APPENDIX C

Abstracts From
COORDINATION OF WATER RESOURCES PROJECTS
AND HIGHWAY DEVELOPMENT

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Definition of Coordination and Examples of Coordination by Highway Officials

Webster's International Dictionary defines coordination as an arrangement in the same order, class, rank, or dignity. It also includes an additional statement to the effect that coordination is a combination designed to give harmonious results. Within that framework of reference it is obvious that coordination of effort by highway officials among themselves, with other governmental agencies, and with other public-interest groups is not a new activity. Convincing evidence of such coordination of effort -- on a gradually increasing scale and at all levels of government -- can be found, for example, in the annual reports of the Bureau of Public Roads beginning with the first report for the year 1893, and in the continuing and increasingly important work of the American Association of State Highway Officials since this organization was established in 1914.

These efforts at coordination were intensified following passage of the Federal-Aid Road Act 35 years ago. Ever since then individuals trained in the precise physical sciences (such as engineering, chemistry, and physics) and persons trained in the somewhat less precise social sciences (such as economics, law, and public administration) have been working together and with the nation's military officials toward a common objective -- the development of a highway transportation system to serve our country's defense needs and its expanding socio-economic requirements....

From all of the coordination of effort which thus far has been undertaken by highway officials among themselves, with representatives of other forms of transportation, and with a host of other public officials and interest groups, there have emerged numerous advancements in the application of the physical and social sciences which are recognized as milestones of achievement in public administration.

Coordination of Water Resources Projects and Highway Development Already Has Begun

A comparison of the early phases of action in each area of coordination already undertaken by highway officials, as described above, with the current status of action concerning highway development and water projects, supports the viewpoint -- which is here expressed with full recognition as to its significance — that the coordination of water projects and highway development already has begun.

To illustrate, as far back as 1935, on the basis of an inter-agency agreement between the Soil Conservation Service and the Bureau of Public Roads, cooperative demonstration projects of roadside improvement for erosion control on highways were undertaken jointly by the Soil Conservation Service and a number of the state highway departments. These studies have resulted in greatly improved soil-conservation practices in highway development throughout the United States. In addition, the results of basic research, conducted by the Soil Conservation Service, on allowable velocities in grass-lined channels and on erosion-control structures are currently being used for highway design purposes. Furthermore, during the past few years highway officials have been making increased use of stream-flow and similar data -- developed by the water resources agencies -- in determining the size of bridge and culvert openings necessary to pass flood flows. The friendly relationships that are developing between water-resources and highway officials in this area of endeavor -- and the willingness with which the former are furnishing stream-flow and similar data to the latter -- are worthy of special recognition at this time. Concrete evidence of the extent of this cooperation is the fact that twenty-one state highway departments are contributing an aggregate amount exceeding $150,000 per year, matched by funds contributed by the U. S. Geological Survey, for stream-flow measurement and related special studies.

The concept of having one agency of government furnish technical or economic data already available to it -- or which it can readily develop -- to another agency of government needing such data in its economic planning is a basic fundamental of coordination of effort. This fundamental concept, as it applies to water projects and highway development, recently found expression in the work of the Federal Inter-Agency River Basin Committee. The FIARBC (as it is called for brevity) is a voluntarily established inter-agency committee composed of representatives from the Department of Agriculture, the Department of the Army, the Department of the Interior, the Department of Commerce, the Federal Power Commission, and the Federal Security Agency. It was created for the purpose of coordinating the efforts of all the Federal agencies concerned in some way with Federal water-resources development....

We believe that the American people are living in an era of complex specialization. The degree of that specialization in every aspect of human endeavor is clearly evidenced by the existence of special-purpose agencies within the executive branch of the Federal Government itself. (The coordinate existence of executive agencies probably is as applicable at the state or local level, where executive agencies operate under state or local laws, as it is at the Federal level.) We believe that each agency...which has programs affected in any way by water-resources development -- whether that effect be large or small -- has the coordinate right, and the same kind of duty, to take part in this aspect of our country's economic development. This gigantic undertaking, as we understand it, calls for contributions from power experts, irrigation experts, soil-conservation experts, flood-control experts, waterway and overland-transportation experts, public water-supply experts, recreation experts, and fish and wildlife experts. In fact, it calls for contributions not only from the experts in practically every area of specialization in human and natural resources development at all levels of government but also from the highly trained specialists in each area of specialization who serve as advisers and consultants to the experts.

Within the foregoing framework of operations, the economic plans and actions of one coordinate agency of government should reflect the economic plans and actions of other coordinate agencies of government. Each agency should take part in the measurement of the impacts that its proposed program might have on the programs of the others, and in the measurement of the impacts which the program of each of the others might have on its own. Where the program which one agency proposes to develop would result in adjustments and increases in cost in the program of another (or in the programs of others) those cost increases -- from the standpoint of an investment appraisal statement -- are, we believe, proper "cost items" to be reflected in the

investment appraisal statement of the program which causes the increases in cost. Conversely, we also believe that where a program being proposed for development by an agency would result in benefits to the program of another (or to the programs of others) those benefits are proper "benefit items" of the program causing the benefits...

Highway improvements can be designed and constructed to aid in soil and water conservation. This area of needed action requires further explanation.

Highway Design and Construction as an Aid to Soil and Water Conservation

It appears that there are a number of ways in which the design and construction of highway improvements can aid in soil and water conservation. The initial opportunity for such aid occurs during highway location studies. Alternate highway locations can be studied from the point of view of water conservation as well as those of traffic and land service. In such studies, which can be facilitated through the use of such modern tools as aerial photography and aerial survey techniques already adopted by a number of the state highway departments, complete ground information can be obtained concerning existing and potential land uses and development, including such details as (a) the location of existing streams, farm ponds, and other bodies of water; (b) the general character of the watershed areas above the proposed highway location, particularly the watershed areas which contribute to high rates of surface runoff; (c) the location of possible borrow pits, ponds or sinks in relation to water runoff; and (d) the general character of existing soils with respect to erosion and possible effects of impoundments upon highway subgrades at possible impoundment sites.

Following selection of the best of available alternate highway routes, such factors as the following can be considered: (a) wherever permitted by existing topography, particularly within vegetated areas already tending to retard surface runoff, the location selected can avoid excessive cuts and fills which tend to increase surface runoff; (b) highway center lines can be located a reasonable distance from streams and other sources of water to protect road embankments against erosion, to prevent siltation from the embankment, and to protect public water supplies against pollution; and (c) new center-line locations and highway design can avoid encroachment on, or straightening of, existing stream channels, thereby reducing the problems arising from such things as accelerated flows at flood stages, stream-bank erosion, and siltation, as well as damage to the road embankment.

The steps already being taken by most of the states in the design of cross sections for new or reconstructed highways to retard water runoff and control erosion can become the standard practice in all of the states. These include such things as liberal flattening and rounding of cut and fill slopes and earth drainage channels; mulching and seeding, sodding, or ground-cover planting of road slopes and drainage channels as soon as possible after final grading; and the use of stone riprap, masonry, check dams, or similar structures and materials to protect channels and culvert inlets and outlets, particularly in arid regions where slopes and drainageways cannot be protected satisfactorily by planted or seeded vegetation.

The modifications already made in the design of some small bridges and culverts to raise water levels and impound water behind highway fills can be studied to determine the extent to which they have been successful and the extent to which they can be adopted elsewhere under similar conditions. Wherever feasible, surface-water runoff from highway rights-of-way can be stored in natural or artificial sinks or basins off the road to recharge the ground water table. Such runoff also can be diverted to and stored in unsightly borrow pits no longer needed in highway construction, not only to improve the appearance of the highway but also to store water and -- in appropriate cases -- to serve recreational or other water uses.

The foregoing examples, and other methods by which highway development can aid in soil and water conservation, can be duplicated on a nation-wide basis through the joint efforts of water-resources and highway officials....