Attachment A

# Metro Connects Implementation Report

May 5, 2022

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## II. Proviso Text

Ordinance 19367[1], Section 6, King County Metro Transit, included as Appendix A, required this report, as described below.

*A Metro Connects implementation report, which shall be transmitted by May 5, 2022, for acceptance by motion, and which shall include:*

1. *A description of the funding needed to implement Metro Connects, the gap between the funding that is available, and the total amount needed and a description of potential funding sources that could be used to fill the funding gap; and*
2. *A description of the strategy the King County Executive has implemented to consult with community members and regional leaders to develop a plan to implement Metro Connects, which should describe outreach and engagement with representatives from communities historically lacking in access to or underserved by transit, the Sound Cities Association, the city of Seattle, King County's regional transportation boards, and any other organization necessary to ensure that a broad representation of regional leaders is consulted.*

## III. Executive Summary

Metro Connects, Metro's long-range service and capital plan, envisions 70 percent more service by 2050. Metro Connects was originally adopted in 2017, with updates adopted by the King County Council in December 2021 through Ordinance 19367. Section 6 of Ordinance 19367 required Metro to complete this "Metro Connects Implementation Report" by May 5, 2022, including: a description of the funding needed to implement Metro Connects, the current funding gap, potential revenue sources, and a description of the engagement strategy to implement Metro Connects.

The Metro Connects service and capital costs were updated in 2021 through the overall Metro Connects update. As of June 2021, Metro expects the interim network (for costing purposes, 2035) to cost approximately $11.5 billion in capital costs and require 5.5 million annual service hours. The 2050 network will require $28.3 billion in capital costs and 7.25 million annual total service hours.

The costs of both networks will significantly exceed projected revenues. In June 2021, Metro projected needing an additional 2.13 million annual service hours and $7.1 billion in capital funding to achieve the Metro Connects interim network. The gap to the 2050 network was 3.58 million annual service hours and $18 billion in capital costs. Since June 2021, revenue projections have increased by approximately $10.4 billion through 2050 because of improved sales tax forecasts and additional federal and state funding allocated to Metro. Those improvements will help but not diminish the need for more funding to deliver the service and capital parts of the interim and 2050 Metro Connects networks.

Metro's Strategic Plan for Public Transportation 2021-2022 directs Metro to "budget and invest in ways that deliver Metro Connects…" and "seek additional funding sources that are equitable and financially sustainable." There are many potential funding mechanisms, some of which could be available more quickly than others. For example, sources like sales and property tax could be available through the King County Transportation Benefit District, which exists in statute but has not yet enacted any of its available revenue mechanisms. Additionally, some potential new revenue mechanisms could address

[1] Link to Ordinance 19367

the gap but would require action from the Washington State Legislature (e.g., a road usage charge, increased capacity for levy growth, new county taxing authority). An ongoing challenge will be balancing the need to fund and grow the mobility network to advance equity with a desire to avoid overburdening people with lower incomes with regressive funding sources. As part of Metro's commitment to equity, Metro recommends elected leaders pursue the least regressive sources possible and implement any sources used in a way that advances equity to the extent possible.

Metro already consults with community members and regional leaders to implement Metro Connects in many ways. First, Metro engages with interested parties to implement Metro Connects through projects like service restructures, flexible service pilots, and capital improvements. For example, engagement with communities and cities was essential to the North Link Connections mobility project[2], which resulted in improved service that aligned with the Metro Connects network in North King County. Metro also engages with communities and cities on policy development and updates, which is crucial to delivering Metro Connects. Through the 2021 policy update process, interested parties, like the Equity Cabinet and Sound Cities Association (SCA), weighed in on Metro's proposal to establish a methodology within the Service Guidelines that directs hours for service growth to routes envisioned in the Metro Connects network. Metro aims to center the voices of priority populations[3], cities, and other interested parties in all its engagement efforts, including the examples previously mentioned.

Finally, should policymakers decide to seek additional funding for Metro Connects, an engagement strategy that centers the needs and voices of priority populations across King County, either through the Equity Cabinet and/or multiple other venues is necessary. Metro recommends engaging cities and regional partners through venues such as the Sound Cities Association, Regional Transit Committee, transportation boards, and others.

Implementing Metro Connects is key to delivering on the goals and objectives in Metro's Strategic Plan for Public Transportation and contributing to healthy communities, a thriving economy, and a sustainable environment. Delivering the Metro Connects service networks help support King County's "True North[4]" and advance the goals and objectives in King County's Strategic Plan, including but not limited to the "mobility," "healthy environment," and "health and human services" goals. Implementing Metro Connects advances the goals and strategies in King County's Strategic Climate Action Plan and Equity and Social Justice Strategic Plan by increasing transit ridership (and reducing greenhouse gas emissions) and improving access to mobility for priority populations.

[2] Metro restructured service around the expansion of light rail to Northgate.
[3] People who are Black, Indigenous, and of color; have low or no-income; are immigrants or refugees; have disabilities; or are linguistically diverse.
[4] King County's True North: Making King County a welcoming community where every person can thrive.

## IV. Background

**Department Overview:** King County Metro is the Puget Sound region's largest public transportation agency. Metro provides bus, paratransit, vanpool, and water taxi services, and operates Seattle Streetcar, Sound Transit Link light rail, and Sound Transit Express bus service. Metro is committed to providing safe, equitable, and sustainable mobility, and prioritizing service where needs are greatest. Metro Connects, Metro's long-range service and capital plan, describes a vision for more than 70 percent more service across King County by 2050.

**Key Historical Context:** The King County Council originally adopted Metro Connects, Metro's long-range plan, via ordinance 18449[5], in 2017. Metro Connects originally included a 2025 service network and a 2040 service network with 70 percent more service than at the time of adoption. All of Metro's growth and service and capital changes, including restructures, build towards Metro Connects. However, the significant service and capital expansion envisioned in the plan has never been fully funded. In 2019, Metro submitted a regional planning report[6], as required by King County Council Motion 15252[7]. Elected officials, with Metro, began discussions about potential funding solutions in 2019 and 2020, but those conversations did not move forward because of the COVID-19 pandemic.

In 2020 and 2021, Metro updated Metro Connects, Metro's Strategic Plan for Public Transportation, and Metro's Service Guidelines. The goals of these updates included:

- incorporating recommendations from Metro's Mobility Framework[8], including centering advancing equity and addressing climate change,
- ensuring the policies better align with each other (i.e., the Service Guidelines directly results in investments in the Metro Connects service networks), and
- making necessary technical changes to the service networks in Metro Connects and associated costs. Such changes included extending the 2040 network to 2050 and reframing the 2025 network to be an "interim" network, which is targeted for when expansion of Link light rail to Ballard is complete[9].

To complete this update, Metro engaged with interested parties including the Metro Mobility Equity Cabinet (community leaders representing priority populations[10] and all riders countywide), the Regional Transit Committee and their staff, King County Council offices and their staff, the Metro Connects technical advisory committee, community advocacy organizations, and others. The updated Metro Connects service and capital plans remained only partially funded and included revised service and capital cost estimates to deliver the interim and 2050 networks. Appendix B explains the capital costing

[5] Ordinance 18449 [LINK]
[6] Status report on Metro's regional planning effort [LINK]
[7] Motion 15252 [LINK]. Motion 15252 asked the King County Executive to initiate a regional planning effort to address the implementation of Metro Connects, update the Metro Connects costs, develop a strategy for engaging with interested parties, and submit a report to the King County Council in May 2019 with a status update.
[8] Mobility Framework Report [LINK]
[9] This timing reflects uncertainty in when Metro would have the funding to implement service growth, while recognizing a need for Metro's system to keep pace with Sound Transit's Link light rail expansion.
[10] Defined as people who are Black, indigenous, or of Color; have low or no-incomes, are foreign-born, are linguistically diverse, or who have disabilities.

methodology. When the King County Council adopted the updated policies (including Metro Connects) through ordinance 19367, it required Metro to complete this implementation report.

**Key Current Context:** Implementing the service networks envisioned in Metro Connects will help achieve the King County Strategic Plan's "Mobility[11]" goal. Delivering Metro Connects will advance transportation and mobility equity as described in the King County Equity and Social Justice Strategic Plan. For example, implementing Metro Connects will require significant investments in service improvements and investments in community partnerships. Achieving the service growth envisioned in Metro Connects, along with increasing land use density and equitable vehicle pricing, are essential to meeting with goals in King County's Strategic Climate Action Plan (such as decreasing vehicle miles traveled). Lastly, funding and fully implementing Metro Connects will help Metro align with many of the goals, objectives, outcomes, and strategies in its Strategic Plan for Public Transportation, such as "Budget and invest in ways that deliver Metro Connects safely, equitably, and sustainably."[12]

**Report Methodology:** This report was assembled by King County Metro and Office of Performance, Strategy, and Budget staff. It includes information from the 2021 update to Metro Connects, including costs of service and capital investments in Metro Connects that were developed by a consultant team[13]. It references engagement that influenced the most recent update to Metro Connects. That engagement occurred from spring 2020 to spring 2021 and was managed by Metro staff and a consultant team.

[11] "Deliver a safe, reliable, and seamless network of transportation options to get people and goods where they need to go, when they need to get there."

[12] This is an objective in the "be responsible stewards of financial resources and invest in line with values and goals" goal of Metro's Strategic Plan for Public Transportation.

[13] The consultant team that updated the Metro Connects costs included staff from Nelson Nygaard, Fehr & Peers, and Parametrix.

## V. Report Requirements

Metro Connects, Metro's long-range service and capital plan envisioning more than 70 percent more service by 2050, is not fully funded. Metro builds towards Metro Connects through its restructures, service growth, capital improvements, and programs and projects. Without additional funding, however, Metro will not be able to fully deliver the Metro Connects envisioned growth.

King County Council Motion 15252[14] (2018) required the King County Executive to collaborate with the King County Council to:

- "Initiate a regional planning effort…to address the implementation of Metro Connects…,"
- "Prepare updated information to supplement METRO CONNECTS to adjust for increased population growth, increasing regional congestion, inflation and construction costs, regional mobility needs and innovations in transportation,"
- "Develop and propose a strategy to convene regional leaders to develop a regional funding plan to implement METRO CONNECTS," and
- "Report on the status of the regional planning effort by May 31, 2019."

In 2019, Metro submitted the required "status report on Metro Transit's regional planning effort,"[15] which described the regional planning effort, Metro's approach to updating the costs in Metro Connects, engagement that would inform the regional planning effort, and next steps.

The need to fully fund Metro Connects – combined with the expiration of the Seattle Transportation Benefit District funding in 2020 – led to conversations among policymakers about if and how King County could pursue more funding for transit. The King County Transportation District discussed regional transit funding at a meeting[16] on March 3, 2020. These discussions coincided with the beginning of the COVID-19 pandemic, which resulted in a pausing of the discussions.

Through the 2021 Metro Connects update, Metro staff worked with consultants to update the service and capital costs of the Metro Connects networks. Metro expects the interim network (for costing purposes, 2035) to cost approximately $11.5 billion in capital costs and require 5.5 million annual service hours. The 2050 network will require an even larger investment—$28.3 billion in capital costs and 7.25 million annual total service hours. These expected costs (both as of June 2021) and their methodology are described in more detail in later sections of this report.

Metro will need significant amounts of new funding to deliver the interim and 2050 networks, even with recent favorable sales tax forecasts and the recent influx of federal funding through bills like the Coronavirus Aid, Relief, and Economic Security Act of 2020 (CARES), the Coronavirus Response and Relief Supplemental Appropriations Act of 2021 (CRRSAA), and the American Rescue Plan Act of 2021 (ARPA).

The updated Metro Connects (along with an updated Strategic Plan for Public Transportation and Service Guidelines) was transmitted to the King County Council in July 2021. The documents were dually referred to the Regional Transit Committee and the Mobility and Environment Committee. Through its

[14] Motion 15252
[15] Status report on Metro's regional planning effort [LINK]
[16] Minutes from March 3, 2020, King County Transportation District meeting [LINK]

deliberations, the Regional Transit Committee added an amendment requiring the creation of this Metro Connects implementation report, due to the King County Council by May 5, 2022. The Regional Transit Committee adopted the policies and associated amendments in November 2021. The King County Council Mobility and Environment Committee adopted the materials on November 30, 2021, and the King County Council adopted them on December 7, 2021, via King County Council Ordinance 19367[17].

This implementation report responds to that requirement, explained in more detail below. The report contains sections aligning to each requirement.

> *A. A Metro Connects implementation report, which shall be transmitted by May 5, 2022, for acceptance by motion, and which shall include:*
>
> *1. A description of the funding needed to implement Metro Connects, the gap between the funding that is available, and the total amount needed and a description of potential funding sources that could be used to fill the funding gap; and*
>
> *2. A description of the strategy the King County executive has implemented to consult with community members and regional leaders to develop a plan to implement Metro Connects, which should describe outreach and engagement with representatives from communities historically lacking in access to or underserved by transit, the Sound Cities Association, the city of Seattle, King County's regional transportation boards and any other organization necessary to ensure that a broad representation of regional leaders is consulted.*

## A. A description of the funding needed to implement Metro Connects, the gap between the funding that is available and the total amount needed, and a description of potential funding sources that could be used to fill the funding gap

### Description of the funding needed to implement Metro Connects

In response to King County Council motion 15252 and for the 2021 update to Metro Connects, Metro revised the expected costs for the Metro Connects interim and 2050 networks[18], as well as Metro's assumptions about forecast revenues. Metro has included the information from the recently adopted update to Metro Connects in this report.

As of June 2021, Metro expects the interim network (for costing purposes, 2035) to cost approximately $11.5 billion in capital costs and require 5.5 million annual service hours. Metro expects the 2050 network to require $28.3 billion in capital costs and 7.25 million annual total service hours. The costs are high-level planning estimates of investments needed to support Metro's network, expressed in year-of-expenditure dollars, which include inflation. These costs are subject to change as investments are

[17] Ordinance 19367

[18] Through the 2021 update, Metro extended the 2040 network in the original Metro Connects out to 2050 to align with the Puget Sound Regional Council's VISION 2050. Metro also reframed the 2025 network to be an "interim" network to reflect uncertainty about funding.

further defined and sequenced. Because of inflation and the ongoing cost of service once implemented, the timing of investments can have a significant impact on the total costs.

The methodology for determining these capital costs is described in full in Appendix B, "Technical Report E (to Metro Connects) – Capital Costing Methodology."

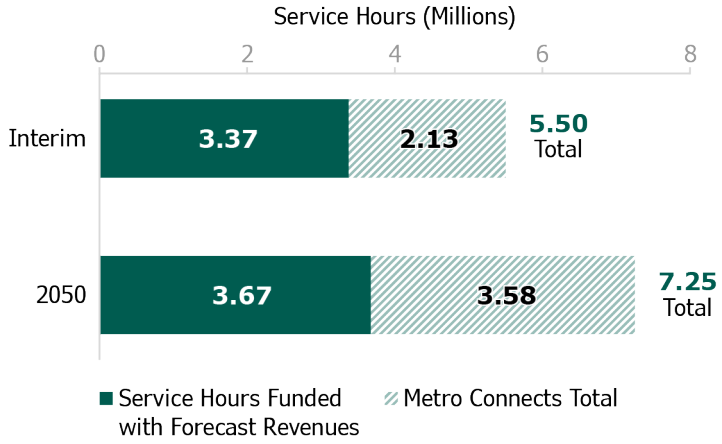
## Description of the gap between the funding that is available, and the total amount needed

### *Gap described in Metro Connects*

The funding gap will fluctuate based on revenue forecasts. That is why Metro has committed to reporting on the Metro Connects funding gap through the "Stewardship" goal section of Metro's web-based Strategic Plan dashboard. Metro will update the current service hours in the system after every service change and the current budget for capital costs after every biennial budget cycle.

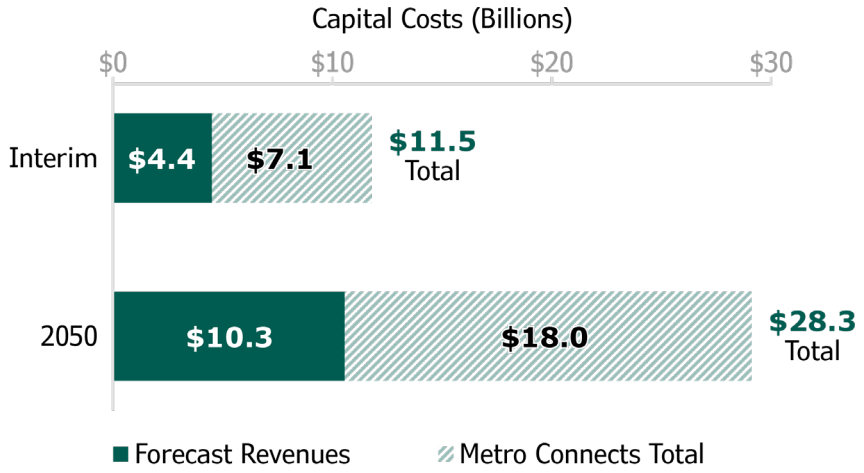
Figure 1 and Figure 2 below illustrate the gap between service and capital additions and what could be funded with forecasted revenues from existing sources - sales tax, farebox revenue, federal and state grants, and others – at the time the updated Metro Connects was transmitted to the King County Council in 2021. This update utilized the revenue assumptions from the adopted 2021-2022 budget. In this update, Metro projected a need of an additional 2.13 million annual service hours and $7.1 billion in capital funding to achieve the Metro Connects interim network. The gap to the 2050 network was 3.58 million annual service hours and $18 billion in capital costs[19].

**Figure 1: Metro Connects service adds and what could be funded with forecasted revenue (as of June 2021)**




[19] The costs for the full 2050 Metro Connects service and capital plan include projections for full fleet electrification.

**Figure 2: Metro Connects capital costs and what could be funded with forecasted revenues (as of June 2021)**




These estimates of Metro's revenues were conservative since they were updated based on projections of more significant economic impacts from COVID-19. However, as explained below, the gap remains significant, even with improved revenue forecasts.

*How recent projections for sales tax and federal funding impact the funding gap*

This report does not include a fully updated gap analysis from what is shown in the figures above because decisions about Metro's expenses will be made through the 2023-2024 biennial budget process, currently underway. However, since the 2021 update to Metro Connects, sales tax projections have improved, and Metro has or expects to receive additional federal funding. In March 2022, the Washington State Legislature also passed Move Ahead Washington, a 16-year transportation revenue package that provides $3 billion for public transportation. This report communicates the impacts of those sources on projected revenues through 2050.

As of March 2022, revenue projections from sales tax and federal funding through 2050 are approximately $10.4 billion higher than when the gap to fund Metro Connects was reported in 2021. Approximately $5 to $6 billion of that is already committed to service (discussed below) and fleet to support service. The net improvements in revenue projections of about $4.4 to $5.4 billion through 2050 help the funding picture, but do not eliminate, the need for more funding to deliver Metro Connects. Again, these numbers do not represent a full update to the funding gap to Metro Connects because they do not account for projected expenses and other changes in revenue (such as additional state funding). The subsection below, "Background on the new revenue projections," includes more detail about how the original funding gap and the updated revenue projections were calculated.

**Background on the new revenue projections**

The 2021 update to Metro Connects used the 2021-2022 Executive Proposed Budget financial model ("Metro Connects Baseline Model") as the basis for forecasts of what could be funded with existing revenues. Since then, there have been significant improvements to revenue forecasts from updated sales tax forecasts from the King County Office of Economic and Financial Analysis (OEFA), as well as incremental funding packages from the federal government.

The 2021-2022 Budget used sales tax projections from the August 2020 OEFA forecast. Sales tax projections have since improved with each forecast. Compared to August 2020, the March 2022 OEFA forecast projected $1.6 billion more in sales tax from 2021 to 2030. Extending that trend through 2050 results in an increase of about $9.3 billion in revenue compared to the Metro Connects Baseline Model.

The 2021-2022 budget modeling included funding from the Coronavirus Aid, Relief, and Economic Security Act (CARES) Act. Since then, the federal government allocated additional funding to Metro through the Coronavirus Response and Relief Supplemental Appropriations Act (CRRSAA) and American Rescue Plan Act (ARPA) legislation. This totaled approximately $600 million in one-time funds that Metro did not know about when developing the Metro Connects Baseline Model.

In March 2022, the Washington State Legislature passed Move Ahead Washington, a 16-year transportation revenue package that provides over $3 billion for public transportation. It will distribute more than $640 million to King County over 16 years to support Metro bus and paratransit service, RapidRide and zero-emission bus construction projects, and a new fully subsidized fare for youth 18 and under. To be eligible for the state grant funding available under this legislation, Metro will offer fully subsidized fares to all youth, ages 18 and under, in proposed legislation expected to be transmitted to the King County Council[20]. Factoring in the projected loss fare revenue from subsidizing youth fares, a net revenue increase from this transportation package of approximately $485 million over 16 years is expected.

This means Metro now projects approximately $10.4 billion[21] more revenue between now and 2050, in year of expenditure dollars, compared to what was projected in the 2021 update to Metro Connects. This additional revenue could support service or capital investments to deliver Metro Connects, though it is not enough to fill the service or capital funding gaps, and Metro spending of Move Ahead Washington funds must align with the “environmental justice” and “overburdened communities” definitions in the state legislation.

Additionally, Metro already assumed how it would spend some of this increased funding through the 2021-2022 second omnibus supplemental budget, which was adopted by the King County Council in 2021. In the original 2021-2022 budget[22] – and therefore the Metro Connects baseline model - Metro assumed a need to reduce about 600,000 annual hours of service through the 2025-2026 biennium, without improved revenue forecasts and/or additional funding (referred to as the “service cliff”). However, because revenue forecasts had improved by the time Metro developed the 2021-2022 second omnibus budget, the assumption of needing to cut 600,000 service hours was removed. That means the service hour gaps shown in the 2021 update to Metro Connects – 2.1 million annual hours for the interim network and 3.6 million annual hours for the 2050 network – are too high and could be reduced by 600,000. Staff estimates the total operating cost to support 600,000 annual hours of service would account for $5.0 billion of the $10.5 billion in additional revenue through 2050 and another $0.5 billion

[20] Proposed legislation to make this change to the youth fare the King County Council will be transmitted to the Council by the end of May to meet the state funding eligibility deadline of October 1, 2022.
[21] $9.3 billion from improved sales tax forecasts plus $600 million in one-time federal funds plus $485 million in projected funding from Move Ahead Washington ($640 million minus $155 million in lost fare revenue)
[22] Adopted in fall 2020

to $1.0 billion would account for additional fleet procurements related to that service, leaving a remainder of $4.4 to $5.4 billion of projected incremental funding.

As an updated financial picture comes together for the 2023-2024 Budget, including rising inflation, significant insurance rate increases, potential additional funding from the federal bipartisan Infrastructure Law and Move Ahead Washington, as well as continued depressed fare revenue, and other impacts, Metro will better understand what other investments the additional funding will sustain. Even with additional investments accommodated by the additional revenue, delivering Metro Connects would still require significantly more funding.

As mentioned previously, once Council has adopted the completely updated financial model for the 2023-2024 Budget, Metro will update the Metro Connects funding measure on its Strategic Plan dashboard.

### A description of potential funding sources that could be used to fill the funding gap

Ultimately, to achieve the service and capital improvements in Metro Connects, additional funding will be needed. New funding could come through new or expanding existing funding sources, though most existing sources are currently dedicated to other uses, such as King County's General Fund. See 'King County Funding Authority' in Appendix C for more information about specific sources.

This section includes a summary of existing and potential funding sources, organized by:

1) The King County Transportation Benefit District, which exists in statute but has not yet enacted any of its available revenue mechanisms,
2) External funding from partners (private, municipal, state, or federal sources), and/or
3) Unutilized or new sources of revenue authority, which would require authorizing action on the part of the State Legislature.

Appendix C, "Tables describing potential funding sources," includes more information about sources under three funding authorities: the King County Transportation Benefit District, Metro Transit, and King County. Because the sources under King County and Metro Transit's funding authority are more likely to be already utilized to their maximum extent, they are not discussed in this part of the report.

Increasing service and building a mobility system that meets riders' needs – especially those of priority populations – will be essential to advancing equity. However, funding growth in a way that does not exacerbate disparities and/or the disproportionate burden that regressive sources have on lower-income individuals must also remain a priority. Balancing these goals is and will continue to be challenging, especially given that some of the more regressive funding sources, like sales tax, are also the revenue sources most readily available.[23] This section describes available and potential funding sources, and notably, each source has advantages and disadvantages. In general, having more progressive tools available would help advance equity from a funding perspective because funding would not come from regressive sources that disproportionately impact people with lower incomes.

[23] Regressive taxes impose a greater burden, relative to resources, on those who have lower incomes.

### *King County Transportation Benefit District (KCTBD)*

Washington state law[24] allows for Transportation Benefit Districts to foster "cooperation of the public and private sectors in addressing transportation needs…through enhanced capability for cities, towns, and counties to make and fund transportation improvements necessitated by economic development and to improve the performance of the transportation system." The King County Transportation Benefit District, established in 2014 via ordinance 17746[25], has numerous available funding sources, most requiring voter approval. Sources include:

- **Vehicle License Fees** (including councilmanic and voter-approved options[26]), assessed on registered vehicles within the TBD area (in this case, King County borders),
- **Sales/Use Tax increments**, including a councilmanic 0.1 percent and an additional 0.2 percent with voter approval (simple majority),
- **Property Tax Excess Levy**, requiring 60 percent voter approval,
- **Development Impact Fees**, dedicated to project-specific transportation improvements necessary on account of economic development and growth,
- **Local Improvement Districts**, allowing for capital costs to be recovered from benefitting property owners, and
- **Vehicle Tolls** on state routes, city streets, or county roads, within the boundaries of the benefit district, unless otherwise prohibited by law and subject to the state tolling authority.

Appendix C includes more information, including authorizing statutes and revenue estimates.

### *Partner/External Funding*

The goal is to build a countywide mobility system, ideally supported by regional funding sources. However, many jurisdictions have funding tools/authority that King County and/or the KCTBD lack, so continued and new partnerships with cities could also help achieve the improvements that the Metro Connects network will bring. For example, King County, as with all county governments in Washington State, lacks the authority to impose business and occupation or utility taxes. Meanwhile, some of the county's revenue tools can only be applied within King County's unincorporated areas (e.g., commercial parking taxes, admissions taxes) and would not generate sufficient revenue to support system expansion regionally.

The 2019 Washington State Joint Transportation Committee's "Assessment of City Transportation Funding Needs"[27] discusses existing and potential revenue sources available to jurisdictions, including:

- City Transportation Benefit Districts (including funding authority as described above),
- Commercial Parking Taxes,
- Transportation Impact Fees,

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[24] RCW [LINK]

[25] Ordinance 17746 [LINK]

[26] Per RCW 36.73.065, a vehicle fee up to fifty dollars can be imposed by majority vote of the governing body of the Transportation Benefit District (i.e. the KC Council). Fees exceeding a certain amount are subject to majority approval by the voters themselves. [LINK]

[27] Washington State Joint Transportation Committee. Assessment of City Transportation Funding Needs. June 2019. [LINK]

- Flexible funding sources (property tax, city business & occupation tax, retail sales tax, utility tax, real estate excise tax), and
- Local Motor Vehicle Fuel Taxes and Rental Car sales tax (requiring new authority).

Metro will continue leveraging state and federal grant funding, which currently is mostly for allocated for capital improvements and, in some instances, operating expenses. This may include federal funds anticipated but not yet received from the Investment Infrastructure & Jobs Act, also known as the Bipartisan Infrastructure Law from the Federal Transit Administration (FTA), as well as other federal aid programs.

### *Unutilized or new sources of revenue*

Many revenue tools that could help implement Metro Connects service and capital improvements require action by the Washington State Legislature, which grants taxing powers to local government. Such new revenue mechanisms would require the legislature to establish taxing authority for local governments, with local government taking follow-up action to implement the funding mechanism (at times via voter approval).

Encouraging transit use and transit-supportive development is essential to achieving policy goals like confronting climate change and advancing equity. Given this, sources that incentivize and relate to the connection between use of the regional transportation network, increased development near transit, and population growth would be especially beneficial. Ideally, new revenue would scale based on growth in population, jobs, and demand for expansion of the county's transportation infrastructure, so new investments in service and infrastructure keep up with demand. New funding sources could incentivize transit use and capture some portion of the growing value of property within Metro's service area. Some combination of transportation fees, taxes, and partner revenues could accomplish this.

Partners like the Puget Sound Regional Council (PSRC), the Washington State Legislature's Joint Transportation Committee (JTC), and cities within King County have studied potential funding sources for regional transportation. Efforts to fund Metro Connects should build on this work (described below) – particularly around sources that require state legislative action.

#### Work done by partners to identify new sources of revenue

*Puget Sound Regional Council (PSRC)*

The Puget Sound Regional Council's 2016 "Transportation Futures Task Force Final Report" (TFR)[28] identified criteria for funding sources for transportation, including the sources' ability to pay for unfunded needs, stability, support for carbon reduction, and equity towards ratepayers (including future generations). The TFR's suggested mechanisms included several already available through Transportation Benefit Districts (described above), plus vehicle mileage taxes/road usage charges, implemented as a per-mile charge on eligible vehicles (particularly electric vehicles not subject to the motor vehicle fuel tax). The TFR also recommended maximizing existing revenue authority, establishing a regional transportation authority, achieving efficiencies with existing funds, and developing new regional funding sources that are flexible, reflect use of the transportation system, allow variance in user fees to effectively reduce congestion emissions, and relate to where revenues are generated.

[28] Puget Sound Regional Council, *Transportation Futures Task Force Final Report*. 2016. Transportation Futures Task Force Final Report (psrc.org) [LINK]

This year, the PSRC is updating its "2022-2050 Regional Transportation Plan[29]" (RTP) to reflect the Vision 2050 plan for growth[30]. As of March 2022, the draft plan describes transportation investments in the Puget Sound through 2050, with Local Transit (including, but not limited to, Metro) comprising nearly a quarter of these investments. The RTP divides transportation needs into Maintenance/Preservation/Operations and System Improvements, where the latter category is largely dependent on new revenues to supplement those projected under current law. The PSRC RTP's financial strategy (Appendix J[31] to the draft RTP) discusses how new revenues for Local Transit can be generated through 2050 across various new sources, including:

- Employee Head/Payroll taxes, assessed on a per-employee basis,
- Local Transit Sales Tax increases,
- Transit Fare increases,
- Ferry Fare increases,
- License Service Fee increases,
- Motor Vehicle Excise Tax (transit share), and
- User Fees / Road Usage Charge.

### *Washington Joint Transportation Committee*

The Washington Joint Transportation Committee (JTC) studied funding needs and potential options for new funding. Its 2020 "Statewide Transportation Needs Assessment" report[32] included a menu of funding options with information on magnitude of revenue generation, ease of implementation, and equity considerations, among other criteria. Like the PSRC materials outlined above, the JTC report discussed gaps between what existing funding can cover and what supporting system maintenance and expansion would require, with current funding often a patchwork across numerous entities and mechanisms. The report identified funding options for local governments, mostly requiring state legislative action to authorize, includes:

- Local utility tax increments, dedicated for transportation projects,
- Increasing the transportation benefit district maximum sales tax rate,
- Lifting the current 1% cap on property tax levy growth,
- Community Facility Districts, where property owners are charged an annual fee for the benefit of local or regional infrastructure (exists but not implemented),
- Local motor vehicle fuel tax (exists but not implemented), and
- Local option tolls.

### *City of Seattle*

The City of Seattle studied local options for tolls in its 2019 "Seattle Congestion Pricing Study.[33]" It examined pricing tools for reducing congestion, focused on cordon pricing (charging vehicles for entry

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[29] Puget Sound Regional Council, *Draft Regional Transportation Plan 2022-2050*. 2022. [LINK]
[30] PSRC, Vision 2050: A Plan for the Central Puget Sound Region. October 2020. [LINK]
[31] Appendix J: Financial Strategy. [LINK]
[32] Washington State Joint Transportation Committee. Statewide Transportation Needs Assessment. July 2020. Phase 1 Summary Report (see Appendix B: Evaluation of Funding Options). [LINK]. Section 2.7, "Estimated Funding Gap," begins on page 55, and section 3.0, "Menu of Funding Options," begins on page 64.
[33] Seattle Congestion Pricing Study summary report [LINK]

into a priced zone), area pricing (charging for vehicle movement within a priced zone), fleet pricing (charging for specific types of vehicle movement), and a road usage charge (RUC, pricing the use of roads). The study noted that as Washington State examines a RUC as a long-term replacement for the state's gas tax, Seattle could be an early adopter and seek to "leverage the state's RUC framework to implement an additional congestion charge."[34]

**More information about the most identified funding mechanisms**

The "road usage charge" and ways to capture value from properties were some of the most identified funding mechanisms in the studies and work discussed above[35]. They are described in more detail below.

### *Road usage charge*

A road usage charge, implemented as a per-mile charge on all eligible vehicles (particularly electric vehicles that are not subject to the motor vehicle fuel tax), potentially varying by time of day or location, would effectively price the use of roads and recover some portion of maintenance and capital costs from the direct users of the public infrastructure. A price on using roads could manage demand and incentivize transit use, potentially through higher charges during peak hours.

Per the Washington State Constitution, proceeds from the motor vehicle fuel tax are restricted to spending on highway purposes[36]. However, a flexible road usage charge, broadened beyond the constraints of the motor vehicle fuel tax and potentially with a local option (as discussed in the Seattle Congestion Study[37]) or in which revenue is directed to its area of origin, could support investments in transportation infrastructure and service.

The PSRC's draft 2022 Regional Transportation Plan estimates a flexible RUC could generate a significant amount towards closing the funding gap through 2050. The draft RTP suggests that regional partners work towards implementation of a flexible road usage charge in 2030 with its financial strategy assuming per-mile rates higher than existing gas-tax equivalents to generate adequate revenues to fund the plan.

In 2018, the Washington State Transportation Commission (WSTC) piloted a RUC with approximately 2,000 drivers, submitting findings and recommendations in early 2020[38]. These recommendations included pursuing a gradual transition to a RUC, with a start-up phase and time for additional testing and research. The WSTC's analysis has focused on state-level road usage charging, with separate assumptions from the PSRC analysis discussed above. The WSTC continues to research a RUC, including

[34] City of Seattle, Congestion Pricing Study, Pricing Tools White Paper, p. 12. [LINK]
[35] These referenced studies include two done by the PSRC, the Washington State Joint Transportation Committee: Statement Transportation Needs Assessment, and the City of Seattle's Congestion Pricing Study.
[36] 18th Amendment to WA Constitution. [LINK]
[37] City of Seattle, Department of Transportation. Seattle Congestion Pricing Study, Phase 1 Summary Report. May 2019. [LINK]
[38] Washington State Transportation Commission, Road Usage Charge Final Assessment. 2020. [LINK]

its performance as a revenue source and its equity impacts[39], with its next study expected for completion in 2023[40].

Finally, Metro's "Transportation Greenhouse Gas (GHG) Emissions Reduction Opportunities Evaluation," included as Appendix D of this report, identified that pricing vehicle travel through a road usage charge (or similar tools, like congestion pricing, tolling, parking pricing, etc.) will be necessary to achieve the King County Strategic Climate Action Plan target of reducing countywide greenhouse gas emissions by 80 percent by 2050. Such tools generate funding for increased transit while encouraging behavior change (by financially disincentivizing single occupancy vehicle travel).

*Property taxes, transit-supportive land use, and other mechanisms to capture value from real estate*

The studies referenced above also discussed ways to generate additional revenue from property. Current law limits regular property tax growth for a taxing district to one percent annually, plus new construction[41]. Increasing the amount of revenue that property tax levies could generate could help fund Metro Connects by reflecting the increased demand on transit resulting from growth. Costs grow at the rate of inflation, so adjusting the existing cap on property tax levy growth to "inflation plus population growth" would help revenue generation keep up. Fixing the tax structure, including replacing the arbitrary property tax cap with a cap designed to keep pace with inflation and population growth, has been included in King County's state legislative agenda because it would better reflect the region's growing needs and the true costs of critical services[42]. Allowing for levy revenues to keep up with cost growth would allow for the County's existing transportation levies to help close the funding gap without needing to rely on increases in more regressive taxes.

As discussed in Metro's Strategic Plan, transit-supportive land use is key to a successful and sustainable regional mobility system. Increasing dense, mixed-use zoning and affordable housing near transit increases equitable access to the Metro Connects network. It also adds new construction value to the property tax base. Partnering with local jurisdictions to facilitate land-use conducive to dense, transit-oriented development, combined with a revised levy growth rate that reflects inflation and population growth, could allow for property tax revenues to better support the regional mobility network.

Mechanisms for recovering costs from growing real estate values (which often become more valuable with increases in transportation infrastructure) include:

- **Local Improvement Districts (LID).** Current law allows for multiple LIDs within transportation benefit districts[43]. The mechanism recognizes that property owners often benefit from public infrastructure improvements, and therefore allows for local improvement districts to bill property owners to recover some capital costs. While administratively complex, LIDs have been used for projects like the Seattle Waterfront and Downtown Seattle Transit Tunnel.
- **Tax Increment Financing (TIF).** Recent updates to state law allow for local governments to utilize TIF to capture revenue from increases in assessed value of real estate within designated

[39] WA Road Usage Charge Equity Research. [LINK]
[40] Washington State House of Representatives, Office of Program Research. Bill Analysis HB 2026. [LINK]
[41] Revised Code of Washington 84.55.010 [LINK]
[42] 2022 State Legislative Agenda. King County Council Motion 16020. [LINK]
[43] Revised Code of Washington 36.73.080 [LINK]

"increment areas". As an economic development tool, TIF aims to support improvements that will incentivize private development, driving increases in assessed value of real estate. Revenues from increases in assessed value are used to pay directly for public improvement costs or to repay bonds issued for those public improvements.

### *Key findings*

In summary, though there are many existing and potential new revenue sources, without action by the Washington State Legislature, the King County Transportation Benefit District (TBD) tools remain the primary mechanism for additional local funding in the near-term. The established King County TBD would need to enact available revenue tools (some subject to voter approval), including sales tax increments, vehicle license fees, and local improvement districts.

Metro recognizes that different cities have different levels of resources, and as such, Metro would prefer to build the robust regional mobility system envisioned in Metro Connects with funding from one or more regional sources, without relying on cities to pay for service expansion in their jurisdictions (which would not be regionally equitable). However, cities have tools available for generating revenue that King County or the King County Transportation Benefit District lack, including business and occupation taxes and utility taxes. Using their revenue tools that are not available to the County or the TBD, cities could fund service, as described in Metro's Service Guidelines, or capital improvements.

Though studies by partners discussed potential new funding sources, two may merit special consideration: a flexible road usage charge and changes to levy constraints to keep up with inflation and population growth. Studies from PSRC and City of Seattle suggested transitioning towards a road usage charge, or similar congestion-fee mechanism, to better manage demand and reduce carbon emissions while generating revenues for transportation improvements. Successful implementation of a RUC, in terms of its ability to support local transit improvements, relies upon it being a flexible source of funding that could be spent on transit (i.e., not a replacement for the motor vehicle fuel tax with revenue restricted to highways). To the extent possible, RUC revenues generated within the Central Puget Sound region should be prioritized for supporting maintenance and system expansion, including projects as identified in Metro Connects. This will require early engagement between local officials, regional interested parties, and the State Legislature.

If the past is a predictor of the future, the Puget Sound region's population growth, inflation, and real estate values may continue to grow. At the same time, current limits property tax rate limits prevent local governments from keeping service and capital investments up to support such growth. Local governments could also use available tools to increase revenue by capturing a portion of the increased property value created by new transportation investments, including through local improvement districts or tax increment financing.

As discussed above, though this report focuses on the facts behind these potential sources, each have strengths and challenges. The regressive nature of tools readily available through the KCTBD – like a sales tax – will remain a challenge because funding transit through regressive sources is not in alignment with Metro and King County's equity goals. Metro's Strategic Plan directs Metro to "budget and invest in ways that deliver Metro Connects safely, equitably, and sustainably" and "seek additional funding sources that are equitable and financially sustainable." Balancing the need for more resources to

implement Metro Connects with not overburdening people with lower incomes via regressive funding sources will be difficult, though having more tools – like new progressive funding sources – could mitigate some of those challenges. Finally, it is necessary for equity to be centered in all discussions of potential funding, in terms of using less regressive sources, potentially pursuing more progressive options, and implementing in an equitable way.

### B. A description of the strategy the King County Executive has implemented to consult with community members and regional leaders to develop a plan to implement Metro Connects, which should describe outreach and engagement with representatives from communities historically lacking in access to or underserved by transit, the Sound Cities Association, the city of Seattle, King County's regional transportation boards and any other organization necessary to ensure that a broad representation of regional leaders is consulted

Metro implements Metro Connects through system, service, and program or project changes, through updates to the guiding policy, and by funding future growth. This section describes engagement related to these facets of implementation.

#### System, service, and program or project-based engagement

Metro engages with partners and interested parties to implement Metro Connects through projects like service restructures, flexible service pilots, and capital improvements. For example, engagement with communities and cities was essential to the North Link Connections mobility project[44]. Metro co-created transit route changes by surveying riders and collaborating with a community-led Mobility Board and 130 community-based organizations to help improve mobility and service connections. Metro focused on creating equitable outcomes by consulting with priority populations including Black, Indigenous, and other Communities of Color (BIPOC), low-income, immigrants and refugees, linguistically diverse, youth, seniors, LGBTIQIA+, people with disabilities, and people experiencing homelessness. Metro also engaged with cities, including members of the Sound Cities Association and the city of Seattle, through this project.

Additionally, Metro continues to engage community in 2022 to redesign much of Metro's transit network in north, east, and south King County to improve mobility and integrate with new Link light rail station openings. These three redesign projects provide a major opportunity to move towards the Metro Connects service networks. As of early 2022, Metro is also working with cities and communities in Renton, Kent, Auburn, and surrounding areas to upgrade the Route 160 to become the RapidRide I Line, consistent with the service networks in Metro Connects. Metro regularly works with cities to make capital improvements consistent with Metro Connects, such as speed and reliability improvements.

Finally, Metro staff will engage interested parties like the Equity Cabinet and cities as appropriate in planning efforts related to delivering the service and capital growth in Metro Connects in an integrated way.

[44] Metro restructured service around the expansion of light rail to Northgate.

### Policy engagement

Keeping Metro Connects and Metro's other guiding policies up to date is essential to implementing Metro Connects. For example, in 2020 and 2021, Metro engaged with communities and interested parties on policy changes like the updates to the Metro Connects networks (and associated costs) and changes to the Service Guidelines to direct investments and growth into the Metro Connects service networks. Those engaged on this effort included:

- Representatives of communities historically lacking in access to or underserved by transit, through the Mobility Equity Cabinet, representing priority populations[45] countywide.
- A group of equity and sustainability focused community and advocacy organizations that Metro convened regularly.
- The King County Transit Advisory Commission.
- The Sound Cities Association (SCA), through monthly briefings to and discussions with the Regional Transit Committee. Metro also briefed members of the Sound Cities Association individually and through broader SCA meetings.
- The City of Seattle, through monthly briefings to and discussions with the Regional Transit Committee, and through the Seattle Transportation Advisory Board.
- King County regional boards, through presentations to the Eastside Transportation Partnership, the South County Area Transportation Board, and SeaShore Transportation Forum.
- Metro Connects Technical Advisory Committee TAC, to engage staff from cities across King County and staff from partners such as Sound Transit and the Puget Sound Regional Council.

Topics of this engagement included the updated Metro Connects service network maps, the updated costs, and how to engage communities and cities in implementing Metro Connects.

### Funding strategy engagement

Should policymakers decide to seek additional funding, Metro recommends an engagement strategy that centers the needs and voices of priority populations across King County, either through the Equity Cabinet and/or other groups and venues. Metro also recommends engaging cities and regional partners through venues such as the Sound Cities Association, Regional Transit Committee, transportation boards, and others.

As directed by Metro's Strategic Plan for Public Transportation, Metro recommends co-creating funding solutions to the extent possible and following best practices for engaging community members, such as compensating them for their time.

## VI. Conclusion/Next Steps

Implementing Metro Connects, Metro's long-range plan, is key to delivering on the goals and objectives in Metro's Strategic Plan for Public Transportation and contributing to healthy communities, a thriving economy, and a sustainable environment. More funding for mobility services would help King County address challenges such as climate change, increased costs and the suburbanization of poverty, and the need to connect King County's growing and diversifying populations to jobs and other opportunities.

[45] As defined in the Mobility Framework, priority populations include people who have low or no income; are Black, Indigenous, or other people of Color; are immigrants or refugees; have disabilities; or are linguistically diverse.

Delivering Metro Connects will help Metro support King County's "True North[46]" and advance the goals and objectives in King County's Strategic Plan, such as:

- "Mobility" goal, objectives: increase integration between transportation modes and all service providers; preserve and optimize the mobility system; ensure safety and security for customers and employees using the mobility network; provide more equitable mobility access and reduce historic gaps.
- "Healthy environment" goal, objective: reduce countywide greenhouse gas emissions by 50 percent by 2030.
- "Health and human services" goal, objective: reduce disparities and improve overall health and personal well-being to create thriving communities.

Implementing the interim and 2050 service networks in Metro Connects is also essential to achieving the goals and targets outlined in the Strategic Climate Action Plan. Metro Connects aligns with King County's Equity and Social Justice Strategic Plan through service networks that increase access to mobility and opportunities for priority populations.

Implementing the service and capital expansion in Metro Connects will require time, collaboration with cities and regional partners, and additional funding, potentially from funding mechanisms not currently available. Metro will continue engaging with communities, cities, and other interested parties on project and program changes that align with Metro Connects, such as service restructures. By following the Service Guidelines' direction for service growth, Metro will also grow service towards the goals in Metro Connects, as existing funding allows. Full implementation of Metro Connects requires additional funding beyond what's projected to be available. It also requires strategies for securing additional funding that centers the voices of priority populations and includes input from cities and interested parties regionwide.

## VII. Appendices

- Appendix A, "Signed ordinance 19367," which includes the language requiring this report.
- Appendix B, "Technical report E (to Metro Connects) – capital costing methodology," which describes in more detail how the capital costs for Metro Connects were updated in 2021.
- Appendix C, "Tables describing potential funding sources," which includes more information about sources available through three funding authorities: King County Transportation Benefit District, Metro Transit Funding Authority, and King County Funding Authority for Transit Purposes.
- Appendix D, "Technical report D (to Metro Connects) – transportation GHG emissions reduction opportunities evaluation," includes more information about how a road usage charge or similar tools will be necessary to achieving the greenhouse gas emissions reduction goals in King County's 2020 Strategic Climate Action Plan.

[46] King County's True North: Making King County a welcoming community where every person can thrive.

1200 King County Courthouse
516 Third Avenue
Seattle, WA 98104

# KING COUNTY

## Signature Report

### Ordinance 19367

**Proposed No.** 2021-0286.2 **Sponsors** Upthegrove, Zahilay and Balducci

AN ORDINANCE relating to public transportation; adopting updates to the King County Metro Strategic Plan for Public Transportation, the King County Metro Service Guidelines and METRO CONNECTS – King County Metro's Long-Range Plan; and setting requirements for reporting and updates.

STATEMENT OF FACTS:

1. In 2011, via Ordinance 17143, the King County Metro Strategic Plan for Public Transportation 2011-2021 ("the strategic plan") and the King County Metro Service Guidelines ("the service guidelines") were adopted. In 2016 – following recommendations made by the regional transit task force in 2011 and the service guidelines task force in 2015, as well as with input from the King County council and executive, local jurisdictions and public transit riders – both the strategic plan and the service guidelines were updated via Ordinance 18301.

2. In 2017, via Ordinance 18449, METRO CONNECTS - King County Metro's Long-Range Plan ("Metro Connects") was adopted. As a long-range transit service and capital plan, Metro Connects was developed with

input from transportation stakeholders, the King County council and executive, local jurisdictions and public transit riders.

3. The strategic plan, the service guidelines and Metro Connects, as adopted, build on the King County Strategic Plan 2010-2014 and the King County Equity and Social Justice Strategic Plan 2016-2022.

4. The strategic plan, the service guidelines and Metro Connects are also informed by significant ongoing and emerging challenges the Metro transit department ("Metro") faces in continuing to work toward a regional, innovative, and integrated mobility network that is safe, equitable, and sustainable. These challenges include a growing and diversifying population, transportation challenges resulting from the displacement of low-income populations from existing urban locations to more affordable but potentially less transit-integrated and accessible geographic areas within the county, the worsening climate crisis, the need to integrate fixed-route transit with new mobility services and regional transportation partners, the COVID-19 pandemic and the need for new, sustainable funding sources.

5. The strategic plan, the service guidelines and Metro Connects are meant to be living documents setting the policy for and guiding the implementation of the Metro transit service and capital networks while responding to growth throughout the county.

6. In November 2018, the King County council passed Motion 15253, which required Metro to develop a regional mobility framework to ensure

that innovations in mobility put people first, use public space equitably and efficiently, and are coordinated with transit policies and regional funding strategies. Metro developed the required mobility framework and the executive transmitted it to the council in October 2019. In March 2020, through Motion 15618, the council adopted the Metro Mobility Framework Recommendations Summary and outlined a process to update the strategic plan, the service guidelines and Metro Connects.

7. In November 2018, the King County council passed Motion 15252, which expressed support for regional planning, coordination and funding efforts to address the implementation of Metro Connects and required Metro to prepare updated information to supplement Metro Connects to adjust for increased population growth, increasing regional congestion, inflation and construction costs, regional mobility needs, and innovations in transportation. In response, Metro presented updated information to supplement Metro Connects in February 2020. That updated information was finalized in 2021 and could be used to support future conversations about additional regional funding for transit.

8. The recommendations adopted as part of Metro's mobility framework have been used to develop updates to the strategic plan, the service guidelines and Metro Connects during 2020 and 2021. Those updates, which have been guided and informed by regional elected leaders, community members, including the mobility equity cabinet, local jurisdictions and agency partners, seek to meet regional mobility needs

while advancing equity, addressing the climate crisis and responding to innovations in transportation technology.

BE IT ORDAINED BY THE COUNCIL OF KING COUNTY:

SECTION 1. The King County Metro Strategic Plan for Public Transportation 2021-2031 is hereby adopted as provided in Attachment A to this ordinance.

SECTION 2. The King County Metro Service Guidelines are hereby adopted as provided in Attachment B to this ordinance.

SECTION 3. The Metro transit department's long-range transit service and capital plan, Metro Connects, is hereby adopted as provided in Attachment C to this ordinance.

SECTION 4. The following are each hereby repealed:

A. Ordinance 17143, Section 5, as amended;

B. Ordinance 17143, Section 6, as amended;

C. Ordinance 17143, Section 9;

D. Ordinance 18301, Section 1;

E. Ordinance 18301, Section 3;

F. Ordinance 18449, Section 1; and

G. Ordinance 18449, Section 4.

SECTION 5. The plans and documents adopted in sections 1, 2 and 3 of this ordinance apply to the passenger ferry service function carried out by the marine division of the Metro transit department as authorized in chapter 36.54 RCW and the King County Code. These plans and documents replace the King County Ferry District 2014-2018

Strategic Plan adopted by the board of the King County Ferry District through resolution FD 2014-05 which is hereby repealed.

SECTION 6. To provide information on the implementation of the plans attached to this ordinance and the performance of transit services, Metro transit department staff shall appear before the regional transit committee and the mobility and environment committee, or its successor, on request, and shall assist the executive in preparing the following performance reports:

A. A Metro Connects implementation report, which shall be transmitted by May 5, 2022, for acceptance by motion, and which shall include:

1. A description of the funding needed to implement Metro Connects, the gap between the funding that is available and the total amount needed and a description of potential funding sources that could be used to fill the funding gap; and

2. A description of the strategy the King County executive has implemented to consult with community members and regional leaders to develop a plan to implement Metro Connects, which should describe outreach and engagement with representatives from communities historically lacking in access to or underserved by transit, the Sound Cities Association, the city of Seattle, King County's regional transportation boards and any other organization necessary to ensure that a broad representation of regional leaders is consulted;

B. A RapidRide prioritization plan, which shall be transmitted by June 30, 2024, for acceptance by motion, and which shall include:

1. Corridor evaluations of RapidRide candidate corridors based on the five factors used in Metro Connects, which are equity, sustainability, service demand, capital and implementation;

2. Preplanning level studies of candidate corridors that consider route alignment, capital investment needs and cost estimates;

3. A description of stakeholder engagement with community members, affected jurisdictions and partner agencies; and

4. A list of the RapidRide candidate lines organized by tier, with a description of the priority level;

C. A system evaluation report, which shall be transmitted each year by October 31, for acceptance by motion, and which shall include:

1. For routes identified as RapidRide candidates, highlight and summarize the performance of the current equivalent routes based on what is reported in the System Evaluation and provide a status update on planned RapidRide lines;

2. The routes analyzed to determine the target service levels with a summary of resulting scores, including route-level equity metrics, and assigned service levels as determined by the service guidelines;

3. The results of the analysis including a list of transit routes and the estimated number of service hours necessary to meet each route's needs;

4. The performance of transit services by route and any changes in the service guidelines thresholds since the previous reporting period; and

5. A list of transit service changes made to routes since the last reporting period; and

D. A performance measurement dashboard, which shall be made available on the internet and on which the Metro transit department shall provide an oral report to the council at least annually, and which shall include:

1. Data and a description of each performance measure identified in the strategic plan;

2. Data and a description of how the Metro transit department's plans and policies are aligned with VISION 2050, the Puget Sound region's growth management policy;

3. A peer agency summary prepared annually for the thirty largest North American transit bus agencies, including Metro and twenty-nine peer agencies, using data contained in the National Transit Database; and

4. A summary of progress towards key performance measures associated with Metro Connects.

SECTION 7. The executive shall transmit to the council an ordinance to update the strategic plan, the service guidelines and Metro Connects within seven years of transmittal. In the interim, the executive may authorize amendments to the strategic plan,

the service guidelines and Metro Connects, that do not materially affect the policies and intent of these documents.

Ordinance 19367 was introduced on 8/17/2021 and passed by the Metropolitan King County Council on 12/7/2021, by the following vote:

Yes: 8 - Ms. Balducci, Mr. Dembowski, Mr. Dunn, Ms. Kohl-Welles, Mr. McDermott, Mr. Upthegrove, Mr. von Reichbauer and Mr. Zahilay
Excused: 1 - Ms. Lambert

KING COUNTY COUNCIL
KING COUNTY, WASHINGTON

DocuSigned by:
Claudia Balducci
7E1C273CE9994B6...
Claudia Balducci, Chair

ATTEST:

DocuSigned by:
Melani Pedroza
8DE1BB375AD3422...
Melani Pedroza, Clerk of the Council

APPROVED this _____ day of 12/15/2021, _____.

DocuSigned by:
Dow Constantine
4FBCAB8196AE4C6...
Dow Constantine, County Executive

**Attachments:** A. King County Metro Strategic Plan for Public Transportation 2021-2031, dated November 17, 2021, B. King County Metro Service Guidelines, dated November 17, 2021, C. King County Metro Long-Range Plan Metro Connects, dated November 17, 2021

**King County Metro** Policy Updates

# Technical Report E

July 2021

King County METRO
*Moving forward together*

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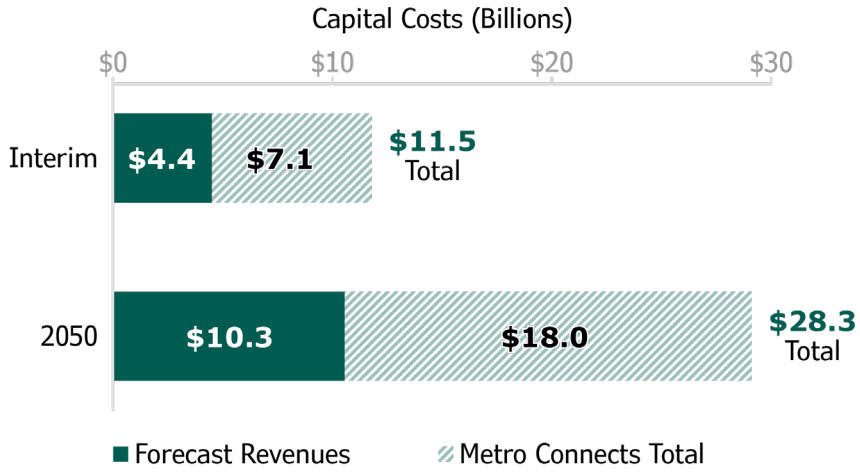
# Technical Report E
# Capital Costing Methodology

## INTRODUCTION

In conjunction with the expansion of transit service envisioned in Metro Connects, approximately $28.3 billion in capital investments would be needed by 2050 to support Metro's future network and meet the vision for high quality, fast, reliable, safe, equitable and sustainable service. The capital costs are reported in Year of Expenditure Dollars (YOE $). This takes into consideration the effect of inflation and creates a better benchmark when comparing actual costs to planned costs. In addition, the update includes costs and revenues needed to support existing service as well as grow service, rather than just the costs and revenues needed to support growth. The breakdown of costs by investment type is shown in Figure E-1.

**Figure E-1 Metro Connects Capital Costs and What Could be Funded with Forecasted Revenues**




Cost categories and sub-categories evaluated in Metro Connects include the following:

- **Speed and Reliability** (including Speed and Reliability, Major Regional Projects, and RapidRide)
- **Passenger Facilities** (including Transit Centers and Stops and Stations)
- **Supporting Infrastructure** (including Technology, Fleet, New Bases, Other Facilities, Layover, and State of Good Repair)
- **Electrification** (including layover charging and charging facilities for existing bus bases)

- **Marine** (Including marine vessels, facilities, and terminals to support new service)

**Figure E-2 Metro Connects Capital Costs by Major Category**

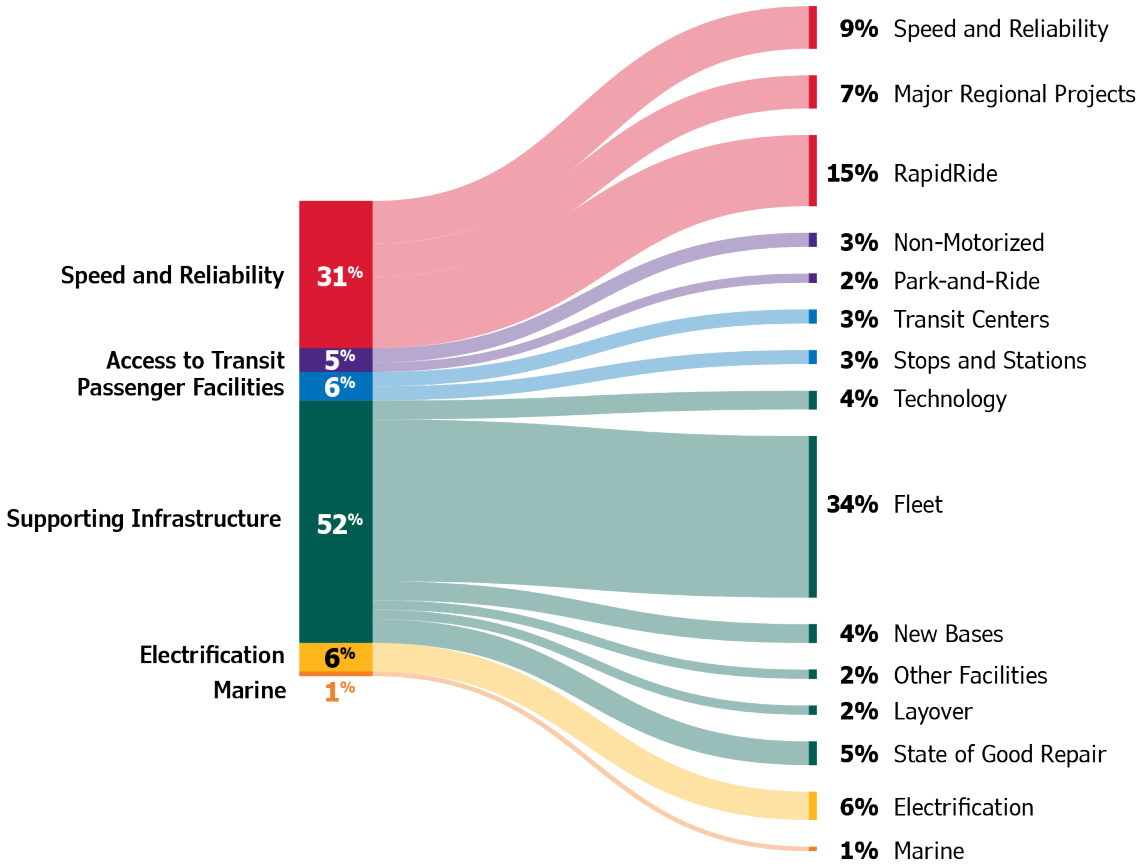


**Figure E-3 Metro Connects Original and Revised Cost Estimates, in millions and YOE dollars**

| Cost Category | Sub-Category | Original Metro Connects Costs (Incremental Growth) | Original Metro Connects Costs without Partnerships (Incremental Growth) | Revised Updated Metro Connects Costs (All costs) |
|---|---|---|---|---|
| Speed and Reliability | Speed and Reliability | $1,755 | $3,679 | $2,532 |
| | Major Regional Projects | $251 | $1,275 | $1,888 |
| | RapidRide | $1,779 | $3,648 | $4,214 |
| Access to Transit | Non-Motorized | $546 | $546 | $792 |
| | Park-and-Ride | $606 | $606 | $684 |
| Passenger Facilities | Transit Centers | $564 | $703 | $922 |
| | Stops and Stations | $990 | $1,034 | $774 |
| Supporting Infrastructure | Technology | $275 | $1,197 | $1,197 |
| | Fleet | $1,152 | $1,152 | $9,614 |
| | New Bases | $688 | $688 | $1,229 |
| | Other Facilities | $274 | $305 | $532 |
| | Layover | $407 | $407 | $557 |
| | State of Good Repair | $0 | $0 | $1,509 |
| Electrification | Electrification | $0 | $0 | $1,657 |
| Marine | Marine | $0 | $0 | $220 |
| **Total** | | | | **$28,321** |

Note: The original Metro Connects cost estimates reflected the costs of incremental growth. The updated costs reflect both the costs to maintain existing service levels and costs to grow and improve service. This table seeks to provide a basis of comparison by cost category from original to revised Metro Connects. Note that some categories in original Metro Connects as shown in this table (including speed and reliability, passenger facilities, and RapidRide) have overlapping costs and would be double counted if all costs were added together.

These costs have been updated since the adoption of the original Metro Connects in 2017, and include revisions associated with inflation, population growth, Sound Transit 3 (ST3), and various Metro planning efforts (such as RapidRide and speed and reliability projects), as well as expanding the timeline to 2050. The update also incorporates recommendations associated with the Mobility Framework (including equity and climate goals), clarifying expectations and opportunities for partnerships, and reflecting current direction and adding new elements as needed, adding new categories for Electrification and Marine, as well as incorporating costs for providing existing service, such as state of good repair and fleet replacement.

Increases from the original Metro Connects cost estimates are primarily due to the following:

- Inclusion of costs and revenues needed to support existing service (rather than just costs and revenues needed to support growth)
- The role of compounding inflation by extending the horizon from 2040 to 2050
- Removal of assumptions related to partnerships
- New costs relating to electrification of the fleet
- Integrating the Marine Division within Metro
- Additional speed and reliability investments due to growing regional congestion

The type and size of investments described here along with associated costs reflect the total regional investment needed to support the vision for the Metro service network and are intended to provide jurisdictions and stakeholders a sense of scale for the program needed to optimize transit service. The revised Metro Connects methodology modifies assumptions related to partnerships. Rather than assuming broad partnership contributions to estimate Metro-specific costs, this analysis now reports total project costs to understand the full magnitude represented by Metro Connects.

Costs should be viewed as order of magnitude estimates. The precise timeline for investment will be affected by local development, changes to the street network, and the buildout of Sound Transit's (ST) regional transit network. Attaining the vision requires partnerships and investment beyond Metro's existing funding sources and Metro will continue to update financial projections, support regional solutions, and develop detailed planning. Metro Connects will be regularly updated to reflect changes over time, including detailing service expansions and capital investments as more information is known.

When adjusted to reflect 2019 dollars for both the original Metro Connects and the updated Metro Connects, the variance is $3.1 billion as shown in Figure E-4. Most of that variance is driven by an additional $1.9 billion in fleet costs due to the higher cost of a battery-electric fleet compared to a hybrid fleet, and replacement costs for an additional seven years. It also includes $0.9 billion in additional costs associated with electrification.

**Figure E-4 Metro Connects Original and Revised Cost Estimates, in Billions and 2019 dollars**

| Full Metro Connects Service Hours (Including Maintaining Existing Service Levels) | Original Metro Connects (2040) | Updated Metro Connects (2050) | Variance |
|---|---|---|---|
| **Total Metro Connects Network** | **6,130,000** | **7,250,000** | **1,120,000** |
| Total Funded | 4,771,000 | 3,673,000 | (1,098,000) |
| Total Unfunded | 1,359,000 | 3,577,000 | 2,218,000 |

| Full Metro Connects Capital Investment (2019$, in Billions) | Original Metro Connects (2040) | Updated Metro Connects (2050)* | Variance |
|---|---|---|---|
| Fleet | $4.2 | $6.2 | $1.9 |
| Non-Fleet | $9.7 | $10.8 | $1.1 |
| **Total Metro Connects Network (with Existing Service)** | **$13.9** | **$17.0** | **$3.1** |
| Total Funded | $7.5 | $6.6 | ($0.9) |
| Total Unfunded | $6.4 | $10.4 | $4.0 |

**2050 costs are shown in 2019 dollars, and not YOE, to help provide a comparison to the original Metro Connects. In Year of Expendature dollars total capital costs are $28.3B*

# Costing Approach

The cost estimates are rough order of magnitude amounts. Because Metro Connects is a high-level vision that does not yet have all potential projects identified, Metro has included resources for unidentified investments within each category (roughly 10 percent of the estimated costs). As Metro moves towards attaining the vision, Metro will develop specific project lists and refine cost estimates further.

Estimates include elements such as planning, design, and construction costs; labor; soft costs; and other related project costs as well as project contingency. The planning, design, and construction costs were developed using historical total project costs, and either a bid-based methodology, or industry standards methodology.

Estimates and methodology included the following steps:

- **Gathering input from Subject Matter Experts (SMEs).** Prior to updating costs and quantities, a series of SME meetings were conducted to confirm if the methodology should remain constant or change based on 2019 knowledge.
- **Review of all previous planning-level cost estimates** including planning, design, and construction costs; soft costs and other related project costs; and project contingency. The planning, design, and construction costs were developed using historical total project costs, and either a bid-based methodology, or industry standards methodology.
- **Review of construction cost index factors** (known as construction inflation) from updated ST cost index tables were used to refine costs. This includes the Consumer Price Index, Construction Cost Index, and Right-of-Way Index.

- **Development of YOE estimates.** The YOE estimates were developed using a combination of project-related schedules, such as RapidRide and base expansions, and more programmatic cost dispersion (similar to the approach used in the original Metro Connects costs). Project-related expenditures were spread out over time based on typical project cost expenditure curves.

# Baseline Scenario

A Baseline Scenario was developed to estimate what Metro is anticipated to be able to afford with existing revenue sources and forecasts. This scenario is based on forecast revenues from Metro's 2021-2022 Budget financial model through 2028, with similar assumptions extended through 2050. Estimates are based on a "slice in time" of known revenues and are subject to change.

The financial model assumes that service hours in 2050 are approximately 5 percent below service hours from Fall 2019, for a total of 3.67 million hours. Remaining revenues are used to estimate the level of capital investment that can be supported in the Baseline Model, for a total of $10.3 billion available by 2050. Additional assumptions for Capital Investment are outlined in Figure E-5 below. This level of investment is adequate to support the costs of maintaining existing service levels and speed and reliability investment to achieve service speeds assumed in the model, with some funding available for discretionary investments. Aside from assumptions for fleet, and speed and reliability, no specific decision or allocation to other discretionary investment categories were made in the Baseline model.

The Baseline scenario forecasts ridership for a 2050 horizon year using planned 2050 service levels. This scenario also includes planned route changes to align with future Sound Transit openings and investments in speed and reliability to support this network.

The 2019 Metro service network was evaluated to understand how to achieve an approximate 5 percent reduction in service hours based on expected truncations with future light rail investments. The transit network used to represent 2050 included the following assumptions:

- All ST2 and ST3 projects including:
  - Link light rail extensions to Tacoma, Everett, West Seattle, Ballard, Redmond, and Issaquah
  - BRT implementations on I-405 and SR-522
  - Planned park-and-ride investments documented in ST2 and ST3
- The existing Metro transit network (pre-COVID) provided the baseline bus network that was modified with assumed integrations with the planned ST transit investments by 2042. These assumptions included the following:
  - King County Metro (KCM) routes were truncated and became feeder routes to the Northgate, 130th, 145th, and 185th Stations
  - All KCM routes that travel on I-90 into Seattle were truncated at Mercer Island Park-and-Ride
  - Most KCM routes traveling from West Seattle or Ballard were truncated at light rail stations
  - Half of all KCM routes traveling on I-5 along the Tacoma Dome Link Extension were assumed to be truncated at the light rail stations along the corridor

- Future year transit service for Community Transit, Everett Transit, and Pierce Transit used previously assumed truncations outside of King County

The most recent 2042 ST Incremental Ridership Model – Base[1] provided the ridership forecasts and the expected change in fleet needs in 2050 as compared to the existing year (2019). The base case financial model assumed an approximate $250 million investment in speed and reliability improvements. This investment was incorporated into the ST Ridership model by increasing the average speeds for a representative set of routes.[2]

The model output generated an estimated 2040 ridership and peak vehicle forecast for the Baseline transit network as the model assumes the 2040 LUV.2 population and employment land use from PSRC. To determine a 2050 ridership value, the 2040 model ridership was then increased at a 1.0 percent annual growth rate, consistent with the population and employment growth planned between 2040 and 2050.[3] For purposes of integrating the ridership and fleet outputs from the ridership model with the financial model, the percent change between base year and horizon year ridership models were applied to the actual observed 2019 ridership and fleet totals. The calculations of the ridership forecasts are shown in Figure E-5 and Figure E-6 and the fleet calculations are in Figure E-6.

The ridership forecasts include a low and high-range estimate, reflecting some of the uncertainty with land use growth expectations, service hour changes, and ridership elasticities.

**Figure E-5 Baseline Scenario Ridership Forecasts**

| Financial Model Assumptions (Fixed-Route Only) | | | |
|---|---|---|---|
| | 2019 | 2050 | Percent Change |
| Annual Ridership | 121,411,000 | 118,470,195 | -2% |
| Annual Service Hours | 3,855,477 | 3,672,500 | -5% |

| ST Ridership Model Outputs | | | |
|---|---|---|---|
| | Low Estimate | High Estimate | |
| Percent change in Average Weekday Boardings (Existing to 2050) | -3% | 2% | |
| Forecast 2050 Ridership | 117,750,000 | 123,850,000 | |

Source: Fehr & Peers and King County Metro, 2020

The fleet needs in the financial model show a decrease from the Fall 2019 peak sign-out of 1,231 vehicles to a low of 953 peak vehicle sign-out in Fall 2026, in part due to the changing financial picture as a result of the Covid-19 pandemic. The calculations assume a linear growth rate between the Fall 2026 fleet number (953) and the 2050 forecast number (1,183). In practice, the fleet change would be less distributed as it would track with service hour changes more specifically.

[1] September 2019 model version

[2] A $250 million investment roughly translates into a 15% (peak) and 10% (off-peak) speed improvement for all frequent routes in the existing network based on the total route-miles and the types of projects and resulting travel times savings that could be funded with that amount.

[3] Based on a review of the VISION 2050 plan compared to the VISION 2040 plan from PSRC

Financial assumptions are based on the FY 21/22 budget and 10-year financial plan, with similar assumptions used to forecast available revenues out to 2050. These are outlined in Figure E-7.

**Figure E-6 Baseline Scenario Fleet Forecasts**

| Financial Model Assumptions | | |
|---|---|---|
| | Fall 2019 | Fall 2026 |
| Peak Vehicle Sign-Out | 1,231 | 953 |
| Total KCM Fleet (No ST) | 1,552 | 1,163 |
| Spare Ratio | 26% | 20% |

| ST Ridership Model Outputs | | |
|---|---|---|
| Percent Change in Peak Vehicle Need (Existing to 2050) | -4% | 2% |
| Forecast Total KCM Fleet (No ST) | 1,183 | 123,850,000 |

| Fleet Forecasts for the Financial Model | | | | | |
|---|---|---|---|---|---|
| Year | Peak Sign-Out Vehicles | Total KCM Fleet (No ST) with Assumed 20% Spare Ratio | Year | Peak Sign-Out Vehicles | Total KCM Fleet (No ST) with Assumed 20% Spare Ratio |
| 2026 | 953 | 1,144 | 2039 | 1,073 | 1,287 |
| 2027 | 962 | 1,155 | 2040 | 1,082 | 1,298 |
| 2028 | 971 | 1,166 | 2041 | 1,091 | 1,309 |
| 2029 | 981 | 1,177 | 2042 | 1,100 | 1,321 |
| 2030 | 990 | 1,188 | 2043 | 1,110 | 1,332 |
| 2031 | 999 | 1,199 | 2044 | 1,119 | 1,343 |
| 2032 | 1,008 | 1,210 | 2045 | 1,128 | 1,354 |
| 2033 | 1,017 | 1,221 | 2046 | 1,137 | 1,365 |
| 2034 | 1,027 | 1,232 | 2047 | 1,146 | 1,376 |
| 2035 | 1,036 | 1,243 | 2048 | 1,156 | 1,387 |
| 2036 | 1,045 | 1,254 | 2049 | 1,165 | 1,398 |
| 2037 | 1,054 | 1,265 | 2050 | 1,183 | 1,420 |
| 2038 | 1,064 | 1,276 | | | |

Source: Fehr & Peers and King County Metro, 2020

**Figure E-7 Baseline Scenario Key Financial Model Assumptions**

| Key Financial Model Assumptions | | |
|---|---|---|
| Input/Category | Assumption | Additional Notes |

| Key Financial Model Assumptions | | |
|---|---|---|
| **Sales Tax Revenue** | August 2020 OEFA[4] projection for existing 0.9% sales tax to Metro | |
| **Property Tax Revenue** | August 2020 OEFA projection for existing property tax allocations to Metro & Marine | |
| **Fares and Farebox Recovery** | $0.25 fare increases for adult fares in 2023, 2025, and then every 3 years after that. | Results in farebox recovery ratio of between 19% and 23% through 2050, lower than the current 25% floor. |
| **Income Based Fares** | Assumed that Metro continues to subsidize and that expense of both subsidy and administration grows with inflation. | For revenue from program, assumed that it stays flat at 2028 levels. |
| **Grant Revenue** | After 2028, assumed conservative averages for operating and capital grants, growing with inflation. | |
| **City of Seattle STBD Service** | Assumed no service as of 2021, and therefore no revenue from City of Seattle. | Although the Seattle Transportation Benefit District (STBD) has now been renewed, this provides a cleaner baseline for comparison to the original Metro Connects. |
| **Wage Growth** | Used Office of Performance, Strategy and Budget increase assumptions through 2028 and assumed 3% YOY after that. | |
| **General Inflation** | Used August OEFA projections for Seattle Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W) through 2029, and then assumed 3% YOY after that. | Applied to most non-personnel expense categories, including capital projects. |
| **Non-Fixed Route Service** | Assumed flat service levels for Access, VanPool, DART, and other non-fixed route services. | Only inflation is driving expense increases. |
| **Debt Funding** | Assumed debt funding for South Annex Base ($340 million) and Electrification assumptions ($97 million) through 2028. | |
| **Capital Improvement Program (CIP) – Infrastructure & Technology** | Adopted 10-year CIP through 2028 with details by sub portfolio. Then, general assumption of $65 million/year in 2029 growing with inflation after that. | $65 million/year is generally low compared to the avg annual expenditure assumed in 10-year CIP. Would probably be considered adequate for essential state of good repair and other key investments. |
| **Capital Improvement Program – Bus Fleet** | Funds fleet purchases and replacements through 2050. | Generally assumes 12-year replacement cycle, which is minimum for FTA funding. |
| **Fund Reserves** | All reserve requirements met through 2050, including Revenue Fleet Replacement Reserve. | Results in ~$1 billion in reserve funds by 2050. |

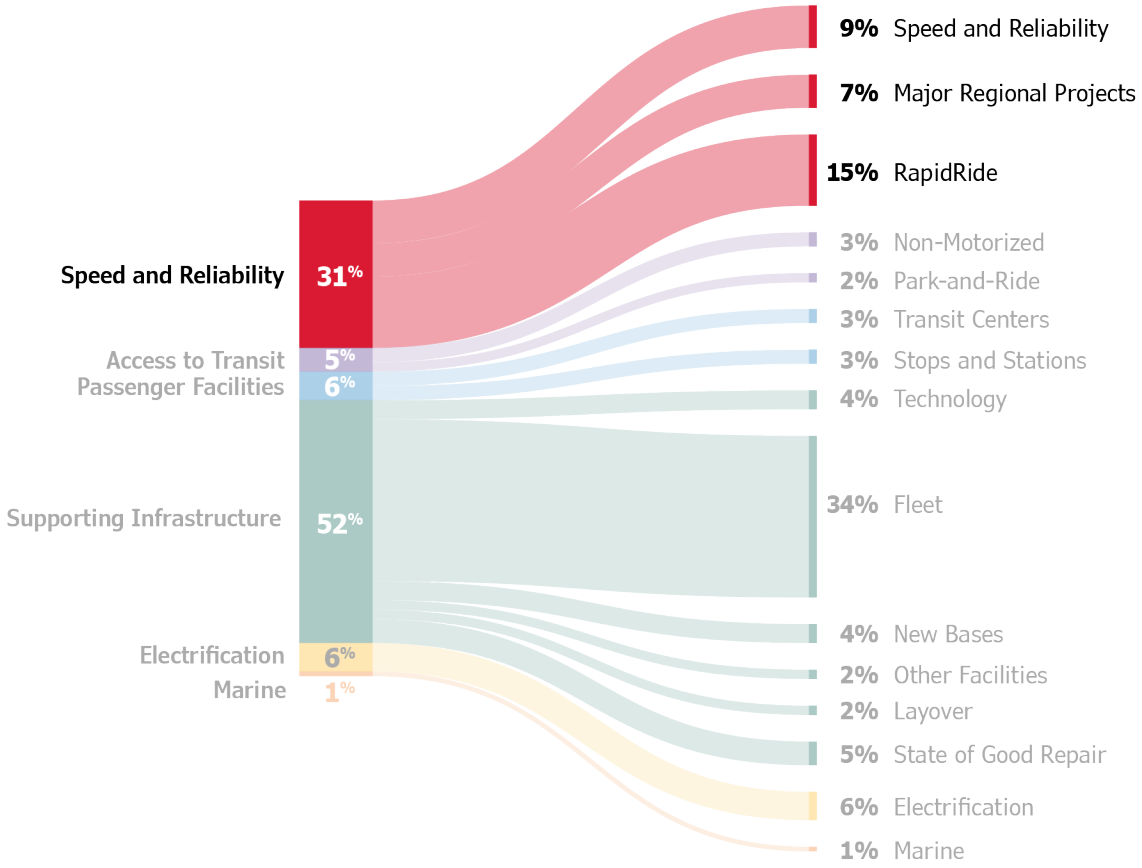
# SPEED AND RELIABILITY

Investments to improve speed and reliability are critical to support fast, reliable, and convenient service. Overall, the total need and costs identified by Metro Connects for speed and reliability improvements are $8.6 B, separated into three categories for cost estimation

[4] Office of Economic and Financial Analysis

purposes: Speed and Reliability, Major Regional Projects, and RapidRide. Together, these speed and reliability investments make up 31 percent of the capital investment identified to support the Metro Connects vision.

**Figure E-8 Speed and Reliability Portion of Capital Costs**




Congestion levels in King County are anticipated to increase more over the next 30 years (5 percent per decade) than originally assumed in Metro Connects (3.75 percent per decade). This increase in congestion will slow bus travel times and require an increase in service hours and fleet to maintain service frequencies, all without factoring in any potential new ridership. Increased investment in speed and reliability is identified in the updated Metro Connects so that service quality is maintained, and speeds do not degrade compared to the original vision. This will also result in significant long-term service hour savings for Metro. Metro goals for speed and reliability are as follows:

- Improve efficiency and predictability on corridors that experience high levels of congestion through speed and reliability improvements. Aim to achieve 10 to 15 percent time travel savings by improving 2 to 3 corridors each biennium.
- Improve transit speed and reliability at congested "hot spot" locations countywide. Aim to complete 10 to 15 spot improvements per year to reduce delays by 3 to 10 percent.

# Speed and Reliability Tools

Metro has a long history of making appropriate speed and reliability capital investments to improve bus operations along corridors. These transit priority tools foster ridership growth,

improve riders' experience with Metro's service, and defers the need for additional operating hours to maintain service if traffic congestion increases. Key speed and reliability tools, along with the benefit that can be expected from the different improvements, are shown in Figure E-9. These tools are used on both RapidRide and non-RapidRide corridors. The full range of tools, their cost and feasibility can be found in Metro's Speed and Reliability Guidelines and Strategies document.

**Figure E-9 Speed and Reliability Tools**

| Treatment | Description | Potential Benefit |
|---|---|---|
| Bus Queue Jump Signal | Buses are given a short lane at signalized intersections, often shared with right-turning vehicles, to bypass queues of general-purpose traffic. Buses get an exclusive green light before general-purpose traffic so that they travel through the intersection in advance of other traffic. | Example: Queue jump signal at 98th Ave NE & Forbes Creek Dr (Kirkland) reduced intersection delay by 24%; other queue jumps have recorded savings in the range of 20 seconds per trip. TCRP* reports reductions in travel time of 5% to 15%.[5] |
| Bus-Only/Business Access Transit (BAT) lanes | By widening the roadway or repurposing an existing lane (on a multi-lane roadway), buses are given a lane exclusive to transit use. BAT lanes are shared between buses and right-turning vehicles to access local business and side streets. They may be used during peak periods only or all day. | Example: BAT lanes along with new signal timings on Aurora Avenue N in Seattle resulted in a 14% to 19% reduction in median travel times.[6] |
| Transit Signal Priority (TSP) | Through active communication with traffic management/control systems, buses are given early or extended green times at intersections to reduce delay and significantly improve travel times. | Example 1: The sum of average intersection delays for buses were reduced by 1 to 1.6 minutes after TSP was implemented on the RapidRide E Line corridor.[7]<br>Example 2: 6% fewer buses on the C and D lines missed their headway after late-ness based TSP strategies were implemented. |
| Bus Bulbs or Curb Extensions | Bus bulbs or curb extensions extend the existing sidewalk into the curb lane (typically a parking lane) to allow buses to serve a stop within the travel lane. This treatment avoids the need for the bus to exit the travel lane and then attempt to re-enter after serving the stop, which can be a significant source of delay for buses on high-volume streets. | TCRP Report 165 reports that implementation of bus bulbs along a transit corridor in San Francisco led to a 7% increase in bus speeds.[8] Other ancillary benefits include shorter intersection crossing distances for pedestrians and an increase in overall sidewalk width. |

[5] "Transit Cooperative Research Program Report 165: Transit Capacity and Quality of Service Manual Transit," 3rd Edition, Transportation Research Board, 2013.

[6] "RapidRide E Line, Before and After Travel Time Studies", King County Metro, 2014.

[7] Ibid.

[8] "Transit Cooperative Research Program Report 165: Transit Capacity and Quality of Service Manual Transit," 3rd Edition, Transportation Research Board, 2013.

| Treatment | Description | Potential Benefit |
|---|---|---|
| Turn Restrictions at Intersections | Allowing buses to make turning movements that are prohibited for other vehicles can allow for more direct routing that can save travel time or provide bus service closer to the passengers' origins and destinations. Prohibiting turning movements can free up time or roadway space for both buses and general-purpose traffic by prohibiting turning movements that cause high levels of delay. | Improves access to bus lanes and bus stops. Resulting transit-only turning movements also set up the possibility for queue jumps.<br>Example: A proposed left turn restriction at Broadway & E Union St in Seattle is projected to save 40 seconds per trip during the PM peak. |
| On-Street Parking Management | As an alternative to bus bulbs, parking may be managed along bus routes to mitigate delay when buses must re-enter traffic. Parking may be restricted for several hundred feet after a bus zone all day or during peak periods. This creates an extended travel lane for buses, allowing them to gradually merge back into traffic. | Improvements to travel times are similar to bus bulbs and curb extensions, and bus operations are made possible or improved at tight turns.<br>Example: On-street parking restrictions on Aurora Ave N in Seattle between N 83rd St and N 85th St intersections in both directions. |
| Optimize Bus Stop Spacing | Closely spaced bus stops with low ridership may be removed or consolidated into new stops. Reducing the number of stops along a corridor improves speeds in two ways. First, reducing the number of stops reduces the time spent decelerating, accelerating, and serving a stop.<br>Second, with fewer bus stops, buses are better able to take advantage of traffic signal progression, resulting in fewer stops for red lights. | Studies estimate a time savings of 10 seconds per stop removed. A study by TriMet showed a 5.7% reduction in travel time when the distance between stops is increased by an average of 6%.[9] |
| Traffic Signal Improvements | Signal timing adjustments – single signal or corridor wide optimization, signal phasing - adding left turn or right turn arrow. | Example: On the 168/180 corridor in South King County, intersection delay was reduced by 15% after implementing traffic signal improvements. |

*Transportation Cooperative Research Program

## Level of Investments

Metro developed a tiered series of investments for speed and reliability improvements. The level of investment for speed and reliability improvements is defined by corridor as High, Medium, Low, and No Investment. These are the classifications used in the Metro Connects document. For cost estimation purposes, the High category was further refined by the amount of right-of-way that would be needed to provide exclusive transit lanes on portions of a corridor.

**The High levels of investment** focus heavily on:

- Providing dedicated right-of-way for transit, assuming exclusive business access transit (BAT) or bus only lanes with additional right-of-way
- Roadway widening
- Intersection geometry modification

[9] "Transportation Research Record: Journal of the Transportation Research Board, No. 1971", Transportation Research Board of the National Academies, 2006.

- New ITS deployment (transit signal priority, real-time signs, all-door and off-board fare collection, active headway management)

**The Medium level of investment** focuses on:

- Existing lane conversion from general purpose to BAT lanes
- Transit signal priority (TSP)
- Bus queue jump signals
- Signal phasing and timing modifications
- On-street parking management
- Implementing bus bulbs

**The Low level of investment** focuses on:

- Spot improvements at key locations for signal timing and phasing modifications
- Traffic operational and lane configuration or channelization changes

Improvements to existing RapidRide corridors were also assumed, including investments at the High, Medium, and Low levels. Figure E-10 shows the percentage of lane miles for each service type that would receive different levels of capital investment.

All these investments would be made in close coordination with local jurisdictional partners. In particular, Metro Connects relies heavily on local jurisdiction concurrence and support to make necessary right-of-way decisions and acquisitions, although Metro Connects does propose some resources to support critical right-of-way acquisition.

**Figure E-10 Levels of Speed and Reliability Investment by Service Type**

| Service | High Investment | Medium Investment | Low Investment | None / No Investment | Total |
|---|---|---|---|---|---|
| Local | 0 | 0 | 40% | 60% | 100% |
| Express | 0 | 25% | 50% | 25% | 100% |
| Frequent | 10% | 50% | 30% | 10% | 100% |

Metro calculated the need for future speed and reliability improvements based upon the Metro Connects 2050 service network using the following methodology:

- Calculated total centerline miles for each service category
- Prepared per mile costs for various categories of investment (High Medium, Low)
- Developed a proportionate distribution for level of investment
- Applied costs and proportions to mileage

It is important to note that for this effort Metro did not evaluate individual corridors for a specific level of investment, but instead used proportional investment levels across the corridor types to determine investment. Because local jurisdictions have ownership and/or management of the right-of-way, coordination will be needed to ensure that the speed and reliability improvements implemented on identified corridors are consistent with their transportation infrastructure plans. It is anticipated that Metro will jointly develop conceptual improvements with the local jurisdiction and then determine the level of funding for individual corridors.

## Cost Assumptions

This portion of the program captures a level of investment to promote transit speed and reliability along frequent, express, and local corridors. These investments were determined on a per centerline mile basis and in accordance with the identified level of investment per corridor: High, Medium, or Low. When calculating costs, only the highest level of investment was assumed where there were overlapping corridors. For example, if a roadway included both a RapidRide and Express route, then the highest level of investment (associated with the RapidRide line) was used to estimate the cost. In this example, the Medium level of investment identified for the Express route was not included in estimated the cost as it would result in double-counting the corridor investment.

Project costs for the High, Medium, and Low investment corridors were developed based on Metro's historical bid information. The High investment corridor was further defined by the degree to which right-of-way (ROW) was assumed to be acquired. For frequent and new RapidRide corridors, the associated civil work and ROW costs were broken out and defined independently from the speed and reliability investment.

Typical elements for High, Medium, and Low levels of investment are shown in Figure E-11.

**Figure E-11 Typical Elements for Speed and Reliability Corridor Investments**

| Investment Level | Features |
|---|---|
| High Investment – Significant additional amount of right-of-way necessary | ▪ Exclusive right-of-way (up to 24 feet of widening)*<br>▪ New traffic signals with communication infrastructure<br>▪ Site preparation/civil work |
| High Investment – Limited additional amount of right-of-way necessary | Same as above, except:<br>▪ Exclusive right-of-way (up to 12 feet of widening)* |
| High Investment – No right-of-way necessary | ▪ No widening required (use existing right-of-way)<br>▪ Up to 75 percent roadway re-channelization<br>▪ Up to 6 transit signal priority per mile (both directions)<br>▪ Up to 2 queue jumps per mile<br>▪ Up to 6 signal modifications and signal synchronization per mile<br>▪ Up to 1 bus bulb per mile |
| Medium Investment | ▪ No widening required (use existing curb-to-curb)<br>▪ Up to 25 percent roadway re-channelization<br>▪ Up to 3 transit signal priority per mile (both directions)<br>▪ Up to 1 queue jump per mile<br>▪ Up to 2 signal modifications per mile<br>▪ Up to 6 signal synchronizations per mile<br>▪ Up to 0.5 bus bulb per mile |
| Low Investment | ▪ No widening required (use existing curb-to-curb)<br>▪ Up to 10 percent roadway re-channelization<br>▪ Up to 4 signal synchronizations per mile<br>▪ Up to 1 queue jump per mile<br>▪ Up to 2 signal modifications per mile |

* Widening improvements may include rebuild sidewalks, illumination, stormwater, and other treatments, depending on the context

# Major Regional Projects

In addition to corridor-level speed and reliability improvements, investments to improve transit operations as part of large major regional projects provide a benefit to transit service, and in some cases, a benefit to general purpose traffic. These investments would alleviate existing congestion problems and benefit transit by providing cross-city connections, address overcapacity roadways and bottlenecks, and/or improve access to the regional network.

For purposes of this plan, costs to improve transit operations as part of planned and example major regional projects were estimated to understand the total level of investment needed. Metro Connects envisions Metro playing a larger role in facilitating the delivery of major regional projects to help ensure efficient and reliable transit service for the region. Investments for specific projects would be identified as the planning and implementation for relevant major regional projects progresses and Metro moves towards attaining the Metro Connects vision.

# Speed and Reliability Cost Estimates

Figure E-12 and Figure E-13 show the estimated costs for speed and reliability improvements for corridors and major regional projects included in Metro Connects.

**Figure E-12 Speed and Reliability Corridor Improvements Estimated Costs**

| Speed and Reliability Corridor Improvements | Unit | Total Units | Estimated Cost (in millions YOE $) |
|---|---|---|---|
| **Frequent *** | Per mile | 370 | $1,708 |
| **Express*** | Per mile | 165 | $280 |
| **Local*** | Per mile | 385 | $314 |
| **Unidentified Investments** | --- | --- | $230 |
| | | **Total** | **$2,532** |

*Metro assumes these investments would be developed in partnership with local jurisdictions, state agencies, and/or other transit providers. In particular, Metro would rely heavily on local jurisdictions to make right-of-way decisions and acquisitions.

**Figure E-13 Major Regional Projects Estimated Costs**

| Major Regional Project Investments | Unit | Total Units | Estimated Cost (in millions YOE $) |
|---|---|---|---|
| **Major Regional Projects** | --- | --- | $1,716 |
| **Unidentified Investments** | --- | --- | $172 |
| | | **Total** | **$1,888** |

# RAPIDRIDE

RapidRide plays a critical role in attracting customers to transit, providing fast and reliable high-quality service to achieve the Metro Connects vision. Overall, Metro Connects identifies four specific RapidRide lines and 11 additional candidate lines for future implementation, for a total estimated cost of $4.2 B. In total, the 2050 network is assumed to have 19 to 23 RapidRide lines.

For the Metro Connects update, RapidRide costs for speed and reliability and passenger facilities were combined into a new stand-alone category to reflect the total costs of RapidRide. This change aligns with how RapidRide is planned and implemented, with both speed and reliability and passenger facility elements included in specific RapidRide projects. This change also helps clarify the total costs for RapidRide expansion and supports the use of existing plans and projects to estimate total combined costs for RapidRide.

## RapidRide Cost Assumptions

To estimate total costs, costs from Metro's 2019-2028 Capital Improvement Program were used for currently planned and funded lines. Since refined RapidRide corridor costs also encompass other capital investment categories (such as passenger facilities, access to transit, and technology), the new category definition helps maintain all applicable RapidRide costs in a single investment category. To estimate a cost for candidate RapidRide routes, the update developed a cost per mile for RapidRide lines built in both urban and suburban areas. The estimate then assumed a split between the urban and suburban categories. This split is based on both previous RapidRide lines and an estimate for the future split between urban and suburban lines of candidate corridors.

There are three classes of bus stops for RapidRide: Small Station, Medium Station, and Large Station. All RapidRide bus stops have consistent design and branding that identifies them as RapidRide stops. Typical RapidRide stop and shelter elements are provided in Figure E-14.

The need for future RapidRide bus stops will be based upon the Metro Connects 2050 service network.

**Figure E-14 RapidRide Stop and Shelter Typical Elements**

| Project Type | Typical Elements |
|---|---|
| RapidRide Small Station | Bench<br>RapidRide Branded Pylon / Station Marker<br>Pedestrian lighting (optional)<br>Power supply (optional) |
| RapidRide Medium Station | Shelter and foundation<br>Bench<br>RapidRide Branded Tech Pylon / Station Marker<br>Real-time bus information<br>Litter receptacle<br>Pedestrian lighting (optional)<br>Power supply |

| Project Type | Typical Elements |
|---|---|
| RapidRide Large Station | Shelter and foundation (potentially multiple)<br>Bench (potentially multiple)<br>RapidRide Branded Tech Pylon / Station Marker<br>Real-time bus information<br>Litter receptacle<br>Bicycle rack (optional)<br>Off-board fare payment (for very high ridership locations)<br>Pedestrian lighting<br>Power supply |

In addition to the station amenities, RapidRide has the potential to include all applicable speed and reliability transit treatments to provide an enhanced RapidRide travel time (compared to existing services). These improvements range significantly from RapidRide line to line. Costing data was generated from the existing and currently planned RapidRide project cost data. Right-of-way costs are split between passenger facilities and speed and reliability costs.

# RapidRide Cost Estimates

Figure E-15 shows the estimated costs for RapidRide improvements included in the Metro Connects update for the interim network and the future 2050 network.

**Figure E-15 Updated Metro Connects RapidRide Estimated Costs, in Millions and YOE Dollars**

| RapidRide Improvement | Total Costs (In Millions YOE $) |
|---|---|
| MADISON RR (G)* | $11 |
| DELRIDGE BURIEN RR (H)* | $67 |
| AUBURN TC RENTON TC RR (I) | $120 |
| RAPIDRIDE EXPANSION / J Line* | $3 |
| RAINIER MT BAKER RR (R)** | $4 |
| C AND D RR LINE ENHANCEMENT | $25 |
| TDC MC RR EXPANSION / Programmatic costs | $29 |
| Interim RR Network<br>(3-5 new lines and upgrades to existing lines) | $1,154 |
| 2050 RR Network<br>(6-9 new lines and upgrades to existing lines) | $2,418 |
| Unknown Projects Contingency | $383 |
| **Total** | **$4,214** |

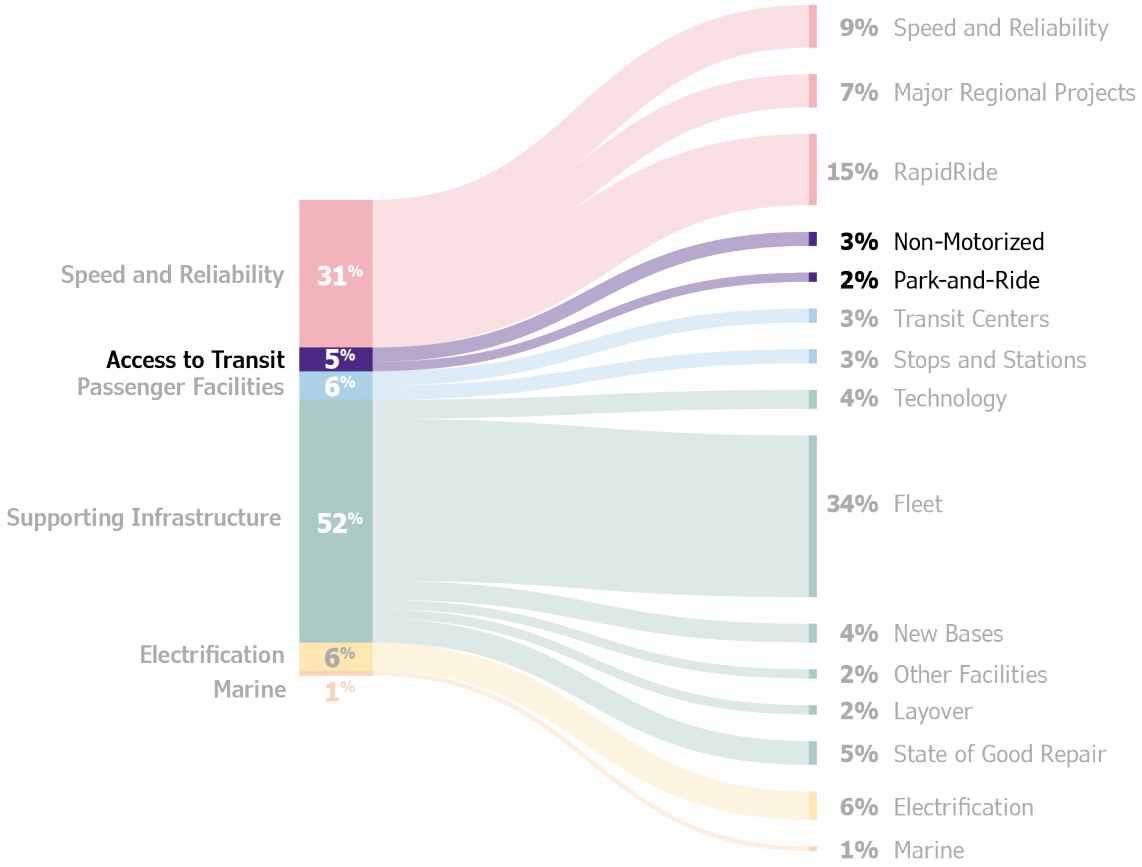
* Costs shown are the remaining Metro costs to align with Metro's Capital Improvement Program, and do not reflect total costs. Total project costs are $140 million for the G Line, $95 million for the H Line, and $85 million for the J Line.
**The costs shown for the Rainier Mt Baker RR (R) are existing costs/expenses for remaining work reflected in the adopted 2021/22 budget, and do not represent full funding needed to complete the line. Estimated costs to complete future candidate RapidRide lines, including the R-LINE if selected, are reflected in the Interim RR Network and 2050 RR Network categories.

# ACCESS TO TRANSIT

Pedestrian, bicycle, and auto access to transit are all important to support the community's ability to connect to a robust and diverse transit network. The Metro Connects vision includes investments that promote access to transit by all modes, with an estimated cost of approximately $1.5 B.

As shown in Figure E-16, Metro Connects proposes significant investments in both non-motorized and auto access to transit. Access to transit investments make up 5 percent of the Metro Connects capital investment.

**Figure E-16 Access to Transit Portion of Capital Costs**



# Bicycle and Pedestrian Improvements

In the Metro Connects 2050 network, 80 percent of all King County residents would be within a half-mile of a frequent transit route. With more people within walking or bicycling distance to transit in the future, Metro would work with local jurisdictions to fund and implement non-motorized transit access improvements that provide customers with safe and easy to use pathways to transit.

The total need, countywide, to complete the non-motorized (sidewalk and bicycling) network far exceeds the resources of any single organization or jurisdiction. In Metro's Non-Motorized Connectivity Study[10], non-motorized access improvement projects that were within one mile of approximately 500 major transit bus stops were identified by local jurisdictions. This study determined that an investment of about $1.8 billion would be needed to complete the non-motorized access projects associated with all 500 of the major stops (equaling about $3.2 million per stop) and that $450 million would be needed to improve access to transit at the top 25 percent of the bus stops with the worst connectivity. This analysis provides a sense of scale for the need associated with non-motorized improvements.

Considering that there are more than 8,000 transit stops across the county, comprehensive non-motorized access would far outstrip Metro's available resources. Metro Connects proposes to work with jurisdictions to partially fund such improvements.

Metro Connects identifies potential funding for non-motorized investment by leveraging funding from local jurisdictions and grants. Additional non-motorized investments that support the service network envisioned in Metro Connects could be developed by partner agencies and/or local jurisdictions, either independently or in partnership with Metro. At this time, locations have not been identified or prioritized.

## Bicycle and Pedestrian Costing Assumptions

The type and number of facilities described in the plan represent a sample of possible non-motorized improvements that could be constructed. As Metro moves toward implementation, additional facilities or improvements may be identified.

Project costs were estimated for quantities of bicycle parking at major transit hubs, sidewalks, and bicycle lanes and/or cycle tracks by using Metro historical costs, and considering recent engineer's estimates for constructed projects. The engineer's estimates represent the current industry standard for typical unit bid-based costs for known elements such as cement concrete sidewalk, asphalt, concrete curb and gutter, ADA ramp, demolition, and pavement restoration. Typical elements for non-motorized improvements are shown in Figure E-17.

[10] "2014. Non-Motorized Connectivity Study", King County Metro and Sound Transit, 2014. Available at: http://metro.kingcounty.gov/programs-projects/nmcs/.

**Figure E-17 Bicycle and Pedestrian Facility Typical Elements**

| Project Type | Typical Elements |
|---|---|
| Mobility hubs | ▪ Spaces designed for people, including enhanced pedestrian environment with lighting, weather protection, real-time arrival information, restrooms, food vending, and placemaking, as appropriate<br>▪ Public transit service, including on-demand services connections, centrally located ADA paratransit boarding area, and bus layover<br>▪ Customer information, including interactive kiosks, ticket vending machines, and wayfinding elements<br>▪ Bicycle amenities, including protected bicycle lane connections and secure storage<br>▪ Micromobility hubs, including designated locations for shared mobility options (such as e-bikes and scooters)<br>▪ Private mobility options, including designated pick-up/drop-off zone for private employer shuttles and Transportation Network Company services<br>▪ Sustainability features, including electric bus and vehicle charging<br>▪ Multi-use parking options, including priority locations for carpool and short-term parking, designated spaces for rideshare vehicle parking, and fully managed parking |
| Sidewalks | ▪ Site preparation<br>▪ 8-foot new sidewalk -<br>▪ Curb and gutter<br>▪ Associated stormwater improvements<br>▪ Illumination<br>▪ Americans with Disabilities Act (ADA) compliant ramps |
| Bicycle parking at major transit hubs | ▪ Bicycle racks<br>▪ On-demand bicycle lockers |
| Bicycle lanes and/or cycle tracks | ▪ Site preparation<br>▪ 5-foot bicycle lane (one direction) or 8-foot cycle track (one direction)<br>▪ 8-foot new sidewalk (one direction)<br>▪ Curb and gutter<br>▪ Associated stormwater improvements<br>▪ Illumination<br>▪ ADA ramps |

# Park-and-Ride Expansion

Figure E-18 shows the historic share of transit access provided by park-and-ride lots in the four transit access zones defined in the plan. These results are based on park-and-ride utilization data from Metro and travel model data from the Puget Sound Regional Council (PSRC). It is important to recognize that the results in Figure E-18 reflect the "home" location of where park-and-ride demand originates, and not the location of the park-and-ride lot itself. As an example, park-and-ride users from Zone 4 areas can and do park at park-and-ride lots located in Zone 2 and 3 areas, where most of the county's park-and-ride lots are located. It is also important to note that there is no currently available data on the number of people who park on-street and walk to an adjacent transit stop (often referred to as "hide-and-ride"). These types of riders are not considered to be park-and-ride users since they do not park at a lot where they can be counted.

**Figure E-18 Existing Conditions: Park-and-Ride Access Mode Share**

| Transit Access Zone | Proportion of Transit Riders that use Park-and-Ride |
|---|---|
| Zone 1 | 8% |
| Zone 2 | 41% |
| Zone 3 | 64% |
| Zone 4 | 84% |
| **Total** | **N/A** |

As shown in Figure E-18, park-and-ride lots provide access to more than half of all transit riders in Zone 3 and 4, meaning that most people who use transit in these areas access it via a park-and-ride lot. On the other hand, in Zone 1, more than 90 percent of transit users walk, bicycle, or get dropped off at a bus stop. In Zone 2, which include a large portion of suburban King County, just over 40 percent of transit users park at a park-and-ride lot to access transit. It is important to note that this data reflects past conditions and not the extensive 2050 transit network envisioned in Metro Connects.

As part of original Metro Connects assumptions, both Metro and Sound Transit identified new park-and-ride supply, with Sound Transit (ST) potentially adding more than 10,320 spaces and Metro adding 3,300. To determine the number of future park-and-ride spaces that Metro could partner to construct, the agency considered several factors:

- Population within walking distance to frequent transit service
- Future local/express service expansion
- Proposed park-and-ride capacity to be provided by Sound Transit
- Future park-and-ride access mode shares reasonably assumed for each access zone

Total stalls in this revised cost estimate are modified from the original Metro Connects to accommodate additional growth from 2040 to 2050.

## Park-and-Ride Expansion Cost Estimating Assumptions

Park-and-rides traditionally have been constructed as structured parking garages or surface parking lots. The original Metro Connects cost analysis assumed structured parking, which has a higher cost than surface parking, and thus provided a conservative cost estimate.

Structured parking was also used as an assumption because many locations are spatially constrained, and a surface lot is prohibitive. In addition, this assumption is consistent with Sound Transit 3 (ST3) planning for typical light rail transit garages.

Revised assumptions include 20 percent of parking stalls being delivered in a structure and 80 percent delivered in leased or shared parking arrangements. Leased parking assumes 20 years of lease payments (or 240 monthly payments) at a rate of $40/stall/month in 2019 dollars, adjusted for inflation.

The costs for new structured park-and-ride facilities are based on a combination of updated Metro Connects estimates and a verification of per stall costs from recent ST structured parking cost estimates, including actual costs from a recently completed project in Bellevue. Figure E-19 contains typical elements and assumed strategies for each park-and-ride project type.

**Figure E-19 Park-and-Ride Access to Transit Typical Elements and Strategy**

| Project Type | Typical Elements and Strategy |
|---|---|
| Structured Parking | ▪ Structured parking garage and foundation<br>▪ Pedestrian plaza/sidewalk<br>▪ Stairs/elevators<br>▪ Electrical components<br>▪ Illumination<br>▪ Utilities<br>▪ Electric vehicle charging stations<br>▪ Site civil work to access garage entrance<br>▪ Right-of-way (based on typical structured garages in King County) |
| Transit-Oriented Development (TOD)/Shared | Partnerships with TOD developers to secure long-term parking leases for transit customers |
| Leased | Parking assumed 20 years of lease payments (240 monthly payments) which assumes a $40/stall/month rate in 2019 dollars, adjusted for inflation |
| Parking Management | Technology and on-site tools to implement managed parking, which could include an on-site payment kiosk and/or physical sensor technology to support parking payment/permitting and reduce costs/labor associated with enforcement |

# Access to Transit Cost Estimates

Figure E-20 and Figure E-21 summarize the estimated costs for access to transit improvements included in Metro Connects.

**Figure E-20 Bicycle and Pedestrian Cost Estimates**

| Non-Motorized Access Improvements | Unit | Total Units | Estimated Cost (in millions YOE $) |
|---|---|---|---|
| Mobility Hubs | Per Each | 5 | $43 |
| Bike Racks | Per Each | 1,000 | $4 |
| Bicycle Storage | Per Each | 1,250 | $18 |
| Sidewalks | Per mile (one way) | 50 | $326 |
| Bicycle Lanes | Per mile (one way) | 20 | $160 |
| Cycle Tracks | Per mile (one way) | 20 | $169 |
| Unidentified Investments | - | - | $72 |
| **Total** | | | **$792** |

**Figure E-21 Park-and-Ride Expansion Cost Estimates**

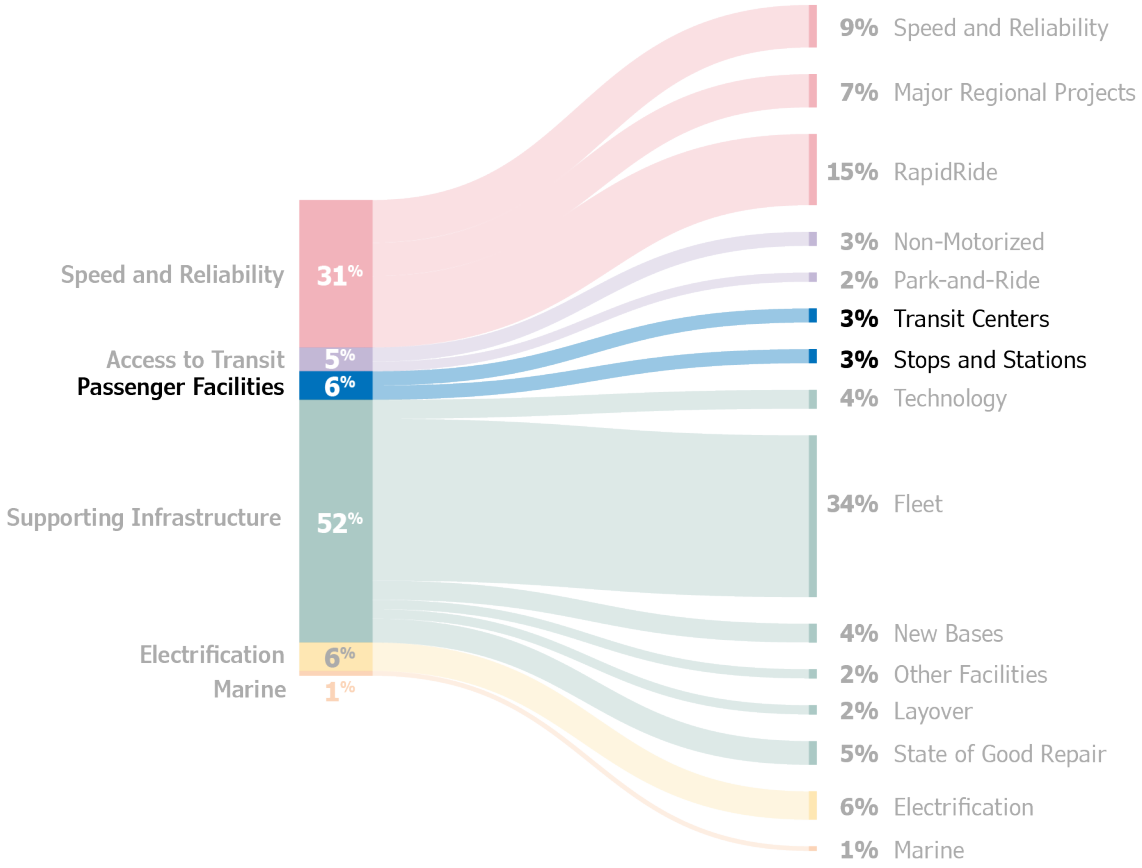
| Vehicular Access to Transit Investments | Unit | Total Units | Estimated Cost (in millions YOE $) |
|---|---|---|---|
| Structured Parking | Per Stall | 924 | $299 |
| TOD/Shared | Per Stall | 1,848 | $299 |
| Leased | Per Stall | 1,848 | $18 |
| Parking Management | Lump Sum | - | $6 |
| Unidentified Investments | - | - | $62 |
| **Total** | | | **$684** |

# PASSENGER FACILITIES

Improving the passenger experience is a key part of Metro Connects and represents a significant element of Metro's proposed capital investment. There are two major categories of Passenger Facilities: Transit Centers, and Bus Stops and Shelters, together representing an estimated cost of approximately $1.7 B.

As shown in Figure E-22, passenger facility investments make up 6 percent of the Metro Connects capital investment.

**Figure E-22 Passenger Facilities Portion of Capital Costs**



# Transit Centers

By 2050, total transit boardings in King County would double compared to 2019. This growth in ridership would be shared between 1) King County Metro, 2) Sound Transit, with new riders on expanded rail and bus rapid transit (BRT) service, and to a lesser extent, 3) Pierce Transit. To achieve this level of transit ridership growth, the envisioned Metro Connects 2050 service network relies on a significantly higher level of bus-to-bus and bus-to rail transfers than the existing network. The facilities necessary to effectively meet customer needs in this future system are in many cases very different from what is provided by current facilities. For one, there will be greater passenger activity, including boardings, alightings, and transfers than exists today. Through Metro's integration with Sound Transit, full busloads of passengers would be expected to transfer to light rail trains to complete their commute, especially during the peak periods. With the anticipated increase in activity, the location and design of transfer facilities would become more important to create an efficient and effective transit network as well as a comfortable, safe, and easy-to-navigate environment for passengers.

Because the increased growth from 2040 to 2050 would not substantially change the total number of locations needing investment, this update to Metro Connects used the same volume of total transit centers as the original Metro Connects to develop cost estimates. This original estimation was based upon the envisioned future service network using the following methodology:

- Identified locations of high boarding and transfer activity (more than 2,500 daily boardings/transfers) and high bus volumes (more than 40 buses per hour during the peak period)
- Evaluated existing facilities at each location
- Identified areas that Sound Transit (ST) is planning and proposing investments in bus/rail integration facilities (ST2 or ST3), at which ST plans to include:
  - 2 off-street bus bays
  - 5 off-street bus layover spaces
  - 2 on-street bus bays
  - An area of approximately one acre at each site
  - A canopy, wind screen, benches, trash cans, information pylon, etc.
- Determined net future investment needed

The locations of major facilities in the Metro Connects 2050 service network and their anticipated boarding and transfer levels are shown in Figure E-24 and Figure E-25. These figures illustrate the anticipated passenger volumes and activities at these locations.

Several of the envisioned future transfer points are existing or planned light rail stations that will be designed and constructed by Sound Transit. In addition to being located at light rail stations, major transit centers and transfer points would be located where bus boardings are high and transfers are anticipated.

Metro would contribute to investments in transit centers and bus stop projects to support the Metro Connects service network, built in partnership with local jurisdictions, state agencies, and other transit providers to ensure they meet the jurisdictional character and needs. Transit centers will include both on- and off-street facilities. The type of investments and design of transit will be based upon a number of factors, including bus volumes and

location. Consistent design elements, such as wayfinding signage and passenger information, can help to provide consistency across all sites. Coordination among Metro and other transit providers would be required to create standard features at major transit centers.

## Transit Center and Transfer Point Costing Assumptions

The estimated cost for off-street facilities was based on historical construction cost information from recently completed facilities: the Burien and Redmond Transit Centers. The costs were adjusted using Commodity Channel Index (CCI) inflation rates and then divided to determine a unit price per bus bay. The estimated costs for on-street facilities were based on a recent engineer's estimate for a minor roadway widening/bus bulb plan. The estimates represent the current industry standard for typical unit bid-based costs for known elements such as cement concrete sidewalk, asphalt, concrete curb and gutter, ADA ramp, and pavement restoration. Typical elements are shown in Figure E-23.

**Figure E-23 On- and Off-Street Facility Typical Elements**

| Project Type | Typical Elements |
|---|---|
| **Off-Street Transit Center Facility** | ▪ Right-of-way (based on right-of-way required for Burien/Redmond Transit Centers)<br>▪ 6 active bus bays<br>▪ 6 to 8 layover spaces<br>▪ Emergency call stations<br>▪ Security<br>▪ Driver comfort station<br>▪ Minor roadway work<br>▪ Sidewalk modifications<br>▪ Driveways<br>▪ Access road paving |
| **On-Street Transit Center Facility** | ▪ Roadway paving<br>▪ Sidewalk<br>▪ Concrete pad<br>▪ Additional signage |

**Figure E-24 Transit Centers – Metro Connects Anticipated Boarding and Transfer Levels**

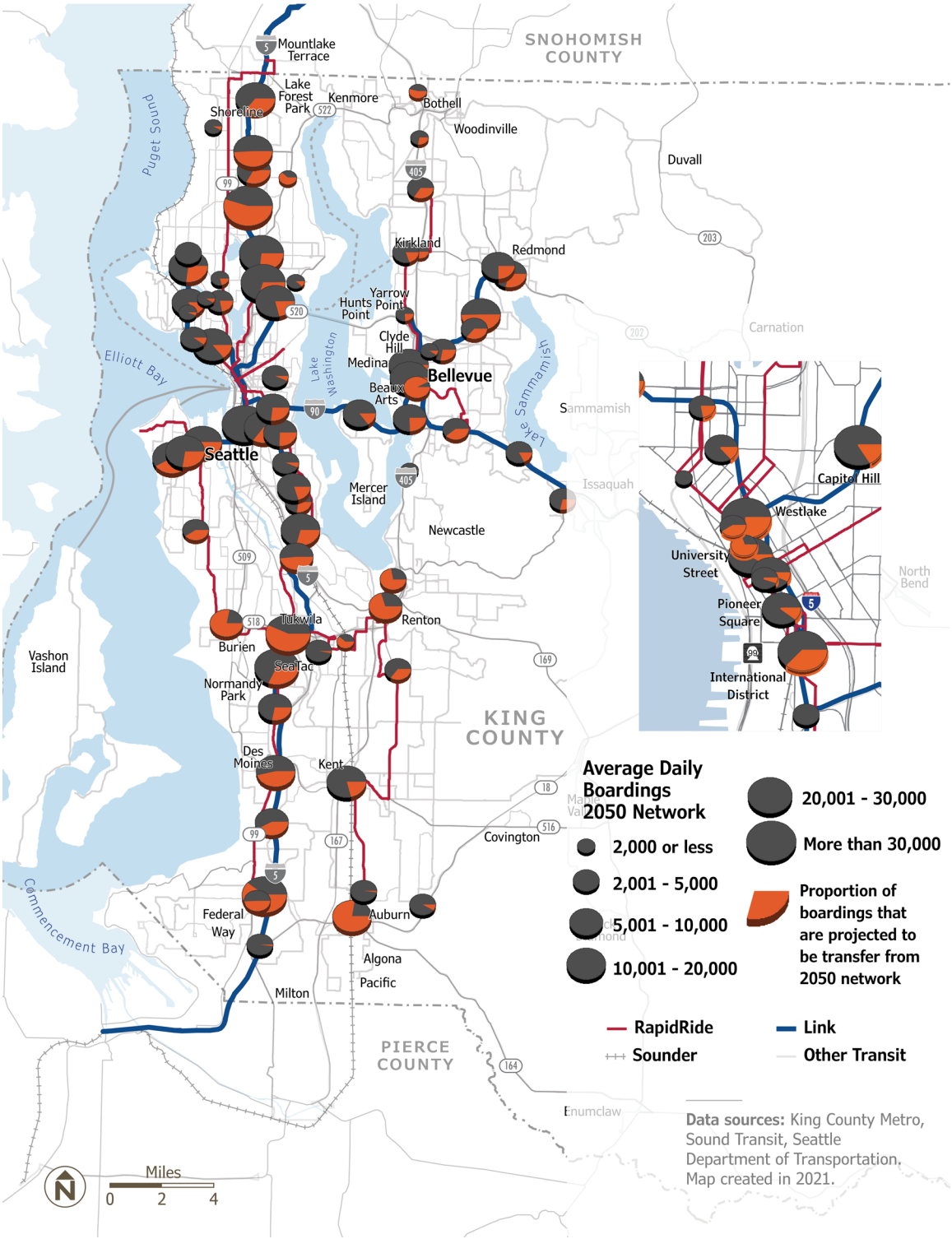
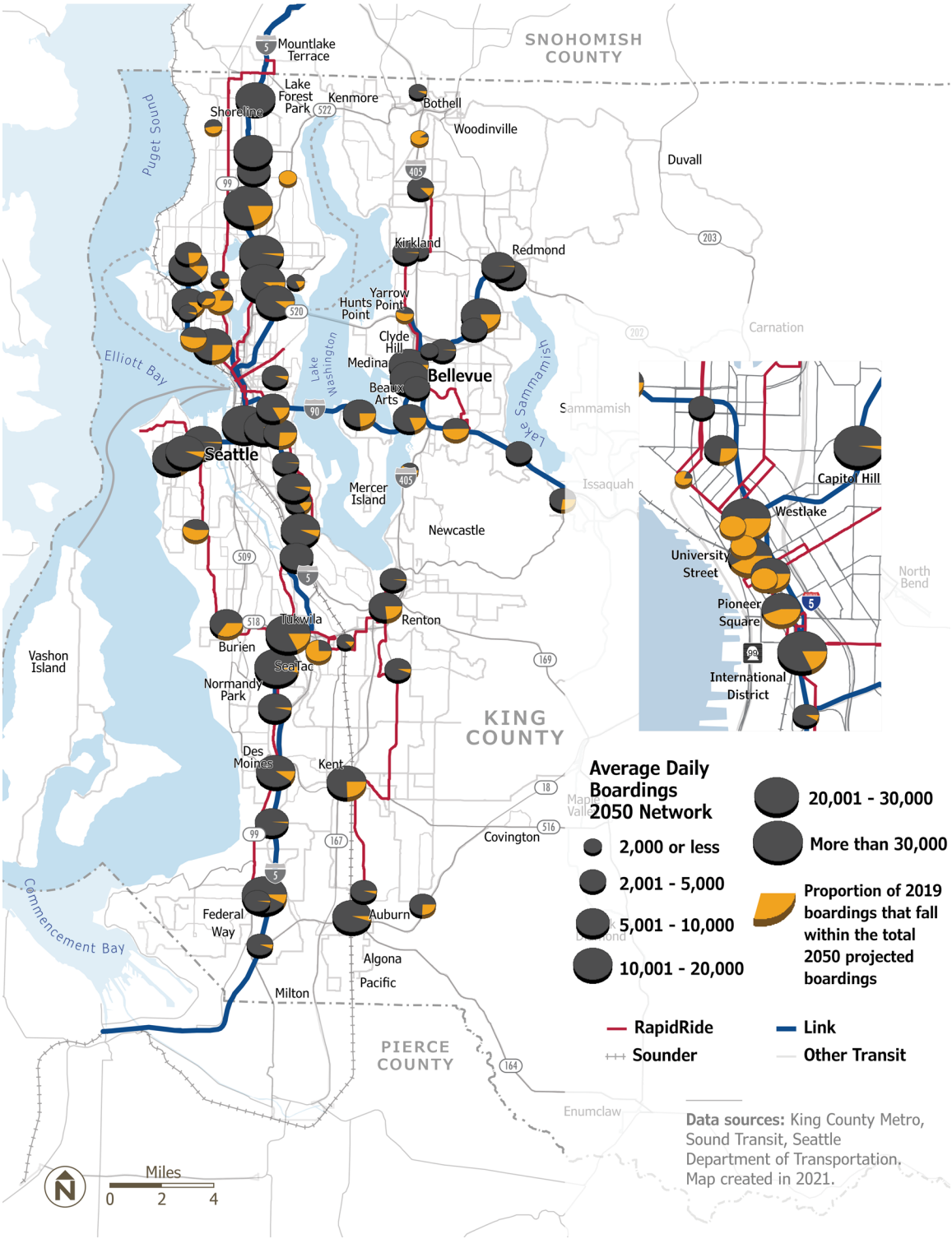


**Figure E-25 Current and Metro Connects 2050 Boarding Levels Current and Metro Connects 2050 Boarding Levels**



# Bus Stops and Shelters

Bus stops and shelters are key locations where customers interact with the agency. Annually, Metro makes an investment in these facilities and also ensures that they are maintained in a state of good repair. Metro serves a variety of bus stops and shelters containing different amenities, based on ridership, the surrounding environment, and service levels. As the agency grows and modifies its service network to meet future needs consistent with the Metro Connects vision, it will need to provide new and expanded passenger facilities. As with transit centers, the envisioned increase in ridership and the increased level of transfer activity will merit an increased investment in passenger facilities.

Metro assumes these facilities would continue to be developed in partnership with local jurisdictions, state agencies, and/or other transit providers. In particular, high ridership stops and transfer facilities will be built in close coordination and partnership with jurisdictions to ensure they meet local needs and character.

Metro currently serves standard bus stops and RapidRide bus stops. Overall, Metro currently maintains over 7,000 bus stops. Each type of facility includes different programmatic elements based on passenger needs.

## Standard Bus Stops

At bus stops with lower ridership, Metro provides a bus stop sign, which indicates to passengers where and which bus routes will stop to pick them up. Metro provides bus shelters at bus stops based on ridership. The anticipated increase in ridership associated with the Metro Connects 2050 service network, and adjustments to the ridership thresholds for shelters, means that the number of facilities will grow.

The updated Metro Connects network used the same number of bus stops as the original Metro Connects to develop cost estimates. The original quantity needed was based on the future service network using the following methodology:

- Calculated number of bus stops with fewer than 1,000 daily boardings
  - Assumed that all existing shelters remain in place
  - Assumed that the proportion of stops that meet the daily ridership threshold for a shelter increases proportionally with ridership on non-RapidRide lines
  - For newly identified shelters:
    - Assumed half will receive a standard shelter investment (bus shelter, shelter footing, litter receptacle, bench)
    - Assumed the other half will receive twice the standard shelter investment
- Calculated number of bus stops with more than 1,000 daily boardings and low transfer activity (fewer than 500 daily transfers)
  - Assumed four times the standard shelter investment at these locations
- Calculated number of bus stops with more than 1,000 daily boardings and high transfer activity (500 or more daily transfers)
  - Assumed an investment comparable to a RapidRide station
- Assumed that half of existing sheltered bus stops will need an additional investment equal to the standard shelter investment as ridership grows

# Passenger Facility Cost Estimating Assumptions

Passenger facilities are assumed to include investments along existing and future RapidRide corridors, as well as non-RapidRide corridors. Estimated costs were based on historical construction cost information from Metro for passenger facilities, extrapolated into the future. Non-RapidRide corridors were broken down into categories according to the number of boardings/transfers and appropriate costs were applied.

Typical elements are shown in Figure E-26.

**Figure E-26 Bus Stop and Shelter Typical Elements**

| Project Type | Typical Elements | |
|---|---|---|
| Standard Shelter (fewer boardings) | ▪ 50% of shelters identified include 1 shelter<br>▪ 50% of shelters identified include 2 shelters<br>▪ Litter receptacle<br>▪ Bench | |
| Standard Shelter (low transfers) | ▪ 4 standard shelters<br>▪ Litter receptacle<br>▪ Bench | |
| Standard Shelter (high transfers) | Comparable elements to RapidRide station, including;<br>▪ Shelter and foundation<br>▪ Bench<br>▪ Lit blade<br>▪ Litter receptacle<br>▪ Bicycle rack (optional)<br>▪ Pedestrian lighting<br>▪ Real-time bus information<br>▪ Power supply | 50% of existing sheltered bus stops receive additional improvements:<br>▪ 1 additional standard shelter<br>▪ Litter receptacle<br>▪ Bench |

# Passenger Facility Cost Estimates

Figure E-27 shows the level of investment in passenger facilities to accommodate future ridership at transfer centers. Figure E-28 shows the estimated costs for bus stops and shelters for non-RapidRide service.

**Figure E-27 Metro Connects Transit Center Estimated Costs**

| Transit Center Investments | Unit | Total Units* | Estimated Metro Costs (in millions YOE $) |
|---|---|---|---|
| Off-Street Transit Center | Bus Bay | 82 | $812 |
| On-Street Transit Center | Bus Bay | 38 | $26 |
| Unidentified Investments | --- | --- | $84 |
| **Total** | | | **$922** |

* A single transit center is comprised of multiple bays. This quantity allows for consistent cost estimation across locations, but does not specify the size of each facility.

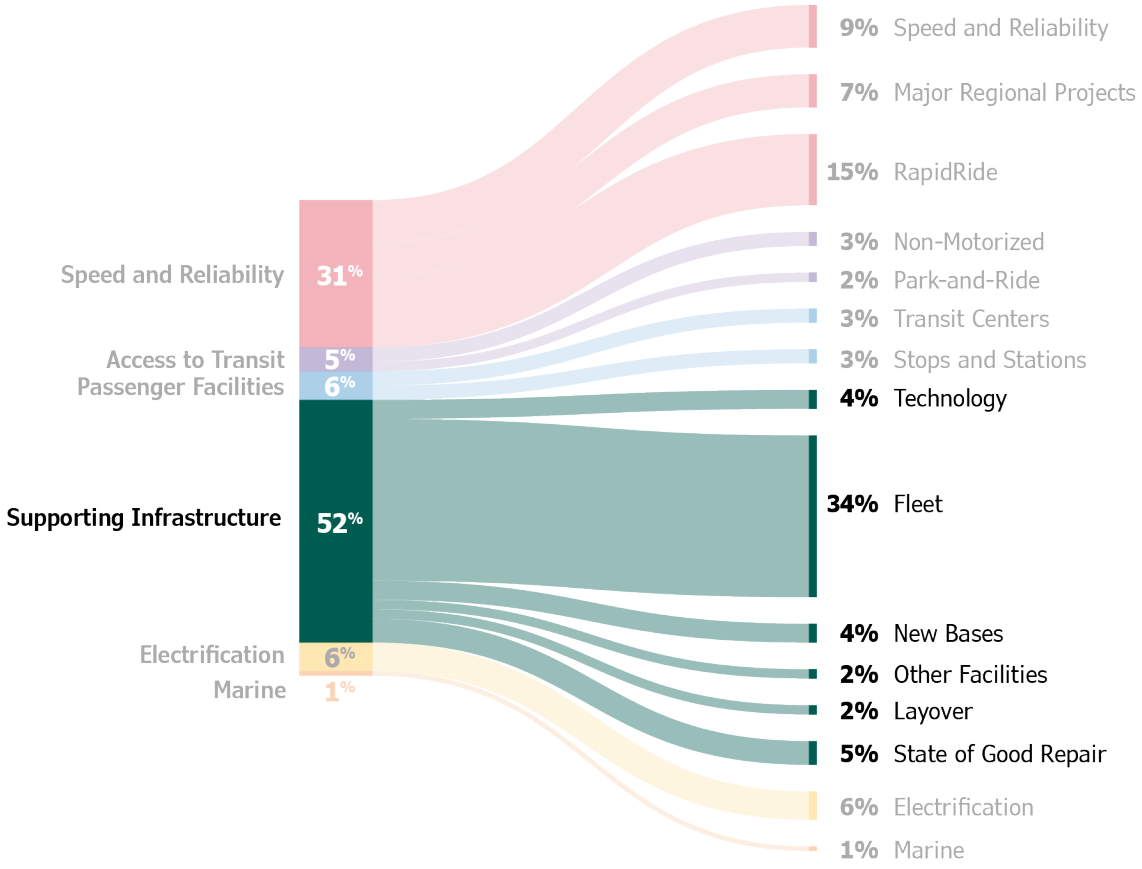
**Figure E-28 Metro Connects Bus Stops and Shelters Estimated Costs (non-RapidRide service)**

| Bus Stops and Stations Investments | Unit | Total Units | Estimated Metro Costs (in millions YOE $) |
|---|---|---|---|
| Shelters (fewer boardings) | Bus Stop | 1,180 | $185 |
| Shelters (low transfers) | Bus Stop | 350 | $143 |
| Shelters (high transfers) | Bus Stop | 405 | $290 |
| Existing Bus Stop Improvements | Bus Stop | 1,615 | $86 |
| Unidentified Investments | --- | --- | $70 |
| **Total** | | | **$774** |

# SUPPORTING INFRASTRUCTURE

Supporting Infrastructure is critical to operate the overall mobility system, and includes the following categories: Technology, Fleet, New Bases, Layover, Other Facilities, and State of Good Repair. Together, these investments represent an estimated cost of $14.6 B, and make up 52 percent of the estimated Metro Connects Capital investment costs.

**Figure E-29 Critical Service Supports Portion of Capital Costs**




Changes from the original Metro Connects include the following:

- Inclusion of fleet and state of good repair costs to maintain existing service levels.
- Construction inflation.
- Increased costs for Battery Electric Buses
- Increased costs for Vanpool and Access fleet base facilities increased to support electric vehicles

# Technology

Over the last few years, technology investments have represented significant portions of Metro's budget. Improvements such as the ORCA system, a new radio system, real time arrival signs at RapidRide stations and elsewhere in the system, and next stop reader boards and audio announcements on all buses provide valuable information and benefits to Metro's customers and help to improve Metro's operations. Other technological investments help Metro collect customer and operational data, manage network operations, and provide improved customer information. Technology investments are expected to continue through the period of Metro Connects as a means to continuously improve payment systems, bus operations, and customer information. Metro Connects assumes technology will continue to comprise approximately 4 percent of overall capital investments, representing $1.2 billion in technology investments. These investments will enable Metro to take advantage of new technologies that improve the customer experience, increase the efficiency of current operations, and support ongoing maintenance and upgrades.

# Fleet

To provide the service levels described in Metro Connects, Metro will need to replace and expand its fleet. These costs represent 34 percent of the Metro Connects capital investment. Compared to the current network, more of the new service proposed in Metro Connects will be in non-peak hours. Since fewer buses are used then, the existing fleet will operate for more hours a day. As a result, Metro could purchase relatively fewer buses compared to the increase in service hours.

## Fleet Costing Assumptions

Metro operates a bus fleet of approximately 1,500 vehicles. These include hybrid diesel-electric coaches, electric trolleys, and several battery buses. Metro currently operates a bus fleet mix of approximately 50 percent articulated buses and 50 percent standard buses (currently 40-foot buses).

Metro is committed to having the greenest fleet possible, with a goal of transitioning to a 100 percent zero-emissions bus fleet by 2035 as identified in King County's Strategic Climate Action Plan. The evaluation of emerging technologies will be integral to this transition. In 2016, Metro introduced its first all-battery powered bus into service.

Metro will need to expand the size of its bus fleet to approximately 1,980 buses to support the added service envisioned in Metro Connects. Metro calculated the need for additional bus fleet investment based upon the 2050 service network using the output from the Sound Transit Incremental Ridership Forecasting Model. This model (which is also used to forecast future transit ridership levels for all transit agencies operating in King County) directly outputs fleet estimates based on the route length and average speed. Metro's standard "reserve ratio" was applied to include the need for spare buses to ensure reliable service.

Based on the current service configuration and split between peak and non-peak service, Metro currently needs a bus for every 2,500 annual service hours provided. This assumption is based on historically high morning and evening peaks for bus service. In the envisioned 2050 service network, morning and evening service peaks would be less pronounced and service hours would be more evenly distributed throughout the day. The more even distribution of service throughout the day would shift the demand for new buses from one per every 2,500 hours upwards to one per every 3,600 service hours.

Cost estimates assume the future bus fleet will be 100 percent zero-emission with a combination of electric trolley and battery electric coaches. No updates were assumed to electric trolley fleet costs, and costs are based on replacement vehicles needed to maintain the current fleet of trolley buses with some modest growth for routes served by the existing trolley infrastructure network.

Consistent with the vision in Metro Connects, Metro anticipates growth in both the paratransit and vanpool fleets. Expenditures for growth and replacement Access, VanPool and other Flexible Service vehicles were based on average annual replacement expenses from Metro's 2019-2028 Capital Improvement Program (CIP). These amounts were then increased annually proportional to the increase in fixed-route bus service to account for growth, and then adjusted for inflation.

Figure E-30 shows the costing assumptions for new fleet vehicles.

**Figure E-30 Bus Fleet Costing Assumptions**

| Fleet Type | Assumptions | Unit Costs |
|---|---|---|
| Bus Fleet | Total 3,988 coaches needed for fleet growth and replacement 2020-2050<br>New bus purchases split between:<br>▪ 40' Bus - 50% of total<br>▪ 60' Bus - 50% of total<br>Assumes all bus purchases are zero emissions after 2025<br>Replacement assumes 12-year replacement cycle (15 year for trolley) | Vehicle costs were developed using 2020 costs from Metro's financial model as follows:<br>▪ Hybrid 40' Bus - $0.95 million<br>▪ Hybrid 60' Bus - $1.23 million<br>▪ Trolley 40' Bus - $0.99 million<br>▪ Trolley 60' Bus - $1.79 million<br>▪ Battery Electric 40' Bus - $1.12 million<br>▪ Battery Electric 60' Bus - $1.64 million |

## Fleet Cost Estimates

Figure E-31 summarizes the total fleet investment needed to support the envisioned 2050 service network. The estimates include cost for the initial purchase of incremental vehicles, as well as associated replacement vehicles.

**Figure E-31 Metro Connects Fleet Investments Estimated Costs**

| Fleet Investments | Unit | Total Units | Estimated Costs (in millions YOE $) |
|---|---|---|---|
| Bus Fleet* | Vehicles | 3,988 | $8,562 |
| VanPool Fleet | Lump Sum | 1,750 | $589 |
| Paratransit Fleet | Lump Sum | 170 | $392 |
| **Total** | | | **$9,614** |

*Includes new and replacement fleet

# New Bases and Other Facilities

To support the provision of transit service in King County, Metro needs to ensure that it has sufficient capacity to dispatch and maintain its vehicles as well as facilities to support its growing system and associated infrastructure. In addition, growth in programs such as Rideshare, VanPool, and Access/Paratransit will necessitate additional facilities to support a larger fleet, and service expansion will require additional passenger facilities needing maintenance. Such facilities represent a large capital investment. The following sections detail the investments needed for Metro to expand its network of supporting infrastructure,

including layover, bus and VanPool base facilities, the trolley network, maintenance facilities consistent with the vision contained in Metro Connects. Any such projects will be done in close coordination with the community and partners.

### New Bus Bases

To support the provision of transit service in King County, Metro needs to ensure that it has sufficient capacity to dispatch and maintain its vehicles. Metro currently maintains and operates seven bus bases throughout King County. Bus bases serve all the daily operational needs crucial to providing transit service, such as bus parking, operator dispatching, and vehicle maintenance. Bases provide services such as bus maintenance, repair, inspection, fueling, interior and exterior washing, and minor paint and body work. Bases also include facilities to support employees located at that facility, such as office space, transit operator lockers and break rooms, and meeting rooms.

Adequate base facilities are essential to supporting the proposed Metro Connects 2050 service network. Increasing the overall fleet requirements by more than 400 buses will require two new bus bases to provide needed capacity. Availability of land and cost of potential sites will affect the location and size of bases that are built by 2050.

Minimizing operations costs and deadheading is a key consideration in siting new facilities. With significant increases in service projected in south King County, a new bus base will be needed there to provide the most efficient use of Metro's service hours.

### VanPool Distribution Base

Metro currently manages a fleet of over 1,700 vans to support its VanPool and other programs, and an additional VanPool distribution base will be needed to support anticipated growth in the VanPool fleet. VanPool distribution bases require parking for vans, space for van inspection and van wash bays, storage for van accessories, structures to support office space for staff while on-site, a sales office, and parking for customers coming to pick up and return vehicles. No maintenance or fueling is performed at these facilities.

A planned expansion of an existing VanPool distribution base will support near term growth. One additional new facility with approximately 300 spaces is anticipated to support the program through the envisioned demand in 2050. Similar to bus maintenance bases, availability of land and cost of potential sites would affect the size and location of a future VanPool distribution base. Co-locating or developing the VanPool distribution base with a bus or Access Paratransit maintenance base would be considered.

### Access Fleet Base

King County Metro currently has an active paratransit fleet of approximately 400 vans comprised of a variety of vehicle sizes and types. The Access program currently leases operating bases located in Bellevue, Kent, Shoreline, and Seattle to support this fleet. Metro recently purchased its Access base property in South Park. Access facilities must be fenced, paved, secure, and have a lighted lot for 100 to 135 vehicles and contract-employee vehicles. They must also have on-site fueling, on-site maintenance services, and general office space for employees.

It is estimated that the program would need to add another base, and based upon the envisioned future service network, an eastside location would be preferred. Similar to bus maintenance bases, availability of land and cost of potential sites would affect the size and location of a future Access fleet base. Co-locating or developing the Access fleet base with

other functions such as the van distribution center could be considered. Changes in propulsion technology have a potential to impact the operational model for the program. Substantial capital investments that are required to create charging depots may make the leased site model less desirable.

### Facilities Maintenance Site

In addition to bases, Metro needs satellite facilities maintenance sites for the efficient reporting and dispatching of staff to support passenger facilities. These sites are used for cleaning, fabrication, maintenance, and repair of Metro facilities, such as bus shelters. Major components of these sites include a fabrication/repair and carpentry shop; landscaping, sign, and constructor shops; covered materials shed(s); covered and heated storage; vehicle parking areas; security fencing; and office space for on-site staff.

One additional facilities maintenance site will be needed to support the Metro Connects 2050 service network. Availability of land and cost of potential sites would affect the size and location of a future facilities maintenance site.

### New Trolley Wire

The Metro Connects 2050 service network anticipates continued use of the existing trolley bus overhead charging network as well as some minor expansions to the network. These modifications generally constitute filling gaps in the existing network to allow for longer or more continuous routes. In terms of costing, it is assumed that new trolley wire would be added to fill gaps in the existing trolley wire network. For cost estimation purposes, the future new trolley wire is assumed to increase by 10 percent (7 miles) based on the existing total trolley overhead wire miles.

## New Bases and Other Facilities Costing Assumptions

### New Bus Base Assumptions

The additional capacity was determined by the size of the future bus fleet, and cost estimates were based off of bus bases designed for 250 vehicles. The total planning, design, and construction cost was divided by the number of vehicles to determine a unit cost of construction per vehicle. In addition, the cost for the New South King County base includes the cost of land acquisition. The total cost for two new bases was updated using the construction and right-of-way cost index method and modified to include bus electrification infrastructure. Metro will also need to make modifications to existing bases to be consistent with changes in fleet and propulsion technology, including charging stations for battery-powered buses, covered in the Electrification section. Typical elements for a new bus base are outlined in Figure E-32:

**Figure E-32 New Bus Base Typical Elements and Strategy**

| Project Type | Typical Elements and Strategy |
|---|---|
| Bus Base | ▪ Land cost for bases on new property (one)<br>▪ Site excavation and preparation<br>▪ Paving (12 acres)<br>▪ Landscaping and irrigation<br>▪ Stormwater drainage and utilities<br>▪ Security fencing and access<br>▪ Operations building (15,000 sq. feet)<br>▪ wash building (10,000 sq. feet)<br>▪ Maintenance building (60,000 sq. feet)<br>▪ Major equipment<br>▪ Building furniture<br>▪ Electrical lighting<br>▪ Off-site mitigation, including roadway development, intersection improvements, and traffic signals<br>▪ Right-of-way (based on average size needed per bus determined by the current size of the Metro bus base) |

## VanPool Distribution Base Assumptions

Unit costs were developed using the existing van distribution facility in Redmond to determine the approximate size and support facility requirements. The Redmond facility includes space for 530 vehicles, therefore unit costs were developed based on a per vehicle unit of measure. This unit cost was applied to the total quantity of vehicle spaces required in the future. In addition, unit costs for the square footage of a building were based on the cost per square foot for the King County Metro bus base project. Equipment and furniture needs were also included at 15 percent, similar to the King County Metro bus base estimate.

For the new van distribution facility, electrification was added to the revised Metro Connects costs estimates based on Level 2 charging. It was also assumed that each vehicle would have its own plug receptacle, which is a conservative assumption. However, it is also understood that more charging facilities could be installed throughout the region at park-and-ride facilities, at employer sites, and at homes where these vehicles may be stored. The facility estimate from Metro Connects was updated using the construction and right-of-way cost index method. For cost estimation purposes vehicle quantity assumptions remain the same from the original Metro Connects. Increases in base costs are due to accommodating electric vehicles.

Surface parking lot costs were determined by developing an average from other planning level projects, including Sound Transit's Lynnwood Link Extension, Sound Transit 3 (ST3) planning, and the Puyallup Sounder station. The average cost determined by these three projects was divided by the total number of stalls for each specific location to determine a unit price per stall. The facility lot size was based on a ratio determined by the existing Redmond facility. Similar to the Redmond facility, the cost estimate assumed that half the site would require landscaping to be conservative. Unit costs for landscaping were included similar to ST3 planning level unit costs.

Typical elements include:

- Surface parking for up to 700 vehicles

- Service building
- Landscaping
- Right-of-way

## Access Fleet Base Assumptions

One new Access fleet facility would be required in the future. This facility was estimated to accommodate between 100 to 135 vehicles. The site would need to be fenced, paved, secure, and lighted. The facility would also need on-site maintenance services, including an estimated nine maintenance bays, work area, parts room, tire storage, fluids distribution and waste, washing area, backup power supply, and space for employees such as lunch/meeting rooms, training room, dispatch office, and manager offices. The approximate space of the maintenance building would be 13,000 square feet. Similar to the VanPool distribution facility, the cost estimate includes an assumption that 50 percent of the site would be landscaping to be conservative.

Unit costs were developed consistent with the methodology used for the van distribution facility. Equipment and furniture needs were also included at 15%, similar to the King County Metro bus base estimate.

For the new Access fleet base, plug-in electrification was added, including additional electrical infrastructure. The Metro Connects estimate was revised using the construction and right-of-way cost index method. Vehicle quantities remain the same. Increases in base costs are due to accommodating electric vehicles.

Typical elements include:

- Surface parking for up to 135 vehicles
- Maintenance building (13,000 sq. feet)
- Landscaping
- Right-of-way

## Facilities Maintenance Site Costing Assumptions

One additional facilities maintenance site will be required to support expanding passenger facilities. This facility would be required when either a new operating base capacity is addressed or if three or more parking garages and/or transit centers were constructed. The facility would include common elements similar to the existing facility such as office spaces, breakroom, mechanical room, sign shop, stores area with loading dock and secure area, fabrication/repair and carpentry shop, landscape shop, locker rooms, constructor shop, laundry room, and a data/computer room. In addition, the proposed facility would need to double the truck yard and provide the following amenities: covered sand and landscape material shed, covered and heated external storage, paint and sand blast room to accommodate shelter refurbishment, and full security fencing, door locks, and cameras.

New facilities maintenance site assumptions remain the same from the original Metro Connects. The estimated costs were updated using the construction and right-of-way cost index method. Unit costs in the original Metro Connects were developed using the existing North Facility site details to determine approximate size and support facility requirements. The number of parking stalls, support facility building size, and size of the site is expected to be 1.5 times the existing North Facility.

Unit costs for the building were based on the 2008 King County Metro bus base's cost per square foot estimates. In addition, equipment and furniture needs were also included at 15 percent of the total cost. Surface parking lot costs were determined by developing an average from other planning level projects, including Sound Transit's Lynnwood Link Extension, ST3 planning, and the Puyallup Sounder station. The average cost of these projects was used to develop a per stall estimate that was then applied to this facility. The facility lot size was based on increasing the existing North Facility site by 1.5 times. It was assumed that 10 percent of the site would require landscaping. Unit costs for landscaping were included similar to ST3 planning level unit costs.

Typical elements include:

- Support buildings
- Employee parking
- Landscaping
- Right-of-way

### New Trolley Wire Costing Assumptions

New trolley wire would be added to fill gaps in the existing trolley wire network. The future new trolley wire is assumed to increase by at least 10 percent (7 miles) based on the existing total trolley overhead wire miles.

New Trolley Wire quantity assumptions remain the same from the original Metro Connects. The estimated costs were updated using the construction cost index method. Costs for trolley wire investments were estimated by using historical construction information by King County Metro from the most recent trolley projects and then extrapolated into the future. The estimated costs include construction, design, project management, and construction administration. Because these efforts would be an extension to existing trolley wire as opposed to totally new wire, 65 percent of the historical costs were used for the estimates. These costs do not include the cost of new substations or land acquisition.

Typical elements include:

- New wires (two-way)
- New poles
- Switches

## New Bases and Other Facilities Cost Estimates

Figure E-33 shows the estimated costs for new bases. Figure E-34 shows the estimated costs for other facilities.

**Figure E-33 Metro Connects New Bases Estimates**

| New Bases and Other Facilities Investments | Unit | Total Units | Estimated Metro Costs (in millions YOE $) |
|---|---|---|---|
| Bus Maintenance Bae (South Annex) | Vehicles | 250 | $340 |
| Bus Maintenance Base (New South King County Base) | Vehicles | 250 | $777 |
| Unidentified Investments | --- | --- | $112 |

| New Bases and Other Facilities Investments | Unit | Total Units | Estimated Metro Costs (in millions YOE $) |
|---|---|---|---|
| **Total** | | | **$1,229** |

**Figure E-34 Metro Connects Other Facilities Cost Estimates**

| New Bases and Other Facilities Investments | Unit | Total Units | Estimated Metro Costs (in millions YOE $) |
|---|---|---|---|
| VanPool Distribution Base | Base | 1 | $191 |
| Access Fleet Base | Base | 1 | $73 |
| Facilities Maintenance Site | Site | 1 | $133 |
| New Trolley Wire | Miles | 7 | $87 |
| Unidentified Investments | --- | --- | $48 |
| **Total** | | | **$532** |

# New Bus Layover

The ability to have buses in the right place to start and end their routes results in a more efficient system as less time is spent getting the bus to the right location or otherwise operating buses without passengers. This is known as bus layover. Time for layover is included in bus schedules and is the periods of time between trips when drivers can take a break, including using the restroom.

Most importantly to the typical transit customer, layover also provides a cushion of time that allows the driver to start the next trip on schedule if the preceding trip ran late. Current layover facilities include space at transit centers where buses can wait as well as street space reserved for transit use in a place that does not disrupt traffic and is located throughout the county. Street layover space is often used at trip ends that do not terminate at transit centers or other off-street facilities. Having dedicated locations for layover serves an important function by providing Metro with increased flexibility for route scheduling and operations.

Metro Connects 2050 will rely on appropriately sized and located layover facilities. Because the updated 2050 network would result in a comparable volume of layover space needed, this update to Meto Connects used the same quantity of layover as the original Metro Connects to develop cost estimates. The original Metro Connects estimated the need for future layover space based on the following methodology:

- Calculated future layover need by subregion based on demand by route category
- Identified existing layover spaces based on the current route end points
- Calculated future layover need by identifying the number of bus route ends within a subarea. Future layover demand was assumed at a number of layover spaces per every peak hour bus trip based on service that ends in the subarea—this is consistent with existing layover space demand per peak hour bus trip. The assumed layover demand for each route service type was as follows:
  - Frequent – four layover spaces
  - Express – two layover spaces
  - Local – one layover space
- Calculated net new layover demand by subtracting existing layover supply against new demand within the subarea; planned layover spaces at Sound Transit and Metro transit centers were also considered in the calculations.
- Assumed all new layover spaces would be off-street; no low-cost on-street spaces were assumed for cost estimating purposes
  - The rationale for the all off-street assumption is an acknowledgement that use of on-street parking is becoming more difficult to locate, and some of the existing on- street layover spaces could be lost to development over time. There is no way of knowing which layover spaces might be lost or how developers would mitigate for lost spaces.

In addition to the layover space included in planned transit centers, Metro would need to secure approximately 270 additional layover spaces throughout the county to support the Metro Connects 2050 service network.

Specific siting of layover facilities would be identified in collaboration with local agencies and right-of-way owners to ensure the most efficient service network (e.g., layover should be

selected near the termini of routes to reduce deadheading wherever possible). Additionally, layover facilities could be jointly maintained and operated with other transit providers.

## Layover Costing Assumptions

For cost estimation purposes, all new layover spaces were assumed to be accommodated in off-street layover facilities. The cost estimates assumed off-street facilities rather than on-street facilities to provide a more conservative estimate. This reflects the difficulty locating on-street layover spaces, the likelihood existing on-street facilities that may be converted into off-street facilities in the future. Before facilities are built, the availability of on-street facilities will be evaluated to determine if right-of-way space can be secured.

Project estimates were based on the layover element of the One Center City project currently being developed by King County and City of Seattle. The One Center City project evaluated multiple options to determine a unit cost range which was then converted to a per unit price per layover bay.

Typical elements for an off-street layover facility include:

- Site excavation and preparation
- Access
- Road paving
- Driveway(s)
- Sidewalk
- Restroom facilities for drivers
- Illumination
- Signal work
- Right-of-way (based on average size of layover space needed per bus determined by the One Center City project)

These estimates were revised using updated unit costs from WSDOT and updated construction and right-of-way cost indices. New layover cost increases are due to updated local unit price assumptions for common elements, such as concrete, steel, and asphalt.

## Layover Cost Estimates

Figure E-35 shows the estimated costs for new layover.

**Figure E-35 Metro Connects Layover Cost Estimates**

| Layover Investments | Unit | Total Units | Estimated Metro Costs (in millions YOE $) |
|---|---|---|---|
| Layover Spaces | Bus Bay | 270 | $505 |
| Unidentified Investments | --- | --- | $51 |
| **Total** | | | **$557** |

# State of Good Repair

Metro's first commitment is to support the existing system by keeping current assets (bus bases, maintenance facilities, revenue and non-revenue vehicles, trolley wire, substations, etc.) in good working condition. Metro will continue to plan for required maintenance on the existing system as part of the biennial budgeting process. The number of assets owned by Metro is expected to grow as the Metro Connects vision is implemented. As these new items are completed, they will be added to the inventories that are used to determine the investments needed to maintain them in a state of good repair. Newer buildings and facilities generally do not require infrastructure maintenance for the first several years they are in operation. However, as facilities reach the 5-, 10- and 15-year marks, additional investment in state of good repair activities is anticipated.

## State of Good Repair Cost Assumptions

The original Metro Connects analysis assumed that the budget for state of good repair is expected to increase by $132 million between 2018 and 2040, representing one percent of the total capital budget envisioned to implement Metro Connects.

This update now includes the cost of maintaining both new and existing facilities. To calculate this, Metro's current 10-year capital improvement plan (CIP) for levels of investment was used. This update used an approach that matches the current 10-year CIP for the first 10 years and one percent of the overall program for subsequent years. The first 10 years will consume most of the state of good repair costs, with an average of nearly $30 million per year, in part due to many existing facilities reaching the end of their useful life. This includes needed repairs to existing trolley wire. All new facilities constructed over the next 20 years will not need extensive repair as those assets will be new.

## State of Good Repair Cost Estimates

Figure E-36 shows the estimated costs for State of Good Repair investments.

**Figure E-36 Metro Connects State of Good Repair Estimated Costs**

| Layover Investments | Unit | Total Units | Estimated Metro Costs (in millions YOE $) |
|---|---|---|---|
| State of Good Repair Investments | Lump Sum | --- | $1,372 |
| Unidentified Investments | --- | --- | $137 |
| **Total** | | | **$1,509** |

# ELECTRIFICATION

Currently, more than one-third (36%) of regional greenhouse gas emissions come from transportation.[11] In 2017, Metro made a commitment to move to a 100 percent zero-emissions fleet powered by renewable energy. This commitment was codified as part of Ordinance 19052[12], which establishes the following goals:

- Fifty percent of Metro's light-duty vehicles transition to electric by 2025 and 100 percent by 2030;
- Fifty percent of Metro's medium-duty vehicles transition to electric by 2028 and 100 percent by 2033; and
- Fifty percent of Metro's heavy-duty vehicles transition to electric vehicles by 2038 and 100 percent by 2043.
- 100% bus fleet to zero emission by 2035

The transition to a zero-emissions fleet is an essential part of King County's strategy to combat the climate crisis. However, the original Metro Connects did not include this as a separate investment category due to the infancy of the program at the time.

Significant future investments are anticipated for battery electric bus infrastructure (including on-route facilities), battery electric bus charge management systems, and integration of this new system with legacy operations systems. Combined the estimate costs to implement battery electric infrastructure is approximately $1.7 B. None of these costs were included in the original Metro Connects. Electrification is an entirely new category in this update to Metro Connects costing.

Since Metro Connects, Metro has made significant progress in fleet electrification, building on Metro's existing electric trolley fleet, including the following:

- Starting in 2016, Metro began operating several short-range battery electric coaches from Bellevue base to surrounding areas.
- Metro is prioritizing deployment of new zero-emissions buses on service operating from south King County, improving air quality first in communities where people are disproportionately affected by pollution. Metro is also taking steps to install charging infrastructure to support zero-emission buses. The first installation of chargers at the South Base Campus will be complete in 2021.
- Metro completed testing of 40- and 60-foot long-range battery-powered buses from multiple manufacturers that can travel up to 140 miles on a single charge to assess the performance and reliability of buses in King County geography, traffic, and weather conditions.
- Based on the results of this testing, Metro placed its first large order of 40 battery electric buses (twenty 60-foot articulated coaches and twenty 40-foot coaches in 2021). In preparation for operations from a new interim base at South Campus, Metro is working with suppliers, utilities, and the battery electric bus industry to

[11] King County, "GHG Emissions in King County: 2017 Inventory Update, Contribution Analyssi, and Wedge Analysis, July 2019, https://your.kingcounty.gov/dnrp/climate/documents/201907-KingCounty-GHG-Emissions-Analysis.pdf

[12] King County Ordinance 19052, https://mkcclegisearch.kingcounty.gov/LegislationDetail.aspx?ID=4159832&GUID=8B07F910-705E-4EC0-AFEA-99EAEEC5182D

accelerate the adoption of standards for charging methods to reduce capital investments and operating expenses.

- Metro is also in the preliminary stages of considering electrification of its non-bus fleets, including its non-revenue, Rideshare, and Access paratransit fleets.

# Battery Electrification Cost Assumptions

This new cost category includes upgrading existing facilities, including the new South Campus interim base, addition of on-route charging throughout the service area, and a comprehensive charge management system. There are additional marginal costs associated with electrification for all new bases, which are now assumed to be built from the start as battery electric bases. These associated cost estimates are included in the Supporting Infrastructure category. Elements and strategies for electrification are included in Figure .

**Figure E-37 Electrification Typical Elements and Strategy**

| Project Type | Typical Elements and Strategy |
|---|---|
| Base Needs (including Interim Base electrification) | ▪ Based on a per-bus unit cost to add the charging infrastructure and associated site elements (such as the addition of added power infrastructure). The quantity is an estimated number of existing bus coach replacements. Unit cost was derived from the recent conceptual design for the electrification of the Interim Base at South Campus. |
| VanPool Distribution Base Upgrade | ▪ Upgrade the existing leased VanPool Distribution Center in Redmond. Other locations are not estimated and some of this will be at homes and will use public charging infrastructure. There will also be partnerships with Electrify America and EVgo. |
| Park-and-Ride Charge Stations | ▪ Installation of 125 Level 2 chargers at park-and-ride lots. |
| On-Route Charging | ▪ On-route charging facilities will also be needed. These will be located primarily in layover areas throughout the service area. No specific planning has occurred to identify locations. |

# Battery Electrification Estimated Costs

Figure E-38 shows the estimated costs for Electrification investments.

**Figure E-38 Metro Connects Estimated Electrification Costs**

| Electrification Investments | Unit | Total Units | Estimated Metro Costs (in millions YOE $) |
|---|---|---|---|
| Base Needs (including Interim Base electrification) | Per Vehicle | 1,393 | $1,058 |
| Van Distribution Base Update | Per Vehicle | 536 | $24 |
| Park-and-Ride Charge Stations | Per Station | 125 | $4 |
| On-Route Charging | Each | 100 | $410 |
| Charge Management System | Lump Sum | 1 | $10 |
| Unknown Projects Contingency | --- | --- | $151 |
| **Total** | | | **$1,657** |

# MARINE

Marine is a new category in this update to Metro Connects. The Marine Division operates the King County Water Taxi passenger ferry service and is being integrated with King County Metro as the department moves toward becoming a full-service mobility agency. Capital costs for Marine have been added to this update based on the six-year program plan for the division, and based on new investments needed to support new routes identified in Metro Connects, with cost estimates developed by Metro staff. Cost categories include Vessel Preservation, Terminal Improvements, and Mobility Improvements, representing a total estimated cost of $220 M.

In early 2016, the King County Council approved the "Final Report on Ferry Expansion Options for Marine Division"[13] (hereafter referred to as the 2015 Marine Expansion Report). The recommended future expansion options for passenger ferry service include two routes on Lake Washington to connect the Cities of Kenmore and Kirkland with the University of Washington (UW) and one route on the Puget Sound that connects Ballard to downtown Seattle.

These three routes met the evaluation criteria of:

- Route time competitiveness with other modes of transit
- Cost of operations – farebox recovery out of 36 potential route combinations analyzed using a service model similar to the existing Vashon Island route during weekday AM and PM commute periods only

## Marine Vessels

The 2015 Marine Expansion Report identifies the new vessels needed to support expanded marine service. One new 150-passenger vessel would be needed for each of the following routes: Ballard to downtown Seattle and Kirkland to UW, and two new 150 passenger vessels would be needed for the Kenmore to UW route.

## Marine Vessel Cost Assumptions

Overall costs for vessels were identified in the 2015 Marine Expansion Report.

The appropriate vessel size for a water taxi route is determined by potential ridership and frequency of sailings. The US Coast Guard has specific safety and security requirements for different vessel classes, including a minimum level of crew for and security infrastructure needs. As such, choosing vessels with adequate capacity to accommodate the projected ridership and future demand can influence staffing levels and security infrastructure improvements.

Based on the ridership analysis, up to a 150-passenger vessel would accommodate ridership projections on each route through 2025. With a 150-passenger vessel, a crew of three would be required by the US Coast Guard. This is a similar size vessel utilized on the West Seattle route today. Any new vessel acquired should have bicycle storage on-board for at least 10 percent of the passengers. Additional storage of bicycles should be provided on

[13] [1] Motion 14561, link to King County - File #: 2015-0517 https://mkcclegisearch.kingcounty.gov/View.ashx?M=F&ID=4548828&GUID=2FCA3651-DC1B-4C3A-ABC4-E99058273A85

land to reduce the number of passengers taking their bicycle on-board the ferry (and increasing the amount of time it takes for all passengers to board and disembark the vessel). The 150-passenger vessels could be accommodated at most terminal locations with modifications to the existing infrastructure. The majority of site locations being considered would require designing boarding stations for the float or pier to facilitate expedited loading and unloading of passengers to help maintain the route schedule.

King County has two options for acquiring a vessel(s) for the new routes: lease or purchase. There are multiple options to purchase a 150-passenger vessel, including purchasing a previously used vessel or constructing a new vessel to add to the King County fleet. The cost estimate for a previously used vessel varies based on the amount of useful life remaining for the vessel as well as maintenance costs. An older vessel with higher use will be cheaper to purchase but would likely have higher maintenance costs; whereas a more expensive used vessel will have a longer estimated lifespan.

In addition to acquiring new vessels, existing vessels require ongoing preservation, and replacement vessels will be needed to maintain existing ferry service. Replacement schedules are based on an average life for a vessel of 25 years.

# Marine Facilities

New and upgraded marine facilities are needed to support existing and expanded marine services. These include new landings, a mobility hub for multi-modal connections in West Seattle, a maintenance facility, and float expansion at Pier 50.

As identified in the 2015 Marine Expansion Report, new landings will be needed for the Ballard to downtown Seattle, Kenmore to UW, and Kirkland to UW routes. In addition, investments in the West Seattle terminal and a new mobility hub will be needed to support existing water taxi service and improve multi-modal connections.

The existing infrastructure to support marine operations is a moorage and maintenance barge on the north side of Pier 48 in Seattle. The proximity to the Pier 50 passenger ferry terminal supports efficient servicing of vessels for preventative maintenance and emergency repairs. The facility provides moorage for all three existing vessels.

As new routes are added, daily maintenance and moorage of new vessels will have to be sited at a terminal or a nearby location. Building a small satellite maintenance facility to provide reliable vessel operations will be a priority—especially for lake routes that will be far from the current maintenance barge.

# Marine Cost Estimates

**Figure E-39 Metro Connects Estimated Cost for Marine Vessels and Facilities**

| Marine Investments | Unit | Total Units | Estimated Metro Costs (in millions YOE $) |
|---|---|---|---|
| Vessel Preservation | Lump Sum | --- | $3 |
| 150-Passenger Vessel Replacement | Vessel | 1 | $10 |
| 278-Passenger Vessel Replacement | Vessel | 1 | $37 |
| West Sea Terminal | Terminal | 1 | $21 |
| W Sea Mobility Transit Hub | Hub | 1 | $13 |
| Maintenance Facility Relocation | Lump Sum | --- | $15 |
| Float Expansion (Pier 50) | Lump Sum | --- | $21 |
| New Ballard Landing | Landing | 1 | $5 |
| New Ballard Vessel | Vessel | 1 | $10 |
| New Kenmore-UW Landings | Landing | 1 | $43 |
| New Kenmore-UW Vessels | Vessel | 2 | $22 |
| New Kirkland-UW Landing | Landing | 1 | $8 |
| New Kirkland-UW Vessel | Vessel | 1 | $12 |
| **Total** | | | **$220** |

# Appendix C: Description of potential funding sources

## King County Transportation Benefit District (KCTBD) Funding Authority

*RCW 36.73 allows for the creation of local Transportation Benefit Districts. In 2014, King County created the KCTBD with Ordinance 17746. The KCTBD's geographic boundaries are those of King County. It is governed by a board made up of the members of the King County Council. RCW 36.73 provides funding authority for Transportation Benefit Districts.*

| Funding Source | Authorizing Statute | Voter Approval Needed? | Max Rate | Max Term | Amount Raised per Increment |
|---|---|---|---|---|---|
| **Non-voted Vehicle License Fee** | RCW 82.80.140; 36.73.040(3)(b); 36.73.065 | No | $50 *(over time, in increments of $20, $20, $10)* | No restriction | $15M/year per $10[1] |
| **Voted Vehicle License Fee** | RCW 82.80.140; 36.73.040(3)(b); 36.73.065 | Yes | $100 | No restriction | $15M/year per $10 |
| **Sales Tax** | RCW 82.14.0455; 36.73.040(3)(a) | Yes *(partial councilmanic option)* | 0.3% (*0.1% councilmanic option, with remaining 0.2% requiring voter approval)* | 10 years *(plus 2nd 10 years with vote, can be longer if bonded)* | $82M/year per 0.1% |
| **Development Impact Fee** | RCW 36.73.040(3)(c); 36.73.120; 39.92.040; 39.92.030 | No *(Must be reasonably necessary as a result of the impact of development )* | Must be linked to development impact | One-time *(Can be paid over 5+ years, must be spent within 6 years)* | Depends on size of fee, geographic area where fee is applied |
| **Tolls** | RCW 36.73.040(3)(d) | Yes | As limited by the Transportation Commission and voters | As limited by the Transportation Commission and voters | Depends on size of toll, geographic area where toll is applied |

[1] Vehicle license fee revenue based on 1.7 vehicles available per King County household (2019 American Community Survey Table B08201)

| | | | | | |
|---|---|---|---|---|---|
| **Property Tax Excess Levy** | RCW 36.73.060; 84.52.056; Article VII, 2(a) | Yes *(60% approval, plus required percentage of participation of previous election)* | In excess of 1% limit | 1 year *(Up to 40 years if bonded)* | $63M/year per $0.10/$1,000 AV |
| **Local Improvement District (LID)** | RCW 36.73.080 | No | Up to amount of special benefit to property owners | No more than 30 years for term of bonds | Depends on size of fee, geographic area of LID |

# Metro Transit Funding Authority

*As a transit agency, Metro Transit is granted a number of funding sources by State law. Some of these sources can fund both operations and capital. Some are limited to specific capital or operating purposes. Metro is currently imposing the maximum allowed sales tax. Other funding sources could be imposed, though in some cases are similar to or the same as funding authority available to King County government.*

| Funding Source | Authorizing Statute | Voter Approval Needed? | Max Rate | Max Term | Amount Raised per Increment |
|---|---|---|---|---|---|
| **Sales Tax** | RCW 82.14.045; 35.58 | Yes | 0.9% ***(NOTE: Metro is currently imposing sales tax at the maximum rate)*** | No limit | $82M/year per 0.1% |
| **County Transit Property Tax Additional Regular Levy**[8] | RCW 84.52.140 | No | $.075 per $1,000 AV | None | $47M/year per $.075/$1,000 AV |
| **Property Tax Excess Levy** | RCW 35.58.116 | Yes *(60% approval, plus 40% participation of previous election)* | In excess of 1% limit | 1 year | $63M/year per $0.10/$1,000 AV |
| **GO Bonds With Excess Levy** | RCW 35.58.116; 84.52.056; 35.58.450 | Yes *(60% approval, plus 40% participation of previous election)* | In excess of 1% limit | Term of bonds *(up to 40 years)* | $63M/year per $0.10/$1,000 AV |
| **B&O Taxes For Businesses** | RCW 35.95.040; 82.04; 82.14.045 | No | As determined by Council ***(NOTE: Cannot be imposed if*** | N/A | Depends on rate, types of businesses affected |

[7] With a permanent multi-year lid lift, the levy lid bumps up more than 1% each year (up to the limit factor specified in the ballot measure) for up to six years. However, if expressly stated in the ballot proposition, the lid lift does not revert and the dollar amount of the levy in the final year of the lid lift is then used as the base to calculate future 101% levy limitations. See RCW 84.55.050 (4)(a).

[6] First $.01 must be used to add capacity to SR520, remainder for "transit related expenditures"

| | | | | | |
|---|---|---|---|---|---|
| | | | ***sales tax is imposed)*** | | |
| **Excise Tax on Residents** | RCW 35.95.040; 82.14.045 | No | $1 *Per month per housing unit* ***(NOTE: Cannot be imposed if sales tax is imposed)*** | N/A | $11M/year per $1[2] |

[2] Housing units based on 2019 WA OFM estimate & American Community Survey 5-year household estimates.

# King County Funding Authority for Transit Purposes

*King County, as a government, has several funding sources that can be used to fund transit. Some of these sources can also be used for other purposes (and in some cases are already being used for other purposes).*

| Funding Source | Authorizing Statute | Voter Approval Needed? | Max Rate | Max Term | Amount Raised per Increment |
|---|---|---|---|---|---|
| **Sales Tax (Basic)**[4] | RCW 82.14.030(1); 82.14.040 | No | 0.5% ***(NOTE: King County is currently imposing sales tax at the maximum rate)*** | N/A | $82M/year per 0.1% |
| **Sales Tax (Optional)**[5] | RCW 82.14.030(2); 82.14.040 | No | 0.5% ***(NOTE: King County is currently imposing sales tax at the maximum rate)*** | N/A | $82M/year per 0.1% |
| **General County Levy Authority** | RCW 36.40.090 (budget) | -- | This revenue source is usually fully budgeted | N/A | $63M/year per $0.10/$1,000 AV |
| **Property Tax Excess Levy Capital GO Debt** | RCW 84.52.056 | Yes *(60% approval, plus 40% participation of previous election)* | In excess of 1% aggregate limit | Term of bonds *(up to 40 years)* | $63M/year per $0.10/$1,000 AV |

[4] If both the County and a City impose the sales tax at its maximum rate of 0.5%, the city rate may not exceed 0.425%. This effectively makes the County's sales tax 0.5% in the Unincorporated areas and 0.075% in the City.

[5] If both the County and a City impose the Optional (2nd half-cent) sales tax at the same rate, then the County receives 15% of the revenue from the City's sales tax proceeds. King County currently levies the full 2nd half-cent sales tax.

[6] With a temporary multi-year levy lid lift, upon expiration, the levy reverts to what it would have been if the levy lid lift never existed and the County had made levies at the maximum rates which would otherwise have been allowed. *See* RCW 84.55.050(5).

| Funding Source | Authorizing Statute | Voter Approval Needed? | Max Rate | Max Term | Amount Raised per Increment |
|---|---|---|---|---|---|
| **Property Tax Single Year Levy Lid Lift (Temporary)** | RCW 84.55.050(1); WAC 458-19-045 | Yes | Limit factor is 101% after first year | As on ballot *(No more than 9 years if for debt service)* | $63M/year per $0.10/$1,000 AV |
| **Property Tax Single Year Levy Lid Lift (Permanent)** | RCW 84.55.050(1); WAC 458-19-045 | Yes | Limit factor is 101% after first year | Bump in year one *(No more than 9 years if for debt service)* | $63M/year per $0.10/$1,000 AV |
| **Property Tax Multi-Year Levy Lid Lift (Temporary)** | RCW 84.55.050(2); WAC 458-19-045 | Yes | Specify limit factor for years 2-6 *(Reverts to 101% after year 6)*[6] | As on ballot *(No more than 9 years if for debt service)* | $63M/year per $0.10/$1,000 AV |
| **Property Tax Multi-Year Levy Lid Lift (Permanent)** | RCW 84.55.050(2); WAC 458-19-045 | Yes | Specify limit factor for years 2-6 (Reverts to 101% after year 6)[7] | As on ballot (No more than 9 years if for debt service) | $63M/year per $0.10/$1,000 AV |
| **Road Improvement Districts** | RCW 36.88 | No | Owners "specially benefited" | Tied to term of debt | Depends on level, geographic area |

# Technical Report D: Transportation GHG Emissions Reduction Opportunities Evaluation

## BACKGROUND

Transportation generates more than one-third of greenhouse gases (GHGs) in King County. Reducing transportation emissions will require a combination of reducing car trips and vehicle emissions. As a public transit provider, King County Metro has a key role to play in reducing emissions both directly (by reducing emissions from its fleet) and indirectly (by getting people where they need to go without using their personal vehicles). In 2017, passenger vehicles made up 25.5 percent of King County emissions, and emissions from the Metro bus fleet made up 0.5 percent. Metro's fixed-route bus fleet alone generates approximately 100,000 tons of emissions annually while providing transit service. Shifting trips from private cars to transit, biking, or walking can all reduce emissions.

On an average weekday before the pandemic, Metro carried over 400,000 riders. Metro estimates that its pre-pandemic service levels reduced regional emissions by over 600,000 tons annually. These reductions are due not only to shifting trips from driving to transit, but also by supporting compact land use that reduces the need and length of private car trips.

Addressing climate change is a core priority for King County and Metro. The King County Metro Mobility Framework established a guiding principle to "address the climate crisis and environmental justice" and includes recommendations to meet King County's climate goals by reducing car use, developing clean infrastructure, promoting climate justice, and by prioritizing ways to make transit convenient and accessible.

The 2020 King County Strategic Climate Action Plan (2020 SCAP) established targets for reducing countywide greenhouse gas (GHG) emissions by 80 percent by 2050 and emissions from King County government operations by 80 percent by 2030. Transportation is responsible for over one-third of all GHG emissions in the county, which is primarily a result of the number and length of trips within, to, and from the county. The 2020 SCAP identifies pathways to achieving the countywide and operational targets, which includes reducing car trips countywide and implementing a zero-emission fleet. In order to meet the GHG emission targets, King County must reduce passenger and light-duty vehicle miles traveled by 20 percent by 2030 and 28 percent by 2050, and reduce county operational fleet emissions by 45 percent by 2025 and 70 percent by 2030, compared to 2017.

Metro led the development of the goals, strategies, and priority actions in the Transportation and Land Use focus area of the 2020 SCAP, building on work completed with the King County Metro Mobility Framework. This work with the 2020 SCAP was also used to inform Metro's Strategic Plan, Service Guidelines, and Metro Connects policy updates. In the development of the 2020 SCAP goals and priority actions, Metro identified the following key questions:

- What level of transit service, land use density, and vehicle usage pricing would be required to reduce vehicle miles traveled by 28 percent by 2050?
- What are the most cost-effective investments Metro can make to reduce GHGs, and what is the annual maximum GHG reduction that can be achieved? What other considerations, such as equity, are important when comparing strategies?

To address these questions, Metro conducted two preliminary analyses that are summarized in this technical report:

- **Evaluation of scenarios to meet vehicle miles travels reduction targets**
- **Comparison of Metro mobility and fleet investment strategies to reduce GHG emissions[1]**

# EVALUATION OF SCENARIOS TO MEET CAR TRIP REDUCTION TARGETS

To establish long-term goals for the SCAP and identify specific priority actions for the next five years, Metro modeled what levels of transit service, land use density, and vehicle usage pricing would be required to reduce vehicle miles traveled by 28 percent by 2050. The purpose of the analysis was to illustrate the scale of action needed. It was not intended to identify specific implementation strategies. The analysis used the PSRC VISION 2050 transit-focused land use scenario as a starting point. VISION 2050 assumes:

- Build out of Sound Transit 3 and Metro Connects[2]
- At least 98.5 percent of new countywide residential construction inside the Urban Growth Area
- A $0.13 per mile road usage and carbon fee.

With VISION 2050 as a baseline, an increase in transit service, land use density, and vehicle usage pricing were each modeled separately, along with a scenario that combined an increase in transit service with vehicle usage pricing.

The results of the evaluation are shown in Figure D-1. Additional analysis found that attempting to achieve the targets through increased transit service or vehicle usage pricing alone was likely cost prohibitive. It was also discovered that increased land use density alone would not achieve the target. Results showed that a combined scenario of equitably

[1] Full version of this analysis is available: King County Metro Mobility and Fleet Investment Strategies to Reduce GHG Emissions

[2] Original modeling conducted in 2019 based on 2017 Metro Connects and draft VISION 2050 transit-focused land use scenario.

implementing increased transit service, increased land use density, and vehicle usage pricing would be the best approach for achieving the target. This means that:

- Increasing land use density and affordable housing near transit, which is a key component of VISION 2050, will be critical to achieving long-term goals.
- Transit service levels above and beyond what is planned in Sound Transit 3 and Metro Connects will be required.
- Pricing vehicle travel either through congestion pricing, tolling, a road usage charge, parking pricing, or similar tools are also necessary components to realistically achieve targets. Equitably implementing any pricing strategy presents a real challenge and is critical to ensure it aligns with Environmental & Social Justice (ESJ) commitments and does not result in an inequitable economic burden for disadvantaged populations.

**Figure D-1 Results of Evaluation**

| | INPUTS/ASSUMPTIONS | | OUTCOMES | | |
|---|---|---|---|---|---|
| **Scenarios Tested** | **Transit Service Levels** | **Population and Job Growth** | **Vehicle Usage Pricing Levels** | **Percentage of Trips** Walk, Bile, Transit, Roll (% Non-Single Occupancy Vehicle Trips) | **Achieves 2020 SCAP and Metro Strategic Plan target for Reduction in Car Trips** (% reduction in VMT from 2017) |
| **VISION 2050** | Sound Transit 3 & 2050 Metro Connects service network | Adopted Regional Growth Strategy | $0.13/mile | 57% | X |
| **Transit Investment Focused** | ↑ | – | – | ↑ | ✓ |
| **Land Use Focused** | – | ↑ | – | – | X |
| **Vehicle Pricing Focused** | – | – | ↑ | ↑ | ✓ |

| Scenarios Tested | INPUTS/ASSUMPTIONS: Transit Service Levels | INPUTS/ASSUMPTIONS: Population and Job Growth | OUTCOMES: Vehicle Usage Pricing Levels | OUTCOMES: Percentage of Trips Walk, Bile, Transit, Roll (% Non-Single Occupancy Vehicle Trips) | OUTCOMES: Achieves 2020 SCAP and Metro Strategic Plan target for Reduction in Car Trips (% reduction in VMT from 2017) |
|---|---|---|---|---|---|
| Combined Scenario | ↑ | – | ↑ | ↑ | ✓ |

The proposed 2050 network in the 2021 Metro Connects update, along with the adopted VISION 2050, are estimated to reduce vehicle miles traveled in the range of 15 to 20 percent, falling short of the 2020 SCAP goal (28 percent reduction by 2050). This indicates a coordinated approach with regional and local agencies is needed to achieve targets. Based on this work, two strategies were adopted in the 2020 SCAP and are included in the King County Metro Strategic Plan update:

- Advocate and engage in regional conversations to evaluate options for vehicle usage pricing that is equitable.
- Advocate and engage in regional conversations on transit service growth and service funding to achieve County climate goals.
- Update Metro's policies, including Service Guidelines and Metro Connects, to reflect service priorities in routes that will reduce GHG emissions, balancing ridership, and climate priorities with other identified investment needs, including equity. Ensuring adherence to climate goals will require service priorities that focus on higher ridership services.

# COMPARISON OF KING COUNTY METRO MOBILITY AND FLEET INVESTMENT STRATEGIES TO REDUCE GHG EMISSIONS

The interim and 2050 service networks in Metro Connects outline Metro investments that will reduce GHG emissions by 1) sustaining and growing public transit and 2) transitioning to an all zero-emission bus fleet. Further investments and policy action by partners and King County residents will be required to address the climate crisis. For the investments in public transit and the fleet that Metro controls, several questions emerged as Metro moves toward implementing Metro Connects:

- What are the various options available to Metro to reduce GHG emissions?
- What is the most cost-effective investment strategy Metro can make to reduce GHGs?
- What other considerations, such as equity, are important when comparing strategies?
- How can Metro prioritize investments to develop a balanced portfolio to achieve goals?

To answer these questions, Metro examined:

- **The relative cost effectiveness**, in terms of dollars invested by Metro per ton of GHGs reduced (i.e., cost to reduce one ton of GHGs). Cost effectiveness is a useful metric for comparing across strategies and has been used by LA Metro[3] in a similar analysis.
- **The annual maximum potential GHG emission reduction** of different mobility and fleet purchasing strategies. Strategies vary in the magnitude of GHG emission reductions that can be achieved. Emissions from passenger transportation in King County is much larger than emissions from the Metro fleet, and as such, the opportunity to reduce emissions from passenger vehicle trips is much larger.

Investment strategies were identified and defined based on input from lead Metro staff and aim to align with Metro Connects updates. Strategies that were identified include:

- **Transit-oriented development (TOD):** Planning of developments surrounding Metro owned properties.
- **Transportation Demand Management**: Targeted campaigns to encourage transit and vanpool ridership
- **Alternative fuels:** Purchasing biodiesel blends or renewable diesel for diesel-hybrid bus fleets.
- **Zero emission fleet:** Transitioning to a zero-emission bus fleet.
- **New BRT/RapidRide corridors with land use change:** Implementing speed and reliability, and service improvements for BRT-type service, along with associated increases in land use and population density.
- **Frequent service expansion with land use change**: Implementing frequent service (i.e., reduced all-day headways) and associated increases in land use and population density.
- **Frequent service expansion**: Implementing frequent service (i.e., reduced all-day headways) during peak or off-peak periods for select routes
- **Speed & reliability:** Investing in corridors to improve peak and off-peak speeds of non-BRT/RapidRide routes
- **Access to transit:** Implementing non-motorized improvements near high-frequency Metro stops
- **First/last mile connections:** Improving access to high-capacity transit (e.g., VIA to transit).

Cost and emission reduction potential are only a few of the factors considered. The full set of quantitative and qualitative criteria included:

- **Cost effectiveness:** What monetary investment would Metro need to make to reduce one ton of GHGs?

[3] Los Angeles County Metropolitan Transportation Authority, 2010. Greenhouse Gas Emissions Cost Effectiveness Study. Available at: http://media.metro.net/projects_studies/sustainability/images/GHGCE_2010_0818.pdf and Los Angeles County Metropolitan Transportation Authority, 2019. Metro Climate Action and Adaptation Plan 2019. Available at: http://media.metro.net/projects_studies/sustainability/images/Climate_Action_Plan.pdf

**Annual maximum GHG emission reductions:** What are the maximum emission reductions that could be achieved in a future year (e.g., 2050) if the strategy is fully implemented?

**Community benefit:** Is there a community benefit beyond GHG reduction?

**Pro-equity opportunity:** Can the benefit be implemented to prioritize where needs are greatest?

**Sphere of influence:** Does Metro directly or indirectly influence GHG reduction?

**Transformational impact:** Does investment reduce future demand for fossil fuel? Is it permanent?

**Time scale:** How quickly can emission reductions be achieved: near- (1 yr. or less), medium- (2-7 yrs.), or long-term (8-15 yrs.)?

The purpose of this analysis was to provide quantitative and qualitative guidance comparing various investments across a set of performance criteria. It was not intended to be project specific, but instead provides a comparison of relative GHG emission reduction opportunities and costs that Metro can implement. With limited resources to commit to address climate change, the main purpose of this analysis was to assess which investment type would have the biggest emission reduction. The most desirable strategies to reduce GHG emissions are those that are cost-effective, offer a large potential to reduce emissions, have a community benefit, provide pro-equity opportunities, result in direct reductions, are transformative, are achievable in the near-term, and can be independently implemented by Metro. All final investment priorities will need to be made considering a range of factors including service needs, operations, safety, and equity.

# Methodology

Each mobility and fleet investment strategy was modeled and evaluated individually. Mobility investments were modeled based on sample projects and scaled to investment levels as defined in the 2021 Metro Connects update. The methodology used is as follows:

Fleet strategies were modeled assuming implementation across the full fleet.

Fleet electrification cost estimates were based on an updated cost benefit analysis by Metro performed in 2020.

Annual cost estimates were based on annual operating costs (e.g., service hours or fuel) in 2050 plus annualized capital infrastructure costs for the year 2050, adjusted for discount and inflation rates. While these annual cost estimates facilitate comparison across multiple strategies, in reality, these strategies will be implemented over many years.

Annual maximum emission reduction potential is based on the emission reductions that could be achieved when strategies are fully implemented or the benefit is fully realized (e.g., land use change). For the purposes of this analysis, 2050 was used for comparison.

Cost effectiveness was quantified based on annual cost estimates divided by annual maximum emissions reduction potential.

This analysis did not consider scenario alternatives for different combinations of investment strategies. While each strategy modeled is distinct, there would be overlap in emissions reductions and the total opportunity to reduce emissions through Metro Connects or fleet investments cannot be determined based on adding together analysis of individual strategies here.

# Results and Key Findings

The comparison of the cost effectiveness (cost per ton of carbon reduced) and annual maximum GHG emission reduction potential in 2050 (tons reduced per year) for each strategy is shown in Figure D-2.[4]

In Figure D-2:

- The width of the bars represents the potential range of cost, with narrow bars representing more known costs and wide bars representing costs with various levels of risk or dependencies. For example, there is a wide bar for frequent service because the cost to reduce one ton GHG ranges from $1,000 to $5,000 depending on the productivity of the service.
- In terms of position, the farther to the left the bar is, the more cost-effective the strategy is.
- The height of the bar reflects the potential emission reduction, with taller bars representing greater potential for emission reductions. The height of the bar varies when the emission reductions are dependent on how the investment is made. For example, investment in high productivity new RapidRide corridors could achieve a maximum of 350,000 tons or as few as 200,000 tons depending on if it is invested in higher or lower productivity corridors.

An ideal strategy would be to the far left, indicating the investment is cost-effective, and tall, indicating the emission reduction potential is large.

Several key findings emerge based on this analysis:

- The most cost-effective investments appear to include TOD, TDM and alternative fuels, all having a cost of between $0 and $300 per ton. When implemented in the most effective way possible, RapidRide or service with land use changes are also relatively efficient at about $500-800 per ton. The same is true with fleet electrification, at an estimated cost of $750 per ton. The least cost-effective investments are access to transit and first/last mile efforts.
- The options with the greatest potential for emission reductions include RapidRide and service with land use changes (between approximately 100,000 and 300,000

[4] Service investment and costs are modeled based on 2021 Metro Connects update. Fleet investments are based on the Zero-Emission Battery Bus Preliminary Implementation Plan (2020) (i.e., fleet plan associated with reduced service levels contemplated in 2025-2026 per the executive proposed budget).

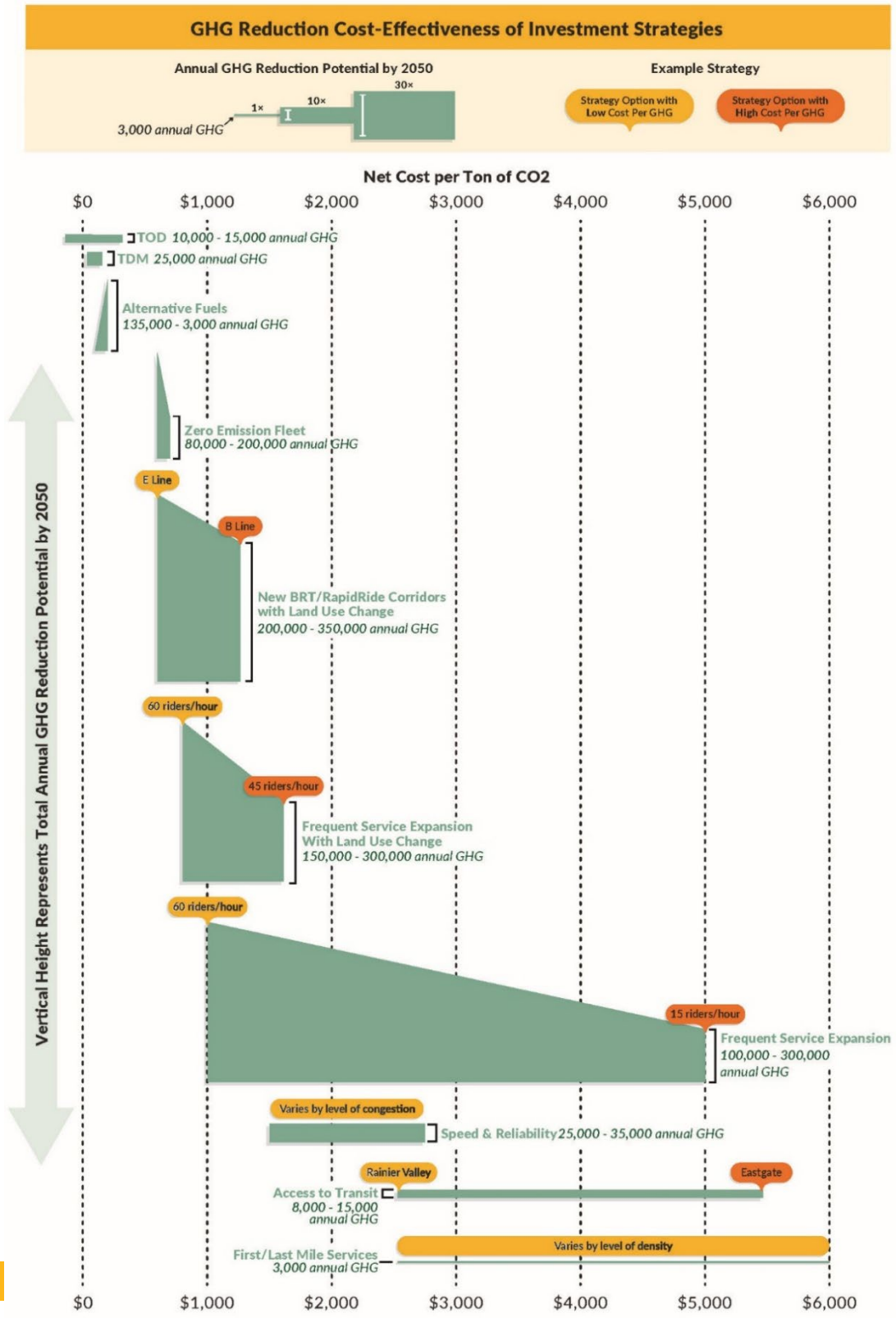
[4] All cost estimates are shown as annual investments in discounted 2019 dollars. Given uncertainty and modeling limitations, analysis excludes near-term COVID-19 related impacts on ridership. Fuel prices are based on current pricing in 2020.

tons/yr.), fleet electrification (135,000 tons/yr.), and service improvements (100,000 to 300,000 tons/yr.). Options with the least potential for emission reductions include TOD, TDM, and speed and reliability.

The options with the most certainty and lowest costs include fleet electrification, TDM, and fuel conversion.

Taken together, this information does not point to one single strategy but rather the need for a combination of strategies.

**Figure D-2 Net Cost Effectiveness Per Ton and Annual GHG Reduction Potential by 2040 of Mobility and Fleet Investment Strategies to Reduce GHG Emissions.**



Other qualitative factors are important when comparing trade-offs among investments to reduce GHG emissions, as shown in Figure D-3. Each strategy was evaluated based on the qualitative criteria, with green representing the most favorable conditions relative to the criteria and red being the least favorable. Ideally, climate strategies would offer community benefit, provide pro-equity opportunities, result in direct reductions, be transformative, be achievable in the near-term and be independently implementable by Metro. When comparing strategies by each of the qualitative considerations, the results indicate:

**Community benefits** are greatest for investments in mobility services because they result in improved mobility and quality of service. Zero-emission fleet investments provide the additional benefit of reduced air pollution; this benefit is minimal for alternative fuels.

**Pro-equity opportunities** exist for both mobility and fleet investments by prioritizing deployment where needs are greatest. Investments in King County Metro-owned property supporting TOD, new RapidRide, and new frequent service combined with active engagement to achieve transit-supportive land use that serves priority populations, supports thriving neighborhoods, and avoids displacement offers the greatest opportunity to advance both climate and equity goals. Zero-emission fleet deployment can be prioritized to address environmental justice.

**Direct or indirect impact** varies by strategy. Metro can influence passenger transportation but cannot directly control transportation choices of residents. In contrast, Metro has direct control over its fleet.

**Transformational investments** support long-term change to low-carbon infrastructure and reduce demand for fossil-fuel. Mobility investments that include long-lasting capital improvements and compact land-use development have a more permanent and transformational impact. Fleet investments that transition Metro to a zero-emission fleet reduces future demand for diesel fuel and is more transformative than the use of alternative fuels.

**Time to achieve** reductions is longest for the most transformational strategies with the most emission reduction potential. Land use changes and transitioning to a zero-emissions fleet have a long-lead time. Investments in TDM, alternative fuels, and frequent service could be realized in the near-term. Over half of the emissions from Metro's bus fleet could be eliminated almost immediately through the purchase of renewable diesel.

**Implementation** of new RapidRide and frequent service with land use change, TOD, and speed and reliability improvements all require significant coordination and support from partners and other organizations.

**Figure D-3 Comparison of Mobility and Fleet Investment Strategies to Reduce GHG Emissions**

| Metro Investments | Cost Effectiveness ($/ton) | Annual GHG Reduction Potential in 2040 (ton/yr.) | Community Benefit? | Pro-equity Opportunity? | Direct or Indirect? | Transformational Investment? | Time to Achieve Reductions? | Can Metro Independently Implement? |
|---|---|---|---|---|---|---|---|---|
| **Transit Oriented Development (TOD)** | <$0 - $300 | 10,000 – 15,000 | Yes - Housing | Yes | Indirect | Yes | Medium | No |
| **Transit Demand Management (TDM)** | $50-$100 | 25,000 | Maybe – Transit Access | Yes | Indirect | Maybe | Near | Yes |
| **Alternative Fuel** | $100 - $300: Biodiesel<br>$200: Renewable diesel | 3,000 – 135,000 | Minimal | Minimal – Contracting | Direct | Maybe | Near | Yes |
| **Zero-emission fleet** | $640 - $740 | 80,000 – 200,000 | Yes – Air pollution and noise | Yes – Air pollution and noise | Direct | Yes | Near, Medium + Long | Yes |
| **New BRT/RapidRide Corridors + Land Use** | $500 - $1,500 | 200,000 – 350,000 | Yes – Service | Yes | Indirect | Yes | Medium + Long | No |
| **Frequent Service Expansion with Land Use** | $750 - $1,000 | 150,000 – 300,000 | Yes- Service | Yes | Indirect | Yes | Near + Long | No |
| **Frequent Service Expansion** | $750 - $3,000 | 100,000 – 300,000 | Yes - Service | Yes | Indirect | Maybe | Near | Yes |
| **Speed & Reliability** (Non-RapidRide) | $1,250 - $2,250 | 25,000 – 35,000 | Yes – Service | Yes | Indirect | Yes | Medium | No |
| **Access to Transit** | $2,500 - $7,000 | 8,000 – 15,000 | Yes – Accessibility | Yes | Indirect | Yes | Medium | No |
| **First/ Last Mile Connections** | $2,500 - $5,500 | 3,000 | Yes - Service | Yes | Indirect | Maybe | Near | Yes |

Preliminary results of this analysis do not point to one simple strategy to reduce GHG emissions, but instead underscore the importance of a portfolio approach to reducing GHG emissions.

- The strategies Metro can likely implement for the least cost, including TOD, TDM, and alternative fuels, are not the same strategies that offer the largest potential opportunity to reduce emissions, which include RapidRide and frequent service with transit-supportive land-use and fleet electrification.
- Metro Transit can have the greatest certainty in emission reductions achieved through fleet conversion to zero-emission, but the opportunity to reduce emissions is fixed at the size of Metro's fleet. Emission reductions will scale with the size of the Metro fleet.
- The most transformative investments in low-carbon infrastructure will likely take the longest to fully realize. Investments in these strategies now – including RapidRide and frequent service with transit-supportive land-use and fleet electrification – will help position King County to achieve long-term goals.
- Fleet electrification appears to offer emission reduction at a cost comparable to high productivity service investments in RapidRide and frequent service.
- High productivity service investments appear to offer Metro Transit the opportunity to reduce emissions for lower cost than low productivity service.
- Alternative use of biofuels or renewable diesel could be an interim strategy to reduce fleet GHG emissions.

As committed to in the Metro Strategic Plan and 2020 SCAP, Metro must take the lead to reduce transportation emissions in the King County region by sustaining and increasing public transit, supporting compact transit-supportive land-use and reducing emissions from Metro fleets. Metro also recognizes that with constrained budgets and staff that these strategies will require new sustained sources of funding and must be implemented over time. This evaluation is a guide to inform comparison of the trade-offs amongst different investment options as Metro implements Metro Connects.