COORDINATING
EXECUTIVE COMMITTEE

REPORT OF ACTIVITIES DURING 1941

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REPORT ON SURVEY OF ROADSIDE DEVELOPMENT PRACTICES

Summary of replies received up to February 15, 1941

FEBRUARY 15

The Executive Committee on Roadside Development distributed outlines for a survey to determine the effect of topography and soils on cross-section design, plant growth, and landscape practices in all regions of the country. State highway department representatives filled in the outlines and returned them through the District Coordinators. This report with chart tabulations of data is presented in three parts:

PART I - TYPICAL HIGHWAY CROSS-SECTION DESIGN
PART II - EROSION AND PLANT MATERIALS
PART III - RIGHT-OF-WAY AND ROADSIDE CONTROL

To simplify the summary the Administrative Districts have been grouped into three general climatic regions: cool humid, warm humid, and dry. The dry region has an annual rainfall of less than 20 inches, whereas the humid regions have an annual rainfall of over 20 inches.

The three influential factors, climate, topography, and soil affect both cross-section design and plant growth. When the entire country is considered as a whole, the influence of climate on cross-section design is relatively small, although it is the dominant factor in plant growth. Topography, on the other hand, influences the design of cross section much more than do soil and climate. Soil has a more decided effect on plant growth than on design.

PART I - CROSS-SECTION DESIGN

In studying the tabulation on sheet 1 of the chart, it is noted that topography has little or no effect on width of surfacing. Surface widths for two lanes vary from 20 to 24 feet with 22 feet dominating when the entire country is considered. Apparently, climate, topography, and soils have little, if any, effect on the surface widths.

When data on other features of the cross section are studied, however, topography is generally the controlling factor. For instance, in rough topography shoulder widths tend to become narrower than in moderate topography. There is also a tendency toward a narrower V-type gutter. Slope ratios from edge of shoulder to gutter tend to steepen. Cut and fill slopes are higher and steeper. An interesting point is brought out, which is not manifest in the charts, that although topography viewed broadly greatly influences design, the individual States are inclined to design a cross section for the type of

topography which dominates the State, and that when topographical changes occur within the State, the design of the section generally is not changed to fit them.

The effect of soil and climate on design cannot be readily seen from a study of the chart and seems to be more or less local in extent. For instance, clay slopes are often steeper than sand for the same height of slope. In regions where snow is a serious problem, the cross section is often designed to keep the roadway as clear of snow as possible and to provide space for snow removed from the traveled way. Gutters often are widened in regions of heavy "cloudburst" summer showers, to obtain the necessary capacity to carry the resulting heavy run-off.

PART II - EROSION AND PLANT MATERIALS

As stated before, climate in the form of abundant rainfall with accompanying relative humidity, is the dominant factor in plant growth. Thus, vegetation is much more easily established in the humid regions. In the dry region, the annual rainfall is not only generally insufficient to provide good plant growth, but much of the precipitation comes as heavy summer showers in which most of the rain runs off and causes heavy erosion instead of soaking into the soil to benefit plant growth.

Topography affects plant growth in that rough topography results in steep slopes where vegetation is more difficult to establish, whereas in easy topography slopes are relatively flat and vegetation is easily established (with sufficient rainfall).

Soils affect plant growth principally by their physical character. Sandy soils are pervious and encourage plant growth, whereas clayey soils are impervious and discourage plant growth.

A study of the charts brings out the fact that low-cost ground cover is used generally in easy topography with flat slopes. As topography becomes rougher and slopes steeper, more costly methods of establishing vegetation are used. Instead of low-cost seeding, mulching and mulch sodding, high-cost strip sodding, and solid sodding, vine and shrub planting are generally resorted to with modifications.

Machine methods for preparing ground can be used on the flatter slopes generally encountered in easy topography compared to costly hand labor methods largely used on steep slopes.

Fertilizers vary widely. Generally inorganic fertilizers are used much more in the humid regions than in the dry region, but formulas have no particular relation to region. In general, fertilizers are of low concentration and have a relatively low nitrogen content. Organic fertilizers generally in the form of manure are used mostly in the dry region, possibly because it is

more available there and because the organic matter in manure undoubtedly is desired to conserve moisture. Also the soils generally are probably richer in plant food making inorganic fertilizing less necessary.

Seed formulas vary considerably even in the same region where growing conditions are similar. In general, the bluegrasses, fescues, timothy, orchard grass, and redtop are commonly used in the cool humid region with the addition of bents in the Pacific northwest area. In the dry region, the wheatgrasses, gramas, and bromes are most common; while in the warm humid region Bermuda, carpet grass, and the Lespedezas are commonly used. In the transition zones between humid and dry, and between cool and warm humid regions, seeds common to the regions on both sides of the zones are noted as being used.

Vine and shrub ground cover plants are generally confined to the cool humid region, the northern part of the warm humid region, and in the dry region to areas having the most favorable climates. See charts for more detail.

PART III - RIGHT-OF-WAY AND ROADSIDE CONTROL

Most States control right-of-way in fee simple, some by easement, and few by both methods.

Generally most of the roadside development factors of (a) erosion control, (b) public utilities, (c) wayside parks, and (d) tree planting, were reported as being considered in acquiring right-of-way.

In control of the roadside, building set-back lines exist in only a few States; billboard legislation is reported generally; roadside zoning, where practiced, is generally by county; limited access control is reported by only a very few States.

Detailed examination of the self-explanatory data tabulated in the accompanying charts is suggested, particularly for comparison by regions.

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Climate is the most important factor influencing plant growth.

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SHEET I

Summary of Roadside Practices by Coordinating Committee on Roadside Improvement

Tabulated by Climatic Regions and Administrative Districts

Part I — Typical Highway Cross Section Design	Dry West				Cool Humid Region					Warm Humid Region		
	1	2	3	12	4	5	7	9	10	6	8	14
1. Roadbed												
2. Width of Surfacing — Smooth	20'-24'	22'	20'-24'	22'-26'	22'-24'	20'		20'-22'	22'-24'	22'	20'-22'	22'
Moderate	20'-24'	22'	20'-24'	22'-26'	22'-24'	20'		20'-22'	22'-24'	22'	20'-22'	22'
Rough	20'-24'	22'	20'-24'	22'-26'	22'-24'	20'		20'-22'	22'	22'	20'-22'	20'
3. Width of Shoulder — Smooth	3'-10'	7', 8'	3', 4'	2'-10'	5', 7', 6'	5'-10'		5'-10'	5'-10'	5'-10'	6'-10'	10', 5', 6'
Moderate	3'-10'	7', 8'	3', 4'	2'-10'	5', 7', 6'	5'-10'		5'-10'	5'-10'	5'-9'	6'-10'	10', 5', 6'
Rough	3'-8'	5', 7'	3'	2'-10'	5', 7', 6'	5'-10'		5'-10'	5'-10'	5'-8'	6'-10'	10', 5', 6'
4. Pitch of Shoulder — Smooth	1/4"	1/2"	1/2"	1/2"	1/2"	1/2"		1/2", 1"	1/2", 3/4"	1/2", 3/4"	1/2"	1/2", 3/4", 1"
Moderate	1/4"	1/2"	1/2"	1/2"	1/2"	1/2"		1/2", 1"	1/2", 3/4"	1/2", 3/4"	1/2"	1/2", 3/4", 1"
Rough	1/4"	1/2"	1/2"	1/2"	1/2"	1/2"		1/2", 1"	1/2", 3/4"	1/2", 3/4"	1/2"	1/2", 3/4", 1"
Maximum Pitch on Curves	1/2"-1"	1 1/2"	1 1/4"	1"	1"	1"-1 1/4"		1"	1/2" to 1"	Continuous	1/2", 1"	1/2", 3/4", 1"
5. Type of Drainage Channel (V = V Type, F = Flat Bottom, R = Rounded) — Smooth	V, F	V, F	F, R	F, R	R	F, R		F, R	F, R	V, R	V, F, R	V, F
Moderate	V, F	V	F	V, R	R	F, R		F, R	F, R	V, R	V, F, R	V, F
Rough	V	V	V	V, R	R	F, R		F, R	F, R	V, R	V, F, R	V, F
6. Slope Ratio from Shoulder Edge to Drainage Channel — Smooth	6:1, 4:1	6:1, 3:1	6:1	4:1, 6:1	5:1	4:1		4:1	1 1/2:1, 3:1	5:1, 10:1	4:1, 10:1	3:1, 5:1
Moderate	4:1	4:1, 3:1	6:1	4:1	4:1	4:1		4:1	1 1/2:1, 3:1	6:1, 10:1	4:1, 10:1	2:1, 4:1, 5:1
Rough	—	3:1, 1 1/2:1	6:1	4:1	4:1	4:1		4:1	1 1/2:1, 3:1	4:1, 5:1	4:1, 10:1	3:1, 2:1
7. Gutter Surface Treatment — Smooth	Grass	All tops Masonry, Oil	All tops Masonry, Oil	Oil mulch on heavy grades	All tops Masonry, Sod	All tops Seeding, Masonry, Sod		All tops Masonry, Sod	All tops Masonry, Sod	All tops Masonry, Sod	All tops Masonry, Sod	All tops Masonry, Sod
Moderate	Grass											
Rough	Oil											
8. Cut Slope Sections — Low (5'-10') I — Smooth	(All tops 1 1/2:1, 2:1, 4:1)	2:1, 4:1	3:1	3:1	6:1, 4:1	4:1		2:1, 4:1	3:1	3:1, 6:1	4:1	3:1
Moderate		1 1/2:1, 4:1	3:1	3:1	6:1, 4:1	4:1		2:1, 4:1	3:1	3:1, 6:1	4:1	3:1
Rough		1 1/2:1, 4:1	3:1	3:1	6:1, 4:1	4:1		2:1, 4:1	3:1	3:1, 6:1	4:1	3:1
Intermediate (10'-20') II, III — Smooth	1:1, 2:1	1:1, 4:1	3:1	2:1	4:1	3:1		2:1	2:1, 4:1	3:1, 4:1	2:1, 4:1	2:1
Moderate	1:1, 2:1	1:1, 4:1	3:1	2:1	4:1	3:1		2:1	2:1, 3:1	3:1, 4:1	2:1, 4:1	2:1
Rough	1:1, 2:1	1:1, 4:1	3:1	2:1	4:1	3:1		2:1	2:1	3:1, 4:1	2:1, 4:1	2:1
High 20'+ III, IV, V — Smooth	1:1, 1 1/2:1	1:1, 3:1	1 1/2:1	1:1	3:1	2:1		1 1/2:1, 2:1	1 1/2:1, 2:1	2:1	2:1	1:1, 1 1/2:1
Moderate	1:1, 1 1/2:1	1:1, 1 1/2:1	1 1/2:1	1:1	3:1	2:1		1 1/2:1, 2:1	1 1/2:1, 2:1	2:1	2:1	1:1, 1 1/2:1
Rough	1:1, 1 1/2:1	1:1, 1 1/2:1	1:1, 1 1/2:1	1:1	3:1	2:1		1 1/2:1, 2:1	1 1/2:1, 2:1	2:1	1:1, 2:1	1:1, 1 1/2:1
9. Fill Slope Sections — Low (5'-10') I — Smooth	4:1	6:1	6:1	4:1	6:1, 4:1	4:1		4:1	4:1, 3:1	4:1, 10:1	4:1	1 1/2:1
Moderate	4:1	6:1	6:1	4:1	6:1, 4:1	4:1		4:1	4:1, 3:1	4:1, 10:1	4:1	1 1/2:1
Rough	4:1	6:1	6:1	4:1	6:1, 4:1	4:1		4:1	4:1, 3:1	4:1, 10:1	4:1	1 1/2:1
Intermediate (10'-20') II, III — Smooth	1 1/2:1, 1 1/2:1	1 1/2:1, 3:1	[illegible]	1 1/2:1	4:1	3:1		2:1	2:1	3:1, 6:1	3:1	1 1/2:1
Moderate	1 1/2:1, 1 1/2:1	1 1/2:1, 3:1	[illegible]	1 1/2:1	4:1	3:1		2:1	2:1	3:1, 6:1	3:1	1 1/2:1
Rough	1 1/2:1, 1 1/2:1	1 1/2:1, 3:1	[illegible]	1 1/2:1	4:1	3:1		2:1	2:1	3:1, 6:1	3:1	1 1/2:1
Rough 20'+ III, IV, V — Smooth	1:1, 1 1/2:1	1 1/2:1	1 1/2:1, 2:1	1 1/2:1	2:1	2:1		2:1	2:1	2:1	2:1	1 1/2:1
Moderate	1:1, 1 1/2:1	1 1/2:1	1 1/2:1, 2:1	1 1/2:1	2:1	2:1		2:1	2:1	2:1	2:1	1 1/2:1
Rough	1:1, 1 1/2:1	1 1/2:1	1 1/2:1, 2:1	1 1/2:1	2:1	2:1		2:1	2:1	2:1	2:1	1 1/2:1
10. Rounding Top of Cuts * (See note in right hand margin) (x = Distance between top and toe of slope) — Smooth	x/3	5'-10'	10'	x/3	4'-10'	10', x/4		Not determined*	10'	"Plans require rounding"	x/3	4', x/4, x/3
Moderate	x/3	5'-10'	10'	x/3	4'-10'	10', x/4			10'		x/3	4', x/4, x/3
Rough	x/3	5'-10'	10'	x/3	4'-10'	10', x/4			10'		x/3	4', x/4, x/3
11. Rounding Toe of Fills (x = Distance between top and toe of slope) — Smooth	x/3	none	x/3, x/2	none	4'-10'	Not determined		10, 3, 0	0	"Plans require rounding"	x/3, 0	0
Moderate	x/3	none	x/3, x/2	none	4'-10'			10, 3, 0	0		x/3, 0	0
Rough	x/3	none	x/3, x/2	none	4'-10'			10, 3, 0	0		x/3, 0	0
Are Tops of Fills Rounded?	no	no	no	no	yes	no, yes		yes	yes	no	yes	no
Are Toes of Cuts Rounded?	no	no	no	no	yes	yes		no	yes	no	no	no
Are Slope Transitions Used?	yes	yes	no	yes	yes	yes		yes	yes	yes	yes	yes

Recapitulation	Dry West 1st	Dry West 2nd	Cool Humid 1st	Cool Humid 2nd	Warm Humid 1st	Warm Humid 2nd	Entire Country 1st	Entire Country 2nd
2. Width of Surfacing — Smooth	20', 22' and 24' about equally important.		22'	20'	22'	20'	22'	20'
Moderate			22'	20'	22'	20'	22'	20'
Rough			22'	20'	22'	20'	22'	20'
3. Width of Shoulder — Smooth	10'	3'	5'-10'	7', 6'	10'	6'	10'	5'
Moderate	10'	3'	5'-10'	7', 6'	10'	6'	10'	5'
Rough	3'		5'-10'	7', 6'	10'	6'	5'-10'	6'
4. Pitch of Shoulder — Smooth	1/2"	1/4"	1/2"	1"	1/2"	1"	1/2"	1"
Moderate	1/2"	1/4"	1/2"	1"	1/2"	1"	1/2"	1"
Rough	1/2"	1/4"	1/2"	1"	1/2"	1"	1/2"	1"
Maximum Pitch on Curves	1"		1"		1"	1/2"	1"	1/2"
5. Type of Drainage Channel — Smooth	F	V, R	R	F	V	F, R	F	R
Moderate	V	F	R	F	V	F, R	F, R	V
Rough	V	R	R	F	V	F, R	F, V	R
6. Slope Ratio from Shoulder Edge to Drainage Channel — Smooth	6:1	4:1	4:1	un-determined	5:1	3:1	4:1	6:1
Moderate	4:1	3:1, 6:1	4:1		4:1	10:1	4:1	6:1, 3:1
Rough	undetermined		4:1		4:1	—	4:1	3:1
7. Gutter Surface Treatment — Smooth	Oil	Masonry	Masonry	Sod	Masonry	Sod	Masonry	Sod
Moderate	Oil	Masonry	Masonry	Sod	Masonry	Sod	Masonry	Sod
Rough	Oil	Masonry	Masonry	Sod	Masonry	Sod	Masonry	Sod
8. Cut Slope — Low — Smooth	3:1	4:1, 2:1	4:1	6:1, 2:1	3:1	6:1, 4:1	4:1	3:1
Moderate	3:1, 1 1/2:1	4:1	4:1	6:1, 2:1	3:1	6:1, 4:1	4:1	3:1
Rough	3:1	4:1	4:1	6:1, 2:1	3:1	6:1, 4:1	4:1	3:1
Intermediate — Smooth	1:1	un-determined	2:1	un-determined	2:1, 4:1	3:1	4:1, 2:1	3:1
Moderate	1:1, 2:1		2:1		2:1, 4:1	3:1	2:1	3:1
Rough	1:1, 2:1		2:1		2:1, 4:1	3:1	2:1	3:1, 4:1
High — Smooth	1:1, 1 1/2:1	1 1/2:1	2:1	1 1/2:1	2:1	1:1, 1 1/2:1	1 1/2:1, 2:1	3:1
Moderate	1:1, 1 1/2:1	—	2:1	1 1/2:1	2:1	1:1, 1 1/2:1	1 1/2:1	2:1
Rough	1:1	1 1/2:1	2:1	1 1/2:1	2:1	1:1, 1 1/2:1	1:1, 1 1/2:1	2:1
9. Fill Slope — Low — Smooth	4:1, 6:1	un-determined	4:1	3:1, 6:1	4:1	1 1/2:1	4:1	3:1
Moderate	4:1, 6:1		4:1	3:1, 6:1	4:1	1 1/2:1	4:1	3:1
Rough	4:1, 6:1		4:1	3:1, 6:1	4:1	1 1/2:1	4:1	3:1
Intermediate — Smooth	1 1/2:1	un determined	2:1	3:1, 4:1	3:1	1 1/2:1	1 1/2:1, 3:1	2:1, 4:1
Moderate	1 1/2:1		2:1	3:1, 4:1	3:1	1 1/2:1	1 1/2:1, 3:1	2:1, 4:1
Rough	1 1/2:1		2:1	3:1, 4:1	3:1	1 1/2:1	1 1/2:1, 3:1	2:1, 4:1
Rough 20'+ — Smooth	1 1/2:1	1:1, 2:1	2:1	un-determined	2:1	1 1/2:1	2:1	1 1/2:1
Moderate	1 1/2:1	1:1, 2:1	2:1		2:1	1 1/2:1	2:1	1 1/2:1
Rough	1 1/2:1	1:1, 2:1	2:1		2:1	1 1/2:1	2:1	1 1/2:1
10. Rounding Top of Cuts — Smooth	x/3	10'	10'	un-determined	x/3	un-determined	10'	x/3'
Moderate	x/3	10'	10'		x/3		10'	x/3'
Rough	x/3	10'	10'		x/3		10'	x/3'
11. Rounding Toe of Fills — Smooth	x/3	0	10'	0	0	x/3	0	x/3
Moderate	x/3	0	10'	0	0	x/3	0	x/3
Rough	x/3	0	10'	0	0	x/3	0	x/3
Are Tops of Fills Rounded?	no	no 2nd	yes	no	no	yes	no	yes
Are Toes of Cuts Rounded?	no	no 2nd	yes	no	no	—	no	yes
Are Slope Transitions Used?	yes	no	yes	—	yes	—	yes	no

Note:

Tabulations by Districts represent a general average of State practices indicated by the survey data for each group of States within their respective Districts. That is, they indicate practices most frequently noted, but not necessarily most extensively used.

In the recapitulation, practices most frequently noted for each climatic region and also for the entire country are tabulated in columns marked "1st" and those next in frequency are tabulated under "2nd".

Occasionally no one practice stands out, in which case they are indicated as "undetermined" or left blank. Quite often two practices rate about equal and in such cases both are tabulated in the same column.

* Nebraska notes: "Believe slope rounding requirements should waive standardization if flatter slopes can be obtained within limits of work or right-of-way."

Since Part I deals with the cross section and since the greater part of District I may be considered as lying within the Dry Region, it has been classed with that region for Part I. However, since Part II deals with erosion and plant materials, it is assumed that most of this type of work takes place in areas where the rainfall is sufficient that these areas may be included in the Cool Humid Region. District I, therefor has been placed with the Cool Humid group for Parts II and III.

In a few instances data have been noted which are obviously incorrect and have, therefor, not been considered in the tabulation. An outstanding case is where one State reported seeding 6" deep. Some data may have been tabulated which are incorrect. It is hoped that such instances will be noticed and reported by the Coordinators so that they may be corrected before a final report is prepared.

SHEET 2

SUMMARY OF ROADSIDE PRACTICES BY COORDINATING COMMITTEE ON ROADSIDE DEVELOPMENT
TABULATED BY CLIMATIC REGIONS

PART II EROSION AND PLANT MATERIALS	DRY WESTERN REGIONS	COOL HUMID REGION	WARM HUMID REGION	SUMMARY — ALL REGIONS ENTIRE UNITED STATES
	DISTRICTS 2, 3 AND 12	DISTRICTS 1, 4, 5, 7, 9, 10	DISTRICTS 6, 8, AND 14	
13. CRITICAL RATIO OF SLOPE STEEPNESS FOR VARIOUS GROUND COVER TYPES SLOPE CLASS AND TYPE OF SOIL TREATMENT (1 = Mulching, 2 = Seeding, 3 = Solid Sod, 4 = Strip Sod, 5 = Block Sod, 6 = Mulch Sod, 7 = Vine Planting, 8 = Low Shrubs, 9 = Topsoiling, 10 = Sprigging) LOW	All slope ratios — 1, 2, 9 (Mulching, Seeding, Topsoiling)	All slope ratios - 1 and 2, 2 (Mulching, Seeding)	Generally 1, 3, 4, 5, 6, 7, 9, 10. In District 14 - 1 and 2 only	Generally seeding, mulching. In South - different types of sodding and sprigging.
INTERMEDIATE	All slope ratios — 1, 2, 7, 8, 9	All slope ratios — 1 and 2, 2, 3, 4, 9	Districts 6, 8 - 1, 3, 4, 6, 7, 9, 10. In District 14 - 1, 2, 4, 7, 8	Seeding, mulching, topsoiling. Also planting of vines and low shrubs. In South - all types sodding, sprigging.
HIGH	All slope ratios — 1, 7, 8, 9	All slope ratios — 1, 2, 3, 4, 7, 8, 9	Districts 2, 3 - 3, 4, 5, 6, 7, 9, 10. In District 14 - 1, 2, 5, 7, 8	Seeding, mulching, topsoiling, planting of vines and shrubs, all types sodding, sprigging.
GUTTER — MAXIMUM GRADE 6–8 % 4–5 % 2–3 % 1 %	Loam and clay Sand	Loam and clay Sand	Loam, clay Sand, loam Sand, loam	Generally loam and clay — (4–5 %) Generally sand. — (2–3 %)
14. SLOPE GRADING AND PREPARATION LOW (CLASS I)	Motor graders, blade graders, tractors, plows, harrows	Motor graders, tractor graders, plows, harrows	Motor graders, maple graders, tractor graders, plows, harrows, horse drawn graders.	Motor graders, tractor graders, plows, harrows.
INTERMEDIATE (CLASS II, III)	Motor graders, blade graders, tractors, plows, harrows	Motor graders, tractor graders, draglines, plows, harrows, horse drawn graders, hand labor	Motor graders, tractor graders, truck shovel, horsedrawn graders, hand labor.	Same plus hand labor
HIGH (CLASS III, IV, V)	Hand labor (Often uses rail attachment with Le Tourneau for spreading topsoil on high slopes.)	Hand labor, bull dozers, drag line, Cat type tractors, teams	Motor graders, truck shovel, hand shovel, plows, harrows, horse drawn graders.	Same as low slopes plus power shovels and hand labor.
15. SLOPE MULCHING METHODS LOW	No outstanding practice - Vary in each district. (1) Topsoiling and seeding (2) Changing texture of soil (3) Topsoiling and mulching with straw (4) Mulching and seeding	Generally hay and straw	Hay, straw, cotton burrs, pine needles, — used generally with topsoil.	Hay, straw commonly used, generally with topsoil.
INTERMEDIATE	(1) Topsoiling and seeding (2) Topsoiling and mulching (3) Changing texture of soil and mulching	Hay, straw - sometimes wired down; topsoil often used, peat moss, duff occasionally	Hay, straw, cotton burrs, pine needles, brush used. Brush frequently used.	Same
HIGH	(1) Topsoiling and seeding (2) Mulching (3) Mulching and covering mulch.	Hay, straw - sometimes wired down, topsoil often used, peat moss, brush, hard wood litter occasionally	Hay, straw, cotton burrs, pine needles, brush used. Brush often staked.	Same
16. SODDING METHODS SOLID SOD KIND OF GRASS THICKNESS OF SOD SIZE OF SOD CUTS AVERAGE COST PER 1000 SQUARE FEET	No sodding. One state only reports sodding of any kind in the Dry Region.	Kentucky Bluegrass 1½"–2" minimum. Variable – 1' square to 20"x65' – average about 1'x6' $20.00 to 27.00	Bermuda, carpet grass in deep South, bluegrass in north 3" minimum for bermuda, carpet. 2" minimum for bluegrass. 5" minimum width for bermuda, carpet. 1'x2' for bluegrass $22.50 to $40.00.	Bluegrass, Carpetgrass, Bermuda 2" minimum for bluegrass, 3" for bermuda, carpet Variable (see regions) $20.00 to 40.00
STRIP SOD KIND OF GRASS THICKNESS OF SOD SIZE OF SOD CUTS AVERAGE COST PER 1000 SQUARE FEET		Kentucky Bluegrass 1½"–2" minimum. Variable – average about 1'x5' $20.00 to $27.00 (information generally omitted)	Bermuda, carpet, bluegrass. 3" minimum for bermuda, carpet. 2" minimum for bluegrass. 6" minimum for bermuda, carpet. 1'x2' for bluegrass. 3.00 to 7.00 – 1' to 5' between strips.	Same as solid sod. Same as solid sod. Same as solid sod. Variable. Costs for Cool Humid Region appear wrong
BLOCK OR SPOT SOD KIND OF GRASS THICKNESS OF SOD SIZE OF SOD CUTS AVERAGE COST PER 1000 SQUARE FEET	Buffalo grass	Not a common practice in this region.	Bermuda, carpet grass 3" minimum 6" minimum width. $2.55	Confined mostly to Warm Humid Region.
SPRIGGING AND MULCH SOD KIND OF GRASS THICKNESS OR RATE APPLIED AVERAGE COST PER 1000 SQUARE FEET		Not a common practice in this region.	Bermuda, carpet, bluegrass, centipede Mulch sod - 3" minimum. Sprigging - 12"x12" (Florida)* see note below 3.00 to 7.00 (6.40 for 1 state)	Mostly in Warm Humid Region, where it largely replaces seeding for low cost grassing.
17. FERTILIZING METHODS COMMERCIAL FERTILIZERS RATE OF APPLICATION	None used generally - One state reports using ammoniated phosphate (6:30:0)	Great variation in fertilizers 5:8:7, 10:5:5, 10:6:4, 7:7:5, 6:14:14, 5:15:5, 10:8:6, 4:12:4, 5:10:5, 4:8:4, Am. sulphate, Am. phosphate, Triple superphosphate Generally 10 to 20 lbs. per 1000 square feet	4:8:4, 4:12:4, 6:8:4, 0:20:0, 4:8:6, 3:10:10, 12:6:4, 4:10:4. One state only lists 12:6:4. 10 to 15 pounds per 1000 square feet.	Wide variation (see region tabulation) Tendency toward small nitrogen content. Indicates need for further study. 10 to 20 pounds
ORGANIC FERTILIZERS RATE OF APPLICATION	Cow manure 1 Part manure to 4 Parts topsoil, 1 ton per 1000 sq. ft.	Bonemeal, cottonseed meal, sludge. Manure most widely used. 400 lbs to 1 ton per 1000 square feet. 1 ton rate for manure.	Manure, sludge, cotton seed meal, and hulls, fish scrap, tankage. Manure - 1½" deep, 1 to 3 cubic yards per 1000 square feet.	Manure most common. Sludge, tankage, fish scrap, cotton seed meal and hulls, bone meal. 1 ton manure per acre.
18. SEED FORMULAS GRASSES	Slender Wheat, Crested Wheat, Western Wheat — widely used Beardless Wild Rye, Awnless Brome, Brome, Bermuda, Buffalo, Timothy, Bulbous Blue, Orchard — less widely used Information generally lacking on germination and purity	(Average Percentage) Germ. / Pur. Kentucky Bluegrass 80 / 85 Canada Bluegrass 80 / 85 Redtop 90 / 95 Chewing's Fescue 85 / 95 Timothy 90 / 99 Orchard grass 85–90 / 90 Rye grass 90 / 96 — Most commonly used Smooth Brome 85 / 90 Western Wheatgrass 70 / 85 — Commonly appearing along western edge of region Pacific Northwest: Common grasses used are Astoria and Highland Bent, Canada and Bulbous Bluegrass, Redtop, Chewing's and Red Fescue	Deep South Bermuda 85–95 Carpet 80–95 Sudan 75–95 Sand read 85–90 Sand drop seed 55–90 North Part of Region Kentucky Blue 70–80, 86 Redtop 90–90 Orchard 80, 87 – 80, 90 Timothy 90–99 Bermuda 80, 90 – 99 Carpet 63 – — Italian Rye 90 – 99 (Note under 16 above * Florida was only state to furnish information on spacing for sprigging.)	See tabulation by regions, listing commonly used grass seeds with average percentage of germination and purity. Generally, the bluegrasses, fescues, redtop, orchard grass, and timothy predominate in the Cool Humid Region with brome and wheatgrasses appearing along the western edge and the bents in the Pacific Northwest. The wheat grasses are dominant in the Dry Region while bermuda and carpet grass are most commonly used in the Warm Humid Region. In the transition zone between the Warm and Cool Humid Regions, bermuda and carpet grass are used as well as bluegrass, redtop, orchard and timothy.

SUMMARY OF ROADSIDE PRACTICES BY COORDINATING COMMITTEE ON ROADSIDE DEVELOPMENT
TABULATED BY CLIMATIC REGIONS

PART II (CONTINUED)	DRY WESTERN REGION DISTRICTS 3 AND 12	COOL HUMID REGION DISTRICTS 1, 4, 5, 7, 9, 10	WARM HUMID REGION DISTRICTS 6, 8, AND 14	SUMMARY – ALL REGIONS ENTIRE UNITED STATES
LEGUMES COVER CROPS	Alsike clover, Ladino clover, White clover, Yellow and White Sweet clover Rye, Wheat, Oats, Wild rye, Buckwheat	White, Alsike, Red, Crimson and Sweet Clover, Korean Lespedeza, Vetch, Alfalfa, Black Medic, Strawberry Clover Oats, Rye, Buckwheat, Wheat, Millet, Foxtail, Barley	Lespedeza (Korean and Sericea), Alsike, White Dutch, Red Clovers, Sweet clover occasionally. Italian rye, Oats, Rye, Wheat	Alsike, White Dutch, Sweet Clover used in all regions. Alfalfa in Middle West, Lespedezas in South Rye, Oats, Wheat generally used
19. SEED FORMULAS SEED MIXES No. 1 2 3 20 SHOULDER SEEDING 21 GUTTER SEEDING 22 CUT AND FILL SLOPE SEEDING	Vary too much to tabulate Rate of application varies from 1½ to 2 pounds per 1000 square feet (approx. 60 to 80 lbs. per acre) Information on Seeding is generally lacking. Where noted, the various wheatgrasses, awnless brome, Bermuda grass, oats and rye are used. Bermuda grass is used in the more southern part of the region. These grasses are used with some variation for shoulders, gutters and slopes at 2 to 4 pounds per 1000 square feet, The heavier applications being used with the heavier coarser seed.	Seed formulas vary too much to tabulate. Rate of application varies from 1½ to 4 pounds per 1000 square feet (approx. 55 to 175 lbs. per acre.) Generally the same mix is used for shoulders, gutters and slopes. Where different mixes are used, shorter growing types such as the blue grasses and fescues are used in the gutters and on the shoulders, the taller grasses such as timothy and orchard grass being limited to the slopes. The blue grasses, fescues, and red top dominate most seed mixtures in this region. Western wheatgrass and brome appear in the mixtures in this region in the western part, while the bents appear in the north west pacific section. Along the southern limits of the region, fescues are largely replaced by the blue grasses and red top.	Seed formulas are numerous. North Carolina reports 9. Rate of application – Generally about 2 pounds per 1000 square feet. Varies from 1 to 4 pounds (40 to 160 per a.) In the deep South seeding is more or less limited, being confined to seeding of Sand reed, Sudan, and Sand Drop seed in District 6, and to Bermuda, Carpet, Korean and Sericea Lespedeza in District 8. In District 14, located in the northern part of this region, seeding is widely practiced. Most commonly used are Bermuda, Carpet, Kentucky and Canada Blue, Orchard, Redtop, Timothy, White Dutch and Alsike Clover, Korean and Sericea Lespedeza. Generally the same seed mix is used for slopes, gutters, and shoulders. * North Carolina uses a temporary seeding on new construction followed later by a permanent seeding	Certain grasses dominate different sections. The blue grasses are most widely used. The fescues, blue grasses, red top dominate the cool humid region. The bents appear in the Pacific Northwest. Wheat grass and brome appear in the western part of the cool humid region and extend into the dry region. Bermuda and Carpet grass appear in the northern part of the warm humid region. Mulch sodding and sprigging replace seeding in deep humid South. The grasses, bromes and wheat grasses are commonly used in the dry region. Where rainfall is insufficient for seeding, mechanical or structural methods must be used to control erosion. * Generally the same mix is used for shoulders, gutters and slopes, indicating need for further study for improvement of seed mixes to fit the requirements for different seeded areas.
23 MISCELLANEOUS DATA IS ROLLING OF GRASS SHOULDERS ADVISABLE? WHEN? IF NOT, WHY NOT?	Yes (Only replies to this question were from District 3)	Yes – after seeding and after frost is out of the soil	Yes – after sodding and sprigging in Districts 6 and 8. In spring in District 14.	Rolling is generally practiced and recommended, generally in the spring.
MULCHES ARE THEY TURNED UNDER PARTIALLY? TURNED UNDER, UNCOVERED OR WHAT? DEPTH OF SEEDING WHAT DEPTH IS USED, RECOMMENDED? IS DEEP SEEDING DESIRABLE?	Partially covered. Uncovered, ½", ½" to 1". Recommended – ½", 1" No	Generally partially covered. One or two favor covering. ¼ to ½", ¾", 2", "slightly raked", "rolled in" also recommended "No" generally. "Yes" occasionally.	Partially covered, not covered (about equally divided) ¼ to ½", ¼ to 1", 1" to 1½". Same for Recommended depth "No". "Yes" on steep grades" (Only two answers)	Partially covered most popular method. Generally shallow seeding practiced and recommended. (Shallow seeding – 0 to ½", deep seeding – ½" +)
TRENCH OR POCKET PLANTING WITH OR WITHOUT TOPSOIL FOR SAND, LOAM, CLAY STEEP SLOPES (1:1 to 1¾:1) MODERATE SLOPES (2:1 to 2½:1) FLAT SLOPES (3:1 AND FLATTER)	Same treatment for all soils. Pocket planting, with and without topsoil and mulch. Same Same (Very little indicated)	Very little variation for soil types. Pocket planting, generally, with or without topsoil and mulch. Generally topsoil and mulch used. Same for all slopes.	Trench method favored – No variation for soil types Trench method with topsoil and mulch Same (Applies to District 14. Very little planting Same in Districts 6 and 8)	Pocket method used most. Topsoil and mulch generally used for all slopes.
GROUND COVER PLANTS N – AVAILABLE FROM NURSERIES D – DRY WELL DRAINED SOIL S – WILL STAND SHADE C – MUST BE COLLECTED M – MOIST SOIL W – WET, POOR DRAINAGE 1 – AVERAGE SPACING 3-5' 2 – AVERAGE SPACING 5-8'	Willow (species) Rose (species) Wolfberry Snowberry Colorado Sumac 3-leaf Sumac Sand cherry Shrubby Cinquefoil Canada buffaloberry Low juniper Shinnery oak Amorpha Creeping Mahonia Golden currant Curlleaf Mountain mahogany VINES Matrimony vine Jap. Honeysuckle Hottentot fig (Plants not keyed for availability, from nurseries, favorite site conditions, or spacing.)	Species and varieties too numerous to tabulate. Those most commonly listed: SHRUBS Sweetfern – C,D The sumacs – C,D Low blueberry – C,D,S Bayberry – N,C,D Roses – N,C,D Snowberry – N,C,D,S Coralberry – N,C,D,S Wild plums – N,C,D New Jersey Tea – N,C,D VINES Bearberry – N,D,C Virginia Creeper – N,M,S Bittersweet – N,S,M Wild grapes – N,M,S Jap honeysuckle – N,M,S Kudzu – N,D,M,S Matrimony vine – N,D,M,S	Most planting in District 14 – Very little in 6 and 8 SHRUBS Coralberry – D,S,C Fragrant Sumac D,S,C Scotch broom D,S,C Redosier dogwood – N Tartarian Honeysuckle N Mountain laurel C,S Rhododendron C,S Azalea species C,S St. John's wort (shrubby) VINES Jap. honeysuckle – C,D,S,M,W Virginia creeper D,S,C Periwinkle – S,C,M Kudzu Bittersweet – N	Shrubs and vines vary according to climate. Very little planting in deep South. Generally native or naturalized plants are used. Occasionally gardenesque species are listed but do not appear to be dominant anywhere.
PART III – RIGHT-OF-WAY AND ROADSIDE CONTROL 1. EXTENT OF STATE CONTROL OF R.O.W. (a) IN FEE SIMPLE OR (b) BY EASEMENT	Fee simple, easement about equally	Fee simple generally. Easement occasionally	Fee simple. Easement in only 1 or 2 cases.	Fee simple generally
2. ROADSIDE FACTORS GIVEN CONSIDERATION IN ACQUISITION OF R.O.W. (a) EROSION CONTROL (b) PUBLIC UTILITIES (c) WAYSIDES (d) PLANTING TREES (e) OTHER	Answers vary from "all factors" to "no factors"	Generally "all" or "most all" factors considered. Occasionally only erosion control or waysides considered.	All or most all factors generally considered. One state reports "No factors considered."	All or most all factors generally considered.
3. CONTROL OF ROADSIDE – BY: (a) BUILDING SET-BACK LINES (b) BILLBOARD LEGISLATION (c) ROADSIDE ZONING BY COUNTY, STATE, OTHER (d) LIMITED ACCESS – FREEWAY, PARKWAY, OTHER	No (California only reports "yes") Generally yes Zoning by county * No limited access except California (* Wyoming reports freeway bill up for voting)	"No" generally. "Yes" occasionally "Yes" generally. "No" occasionally County generally. Occasionally by State and local ordinance Generally "No". Limited access in several states.	"No" generally "Yes" generally "No zoning" generally. Occasionally by County No limited access	"No" generally "Yes" generally "Zoning by County" predominant No limited access
4. EXTENT 1, 2, 3 ARE INVOLVED IN THIS STUDY PROBLEM.	Answers vary – "All involved." Sufficient right-of-way for comprehensive planning. Control of private property along roadside desirable for human use and enjoyment." "Billboard legislation and roadside zoning."	Generally not answered. "All factors considered important" when answered.	Answers vary widely: "All factors involved", "All but 3a, c, d", "1 is essential, 2 of primary importance", "Slope grading".	Answers too varied to select on outstanding preference.