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September 28, 2017

Mr. Barry J. DeWeese  
Assistant Inspector General for Surface Transportation Audits  
U.S. Department of Transportation  
Office of Inspector General  
1200 New Jersey Ave S.E. 7<sup>th</sup> Floor  
Washington, DC 20590

Mr. DeWeese,

Thank you for sharing the results of the audit of METRO's financial condition and capacity conducted by the Office of Inspector General (OIG) of the U.S. Department of Transportation, with assistance of an independent consulting firm, Steer Davies Gleaves (SDG). As we have stated publicly, and in meetings with your team, METRO will not move forward with any major system expansion until potential funding sources are identified.

The analysis, requested by U.S. Rep. John Culberson, confirms much of what we have stated publicly regarding our ability to provide service and pay debts. Specifically, the report confirms:

- that METRO can maintain its current level of service and satisfy debts through FY 2021, absent dramatic adverse financial developments;
- that METRO's ability to operate and maintain its transit system at present levels of service is satisfactory;
- that METRO has the highest cash reserve target among several peer agencies, based on its Board-directed policy to retain cash reserves beyond the required minimum of 15 percent of operating expenses; and
- that METRO has lower debt-to-revenue ratio than several peer systems.

The report noted that METRO could encounter difficulties maintaining its discretionary additional reserves (over and above the 15 percent minimum) if it encountered dramatically adverse revenue or cost changes.

The assessment also discussed whether METRO could fund a significant multi-million dollar capital project based on current revenue projections. SDG applied varying stress tests to different baseline assumptions, and concluded that: "METRO's ability to finance a capital project in the next few years, with pre-construction activity beginning in FY 2018, ranges from \$0 to a \$2.6 billion project..."

**Metropolitan Transit Authority of Harris County, Texas**

1900 Main • P.O. Box 61429 • Houston, Texas 77208-1429

713-635-4000 • RideMETRO.org

**APTA 2015 OUTSTANDING PUBLIC TRANSPORTATION SYSTEM**

METRO has not finalized any plans to embark on any major capital expansion. Instead, METRO is currently seeking public comment as it develops a new plan for transit services ("METRONext") in the Houston Region. METRONext is focused on providing more transportation choices to more people as our region increases to nearly 10 million in the next 20 years.

METRO is pleased that the audit clearly demonstrated our conservative approach toward fiscal management and our commitment to maintaining quality and sustained services for our region. METRO remains committed to complete financial transparency and good stewardship of public dollars.

Sincerely,



Thomas C. Lambert  
President & Chief Executive Officer

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# *Office of Inspector General*

# *Audit Report*

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## **ASSESSMENT OF HARRIS COUNTY TEXAS METRO'S FINANCIAL CONDITION AND CAPACITY**

*Federal Transit Administration*

*Report Number: ST2017100*

*Date Issued: September 20, 2017*






U.S. Department of  
Transportation  
Office of Inspector General

# Memorandum

Subject: **INFORMATION:** Assessment of Harris County  
Texas METRO's Financial Condition and  
Capacity  
Federal Transit Administration  
Report Number ST2017100

September 20, 2017

From: Barry J. DeWeese   
Assistant Inspector General for  
Surface Transportation Audits

Reply to  
Attn. of: JA-30

To: Federal Transit Administrator

The Metropolitan Transit Authority of Harris County, TX (METRO) is the Nation's sixteenth largest transit system in terms of passenger miles, providing a range of transit services<sup>1</sup> to approximately 3.6 million people in the Houston area. The House Appropriations Committee directed us to conduct a financial solvency<sup>2</sup> audit of METRO.<sup>3</sup> Accordingly, our objective was to evaluate METRO's financial condition and capacity, including its ability to fund new services while maintaining current operations. For a glossary of the financial terms used in this report, see exhibit A. Because METRO is a Federal Transit Administration (FTA) grantee, we are providing this report to FTA.

We hired Steer Davies Gleave (SDG)<sup>4</sup> to conduct an evaluation of METRO's financial condition and capacity, subject to our oversight. To support and oversee SDG's work, we interviewed METRO officials and collected relevant documentation. We also developed and implemented an oversight plan—including regular meetings and communications, reviews of SDG deliverables and supporting documentation, and evaluations of SDG's quality assurance processes—to ensure that SDG's work met our audit objective and was in accordance with generally accepted Government auditing standards. We directed

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<sup>1</sup> These services include bus, light rail, and high occupancy vehicle/toll lanes.

<sup>2</sup> Financial solvency is the ability of an organization to meet its long-term financial obligations.

<sup>3</sup> House Report 114-129, May 27, 2015. The Report further directed us to conduct, as part of our audit, a stress test to determine whether METRO has adequate finances to pay for the construction of new rail lines while it operates and maintains existing rail lines and buses.

<sup>4</sup> SDG is an independent transportation consultancy with expertise in planning and forecasting. We selected SDG based on its detailed technical proposal, prior work, and client testimonials.

SDG to utilize FTA's Financial Capacity Policy<sup>5</sup> and guidance<sup>6</sup> to assess METRO's condition and capacity.<sup>7</sup>

To evaluate METRO's financial condition, SDG developed two sets of financial projections for revenue and costs, which SDG refers to as the METRO baseline and SDG baseline, respectively. For the METRO baseline, SDG used METRO's revenue and costs planning assumptions for fiscal years 2017 through 2021 and then adopted assumptions consistent with METRO's from fiscal year 2022 through fiscal year 2050.<sup>8</sup> We have focused our reporting on the 5-year period that METRO's revenue and costs planning assumptions covered—fiscal years 2017 through 2021. For the SDG baseline, SDG used alternative revenue projections that reflect an observed cyclical economic trend that impacts sales tax revenues. SDG also used cost projections that account for known future cost increases, such as growth in staff wages. SDG then conducted sensitivity analyses—which FTA guidance describes as a method to determine the impact of changes in specific sensitive, or uncertain, assumptions—on the baselines it developed.

Once SDG evaluated the sensitivity of individual assumptions, it performed stress tests<sup>9</sup> to assess METRO's capacity to finance new capital projects while maintaining current operations. In these stress tests, SDG used FTA's financial capacity assessment approach that evaluates a grant applicant's financial information, including projections, and determines the applicant's ability to undertake a major capital project. Because it was not pursuing any major capital project, METRO had not developed project-related financial information that typically informs a financial capacity assessment. SDG therefore identified a project similar to a project METRO recently considered, the University Corridor Light Rail Transit (University Line) project, to use as a proxy—the City of Charlotte's approximately \$1.16 billion light rail transit (LRT) Blue Line Extension (Charlotte Extension).

We conducted our work from September 1, 2016 to August 10, 2017, prior to Hurricane Harvey's impact on the Houston area. For further information on our

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<sup>5</sup> FTA's Financial Capacity Policy, FTA Circular 7008.1A (2002).

<sup>6</sup> FTA, *Financial Management Oversight Contractors' Guide for Conducting Financial Capacity Assessments* (July 2002).

<sup>7</sup> FTA's Financial Capacity Policy describes assessment of financial condition based on historical trends and current experience in a grantee's financial ability to operate and maintain its transit system at current service levels. It defines a satisfactory financial condition as a grantee's ability to pay current costs from existing revenues. This policy describes the following aspects of financial capacity: (1) the general financial condition of a grantee and its non-Federal funding entities; and (2) the financial capability of the grantee and its non-Federal funding entities, including an assessment of the grantee's ability to fund both current capital projects and operating needs. It defines satisfactory financial capability as a grantee's ability to pay expansion costs in addition to its current costs from projected revenues.

<sup>8</sup> METRO's fiscal year runs from October 1 through September 30.

<sup>9</sup> Stress tests determine the impact of adverse changes on uncertain projections that can occur simultaneously.

scope and methodology, see exhibit B. For information on SDG's scope and methodology, including the financial assumptions—and the bases for these assumptions—the firm used for each of its baselines, see exhibits C and D.

We acknowledge that, by their nature, financial projections assume the occurrence of future events that are unlikely to occur exactly as planned. Variances between assumed and actual outcomes may occur and affect the findings presented in this report.

## **BACKGROUND**

In 1978, Houston-area voters approved METRO's creation and the system began operation in 1979. METRO's first light rail line began operating in 2004, and it completed a light rail system extension in January 2017.

METRO is governed by a nine-member Board of Directors that has authority to set policies—including sale of short term bonds, operating reserve requirements, and strategic plans.<sup>10</sup> At its Board's direction, METRO's management has taken a fiscally conservative approach to planning. METRO officials stated that METRO's 5-year plan—developed through the fiscal year 2017 business planning process—incorporated steps to reduce sales tax growth projections and enhance cash reserves. For example, while METRO must retain 15 percent of its operating expenses to maintain its current bond rating,<sup>11</sup> the Board has also directed METRO to retain an additional 10 percent of its operating reserve and a \$10 million reserve fund.

Most of METRO's funding comes from a dedicated 1 percent tax generated by sales tax and business use tax revenues. For example, approximately \$517.3 million, or 70.9 percent, of METRO's \$729.2 million in total fiscal year 2016 funding was from sales and use tax revenue. This revenue source can be impacted by volatility in the energy market and national economic trends. The University of Houston's Institute for Regional Forecasting (Institute) develops sales and use tax revenue projections to inform METRO's planning process. For the fiscal year 2017 budget, the Institute revised its 5-year revenue projections downward based on local economic conditions. METRO's Board directed METRO management to further reduce these estimates by an average of

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<sup>10</sup> Texas Transportation Code, Chapter 451.

<sup>11</sup> According to METRO's fiscal year 2016 Comprehensive Annual Financial Report, METRO received a bond rating of Aa2 from Moody's Investors Service, Inc. and AA+ from Standard & Poor's Ratings Services on its fiscal year 2016 debt issues.

0.7 percent per year between fiscal years 2017 and 2021<sup>12</sup> in line with its conservative approach.

Since fiscal year 2011, METRO has also received approximately \$1.4 billion from FTA, including nearly \$866 million in capital funding for two rail transit projects. METRO does not plan to begin any other major projects through fiscal year 2021. METRO also previously sought approximately \$800 million in FTA capital funding for an additional rail transit project—the University Line project—which METRO anticipated in 2011 would require approximately \$1.6 billion in total capital funding. In 2016, FTA removed the University Line project from its Capital Improvement Grant Program due to project inactivity and a lack of demonstrated progress on the project’s design and local financial commitment over the previous several years. However, METRO may seek Federal funds for capital projects in the future.

## **RESULTS IN BRIEF**

Based on SDG’s analysis, we found that METRO’s financial condition—its ability to operate and maintain its transit system at present levels of service—was satisfactory but vulnerable to adverse revenue or cost changes. Specifically, under both baselines, SDG projected that METRO would be able to maintain its current operations and debt obligations through fiscal year 2021 while maintaining its minimum required level of operating reserves—15 percent of operating expenses. METRO has the highest cash reserve target among several peer systems, based on METRO’s Board-directed policy to retain cash reserves beyond the required 15 percent of operating expenses. In addition, METRO has a lower debt-to-revenue ratio than several peer systems. However, SDG’s analyses revealed that METRO may encounter difficulties maintaining its added cash reserves if it faces adverse revenue or cost changes. For example, using either baseline, adverse revenue changes of 5 percent or adverse cost changes of 10 percent in fiscal year 2017 could prevent METRO from meeting its added cash reserve targets in each of the 5 fiscal years from 2017 through 2021.<sup>13</sup>

We also found, based on SDG’s analysis, that METRO’s financial capacity—which includes both general financial condition and the stability and reliability of revenue sources needed to meet future annual capital, operating and maintenance costs—was significantly restricted due to a recent lack of reliability and stability in

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<sup>12</sup> The Board-directed changes were -1.00 percent for fiscal year 2017, -1.00 percent for fiscal year 2018, -0.75 percent for fiscal year 2019, -0.50 percent for fiscal year 2020 and -0.25 percent for fiscal year 2021.

<sup>13</sup> For its sensitivity testing, SDG tested 5 or 10 percent changes to line items in fiscal year 2017. For example, if METRO’s budgeted farebox revenue from rider fares in fiscal year 2017 was \$100 million, then the 5 percent test would assume that fiscal year 2017 farebox revenue was instead \$95 million.

revenues, and as a result, METRO's ability to fund new services while maintaining operations is limited. Primarily due to reduced sales and use tax revenue projections from the Institute, METRO revised its 5-year revenue projections downward between its fiscal year 2016 and fiscal year 2017 budgets, providing evidence of short-term instability in revenue sources. Therefore, significantly lower-than-budgeted actual revenues could negatively affect both METRO's current operations and its ability to fund future capital projects. To illustrate, under SDG's METRO baseline, SDG projected that METRO could fund its share of a \$2.6 billion project. Therefore, under this baseline, METRO could fund its share of the \$1.16 billion Charlotte proxy project. However, using the SDG baseline and SDG baseline stress case scenario results, METRO would be limited to a \$456 million project—a project cost approximately 20 percent of what METRO could support under the METRO baseline. Using the SDG baseline, METRO would need to delay pre-construction activity<sup>14</sup> on an investment similar to the Charlotte Extension until 2023 at the earliest to have sufficient resources.

### **METRO'S FINANCIAL CONDITION WAS SATISFACTORY BUT VULNERABLE TO ADVERSE REVENUE AND COSTS CHANGES**

We determined, based on SDG's application of FTA guidance, that METRO had a satisfactory financial condition but that adverse changes in either revenues or costs could pose risks for this condition in the future.

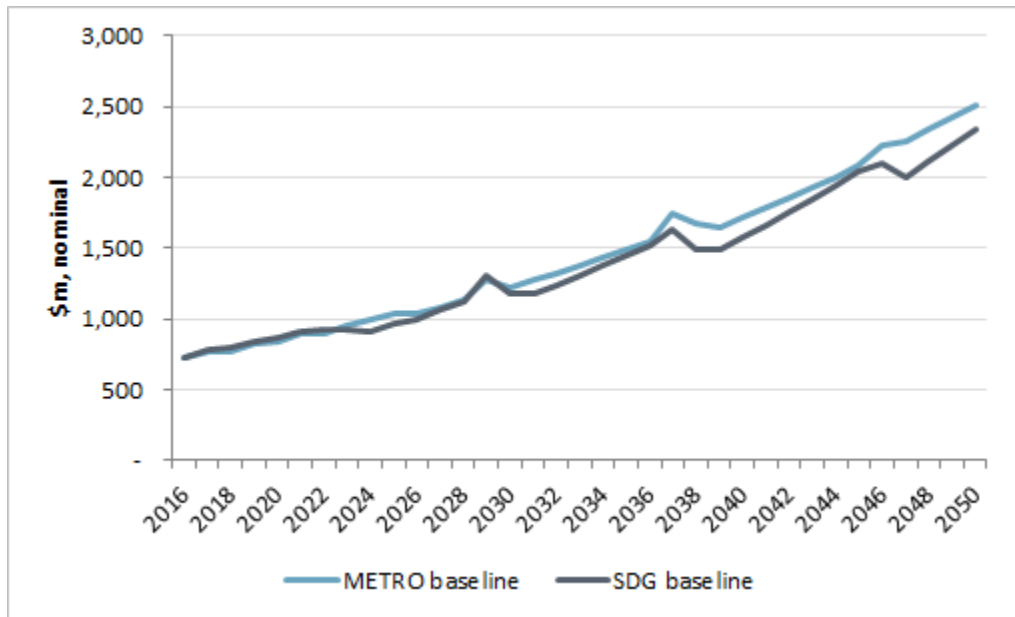
Specifically, under both its METRO baseline and SDG baseline, SDG projected that METRO can maintain its current operations and debt obligations from fiscal years 2017 through 2021 while also maintaining its minimum required level of operating reserves—15 percent of operating expenses. As illustrated in figures 1 and 2, SDG's two revenue and costs baselines are similar through fiscal year 2021. Beyond 2021, the METRO revenue baseline grows at a slightly higher average rate than the SDG revenue baseline due to different sales tax revenue growth assumptions. The METRO costs baseline, however, grows at a lower average rate than the SDG costs baseline due to different operating cost growth assumptions.

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<sup>14</sup> For purposes of SDG's analysis, pre-construction activity refers to project phases, such as preliminary engineering and final design, which precede major capital transit project construction. See table B-4 in exhibit B for additional information.



**Figure 1. Revenues—METRO and SDG Baselines**



Source: METRO's business plan and budget for fiscal year 2017 and SDG analysis.

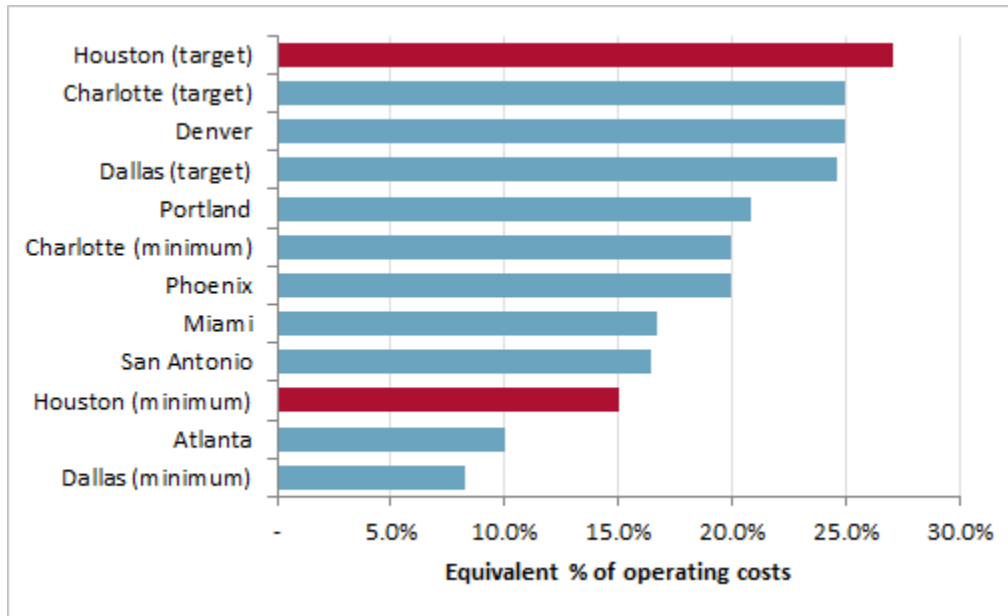
**Figure 2. Costs—METRO and SDG Baselines**



Source: METRO's business plan and budget for fiscal year 2017 and SDG analysis.

Because of its Board-directed policy to retain cash reserves beyond the required 15 percent of operating expenses, METRO has the highest cash reserve target among several peer systems (see figure 3).

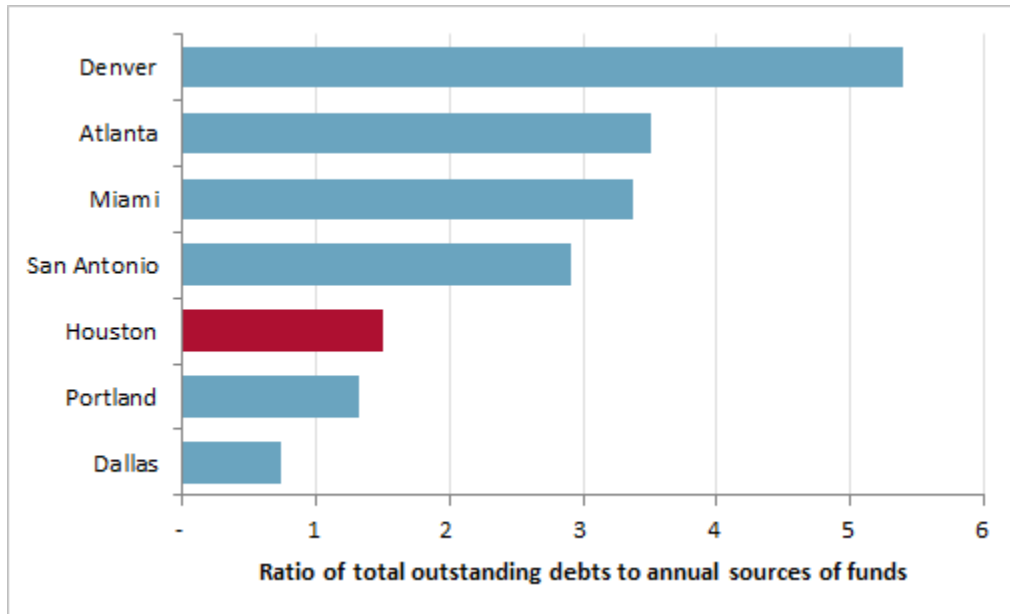
**Figure 3. METRO's and Peer Systems' Required Cash Reserve Minimums and Targets**



Source: METRO's business plan and budget for fiscal year 2017 and reported debt policies of peer entities.

METRO also has a lower debt-to-revenue ratio than several peer systems (see figure 4), and consequently, SDG had no concerns regarding the current level of METRO's debts compared to those of peer systems.

**Figure 4. METRO's and Peer Systems' Ratios of Debts to Annual Sources of Funds<sup>a</sup>**



<sup>a</sup> SDG omitted the Charlotte Area Transit System and City of Phoenix Public Transit Department from this analysis, because it could not locate consistent information on outstanding debts and annual sources of funds for these systems.

Source: METRO's business plan and budget for fiscal year 2017 and reported debt policies of peer entities.

SDG's analysis indicates that while METRO's financial condition was satisfactory, several possible revenue and cost changes could negatively impact its position in the future. SDG ran sensitivity analyses using the METRO and SDG baselines to determine how changes to sensitive, or uncertain, assumptions can affect the financial projections. According to most of these analyses, METRO may encounter difficulties maintaining its added cash reserves in the event of revenue declines or cost increases. Furthermore, if METRO were to experience 10 percent sales tax revenue declines in fiscal year 2017—and did not take actions such as reducing service or borrowing—it could exhaust its cash reserves and be insolvent at points from fiscal years 2017 through 2021.

SDG identified evidence of instability in METRO's anticipated future revenue, which includes sales taxes and other revenue sources. Specifically, METRO significantly reduced its 5-year revenue projections between its fiscal year 2016 and fiscal year 2017 budgets—ranging from a 6.0 percent reduction in total revenues for fiscal year 2018 to a 10.1 percent reduction in total revenues for fiscal year 2016. Because the reduction from fiscal years 2017 through 2020 was primarily due to a lowered sales tax projection from the Institute, rather than subsequent Board action to reduce this projection, SDG considered it reasonable to test for additional 5 and 10 percent revenue reductions in fiscal year 2017. For

example, using METRO’s baseline, SDG reduced METRO’s individual revenue items—such as total sales taxes; bus, LRT and METROLift<sup>15</sup> fare revenues, known as farebox; or Federal grant funding—by 5 percent in fiscal year 2017 and determined the impact on that year and the following 4 fiscal years. As illustrated in table 1, SDG determined that if total sales taxes were reduced, METRO could not meet its required 15 percent of operating reserves in 3 of the 5 years. SDG also determined that, if total sales taxes were reduced by 5 percent, the largest difference between METRO’s cash reserve and its required 15 percent operating reserve level in these 3 years would be \$57 million. See table 1 for the impact of a 5 percent reduction on other revenues.

**Table 1. METRO Baseline Sensitivity to a 5 Percent Revenue Decrease for Fiscal Years 2017 through 2021**

	Years below cash reserve threshold			Largest difference from cash reserve threshold (millions)		
	<i>Board-directed</i>	<i>Required</i>	<i>No Reserve</i>	<i>Board-directed</i>	<i>Required</i>	<i>No Reserve</i>
Total sales taxes	4	3	-	(\$128)	(\$57)	\$34
Farebox	2	-	-	(\$14)	\$57	\$147
Vanpool <sup>a</sup>	2	-	-	(\$1)	\$68	\$157
HOT lanes <sup>b</sup>	2	-	-	(\$1)	\$68	\$156
Federal grant funding	3	-	-	(\$21)	\$49	\$140
Other revenue sources	2	-	-	(\$1)	\$68	\$156

<sup>a</sup> Revenue from a METRO shared-ride service. Vanpool revenue was \$0 in fiscal year 2016, so the reduction of 5 percent is applied to fiscal year 2018 onwards rather than to fiscal year 2017 onwards.

<sup>b</sup> Revenue from METRO’s high occupancy vehicle/toll (HOT) lanes.

Source: SDG analysis.

Furthermore, if its sales tax revenues decrease by 10 percent in fiscal year 2017, METRO could not meet its required operating reserves for 4 of the 5 years, and without action, would be insolvent during 3 of the 5 years. See exhibit E for the results of this and SDG’s other revenue sensitivity analyses.

Using the SDG baseline, SDG’s sensitivity analysis shows that if METRO’s sales tax revenues decrease by 5 percent, METRO could not meet its added reserve levels for 3 of the 5 years. If its sales tax revenues decrease by 10 percent,

<sup>15</sup> A shared-ride complementary service that provides transportation for persons with disabilities who cannot board, ride or disembark from a METRO fixed-route bus.

METRO could not meet its required operating reserves for 3 of the 5 years, and without action, would be insolvent during 2 of the 5 years.

SDG also identified evidence of instability in METRO's anticipated costs. Specifically, between its fiscal year 2016 and 2017 budgets, METRO reduced its total operating costs forecast by 3.5 percent for fiscal year 2016 with reductions increasing to 5.4 percent in 2020. SDG also determined that METRO assumed future operating cost increases would be limited to 1.5 percent a year—despite planned cost increases of 3.0 percent per year for its unionized workers and comparable increases planned for non-union staff in fiscal year 2017. If applied every year in a 5-year projection, the discrepancy would reach 7.6 percent in fiscal year 2021.<sup>16</sup>

SDG concluded that additional cost changes of 5 and 10 percent from the METRO baseline were reasonable for testing. For example, using METRO's baseline, SDG increased METRO's individual cost items—such as METROLift, labor and fringe benefits, and other operating expenses—by 5 percent in fiscal year 2017 to determine the impact on that year and the following 4 fiscal years. As illustrated in table 2, when SDG increased METRO's labor and fringe benefit costs by 5 percent, METRO could meet its required reserve level in all 5 fiscal years from 2017 through 2021, but could not meet its added reserve level in as many as 4 of the 5 years. SDG also determined that, if labor and fringe benefit costs increased by 5 percent, the largest difference between METRO's cash reserve and added reserve level in these 4 years would be \$61 million. See table 2 for the impact of a 5 percent increase on other costs.

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<sup>16</sup> SDG used the following formula to calculate the discrepancy between METRO's future cost increase assumption (1.5 percent per year) and its agreed cost increase for unionized staff (3.0 percent per year) over the 5 year projection:  $(1 + 3.0\%) / (1 + 1.5\%)^5 - 1 = 7.6\%$ .

**Table 2. METRO Baseline Sensitivity to a 5 Percent Cost Increase for Fiscal Years 2017 through 2021**

	Years below cash reserve threshold			Largest difference from cash reserve threshold (millions)		
	<i>Board-directed</i>	<i>Required</i>	<i>No Reserve</i>	<i>Board-directed</i>	<i>Required</i>	<i>No Reserve</i>
METROLift	2	-	-	(\$14)	\$57	\$148
Other operating costs <sup>a</sup>	2	-	-	(\$1)	\$69	\$157
Labor and fringe benefits	4	-	-	(\$61)	\$11	\$103
Non-labor	4	-	-	(\$38)	\$33	\$124
Capital program expenses <sup>b</sup>	3	-	-	(\$25)	\$45	\$136

<sup>a</sup> Costs or expenses associated with the operation of the transit agency.

<sup>b</sup> Expenses related to the acquisition or upgrade of physical assets such as property or equipment.

Source: SDG analysis.

Furthermore, if either labor and fringe benefit costs or non-labor costs increase by 10 percent, METRO could not maintain its required operating reserve in 3 of the 5 years and 1 of the 5 years, respectively. See exhibit E for the results of this and SDG's other revenue sensitivity analyses.

SDG's sensitivity analysis using the SDG baseline shows that if any of METRO's individual cost line items increase by 5 percent in fiscal year 2017, METRO could meet both its required operating reserve and its added reserve levels during each of the 5 fiscal years from 2017 through 2021. However, should either labor and fringe benefit costs or non-labor costs increase by 10 percent, METRO could not meet its added reserve levels in 4 and 2 of the 5 years, respectively.

METRO officials identified several actions METRO could take in the event that it needs additional funds to meet operating costs due to short-term revenue declines or cost increases. These actions include seeking Board approval to reduce cash reserve levels to as low as the required 15 percent of operating expenses, reducing services, and borrowing funds.

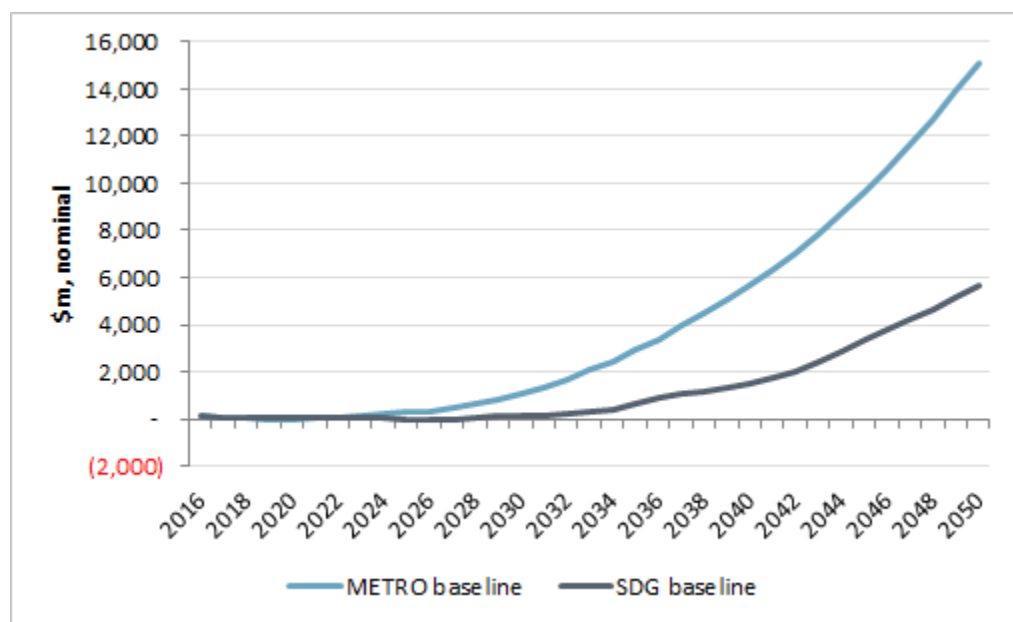
## **METRO'S CURRENT CAPACITY TO FUND SYSTEM EXPANSION WAS LIMITED**

We also found, based on SDG's application of FTA guidance with some modifications because METRO was not pursuing a specific new project, that METRO's current financial capacity is significantly restricted due to recent unreliability and instability in its projected revenues. METRO significantly revised its 5-year revenue projections downward between its fiscal year 2016 and 2017

budgets, primarily due to reduced revenue forecasting estimates from the Institute, providing evidence of instability in METRO’s revenue. This instability limits the Agency’s ability to support existing operation costs while undertaking system expansion.

Under both its METRO baseline and SDG baseline, SDG projected that METRO’s available cash for investments will average less than \$100 million each year through fiscal year 2023. After that year, the METRO baseline projects a significant increase in available cash from revenues growing at a faster rate than costs because the baseline was based on assumptions consistent with METRO’s short-term planning assumptions which do not reflect cyclical trends or known cost increases. In contrast, the SDG baseline remains flat for a longer period of time and then grows at a slower rate than the METRO baseline, because the SDG baseline reflects cyclical changes in the energy market and known METRO cost increases.<sup>17</sup> See figure 5.

**Figure 5. METRO and SDG Baselines Cash Available for Investment**



Source: METRO’s business plan and budget for fiscal year 2017 and SDG analysis.

To evaluate METRO’s financial capacity for new projects, SDG applied three different stress tests to the METRO and SDG baselines, and determined different possible maximum investment levels under bond issuance and public-private

<sup>17</sup> See exhibits C and D for additional information about SDG’s financial baseline assumptions.

partnership (P3)<sup>18</sup> assumptions. Through its sensitivity analyses, SDG identified sales tax revenue reductions and operating cost increases as critical risk factors, where adverse growth changes to these factors would have a significant negative impact on METRO's financial condition. Therefore, SDG included these factors in two of its three stress case scenarios. The stress case scenarios are:

- **Stress case 1.** Sales tax growth is reduced from the baseline level by 0.5 percent each year from fiscal year 2017 through fiscal year 2021, with a total reduction of approximately 2.5 percent by fiscal year 2021;
- **Stress case 2.** Sales tax growth is reduced from the baseline level by 1.0 percent each year from fiscal year 2017 through fiscal year 2021, with a total reduction of approximately 5.0 percent by fiscal year 2021, and operating cost growth increased from the baseline level by 0.5 percent in each year from fiscal year 2017 through fiscal year 2021, leading to a total increase of approximately 2.5 percent by fiscal year 2021; and
- **Stress case 3.** No change is made to the baseline revenue and cost assumptions but capital costs overrun by 10 percent relative to the estimated capital cost of the Charlotte Extension project.

Depending on the baseline and stress case used, METRO's ability to finance a capital project in the next few years—with pre-construction activity beginning in fiscal year 2018—ranges from \$0 to a \$2.6 billion project, provided that METRO obtains Board approval to use its additional cash reserves beyond the required 15 percent of operating expenses reserve level. Under SDG's METRO baseline, SDG projected that METRO could currently fund its share of a \$2.6 billion project. Therefore, under this baseline, METRO could fund its share of the \$1.16 billion Charlotte proxy project. However, using the SDG baseline and SDG baseline stress case scenario results, METRO would currently be limited to a \$456 million project—a project cost approximately 20 percent of what METRO could support under the METRO baseline. See table 3.

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<sup>18</sup> Public-private partnerships can be defined as contractual agreements formed between a public agency and a private sector entity that allow for greater private sector participation in the delivery and financing of transportation projects.



**Table 3. Scenario Analysis: Projected Maximum Level of Investment**

Baseline and financing assumptions	Projected maximum level of investment (millions)			
	Base case	Stress case 1	Stress case 2	Stress case 3
METRO baseline, bond issue	\$2,661 <sup>a</sup>	\$1,379 <sup>a</sup>	-	\$1,954
METRO baseline, P3	\$2,661 <sup>a</sup>	\$1,379 <sup>a</sup>	-	\$2,661
SDG baseline, bond issue	\$290	-	-	\$210
SDG baseline, P3	\$456	-	-	\$456

<sup>a</sup> Based on SDG's analysis under these scenarios, METRO's projected maximum level of potential investment is the same under both the bond issue and P3 financing approaches.  
Source: SDG analysis.

SDG's analysis shows that METRO is unable to finance almost any capital projects while meeting its added cash reserve levels, which impact the amount of cash METRO has available for investment. According to SDG's stress testing, under the METRO baseline and in one of the METRO baseline stress case scenarios, METRO could fund an approximately \$12 million investment while maintaining its added reserve levels. See table 4.

**Table 4. Scenario Analysis: Projected Maximum Level of Investment at Added Reserve Levels**

Baseline and financing assumptions	Projected maximum level of investment at added reserve levels (millions)			
	Base case	Stress case 1	Stress case 2	Stress case 3
METRO baseline, bond issue	\$12	-	-	\$12
METRO baseline, P3	\$12	-	-	N/A <sup>a</sup>
SDG baseline, bond issue	-	-	-	-
SDG baseline, P3	-	-	-	N/A <sup>a</sup>

<sup>a</sup> Stress case scenario 3 increases capital costs by 10 percent relative to the estimated capital cost. This capital cost increase is only applied to the bond issue funding approach because the contractor in a P3 would bear the cost overrun risk.  
Source: SDG analysis.

Based on the SDG baseline and stress case scenario results, SDG determined that METRO could not support a project the size of the Charlotte Extension at this time. METRO officials stated METRO is not involved in or planning to commence such a project at this time.

Using the \$1.16 billion Charlotte Extension cost (except for stress case scenario 3, in which cost overruns increase project costs by 10 percent over the estimate), SDG shifted the pre-construction activity year to a point at which METRO meets its 15 percent of operating costs requirement. According to SDG, in many cases, METRO is projected to not meet this requirement regardless of whether it is pursuing any additional capital projects. In these instances, each year identified in table 5 is the earliest METRO could begin pre-construction activity under the different baselines and stress case scenarios once it has returned to a point at which it can meet its 15 percent requirement. SDG did not allow METRO to incur additional costs in years when the Agency does not have cash reserves to meet its 15 percent requirement. While SDG found that, under the METRO baseline, METRO could potentially finance a capital project the size of the Charlotte Extension with pre-construction activity beginning in fiscal year 2018, SDG did not find this to be true in any of the SDG baseline scenarios. Using SDG's baseline, METRO could not begin pre-construction activity on a project comparable to the Charlotte Extension until 2023 at the earliest to have sufficient resources. See table 5.

**Table 5. Scenario Analysis: Projected Earliest Dates for Future Investments**

Baseline and financing assumptions	Projected earliest dates for future investments			
	Base case	Stress case 1	Stress case 2	Stress case 3
METRO baseline, bond issue	2018	2018	2025	2018
METRO baseline, P3	2018	2018	2025	2018
SDG baseline, bond issue	2023	2029	2036	2024
SDG baseline, P3	2023	2029	2036	2023

Source: SDG analysis.

## CONCLUDING OBSERVATIONS

METRO could face challenges in maintaining its satisfactory financial condition but has the ability to revise its current cash reserve practices if it needs additional funds. Furthermore, METRO's limited financial capacity suggests focus on the operation and maintenance of its current system rather than significant system expansion in the near term.

Because this report is primarily for informational purposes for Congress, we are not making recommendations to FTA.

## **AGENCY COMMENTS AND OFFICE OF INSPECTOR GENERAL RESPONSE**

We provided a draft of this report to FTA on August 10, 2017, and received its technical comments on August 25, 2017, which we incorporated as appropriate. The Agency elected not to provide a formal management response to the report.

We appreciate the courtesies and cooperation of the Federal Transit Administration's representatives during this audit. If you have any questions concerning this report, please call me at (202) 366-5630, or Tiffany Mostert, Program Director, at (202) 366-0625.

#

cc: The Secretary  
DOT Audit Liaison, M-1  
FTA Audit Liaison, TBP-30

## EXHIBIT A. GLOSSARY

***bond rating***: a ranking based on the relative future credit risk of a bond issuer, based upon an informed opinion of how issuers will perform relative to other issuers.

***capital expenses***: expenses related to the acquisition or upgrade of physical assets, such as property or equipment.

***elasticity***: a measure of the sensitivity to change in one variable brought about by a change in some other variable.

***financial baseline***: the projected revenues and costs associated with continuation of an entity's existing services, excluding the impact of any additional capital investment.

***financial capability***: the stability and reliability of revenue sources needed to meet a transit system's future annual capital and operating and maintenance costs.

***financial capacity***: (1) the general financial condition of a public transit system and its non-Federal funding entities; and (2) the financial capability of the transit system and its non-Federal funding entities, which includes an assessment of the transit system's ability to fund current capital projects as well as ongoing operating needs.

***financial condition***: the financial ability to operate and maintain a transit system at present levels of service.

***financial projection***: an entity's projected revenues and costs associated with any given future-year scenario.

***financial solvency***: an entity's ability to meet its obligations.

***operating expenses***: expenses associated with an entity's operation.

***public-private partnerships***: contractual agreements between a public agency and a private sector entity that allow for greater private sector participation in the delivery and financing of projects, such as transportation projects.

***regional transportation plan***: a long-range plan that identifies roadway, transit and other transportation projects for a region for the next 20 years or more.

***sensitivity analysis***: a process to determine the impact of changes in sensitive, or uncertain, assumptions on a financial projection.

*stress test*: can be performed as part of a sensitivity analysis to determine the impact of the adverse changes that can occur simultaneously on uncertain financial projections.

## **EXHIBIT B. OIG'S SCOPE AND METHODOLOGY**

We conducted our work from September 1, 2016 through August 10, 2017 in accordance with generally accepted Government auditing standards (GAGAS). Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and observations based on our audit objectives. However, this audit contains financial projections and we acknowledge that, by their nature, these projections assume the occurrence of future events that are unlikely to occur exactly as planned. Variances between assumed and actual outcomes may occur and could be material to the findings in this report.

The House Appropriations Committee directed our office to conduct a financial solvency audit of METRO, including a stress test, to determine whether METRO has adequate finances to pay for new rail line construction as well as the operation and maintenance of existing rail lines and buses. Our audit objective was to evaluate METRO's financial condition and capacity, including its ability to fund new services while maintaining current operations.

We determined that we would best be able to complete our objective with external assistance. We issued a request for quotation in order to hire a contractor to perform an evaluation of METRO's financial condition and capacity, including conducting sensitivity analyses on METRO's budget, subject to our oversight. The statement of work we provided to potential contractors included interim deliverables due at different points, which taken together would constitute the final report. We convened a technical evaluation panel to review proposals for the contract, and the Office of the Secretary of Transportation (OST) awarded the contract to SDG after we determined that SDG's technical and pricing proposals would provide the best overall value. The selection team included our personnel with the technical expertise to evaluate the proposals—the Chief Economist, an OIG Senior Economist and a Program Director who specializes in financial analysis. Following the contract award, we used a Contracting Officer's Representative (COR), who was tasked with ensuring satisfactory performance of our contract and serving as a liaison between us and SDG.

To support SDG's work, we interviewed METRO officials, visited transportation facilities, and collected documents. We provided this information to SDG to inform its work. We also oversaw SDG's interviews with METRO and the Institute. We directed SDG to use FTA's Circular 7008.1A and *Financial Management Oversight Contractors' Guide for Conducting Financial Capacity Assessments* to guide its work. For a detailed explanation of how SDG conducted its work, please see exhibits C and D.

With the assistance of our COR, we created and implemented an oversight plan to ensure that SDG's work met the terms of the contract and GAGAS. SDG provided weekly progress reports to the audit team. We also communicated regularly with SDG personnel on SDG's progress and to address any concerns that they identified in the course of their work. As part of our oversight plan, we met with SDG in December 2016 to review and discuss SDG's quality assurance policies and procedures and to ensure that their internal procedures aligned with GAGAS. We met with SDG again in February 2017 to determine whether it was carrying out the work under our contract in accordance with its quality assurance policies and procedures that we concluded aligned with GAGAS in December 2016. We assessed SDG's Business Plan and use of internal quality control documents. Using documentary and testimonial information that SDG provided, we traced and verified selected product elements to determine their accuracy and alignment with GAGAS. Our Senior Statistician evaluated SDG's data reliability processes for sufficiency and the data reliability testing that SDG performed on all the databases used to draw conclusions. Our Statistician determined that SDG's data reliability processes were sufficiently reliable for purposes of this audit. Based on our review, we determined that the work performed by SDG would meet GAGAS.

In addition to our oversight of SDG's internal quality assurance policies and procedures, our oversight plan included steps to ensure detailed review and evaluation of SDG's work throughout the contract. We evaluated each of SDG's draft deliverables for sufficiency, accuracy, and clarity prior to accepting the final deliverables. The review process included input from our personnel with technical expertise in relevant quantitative methods and contract oversight. Our Chief Economist, the consulting Program Director with technical expertise in financial analysis and our Senior Statistician all reviewed and provided feedback on SDG's draft deliverables. Our Chief Economist evaluated SDG's testing approach methodology to ensure its validity and our consulting Program Director reviewed SDG's financial projections for sufficiency and appropriateness. We provided SDG with written comments on its draft deliverables through electronic comments in both the draft documents and in Microsoft Excel workbooks that detailed our comments and SDG's responses. SDG incorporated our suggestions into the subsequent versions of its draft report, and we informed SDG whether or not its changes were sufficient. Upon receipt of SDG's final deliverable, our Chief Economist, Financial Analyst, Senior Statistician, COR, and senior management reviewed the final report and determined that it was sufficient. OIG accepted SDG's final report in May 2017.

## **EXHIBIT C. SDG'S SCOPE AND METHODOLOGY**

### **Overview**

To conduct its work, SDG performed an evaluation of METRO's financial condition and capacity to determine if METRO has adequate funds for both the construction of new rail lines and the operation and maintenance of existing rail lines and buses. SDG focused its evaluation on the sustainability of operations in the long term without using reserves, and identified the means and the extent to which additional operating expenditures could be covered before committing to new capital expenditures. SDG reviewed METRO's documentation, beginning with an assessment of the Agency's short-term budgeting that compared the budgeted and actual or estimated outcomes provided in METRO's fiscal year 2016 and fiscal year 2017 budget books. SDG also compared METRO's debt policy and debt levels to those of peer systems.

After evaluating METRO's documentation, SDG created two baseline projections to outline assumptions for how METRO's revenues and costs may develop. The first was the METRO baseline which reflected available METRO reported projections until fiscal year 2021 and adopted assumptions consistent with METRO's projections after that point. The second baseline—the SDG baseline—was an alternative central case that reflected SDG's independent view of the development of METRO's revenues and costs. Using these two baseline projections, SDG conducted sensitivity analyses to determine the impact of changes to METRO's revenue and cost assumptions.

SDG also used these baselines to test METRO's ability to pursue a hypothetical project based on the City of Charlotte's light rail transit (LRT) Blue Line Extension (Charlotte Extension) which has cost approximately \$1.16 billion. Because METRO was not currently pursuing any major projects, SDG selected this project as a proxy because it is from one of METRO's peer systems. SDG developed three stress case scenarios—tests performed to determine the impact of adverse changes that can occur simultaneously—on the two baseline projections focused on the specific revenue and cost items identified through SDG's sensitivity analyses. For these revenue and cost items, which SDG characterized as critical risk factors, adverse growth changes would have a significant negative impact on METRO's financial condition.

### **SDG's Statement on METRO Data Assumptions, Reliability, and Limitations**

SDG emphasized that its evaluation does not constitute an audit of any financial statements prepared by METRO but is instead an analysis of METRO's budget



projections focused on substantive, material issues that affect METRO's financial condition and capacity.

SDG listed several specific assumptions or limitations that should be considered:

- METRO forecasts could be based on limited or inaccurate information. SDG performed data reliability checks on all core datasets used in this analysis. These checks include comparing data to other available sources and confirming that datasets do not include any unexplained trends. However, this evaluation does not constitute an audit of any financial statements or other documents prepared by METRO. Accordingly, it was necessary for SDG to assume that most data that METRO provided were accurate. As a result, any inherent limitations, errors, or irregularities that occurred may not be detected.
- New financing options may become available and access to existing options may be withdrawn or subject to material change. SDG's assessment is based on the range of financing options considered reasonably available to METRO as of the date of this report. Any changes in existing financing options or introduction of new financing options in the future may therefore impact the conclusions reached. More generally, any evaluation beyond the period of analysis outlined in this report is not appropriate.
- Political decisions and leadership changes could significantly impact planning. SDG's assessment has been based on its understanding of METRO's current policies and, more generally, those of State and Federal bodies responsible for transit policies and funding. Any changes in such policies may impact the conclusions reached.

### **SDG's Assessment of METRO Budget Data**

SDG began its assessment of METRO's financial condition with a review of METRO's budgets and financial data. SDG examined METRO's ridership and fares; compared the budgeted and actual or estimated outcomes presented within METRO's fiscal year 2016 and fiscal year 2017 budget books; and compared METRO's debt policy and debt levels to those of peer systems.

To assess METRO's short-term budgeting, SDG analyzed METRO ridership data from fiscal years 2011 through 2016. Ridership includes local bus service, METRO Rail, and Park and Ride. SDG also analyzed METRO's fares and fare structure, including transfers, fare types, and discounts.

To analyze METRO revenues, SDG compared actual and estimated revenues for fiscal years 2014 through 2016, the budgeted revenues for fiscal years 2015 through 2017, and assessed the differences between the budgets and the actual or estimated values. SDG also compared and analyzed METRO's fiscal year 2016

### **Exhibit C. SDG's Scope and Methodology**

and fiscal year 2017 budget revenue projections through fiscal year 2020 and fiscal year 2021 respectively, examining sales tax, General Mobility Program (GMP) transfer,<sup>19</sup> fares, vanpool, HOT lane, grants, interest, bond proceeds, and miscellaneous revenue items. SDG conducted these revenue assessments by calculating the differences between METRO's budgets for fiscal year 2016 and fiscal year 2017, examining the year to year variance as both a percentage and a dollar value. By comparing the differences between these two budgets, SDG identified multiple revenue line items that were revised significantly downward between the two budgets. SDG considered these revisions significant if they represented a change equivalent to 10 percent or more of METRO's overall cash balance in any given year.

To analyze METRO's costs, SDG compared actual and estimated costs for fiscal years 2014 through 2016, the budgeted costs for fiscal years 2015 through 2017, and assessed the differences between the budgets and the actual or estimated values. SDG also compared and analyzed METRO's fiscal year 2016 and fiscal year 2017 budget cost projections through fiscal year 2020 and fiscal year 2021 respectively, examining labor and fringe benefits, non-labor, contingency, capital budget, and debt service. SDG conducted these cost assessments by calculating the differences between METRO's fiscal year 2016 and fiscal year 2017 budgets, examining the year to year variance as both a percentage and a dollar value. By comparing the differences between the fiscal year 2016 and fiscal year 2017 budgets, SDG identified multiple cost line items that were revised significantly downward between the two budgets. SDG considered these revisions significant if they represented a change equivalent to 10 percent or more of METRO's overall cash balance in any given year.

SDG analyzed METRO's cash reserves, its reserve policies, and its cash position relative to peer agencies. SDG compared METRO's projected cash reserves through fiscal years 2020 and 2021 as reported in METRO's fiscal year 2016 and fiscal year 2017 budget books in order to identify the cash available for investment after deducting the target level of operating reserve funds. SDG also performed analyses of the differences between the two projections from the fiscal year 2016 and fiscal year 2017 budgets. SDG conducted a cash reserve analysis by calculating METRO's projected cash reserves through fiscal year 2021, and calculating the year to year percentage change in cash reserves. Using this information, SDG calculated METRO's available cash for investment through fiscal year 2021, and determined METRO's annual available cash for investment by calculating the difference between METRO's end of year cash reserve balance and the METRO Board's required operating reserve level.

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<sup>19</sup> GMP dedicates 25 percent of METRO's sales tax revenues to its constituent entities for General Mobility projects, such as constructing or maintaining streets, roads, traffic signals, sidewalks, and hike and bike trails.

SDG also reviewed METRO's debt policy and compared its debt levels and debt ratios to peer systems. METRO identified its peer public transportation systems as those with relatively new LRT operations, that are not heavy rail-focused, and typically in southern States, citing systems such as San Antonio, Austin, Phoenix, and Charlotte. SDG reviewed these agencies and included several other systems that met some or all of METRO's criteria—Dallas, Atlanta, and Miami—and excluded systems such as Austin because it could not identify comparable data for these systems from publicly available sources. SDG also included Portland's and Denver's systems as peer systems. Portland publishes useful statistics for its system—the age distribution of riders—and SDG used these in some of its later calculations. Denver's system—like Houston's—is largely bus-focused with the relatively recent addition of light rail lines that it continues to expand. SDG ultimately included the systems in Charlotte, Denver, Dallas, Portland, Phoenix, Miami, San Antonio and Atlanta as METRO's peer systems. SDG ranked the systems according to debt policy (the minimum cash reserves required) and debt-to-revenue ratios.

To examine METRO's financial condition and capability, SDG analyzed METRO's revenues, examining METRO's future year projections through fiscal year 2021 and comparing them to historically observed trends. In its revenue analyses, SDG examined both the historical trends and future projections related to the 1 percent dedicated sales and use tax as well as METRO's farebox, vanpool, HOT lane, interest, grant funding, bond proceeds, and minor and one-off revenue sources. SDG calculated year to year percentage changes in these revenue items to evaluate METRO's projected growth trend against its historical trend. SDG also evaluated the basis of METRO's revenue projections. SDG used the standard—based on its professional judgment—that projections can be considered reasonable if projected average annual growth is at most 10 percent higher or lower than historically observed trends, there are no significant reasons to believe that future trends would be significantly worse, and significant justification is provided for projected growth being higher than historical growth.

SDG similarly analyzed METRO's costs, including METRO's future year projections through fiscal year 2021, and compared them to historically observed trends. SDG examined costs by category, including bus, METROLift, and rail as well as various lower-valued on-going costs and one-off cost items such as the GMP referendum increment, traffic management, HOT lanes, METRO bus network costs, incremental uptown-dedicated bus lane operations, and allowance for the Super Bowl. These categories contained labor and fringe benefits, including union and non-union labor; non-labor costs, including services, materials and supplies, fuel and utilities, casualty and liability; and purchased

transportation, leases, rentals and miscellaneous.<sup>20</sup> SDG also considered contingency costs. It then compared METRO's cost projections and estimates to METRO's historical cost data in the National Transit Database (NTD). SDG also evaluated historical trends and future projections of debt service expenses, and costs for maintenance of capital equipment, facilities and vehicles. SDG calculated year to year percentage changes in these cost items to evaluate METRO's projected growth trends against its historical trend. In addition, SDG evaluated the basis of METRO's cost projections. SDG used the standard—based on its professional judgment—that projections can be considered reasonable if projected average annual growth is at most 10 percent higher or lower than historically observed trends, there are no significant reasons to believe that future trends would be significantly worse, and significant justification is provided for projected growth being higher than historical growth.

### **SDG's Baseline Projections**

SDG created two baseline projections to outline assumptions for how METRO's revenues and costs may develop, one of which reflected METRO's reported projections until fiscal year 2021, with assumptions consistent with those projections after that point, and the other an alternative central case that reflected SDG's independent view on the development of METRO's revenues and costs.

Because METRO is not planning a major capital investment project, it is not required to develop a constrained long-term financial projection at this time. Accordingly, METRO has not produced projections on its financial position beyond fiscal year 2021, apart from expected debt service costs. However, if it were to assess METRO's ability to fund a future capital project, FTA would consider METRO's financial position over a longer timeframe than the 5-year outlook presented within METRO's fiscal year 2017 budget book. Accordingly, SDG constructed two financial projections that extend beyond fiscal year 2021 to fiscal year 2050:

- The METRO baseline reflects, where available, METRO's reported projections up to fiscal year 2021, and adopts assumptions that are meant to be consistent with METRO's projections thereafter; and
- The SDG baseline reflects SDG's independent view of the development of METRO's revenues and costs, taking into account potential risks.

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<sup>20</sup> METRO does not produce operating cost projections by cost category, but implicitly assumes non-labor costs to grow—according to direction from its Board—by 1.5 percent annually.

As it developed the METRO baseline, SDG emphasized that this baseline should not be taken to infer that the forecasts beyond fiscal year 2021 either represent the views of, or are endorsed by, METRO's Board or management.

In its fiscal year 2017 budget, METRO generated constrained forecasts through fiscal year 2021, so SDG focused its evaluation on the two baselines from fiscal years 2017 through 2021. For the METRO and SDG baseline assumptions for fiscal years 2017 through 2021, see table C-1.

**Table C-1. Financial Baseline Assumptions—Fiscal Years 2017 Through 2021**

<b>Assumptions</b>	<b>METRO Baseline</b>	<b>SDG Baseline</b>
REVENUE	For fiscal years 2017 through 2021, SDG used METRO's revenue assumptions.	SDG developed a sales tax revenue projection using the Institute's elasticities, <sup>b</sup> but including the cyclical nature of Houston's energy jobs which typically experience a 10% reduction every 7 years. Other baseline revenue items were impacted by future population growth projections and anticipated inflation costs.
	<p>METRO's assumptions included the following average annual growth projections:</p> <ul style="list-style-type: none"> <li>• Total sales tax - 4.7%<sup>a</sup></li> <li>• Farebox revenue - 3.0%</li> <li>• HOT Lane revenue - 5.0%</li> <li>• U.S. employment -1.7%</li> </ul>	<p>SDG's assumptions included the following average annual growth projections:</p> <ul style="list-style-type: none"> <li>• Total sales tax - 5.2%</li> <li>• Farebox revenue - 1.6%</li> <li>• HOT Lane revenue - 3.8%</li> <li>• U.S. employment - 1.2% (based on Woods &amp; Poole forecasting data)</li> </ul>
OPERATING COSTS	Through fiscal year 2021, SDG used METRO's operating cost assumptions.	SDG developed a projection by cost category <sup>c</sup> that accounted for known future cost increases, particularly labor costs. The baseline also used anticipated demographic growth, inflation, fuel cost, and health insurance cost projections.
	<p>METRO's assumptions included the following average annual growth projections:</p> <ul style="list-style-type: none"> <li>• METROLift costs - 1.5%</li> <li>• Labor wage costs - 1.9%</li> <li>• Fringe benefit costs - 1.9%</li> </ul>	<p>SDG's assumptions included the following average annual growth projections:</p> <ul style="list-style-type: none"> <li>• METROLift costs - 4.6%</li> <li>• Labor wage costs - 2.6%</li> <li>• Fringe benefit costs - 3.5%</li> </ul>

<sup>a</sup> Both the METRO and SDG baselines include the Board-directed sales tax forecast reductions through fiscal year 2021.

<sup>b</sup> In the SDG baseline, elasticities refers to (1) the relationship between Houston employment projections and U.S. employment and oil industry employment (two elasticities) and (2) the relationship between sales tax revenue projections and Houston employment, in both the short and long term (two elasticities).

<sup>c</sup> SDG aggregated baseline operating costs by cost category rather than service type, but separated METROLift to produce separate cost projections. METROLift services are disproportionately used by senior citizens, a segment of the population expected to grow significantly faster than the Harris County population as a whole.

Source: OIG analysis of SDG data.

For the METRO and SDG baseline assumptions for all years through fiscal year 2050, see exhibit D.

## **Exhibit C. SDG's Scope and Methodology**

## **SDG's Sensitivity Analyses**

Using the METRO and baseline projections, SDG conducted sensitivity analyses to ascertain how changes to METRO's revenue and cost assumptions would affect the Agency's ability to meet different cash levels. This analysis also enabled SDG to identify which of these assumptions would have the greatest impact, when changed, on METRO's ability to meet these cash levels.

Using both baseline projections, SDG conducted a series of sensitivity tests on METRO's revenues and costs to determine the impact of changes in sensitive, or uncertain, assumptions on the financial projections. In these tests, SDG made adverse changes of 5 and 10 percent (relative to the METRO baseline) to individual revenue and cost line items to determine how the changes would impact METRO's cash position relative to the following three levels:

- 25 percent of operating expenses plus \$10 million. If METRO is anticipated to contravene its current cash reserve policies (25 percent of its operating costs plus a further \$10 million);
- 15 percent of operating expenses. If METRO is anticipated to contravene the minimum required cash reserves (15 percent of its operating costs); and
- Zero cash balance. If METRO is anticipated to have negative cash reserves.

SDG outlined its rationale for selecting 5 and 10 percent revenue and cost changes for its tests. In its review of METRO's budgets, SDG had determined that METRO significantly reduced its 5-year revenue projections between its fiscal year 2016 and fiscal year 2017 budgets—ranging from 6.0 percent for fiscal year 2018 to 10.1 percent for fiscal year 2016. Because, for fiscal years 2017 through 2020, the reduction was primarily due to a lowered sales tax projection from the Institute, rather than subsequent Board action to reduce this projection, SDG considered it reasonable to test for additional 5 and 10 percent revenue reductions. Using the METRO and SDG baselines, SDG tested 5 and 10 percent reductions in fiscal year 2017 for specific revenue items—total sales taxes, farebox, vanpool, HOT lanes, Federal grant funding and other revenue sources—to determine whether these reductions limited METRO's financial capacity to the extent that it could not meet one or more of the three cash levels between fiscal years 2017 and 2021.

In its review of METRO's budgets, SDG identified evidence of instability in METRO's anticipated future costs. Specifically, SDG calculated that METRO—between its fiscal year 2016 and fiscal year 2017 budgets—reduced its total operating costs forecast by 3.5 percent in fiscal year 2016, with reductions increasing to 5.4 percent in 2020. SDG also found that METRO had assumed

### **Exhibit C. SDG's Scope and Methodology**

future operating cost increases to be limited to 1.5 percent per year—despite planned cost increases of 3.0 percent per year for its unionized workers, with comparable increases planned for non-union staff in fiscal year 2017. If applied every year in a 5-year projection—fiscal years 2017 through 2021—the discrepancy would reach 7.6 percent in fiscal year 2021. SDG used the following formula to calculate the discrepancy between METRO’s future cost increase assumption (1.5 percent per year) and its agreed cost increase for unionized staff (3.0 percent per year) over the 5 years:  $(1 + 3.0\%) / (1 + 1.5\%)^5 - 1 = 7.6\%$ .

SDG concluded that additional cost changes of 5 and 10 percent from the METRO baseline were also reasonable for testing and performed these tests. SDG tested a 5 percent and 10 percent one-time increase for cost line items METROLift, other operating costs, labor and fringe benefits, non-labor, and capital program expenses on both the METRO and SDG baselines to determine how they impacted METRO’s financial capacity. Each of these cost categories was tested in isolation with all other revenues and costs remaining the same.

Sensitivity testing enabled SDG to identify the revenue and cost items that it characterized as critical risk factors, for which adverse growth changes would have a significant negative impact on METRO’s financial condition.

### **SDG’s Capital Investment Assumptions**

To develop the inputs necessary for evaluating METRO’s potential for capital investment, SDG identified a capital project and developed project financing assumptions.

Because METRO had no major project under way, SDG identified a proxy project, and made capital investment assumptions. SDG used the Charlotte Extension as a proxy, and made some additional assumptions to reflect its view of the options available to METRO. Charlotte is considered a peer system and like METRO, already operates a LRT. However, Charlotte is smaller than Harris County and the Charlotte Area Transit System carries only a third of the passenger trip volumes of METRO across both bus and LRT modes. The project can be viewed as a smaller scale and lower cost version of METRO’s University Line project, a project which METRO previously proposed but is no longer pursuing. See table C-2 for information on the two projects.



**Table C-2. SDG's Comparison of the Charlotte Extension and METRO University Line**

	<b>Charlotte Blue Line Extension</b>	<b>METRO University Line Project</b>
Technology	LRT	LRT
Length	9.3 miles	11.3 miles
Stations	11	19
LRT Vehicles	18	32
Riders per day (forecast for 2035/2030)	24,500	49,000
Total capital cost including financing (millions)	\$1,160.08	\$1,563.07
Federal Full Funding Grant Agreement (5309 New Starts)	50%	50% (anticipated)
State funds	25%	Nil (anticipated)
Local funds	25% (TIFIA loan supported by sales tax revenue, plus Pay-As-You-Go and contributions in kind)	50%

Source: SDG analysis of FTA information.

In its capital investment test, SDG considered an option based on the parameters for construction and operation of the Charlotte Extension but with alternative funding options that better reflected the choices available to METRO for an equivalent project:

- A local bond issue following approval in a new voter referendum, supported by sales tax receipts; and
- A P3 approach that used sales tax receipts to pay operating, maintenance, and financing costs of a private sector contractor over a 25-year concession period.

SDG assumed that both options would make use of FTA New Starts grants (to contribute 50 percent of capital costs in both cases). The maximum contribution from the Transportation Infrastructure Finance and Innovation Act (TIFIA) grant program would be limited to 30 percent when provided in combination with a 50 percent New Starts grant. For a comparison of the capital investment financing options, see table C-3.

**Table C-3. SDG's Comparison of Financing Option Assumptions**

	<b>Assumption (bond issue)</b>	<b>Assumption (P3)</b>	<b>Basis of assumption</b>
Capital cost, including planning (millions)	\$1,160	-	Equivalent to cost of Charlotte Extension.
Capital cost phasing	Planning <sup>b</sup> : 5%, within which: <ul style="list-style-type: none"> <li>• Yr1: 5%</li> <li>• Yr2: 5%</li> <li>• Yr3: 30%</li> <li>• Yr4: 30%</li> <li>• Yr5: 30%</li> </ul> Construction: 95%, within which: <ul style="list-style-type: none"> <li>• Yr1: 10%</li> <li>• Yr2: 27%</li> <li>• Yr3: 27%</li> <li>• Yr4: 27%</li> <li>• Yr5: 5%</li> <li>• Yr6: 5%</li> </ul>	Planning: 5%, within which: <ul style="list-style-type: none"> <li>• Yr1: 5%</li> <li>• Yr2: 5%</li> <li>• Yr3: 30%</li> <li>• Yr4: 30%</li> <li>• Yr5: 30%</li> </ul> Construction: 95%, within which: <ul style="list-style-type: none"> <li>• Yr1: 33%</li> <li>• Yr2: 33%</li> <li>• Yr3: 33%</li> </ul>	Developed on the basis of the expenditure for the Charlotte Extension, adjusted in accordance with overall timeline assumed for each option.
FTA grant percent of construction costs <sup>a</sup>	50%	-	Equivalent to Charlotte Extension percent.
Operating costs (operations), 2015 (millions)	\$8	-	Equivalent to Charlotte Extension costs.
Operating costs (maintenance), 2015 (millions)	\$8	-	Equivalent to Charlotte Extension costs.
Farebox revenue, 2015 (millions)	\$4.8	-	Developed based on reported farebox recovery for LRT systems in the NTD (in particular Houston and Charlotte).
Annual growth in operating costs	2.8%	-	Based on long-term (2021-2050) growth assumed in operating costs within SDG baseline.
Annual growth in farebox revenue	3.2%	-	Based on long-term (2021-2050) growth assumed in farebox revenue within SDG baseline.
Cost of issuance	0.9%	-	Based on total cost of issuance across all of METRO's existing debt.

**Exhibit C. SDG's Scope and Methodology**

	<b>Assumption (bond issue)</b>	<b>Assumption (P3)</b>	<b>Basis of assumption</b>
Term	25 years	<ul style="list-style-type: none"> <li>• Private debt/equity: 25 years</li> <li>• Federal loans: 30 years</li> </ul>	Based on assumed concession period.
Interest rates	<ul style="list-style-type: none"> <li>• Bond interest rate: 5.4%</li> <li>• Interest on undrawn bonds: 2.7%</li> </ul>	<ul style="list-style-type: none"> <li>• Private debt rate: 7.2%</li> <li>• Private equity assumed return: 10.3%</li> <li>• Federal loan rate: 5.8%</li> <li>• Interest on undrawn financing: 2.7%</li> </ul>	<p>Bond issue assumptions:</p> <ul style="list-style-type: none"> <li>• <i>Bond interest rate</i>: Based on assumptions set out in exhibit D.<sup>c</sup></li> <li>• <i>Interest on undrawn bonds</i>: Based on same methodology as outlined in exhibit D, adjusting for difference between the Federal Reserve rates and 10-year Treasury yield rate.<sup>d</sup></li> <li>• <i>Treasury 1-year rates</i>: Average for 2016 is 0.61%.</li> </ul> <p>P3 assumptions:</p> <ul style="list-style-type: none"> <li>• <i>Private debt rate</i>: Private debt for infrastructure is typically rated Baa or BBB.<sup>e</sup> Average spread over mid-rate swaps over last 5 years has been approximately 2%.<sup>f</sup> Private debt rate is then based on projected Treasury yield rate (equivalent to the term of the debt) (5.2%) and average spread (2.0%).</li> <li>• <i>Private equity assumed return</i>: Based on an assessment of reasonable rate of equity return.<sup>g</sup></li> <li>• <i>Federal loan rate</i>: TIFIA interest rates set at levels equal to or greater than the yield on U.S. Treasury securities of comparable maturity.<sup>h</sup> Rate is therefore based on projected Treasury bond rate (equivalent to term of debt) (5.8%).</li> <li>• <i>Interest on undrawn financing</i>: Same as for interest on undrawn bonds above.</li> </ul>
Grace periods	1 year	<ul style="list-style-type: none"> <li>• 1 year for Federal loans</li> <li>• 2 years for private financing</li> </ul>	Assumed based on METRO's existing debt arrangements.

## Exhibit C. SDG's Scope and Methodology

<sup>a</sup> SDG noted that “[there] may also be the potential for increased FTA state of good repair funding 8 years after project opening. However, the impact of this is considered to be neutral when set against the need for state of good repair investment in the project, and accordingly is not explicitly included in the analysis.”

<sup>b</sup> In the context of SDG’s analysis, planning refers to pre-construction activities. See SDG’s Conventional Design Bid Build approach and P3 Design Build Finance Operate Maintain approach timeline descriptions in exhibit C for additional information.

<sup>c</sup> See tables D-23 through D-25 in exhibit D.

<sup>d</sup> See tables D-23 through D-25 in exhibit D; see also [www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield](http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield).

<sup>e</sup> SDG provided the following example: [https://www.moodys.com/research/Moodys-assigns-P-Baa3-to-Blueridge-Transportation-Group-LLCs-Private--PR\\_345405](https://www.moodys.com/research/Moodys-assigns-P-Baa3-to-Blueridge-Transportation-Group-LLCs-Private--PR_345405).

<sup>f</sup> See <https://fred.stlouisfed.org/series/BAMLC0A4CBBB>.

<sup>g</sup> See <https://www.ferc.gov/CalendarFiles/20160928194709-EL14-12-002.pdf>.

<sup>h</sup> See <https://www.transportation.gov/tifia/chapter-2-terms-and-funding-credit-instruments>.

Source: SDG analysis.

To perform its analysis, SDG assumed that pre-construction activity would commence in fiscal year 2018 and the project would be completed in fiscal year 2029 if using local bonds, or fiscal year 2026 if using a P3 approach. In its evaluation, SDG assessed the effect of the capital investment on METRO’s cash balance over a 25-year period, allowing for the construction, equipping, and operation of the line, and phased payments. SDG’s work drew on the level of costs identified in prior studies, suitably updated to account for cost inflation and an appropriate contingency. SDG outlined the assumptions used for these timelines, including the pre-construction activities, as follows:

#### **Conventional Design Bid Build approach:<sup>21</sup>**

- Preliminary engineering to 30 percent design and draft environmental impact statement, years 1 and 2;
- 65 percent design and final environmental impact statement and record of decision, years 3 and 4;
- Final design, years 5 and 6;
- Construction, years 6 through 10, including equipment procurement and delivery; and
- Testing, training and mobilization, 6 months.

#### **P3 Design Build Finance Operate Maintain approach:**

- Draft request for proposals (RFP) and concession agreement, 4 to 6 months in advance;

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<sup>21</sup> This approach would require voter approval for a bond issue within the first 3 years. SDG developed the timelines for both approaches.

- Call for expression of interest and bidder briefings, 2 months; may overlap with advance work;
- Issue RFP and allow time for bidder responses, 3 months;
- Bid evaluation and selection of preferred bidder, 3 months;
- Contract negotiations to signing concession agreement, 6 months;
- Phase I notice to proceed issued;
- Federal grant awarded; Phase II notice to proceed issued, 12 months;
- Finalized design and approval process, 2 years assuming streamlined FTA process;
- Construction, 2.5 years with integrated process; and
- Testing, training, and mobilization, 6 months.

SDG's assumptions would lead to project timeline minimums—through testing, training and mobilization—of approximately 10.5 years for a conventional design bid build approach, and 7.5 years for a P3.

Finally, SDG considered METRO's potential for capital investment in both the METRO and SDG baseline scenarios. Except where otherwise stated, each assessment assumes that METRO would commence the planning of a future capital investment in fiscal year 2018. On the basis of the capital investment assumptions, this assumption implies that operations would commence following project completion in fiscal year 2029 if using a conventional design bid build approach or in fiscal year 2026 if using a P3 approach.

SDG also performed a "break even" analysis, summarizing the projected level of investment that METRO could afford while retaining sufficient cash reserves for each of the three thresholds in all years from fiscal year 2017 onwards. SDG completed this analysis using both the METRO baseline and SDG baseline projections and both financing approaches. SDG performed the analysis by scaling the assumed capital investment in order for METRO's ending cash balance to be equal to or greater than the level required to maintain each threshold of cash reserves in every year.

To assess METRO's future ability to fund capital investment projects, SDG kept the assumed scale of investment fixed at \$1.16 billion (consistent in scale with the Charlotte Extension project), but shifted the year in which project pre-construction activity was assumed to commence. Similarly, the assumed first year of

### **Exhibit C. SDG's Scope and Methodology**

construction would be correspondingly delayed (kept at 5 years after pre-construction activity commences), and the assumed first year of operations would be correspondingly delayed (kept at 11 and 8 years after pre-construction activity commences, depending on the approach used). SDG used the minimum level of operating reserve as required by METRO's existing policy (maintaining cash reserves of 15 percent of its annual operating costs) as the target threshold setting the minimum level of cash reserves.

### **SDG's Stress Case Analyses**

We directed SDG to include stress tests—performed to determine the impact of adverse changes that can occur simultaneously on uncertain financial projections—in its evaluation of METRO. To perform stress case analyses, SDG performed tests on revenue and cost line items that it identified as key through its sensitivity testing to assess METRO's capacity to fund future capital investment under a range of scenarios.

In its revenue and cost sensitivity analyses, SDG determined that METRO's financial condition was vulnerable to 5 and 10 percent reductions in key revenue and cost items. SDG therefore determined that including such adverse revenue and cost assumptions as part of the stress case scenarios—while considered to be reasonable in themselves—would not be necessary. According to SDG, the stress case scenarios demonstrate the projected impact on METRO's finances, and the realistic level of capital investment METRO could afford, and in turn, the affordability risks even under scenarios that are less adverse than might reasonably be tested.

SDG used the key revenue and cost items it identified—sales tax revenue and operating costs (particularly labor and non-labor costs), respectively—in three stress case scenarios to determine what METRO could afford under each baseline, if the key revenue and/or cost items changed adversely. The stress case scenarios are:

- **Stress Case Scenario 1:** Sales tax growth reduced by 0.5 percent each year from fiscal years 2017 through 2021, which results in a total reduction of approximately 2.5 percent by fiscal year 2021;
- **Stress Case Scenario 2:** Sales tax growth reduced by 1.0 percent each year from fiscal years 2017 through 2021, which results in a total reduction of approximately 5.0 percent by fiscal year 2021, and operating cost growth increases by 0.5 percent in each year from fiscal years 2017 through 2021, which results in a total increase of approximately 2.5 percent by fiscal year 2021;

### **Exhibit C. SDG's Scope and Methodology**

- **Stress Case Scenario 3:** No changes to the baseline revenue or cost assumptions, and actual capital costs are increased by 10 percent relative to the estimated capital cost. SDG based the 10 percent increase on its analysis of an FTA study<sup>22</sup> of its capital projects, and stated that the assumption made in this stress case represents an average overrun, not a worst-case scenario. According to SDG, in this stress case scenario, the cost overrun is assumed to be spread over the entire construction period in accordance with the profile assumed for overall construction costs, and is assumed to be covered by METRO using its cash reserves. However, these assumptions apply only to the design-bid-build approach because under a P3 contract, the risk would ordinarily fall on the contractor instead of METRO.

Using these three scenarios, SDG conducted break-even analyses to determine the capital investment METRO could afford in each scenario under each baseline. SDG then used the stress case scenarios to examine possible timing of investments by using a capital project investment of \$1.16 billion, assuming that pre-construction activity takes about 5 years and construction takes about 3 to 5 years, depending on approach.<sup>23</sup> The timing of project pre-construction activity commencement was based on METRO's maintenance of its required 15 percent cash reserve.

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<sup>22</sup> SDG cited FTA's *The Predicted and Actual Impacts of New Starts Projects – 2007*, (April 2008). According to SDG, this study covered 21 capital projects and reported average capital cost overruns of 40 percent relative to the draft environmental impact statement stage estimates, 12 percent relative to the final environmental impact statement stage estimates, and 6 percent relative to the original full funding grant agreement (FFGA) estimates. According to SDG, the study notes that by the time that an FFGA is executed, the as-built costs generally come close to the costs estimated for the original FFGA, but there are notable exceptions. There were four projects that cost 30 percent more than estimated in the original FFGA.

<sup>23</sup> See SDG's Conventional Design Bid Build approach and P3 Design Build Finance Operate Maintain approach timeline descriptions in exhibit C for additional information.

## **Exhibit C. SDG's Scope and Methodology**

## EXHIBIT D. SDG'S FINANCIAL BASELINE ASSUMPTIONS THROUGH FISCAL YEAR 2050

**Table D-1. Financial Baseline Assumptions—Total Sales Tax Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
Total sales tax	Average annual growth in future years <sup>a</sup> :	Average annual growth:
	2016–2021: 3.5%	2016–2021: 4.2%
	2021–2025: 4.9%	2021–2025: 2.1%
	2025–2030: 4.4%	2025–2030: 5.0%
	2030–2035: 4.1%	2030–2035: 4.1%
	2035–2040: 4.0%	2035–2040: 2.5%
	2040–2045: 3.8%	2040–2045: 5.6%
	2045–2050: 3.7%	2045–2050: 2.5%

<sup>a</sup> Based on SDG's calculations, METRO's average sales tax growth between fiscal year 2017 to 2021 is 4.7 percent a year (as reflected in exhibit C, table C-1) while METRO's average sales tax growth from fiscal years 2016 through 2021 (to allow for comparison with SDG's assumption data in this table) is 3.5 percent. Source: SDG analysis.

Under the METRO baseline, SDG predicts annual growth between fiscal years 2021 and 2040 consistent with the Institute's projections from June 2016. Because projections are not available for after fiscal year 2040, SDG assumed a continuation of the declining growth rate in each year, based upon the average decline projected by the Institute over the prior 5-year period (between fiscal year 2035 and 2040). This results in a growth rate that reduces by 0.025 percent each year after fiscal year 2040.

For the SDG baseline, SDG developed sales tax projections using the elasticities estimated by the Institute and applied these to alternative views on the development of each underlying indicator. Oil employment growth is based on the Institute's forecasts but with an allowance for the cyclical nature of Houston energy jobs. There is assumed to be a 10 percent reduction in oil jobs every 7 years based on the observed historical cycle. US employment growth is based upon anticipated employment growth as produced by economic forecasters Woods & Poole. Between 2016 and 2040, an average annual growth of 1.2 percent occurs, compared to 1.7 percent assumed by the Institute. SDG allowed for the cyclical nature of employment in order to align with the observed historical sales tax revenue reductions during these cycles, assuming a 2 percent reduction in US jobs every 7 years.

Overall, SDG determined that these assumptions result in an average reduction of 3 to 4 percent in sales tax revenues during each economic cycle, which compares



to an average reduction of 4 percent observed historically. The variable growth rates reflect this cyclical nature.

SDG applied adjustments to the raw sales tax forecast for fiscal years 2017 through 2021 consistent with those made by METRO, as prudent adjustments for a more conservative forecast.

**Table D-2. Financial Baseline Assumptions—General Mobility Program Transfer Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
General Mobility Program (GMP) Transfer	Calculated from the total sales tax.	Calculated from the total sales tax.

Source: SDG analysis.

Under both the METRO and SDG baselines, future year parameters are assumed to remain unchanged from the current arrangements. In accordance with the terms of a referendum approved by voters in November 2012, METRO dedicates a share of its sales tax revenue to local jurisdictions to support the GMP. The baseline funding level was set at 25 percent of the value of sales tax receipts in the year to September 30, 2014. This agreement runs through to December 31, 2025. Continuity beyond December 31, 2025 is subject to the outcome of a voter referendum, SDG assumed this referendum will renew the arrangements for the division of revenues between GMP and METRO on the current terms, but with the formulation rebased to the total sales tax income in 2025. Similarly, a rebase of the formulation is assumed in 2038, based on the results of the voter referendum being in effect for the same time period as the existing one.

**Table D-3. Financial Baseline Assumptions for Farebox Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
Farebox	Through fiscal year 2021, SDG used METRO's revenue assumptions. Average annual growth in future years, 2021–2050:3.0%	Average annual growth: 2016–2021: 1.6% 2021–2025: 1.6% 2025–2030: 3.8% 2030–2035: 3.7% 2035–2040: 3.4% 2040–2045: 3.3% 2045–2050: 3.4%

Source: SDG analysis.

For the METRO baseline, SDG uses METRO's assumption that farebox revenues increase by 2.8 percent in fiscal year 2017 and grow by 3.0 percent in each year

## Exhibit D. SDG's Financial Baseline Assumptions Through 2050

between fiscal years 2018 and 2021. SDG continues the 3.0 percent per year growth assumption beyond fiscal year 2021. In the SDG baseline, SDG assumes ridership to grow in line with anticipated population growth in Harris County.<sup>24</sup> The average yield per passenger is assumed to remain constant in nominal terms until fiscal year 2021 (METRO indicated that it has no plans to increase fares). Thereafter, SDG assumes fares will increase every 5 years by an amount equivalent to Consumer Price Index (CPI) inflation over the full 5-year period (consistent with inflation assumptions adopted within the development of the METRO baseline).<sup>25</sup> Accordingly, SDG assumes long-term fares will remain broadly constant in real terms. Elasticities are typically calculated and applied to a change in fares in real terms. In theory, the real reduction in fares in the interval between fare changes should contribute to some increase in demand that will be reversed when the real level of fares is restored. A simplifying assumption is made of no net change in demand related to the level of fares under this policy of periodic changes. Because the level of farebox recovery is expected to remain low relative to operating costs, there will be minimal impact on METRO's financial solvency as a result of this simplification.

**Table D-4. Financial Baseline Assumptions for Vanpool Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
Vanpool	Through fiscal year 2021, SDG used METRO's revenue assumptions. Average annual growth in future years, 2021–2050: 0.0%	Consistent with METRO baseline to fiscal year 2021. Average annual growth in future years: 2021–2025: 3.8% 2025–2030: 3.8% 2030–2035: 3.5% 2035–2040: 3.3% 2040–2045: 3.4% 2045–2050: 3.4%

Source: SDG analysis.

From fiscal year 2017 through fiscal year 2021, METRO projected that vanpool revenue would increase by 10.7 percent in fiscal year 2019, then remain constant. The METRO baseline assumption adopted by SDG assumes a continuation of this projection.

<sup>24</sup> As produced by economic forecasters Woods & Poole (<https://www.woodsandpoole.com/>).

<sup>25</sup> SDG notes that increases in fares every 5 years are consistent with assumptions that METRO adopted as part of its North Line Financial Plan 2011 (*A Financial Capacity Assessment of the Metropolitan Transit Authority of Harris County, Texas, North Corridor Light Rail Transit Project*, July 29, 2011). Peer systems, such as Dallas Area Rapid Transit, have made similar assumptions.

The SDG baseline is consistent with the METRO baseline assumptions through fiscal year 2021 due to the one-off growth that METRO anticipates in fiscal year 2019, for which METRO's projections are considered the most appropriate source. Thereafter, growth projections have been based on anticipated overall population growth for Harris County and anticipated CPI inflation.

**Table D-5. Financial Baseline Assumptions for HOT Lane Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
HOT lane	5.0% growth each year.	Average annual growth: 2016–2021: 3.8% 2021–2025: 3.8% 2025–2030: 3.8% 2030–2035: 3.5% 2035–2040: 3.3% 2040–2045: 3.4% 2045–2050: 3.4%

Source: SDG analysis.

According to SDG, METRO's projections assume that in each year between fiscal years 2016 and 2021, HOT lane revenues grow by 5.0 percent. The assumption adopted by SDG within the METRO baseline assumes a continuation of this projection.

For the SDG baseline, SDG assumes growth based on anticipated overall population growth for Harris County and anticipated CPI inflation.

**Table D-6. Financial Baseline Assumptions for Service-Related Grants Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
Service-related grants	Through fiscal year 2021, SDG used METRO's revenue assumptions. Average annual growth in future years, 2021–2050: 0.0%	Through fiscal year 2021, SDG used METRO's revenue assumptions. Average annual growth in future years, 2021–2050: 0.0%

Source: SDG analysis.

METRO projected that service-related grants decline each year until fiscal year 2019, at an average annual rate of 5.7 percent. From fiscal year 2019 through fiscal year 2021, METRO's projections assume service related grants remain

constant in nominal terms. SDG's METRO baseline assumes a continuation of this projection.

SDG determined that METRO's assumption—no real growth in service related formula grants in future years—is consistent with assumptions adopted by peer agencies and that these assumptions are reasonable. Therefore, all Federal grant assumptions in the SDG baseline are consistent with SDG's METRO baseline assumptions.

**Table D-7. Financial Baseline Assumptions for Capital Grants Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
Capital grants	Through fiscal year 2021, SDG used METRO's revenue assumptions. Average annual growth in future years, 2021–2050: 0.0%	Through fiscal year 2021, SDG used METRO's revenue assumptions. Average annual growth in future years, 2021-2050: 0.0%

Source: SDG analysis.

METRO projected that capital grants decline each year until fiscal year 2019, at an average annual rate of 11.6 percent. From fiscal year 2019 through 2021, METRO's projections assume capital grants remain constant in nominal terms. SDG's METRO baseline assumes a continuation of this projection.

SDG determined that METRO's assumption—no real growth in capital grants in future years—is consistent with assumptions adopted by peer agencies and that these assumptions are reasonable. Therefore, all Federal grant assumptions in the SDG baseline are consistent with SDG's METRO baseline assumptions.

**Table D-8. Financial Baseline Assumptions for FFGAs Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
FFGA	Through fiscal year 2021, SDG used METRO's revenue assumptions. After fiscal year 2021, \$0 in each year.	Through fiscal year 2021, SDG used METRO's revenue assumptions. After fiscal year 2021, \$0 in each year.

Source: SDG analysis.

METRO projected that its FFGA funds will decline, except for in fiscal years 2017 and 2021. SDG states that METRO anticipates completion of the current LRT program by the end of fiscal year 2021. Therefore, SDG assumes that all

## Exhibit D. SDG's Financial Baseline Assumptions Through 2050

appropriation grant income is assumed to be paid out by fiscal year 2021 and will be zero thereafter within the METRO baseline and the SDG baseline.

**Table D-9. Financial Baseline Assumptions for Surplus Property Sales Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
Surplus property sales	Through fiscal year 2021, SDG used METRO's revenue assumptions. After fiscal year 2021, \$0 in each year.	Through fiscal year 2021, SDG used METRO's revenue assumptions. After fiscal year 2021, \$0 in each year.

Source: SDG analysis.

SDG notes that surplus property sales was a one-off item included in fiscal year 2016, with a value of zero thereafter. SDG assumes this value remains zero in each following year within the METRO baseline and the SDG baseline.

**Table D-10. Financial Baseline Assumptions for Transfer of Unascribed GMP Funds<sup>a</sup> Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
Transfer of unascribed GMP funds	Through fiscal year 2021, SDG used METRO's revenue assumptions. After fiscal year 2021, \$0 in each year.	Through fiscal year 2021, SDG used METRO's revenue assumptions. After fiscal year 2021, \$0 in each year.

<sup>a</sup> Remaining funds in the GMP escrow account that METRO may use for other purposes.  
Source: SDG analysis.

SDG noted that transfer of unascribed GMP funds was a one-off item included in fiscal year 2017, with a value of zero thereafter. SDG assumes this value remains zero in each year within the METRO baseline and the SDG baseline.

**Table D-11. Financial Baseline Assumptions for Miscellaneous Revenue Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
Miscellaneous revenue	Through fiscal year 2021, SDG used METRO's revenue assumptions. After fiscal year 2021, 1.5% growth each year.	Through fiscal year 2021, SDG used METRO's revenue assumptions. After fiscal year 2021, 1.5% growth each year.

Source: SDG analysis.

SDG determined that METRO's projections assume that by fiscal year 2019, miscellaneous revenues grow by 1.5 percent. SDG assumes a continuation of this projection within the METRO baseline and the SDG baseline.

**Table D-12. Financial Baseline Assumptions for General Bus Current Service Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
General bus current service	Through fiscal year 2021, SDG used METRO's cost assumptions. After fiscal year 2021, 1.5% growth each year.	N/A (SDG aggregated operating costs by category not service type).

Source: SDG analysis.

SDG determined that METRO's projections assume that by fiscal year 2020, general bus current service costs grow by 1.5 percent. SDG assumes a continuation of this projection within the METRO baseline.

For the SDG baseline, with the exception of METROLift, SDG aggregated operating costs by category as opposed to service type, as this allowed SDG to incorporate known and anticipated growth in specific line items.

**Table D-13. Financial Baseline Assumptions for METROLift Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
METROLift	Through fiscal year 2021, SDG used METRO's cost assumptions. After fiscal year 2021, 1.5% growth each year.	Average annual growth: 2017–2021: 4.6% 2021–2025: 4.6% 2025–2030: 4.4% 2030–2035: 3.8% 2035–2040: 3.4% 2040–2045: 3.5% 2045–2050: 3.6%

Source: SDG analysis.

According to SDG, METRO's projections assume that METROLift costs grow by 4.3 percent in fiscal year 2017 and 1.5 percent each year through fiscal year 2021. SDG continues this assumption in its METRO baseline through fiscal year 2050.

METROLift services are disproportionately used by senior citizens. Because this segment of the population is expected to grow significantly faster than the Harris County population as a whole (based on Woods & Poole's demographic projections), SDG developed cost projections for METROLift services using a

## Exhibit D. SDG's Financial Baseline Assumptions Through 2050

weighted growth for the anticipated rider population—70 percent under 70 and 30 percent 70 and over—for its SDG baseline.<sup>26</sup> SDG also incorporated anticipated CPI inflation into METROLift cost assumptions for the SDG baseline.

**Table D-14. Financial Baseline Assumptions for METRORail Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
METRORail	Through fiscal year 2021, SDG used METRO's cost assumptions. After fiscal year 2021, 1.5% growth each year.	N/A (SDG aggregated operating costs by category not service type).

Source: SDG analysis.

According to SDG, METRO projected rail costs to grow by 22.4 percent in fiscal year 2017 and by 1.5 percent each year thereafter. SDG continues this assumption in the METRO baseline through fiscal year 2050.

For the SDG baseline, SDG aggregated operating costs by category as opposed to service type, as this allowed SDG to incorporate known and anticipated growth in specific line items.

**Table D-15. Financial Baseline Assumptions for Other Operating Costs: On-Going Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
Other operating costs: On-going	Through fiscal year 2021, SDG used METRO's cost assumptions. After fiscal year 2021, 1.5% growth each year.	N/A (SDG aggregated operating costs by category not service type).

Source: SDG analysis.

SDG states that METRO projections assume other ongoing operating costs—which, based on SDG's grouping, include Star Van Pool and HOT lane operating costs—increase by 38.1 percent in fiscal year 2017 due in part to bringing some vanpool services in-house and by 1.5 percent each year thereafter. SDG continues this assumption in the METRO baseline through fiscal year 2050.

<sup>26</sup> Because it did not receive a breakdown of ridership by age for METRO's METROLift service, SDG based its estimated split of ridership on the reported split for equivalent paratransit services on data reported by the Tri-County Metropolitan Transportation District of Oregon. See <https://trimet.org/budget/pdf/2017-financial-forecast.pdf>.

For the SDG baseline, SDG aggregated operating costs by category as opposed to by service type, as this allowed SDG to incorporate known and anticipated growth in specific line items.

**Table D-16. Financial Baseline Assumptions for Other Operating Costs: Non-Standard Through Fiscal Year 2050**

<b>Item</b>	<b>METRO assumption</b>	<b>SDG assumption</b>
Other operating costs: Non-standard <sup>a</sup>	Through fiscal year 2021, SDG used METRO's cost assumptions. After fiscal year 2021, \$0 in each year.	Allowance for a one-off major event every 5 years. All other items, \$0 in each year.

<sup>a</sup> Excludes bus service—GMP referendum increment.  
Source: SDG analysis.

According to SDG, it uses METRO's projections through 2021 of non-standard other operating costs, such as METRO bus network costs and incremental uptown dedicated bus lanes operation, that include one-off items such as the allowance for extra costs associated with services for the Super Bowl. However, these costs are projected to have a value of zero in fiscal year 2021. SDG assumes this value remains zero in each year after fiscal year 2021 under the METRO baseline.

While specific future events cannot be known at this stage, SDG considers it reasonable to assume that METRO will need to accommodate future special events. SDG incorporated costs for major events every 5 years within the SDG baseline. The assumption of a 5-year cycle is a high-level assumption based on SDG's professional judgment (METRO anticipated only one such event in its 5-year projection in its fiscal year 2017 budget). SDG based the value of these periodic events on the incremental costs that METRO attributed to the Super Bowl, adjusted to account for CPI inflation using consistent sources as described above.



**Table D-17. Financial Baseline Assumptions: Other Operating Costs: Bus Service—GMP Referendum Increment Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
Other operating costs: Bus service—GMP referendum increment	Through fiscal year 2021, SDG used METRO's cost assumptions.  After fiscal year 2021, calculated from 2012 referendum increment revenue.	Consistent with METRO baseline.

Source: SDG analysis.

Under both the METRO and SDG baselines, SDG assumes future year parameters to remain unchanged from the current arrangements (25 percent times the previous year uplift).

**Table D-18. Financial Baseline Assumptions: Labor Wages Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
Labor wages	N/A (METRO aggregated operating costs by service type not cost categories).	Average annual growth: 2017–2021: 2.6% 2021–2025: 2.2% 2025–2030: 2.2% 2030–2035: 2.0% 2035–2040: 1.9% 2040–2045: 2.1% 2045–2050: 2.2%

Source: SDG analysis.

METRO does not produce operating cost projections by cost category (only by service type). However, METRO has projected the majority of ongoing costs to grow by 1.5 percent in the future, in accordance with the assumptions provided by the METRO Board. Implicitly, therefore, labor and fringe benefits are assumed to grow by 1.5 percent in the future. However, until fiscal year 2019, this is inconsistent with known contractual agreements whereby costs would increase by 3.0 percent each year. SDG noted that an alternative implication could be that labor and fringe benefits are assumed to grow by 3.0 percent each year in accordance with the agreed unionized staff contract, which would in turn imply that all other operating costs decrease by 0.9 percent each year (to maintain 1.5 percent growth overall). However, as METRO does not outline any

assumptions at this level, SDG determined that an overall 1.5 percent increase better represents METRO’s actual position.

SDG incorporated the unionized labor agreement information—in which wages increase by 3.0 percent each year until fiscal year 2019—within the SDG baseline. METRO also informed SDG that an equivalent 3.0 percent increase would be given to non-union staff in fiscal year 2017. SDG incorporated this increase and assumed that non-union staff would receive an equivalent increase up to fiscal year 2019, consistent with the agreement reached with union staff. SDG assumes that thereafter, wages will increase in line with CPI inflation (using consistent sources as described above).

**Table D-19. Financial Baseline Assumptions: Services/Allocation Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
Services	N/A (METRO aggregated operating costs by service type not cost categories).	Average annual growth:
Materials and supplies		2017–2021: 2.1%
Casualty and liability		2021–2025: 2.2%
Leases, rentals and miscellaneous		2025–2030: 2.2%
Contingency/allocation		2030–2035: 2.0%
		2035–2040: 1.9%
	2040–2045: 2.1%	
		2045–2050: 2.2%

Source: SDG analysis.

In the SDG baseline, SDG assumes this category will grow in line with CPI inflation.

**Table D-20. Financial Baseline Assumptions: Fringe Benefits Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
Fringe benefits	N/A (METRO aggregated operating costs by service type not cost categories).	Average annual growth:
		2017–2021: 3.5%
		2021–2025: 3.5%
		2025–2030: 3.6%
		2030–2035: 3.4%
		2035–2040: 3.3%
		2040–2045: 3.5%
		2045–2050: 3.6%

Source: SDG analysis.

According to SDG, a significant portion of fringe benefits can be attributed to medical insurance expenses. The Bureau of Labor Statistics (BLS) estimates this portion at just over 50 percent.<sup>27</sup> BLS publishes historic inflation by item, including health insurance costs.<sup>28</sup> Therefore, SDG used average growth in health insurance compared to overall CPI to estimate the long-term difference in growth.<sup>29</sup> SDG applied this growth within the SDG baseline to the portion of fringe benefits assumed to be attributable to health insurance costs (50 percent), with the remaining costs assumed to grow in line with CPI inflation.

**Table D-21. Financial Baseline Assumptions: Fuel and Utilities Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
Fuel and utilities	N/A (METRO aggregated operating costs by service type not cost categories).	Average annual growth: 2017–2021: 4.5% 2021–2025: 5.0% 2025–2030: 3.0% 2030–2035: 3.0% 2035–2040: 2.6% 2040–2045: 2.5% 2045–2050: 2.5%

Source: SDG analysis.

For the SDG baseline, SDG based its fuel and utilities assumption on a February 2016 METRO Board meeting packet titled Energy Management Efforts at METRO (January 2016) that reported costs for electricity consumption (\$5.25 million) and water and natural gas (\$850,000). SDG assumed that fuel costs account for the vast majority of METRO’s residual costs. SDG based its fuel and utilities growth projection, from fiscal year 2018 onwards, on the US Energy Information Administration’s projections of electricity, natural gas, and gasoline costs.<sup>30</sup> SDG assumes growth lags by 18 months to reflect the ability of METRO to hedge against future costs.

<sup>27</sup> See <https://www.bls.gov/news.release/pdf/ecec.pdf>.

<sup>28</sup> See <https://www.bls.gov/cpi/cpid1612.pdf>.

<sup>29</sup> According to SDG, from 2008 to 2010, the impacts of the great recession resulted in health insurance cost reductions in absolute terms, rather than growth. Accordingly, when calculating the average difference between 2007 and 2016, this implies a difference of only 0.1 percent a year. However, from 2011 onwards when the global and U.S. economies were returning to growth the average difference has been 2.8 percent a year. Therefore, SDG used the higher figure of 2.8 percent, since wider evidence (in particular historical health plan costs reported by Trimet [see <https://trimet.org/budget/pdf/2017-financial-forecast.pdf>]) suggests the historical difference was significantly higher than this.

<sup>30</sup> See <http://www.eia.gov/outlooks/aeo/>.

**Table D-22. Financial Baseline Assumptions: Purchased Transportation Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
Purchased transportation	N/A (METRO aggregated operating costs by service type not cost categories).	Average annual growth: 2017–2021: 3.1% 2021–2025: 3.0% 2025–2030: 2.7% 2030–2035: 2.5% 2035–2040: 2.4% 2040–2045: 2.5% 2045–2050: 2.6%

Source: SDG analysis.

For the SDG baseline, SDG assumes purchased transportation costs to grow in line with overall in-house costs. METRO confirmed that the costs of purchased and in-house transportation are broadly equivalent and this assumption assumes that remains the case moving forward.

**Table D-23. Financial Baseline Assumptions: Interest Rates (Debt Service) Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
Interest rates (debt service)	Through fiscal year 2021, SDG used METRO's assumptions. After fiscal year 2021: Base for 10-year debt: <ul style="list-style-type: none"> <li>• 2017: 2.68%</li> <li>• 2018: 3.48%</li> <li>• 2019–2050: 4.08%</li> </ul> Increment for each year of term different from 10: <ul style="list-style-type: none"> <li>• 0.08% for each year.</li> <li>• Each rate rounded to the nearest 0.1%.</li> </ul>	Consistent with METRO baseline. <sup>a</sup>

<sup>a</sup> With the exception of calculated expenses used. See below.

Source: SDG analysis.

METRO projected total debt service expense to grow each year between fiscal years 2016 and 2020 at an average annual rate of 10.8 percent, before decreasing by 7.3 percent in 2021 as a result of the expiration of the 2015 series A bonds.

METRO produced an official statement on November 17, 2016, related to its existing debts<sup>31</sup> which provides anticipated future payments related to each of METRO's bonds and contractual obligations. These profiles have been used as the basis for the majority of future debt service expense for METRO's existing debt. There are, however, the following exceptions to this:

- (1) The November 17, 2016, METRO official statement does not include information related to the Series 2016A, 2016B and 2016C debts. SDG raised a question to METRO regarding this, and METRO has provided in response an equivalent profile for each of these items. Values provided by METRO in its response have therefore been used as the future basis for payments related to these debts.
- (2) The outstanding balances related to the Series 2009A, 2009B and 2011A debts are not fully aligned in the official statement. Accordingly, SDG estimated the outstanding profile of payments assuming they are paid off in equal nominal amounts across the remainder of the maximum term.

In addition to the existing debts, there are three new items of capital expenditure for which additional debt is anticipated. Allowance for the following investments in expansion and renewals were incorporated by SDG:

- Park & Ride (P&R) buses: METRO's fiscal year 2017 budget book outlines the intention to expand the P&R fleet with the purchase of additional buses in fiscal year 2019;
- On-going bus fleet renewal: There is a need to continually renew the existing bus fleet given the useful life of the fleet and the desire to maintain a broadly stable average age profile. METRO has advised that long-term they need to replace approximately 100 buses each year (implying an average useful life of just over 12 years, which is broadly in line with FTA guidance); and
- LRT fleet renewal: The existing LRT fleet comprises of 18 vehicles from 2004 (due for renewal in 2029 assuming a 25-year life in line with FTA guidance), and 19 vehicles from 2012 (due for renewal in 2037). The additional 8 vehicles due to be delivered in 2021 will require replacement in 2046. These vehicles will each require renewal over the assessment period.

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<sup>31</sup> <https://www.ridemetro.org/MetroPDFs/FinancialAuditInformation/2016/METRO-Series-2016DOfficial-Statement.pdf>.

Although FTA funding is available for new buses under Section 5339 Bus and Bus Facilities Program, METRO currently allocates these funds for preventative maintenance expenditure. SDG assumed that METRO continues this practice.

Table D-23 outlines the assumptions regarding the terms of new debt associated with each of these investments.

For the SDG baseline, all of the core assumptions adopted related to debt service expenses are consistent with the METRO baseline assumptions, with the exception that SDG utilized the calculated expenses from fiscal year 2017 as opposed to from fiscal year 2021 (which are used in the METRO baseline). Therefore, there is no requirement to include the balancing item with the SDG baseline.

SDG developed assumptions based upon median interest rate forecasts produced by the Federal Reserve,<sup>32</sup> adjusted for the difference between the Federal Reserve rates, the 10-year Treasury yield rate,<sup>33</sup> and the latest rates that METRO currently pays on its debts from 2016. The following rates were incorporated into the METRO and SDG baselines:

Federal Reserve rates:

- 2016: 0.90 percent
- 2017: 1.60 percent
- 2018: 2.40 percent
- Longer term: 3.00 percent

Treasury 10-year rates:

- Average 2016: 1.84 percent

METRO latest debt rates:

- 2016A (13 years): 2.21 percent
- 2016B (17 years): 2.58 percent
- 2016C (5 years): 1.60 percent

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<sup>32</sup> See [www.federalreserve.gov/monetarypolicy/fomcprojtabl20160615.htm](http://www.federalreserve.gov/monetarypolicy/fomcprojtabl20160615.htm).

<sup>33</sup> See [www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield](http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield).

- Estimated 10-year: 1.98 percent<sup>34</sup>
- Estimated increment for each year: 0.08 percent<sup>35</sup>

Estimated increment to Federal Reserve rates:

- 1.08 percent<sup>36</sup>

Output estimated new debt rates for 10-year debt issued in:

- 2016: 2.02 percent
- 2017: 2.68 percent
- 2018: 3.48 percent

Longer term: 4.08 percent

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<sup>34</sup>  $1.60\% + (2.21\% - 1.60\%) / (13 - 5) * (10 - 5) = 1.98\%$ .

<sup>35</sup>  $((2.21\% - 1.60\%) / (13 - 5) + (2.58\% - 2.21\%) / (17 - 13)) / 2 = 0.08\%$ . This assumes a linear profile within the Treasury yield curve. This is a slight simplification of the typical trends, but it broadly aligns with the values for different maturities currently reported, so SDG considered it reasonable. See also <https://www.treasury.gov/resource-center/data-chart-center/interestrates/Pages/Historic-Yield-Data-Visualization.aspx>.

<sup>36</sup>  $1.98\% - 0.90\% = 1.08\%$ .

**Table D-24. Financial Baseline Assumptions: Debt Value Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
Debt value	<p>Through fiscal year 2021, SDG used METRO's assumptions.</p> <p>After fiscal year 2021:</p> <p><i>P&amp;R buses:</i></p> <ul style="list-style-type: none"> <li>• \$14.3 million in 2019</li> </ul> <p><i>On-going bus fleet renewal:</i></p> <ul style="list-style-type: none"> <li>• 2017: 2 buses</li> <li>• 2018: 143 buses</li> <li>• 2019: 59 buses</li> <li>• 2020: 89 buses</li> <li>• 2021: 121 buses</li> <li>• 2022: 90 buses</li> <li>• 2023–2050: 100</li> </ul> <p><i>Buses per year:</i></p> <ul style="list-style-type: none"> <li>• Each bus at rate of \$0.5 million (2017 prices), grown in line with CPI.</li> </ul> <p><i>LRT fleet renewal:</i></p> <ul style="list-style-type: none"> <li>• 2029: 18 vehicles</li> <li>• 2037: 19 vehicles</li> <li>• 2046: 8 vehicles</li> <li>• Each vehicle at \$4.4 million (2012 prices), grown in line with CPI.</li> </ul>	Consistent with METRO baseline.

Source: SDG analysis.

**Table D-25. Financial Baseline Assumptions: Term of Debt Through Fiscal Year 2050**

Item	METRO assumption	SDG assumption
Term of debt	<p>Through fiscal year 2021, SDG used METRO's assumptions.</p> <p>After fiscal year 2021:</p> <ul style="list-style-type: none"> <li>• P&amp;R buses: 12 years</li> <li>• On-going bus fleet renewal: 12 years</li> <li>• LRT fleet renewal: 25 years</li> </ul>	Consistent with METRO baseline.

Source: SDG analysis.

SDG developed the following assumptions for incorporating debt value projections into the METRO and SDG baselines:

**Exhibit D. SDG's Financial Baseline Assumptions Through 2050**



P&R buses:

- Based on value outlined within METRO's fiscal year 2017 budget book.

On-going bus fleet renewal:

- Fleet replacement profile up to fiscal year 2022 based upon the latest fleet replacement plan provided by METRO.
- Thereafter METRO has advised that long-term they need to replace approximately 100 buses each year.
- The value per bus is based upon the estimated average cost per vehicle within METRO's latest fleet replacement plan, allowing for cost inflation.
- Future growth is based upon inflation.

LRT fleet renewal:

- Fleet replacement profile based upon the age of the existing fleet and the anticipated vehicle life, in line with METRO depreciation policy.
- The value per vehicle is based upon the average cost per vehicle reported by METRO for the 19 vehicles purchased in 2012.
- Future growth in based upon inflation.

For both the METRO baseline and the SDG baseline, SDG assumes the term of debt to align with the anticipated life of each vehicle in line with FTA guidance on useful life and METRO depreciation policy.

The calculations above produce outputs of outstanding debt balance by the end of fiscal year 2021 within 2 percent of the values outlined within METRO's fiscal year 2017 budget book. It is to be expected that there will be some difference, since a precise profile for all existing debt is not available (in particular for the 2009A, 2009B and 2011A debts), and since precise assumptions related to each element of new debt are not available. In order to account for this difference—therefore ensuring that SDG's projected opening debt balance in fiscal year 2022 is consistent with METRO's projections—SDG included a balancing item, which SDG assumed to be paid down over a period of 5 years, using consistent assumptions to those outlined in tables D-23 through D-25.

Many of METRO's bond series include an option to redeem the obligations at an earlier date. This option may be taken where there is an opportunity to refinance at a lower rate. In making future projections of debt service payments we have taken

## **Exhibit D. SDG's Financial Baseline Assumptions Through 2050**

the conservative assumption that the debt will be retired in accordance with the specified principal repayment schedule over the full term.

Regarding capital equipment, facilities and vehicles, all assumptions related to future capital expenditures are consistent with the debt service expense items outlined above.

## EXHIBIT E. SENSITIVITY ANALYSES

**Table E-1. METRO Baseline Sensitivity to a 10 Percent Revenue Decrease for Fiscal Years 2017 through 2021**

	Years below cash reserve threshold			Largest difference from cash reserve threshold (millions)		
	<i>Board-directed</i>	<i>Required</i>	<i>No Reserve</i>	<i>Board-directed</i>	<i>Required</i>	<i>No Reserve</i>
Total sales taxes	4	4	3	(\$278)	(\$208)	(\$117)
Farebox	3	-	-	(\$27)	\$43	\$133
Vanpool	2	-	-	(\$2)	\$68	\$156
HOT lanes	2	-	-	(\$3)	\$67	\$155
Federal grant funding	4	-	-	(\$42)	\$28	\$118
Other revenue sources	2	-	-	(\$2)	\$67	\$155

Source: SDG analysis.

**Table E-2. METRO Baseline Sensitivity to a 10 Percent Cost Increase for Fiscal Years 2017 through 2021**

	Years below cash reserve threshold			Largest difference from cash reserve threshold (millions)		
	<i>Board-directed</i>	<i>Required</i>	<i>No Reserve</i>	<i>Board-directed</i>	<i>Required</i>	<i>No Reserve</i>
METROLift	3	-	-	(\$27)	\$43	\$135
Other operating costs	2	-	-	(\$1)	\$68	\$156
Labor and fringe benefits	4	3	-	(\$127)	(\$53)	\$42
Non-labor	4	1	-	(\$77)	(\$5)	\$88
Capital program expenses	4	-	-	(\$50)	\$21	\$111

Source: SDG analysis.

**Table E-3. SDG Baseline Sensitivity to a 5 Percent Revenue Decrease for Fiscal Years 2017 through 2021**

	Years below cash reserve threshold			Largest difference from cash reserve threshold (millions)		
	<i>Board-directed</i>	<i>Required</i>	<i>No Reserve</i>	<i>Board-directed</i>	<i>Required</i>	<i>No Reserve</i>
Total sales taxes	3	-	-	(\$68)	\$6	\$102
Farebox	-	-	-	\$52	\$121	\$208
Vanpool	-	-	-	\$59	\$127	\$215
HOT lanes	-	-	-	\$58	\$127	\$214
Federal grant funding	-	-	-	\$46	\$116	\$203
Other revenue sources	-	-	-	\$59	\$127	\$214

Source: SDG analysis.

**Table E-4. SDG Baseline Sensitivity to a 10 Percent Revenue Decrease for Fiscal Years 2017 through 2021**

	Years below cash reserve threshold			Largest difference from cash reserve threshold (millions)		
	<i>Board-directed</i>	<i>Required</i>	<i>No Reserve</i>	<i>Board-directed</i>	<i>Required</i>	<i>No Reserve</i>
Total sales taxes	4	3	2	(\$222)	(\$148)	(\$52)
Farebox	-	-	-	\$42	\$112	\$202
Vanpool	-	-	-	\$59	\$127	\$214
HOT lanes	-	-	-	\$58	\$126	\$213
Federal grant funding	-	-	-	\$27	\$99	\$190
Other revenue sources	-	-	-	\$58	\$126	\$213

Source: SDG analysis.

**Table E-5. SDG Baseline Sensitivity to a 5 Percent Cost Increase for Fiscal Years 2017 through 2021**

	Years below cash reserve threshold			Largest difference from cash reserve threshold (millions)		
	<i>Board-directed</i>	<i>Required</i>	<i>No Reserve</i>	<i>Board-directed</i>	<i>Required</i>	<i>No Reserve</i>
METROLift	-	-	-	\$51	\$120	\$208
Other operating costs	-	-	-	\$59	\$127	\$214
Labor and fringe benefits	-	-	-	\$7	\$81	\$177
Non-labor	-	-	-	\$30	\$104	\$195
Capital program expenses	-	-	-	\$42	\$112	\$200

Source: SDG analysis.

**Table E-6. SDG Baseline Sensitivity to a 10 Percent Cost Increase for Fiscal Years 2017 through 2021**

	Years below cash reserve threshold			Largest difference from cash reserve threshold (millions)		
	<i>Board-directed</i>	<i>Required</i>	<i>No Reserve</i>	<i>Board-directed</i>	<i>Required</i>	<i>No Reserve</i>
METROLift	-	-	-	\$40	\$111	\$202
Other operating costs	-	-	-	\$58	\$127	\$214
Labor and fringe benefits	4	-	-	(\$65)	\$13	\$113
Non-labor	2	-	-	(\$8)	\$66	\$162
Capital program expenses	-	-	-	\$19	\$92	\$182

Source: SDG analysis.

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