History and Future of the North Shore Rail Line on Staten Island

Michael Minn
Department of Geography, Hunter College
City University of New York
http://michaelminn.com

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Abstract

Reactivation of the Staten Island Railway North Shore line offers significant potential for improving quality-of-life on the northern third of Staten Island. The North Shore line could be part of a comprehensive transportation and development plan for the island that will mitigate serious inadequacies in existing transportation infrastructure and potentially deliterious demographic changes associated with growth and maturation on the island. However, the probable $600 million construction cost and $18 million annual operating deficits represent a serious political obstacle and call into question whether the resulting economic benefits are worth the considerable expenditure of public funds, even when considered as a long-term investment in the island's future.

INTRODUCTION

Mobility has been a problem on Staten Island since the 19th century (1). Staten Island is large and sparsely populated with vital economic connections to New Jersey and the rest of New York City across bodies of water that impede smooth traffic flow and timely access. The island is too densely settled to permit free movement, but not dense enough to make public transportation convenient or financially self-sufficient. Over half the island's workers commute off the island for work (2), necessitating long-distance travel through old urban development where transportation is inherently expensive and slow.

A potential partial solution to transportation problems on Staten Island's North Shore could be reactivation of an abandoned 5.1-mile rail line that formerly connected the neighborhoods of Arlington, Mariner's Harbor, Elm Park, Port Richmond, West New Brighton, Livingston and New Brighton with the ferry terminal at St. George. While existing local and limited-stop bus service requires 30–40 minutes to cover that distance, various rail options could reduce that time to around 13 minutes, a potential 50% to 68% time savings for as many as 12,000 daily riders. However, that improved mobility would come at considerable expense and serious questions can be raised whether that expense is worth the ultimate benefit.

This paper explores the history of rail transportation on Staten Island and presents a framework for evaluating reactivation of the North Shore line as an extension of the existing Staten Island Railway.

HISTORY OF RAILROADS ON STATEN ISLAND

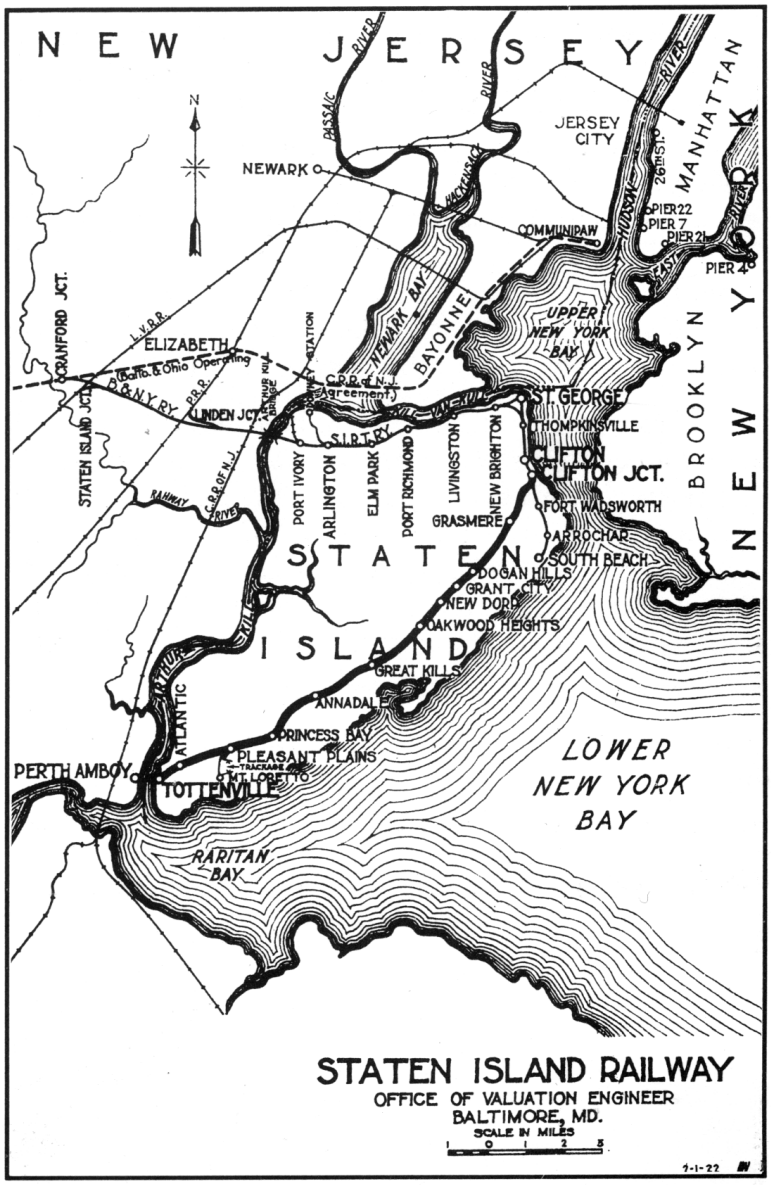


Figure 1: Staten Island Railway, 1922

The first detected human presence Staten Island dates back to around 12,000 BC with permanent settlement beginning around 3,000 BC. The first European visit was by Giovanni da Verrazano in 1524 and after Dutch explorer Henry Hudson sailed up the Hudson river in 1609 and began settling in the area, the Dutch named the island “Staten Eylandt” (States General). The first per-

manent European settlement was amde in 1661 at Oude Dorp, just south of the Narrows, but the island remained sparsely populated up through the beginning of the 19th century. The 18th and 19th century Staten Island economy was largely devoted to agriculture, fishing and some maritime trade. The island was occupied and used as a staging area by the British during the American Revolutionary War and was their final point of departure at the conclusion of the war (3).

Growth on Staten Island became much more rapid in the early 19th century as New York City emerged as a dominant industrial age commercial center. Population growth was most intense on the northern and eastern shores with the southern shore and central parts of the island remaining home for the wealthy. With the growth came the need for better transportation infrastructure.

Cornelius Vanderbilt (1794–1877) was born on Staten Island and would grow up to be one of the most important figures in 19th century American railroading. He began his career in working with his father in sail ferry services to Manhattan before starting his own service in 1810. Vanderbilt proved to be an extremely shrewd businessman and was able to land a lucrative contract supplying the military bases built on the island for the War of 1812. After the war, he expanded his operations to Long Island Sound and along the Atlantic Coast. His transition of operations from sail to steam ferry service in 1818 would provide the basis for his fortune. After steam railroads first arrived in Manhattan in 1832, Vanderbilt begain taking an interest in railroads and he would ultimately consolidate the New York Central into one of the 19th century's most powerful railroad empires (4).

A group Staten Islanders wishing to follow New York into the steam rail age received charter to incorporate the Staten Island Railroad in 1836 although the group never began construction. In 1851 articles of association were drawn up to begin construction on a line between Tottenville on the southern tip of the island and Stapleton. While Vanderbilt's fame would come from buying rather than constructing railroads, he controlled the east shore ferry terminals (now Clifton) near where the line would terminate and the need for capital brought in his involvement. Staten Island's first rail line opened in stages between 23 April and 2 June 1860 (5).

The advent of rail passenger service both responded to growth on the island and promoted further development around depots along the line. The combined rail + ferry trip from Tottenville to Manhattan required 90 minutes (6). Residential and industrial growth slowed during the American Civil War as the island became a major military encampment and training ground.

Throughout its life, the SIRR and its successors would never be very lucrative and the first financial issues arose in 1861 with a foreclosure on two locomotives. Cornelius Vanderbilt's son William Vanderbilt became receiver and service continued. Coordination of timing with uncooperative ferry captains also became an issue, so Cornelius Vanderbilt had the SIRR purchase the ferry service to Manhattan in 1864. A disasterous boiler explosion on the ferry Westfield in 1871 lead to another bankruptcy in 1871. The railroad was purchased and reorganized by George Law and renamed the Staten Island Railway (7, 8).

Erastus Wiman (1834–1904) was a Canadian businessman who had settled on the island in 1867 and became one of the islands foremost citizens. In 1880 Wiman incorporated the Staten Island Rapid Transit (SIRT) as part of a vision of turning Staten Island into a transportion hub that could rival Manhattan. The core of his idea involved building a unified ferry and rail terminal at the tip of the island on closest point to both Manhattan and Brooklyn. A new rail line would be built around the northeast tip of the island and along the north shore to connect with mainland railroads in New Jersey (8, 9).

Baltimore and Ohio Railroad (B&O) also saw Staten Island as an entree into the lucrative

New York market. They joined with the SIRT in 1884 to lease the SIRR line and start construction on the North Shore line (9). In order to convince George Law to extend Wiman's option on the proposed ferry terminal property, Wiman offered to rename the area St. George (10).

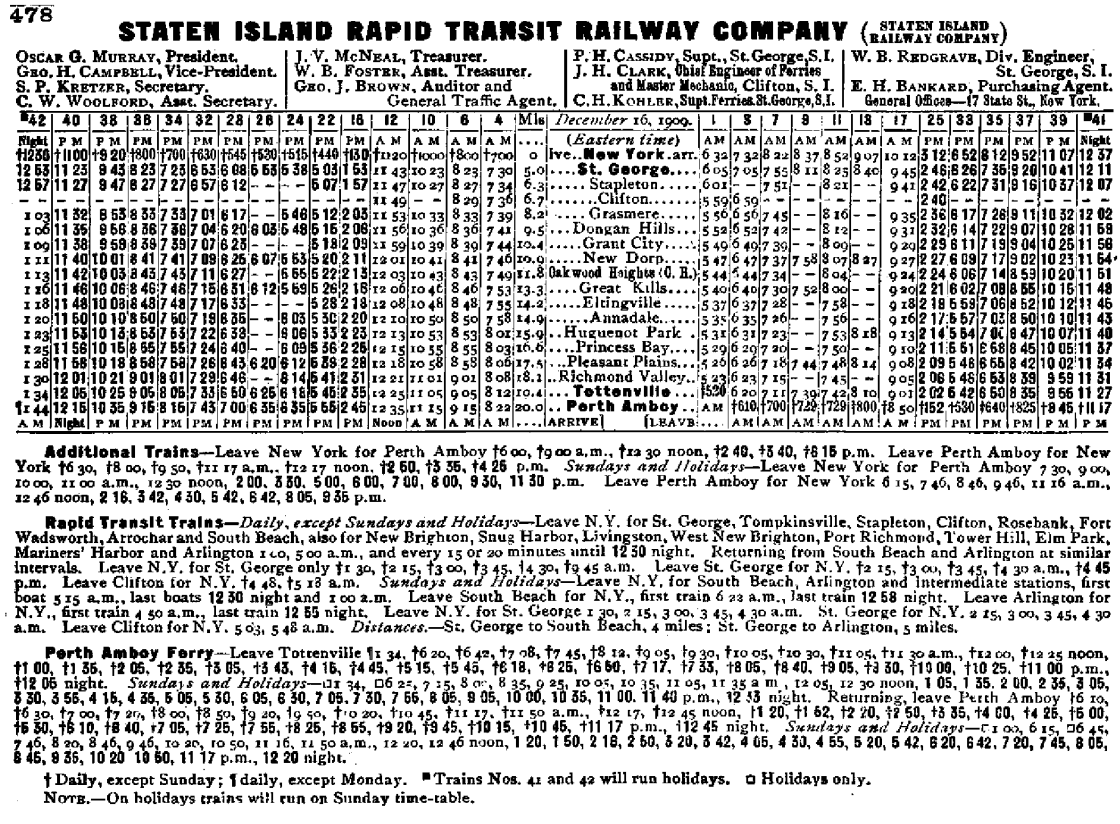
The B&O quickly finished construction of the North Shore line up to Arthur Kill in 1885. A 1.1 mile tunnel and extension from Clifton was also added along with double tracking to complete a continuous South Shore line from St. George to Tottenville (9, 11). And, the system expansion included a two-mile passenger line connecting Clifton along the eastern shore with South Beach. The South Beach line was ready by the summer of 1886 to provide access between the St. George feries and growing residential, resort and amusement park developments in the area - including some owned by Wiman (12).

Legal maneuvers from competing railroads delayed construction of a massive 500-foot swing-span drawbridge over Arthur Kill and the connecting line in New Jersey to the Jersey Central line in Cranford. The first freight from the mainland finally flowed in 1890, with cars crossing Arthur Kill and then proceeding to terminals to at Arlington or St. George. Cargo from railcars was transferred to barges either by hand (as lighterage or break-bulk), by dumping (for bulk commodities like coal) or by rolling the entire car on a carfloat to be carried across the water to rail lines at various points along the water in other boroughs. The transfer process was cumbersome and expensive, but that was the price of doing business in the nation's commercial capitol. (4, 13, 14).

Ironically, rail infrastructure was integral to Staten Island becoming the home to some of the earliest suburban development in the nation, presaging its later role as the city's most suburbanized borough. Wealth residents continued to build mansions on the hills in the center of the island and manufacturing came to dominate the North Shore.

Freight was the B&O's primary interest in Staten Island, with their mainland passenger service to New York going directly to a large and attractive ferry terminal built in 1889 in Jersey City. Except for a rumored venture with the Jersey Central between 1900 and 1903 that is sparsely documented, the Staten Island North Shore line does not appear to have been used for regular passenger service from the mainland. While rail service to New Jersey might seem logical given all the effort put into building the North Shore line, freight traffic, drawbridge contention and ferry delays likely made that impractial for anything other than special occasions. Prior to construction of the bridges to New Jersey in the 1920s and 1930s, access via ferries, such as the Tottenville ferry to the Central Railroad of New Jersey station in Perth Amboy appears to have been the only regular direct passenger option for Staten Island residents.

Sources indicate that the North Shore line began carrying local passengers when it opened on 1886. North Shore stations are not explicitly listed on the SIRT timetable in the 1910 Official Guide to the Railways (see figure 2), although they are mentioned as "rapid transit trains" running at frequent intervals (15). Although controlled and operated by the SIRT, the older Tottenville line was apparently still referred to as the Staten Island Railway to distinguish it from the North Shore line operating as the Staten Island Rapid Transit Railway (16). North Shore line stations are shown on a 1922 map of the SIRT (9) listed as the "S.I.R.T. RY," as opposed to the Clifton-Tottenville line listed as the "Staten Island Railway." By the 1936 Official Guide, service on all three lines (Tottenville, South Beach and the North Shore to Arlington) was presumably frequent enough to be indistinguishable from conventional transit service and no explicit timetable is given. None of the schedules or maps lists direct service to New Jersey or points West (17).



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STATEN ISLAND RAPID TRANSIT RAILWAY COMPANY (STATEN ISLAND RAILWAY COMPANY)

Oscar G. Murray, President. Geo. H. Campbell, Vice-President. S. P. Kretzer, Secretary. C. W. Woolford, Asst. Secretary.

J. V. McNeal, Treasurer. W. B. Foster, Asst. Treasurer. Geo. J. Brown, Auditor and General Traffic Agent.

P. H. Cassidy, Supt., St. George, S. I. J. H. Clark, Chief Engineer of Ferries and Master Mechanic, Clifton, S. I. C. H. Kohler, Supt. Ferries at St. George, S. I.

W. B. Redgrave, Div. Engineer, St. George, S. I. E. H. Bankard, Purchasing Agent. General Offices—17 State St., New York.

■42	40	38	36	34	32	28	26	24	22	18	12	10	6	4	Mls	*December 16, 1909.*	1	5	7	9	11	13	17	25	33	35	37	39	■41
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†12 56	†11 00	†9 20	†8 00	†7 00	†6 30	†5 45	†5 30	†5 15	†4 40	†4 30	†12 20	†10 00	†8 00	†7 00	0	lve..**New York**..arr.	6 32	7 32	8 22	8 37	8 52	9 07	10 12	3 12	6 52	8 12	9 52	11 07	12 37
12 53	11 23	9 43	8 23	7 23	6 53	6 08	5 53	5 38	5 03	4 53	11 43	10 23	8 23	7 30	5.0	....**St. George**....	6 05	7 05	7 55	8 11	8 25	8 40	9 45	2 46	6 26	7 36	9 26	10 41	12 11
12 57	11 27	9 47	8 27	7 27	6 57	6 12	– –	– –	5 07	4 57	11 47	10 27	8 27	7 34	6.3	..... Stapleton.....	6 01	– –	7 51	– –	8 21	– –	9 41	2 42	6 22	7 31	9 16	10 37	12 07
– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	11 49	– –	8 29	7 36	6.7	.....Clifton.....	5 59	6 59	– –	– –	– –	– –	– –	2 40	– –	– –	– –	– –	– –
1 03	11 32	9 53	8 33	7 33	7 01	6 17	– –	5 46	5 12	2 05	11 53	10 33	8 33	7 39	8.2	..... Grasmere.....	5 56	6 56	7 45	– –	8 16	– –	9 35	2 36	6 17	7 28	9 11	10 32	12 02
1 06	11 35	9 56	8 36	7 36	7 04	6 20	6 05	5 49	5 16	2 08	11 56	10 36	8 36	7 41	9.5	...Dongan Hills....	5 52	6 52	7 42	– –	8 12	– –	9 31	2 32	6 14	7 22	9 07	10 28	11 58
1 09	11 38	9 59	8 39	7 39	7 07	6 23	– –	– –	5 18	2 09	11 59	10 39	8 39	7 44	10.4	.....Grant City.....	5 49	6 49	7 39	– –	8 09	– –	9 29	2 29	6 11	7 19	9 04	10 25	11 58
1 11	11 40	10 01	8 41	7 41	7 09	6 25	6 07	5 53	5 20	2 11	12 01	10 41	8 41	7 46	10.9	.....New Dorp.....	5 47	6 47	7 37	7 58	8 07	8 27	9 27	2 27	6 09	7 17	9 02	10 23	11 54
1 13	11 42	10 03	8 43	7 43	7 11	6 27	– –	6 55	5 22	2 13	12 03	10 43	8 43	7 49	11.8	Oakwood Heights (O. H.)	5 44	6 44	7 34	– –	8 04	– –	9 24	2 24	6 06	7 14	8 59	10 20	11 51
1 16	11 46	10 06	8 46	7 46	7 15	6 31	6 12	5 59	5 26	2 18	12 06	10 46	8 46	7 53	13.3	.....Great Kills.....	5 40	6 40	7 30	7 52	8 00	– –	9 20	2 21	6 02	7 08	8 55	10 15	11 48
1 18	11 48	10 08	8 48	7 48	7 17	6 33	– –	– –	5 28	2 18	12 08	10 48	8 48	7 55	14.2	.....Eltingville.....	5 37	6 37	7 28	– –	7 58	– –	9 18	2 18	5 59	7 06	8 52	10 12	11 46
1 20	11 50	10 10	8 50	7 50	7 19	6 35	– –	6 03	5 30	2 20	12 10	10 50	8 50	7 58	14.9	.....Annadale.....	5 35	6 35	7 26	– –	7 56	– –	9 16	2 17	5 57	7 03	8 50	10 10	11 43
1 23	11 53	10 13	8 53	7 53	7 22	6 38	– –	6 06	5 33	2 23	12 13	10 53	8 53	8 01	15.9	..Huguenot Park ..	5 31	6 31	7 23	– –	7 53	8 18	9 13	2 14	5 54	7 00	8 47	10 07	11 40
1 25	11 56	10 15	8 55	7 55	7 24	6 40	– –	6 09	5 36	2 26	12 15	10 55	8 55	8 03	16.6	....Princess Bay....	5 29	6 29	7 20	– –	7 50	– –	9 10	2 11	5 51	6 58	8 45	10 05	11 37
1 28	11 58	10 18	8 58	7 58	7 26	6 43	6 20	6 12	5 39	2 28	12 18	10 58	8 58	8 06	17.5	...Pleasant Plains....	5 26	6 26	7 18	7 44	7 48	8 14	9 08	2 09	5 48	6 55	8 42	10 02	11 34
1 30	12 01	10 21	9 01	8 01	7 29	6 46	– –	6 14	5 41	2 31	12 21	11 01	9 01	8 08	18.1	..Richmond Valley..	5 23	6 23	7 15	– –	7 45	– –	9 05	2 06	5 45	6 53	8 38	9 55	11 31
1 34	12 05	10 25	9 05	8 05	7 33	6 50	6 25	6 18	5 45	2 35	12 25	11 05	9 05	8 12	19.4	...**Tottenville**...	5 20	6 20	7 11	7 39	7 42	8 10	9 01	2 02	6 42	6 50	8 35	9 56	11 27
†1 44	12 15	10 35	9 15	8 15	7 43	7 00	6 35	6 35	5 55	2 45	12 35	11 15	9 15	8 22	20.0	.. **Perth Amboy** ..	A M	†6 10	†7 00	†7 29	†7 29	†8 00	†8 50	†12	†5 30	†6 40	†8 25	†8 45	†11 17
A M	Night	P M	P M	P M	P M	P M	P M	P M	P M	P M	Noon	A M	A M	A M	....	ARRIVE	LEAVE	A M	A M	A M	A M	A M	A M	A M	P M	P M	P M	P M	P M	P M

Additional Trains—Leave New York for Perth Amboy †6 00, †9 00 a.m., †12 30 noon, †2 40, †5 40, †8 15 p.m. Leave Perth Amboy for New York †6 30, †8 00, †9 50, †11 17 a.m., †12 17 noon, †2 50, †3 35, †4 26 p.m. *Sundays and Holidays*—Leave New York for Perth Amboy 7 30, 9 00, 10 00, 11 00 a.m., 12 30 noon, 2 00, 3 50, 5 00, 6 00, 7 00, 8 00, 9 30, 11 30 p.m. Leave Perth Amboy for New York 6 15, 7 46, 8 46, 9 46, 11 16 a.m., 12 46 noon, 2 16, 3 42, 4 30, 5 42, 6 42, 8 05, 9 35 p.m.

Rapid Transit Trains—*Daily, except Sundays and Holidays*—Leave N.Y. for St. George, Tompkinsville, Stapleton, Clifton, Rosebank, Fort Wadsworth, Arrochar and South Beach, also for New Brighton, Snug Harbor, Livingston, West New Brighton, Port Richmond, Tower Hill, Elm Park, Mariners' Harbor and Arlington 1 00, 5 00 a.m., and every 15 or 20 minutes until 12 30 night. Returning from South Beach and Arlington at similar intervals. Leave N.Y. for St. George only †1 30, †2 15, †3 00, †3 45, †4 30, †9 45 a.m. Leave St. George for N.Y. †2 15, †3 00, †3 45, †4 30 a.m., †4 45 p.m. Leave Clifton for N.Y. †4 48, †5 18 a.m. *Sundays and Holidays*—Leave N.Y. for South Beach, Arlington and intermediate stations, first boat 5 15 a.m., last boats 12 30 night and 1 00 a.m. Leave South Beach for N.Y., first train 6 22 a.m., last train 12 58 night. Leave Arlington for N.Y., first train 4 30 a.m., last train 12 55 night. Leave N.Y. for St. George 1 30, 2 15, 3 00, 3 45, 4 30 a.m. St. George for N.Y. 2 15, 3 00, 3 45, 4 30 a.m. Leave Clifton for N.Y. 5 03, 5 48 a.m. *Distances.*—St. George to South Beach, 4 miles; St. George to Arlington, 5 miles.

Perth Amboy Ferry—Leave Tottenville ¶1 34, †6 20, †6 42, †7 08, †7 45, †8 12, †9 05, †9 30, †10 05, †10 30, †11 05, †11 30 a.m., †12 00, †12 25 noon, †1 00, †1 35, †2 05, †2 35, †3 05, †3 43, †4 16, †4 45, †5 15, †5 45, †6 18, †8 25, †6 50, †7 17, †7 33, †8 05, †8 40, †9 05, †3 30, †10 00, †10 25, †11 00 p.m., †12 06 night. *Sundays and Holidays*—¶1 34, □6 25, 7 25, 8 00, 8 35, 9 25, 10 05, 10 35, 11 00, 11 40 p.m., 12 53 night. Returning, leave Perth Amboy †6 10, 6 30, 7 56, 4 15, 4 35, 5 05, 5 30, 6 05, 6 30, 7 05, 7 30, 7 55, 8 05, 9 05, 10 00, 10 35, 11 00, 11 40 p.m., 12 53 night. Returning, leave Perth Amboy †6 10, †6 30, †7 00, †7 20, †8 00, †8 50, †9 20, †9 50, †10 20, †10 45, †11 17, †11 50 a.m., †12 17, †12 45 noon, †1 20, †1 52, †2 20, †2 50, †3 35, †4 00, †4 26, †5 00, †5 50, †6 10, †8 40, †7 05, †7 25, †7 55, †8 25, †8 55, †9 20, †9 45, †10 15, †10 45, †11 17 p.m., †12 45 night. *Sundays and Holidays*—□1 00, 6 15, □6 45, 7 46, 8 20, 8 46, 9 46, 10 20, 10 50, 11 16, 11 50 a.m., 12 20, 12 46 noon, 1 20, 1 50, 2 16, 2 50, 3 20, 3 42, 4 05, 4 30, 4 55, 5 20, 5 42, 6 20, 6 42, 7 20, 7 45, 8 05, 8 45, 9 35, 10 20, 10 50, 11 17 p.m., 12 20 night.

† Daily, except Sunday; ¶ daily, except Monday. ■ Trains Nos. 41 and 42 will run holidays. □ Holidays only.

Note.—On holidays trains will run on Sunday time-table.

Figure 2: SIRT in the 1919 Official Guide to the Railroads

The delays and debt incurred in the 1884–1886 construction of the New York extension proved a heavy load for the already fragile B&O. The company turned to J.P. Morgan for financing and Morgan had B&O president Robert Garrett (1846–1896) ousted in 1887. Garrett had personally watched Cornelius Vanderbilt's son William Vanderbilt die of a stroke during an 1885 meeting over the Staten Island operations and his ejection from the B&O, along with other personal problems, lead to a mental breakdown and early death at the age of 49. Wiman would be outsted from the SIRT along with Garrett. Wiman's island-centric investments would ultimately prove vulnerable to the Panic of 1893 and he passed away a broken man nine years later (13, 14).

Electric trolley service came to the island between 1892 and 1894, primarily to connect areas on the northern and eastern shores to ferry terminals. The trolly lines included an electrification of the formerly horse-drawn Staten Island Belt Line Railroad between Tomkinsville and West New Brighton. Competition from the trolleys forced the SIRT into yet another bankruptcy and the B&O acquired control of the SIRT in 1899 (18).

The B&O's control of the SIRT ferries presented them with an opportunity to route their passenger ferries from Jersey City to the SIRT's Whitehall street terminal on the tip of Lower Manhattan, which was a hub for the city's growing rapid transit system. Service was inaugurated in 1897, but in an ongoing theme of star-crossed New York endeavors, an SIRT ferry collided with a B&O ferry in 1901, drowning five of the 995 passengers and raising pressure for public ownership of the ferry system. In 1905 the city took title to the terminal and ferries, ending the SIRT's control of South Ferry service. The opening of the Pennsylvania Railroad's (PRR) tunnels

to Manhattan and midtown station in 1910 further weakened the B&O's passenger rail situation, although passenger service to Manhattan via ferry limped along until 1958 (14).

Freight service to Staten Island proved to be considerably more remunerative than the B&O's passenger efforts as industrial growth on the island continued. In 1905 Procter & Gamble opened a large plant near the B&O's Arlington Yard, resulting in significant additional traffic. Around the same time, the American Dock & Trust Company expanded their Tompkinsville operations just to the east of St. George, continuing the expansion of pier and warehouse activity on the northeastern shore. Coal tranfer to barges in St. George became very lucrative, leaving the comparatively small St. George yard in an overcrowed state by 1912. In response, the B&O began running some of its float traffic through its old freight facility in Jersey City (19).

In 1911, the Brooklyn Rapid Transit Company (BRT), which operated transit and trolly lines, began considering the possibility of a rail tunnel from 67th street in Brooklyn under the Narrows to Staten Island. The line was included in the 1913 "Dual Contracts" between the city, the BRT and the other city subway company, the Interborough Rapid Transit (IRT), that built or rebuilt much of the city's subways and elevated lines. However, the dual contracts did not include any funding for the line and the idea never became anything more than the first of numerous unrealized tunnel proposals (20).

Shipyards on the North Shore as well as various island factories proved vital in the First World War. Rail congestion prompted the Federal government to take control of the railroad companies during the war, giving the B&O passenger lines the access to Penn Station and a direct rail connection to Manhattan that the company had long coveted. The B&O managed to extend their tenure at Penn Station until new management at the PRR terminated the arrangement in 1926 (21). Following their ouster from Penn Station, the B&O supposedly tried some experimental passenger runs from New Jersey through St. George, but the additional time required for the ferry ride to Manhattan made the route no better than the Jersey City terminal for competing with the PRR.

Buses arrived on the island in the 1910s and by 1920 there were over 100 buses running along various lines in the city (22). Buses slowly replaced trollys and the final trolly line ceased operations in 1934 (11). Improved bus transport and growing automobile ownership would ultimately prove very detrimental to passenger rail on the island as the century progressed.

The idea of a rail tunnel to Brooklyn was revived after the war with a 1921 request to the Board of Estimate for a proposed city-funded freight and passenger tunnel that would connect to the 4th Avenue subway in Brooklyn. St. George was ultimately chosen as the Staten Island portal and shafts were sunk on both sides of the harbor in 1923. The freight tunnel was removed from the project in 1925 (reputedly under the influence of the PRR) and the entire project was abandoned in 1926 due to mysterious financing and political problems. The shafts were filled in during a 1950 viaduct improvement project. Additional proposals reared their heads in 1930 and 1945 to a similar fate (11, 23). In 1936 a proposal was made to run the SIRT over the Bayonne Bridge and into Manhattan through the Hudson & Manhattan Tubes (later the PATH) never got much further than a public announcement (24). In 2002 the New York City Economic Development Corporation began evaluating options for a freight rail tunnel that would ease truck congestion on area roads and might include a portal on Staten Island. However, as of this writing, the recommendations seem to be leading to a New Jersey portal and financing is still uncertain (25).

Although the tunnel to Brooklyn never got built, the prospect of a connection of the SIRT with the New York Subway system, along with a 1923 law requiring electrified traction in the city lead to electrification of the SIRR. The upgrade was remarkabley swift, being completed in mid

1925 just over a year after preliminary plans were submitted. Despite the law, the electrification did not remove steam freight locomotives from the system for many years, although it did improve the speed and comfort of passenger service (20, 23).

Elimination of at-grade street crossings by rail lines in the city had been a major item of public interest since the beginning of the century, but grade crossing elimination was fought vigorously by the SIRT with procrastination and legal action. The SIRT did not participate in a 1927 agreeement by the state with 60 other railroads for the elimination of 276 grade crossings, instead chosing to fight unsuccessfully appeal all the way to the U.S. Supreme Court (which refused to hear the case) (26, 27).

The B&O, like all railroads was hit hard by the depression in the 1930s, but infrastructure spending by the Federal Public Works Administration provided cash for the effort that the SIRT was so loathe to invest itself (28). Grade separation was accomplished both by lowering the rail grade into trenches and raising it above street level. The peak of the effort was a $6 million mile-long viaduct in Port Richmond that opened on 25 February 1937 and single-handedly eliminated 34 grade crossings. World War II and the decline of railroads following the war delayed removal of the final grade crossings, although sources dispute whether the final Tottenville line removal was 1966 or just prior to the 1971 sale of the lines to the city (19, 29).

As with the first World War, the second World War brought a massive increase in traffic to the SIRT. Freight tonnage began increasing in 1939 and peaked at a record 3.2 million tons in 1944. Stapleton was a port of embarcation and handled 742,000 troops and 100,000 prisoners of war. The Stapleton piers also handled hospital ships and military hospital cars were moved on the SIRT, including some for the rehabilitation facility at Staten Island's Halloran Hospital. The surge in traffic resulted in the addition of diesel locomotives to the line, and the system's final steam locomotives were retired with the traffic dropoff at the end of the war (30).

The end of the war also represented the beginning of a long decline in the fortunes of railroads in America. Increasing automobile ownership and bus service simultaneously reduced the passenger ridership on the SIRT. The New York City Board of Transportation gained almost complete control of the island's bus lines in 1948 and cut fares to match the other city lines. The SIRT could not match the fare cut and lost 60% of its business almost immediately. The SIRT announced plans to terminate all passenger operations in 1953 but a threat from the city to relieve them of their still-profitable freight service along with a committment for a sizeable city subsidy preserved the Tottenville line. The short South Beach and North Shore lines were agreed to be no longer viable and passenger service was terminated on both lines March 31, 1953. With the exception of the SIRT Tottenville line, the B&O terminated all of its eastern passenger service in 1958 (31, 32, 33).

In 1957, an oil tanker collided with center pier of the old Arthur Kill swing bridge and disabled it. The bridge had long-since become an obsolete menace to shipping in the channel and talks had been ongoing with the federal government since the early 1950s to replace it. A new single-track lift bridge was quickly built and opened to traffic on August 25, 1959. Since the bridge aided water navigation, 90% of the $11 million cost was assumed by the federal government. The 559-foot main lift span remains the longest in the world and provides 135 feet of clearance above MHT when elevated. The new bridge also provided capacity for heavier coal hoppers. The SIRT also added a three-mile-long spur (the Travis Branch) from Arlington to the then-new Con Edison Arthur Kill power plant for coal delivery (34, 35).

The advent of containerization and long-distance truck transport in the 1950s also began to

slowly reduce the need for expensive lighterage and rail carfloat operations through Staten Island. In 1963 the B&O came under the financial control of the Chesapeake & Ohio Railroad (C&O), with proceeds of the transaction used to purchase new freight cars and expand tunnels to accomodate piggyback trailers (36).

In 1970, President Nixon signed into law the Rail Passenger Service Act to consolidate most of what was left of America's passenger rail system and Amtrak began operations on May 1, 1971. On July 1, 1971, Staten Island Rapid Transit Operating Authority, a division of the Metropolitan Transportation Authority (MTA), took over Staten Island's rail operations. This ended almost 90 years of B&O control over the system, although the B&O retained trackage rights for freight operations. In March of 1973, a fleet of R-44 cars was christened on the line, unifying the equipment with the rest of the New York City subway system. In the early 1990s, the MTA renamed the line the MTA Staten Island Railway (37).

On the freight side, the formation of Conrail in 1976 as a federally-subsidized competitor along much of the B&O's territory made life for the company increasingly difficult. B&O had managed to continue limited carfloat operations through St. George, but turned the service over to the New York Dock Railway in 1976. New York Dock finally abandoned the St. George carfloat operations in 1980, leaving the St. George yard handling only a small amount of traffic for what little industry remained on the island. In 1985, the operating rights for the North Shore and the connection to Cranford Junction were sold to the Delaware-Ostego Corporation.

The B&O and its fellow C&O companies were consolidated into CSX in 1987, ending the 160-year history of America's oldest railroad company. The association of the B&O with Staten Island seems apt since both lived in the shadow of two larger brothers. In the case of the B&O, the railroad always aspired to the success of the Pennsylvania Railroad and the New York Central Railroad, but was always the third of the big 3. Likewise, Staten Island has always been an afterthought following Manhattan and the Long Island boroughs.

In 1989, Delaware-Otsego embargoed the crumbling shoreline section of the North Shore line just west of St. George and terminated freight service to the island completely the following year. (19, 38) The New York City Economic Development Corporation (NYCEDC) purchased the Arthur Kill bridge and North Shore line in 1994 from CSX, which had retrieved it from the bankruptcy of Delaware-Ostego. Current tax lot information gives the owner as "Department of Business."(39)

In 2004 the NYCEDC and the Port Authority of New York and New Jersey joined in a $75 million renovation of the bridge and rail line up through Arlington. The Port Authority also contributed $56 million for a viaduct in New Jersey for better main line connection and added an additional $26 million for upgrades to the New York Container Terminal (originally the Howland Hook Marine Terminal built in 1972 by Jakob Isbrandtsen). Also included was a $40 million waste transfer station to facilitate rail movement of the island's garbage to mainland landfills. The rail line between New Jersey and the container terminal was officially reactivated by the Mayor on April 17, 2007, although the North Shore line from Arlington eastward still remained derelict and inactive (34, 40, 41).

In 2003, Borough President James Molinaro and the Port Authority commissioned a study on the feasibility of rebuilding the North Shore line and restoring passenger service to St. George. A similar study was performed in 2009 exploring the possibility of expanding the Hudson-Bergen light rail line over the Bayonne Bridge and along the west shore (including the SIRT Travis Branch ROW), creating the possibility of a rail belt line around the island. Mayor Bloomberg included

reactivation of the North Shore line in his 2009 campaign and the MTA hired SYSTRA Consulting in 2009 to further explore options for the North Shore (42, 43)

Recommendations for further reading on the history of Staten Island's railroads include *Staten Island Rapid Transit: The Essential History*, an online revision of a 1965 published history by Irvin Leigh (`http://thethirdrail.net/0201/sirt14.html`), and *Royal Blue Line*, a richly illustrated history of the B&O railroad by Herbert Harwood that is available in paperback or in the original hardcover at the New York Public Library.

NSRR CONDITION IN 2009

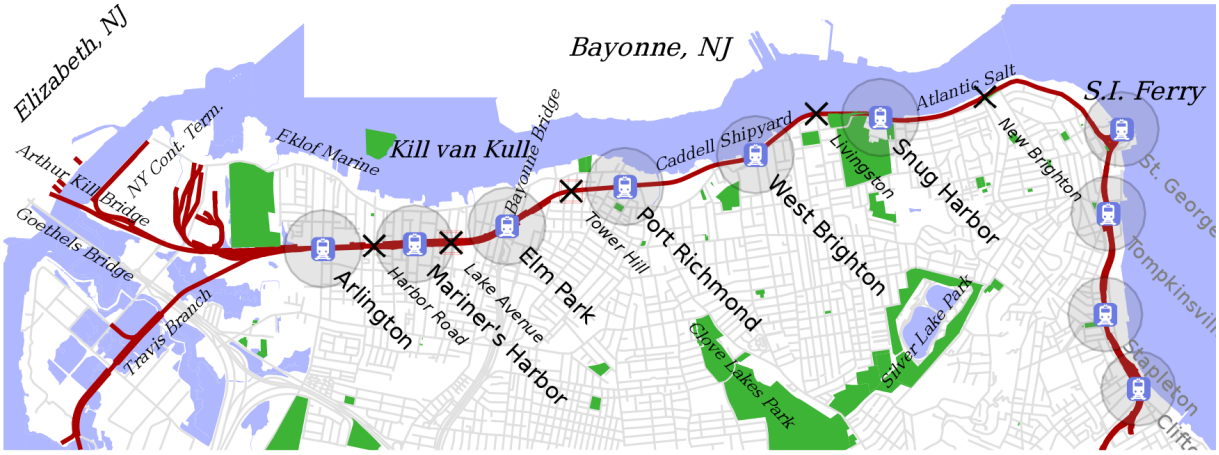


Figure 3: Proposed North Shore Rail Line Stations

Given the poor state of the line at abandonment and lack of maintenance since, conditions on the NSRR vary dramatically. The NSRR ROW can be divided into seven sections that are distinguished by design and current condition. Sections are described from east to west:

St. George to New Brighton (0.7 miles): The former St. George railyard was converted into commuter parking lot and stadium for a minor-league affiliate of the New York Yankees baseball team. The former NSRR platforms at the St. George ferry terminal are still intact and track continues to past a special-event station at the ballpark and about 1,000 feet north to a terminating bumper. The intact ROW (overgrown and with no track) continues directly alongside Richmond Terrace to the site of the (now-defunct) New Brighton stop at the foot of Jersey Street. Reactivation of the ROW would entail moving Bank Street (which runs parallel to the ROW and is used to access the parking lot from Jersey Street) around 20 feet away from the ROW.

New Brighton to Snug Harbor (0.4 miles): The ROW is reputedly intact through the facilities of the old U.S. Gypsum plant. However, no trackwork is obvious and Atlantic Salt has massive piles of rock salt on the west side of the site over what presumably is the ROW. Restoring ROW through this area would likely involve relocating Atlantic Salt, demolishing the old plant, and/or elevating the ROW above whatever operations remain there. In the event of eviction, the proximity of this area to the densely populated areas around St. George make it an excellent potential site for a waterfront park.

Snug Harbor to West Brighton (1 mile): The topography in this area rises inland toward the hills in St. George, necessitating construction of the rail line along the shoreline on wood trestle

that was enclosed by a wooden retaining wall and filled with gravel and ballast. By the late 1980s, much of the retaining wall had decayed and eroded, taking the tracks and some of the shoreline with it. Reconstruction would likely involve either restoring the retaining walls, building the rail line on new piers, and / or, in the case of light rail, relocating the ROW up closer to Richmond Terrace and turning the shoreline into recreational area.

West Brighton to Port Richmond (1 mile): The ROW narrows in this area and runs through active industrial property, notably the Cadell shipyard. Much of the ROW is being used for storage but no permanent structures have been built on it. Elevation and relocation of the track above grade would be required to preserve the businesses here.

Port Richmond to Tower Hill (0.8 miles): As the ROW moves west from the industrial area, it rises on an elevated concrete viaduct that was built in the late 1930s to eliminate grade crossings. A 2000 inspection revealed the viaduct to be largely sound, although age, lack of maintenance and issues with ADA compliance would likely necessitate extensive repairs (42). Old station platforms and awnings still exist on the viaduct, although their poor condition and old design would probably require complete reconstruction. Consideration is also being given to replacement of the structure or demolition with restoration of the at-grade crossings.

Tower Hill to Arlington (1.5 miles): The concrete viaduct ends just to the West of Treadwell Avenue, with the ROW proceding on an embankment to the Bayonne Bridge, where it descends into and open cut. A single track seems to be intact from here on west with some derelict vestigial station facilities and platforms, although the cut is heavily overgrown. Street bridges over the ROW have been maintained and this is likely the least expensive stretch of ROW to restore. This is also the area that will receive the greatest commuting time reductions on the line. If the Hudson-Bergen Light Rail (HBRL) line is extended into Staten Island, the Elm Park station, just under the approach to the Bayonne Bridge on Hwy. 440, would presumably be a transfer point between the two lines.

Arlington to Arthur Kill (0.5 mile): The far western part of the line has been reactivated for freight service to the New York Container Terminal in Howland Hook. The restored line begins with a single track just west of Harbor Road and expands to three tracks just west of South Road. The Travis Branch also splits off of the line just east of South Road and continues down the West Shore to an electrical plant. There has never been regular passenger rail service on this stretch and there are no plans to add it. Adding a stop along this stretch might be helpful for some New York Container Terminal employees, but limited potential patronage and possibility of contention with freight service might not make an additional stop worth the cost. The area west of South Road and south of the ROW is largely undeveloped and is a potential location for an additional rail yard and / or a new maintenance facility.

Table 4 lists current or former stations on the North Shore line with mile markers. Stations proposed for reactivation in the 2004 feasibility study are indicated in bold.

Mile	Station
0.0	**St. George**
0.1	*Richmond County Bank Ballpark (seasonal)*
0.7	*New Brighton: Richmond Terrace at Jersey St.*
1.2	**Snug Harbor: Richmond Terrace btw. Snug Harbor Rd. & Tusen St.**
1.8	*Livingston (S.S. Harbor): Richmond Terrace at Snug Harbor Rd.*
2.4	**West Brighton: Richmond Terrace at N. Burgher**
3.0	**Port Richmond: Park Avenue at Church Street**
3.4	*Tower Hill: Btw Treadwell and Sharpe Avenues*
3.9	**Elm Park: Willowbrook Pkwy btw Lasalle & Innis**
4.3	*Lake Avenue:*
4.6	**Mariners Harbor: Van Pelt Ave. at Linden Ave.**
4.9	*Harbor Road*
5.2	**Arlington: South Avenue btw Arlington Pl. and Brabant St.**
6.1	*Port Ivory: Former Procter and Gamble plant (Milliken)*
6.8	*Arthur Kill Drawbridge*
7.9	*Bayway, NJ*
9.2	*Linden, NJ*
10.9	*Bantas, NJ*
11.7	*Staten Island Jct. (with CR Lehigh Line)*
12.2	*Cranford Jct. (LVRR Interchange)*

Figure 4: Former and Current North Shore Rail Line Stations

MODAL OPTIONS

Although the NSRR line historically was a heavy rail line, the 2004 feasibility study explored four additional modal options: Electric Light Rail (LRT), Diesel Multiple Unit Light Rail (DMU), Streetcar, and Bus Rapid Transit. All have similar capital construction cost estimates ($347MM to $377MM in 2003 dollars), although the modes vary somewhat more significantly in operation/maintenance costs and ridership growth capacity. The study ultimately recommends light rail as offering reduced construction costs and more flexible operational parameters than the other options.

While acknowledging the advantages of light rail, this report recommends heavy rail for the following reasons:

Limited Capital Cost Differential: The $26MM capital cost differential between light and heavy rail will likely not be as significant as inevitable contingencies mount during the construction process. The primary savings are from light rail being able to cross roadways at grade, eliminating the need for rehabilitation and construction of elevated grade crossings. However, roadway crossings present significantly increased potential for accidents and operational difficulties. Handicapping future traffic flow for a fairly meagre (and likely illusory) 7% savings may be shortsighted.

Limited Operating Cost Differential: Projected annual operating costs for light rail are only 62% of those for heavy rail. However, extrapolation of costs from the existing MTA Staten Island Railway (SIRR) indicate that the heavy rail costs are significantly understated, which calls into question the methodology used to calculate the light rail operational costs as well.

Additional Maintenance Facilities: Use of heavy rail on the NSRR would likely permit use of an expanded existing facility in Clifton. Use of light rail would require creation of an

entirely new facility and require a separate crew of maintainers. If actual ridership turns out to be significantly lower than projections for any meaningful period of time, the expense of the separate facility could reduce the viability of the entire line. Use of a single consolidated facility would permit more scaling flexibility to meet expansions or contractions of demand.

Dissimilar Rolling Stock: Neither the SIRR or MTA have any direct experience with light rail cars and it is not unlikely that there could be acute or chronic learning curve issues. By contrast, the MTA has been using heavy rail cars for over a century and has a robust infrastructure in place to handle design, purchase and maintenance issues with the vehicles. Using a single type of rolling stock across the entire SIRR system would enhance scalability, load balancing, and fault tolerance across all SIRR operations.

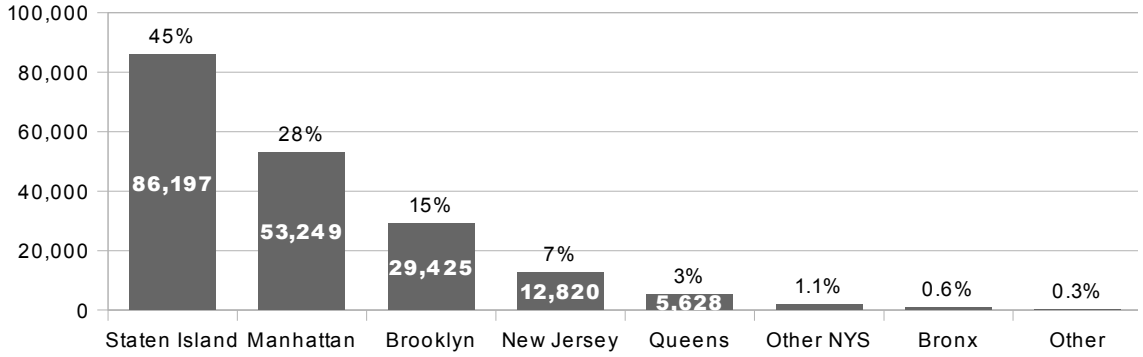
Waterfront Desirability: A significant consideration in the choice of light rail is the ability to provide more meaningful recreational access to the waterfront along Richmond Terrace, since grade and safety considerations would require maintaining a heavy rail ROW fairly close to its existing location along the water's edge. However, as mentioned elsewhere in this document, there is some doubt whether a waterfront along a still active industrial waterway would be an ideal candidate for parkland and would find significant patronage even if created.

Freight Access: The North Shore line historically also served as a freight line to very active industrial activity in St. George and along both the north and south shores of the island. Although St. George no longer has any significant amount of industry, the South Shore retains some industrial activity and the North Shore is still quite vibrant. The tracks west of the proposed NSRR passenger line are active with renewed freight activity, notably to the New York Container Terminal, a large intermodal container and general cargo-handling facility that opened in 2007 and is connected to the mainland over the Arthur Kill drawbridge. While there are no plans or proposals to bring freight operations to the NSRR or the existing passenger line along the South Shore, increasing fuel prices and a potential future move to electrified freight transport powered by renewable electricity sources make future freight operation on the NSRR a distinct possibility. Rebuilding the old heavy rail ROW as a light rail line below heavy rail standards (notably with grade crossings and lower-profile rail weights) would make restoration of freight operations in the future much more difficult.

USER PROFILE

The 2004 NSRR feasibility study predicts 11,400 daily boardings (2,600 during the morning rush peak) with a total of 3,575,000 annual boardings (42). Given the orientation of the NSRR ROW, a primary focus of planning is based around commuters that use the St. George Ferry to Manhattan, including riders that would continue on the subway to Queens or Brooklyn.

The 2000 census listed Staten Island has having a population of 443,728 (44). Of the islands 192,000 workers in 2000, around 55% commuted off the island, including 88,000 (46%) that commuted to Manhattan, Brooklyn or Queens (2).



Source: USCB 2008 (2)

Figure 5: Where Staten Islanders Work, 2000

In 2000, residents of the North Shore area took around 15,400 daily transit trips (both directions) to the St. George ferry on buses. Many, if not most of these would be supplanted by much more expiditious NSRR service, cutting as much as a half-hour off typical travel time to St. George.

In the area around the NSRR, around 11,000 persons (3% of island population) live within 1/4 mile of a proposed station and 36,000 (8% of island population) live within 1/2 mile of a proposed station. The combined new NSRR with the existing SIRR would provide rail access to around 9% of island residents within 1/4 mile of a station and 33% of residents within 1/2 mile of a station.

Another major impetus behind the NSRR is consideration for future growth on Staten Island. The city's PlanNYC 2030 project predicted a 24% growth in Staten Island population between 2000 and 2030, equivalent to a 0.73% annual growth rate (45). While there are questions that can be raised about how realistic those numbers really are, very serious concerns can still be raised about the strains that any growth will place on already overtaxed road infrastructure. Failure to deal with transportation issues proactively, along with other demographic changes could result not only in a reduced quality of life, but reduced economic potential, coupled with increased demands on public services associated with an older, poorer and less-educated borough. Financial assessments of the NSRR's potential benefits to the community, as will as consideration of the potential situation if the NSRR is not reactivated are detailed later in this paper.

CAPITAL CONSTRUCTION COSTS AND SCHEDULE

The 2004 feasibility study provided estimates of projected construction costs for the NSRR in 2003 dollars, with the caveat that a more detailed engineering analysis would be needed to supply reliable numbers (42). Some vague scheduling possibilities were also provided, which are considered along with the scheduling of construction the HBLR to give the potential construction cost schedule in figure 6. Columns are given with calculation of cost inflation that would be associated with a historically typical 3% annual inflation rate over the 10-year design and construction period.

($ in millions)

Year	Phase	Soft Costs	Guideway	Facilities	Systems	Stations	Vehicles	Special Conditions	Contingency	Total (2009 $)	Inflation 3.0%	Inflation Adjustment
2010	Alternatives Study	$2								$2	*100%*	$2
2011	Environmental Impact Process	$10								$10	*103%*	$10
2012	EIS (cont'd)	$10								$10	*106%*	$11
2013	EIS (cont'd)	$10								$10	*109%*	$11
2014	Final Design / Agreements	$10								$10	*113%*	$11
2015	Final Design (cont'd)	$10								$10	*116%*	$12
2016	Final Design (cont'd)	$10								$10	*119%*	$12
2017	Construction Year 1	$10	$28				$24	$15	$22	$99	*123%*	$122
2018	Construction Year 2	$10	$28		$11	$8		$15	$22	$94	*127%*	$119
2019	Construction Year 3	$10	$28	$18	$11	$8		$15	$22	$112	*130%*	$146
2020	Construction Year 4	$10	$28	$18	$11	$8		$15	$22	$112	*134%*	$151
2021	**Opening Total Cost**	**$102**	**$112**	**$36**	**$33**	**$25**	**$24**	**$59**	**$87**	**$479**	*138%*	**$606**

Source: Derived from URS 2003. Soft costs assumed based on "tens of millions" EIS estimate

Figure 6: Capital Construction Cost Schedule

New transit infrastructure is typically funded as much as 80% by the federal government with state and local matching funds making up the balance. The $600 million NJ Transit Secaucas Train Station was 75% funded with a $450 million federal grant (46). $604 million of the initial $1.1 billion HBLR DBOM contract (58%) was from the Federal Transit Administration's New Starts Full Funding Grant Agreements, with the remainder coming from Grant Anticipation Notes (GANs) (backed by passenger fares) and the State Transportation Trust Fund (motor fuel tax receipts) (47). The $1.3 billion federal Full Funding Grant Agreement of the $4.9 billion first phase of Manhattan's Second Avenue Subway (which also includes a $450 million bond approved by voters in 2005 and $1.05 billion authorized by the state) is significantly lower (28%) than with most transit systems, although because of the massive expense of the project, the federal share still represents an unusually large absolute amount (48, 49).

Based on this precedent, the assumption is that the construction costs for the NSRR will be paid for with federal and state funds. As will be demonstrated later in the valuations, it would be completely impractical to fund construction of the NSRR solely with user fees.

DIRECT REVENUES

($ in millions)	
Direct Revenues	
Farebox revenue	$2.83
Advertising and other	$1.02
Indirect Revenues	
Value of reduced commuting time	$11.54
Property taxes from increased valuations	$3.10
Income taxes from population growth	$7.29
Reduced auto use	$19.55
Mitigation of crime increase	$43.00
Total annual direct and indirect revenue	$88.33

Note: Assumes 3% annual inflation

Figure 7: Projected Direct and Indirect Revenues, 2021

Farebox Revenue: The bulk of direct revenues from the operation of the NSRR would come from passenger fares. However, assuming integration of the NSRR into existing SIRR operations, fare estimates are skewed by the means in in which fares are currently collected on the SIRR.

The SIRR historically operated in a manner similar to other local railroads, with conductors punching paper tickets and collecting money. However, with the advent of metrocards in 1997, the railroad elected not to go to the expense of installing turnstiles at each station. Since most riders (90%) used the line to travel to the ferry at St. George, a single set of turnstiles was installed at St. George, collecting fares in both directions (50). But since transfers from the subway in Manhattan to the SIRR are free, this reduces the number of locally paid fares to around 45% of actual boardings.

Using this same procedure, the projected 3.6 million boardings could be expected to bring around $1.8 in revenues at the current $2.25 per-ride fare, or $2.8 million assuming that fares are around $3.50 with increases needed by opening in 2021 to keep up with an average annual 3% inflation rate.

Advertising and Rental: The other significant revenue sources for the SIRR are advertising in stations and cars and, perhaps, some rental of space in stations. Using the $1.9 million earned by the SIRR in non-farebox revenue in 2008, multiplying by a 3% annual inflation rate and interpolating based on 1/3 the amount of track, the NSRR could be expected to generate $1.1 million in non-farebox revenue per year on opening in 2021.

Trackage Fees: Although there are no current plans for freight operation on the NSRR or SIRR, future freight operations to industry on the island could yield trackage fees. Freight operation would present serious scheduling issues, although nighttime passenger service would likely be limited, providing ample opportunity for overnight movement and deliveries.

Although it will represent a trivial savings, it should be noted that service trains that pick up garbage at SIRR and NSRR stations may be able to proceed directly to the borough's garbage transfer station at Howland Hook, providing a simple, non-truck path for garbage off of the island.

INDIRECT REVENUES

Direct revenues will almost certainly never cover the maintenance and operation of the NSRR, much less pay for construction. The $4 million or so from direct revenue would still be only about 20% of the projected annual 2021 operations and maintenance cost of $21 million based on interpolation from 2008 annual costs for the SIRR. However, indirect benefits to the community and city must also be considered. Although serious questions can be raised about the valuation methodologies, techniques are available for monetizing some of the benefits that the NSRR would provide upon opening.

Since much of Staten Island developed after the advent of suburbanization, the island has all of the infrastructural ills associated with low-density development, along with the historic, bureaucratic and financial complications endemic to being a borough of New York City. While the island has considerable residential appeal as a result of its simultaneous proximity and distance from Manhattan, the island has spatial and cultural distinctions that have operated to the detriment of the borough:

- High commuting times
- Increasing traffic congestion
- Increasing travel costs
- Pedestrian-averse development
- Transit dependence primarily on slow, crowded and expensive city buses
- Inconvenient transit options for intra-borough mobility
- Limited visitor accessibility to island cultural institutions
- Real estate resources that are undercapitalized due, in part, to limited transit options
- Decreasing air quality
- Complete and unsustainable reliance on automobiles, buses and trucks

These problems are largely qualitative and aesthetic “quality-of-life” issues, but some can be quantitatively assessed through direct and indirect measures of effectiveness that can then be used to evaluate any potential solutions to these problems. Since the focus of this document is financial, measures that can be used to translate some of these problems into financial costs and benefits, along with projections for the NSRR are calculated with revenues.

Value of Commute Time Savings

New Yorkers have the highest commuting times in the nation and in 2000 the average commuting time for Staten Islanders was the worst for all New Yorkers at 44.1 minutes (51). 2003 average commuting time dropped to 41.7 minutes, although oscillations over the years do not indicate that this is necessarily a long-term trend (52) and even modest growth in the future will only exacerbate the situation (46, 53).

While the borough-wide average is fairly similar to averages for the Bronx and Queens, averages tend to smooth out the extremes. In the case of the North Shore, this is especially deceptive since commute times to Midtown Manhattan from Arlington or Mariner's Harbor via public transportation can routinely take as much as 90 minutes. By significantly reducing access time to the St. George ferry by up to 30 minutes, the NSRR would offer a considerable improvement in quality-of-life that can be translated into financial savings based on the earnings of the populations involved.

The primary city bus lines through the area to St. George are the S46 and S40. The S46 schedule lists the trip to St. George as taking 44 minutes from Arlington. The S40 Limited schedule list the same trip at 28 minutes (54). Traffic or weather conditions can increase travel times substantially. By contrast, heavy or light rail on the NSRR will make the same trip in 13 minutes and be much more tolerant to the vagaries of weather and congestion.

The Transportation Cooperative Research Program cites research estimating a the value of peak period travel to be approximately 40 to 50 percent of the average pre-tax hourly wage with the assumption is made that time spent commuting is lost time that might otherwise be spent engaging in productive activity (55). The wage rate discount is applied because the assumption is not universally true for all workers at all times and because some portion of commuting time in public transit can, in fact, sometimes be used to engage in work-associated activities.

Figure 8 uses projected boardings at various stations, the estimated time savings over the bus, and median household incomes from 2000 census tracts surrounding the stations. No consideration is given to increased boardings associated with population increases, increased incomes associated with gentrification, or multiple-income households.

	AM Peak Boardings	Bus Minutes	NSRR Minutes	Minutes Saved	Median Income	Hourly Equivalent	Time Value
Arlington	507	28	13	15,210	$29,528	$15	$1,871
Mariner's Harbor	371	39	10	21,518	$43,417	$22	$3,893
Elm Park	1,454	30	8	63,976	$58,776	$29	$15,668
Port Richmond	431	17	6	9,482	$49,069	$25	$1,939
West Brighton	530	7	4	3,180	$36,275	$18	$481
Snug Harbor	97	2	2	0	$54,984	$27	$0
Daily	3,390			113,366			$23,851
Annual (2000 Dollars)	881,400			29,475,160			$6,201,277
Annual (2021 Dollars)							**$11,536,202**

Source: URS 2003, USCB 2008

Note: Assumes 2 boardings/person/day, 5-day workweek, 50-weeks/year/person, 3% annual inflation, commute value = 50% hourly rate

Figure 8: Valuation of NSRR Commute Time Savings

Whitelegg (56) has pointed out that economic benefits based on small incremental savings in time have been used to vastly overstate those benefits and promote excessive additional highway construction. And there is reason to question whether the time valuations used by the TRB are rational in practice. However, the time benefits that would be created for thousands of North Shore residents compared to buses are substantial, so these monetizations are used with the appropreate caveats given above.

Increased Property Tax Revenue

Improvement of mobility provided by rail lines is typically associated with development and increased property values surrounding the lines. The relationship between transit, development, social considerations, geography and property valuations are complex, making definitive quantitative calculations subject to widely varying interpretations.

The opening of the HBLR just across Arthur Kill was associated with $5.3 billion of new residential units (57). An analysis of property around HBLR stations found increases in assessed valuation of 50% within 1/4 mile of HBLR stations and 25% within 1/2 mile (58). By contrast, a more modest increase of 2% to 5% was observed for median home values around stations for a new light rail line in Buffalo, NY (59). Other studies have shown both positive and negative affects in different situations. Since the North Shore situation is likely to be a bit brighter than Buffalo, but significantly less successful than Jersey City, a 10% premium is assumed with the caveat that the property value benefits could be significantly higher or lower.

Using 2007 tax lot data from the city, the assessed value of property within 1/2 mile of proposed NSRR stops is $335 million, of which $180 million is not tax-exempt (60). Assuming the 2008 citywide average direct tax rate of 11.66% (61), this represented tax revenue to the city of around $21 million. Assuming a 10% premium associated with NSRR, this would represent additional revenue to the city of $2.1 million in 2008 dollars or $3.1 million in 2021 dollars, assuming an average inflation rate of 3%.

Additional increase in property value might be attributable to reduction of the depressive effect of having an grassy, abandoned rail line coursing through the area.

The North Shore is already an area of comparatively dense but old development compared to the rest of the island. As such, additional multi-unit residential and, possibly, office development could result from the improved mobility afforded by the NSRR. However, without a picture of the comprehensive rezoning and tax initiative that could accompany city focus on development of the area, no good predicted values for tax increases from new development are proposed in this document.

Increased Income Tax Revenue

The development of the NSRR would make access to the St. George ferry considerably more convenient for area residents, presumably promoting the development of more dense multi-unit buildings and attracting a significant amount of the population growth predicted for the island. Unlike the highly suburbanized areas in the center and southern parts of the island, the North Shore is also home to swaths of older housing stock and underutilized properties that might be amenable to multi-unit residential development within walking distance of NSRR stations.

The 2000 census tracts near the St. George Ferry are home to many large apartment buildings, yielding a population density of 28,000 to 36,000 residents per square mile. The residential tracts around the Clifton Station on the SIRR (seven minutes from St. George) have densities of around 25,000 residents per square mile (44).

By contrast, the most densely populated tract along the NSRR line is in Arlington at 22,000 residents per square mile. Most of the other residential tracts run in the range of 15,000 to 20,000 persons per square mile (44). While some of this tract-level differential can be attributable to the wide variety of land uses in the area, this does indicate that the NSRR has the potential to be part of a comprehensive development plan that results in 15% to 20% population growth in the area to a density similar to Clifton. If the 24% countywide growth rate in PlanNYC 2030 turns out to

be true, the growth rate might even be greater in the NSRR area since it would be less subject to NIMBY issues that may arise in the suburbanized regions of the island.

With 36,000 residents living within 1/2 mile of NSRR hubs and an average per capita income $13,600 (median household income divided by median household size), area income is around $490 million dollars. A 20% population increase would result in increased area income of around $98 million. Assuming income keeps up with an average 3% inflation rate, increased income at the opening of the NSRR in 2021 would be around $182 million. Assuming an effective city tax rate of 4% (62), that represents an additional $7.3 million in annual city tax revenue that can be associated with the development of the NSRR.

Crime

The North Shore is an area of comparatively high crime, especially when compared to the South Shore. One hope for the North Shore line is that it might attract some level of gentrification and, correspondingly reduce crime and the associated financial costs of crime to the city and community. Research has indicated that gentrification does lead to an eventual reduction in personal but not property crime (63).

Staten Island is divided into three police precincts by the New York Police Department (NYPD) in bands that roughly cover the north, center and south parts of the island. The area around the North Shore ROW is contained within the 120th Precinct.

Figure 9 gives crime statistics for the Staten Island precincts for reported years from 1990 to 2008. Also included in the table for comparison are citywide statistics and statistics for three representative Brooklyn precincts. Williamsburg and Greenpoint (90th and 94th precincts) are two neighborhoods that were home to a large number of underutilized or abandoned industrial sites. This neighborhood underwent a controversial rezoning in 2005 that resulted in a radical gentrification. By contrast, the Brownsville neighborhood just to the east of Williamsburg is home to a number of public housing projects and, accordingly, high crime rates.

	1990	1995	1998	2001	2008
120th Pct (SI North) Incidents	6,727	4,351	2,595	2,085	1,690
% of 1998				*80%*	*65%*
120th Pct (SI North) Murder	16	17	9	7	13
% of 1998				*80%*	*65%*
Murders per 1,000,000 people				*42.6*	*79.1*
122nd Pct (SI Central) Incidents	6,822	3,839	1,993	1,444	1,254
122nd Pct (SI Central) Murder	8	4	2	4	7
% of 1998				*72%*	*63%*
Murders per 1,000,000 people				*35.2*	*61.6*
123rd Pct (SI South) Incidents	1,760	1,101	747	514	514
123rd Pct (SI South) Murder	5	5	1	2	1
% of 1998				*69%*	*69%*
Murders per 1,000,000 people				*15.9*	*7.9*
Citywide Incidents	527,257	312,332	212,913	162,064	117,892
Citywide Murder	2,262	1,181	629	649	523
% of 1998				*76%*	*55%*
Murders per 1,000,000 people				*81.0*	*65.3*
90th Pct (Williamsburg) Incidents	5,392	3,439	2,185	2,014	1,891
90th Pct (Williamsburg) Murder	24	14	2	12	6
% of 1998				*92%*	*87%*
Murders per 1,000,000 people				*108.1*	*54.0*
94th Pct (Greenpoint) Incidents	3,401	2,024	1,282	968	905
94th Pct (Greenpoint) Murder	8	4	7	5	1
% of 1998				*76%*	*71%*
Murders per 1,000,000 people				*98.9*	*19.8*
73rd Pct (Brownsville) Incidents	8,243	4,209	3,023	2,597	2,150
73rd Pct (Brownsville)Murder	60	28	26	26	31
% of 1998				*86%*	*71%*
Murders per 1,000,000 people				*301.7*	*359.7*

Source: NYPD (64), Smith and Purtell (65)

Figure 9: Crime Statistics for Staten Island and Parts of NYC 1990–2008

From the very limited statistics given above, gentrification in Williamsburg/Greenpoint does not appear to have yet resulted in any significant reduction in crime. However, the experience there has been quite bumpy and is far from complete, so this is not directly predictive of the effect on the North Shore, especially since development in Williamsburg/Greenpoint was made with inadequate thought to providing adequate transit.

However, special note should be made of a murder rate on the North Shore that is significantly above the more affluent areas on the southern part of the island. Murder is an incredibly expensive crime, not only in terms of loss to family and loved ones, but in costs to the city and state of prosecution, incarceration and lost lifetime earning potential. The tangible and intangible costs of a single murder have been estimated as high as $8.5 million (66). If the murder rate in precinct 120 could be reduced even halfway to the rate in the southern part of the island (to 30 per million residents), at current population levels that would result in a savings of around 5 lives or $43 million per year.

By contrast, if a “do nothing” option were chosen to forgo NSRR reactivation, population growth without adequate mobility could result in larger pockets of poverty and increased crime. If

the murder rate deteriorated to levels approaching Brownsville (around 300 per million residents), the 40 or so additional annual murders would represent a cost of over $300 million per year.

The relationship between mobility and community crime rates is hopelessly complex and the social costs of crime are certainly incalculable. However, these numbers are included to indicate the potentially high social costs that may be associated with failure to reactivate the NSRR.

Traffic Reduction

The low population density of Staten Island leaves most residents at least partially dependent on private automobiles. Intraborough transportation to shopping and recreation is especially auto intensive. While the NSRR will not radically change the situation island-wide, it may result in modal changes for many commuters. And increased density could result in more localized options for neighborhood shopping and social life, alleviating the need for some residents to use and/or own a car.

2000 census data indicates that commuters in the neighborhoods around the NSRR use public transportaton at rates similar to the average of island residents (32% to 27%). By contrast, over half of the workers in St. George use public transportation to get to work (67). If the approximately 16,000 workers in the NSRR area used public transit at the rate of St. George residents, that would remove around 2,500 from the road each working day. If half of those cars are going to Manhattan and half to Brooklyn, assuming an 80 cents/mile cost of driving a car in 2021 (adjusted for 3% annual inflation over 1991 (68)), that would represent a savings to commuters of almost $20 million per year.

Express buses provide service to midtown Manhattan from Arlington and Port Richmond. Scheduled times for the x14 bus list the commute from Port Richmond between 90 to 100 minutes, with earlier departures taking less time. The x12 lists travel times from Mariner's Harbor to midtown at between 80 and 110 minutes Six bus routes (x10, x12, x13, x14, x16 and x42) make around 290 trips between the North Shore and midtown Manhattan (54).

While the travel times for express buses are long, the absence of mode changes, overcrowding and walking time make them a desirable option for many North Shore commuters. However, express buses are dependent on the Verazano Narrows Bridge and the Gowanus Expressway, both of which are chronically overcrowded at peak commuting times. A single accident or weather condition can result in extensive travel delays for thousands of people, resulting in frustration and lost work time (69, 70). Inauguration of NSRR service would improve the transit times and reduce costs for some commuters, making it a more desirable option than express buses, and consequently reducing the number of express buses that use the Verazano/Gowanus corridor.

The entire MTA bus operation is somewhat less revenue deficient (bus fares cover around 50% of operating expenses) than the subway system (fares cover 33% of expenses) and quite a bit less than the SIRR (fares cover 15% of expenses) (71). However, fares for express buses ($5.50) are over twice the transit fare on subways and local buses, so the express buses may break even. As such it is not possible to say whether there would be much direct savings to the city or MTA from moving Manhattan commuters from express buses to the NSRR and ferry.

Of greater long-term consideration is the sustainability of Staten Island's road-vehicle-based mobility infrastructure. Fuel currently accounts for 8% of the MTA's expense (34% of non-labor expense) for running buses in the city (71). But as petroleum becomes more scarce and expensive, cars and buses will become more expensive to operate, although the comparatively small size of Staten Island may be frendlier to electric vehicles than more sprawled areas like

New Jersey or Texas. Ferry transportation is extremely energy efficient and electrified rail lines like the NSRR and SIRR can run on electricity generated from renewable sources like wind. In the absence of some yet-unforseen radical breakthrough in liquid fuel or battery technology, electrified fixed-rail vehicles are likely to become increasingly attractive in the coming years.

Mitigation of Zoning-Limited Growth

Staten Island's low population density has historically been a prime attraction (70). Aging residential neighborhoods around the island have banded together to preserve the low-density suburban character of their neighborhoods by fighting "knockdowns" and out-of-context development with new zoning restrictions (72). However, these actions restrict the economic vitality of the island and artificially inflate property exchange value well above use value.

Reactivation of the NSRR as part of a comprehensive development plan for the North Shore could help mitigate some of these issues by promoting high-density, transit-oriented development that is unwelcome on other parts of the island. Such development could permit continued growth in the borough without attracting the levels of NIMBY backlash that would be encountered by attempting to centrally reshape the more insular suburban areas. The growth would also not add to the growing transport cogestion problems associated with auto-centric parts of the island.

PRO FORMA VALUATIONS

Using a discounting of future cash flows to calculate current valuation, it is possible to build a framework for calculating financing options for construction. Three potential models are presented below.

The first valuation in figure 10 is a conventional approach that assumes use of federal, state and city grant money to fund construction costs. The highly negative valuation dramatizes how little of the construction or operation cost is recovered from direct revenues.

($ in millions)

Year	Revenue	Capital Construction	Operations & Maintenance	Surplus (Deficit)	SPPWF	Present Worth
2010		$1.5		($1.5)	1.0000	($1.5)
2011		$10.3		($10.3)	0.9615	($9.9)
2012		$10.6		($10.6)	0.9246	($9.8)
2013		$10.9		($10.9)	0.8890	($9.7)
2014		$11.3		($11.3)	0.8548	($9.6)
2015		$11.6		($11.6)	0.8219	($9.5)
2016		$11.9		($11.9)	0.7903	($9.4)
2017		$121.5		($121.5)	0.7599	($92.4)
2018		$119.2		($119.2)	0.7307	($87.1)
2019		$146.4		($146.4)	0.7026	($102.9)
2020		$150.8		($150.8)	0.6756	($101.9)
2021	$3.8		$25.3	($21.4)	0.6496	($13.9)
2022	$3.9		$26.0	($22.1)	0.6246	($13.8)
2023	$3.9		$26.8	($22.9)	0.6006	($13.7)
2024	$3.9		$27.6	($23.7)	0.5775	($13.7)
2025	$4.4		$28.4	($24.0)	0.5553	($13.4)
2026	$4.4		$29.3	($24.9)	0.5339	($13.3)
2027	$4.5		$30.2	($25.7)	0.5134	($13.2)
2028	$4.5		$31.1	($26.6)	0.4936	($13.1)
2029	$4.5		$32.0	($27.5)	0.4746	($13.0)
2030	$4.6		$33.0	($28.4)	0.4564	($13.0)
	$42.4	**$606.0**	$289.5	($853.2)		**($577.8)**

Assumptions:

3.0%	Inflation
4.0%	Discount rate
$3.50	2021 Fare
$4.00	2025 Fare
$1.02	2021 Advertising revenue (in millions)
807,539	Annual directly paid boardings

Figure 10: Standard NSRR Valuation

The second valuation in figure 11 factors in monetized indirect "revenues" coming from community benefits that can be attributed to the presence of the NSRR. The valuation does move into positive territory, but still falls far short of the construction cost in the 20 year time frame given here. There may be ways to value the community benefits at a higher level, and since the benefits are larger than operating costs, it is possible to say that the investment may be worth it on a longer time horizon. But even with monetized community benefits factored in, when the time-value of construction money is considered it becomes difficult to provide quantifiable financial justification for such a significant capital expenditure.

($ in millions)

Year	Direct Revenue	Indirect Revenue	Capital Construction	Operations & Maintenance	Surplus (Deficit)	SPPWF	Present Worth
2010			$1.5		($1.5)	1.0000	($1.5)
2011	$6.0		$10.3		($4.3)	0.9615	($4.2)
2012	$6.2		$10.6		($4.5)	0.9246	($4.1)
2013	$6.3		$10.9		($4.6)	0.8890	($4.1)
2014	$6.5		$11.3		($4.7)	0.8548	($4.0)
2015	$6.7		$11.6		($4.9)	0.8219	($4.0)
2016	$6.9		$11.9		($5.0)	0.7903	($4.0)
2017	$70.5		$121.5		($51.0)	0.7599	($38.8)
2018	$69.1		$119.2		($50.0)	0.7307	($36.6)
2019	$84.9		$146.4		($61.5)	0.7026	($43.2)
2020	$87.5		$150.8		($63.3)	0.6756	($42.8)
2021	$3.8	$84.5		$25.3	$63.1	0.6496	$41.0
2022	$3.9	$87.0		$26.0	$64.9	0.6246	$40.5
2023	$3.9	$89.6		$26.8	$66.7	0.6006	$40.1
2024	$3.9	$92.3		$27.6	$68.7	0.5775	$39.6
2025	$4.4	$95.1		$28.4	$71.0	0.5553	$39.4
2026	$4.4	$97.9		$29.3	$73.1	0.5339	$39.0
2027	$4.5	$100.9		$30.2	$75.2	0.5134	$38.6
2028	$4.5	$103.9		$31.1	$77.3	0.4936	$38.2
2029	$4.5	$107.0		$32.0	$79.5	0.4746	$37.8
2030	$4.6	$110.2		$33.0	$81.8	0.4564	$37.3
	$393.0		**$606.0**	$289.5	$465.9		**$204.3**

Assumptions:

3.0%	Inflation
4.0%	Discount rate
58.0%	Federal share of construction costs (treated as direct revenue)
$3.50	2021 Fare
$4.00	2025 Fare
$1.02	2021 Advertising revenue (in millions)
807,539	Annual directly paid boardings

Figure 11: NSRR Valuation with Capitalized Indirect Community Benefits

The final valuation in figure 12 is a fanciful "libertarian" model that assumes operation by a private entity in which all construction and operational costs costs are paid in direct user fees, with no public funding involved whatsoever. The model only works if fares on opening are $250 per ride, jumping to $290 per ride in 2025. While this would be completely impractical without some radical devaluation of our currency and the politically impossible act of eliminating public spending on all other transportation infrastructure on the island (and maybe not even then), it does give an indication of why transportation lines like this cannot be built by the private sector without public sector involvement.

($ in millions)

Year	Direct Revenue	Capital Construction	Operations & Maintenance	Surplus (Deficit)	SPPWF	Present Worth
2010		$1.5		($1.5)	1.0000	($1.5)
2011		$10.3		($10.3)	0.9615	($9.9)
2012		$10.6		($10.6)	0.9246	($9.8)
2013		$10.9		($10.9)	0.8890	($9.7)
2014		$11.3		($11.3)	0.8548	($9.6)
2015		$11.6		($11.6)	0.8219	($9.5)
2016		$11.9		($11.9)	0.7903	($9.4)
2017		$121.5		($121.5)	0.7599	($92.4)
2018		$119.2		($119.2)	0.7307	($87.1)
2019		$146.4		($146.4)	0.7026	($102.9)
2020		$150.8		($150.8)	0.6756	($101.9)
2021	$202.9		$25.3	$177.6	0.6496	$115.4
2022	$202.9		$26.0	$176.9	0.6246	$110.5
2023	$203.0		$26.8	$176.2	0.6006	$105.8
2024	$203.0		$27.6	$175.4	0.5775	$101.3
2025	$235.3		$28.4	$206.9	0.5553	$114.9
2026	$235.4		$29.3	$206.1	0.5339	$110.0
2027	$235.4		$30.2	$205.2	0.5134	$105.4
2028	$235.4		$31.1	$204.4	0.4936	$100.9
2029	$235.5		$32.0	$203.5	0.4746	$96.6
2030	$235.5		$33.0	$202.6	0.4564	$92.4
	$2,224.4	**$606.0**	$289.5	$1,328.8		**$609.5**

Assumptions:

3.0%	Inflation
4.0%	Discount rate
$250.00	**2021 Fare**
$290.00	**2025 Fare**
$1.02	2021 Advertising revenue
807,539	Annual directly paid boardings

Figure 12: "Liberatarian" NSRR Valuation

OPERATIONS AND MAINTENANCE

This document assumes complete integration of the NSRR operations into the existing SIRR operations with a 35% expansion of most staffing and operational capacity approximating the increase in track miles represented by the addition of the NSRR line. Figure 13 lists anticipated staffing needs by department and operational group (71).

Occupational Group	SIRR 2008	NSRR + SIRR 2021
Administration		
Managers/Supervisors	14	14
Professional, Technical, Clerical	14	14
Total Administration	28	28
Operations		
Managers/Supervisors	8	11
Professional, Technical, Clerical	5	7
Operational Hourlies	80	109
Total Operations	93	126
Maintenance		
Managers/Supervisors	7	9
Professional, Technical, Clerical	3	4
Operational Hourlies	136	185
Total Maintenance	146	198
Total		
Managers/Supervisors	29	34
Professional, Technical, Clerical	22	25
Operational Hourlies	216	293
Total Positions	**267**	**352**

Department	SIRR 2008	NSRR + SIRR 2021
Administration		
Executive	11	11
General Office	10	10
Purchasing/Stores	7	7
Total Administration	28	28
Operations		
Transportation	93	126
Maintenance		
Mechanical	35	47
Car and Station Cleaning	16	22
Power/Signals	24	33
Maintenance of Way	48	65
Bridge and Buildings	21	28
Material Handling	2	3
Total Maintenance	146	198
Total	**267**	**352**

Figure 13: Anticipated Staffing for Integrated SIRR + NSRR operations

The consolidated financial statements for the SIRR do not include any engineering or capital expenditures, presumably since there are no significant active upgrade or expansion projects. Engineering and capital expenditures for the NSRR in this document are treated separately and included in the construction cost schedule and valuations.

Addition of additional NSRR stations would presumably include some manpower costs associated with additional police patrols and response to crimes or accidents. Those costs are assumed to be borne by NYPD Precinct 120 and are not included in these statements.

PRO FORMA FINANCIAL STATEMENT FOR POST-CONSTRUCTION PERIOD

The financial statement in figure 14 provides projections for the first three years of operation of an integrated NSRR and SIRR operation. Values are extrapolated from the 2010 proposed MTA budget (71) based on increased operating costs associated with additional track mileage and an assumed average 3% annual inflation rate.

($ in millions)

Non-Reimbursable	2010 Baseline Budget	2021 (No NSRR)	2021	2022	2023
Assumptions					
Track Mileage	*14.3*	*14.3*	*19.4*	*19.4*	*19.4*
Inflation over 2010 (assumes 2% avg. annual CPI)	*1.00*	*1.24*	*1.24*	*1.27*	*1.29*
Fare	*$2.25*	*$3.50*	*$3.50*	*$3.50*	*$3.50*
Annual Ridership	*4,594,000*	*4,594,000*	*8,169,000*	*8,169,000*	*8,169,000*
Operating Revenue					
Farebox Revenue	$5.31	$8.25	$14.67	$14.67	$14.67
Toll Revenue	-	-	-	-	-
Other Operating Revenue	2.07	2.58	3.49	3.56	3.63
Capital and Other Reimbursements	-	-	-	-	-
Total Revenue	$7.38	$10.83	$18.17	$18.24	$18.31
Farebox % of Expenses	*10%*	*14%*	*19%*	*19%*	*18%*
Operating Expenses					
Labor:					
Payroll	$16.06	$19.96	$27.09	$27.63	$28.18
Overtime	0.78	0.96	1.31	1.34	1.36
Health and Welfare	3.02	3.76	5.10	5.20	5.31
OPEB Current Payment	0.55	0.68	0.92	0.94	0.96
Pensions	6.42	7.98	10.82	11.04	11.26
Other Fringe Benefits	1.26	1.56	2.12	2.16	2.20
Reimbursable Overhead	-	-	-	-	-
Total Labor Expenses	$28.07	$34.91	$47.35	$48.30	$49.27
Non-Labor:					
Traction and Propulsion Power	$3.51	$4.37	$5.93	$6.04	$6.17
Insurance	0.30	0.38	0.51	0.52	0.53
Claims	0.27	0.33	0.45	0.46	0.47
Paratransit Service Contracts	-	-	-	-	-
Maintenance and Other Operating Contracts	4.51	5.61	7.60	7.76	7.91
Professional Service Contracts	0.35	0.43	0.59	0.60	0.61
Materials & Supplies	1.01	1.26	1.70	1.74	1.77
Other Business Expenses	0.01	0.01	0.01	0.01	0.01
Total Non-Labor Expenses	$9.95	$12.37	$16.79	$17.12	$17.47
Other Expenses Adjustments:					
Other					
Total Other Expense Adjustments	$0.00	$0.00	$0.00	$0.00	$0.00
Total Expenses before Depreciation	$38.03	$47.28	$64.14	$65.42	$66.73
Depreciation	10.34	10.34	10.34	10.34	10.34
OPEB Obligation	2.80	2.80	2.80	2.80	2.80
Environmental Remediation	0.00	0.00	0.00	0.00	0.00
Total Expenses	$51.16	$60.42	$77.28	$78.56	$79.87
Net Surplus/(Deficit)	**($43.79)**	**($49.59)**	**($59.11)**	**($60.32)**	**($61.56)**

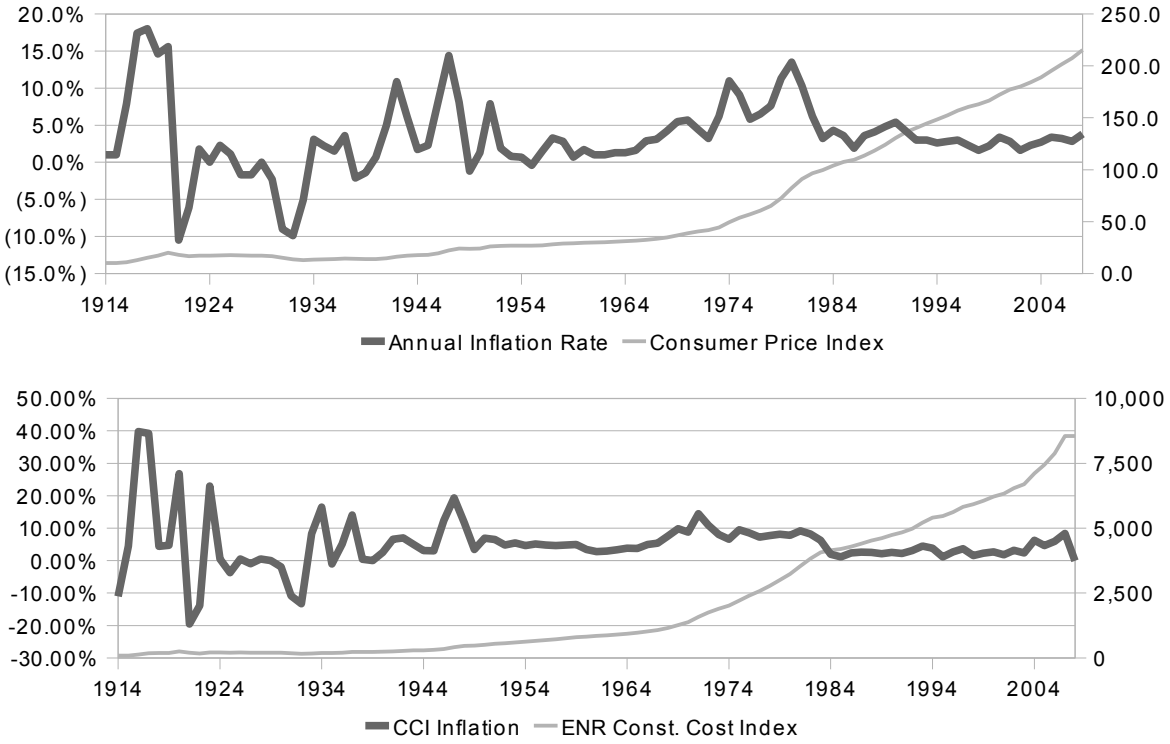
Figure 14: Pro Forma SIRR Financial Statement after NSRR Construction and Integration

RISK FACTORS

Inflation

Since the mid 1980s, inflation as judged by the Consumer Price Index has remained fairly steady at around 3%, and that value is used for non-capital cost inflation as well as projected fare and revenue CPI increases. Construction costs have been somewhat more volatile lately, although inflation judged by the Engineering News Record Construction cost index over the past couple of

decades has also averaged around 3%, so that rate is used for projecting current capital costs into the future.



Source: BLS (73) and ENR (74)

Figure 15: U.S. Consumer Price Index and ENR Construction Cost Index: 1914–2008

Changes in national and international economic positions, notably with increasing American indebtdedness and the economic ascendency of China, give some indication that future inflation rates may be higher in the future, and potentially much higher.

Source Data Limitations

This report relies heavily on data provided in the 2004 *Feasibility Study of the North Shore Railroad Right-of-Way,* which was commissioned by the Staten Island Borough President and funded by the PANYNJ. This is not a detailed engineering report and relies on significant assumptions and simulations. Given the biases inherent in such a creation process, costs may be higher and ridership / revenues may be lower in actual practice.

Regional Economic Health

One of the primary obstacles to any large infrastructure project in New York City is finding financing for efforts where the benefits are difficult to directly quantify or capitalize. While the current economic crisis will likely pass, continued economic dependence on the FIRE sector (Finance, Investment, Real Estate) and larger globalized economic trends might not favor massive infrastructure investments in inner-ring suburban areas like Staten Island that retain significant spatial and cultural detachment from the central “global” city.

Because the NSRR cannot be capitalized to self-sufficiency, private capital investment would require significan public support. Operating deficits will continue indefinitely, requiring redistribution from other MTA operations, including general city tax revenues. With the potential that demographic declines will not abated by anticipated development efforts or that future revenues and development would be constricted by declines in the economic and political health of the city or nation, it may be difficult to make an economic case for investment in the NSRR.

Political Will

Mayor Bloomberg included reactivation of the NSRL in his successful 2009 campaign for a third mayoral term and Borough President James P. Molinaro has been a longtime supporter of NSRR reactivation (43). However, the Mayor and Borough president do not have direct control over MTA capital decisions. It remains to be seen whether the political rhetoric will become the concerted political leadership needed to redirect capital funds from competing projects like the Second Avenue Subway that could be argued as providing greater benefit for a larger number of people.

Political Conservatism

Staten Island has been politically conservative since the earliest days of European settlement. The island had a strong Tory sentiment during the Revolutionary war and was the final British point of departure at the close of the war on 5 December 1783. Although the island was home to notable abolitionists and hosted numerous Union military installations during the American Civil War, draft riots occurred simultaneously with those on Manhattan in 1863 and much of the island sympathized with the South. In the 2008 presidential election, John McCain won Richmond County despite winning the city overall by a large margin (75).

While conservatives have, in practice, not been averse to public spending for infrastructure in some situations, contemporary conservative rhetoric consistently bemoans “big government” and “higher taxes.” If conservative political leaders choose to target the stunningly-expensive NSRL as a waste of taxpayer money that they would rather see spent on more conventional suburban roadway improvements, they might find fertile ground for their efforts in the island’s conservative political heritage.

Class and Race Issues

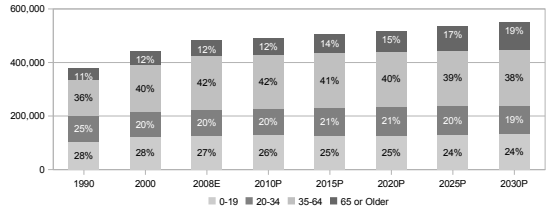
The North Shore has traditionally been less affluent than the rest of the island and is home to three large public housing projects (76). Accordingly, the area has been viewed with some suspicion by suburban neighbors on the rest of the island. With the common tendency for neighborhoods to aggregate along class barriers, it is possible that political opposition could arise during the environmental impact evaluation if the NSRR is perceived as opening up the rest of the island to ready access by undesirables.

Conversely, the hope of NSRR proponents is that the NSRR would open the area to redevelopment, which would result in gentrification. The potential for displacement might be viewed with hostility by poorer and older long-time North Shore residents and result in political opposition that, ironically, might harmonize with racially-motivated opposition from the south, resulting in delay or cancellation of the NSRL project.

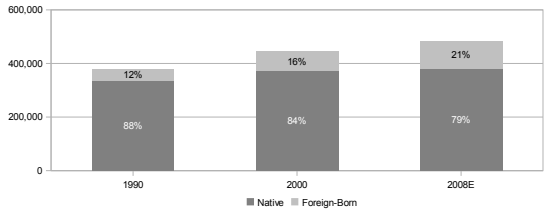
Anti-Development Sentiment
For many residents of Staten Island, especially families, the island's low population density is a prime attraction (70). Any city efforts to encourage higher density development that would displace-low income residents into currently middle-income areas may result in political opposition.

Aesthetic Limitations
Another of the stated goals of NSRR proponents is opening up the waterfront to more public recreation, with the implication that a more attractive waterfront would also attract residential development and the associated economic growth. However, the North Shore faces Bayonne, NJ, which remains largely industrial. While waterfront developments in Long Island City, Williamsburgh and Newport, NJ have benefitted from attractive views of Manhattan, it is open to question whether views of large fuel oil tanks would have the same aesthetic appeal.

Demographic Change
Although Staten Island is politically a part of New York City, development of the island over the past fifty years gives it considerable resemblence to an inner-ring suburb. Accordingly, the island is undergoing similar demographic changes. Of particular concern is a decreasing percentage of the population in the economically vital 18–34 age range and an outflux of island-born residents and middle-class seniors (72, 77).



(a) Age Group Trends on Staten Island



(b) Foreign-Born Trends on Staten Island

Given the complex social transformations associated with demographic change, it is difficult to identify whether any specific set of demographic changes will be more advantageous or problematic. Increases in elderly populations represent both decreased discretionary spending and increased economic activity in the medical sector. Increased foreign-born populations stereotypically are associated with increased demand on social services, but are also associated with higher rates of entrepreneurship than native-born residents (72).

It can also be asked how much of the concern over demographic change is motivated by fear of change rather than objective concern for the economic future of the island. While figure 16(a) shows a clear increase in foreign-born island residents (44), Staten Island has a long and colorful history as a gateway for immigrants from all over the planet who have gone on to become an integral part of the American story. Similarly, the aging of the baby boomers is an issue throughout the country and the figure 16(b) shows the demographic with the most growth since 1990 is not the elderly, but gen-X'ers and late boomers between 35 and 65 (44). While demographic changes will present challenges on Staten Island in the future, it cannot be assumed that those changes will necessarily represent a lower quality of life for a future residents.

CONTRASTS WITH THE HUDSON-BERGEN LIGHT RAIL LINE

The Hudson-Bergen Light Rail line (HBLR) began operations in 2000 in New Jersey's Hudson County, just across the Hudson River from Manhattan. Comparisons between various Staten Island rail proposals and the HBLR are relevant because of the relative success of HBLR and its geographic proximity to Staten Island. While there are certainly lessons to be learned, there are also limits to which the HBLR experience can be translated to very different conditions.

Project Scheduling: HBLR is notable for the rapidity and efficiency of the process needed to realize the long-simmering plans. Part of the credit goes to the use of a $1 billion, 15-year, fixed-price Design-Build-Operate-Maintain (DBOM) contract, which gave a single contractor (21st Century Rail Corporation) complete responsibility from the beginning of the 5-year design and construction phase through a decade of operations. Aside from streamlining the process in a smaller, less-bureaucratic entity, this type of contract also gives incentive for both faster construction (to maximize revenue-generating contract time) and better construction (since the contractor would have to efficiently operate what they built). The contract was initially only for the 9.5-mile first phase (MOS-I), but has been extended for the additional phases needed to complete 20.6 mile line (78).

The project has been represented as going from design to opening in a remarkable 5.5 years (79). However, a closer look at the timetable for development in figure 1 indicates that although the construction phase was a bit faster than schedule proposed in this document for the NSRR, time from beginning of EIS to opening was 11 years, or around the same amount of time that is projected for the NSRR. As such, use of a DBOM contract with the NSRR would likely not get it online much faster than with conventional MTA procedures.

Years	Milestone
Early 1980s	Exchange Place office development starts
1984-1985	HBLR Planning study
1989-1992	HBLR EIS
1992-1993	HBLR Alternatives study
1994	NJ Transit decides on DBOM
1995	Bayonne supplemental EIS
1996	Final Alternatives analysis, FTA Grant, Contractor hired
1999	Construction complete
2000	Bayonne to Exchange Place service starts
2002	Hoboken service starts
2003	Bayonne service starts
2004	Weehawken service starts
2005	Tonnelle Ave. service starts

Source: (78)

Table 1: Hudson-Bergen Light Rail Timeline

DBOM not practical with heavy rail: Although the HBLR (like the proposed NSRR) was built on then-underutilized existing ROW, the HBLR is a completely new system that does not have to directly connect to any existing system. The DBOM turns complete operational control over to

the contractor. While it would be possible to have two totally separate heavy rail systems on Staten Island, such a situation would likely promote the same kind of duplication of facilities and effort and internicine conflict that existed in the early days of the New York City subway. As such, use of a DBOM would seem to favor selection of a totally separate mode for the NSRR (likely, light rail) and preclude heavy rail.

Spatial Constraints: The HBLR was able to take advantage of the capital void left by deindustrialization of Hudson County in the late 20th century. This left large expanses of abandoned or underutilized industrial land ripe for redevelopment within minutes of the more vibrant economic and social climes of Manhattan. By contrast, the industrial and residential areas surrounding the proposed NSRR ROW are still comparatively active, leaving considerably dimmer prospects for development of luxury residential and office buildings.

Temporal Constraints: The HBLR facilitated development of land that was still fairly close to Manhattan but not close enough to the PATH system to be suitable for convenient mobility by residents and workers. A resident in Lincoln Harbor can be in midtown Manhattan in 30 minutes with a combined HBLR / PATH ride.

By contrast, even residents of St. George directly adjacent to the ferry have a 30 minute boat ride and an additional 15 minute subway ride to midtown. Add an additional 15 minute NSRR ride and the disincentives to HBLR-style development on the NSRR become clear.

HBLR Extension: Part of the mobility plan for the West Shore includes extension of the HBLR across the Bayonne Bridge and, possibly, as far as the Richmond Valley SIRR station on the south shore (80). While this additional mobility option may make sense for residents on the West Shore, it is not an adequate substitute for Manhattan commuters in areas where the HBLR and NSRR would overlap.

For a resident of Elm Park, commuting to Manhattan would involve a 10-minute HBLR ride over the bridge to Bayonne, an additional 25 minutes to Pavonia and a 20-minute PATH ride to 33rd Street Manhattan. A similar NSRR path would include a 10-minute NSRR ride to the St. George ferry, a 30 minute ferry ride to Manhattan and a 15-minute subway ride to midtown. Adding in connection time between modes and both trips remain 60 to 75 minutes each way. This is a considerable improvement over the existing bus-ferry-subway route, but the HBLR has no advantage over the NSRR.

In addition, there is an issue with passenger fares and experience. The combined HBLR+Path trip (at current rates) would cost $4.75 each way. NSRR would involve a single $2.25 fare payment at St. George that would include a free transfer at South Ferry to any location in Manhattan. Plus, the 30-minute ferry ride would be considerably more spacious and scenic than comparable time in a cramped rush-hour light rail car.

Development Limitations: While most other major urban area in New Jersey had declining populations between 1980 and 2000, Jersey City gained 240,000 residents. Lower business costs, proximity to Manhattan, and availability of reliable PATH train service to New York are cited as reasons why a number of firms like NatWest began locating offices in Jersey City in the early 1980s (78).

State forecasts project an additional 28,000 residents (11% total growth, 0.5% average annual growth) between 2000 and 2020 (78). Between the opening of the HBLR in 2000 and 2008, over 10,000 housing units at a total cost of $5.3 billion were built or under construction (57). While the HBLR cannot take sole credit for those increases, the availability of cost-effective and reliable public transit was likely important to the development of the area.

However, given the aforementioned spatial and temporal disadvantages, it seems highly unlikely that the NSRR could precipitate similar development on Staten Island's North Shore.

Funding: One area where a similarity between NSRR and HBLR could be hoped for is in the source of funds for its construction. The 15-year DBOM contract amount for the first phase (MOS-I) was $1.1 billion (79). $604 million of that (58%) was from the Federal Transit Administration's New Starts Full Funding Grant Agreements, with the remainder coming from Grant Anticipation Notes (GANs) (backed by passenger fares) and the State Transportation Trust Fund (motor fuel tax receipts) (47). The second phase (MOS-II) is, like the NSRR, a 5.1 mile total extension that was also built under a DBOM contract for $1.2 billion. That funding breaks down along similar lines:

Federal	
Section 5309 New Starts FFGA Committment	$500.00 million
Section 5307 Urbanized Area Formula Funds	$153.70 million
State	
New Jersey Transportation Trust Fund	$530.00 million
PANYNJ Utility Reimbursements	$31.30

Source: (81)

Table 2: Hudson-Bergen Light Rail MOS-II Funding

CONCLUSIONS

While the reactivated NSRR offers the potential for significant mobility improvement along the North Shore of Staten Island, there are serious, issues that call into question whether the reactivation is worth the considerable expense.

The geographic time-space constraints on mobility that have bedeviled the island in the past would seem to indicate that the island will always be just a little too far away from the city center to ever be an integral part of its life in the way that Brooklyn, Queens and Jersey City are. While the NSRR would regularly clip a good 30 minutes off the commute time from Mariner's Harber or Arlington to Manhattan, physical and economic constraints on current transportation technology make it impossible to reduce travel times under an hour. In the absence of redevelopment that makes the North Shore a significantly more desirable place to live than it does now, the advantages of living on Staten Island may not outweigh the temporal and qualitative drawbacks.

The low-density suburban development that has been Staten Island's primary attraction is also an albatross that makes public transportation economically unviable. While it is certaily possible to run public transportation at a considerable deficit for political reasons (e.g. the current SIRR), adding additional track mileage will only increase SIRR deficits. If economic conditions do not return to sustained, long-term growth, it may not be possible to justify continued NSRR operation, resulting in a replay of the 1953 closure and loss of a considerable capital investment.

The NSRR was historically most important as a freight line with passenger service as a secondary consideration. As such, it is simply in the wrong place. Even if it were possible to run new elevated or subterranean line(s) through the current population hearts of the island (say, down Victory Boulevard, Forest Avenue, and/or Hyland Boulevard), the low-density of development would

certainly not result in ridership counts and revenues that would make the line(s) economically self-sufficient. If and when gasoline prices start heading above $6 per gallon, there may be a clamor for inexpensive mass transit, but that will simply not be possible without plowing up the single-family tract homes and replacing them with development resembling Astoria or Park Slope.

Much of the economic rationale behind the NSRR rests on the promise of economic re-development, and the indirect revenue forcasts in this document reflect that. However, there are serious, unanswered questions about the future of New York City and, consequently, the future of Staten Island. Projections have been made for remarkable future city growth that may well run up against resource and economic limitations well before the NSRR realizes its full potential, or even gets built. The development orgy of the first decade of the 21st century of which the NSRR is a vestigial remnant may prove to be yet another folly at the end of the American empire.

However, the NSRR is a grand effort to recapture some of the glory of Staten Island's industrial past while, literally, building a pathway to the future. Since infrastructure is built for future generations, it seems we are called to do no less than our fathers did for us. Whether we have the money or the will to spend it for such a long-term vision is beyond the scope of this document. The decision on whether to build the NSRR will likely be more dependent on politics than any rational evaluation of economics. If the city can get the federal and state governments to pay for it, the NSRR will get built. If not, it won't.

The design phase of the NSRR is proceding apace with an alternatives analysis due sometime in 2010. While questions can be raised about the motivations and interests of SYSTRA given their ties to the HBLR, the success of the HBLR indicates that they are fully qualified to advance the NSRR into the next phase. As such, no further engineering recommendations can be made other than to carry on.

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