WORK OF THE ILLINOIS STATE GEOLOGICAL SURVEY

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Topographic mapping in Illinois was begun in 1887 by the U. S. Geological Survey. In 1905 a co-operative agreement was entered into by the U. S. Geological Survey and the State of Illinois, according to which each party was to make an equal annual allotment. From that time up to the present a total of from $16,000 to $30,000 has been spent each year in carrying this work forward. The State determines the areas and order or progress of the work, whereas the Federal Survey with its corps of trained engineers does the field work, and the maps are engraved and printed at Washington.

The present rate would necessitate about 35 years to complete our own State work as well as that of the United States. Recent detailed study of this situation has shown the need for greater expedition of the work, and a recommendation has been made to speed up the rate so as to complete it in about 12 or 13 years. Such a program calls for an annual appropriation by Illinois of $35,000.00, to be met by a like amount from the Federal Survey. While this may appear a large amount, the urgent need of the maps can be appreciated from such considerations as the following:

1. *Public Utilities.*

Available topographic maps made by the U. S. Geological Survey saved the City of New York hundreds of thousands of dollars and years of time in extending its water supply. This need was emphasized by the time and work required where the maps were lacking or obsolete.

After expending $10,000 in examining sources of water supply for Waterbury, Conn., the city engineer had access to topographic maps of the area and from an inspection of these was enabled to develop a better supply which is used at present.

2. *Industrial Development.*

The value of a topographic map of one quadrangle in Washington was estimated to be worth more than its en-

tire cost to one company alone. This permits efficient exploitation and development of the resources of an area and should mean increased economy for the general public.

3. Highway Construction.

Federal and State governments are spending hundreds of millions of dollars each year in road building and these projects call for a mass of detailed information. Where accurate detailed topographic maps are not available, costly preliminary surveys must be executed.

A member of the Wisconsin State Highway Commission estimated that a complete topographic map of Wisconsin would be worth more than its entire cost just for the road building program. The Association of State Highway officials considers that the saving in highway funds alone would be greater than the cost of making these Topographic maps.

The chief engineer of the Iowa State Highway Commission estimated that 50% of 6000 miles of a primary road system might have to be modified to secure proper grades and alignment because no topographic survey was available when the roads were first planned. In our own State, road building may average as high as $35,000 or $40,000 per mile. Hence our increased annual appropriation represents the average cost of only one mile of highway construction.

Maryland has a complete topographic map of the State, and the chief engineer of the State Roads Commission estimates the saving on road work to exceed the entire map cost.

For initial and maintenance use of State Highways, the value of such maps has been estimated to be worth at least $250.00 per mile. This figure applied to Illinois maps makes the first cost appear insignificant.

4. Transportation Needs.

Transportation problems involve the construction and use of railroads, highways and waterways, and are greatly facilitated by topographic maps. If adequate topographic

maps are available, new construction and improvement of existing routes can be accomplished without preliminary surveys.

One resident railway engineer estimated such saving in a short piece of railway work in Ohio at $85,000.00. The map cost was $4,000.00. Another railway engineer considers that hundreds of thousands of dollars are annually spent and much of it absolutely lost through lack of having the country mapped. This loss rests upon the public in capitalized costs.

5. Use of Water Resources.

A rational utilization of water for irrigation, municipal supply and power development, depends upon a knowledge of total annual yield of the stream which is to serve as the source of supply, the daily variations in flow, and the practicability of constructing reservoirs of sufficient capacity to store the water until needed for use. Many projects involve the construction of canals, channels or reservoirs. All these problems necessitate a broad comprehensive knowledge of the topography of the catchment basin. Other problems call for a map of the topography of dam sites, reservoir sites, canal lines, and the configuration of the irrigable lands.

In order to develop intelligently the water-power resources of a state, it is first necessary to know what those resources are. Before a final analysis of such water-power resources can be properly formulated, the greater part of the state should be mapped topographically. As only one-third of Illinois has been mapped, we cannot yet make adequate plans for our own water-power development.

6. Drainage.

In order to dispose properly of surplus water in swampy and flooded regions, it is necessary to know the extent and slope of the land to be drained, the area of the catchment basin yielding water into the drainage system and the location, slope and capacity of the ditches for reclaiming such land. In Illinois there are about 1,150,000 acres subject to overflow, and additional area of the State is subject to betterment through drainage.

7. Agricultural Development.

Maps showing the character of the soil and the configuration of the ground indicate to the settler the desirability or undesirability of any particular piece of land for farming, and so assist him in its proper cultivation. Hence soil maps are of increased value where printed on topographic maps.

8. Development of Mineral Resources.

Geological study showing the mineral resources of a region must be preceded by a topographic map of the area on which to plot the field data. Many promising mineral areas in the west now await topographic mapping for their detailed study and development.

9. Utilization of Timber Resources.

The economical examination of timber bodies, the location of logging railways and tramways, the estimation of costs of logging operations, the determination of areas that can be logged from different bases of operation, the selection of lines of communication, lookout points, fire lines, etc., are all dependent upon a knowledge of the topography as well as the forest cover of the region considered. Hence a topographic map is fundamental to the wise administration of forested areas, decreasing the cost and materially increasing the efficiency of forest management.

10. Utilization of Grazing Resources.

Efficient administration of grazing lands requires mapping of the topography and vegetative cover, in order that the kind of stock and number of animals that can be carried may be determined, and that appropriate seasonal use of the range may be planned. Such maps are invaluable aids in range management.

11. Educational Uses.

In the study of physical geography, topographic maps of the U. S. Geological Survey are of widely recognized value. To the trained reader such maps give a great variety of information such as suggestions of climate, character of underlying rock, industries of an area and geologic history.

12. Popular Uses.

Motor users, both for business and pleasure, find the maps of great value because of the accurate record of roads, grades and distance between distant points.

13. Statistical Uses.

Such maps are of wide use and recognized value as base maps for graphic representation of facts relating to population, industry, products, etc.

14. National Defense.

Such defense can be efficiently planned only where accurate topographic maps are available. The transfer, disposition and maintenance of a military organization require a detailed knowledge of topography. For offensive and defensive preparation such maps are absolutely indispensable. As a measure of preparedness, such maps justify all possible haste for their completion.

About one-third of Illinois has been topographically mapped, but some revision of the older maps has been found necessary, so that 30% of the State now has good maps available. As fast as the quadrangles of a county are completed, the State issues a topographic map of that County. Maps of eight counties are now available (Clinton, Gallatin, Hardin, Lawrence, McDonough, Monroe, Randolph and St. Clair). As soon as three quadrangles and parts of five more are completed, the State can issue topographic maps of Alexander, Jackson, Johnson, Massac, Pope, Pulaski, Saline, Union and Williamson Counties.

As numerous drainage projects and many miles of highways will be planned and constructed in the next decade, the wisdom of hastening the completion of our State Topographic map is obvious. Lack of it means not only delay in carrying forward certain improvements, but additional cost for development and construction work preceding their completion, and the people of the State pay for this extra cost in higher utility and service charges. Thus our State Legislature, by making an appropriation of $70,000 for the next biennium for this work, will assist greatly in the State's development and will save our people many dollars in unnecessary construction costs and capitalized charges.

The present biennium has seen the completion of a drainage survey of the State under the supervision of the State Geological Survey. The information thus collected and published as bulletin 42 presents a remarkable picture of agricultural opportunity in this State. More than 1,100,000 acres of bottom lands are subject to overflow and in consequence, has merely a nominal value at present. Yet these same lands, where reclaimed by feasible drainage projects, will add millions of dollars to the wealth of the State.

Although Illinois is considered primarily an agricultural state, the annual mineral production ranges well up into millions of dollars. Coal, clay, cement, oil and building stone are a few of the raw products present here in abundance and their economical and efficient exploitation is due in large part to the scientific work conducted by the Illinois State Geological Survey.