



STATE SPENDING SERIES: TRANSIT COSTS

MARCH 2025



As Maryland's elected Chief Fiscal Officer and member of the state spending board – the Board of Public Works – the Comptroller of Maryland is supportive of cost-effective investments that grow the economy and advance opportunity for all Marylanders. This report is the first in a series that explains state expenses and shares lessons learned from across the United States and the world about cost drivers of critical infrastructure and other public goods that are essential to inclusive growth.

Public transportation, or mass transit, allows employers to attract talent across a region, provides workers a reliable and affordable commuting option, and decreases roadway emissions that pollute the air and contribute to climate change. Transit is a win-win-win for employers, workers, and the environment but expanding transit options, especially rail, is a significant challenge for governments given the enormous amount of time, effort, and money required for such large-scale projects.

The Maryland Transit Administration (MTA) within the Maryland Department of Transportation (MDOT) builds and operates several rail systems across the state, including the Light RailLink and Metro Subway in the Baltimore region, the MARC Train spanning eight counties in Central and Western Maryland, and the Purple Line light rail currently under construction in the Washington, DC suburbs.ⁱ Current and planned projects like the Purple Line, Red Line in Baltimore, and Southern Maryland Rapid Transit line aim to further expand transit options statewide.

Major headwinds threaten the future of transit in Maryland, to the detriment of residents and employers, and the climate and economy, including the following:

- The Purple Line, a 16-mile west-east light rail line with 21 stations connecting Bethesda in Montgomery County to New Carrollton in Prince George's County has experienced severe cost and time overruns. Originally budgeted for \$5.6 billion with a completion date in 2022, the project's total budget inclusive of construction, operation, and maintenance has ballooned to \$9.8 billion with a planned opening by the end of 2027.¹ The years' long challenges with the Purple Line have resulted in reputational risk for future rail projects in the state.
- Transportation funding in Maryland across all modes faces a \$1.3 billion budget deficit over the next six years.² Operating costs are growing faster than dedicated revenues. A commission established by the Maryland General Assembly in 2023 to examine long-term transportation revenue needs and produce recommendations for modernizing the state's Transportation Trust Fund (TTF) was reconstituted last year after disagreements by the two chambers over differing tax proposals and has yet to release a final report.ⁱⁱ Legislation has been introduced this year to increase funding for the TTF but may not be enough to fund at a level that is needed for future projects.

ⁱ MDOT also provides annual funding to the Washington Metropolitan Area Transit Authority (WMATA) to help fund operating and capital costs of the WMATA rail and bus system serving the Maryland suburbs of Washington, D.C.

ⁱⁱ The Transportation Revenue And Infrastructure Needs (TRAIN) Commission was established on July 1, 2023 and released an [interim report](#) in January 2024. The Maryland General Assembly dissolved the original 31-member Commission during the 2024 legislative session and established two, new panels charged with delivering a final report by January 2025. As of March 2025, the panels have not been announced and the report has not been completed.



- A new Trump Administration in Washington is unlikely to provide necessary federal support for transit in Maryland based on his first term actions and stated plans to cut transit funding.³ Additionally, Maryland's federal transportation advocacy must prioritize securing already committed funds for the rebuilding of the former Francis Scott Key Bridge, which tragically collapsed in March 2024 when a cargo ship crashed into a main pillar of the span.

Decreased ridership resulting from the COVID-19 pandemic is another stubborn challenge. While the numbers have been trending up in recent years, ridership across all transit modes in 2024 was still at just 71% of pre-pandemic levels.⁴ These headwinds should not derail Maryland's plans to invest in transit. And while a smart and fair approach to increasing transit revenue is a must given the TTF's current revenue shortfalls, so too is a critical review of the expense side of the ledger to understand how to manage and control transit costs, especially in areas where large overruns are common.

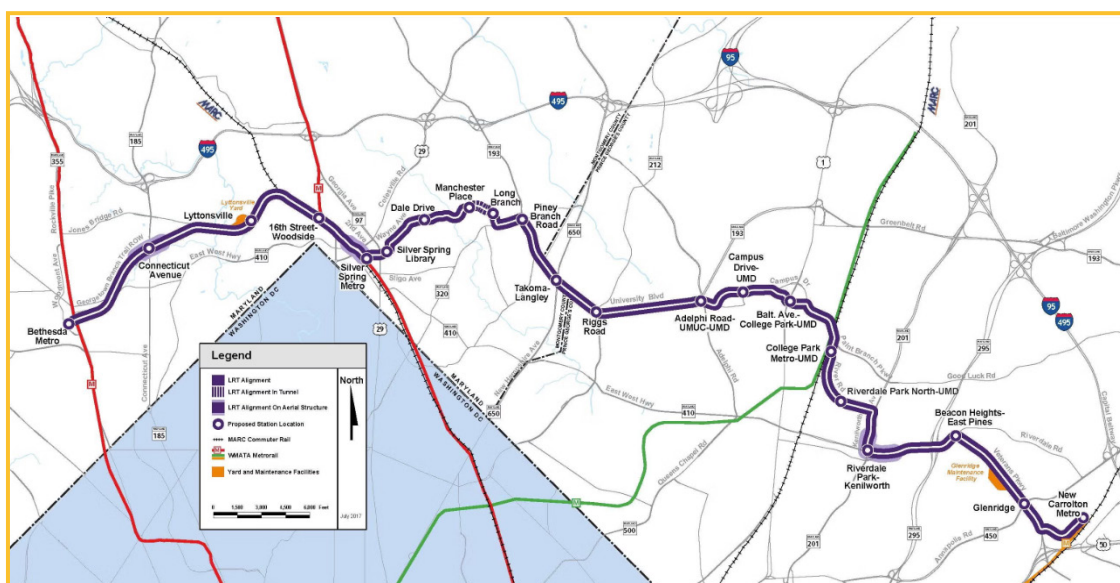
The [Transit Costs Project at New York University's \(NYU\) Marron Institute of Urban Management](#) has performed extensive research of transit systems across the world to identify and quantify the largest cost drivers of modern transit projects. Their research offers recommendations and best practices for enhancing efficiency and managing costs. The [Eno Center for Transportation](#) has collected construction costs and timeline data for 180 domestic and international rail transit projects completed in the last 20 years, and has similarly developed best practices for transportation professionals.

The sections below present key recommendations from this research instructive for Maryland projects and for the state's policymakers and public to consider for effectively and efficiently expanding transit statewide.

Section 1: Planning & Promoting

The construction of mass transit in the U.S. takes four to eight years on average and sometimes much longer depending on the amount of tunneling required.⁵ The planning phase for projects is an opportunity to establish long term success by building community consensus, developing a blueprint that accounts for geographic and other construction obstacles, and anticipating future expansion and modification. Research from the NYU Transit Costs Project identifies several steps in the project planning phase that have proven results for keeping projects on budget and on schedule.

Purple Line Map (Source: MDOT/MTA)



Community Support: Build Consensus then Build Transit

Planners, typically at the state level, must build a strong coalition in support of projects that can clearly articulate the value proposition, dispel myths, and encourage county and local government, community, and business leaders to champion the project and maintain support against opposition. The NYU Transit Costs Project recommends that experts should initially perform design and feasibility studies and bring a recommended course of action to stakeholders and the wider community. No project will get complete buy-in, but it is important for planners to be transparent. Where there are disagreements or alternative proposals floated by the community, planners should provide clear rationale for their decisions backed up by data and evidence. In some cases, planners may want to study alternative proposals, but if they know the proposals are unrealistic, they should not perform additional, unnecessary studies that can add time and costs to the project.⁶

Maryland's Purple Line faced several groups fundamentally opposed to the project that created obstacles that were difficult to avoid. For example, several lawsuits filed prior to construction alleged certain permits were contrary to the federal Clean Water Act, creating unexpected legal and planning costs and delaying the project. Legal, permitting, and review costs have seen the largest percent increases for the Purple Line, skyrocketing by 1,500% from an initially budgeted \$6 million to nearly \$900 million.⁷ While the pre-construction lawsuits played a part in these increased costs, many other factors also played a role, including settlement costs paid out to contractors, discussed in more detail below.

Route Selection: Choose the Path of Least Resistance

Route selection is a major stage of the planning process that can make-or-break the ultimate success of a project. When governments and transportation experts plan transit lines they must carefully consider the specific pathway options and how the project will impact the built and undeveloped environment. For example, tunnels may be used to avoid above ground structures and associated challenges with land acquisition, eminent domain, and community opposition. This is a costly approach, especially in the U.S. Governments in the U.S. pay 65% more for tunneled projects compared to tunneled projects in other countries.⁸ In addition, planners grapple with unknown underground conditions and sometimes make costly mistakes by not carefully analyzing and accounting for geographic, geological, and terrain obstacles along proposed routes that could ultimately hamstring and delay construction, adding to costs.⁹



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Even when community support exists for a project, there is often disagreement on the specific pathway and how to build, or even when to build. Politics and NIMBYismⁱⁱⁱ are common obstacles to the most efficient route selection. European countries that build transit at overall lower costs place less influence with elected officials and more in the hands of transportation professionals through tight government supervision based on economic performance and competitive funding based on cost-effectiveness.¹⁰ In the U.S. especially, elected officials and local governments have a strong voice in planning, route and station selection, and other project features when transit lines run through their jurisdictions. It is important to engage with these leaders early in the process, build a strong consensus around a final plan, and put safeguards in place to ensure local government administrations across multiple leadership changes deliver on commitments relating to land acquisition, permitting, and other actions in exchange for state or federal funds they receive for the project.

iii NIMBY stands for "Not In My Back Yard" and is a term used for local community opposition to development.



Scalability and Standardization: Plan for Expansion and Economies of Scale from the Start

Successful transit projects require sticking to a long-term plan. However, elected leadership and priorities can change multiple times over the course of a project, jeopardizing a consistent plan throughout the life of the project. Creating clear project phases from the beginning that include plans for further expansion results in more efficient delivery of projects. With careful and planned foresight, governments can secure easements and rights of way, begin community listening sessions, and strategize well in advance of future construction.



Standardization can reduce overall project costs by a factor of 1.35.

In addition, design standardizations for features such as stations allow for replication without creating new designs and incurring new costs. While there will always be a need for some customization due to differing environmental and community needs, standardization allows for the use of the same equipment, materials, and contractors, which takes advantage of economies of scale and keeps costs under control. The NYU research found that standardization can reduce overall project costs by a factor of 1.35.¹¹

In many cases, cost overruns can be determined well before shovels even go into the ground. Decisions made during the planning and design phase from community buy-in to route selection and terrain analysis to design and equipment choices for physical structures have a major impact on a project's overall budget and timeline. Research from the Eno Center found that projects with long planning periods or contentious design processes, need for approvals by multiple entities, and community backlash can result in at least 7% higher costs.¹²

Section 2: Leadership & Labor

Mass transit projects are complex exercises in public management. They require a wide range of difficult tasks that involve input, approval, and actions from multiple stakeholders, partners, and decision-makers. Examples of some of these tasks include: feasibility and environmental impact studies; federal, state, and local permitting and sustained compliance with relevant laws; procurements for the various phases of the project; utility and other infrastructure relocation or new construction.

The domestic and international projects reviewed by the NYU Transit Costs Project and Eno Center demonstrate that successful projects delivered on budget and on time must have strong leadership, clear chains of command and decision-making processes, and open lines of communication and coordination among all parties.



Purple Line Construction, College Park, Maryland



Coordination: Make Sure Everyone Plays Their Part

By necessity, transit projects require a number of partners and decision-makers. An orchestra of government agencies, public utilities, authorities, and other entities play key roles in the planning, execution, and ongoing operation and maintenance of mass transit. In Maryland, the MTA leads planning and management of transit projects from start to finish, but many other agencies are involved throughout.

The Department of Natural Resources (DNR) and Maryland Department of the Environment (MDE) approve and oversee disruptions to the natural environment, including tree-cutting operations or wetlands disturbances. County and municipal governments and public authorities are required to approve changes to their roadways, parcels of land, or underground infrastructure, such as water and sewer lines, and may need to perform work related to these functions. Utility companies need to review and relocate utility lines disturbed by the project. Where federal funding is involved, which is the case in most transit projects, the Federal Transit Administration (FTA) must review and approve environmental impact studies and other requirements. The Army Corps of Engineers must approve Clean Water Act permits for discharging dredge and fill materials during construction work.

Any delays, disagreements, or missteps from one of these partners can disrupt an entire project, leading to cost and time overruns. Strong leadership and communication are necessary throughout the life of a project to identify, prevent, and manage such challenges.

Labor: To Outsource or Not to Outsource (and How Much)

Labor is a core component of transit projects, from planning to execution to operation. One of the key benefits of transit projects is that they are job creators, both temporary construction jobs and permanent operations and maintenance jobs. As such, labor costs are a significant component of project budgets and must be carefully monitored and managed.



In cases where labor costs are 50% of construction budgets, projects tend to cost 1.5 times more than projects with lower labor cost percentages.



Labor costs vary across project types and countries. In Europe and the U.S., labor costs range from about 25% to 50% of construction costs. Research has shown that increased labor costs are not necessarily the result of differences in pay but are usually the result of redundancy or overstaffing.¹³ Higher percentages of spending on labor, in turn, result in higher overall project costs, especially where higher costs do not result in greater productivity. In cases where labor costs are 50% of construction budgets, projects tend to cost 1.5 times more than projects with lower labor cost percentages.¹⁴

European countries realize cost efficiencies by relying on the same, often migrant labor forces for transit line construction, sometimes even providing temporary housing for the mobile workforce.¹⁵ These workers bring skills acquired on other similar projects, resulting in improved productivity and ultimately lower labor costs. Transit projects in the U.S. prioritize unionized labor forces local to the project and negotiate stricter overtime and wage regulations, which may help explain the differences in cost.



Governments are increasingly outsourcing more work to private consultants and performing a smaller share of functions such as planning, permitting, and project management in-house.

While the labor discussion tends to focus on construction jobs, other areas that tend to get overlooked but can significantly inflate costs are professional services, management, and architecture and engineering work. Specifically, governments are increasingly outsourcing more of this type of work to private consultants and performing a smaller share of functions such as planning, permitting, and project management in-house. Outside consultants are usually more expensive than in-house staff, are incentivized to maximize payments from government clients, and often operate with little public oversight.^{16,17} Additionally, private sectors jobs tend to pay more than similar jobs in the public sector, making it difficult for government agencies to hire or retain staff who can earn higher wages in the private sector.

Purple Line Car, Riverdale, Maryland



The more government agencies rely on outside consultants, the less expertise remains within the agency. This dynamic creates a perceived or actual need to have even more contracts with expert consultants to serve as a “security blanket” by producing additional studies and solving basic problems that in-house experts are no longer around to handle.¹⁸ A common source of cost overruns with consultants is change orders, which are typical for large, complex projects.^{iv} Change orders tend to be more cost-efficient when managed by government employees who can be more flexible than consultants when obstacles emerge during project development and construction.

Ultimately, government agencies are forced to make difficult decisions about building out a more robust government workforce – which may result in overstaffing once the project is complete but also creates institutional knowledge for the next transit project – or contract out the expertise to high-priced consultants. In recent years, the balance has shifted to outsourcing and an expanding role for consultants, resulting in inflated project budgets.¹⁹

Ligh Rail Facility, Baltimore, Maryland



The Purple Line federal monitor reports have expressed concern regarding MTA’s in-house staffing of the project. According to a report from June 2024, “open positions, a lack of continuity, and staff serving in multiple roles all pose a risk to the quality of the oversight the Project Sponsor [MTA] must provide.” The report goes on to suggest that staffing shortages may be the reason for problems relating to construction safety and quality management.²⁰

The same report noted several departures and new hires among MTA’s Purple Line staff. According to the most recent MTA Purple Line organizational chart, there are a total of 11 full-time equivalent (FTE) staff dedicated to the Purple Line project within MTA. Two staff are a Communications Director and Deputy Director. The remaining staff are focused on project management, compliance, contracting, real property, and quality, safety, and security oversight. Two of these positions are currently vacant.²¹ According to the NYU researchers, this is a very small amount of in-house FTE staff compared to comparable projects. For example, the \$2.3 billion Boston Green Line extension had an in-house staff of 83 FTEs, and the New York City and Seattle transit agencies have in-house construction oversight staff (for multiple projects) of about 100 and 250 FTEs, respectfully.²²

^{iv} The FTA defines a change order as a modification to a contract that requires approval. Change orders can add or remove work, or extend a project’s schedule.

Section 3: Finance & Function

The business side of building mass transit is a key factor that determines delivery costs. Specifically, decisions relating to financing models, risk management, and procurement methods can lead to vastly different cost outcomes. State governments must weigh a range of factors when deciding the best approach to take, such as whether to share financial burden with the private sector, how to divide up contracts by various functions within the overall scope of work, and how to safeguard against unforeseen circumstances.

Public Private Partnerships: High Risk for High Reward?

Budgeting for a long-term project can be extremely difficult because most governments have limited capital and operating budgets for high-cost, multi-year projects and must prioritize short-term needs, such as maintaining a state of good repair for existing infrastructure. In Maryland, maintaining MTA's assets alone in a state of good repair would cost over \$10 billion from 2022 to 2031.²³ Because of these funding constraints, in recent years, governments across the U.S. have increasingly turned to Public Private Partnerships, or P3s, for financing and executing large transit projects.

P3s are contractual agreements between a public agency and a private entity that allow for greater private participation in the delivery of projects. Under the P3 model, private companies take on a portion of capitalization and financial risk in exchange for earning revenues over the course of the project's operations. For governments, the P3 model lessens public debt burdens and minimizes a need for ongoing budget requests from legislatures. The U.S. Department of Transportation has encouraged state and local governments to consider P3s, stating: "Early involvement of the private sector can bring innovation, efficiency, and capital to address complex transportation problems facing State and local governments."²⁴

Maryland Board of Public Works Purple Line Project Contract Modification Approvals

Item	Action	Amount
Original item: 4/16/2016	Approval of P3 contract	\$5.6 billion
Mod. #1: 6/14/2016	Clarifying language	\$0
Mod. #2: 12/16/2020	Settlement agreement	\$250 million
Mod. #3: 5/4/2021	Amendment settlement agreement	\$0
Mod. #4: 8/17/2021	Amendment settlement agreement	\$0
Mod. #5: 9/15/2021	Amendment settlement agreement	\$0
Mod. #6: 1/26/2022	Approval of new design-build contractor	\$3.4 billion
Mod. #7: 7/19/2023	Contract extension	\$148 million
Mod. #8: 3/13/2024	Contract extension	\$415 million

**Total project budget over the full concession term with modifications:
\$9,847,350,319**

Maryland enacted legislation in 2013 enabling the use of P3s in the state.²⁵ The Purple Line has been the state's most visible P3, launching in April 2016 with a \$5.6 billion award to a consortium of companies, called the Purple Line Transit Partners (PLTP).^v Unfortunately, the P3 has not gone according to plan due to a host of factors.

In 2020, one of the construction firms within the private consortium exercised a clause in the contract to walk away if there was a 365-day delay not caused by PLTP. The company filed a claim for \$800 million in additional payments due to delays relating to legal challenges, right-of-way acquisitions, and other land parcel issues (see Community Support section). The State settled for \$250 million^{vi} (see Modifications table on page 8) and temporarily took on much of the work abandoned by the company.²⁶

In 2022, Maryland reached an agreement with a new consortium of firms for an additional \$3.4 billion.^{vii} The new group and MTA encountered problems with the project and missed deadlines, notably part of the completed construction work did not match the design specifications, and needed to complete further due diligence to ensure the project was proceeding properly. Delays resulting from the COVID-19 pandemic and supply chain shortages created additional challenges. In 2023 and 2024, the Board of Public Works approved additional modifications totaling \$563 million.

The Purple Line now has an estimated total price tag during the full concession term, inclusive of design, construction, 30 years of operation, and debt service of \$9.8 billion, 76% over the original budget from 2016. While the P3 model is not the sole reason for the project's cost overruns, the shift in risk and responsibilities to the private sector allowed for companies with little equity invested in the project to walk off the job while the State was left to pick up the pieces.

Procurement and Delivery: The Importance of Sweating the Details

There are three primary types of procurement models for large-scale transit projects, according to research. They are design-bid-build (DBB), design-build (DB), and construction manager/general contractor (CM/GC). DBB is the traditional approach to project delivery where key functions are separated out and the government essentially purchases and becomes the owner of a design and then solicits bidders for construction. Critics of this approach maintain that it results in inefficiencies and cost overruns when the strengths of the construction firms don't align with the requirements of the design.



Costs can be better controlled when governments maintain supervision of key aspects of planning, construction management, and change orders.

DB and CM/GC delivery models have become common in recent years and are viewed as more flexible and efficient than DBB. Under DB, the same entity, typically structured as a joint venture, is tasked with designing and building the project, as well as maintaining ownership of the design.^{viii}

^v The Purple Line uses a payment agreement common among P3s known as availability payments. Rather than receiving direct farebox revenue, the private sector partnership receives an agreed upon monthly payment throughout the course of the project's construction and operations period, or concession term, which is based on meeting set performance targets. The State retains all farebox revenue.

^{vi} The settlement payment was a significant source of the legal cost overruns discussed on page 3.

^{vii} This additional cost includes debt service paid to bondholders, as well as construction costs and other payments to contractors.

^{viii} The construction of the Purple Line is a DB procurement model, but the entire project is known as a P3/DBFOM (Design Build Finance Operate Maintain) model.



While this model is designed to create more synergies between design and construction, it adds a layer of oversight functions on top of those of the government agency, which can create time and cost challenges if the contractors underperform or exercise clauses in the contract allowing them to walk away. CM/GC is viewed as a hybrid model whereby the government maintains ownership of the design but, unlike DB, brings in the construction manager, or general contractor, during the design phase to analyze design plans and identify concerns or issues with the design before transitioning to construction.

The Eno Center report found that while the delivery model is important, even more important from a cost control perspective is the attention to key details within and even prior to procurements. For example, research indicates that costs can be better controlled when governments maintain supervision of key aspects of planning, construction management, and change orders. In addition, government agencies can manage costs by spending more time understanding the riskiest or most challenging parts of a build before issuing a request for proposal (RFP).²⁷ In the case of the Purple Line, a better understanding of tougher than expected terrain, for example an 1,100 foot-tunnel section in Silver Spring with dense rock, might have saved time and money in the long run (see Route Selection section above).²⁸



Transit projects scored primarily by lowest bid yield the worst results on ultimate cost and timeline. The projects that get the best results typically have a technical merit weight of 50% or more.

The RFP scoring methodology is another detail worth sweating, per the NYU Transit Costs Project report. In most cases, procurements are evaluated on price, timeline, and technical merit. Research indicates that transit projects scored primarily by lowest bid yield the worst results on ultimate cost and timeline. The projects that get the best results typically have a technical merit weight of 50% or more.²⁹

Conclusion

Mass transit is an essential element of regional competitiveness, economic inclusion, and climate sustainability. But planning, executing, and operating large scale projects is extremely challenging for the public and private sectors. Even in cases where everything goes exactly as planned, unforeseen circumstances, such as a global pandemic, supply chain disruptions, or general market volatility can upend projects. As Maryland looks to grow its transit system in the coming years, in the face of financial and political headwinds, the factors and cost drivers listed in this report are worth accounting for and understanding. Broad community and stakeholder support, careful planning and risk analysis, strong and sustained leadership, consideration of labor and consulting models, and use of modern and accountable financing, procurement, and delivery models increase the likelihood of building mass transit that is delivered on time, on budget, and on scope.



Endnotes

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