

THE SMALL WATERSHED FLOOD PROTECTION PROGRAM IN CONNECTICUT *

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I AM happy to be here with you today to talk about our small Watershed Flood Protection Program in Connecticut. I want to thank Roy Collins and your Connecticut Society of Civil Engineers for providing the opportunity to tell you something about what we have been doing in our state since the inception of this program ten years ago.

The term "Flood Control" to most of us calls to mind the high dams built by the Army Engineers or the Bureau of Reclamation in various parts of the country. The association is a natural one because large dams and dikes, until recently, have been the principal means of flood control throughout the United States. In Connecticut the Corps of Army Engineers in cooperation with the Water Resources Division of the Department of Agriculture and Natural Resources have constructed a number of dams, reservoirs, dikes, channel improvements and other structures. This work was started after the floods of 1936 and 1938 and with the impetus of the 1955 floods is continuing today with several projects in the planning or building stages. The extensive diking along the Connecticut River in the Hartford area is an example of this work. The corps was also responsible for enclosing the lower reach of the Park River in Hartford in a two barrel conduit designed for pulling floodwaters from the lower watershed into the Connecticut River. The engineers are currently engaged in studying the need for additional conduit construction in this area.

We are all aware of the debt that we owe on the state and on the national level to the Corps of Engineers and to the Bureau of Reclamation for the work that they have accomplished in flood control. In spite of the number and size of these programs the problem of extensive destruction by floods is still a major one. This is due in part to the fact that more than half of the flood damage in the United States occurs in over eight thousand small watersheds throughout the nation. The term Small Watershed in this context refers to those drainage areas having less than 250,000 acres. There is nothing to prevent the Corps of Engineers from undertaking projects in these areas except the physical inability to accomplish all that they are asked to do. They have, in fact, done work on many small watersheds,

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but generally the larger problems have to be tackled first. Of course, this means that many flood-prone areas must remain unprotected until other remedial action can be taken.

This is where the Small Watershed Program comes in. As far back as the nineteen thirties the U. S. Department of Agriculture began to seek ways and means of providing protection on smaller streams and rivers. This was continued until 1954 when Congress approved a legislative program for comprehensive treatment of Small Watersheds which included Flood Control. This legislation is known as the Watershed Protection and Flood Prevention Act — Public Law 566 of the 83rd Congress. It provides for a variety of treatment measures such as erosion control, drainage, irrigation, and fish and wildlife and recreational development. With regard to flood control, the law provides that the federal government will underwrite 100% of the cost of construction of flood prevention structures. The local organization must purchase the land, easements and rights of way needed for the building of these devices. The relocation of roads and utilities is also a local responsibility.

An interesting and important aspect of Public Law 566 is that it provides for the work to be done by the local organization. Contrary to most federal programs the local people initiate and administer these programs with the assistance of the U. S. Soil Conservation Service. In Connecticut, because we are a small state, and for better coordination, the Commissioner of Agriculture and Natural Resources is authorized to act as a "Local Organization" for the purposes of Public Law 566. However, the townspeople in the Small Watersheds affected by these projects must agree to the need for action before anything can be initiated.

The first criterion which must be met before a proposed project can get underway is that the annual net benefits which would result from construction of the proposed improvements must exceed the annual cost of flood damage. An application which meets this test must then go through several stages of planning and approval by the state and the U.S.D.A., culminating hopefully in congressional sanction of the project. Five hundred Small Watershed Projects have been authorized by this process throughout the United States. These projects cover a total area of more than 30 million acres.

In Connecticut the legislation authorizing state action in conjunction with Public Law 566 is contained in Section 25-106 through 109 of the General Statutes. These laws were passed at the special session of the General Assembly in November of 1955. This session was called to take action to repair the effects of the disastrous floods in August and October

of that year. The legislature thoughtfully provided the initial sum of \$500,000 to allow us to get moving on these Small Watershed Programs right away.

The flood damages caused by the 1955 floods can only be termed catastrophic. It brought home to the people of Connecticut the bitter fact that a comprehensive flood protection and prevention program was urgently needed and that action was obviously overdue. Complacency turned to concern throughout the state as small streams became raging torrents, taking lives, engulfing homes and destroying property. Most of this havoc was unnecessary and could have been prevented.

There was every reason to expect that a major flood of these proportions would occur sooner or later. In the Park River area in Hartford alone there have been at least four floods of the same magnitude during the last 200 years. The important fact which was generally realized after these floodings was that a program was needed which depended not only on large dams and dikes but on a variety of means and methods to control and to prevent this recurring problem.

With the memory of the floods still fresh in the minds of people we were able to get the Small Watershed Program underway with a minimum of opposition. I can't say there were no dissenters to some of these projects. Certainly there were some and although they were usually not numerous, they were often a very vocal minority. But we have been able to make notable strides in the program during the last ten years. Five Watershed Projects have either been completed or are now well underway. Two new projects on the Norwalk River and on Mill, Farm and Shepard Brooks in the Hamden area are in the process of being approved.

Our first project was the construction of a training dike and diversion channel on Roaring Brook and Walnut Street Brook in Farmington. These structures are helping to protect homes and the municipal recreation site from damage.

The next undertaking was the Furnace Brook-Middle River Project in the Stafford Springs area. The '55 flood caused damages here of \$1,300,000. Similar floods have caused damages of more than 3 million dollars in the previous twenty-year period alone. Six dry dams have been constructed in this watershed providing capability of storing most of the runoff to be expected in future floods.

I might take a moment here to describe these floodwater retarding structures. They vary considerably in height (from 77 feet on down to about 20 feet) and in length up to a mile. They are basically earthen embankments which blend with the surrounding scenery when grassed over.

These structures operate automatically. There is a principal concrete pipe spillway running through the dam and an emergency overflow spillway located near the top of the dam. In a flood situation, the limited capacity of the principal spillway causes the reservoir to fill till it reaches the level of the emergency overflow spillway or until flowage into the reservoir diminishes. After that point the impounded water is slowly released over a period of some days until all of the water has been vacated.

Extensive channel improvements have also been made in the Stafford Springs area to permit floodwaters to flow more freely and rapidly, thus avoiding the backup caused by the narrow, twisted and obstructed channels which they replaced. This project also required relocation of a portion of the Central Vermont Railway and construction of a new railroad bridge. The total cost of this undertaking was somewhat more than 4 million dollars.

The Blackberry River Project was designed to alleviate flood damage in the towns of Canaan and Norfolk. Over the previous twenty-five years the cost of such damage had amounted to a million and a half dollars. Five dry dams are planned on this project. The first of these was completed in 1961 and is located in Massachusetts. Acquisition of the land and easements for this site was accomplished with the active and friendly participation of our neighbor to the north. It is a good example of the wonderful spirit of cooperation which has been evident in our relationship with representatives of all levels of government, our consulting engineers, public utilities and private citizens in working out the many problems inherent in undertakings like these.

The Massachusetts site has also been developed as a multiple-purpose area for recreation as well as wildlife development. Public Law 566 as amended allows for the utilization of small watershed sites for these purposes when they are compatible with the main purpose of flood control.

The 1955 floods caused direct damages in the Hartford area amounting to more than 7 million dollars and untold indirect damages such as loss of production and wages. Most of this destruction was caused by flooding of the Park River Basin. We now have underway two Small Watershed projects in this area, one on the north branch and one on the south branch of the river.

The north branch of the Park River Project will eventually have four flood retarding structures located in Bloomfield. Three of these have been completed and one is under construction. Here again recreation and wildlife development facilities will be incorporated into this project. Either with or without federal participation.

These dams will provide protection to all downstream locations. They are located far up on the tributaries or the watershed due to the highly urbanized character of the area and this of course means that here will be some residual damage expected. This is because the degree of protection decreases as the distance from the dam increases and is due of course to uncontrolled runoff below the dam sites. The total cost of this project will be about 5 million dollars.

The South Branch of the Park River presents the greatest challenges in providing an effective control program. This is due to the highly developed character of the watershed. Treatment measures include construction of four dry dams, retention of one natural floodwater detention swamp and more than nine miles of channel improvement to reduce flood damages. Completion of this work will provide protection to Hartford, West Hartford and Newington and will reduce flood damages by 82%. Total costs of the South Branch System will be about 16 million dollars, making the combined cost for north and south branches of the Park River somewhere in the vicinity of 21 million dollars.

The Park River watershed protection system is an interesting project for several reasons. It has attracted national attention because of these unique features.

First of all, Public Law 566 projects are usually undertaken in areas which are more rural than urban and the Park River Watershed is highly urban in character.

A second noteworthy aspect of this project is the number of organizations which are cooperating effectively and harmoniously to achieve the level of flood protection which is necessary and desirable. If I may, I would like to name these diverse entities just to give you some idea of the complexity of the undertaking. First we have the United States Department of Agriculture, Soil Conservation Service, the U. S. Army Corps of Engineers, the U. S. Bureau of Public Roads, the Greater Hartford Flood Commission, the Capitol Regional Planning Agency, the Metropolitan District Commission, and in the city of Hartford and New Britain and the towns of West Hartford, Bloomfield, Newington and Farmington such departments as Flood Control Committees, Planning Boards, Public Works Department, Park Departments and Conservation Commissions. Also, a Citizens' Advisory Committee for the north and south branch of the Park River, the State Highway Department, and in the Connecticut Department of Agriculture and Natural Resources, the Water Resources Commission and the Soil and Water Conservation Division.

I want to tell you that it is no mean tribute to the people in all of these organizations that this project has proceeded so well in view of the maze of

interrelationships which exist in this situation. The liaison people who have worked in this project, employees of my department and our consulting engineers have performed a highly creditable job in maintaining the lines of communication which have permitted us to make progress. In addition to the civil and hydrological engineering capabilities required, these people have displayed an excellent knowledge of human engineering, and I use that term in its very best sense.

These things could not have been accomplished if all of the people in the public and private agencies had not displayed the kind of enlightened self-interest which develops cooperative activity for a common cause.

I have left for last what is perhaps the most important part of this entire effort. Without this phase of the project all or a major part of the protection which these dams, channel improvements, conduits and any other devices which will have been constructed will be negated in a very few years. I am referring to development of effective controls of the use of the floodway along the streams which make up the Park River Watershed.

The memory of man is very short when it comes to some things. Floods and the destruction which they cause is apparently one of these things which are difficult to remember. After every disaster has occurred people return to the flood channels to build again on the river's right-of-way. For every 6 dollars spent for flood control in the past, 5 dollars has been spent to rebuild permanent structures in the flood channels. Sooner or later the river will collect its rent for this encroachment. Although encroachment in a floodway is like playing Russian Roulette with only one empty chamber, people are dogged in their persistent efforts to build and to rebuild in these flood courses.

Jerry Degen of Anderson-Nichols quoted this saying to me recently, "floods are an act of nature — flood damage is an act of man." How true that statement is. If no buildings of a permanent or obstructive nature were constructed in the river's right of way, there would be no damage of any consequence.

For these reasons we have incorporated into our plans for protection of the Park River watershed the use of regulatory measures to prevent encroachment onto the flood channels of the river and its tributaries. These regulation measures consist of the establishment of stream encroachment lines, flood plain zoning and the recommendation of subdivision regulations and building codes which prohibit building in areas threatened by floods.

The purpose of channel encroachment lines is to define the floodway which is needed to carry off high volumes of water and to prohibit the

infringement on this right of way of any structure which would tend to obstruct the free flow of these waters or which could be damaged in a flood situation.

After the 1955 floods the legislature authorized the Water Resources Commission to establish encroachment lines on any waterway beyond which no obstruction should be placed without authorization by the commission. Water Resources Committee has used this authority to establish 135 miles of encroachment lines so far with about 600 additional miles needed. They are currently working on the establishment of about 60 miles of encroachment lines in the Park River complex. A report for establishment of channel encroachment lines and flood plain delineation has been prepared on the north branch. Public hearings have been held and the first of these 60 miles of encroachment lines and flood plain delineation has been prepared on the north branch. Public hearings have been held and the first of these 60 miles of lines will soon be established.

Towns are also authorized to establish encroachment lines and it is expected that there will be supplemental assistance from communities which choose to exercise this authority in the Park River watershed.

Flood plain zoning ordinances are another type of regulatory measure which is being used to keep the floodways clear. Municipalities are authorized to adopt such ordinances to limit development in flood hazard areas to uses which do not conflict with the prevention of flood damages. Several of the towns in the Park River watershed have either adopted their flood plain ordinance or are preparing these regulations for adoption.

Building codes and subdivision regulations are other means by which the municipalities will be able to limit the construction of building in flood hazard areas. Effective enforcement of these regulatory powers is expected to prevent much unwise construction in areas subject to flooding.

We don't expect that people are going to accept the establishment of encroachment lines, flood plain zoning and the other measures we have mentioned without some difference of opinion. In every case where these regulations have been proposed for implementation there has been vigorous dissent. Some of it is warranted because inequities will inevitably appear but most of the hue and cry is based on a lack of knowledge of the dangers involved in building in flood channels.

In the adoption of flood plain regulations the point is usually brought out that when building of permanent structures is prohibited the land is useless. Actually these flood plains can be very useful and an asset to the community. Some of the uses which these areas have been used for are for agriculture, marinas, athletic fields, camping, picnicking, wildlife refuges,

green belts and many other conservation and recreation uses. These are often the only real open areas left in some of our communities.

At any rate, all of these measures are being used in the comprehensive program for protection of the Park River watershed. In this sense it is a pilot project which shows every promise of a very high degree of success. The best of what we learn from this effort will be adopted for use in other watershed programs both in Connecticut and in many other parts of the nation.

The comprehensiveness of the program and the high degree of cooperation between many organizations for the achievement of effective results on a long range scale are characteristic of the approach which we find to be needed in many other natural resource problem areas. In these increasingly complex endeavors I can hope for no more than that they will be as successful as the Small Watershed Protection Program has been up to the present time.