The justification for federal assistance in emerging United States surface freight transportation modes: the case for America’s Marine Highways

by

James G. Jorgenson

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in International Transportation Management State University of New York Maritime College April 2021 Thesis Advisor: Shmuel Yahalom, Ph.D.
Contents

Acknowledgements .......................................................................................................................... ii
List of Figures ................................................................................................................................ iii
List of Tables ................................................................................................................................ iii
Introduction .................................................................................................................................. 1
Literature Review ............................................................................................................................ 3
Part I .............................................................................................................................................. 11
   The First Transcontinental Railroad .......................................................................................... 12
   The Interstate Highway System ................................................................................................. 24
   Pilot programs and federal aid .................................................................................................. 41
Part II ............................................................................................................................................ 45
   Historical perspective of the United States maritime industry ................................................. 46
Part III ........................................................................................................................................... 65
   America’s Marine Highway Program ....................................................................................... 66
   Conclusion ................................................................................................................................. 80
   Considerations and Future Research ....................................................................................... 82
References .................................................................................................................................... 83
Appendix ....................................................................................................................................... 92
Acknowledgements

To both of my parents, I would like to thank my mother for teaching me the value of an education and I would like to thank my father for teaching me the importance of effort and attitude.

To Captain Matt Brewster, you have been a mentor to me for the past six years of my career, education, and life. Without your guidance, I would not be where I am today. Thank you.

To Captain Jeffrey Flumignan of the Maritime Administration, I am indebted to your assistance and willingness to support me in my research. To all other employees of the Department of Transportation that assisted me in my research, thank you.

To Professor Rob Cannizzaro, thank you for taking the time to answer my questions. You unintentionally helped me recognize the assumptions that I make in my research. Recognizing the assumptions I make helped me tremendously throughout this graduate program but more specifically with my thesis. Thank you.

To Dr. Smith, I would like to thank you for teaching me at a young age about the affect we have on our environment and the various methods we can exploit to reduce our impact on it.

To Dr. Yahalom, your guidance and advice in helping me develop my thesis and your ability to ask me questions throughout my research that I did not know needed to be asked led me to develop a thesis that I am truly proud of. For everything you have done, thank you.

To Mr. Bruce Richards, your insight and experience inadvertently taught me that parts of my research would take more time to develop than I had anticipated. You helped me come to the realization of what I am not capable of which, to me, has become equally as important as understanding what I am capable of. Thank you.

To Mr. Peter Keyes, thank you for encouraging me to find my own path in my education and research.

To all the librarians and staff members at the New York Public Library, Library of Congress, and Stephen B. Luce Library, thank you for the promptness and rapidity of your responses in helping me find resources I thought impossible to find.

To all other friends, family, and co-workers, talking openly with all of you about my research helped me fill in the gaps of my knowledge. Thank you for listening.

To my best friend, Ashley, if it were not for your constant patience, reassurance, and support, I would not have been able to accomplish any of this. Your confidence in my abilities has imparted me with a sense of self-worth I never knew that I was missing. For that, and for many other things, I am profoundly grateful. From the bottom of my heart, thank you.
List of Figures

Figure 3-1: America’s Marine Highway Routes ................................................................. 67
Figure 3-2: Fiscal Year 2021 Department of Transportation (DOT) Budget ...................... 74

List of Tables

Table 3-1: Designated Marine Highway Projects by Year ............................................... 67
Introduction

In 2010, the United States Department of Transportation (DOT) and Maritime Administration (MARAD) developed America’s Marine Highway Program (AMHP), a type of ‘short-sea shipping’ program unique to the U.S.—similar programs are observed in other parts of the world, e.g. Motorways of the Seas (MoS) in Europe (Raza, Svanberg, & Wiegmans, 2020); AMHP implements the Energy Independence and Security Act (EISA) of 2007 requirements regarding short-sea shipping (Energy Independence and Security Act of 2007, 2007). A key driver of this program is to minimize congested surface transportation conditions, i.e., roads and railways, by developing designated Marine Highways to increase freight transportation capacity, reduce travel delays, reduce greenhouse gas (GHG) emissions, conserve energy, improve safety, and reduce landside infrastructure maintenance costs (Revision of the America’s Marine Highway Program Regulations, 2017). Nearly a decade after its implementation, America’s Marine Highway Program continues to be an emerging freight transportation alternative.

In 2013, the engineering firm Parsons Brinckerhoff (2013, sec. 5-6) prepared a report for the East Coast Marine Highway Initiative Awarding Authority that concluded that the development of a marine highway system could be created and sustained with initial federal start-up support, like what was seen with the first transcontinental railroad in the 1860s and the Interstate Highway System in the 1950s; the East Coast Marine Highway Initiative Awarding Authority was the sponsor of the report and is comprised of the U.S. Maritime Administration (MARAD), New Bedford Harbor Development Commission, Maryland Port Administration, New Jersey Department of Transportation, Canaveral Port Authority, and the I-95 Corridor Coalition. Historically, these emerging surface freight transportation modes, i.e., the first transcontinental railroad and the Interstate Highway System, received legislation that
appropriated significant levels of federal assistance from the Pacific Railroad Act of 1862 and
the Federal Aid Highway Act and Highway Revenue Act of 1956, respectively, during their
nascent stage due to their high social rate of return.

Based on the social rate of return, legislation and federal assistance at levels analogous to
the first transcontinental railroad and Interstate Highway System may be justified and essential to
establish America’s Marine Highway Program as an economical and commercially viable freight
transportation alternative. Historically, however, it has been debated whether federal assistance
in developing both the first transcontinental railroad and Interstate Highway System was
necessary. The objective of this study is to determine what led to the congressional decision for
federal assistance in emerging United States surface freight transportation modes, i.e., the first
transcontinental railroad and the Interstate Highway System, and whether federal assistance was
justified so that they may serve as models in developing plans and policies that effectively
promote America’s Marine Highway Program.

This study is organized as follows: Part I contains a historical analysis of how emerging
U.S. surface freight transportation modes were established, i.e., the first transcontinental railroad
and the Interstate Highway System, and why they received federal assistance so that they may
serve as models in developing effective plans and policies to promote America’s Marine
Highway Program in the future. Part II includes a historical perspective of the U.S. merchant
marine to facilitate an understanding of the events and policies that have shaped the U.S.
merchant marine and the effect it has had on America’s Marine Highway Program. Part III
discusses America’s Marine Highway Program and the associated obstacles and public benefits
of the program. Additionally, Part III includes the conclusion as well as considerations and
recommendations for future research.
Literature Review

The literature review is divided into five sections: the first transcontinental railroad; the Interstate Highway System; the United States merchant marine; America’s Marine Highways; and an overview.

The First Transcontinental Railroad

Ambrose (2000) provides a historical analysis of how the first transcontinental railroad was constructed. A discussion of the financing and political arguments for the first transcontinental railroad are also deliberated.

Armstrong (2008) discusses the past and present state of the United States railroads in the U.S. freight transportation system. Armstrong (2008) goes into elaborate detail on current topics such as technology used in present day railroads, terminal operations, and railroad labor relations.


Duran (2010) developed a thesis regarding the expected profitability of the first transcontinental railroad based on *ex-ante* and *ex-post* information; *ex-ante* information primarily came from entrepreneurs while *ex-post* information was derived from operation of the railroad after it was built. Duran (2010) was able to determine that the first transcontinental railroad was in fact expected to be profitable.

Duran (2013) discusses whether the Pacific Railroad Act was necessary to stimulate private investment in building the first transcontinental railroad.

Fogel (1960) discusses the government’s decision to intervene in the construction of the Union Pacific Railroad by estimating the social rate of return on the construction expenditure.
Hiltzik (2020) provided a detailed analysis of the barons associated with U.S. railroad industry in the 19th century and their impact on the nation.

Loomis (2018) generated a brief overview of the impact Asa Whitney had on the first transcontinental railroad.

McClelland (1972) wrote an article and developed a model to determine the social rate of return on investment in American railroads during the nineteenth century and why previous economists work on the subject are incorrect. McClelland (1972) also discusses the difficulties in measuring the social rate of return.

Mercer (1970) discusses the rates of return for the Central Pacific Railroad during the 19th century. Mercer (1970) goes on to create an economic analysis of land-grant policy for the Central Pacific Railroad and the positive contribution it had towards economic growth in the 19th century.

*The Interstate Highway System*

Lewis (2013) writes a detailed, chronological book about the creation and consequences of the Interstate Highway System on the United States. Lewis (2013) starts with Thomas MacDonald and his initial plan for a national road network and finishes with a discussion regarding the Intermodal Transportation Efficiency Act (ISTEA) and the impact the interstates has on the U.S. today.

Mamuneas and Nadiri (1994) examine the effects of publicly financed infrastructure and R&D capitals on the cost structure of productivity performance of various U.S. manufacturing industries. Nadiri and Mamuneas (1994) found that the rates of return on public R&D and infrastructure capital vary over time.
Mamuneas and Nadiri (2003) develop a model to measure the economic benefits of infrastructure capital and the effects of highway capital on the U.S. economy—Mamuneas and Nadiri (2003) found that the net rate of return to be 34 percent on average from 1949 to 2000 but only 14 percent from 1990 to 2000.

Murphy (2009) developed a concise and deliberate book of the Interstate Highway System from its inception until the completion of the “Big Dig” in Boston, Massachusetts.

The National Academies of Sciences, Engineering, and Medicine (2019) provides a detailed, evidence-based consensus on the Interstate Highway Systems challenges, necessary investments, and recommendations to effectively fund and restore the system to more appropriately align the system with the current state of the U.S. freight transportation system.

Rose and Mohl (2012) developed a book that discusses, as the title directly states, United States highway politics and policy since 1939. The book starts with visions of a national road network at the turn of the twentieth century to Freeway Teardown movements across the United States.

Rose, Seely, and Barrett (2010) discuss the United States transportation system in detail and the policies that shaped it in the twentieth century; this includes discussions of railroads, trucks, and airlines and their respective policies.

*The United States Merchant Marine*

Akpan (2019) developed a comprehensive review of maritime cabotage law in both the United States and abroad and its underpinning principles. Akpan (2019) goes further into discussion about what the common understanding of the maritime cabotage law should be and on what intellectual basis it can be justified.
Day (1920) discusses the U.S. merchant fleet pre- and post-World War I with an analysis of the war and an outlook on the existing state of shipping. Day (1920) also discusses the problems associated with converting a war fleet to permanent peace-time services.

De La Pedraja (1994) created a historical dictionary of the U.S. merchant marine and the shipping industry since the introduction of steam. This piece of literature gives detailed definitions of nearly every facet of the U.S. merchant marine.

Ferguson, Lerner, McGee, Oi, Rapping, and Sobotka (1961) discuss the economic value of the subsidized U.S. merchant marine regarding the associated operating differential subsidy (ODS) and construction differential subsidy (CDS) of the Merchant Marine Act of 1936.

Fitzgerald (1986) developed a dissertation that discusses the Port of San Francisco’s lack of initial commitment and continued struggle to create a viable policy to meet the demands of containerized cargo nearly three decades after its implementation.


Frittelli (2019), in the most recent congressional research report prepared for members and committees of the U.S. Congress, analyzes U.S. shipping under the Jones Act with a legislative and regulatory background. The Appendices provide exemptions and waivers to the Jones Act since its inception.

Frittelli and Carter (2020) developed a report for the U.S. Congress regarding the distribution of the Harbor Maintenance Trust Fund expenditures, its unspent balance, and relevant data to inform decision making.
Gibson and Donovan (2000) discuss U.S. maritime policy, its initial effectiveness, and how the ineffectiveness of appropriate policy implementation has led the U.S. merchant marine to its current state. As an aside, Gibson was a former maritime administrator.

Gorter (1977) examines United States maritime policies following the World War’s and pertinent international economic and political developments.

Jantscher (1975) examines the federal aids to the U.S. maritime industries, the reasons for their implementation, and what they cost the public.

Kilmarx (1979) develops a detailed analysis of the history of the U.S. merchant marine and shipbuilding industry since colonial America. Kilmarx (1979) asserts that the policies of the U.S. merchant marine have proven to be inadequate and a contributing factor to this being a lack of historical understanding of the U.S. merchant marine.

Lawrence (1966) examines the threats to the U.S. private shipping industry and the outdated subsidy system associated with the Merchant Marine Act of 1936.

Maurer and Yu (2008) discuss the economic impact of the Panama Canal and develop a model to determine its social rate of return.

McDowell and Gibbs (1954) discuss the principal aspects of ocean transportation following the World War’s. Discussions about maritime law, marine insurance, shipping finance, and rates and regulations are provided.

Seafarers’ Right International (2018) developed an in-depth analysis of the cabotage laws of the world, both past and present.

The U.S. Maritime Commission (1937) developed an economic survey of the U.S. merchant marine that discusses the issues affecting the ocean-going shipping industry and its relevance to the Merchant Marine Act of 1936.
The U.S. Senate (1935) report, known as the Black Committee report, details the abuse associated with the ocean mail contracts associated with the Merchant Marine Act of 1928.

Whitehurst (1983) discusses a wide range of issues, from policy to industry problems, that affect the current state of American shipping.

Zeis (1938) discusses the motives and forces that guided Congressional action in developing American shipping policy before the Civil War and through World War I.

*America’s Marine Highways*

Burns (2015) examines global port management practices and describes how ports are affected by changes that occur nationally, regionally, and globally.

Levinson (2016) discusses the history and the impact the modern shipping container has had on the world economy.

Levinson (2020) discusses how the concept of globalization is shifting and its effects on the global balance of power.


Parsons Brinckerhoff (2013) prepared a report for the East Coast Marine Highway Initiative Awarding Authority that determined the potential business opportunities for the East Coast Marine Highway Initiative and created strategies for the development of marine highway services along the I-95 corridor.

Perakis and Denisis (2008) discuss the latest developments in short-sea shipping in the United States and Europe and the major issues and benefits related to these programs.
Raza, Svanberg, and Wiegmans (2020) developed a literature review on modal shifts from road haulage to short-sea shipping and created a path for future research based on six categories: factors influencing short-sea shipping competitiveness; the policy-oriented perspective; environmental legislation; short-sea shipping performance; port characteristics; and a multi-agent perspective.

Rodrigue, Comtois, and Slack (2017) discuss the spatial aspects of transportation and how the mobility of passengers and freight is linked with geography.

**Overview**

The literature associated with the first transcontinental railroad and the Interstate Highway System includes numerous accounts of why and how these emerging freight transportation modes were developed and the reasoning for federal assistance. The decision for federal assistance was based on the social rate of return of the respective transportation mode. The issue that is central to this study, and that is overlooked and missing in the literature regarding the United States merchant marine and America’s Marine Highway Program, is that federal assistance and policy in developing America’s Marine Highways should be based on the social rate of return associated with the positive externalities America’s Marine Highways can create.

Based on these reasons, the study is organized as follows: Part I contains a historical analysis of how emerging U.S. surface freight transportation modes were established, i.e., the first transcontinental railroad and the Interstate Highway System, and why they received federal assistance so that they may serve as models in developing effective plans and policies to promote America’s Marine Highways in the future. Part II includes a historical perspective of the U.S. merchant marine to facilitate an understanding of the events and policies that have shaped the
U.S. merchant marine and the effect it has had on America’s Marine Highway Program. Part III discusses America’s Marine Highway Program and the associated obstacles and public benefits of the program. Additionally, Part III includes the conclusion as well as considerations and recommendations for future research.
Part I
The First Transcontinental Railroad

Through the mid-19th century, successful development of the railroads of the eastern United States had been accepted (Hiltzik, 2020):

By the start of the Civil War in April 1861, most of the eastern half of the country had been crosshatched with rails from Maine to Georgia, across to Chicago, and from there due south to New Orleans; but the railroads penetrated no farther west than Kansas City. In 1857, according to a famous map published by the historian Charles O. Paullin, one could reach Cleveland from New York in one day and Chicago in two by rail. But then the tracks ran out and the burdens of overland travel took over: traveling to San Francisco from Chicago required four weeks and Seattle nearly six. (p. 13)

As the growth of railroads in the 19th century continued—a more than twenty-fold increase in track mileage from 1834 to 1854, from 763 miles of track to 15,675 miles of track, respectively (Ambrose, 2000, p. 35)—and as the United States acquired more territory on the Pacific Coast, interest was growing in westward expansion. The westward expansion of the United States was accomplished with the development of the first transcontinental railroad—commonly referred to as the Pacific Railroad. To understand why and how the first transcontinental railroad was constructed, an analysis of the inception, legislation, and reasoning for federal assistance (also referred to as public assistance, federal aid, and government aid) will be discussed in the proceeding section.

As trade between the eastern and western economies of the world continued to expand throughout the nineteenth century, there was growing demand in developing solutions to lessen the distance between the East and the West (Loomis, 2018, p. 3). Railroads in the United States,
especially the eastern United States, were becoming increasingly popular as a long-distance freight transportation alternative because of its competitive advantage, i.e. speed, when compared to waterborne freight transportation; for example, “a trip on the Erie Canal’s 363 miles between Albany and Buffalo took up to four days; a locomotive would soon be able to cover the distance in less than five hours” (Hiltzik, 2020, p. 10). The desire to lessen the distance freight traveled between the East and the West and the increased utilization of railroads in the United States inevitably led to the idea of using the continental United States as a land-bridge, i.e., “an intermodal connection between two ocean carriers separated by a landmass, linked together in a seamless transaction by a land carrier” (Rodrigue, Camtois, & Slack, 2017, p. 415).

The initial proposal to Congress for a railroad to the Pacific was presented by New York legislator, Zadock Pratt, before the second session of the Twenty-eighth Congress (Bain, 1999, p. 13). The title of the document presented, *Railroad from Lake Michigan to the Pacific: Memorial of Asa Whitney, of New York City, relative to the construction of a railroad from lake Michigan to the Pacific ocean* (U.S. Congress, 1845), was handed to Pratt by the author of the document, Asa Whitney. In his memorial, Asa Whitney called upon Congress for a railroad that would cover over 2,000 miles from Lake Michigan to the mouth of the Columbia River (which forms the border between Oregon and Washington), with a right-of-way extending 60 miles wide, and for appropriations totaling $65 million (Ibid). The purpose of the transcontinental railroad proposed by Asa Whitney, among other things, was two-fold: it would decrease the distance traveled from London to China by approximately 5,500 miles, when compared to the traditional route of sailing around the Cape of Good Hope, by creating a land-bridge through the continental U.S. and it would also give the U.S. the ability to control trade with China by diverting Anglo-Chinese traffic from around the tip of Africa—the traffic around the Cape of Good Hope was
estimated to be 1.26 million tons for various years between 1833 to 1845 for the ports of England, the United States, France, Antwerp, Bremen, Hamburgh, the Netherlands, and Russia, and China (Duran, 2010, p. 81—as cited in Whitney, 1849, p. 69)—across the continental U.S. thus effectively giving the U.S. the ability to alter Anglo-Chinese trade patterns in favor of the alternative land-bridge option across the U.S. (Loomis, 2018, p. 4; Duran, 2010, p. 80).

Whitney elaborates further with additional benefits that the United States could anticipate in development of such a railroad: one of the benefits being increased commerce, “your honorable body will readily see the revolution by this [railroad from Lake Michigan to the Pacific] to be wrought in the entire commerce of the world” (U.S. Congress, 1845, p. 2); another benefit being strategic naval control of the Pacific Ocean, “affording a communication from Washington to the Columbia River in less than eight days, a naval depot, with a comparatively small navy, would command the Pacific, the South Atlantic, and Indian Oceans, and the China Seas” (Ibid).

As Whitney anticipated, the expected benefits to the commerce and defense of the United States of building a railroad to the Pacific inevitably did form the explicit reasoning for federal assistance in the construction efforts of the first transcontinental railroad. This single proposal, and Asa Whitney’s efforts before and after this proposal was furnished to Congress, led him to be coined “the Father of the Pacific Railroads” (Loomis, 2018, p. 12).

*The Pacific Railroad Act of 1862*

For nearly two decades after Asa Whitney’s proposal to Congress, although public interest continued to grow for his proposal of a railroad to the Pacific, Congress couldn’t come to an agreement on a bill in favor of Whitney’s plan (Loomis, 2018, p. 8-9). Much of the reasoning
stemmed from the legislative disagreement over the eastern terminus of the proposed railroad (Ibid):

California had become a part of the public domain in 1848, and San Francisco was at once recognized on all sides as the proper place for its western terminus. But with California reaching as far south as any of the southern states, eastern termini in the southern portion of the country became as feasible as termini farther north, and the strife became keen as to the States through which the new transcontinental line was to run. (p. 9)

Fogel (1960) postulated a similar sentiment, “as public discussion became more intense and insistent, Congress seemed to become more deeply enmeshed in that local and sectional rivalry which prevented the majority sentiment in favor of the road from being embodied in law” (p. 19).

Fogel (1960) also suggests that there were two critical factors that led to growing levels of public impatience for a railroad to the Pacific. First, “the general public’s attitude was that the [first transcontinental railroad] was long overdue” (Ibid, p. 19). As cited previously, this attitude stems from nearly two decades of legislative disagreement in Congress. Additionally:

The second and more important factor in promoting public impatience was the attitude that regardless of whether or not the building of the road was ripe from the point of view of its profitability to the builders and owners of the road, it was not only ripe but overripe when measured by the standard of national need. The arguments of national necessity were military and political as well as economic. (Ibid, p. 20)

---

1 Sacramento, California, was later declared the western terminus.
It was not until the southern states seceded from the Union in 1861 that all territories in which the Civil War was taking place were removed from consideration for the eastern termini of the first transcontinental railroad (Loomis, 2018, p. 10). Consequently, northern routes were left as the only feasible option for the eastern termini of the first transcontinental railroad. As Hiltzik (2020) explains, “with the outbreak of the Civil War, the necessity of moving troops and equipment cross-country endowed his [Asa Whitney’s] idea with renewed urgency in Congress” (p. 15).

Thus, on July 1, 1862, less than twenty years after Asa Whitney submitted his proposal to Congress for a transcontinental railroad, President Abraham Lincoln signed the Pacific Railroad Act of 1862 into law—titled, “an act to aid in the construction of a railroad and telegraph line from the Missouri River to the Pacific Ocean, and to secure to the government the use of the same for postal, military, and other purposes” (Pacific Railroad Act of 1862, 1862). While it is worth mentioning that the construction of a telegraph line along the railroad was a critical piece of the 1862 Act, the telegraph’s impact and affects are not the intended focus of this study and therefore will not be discussed further.

The termini, i.e., the points in which the Pacific Railroad will start and end, as well as the track gages, were highly contested pieces of the legislation. The track gages, i.e., the distance between the rails of a railroad track (Armstrong, 2008, p. 337), were contested simply because competing railroad companies used different track gages. Consequently, the new “standard gage” to be set for the Pacific Railroad would benefit some companies and not others. The reason the eastern termini was highly contested was due to the associated political, economic, military, and social benefits a railroad of this magnitude would bring to a geographic area; as Duran (2013) mentions, “the railroad would generate higher growth for one region over others and would
divert trade from other regions” (p. 194). These highly contested issues led to the decision of track gages and the termini of the Central Pacific Railroad and the Union Pacific Railroad—the two railroad lines that encompassed the first transcontinental railroad—to be fixed by the President of the United States, then President Abraham Lincoln, as required by the 1862 Act.2

The first surveys submitted to Washington to promote a bill for a two-stage transcontinental railroad was submitted by Theodore Judah (Duran, 2013, p. 194). The purpose for splitting the first transcontinental railroad into two stages was in large part the result of increasing interest for such a railroad by entrepreneurs (Duran, 2013):

The key moment came when the entrepreneurs divided the plan to build the railroad in two stages after the 1859 Nevada gold rush. The first stage would profit from transporting the Nevada mining traffic, the second stage from transporting the California and China trades. (p. 196)

These entrepreneurs were inevitably able to buy votes “to help pass the Pacific Railroad Act of 1862 through Congress” (Duran, 2013, p. 193).

The first stage of the first transcontinental railroad, known as the Central Pacific Railroad (CPRR), was built by the Central Pacific Railroad Company—the CPRR started in Sacramento, California, and ended in Promontory Summit, Utah; and the second stage, known as the Union Pacific Railroad (UPRR), was built by the Union Pacific Railway Company—the UPRR started in Omaha, Nebraska, and ended in Promontory Summit, Utah. Duran (2010) explains how the topography along the routes created unique engineering obstacles for each stage:

---

2 The “standard gage” set by Abraham Lincoln of four feet eight and a half inches continues to be the “standard gage” for the North American rail network that allows freight cars to move freely between Canada, Mexico, and from coast to coast (Ambrose, 2000, p. 95; Armstrong, 2008, p. 23).
The Pacific Railroad, as an engineering problem, represented a challenge in that it would cross the most difficult terrain in the United States. The railroad would cross the Rocky Mountains and the Sierra Nevada, facing steep grades, deep ravines, solid granite walls and harsh winters. It would also cross the deserts between the Rockies and the Sierra, where very little construction inputs like wood, water and food were available. (p. 24)

**Federal Aid in the First Transcontinental Railroad**

Historically, there has been debate over whether federal aid was even necessary in promoting the private construction of the first transcontinental railroad by the two companies. The debate in question is whether the first transcontinental railroad was expected to be profitable and if the first transcontinental railroad was expected to be profitable, then why was federal aid necessary?

Duran (2010) was able to answer this question and successfully defended that the first transcontinental railroad was expected to be profitable and thus the railroad was built after transportation demand had already been established; the standard view prior to this thesis was that the first transcontinental railroad was not expected to be profitable but Duran (2010) was able to determine that it was in fact profitable. Although the first transcontinental railroad was expected to be profitable, Duran (2010) argued two reasons as to why Congress granted federal aid:

First, the capital market was severely affected during the Civil War and reconstruction; subsidies substituted for a well-functioning domestic and international capital markets. Second, the Pacific Railroad generated positive and negative externalities and a political conflict over the distribution of these externalities existed; entrepreneurs lobbied for
subsidies to insure against future changes in the political equilibrium and the risk of expropriation. Finally, the Pacific Railroad Act also facilitated coordination of construction of the two stages of the railroad line by dividing ownership and setting a construction race between the Central Pacific and the Union Pacific, promoting simultaneous and rapid construction of the Pacific Railroad. (p. 284)

The justification of federal aid stems from the transcontinental railroad creating positive externalities regarding the social rate of return; the positive externalities of the UPRR, or, in this instance, the social rate of return, according to Fogel (1960, p. 98), includes:

a.) The increase in income…due to the opening up of lands in states through which the railroad passed;

b.) The saving to private shippers in areas east of Omaha and West of Ogden City as a result of being able to utilize the Union Pacific for shipments to points beyond the territory traversed by the road at lower rates than would otherwise have prevailed;

c.) The saving to the government as a result of being able to transport men, mail, and material at low railroad rates instead of high wagon and steamship rates;

d.) The saving to producers outside the immediate territory of the Union Pacific as a result of a better division of labor made possible by the existence of the railroad.

The social rate of return—defined by Fogel (1960) as, “the increase in the value of the product of all firms [the government, households, and formally organized businesses] attributable to the investment” (p. 94)—associated with the first transcontinental railroad justified the congressional decision for federal aid. The average social rate of return on the construction expenditure (approximately $60 million in 1869 dollars) for the UPRR for the ten
The year period between 1870 and 1879 was determined to be 29.9 percent (Fogel, 1960, p. 102); the average social rate of return for the CPRR for the 26 year period between 1864 and 1889 was determined to be 24.1 percent (Mercer, 1970, p. 625). The decision for federal aid accelerated the construction race between the UPRR and the CPRR that resulted in promoting simultaneous and rapid construction of the railroad. It is based on this reason, i.e., the high social rate of return, that federal assistance can be justified in constructing the United States surface freight transportation system.

To finance a railroad project of this magnitude, only one entity in the U.S. had the resources necessary to aid in its successful development: the federal government. Asa Whitney understood this, hence why his proposal to Congress called for $65 million of appropriations from the federal government (U.S. Congress, 1845). Another individual that understood that private enterprise alone could not construct a railroad of this magnitude was Theodore Judah; the man who explored, surveyed, and persuaded politicians of a feasible route through the Sierra Nevada—in what came to be the Central Pacific Railroad. As Ambrose (2000) mentions, “it was [Theodore] Judah above all others who saw that the [railroad] line could be built but only with government aid, since only the government had the resources to pay for it” (p. 19).

The 1862 Act appropriated a significant level of land grant and construction subsidies to both the UPRR and CPRR. The construction subsidy in question comes in the form of government bonds. Under section 5 of the 1862 Act (Pacific Railroad Act of 1862, 1862):

Upon the certificate in writing of said commissioners of the completion and equipment of forty consecutive miles of said railroad and telegraph, in accordance with the provisions

---

3 However, McClelland (1972, p. 483) contends that the social rate of return Fogel (1960) declares is inflated and should be roughly 17.7 percent.
of this act, issue to said company bonds of the United States of one thousand dollars each...to the amount of sixteen said bonds per mile for such section of forty miles (p. 492).

The issuance and delivery of the U.S. government-issued bonds to either the Union Pacific Railroad Company or the Central Pacific Railroad Company constituted “a first mortgage on the whole line of the railroad...” (Pacific Railroad Act of 1862, 1862, p. 493). Since the federal government bore much of the financial risk of the first transcontinental railroad, as authorized in the Pacific Railroad Act of 1862, in the event either company defaulted on their loans, the Secretary of the Treasury was authorized to take possession of the railroad line “for the use and benefit of the United States” (Ibid).

The 1862 Act received various levels of scrutiny regarding its complicated syntax (Ambrose, 2000, p. 80), section 11 of the 1862 Act did address the difference in construction efforts; from the flat lands of Nebraska, to the foothills of Wyoming, to the mountains of the Sierra Nevada (Pacific Railroad Act of 1862, 1862). The 1862 Act called for triple the bonds to be issued for “the most mountainous and difficult parts” (Ibid, p. 495) and double the bonds for the foothills (Ibid). The reason for double and triple the bonds to be issued for construction efforts in the foothills and mountains, respectively, is because the terrain posed unique challenges thus making it more costly. For example, the mountain ranges in the Sierra Nevada were more labor intensive due to its geologic features, i.e., granite (Duran, 2010, p. 207). Parts of the Sierra Nevada required significant amounts of black powder—an expense unique to the mountains and some sections of the foothills—to loosen the granite to help make cuts and fills.
and the grading of the roadbed (Ambrose, 2000, p 119-120). Based on this, the UPRR and CPRR “would receive financial aid in the form of government bonds at $16,000 per mile for flat land, $32,000 for foothills, and $48,000 per mile for mountainous terrain…” (Ambrose, 2000, p. 80-81). Bain (1999, p. 116) observed similar figures. These figures, as well as an abbreviated version of the 1862 Act, are reflected in the railroads overall costs which are provided by Duran (2013):

The [1862] Act allocated the first stage of [Theodore] Judah’s transcontinental railroad plan to the Central Pacific. It granted the right of way for the second stage to the Union Pacific, which was incorporated on October 29, 1863 as part of the act. Both companies would build the road and operate it under a long-term lease. The two companies’ rails met in Promontory Point [Summit], Utah, on May 10, 1869, and completed the first transcontinental railroad. Construction of the first stage to Nevada cost $14.1 million, and the whole railroad cost $64.6 million (1860 dollars). With a loan of $37 million (1860 dollars) and 5.5 million acres granted to the railroad companies, it was the largest project supported by federal government in the nineteenth century. (p. 181)

The initial plan for the construction of the first transcontinental railroad was developed by Asa Whitney with its primary purpose of creating a land-bridge across the continental U.S. to reduce travel times and divert traffic from around the Cape of Good Hope and Cape Horn for the economies of the eastern and western hemisphere. What inevitably led to the successful development of the first transcontinental railroad was the enactment of the Pacific Railroad Act of 1862 which appropriated the federal funding necessary to develop a railroad to the Pacific.

---

4 Bloomer Cut required “as much as five hundred kegs of blasting powder a day in early 1864—more than most major battles in the ongoing Civil War—at a cost of $5 to $6 per keg” (Ambrose, 2000, p. 119-120).
The decision for federal aid in the construction and development of the first transcontinental railroad can be justified due to the high social rate of return that was anticipated based on the positive externalities that the railroad would create. A comparable level of federal assistance was deemed necessary for the construction and development of the Interstate Highway System which will be discussed in the next section.
The Interstate Highway System

The first proposal for the development of a national road network preludes the first transcontinental railroad. The demand for the construction of such a road network was conceived out of the growing concern for improving the commerce and defense capabilities of the United States (U.S. Congress, 1939, p. 114). This concern was felt throughout the 19th and into the 20th century, but it was not until 1956 that a comprehensive piece of legislation was ratified that would successfully improve the commerce and defense capabilities of the United States with a plan for the funding and construction of an Interstate Highway System. To understand why and how the Interstate Highway System was constructed, an analysis of the inception, legislation, and reasoning for federal assistance will be discussed in the subsequent section.

Dwight D. Eisenhower and Thomas H. MacDonald

In 1919, less than a year after the armistice following World War I, Lieutenant Colonel Dwight D. Eisenhower spent two months traveling with a convoy of military vehicles from Washington D.C., to San Francisco, California (Murphy, 2009). The purpose of this military convoy was to test the efficacy and reliability of the nation’s national road network and its ability to meet the defense needs of the United States. Murphy (2009) gives a summary of the convoy and its results:

The convoy of 81 vehicles—trucks, ambulances, cars, motorcycles, mobile dining and kitchen cars, and boat and artillery hitches—was three miles long from front to rear. It labored its way at an average of five miles an hour on roads made of sand, mud, and dirt through 11 states and 350 cities. Sometimes the convoy could manage to move only three miles in an entire day. It took two months for the convoy to complete a trip that would
take less than a week today. As bad as the roads were before the army launched its
attention-getting demonstration, they were considerably worse after the convoy rumbled
through. Almost a hundred bridges were damaged or destroyed by the weight and
pounding of the heavy military vehicles. Already deeply rutted roads were torn up even
more. The convoy itself suffered, too. More than 10 percent of the vehicles were
abandoned along the way, rendered inoperable by the punishing road conditions. (p. 47)

The first comprehensive report outlining a national road network that met the commerce and
defense needs of the United States was not published until twenty years following the 1919
Transcontinental Motor Convoy.

According to Rose and Mohl (2012, p. 98), the first comprehensive effort to
conceptualize an Interstate Highway System (IHS) came from a 1939 two-part report from the
Federal Bureau of Public Road’s (now the Federal Highway Administration) titled Toll Roads
and Free Roads (U.S. Congress, 1939). The authors of the 1939 report—largely written by
Thomas H. MacDonald, chief of the Bureau of Public Roads (BPR) who believed that, “the
national road-building project was every bit as important an undertaking and as vital to national
interests as was the transcontinental railroad 50 years earlier” (Murphy, 2009, p. 30), and his
assistant Herbert S. Fairbank—made recommendations based on Part I of the report that tested
the feasibility of a system of transcontinental toll roads—three highways running north and south
and three highways running east and west—and Part II of the report that revealed future
considerations for free highway development.

Part I of the 1939 report was created in accordance with section 13 of the Federal Aid
Highway Act of 1938 (as cited in U.S. Congress, 1939):
The Chief of the Bureau of Public Roads is hereby directed to investigate and make a report of his findings and recommend to the Congress not later than February 1, 1939, with respect to the feasibility of building, and cost of, super-highways not exceeding three in number, running in a general direction from the eastern to the western portion of the United States, and not exceeding three in number, running in a general direction from the northern to the southern portion of the United States, including the feasibility of a toll system on such roads. (p. 1)

The 1939 report found that the building of the six superhighways “is entirely feasible from a physical standpoint” (Ibid, p. 1). The estimated cost per mile would vary from as little as $63,000 in locations from Rupert, ID, to Brigham, UT, to more than $1.1 million from Jersey City, N.J., to New Haven, CT; the cost per mile of these superhighways varied because of factors such as the estimated cost of right-of-way, the number of access points, and the number of bridges, to name a few (Ibid). The 1939 report found a “conservative average” for the annual expenditure for the six superhighways to be more than $184 million per year for the period of 1945 to 1960 (Ibid, p. 2).

For this direct toll system to be feasible, the amount expended by the federal government would need to be recovered with the use of direct tolls from the users. Part I of the 1939 report revealed that the amount expended would far exceed the amount recovered (Ibid):

On the basis of the assumed rates of toll, the estimated total toll collection from the maximum amount of traffic that can reasonably be expected to use the six superhighways would be $84,037,000 for the year 1960 and for the period 1945-60 would be $1,154,236,000, or an average of $72,140,000 per year for the 16-year period, which is considerably less than the $184,054,000, estimated as the probable average total annual
cost of the six superhighways. It is, therefore, concluded that a direct toll system on these six superhighways, in their entirety, would not be feasible as a means of recovering the entire cost of the facilities. (p. 2)

As a silver lining to Part I of the report, the discovery of the financial infeasibility of direct toll superhighways aided the BPR in making recommendations for desirable federal actions for a plan for free highway development found in Part II.

Part II of the 1939 report—titled, *Master Plan for Free Highway Development*—revealed the four most important considerations for the federal government in respect to future free highway development (Ibid, p. 121-122):

1. Facilitating the acquisition of adequate rights-of-way.
2. Providing, in cooperation with the States and the War Department, for detailed investigations leading to the designation of a system of reasonably direct interregional highways…In view of the predominant national importance of such a system, the Federal Government could reasonably contribute to its construction in a proportion materially larger than that in which it contributes under the Federal Highway Act.
3. Continuance of cooperation with the States in the improvement of the Federal-aid highway system and the elimination of hazards at railroad grade crossings…
4. Continuance of the program of secondary and feeder road construction, with appropriations equal to, or larger than those authorized for fiscal years 1940 and 1941…

Part I of the 1939 report found that “the financing of the full costs of such highways by direct-toll collections is not possible” (U.S. Congress, 1939, p. ix), therefore the federal government would have to find another method to finance the construction of a national road
network. Part II of the 1939 report made suggestions to be considered by the federal government for a future plan for free highway development. The type of federal aid to be utilized and the considerations for free highway development were not agreed upon until more than 10 years later under the Eisenhower Administration.

Elected President of the United States in 1953, a goal of President Dwight D. Eisenhower’s first term was to revitalize the nation’s highways (Federal Highway Administration, 2018). Much of what shaped his desire to revitalize the nation’s highways stemmed from his experience in the Army. The 1919 Transcontinental Motor Convoy being one of his experiences. The other experience that significantly influenced the value that President Eisenhower placed on an efficient and effective national road network followed V-E Day. As Commander of the Allied Forces, General Eisenhower traveled the German autobahn himself and acknowledged the value of the German superhighway’s effect on the nation’s resilient defense capabilities (Lewis, 2013, p. 90). President Eisenhower’s experiences and the findings of the 1939 report are considered here as catalysts for what came to be the inception of the Interstate Highway System enacted in 1956.

*The Federal-Aid Highway Act of 1956*

President Eisenhower understood that an Interstate Highway System of the magnitude the country required would necessitate federal aid of the largest extent possible. With the financing of the highways by toll-use found to be infeasible by the 1939 report, other forms of federal aid in the construction of an Interstate Highway System were entertained. The method that was inevitably implemented was first introduced by General Lucius D. Clay, head of the Interagency Committee that was tasked by President Eisenhower to develop a proposal that would address
“the economic requirements for a national road program and then submit a construction and finance plan to the president’s advisory committee” (Rose et al., 2012, p. 73).

The Interagency Committee (commonly referred to as the Clay Committee) submitted its final report to the President on January 11, 1955 (President's Advisory Committee, 1955). The proposal, known as the Clay Committee Report, classified the recommended highway network into three designated systems: the federal-aid primary system—described as connecting “all of the principal cities, county seats, ports, manufacturing areas, and other traffic generating areas” (Ibid, p. 5); the Interstate System—viewed as a section of “the primary system [that is] more important than others, from the viewpoint of national interest” (Ibid); and the federal-aid secondary system—referred to as the farm-to-market system that was composed of feeder roads that linked “the farms, factories, distribution outlets, and smaller communities of our nation with the primary system” (Ibid). In 1954, the primary and secondary system totaled more than 234,000 miles and 482,000 miles, respectively (Ibid). The Clay Committee Report (Ibid) elaborates on why the highway network is designated into separate systems, i.e., for purposes of financing and management:

Thus [the systems] are classified in accordance with the responsibility which those political jurisdictions have in the highway function. A street or road providing access to individual homes or farms obviously is of predominant local interest, whereas one linking together the principal population centers of a State is primarily of state and federal concern. Traffic tends to concentrate on rather limited mileages of highways, so that some of these highways are required to carry heavier volumes than others. (p. 5)

The report then continues with an explanation as to why the current highway system is inadequate, “reduced to its simplest terms, the highway problem is this: traffic has expanded
sharply, without a corresponding expansion in capacity of roads and streets” (Ibid, p. 8). The increase in traffic and the inability to increase the capacity of highway infrastructure, among other things, led to deteriorating roadways and consequently increased safety concerns—President Eisenhower created a grim analogy on the matter as the current set of highways having an “annual death toll comparable to the casualties of a bloody war, beyond calculation in dollar terms” (Ibid, p. 10). As extreme as this statement may seem, this was no hyperbole—from 1946 to 1953, traffic deaths in the U.S. accounted for more than 240,000 lives, more than 30,000 lives per year (Ibid, p. 11). The report then outlines the need for an adequate right-of-way, to be facilitated by the federal government through eminent domain, in order to construct controlled access highways capable of complying with the standards for an effective interstate system for both commerce and defense purposes (Ibid, p. 14).

Based on the Clay Committee Report, out of the $101 billion estimated for the total construction costs of the ten-year program, the federal portion of the cost would amount to about 30 percent of the total, with local and state governments responsible for the remaining 70 percent. (Ibid, p. 19). However, the modernization of the interstate system was estimated to cost $27 billion, i.e., approximately a quarter of the ten-year total construction costs for the project, and so, as “the interstate network is preponderantly national in scope and function” (Ibid, p. v), the federal government would cover $25 billion—roughly 90 percent of the cost of the entire Interstate Highway System (Ibid, p. 21) A summary of the financing program for the interstate system outlined in the 1955 report was provided by Rose et al. (2012):

Directors of a Federal Highway Corporation would handle financing of about $2.5 billion worth of construction yearly while the commissioner of public roads supervised operations. Executives of the corporation would issue bonds—about $25 billion worth
[over ten years]—and retire them over thirty years with gas tax income and occasional borrowing from the treasury. Since traffic would increase, a point on which all agreed, an increase in the gas tax was unnecessary. So lucrative was this arrangement, figured Clay, that it would generate sufficient funds to pay 90 percent of Interstate system costs, to refund debts of toll authorities, and to bring their roads into the Interstate system. (p. 76)

The Clay Committee report maintained a similar view to the *Toll Roads and Free Roads* report regarding the view on toll-road construction, i.e., “that the Federal Government should not enter into toll-road construction nor provide funds for deficit financing of otherwise non-self-supporting projects” (Ibid, p. 16).

The program laid out in the Clay Committee report received various levels of criticism and opposition (Lewis, 2013, p. 112; Rose et al., 2012, p. 78). Subsequently, the Clay program was inevitably turned down and an interstate construction bill sponsored by Senator Albert Arnold Gore, father of Vice President Al Gore, Jr., was approved by the Senate (Lewis, 2013, p. 80). The starkest difference between the two programs was Senator Gore’s inclusion of the Davis-Bacon Amendment that appealed greatly to organized labor (Ibid).

With revisions to Gore’s bill and months of legislative delays, a major highway bill sponsored by Congressmen Hale Boggs of Louisiana and George Fallon of Maryland, known as the Boggs-Fallon bill, was approved by the House on April 27 (Rose et al., 2012, p. 88), approved by the Senate on June 26, and was signed by President Eisenhower on June 29, 1956 (Ibid, p. 92). According to Rose et al. (2012), the key to the success of the Boggs-Fallon bill was “providing something for everyone without imposing high taxes on truckers” (Ibid, p. 89); this inevitably led to “the decision of truckers and leaders of motorist associations, however reluctant, to sponsor the entire federal aid highway program” (Ibid, p. 92). These efforts, and the
efforts of those not mentioned, established the act known as the Federal Aid Highway Act of 1956 and the Highway Revenue Act of 1956.

The primary functions of the Federal-Aid Highway Act of 1956 can be found in its preamble (Federal-Aid Highway Act of 1956, 1956):

To amend and supplement the Federal-Aid Road Act approved July 11, 1916, to authorize appropriations for continuing the construction of highways; to amend the Internal Revenue Code of 1954 to provide additional revenue from the taxes on motor fuel, tires, and trucks and buses; and for other purposes. (p. 374)

While the Interstate Highway System would be able to drastically improve the commerce capabilities of the United States, its true purpose was declared in section 108 of the 1956 Act (Ibid):

It is hereby declared to be essential to the national interest to provide for the early completion of the “National System of Interstate Highways” …It is the intent of the Congress that the Interstate System be completed as nearly as practicable over a thirteen-year period and that the entire System in all the States be brought to simultaneous completion. Because of its primary importance to the national defense, the name of such system is hereby changed to the “National System of Interstate and Defense Highways”. Such National System of Interstate and Defense Highways is hereinafter in this Act referred to as the “Interstate System”. (p. 378)

The construction plan that was inevitably approved under the 1956 Act demanded the highest level of federal-state partnership in leading to its successful development. While the construction details of the Interstate Highway System are not the intended focus of this study,
they must be acknowledged. The National Academies of Sciences, Engineering, and Medicine (2019) provides a synopsis of the plan regarding how the Interstate Highway System was constructed:

The federal government provides leadership in establishing the national vision for the overall system, the bulk of the needed funding, and overall standards, while states prioritize and execute projects in their continued role as owners, builders, operators, and maintainers of the system. (p. 207)

Although the primary importance of the interstate system in the 1956 Act was focused largely on the national defense needs of the United States, several years later President Eisenhower discovered that the Interstate Highway System was in fact inadequate for defense purposes. The reason for this inadequacy is explained by Murphy (2009):

Its [The Interstate Highways] overpasses and bridges were being built three feet shorter than necessary for the safe transportation of missiles and other weapons. Intracity highways served no purpose from a military and defense standpoint: troops and evacuees needed to move quickly between—not within—population centers. (p. 92)

As with any piece of legislation, after decades of legislative debate, compromises had to be made to allow a federal aid highway bill to be passed. The legislative compromises made, President Eisenhower’s oversight while the interstate highway bill was being drafted (Murphy, 2009, p.

---

5 For detailed information on construction of the Interstate Highway System after the 1956 Act, as well as construction controversies, see: Chapters 6, 7, & 8 of Divided Highways by Tom Lewis (2013); Chapters 8 & 9 of Interstate: Highway Politics and Policy since 1939 by Mark H. Rose and Raymond A. Mohl (2012).

6 A detailed discussion of the legislative compromises made regarding the 1956 Act can be found in Chapters 6 & 7 of Interstate: Highway Politics and Policy since 1939 by Mark H. Rose and Raymond A. Mohl (2012).
92), and the President’s desire to simply wanting the job done (Rose et al., 2012, p. 94) led to the initial inadequacy of the Interstate Highway System for defense purposes.

These defense inadequacies, however, were addressed and reconciled several years later so that eventually a 43,000-mile priority network was established that would be suitable for defense purposes (Federal Highway Administration, 2018). Although the Interstate Highways were initially inadequate for defense purposes, this should not diminish the determination and perseverance exhibited by President Eisenhower to improve the commerce and defense capabilities of the United States. For his efforts, President Dwight D. Eisenhower is known as the “Father of the Interstate System” (Ibid).

*Federal Aid in the Interstate Highway System*

In parallel to the development of the first transcontinental railroad, the justification of federal aid stems from the Interstate Highway Systems ability to create positive externalities regarding the social rate of return. As Rodrigue, Comtois, and Slack (2017) mention, the strategic purpose of the Interstate Highway System “was to provide a national road system servicing the American economy and to support troop movements” (p. 132). Although President Eisenhower was mainly motivated to construct an Interstate Highway System for defense purposes, he also pushed heavily for its development because he understood the economic benefits associated with a public works program of this caliber (Lewis, 2013, p. 86).

The initial study—sponsored by the Federal Highway Administration—regarding the social rate of return associated with the Interstate Highway System was initially developed in 1994 by Mamuneas and Nadiri (1994) and later fully developed in 2003, again by Mamuneas and Nadiri (2003). Mamuneas and Nadiri (2003) measured the economic benefits of
infrastructure capital and found that the net social rate of return, i.e., the net social benefit to society, of highway capital between 1949 and 2000 to be .336 or 34 percent; however, between 1990 and 2000, the social rate of return was found to be .136 or 14 percent. These figures, and the formulas used to determine the social rate of return of highway capital, are derived from the following variables: the marginal benefit to consumers, the marginal benefit to producers, tax distortion effects, and the marginal cost of production (Ibid, p. 15). For purposes of this study, a high social rate of return ranges from 20 to 30 percent.8

Lewis (2013, p. 86-88) gives examples of the positive economic ripple effects of a highway construction program—from the surveyors for the right-of-way, to the equipment operators that would level and grade, gravel contractors for the ballast, cement contractors, welders, and the other sectors of the economy that would help produce goods for highway construction; as Lewis (2013) suggests, “a highway program could become a great tidal wave of federal money breaking over every sector of the American economy and influencing every aspect of American life” (p. 88).

The first piece of legislation that called for federal aid highway funding was signed into law under President Woodrow Wilson, known as the Federal Aid Road Act of 1916; the most apparent difference between the 1916 Act and the 1956 Act is that, from a federal aid standpoint,

---

7 For micro- and macro-economic perspectives of public capital and private sector economic performance on U.S. highways, see Federal Highway Administration (2014).
8 As Fogel (1960) states, “the greater the margin by which the return on the capital so invested exceeded the market rate of return, the more confidence one would tend to have in the validity of the government decision to intervene” (p. 92). The social rate of return “is based on the increase in the value of the product of all firms attributable to the investment”, i.e., the private rate of return on the expenditure plus externalities gives you the social rate of return (Fogel, 1960, p. 94). Fogel (1960, p. 103) considers the 29.9 percent average social rate of return of the Union Pacific Railroad as “extremely high”; Mercer (1970, p. 625) found the social rate of return of the Central Pacific Railroad to be 24.1 percent; Mamuneas and Nadiri (2003) found the Interstate Highway System to have a net social rate of return to be 34 percent. These rates of return led to the assumption that a high social rate of return ranges from 20 to 30 percent.
the 1916 Act, under section 6, called for federal aid of up to fifty percent of the total estimated cost (a federal-state ratio of 50-50) and not to exceed $10,000 per mile (Federal Aid Road Act of 1916, 1916). While the 1956 Act did not stipulate limitations on the exact cost per mile—however, Murphy (2009) found that, on average, “each mile of interstate cost about $1 million to build; some rural stretches cost less than a half million dollars per mile, whereas some urban routes required more than $12 million per mile” (p. 88)—section 102 called for federal aid of 45 percent for the federal-aid primary highway system, 30 percent for the federal-aid secondary highway system, and 25 percent for extensions of these systems within urban areas (Federal Aid Highway Act of 1956, 1956). The federal-state ratio was determined based on the needs of the roads for local, state, and the federal government; e.g., the primary highway system would benefit both state and federal government near equally while the secondary highway system and its extensions would primarily benefit state and local governments. However, this federal-state ratio for funding would change drastically with the interstate system because of its primary function in its purpose for national defense.

Regarding the interstate system, section 108(e) of the 1956 Act called for federal aid of up to 90 percent (a federal-state ratio of 90-10), in some cases 95 percent, of the total estimated cost of designated interstate highway projects (Federal Aid Highway Act of 1956, 1956). The formula used to determine the ratio of apportionment between states to receive federal aid did not materially change from the 1916 Act to the 1956 Act; under section 4 of the 1916 Act (Federal Aid Road Act of 1916, 1916), the appropriations shall be apportioned as follows:

One-third in the ratio which the area if each State bears to the total area of all the States; one-third in the ratio which the population of each State bears to the total population of all States, as shown in the latest available Federal census; one-third in the ratio which the
mileage of rural delivery routes and star routes in each State bears to the total mileage of rural delivery routes and star routes in all States. (p. 357)

Near identical formulas for apportionment ratios are reflected in section 21 of the Federal Highway Act of 1921 (Federal Highway Act of 1921, 1921), section 4 of the Federal-Aid Highway Act of 1944 (Federal Aid Highway Act of 1944, 1944), and, lastly, section 2 of the Federal Aid Highway Act of 1956 (Federal Aid Highway Act of 1956, 1956).

The level of appropriations for the Interstate Highway System over the thirteen-year period outlined under section 108(b) totaled over $25 billion (Federal Aid Highway Act of 1956, 1956). These appropriations would be financed primarily by an increase in tax on diesel and special motor fuels (section 202), an increase in tax on trucks, truck trailers, buses, etc. (section 203), an increase in tax on tires of the type used on highway vehicles and tread rubber (section 204), an increase in tax on gasoline (section 205), and an increase in tax on the use of certain vehicles (section 206) (Highway Revenue Act of 1956, 1956). These taxes would then be allocated into the non-divertible Highway Trust Fund, created under section 209 (Ibid), that would then finance the appropriations necessary for the construction and maintenance of the Interstate System. In total, the final estimated cost of the Interstate Highway System was issued in 1991—the total cost was $128.9 billion with a federal share of $119 billion (Federal Highway Administration, 2018). While the indirect and direct benefits of the Interstate Highway System were readily seen in increased highway safety as well as improved commerce and defense capabilities of the United States, the costs, i.e., the negative externalities, must also be addressed.

After the 1956 Act became law, Interstate Highway construction projects tore through the landscape—more specifically through the urban landscape. Permitted by the federal law of eminent domain, i.e., the 5th Amendment of the United States Constitution, Interstate Highway
construction projects were granted the land use required for their required right-of-way.⁹ State and local governments were authorized to build Interstate Highways based on engineering guidelines set out and approved under the 1956 Act. Rose et al. (2012) gives an outline of what came to fruition:

> Working within federal traffic engineering guidelines, highway builders at state and local levels routed new urban expressways in directions of their choosing. Local agendas often dictated such decisions; the result was to drive the Interstates through mostly black and poor neighborhoods. Urban blacks were heavily concentrated in these areas with the oldest and most dilapidated housing, where land acquisition costs were relatively low, and where organized political opposition was weakest. (p. 103)

After nearly a decade of Interstate Highway construction, transportation planning and housing assistance programs were finally enacted under the Highway Act of 1962 that improved the urban transportation planning process and “provided relocation assistance to displaced families and businesses” (Ibid, p. 137).

While predominantly minority urban communities were disproportionately affected and displaced by the interstate construction projects in the 1950s and 1960s, national historic sites and parks were also under siege in cities and states scattered across the country—e.g., the French Quarter in New Orleans, Louisiana (Ibid, p. 154). It wasn’t until two pieces of legislation were enacted in 1966, i.e., the Federal Aid Highway Act of 1966 and the National Historic Preservation Act of 1966, that parks and historic sites, respectively, would be protected from

---

⁹ It is worth noting that eminent domain was also used for the construction of the first transcontinental railroad that granted the UPRR and CPRR the right-of-way necessary for the construction of the Pacific Railway. Additionally, under section 2 of the Pacific Railroad Act of 1862 (1862), Native American’s were stripped of the titles to their lands, “The United States shall extinguish as rapidly as may be, the Indian titles to all lands falling under the operation of this act and required for the said right-of-way and grants hereinafter made” (p. 492).
federal highway projects unless “all possible alternatives had been considered” (Ibid, p. 138). Lastly, appointed Federal Highway Administrator in 1967, Lowell K. Bridwell pushed heavily for state road departments to “consider social and environmental impacts in the planning of urban expressways” (Ibid, p. 141). More than a decade after the 1956 Act was ratified and the Interstate Highways were near completed, the National Environmental Policy Act of 1969 (NEPA) was enacted that “added environmentally sensitive areas to the list of prohibited places for federal highways and required environmental-impact studies for all federal construction projects” (Ibid, p. 155).

The aforementioned events inevitably led to what was coined the “Freeway Revolts” of the 1960s and 1970s which, according to Rose et al. (2012, p. 135), led to crucial responses at the level of policy implementation; e.g., the Federal Aid Highway Act of 1966, the National Historic Preservation Act of 1966, and the National Environmental Policy Act of 1969, to name a few. These pieces of legislation were the result of more than a decade’s worth of “Freeway Revolts” that inevitably led to more purposeful planning and policy affecting federal construction projects. However, “the damage done to the social fabric and economic vitality of many cities by urban freeways that split and isolated neighborhoods persists to this day…” (National Academies of Sciences, Engineering, and Medicine, 2019, p. 42).

Although the construction of the Interstate Highways came at an immeasurable cost to countless communities throughout the United States, the social rate of return associated with the Interstate Highway System, i.e., 34 percent from 1949 to 2000 (Nadiri et al., 2003), justified the congressional decision for federal aid. This decision accelerated construction efforts for

---

10 For detailed information on the effects of Interstate construction on urban areas and the “Freeway Revolts” of the 1960s and 1970s, see: Chapter 8, 9, & 10, of Interstate: Highway Politics and Policy since 1939 by Mark H. Rose and Raymond A. Mohl (2012); Chapter 8 of Divided Highways by Tom Lewis (2013).
Interstate Highways that resulted in an elaborate road network and public works project that led to generations of economic growth. It is based on this reason, i.e., the high social rate of return, that federal aid can be justified in constructing the United States surface freight transportation system.
Pilot programs and federal aid

Pilot programs typically serve as small-scale tests of the feasibility of a potentially larger or full-scale project. Emerging freight transportation modes, i.e., the first transcontinental railroad and the Interstate Highway System, inadvertently developed unofficial pilot programs that helped lead to the congressional decision for federal assistance.

The Central Pacific Railroad

The pilot program for the first transcontinental railroad is considered here as the construction of the first stage of the railroad, the CPRR, from Sacramento to Promontory Summit. As Duran (2010) stated:

Since the entrepreneurs make the decision to build the second stage [the UPRR] after completion of the first stage [the CPRR], by then they already know if the expected operational practicability and construction cost reductions of the first stage have been achieved. Successful completion and operation of the first stage with lower construction costs certainly boosts the expected operational practicability of the simpler second stage. The economic incentives for the second stage were connected to increasing traffic growth and high transport time savings premiums. The development of the Colorado gold rush and growth of the Californian and Chinese trades were expected to generate rapid transport demand growth. (p. 282)

By creating a pilot program for the first transcontinental railroad, i.e., the CPRR, the federal government was able to demonstrate the projects feasibility based on transportation demand growth; the transportation demand growth led to profits from four sources (Duran, 2010):

i) technological advantage over wagon roads for the first stage;
ii) rapid transport demand growth on the back of mining booms, the relatively fast growth of the international trade and the fast integration between eastern and western United States;

iii) new good attributes of the rail route generating market power and allowing to charge high transport prices to transport to and from the Pacific Ocean;

iv) little initial knowledge of the topography of the West and rapid accumulation of this knowledge, allowing to improve the location of the route and reducing substantially construction cost. (p. 238)

Based on profits from transportation demand growth, the federal government was able to successfully demonstrate the feasibility of the CPRR. As the CPRR became more established as an alternative mode of transportation, the increased transportation demand growth led to more interest in construction efforts for the UPRR. Thus, leading to the successful development and completion of the first transcontinental railroad.

*The 1919 Transcontinental Motor Convoy*

The pilot program for the Interstate Highway System is considered here as the 1919 Transcontinental Motor Convoy. The 1919 Convoy is considered to be the pilot program for the Interstate Highway System because it was a small scale study that tested the feasibility of “the mobility of the military during wartime conditions” (Dwight D. Eisenhower Presidential Library, Museum, and Boyhood Home, n.d.). Through this pilot program, i.e., the 1919 Convoy, it was able to clearly demonstrate the inefficacy of the current interstate highway infrastructure for defense purposes.
Although the results of the 1919 Convoy were previously addressed, it is worth mentioning again the impact the 1919 Convoy had on President Eisenhower as he championed for an effective Interstate System throughout his military and political career that inevitably came to influence his decisions to construct an Interstate Highway System during his presidency (Ibid). While the 1919 Convoy as a pilot program is in stark contrast to the CPRR, they are similar in that they both garnered significant levels of public attention and both created a tangible program that demonstrated the feasibility—or infeasibility—of the respective transportation mode to the United States.

Federal Aid

Historically, these pilot programs were supported with federal aid from the federal government. Emerging U.S. freight transportation modes, i.e., the first transcontinental railroad and the Interstate Highway System, received significant initial federal support in the form of federal aid—specifically fiscal aid—due to their positive externalities, i.e., the social rate of return.11 The high social rate of return associated with these modes—29.9 percent for the UPRR (Fogel, 1960, p. 102) and 24.1 percent for the CPRR (Mercer, 1970, p. 625) which encompasses the entire first transcontinental railroad and 34 percent (Nadiri et al., 2003) for the Interstate Highway System—led to the congressional decision for federal aid because of the positive externalities that would significantly benefit the United States on federal, state, and local levels.

Federal government involvement—more specifically federal aid—in a pilot program addresses several issues. First, the federal government bears much of the financial risk associated

---

11 Federal aid can be classified as either fiscal or nonfiscal in character: fiscal aids “cover all forms of assistance that are rendered through the exercise of a government’s taxing or spending powers” (Jantscher, 1975, p.10); nonfiscal aids cover all forms of assistance that are “rendered through the exercise of a government’s regulatory powers” (Ibid, p.11).
with the program. Since the initial development of transportation modes has historically required significant levels of capital, much of which is beyond the capability of private enterprise, the federal government has the means to aid in its development. This is significant because firms (firms meaning any form of state or local government, private or public interest) can approach this type of program with reluctance until it is able to prove its commercial viability. Second, the federal government has the means, in the form of capital and resources, to sustain a long-term pilot program until it becomes commercially viable and self-sustaining. The relevance here is that private enterprise is typically only capable of maintaining a service so long as the program remains commercially viable; once the program becomes uneconomic then the program is concluded. Third, it takes time for a transportation mode to establish itself in the market and a long-term pilot program gives the market enough time to shift to the transportation mode that is most advantageous. Thus, encouraging commercial viability and a self-sustaining service.
Part II
Historical perspective of the United States maritime industry

Since the first act of the 1st U.S. Congress, the United States maritime industry has consistently received various levels of federal assistance. Historically, federal assistance to the U.S. maritime industry has stemmed from numerous programs that can be arranged into four categories: financial assistance; cargo and revenue assistance; administrative assistance; and incentive assistance (Frankel, 1982, p. 44). These four categories can then be classified as either fiscal or non-fiscal in character (Jantscher, 1975, p. 10). To aid in the development of a Marine Highway System, and to create a parallel between emerging freight transportation modes, a detailed perspective of historical events and relevant legislation to the U.S. maritime industry will be addressed.

Pre-20th century

Shortly after the United States gained its independence from Great Britain, the U.S. merchant fleet was adversely affected with less protection upon global waters and severely restricted trade ties (Kilmarx, 1979, p. 27). Additionally, cheaper goods from Britain flooded the American market (Ibid). These events required a response from Congress; the response was increased protection. As Kilmarx (1979) asserts, “the inability of the young nation [the U.S.], either to protect itself from foreign economic invasion or to break the mercantilistic bands which held shut the ports and colonies of Britain and Spain, helped fuel the drive to establish a stronger form of government in 1789” (p. 27).

The first form of federal aid to the U.S. maritime industry came with the Tariff Act of 1789. This Act levied preferential tariffs, commonly referred to as a discriminatory tariff or a protective tariff, that demanded higher duties upon foreign flag vessels than U.S. flagged vessels;
this Act effectively excluded foreign flag vessels from the U.S. coasting trade (Kilmarx, 1979, p. 28). Another relevant section of the Act was that only ships built in the United States could qualify for American registry (Gibson & Donovan, 2000, p. 23). Less than thirty years after the 1789 Act, the Navigation Act of 1817 became law which, under section 4, barred foreign-flagged vessels from the movement of goods between U.S. ports (Akpan, 2019, p. 12). The primary purpose of these two pieces of protective legislation was to establish a strong central government capable of protecting domestic interests from foreign competition.

Since the 1817 Act, the movement of goods between two or more U.S. ports has been reserved for the nation’s fleet. Navigation along the U.S. coastline, synonymously referred to as coasting or coastwise trade, are protected by what is commonly referred to as maritime cabotage law. According to Akpan (2019):

Maritime cabotage law is a legal instrument that allows a sovereign state to reserve all or some of the maritime activities taking place between two or more geographical points of its territorial waters to its national instrumentalities of commerce. By national instrumentalities of commerce, we are referring to indigenous sea and shore personnel, institutions such as ship registers, and maritime infrastructures such as ships and shipyards. (p. 6)

These two pieces of legislation, i.e., the Tariff Act of 1789 and the Navigation Act of 1817, are considered here as the foundation of the protectionist legislation associated with the U.S. maritime cabotage trade. To better understand the entire U.S. maritime industry, i.e., vessels engaged in both domestic and foreign trade, a review of relevant U.S. maritime policies and their drivers will facilitate the next part of this discussion.
Pre-World War I

Prior to World War I, the Panama Canal was nearing completion. Accordingly, the U.S. government was compelled to define rules that would govern this newly developed Canal Zone. Signed into law under President William Howard Taft, the Panama Canal Act of 1912 was ratified to stipulate rules “for the opening, maintenance, protection, and operation of the Panama Canal, and the sanitation and government of the Canal Zone” (Panama Canal Act of 1912 (1912)—as cited in De La Pedraja, 1994, p. 479). The 1912 Act addressed two issues facing the U.S. merchant marine: it aimed to protect and enhance the U.S. merchant fleet with the prohibition of foreign-built vessels from engaging in the U.S. coastwise trade through the Panama Canal (Jantscher, 1975, p. 47; Panama Canal Act of 1912, 1912, p. 562) and the absolute prohibition of the ownership by the railroads of any vessel that would use the Panama Canal (De La Pedraja Toman, 1994, p. 479).12

The 1912 Act, under section 5, reserved toll-free use of the Panama Canal for American coastwise trade—this was viewed as a discriminatory rate (Panama Canal Act of 1912, 1912, p. 562). Although the Panama Canal was not officially opened for vessel traffic until August 15, 1914, the 1912 Act was met with significant levels of criticism due to its violation of the Hay-Pauncefote Treaty of 1901 between the United States and Great Britain that banned discriminatory rates for canal users. Shortly thereafter, to preserve American diplomacy, President Woodrow Wilson was able to secure a congressional repeal of the canal-toll rider thus eliminating the discriminatory toll rate (Kilmarx, 1979, p. 115-116). However, 1914 was not only the opening of the Panama Canal, but it also marked the beginning of World War I.

12 According to Maurer & Yu (2008), from 1923 to 1937, the social rate of return from the Panama Canal was found to average between 10.1 and 10.6 percent (p. 703).
Prior to the United States direct involvement in the first World War, as a part of President Wilson’s presidential campaign and ongoing efforts to effectively promote the U.S. merchant marine, President Wilson expressed his shipping concerns and the United States fleet’s inability to carry the greater portion of its own cargo. Supporting data in a study by Kilmarx (1979—as cited in Saugstad, 1932) estimated that:

Between 1870 and 1910, the nation’s wealth had increased 600 percent, railroad mileage 400 percent, Lake Superior iron-ore production 600 percent, and coal production 1,000 percent. But the United States foreign trade fleet had decreased 50 percent. Whereas in 1870 American vessels carried 37.6 percent of the nation’s exports, in 1910 they hauled only 8.7 percent. (p. 115)

As the war progressed in Europe, Great Britain, Germany, France, and Italy, all of whom U.S. merchants depended upon heavily for their exports, withdrew their merchant fleets from transatlantic service to focus their resources more appropriately on the war effort (Kilmarx, 1979, p. 116; Lawrence, 1966, p. 38). Although the U.S. was not yet directly engaged in the war overseas, the United States merchant fleets inability to carry its own exports and effectively engage in foreign commerce put the U.S. economy and transportation system in what seemed to be a paralytic state; as an example, Gibson et al. (2000, p. 104) estimated that, “in August 1913, America had exported 257,000 bales of cotton; a year later, less than one tenth of this amount had been sent overseas”—the inability of the U.S. to effectively export the surplus of cotton drove down the price of a bale of cotton to half the previous year’s price (as cited in Kilmarx, 1979, p. 117).

Although President Wilson’s shipping concerns became a reality as belligerent foreign nations directly engaged in the war withdrew their merchant fleets from foreign commerce, the
outbreak of World War I, from a sheerly economic perspective, presented an opportunity for the United States to gain control of foreign trade routes. According to Gibson et al. (2000, p. 104), both freight rates and insurance rates became cost prohibitive for belligerent nations and the U.S., a neutral at this time, recognized and ceased on this newfound economic opportunity (as cited in Zeis, 1938, p. 85). Recognizing the opportunity, President Wilson acted by liberalizing the Panama Canal Act of 1912 to allow the transfer of registry of foreign-built ships to American registry to engage in foreign trade routes (a form of “free-ship” policy) and the President had the Secretary of the Treasury, William McAdoo, authorize legislation to establish a Bureau of War Risk Insurance to underwrite war risk insurance on American-owned ships (Gibson et al., 2000, p. 105; Lawrence, 1966, p. 39). Lawrence (1966) mentions that, immediately following these two statutes by President Wilson, the following occurred:

At the outbreak of war over 500,000 tons of U.S.-owned shipping was registered abroad.
By the end of September 1914 more than half of this tonnage had transferred to U.S. flag.
In addition, some foreign tonnage was purchased and shifted to U.S. registry before restrictions on sales were applied by other governments. Suitable vessels operating in domestic trades were also transferred to foreign service. (p. 39)

The United States now had a growing fleet of U.S. flagged vessels engaged in foreign commerce. However, the resulting increase in freight rates for vessels engaged in foreign trade diverted vessels engaged in the U.S. coastwise trade as there was, for lack of a better term, more money to be made in offshore operations.

Although the fleet of U.S. flagged vessels engaged in foreign commerce was growing due to the liberalization of maritime policy, it was not enough to support the needs of the United States economy or the needs of the U.S. military (Kilmarx, 1979, p. 116-117). These events, and
the growing concern of the dwindling coastal fleet necessitated a response from President Wilson. In response, the Shipping Act of 1916 was ratified.

On September 17, 1916, in first of its kind legislation, the Shipping Act of 1916 established the United States Shipping Board (USSB) and initiated government regulation of ocean transportation. The primary functions of the 1916 Act can be found in its preamble (Shipping Act of 1916, 1916):

To establish a United States Shipping Board for the purpose of encouraging, developing, and creating a naval auxiliary and naval reserve and a merchant marine to meet the requirements of the commerce of the United States with its Territories and possessions and with foreign countries; to regulate carriers by water engaged in the foreign and interstate commerce of the United States; and for other purposes. (p. 728)

Congress passed the 1916 Act for two reasons: rising fears of monopoly practices in shipping conferences and shipping shortages caused by World War I (De La Pedraja Toman, 1994, p. 559). It was not until after the United States declared war on Germany on April 6, 1917, that a U.S. merchant marine fleet of an appropriate size was established.

World War I

After the United States entered World War I, the war-impelled economy of the United States requisitioned what coastwise vessels were left to engage in the war efforts. This left the U.S. with a deficit of vessels servicing the coastal trade. These events inevitably compelled the Wilson Administration, more specifically the USSB, to take drastic measures to suspend cabotage legislation, i.e. the Navigation Act of 1817 and its respective amendments of 1893 and
1898, for the duration of the war plus 120 days (*Shipping. Coastwise trade permitted to registered foreign-built vessels, etc., during the war, 1917*).

Although regulating domestic and foreign trade carriers was a critical piece of the 1916 Act, the USSB was authorized “to form one or more corporations for the purchase, construction, equipment, lease, charter, maintenance and operation of merchant vessels in the commerce of the United States” (De La Pedraja Toman, 1994, p. 560). To the U.S. merchant marine this was a pivotal moment because, as the United States was preparing for a wartime emergency, the USSB established the Emergency Fleet Corporation (EFC) to build and operate an unprecedented level of tonnage for the war less than two weeks after the United States formally declared war on Germany.

The efforts of the EFC were widely considered an emergency shipbuilding program. Congress had initially appropriated $750 million to President Wilson for the emergency shipbuilding effort but months later this amount was actually increased to over $3 billion (Zeis, 1938, p. 97-98)—this amount of money “was twice the value of the entire world fleet engaged in international trade prior to 1914” (Gibson et al., 2000, p. 113—as cited in Zeis, 1938)! In total, the EFC built or acquired over 1,700 merchant ships: 470 ships delivered prior to the armistice on November 11, 1918; 757 ships delivered in 1919; 406 ships delivered in 1920; 68 ships delivered in 1921; and three ships built in 1922, the same year the emergency shipbuilding program was dissolved (De La Pedraja Toman, 1994, p. 191).

Although the USSB was authorized to create the EFC, it was also written under section 11 of the Shipping Act of 1916 that (*Shipping Act of 1916, 1916*):
At the expiration of five years from the conclusion of the present European war the operation of vessels on the part of any such corporation in which the United States is then a stockholder shall cease and the said corporation stand dissolved. (p. 732)

What this meant for the U.S. merchant fleet is that within the five years following November 11, 1918, Armistice Day (what is now Veteran’s Day), a surplus amount of tonnage would be available for sale by the U.S. government. The dissolution of the EFC created the impetus that the U.S. merchant marine desperately needed. Before the turn of the 20th century, the U.S. fleet made up just 8.6 percent of the world merchant marine (in tonnage); in contrast, by 1920, some twenty-five years later, the U.S. merchant fleet had grown over 800 percent and now comprised of over a quarter, or 28 percent, of the tonnage of the world merchant marine (Gorter, 1977, p. 12). However, now that the U.S. government was required to dispose of the largest merchant fleet in the world, this created a new congressional priority for the sale of government ships in what inevitably became the Merchant Marine Act of 1920.

*Post-World War I*

As the war came to an end, amid a global flu pandemic (Centers for Disease Control and Prevention, 2019), and as peace delegation progressed at the Versailles Peace Conference, the commercial ambitions of Great Britain, i.e., to recapture and dominate the world’s carrying trades, became clear to Admiral William Benson, chairman of the USSB (Kilmarx, 1979, p. 133-135). With the commercial objectives of Great Britain and a newly available merchant fleet at his disposal, Admiral Benson pushed for, according to Kilmarx (1979), “unusually strong discrimination and subsidies and a 100 percent American involvement in all shipping affairs” (p. 136). With the protectionist point-of-view of Admiral Benson and, according to De La Pedraja (1994), the “fanatical support for a subsidized and privately owned merchant marine” (p. 285) of
Senator Wesley Jones, the two teamed up to sponsor a bill that was signed into law by President Woodrow Wilson on June 5, 1920, in what became the Merchant Marine Act of 1920—commonly referred to as the Jones Act.

The preamble states the purpose of the Merchant Marine Act of 1920, “An Act to provide for the promotion and maintenance of the American merchant marine, to repeal certain emergency legislation, and provide for the disposition, regulation, and use of property acquired thereunder, and for other purposes” (Merchant Marine Act of 1920, 1920). Section 1 of the 1920 Act states the official policy for the development of an American merchant marine (Merchant Marine Act of 1920, 1920):

That it is necessary for the national defense and for the proper growth of its foreign and domestic commerce that the United States shall have a merchant marine of the best equipped and most suitable types of vessels sufficient to carry the greater portion of its commerce and serve as a naval or military auxiliary in time of war or national emergency, ultimately to be owned and operated privately by citizens of the United States; and it is hereby declared to be the policy of the United States to do whatever may be necessary to develop and encourage the maintenance of such a merchant marine, and, in so far as may not be inconsistent with the express provisions of this Act, the United States Shipping Board shall, in the disposition of vessels and shipping property as hereinafter provided, in the making of rules and regulations, and in the administration of the shipping laws keep always in view this purpose and object as the primary end to be attained. (p. 988)

With an abundance of ships at the USSBs disposal, the Merchant Marine Act of 1920 was, in large part, a ship-sale act that “provided for the sale of government-owned ships and
routes on which government-sponsored service had been established” (Whitehurst, 1983, p. 26). Frankel (1982, p. 46) echoes a similar sentiment. Kilmarx (1979) contends that the Merchant Marine Act of 1920 accomplished two administrative objectives: “it completed the governments general economic demobilization following the war” (p. 136) and it strengthened “the foreign trade apparatus of American commerce” (p. 137). Akpan (2019) endorses a similar view in that the 1920 Act “was conceived originally to sustain the merchant fleet after World War I” (p. 114). Consequently, in June 1920, the U.S. merchant fleet was comprised of 4,110 vessels of 100 tons or greater—i.e., 27 percent of the world tonnage (U.S. Federal Reserve Board, 1921, p. 186).

Regarding U.S. politics following World War I, Levinson (2020) asserts that, “Nationalistic ideas came to dominate economic policy. Trade barriers rose anew, foreign investment became suspect, and domestic control of merchant shipping was treated as a strategic imperative” (p. 39). Bearing this in mind, Section 27 of the Merchant Marine Act of 1920 re-established the U.S. cabotage laws (Merchant Marine Act of 1920, 1920):

That no merchandise shall be transported by water, or by land and water, on penalty of forfeiture thereof, between points in the United States, including Districts, Territories, and possessions thereof embraced within the coastwise laws, either directly or via a foreign port, or for any part of the transportation, in any other vessel than a vessel built in and documented under the laws of the United States and owned by persons who are citizens of the United States...”. (p. 999)

The 1920 Act provides the framework for the current cabotage laws of the United States found throughout Title 46 of the U.S. Code; Akpan (2019) describes the 1920 Act as a “more stringent version of the 1789 and 1898 acts” (p. 115). Fundamentally, however, cabotage laws have essentially remained the same since the 1898 amendment to the Navigation Act of 1817.
Understanding the events and legislation from the Tariff Act of 1789 to the Merchant Marine Act of 1920 is necessary in forming an understanding of the cabotage laws that have historically shaped the United States merchant marine to preface and highlight the effects they have had on the U.S. merchant marine at present. From this point forward, relevant U.S. maritime legislation will be presented in chronological order with the events that led up to and followed their enactment.

**The Merchant Marine Act of 1928**

In large part, the aim of the Merchant Marine Act of 1920 was to “create a commercially viable merchant marine that would also serve the needs of the country” (Jantscher, 1975, p. 17). However, it became clear that the privately owned U.S. merchant marine could not compete with foreign competitors (Ibid)—e.g., “ships, stores, repairs, [and] crew, formerly cost the American operator much more than the foreign” (Day, 1920, p. 601). In response to the inability to halt the decline of the U.S. merchant marine with the enactment of the Shipping Act of 1916 and the Merchant Marine Act of 1920 (De La Pedraja Toman, 1994, p. 392), Congress sought to create legislation that would stimulate the construction of new vessels by providing “public subsidies to private shipping lines” for ocean mail contracts (Jantscher, 1975, p. 17). With critical support from Senator Wesley Jones (the senator who sponsored the Merchant Marine Act of 1920, i.e. the Jones Act), this new piece of legislation, enacted on May 22, 1928, was primarily created to “keep afloat the operating companies involved in international trade” (Gibson et al., 2000, p. 122). This piece of legislation became known as the Merchant Marine Act of 1928.

However, under the direction of Senator Hugo Black, chairman of the Senate Investigating Committee, the ocean mail contracts, and the 1928 Act as a whole, were found to be mismanaged and heavily abused leading to significant waste of public funds—the subsidy
contracts were found to be ten times the normal rate for mail carried with operators being awarded approximately $200 million in subsidies (Gibson et al., 2000, p. 124). The resulting scandal due to the findings of the Black Committee, so named because the committee was headed by Senator Hugo Black (De La Pedraja Toman, 1994, p. 78), led to the Merchant Marine Act of 1928 being commonly referred to as a failed program (Gibson et al., 2000, p. 126; Jantscher, 1975, p. 17). Gibson et al. (2000, p. 130) found that the 1928 Act “had in fact not resulted in any significant increase in tonnage, despite the vast funds expended” (as cited in U.S. Senate, 1935). Under the recommendations of the Black Committee, because of the findings of the Black Committee report13, new legislation was passed not only effectively repealing the 1928 Act but implementing a new subsidy program for private shipowners that had stricter and more rigid requirements—in what became known as the Merchant Marine Act of 1936.

The Merchant Marine Act of 1936

According to Gibson et al. (2000, p. 131), although the Black Committee had its reservations regarding a privately owned and operated merchant marine, it became clear that this method was the only viable option in public policy supporting the U.S. merchant marine. And so, with the cautions and recommendations of the Black Committee Report in mind, promoting the U.S. merchant marine was critically important to President Franklin D. Roosevelt. In 1935, based on recommendations and in favor of the Black Committee Report, President Roosevelt endorsed the report and gave Congress three reasons as to why the United States needed an adequate merchant marine: for shipping needs in peace; for shipping needs in war as a neutral; and for

13 See Gibson et al., 2000, p. 126-133, for extensive details on the Black Committee report.
shipping and naval needs with the United States as a belligerent (Gibson et al., 2000, p. 133-134).

However, the U.S. merchant marine engaged in foreign commerce was at a competitive disadvantage when compared to its foreign counterparts that could construct and operate vessel at nearly half the cost; according to Jantscher (1975), “during most of the postwar years the prices of ships built in this country have been nearly double—sometimes more than double—the prices of ships built abroad” (p. 139). Fritelli (2019, p. 4—as cited in U.S. Maritime Commission, 1937) observed similar figures.

To bring the U.S. ship construction and operating costs on parity with foreign costs, President Roosevelt and Congress recognized the need and sought to subsidize the U.S. merchant marine engaged in foreign trade liner service. To achieve parity, the Merchant Marine Act of 1936, “established the two main types of government assistance, the construction differential subsidy (CDS) to help the shipbuilders and the operating differential subsidy (ODS) to help shipowners” (De La Pedraja Toman, 1994, p. 394). However, for shipowners to qualify for an ODS, the ship had to be built with a CDS (Ibid).

The 1936 Act, under section 502 and section 603, respectively, allowed for a CDS of up to 33 1/3 percent of the construction cost of the vessel (Merchant Marine Act of 1936, 1936, p. 1996) and an ODS of up to 75 percent of the operating cost of the vessel (Ibid, p. 2002). However, the ODS is calculated using only the difference between American and foreign operating costs of five different types: wages, subsistence, maintenance and repairs, and insurance (Ferguson, Lerner, McGee, Oi, Rapping, & Sobotka, 1961, p. 45). The Act, specifically the ODS and CDS, created federal aids to the maritime industry that came at a significant economic expense. Jantscher (1975) revealed that by 1973, the ODS had totaled over
$3.6 billion, the CDS had totaled over $1.8 billion, and, in 1969, “the federal government paid about 67 cents of every dollar of wages aboard U.S. cargo vessels in subsidized service” (p. 138).

Furthermore, in determining the economic value of the subsidized U.S. merchant marine, Ferguson et al. (1961) found that the subsidy program associated with the Merchant Marine Act of 1936, i.e., the operating differential subsidy (ODS) and the construction differential subsidy (CDS), “cannot make a substantial economic contribution under prevailing rate policy” (p. 472). However, as Ferguson et al. (1961) explicitly states, “the study has not considered the military value of the [U.S.] merchant marine” (p. 470).

While the total cost of the 1936 Act is considerable in promoting the U.S. merchant marine and shipbuilding industry, the timing and context under which the 1936 Act was passed should be considered regarding the state of the U.S. economy following World War I. While the 1936 Act was an act to aid the U.S. merchant marine, it also came at a time when economic recovery and employment efforts following the Great Depression were shaped by New Deal policies under President Roosevelt. Thus, as Gibson et al. (2000) contended, “[the 1936 Act] was in many ways a bill designed to stimulate employment” (p. 136).


It is necessary for the national defense and development of its foreign and domestic commerce that the United States shall have a merchant marine (a) sufficient to carry its domestic water-borne commerce and a substantial portion of the water-borne export and import foreign-commerce of the United States and to provide shipping service on all

---

14 It is important to note that the contracts associated with the ODS and CDS of the Merchant Marine Act of 1936 have been expired for more than a decade.
routes essential for maintaining the flow of such domestic and foreign water-borne commerce at all times, (b) capable of serving as a naval and military auxiliary in time of war or national emergency, (c) owned and operated under the United States flag by citizens of the United States insofar as may be practicable, and (d) composed of the best-equipped, safest, and most suitable types of vessels, constructed in the United States and manned with a trained and efficient citizen personnel. It is hereby declared to be the policy of the United States to foster the development and encourage the maintenance of such a merchant marine. (p. 1985)

As Frankel (1982, p. 46) indicated, this basic reaffirmation of the 1920 Act clearly demonstrated the government's desired role of the merchant marine for the United States. The Merchant Marine Act of 1936 and its respective amendments continue to define American maritime foreign trade policy today (Gibson et al., 2000, p. 126). These two sets of statutes, the 1920 Act and the 1936 Act, reasserted the key drivers that continue to define U.S. maritime policy: commerce and defense.

*The Merchant Ship Sales Act of 1946*

As the U.S. merchant fleet had already more than tripled in size from 1914 to 1939 (Gibson et al., 2000, p. 165), it was quickly realized that entrance into World War II would require an even larger fleet of merchant vessels due to the war on two fronts. With the United States inevitable entry into the war as a belligerent and the need for a larger merchant fleet, shipbuilding programs were devised under the direction of chairman of the U.S. Maritime Commission (the Maritime Commission replaced the USSB under section 202 of the 1936 Act) and War Shipping Administrator Admiral Emory S. “Jerry” Land. By the end of World War II in 1945, under the direction of Admiral Land and approval of President Roosevelt, the U.S. had
built 5,000 ships at a cost of $12 billion utilizing the novel shipbuilding programs that constructed the renowned Liberty ships, Victory ships, and T-2 tankers, of World War II (Gibson et al., 2000, p. 167; De La Pedraja, 1994, p. 298).

Following the end of World War II in 1945, however, the U.S. Maritime Commission had a merchant fleet that was well beyond the capacity needed to sustain U.S. domestic and foreign trade routes. To dispose of its wartime fleet, the Merchant Ship Sales Act of 1946 was established to make the surplus fleet available for sale to both American and Allied owners (Merchant Ship Sales Act of 1946, 1946); of the more than 4,000 vessels available for sale, nearly 3,500 were dry-cargo vessels and 563 were tankers (McDowell and Gibbs, 1954, p. 259). The 1946 Act, aside from disposing our wartime fleet, was created to aid in the kickstarting of Allied economies that were destroyed following World War II (Gibson et al., 2000, p. 170).

While the 1946 Act also created the National Defense Reserve Fleet (NDRF), a nucleus fleet for the U.S. in case of emergency, the U.S. was able to sell more than 1,100 vessels to non-citizens and more than 800 vessels to U.S. citizens (Kilmarx, 1979, p. 222). As a result, the 1946 Act quickly diminished the size and scope of the U.S. merchant fleet and contributed significantly to the change in the global position of the U.S. merchant marine (Gorter, 1977, p. 6; De La Pedraja Toman, 1994, p. 569). While the acute and chronic effects of such shipbuilding and ship sales programs of the U.S. merchant fleet after World War II are evident, the effects of World War II on U.S. coastal shipping and the domestic U.S. freight transportation system in general requires further analysis.

U.S. coastwise shipping and World War II

Prior to World War II, coastal shipping was able to compete directly with both rail and road for freight. During World War II, however, the need for additional sealift capacity abroad
took precedence over maintaining domestic trade routes forcing domestic operators to enter their vessels into military service. The onset of World War II, according to Gorter (1977), “virtually halted the coasting trade…The trucks and railroads picked up the cargoes formerly moved by vessel…” (p. 133). Gorter (1977) also mentions the “efficiency of trucks and railroads, and the high cost of ocean transportation…” (p. 133) as factors contributing to the shrinking domestic merchant fleet following World War II. Kilmarx (1979, p. 227) acknowledges the decline of the coastal shipping trade after World War II being largely attributable to the competition between rail and trucking.

McDowell et al. (1954) referred to several problems U.S. domestic operators confronted following World War II: ship replacements—most of the vessels pressed into war “were either worn out or lost” and thus needed to be replaced by domestic operators (Ibid, p. 99); rates—the freight rate structure following the war and the high capital costs associated with shipbuilding “deterred ship operators from investing in the ever more costly ships for domestic operation” (Ibid, p. 101); handling costs—“costs, mainly those associated with the transfer of goods between ship and shore, have increased to the point where domestic water transportation has been virtually priced out of business” (Ibid, p. 101); labor relations—“unstable labor-management relations in the shipping industry and on the water front for nearly twenty years have shaken the faith of shippers and consignees in the dependability of water service” (Ibid, p. 101); and economic development—“changes in the location of industry have limited the amount of cargo available to water carriers” (Ibid, p. 102). To put the shrinking domestic coastwise fleet into perspective, the domestic dry-cargo fleet was comprised of 490 vessels in 1939; by 1948, the domestic dry-cargo fleet had shrunk to just 151 vessels, less than a third of its pre-war size.
(McDowell et al., 1954, p. 98). Fitzgerald (1986, p. 30) expressed similar findings of the Pacific Coast domestic shipping industry following World War II.

Nearly forty years following World War II, Whitehurst (1983) shared a similar view regarding the reasons for a modal shift of freight from water to rail and truck:

The traditional break-bulk ship was labor intensive, with respect to both shoreside cargo handling and shipboard manning. The ocean system as it was then constituted simply could not compete for general freight with the scheduling flexibility of the railroads in bulk movement or the long-haul trucks on the nation’s newly built interstate highways…Not even the advent of the container helped in the long run, for while containers had the potential to significantly reduce the cost of the ocean system, stevedore work rules limited any real savings. Moreover, the rail and truck modes quickly adapted to the innovation. (p. 61)

While the development of the first transcontinental railroad and the Interstate Highway System have been discussed, it is worth acknowledging that the U.S. merchant marine engaged in coastwise trade, more specifically the coasting trade of containerized cargo in the contiguous United States, has historically been at a competitive disadvantage when compared to rail and truck. Fritelli (2019, p. 14) observed that domestic ships are carrying less freight today than in the 1950s while other transportation modes are carrying more.

Most of the disadvantages associated with the United States coastal trade of break-bulk and now containerized cargo have, for the most part, remained the same following World War II. The construction of the Interstate Highway System and the development of the intermodal shipping container developed by Malcom McLean, known as the father of containerization (S.
Resolution 454, 2006), in the 1950s and 1960s further exacerbated these disadvantages. Since 2010, to address these disadvantages and other issues, the Maritime Administration developed America’s Marine Highway Program. America’s Marine Highways aim to minimize congested surface transportation conditions and increase the United States surface freight transportation system capacity by utilizing the navigable waterways of the United States. America’s Marine Highway Program will be discussed in Part III.
Part III
America’s Marine Highway Program

In 2010, the United States Department of Transportation (DOT) and Maritime Administration (MARAD) developed America’s Marine Highway Program (AMHP), a type of ‘short-sea shipping’ program unique to the U.S. with similar programs observed in other parts of the world—e.g., Motorways of the Seas (MoS) in Europe (Raza, Svanberg, & Wiegmans, 2020); AMHP implements the Energy Independence and Security Act (EISA) of 2007 requirements regarding short-sea shipping (Energy Independence and Security Act of 2007, 2007). A key driver of this program is to minimize congested surface transportation conditions, i.e., roads and railways, by developing designated Marine Highways to increase freight transportation capacity, reduce travel delays, reduce greenhouse gas (GHG) emissions, conserve energy, improve safety, and reduce landside infrastructure maintenance costs (Revision of the America’s Marine Highway Program Regulations, 2017).

MARAD has currently approved and included 26 designated Marine Highway routes (Appendix A) (U.S. Maritime Administration, 2019); for example, the Marine Highway M-95 route runs parallel to and serves as an extension of the Interstate Highway I-95 along the United States east coast; see Figure 3-1. Currently, there are 46 designated projects along these routes with most of the designated projects providing either intra-harbor, ferry, or non-contiguous services (U.S. Maritime Administration, 2021). These 46 projects are a five-fold increase in designated Marine Highway projects over the past decade; see Table 3-1.
Figure 3-1: America’s Marine Highway Routes

Source: https://www.maritime.dot.gov/grants/marine-highways/marine-highway

Table 3-1: Designated Marine Highway Projects by Year

Source: U.S. Maritime Administration, 2011; U.S. Maritime Administration, 2021
America’s Marine Highways (AMH) have two markets: international feeder cargo and domestic cargo; “international feeder cargo consists of shipments that arrive at a North American port from overseas and then are ultimately delivered by a smaller vessel to another North American port. Domestic cargo originates and terminates within North America” (National Academies of Sciences, Engineering, and Medicine, 2010, p. 8). The two markets require different handling and equipment characteristics, e.g., feeder cargo typically utilizes International Organization for Standardization (ISO) 20’ or 40’ containers while domestic cargo utilizes domestic 53’ containers. America’s Marine Highways can move several types of surface transportation equipment, including intermodal containers both on and off chassis, non-containerized trailers, and rail cars, with the use of containerships, roll-on/roll-off vessels (RO-ROs), and various tug and barge arrangements. However, according to Frittelli (2019), transshipping containerized cargo does not exist in the United States:

Transshipment of international containerized cargo by feeder ships is prevalent abroad, but the practice does not exist in the United States. Instead, essentially all movement of containers between ports in the contiguous United States, including import and export containers, occurs by truck or train. (p. 11)

In its most basic form, America’s Marine Highways propose to create a modal shift for cargo that is most advantageous to be carried by water, e.g., heavy, and hazardous freight. A modal shift to Marine Highways can create positive externalities that otherwise would not be possible with either rail or road. However, there are obstacles associated with America’s Marine Highway services that requires further discussion.
Obstacles

The National Academies of Sciences, Engineering, and Medicine (2010) developed a report that organized obstacles unique to America’s Marine Highways. Service/marketing obstacles include the following: perception of Marine Highway services by other firms, e.g. operators and shippers; lack of supply chain orientation and a lack of modal integration; schedule reliability; trip frequency; insufficient demand; difficulty in selling a feeder service to ocean carriers; large, coastwise ports already served by foreign lines; lack of a defined market, and transit time. Even within the maritime industry, there seems to be a lack of awareness of AMH services or even the concept of Marine Highways in general. The services that individuals or firms are aware of are usually failed ventures which understandably alters the perceived value placed on AMH services. One of the most challenging obstacles to overcome is making AMH services cost competitive with both rail and truck while simultaneously including a time/cost trade off associated with the increased transit time of AMH services.

The costs and operational constraints associated with Marine Highway services creates considerable obstacles. Many of which are unique to waterborne carriers. For example, according to the 2020 New York Terminal Conference Terminal Schedule, as of October 1, 2020, the terminal throughput rate (handling costs of lifting a single container on or off a vessel) for five container terminals in the Port of New York/New Jersey (this includes Red Hook Container Terminal, Global Container Terminal in Bayonne and New York, Port Newark Container Terminal, and APM Terminals in Elizabeth) is $418.07 (New York Terminal Conference, 2020); the terminal throughput rate (actually listed as the basic container unit rate in the Schedule of Rates for Virginia International Terminals) at six container terminals in the Port of Virginia (this includes Virginia International Gateway, Norfolk International Terminals,
Portsmouth Marine Terminal, Newport News Marine Terminal, Virginia Inland Port, and Richmond Marine Terminal) is $452.31 (Virginia International Terminals, 2020).

These rates differ in that some include certain fees, such as dockage fees, for example, while others do not. Both rates, however, are straight time rates and do not include overtime or double-time, or any other miscellaneous costs associated with the cost of terminal operations while in the port. After personal interviews with representatives of both Virginia International Terminals and the International Longshoremen’s Association (ILA), the labor union that provides most of the labor associated with East Coast container terminals, both suggested that a volume discount can be negotiated between terminals, the ILA, and carriers.

It is important to understand that container terminals on the east coast of the United States provide either ILA or non-ILA labor. Non-ILA ports typically have much lower terminal throughput rates when juxtaposed to ILA labor. For example, the International Marine Terminal in Portland, Maine, which provides non-ILA labor, has a terminal throughput rate (actually written as a wharfage charge) of $45.00 for a loaded container and $25.00 for an empty container (Maine Port Authority, 2020). This rate is also not inclusive of other fees such as dockage fees. The terminal throughput rates of both ILA and non-ILA ports will inevitably be reflected in the freight rates charged by the operators and carriers that call on these ports. Other obstacles associated with operating cost include: terminal lease costs being too high; lack of capital; economic load requirements; and increased lead time (National Academies of Sciences, Engineering, and Medicine, 2010).

The obstacles associated with infrastructure and shoreside equipment include terminal handling equipment, driver hours-of-service rules, and port infrastructure. Port infrastructure obstacles to AMH can include vessel restrictions within the navigable waterways, breadth and
draft, and air draft restrictions for overpasses and bridges. Many of the underutilized ports do not
have the necessary superstructure, in the form of cargo handling equipment, cargo storage, and
distribution (Burns, 2015, p. 185), to support Marine Highway services.

There are several government and regulatory obstacles associated with AMH services. The
regulatory obstacle cited most often is the Harbor Maintenance Tax (HMT). The HMT is an
ad valorem tax on the value of imported cargo (Water Resources Development Act of 1986,
1986). Currently, the HMT is assessed at a rate of .125 percent of the value of the cargo ($1.25
per $1,000 worth of cargo) (Fritelli & Carter, 2020). The HMT is deposited into the non-
divertible Harbor Maintenance Trust Fund (HMTF) that appropriates funds for the U.S. Army
Corp of Engineers (USACE) for U.S. harbor maintenance and dredging; as of last year, the
HMTF had an unspent balance of more than $9 billion (Ibid).

The issue associated with HMT relative to AMH services is that the duty would be levied
twice, once for international goods imported into the U.S. and then again when transshipped via
AMH services to its destination port. The HMT could account for up to 2.5 percent of the total
cost of using AMH services (National Academies of Sciences, Engineering, and Medicine,
2010). However, if Congress were to reduce, repeal, or subsidize the HMT for Marine Highway
services, this decision could violate international trade agreements as it would be viewed as a
discriminatory tariff (National Academies of Sciences, Engineering, and Medicine, 2010, p.
29)—a similar experience was discussed in Part II with the Panama Canal Act of 1912 and the
toll-free use of the canal for U.S. coastwise vessels violating a trade agreement with Great
Britain. Other government and regulatory obstacles associated with AMH include customs
clearance, costs vs. public benefit, federal policies, security, cabotage, and various municipal
issues.
Lastly, there are vessel related issues that act as obstacles relative to AMH. First, there is the cost of vessels being U.S.-built. As discussed in Part II, the United States coastwise trade is protected by its cabotage laws found under section 27 of the Merchant Marine Act of 1920. Cabotage laws exist along the coastlines of 80 percent of the world (Seafarers’ Rights International, 2018, p. 54). However, the United States is the only nation in the world that has cabotage laws that require vessels to be domestically built (Gibson et al., 2000, p. 303; National Academies of Sciences, Engineering, and Medicine, 2010, p. 71). U.S. cabotage laws, among other things, have facilitated the high cost of U.S.-built vessels—for example, U.S.-built containerships are reported to be five times the cost of containerships of comparable size built in foreign shipyards (Frittelli, 2019, p. 4; Akpan, 2019, p. 127).

Second, there is currently a lack of qualified vessels under the Jones Act that would be suitable for Marine Highway services. Essentially all of the oceangoing self-propelled vessels of 1,000 gross tons or more, a total of 24 containerships and seven Ro-Ro’s, that do qualify for Marine Highway services, i.e., Jones Act eligible, currently serve the non-contiguous U.S. trade routes—namely, Alaska, Hawaii, American Samoa, and Puerto Rico (U.S. Maritime Administration, 2019a). The vessels that do currently serve the U.S. contiguous trade are of tug and barge configurations.

It is important to note that many of these obstacles are apparent for the U.S. merchant marine engaged in both domestic and foreign commerce. However, the obstacles associated with America’s Marine Highways can be reduced to one core issue: Marine Highway services are not cost-competitive with the alternative transportation modes that exist, i.e., rail and road (National Academies of Sciences, Engineering, and Medicine, 2010, p. 3)—e.g., Parsons Brinckerhoff (2013) found that M-95 service costs exceeded expected revenues, “service operating costs [for
M-95 services] exceeded revenues by a minimum of $150-200 per load on average along the highest performing routes, under the favorable sensitivity and highest utilization level” (sec. ES-5). In developing America’s Marine Highway Program, the National Academies of Sciences, Engineering, and Medicine (2010) suggests, “a 20 to 30 percent discount off trucking costs may be required to compensate for a transit time increase of one day for longer short sea transits” (p. 3).

For Marine Highway services to overcome these issues and obstacles and develop into an economical and commercially viable freight transportation alternative, a similar degree of federal assistance that was provided in developing both the first transcontinental railroad and Interstate Highway System may be what is necessary to bring America’s Marine Highways out of its nascent stage. To accomplish this, the Maritime Administration’s budget may need to increase if a high degree of federal assistance is justified based on a measurable social rate of return—currently, the Maritime Administration’s budget accounts for approximately one percent of the entire Department of Transportation budget for 2021 (U.S. Department of Transportation, 2020); see Figure 3-2. The question of whether this degree of federal assistance is justified has historically been based on the social rate of return in developing and sustaining emerging surface freight transportation modes, i.e., rail and road.
In 2020, the DOT and MARAD released a report to congress regarding recommendations “for specific issues related to the Marine Transportation System (MTS) and national sealift strategies” (U.S. Department of Transportation, 2020, p. 2) in order to develop goals and objectives for a stronger maritime nation. The first strategic goal is to “strengthen the U.S. maritime capabilities essential to national security and economic prosperity” (Ibid)—the third objective listed to attain this goal is to, “develop and expand marine highway service options and facilitate their further integration into the current U.S. surface transportation system through the America’s Marine Highway Program, especially where water-based transport is the most efficient, effective and sustainable option” (Ibid, p. 11).
The objective in developing and sustaining the first transcontinental railroad and Interstate Highway System were reduced to two core drivers: commerce and defense. Federal assistance in both transportation modes were heavily gauged on the social rate of return associated with the externalities created by both modes. Historically, the argument for federal aid for the U.S. merchant marine has been based on these same drivers, i.e., commerce and defense. Following World War II, the commerce and defense arguments for federal assistance to the U.S. merchant marine began to shift to a broader, more ubiquitous term: national security. Jantscher (1975) asserts that:

The national security argument contains the soundest justification for a program of public assistance to the U.S. maritime industries. The core of the argument is that these [maritime] industries contribute importantly to the nation’s security by reducing U.S. dependence on foreign suppliers for ships and shipping services. (p. 142)

However, Jantscher (1975) elaborates further and subcategorizes national security in two parts, i.e., military security and economic security:

If a distinction between military and economic security is recognized, there might still be a national security argument. The fleet’s contribution to military security, as expressed in its fitness for service to the nation’s armed forces, is an important part of the fleet’s total contribution to national security—but only a part. The U.S. merchant marine also serves the nation by carrying much U.S. commerce. Most imports, however, continue to arrive in foreign flag vessels. If this flow were ever interrupted, the nation’s well-being would be in jeopardy. To the extent that U.S. flag vessels can be relied on in time of emergency more than foreign flag vessels, the creation of a U.S. flag merchant fleet that can carry a sizable fraction of the nation’s commerce increases national economic security. (p. 126)
Additionally, Jantscher (1975) brings awareness to that fact that, “it would be necessary of course to distinguish economic security from military security, and to realize the two may not be served equally by one program” (p. 144). Whitehurst (1983) echoes Jantscher’s assertions, “the best reason for government support of a merchant marine, whether through subsidies, cargo preference, cabotage laws, or bilateral cargo-sharing agreements, is to preserve national security” (p. 21). Regarding the maritime contribution to national defense, Frankel (1982) refers to dual aspects—i.e., “One is the provision of complementary merchant shipping operations necessary to move military cargo. The other is provision of shipping to move essential imports during periods of emergency, involving war or other critical economic contingencies.” (p. 5)—as the national security objective of the U.S. maritime shipping industry.

For these reasons, to justify the degree of federal assistance necessary in developing America’s Marine Highway Program into a commercially viable, self-sustaining freight transportation alternative, significant initial federal support in developing America’s Marine Highways should be based on the positive externalities associated with America’s Marine Highway Program, i.e., the social rate of return. The social rate of return of America’s Marine Highways Program should be measured based on its benefits to national security. To minimize ambiguity, the syntax regarding the definition of national security for the purpose of this study will encompass economic security, environmental security, and military security.

The U.S. Maritime Administration (2011, p. 1) mentions several external benefits of AMH:

- Improving our nation’s economic competitiveness while creating and sustaining jobs, including through the reduction of landside traffic congestion, the ability to add cost-effective new freight and passenger transportation capacity, the reduction of wear-and-
tear on roads and bridges, and by providing resiliency to the surface transportation system.

- Providing an environmentally sustainable transportation system that requires less energy and reduces greenhouse gas (GHG) emissions per ton-mile of freight moved.
- Adding to the nation’ strategic sealift resources and supporting the nations shipbuilding industry.
- Improving public safety and security through the safe movement of passengers and freight, including hazardous materials, and by enabling more effective transportation responses to natural and manmade disasters.

It is based on these externalities, and their associated benefits to U.S. national security, that the social rate of return of America’s Marine Highways may be able to justify a similar level of federal assistance that was seen in developing both the first transcontinental railroad and Interstate Highway System. While determining the social rate of return of America’s Marine Highways is beyond the scope of this study, as a reference, the European Commission estimated that their Marco Polo program—a program with the broad objective to enhance intermodalism which includes the Motorways of the Sea program, a program that is analogous to America’s Marine Highway Program—will generate at least 6 euro in social and environmental benefits for every 1 euro in grants (Perakis & Denisis, 2008, p. 598).

Marine Highway pilot program

Pilot programs in the development of emerging freight transportation modes was discussed in Part I, the first transcontinental railroad had the CPRR and the Interstate Highway System had the 1919 Convoy. Similarly, a pilot program for the United States Navy was developed under President Theodore Roosevelt in 1909 to demonstrate United States military sea
power on a global scale. This pilot program, known as the Great White Fleet, inevitably demonstrated the United States inability to provide the necessary sealift capacity to replenish and refuel the Great White Fleet abroad (Kilmarx, 1979, p. 98); this pilot program, along with events that transpired during both World War I and World War II, aided in the successful development of what was then known as the Military Sea Transportation Service (MSTS)—the Military Sea Transportation Service was then later renamed to Military Sealift Command (MSC), i.e., the current fleet of government contracted vessels that provides ocean transportation services for the Department of Defense (U.S. Navy's Military Sealift Command, n.d.). These pilot programs are relevant in that they were able to prove the efficacy or inefficacy of the program in which they were trying to promote.

The relevance of these pilot programs to America’s Marine Highways is that they provided a tangible service that could be measured. These pilot programs were able to create performance indicators that could measure the effectiveness, or ineffectiveness, of the respective program; these performance indicators inevitably helped determine methods in effectively and efficiently promoting these programs in the future. The CPRR and 1919 Convoy ultimately aided the federal government in determining the social rate of return that justified the level of federal assistance necessary for the successful development of the first transcontinental railroad and the Interstate Highway System, respectively.

To date, there are 46 approved Marine Highway projects with most of these projects taking place on the U.S. east and gulf coast. One reasoning for this increase in Marine Highway projects on the U.S. east and gulf coast is that, according to the National Academies of Sciences, Engineering, and Medicine (2010), “researchers concluded that there is no critical distance for determining whether a particular venture will be successful” (p. 2). The U.S. east and gulf coast
have various ports and terminals scattered along the coastlines that can facilitate all types of Marine Highway services. Because of the increased popularity in America’s Marine Highway Program over the past decade (Table 3-1), especially on the U.S. east and gulf coast, America’s Marine Highways have naturally established its own form of pilot program due to the apparent growth in transportation demand for these types of services. While many of these projects may be small in scale, they clearly indicate that there is growing interest in marine highway services.
Conclusion

Currently, U.S. Interstate Highways are experiencing challenges that are analogous to the experience of the U.S. national road network prior to the Federal-Aid Highway Act of 1956 and subsequent construction of the Interstate Highway System, i.e., deteriorating roadways and increased safety concerns. While the challenges for the current Interstate Highway System infrastructure have gradually worsened with time, there is mounting concern to reduce landside transportation congestion and their associated externalities, e.g., greenhouse gas (GHG) emissions and wear-and-tear on roads. America’s Marine Highways have the ability to alleviate landside transportation congestion and increase the U.S. surface freight transportation system capacity.

Emerging freight transportation modes, i.e., the first transcontinental railroad and the Interstate Highway System, received significant initial federal support in the form of federal aid—specifically fiscal aid—due to their positive externalities, i.e., the social rate of return. Transportation demand growth of America’s Marine Highway services has indicated there is growing interest and merit to this program. However, regarding adding capacity to the U.S. surface freight transportation system, America’s Marine Highway Program is still in its nascent stage. Based on the social rate of return of America’s Marine Highway Program, the degree of federal assistance seen in establishing the first transcontinental railroad and the Interstate Highway System may be what is necessary to bring America’s Marine Highway Program out of its nascent stage and into an economical, commercially viable, and self-sustaining freight transportation alternative.

To determine the degree or if federal assistance is necessary, the social rate of return must be measured—a high social rate of return should range from 20 to 30 percent. Historically,
estimating the social rate of return on federal investment in emerging freight transportation modes has been challenging because the externalities associated with the social rate of return were difficult to measure. However, many of the externalities associated with the social rate of return of America’s Marine Highways are measurable. To determine the social rate of return based on the externalities of America’s Marine Highway Program, first, a plan must be conceptualized and developed. Asa Whitney’s 1849 study and the Bureau of Public Roads 1939 report could be used as models to aid in developing a plan suitable for America’s Marine Highway Program to add appropriate and effective capacity to the U.S. surface freight transportation system.
Considerations and Future Research

To determine the degree of federal assistance that is appropriate and necessary in developing America’s Marine Highways, the social rate of return and associated public benefits need to be quantified, as proposed by MARAD in a 2011 report to Congress (U.S. Maritime Administration, 2011, p. 44). The social rate of return can be measured by establishing a set of performance indicators, i.e., Key Performance Indicators (KPIs), derived from AMH externalities—e.g., KPIs such as emissions, employment, and public safety, to name a few. However, it is also important to keep in mind that federal assistance in emerging freight transportation modes has led to various degrees of corruption, scandal, and waste: the first transcontinental railroad had the Credit Mobilier; the U.S. merchant marine had the Merchant Marine Act of 1928; and the Interstate Highway System had wasteful construction contracts awarded. This is not to detract from enabling federal assistance to America’s Marine Highway Program but to bring awareness to past examples to prevent the waste of public funds in the future.

In the future, the Maritime Administration’s budget may need to increase if a high degree of federal assistance is justified based on a measurable social rate of return. Before future policies are developed, Marine Highway services need to be promoted effectively and consideration needs to be given to all associated firms and industry groups. Further policy development and economic research will help develop a suitable plan that would establish a set of appropriate KPIs to measure the social rate of return of America’s Marine Highways in order to justify the decision for federal assistance in this emerging United States surface freight transportation mode, that is, America’s Marine Highways.
References


Duran, X. H. (2010). *Was the first transcontinental railroad expected to be profitable? Evidence from entrepreneur's declared expectations, an empirical entry decision model, and ex-post information* (Doctoral dissertation, London School of Economics and Political Science (United Kingdom)).

https://doi.org/10.1017/S0022050713000065


https://www.govinfo.gov/content/pkg/PLAW-110publ140/pdf/PLAW-110publ140.pdf


https://www.loc.gov/law/help/statutes-at-large/64th-congress/session-1/c64s1ch241.pdf


https://www.govinfo.gov/content/pkg/STATUTE-70/pdf/STATUTE-70-Pg374.pdf


https://www.loc.gov/law/help/statutes-at-large/67th-congress/Session%201/c67s1ch119.pdf


https://www.fhwa.dot.gov/policy/otps/summaries.cfm#macro1


https://www.govinfo.gov/content/pkg/STATUTE-70/pdf/STATUTE-70-Pg374.pdf


National Academies of Sciences, Engineering, and Medicine. (2019). Renewing the National
Commitment to the Interstate Highway System: A Foundation for the Future.

New York Terminal Conference. (2020, October 1). Tariffs Information: Port Authority of New
York and New Jersey. Retrieved February 21, 2021, from

Pacific Railroad Act of 1862, ch. 120, 12 Stat. 489 (1862).
https://www.loc.gov/law/help/statutes-at-large/37th-congress/session-2/c37s2ch120.pdf


New Bedford, MA: East Coast Marine Highway Initiative Awarding Authority.

https://doi.org/10.1080/03088830802469501


shipping: a systematic literature review and research directions. Transport Reviews,
40(3), 382-406.


U.S. Senate. *Investigation of air mail and ocean mail contracts.* 74th Cong., 1st sess., 1935, S. Rept. 898.


# Appendix A

List of Designated United States Marine Highway Routes

<table>
<thead>
<tr>
<th>Route</th>
<th>Applicant</th>
<th>Supporters</th>
<th>Landside Route Served</th>
<th>Route Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marine Highway M-5</td>
<td>California DOT (Caltrans), Oregon DOT (ODOT), and Oregon Business Development Department (OBDD)</td>
<td>Pacific Northwest Waterways Association, California Marine Affairs and Navigation Conference, Humboldt Bay Harbor, Recreation, and Conservation District / Port of Humboldt Bay, Port of Skagit County, WA, Skagit County Board of Commissioners, Town of La Conner, WA, and Swinomish Tribal Community</td>
<td>Interstate-5</td>
<td>The M-5 Route includes the Pacific Ocean coastal waters, connecting commercial navigation channels, ports, and harbors from San Diego, CA, to the US-Canada border north of Seattle, WA. It spans Washington, Oregon, and California along the West Coast. It connects to the M-84 Route at Astoria, OR, and the M-580 Route at Oakland, CA.</td>
</tr>
<tr>
<td>Marine Highway M-580</td>
<td>Port of Stockton, California</td>
<td>Bay Area Air Quality Management District, San Joaquin Valley Air Pollution Control District, Port of Oakland, and the Port of West Sacramento.</td>
<td>Interstate-580</td>
<td>The M-580 Route includes the San Joaquin River, Sacramento River, and connecting commercial navigation channels, ports, and harbors in Central California from Sacramento to Oakland, CA. It connects to the M-5 Route at Oakland, CA.</td>
</tr>
<tr>
<td>Marine Highway M-84</td>
<td>Port of Portland, Oregon</td>
<td>The Pacific Northwest Waterways Association</td>
<td>Interstate-84</td>
<td>The M-84 Route includes the Columbia, Willamette and Snake Rivers, connecting commercial navigation channels, ports, and harbors. It spans Oregon, Washington, and Idaho from Astoria, OR, to Lewiston, ID, and a 26 mile portion of the Willamette River from Willamette Falls to the confluence with the Columbia River. It connects to the M-5 Route in Astoria, OR.</td>
</tr>
<tr>
<td>Marine Highway M-10</td>
<td>Mississippi DOT</td>
<td>Florida DOT, Texas DOT, Louisiana DOT, NW Louisiana Economic Development Foundation, South Alabama Regional Planning Commission, Port of Jacksonville, Port of Tampa, Port of Pensacola, Port of Morgan City, Port of New Orleans, St. Bernard Terminal and Harbor District, Port of Lake Charles, Port of Houston Authority, Port of Brownsville, and Gulf Intracoastal Canal Association</td>
<td>The M-10 Route includes the Gulf of Mexico, the Gulf Intracoastal Waterway, and connecting commercial navigation channels, ports, and harbors. It stretches from Brownsville, TX, to Jacksonville and Port Manatee, FL, and includes Texas, Louisiana, Mississippi, Alabama, and Florida. It connects to the M-49 Route at Morgan City, LA, the M-65 Route in Mobile, AL, and the M-55 in New Orleans, LA.</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Marine Highway M-49</td>
<td>Louisiana Department of Transportation &amp; Development</td>
<td>NE Louisiana Economic Development Foundation, Rapides Area Planning Commission, The Port of Morgan City, Natchitoches Parish, Port of New Orleans, Port of Greater Baton Rouge, Port of Krotz Springs, and the Caddo/Bossier Port Commission</td>
<td>The M-49 Route includes the Atchafalaya River, the J. Bennett Johnson Waterway, and connecting commercial navigation channels, ports, and harbors. It spans southwest Louisiana from Morgan City to Shreveport, LA, along US Highway 90 and Interstate 49. It connects to the M-10 Route at Morgan City, LA.</td>
<td></td>
</tr>
<tr>
<td>Marine Highway M-55</td>
<td>Missouri and Illinois DOT</td>
<td>Southeast Missouri Regional Port Authority and the Ohio Department of Transportation</td>
<td>The M-55 Route includes the Mississippi and Illinois Rivers from New Orleans, LA, via St. Louis, MO, to Chicago, IL, through Louisiana, Mississippi, Arkansas, Tennessee, Missouri, and Illinois. It includes connecting commercial navigation channels, ports, and harbors. It connects to the M-90 Route at Chicago, IL, the M-40 Route at Napoleon, AR, crosses the M-70 Route at St. Louis, MO, and meets the M-10 Route at New Orleans, LA.</td>
<td></td>
</tr>
<tr>
<td>Marine Highway M-65</td>
<td>Tennessee-Tombigbee Waterway Development Authority</td>
<td>State of Alabama, Alabama State Port Authority, West Virginia DOT, South Alabama Regional Planning Commission, Yellow Creek State Inland Port Authority, Paducah-McCracken County Riverport Authority, Port Itawamba, Lowndes County Port Authority, Coalition of Alabama Waterway Associations, Inc.</td>
<td>The M-65 Route includes the Mobile, Tombigbee, and Black Warrior Rivers from the Port of Mobile to the Port of Birmingham, AL; and the Mobile River, Tennessee-Tombigbee Waterway, and Tennessee River via the Ohio River in Paducah, KY, to the Mississippi River. The route also includes all commercial navigation channels, ports, and harbors in Alabama, Mississippi, and Tennessee. It connects to the M-10 Route in Mobile, AL, and the M-55 Route in Cairo, IL.</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Marine Highway M-70</td>
<td>Ohio DOT</td>
<td>Illinois DOT, Missouri Chamber of Commerce, Missouri DOT, and Cape Girardeau Area MAGNET</td>
<td>The M-70 Route includes the Ohio, Mississippi, and Missouri Rivers, and connecting commercial navigation channels, ports, and harbors, from Pittsburgh, PA, to Kansas City, MO. It spans Pennsylvania, Ohio, Indiana, Illinois, and Missouri, connecting to the M-55 Route at St. Louis, MO.</td>
<td></td>
</tr>
<tr>
<td>Marine Highway M-90</td>
<td>Ohio DOT</td>
<td>Wisconsin DOT, Greater Buffalo-Niagara Regional Transportation Council, Monroe County Planning &amp; Dev. Dept., Algoma, WI, Port of Milwaukee, Cleveland-Cuyahoga County Port Authority, Lake Carriers Association, New York State DOT, and the New York State Canal Corporation</td>
<td>The M-90 Route is the Great Lakes, Erie Canal, and connecting commercial navigation channels, ports, and harbors from Albany, NY to Chicago, IL and Duluth, MN. It spans New York, Pennsylvania, Ohio, Indiana, Illinois, Michigan, and Wisconsin. It connects to the M-75 Detroit/Windsor Crossing near Detroit, MI, and the M-71/77 Lake Erie Crossing near Cleveland, OH.</td>
<td></td>
</tr>
<tr>
<td>Marine Highway M-95</td>
<td>Interstate-95 Route Coalition</td>
<td>Interstate-95</td>
<td>Marine Highway M-2</td>
<td>San Juan Port Commission</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------------------------</td>
<td>---------------</td>
<td>--------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td><strong>Council of State Governments’ Eastern Regional Conference, Commonwealth of PA, NJDOT, CT DOT, CT Maritime Commission, Florida DOT, East Central FL RPC, Space Coast Transportation Planning Authority, Economic Development Commission of Florida's Space Coast, DE Valley RPC, DE River &amp; Bay Authority, SE Regional Planning &amp; Economic Dev. Commission, Richmond Regional RPC, NJ Transportation Planning Authority, NY Metropolitan Transportation Council, NYCDOT, NYSDOT, Port of Baltimore, NC Ports, Port of Mass., Port of New Bedford, MA, City of New London, CT, Philadelphia Regional Port Authority, MD Port Commission, Philadelphia Regional Port Authority, ME Port Authority, Port Authority of NY &amp; NJ, Port Canaveral, FL, SC State Port Authority, VA Port Authority, Port of Davisville, RI, Jaxport, FL, and the Maritime Association of the Port of New York &amp; New Jersey</strong></td>
<td></td>
<td>The M-95 Route includes the Atlantic Ocean coastal waters, Atlantic Intracoastal Waterway, and connecting commercial navigation channels, ports, and harbors. It stretches from Miami, FL, to Portland, ME, and spans 15 states. It connects to the M-87 Route and the M-90 Route near New York City; and the M-64 Route at Norfolk, VA.</td>
<td>The Ports of Ponce and marine/port facilities in Mayaguez, Ceiba (former US Naval Station Roosevelt Roads), Yabucoa, Guanica, Guayanilla, Guayanilla, and Arebico</td>
<td>The M-2 Route includes the Caribbean Sea, and connecting commercial navigation channels, ports, and harbors around the perimeter of Puerto Rico via San Juan, Mayagüez, and Ponce.</td>
</tr>
<tr>
<td>Marine Highway M-87</td>
<td>New York State DOT</td>
<td>Albany Port District Commission, Port Authority of New York &amp; New Jersey, and New York State Canal Corp.</td>
<td>Interstate-87</td>
<td>The M-87 Route is the Hudson River, connecting commercial navigation channels such as the Erie Canal, ports, and harbors from New York City to Albany, NY. It spans eastern New York State. It connects to the M-90 Route at Albany, NY, and the M-95 Route at New York City.</td>
</tr>
<tr>
<td>Marine Highway M-64</td>
<td>Richmond Regional Planning District Commission</td>
<td>Port of Richmond, Virginia Port Authority, and Hampton Roads Transportation Planning Organization</td>
<td>Interstate-64</td>
<td>The M-64 Route includes Hampton Roads, the Chesapeake Bay, James River, and connecting commercial navigation channels, ports, and harbors. It spans southeast Virginia from Norfolk to Richmond, VA. It connects to the M-95 Route at Norfolk, VA.</td>
</tr>
<tr>
<td>Marine Highway M-5</td>
<td>West Coast Route Coalition</td>
<td>State of Alaska (Alaska Marine Highway System)</td>
<td>ALCAN Highway and Richardson Highway</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>---------------------------</td>
<td>---------------------------------------------</td>
<td>-------------------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The M-5 Alaska Marine Highway Route consists of the Pacific Ocean coastal waters, including the Inside Passage, connecting commercial navigation channels, ports, and harbors from Puget Sound to Unalaska in the Aleutian Islands of Alaska. It spans British Columbia and lower Alaska and connects to the M-A1 Crossing near Anchorage, AK, and the M-5 Route at the Canadian border north of Bellingham, WA.</td>
<td></td>
</tr>
<tr>
<td>Marine Highway M-75</td>
<td></td>
<td>Detroit/Wayne County Port Authority</td>
<td>Interstate-75</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The M-75 Crossing includes the Detroit River and Lake Erie, from Detroit, MI, to Toledo, OH, and connecting commercial navigation channels, ports, and harbors.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The M-71/77 Lake Erie Marine Highway Crossing transits Lake Erie between Ohio ports and Ontario ports. It serves to extend the landside Interstate-71 and -77 Routes and connects to the M-90 Route near Painesville, OH.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The M-A1 Route includes the Upper Cook Inlet, the Matanuska and Susitna Rivers, and connecting commercial navigation channels, ports, and harbors. It stretches from Anchorage to Talkeetna and Palmer. It is an extension of the Alaska Marine Highway System.</td>
<td></td>
</tr>
<tr>
<td>Marine Highway M-146</td>
<td>Chambers County Improvement District No.1 &amp; Chambers-Liberty Counties Navigation District</td>
<td>Interstate-10 and TX-146</td>
<td>The M-146 Marine Highway Route includes the navigable waters between the Cedar Crossing Industrial Park in Chambers County and the Port of Houston, TX. The route is located in southeast Texas, along the Gulf of Mexico on Galveston Bay. These commercially navigable waters provide a direct route from the Houston Ship Channel to the Cedar Crossing Industrial Park, one of the largest industrial parks in the nation.</td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------</td>
<td>------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Marine Highway M-495</td>
<td>District of Columbia DOT, Virginia Office of Intermodal Planning and Investment, the Town of Indian Head, MD, Charles County, MD, the Department of the Navy, Joint Base Anacostia/Bolling and a potential vessel operator</td>
<td>Interstate-95, Interstate-295, Interstate-395, and Interstate-495</td>
<td>The M-495 Marine Highway Route includes the navigable portions of the Anacostia, Occoquan and Potomac Rivers. These segments have potential to reduce regional rush-hour congestion through the operation of passenger ferry services and would provide a needed redundancy to the regional system.</td>
<td></td>
</tr>
<tr>
<td>Marine Highway M-29</td>
<td>Kansas DOT, the Mid-America Regional Council, St. Joseph Area Transportation Study Organization, Missouri Department of Economic Development, the Inland River Ports and Terminals Association and the Nebraska City Dock Board</td>
<td>Interstate-29, Interstate-35, Interstate-70, and Interstate-49</td>
<td>The M-29 Marine Highway Route establishes a connection between the middle section of the Missouri River in Sioux City, IA, and the M-70 Marine Highway Route at Kansas City, Missouri.</td>
<td></td>
</tr>
<tr>
<td>Marine Highway M-295</td>
<td>Bridgeport, New Haven and New London Port Authorities, the City of New London, the New York Metropolitan Transportation Council, and regional ferry operators</td>
<td>Interstate-95, Interstate-295, Interstate-495, and Interstate-678</td>
<td>The M-295 includes the entire East River (from New York Harbor where it connects to the M-87) and Long Island Sound up to and including Block Island Sound. The Route includes operating ferry systems that connect Connecticut to New York and provides a substantial shortcut for people that need to cross the Long Island Sound. There are two existing ferry systems that create substantial improvements to the overall capacity of the national freight transportation system as a possible alternative to ground transportation in the movement of people.</td>
<td></td>
</tr>
<tr>
<td>Marine Highway M-35</td>
<td>Illinois DOT, Iowa DOT, Minnesota DOT, Missouri DOT, and Wisconsin DOT</td>
<td>Inland Rivers Ports and Terminals Association and Upper Mississippi River Basin Association</td>
<td>Interstate-35, Interstate-94, (includes U.S. 61, Missouri State Route-27, Iowa State Route-27, and Interstate-35)</td>
<td>The M-35, which can commonly be referred to as “Waterway of the Saints” Marine Highway Route, links the Upper Mississippi River with the existing M-55 Route. The M-35 Route runs from Lock/Mile 1 on the Mississippi River in Minneapolis, MN, to the confluence of the Mississippi and Illinois Rivers in Grafton, IL, where the M-55 Route begins. Together, the M-35 and M-55 provide an all-water route from the beginning of the Mississippi River to the Gulf of Mexico.</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------------------------</td>
<td>-------------------------------------------------</td>
<td>-------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Marine Highway M-69</td>
<td>Texas DOT</td>
<td>Interstate-69</td>
<td></td>
<td>The M-69 Route includes the Gulf of Mexico, the Gulf Intracoastal Waterway, and connecting commercial navigation channels, ports, and harbors within the State of Texas. It includes 11 deep-water and 13 shallow-draft ports between Brownsville and Port Arthur. It intersects with the M-146 Route and connects with the M-10 Route in Port Arthur, which extends and intersects with the M-49 Route in Morgan City, LA; the M-55 Route in New Orleans, LA; and the M-65 Route in Mobile, AL.</td>
</tr>
<tr>
<td>Marine Highway M-H1</td>
<td>State of Hawaii DOT</td>
<td>Hawaii Harbor Users Group (HHUG)</td>
<td>Hawaii State Road H1. The State is served by 4,430 miles of public roadways, including 55 miles of interstate highways, but none connect Hawai‘i’s markets to the continent, or support surface transport between or among the islands.</td>
<td>The M-H1 Marine Highway Route includes the waterways and ocean channels used to transport goods and commodities between the Hawaiian Islands of Hawaii, Maui, Molokai, Lanai, Oahu, and Kauai. The waterways include the Alenuihaha Channel, Auau Channel, Kealakahiki Channel, Pailolo Channel, Kalohi Channel, Kaiwi Channel, Kaieiewaho Channel, and the Kaulakahi Channel.</td>
</tr>
<tr>
<td>Marine Highway AS-1</td>
<td>Port of Pago Pago, American Samoa</td>
<td>Department of Port Administration (DPA), American Samoa Government Departments and Agencies, Swains Island, Rose Island, Manu’a Districts and the Eastern District</td>
<td>American Samoa is a United States Territory located in the Pacific Ocean, south of the equator and sits in the heart of Polynesia. Its harbor operations is in the South Pacific region as a hub for International trade and regional transshipment. Situated at 14 degrees 20’ south latitude and 172 degrees 42’ west longitude, it is the only U.S Territory below the equator and is made up of seven islands. This Marine Highway Route includes the waterways and ocean channels between islands of the territory of American Samoa, within the Exclusive Economic Zone (EEZ). Theses Islands include: Tutuila, Aunuu, Ofo, Olosega, Ta’u, Swains, and Rose Atoll.</td>
<td></td>
</tr>
</tbody>
</table>