NEW YORK UNIVERSITY
JOURNAL OF LAW & LIBERTY

PRIORITIZING POLITICS AHEAD OF TRANSIT PROJECTS

Eric Goldwyn[*]

INTRODUCTION

In the span of five years, the Federal Transit Administration's (FTA) New Starts capital grant program expanded from just over one billion dollars in Fiscal Year 2019 to nearly four and a half billion dollars in Fiscal Year 2024. The Bipartisan Infrastructure Law, more broadly, authorizes as much as $108 billion in Federal support for

[*] Eric Goldywn is a program director at the Marron Institute of Urban Management and a Clinical Assistant Professor in the Transportation and Land-Use program at the NYU Marron Institute. He received his Ph.D. in Urban Planning from Columbia University. He teaches courses on urban planning and urban studies and his writing on cities and transportation technology has been published in academic journals and popular press outlets.

public transportation through Fiscal Year 2026. With more money available for capital projects than ever before, it is critical that this money be spent well and develop projects that contribute to decarbonizing the transportation sector, promote compatible land-use goals, and improve access within and between American cities.

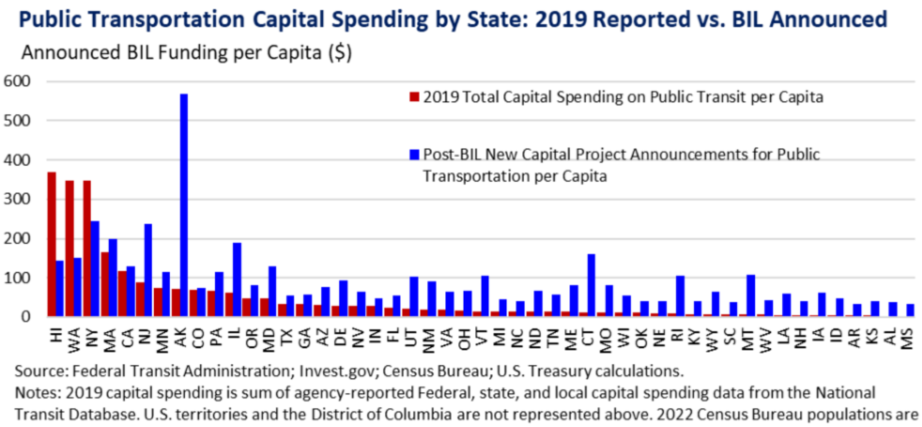

Figure 1: Public Transportation Capital Spending per Capita by State: 2019 vs. Post-BIL Announcements

As exciting as the opportunity ahead of us is, there is concern that it is too difficult and expensive to build large-scale, transformative infrastructure projects in the United States in the 21st century. In the media, Klein, Gordon, Demsas, and many, many others have lamented large infrastructure projects' soaring costs and extended timelines. Flyvbjerg argues that large infrastructure projects, megaprojects, are defined both by their large initial cost estimates that give them their name, but also by their tendency to be over budget, behind schedule, and produce fewer benefits than promised. Making this more urgent in the United States, Goldwyn et al.'s Transit Cost Project found that in a sample of 883 rapid rail projects across 57 countries plus Taiwan and Hong Kong, the United States had the eighth highest costs per kilometer in Purchasing Power Parity adjusted 2023 dollars. This reading of the data omits the key fact that in the United States only 34% of projects in the database are tunneled, the most expensive rapid rail construction method, while the eight countries with higher per kilometer costs build 65% or more of their projects in tunnels. Additionally, the current group of projects in the development pipeline in the United

States, such as Phase 2 of the Second Avenue Subway, Gateway Tunnel Project, Transbay Downtown Rail Extension, West Seattle to Ballard Link Extension, and the BART extension to San Jose have higher absolute costs and per kilometer costs than their predecessors.

In this paper, I argue that these mounting costs and delays are the product of prioritizing politics *ahead* of transit projects. Alan Altshuler and David Luberoff explain that over the last 60 years it has become increasingly difficult to carry out disruptive projects in the United States: "the capacity of local growth coalitions to impose disruption on other local interests sharply—and durably-declined in the late 1960s and early 1970s." Nuno Gil approaches this issue from a different vantage point. He argues, rather, that impacted stakeholders, often "nonmarket actors" such as municipal agencies, require tangible value from megaprojects in order to allow them to proceed. In practice this "value distribution" is negotiated and renegotiated as political and funding commitments become firmer rather than at the outset when so much is still unknown. This ongoing uncertainty leads to larger project scopes, schedule slippage, and higher costs over time. For transit projects, this do no harm principle or expansive value distribution framework adds costs and diminishes project benefits, when viewed through the lens of faster travel times and greater ridership, when agencies site a transit project in a less convenient freight railroad right-of-way rather than condemning private land, use federal grants to pay for elements beyond the needs of a transit project to gain needed permits, adopt more expensive designs to limit third party interfaces, and placate different powerbrokers, including elected officials, utility companies, transit agency operating entities, and others while undercutting traditional planning, design, cost estimating, and project management.

Methodologically, I rely on quantitative and qualitative methods to describe and explain why American rapid rail transit costs are higher than global averages. I draw on quantitative evidence to develop key descriptive statistics, namely a global weighted average of rapid rail projects per kilometer, and contextualize global rail transit project costs to show how American projects exceed international averages. Next, I take an in-depth look at two recently completed domestic transit projects, Phase 1 of the Second Avenue Subway in New York and the Green Line Extension in

Massachusetts. I examine planning documents, official reports, historical accounts, media coverage, and the megaproject and project management literatures to understand the development and shortcomings of specific projects. Additionally, I have conducted more than 170 semi-structured interviews with elected officials, agency staff, consultants, contractors, laborers, and others familiar with specific projects and the broader transportation industry including transit and mainline rail projects in Massachusetts, New York, California, Utah, Oregon, Maryland, Texas, Florida, and Washington. I show how project sponsors struggle to define their project's purpose clearly; thus, never finding firm footing in the project development or construction phases, and how forces within and beyond agencies' control knock them off their course. I conclude by sharing some good news: it is possible to build these projects faster and cheaper, as they do in Spain, South Korea, Turkey, Italy, Chile, and Sweden, but it requires changing our priorities and nurturing the expertise to plan, design, and manage rapid rail transit projects.

I. DATA

The project level cost data used in this paper comes from the Transit Costs Project database. In sum, the dataset contains 883 rail transit projects, 19,979.3 kilometers, 57 countries, and 187 cities. The cost data is normalized using Purchasing Power Parity conversion to adjust for cost-of-living differences and all costs are inflated from the project midpoints to 2023 US Dollars. This data focuses on project costs rather than more granular measures because it was designed to include as many countries and projects as possible. Beyond project costs, the dataset also reports route kilometers, number of stations, and the proportion of tunneled route kilometers. Data excludes rolling stock, financing, and taxes where possible to keep the data consistent.

While lump sum project costs are imperfect when comparing individual project elements against one another, they do describe the global rail rapid transit project landscape. Total costs reveal the variation in absolute costs, and allow me to draw conclusions about how much projects should cost based on averages. Flyvbjerg et al. also compiled a dataset including transit project costs, but rather than looking at overall costs, they, instead, focused on the difference between projected versus actual costs and benefits, highlighting cost overruns and reduced benefits. Overruns happen, absolutely, but I rely on aggregated data to understand global averages to identify patterns and deviations in the data to inform further research that asks *why* costs vary from country to country? I focus on why costs vary so that I can learn how low-cost countries deliver projects, and translate those practices into the American context. Based on the Transit Cost Project data, the global weighted average cost per kilometer is $236.78 million in 2023 dollars. Domestic projects have a weighted average of $608.89 million per kilometer in 2023 dollars, the eighth most expensive in the world (Figure 2). American projects, however, have a lower proportion of tunneled kilometers than projects in more expensive countries. Only 34% of the 180.8 kilometers of domestic projects in the data base are tunneled, while 47% or more of the kilometers in more expensive countries are tunneled. Tunneling is the most expensive rail construction method and is positively correlated with costs. Based on this data, American transit projects are more expensive to construct than projects abroad, and, as noted above, the current projects in the development phase are expected to be even more expensive on a per kilometer basis, which means that each dollar spent in the future will yield fewer kilometers of transit.

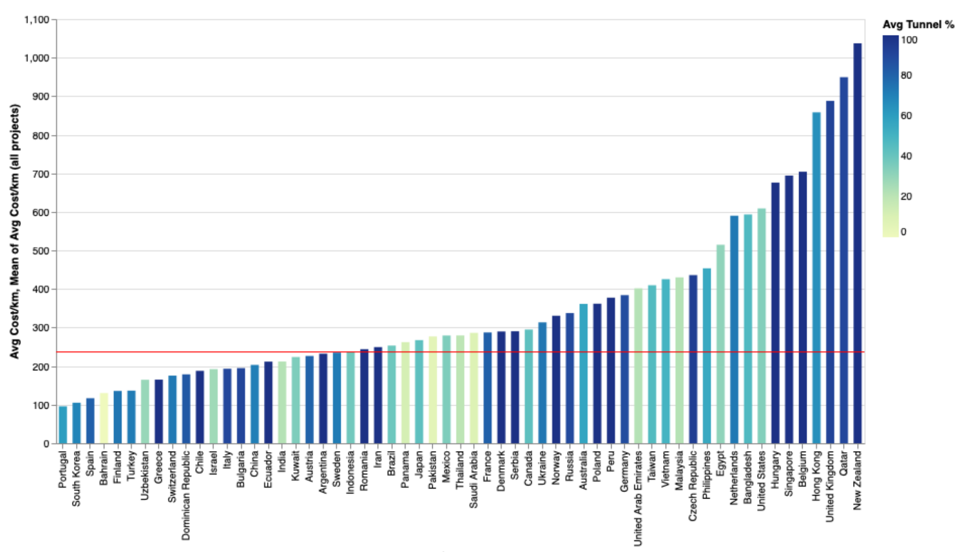

Figure 2: Average Costs per Kilometer and Global Weighted Average in Red

II. ETERNAL PROJECTS

In order to understand why American transit projects are so expensive relative to global norms, I conducted two in-depth case studies, with collaborators Alon Levy and Elif Ensari from NYU Marron, of the Massachusetts Bay Transportation Authority's (MBTA) Green Line Extension (GLX) and the New York Metropolitan Transportation Authority's (MTA) Phase 1 of the Second Avenue Subway (Phase 1). I selected these specific projects because they were conceived of decades ago, but failed to curry enough political interest and funding to reach revenue service until the twenty first century.[1] Additionally, both projects provide insight into what drives costs. GLX was cancelled before being redesigned and retendered, and Phase 1 is one of the most expensive completed subway projects on a per kilometer basis in the Transit Costs Project database.[2]

When both projects were rebooted in the 1980s and 1990s, many assumed that these reconstituted projects would meet the same fate as their earlier incarnations.[3] *The New York Times*, to take one example, reported that "Norman Silverman, a planner for the transit authority, said that building the full Second Avenue Subway line is on the 'outer bounds' of possibility."[4]

III. A FLUID INITIAL CONCEPT

Without a clear path to completion both projects began humbly. The initial plan for the 1980s-1990s era Second Avenue Subway was to extend the Broadway line from 63rd Street to 125th Street rather than build a new line running the full-length of Manhattan, as had been the plan in the 1970s, from 125th Street to Hanover Square.[5] The initial concept for the Green Line Extension spelled out in the *Beyond Lechmere Northwest Corridor Study*, similarly, promised a scaled down

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1 ERIC GOLDWYN, ALON LEVY & ELIF ENSARI, THE BOSTON CASE: THE STORY OF THE GREEN LINE EXTENSION, NYU MARRON (2021), [perma.cc/CCQ4-4YSH].

2 TRANSIT COSTS PROJECT, *Transit Cost Project Database, Merged Costs (1.4)*, TRANSITCOSTS.COM, [perma.cc/7QRQ-9DVM].

3 Goldwyn et al., *supra* note 1.

4 Randy Kennedy, *Experts Offer a Wish List to Improve Transportation on the East Side*, N.Y. TIMES, Jul. 27, 1995, [perma.cc/GZS7-LK36].

5 PHILIP PLOTCH, LAST SUBWAY: THE LONG WAIT FOR THE NEXT TRAIN IN NEW YORK CITY 124–132 (2020).

project with unassuming stations consisting of ADA accessible ramps leading to exposed platforms partially covered by canopies.

As political support for the projects increased, however, both prioritized securing federal funding by drawing in supporters ahead of establishing specific project goals beyond the general alignments. Gil explains that before projects are funded and environmentally cleared, there is limited incentive and budget for project sponsors to sort out third-party entanglements; thus, the project sponsors need to distribute value *after* they have already announced scope, schedule, and budget.[6] This sequence prioritizes locating funding ahead of planning and clarifying project goals. Under this structure, agencies perfect federal grant applications, usually with the assistance of consultants, rather than their projects. One senior official we interviewed about the Green Line Extension explained that "figuring out how to get the FFGA [Full-Funding Grant Agreement] done before 2014 [a new governor assumed office in 2015], meant not figuring out the project."[7] In order to get federal funding, also known as a Full-Funding Grant Agreement (FFGA), the project agreed to build expensive, iconic stations, and pay for improvements that satisfied external interests, namely the Massachusetts Department of Transportation and local pedestrian and bicycle advocates. Another senior planner involved in redesigning GLX explained that MBTA staff were guilty of "pushing the yes button," whenever a request was made to add an element, rather than managing the budget and sticking to the core goal of GLX, providing rapid transit service connecting Medford with Cambridge, the MBTA simply said yes.[8] By agreeing to pay for the replacement or refurbishment of 11 bridges, four multispan viaducts, and a shared pedestrian/bicycle path, known as the Community Path, the MBTA had to reduce the project's transit-specific scope; thus, delivering fewer transportation benefits to fewer transit riders.[9] The cost of these additions, in project terms, meant one less station, fewer train cars, and a shorter overall alignment.[10]

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[6] Gil Nuno, *Cracking the Megaproject Puzzle: A Stakeholder Perspective?*, 41 INT'L J. OF PROJECT MGMT. 1, 6 (2003).

[7] Personal Interview A (June 2020) (on file with author).

[8] Personal Interview B (July 2020) (on file with author).

[9] MASS. DEP'T OF TRANSP., FINAL ENVIRONMENTAL IMPACT REPORT (2010), [perma.cc/XYN6-XR62].

[10] *Id.*

In New York, the project scope expanded and contracted to fit the political and funding realities facing the MTA. As noted earlier, the initial concept was to extend the existing Broadway line, the Q train, north. This plan was roundly criticized by elected officials and media outlets who wanted to see a new line, not an extension, running the length of Manhattan.[11] In turn, the MTA asked its consultants to design a 13.7-kilometer Second Avenue Subway serving the east side of Manhattan.[12] Since the full-length project carried a $16.8 billion cost estimate, and there was no viable funding plan, the MTA broke the project into four smaller phases, starting with a 3.7-kilometer Phase 1.[13] As we saw with GLX, Phase 1's scope changed over time. At the outset, the project scope called for 68 railcars, but those were eliminated later.[14] The 72nd Street station was redesigned from three to two tracks in order to reduce the cavern width from 30 meters to 21 meters so that it fit entirely within the public right-of-way. This design change shaved $90 million off of the station's projected costs, but triggered $26.5 million in change orders.[15] Even securing the FFGA took two or three years longer than anticipated because of concerns about whether New Yorkers would approve a transportation bond act in 2005 to ensure a large enough local match to pay for the project.[16]

Under these circumstances, it is easy to see why project scopes wax and wane with new political and funding constraints. Terry Williams and Knut Samset argue that the "complex and turbulent," environment that megaprojects operate within are poorly suited to traditional project management strategies.[17] It is impossible to maintain clear project goals from the outset of planning when the final project budget is determined last.

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[11] Richard Perez-Pena, *Assembly Speaker Links Subway to Budget Vote*, N.Y. TIMES, Mar. 15, 2000, [perma.cc/7J2P-TPRS].

[12] *Id.*

[13] *See* Plotch, *supra* note 5, at 124–32.

[14] URBAN ENGINEERS OF NEW YORK, P.C., PMOC Mini Monthly Report: SECOND AVENUE SUBWAY PHASE 1 (MTACC-SAS) PROJECT 12 (Oct. 2010), [perma.cc/GE8K-U869].

[15] *Id.*; Urban Engineers of New York, P.C., FED. TRANSIT ADMIN. PROJECT MANAGEMENT OVERSIGHT PROGRAM, METRO. TRANSP. AUTH. SECOND AVENUE SUBWAY: MONTHLY REPORT – PART I (Jan. 2009), [perma.cc/X8JV-4F2Z]; Urban Engineers of New York, P.C., FED. TRANSIT ADMIN., Metro. Transp. Auth. SECOND AVENUE SUBWAY: MONTHLY REPORT – PART I (Mar. 2009), [perma.cc/WX3U-35VW].

[16] Personal Interview A (June 2020) (on file with author).

[17] Terry Williams & Knut Samset, *Issues in Front-End Decision Making on Projects*, 41 PROJECT MGMT. J. 38, 49 (2010).

IV. IS THIS A TRANSIT PROJECT?

Multibillion dollar transit projects are vulnerable to taking on unanticipated costs that have negligible transit benefits. As noted in the previous section, transit agencies agree to include additional elements to win over support and gain funding. In this section, I show how transit projects, once they have received funding and support from elected officials, the agencies continue to pay for more non-transit related improvements. Or as Gil would say, distribute value, in order to secure permits and keep projects moving forward.[18] Third parties successfully extract transit project dollars because transit projects are inherently disruptive, which means that transit agencies need third parties to grant access to their property. Ripping up streets to build an underground station, especially in a densely populated area where transit has the best chance to succeed requires additional capital projects that no one would mistake for a transit project, such as utility relocations, street restorations, street tree plantings, and sidewalk gradings. In the United States, transit agencies need permits from third parties, such as municipal departments of transportation, electric utilities, telecommunications companies, and others to build their projects. These interfaces make it difficult for transit agencies to manage projects without external interference and scope additions. Elkind captures this dynamic perfectly when he details the Los Angeles County Transportation Commission's (LACTC), later LA Metro, inability to get the City of Los Angeles to pay for its share of improvements:

> When LACTC removed the sewer, traffic lights, electric utilities, and other city-owned infrastructure from the construction path, standard contract language required the LACTC to "replace" the infrastructure. If the replacement was superior to the original, the LACTC could deem it a "betterment," for which the city would have to contribute. Conflicts arose when cities claimed that LACTC "betterments" were merely replacements and refused to pay. James Okazaki, working for the City of Los Angeles Department of Transportation, noted: "There were

[18] Gil Nuno, *Cracking the Megaproject Puzzle: A Stakeholder Perspective?*, 41 INT'L J. OF PROJECT MGMT. 1, 6 (2023).

> continuous disputes about whether changing six-inch sewers to ten-inch sewers is a 'replacement' or a 'betterment.' Every intersection they went through, there were improvements…"[19]

The MTA, MBTA, and every transit agency face similar difficulties when building their projects. The MTA's Head of Construction and Development, Jamie Torres-Springer (2022) acknowledged that unanticipated third-party costs added $250-$300 million to Phase 1's $4.6 billion cost, but this estimate omits bid premiums contractors tack on to public agency contracts or the delays that trigger claims and inflate the cost of other contracts by either slowing them down or pushing back when they are tendered.[20] In the former case, this exposes the agency to daily impact costs (more on this below). In the latter case, inflation and perceived uncertainty lead to higher bids.[21]

During Phase 1 of the Second Avenue Subway, the MTA tendered a relatively small advanced utility contract to clear the way for a $302 million heavy civil construction contract for the 86th Street Station. The advanced utility contract was projected to last 19 months and cost $34 million. In the final accounting, it ended up running 28 months, 47% longer than anticipated, and costing $41 million, a 19% overrun.[22] Since this contract was relatively well contained, I was able to focus on what happens when a third party, in this case the New York City of Department of Environmental Protection (DEP) fails to approve utility replacement plans prior to the MTA tendering a construction contract. As soon as this contract was awarded, the contractor was stuck in limbo as the MTA and DEP fought about pipe replacements.[23]

In the initial scope of work, the contractor was supposed to excavate two starter shafts, and replace, support, and relocate utilities at both shafts while maintaining the flow of traffic. The final

[19] ETHAN ELKIND, RAILTOWN: THE FIGHT FOR THE LOS ANGELES METRO RAIL AND THE FUTURE OF THE CITY (2014).

[20] JAMIE TORRES-SPRINGER, MTA CAPITAL PROGRAM: UPDATE ON COST BENCHMARKING & CONTAINMENT (2022).

[21] Personal Interview A (Aug. 2021) (on file with author).

[22] *See* MTA CAPITAL CONSTRUCTION, QUARTERLY REPORT: SECOND AVENUE SUBWAY PHASE 1 (2013), [perma.cc/TW8Z-KTBU].

[23] *See* URBAN ENGINEERS OF NEW YORK, P.C., PMOC MINI MONTHLY REPORT: SECOND AVENUE SUBWAY PHASE 1 (MTACC-SAS) PROJECT 12 (OCT. 2010), [perma.cc/GE8K-U869]; Personal Interview A (May 2022) (on file with author).

scope of work was reduced, only one shaft was excavated, because of difficulties coordinating with DEP. When the MTA tendered the contract, it planned to replace existing 48-inch diameter cast-iron pipes with new 48-inch diameter ductile-iron pipes.[24] DEP, however, wanted the MTA to replace the old pipes with 60-inch diameter steel pipes.[25] As the MTA and DEP proposed and counter-proposed alternatives and waited for the other to respond, the contractor was unable to advance any DEP-related utility relocation work.[26] The pipe replacement saga was finally resolved after a six-month delay, when the MTA's head of Capital Construction and the head of DEP worked out a compromise that their staffs were unable to negotiate.[27] The delay exposed the MTA to $15,000 per day contractor claims, which ultimately led to a global $2,240,000 settlement that included more than the DEP delays.[28]

V. EXPENSIVE DESIGN DECISIONS

While transit agencies routinely capitulate to third party demands, or at the very least, are delayed by them, as chronicled above, transit agencies also commit self-inflicted wounds by opting for more expensive design solutions than are strictly necessary. Since there are no codified national standards for stations, each agency follows its own standards, or turns to consultants to develop standards and designs based on peer agencies and internal input. In Italy, as a point of contrast, there are national guidelines that inform multiple aspects of station design.[29] Without guidelines and standards to structure the design process, both the MBTA and MTA designed stations with more "back-of-house" space, the non-passenger areas reserved for agency staff, than peer agencies in Italy, France, Sweden, Turkey, Germany, and Denmark.[30] In the case of the Green Line Extension, which was significantly redesigned prior to the start of revenue service in 2022, much of the savings that allowed

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[24] *Id.*
[25] *Id.*
[26] *Id.*
[27] *Id*.
[28] *See* METRO. TRANSP. AUTH., MTA BOARD ACTION ITEMS: APRIL 2013 at 122 (2013).
[29] *See* MARCO CHITTI ET AL., THE ITALIAN CASE: TURIN, MILAN, ROME AND NAPLES 27–45 (2022) [perma.cc/2FRR-6HSN].
[30] ERIC GOLDWYN ET AL., TRANSIT COSTS PROJECT: UNDERSTANDING TRANSIT INFRASTRUCTURE COSTS IN AMERICAN CITIES (2023), [perma.cc/9E2R-VLEZ].

the project to proceed came from reducing station sizes and the vehicle maintenance facility.[31]

Underground subway stations are expensive. Robert O'Neil et al. were hired by the United States Department of Transportation to study the design and construction of subway stations.[32] The research team visited stations in 12 cities across United States, Mexico, Canada, and Europe, and found that underground stations were 2.5 to 3 times more expensive than aerial stations and four to five times more expensive than at-grade stations.[33] Phase 1's station construction costs accounted for $2.44 billion of $3.16 billion in total construction costs, or 77%.[34] A closer examination of the stations revealed that the station boxes, the total excavation required to build them, for 72nd Street, 86th Street, and 96th Street differed significantly from one another despite having the same 187-meter platforms.[35] The three new station boxes measured 485, 398, and 295 meters long, or 60% to 160% longer than the platform lengths (Figure 3).[36] When I compared these proportions to other stations from around the world, I found that in low cost and medium cost countries, station boxes are often only 2% to 20% longer than the station platform.[37] Going a step further, Elif Ensari et al. explained that the newest designs for Phase 3 of Istanbul's M3 line excavated multiple smaller cut-and-cover boxes shorter than the platform length in order to fit into Istanbul's densely built-up urban environment without excavating a large station box.[38]

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[31] ERIC GOLDWYN ET AL., THE BOSTON CASE: THE STORY OF THE GREEN LINE EXTENSION 21 (2021), [perma.cc/2EKW-HFXQ].

[32] ROBERT O'NEIL ET AL., STUDY OF SUBWAY STATION DESIGN AND CONSTRUCTION at iii (1977), [perma.cc/XSJ2-FR6F].

[33] *Id.* at 1.

[34] ERIC GOLDWYN ET AL., THE NEW YORK CASE 19 (2023), [perma.cc/7CLT-8YSS].

[35] *Id.* at 54.

[36] *See infra* Figure 3. The variation can be explained by the presence of north and south crossovers at 72nd Street and the desire to connect the 96th Street Station, which begins at 92nd Street due to geological considerations, to existing tunnels that begin at 99th Street. It is not entirely evident that the 72nd Street Station needed two crossovers or that the 96th Street Station had to start at 92nd Street.

[37] Eric Goldwyn Et Al., Transit Costs Project: Understanding Transit Infrastructure Costs in American Cities (2023), [perma.cc/9E2R-VLEZ].

[38] ELIF ENSARI ET AL., THE ISTANBUL CASE 51–53 (2022) [perma.cc/94YK-GRUJ].

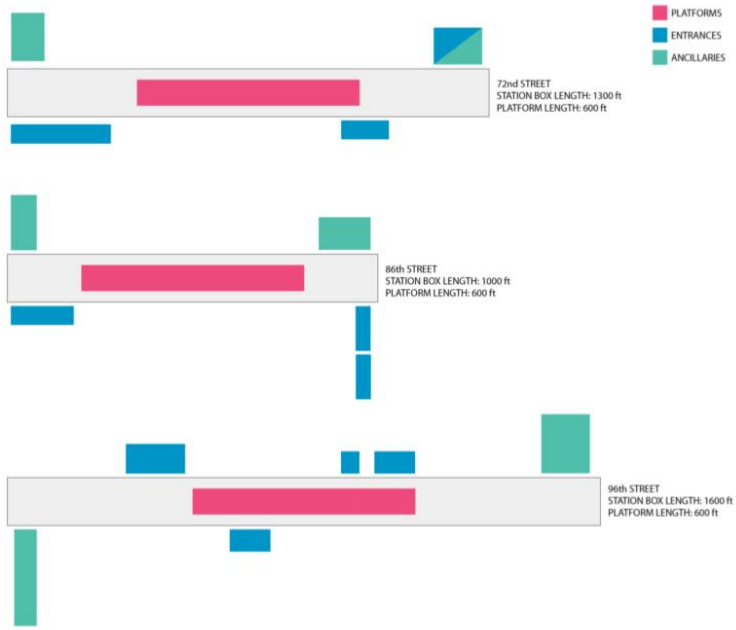

Figure 3: Phase 1 of the Second Avenue Subway Station Diagram

The MTA ended up with vastly larger stations than anywhere else in the world because the operating agency, New York City Transit (NYCT), requested underground "back-of-house" space for track maintainers, electricians, train operators, and other user groups that operate and maintain the subway.[39] These spaces include offices, changing rooms, dining rooms, storage, and work spaces.[40] A former NYCT president told me: "Back-of-house space is important. You can never have enough it…. If you don't get it during construction, you're never going to get it."[41] While one can understand the general sentiment of this statement, there is a difference between what is the minimum amount of back-of-house space required to maintain and operate the subway, I would argue the 2% to 20% longer that the station platform mentioned earlier, and what is the most space NYCT can request. For Phase 1, NYCT succeeded in securing separate, unshared spaces for each NYCT user group.[42] By contrast, when one looks at the station design concept proposed in the Final

[39] *See* PLOTCH, *supra* note 5, at 171.
[40] *See id.*
[41] Personal Interview B (April 2022) (on file with author).
[42] *See* Plotch, *supra* note 5, at 171.

Environmental Impact Statement from 2004, the design consultants proposed consolidated, shared rooms, a common practice used in other countries and being embraced for the proposed Phase 2 of the Second Avenue Subway.[43]

While Phase 1 grew its costs by adding space, GLX reduced its costs by cutting back the elements that were nice to haves, but not central to the project's success. The MBTA was forced to scale back the project because it had seen its overall estimated costs grow from $2 billion to $3 billion over the course of 2015. It hired an Interim Project Management Team to value engineer the project and deliver it for no more than $2.3 billion.[44] The Team focused its efforts on paring back the number of bridges the project would rebuild or refurbish from 11 to six, simplifying the seven new stations, and reducing the size of the vehicle maintenance facility.[45] For the sake of brevity, I will focus solely on the Team's work value engineering the stations because this example clarifies how the project spiraled and grew beyond the initial project described in the Beyond Lechmere report.[46]

After the Interim Project Management Team finished its GLX assessment, it estimated that the 7 new stations would cost $409.5 million, or $58.5 million per station.[47] In its revised proposal, it eliminated the fully enclosed iconic station structures (Figure 4) that included personnel rooms, bathrooms, multiple floors, and elevators, and adopted a more spartan design: single-level, open air platform with a canopy that followed the designs conceived back in 2005.[48] This change led to a new estimate of $121.2 million, or $17.3 million per station, a 70% savings from the initial estimate.[49] Not only did the new plan reduce amenities, but it also cut back on the quantities needed to build each station, such as the amount concrete, steel, and electrical wiring (Figure 5).[50] Overall, the new plan shrunk the overall station square footage by a staggering 9,959 square meters, a 91% savings.[51]

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[43] METRO. TRANSP. AUTH., CONCEPTUAL DRAWING OF THE 125TH STREET STATION (FIGURE 2-7) (2004), [perma.cc/3RXH-8P5S].
[44] *See* Goldwyn et al., *supra* note 1, at 21.
[45] *Id.* at 21, 46.
[46] For a fuller discussion of the Green Line Extension see Goldwyn et al., *supra* note 1.
[47] *Id.* at 44.
[48] *Id.* at 46–47.
[49] *Id.* at 46.
[50] *Id.*
[51] *Id.*

Figure 4: Proposed Union Square Station – 11/6/2014

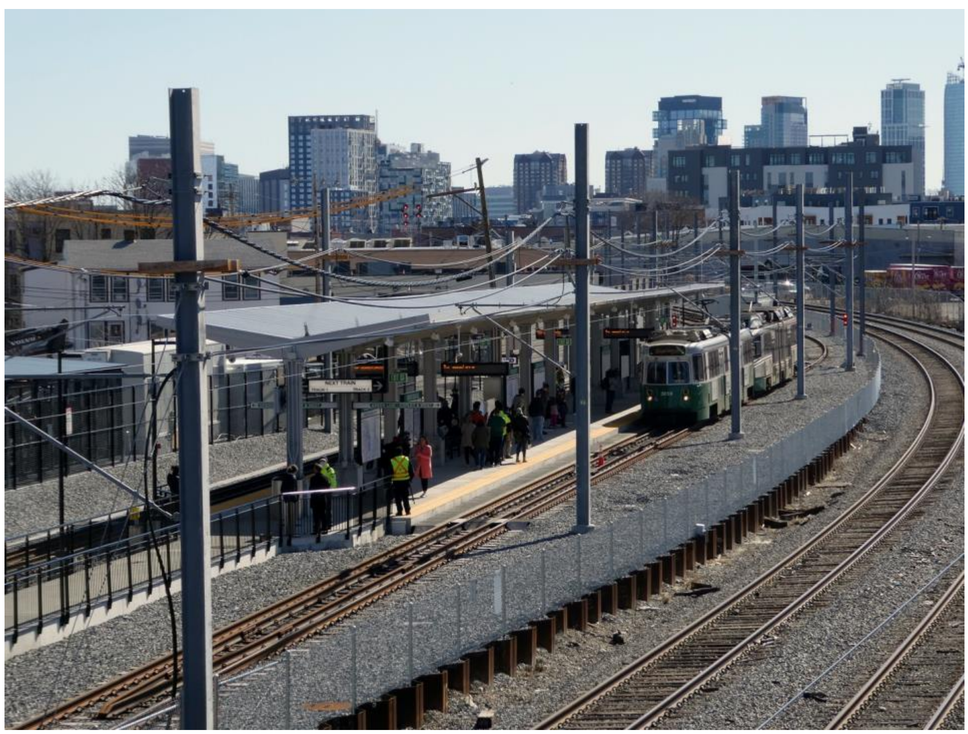

Figure 5: Union Square Station

VI. HOW TO BUILD TRANSIT PROJECTS IN THE UNITED STATES

Even though Phase 1 and the Green Line Extension encountered multiple setbacks, there are three clear lessons to be learned from these two cases that should be extended to every transit project in the country. First, every project needs political champions who will fight for predictable project funding and help overcome obstacles so that the agency experts can pursue the best projects. In both New York and Massachusetts, outside pressures forced the project teams to add project elements in order gain favor and funding, such as bridge replacements.

Second, transit agencies and third parties need clear, binding agreements to ensure better coordination and rules of engagement. Third parties should not be able to slow down construction or design because of local permits after the project has achieved funding and environmental clearance. To avoid the six-month MTA-DEP delay described earlier, third party agreements need strict time limits for review and approvals, as is common in Italy. If a third party fails to review documents in a timely manner, projects should be entitled to move ahead automatically, assuming the transit agency has shared adequate documentation. The recently opened the Réseau express métropolitain in Montreal shows that another regime is possible in North America, but this kind of change requires legislation that clearly spells out timelines and consequences for failing to meet them.

Third, learn from other transit systems. Now that we know which countries build cheaply and well, Spain, South Korea, Turkey, Italy, Chile, and Sweden, we should adopt design practices, especially for stations, that mimic best practices. Where possible, we should also adopt standards that make station design more modular and less bespoke so that expertise built up on one project can more easily transfer to other projects.

CONCLUSION

It is possible to build big things in the United States. What is needed, however, is a recognition that projects need to take precedence over politics, or at least that the politics of projects need to be more transparent so that elected officials and citizens understand why project costs increase and schedules slip. Since transit agencies occupy an awkward position vis-à-vis municipalities, counties, and states, they need political champions who will dedicate funding and help agencies overcome obstacles. Transit agencies, typically, serve multiple jurisdictions, but are not large enough concerns for governors to intervene, and because municipalities rarely allocate significant municipal budget dollars to these capital projects, there are few natural champions at the local level who will prioritize the transit agency ahead of a municipal agency. As a result of this lack of support, transit agencies are easily pushed around, and forced to accept whatever terms municipalities, utilities, or property owners propose. In this paper, I have shown how domestic transit projects, on average cost 257% more than a weighted global average of 883 rapid rail projects in 57 countries.

While American transit projects are among the most expensive in the world, the aggregated data does not explain why American projects are more expensive than those in low-cost countries. Based on a review of the literature, two in-depth case studies of projects in New York and Massachusetts, and more than 170 semi-structured interviews, I highlighted three main challenges: a fluid initial project concept, third party entanglements, and internal agency decision making.

As we saw in New York and Massachusetts, the transit agencies leading those projects changed the project plan as funding and political support emerged. Phase 1 of the Second Avenue Subway started off as an extension before transforming into a full, standalone line. Ironically, it was later divided into four smaller phases so as to secure federal funding.[52] GLX began as a modest extension before the project sponsor agreed to increase the non-transit scope, such as replacing and repairing bridges, which in turn led to a shorter alignment serving fewer stations.[53] Additionally, the project's conceptual design envisioned low-cost utilitarian stations that eventually turned into bespoke iconic stations that would later be eliminated from the project scope as costs outstripped a new governor's willingness to pay for overruns.[54] Even after securing

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[52] Plotch, *supra* note 5, at 160, 173–74.

[53] *See* Goldwyn et al., *supra* note 1, at 25; *see also*, MASS. BAY TRANSP. AUTH., BEYOND LECHMERE NORTHWEST CORRIDOR STUDY: CAMBRIDGE, SOMERVILLE, MEDFORD, MASSACHUSETTS 80–84 (2005) (detailing proposed rail expansions) [perma.cc/H2KF-NCF3]; MASS. DEP'T TRANSP., GREEN LINE EXTENSION PROJECT FINAL ENV'T IMPACT REP. 53–54 (2010) (detailing the seven proposed station locations) [perma.cc/72HF-YRNQ].

[54] Goldwyn et al., *supra* note 1, at 43–44, 46–47.

funding and political support, these projects were forced to adjust as third parties withheld permits and demanded additional mitigations.[55] While local permitting does present an opportunity for third parties, like New York City's Department of Environmental Protection, to slow down projects and add costs, transit agencies also use capital projects as an opening to build the facilities they would like rather than the facilities they need.[56]

Despite the high costs of these projects, they point the way to better outcomes. In addition to the need for political champions who will fund and support transit projects from the outset, policy needs to change to allow transit agencies to enter into third party agreements with clear timelines, rules, and consequences so that there is greater certainty once contracts are let that permits will not be withheld, and that the transit agency has been transparent about its work plan. Finally, there is now a Transit Costs Project database with hundreds of transit projects from around the world that can help project sponsors identify similar projects based on route kilometers, percentage tunneled, costs, or number of stations. Presumably any problem that arises here in the States, from a design or technology standpoint, has been addressed and solved internationally. We need to find those examples, adopt standards that have been tested and proven, and carry the lessons learned forward to future projects if we want to demonstrate that we can still build big things in America.

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[55] *See* Plotch, *supra* note 5, at 205, 210, 217; Goldwyn et al., *supra* note 1, at 24; *see also* Aaron Gordon, *Why Doesn't America Build Things*, VICE (Aug. 22, 2022), [perma.cc/V6M2-EPNH] (naming permitting as a leading cause of construction delays).

[56] *See* ALAN ALTSHULER & DAVID LUBEROFF, MEGA-PROJECTS: THE CHANGING POLITICS OF URBAN PUBLIC INVESTMENT 246 (2003); Gordon, *supra* note 55.