crus galli</i>
C	Ohio Buckeye	<i>Aesculus glabra</i>	NC	Scarlet Thorn	<i>Crataegus coccinea</i>
NCP	Horse Chestnut	<i>Aesculus hippocastanum</i>	M	Colorado Hawthorn	<i>Crataegus coloradensis</i>
S	Camphor Tree	<i>Cinnamomum camphora</i>			
NCS	Catalpa	<i>Catalpa speciosa</i>			
S	China Tree	<i>Melia azedarach</i>			
S	Southern Cypress	<i>Cupressus macrocarpa</i>			
NMCS	American Elm	<i>Ulmus americana</i>	NMCP	Paper or Canoe Birch	<i>Betula papyrifera</i>
NCS	Ginkgo	<i>Ginkgo biloba</i>	CS	River Birch	<i>Betula nigra</i>
CS	Sweet Gum	<i>Liquidambar styraciflua</i>	NMCP	White Birch	<i>Betula alba</i>
NMCP	Hackberry	<i>Celtis occidentalis</i>	NCS	Golden Willow	<i>Salix vitellina aurea</i>
NCP	Linden or Basswood	<i>Tilia americana</i>	NC	Pussy Willow	<i>Salix caprea</i>
P	Madrona	<i>Arbutus procera</i>	NCS	Weeping Willow	<i>Salix babylonica</i>
S	Magnolia	<i>Magnolia grandiflora</i>	NMCP	White Willow	<i>Salix alba</i>
CS	Magnolia	<i>Magnolia acuminata</i>			
NMCP	Norway Maple	<i>Acer platanoides</i>			
NC	Red Maple	<i>Acer rubrum</i>			
NMC	Sugar Maple	<i>Acer saccharum</i>			
NC	Bur Oak	<i>Quercus macrocarpa</i>	CS	Beech	<i>Fagus americana</i>
CS	Laurel Oak	<i>Quercus laurifolia</i>	NMC	Black Walnut	<i>Juglans nigra</i>
S	Live Oak	<i>Quercus virginiana</i>	NC	Butternut	<i>Juglans cinerea</i>
NMCP	Pin Oak	<i>Quercus palustris</i>	CPS	English Walnut	<i>Juglans regia</i>
NMCP	Red Oak	<i>Quercus rubra</i>	NC	Hickory	<i>Hicoria ovata</i>
NC	Scarlet Oak	<i>Quercus coccinea</i>			
NCS	Swamp White Oak	<i>Quercus platanooides</i>			
CS	Water Oak	<i>Quercus nigra</i>			
NCS	White Oak	<i>Quercus alba</i>			
S	Desert Palm	<i>Washingtonia filamentosa</i>	NMC	Arbor Vitae	<i>Thuja occidentalis</i>
S	Royal Palm	<i>Roystonea regia</i>	NMCP	Fir or White Spruce	<i>Abies concolor</i>
S	Sabal Palm	<i>Sabal palmetto</i>	NMCP	Balsam Fir	<i>Abies balsamea</i>
CS	Pecan	<i>Hicoria pecan</i>	MP	Douglas Fir	<i>Tsuga douglassi</i>
CS	Pepperidge	<i>Nyssa sylvatica</i>	M	Colorado Silver Cedar	<i>Juniperus scopulorum</i>
S	Poinciana	<i>Poinciana regia</i>	NCP	Hemlock	<i>Tsuga canadensis</i>
CS	Oriental Plane	<i>Platanus orientalis</i>	S	Australian Pine	<i>Pinus australis</i>
NCS	Sycamore	<i>Platanus occidentalis</i>	NC	Austrian Pine	<i>Pinus austriaca</i>
CS	Sassafras	<i>Sassafras officinalis</i>	S	Eucalyptus	<i>Eucalyptus ficifolia</i>
S	Soapberry	<i>Sapindus drummondi</i>	CS	Georgia Pine	<i>Pinus palustris</i>
CS	Tulip Tree	<i>Liriodendron tulipifera</i>	NMC	Rocky Mt. Pine	<i>Pinus ponderosa</i>
			NC	Scotch Pine	<i>Pinus sylvestris</i>
			NMC	White Pine	<i>Pinus strobus</i>
			NMC	Colorado Blue Spruce	<i>Picea pungens</i>
NC	Crabapple	<i>Malus coronarius</i>	NC	White Spruce	<i>Picea canadensis</i>
CSP	Flowering Dogwood	<i>Cornus florida</i>	NCP	Larch	<i>Larix americana</i>
NCP	Mountain Ash	<i>Sorbus americana</i>	NMCP	Yew	<i>Taxus canadensis</i>
NMCP	Wild Plum	<i>Prunus americana</i>	NMP		

Small Trees

NC	Crabapple	<i>Malus coronarius</i>
CSP	Flowering Dogwood	<i>Cornus florida</i>
NCP	Mountain Ash	<i>Sorbus americana</i>
NMCP	Wild Plum	<i>Prunus americana</i>

Trees At Streams

NMCP	Paper or Canoe Birch	<i>Betula papyrifera</i>
CS	River Birch	<i>Betula nigra</i>
NMCP	White Birch	<i>Betula alba</i>
NCS	Golden Willow	<i>Salix vitellina aurea</i>
NC	Pussy Willow	<i>Salix caprea</i>
NCS	Weeping Willow	<i>Salix babylonica</i>
NMCP	White Willow	<i>Salix alba</i>

Nut Trees

CS	Beech	<i>Fagus americana</i>
NMC	Black Walnut	<i>Juglans nigra</i>
NC	Butternut	<i>Juglans cinerea</i>
CPS	English Walnut	<i>Juglans regia</i>
NC	Hickory	<i>Hicoria ovata</i>

Evergreens

NMC	Arbor Vitae	<i>Thuja occidentalis</i>
NMCP	Fir or White Spruce	<i>Abies concolor</i>
NMCP	Balsam Fir	<i>Abies balsamea</i>
MP	Douglas Fir	<i>Tsuga douglassi</i>
M	Colorado Silver Cedar	<i>Juniperus scopulorum</i>
NCP	Hemlock	<i>Tsuga canadensis</i>
S	Australian Pine	<i>Pinus australis</i>
NC	Austrian Pine	<i>Pinus austriaca</i>
S	Eucalyptus	<i>Eucalyptus ficifolia</i>
CS	Georgia Pine	<i>Pinus palustris</i>
NMC	Rocky Mt. Pine	<i>Pinus ponderosa</i>
NC	Scotch Pine	<i>Pinus sylvestris</i>
NMC	White Pine	<i>Pinus strobus</i>
NMC	Colorado Blue Spruce	<i>Picea pungens</i>
NCP	White Spruce	<i>Picea canadensis</i>
NMCP	Larch	<i>Larix americana</i>
NMP	Yew	<i>Taxus canadensis</i>

Shrubs

Region	Common Name	Scientific Name
CS	Flowering Almond	Prunus japonica
NMCP	Aralia	Aralia pentaphylla
NMCS	Arrowwood	Viburnum dentatum
CS	Azalea	Azalea amoena
NMCP	Japanese Barberry	Berberis thunbergi
CS	Button Bush	Cephalanthus occidentalis
MPS	Broom	Aphyllon ludovicianum
CS	Cinquefoil	Potentilla fruticosa
NC	Alpine Currant	Ribes alpinum
NCS	Dewberry	Lucretia
NMCP	Grey-branched Dog-wood	Cornus paniculata
NMCP	Red-branched Dog-wood	Cornus stolonifera
NMCP	Elder	Sambucus canadensis
NMC	Hazelnut	Corylus americana
S	Hibiscus	Hibiscus grandiflorus
NMCP	Bush Honeysuckle	Lonicera tartarica
NMCP	Indian Currant	Symphoricarpos vulgaris
CS	Kerria	Kerria japonica
NP	Kinnikinnick	Arctostaphylos uva-ursi
NMCP	Lilac	Syringa vulgaris
S	Oleander	Oleander
NMCP	Ibota Privet	Ligustrum ibota
CMS	Flowering Quince	Cydonia japonica
NCS	Sweet Briar	Rosa rubiginosa
NMCP	Meadow Rose	Rosa blanda
NMCP	Memorial Rose	Rosa wichuraiana
NCS	Swamp Rose	Rosa carolina
NCS	Wild Rose	Rosa setigera
P	Salal	Gaultheria shallon
NMCS	Sheepberry	Viburnum lentago
NMCP	Snowberry	Symphoricarpos racemosus
NMCP	Spirea	Spiraea van houttei
NMCP	Sumac	Rhus typhina

Shrubs—Continued

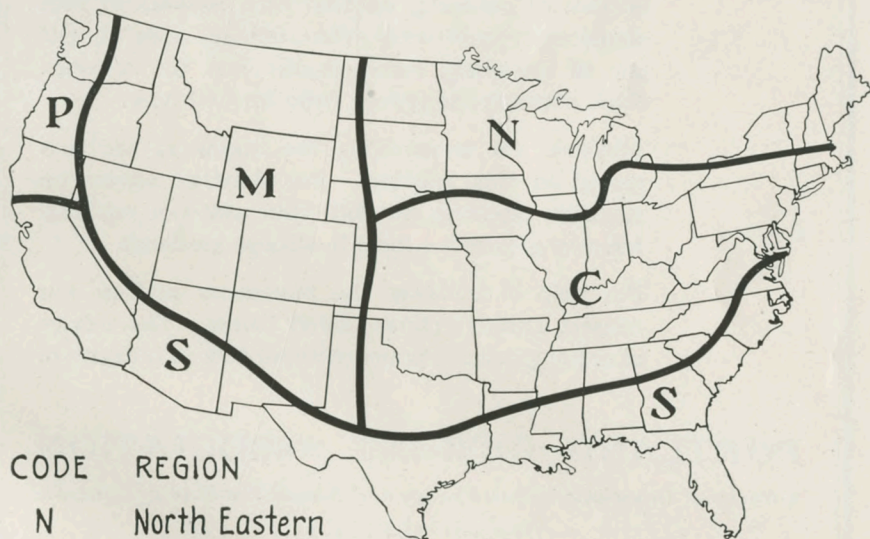
Region	Common Name	Scientific Name
NCS	Fragrant Sumac	Rhus aromatica
NMCP	Syringa	Philadelphus coronarius

Evergreen Shrubs

Region	Common Name	Scientific Name
CSP	Holly	Ilex opaca
CS	Mountain Laurel	Kalmia latifolia
CSP	Mahonia	Mahonia aquifolia
CSP	Rhododendron	Rhododendron maximum

Vines

Region	Common Name	Scientific Name
CMS	Bittersweet	Celastrus scandens
NMCP	Clematis	Clematis virginiana
CMS	Euonymus	Euonymus radicans
NMCS	Wild Grape	Vitis aestivalis
NMCS	Honeysuckle	Lonicera halleana
CS	Boston Ivy	Ampelopsis veitchi
CMS	English Ivy	Hedera helix
NCS	Matrimony Vine	Lycium barbarum
NMCS	Mooneeed	Menispermum canadense
NCS	Myrtle	Vine minor
NMCS	Trailing Rose	Rosa wichuraiana Dorothy Perkins
		Rosa wichuraiana Evergreen Gem
		Rosa wichuraiana Farquhar
		Rosa wichuraiana Gardenia
		Rosa wichuraiana Hiawatha
		Rosa wichuraiana South Orange Perfection
		Rosa wichuraiana Excelsa



CODE	REGION
N	North Eastern
C	Central Eastern
M	Mountain
P	Northern Pacific Coast
S	Southern and South Pacific Coast

First— The Pavement

THE motorist wants to get over the ground. He wants distance without nerve-wracking, car-wrecking jolts. Speed with comfort, a perfect road with attractive surroundings is the ideal.

But first the automobilist wants a pavement on which he can cover the distance. He wants an even, durable surface that is always the same, regardless of season or weather. That surface is assured when the road is concrete-paved.

After that, the motorist wants refreshing shade and appealing scenery. Trees and shrubs planted along the highway enhance the natural beauty of the country bordering the road. The clean, white surface of concrete, mottled with patches of cool shade and lined with green foliage, adds to the joy of motoring, increases the lure of the open road, attracts the tourist from far and near.

Methods for beautifying the highways are suggested in this booklet. For detailed advice on roadside planting, consult your state or national forestry service, or local landscape gardener.

For help in building the pavement, address our nearest District Office, listed below. The advice of our engineers is yours, without cost or obligation.

PORTLAND CEMENT ASSOCIATION

A National Organization to Improve and Extend the Uses of Concrete

District Offices at

Atlanta
Birmingham
Boston
Chicago
Dallas
Denver

Des Moines
Detroit
Helena
Indianapolis
Jacksonville

Kansas City
Los Angeles
Memphis
Milwaukee
Minneapolis
New Orleans

New York
Parkersburg
Philadelphia
Pittsburgh
Portland, Oreg.

Salt Lake City
San Francisco
Seattle
St. Louis
Vancouver, B. C.
Washington, D. C.