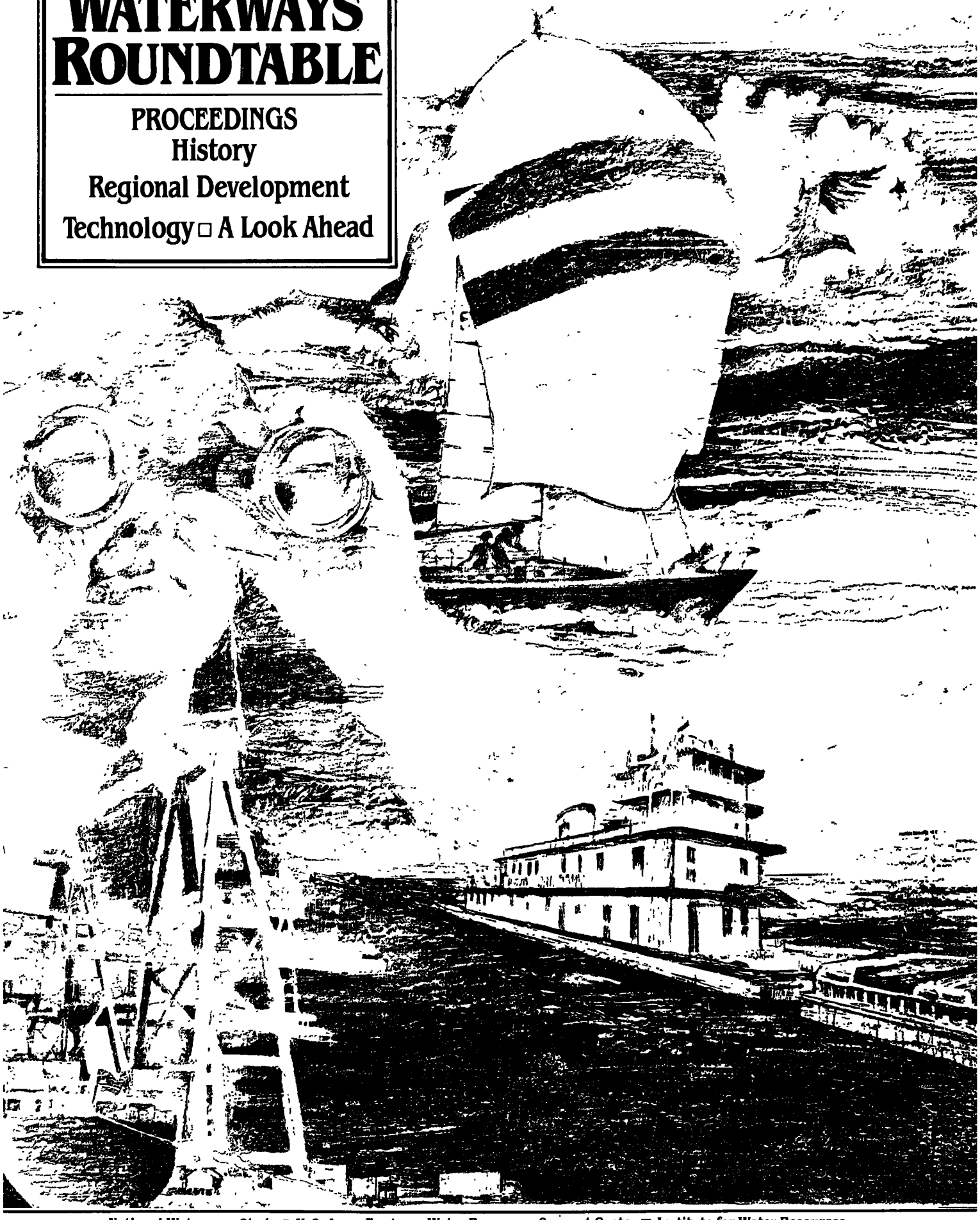
NATIONAL WATERWAYS ROUNDTABLE

PROCEEDINGS
History
Regional Development
Technology □ A Look Ahead



National Waterways Study □ U. S. Army Engineer Water Resources Support Center □ Institute for Water Resources

PLANNING CONSIDERATIONS FOR COMMERCIAL WATERWAYS AND PORTS OF THE UNITED STATES

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SUMMARY OVERVIEW

This staff report is intended as an introduction to some of the principal social, economical and technical problems in planning future commercial waterways and ports of the United States. Commercial waterways and ports are those used regularly in the movement of freight in domestic or foreign trade. There is also limited use of these waterways for passenger traffic. The commercial waterways include the inland waterways, such as the Ohio and Mississippi Rivers; the coastal waterways and canals; the Great Lakes and the coastal trade routes.

The navigation improvements discussed here and their operation and maintenance are, for the most part, under the jurisdiction of the United States Army Corps of Engineers. In its future water resource planning and management program, the Corps of Engineers has the complex task of relating the transportation function to the many other essential functions served by the water resources of the nation, including municipal and industrial water supply, hydroelectric power generation, recreation, and waste disposal and conveyance. Flood control, drainage, shoreline protection, and fish and wildlife habitat protection and enhancement are also essential elements in the multiple purpose water resources planning program of the Corps. In appraising the commercial transportation potential of the nation's waterways, it is important at the outset to understand that programs which facilitate other uses for the water resource may either strengthen the navigation capacity, as when flood control reservoirs provide storage to regulate streamflow, or diminish that capacity, as when withdrawals of water for irrigation place seasonal limitations on the availability of streamflow. Thus, the forces of competition for the water resource together with the related resource management plans strongly influence the role of water transportation in relation to the other modes of transportation covered in national transportation planning.

The growing complexity of both water resource planning and general transportation planning has tended to obscure both the role of the waterways in transportation and the value of the waterways and ports to interstate highway motor carriers and the railroad freight train as movers of commodities than there is of the waterways, tows and ships, and related port facilities. The highways and railroads are, or course, vital elements in our national transport system. So are the waterways, for the nation still seems to be faced with requirements for increasing

its total transport capacity to meet both foreign and domestic commodity transportation needs. It is important for the public to have a good understanding of each element in the transportation system so that a truly integrated system may be gradually developed, serving the nationwide need for freight movement in the most effective, economical, and energy-efficient manner.

There are 25,500 miles of commercially navigable inland and coastal waterways in addition to the shipping lanes of the Great Lakes and the coastal trade routes. These waterways are served by commercial ports operated by private industry or by local or state government. Navigation improvements along the waterways include locks at 265 sites, channel alignments, bank stabilization, cut-offs, dredging and clearing and snagging operations. The Corps of Engineers operates most of the locks, maintains most of the improved waterways and is also responsible for much of the dredge fleet capacity required for maintaining the channels and ports. Since 1824, the Federal government has invested about $10 billion in the development and maintenance of the inland and intracoastal waterways and in the Great Lakes and coastal ports. Annual maintenance costs for these facilities range from $350 to $400 million at the present time.

There is an important national defense aspect to the development and operation and maintenance work of the United States Army Corps of Engineers on the nation's waterways and ports. However the investment in waterways and ports is also justified by the great volume of commercial traffic which uses the system. Approximately two billion tons of freight move along the waterways and through the ports each year. Commercial waterway traffic has increased sevenfold in the past 25 years, reaching a 1977 level of more than 350 billion ton-miles. About one-sixth of the nation's domestic intercity freight moves by the inland waterways and the Great Lakes.

The effectiveness of the waterways in the movement of crude and refined petroleum, coal, grains and fertilizers, industrial chemicals, iron ore, iron and steel products and other bulk commodities has been established by numerous engineering and economic studies. Energy-efficiency comparisons among transport modes are difficult to make, but there is enough evidence to establish modest claims for the efficiency of water transportation in this era of energy shortages. The efficient utilization of the right-of-way by commercial water carriers is also clearly demonstrated. The annual volume of commerce now moving on the waterways averages about 14 million ton-miles per mile of waterway in the system.

The benefits to the nation from the commercial waterway system are widely distributed. Students of the system have found that 131 of the nation's 150 largest urban areas are situated along the commercial navigation system, and that 95 percent of the United States population lives in states served by the waterways. National transportation cost savings due to availability of waterways are substantial.

While the government develops and maintains the waterways, the movement of freight by barge and ship is a private commercial operation throughout the system. On the inland waterways there are about 1,800 private companies engaged in the commercial movement of goods. The capital investment in commercial barges and towing equipment is about $2 billion. Over 80,000 persons are employed in the inland waterways fleet alone. Even these figures would be dwarfed by the addition of similar figures on investment and employment in land-based facilities dependent on the waterways system and in the Great Lakes and ocean-going fleets and their attendant land-based facilities.

A NEW LOOK AT U.S. WATERWAYS

Waterway plans are ideally part of transportation plans as well as part of water resources planning at the Federal and state level. But comprehensive plans including all modes of transportation have proved difficult to develop and are not yet available for the Nation. Likewise, water resources planning is undergoing many changes in response to environmental and conservation objectives, and to changes in the location and character of our water resources problems. A National Transportation Policy Study Commission comprising members of Congress from both the House and the Senate, and private citizens appointed by the President, has recently prepared reports which provide some of the needed guides within the Federal government for preparing planning objectives for the national transportation system.

Despite the lack of explicit transportation planning guidelines, there is a growing recognition of the need for efforts toward development of an integrated, multimodal transportation system, including a comprehensive plan to guide waterway development as part of such a system. The goal of such a plan is to further national goals and objectives through a balanced approach in which technical, economic, social, institutional, and environmental considerations are carefully considered in relation to both the transportation needs and other water resources needs served by each segment of the waterway system.

Three elements of the waterways system need strong emphasis in any discussion of water transportation planning. These are: (1) basic freight movement capability, (2) safety and reliability, and (3) the potential defense and emergency roles. Knowledge of these aspects is necessary to define the functional role of water transportation and understand the potential for integration into a multimodal, national freight transportation network.

Assessment of the transport capability of a waterways system is a highly technical planning task. The system required to meet future needs, as well as the capability to meet current demand, must be appraised. The full range of other water uses, current and projected, must be considered in any assessment of waterway capability, as must the wide range of transportation needs including defense, security, and emergency. Both supply and demand perspectives must be maintained throughout the capability analysis, and there may be need for qualitative studies of the relevant waterway institutions. These inventories and investigations should lead to the identification of significant constraints throughout the waterway system in the sense that problems and issues will be brought into focus so that a realistic estimate of waterways capability, present and potential, is possible.

Because supportive projections of regional and national activity underlie forecasts of navigation needs, it is necessary to develop rational, coordinated sets of assumptions about future expectations. The development of these scenarios will facilitate displaying a number of important capability comparisons including: (1) the capability of the current system to meet the current needs; (2) the capability of the existing system to meet all or part of the projected needs; (3) the capability of alternative waterways development/management strategies to serve projected future needs.

Questions concerning the safety of navigation facilities, their operational procedures, and the reliability of the system under sustained use are, of course, closely related to the capability question. But these latter questions have special significance for the U.S. waterways where many of the navigation improvements were installed decades ago with consequent concern in many cases for the sheer structural adequacy of the system. Questions of dam safety, for example, as well as the general safety of all elements of the transportation system--rail, truck, water, pipeline and air--are today sharply etched on the public mind. Less dramatic, but not unprecedented, events such as the collapse of lock walls could also cause loss of life. However, breakdown of waterway service due to functional failure of a critically located major structure such as Lock and Dam No. 26 on the Mississippi River or Gallipolis Lock and Dam on the Ohio River would have far more serious national implications than the considerably less likely failure which would result in loss of life. The hazardous or pollutant character of some commodities commonly moved by water is also of concern to waterway operators and the public. Water transport has several significant advantages over other modes in the movement of hazardous materials. Other navigation hazards stem from the geometry of specific waterways, often leading to the need for safety related dredging. Plans for the waterways will be significantly shaped by these safety factors, some of which are closely related to the age and operating characteristics of essential system facilities now under heavy use.

All modern industrial societies are dependent on reliable and efficient freight transport systems, and the underlying planning and management, which makes them possible. In the United States economy, transportation outlays directly or indirectly account for about 20 percent of the gross national product. Transportation or transport-related industries employ over 10 million people, about 11 percent of the civilian workforce. This dependence makes transportation planning a crucial part of national economic planning and of defense and emergency planning. The history of waterways use testifies to the important part the waterways have played in national defense during every major war. The intrinsic value of the waterway as a logistical element in defense planning is widely recognized. However, the low redundance of much of the inland waterways system makes it vulnerable with consequent implications for national defense, security, and emergency funds.

MOVING TOWARD AN INTEGRATED TRANSPORTATION SYSTEM

Significant and rapid changes are occurring throughout the United States economy. Some of these stem from the cumulative effect of new technologies. Others are related to the maturing of our economy as evidenced, for example, by the growth of the service sector over the manufacturing and industrial sectors. There have also been quite rapid changes in the character of our foreign trade in response to the changing needs and desires of other nations. Important changes have followed from our altered position in respect to the sources of energy, both foreign and domestic. Each of these changes holds important implications for our transportation network, including water transportation.

Once we relate transportation to the many needs which it serves and thus to the many technical, social, and economic influences and pressures to which it must respond, we have a basis for understanding that transportation plans are made up of many elements of greatly varying weight. Add to this the fact that transportation plans are meant to serve goals and objectives directed to future conditions, and it is clear that all transport modes rail, truck, water, pipeline, and even air are parts of a whole and are properly judged by the contribution they make to national goals and objectives. Thus the U.S. waterways system must be examined with the objective of appraising the contribution it is capable of making to the transportation system of the nation.

The social and economic changes mentioned above (and many others could be added to the list) have begun to alter fundamentally the role of commercial transportation in our economy. It can be anticipated that water transportation will feel its share of the impacts of economic and social change. In examining those forces for changes which may

influence the role of transportation in the future, the trends and hypotheses discussed below provide a useful framework for thinking about future transportation needs.

1. The Changing Role of Transportation. The national transportation system must be viewed as dynamic, as capable of significant change, in both its private and public sector. This is not unrealistic in light of the great changes in the U.S. transportation system which have taken place in the last generations. Today transportation change, to a very large degree, comes about in response to changes in the economic and social life of the nation and the regions rather than as a result of acts of enterprise on the part of the transportation sector. Transportation appears to be increasingly a result rather than a cause of economic change. In other words, the locational effect of transportation improvements on industry and manufacturing is today less than it was in the 19th and early 20th centuries when so many of our waterways, and later railways, were opening up new territory for the south and westward movement of agriculture, industry, and manufacturing.

2. Transportation Policy vs. Modal Assessments. The relationships which existed in the past or which exist today between transport modes—rail, truck, water, pipeline and air—do not provide a wholly adequate basis for examining the future. Each of the major modes has a distinctly different history. The history of each casts long shadows across America. Gradual changes in the structure of our economy, in technology and in national objectives have allowed these shadows to converge so that when we think of transportation from the national point of view, we first think of the nation's total transport capacity and how to strengthen it, not in terms of railroad plans or the needs for waterways. Transportation policy now demands attention over modal plans.

3. Factors in Modal Selection. Transportation planning where mode selection and promotions are concerned is undergoing important rethinking. Among shippers this takes the form of considering long run as well as immediate interest in planning for commodity transport. Low costs and degree of service are certainly important elements in all transportation decisions, but they may not be the most important elements, particularly where long run considerations are significant. Developing technologies, particularly management technology, are affecting the relationship between modes. Environmental and conservation requirements, particularly where there are tax or other incentives, have become important in transportation decisions. Energy-specific priorities are now well understood as are matters of safety. The planner's role in spotting potentials and trends in model shifts, should lead to the development of a more responsive transportation system, but the planner needs the help of shipper and carrier judgments expressed through broadbased decisions on what is important to the national transport system.

4. Integration as an Objective. The achievement of an integrated transport system is one of the major objectives of transportation planning. It is clearly important to understand what is meant by the term "integrated" as used by transportation planners. In ideal terms an integrated transport system is one in which each mode is employed to produce the greatest overall transportation benefit for the nation. It is necessary to carefully distinguish between an integrated system and a national transportation system based upon a desired level of intermodel movements, preservation of modes or any other objective. The objective of an integrated system does not imply any specific degree of intermodality. For example, it is quite possible that an integrated system designed to its optimum would have a significant volume of intermodel movement between rail and truck, truck and water, and between rail and water. There may be, of course, other combinations of modes as the need for transportation services dictates. There are many institutional arrangements which further or retard intermodal movements. Of these, through or joint rates are often mentioned. But it is possible to have commodities moving in intermodal traffic without the availability of through rates (in which one combined rate is offered for movement by two or more modes of transportation) and without joint rates (in which separate rates are offered for a continued movement of a commodity from origin to destination by two or more modes).

5. Some Hidden Costs. Transportation, like other economic and social segments, has sometimes produced negative impacts which have not been easy to cover in the price charged for transport services. Often these have been forgotten or ignored. The social cost of these negative impacts is often high. In any case they should be sought out and remedies developed as far as possible. Planners suspect that a close look at transportation will identify many yet unknown areas for qualitative improvement. National guidelines and possibly incentives may be needed to stimulate interest in technological assessment, growth strategies, environmental quality, defense, safety and welfare considerations. We often speak of transportation needs. One of the biggest "needs" may be a better understanding of the qualitative changes that should be made in each of the areas just mentioned. In this light the intrinsic value of transportation planning becomes evident.

6. Flow Characteristics of Transportation. As the American economy has grown larger and more complex, the delivery of goods and raw materials has increasingly taken on characteristics of a continuous flow rather than those of a series of finite, discontinuous shipments which are more characteristic of less developed economies. Once the flow characteristic becomes rather fully developed, the time required for delivery—that is, the speed of delivery of individual shipments—is not as important as efficiency, regularity, safety and certainty of shipment delivery. The flow character of transport may prove important in

determining the relative value of a given mode in satisfying varying future transportation requirements. The trend toward flow characteristics for certain types of shipments does not reduce the importance of speed of delivery for other types of goods. It does suggest that there are few blanket rules to guide transportation planning and that choice of mode is a complex matter.

7. Changes in Foreign Shipper Practices. The transportation system as a whole and the waterway and ports in particular, will be subject to influences which stem from foreign trade. In recent years new technology in ship design such as LASH and Seabee and a certain type of mini-ships, has brought a degree of international activity into the inland waterways of the United States. The development of deepwater ports for the unloading of very large bulk carriers has also introduced planning needs which stem from changes in foreign trade. The development of offshore oil terminals may have an important impact on the waterways and ports as it occurs.

8. Energy Considerations. The significance of the energy shortages for transportation planning needs to be carefully analyzed. Clearly, energy efficiency in transportation may change conventional concepts about the relative advantages of different modes. But the impact will be felt more broadly. The prospect of an energy-constrained economy for many years ahead sharply suggests that transportation cannot continue its role as a major force in the geography of economic and social growth, and, indeed, that transportation planning should be guided by national economic needs and policies to allocate scarce resources, promote conservation, and sustain environmental efforts.

9. Impact of Service Indicators. Economists and geographers have pointed out that the distribution of the service sector may become a major factor in the distribution of future economic development and thus in the pattern and use of the commercial transportation system. The shape the service sector will ultimately take is not known. It has been suggested that the location of service industries will be strongly influenced by the new technologies of data transmission and how they are organized and priced. This suggests that some of the regulatory agencies which have had little to do with transportation, such as the Federal Communication Commission (FCC) may in the future emerge as important to transportation planning.

10. Location Effects of Transportation. It has been emphasized that transportation is increasingly a result rather than a cause of economic and social change. Overall, this is probably true, but transportation still has locational effects and may on occasion generate its own demand for freight movement. The location effects of transportation on regional economic development cannot be overlooked, particularly where other social, economic and natural factors are favorable.

These types of considerations are typical of the problem areas, the planning elements, and the planning objectives with which transportation specialists work seeking to identify and to understand the modes and the combination of model movement best equipped to serve particular transportation objectives. An important element is this understanding relates to the impact of foreseeable technologies on each mode and combination of modes, for unless this perspective can be achieved, the plans developed may lead to a system that is not needed or that is less than responsive to present or future transport requirements. Viewed today, the cumulative effect of technology on transportation generally has been to reduce cost and to increase the ubiquity and the flexibility of all transportation services. Students of technology as it affects transportation see continued cost savings, increased service reliability, greater capability for intermodel freight movement, increased speed of service, and enhanced safety and security. They urge the development of new technologies and the rapid transfer of technology among modes with the aim of reducing needed capital investment and operating cost.

NEW TECHNOLOGIES, NEW APPROACHES

New technologies which are now influencing all transport modes are of three general types: (1) transport planning, management and operations are all benefiting from automatic data processing, distribution and control equipment; (2) containerization and the terminals and equipment associated with it is becoming widely used in both domestic and foreign trade, although its full potential has not been realized; (3) vehicles, including rail, truck and waterways equipment are all being improved but at different rates. The distribution of high technology varies greatly by mode. Many of these innovations reduce transportation costs by lowering terminal operating expenses.

While technological improvements are clearly increasing the flexibility of all modes and encouraging certain types of intermodality, the character of the modes remains quite distinct. It is this difference in modal characteristics that determines the value of a given transportation service in meeting varying transport requirements. Defining modal advantages precisely has proved difficult to do in practice. Conceptually it involves relating modal capacity to point-to-point flow as well as to shipment size, frequency and distance of shipments, and desired service levels. Nevertheless, some generalized observations on modal characteristics are useful in understanding commercial transport planning.

For the service areas in which waterways are available, the water mode usually possesses more favorable capacity and cost characteristics than any other mode, for shippers having large quantities of bulk commodities usually seek water carriers where possible. Rail, especially the unit train, is the other possible choice for bulk commodity shipments, and there is often keen competition between rail and water for bulk commodity movements. But where pipeline transportation is available and a high volume of commodities suitable for pipeline exist, the pipeline can dominate all other modes in terms of speed, efficiency and cost. There is often a shift from inland water to pipeline movement for petroleum and related products when the volume of movement reaches a given threshold.

The movement of finished goods is commonly allocated to truck or rail, depending on size, distance and commodity value. Truck and rail provide greater flexibility of speed and are almost evenly distributed throughout the nation. Truck is rarely a direct competitor with water as it handles relatively high value, nonbulk shipments in much smaller lots and usually operates over short distances. The primary focus of intermodal competition occurs between water and rail. Trucking often competes directly with rail, but is largely complementary to the waterways. One major barge line is the owner of a trucking company. The railroads are inhibited by the Panama Canal Act from owning barge lines in all areas in which they offer competitive services. One railroad company now owns a barge line.

In general terms, water has a natural advantage over rail in line haul costs and capacity when sufficient flow volume exists. Transfer, feeder and distributor costs associated with some waterborne movements tend to limit the ability of the water mode to extend its competitive reach inland. Rail possesses a natural advantage over water in terms of speed and geographic range which imparts greater flexibility. The water mode's slower linehaul speed may create an inventory cost disadvantage, particularly for high value or time-sensitive commodities. In general, the water mode has its greatest inherent advantage in the transportation of high-volume, bulk commodities between origins and destinations that are close to or located directly on the waterway.

Bulk commodities are attracted to the water mode since they possess the characteristics necessary to take advantage of the water mode's advantages and can be handled by mechanized facilities. This contributes to the ability to load, unload and store large volumes with relative ease and tends to diminish the water mode's relative handling cost disadvantage. In contradistinction to nonbulks, bulk commodities tend to move in sufficient volumes to capitalize on the low-cost, high-volume capabilities of water transportation. Bulks can be transhipped more efficiently than nonbulks. If shippers and receivers of bulks are located on waterways, transfer, feeder and distributor services are not required.

Bulks also tend to be lower-valued products than nonbulks. This, in turn, holds down inventory costs associated with storing the large volumes necessary to efficiently utilize water transportation and maximizes the importance of low line haul costs. Low value cargoes also minimize inventory costs traceable to longer transit times incurred when using the water mode.

With respect to competition between rail and water, it should be noted that for shipments in regulated commerce, there may be direct competition within the waterways industry by competing barge lines offering services over the same routes to the same points of origin and destination. These lines are also faced with competition from private water carriage and rail.

Profitable operation in the waterway mode has been made possible by the relative lack of complexity of the barging industry, the limited number of commodities moving on the waterways, the sheltered position of the waterways industry, and because no great disparity in efficiency of significant magnitude exists between the various waterway companies. However, the waterways are vulnerable because of their exposure to selective rate reductions by the railroad industry, their continuing need for water-oriented industry sites for origin and destination of traffic movements, their need for fleeting areas, the need for continued dredging and maintenance of channels, and the need for maintenance and operation of locks and dams.

While freight transportation needs should continue to grow in an absolute sense, it may well be at a rate lower than that for the economy as a whole. As a result, competition between rail and water for bulk commodity traffic should intensify. Mining and agriculture, traditionally important consumers of freight services, are among the slowest growing sectors of the economy. Manufacturing has become a relatively stable sector, declining in relative importance in all census regions and subregions since 1950. Whatever increases occur in the manufacturing sector, in terms of employment and output, may not offset the slowed growth in agriculture and mining. The overall demand for freight transportation will diminish as a factor in industry locational decisions if the following events occur:

1. Current demographic trends persist, coupled with "miniaturization" in manufacturing, and continue to reduce the physical transport requirements per dollar per unit of manufacturing output.

2. A technologically-induced decline in transport occurs with the progressive establishment of a nationwide energy grid and expected changes in electric energy production.

The waterways industry as a whole is very competitive. It is usually responsive to the value of new and improved equipment and management practices. The inland waterways operators are among the most efficient and competitive in the system. The management of the inland waterways barge fleets is generally alert with a healthy philosophy. Economists who have studied the inland waterway companies expect the industry to grow in the future at about the same rate as over the past 10 years. Most of the inland waterways shipments are in barge loads (up to 1,500 tons), usually moved in "integrated tows"--ranging up to 48 barges on the lower Mississippi and 15 barges on the Ohio. There is a trend in the industry toward larger companies and toward ownership of water transportation companies by large corporations and cooperatives.

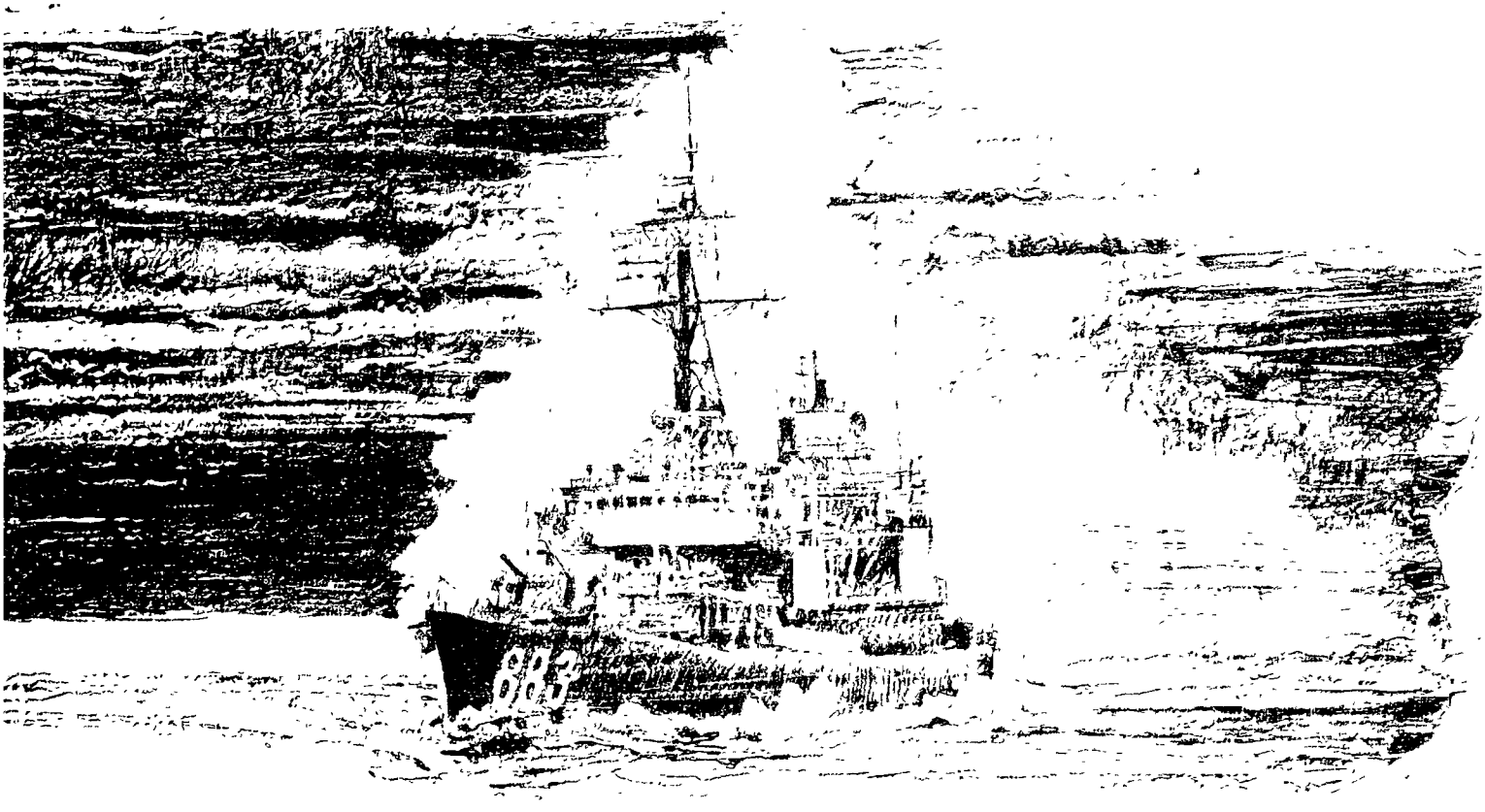
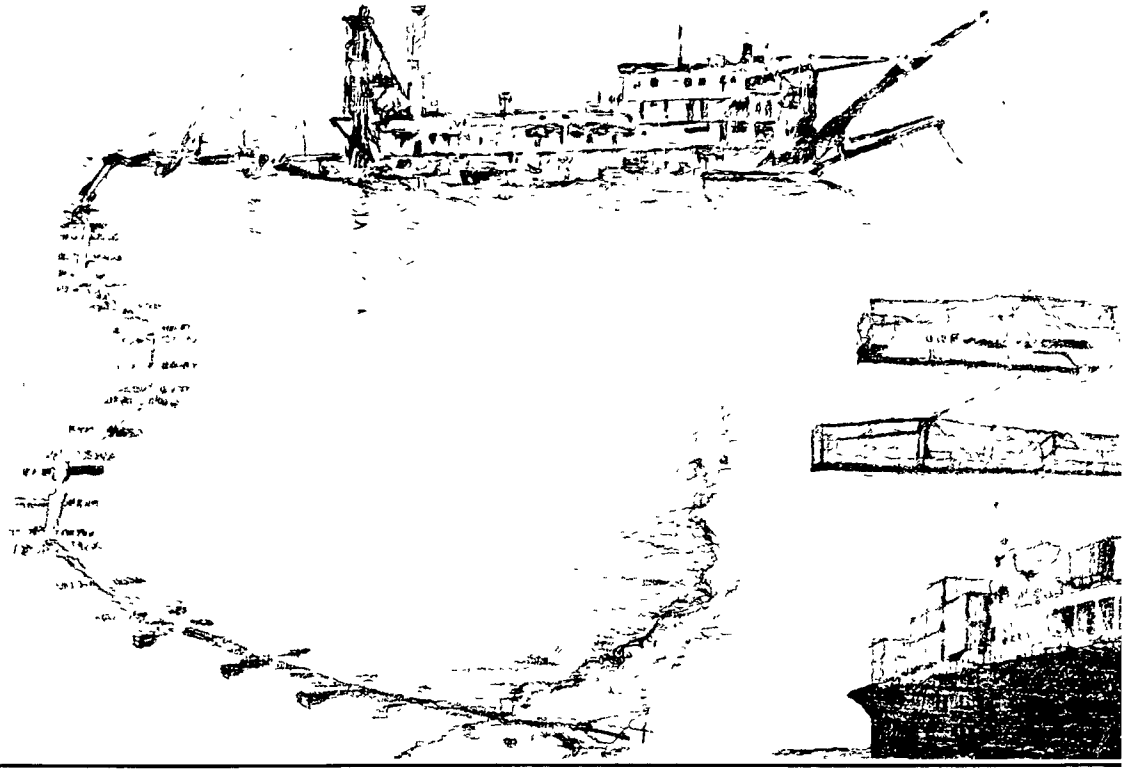
The transportation industry has traditionally been one of the most regulated by government. More than a score of U.S. agencies and many state agencies administer regulatory programs which impact on waterway transportation. The most important are: The Interstate Commerce Commission, the Department of Transportation, the U.S. Army Corps of Engineers, the Maritime Administration, the Environmental Protection Agency, the Occupational Safety and Health Administration, the Federal Communications Commission and the Federal Energy Administration. There are many reasons why the transportation industry is regulated. It has many of the characteristics of a utility and sometimes those of a monopoly. There is a large government investment in each of the modes made in the hope that the transportation services to meet broad public needs will develop. The inland waterways barge operations are the least regulated mode, with the possible exception of the pipeline network. Only about 10 percent of the 1,800 companies engaged in the barge and towing industry in the United States are regulated under the Interstate Commerce Commission. The remaining 90 percent are either engaged in exempt, for-rehire service (bulk shipments) or in private transportation for parent or associated companies. Of the total commerce moving on the waterways, less than 15 percent moves in regulated commerce.

While the economic regulation of the inland waterways is restricted to a relatively small portion of the traffic, the high level of regulations in the other modes has a very important effect on the waterways and particularly on the potential for greater intermodal movement under through or joint rates as well as on the larger question on the role of the waterways may play in an integrated transport system for the United States.

Transport regulation is a task that has troubled most governments of the world over a very long period. Today there is a great clamor for the deregulation of the transportation industry in the belief that free competition will offer the needed control. Certainly many inequities and inefficiencies have been demonstrated in studies of modal competition between the regulated and unregulated modes. The economist,

Robert W. Harbeson, established that economic losses arising from the use of trucks in instances where railroads were more economical were somewhere between $1 to 2.8 billion in 1963. If made today, this estimate would surely be doubled. In 1975 Bechtel Inc. estimated that potential savings through complete and more efficient use of transportation capabilities as a result of deregulation range from $3 to $10 billion per year. They also conclude: "The imposition of regulation on intercity trucking services has converted a trucking industry which by itself should have functional efficiency in a free competitive atmosphere into one which operates as a semi-monopolistic transportation mode. Regulation has also fostered private trucking and the use of company-owned equipment on the inland waterways as an alternative to for-hire transport for large shippers, industry, and cooperatives."

The problems faced by the rail mode are also well known. The railroads have seen their role and modal share decline from one of near dominance to one of general retrechment. In recent years the railroads generally have not been able to attract the investment necessary for needed improvements, or to keep up technological advances. In this situation they have understandably attempted to retain all possible long haul movements, doing so in some instances at less than variable cost. This has acted to restrict desirable intermodalism, by the establishment of rates to encourage exclusive rail use whenever the opportunity arose. The movement of manufacturing and industry to the suburbs where it is impossible or prohibitively expensive for rail lines to follow has hampered the rails in maintaining their market position.

The magnitude of the future demand for transportation and the serious questions being raised regarding the capability to meet foreseen needs effectively and safely is receiving attention at the highest levels of government. It is clear that there is no easy or painless way to achieve an effective integrated commercial transport system for the United States. But the steps toward a desirable level of integration of modes in the transportation system are becoming better understood as the problem of each mode comes under public attention. The financial and capital formation problems of the rail system, the growing public cost of the highways for even longer and heavier trucks, the case for user charges on the commercial waterways, the economic and social problems of airport enlargement and the environmental impact of pipeline developments are now all well known. This knowledge does not make many people happy but it does offer the potential for agreement on what are rational and equitable goals and objectives for a cooperative effort toward an integrated national transportation system, the principles by which such a system should be effected, and the means to be employed in achievement of this goal.

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