the elevator of 5.7 times per year and based on elevator storage capacity of approximately 160 million bushels, the minimum annual handling for profitable operations on all three ocean coasts would be approximately 24.5 million tons or an average of about 400,000 tons per berth.

It was estimated that the 1960 annual capacity of coal berths on the three ocean coasts approximated 357.7 million tons (1.4 million tons × 70 percent to obtain effective vessel working time × 365 days). The total of 357.7 million tons divided by the total number of berths equals an annual average of 8.7 million tons per berth. The 1960 annual capacity of all coal berths on the Great Lakes was 285 million tons (1.7 × 70 percent × 240 days of navigation season). The total of 285 million tons divided by the total number of berths equals an annual average of 3.57 million tons per berth.

On the basis of New York's brief operating experience, it appears that the practical and effective capacity of a container berth for an operation like that of the Sea-Land Service, Inc., is about 500,000 tons per year. The Sea-Land terminal operations in the port of New York have reflected a containerized general cargo rate of 280 tons per gang-hour as compared to the approximate 15 tons per gang-hour normally handled on a conventional break-bulk cargo ship.

(d) *Qualitative Standards of Performance*

In general, port facilities are more than adequate on a quantitative basis to serve the maritime industry in times of peace and during war or crisis. Many are not adequate on a qualitative basis due to the current requirements imposed by technological developments in both sea and land transport. However, substantial numbers of these antiquated terminals are in the process of modernization or removal for new, modern, facilities.

In the past 17 years (Jan. 1, 1946–Dec. 31, 1962), a total of some $1,619,600,000 has been spent on piers, wharves, and docks alone in all U.S. ports for handling of bulk and general cargoes. This total figure was expended for waterside facilities only. It does not include many other construction projects in the broad field of port development which have also been built at these harbors, such as barge terminals, shipyards, harbor floating equipment, ferries, bridges, tunnels, expressways, airports, railroad yards, and other transportation facilities.

In the foreseeable future, there is no sign that this nationwide port building and modernization program will diminish in tempo. Impressive long-range building plans continue to be projected at seaboard ports.

In the economical design of piers and wharves an estimate of the commercial life of a structure is of considerable importance.

Some port engineers consider that it is not profitable to spend money for permanence of piers and wharves in excess of that required to give them a life of about 40 years. As few as 25 years has been allowed as the commercial life of wharf structures in some ports. On the other hand, there are ports where construction has been based on a life of 100 years. However, it is seldom advisable to make the total