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**B**Y conception of a dock and wharf we mean the act of the primary creator of the general idea who, as a railroad president, corporation director or property owner, conceives or puts together the plan of constructing and operating a dock and wharf, building his thought from a mass of separate ideas, business conditions, laws and physical conditions. He starts from a nebulous mass of information with or without few factors of evaluation of the numerous parts and directs the project into engineering channels, from which comes the final development and structure. The engineer, because of the knowledge he possesses of the properties and use of materials, their costs and relative economies, may even be called into or delegated to solve the problem in its conception as well as develop the plan.

Therefore, the problem of the conception of the plan is outlined here before taking up the factors of design.

If it were possible to give each factor of design a value the problem might be reduced to a mathematical basis, but the factors are variable and can only be expressed in general terms until a definite problem is studied.

In conceiving the general plan or scheme of a dock, wharf or waterfront improvement, the character of the service to be rendered or the mission of the completed property is of first importance. A dock and wharf is a means to an end. Except as the means determines the operating cost, the choice of the means is of less importance than the accomplishment of the ends. That plan which accomplishes the end with the lowest cost per year is the most economical. We must include in the cost per year charges which will secure all original invested capital. Each kind of business or service has its own peculiar requirements which call for appropriate qualities in the character of the dock and wharf.

By the definition given above, the dock being the water basin adjacent to the wharf and serving the purpose of giving approach to the wharf for appropriate vessels, is of fewer and simpler details. It partakes of the qualities of any sea road, that is, sufficient room to manoeuvre the boats with ease and dispatch, including boats of the present size and future increased size, sufficient frontage on wharf to accommodate the required number of vessels with depth to float loaded vessels of the present draft and future design.

Consideration must be given to allowing space enough for maintenance and dredging operations if the conditions are liable to cause changes in the depth of water.

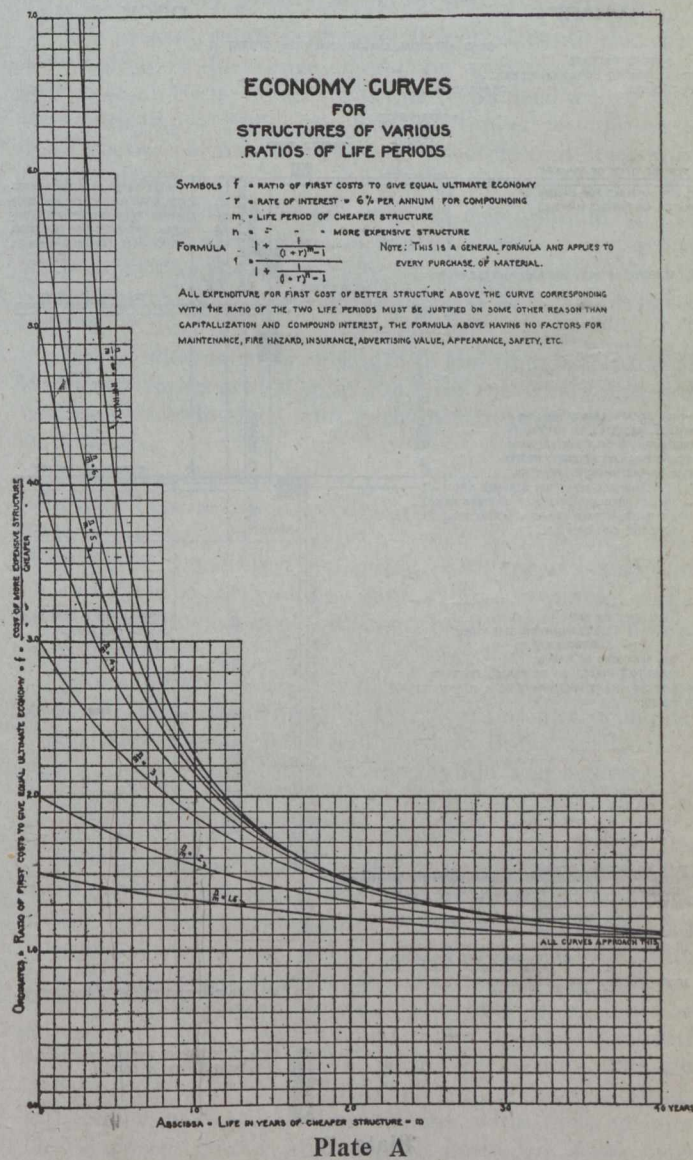
The vessels inside the dock should not be unnecessarily exposed to rough water, and if possible the plan should be such as to secure favorable conditions at the entrance for boats during rough weather and various phases of the tide.

In some cases the dock may be constructed on line of two adjacent properties of different ownership, the dock area being chosen sufficient to serve both properties. The total area thus devoted to water surface may be less than the area required if both parties were to build separate docks. Dock property, which includes the land under the

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water, available for construction of both dock and wharf, has risen in value in recent years and economy in the plan which will minimize the area wasted in waterway is greatly to be desired. Community developments of dock property are very important. The United States government has spent large sums of money in developing harbors and approaches thereto and will continue to do so. This cost is borne indirectly by all and economy in use of the frontages on these harbors will lessen the total amount required to be spent on harbor development, besides producing the greatest returns to each individual property.

Sometimes the dock work is reduced to a minimum because the necessary service is secured by a pier run out into deep water.



The general scheme of a wharf will often be started with limitations of property available either because of prohibitive cost or the finished development of adjoining property by other owners. The shape of parcels of waterfront property is more liable to be irregular than regular, sometimes approaching the square, at other times a long strip between other strips. Sometimes when the shape is suitable, the approach is unsatisfactory because of developments of industries and surrounding communities. The facility of approach with the railroad tracks, complications of manufacturing and improved properties, general natural layout of the ground over which the ap-