

Analysis and Evaluation of the City
and County of Honolulu's
Proposed High Capacity Rail
Transit Project

FINAL REPORT

for the
Hawaii Department of Transportation
December 2, 2010

Prepared by



**Infrastructure
Management
Group, Inc.**

In association with:

CBRE
CB RICHARD ELLIS

B R I N G I N G B U S I N E S S T O G O V E R N M E N T™

EXECUTIVE SUMMARY

Financial Plan Assessment, Feasibility and Fiscal Implications of the Honolulu Rail Transit Project

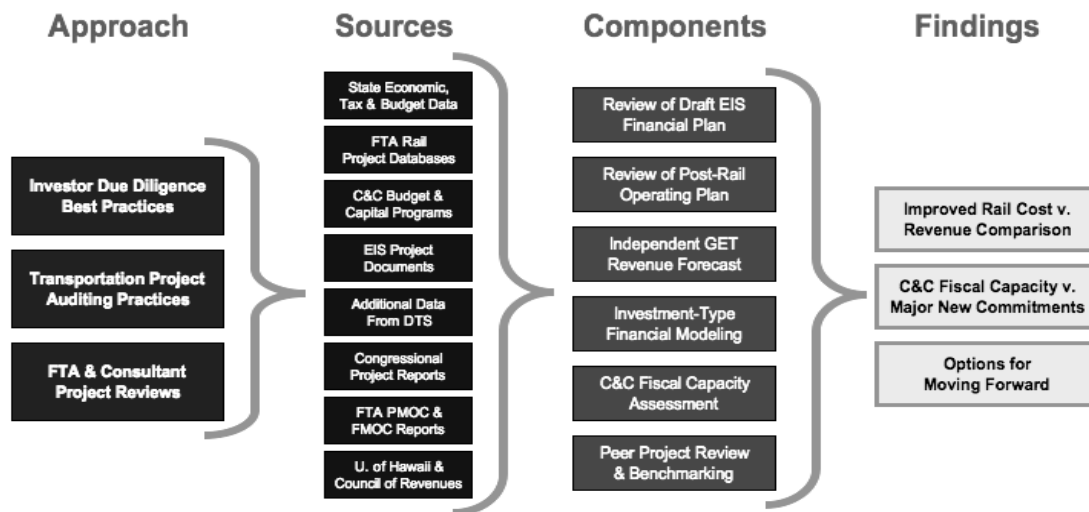
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1. Study Overview

The Honolulu High Capacity Rail Transit Project is one of the largest proposed transit projects in the country. Its budget dwarfs the New York Second Avenue Subway Phase I and the Washington Dulles Corridor Metrorail Project. Of the 43 projects listed in the Federal Transit Administration’s (“FTA’s”) *Annual Report on Funding Recommendations*, the only projects with larger dollar values are the New York Long Island Rail Road East Side Access and the New Jersey Access to the Region’s Core, which was recently canceled by the New Jersey governor due to its cost overruns. In light of Honolulu project’s size compared to the population served by it, Governor Linda Lingle requested that the Hawaii Department of Transportation procure an independent financial review.

Infrastructure Management Group, Inc. (“IMG”), in conjunction with the Land Use and Economic Consulting Group of CB Richard Ellis (“CBRE”) and Thomas A. Rubin (together, the “IMG Team”) was tasked by the Hawaii Department of Transportation to evaluate the rail project’s financial plan, including revenues and costs, the post-rail operating plan, and the fiscal implications for Honolulu. In addition, the IMG Team examined the financial performance history of other relevant transit rail projects relevant to Honolulu’s plans. The diagram below summarizes the analytic process.

The Independent Financial Assessment Process



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This report goes substantially beyond the relatively limited periodic financial reviews conducted as part of the FTA's new starts grant approval process. Those reviews and the FTA's process itself are directed toward protection of the federal interest and rely upon the strictures of the Full Funding Grant Agreement ("FFGA") to place all risk of cost overruns or revenue shortfalls on local taxpayers. By contrast, the IMG Team used standard infrastructure investor due diligence processes similar to what lenders, bond rating agencies and infrastructure fund managers use to evaluate financial feasibility.

The IMG Team's analysis takes the *local public investment perspective*, seeking to assess the reasonableness and accuracy of the current Financial Plan while separately analyzing (using new models with updated information and more complete range of assumptions) the local fiscal consequences of the most likely cost and revenue scenarios. Such independent due diligence is essential to informed investment decisions. The assessment was guided by the following:

- Standard investor due diligence practices for publicly and privately funded infrastructure projects in the U.S.;
- The IMG Team's collective experience in reviewing other, similar transportation investments for governments and private investors in the U.S. and around the world, and
- The specific concerns expressed by the FTA in its internal review of the project, particularly those raised in the full report of New Starts Financial Assessment conducted by its independent Financial Management Oversight Consultant ("FMOC").

The assessment consisted of a review of the current Financial Plan and the conduct of several independent, standalone analyses. All told, the assessment included five major components:

1. A review of the current Financial Plan
This task was led by IMG with assistance from Thomas Rubin and the Land Use and Economic Consulting Group of CB Richard Ellis. It was based upon the Team's collective experience with other rail projects as well as FTA reports and transit industry databases.
1. A peer project review
This task was conducted by IMG and transit finance and accounting specialist Thomas Rubin using FTA data, Congressional reports, contacts with the peer project sponsor agencies and previous internal and published reports on the peer projects. Information from these peer projects informed the financial risk assessment and provided lessons for Hawaii on the management of its rail project and post-rail operations.
2. A new GET surcharge revenue forecast, based on the latest data
This task was led by the Land Use and Economic Consulting Group of CB Richard Ellis, a global development advisory firm with an office in Honolulu, using data from the Hawaii

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Department of Taxation, Department of Business, Economic Development and Tourism, the University of Hawaii, and other sources. The forecast utilized the strong historical relationships between growth rates for the US Gross Domestic Product, Hawaii Gross State Product, Honolulu County economic activity, population, and GET collections.

3. A new investment-type financial model, including revised inputs and more complete scenarios

This task was led by IMG using proven financial models from other transit new start projects and incorporating data from several sources, including the current Financial Plan, the new GET forecasts, the Operating Plan assessment, the FTA FMOC and PMOC reports, and the peer projects analysis. The model utilized a Base Case (mostly likely), Downside Case (which we have judged to be the second most likely), and Best Case (judged to be plausible but least likely) scenarios.

4. A review of the post-rail operating plan, including assessment of the projected costs, revenues and service assumptions

This task was conducted by Thomas Rubin using information in the EIS, FTA data and documents, and other proprietary and publicly available data. This was based on the post-rail experience of other transit systems and FTA funding, maintenance and equipment replacement guidelines.

5. An assessment of the C&C strategic fiscal capacity

This task was conducted by IMG based upon information supplied by various State of Hawaii agencies, C&C agencies, members of the Council of Revenues and publicly available data. It compared the C&C's prospective baseline spending levels to the new capital improvement other major spending obligations that were unknown at the time of the rail project financial plan was developed.

The combination of these task components allowed The IMG Team to evaluate the current Financial Plan and the project itself from a variety of capital, revenue, cost and risk perspectives, and to do so without relying entirely on the models and assumptions used by the project's engineer and program manager.

Our findings are summarized below:

- 1. GET revenues are most likely to grow at a compounded rate that is approximately 30 percent lower than the forecast included in the current Financial Plan.**
- 2. The Project is most likely to require over \$1.7 billion more capital and operating subsidy from the City of Honolulu over the 20-year time frame than was assumed in the current Financial Plan. The difference between the planned and most likely subsidy over 30 years will be even greater, as major rail repair and equipment replacement costs are included and larger-than planned operating subsidies persist.**

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- 3. *There is a substantial risk that required subsidy could be \$4.5 billion more than the planned amount over the 20-year timeframe, even if all of the current Financial Plan's presumed federal New Start funds are realized (but delayed) and construction costs are only 10 percent more than assumed in the current Financial Plan.***
- 4. *The total capital and operating subsidy paid by local taxpayers in addition to the GET surcharge is estimated to range from \$9.3 billion under the 30-year Best Case scenario to \$14.5 billion under the 30-year Downside Case.***
- 5. *The debt required to finance the rail project is likely to push annual debt service levels for Honolulu well past its current 20-percent-of-budget guidelines.***
- 6. *The financial challenges for the rail project could be overcome by increasing the duration or size of the GET surcharge. For example, the construction shortfall could be eliminated by between 5 and 19 years (depending upon the scenario) or increasing the GET surcharge rate by between 24 and 76 percent.***
- 7. *Post-rail transit system usage and fare revenue are likely to be substantially lower than is projected in the current Financial Plan, since the Plan's projection would require an unprecedented and unrealistic growth in transit utilization for a city that already has one of the highest transit utilization rates in the country.***
- 8. *The rail project will be competing with other large and previously ill-defined or unaccounted financial obligations of Honolulu, such as unfunded pension and retiree health care liabilities and increased capital and operating expenses related to compliance with the EPA wastewater consent decree.***

2. Lessons from Other Rail New Starts

A large number of assumptions go into creating cost and revenue estimates for a rail transit project. Although these estimates become more refined as the project moves through the planning phase from concept to construction details, the consistency with which actual costs have exceeded these estimates and ridership has fallen short caused Congress to require that FTA to submit annual "Before and After" reports on all federally-assisted rail projects.

In order to understand the likelihood that each risk might be realized in the Honolulu project, the IMG Team conducted case studies of several other U.S. rail transit projects. Most had outcomes substantially different from their plans. We compared the information in these case studies to the Honolulu project plans. We also reviewed additional FTA reports, studies, and information

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provided directly to IMG from the peer project sponsors. This analysis revealed the several important lessons for the Honolulu project.

On average, the actual costs of heavy rail New Starts projects are significantly higher than estimated in the AA/DEIS, FEIS, and FFGA. In its “Before and After” assessment report of 2007, for example, FTA concluded that approximately half of the studied projects in the report “significantly underestimated capital costs in their AA/DEIS,” with most others showing at least some material underestimation (the Financial Plan reviewed by The IMG Team was roughly between the DEIS and FEIS stage). As shown in the following table, data on nine New Starts heavy rail projects shows that final costs average 29.2% higher than AA/DEIS stage, and 22% higher than the FEIS stage and FFGA stage. These overruns occurred despite the 20 percent to 40 percent contingencies built into the projects’ cost estimates at the FEIS stage.

Estimated vs. As-Built Costs for Heavy Rail Projects

City	Project Name	\$ Yr	Capital Costs (millions) reported in same year dollars of construction dollars*				As-Built Capital Costs as Percentage of Estimate		
			AA/DEIS	FEIS	FFGA	As-Built	AA/DEIS	FEIS	FFGA
Atlanta	North Line Extension	1997	439.5	389.7	352.0	472.7	107.5%	121.3%	134.3%
Baltimore	Extension to Johns Hopkins	1991	313.7	310.5	310.5	353.0	112.5%	113.7%	113.7%
Chicago	Douglas Branch	2004	441.7	477.7	473.2	440.8	99.8%	92.3%	93.2%
Chicago	SW Transitway	1990	604.0	532.3	438.4	522.0	86.4%	98.1%	119.1%
Los Angeles	Red Line	1995	3,031.3	3,181.3	3,505.6	4,469.7	147.5%	140.5%	127.5%
San Francisco	BART Ext. to SFO	2004	1,193.9	1,230.0	1,185.7	1,551.6	130.0%	126.1%	130.9%
San Francisco	Colma BART Station	1996	112.5	130.1	171.6	179.9	159.9%	138.2%	104.9%
San Juan	Tren Urbano	2001	1085.6	1309.2	1280.6	2228.4	205.3%	170.2%	174.0%
Washington DC	Largo Metro Rail Ext.	2002	375.0	432.6	412.6	426.4	113.7%	98.6%	103.3%
						AVERAGE	129.2%	122.1%	122.3%

*Values expressed as midpoint of construction dollars

The capital cost estimates in the Honolulu Financial Plan include an aggregate 31 percent construction cost contingency, but this is merely typical of the contingencies that were built into the DEIS-stage and FEIS-stage estimates for the projects listed above and for FTA New Start applications overall at the same stage of plan development; that is, the Honolulu estimates do not include a greater-than-usual measure of protection from the cost escalation risk factors that have afflicted previous rail New Starts.

Similarly, FTA has identified fare revenue forecasts as an additional concern for New Starts, especially for cities without rail experience. An examination of AA/DEIS and FEIS reports reveals that the ridership estimates stated in these documents are often highly optimistic. Moreover, a 2007 FTA report concluded that ridership forecasts for initial build-out of multi-phase systems tend



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to have higher errors than extensions or subsequent projects in the same metropolitan area: actual ridership was 47 percent less than estimated for initial rail projects, while projects with an existing system already in place were 35% lower.

In addition to the typical New Start cost and ridership issues, a number of risk factors specific to Honolulu could increase the potential for cost overruns. These include the following:

- **The project is the first rail project for the sponsoring agency.** Previous “rookie” agencies have been considerably more likely to experience cost overruns and operational underperformance despite the use of experienced consulting engineers and construction managers. The likely reason is that each city has unique characteristics that, despite bringing experience from other agencies, remain unknown until construction and operation. These rail issues then reverberate through the operation of the full bus-rail transit system as the agency.
- **The project is on an island and relatively isolated from sources of materials and specialized labor.** Oahu’s island geography increases the risk of construction cost overruns, since nearly all materials and a large amount of the construction management and technical expertise will have to be transported or relocated, respectively, from long distances. Some of the largest transit rail project cost overruns have occurred as a result of difficult transportation logistics and the need to import specialized expertise. According to the FTA’s Project Management Oversight Consultant’s 2009 report, the project plan submitted by Honolulu did not adequately address these risks in either its cost estimates or construction planning.
- **The project utilizes a relatively unique elevated heavy rail system.** There are relatively few examples of large-scale elevated rail systems, and even fewer for heavy rail, particularly in the US. This feature compounds the risks routinely associated with a sponsoring agency’s inexperience and logistical challenges associated with construction sites remote from materials and specialty expertise.

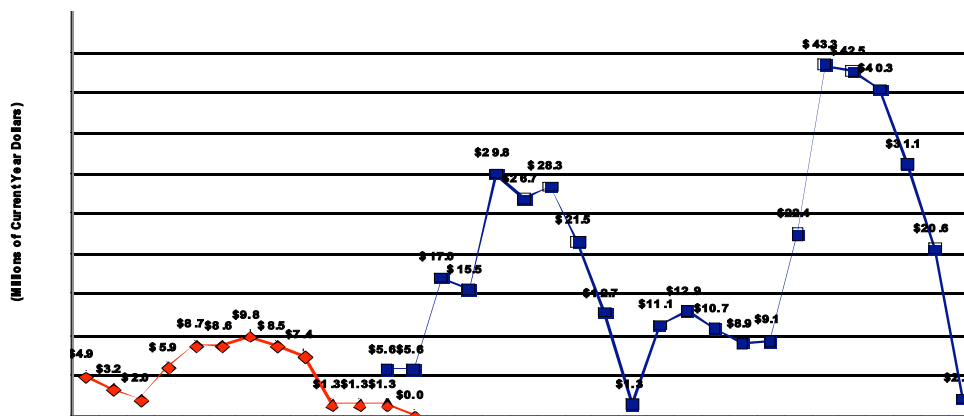
Although The IMG Team did not directly incorporate the results of this peer-based risk assessment into its financial analysis Base Case, the overall “before and after” record suggests that the outputs of IMG’s models be treated as conservative estimates of the potential financial demands that the rail project is likely to place on the City and County of Honolulu.

3. Federal Funds

The Financial Plan includes funding from four different federal transit assistance programs. The IMG Team reviewed the Financial Plan’s assumptions for all four, as detailed below.



- 5307 Urbanized Area Formula Funding** grants provide transit capital and operating assistance in urban areas and for transportation related planning. The IMG Team performed analyses of the estimates used in the Financial Plan. IMG's own estimates were fairly close to the Financial Plan projections. However, the Financial Plan shows the 5307 formula funding, which is generally first used for bus and demand-responsive capital renewal and replacement, going entirely for fixed guideway construction during the period 2011-2019, for a total of \$301 million. This cannot be done if these funds are needed for bus capital renewal and replacement.
- 5309 Fixed Guideway Modernization Funding** is separate from the 5309 New Starts funding. It is intended to provide capital assistance for the modernization of already existing rail and other guideway transit systems. This is another formula-driven grant funding program, where the annual allocations to each urbanized area with fixed guideway transit operations is allotted based on a very complex formula in Federal law using fixed guideway operating data submitted by each transit operator to FTA. The IMG Team found the Financial Plan estimates in the model to be reasonable or perhaps a bit conservative overall.
- 5309 Bus Discretionary Funds** are generally intended to fund bus uses. It, like the New Starts program, has been a 100% "earmarked" program for many years, with Congress directly deciding the grantee, purpose, and amount for each allocation. The Financial Plan projects a total of \$419 million over the 22 years, 2009-2030, or approximately \$19 million a year. In order to evaluate this projection, we reviewed the actual allocations made for the period, 1998-2010, from the FTA. The graph below displays the historical actual (in red) and projected times series (in blue) for this program:



In recent years, Honolulu's receipts from this program have been less than in previous years: \$1.3 million a year for 2007, 2008, and 2009, and nothing in 2010. In fact, Honolulu bus discretionary grant funding has fallen sharply since it began receiving New Start

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grants. This is a pattern consistent with the experience of other New Start grant recipients. It calls into question the projected bus discretionary funding for the period 2011-2017, when over \$154 million is expected over these seven years, an average of approximately \$22 million per year, at the same time that Honolulu is projected to be receiving \$1.38 billion in New Starts grants. Accordingly, we do not find these projections to be viable.

- **5309 New Starts Funding:** While we believe that the Financial Plan assumption of a \$1.55 B FTA commitment to the Project is possible, it is optimistic in aggregate and, at \$250 million per year, highly optimistic with regard to the annual appropriation. This concern was also raised by the FTA's FMOC. Nevertheless, we have mostly accepted the assumption in our financial analysis by simply extending the time period over which the funds are paid (by additional three years in the Base Case). However, the City may need to find different sources of funding to cover the bridge loans that will be required to keep the construction period from being extended.

We believe that the federal New Start grant assumptions in the Financial Plan are materially at risk despite FTA's tentative approvals to date (although we have opted to include the dollar amount assumption in our own financial model, albeit over a longer period of time). Moreover, we find that the Financial Plan's assumptions for FTA bus discretionary grants to be both unprecedented and unacceptably optimistic, a concern shared by the FTA's independent financial consultant. Changing the assumption to a more realistic level increases the local subsidy by approximately \$227 million over 20 years.

4. GET Surcharge Revenues

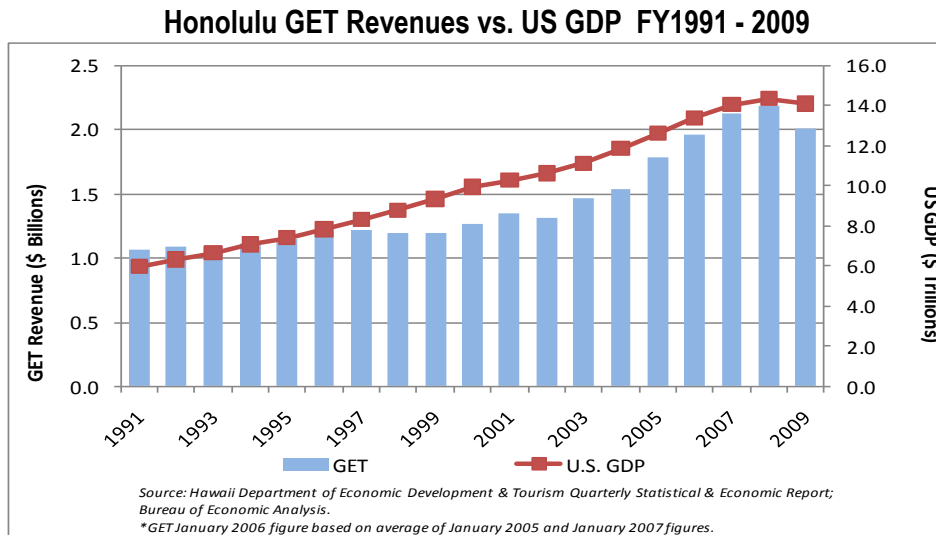
The IMG Team examined key economic variables in Hawaii and the U.S. economy from FY 1990 thru FY 2010 from the Hawaii Department of Business, Economic Development and Tourism ("DBEDT") and the U.S Bureau of Economic Analysis. We examined monthly GET collections in Honolulu County, employed workforce, population, construction permits and spending. We also examined the U.S. Gross Domestic Product for each fiscal year from 1990 through 2009 to determine the statistical relationship with the Hawaiian economy for use in forecasting GET.

In order to overcome the possible effect of temporary swings in the long-term relationships between GET revenues and the US and Hawaiian economies (e.g., short-lived spikes or drops in tourism or construction), the IMG Team looked at three different 15-year time periods between 1990 and 2010, each containing a slightly different mix of boom and bust phenomenon. These were used to define the Base Case, Best Case and Downside Cases. Key findings were:

- Actual GET revenues collected in FY 2009 and FY 2010 were 4.9 percent and 2.1 percent lower than the prior year's actual collection respectively – so the base year for our forecast was \$5 million lower than PB.

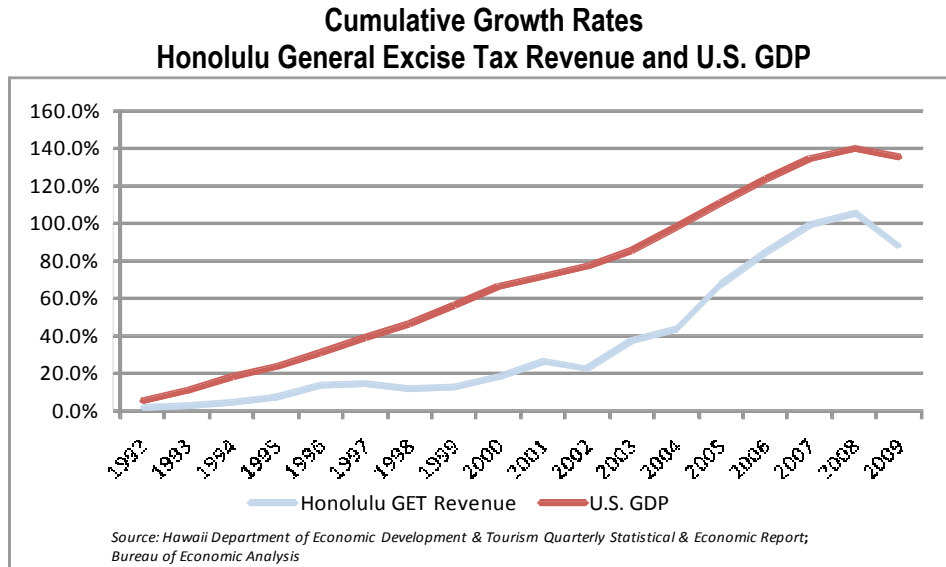
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- The U.S. GDP has outpaced the Hawaii economy over past 20 years by +40 percent (4.5% CAGR vs 3.3% CAGR).
- While there have been periods before 1990 in which Honolulu's economic growth rates have exceeded US GDP growth (the emergence of long-distance jet service, airline deregulation and surges in the Japanese economy), the relationship of the past three decades (as shown in the chart below) -- and most likely future relationship -- is that Hawaii and Honolulu's growth lags US GDP growth somewhat, as other tourism-dependent regional economies have tended to do over the long term.



- Since 1990, Honolulu GET growth rates have averaged between 3.5 percent and 4.7 percent over every 15-year period since 1990, somewhat less than US GDP growth. The chart below shows the cumulative impact of this difference: over time the growth of GET revenues have grown to a cumulative level that as of 2009 was roughly 37 percent lower than the growth of U.S. GDP. We believe that a similar aggregate impact can reasonably be expected over the 20-30 year planning period of the rail project.

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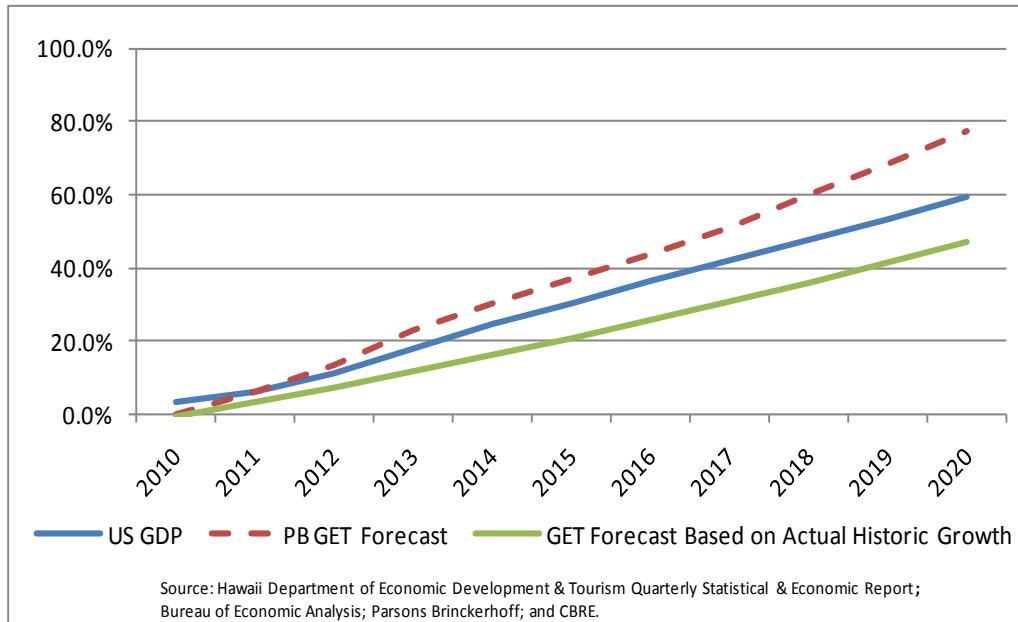
- Honolulu GET growth rates spiked between 2004 and 2008 because of an unprecedented and temporary surge in (taxable) residential construction activity. We believe this may have affected the accuracy of the current Financial Plan’s GET forecasts.
- Unrealized GET forecasts have contributed to the inaccuracy of the baseline GET assumptions used in the Financial Plan. The actual 2010 GET is \$ 2,316 million - a 20% decline from 2007 estimates. In 2010 the projected GET for 2014 is \$3,036 million - a 7 percent decline from 2008 and an 18 percent decline from 2007 estimates.

As noted earlier, The IMG Team’s GET forecasting model utilizes a range of 15-year compound annual growth rates (“CAGR”) for the Hawaii economy beginning in the mid-1990’s and ending at the peak of the economic boom and at the end of the most recent recession to provide a conservative to optimistic forecast assumption. For 1995-2010 the CAGR was 3.7%. For 1994-2009 the CAGR was 4.0%. For 1993-2008 the CAGR was 4.7%. As another reference source, the Congressional Budget Office (“CBO”) forecasted growth in U.S. GDP is expected to average between 4 percent and 4.5 percent for next ten years. Assuming a similar historic relationship, the GET tax growth is unlikely to grow beyond a 4 percent compound growth rate over the forecast period, well below the 5.4 percent in the current Financial Plan.

Modeling this relationship yields GET revenues that are \$366 million to \$560 million less than the \$3.5 billion estimated by Financial Plan. The chart below shows that the Financial Plan forecast for GET revenue growth exceeds the cumulative growth rate of the U.S. economy and the historic average growth rate of the Hawaiian economy by 40 percent within the first 10 years of the forecast period.

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**Forecast Cumulative Growth Rates
 Honolulu General Excise Tax Revenue and U.S. GDP**



The red dotted line (“PB GET Forecast”) is the forecast used in the Financial Plan. The solid blue line is the cumulative growth rate for U.S. GDP. The solid green line is the GET forecast based on actual historical growth, which was used by The IMG Team in its financial model.

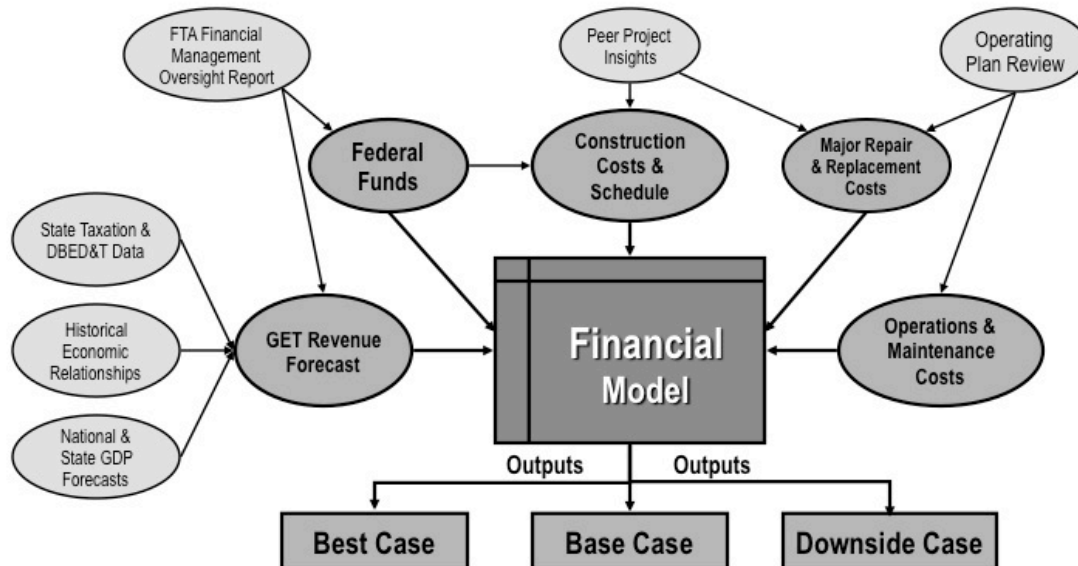
The gap between the Financial Plan’s GET forecast and the forecast based on historical trends is very large in project financing terms: lenders and investors typically discount revenue forecasts that so sharply deviate from known historical relationships. In order for the Financial Plan’s forecast of GET revenue (“PB GET Forecast”) to occur, the Hawaiian economy and Honolulu’s share of it would have to experience long-term growth rates more than double population growth. This is a highly unlikely scenario.

5. The Financial Analysis

The IMG Team developed a new financial model for the project based upon IMG’s own transit project finance models from similar projects and utilizing the new GET forecasts (see Section 4 in this Executive Summary), cost data from the current Financial Plan and other sources, and updated assumptions for inflation, financing costs and other inputs. The diagram below shows how the information was combined in the model:

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Inputs to the Financial Model



The IMG Team conducted the financial analysis using both 20-year and 30-year time horizons. The 20-year horizon was used to draw direct comparisons with the current Financial Plan because the Plan includes only 20-year projections. However, we used a 30-year model to calculate total and line-item subsidies over the industry-standard 30-year transportation project finance evaluation period. While the 30-year results cannot be compared directly to the current Financial Plan, they do provide a more comprehensive picture of the financial obligations -- including major repair and replacement costs and out-year operating subsidies -- that will accompany Honolulu's rail system.

In developing this new model, we had several concerns about using the assumptions in the current Financial Plan:

- Our concerns over the Financial Plan's revenue assumptions are based upon the results of the new GET forecast, a review of the operating plan's ridership (and fare) growth projections, and sharp deviations from the historic FTA bus capital grant receipts.
- Our concerns over some elements of the Plan's cost assumptions are based upon the experience of other rail projects, historic Honolulu trends and the specific risk factors associated with the Honolulu rail project.

Nevertheless, in some instances we have accepted the Financial Plan's assumptions in the Base Case in order to simplify the analysis and maintain a conservative stance on variables for which we had less information.

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The table below shows how the assumptions vary. Note that the dollar amounts in the line item for 5309 Bus Discretionary Funds applies only to the 20-year comparison, since we did not perform a direct 30-year comparison between the current Financial Plan and the results of our model.

Assumption	Current Financial Plan	IMG Model	Reasoning
Construction Costs	\$5.1 B	\$5.3 B (excluding inflation)	Reflects recommendation from FTA PMOC report
Model start year	2009	2011	ROD not received in 2010 as expected in Financial Plan
Model length	20 years	30 years	Enables forecast of ongoing maintenance investments
Beginning Transit Fund Balance	\$154 M	\$381 M	Construction delay results in more GET collections
New Starts Funding	\$1.55 B over 9 years	\$1.55 B over 12 years	Project unlikely to receive more than \$150 M per year in New Starts funding
Grant Anticipation Notes	N/A	For shortfall from New Starts funds	Bridge financing needed while New Starts funding is pending
5309 Bus Discretionary	\$419 M	\$166.4 M	Capped at \$2.6 M per year during construction. Very rare for properties to receive major Bus Discretionary in same years as New Starts funds
Operations & Maintenance Costs	\$7.2 B	\$7.7 B	Includes wait time between bus runs
GET revenue	\$3.5 B	\$2.7 B	4% long-term growth rate maintains historic relationship of GET and GDP

These basic assumptions were further refined into three scenarios: Base Case, Best Case and Downside Case. The assumptions for these scenarios are summarized in the table below:

SUMMARY OF SCENARIOS			
	Base Case	Downside Case	Best Case
Beginning Year of the Model	2011	2013	2011
Transit Fund Balance at Start of Construction	\$ 380,880,555	\$ 718,859,595	\$ 380,880,555
Long-Term Debt Interest Rate	3.96%	4.96%	3.96%
City Funds for Ongoing Capex Annual Cap	-	100,000,000	-
GET Forecast	IMG 4%	IMG 3.7%	IMG 4.7%
O&M Forecast	IMG	IMG	EIS
O&M Increase	0%	10%	0%
CAPEX Increase	0%	10%	0%
Capital Renewal & Replacement Forecast	Lower IMG	IMG	Lower IMG w/ \$25 M Cap
Capital Renewal & Replacement Increase/Decrease	0%	20%	-20%
Fare Revenue Decrease	0%	-20%	0%
Fare Elasticity	-0.1	-0.33	0
New Starts Forecast	\$150 M Cap, extended 3 yrs	\$150 M Cap, extended 3 yrs	Financial Plan
5309 Bus Discretionary Forecast	Doubled IMG	IMG (\$1.3 M per year)	Financial Plan w/ \$15 M and \$20 M Cap

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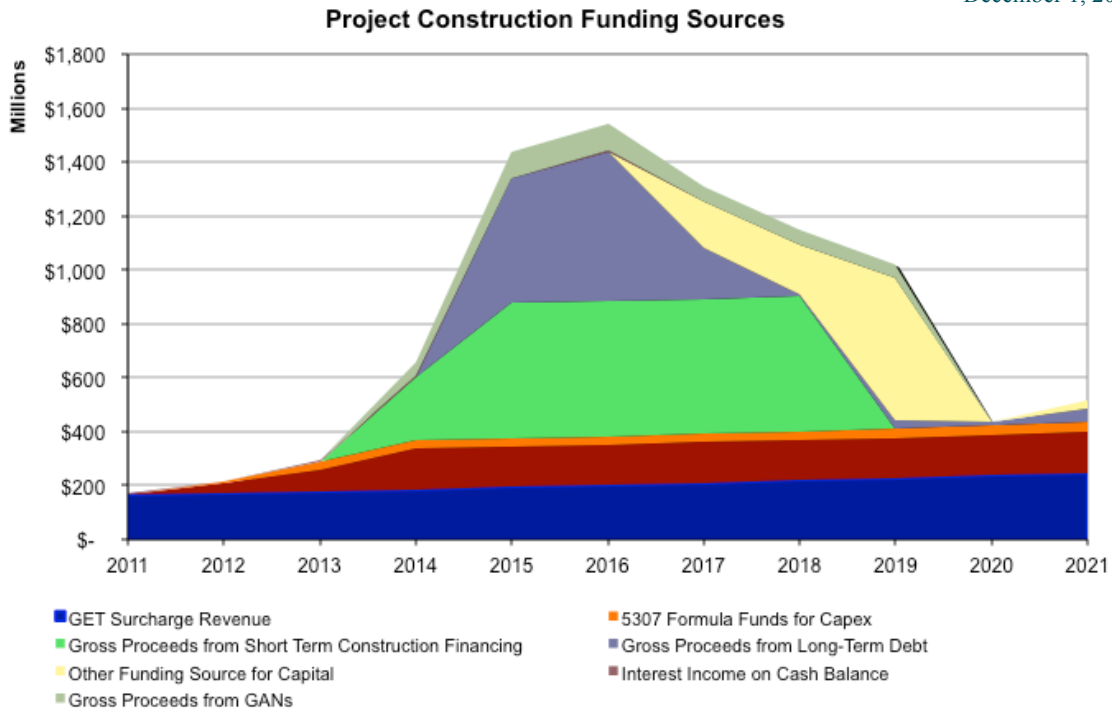
Based on the assumptions and various adjustments to the Financial Plan projections discussed above, IMG's financial analysis estimates the impact the taxpayer subsidy (in addition to the GET surcharge revenue) that the rail project would require over a 30-year period. The results of this analysis are presented in the table below. The key results are highlighted in yellow for each of the three business lines, Rail Construction, Ongoing Capital and Major Maintenance, and Operations.

SCENARIO RESULTS (30 Yr)			
	Base Case	Downside Case	Best Case
Beginning Model Year	2011	2013	2011
Transit Fund Balance Prior to Construction	380,880,555	718,859,595	380,880,555
GET Surcharge Revenue	2,700,943,516	2,306,439,863	2,838,061,453
Total Farebox revenues	3,856,775,624	2,799,582,625	4,120,640,531
Total Debt Service	4,329,216,249	3,853,947,576	3,897,898,165
Total OpEx	12,424,589,605	14,316,916,725	11,893,733,614
Total Ongoing CapEx	2,487,410,441	2,770,245,758	2,373,210,441
<i>Rail Construction Shortfall</i>	<i>909,544,246</i>	<i>1,701,802,819</i>	<i>678,256,434</i>
<i>City Match Funds for Ongoing Capex</i>	<i>1,738,328,475</i>	<i>1,775,374,204</i>	<i>1,597,487,679</i>
<i>City Operating Subsidy</i>	<i>7,845,252,049</i>	<i>10,794,772,169</i>	<i>7,050,531,151</i>
Total City Support	10,493,124,771	14,271,949,192	9,326,275,263

All scenarios require at least \$9 B in subsidies from the City over 30 years. For the Base Case, the portion of this subsidy attributable to the construction shortfall (\$909.5 M) can be eliminated if the funding shortfall is eliminated by extending the GET sunset year to 2030 or by instituting an increase in GET surcharge of 36 percent (Base Case). The entire additional Honolulu subsidy could probably be eliminated by increasing the GET surcharge and continuing it indefinitely.

The chart below shows (in yellow) how much *new* capital subsidy from the City is needed *in addition to* the amounts in the Financial Plan simply to cover construction costs in the Base Case.

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This construction fund shortfall can be eliminated either by extending the GET surcharge until 2030 or increasing the surcharge rate to 0.0068 instead of the current 0.005. However, covering *post-construction* capital, operating and maintenance subsidies *beyond what is included in the current Financial Plan* would require several times those hypothetical increases.

Since the Financial Plan forecast is 20 years, we also conducted model runs using a 20-year time horizon. As noted earlier, the most significant differences between the IMG Model Base Case results and those of the Financial Plan are lower GET surcharge revenue projections in the IMG Base Case, and significantly higher City support for ongoing capital costs mainly due to lower 5309 Bus Discretionary grant projections. When the Base Case scenario results are summarized for a 20-year period and compared to the Financial Plan, the additional subsidy amount required is \$1.725 billion. The breakdown of this total among construction, ongoing capital expenditure (that is, making up for the lower 5309 FTA funds) and operating subsidy is shown in the following table:

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SCENARIO RESULTS (20 Yr)			
	Base Case	EIS Financial Plan*	Difference
Beginning Model Year	2011	2009	2 Yrs
Transit Fund Balance	380,880,555	154,429,296	226,451,259
GET Surcharge Revenue	2,700,943,516	3,524,257,317	(823,313,801)
Total Farebox revenues	2,320,904,460	2,274,676,571	46,227,889
Total Debt Service	4,324,416,249	4,461,054,516	(136,638,267)
Total OpEx	7,726,545,991	7,242,420,006	484,125,984
Total Ongoing CapEx	1,492,533,588	1,381,671,715	110,861,873
<i>Rail Construction Shortfall</i>	<i>909,544,246</i>	<i>-</i>	<i>909,544,246</i>
<i>City Match Funds for Ongoing Capex</i>	<i>948,986,851</i>	<i>571,363,394</i>	<i>377,623,457</i>
<i>City Operating Subsidy</i>	<i>5,135,558,508</i>	<i>4,697,660,413</i>	<i>437,898,095</i>
Total City Support	6,994,089,606	5,269,023,807	1,725,065,799

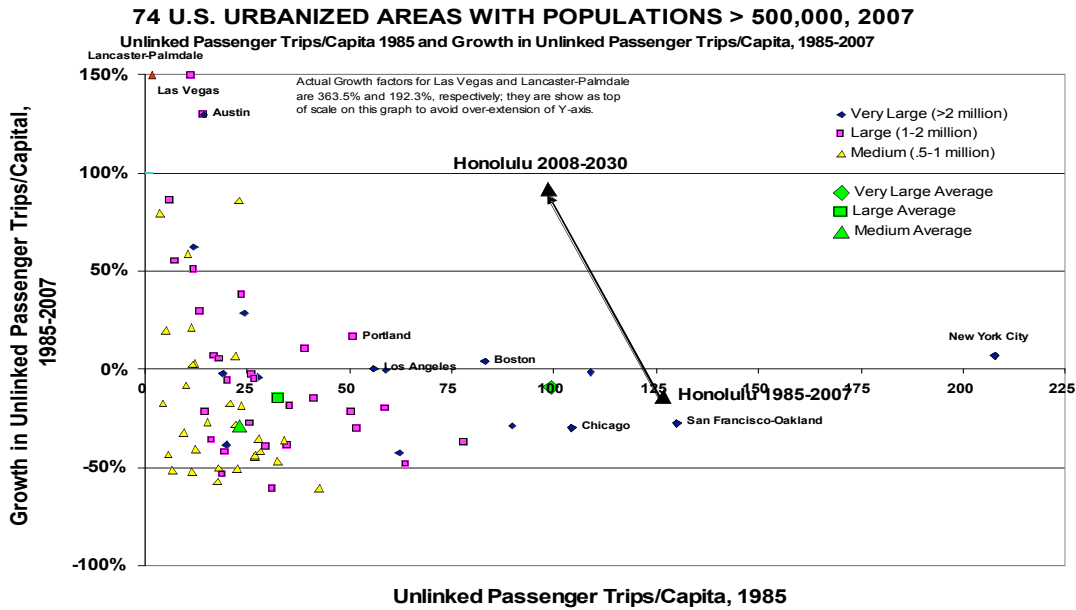
Under the most likely scenario, the C&C will need to provide at least \$1.725 B more from its General Fund over 20 years to support the rail project than is forecasted in the current Financial Plan. Moreover, if construction and operating costs replicate the experience of many peer projects in cities without previous rail development, or if the optimistic federal fund assumption is not fully realized, this new and additional funding requirement could grow to nearly \$4.5 B. Total 30-year C&C General Fund support for the rail project (construction and operations) is projected to range between \$9.3 B and \$14.3 B.

The FTA's independent financial consultant shared these concerns in its report evaluating the Honolulu rail project's Financial Plan: "First, it is questionable whether the City can afford the growth in subsidies presented in this financial plan, which require a higher portion of the General Fund and Highway Fund revenues than has historically been the case. Second, the subsidies could be yet higher due to optimistic assumptions regarding operating cost growth for all services. Third, the projected cash balances of the Public Transportation System Fund, inferred from current cash plus investments and the forecasted balanced budget, fall below the 1.5 Month standard (12 percent of operating costs) that would be needed to support a higher rating. Finally, there is some prospect that the Project's O&M costs could be understated, based on comparison to heavy rail and light rail operations in the US."

The financial challenges for the rail project could be overcome by increasing the duration or size of the GET surcharge. For example, the construction shortfall could be eliminated by extending collections by 5 to 19 years (depending upon the scenario) or increasing the GET surcharge rate by between 24 and 76 percent. The entire City subsidy (\$7 billion in the 20-year Base Case and \$10.5 billion in the 30-year Base Case) could be eliminated by increasing the GET surcharge and then continuing it indefinitely.

6. Issues in the Post-Rail Operating Plan

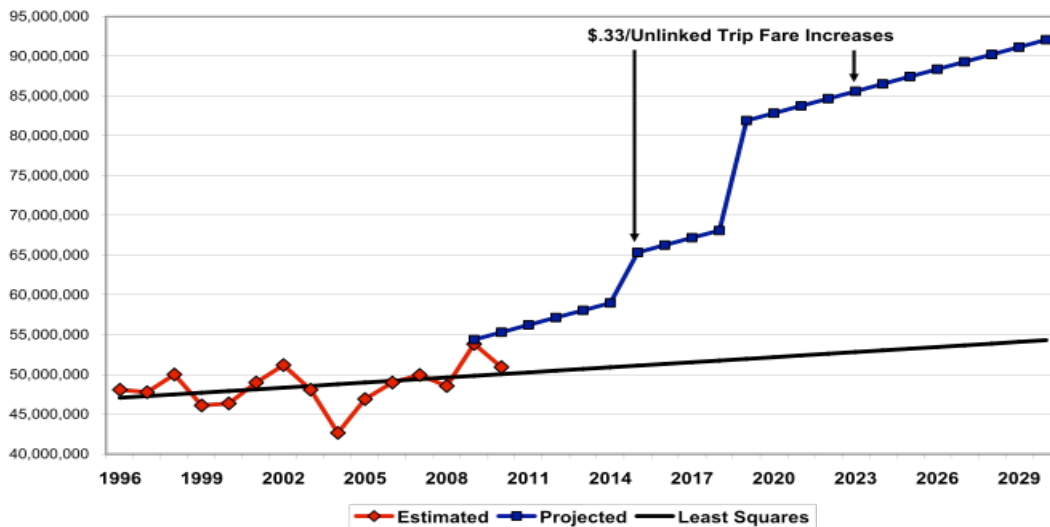
The project plan shows an exceptionally large growth in transit utilization in Honolulu over the study period, 2008-2030, a rate The IMG Team believes to be unrealistic for a city already starting from one of the high base level of usage in the country. In 2007, Honolulu ranked second in unlinked passenger trips ("UPT") per capita, trailing only New York City, and fourth in passenger miles ("PM") per capita, after New York City, Washington, D.C., and San Francisco-Oakland. From 2007 to 2030, Honolulu's UPT per capita is projected to increase 73% and PM per capita 119%. There is no historical precedent for the transit trip and passenger miles growth projected for Honolulu during the study. The chart below shows how extraordinary this increase would be – note the line drawn between Honolulu's historic usage level and the forecast level -- compared to growth rates for other cities: while cities that start off with low transit usage often experience big percentage jumps (the left side of the chart), cities with high transit usage (the middle and right side of the chart) do not, and for logical reasons. Accordingly, the Financial Plan's post-rail ridership and fare revenue scenario appears implausible.



This concern is amplified by the series of very large fare increases assumed in the Financial Plan. The following graph shows unlinked passenger trips from the historical through the projection period, with the two major fare increases marked.

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**TheBus + Rail Linked Trips
 1996-2008 Estimated/2009-2030 Projected**



Note from the chart that the fare increases are assumed to have no impact on ridership. In fact, the first one, in 2015, is actually accompanied by a major increase in ridership – from 59.0 M to 65.3 M annual linked trips, or approximately 11% – due primarily to the opening of another section of the rail system in that year. The second shows an increase from 83.7 M to 84.7 M linked trips, or approximately 1%. This runs directly counter to experience. In 1991, the American Public Transit Association produced its survey of surveys, *Fare Elasticity and Its Application to Forecasting Transit Demand*ⁱ, which consolidated results of before and after fare increase surveys of 52 transit systems. It found the fare elasticity for bus systems in urbanized areas of one million or more is minus .36 and, in cities of less than one million (like Honolulu), minus .43. A simple application of the APTA fare elasticities suggests that the planned 2015 35% fare increase would produce a *reduction* in ridership of approximately 12%, vs. the 11% *increase* projected (this does *not* consider the increase in ridership that the opening of a rail extension would likely have), and the 2023 increase of 26% would produce a *decline* of approximately 9%, vs. the 1% *increase* projected.

Post-rail transit system usage and fare revenue are likely to be substantially lower than that projected in the current Financial Plan, since the Plan’s projection would require an unprecedented and unrealistic growth in transit utilization for a city that already has one of the highest transit utilization rates in the country.

7.0 Fiscal Capacity

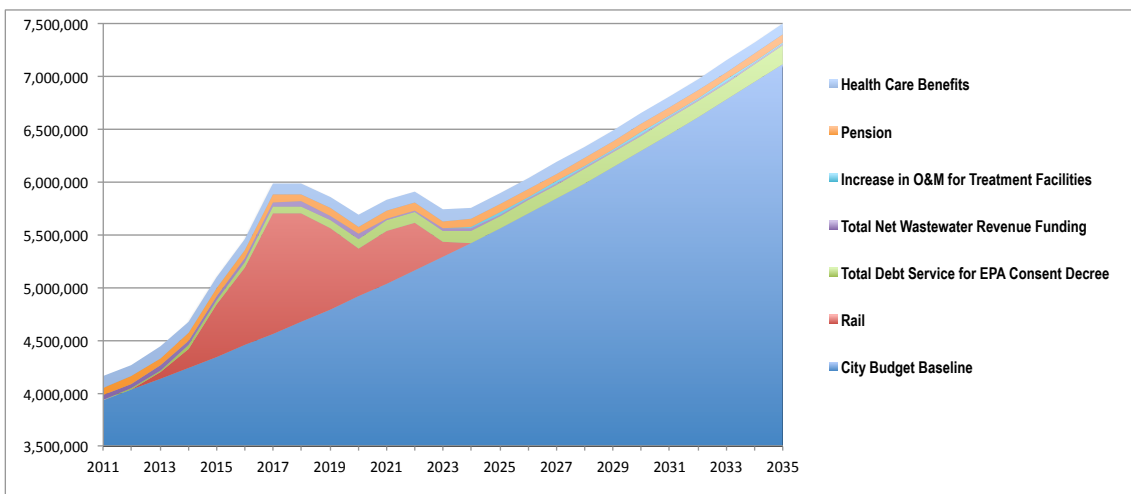
The rail project will be built at a time when the C&C’s fiscal resources will be strained by other substantial commitments, many of which were not fully known when the rail plan was developed,

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such as the costs of complying with the recent EPA wastewater consent decree and the unfunded pension and health care commitments for C&C retirees. Accordingly, the IMG Team identified the major new demands and compared the magnitude to both the rail project's and the City and County's projected baseline spending level. Although compliance with the EPA consent decree is funded sewer fees rather than by taxes, we include it here because it draws from the same economic base as city taxes. Moreover, in some cases, utility revenue bond obligations can also affect rating agency views of a city's overall fiscal capacity.

The chart below depicts obligations that the C&C will be responsible for through FY 2035 and the level of spending associated with those obligations. It includes (1) a baseline level of spending (city budget) growing at 2.5 percent annually in nominal terms (well below its historical growth rate, but suitable for illustration purposes), (2) expenditures related to rail construction, (3) additional expenses related to the recent EPA consent decree and paid through wastewater rates, and (4) actuarially calculated contributions required to keep up with the City and County's growing employee pensions and other post retirement benefit (i.e. healthcare) obligations.

Projected City/County Expenditures through 2035 (\$000s)



The areas above the City Budget Baseline level are relatively new or recently-known expenses that the city and county will likely be responsible for over the next 25 years and which they are currently not incurring. They include the following:

- **Unfunded Pension Liability:** The C&C does not report the level of pension liability as separate from state obligations. Instead, city financial statements reference state actuary reports. Traditionally the C&C represents about 13.5% of total reported state liability. We used this assumption to extrapolate the C&C's obligation from the statewide data.

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- **Unfunded Retiree Health Care Liability:** Across the U.S., government expenditures for retiree health care are increasing rapidly due to both rising medical costs and the increasing number of retired public employees. Honolulu and Hawaii continue to fund retiree health care primarily out of general funds on a pay-as-you-go basis, meaning that the health care obligations are essentially 0% pre-funded. The City of Honolulu reports its total liability for OPEB to be approximately \$1.95B and state unfunded OPEB liability estimates are much higher. While the reported C&C unfunded liability purports to take into account the rising cost of healthcare, leaving the OPEB obligations essentially 0% funded will lead to a ballooning obligation as more and more employees retire, placing ever increasing pressure on the yearly C&C budget. This means that the chart above may significantly understate the likely growth in the C&C's obligations.
- **Wastewater Consent Decree Compliance:** In total, the C&C expect to spend \$5.4B on capital improvements to satisfy the EPA wastewater consent decree. The upgrades and repair will also increase overall Operations and Maintenance (O&M) costs of the system. These costs could rise significantly based upon the experience of other cities adopting similar improvements. No official estimates on these increases have been made available to the public, so IMG utilized its in-house wastewater utility expertise to estimate the potential new obligation. The city will finance much of the increased operations and capital costs through rate increases. Fitch reports that Honolulu increased rates 175% (on a cumulative basis) from 2006-2011. The report also pointed out that the system is highly leveraged compared to peer systems and that debt levels are projected to increase even more in order to comply with the consent decree: *"Debt per customer is projected to climb from about \$9,500 currently to \$15,000, compared with Fitch 'AA' rating category median for water and wastewater utilities of about \$2,000 per customer."*
- **The Rail Project:** Similar debt concerns arise from the new obligations associated with the rail project. The 20% general obligation debt guideline is particularly relevant for the bonds issued during the final year of rail construction, when the FTA FMOC forecasts City debt to rise to 19.4% of the City operating budget under the assumptions used in the current Financial Plan, which we regard as overly optimistic. Moreover, the recent FTA review of the Rail Project reported that *"it is questionable whether the operating subsidy required by the project could be absorbed by the City without tangible cuts in City services or increases in other taxes"* and that the city showed *"very little capacity to absorb cost increases or funding shortfalls [with] potentially significant revenue risks."* As the IMG Team's independent financial analysis shows, the rail project alone is likely to cause the City and County to exceed its statutory debt limit.

The FTA's financial consultant (FMOC) reached the following conclusion in his report on the Financial Plan: "The debt financing assumptions for the project maximize the leverage that could be gained from the GET surcharge revenue stream, leaving little if any upside to debt capacity. The Project-related debt will also push the City to its limit of affordability for general obligation debt." We concur with the FTA's evaluation of the C&C's fiscal capacity,

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and add to it our conclusion that the rail project's subsidies will need to be substantially higher than the assumptions in the Financial Plan (a concern also raised by the FMOC).

Additionally, the need to comply with the EPA wastewater consent decree will impose an additional burden on Honolulu household income that will equal the new financial burden of the rail project. Finally, the C&C's unfunded retiree obligations are likely to add several times the financial burdens posed by the rail and wastewater projects, placing vastly greater pressures on Honolulu's government budget and necessitating significant tax increases and/or spending cuts. This will make it more challenging to provide the upfront and continuing subsidies for the rail project.

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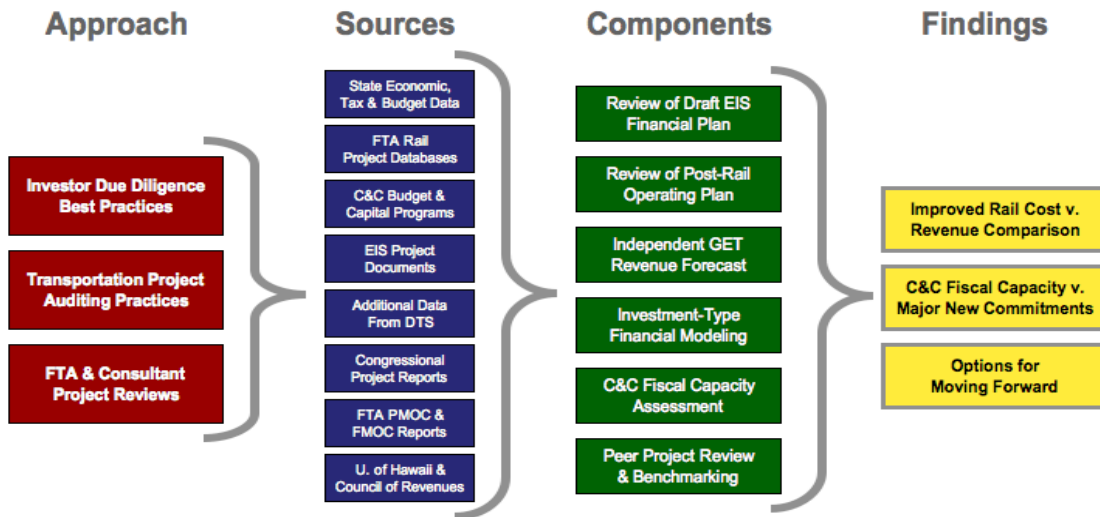


1.0 Introduction

Infrastructure Management Group, Inc. (“IMG”), in conjunction with the Land Use and Economic Consulting Group of CB Richard Ellis (“CBRE”) and Thomas A. Rubin, was tasked by the Hawaii Department of Transportation to evaluate the proposed Honolulu High-Capacity Transit Corridor project’s (the “Rail Project”) financial plan, including sources and uses of funds, critical assumptions regarding revenues and costs, the transit system’s post-rail operating plan, and future fiscal implications for the City and County of Honolulu (“C&C”). In addition, IMG examined the financial performance history of other relevant transit rail projects that might provide useful insights for Honolulu.

The IMG Team’s assessment goes beyond the relatively limited scope of the Federal Transit Administration’s (“FTA’s”) new starts grant approval process, which is directed toward protection of the federal interest and which relies mostly upon the strictures of the Full Funding Grant Agreement (“FFGA”) to limit future federal liabilities and force local governments to bear cost overruns or revenue shortfalls to complete the project as proposed and then to operate it as agreed. Accordingly, the IMG Team used standard infrastructure investor due diligence processes similar to what bond rating agencies and infrastructure fund managers use to evaluate financial feasibility. The diagram below summarizes the analytic process.

The Independent Financial Assessment Process



This independent assessment process is also distinguishable from the conceptual financial planning conducted by the project’s engineer and program manager, which is conducted in support

the project's federal grant application rather than as an independent, disinterested feasibility evaluation. Instead, this analysis takes the local public investment perspective, seeking to assess the potential local fiscal consequences of likely cost and revenue outcomes. Such independent due diligence is essential to informed investment decisions, and IMG is pleased to provide that analysis herein.

The assessment was guided by the following:

- Standard investor due diligence practices for publicly and privately funded infrastructure projects in the U.S.;
- The IMG Team's collective experience in reviewing other, similar transportation investments for governments and private investors in the U.S. and around the world, and
- The specific concerns expressed in the Federal Transit Administration in its internal review of the project, including those raised in the full report of New Starts Financial Assessment conducted by its independent consultant.

The assessment consisted of a review of the current Financial Plan and the conduct of several independent, standalone analyses. All told, the assessment included six major components:

1. A review of the current Financial Plan

This task was led by IMG with assistance from Thomas A. Rubin and CB Richard Ellis. It was based upon the Team's collective experience with other rail projects as well as FTA and industry databases.

2. A new GET surcharge revenue forecast, based on the latest data

This task was led by CB Richard Ellis, a global real estate and project development advisory firm with offices in Honolulu, using data from the Hawaii Department of Taxation, Department of Business, Economic Development and Tourism, University of Hawaii, and other sources. It utilized the historical relationships between US GDP, Hawaii GDP, Honolulu County economic activities, population, and GET collections.

3. A new investment-type financial model, revised inputs and more complete scenarios

This task was led by IMG using proven financial models from other transit new start projects and incorporating data from several sources, including the current Financial Plan, the new GET forecasts, the Operating Plan assessment, and the peer projects benchmarking analysis.

4. An assessment of the C&C strategic fiscal capacity

This task was conducted by IMG based upon information supplied by various State of Hawaii agencies, C&C agencies, members of the Council of Revenues and publicly available data. It

compared the C&C's prospective baseline spending levels to the new capital improvement other major spending obligations that were unknown at the time of the rail project financial plan was developed.

5. A review of the post-rail Operating Plan, including testing of the projected costs, revenues and service assumptions

This task was conducted by transit finance and accounting specialist Thomas A. Rubin using information in the Financial Plan, FTA data and documents, and other proprietary and publicly available data. This was based on the post-rail experience of other transit systems and FTA funding, maintenance and equipment replacement guidelines.

6. A peer project review and benchmarking analysis

This task was conducted by IMG and Thomas A. Rubin using FTA data, Congressional reports, contacts with the peer project sponsor agencies and previous internal and published reports on the peer projects. Information from these peer projects informed the financial risk assessment and provided lessons for Hawaii on the management of its rail project and post-rail operations.

Sponsor Financial Plan Overview

The primary document that the IMG Team was tasked with reviewing is the *Honolulu High-Capacity Transit Corridor Project Financial Plan for Entry Into Preliminary Engineering*, dated May 2009 (the "Financial Plan"). Prepared by Parsons Brinkerhoff ("PB") on behalf of the City and County of Honolulu, the Financial Plan contains the following elements:

- Overview and description of the Project
- Capital Plan, including Rail Project development, rail and bus ongoing capital costs, and a plan for funding and financing these activities.
- Operations and Maintenance Plan, which forecasts the level of rail and bus service and identifies funding sources (fares and C&C subsidies) and Operating and Maintenance (O&M) costs.
- Conclusions, which highlights six "key funding aspects" of the Financial Plan. These include the following:
 1. 30% FTA New Starts funding for the Rail Project capital, which totals \$1.55 B
 2. GET surcharge revenue based on slow growth in 2009-2010. The 2009 and 2010 forecasts in the Financial Plan overestimated actual GET collections by \$4.9 M and \$2.2 M, respectively.
 3. Contingency levels in line with FTA guidelines. The IMG Team confirmed that projects entering Preliminary Engineering typically have contingencies between 20 and 40%. The Financial Plan's stated 30% contingency fits in this range. We would note, however, that other heavy rail projects (which also contained similar contingencies) have exceeded cost projections by 22-29% from similar levels (see Section 2.1 below)

4. City operating subsidies are forecast to be in line with the percentage of the City operating budget. The IMG Team analysis found that Financial Plan O&M costs are likely understated by about 2% (rail) and 6% (bus).
 5. No expansionary growth in the size of federal formula programs. While the IMG Team concurs with Financial Plan estimates of FTA *formula* funds, the Financial Plan has extremely aggressive assumptions for FTA *discretionary* funds (see Section 3.3). IMG has reduced the 20-year forecast of 5309 bus discretionary funds to \$166.4 M from \$419 M in the Financial Plan.
 6. Continual updating of Financial Plan. We would note that the City has informed us that there has been no official update since August 2009, despite the Final EIS being completed, and the capital costs of the Project changing from that in the Financial Plan to what is in the FTA's *Annual Report on Funding Recommendations*.
- Discussion of risks and uncertainties. The sensitivity analysis in the Financial Plan could be more robust – assuming funds from private development and/or from airport sources as a way to overcome shortfalls is highly uncertain. Moreover, only two scenarios were tested, a 10% decline in GET revenue, and a 10% increase in construction costs.

The IMG Team analyzed the critical assumptions and forecasts in the Financial Plan. This report details the areas where we believe alternate assumptions are more appropriate.



2.0 Planned versus Actual Costs for Rail Transit Projects

A large number of assumptions go into creating estimates on cost and revenues for a rail transit system. The FTA, in their reviews of past projects, cites the following major financial risks:

1. Construction costs could be higher than expected
2. Ridership, and farebox revenue, may not meet projections
3. Operations and maintenance costs may vary from forecast
4. Level of service may fall below early projections

In order to understand the likelihood that each risk will affect the Honolulu project, the IMG Team conducted case studies of several U.S. rail transit projects that had outcomes substantially different from their plans. Full case studies are available in the Appendix of this report, but the key findings and summaries of examples are presented here.

2.1 CASE STUDIES

In our case studies section, we analyze a number of recent major U.S. rail transit projects that had outcomes substantially different from their plans. While it would be incorrect to state that all such projects have negative outcomes, their frequency suggests caution regarding all rail project cost estimates with caution, particularly those developed prior to final design. For projects with significant risk factors (e.g., first-time rail agency, logistical challenges for materials and staff, etc.), this caution should extend even past the final design and the FTA Full Funding Grant Agreement.

The table below shows how a number of heavy rail projects performed compared to their original cost estimates at various stages in the planning and approval process (AA/DEIS, FEIS, and FFTA). Each of these projects is discussed in more detail in the "Case Studies" appendix of this report.

**Estimated vs. As-Built Costs for Heavy Rail
 Projects (\$ millions)**

City	Project Name	\$ Yr	Capital Costs (millions) reported in same year dollars of construction dollars*			
			AA/DEIS	FEIS	FFGA	As-Built
Atlanta	North Line Extension	1997	439.5	389.7	352.0	472.7
Baltimore	Extension to Johns Hopkins	1991	313.7	310.5	310.5	353.0
Chicago	Douglas Branch	2004	441.7	477.7	473.2	440.8
Chicago	SW Transitway	1990	604.0	532.3	438.4	522.0
Los Angeles	Red Line	1995	3,031.3	3,181.3	3,505.6	4,469.7
San Francisco	BART Ext. to SFO	2004	1,193.9	1,230.0	1,185.7	1,551.6
San Francisco	Colma BART Station	1996	112.5	130.1	171.6	179.9
San Juan	Tren Urbano	2001	1,085.6	1,309.2	1,280.6	2,228.4
Washington DC	Largo Metro Rail Ext.	2002	375.0	432.6	412.6	426.4
AVERAGE			129.2%	122.1%	122.3%	

Data from 22 light rail project showed similar results at the stage of the Honolulu project but then improved later in the process, averaging increases of 133.3% (AA/DEIS), 111.0% (FEIS), and 101.5% (FFGA) compared to as-built cost costs.

In addition to the projects shown in the table, several other examples are presented below:

- Denver Regional Transit District FasTracks** – FasTracks was approved by the voters in 2004 as a \$4.7 B guideway transit expansion program for nine corridors to be implemented over a 12-year period financed by a .4% sales tax rate increase. It is now believed to have a shortfall of at least \$2.4 B, which would mean that the program would be delayed over 25 years or, alternatively, a doubling of the sales tax would be required for somewhat faster completion.
- Los Angeles County Metropolitan Transportation Authority (Metro): Long Beach to Los Angeles Blue Line** – Los Angeles' first modern rail line was the Long Beach light rail line, which opened in 1990. The original planning construction cost was \$125M, the first published cost was \$146 M, the environmental clearance document cost was approximately \$399 M, and the final project budget was \$595 M, and the admitted construction cost is \$863.9 M. The Blue Line is the most heavily utilized light rail line in the U.S., frequently reaching 80,000 working weekday passengers, but this is largely due to the very low fares, particularly for end-to-end rides of over 20 miles. The high ridership, while very welcome, forced many additional charges. These include having to extend stations to handle three-car trains, the unanticipated high demand for rail cars forcing Metro to buy cars that it had not intended to buy for Green Line (the next light rail line to be constructed in Los Angeles) operations, and to build an

unanticipated Green Line operating yard because there was not sufficient rail car storage space at the Blue Line operating yard.

- **Minneapolis/Saint Paul Metro Hiawatha Line** – The budget for this project has not varied from the \$675.43 M in the Full-Funding Grant Agreement, but a change to a station location and design added \$40 M to the cost, net of elimination of two rail cars, which saved approximately \$6 M. In addition, there was approximately \$50 M in project-related costs paid by other governmental agency and local utility rate payers.
- **New Jersey Transit Corporation: Access to the Region's Core (ARC)** – ARC was to be an \$8.7 B dollar addition of twin 9.0-mile commuter rail tunnels under the Hudson River, and related supporting infrastructure improvements, from New Jersey to near Penn Station, to relieve the very overcrowded and aging existing tunnels. Construction began in 2009, but, recently, after New Jersey Governor Chris Christie learned that the construction cost estimates had increased to \$10.9-13.7 B, with the State responsible for substantially all of the overrun, he cancelled the project, forfeiting the largest single FTA grant ever made, \$3.0 B, even though this means that the State may have to repay the Federal government as much as \$271 M.
- **Seattle Central Puget Sound Regional Transportation Authority Central Link** – In 1996, the voters of the greater Seattle area approved "Sound Move," a \$3.9 B transit expansion plan to be substantially completed within a decade, funded by a .4% sales tax rate increase and a 0.3% vehicle license fee increase. The centerpiece of Sound Move was Central Link, a light rail line through Seattle, with the first 21 miles to be in service by 2006 for a total cost of \$1.8 B. The first segment scheduled for construction was the most technically challenging, 7.2 miles with extensive tunneling. In order to speed the completion of the project along, Sound Transit conducted a negotiated procurement of the construction contractor as the FFGA process was being completed, so that actual heavy construction activities could commence almost immediately after the FFGA was executed. However, after the FFGA had been announced, but still within the 60-day Congressional review period, it became widely known that the segment was hundreds of millions of dollars over the expected \$1,674 M. Sound Transit then revised the project financial plan, and a new FFGA, for \$2,603 M, was executed – a 55% cost increase prior to breaking ground. After substantial investigation, which disclosed that the true overrun was likely to be approximately \$2 B, the FFGA was withdrawn and Sound Transit began to plan for a new first segment. The new scaled-down proposal has 17.0 miles opening by 2017 for \$4.384 B compared to the Sound Transit plan for 21 miles opening in 2006 for \$1.8 B. Sound Transit recently returned to the voters for an additional 0.5% sales tax for the foreseeable future.

2.2 LESSONS FOR HONOLULU

Capital expenditure, operations and maintenance expense, and ridership forecasting have been of particular interest to the FTA in their reviews of past rail projects because of persistent differences between plan estimates and actual results. An accurate understanding of what costs and revenues will be into the foreseeable future allows a transit authority to know what level of subsidies will be required to operate and maintain the system over the ensuing decades. Following are summaries of lessons learned from past projects on these three metrics as well as a few others.¹ Following the discussion, there are several tables that attempt to summarize the capital expenditure forecasts while showing risk factors for each project included.

2.2.1 Capital Expenditure Forecasts²

On average, actual costs of New Starts projects are significantly higher than estimated in the AA/DEIS, FEIS, and FFGA. In its Contractor Assessment Report of 2007, the FTA considered AA/DEIS estimates that came within 20% of actual costs to be “reliable.” Approximately half of the studied projects in the report were not within this range and “significantly underestimated capital costs in their AA/DEIS.” More than 70% of the estimates were less than the as-built capital costs. There are several potential reasons for this.

The time period between the release of an AA/DEIS and when the project opens for revenue operations is eight years, on average. This leaves a lot of time for changes to project plan and financing options. Cost changes can arise from any of several other sources including inflation, increases in unit costs, changes in project scope, and unforeseen construction difficulties. More time generally correlates with greater change in the plan.

There are two general types of scope changes. One is changes or additions to the project at some point between the original plan and project completion, such as moving or adding a station, adding features such as expanded parking, or increasing the rail car order. The other is deletions of scope features, such as miles of track, stations, number of rail cars, and other portions of the project. This is often done in an attempt to stay within, or closer to, cost projections.

While some of these issues are difficult for planners to reliably forecast, the trend for AA/DEIS estimates shows improvement over time. That is, an AA/DEIS can be expected to be closer to the correct cost than the average 20.9% error if it was prepared in the more recent past. It is unclear whether this is due to the fact that planners have become more skilled, that projects are being implemented more quickly after the AA/DEIS is issued, or that planners, designers, and project proponents have become conscious of the previous record of missed projections and have deliberately become more cautious, or some mix of these and other reasons.

Further, estimates tend to get better from the earlier to the later documents in the planning process. While actual costs average 20.9% over inflation adjusted AA/DEIS estimates, they are

about a third of that (7.3%) over the estimates given in the FFGA (heavy rail and light rail projects combined). This is as expected because the more complete the planning and design, the closer the project scope becomes to the actual as-built project, and the more is known about potential problems such as difficulties in right-of-way acquisition, construction costs, etc. Because the number and size of uncertainties are reduced, the estimates are more accurate. It is clear, however, that estimates still tend to be lower than actual costs, and that estimates generated from insufficient or incorrect sources of information can produce wildly inaccurate cost projections.

2.2.2 Ridership Level Projections

A look back at AA/DEIS and FEIS reports from the last several decades shows that ridership estimates stated in these documents are often optimistic. In fact, a 1990 report by the FTA³ reveals that 90% of the studied projects had estimates that more than doubled actual results, and 40% had actual ridership less than 30% of what was estimated. While computer technology, political pressure, and greater scrutiny by contractors has helped to reach better estimates since the 1990 report,⁴ there is still much room for improvement.

2.2.3 Initial Project Bias

Interestingly, the FTA found in the 2007 report⁵ that ridership forecasts for initial projects tend to have higher errors than extensions or subsequent projects in the same metropolitan area. In fact, on average an initial project ridership estimate is 47% over true numbers, while projects with an existing system in place are 35% off the mark.⁶ Hiring staff and consultants with experience in subsequent projects in other cities likely will not improve the forecasts because so much of what goes into an “accurate” estimate depends on specialized local considerations. Many of these considerations are completely unknown or are too complex to put into numbers.

These “rookie” projects – those that are the first at the sponsoring agency — also tend to underestimate capital costs by a greater margin than projects in locations where rail transit already exists. In fact, rookie heavy rail as-built costs are 176.4% of the AA/DEIS estimates. FFGA estimates only bring that error down to 150.8% of costs. For light rail DEIS estimates are about 154.2% of actual with FFGA estimates coming in nearly the same as average estimates for the same mode.⁷

2.2.4 Operating and Maintenance Expenditure Predictions⁸

O&M costs are generally overestimated, though their deviation from actual results is generally much lower than other estimates. This may be due to the fact that it is relatively easy to determine the unit cost of service. Early maintenance costs and operational needs are much easier to calculate early in a project. It is likely that O&M costs will increase significantly as a system ages.

In some cases, the estimates are high simply because the actual level of service offered upon opening for revenue service is lower than what was initially projected.

As with ridership and capital cost estimates, the ability of planners to produce cost projections for O&M improves when there is already an operating transit system with the same mode under construction. This is the case because local experience will give clues into what level of service will actually be needed as well as into what unit costs will be for that service. Also, the experience of other transit systems that have operated similar systems is generally far easier to transfer to new cities than construction cost and ridership projections.

While O&M projections have come in close to actual numbers, this does not mean that scrutiny should not be applied to O&M estimates. There are examples of projects that have seriously miscalculated the level of cost of the O&M requirements. One that is particularly interesting in the context of the Hawaii project is the Colma BART Station in San Francisco. This project had positive indicators for accurate estimation (i.e. existing mode, etc), yet their actual O&M costs were 138.8% as a percentage of the estimate presented in the DEIS, and over 130% of the estimate of the FEIS. Incorrect operations estimates regarding headways and other service levels leads to miscalculated projected O&M costs.

Further, it is often the case that the level of service offered when a rail line opens is far less than what was promised. This was the case for the Colma station mentioned above, even though the ridership levels were close to what was expected. Despite operating less service, the Colma station had O&M costs that far exceeded projections. The fact that other systems have lower than promised service level, but the same O&M costs suggests that services are being cut to hit target expense levels.

The improved estimates on subsequent projects for various metropolitan areas appear to be the result of an ability to observe actual ridership in the same metro area where the new line or extension will be placed. Hawaii may be able to take cues from the existing bus system, but there is no existing rail system data to look to.

2.2.5 Service Levels

As has been mentioned, many projects operate at service levels far below what was projected in the AA/DEIS, FEIS, and FFGA.⁹ Whether or not increased service levels would produce more ridership is a question transit agencies have had to ask. Apparently many officials have concluded that lowering service levels to slow (but not stop) cost overruns is more palatable than risking higher service levels that may end up not being able to justify their cost. In any case, the end result is that lower ridership tends to produce lower farebox revenue, making it more difficult for the rail line to pay its bills on time.

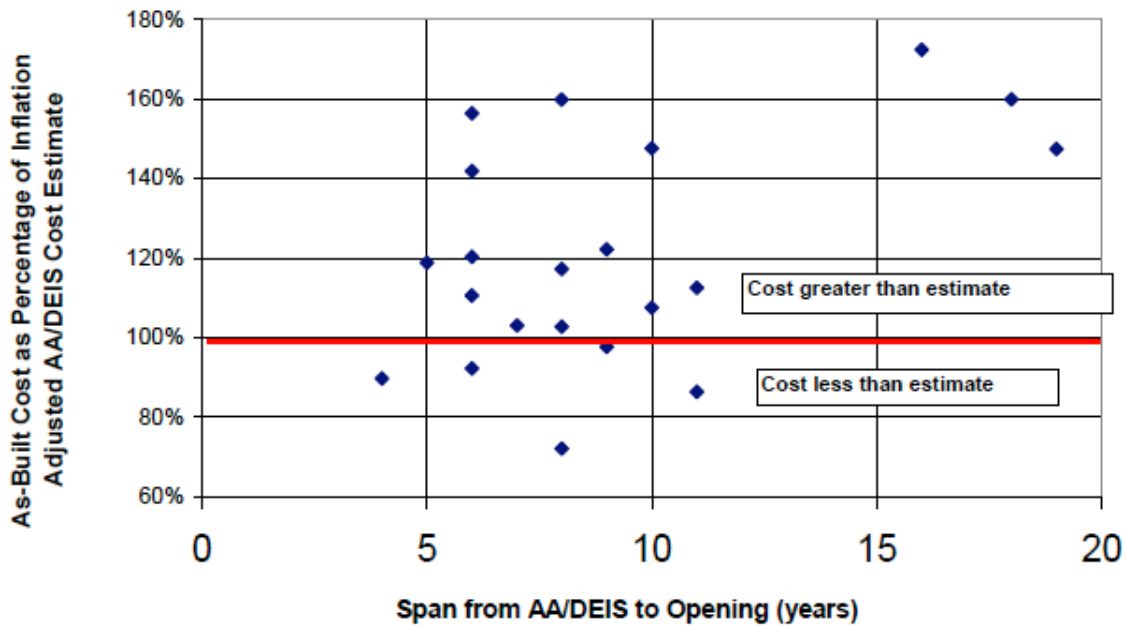
2.2.6 Ridership and Farebox Revenue

Finally, it must be understood that increasing ridership does not necessarily equal proportionally increased farebox revenue. In metropolitan areas where there are other mass transit options, cannibalization of farebox revenues is certain to occur. This concern is especially pertinent in transit systems that will charge one fee for the use of various transit options. Riders who already pay to use the bus everyday through fare media such as monthly or weekly passes may not be paying any more to use both the bus and the new rail line and those that use transfers may pay only slightly more. Thus, even though the trains are more full because those riders are there, farebox revenue has not changed. For a transit authority that manages various transit programs, it is imperative that new services produce a greater number of paying riders, not just full train cars, or operating subsidy requirements may increase significantly without any additional offsetting revenues. Accurate estimates of how much (or little) will help public officials make better decisions when considering major transit developments.

2.2.7 Time Between Prediction and Measurement

The amount of time between the forecast and the actual measurement appears to be important when attempting to create accurate estimates. This suggests that New Starts applicants that have fewer years between the AA/DEIS, FEIS, and FFGA and the actual implementation of the plan will find that their estimates come closer to actual results. The following graph illustrates that if a project goes longer than about 15 years between planning and opening, there is a much greater chance that the project will come in well over estimates in capital costs. As seen in the chart, 12 out of 16 projects with less than ten years between planning and opening came in above cost, including six that were at least 20% above cost projections.

Increase in Project Capital Cost vs. Time Between Planning and Opening¹⁰



On average, the length of time it takes to go from planning to opening is getting shorter. This may bode well for future estimates.

Other matters to take into account here are that the scale of these projects has also declined over the same time period (more recent projects have cost less than those several decades old) and that, as the number of transit guideway cities has increased, the number of rookie project construction agencies has declined as the portion of follow-on projects has increased. These facts may have contributed to more accurate estimates. If this is the case, a very expensive project such as the Honolulu raised rail should consider where some estimates might need to be revised upward.

Again, as has been alluded above, predictions are getting better with time. Predictions are being created with more thought and more detailed modeling practices. Specifically, projects that have been completed since 1990 are markedly more on target with their forecasts than were projects completed before 1990. It is expected that these predictions will continue to improve into the future.

Despite these overall improvements, it is still true that rookie locations under-predict costs and over-predict ridership at a higher rate than expected compared to a project being constructed where a system of the same mode exists.

Each rail project has its own unique set of circumstances, making it difficult to compare any two projects. However, looking at projects more or less in the aggregate can give an understanding of potential points of concern during planning phases. Perhaps the clearest lesson that the data on peer projects holds for Honolulu is that it is impossible to predict all of the contingencies that might befall a project, and that, on average, planners have tended to under predict the end costs.

Much more detail is presented on various of these projects in the Appendix. All of the information in the chart was taken from the Contractor Performance Assessment Report from 2007 by the FTA.¹¹

2.3 CASE STUDY CONCLUSIONS

The IMG Team reviewed available data from FTA and other sources in order to develop a case study history of rail transit development in the U.S. We found that heavy rail New Start transit project constructions costs increase by an average of 29% from the AA/DEIS phase to completion, and by over 22% from the Full Funding Grant Agreement stage.

In addition, ridership is very frequently overestimated, and thus farebox revenue as well. While operating cost forecasts are typically more reliable, there have been instances of underestimation. Moreover, some agencies have reduced the level of service planned in order to stay within cost boundaries. Some cities, such as Los Angeles and Seattle, have been forced to seek additional sales tax funding when it became apparent that the systems planned could not be supported by the initial amount.

The Honolulu rail project has many of the key risk factors that often lead to escalating construction costs and ongoing revenue shortfalls. Honolulu's status as a first time developer of heavy rail transit, its island location, and the elevated nature of the proposed project are attributes that have been associated with cost increases for other transit properties.

While each project is unique, and local financial, technical, and political considerations differ, the case studies provide a clear message to use conservative forecasting of costs and revenues and to be prepared for changes in project scope as unforeseen conditions come to light.

Detailed case studies for about 20 major projects are provided in the Appendix.



3.0 Federal Funding

The Federal public transit grant program had its origins in the Urban Mass Transportation Act of 1964. While some of the specific Federal Transit Administration grant programs can be traced directly to that Act, the Federal grants awards process is based on Congress adopting reauthorization acts approximately every five years and annual appropriation acts becoming law. The former set the parameters of the grant programs and set the maximum amount authorized for the period of the authorization, generally five years. Every authorization bill has resulted in significant changes to existing grant programs and the creation of new grant programs. Most of these changes are either neutral or positive in terms of use of funds.

The annual appropriation acts generally use the entire funding authority in the authorization acts, though they are not required to do so.

The current Federal surface transportation reauthorization act has expired and needs extension. At this point, it is impossible for anyone to know with certainty which programs will be authorized, how current programs might be changed, and what the levels of funding will be for those programs. The uncertainty is even higher for subsequent necessary reauthorization acts approximately every five years thereafter until the end of the forecast period.

The project financial projections have been based on what has become the accepted standard for modeling such funding sources, namely that the programs will continue at approximately their current levels of funding, with approximately the currently applicable legislative and regulatory requirements, with stated inflationary program growth assumptions. Undoubtedly this will not occur, but the implicit assumption is that the positive changes and the negative changes will be approximately off-setting.

That said, it must be understood that all Federal grant legislation is subject to very significant change without notice.

3.1 5307 URBANIZED AREA FORMULA FUNDING

49 USC 5307 Urbanized Area Formula Funding grants provide transit capital and operating assistance in urban areas and for transportation related planning. Specifically, activities that are eligible for 5307 funding include “planning, engineering design and evaluation of transit projects and other technical transportation-related studies; capital investments in bus and bus related activities such as replacement of buses, overhaul of buses, rebuilding of buses, crime prevention

and security equipment and construction of maintenance and passenger facilities; and capital investments in new and existing fixed guideway systems including rolling stock, overhaul and rebuilding of vehicles, track, signals, communications, and computer hardware and software.”¹²

These funds are awarded on an annual basis. The value of the grant is computed using a formula¹³ imbedded in Federal Law based on several urbanized area¹⁴ (UZA) population and demographic characteristics and transit service provided and consumed data reported by the transit operators in each UZA to the Federal Transit Administration.

The IMG team performed analysis of the estimates in the Financial Plan cash flow model. The results of these tests were that estimated grant levels in the cash flow model appear to be reasonable. Various contingencies and assumptions go into these kinds of estimates when projecting into the future, but because the funding is based on a given formula, estimates are not as complicated as some other funding sources. IMG estimates were fairly close to the PB projections. IMG therefore kept the Financial Plan numbers in their model through 2030.

3.2 5309 FIXED GUIDEWAY MODERNIZATION FUNDS

5309 Fixed Guideway Modernization Funding is separate from the 5309 New Starts funding. It is intended to provide capital assistance for the modernization of already existing rail and other guideway transit systems. The program “was originally designed to ensure the proper renovation of the nation’s older rail transit systems, and the program continues to ensure that as Federal New Starts investment projects age, they can be modernized.”¹⁵ These funds can be used to “improve existing fixed guideway systems, including purchase and rehabilitation of rolling stock, track, line equipment, structures, signals and communications, power equipment and substations, passenger stations and terminals, security equipment and systems, maintenance facilities and equipment, operational support equipment including computer hardware and software, system extensions, and preventive maintenance.”¹⁶

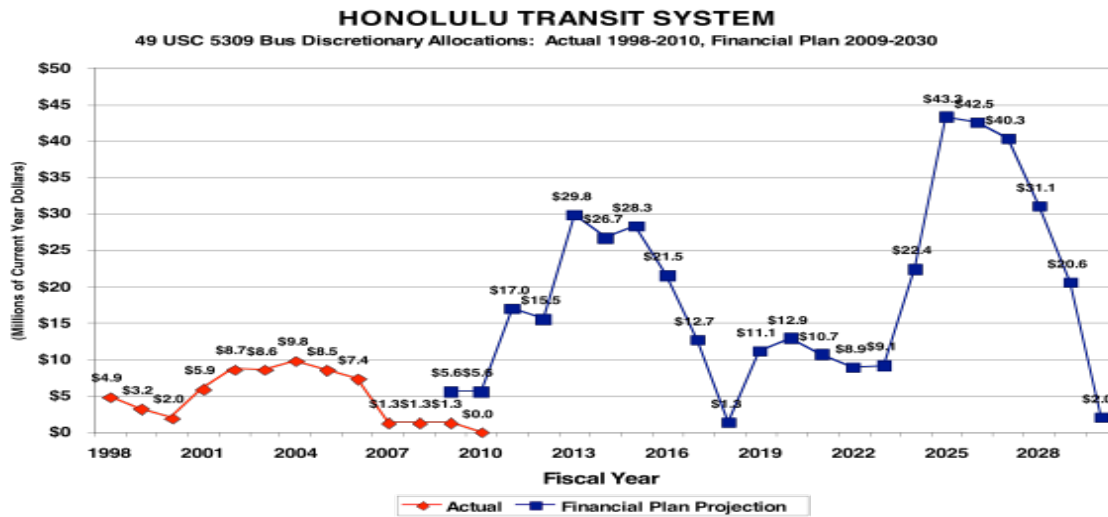
This is another formula-driven grant funding program, where the annual allocations to each urbanized area with fixed guideway transit operations is allotted based on a very complex formula in Federal law using fixed guideway operating data submitted by each transit operator to FTA. It is used to allocate 40% of the total Federal 5309 “pot,” with “New Starts” also getting 40% and bus discretionary the remaining 20%.

The IMG team found the Financial Plan estimates in the model to be reasonable or perhaps a bit conservative overall. It is likely that the City of Honolulu will be able to collect at least the projected level of funds specified, and may actually collect a few million dollars more per year in the out years.

3.3 5309 BUS DISCRETIONARY FUNDS

This program is intended to fund bus uses, generally other than major fixed guideway bus costs that are eligible for 5309 New Starts funding, that are beyond what the 5307 Formula grants provide. It, like the New Starts program, has been a 100% “earmarked” program for many years, where Congress directly decides the grantee, purpose, and amount for each individual allocation.

The Financial Plan projects a total of \$419 M over the 22 years, 2009-2030, of the period of the projection, or approximately \$19 M a year. In order to evaluate this projection, we reviewed the actual allocations made for the period, 1998-2010, from the FTA¹⁷. The graph below displays the historical actual and projected times series for this program:



Obviously, the historical record data presents some question regarding the viability of the projections. The amounts projected for sixteen of the 22 years of the financial plan are larger than the largest amount that Honolulu has received in the thirteen-year historical period and, in twelve of these years, the amount projected for Honolulu exceeds the largest amount any grantee has received for a single project in any year in the historical period (See table on following page).

The members of Hawaii's and Honolulu's Congressional delegations have done very well by Honolulu during the historical period. For the entire period, Honolulu has been one of the top few UZA's in such receipts and may be the absolute top recipient.

However, in recent years, Honolulu's receipts from this program have been less than previously: \$1.3 M a year for 2007, 2008, and 2009, and nothing in 2010.

Another way of looking at the funding possibilities of this program is through the combination of the historical record and projected funding on a year-by-year basis.

**HONOLULU HIGH-CAPACITY TRANSIT CORRIDOR PROJECT
 ANALYSIS OF 49 USC 5309 "BUS DISCRETIONARY" REVENUES**

Fiscal Year	Historical Record			Financial Plan Projections	
	Honolulu Allocations		Largest Bus Grant	Bus	New Starts
	Bus	New Starts			
1998	\$4,885,985	\$2,977,660	\$8,794,766		
1999	3,225,625		11,909,994		
2000	1,962,190		9,810,950		
2001	5,941,889	2,476,608	13,369,250		
2002	8,662,754	11,880,157	13,365,392		
2003	8,607,188		11,395,917		
2004	9,822,598		9,822,598		
2005	8,546,004		9,717,782		
2006	7,350,000		7,350,000		
2007	1,300,000		6,000,000		
2008	1,300,000	15,190,000	5,000,000		
2009	1,300,000	19,800,000	4,750,000	\$5,558,291	\$0
2010	0	30,000,000	4,000,000	5,558,291	35,040,000
2011				16,965,074	80,000,000
2012				15,498,833	200,000,000
2013				29,849,837	250,000,000
2014				26,659,117	250,000,000
2015				28,284,567	200,000,000
2016				21,509,926	200,000,000
2017				12,660,415	200,000,000
2018				1,324,168	134,960,000
2019				11,086,009	0
2020				12,894,337	0
2021				10,661,786	0
2022				8,884,697	0
2023				9,128,801	0
2024				22,360,111	0
2025				43,262,376	0
2026				42,475,049	0
2027				40,273,588	0
2028				31,071,123	0
2029				20,584,542	0
2030				2,010,647	0

Honolulu Received Largest Bus Grant of Year

(The 1998 New Starts grant was for “Major Investment Analysis of Transit Alternatives,” the 2001-2001 New Starts grants were for the proposed bus rapid transit project.)

As can be seen in 2006 through 2010, Honolulu bus discretionary grant funding has been reduced considerable since it began receiving major new start grants. This is a pattern that we also have noticed in recent years with other major new start grant recipients.

This calls into question the projected bus discretionary funding for the period 2011-2017, when over \$154 M is expected over these seven years, an average of approximately \$22 M per year, at the same time that Honolulu is projected to be receiving \$1.38 B in New Starts grants.

We do not find these projections to be viable. We have substituted our own, based on our own judgment and experience, recognizing that there is no way to make precise projections with the data now available, as follows:

- 2011-2019 – During the period of major rail construction, which we have extended two years to 2019 for reasons discussed elsewhere, we are projecting grant level as low as the \$1.3 M per year that Honolulu received in 2007-2009.
- 2020-end of projection period – After major rail construction is completed, we project Honolulu receiving as little as \$6.5 M per year, the average that Honolulu received during the period, 1998-2006.

In the context of how these funds are generally distributed – the 2009 allocation of \$734.6 M in bus discretionary grants comprehended 947 individual allocations with very few individual grantees receiving more than two awards – we believe that, if anything, our projections for Honolulu in these years may be high.

What is particularly critical about our shift in the amounts and timing of the awards is the reduction in bus discretionary funding during the period of major rail construction, which is also a period of major bus expansion and renewal and replacement. The Financial Plan shows the 5307 formula funding, which is generally first used for bus and demand-responsive capital renewal and replacement, going entirely for fixed guideway construction during the period 2011-2019, for a total of \$301 M. This cannot be done if these funds are needed for bus capital renewal and replacement.

3.4 FEDERAL FUNDING CONCLUSION

Like nearly all major new transit projects, the HHCTC project will rely heavily on federal grant programs, including FTA 5309 New Starts funds, 5307 Urbanized Area Formula Funding, 5309 Fixed Guideway Modernization Funds, and 5309 Bus Discretionary Funds. The IMG Team

examined the Financial Plan forecasts for each program in order to determine if the projected funding levels are reasonable.

For all of these programs except the 5309 Bus Discretionary Fund, the IMG Team concurs that the projections are reasonable. The Financial Plan calls for 30% funding, or \$1.55 B, from federal New Starts funds. While this would be one of the largest New Starts awards, the percentage participation is reasonable. Further, it is typical for the FTA to provide the entire grant request in its FFGA or none at all.

Regarding the 5309 Bus Discretionary funds, however, we believe the Financial Plan is extremely optimistic, for two reasons. First, the level of grants expected in 12 years is greater than the largest grants provided to any agency by the program since 1998 (\$9.8 M to Honolulu in 2004). Moreover, this is a program 100% earmarked by Congress, and the history shows that properties receiving significant New Starts funds usually do not receive major Bus Discretionary dollars in the same year. In contrast, the Financial Plan calls for grants averaging \$22 million per year during the same time that Honolulu is expected to receive \$1.38 B in New Starts funding.



4.0 GENERAL EXCISE TAX (GET) FORECAST

The major source of funding for the proposed Honolulu High-Capacity Transit Corridor project comes from the 0.5% surcharge applied to economic activity subject to the full GET on the Island of Oahu (excludes wholesale transactions).

The State began collecting the surcharge in January 2007, and retains 10% of the revenue collected for its administrative fee. The remaining 90% accumulates for the City and County of Honolulu to fund eligible capital costs associated with the Project.

Approximately \$3.52 B was estimated in the Financial Plan to be raised from FY2009 thru FY2023, out of a total capital budget of \$5.12 B, or 70%. If the forecast proves to be aggressive, the City and County will need to find significant other sources of funding.

In the following analysis, we review GET forecasts by both Parsons Brinckerhoff for use in the Financial Plan as well as the State of Hawaii, focusing on the key drivers of the estimates. We then present our own forecast, presenting the economic analysis, data sources, and assumptions that led to our estimates and conclusions. Based on our analysis, we conclude that the GET revenue will likely be \$366 M to \$560 M short of the \$3.525 B estimated by PB in the Project's Financial Plan.

4.1 PARSONS BRINCKERHOFF FINANCIAL PLAN GET FORECAST

Parsons Brinckerhoff developed a GET Forecast model in November 2008, for the Draft EIS on the Project. The model was updated in March 2009, to reflect the worsening economy impacting Hawaii, the U.S., and the world. A report was published summarizing the analysis and methodology for the 15-year forecast.

The major business categories affecting the GET tax historically have been retailing, representing approximately 45% of all collections, services at 20%, and construction contracting at 12% of the total. For its forecast model, PB looked at the growth rates for various economic activities from 1995 thru 2007, a period coinciding with the bottom of an economic recession to the top of the economic boom period.

PB's forecasted GET revenues assumed a compound annual growth rate of approximately 5.8% from FY2010 through FY2023, with short-term growth rates as high as 8% for 2012 thru 2013.

4.2 STATE GET FORECASTS

It is important to note that the State's own forecast of statewide GET revenue growth has gone down dramatically since fall of 2007, reflecting the severity of the worldwide economic recession.

- In September 2007, the forecast GET for 2010 was \$2,974 M
- The October 2008 forecasted GET for 2010 was \$2,689 M
- The actual 2010 GET was \$ 2,316 M which is a 20% decline from 2007 estimates

The same declining forecasts applied to future GET estimates:

- In 2007, the projected GET for 2014 was \$3,655 M
- In 2008, the projected GET for 2014 was \$3,257 M
- In 2010, the projected GET for 2014 is \$3,036 M, which is a 7% decline from 2008 and an 18% decline from 2007 estimates.

4.3 CBRE ECONOMIC ANALYSIS

To prepare our independent forecast of GET revenues, CBRE Land Use and Economic Consulting Group examined key economic variables in Hawaii and the United States economy from FY1990 thru FY2010 from the Hawaii Department of Business, Economic Development and Tourism ("DBEDT") website and the U.S Bureau of Economic Analysis.

We looked at monthly GET collections in Honolulu County, employed workforce, general population and construction permits and spending. We also examined the U.S. Gross Domestic Product for each fiscal year from 1990 through 2009, to determine the statistical relationship with the Hawaiian economy for use in forecasting GET.

Key findings were:

- Actual GET revenues collected in FY2009 and FY2010 were 4.9% and 2.1% lower than the prior year's actual collection respectively – so the base year for our forecast was \$5 M lower than PB.
- The U.S. GDP has outpaced the Hawaii economy over past 20 years by more than 40% (4.5% CAGR vs 3.3% CAGR).

Figure 4-1
Honolulu GET Revenues vs. US GDP
FY1991 - 2009

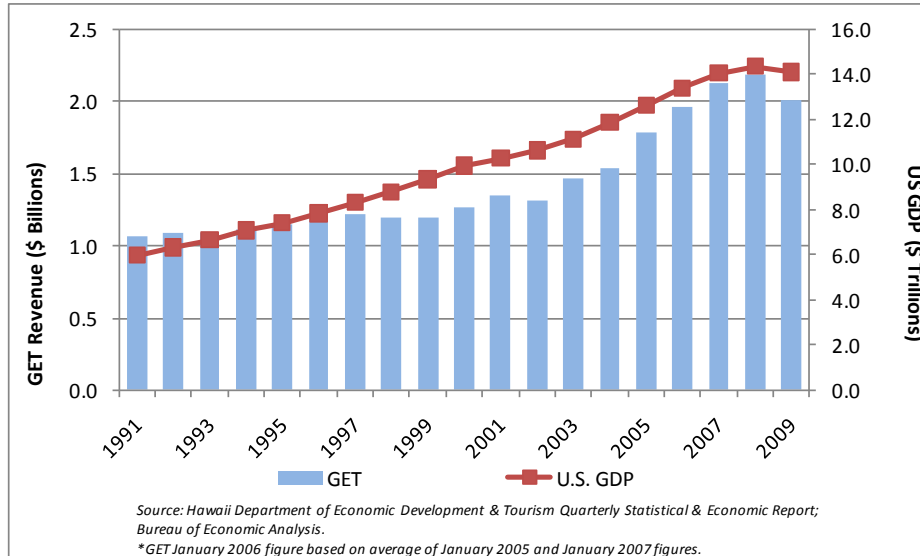
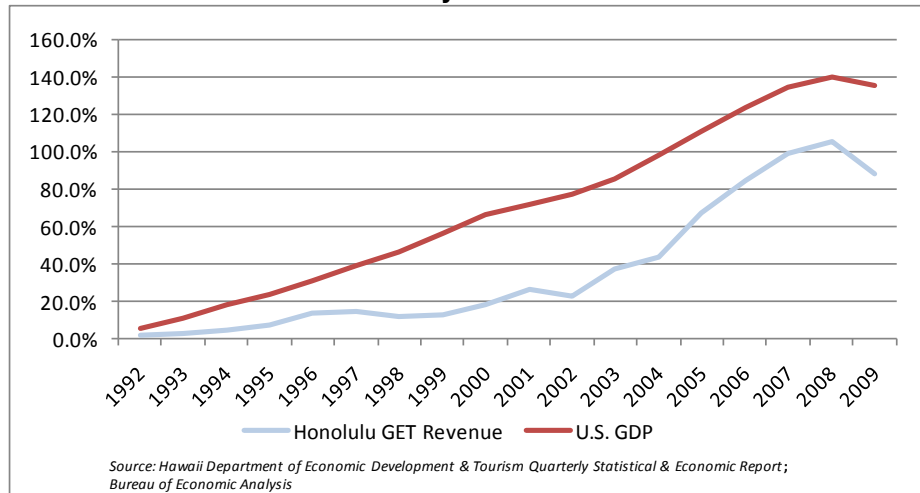
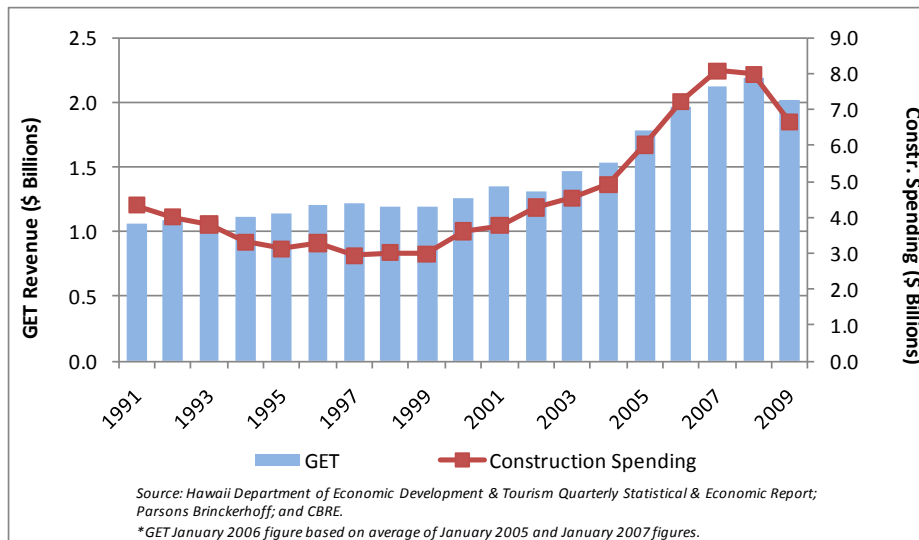


Figure 4-2
Cumulative Growth Rates
Honolulu General Excise Tax Revenue and U.S. GDP
Base year: 1991



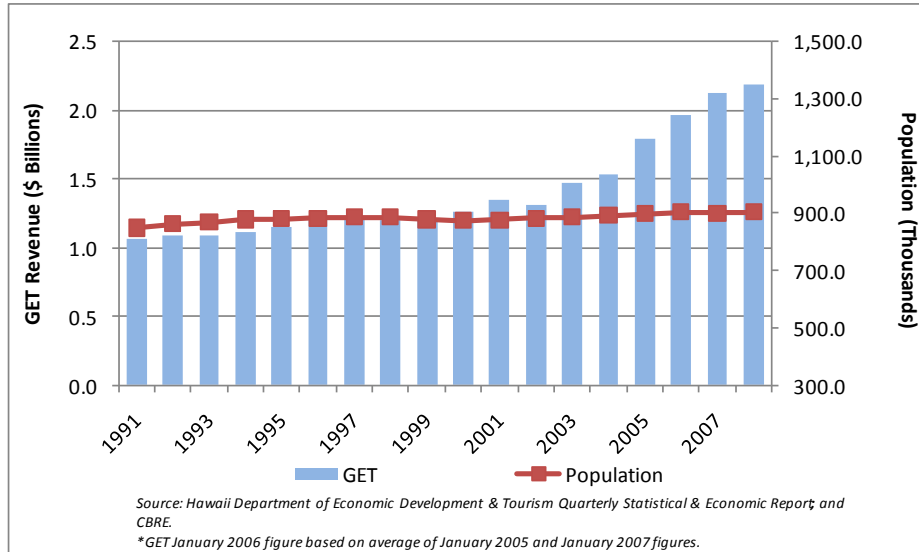
- Honolulu GET growth rates have averaged between 3.5% and 4.7% over every 15-year period since 1990.
- Construction industry spending paralleled the overall GET growth rate.

Figure 4-3
Honolulu GET Revenues vs. Construction Spending
FY1991 – 2009



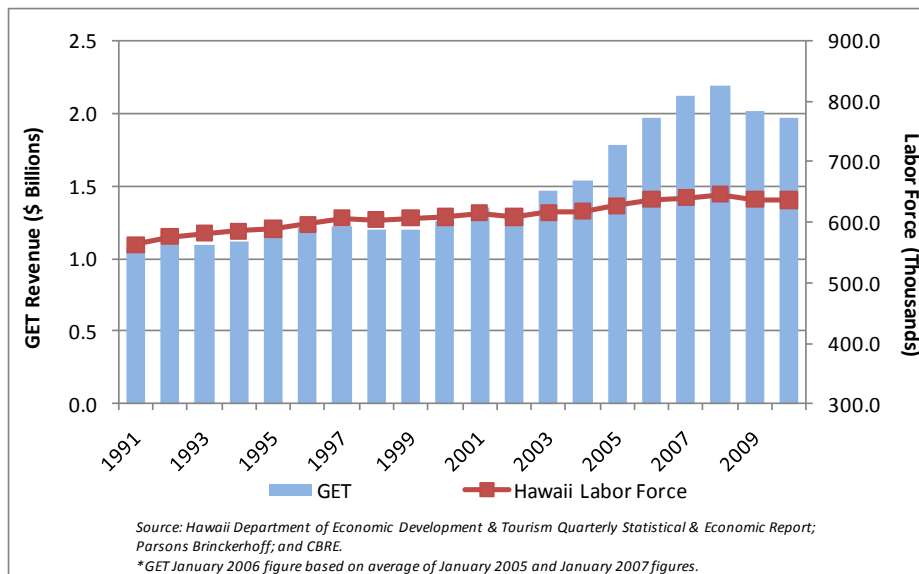
- Population and GET revenues moved together until the construction boom in the mid-2000's, which raised GET revenues sharply but only temporarily.

Figure 4-4
Honolulu GET Revenues vs. Population
FY1991 - 2008



- Labor force growth has been roughly consistent with population growth, and so shows a similar correlation with GET revenues.

Figure 4-5
Honolulu GET Revenues vs. Hawaii Labor Force
FY1991 - 2010



Taken together, these charts reveal that GET revenues have a relatively strong correlation with population (and workforce), Hawaii economic growth, and US GDP. Historically, these correlations have been disrupted only by temporary surges in construction spending (according to information from the Hawaii Department of Business Economic Development and Tourism) and Asian tourism. Accordingly, forecasts of population and US GDP growth are likely to be the best predictors of future GET revenues.

4.4 CBRE GET FORECAST

To determine the appropriate base year from which to apply the long-term growth rates, CBRE reviewed the Quarterly Statistical & Economic Report for 4th Quarter 2010, just released by the State of Hawaii DBEDT.

The report found that the Hawaiian economy was showing signs of strengthening after three years of declining economic activity, employment, and tax revenues. The most recent quarter (July-Sept. 2010) showed 8-9% gains in visitor arrivals, 12-13% gains in the number of visitor days and approximately 3% increase in GET collection compared to the prior year period. This would indicate that FY2010 represents the low point in the Hawaiian economy and that the growth should begin in 2011.

CBRE relied on the Honolulu County GET data from 1990 thru 2010 to measure historic compound annual growth rates in order to determine an appropriate range of assumptions for future growth of the 0.5% GET surcharge revenue. We understand that the County GET data has some flaws related to economic activity from businesses based in Honolulu that also have establishments in outer islands. Since we are only measuring compound annual growth rates over a 15-year period, any flaws in the absolute numbers will not materially impact the billions of dollars in annual economic activity in Honolulu. The only other data available is statewide GET which is more problematic due to varying growth rates of the outer islands.

Because of the collapse of the Japanese economy in 1990, Hawaii tourism was significantly affected for most of the 1990s, resulting in a decade of slow growth before a substantial recovery began in 2005. Beginning in 2003, coinciding with the national real estate boom resulting from historic low interest rates, the Hawaii economy saw double digit growth in GET receipts through 2007 before the collapse in 2008-10. Given the weakened economic conditions affecting most of the U.S. and the industrialized world, future growth rates are unlikely to rebound as sharply as they have following other recessions.

We decided on a 15-year analysis period since the GET surcharge period was for a 15-year term 2008-2023. This allows for a full cycle of recession and recovery. We looked at the compound

annual growth rates from 1990-2005, 1991-2006, 1992-2007, 1993-2008, 1994-2009 and 1995-2010. The annual growth rates ranged from approx. 3.0% to 4.7% per year. To avoid focusing too much on the 1990's period - CBRE selected the 1993-2008 period with the highest growth rate of 4.7% as the optimistic assumption. The 1994-2009 period with a 4.0% compound growth rate was deemed to be the expected case growth rate assumption, while the 1995-2010 period with a 3.7% growth rate was deemed to be the conservative assumption.

As another reference source, the Congressional Budget Office (“CBO”) forecasted growth in U.S. GDP is expected to average between 4% and 4.5% for the next ten years. Assuming a similar historic relationship, the Honolulu GET tax growth is unlikely to growth beyond a 4% compound growth rate over the forecast period.

For the financial analysis, CBRE prepared an Excel model that projects the GET surcharge to be collected from 2009-2023 under a conservative estimate of 3.7% per year, a base case estimate of 4.0% per year, and an optimistic estimate of a 4.7% annual compound growth rate.

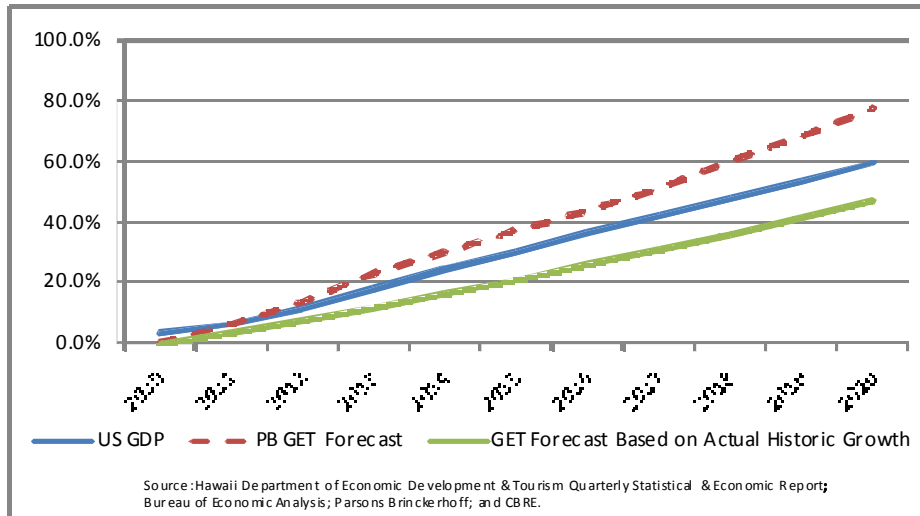
The GET revenue is \$366 M to \$560 M short of the \$3.525 B estimated by PB in the Project’s Financial Plan as shown below.

GET Revenue Projections

	Conservative	Base Case	Optimistic
Growth Rate	3.7%	4.0%	4.7%
2011 GET Revenue	\$165 M	\$166 M	\$167 M
2015 GET Revenue	192 M	195 M	201 M
2020 GET Revenue	230 M	237 M	253 M
Total Revenue	\$2.96 B	\$3.02 B	\$3.16 B

As a point of comparison, we have illustrated various projected growth rates for both the Honolulu GET and the U.S. GDP over the next 10 years. As shown in Figure 4-6, one can see that the Parsons Brinckerhoff forecast for GET revenue growth exceeds the cumulative growth rate of the U.S. economy and the historic average growth rate of the Hawaiian economy by 40% within 10 years.

**Figure 4-6
 Forecast Cumulative Growth Rates
 Honolulu General Excise Tax Revenue and U.S. GDP**



In order for the Financial Plan forecast of GET revenue to occur, the Hawaiian economy and Honolulu’s share of it will have to see long-term growth rates more than double population growth.

4.5 GET FORECAST ANALYSIS CONCLUSIONS

Although projections from both the state and Financial Plan have been revised downward to take into account the economic recession, it is likely that they are still unrealistically high. The Financial Plan chose to base the projections on growth during a time period between an economic recession and subsequent boom years and have over predicted revenues for 2009 and 2010. Considering the factors that have historically affected GET revenues, and putting that in the context of historic trends, we have shown that GET surcharge growth rates are likely to be between 3.7% and 4.7%, well below the Financial Plan projections. Our analysis shows that GET revenues will likely fall \$366 M to \$560 M short of the \$3.525 B estimated by PB in the Project’s Financial Plan.



5.0 The Financial Model

5.1 OVERVIEW

In order to analyze the financial resources that will be required to implement the High Capacity Rail Project, IMG developed an investment-type financial model. The purpose of the model analysis is to determine the likely range of support the C&C of Honolulu should be prepared to contribute in order to construct, operate, and maintain the Project and the existing transit system services. Although the model shares similarities with the sponsor's financial analysis, which complies with FTA guidelines, the IMG Model differs in the following significant ways:

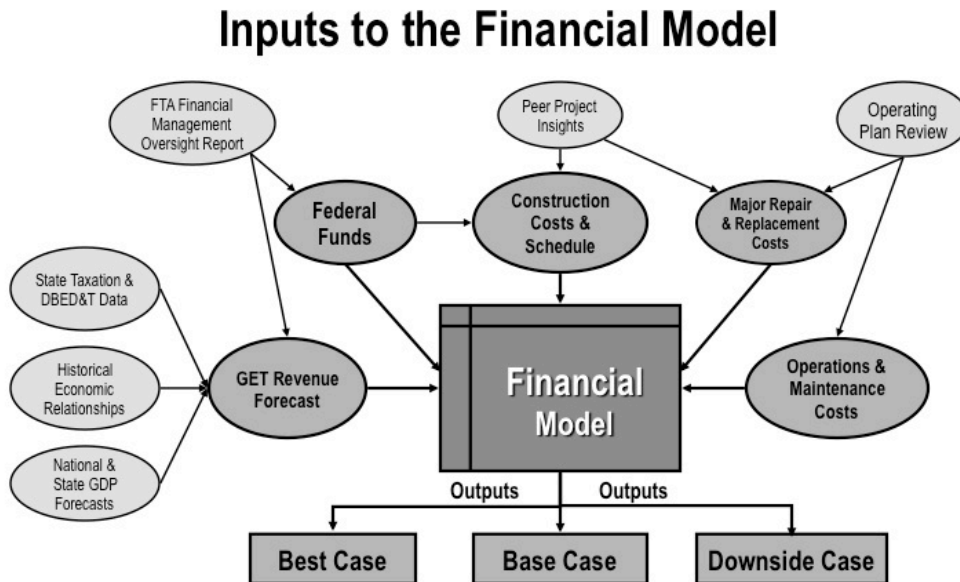
- Unlike the Financial Plan, which is a 20-year forecast (2009-2030) as required by the FTA, the IMG Model is a 30-year model (2011-2040). Investors in a project would require the added analysis period to assess the long-term impact of operating costs and renewal/rehabilitation costs. Since the Project would not be completed until 2019 under the Financial Plan, it is critical to have a longer post-construction analysis to ensure that long-term Project needs are met.
- The IMG Model incorporates the detailed analysis and forecasts of construction costs, GET, federal funding, operating and maintenance costs, and major maintenance expenses described earlier in this report.
- Sensitivity and scenario analysis is used to analyze the Project feasibility under a range of assumptions.
- The IMG Model reports the total C&C funding needed for the project, including projected shortfalls compared to the funding levels provided in the Financial Plan.
- In scenarios where funding falls short, the IMG Model analyzes how changes in the GET could remove the shortfall either by extending the GET collections beyond 2023 or by increasing the GET from today through 2023.

The IMG Model provides a series of summary tables and graphs to facilitate analysis. This includes sources and uses of funds, broken out by rail project construction, ongoing bus and rail capital, and operating costs. The goal of the model is to determine the following:

1. Funding for the rail project construction that will be needed over and above the resources assumed, if any. Such extra funds would most likely need to come from local sources.
2. Total C&C subsidy payments to support the operation of the rail, bus, and Handi-van services

5.2 STRUCTURE AND KEY ELEMENTS

The financial model, developed in Microsoft Excel, is structured to provide a clear view of Project sources, uses, and net cash flows in each given year for capital costs, ongoing system capital costs and operations. The key elements of the model include revenue sources, such as GET surcharge funds, federal funds, and fare revenue; capital costs; and operating expenditures. The figure below depicts the inputs to the financial model.



5.3 MODEL OUTPUTS

The key Model outputs detail the support the C&C of Honolulu will need to provide to the Project. In order to accomplish this, the model tracks the three major DTS business lines for the forecast period. Each of these business lines is tracked separately in the model, and the results are compiled into a single summary of DTS sources and uses.

1. Construction of the High Capacity Rail Corridor Project

Funding for the Project comes from FTA 5309 New Starts funds and FTA 5307 formula funds. GET surcharge revenue is leveraged as needed through short-term debt (limited to \$500 M) and long-term debt (limited to the borrowing capacity of DTS as calculated based upon ability to pay annual debt service). In addition, in scenarios where New Starts funds are provided over a period of time longer than the construction period, Grant Anticipation Notes (GANs) are used as a financial

bridge. While IMG understands that issuing stand-alone GANs may not be realistic and the City may need to find different sources of funding, GANs are included to estimate the interest cost of bridge financing in anticipation of New Starts grants received after the construction period. The “Other Funding Sources for Capital” reflects a shortfall in the budget of \$909.5 M that would have to be filled with further C&C or other support.

Total Rail Construction Sources (30 Yr)	
GET Surcharge Revenue	2,700,943,516
New Starts 5309 Revenue	1,550,000,000
5307 Formula Funds for Capex	300,718,390
Gross Proceeds from Short Term Construction Fin:	2,235,144,381
Gross Proceeds from Long-Term Debt	1,309,041,685
Gross Proceeds from GANs	415,000,000
Interest Income on Cash Balance	27,107,438
Other Funding Source for Capital	909,544,246
Cash	407,815,130
Total Sources	9,855,314,786
Total Rail Construction Uses (30 Yr)	
Capital Costs	5,526,098,537
Debt Service	
Issuance Costs	33,678,278
Interest Payment on Short Term Financing	37,103,397
Principal Payment on Short Term Financing	2,235,144,381
Interest Payment on LT Debt	212,433,308
Principal Payment on LT Debt	1,309,041,685
Interest Payment on GANs	101,815,200
Principal Payment on GANs	400,000,000
Total Debt Service	4,329,216,249
Cash	-
Total Sources	9,855,314,786

2. Ongoing rail and bus capital costs

These costs reflect the ongoing cost of purchasing rail and bus vehicles, rail rehabilitation and replacement costs, and Handi-Van acquisition costs. The table below shows the funding sources for ongoing capital. As shown in the “City Match Funds” Line, the C&C is assumed to make up any shortfalls after 5309 and 5307 funds are exhausted.

Ongoing System Capital Funding Sources (30 Yr)	
5309 Bus Discretionary	270,400,000
FTA 5309 FG Mod. Revenues	208,736,205
5307 Formula Funds for Ongoing Capex	316,549,724
Transfers to the State's Vanpool program	(51,603,963)
City Match Funds for Ongoing Capex	1,738,328,475
Cash	5,000,000
Total Sources	2,487,410,441
Ongoing System Capital Uses (30 Yr)	
Additional Railcar Acquisition	76,701,717
Rail Rehab, Replacement	371,000,000
Airport Alt. Bus Acquisition Costs	1,720,584,947
Total Ongoing Bus CapEx	174,231,229
Handi-Van Acquisitions	144,892,548
Cash	-
Total Sources	2,487,410,441

3. Operations of the rail, bus, and Handi-van systems

These operating costs are funded by farebox revenue, FTA 5307 formula funds for preventive maintenance, and subsidies from the City. A key assumption of the model is that the City provides funds to cover all operating subsidy for the systems.

Operating Revenue (30 Yr)	
Farebox revenues (bus and rail)	3,782,331,830
Farebox revenues (handi-van)	74,443,795
5307 Formula Funds for Preventive Maintenance	722,561,932
City Operating Subsidy	7,845,252,049
Total Sources	12,424,589,605
Operating Costs (30 Yr)	
Bus	8,722,042,492
Fixed Guideway	2,590,176,513
Handi-Van	1,112,370,601
Total Sources	12,424,589,605

5.4 CRITICAL ASSUMPTIONS, DIFFERENCES WITH FINANCIAL PLAN MODEL, AND RATIONALE

The financial model was built utilizing many assumptions from the Financial Plan, with certain adjustments based on the IMG Team's analysis of the Project and projections of the Oahu economy. The Base Case incorporates the following key assumptions directly from the sponsor plan:

- Rail project construction costs
- Fare revenue
- FTA 5307 formula funds for capital costs

Other assumptions are altered from the sponsor forecast based on IMG analysis.

Analysis Timeframe: Unlike the Financial Plan model, which is a 20-year model (2009-2030) as required by FTA, IMG's model, as an investment-type, is a 30-year model (2011-2040) and encompasses longer post-construction system operations in order to assess a solid long-term base of project economic feasibility and longevity. For post-2030 years, IMG Team extended the model by either assuming a long-term inflation rate of 2.5%, individual growth rates for different forecasts or applying the last year (2030) growth rate in the Financial Plan.

Construction Timing: One of the variations from the Financial Plan is a two-year delay in project development. This reflects the fact that the Project is behind the Financial Plan schedule, which called for FTA's Record of Decision in Fall 2009, and a Full Funding Grant Agreement by February 2011.

This two year delay assumption is based on our analysis of the nine New Start projects with FFGAs in the most recent FTA *Annual Report to Congress*, showing an average period between Final EIS (which the Honolulu project is close to, but has not yet completed) of 33.5 months, with a range of from 16 to 65 months. The delay to actual construction commencement can be reduced by the utilization of a Letter of No Prejudice, which allows the grant applicant to commence work without and executed FFGA, with the Federal government agreeing to regard the costs of all such work as comprehended by the FFGA to be signed in the future, but, these require the grant applicant to pay all costs if the FFGA is not forthcoming.

The IMG Model's initial year is 2011, hence certain Financial Plan's inputs (capital costs, ridership forecast, etc.) were pushed back by two years and adjusted for inflation, if applicable, based on inflation rates reported by the Bureau of Labor and Statistics for Honolulu. Due to this delay, the model excludes ARRA funds as a revenue source since they are assumed will be no longer available in 2011.

Beginning Transit Fund Balance: The most recent data available to the IMG Team showed a Transit Fund balance of \$351.5 M as of April 30, 2010.¹⁸ The Transit Fund balance in the model

takes this figure, and adds actual May and June 2010 GET surcharge collections (\$29.4 M). Although it is highly likely that there will be additional Transit Fund expenditures prior to the start of construction, such as for the cost of retaining an ongoing consultant team, no estimate of such costs was available IMG. Therefore, we are likely overstating the cash funds available for the project.

Financing Assumptions: For the Base Case, IMG accepts the general structure of leveraging GET revenue through short-term and long-term debt, and uses Financial Plan interest rates. However, the IMG model restricts the GET surcharge revenue backed debt capacity to a debt service coverage ratio of 1.0x (excluding issuance costs) to ensure that debt service payments can be covered in each year. Long-term debt borrowing capacity was not limited in the Financial Plan because of the absence of debt coverage ratio requirement; hence, the Financial Plan allows higher debt issuances than in IMG model.

The Financial Plan assumes that there is no debt service coverage requirement and no debt service reserve requirement because long-term debt will be a general obligation of the City. Should these assumptions be incorrect, borrowing cost would be substantially higher.

Short-term debt is restricted to \$500 M outstanding, and is rolled annually. As in the Financial Plan, a short-term construction financing is rolled over for six years and paid off with long-term debt proceeds in the seventh year. Long-term debt is issued based upon need each year and repaid by GET surcharge sunset in 2023.

The IMG model adds Grant Anticipation Notes (GANs) as a funding source to bridge gaps where New Starts funds are provided at a slower rate than in the Financial Plan. Since principal will be repaid from the future New Starts funds, the Model tracks the interest accumulated on the GANs.

Other Forecasts: The IMG Team also adjusted federal funds, GET surcharge revenue, O&M, capital repair and replacement forecasts as described in the previous sections. These forecasts varied for each scenario and are addressed in more detail in Scenarios section. The key differences between the IMG Model and the Financial Plan are summarized in the table below.

Assumption	Financial Plan	IMG Model	Reasoning
Construction Costs	\$5.1 B	\$5.3 B (excluding inflation)	Reflects recommendation from FTA PMOC report
Model start year	2009	2011	ROD not received in 2010 as expected in Financial Plan
Model length	20 years	30 years	Enables forecast of ongoing maintenance investments
Beginning Transit Fund Balance	\$154 M	\$381 M	Construction delay results in more GET collections

New Starts Funding	\$1.55 B over 9 years	\$1.55 B over 12 years	Project unlikely to receive more than \$150 M per year in New Starts funding
Grant Anticipation Notes	N/A	Used to make up shortfall from New Starts	Bridge financing needed while New Starts funding is pending
5309 Bus Discretionary	\$419 M	\$166.4 M	Capped at \$2.6 M per year during construction. Very rare for properties to receive major Bus Discretionary in same years as New Starts funds
Operations & Maintenance Costs	\$7.2 B	\$7.7 B	Includes wait time between bus runs
GET revenue	\$3.5 B	\$2.7 B	4% long-term growth rate maintains historic relationship of GET and GDP

Appendix 1 lists other model assumptions.

5.5 FEDERAL FUNDS AND GET INTEGRATION INTO THE MODEL

Federal funding for the Project and for ongoing capital investment and operation of the rail, bus, and Handi-van service comes from five major sources:

- FTA New Starts grants
- 5307 Urbanized Area Formula Funding
- FTA 5309 Fixed Guideway Modernization Funds
- 5309 Bus Discretionary Funds
- Local funds, including the C&C match for ongoing capital costs, operating subsidies, and to make up any shortfalls in the Rail Project construction.

As discussed in section 3.0 General Statement on Federal Funding, IMG confirmed PB's projected 5307 Urbanized Area Formula Funding and 5309 Fixed Guideway Modernization grant amounts to be reasonable. However, we significantly revised the 5309 Bus Discretionary funds. Analyzing previous allocations to the City of Honolulu and reviewing historical 5309 Bus Discretionary funds to other cities across the US, IMG found no basis for such large 5309 Bus Discretionary funds projections. The model utilizes an IMG-adjusted 5309 Bus Discretionary funds forecast of \$2.6 M per year in the years when the Project is receiving New Starts funds and \$13 M per year in the post-construction years. This is actually double than the IMG forecast for 5309 Bus Discretionary funds, but is used in the Base Case because of the major difference from the Financial Plan forecast. This forecast was further adjusted for each scenario as described in Scenarios section.

IMG also reviewed New Starts grant amounts, and while we concur that the total \$1.55 B FTA New Starts funding for Project is possible, we believe that it is likely that the grant schedule will be longer than in the Financial Plan. In the Financial Plan New Starts projections, annual amounts reach \$200 M to \$250 M in six years, which is optimistic for an annual appropriation. In order to maintain the total of \$1.55 B grant request, the New Starts grants are extended for additional three years in the IMG Model. In order to keep construction schedule as planned, the model assumes that the required funds above \$150 M New Starts grant will be financed with Grant Anticipation Notes (GANs) and repaid with New Starts grants in years when they become available (understanding, as stated above, that GANs are use in the model only to provide a rough estimate of bridge financing costs).

The GET surcharge revenue forecast, another major revenue source in the model, was also adjusted by IMG as described in section 4.0, General Excise Tax (GET) Forecast. The adjustment is based on continuing the historical relationship between GET revenue and Hawaii GDP, and growing the GET surcharge revenue from a more recent collection date than in the Financial Plan.

5.6 CAPITAL COSTS, O&M, AND MAJOR RENEWAL AND REPLACEMENT

Capital costs projections total \$5.347 B in 2009 dollars in the IMG Model. This figure is adjusted from the \$5.120 B projections in the Financial Plan based on Honolulu High-Capacity Transit Corridor Project Spot Report recommendation by the FTA's Project Management Oversight Contractor ("PMOC"). These costs were escalated to 2011 dollars in IMG's model due to the two-year delay and totaled \$5.526 B. The adjustments were also made to O&M and major renewal and replacement cost projections.

As explained in the Operating Plan Review (Section 6), IMG found that O&M costs for bus and fixed guideway were underestimated due to Layover and Recovery Time calculation. The IMG Team adjusted these projections to reflect new revenue vehicle hours thus the new O&M cost projections are on average 6% for bus and 2% for fixed guideway higher than those in the Operating Plan.

Major renewal and replacement costs were adjusted for fixed guideway, as explained in the Operating Plan Review (Section 6). The Operating Plan assumes no fixed guideway renewal and replacement costs until 2026. IMG team believes such projections are highly underestimated and certainly would happen earlier than 2026. As such, the model utilizes IMG projected fixed guideway renewal and replacement costs, which also vary depending on the scenario.

5.7 SCENARIOS

Of necessity, the financial forecast for the Project relies on numerous assumptions and forecasts. Scenario and sensitivity analysis was used to analyze the Project under varying assumptions. The goal of this analysis is to define a range within which exists a high probability of actual financial results. Toward this end, IMG analyzed four cases:

1. The Base Case is considered the scenario most likely to occur, based on our analysis.
2. The Best Case includes assumptions that are more optimistic than the Base Case, but still within the range an investor would find reasonable.
3. The Downside Case is a downside scenario where assumptions are toward the pessimistic end of the likely range, but still are very reasonable. The C&C should be prepared to provide the levels of support to the Project required in the Downside Case.
4. Finally, a Validation Case was developed that reflects Financial Plan assumptions (where known), in order to demonstrate the IMG Model is working accurately.

The underlying assumptions for each of the cases are described in the following paragraphs.

The **Base Case** is a scenario that is most likely to happen.

- The initial year of the model is 2011 with construction commencing in 2012.
- The initial cash balance is \$381 M.
- GET surcharge revenue forecast with a four percent growth rate was chosen for the Base Case. The forecast was developed by the IMG Team based on historical 1994-2009 compound annual growth rates of Hawaii economy, as described in the earlier chapters.
- New Starts funds are limited to \$150 M per year but extended for three more years than in the Financial Plan in order to maintain a total \$1.55 B appropriation. In order to keep construction schedule as planned, the model assumes that the required funds above \$150 M New Starts appropriation will be financed with Grant Anticipation Notes (GANs) and repaid with New Starts appropriations in years when appropriations are available. While the Team understands that GANs may not be a realistic type of debt and the City may need to find different sources of funding, for the sake of validating the model, GANs were assumed to be plausible.
- Lower 5309 Bus Discretionary forecast of \$2.6 M in years when New Starts funds are received and \$13 M in other years was assumed in the Base Case, per the IMG Team analysis.
- Fare elasticity is assumed to be -0.1. Currently, Financial Plan ridership forecast does not appear to account for fare elasticity in the years of fare increases. As discussed in the Downside Case below, this is below the typical standard elasticity, making the assumption favorable to the project's financial viability.
- The Base Case utilizes an IMG Team adjusted O&M forecast, which corrects Revenue Vehicle Miles understatement in Financial Plan projected operating costs.
- Fixed guideway renewal and replacement costs were adjusted to reflect earlier and larger expenses.

The **Best Case** is an optimistic version of the Base Case scenario.

- The initial year of the model is 2011 and the initial cash balance of \$381 M as in the Base Case.
- GET surcharge revenue forecast with 4.7 percent growth rate was selected based on the IMG Team developed forecast, which was based on historical 1993-2008 compound annual growth rates of Hawaii economy.
- Financial Plan New Starts appropriation amounts and schedule were maintained in the Best Case.
- Financial Plan 5309 Bus Discretionary forecast was capped at \$15 M per year in the years when New Starts grants are received and, \$20 M per year afterwards.
- O&M costs were considered to be the same as in the Operating Plan.
- The Base Case fixed guideway renewal and replacement costs were used for the Best Case but were capped to \$25 M per year. In addition, all major renewal and replacement costs were decreased by 20 percent.

The **Downside Case** is a conservative scenario with more severe contingencies than the Base Case reflecting issues seen with some peer rail systems as described in Section 2.0 of this report.

- The initial year of the model is 2013 with construction commencing in 2014.
- Due to an additional two-year delay from the Base Case, the initial cash balance was assumed to have accumulated to \$719 M in the Downside Case scenario. The balance was calculated by taking the Base Case cash balance and adding 2011 and 2012 estimated GET surcharge revenue. While the delays in the Project development require additional costs to the City in the form of consultants and planning fees, IMG Team decided to exclude such costs and assume that all collected GET surcharge revenues will be deposited to the Transit Fund and no expenditures incurred during the additional two years.
- The Downside Case scenario utilizes a conservative GET surcharge revenue forecast growth rate of 3.7%. The forecast was developed by IMG Team based on historical 1995-2010 compound annual growth rates of Hawaii economy as described in Section 4.0.
- Just as in the Base Case, the Downside Case scenario limits New Starts funds to \$150 M a year but extends the appropriations for three more years than in the Financial Plan in order to maintain a total of \$1.55 B appropriation.
- Capital costs were assumed to increase by 10 percent.
- 5309 Bus Discretionary fund forecast assumes \$1.3 M grants during the construction period and \$6.5 M in the post-construction years.
- Fare elasticity – a -0.33 elasticity factor was applied to Financial Plan ridership. The elasticity factor is based on Simpson-Curtin rule, which implies that each 3% fare increase reduces ridership by 1 percent or -0.33. It is a common transit industry rule of thumb for rough estimates that is often applied to bus and rail ridership.

- Fare revenue was decreased by 20% due to either unrealized ridership levels or lower than expected increases in fares.
- While IMG understands that the City is required to match all FTA funding programs with at least 20% of local funds, the Downside Case assumes that this contribution toward ongoing system capital needs is limited to a maximum of \$100 M per year.
- The Base Case utilizes an IMG Team adjusted O&M forecast and additionally increased by 10 percent.
- In this scenario, more aggressive fixed guideway renewal and replacement costs utilized than in the Base Case. In addition, all major renewal and replacement costs are increased by 20%.
- The interest rate for long-term debt (City General Obligation bonds) was increased 100 bps from 3.96% to 4.96% in the event that municipal bond market conditions change or the City's bond rating is downgraded by the credit agencies due to City's indebtedness level.

The table below summarizes the three scenarios.

SUMMARY OF SCENARIOS			
	Base Case	Downside Case	Best Case
Beginning Year of the Model	2011	2013	2011
Transit Fund Balance at Start of Construction	\$ 380,880,555	\$ 718,859,595	\$ 380,880,555
Long-Term Debt Interest Rate	3.96%	4.96%	3.96%
City Funds for Ongoing Capex Annual Cap	-	100,000,000	-
GET Forecast	IMG 4%	IMG 3.7%	IMG 4.7%
O&M Forecast	IMG	IMG	EIS
O&M Increase	0%	10%	0%
CAPEX Increase	0%	10%	0%
Capital Renewal & Replacement Forecast	Lower IMG	IMG	Lower IMG w/ \$25 M Cap
Capital Renewal & Replacement Increase/Decrease	0%	20%	-20%
Fare Revenue Decrease	0%	-20%	0%
Fare Elasticity	-0.1	-0.33	0
New Starts Forecast	\$150 M Cap, extended 3 yrs	\$150 M Cap, extended 3 yrs	Financial Plan
5309 Bus Discretionary Forecast	Doubled IMG	IMG (\$1.3 M per year)	Financial Plan w/ \$15 M and \$20 M Cap

5.8 OUTPUTS AND INTERMEDIATE FINDINGS

Based on the assumptions and various adjustments to the Financial Plan projections discussed above, IMG's financial analysis estimates the magnitude of the impact the Project could have on the C&C General Fund over a 30-year period. The results of this analysis are presented in the table below. The key results are highlighted in yellow for each of the three business lines: Rail Construction, Ongoing Capital and Major Maintenance, and Operations.

SCENARIO RESULTS (30 Yr)			
	Base Case	Downside Case	Best Case
Beginning Model Year	2011	2013	2011
Transit Fund Balance Prior to Construction	380,880,555	718,859,595	380,880,555
GET Surcharge Revenue	2,700,943,516	2,306,439,863	2,838,061,453
Total Farebox revenues	3,856,775,624	2,799,582,625	4,120,640,531
Total Debt Service	4,329,216,249	3,853,947,576	3,897,898,165
Total OpEx	12,424,589,605	14,316,916,725	11,893,733,614
Total Ongoing CapEx	2,487,410,441	2,770,245,758	2,373,210,441
<i>Rail Construction Shortfall</i>	<i>909,544,246</i>	<i>1,701,802,819</i>	<i>678,256,434</i>
<i>City Match Funds for Ongoing Capex</i>	<i>1,738,328,475</i>	<i>1,775,374,204</i>	<i>1,597,487,679</i>
<i>City Operating Subsidy</i>	<i>7,845,252,049</i>	<i>10,794,772,169</i>	<i>7,050,531,151</i>
Total City Support	10,493,124,771	14,271,949,192	9,326,275,263
To Avoid Shortfall (either/or)			
Increase Sunset Year to	2030	2041	2027
Increase GET Surcharge to	0.0068	0.0088	0.0062

Under the three selected scenarios, the City would be required to subsidize over \$7.0 B (nearly \$10.8 B in the worst case scenario) of Project operations and fund at least \$1.6 B of system ongoing capital expenditures. Additionally, the C&C would need to close a \$678 M to \$1.7 B capital funding shortfall, which could occur due to lower than expected GET surcharge revenue and/or federal grants and higher than expected costs. Overall, the C&C would be required to pay \$8.6 B to \$12.6 B from the General Fund over 30 years.

In order to make up these shortfalls, the C&C may elect to either extend or increase the GET. The extension of the 0.005 cent GET to 2027 (Best Case) up to 2041 (Downside Case), or an increase in the GET of 24% (Best Case) to 76% (Downside Case) would resolve the funding gaps.

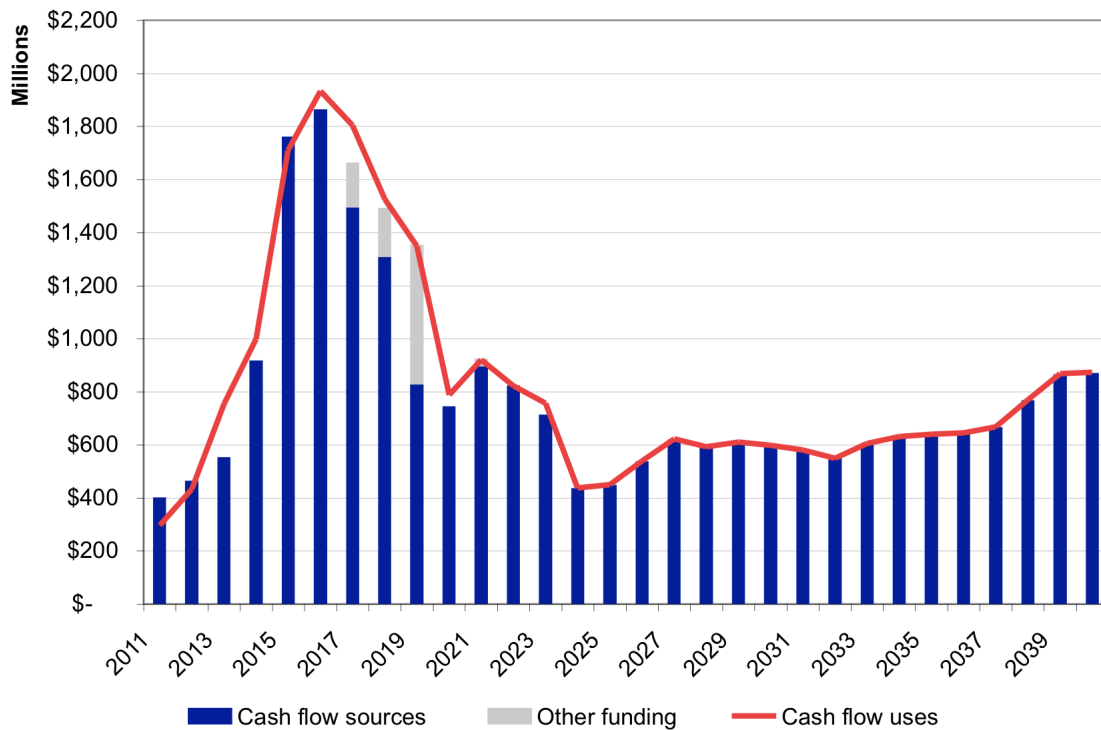
The findings of each scenario are discussed in more detail below.

Base Case:

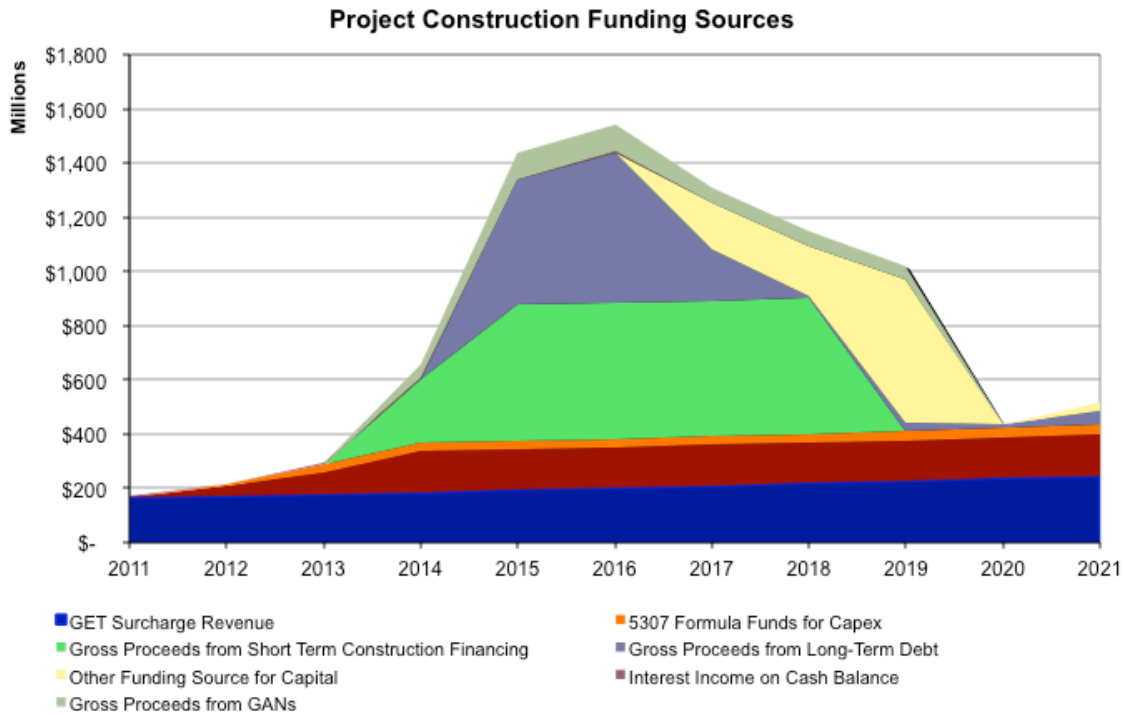
The Base Case scenario assumes 30 percent lower GET surcharge revenue and 8% lower federal funds than in the Financial Plan. As can be seen in the Scenario Results table above, while operating revenues reach \$3.9 B, operating expenditures total over \$12.4 B over 30 years and require \$7.8 B of operating subsidy from the City. Also, the City is required to fund \$1.7 B for ongoing capital expenditures. Further, the "Other Funding Source for Capital" line represents the

funding shortfall of \$909 M that exists after assumed borrowing limits are reached. The funding shortfall occurs during the construction years of 2017-2019 and in 2021 after the initial Transit Fund cash balance is used up. This can be clearly seen in the Sources and Uses graph below.

Base Case - Sources and Uses



The funding gap peaks at \$526 M in 2019, when short-term financing is scheduled to be repaid but GET surcharge revenue-backed bonds cannot be issued for the required amount of debt. Long-term debt is issued up to capacity in years 2017-2021. Due to lower New Starts appropriations and the need to keep the planned construction on schedule, the City will have to issue over \$400 M worth of GANs and pay over \$118 M in interest and issuance costs. Total Base Case scenario debt service amounts to \$4.33 B over the 30-year period. The graph below depicts total Project funding sources during construction years and the estimated funding shortfall.



The funding shortfall shown above can be eliminated either by extending the GET surcharge until 2030 or increasing the surcharge rate to 0.0068 instead of the current 0.005.

Since the Financial Plan forecast is 20 years, in order to compare the results to the IMG Team analysis, a summary matching that timeframe was conducted. When the Base Case scenario results are summarized for a 20-year period and compared to the Financial Plan, the difference in the amount that would have to be contributed by the C&C is \$1.725 B. As noted earlier, the most significant differences between the IMG Model Base Case results and those of the Financial Plan are:

- Lower GET surcharge revenue projections in the IMG Base Case
- Significantly higher C&C support for ongoing capital costs in the IMG Base Case mainly due to lower 5309 Bus Discretionary grant projections.

These differences are shown in the following table:

SCENARIO RESULTS (20 Yr)			
	Base Case	EIS Financial Plan*	Difference
Beginning Model Year	2011	2009	2 Yrs
Transit Fund Balance	380,880,555	154,429,296	226,451,259
GET Surcharge Revenue	2,700,943,516	3,524,257,317	(823,313,801)
Total Farebox revenues	2,320,904,460	2,274,676,571	46,227,889
Total Debt Service	4,324,416,249	4,461,054,516	(136,638,267)
Total OpEx	7,726,545,991	7,242,420,006	484,125,984
Total Ongoing CapEx	1,492,533,588	1,381,671,715	110,861,873
<i>Rail Construction Shortfall</i>	<i>909,544,246</i>	<i>-</i>	<i>909,544,246</i>
<i>City Match Funds for Ongoing Capex</i>	<i>948,986,851</i>	<i>571,363,394</i>	<i>377,623,457</i>
<i>City Operating Subsidy</i>	<i>5,135,558,508</i>	<i>4,697,660,413</i>	<i>437,898,095</i>
Total City Support	6,994,089,606	5,269,023,807	1,725,065,799

The difference between the 30-year and 20-year model results cannot be underestimated because of additional funds that are needed to support system operations and ongoing capital expenditures. After construction of the Project is completed and the system becomes fully operational, the C&C is further required to provide \$636 M to \$790 M in operating subsidies and \$2.36 B to \$3.9 B for ongoing capital needs over the next 10-year period.

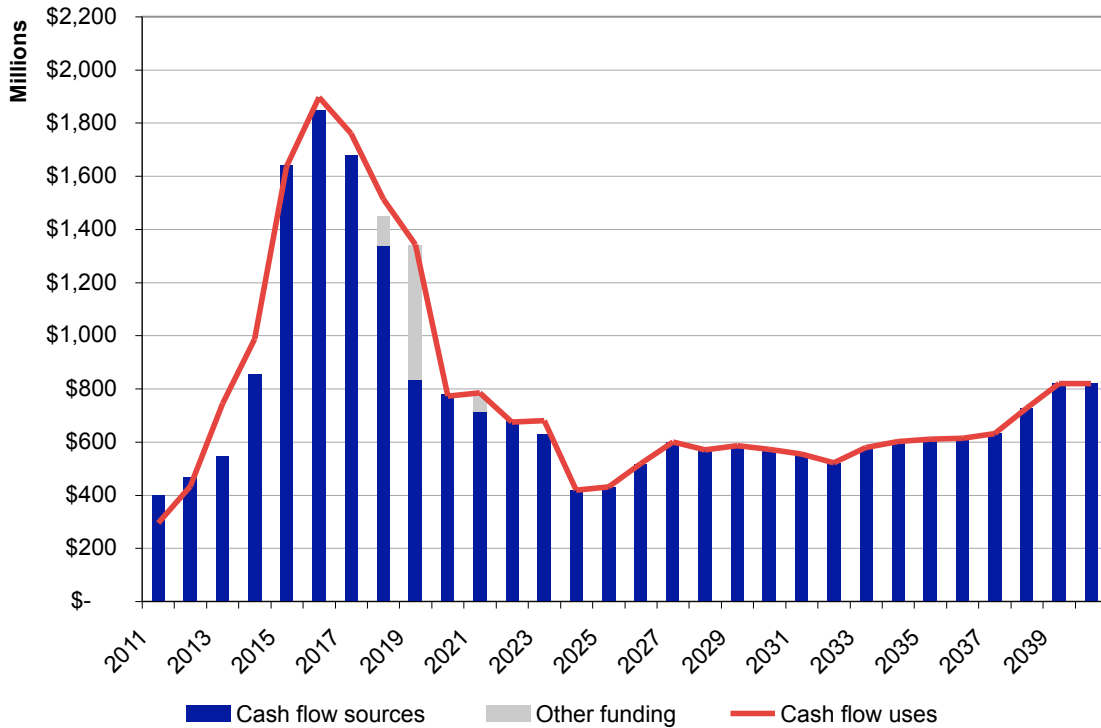
For more detail on the Base Case scenario results refer to Appendix 2.

Best Case:

The Best Case scenario, as described in Scenarios section, provides a slightly better picture than the Base Case due to more optimistic GET surcharge revenue projections, higher 5309 Bus Discretionary grant amounts and lower capital renewal and replacement costs, among other variations.

Even though total GET surcharge and farebox revenue is 5% and 6%, respectively, higher than in the Base Case, the Best Case scenario funding shortfall for the Rail Project is significant at \$678 M. Operating expenses exceed farebox revenue by over \$7 B, which must be covered with subsidy from the City. And while capital renewal and replacement costs were decreased by 20% from the Base Case, the City would still be required to match almost \$1.6 B worth of ongoing capital expenditures over 30 years. The years when cash flow uses exceed cash flow sources are shown in the Sources and Uses graph below.

Best Case - Sources and Uses



The most severe funding shortfalls exist in 2018 and 2019, and, as stated before, accumulates to \$678 M. Total debt service reaches \$3.85 B over the 30-year period with long-term debt reaching its borrowing capacity in 2018-2021. Since the New Starts grant amounts and schedule were assumed to be as in the Financial Plan, there was no need to issue GANs.

According to the model analysis, the funding shortfall could be eliminated by either extending GET surcharge until 2027 or increasing the surcharge rate by 24% to 0.0062.

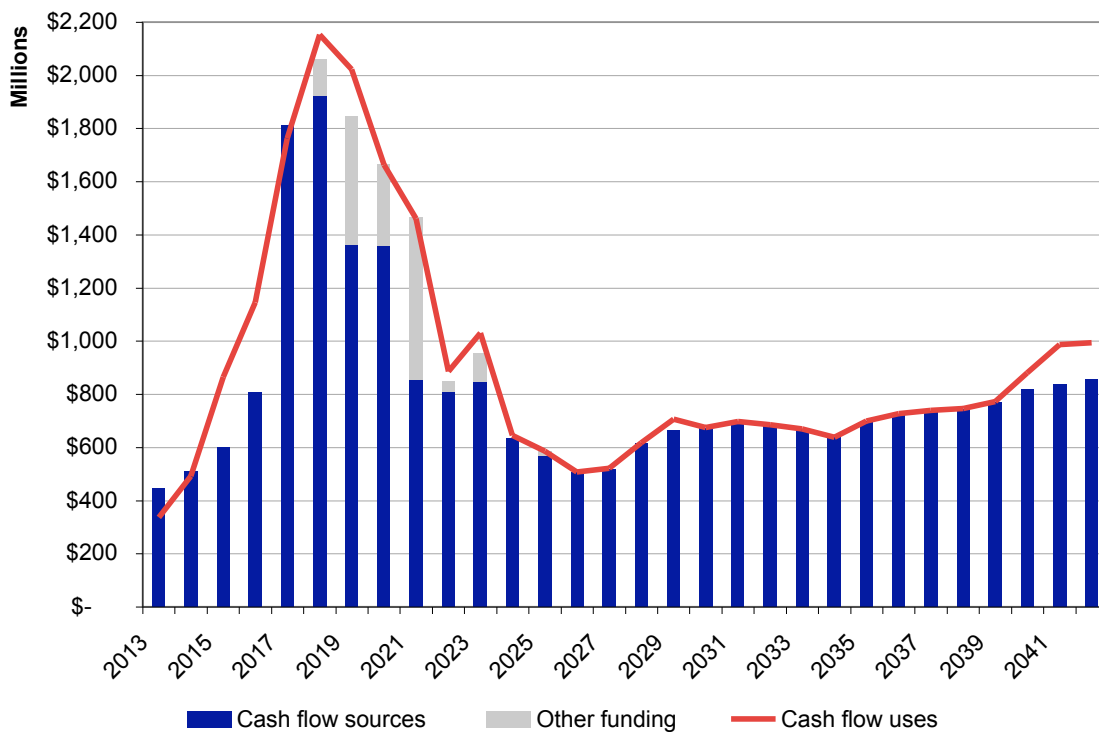
Appendix 3 provides more detail on the Best Case scenario results.

Downside Case:

The Downside Case analyzed the Project finances under more severe, but still reasonable, assumptions than the Base Case circumstances. An additional two-year delay, 53 percent lower than original GET surcharge revenue projections, lower federal funding, higher O&M, lower farebox revenue, higher capital costs and other assumptions resulted in a dismal financial situation of the Project and amounted to \$1.7 B in cash shortfall.

Due to lower farebox revenue and higher operating costs, the Project farebox recovery rate for the 30-year period is only 20 percent; hence requiring almost \$11 B in operating subsidies from the City. The City must also contribute 64% of total \$2.8 B of ongoing capital expenditures. The funding shortfall is more acute, as shown in the Sources and Uses graph below, due to higher overall project costs.

Downside Case - Sources and Uses



Total debt service reaches \$3.85 B over a 30-year period, which is lower than in the Base Case due to a higher initial cash balance in the Transit Fund (\$719 M). Long-term debt capacity reaches

its limit in 2018 with no additional debt issuances until 2022 when the borrowing capacity is maximized again. During 2018-2025, the Rail Project funding gap accumulates to \$1.70 B, reaching as high as \$610.9 M in 2021. Just as in the Base Case, the C&C will have to issue over \$400 M worth of GANs and pay \$118 M in interest and issuance costs in order to continue with the Project construction schedule.

Increasing the GET surcharge rate to 0.0088 would eliminate the Project funding shortfall. The analysis also presented that extending GET surcharge by 18 years to 2041 could also eliminate the funding shortfall.

Appendix 4 provides more detail on the Downside Case scenario results.

IMPORTANT DISCLOSURE: The Downside Case should not be regarded as the “worst” case. Many of the assumptions in the downside case are relatively optimistic, and we expect they are as about as likely to occur as the Base Case.

5.9 FINANCIAL MODEL CONCLUSIONS

The IMG Team developed an investor-style financial model to analyze the proposed HHCTC project. Three analysis cases were developed, the Base Case, Best Case, and Downside Case. Each analyzes the three business lines the transit system will require, namely construction of the rail project, ongoing capital for rail and bus replacement, and operating the rail, bus, and Handi-Van services. It is important to note that the Downside Case is far from a worst case scenario, and in fact is approximately as likely to occur as the Base Case.

Under the Base Case, the C&C will need to provide at least \$1.725 B more from its General Fund to support the rail project than is forecasted in the Financial Plan, including \$909 M in rail project construction costs. Moreover, if construction and operating costs replicate the experience of many peer projects in cities without previous rail development, or if the optimistic federal fund assumption is not fully realized, this additional funding requirement could grow to nearly \$4.5 B above and beyond the Financial Plan projections.

In all cases, the C&C will need to provide significant subsidies for Project construction and operations. Total 30-year C&C General Fund support for the rail project is projected to range between \$9.3 (Best Case) and \$14.3 B (Downside Case). This compares to only \$5.3 B (over 20 years) in the Financial Plan.

It is important to analyze the Project economics from a public investor perspective and go beyond a 20-year planning horizon required by FTA. As IMG's analysis shows, additional financial

commitment required by the C&C to operate and maintain the system for 10 years beyond the Financial Plan forecast ranges from \$3.15 B to \$4.53 B.

Even though IMG's estimated Project construction costs significantly exceed those in the Financial Plan, there are alternatives to address the projected funding shortfall. The first one is to extend the duration of the GET transit surcharge. The GET surcharge extension may need to be from four to 18 years, depending on the scenario. Alternatively, increasing the GET surcharge rate from 0.005 to up to 0.062 (Best Case) or to 0.0088 (Downside Case) would close the construction funding gap.

The key risks to the financial plan are that federal funding (particularly 5309 Bus Discretionary grants) will not meet expectations, that GET surcharge revenues will be below forecast, that capital costs will increase, and that farebox revenue will not meet projections.



6.0 Operating Plan Review

6.1 INTRODUCTION

The Operation and Maintenance costs (O&M) of the rail project will be substantial and ongoing. As with all other transit rail systems in the US, substantial subsidies will be required each year of operations. If the O&M cost estimates and planning assumptions are incorrect, then subsidies required might differ from the Financial Plan. After reviewing the Operating Plan we are concerned that the plan underestimates future operating costs, and therefore the operating subsidies required.

We compared data in the operating component of the Financial Plan to data obtained directly from the Federal Transit Administration's National Transit Database (NTD) for the 1996-2008 period and data that the Honolulu DTS presented to NTD for 2009 and 2010. In the process of calculating performance indicators, we noted certain discontinuities. These discontinuities are likely to impact the level of required subsidies.

6.2 BUS AND RAIL OPERATING COSTS

Specifically, we performed calculations of bus and rail average operating speeds and vehicle revenue miles for the historic (1996-2010) and the projection (2009-2030) periods, and found projections from the Financial Plan to be well above what would be expected based on historic trends for the Honolulu DTS bus system. The Financial Plan's projections of vehicle revenue hours, however, were *below* what would likely be expected based on historic numbers. The plan, therefore, expects to cover far more vehicle revenue miles in a shorter amount of time than trend estimates would indicate.

We believe that the problem is one of definition, namely that of revenue vehicle hours. When transit agencies report Vehicle Revenue Miles to FTA, they include layover/recovery time, but exclude deadhead, operator training, vehicle maintenance testing, and school bus and charter services. Layover/recovery time is the time at the end of the route before the departure time of the next trip. This allows the operator a break (layover), as well as buffer time to get back on schedule (recovery).

When it comes to managing transit operations, particularly in the scheduling and run cutting of operator and vehicle assignments, the proper treatment of layover and recovery time is absolutely essential for purposes of operations planning, labor contract compliance, and preparing paychecks.

However, for purposes of long-term planning, such as integrating a major fixed guideway system, it is not important to get into layover and recovery time in the details of the service planning. Instead of the NTD definition of VRHr, with layover and recovery time, it is generally sufficient to ignore these and do the planning strictly on the basis of the passenger service time while the vehicle is actually in motion. **However, when calculating operating costs, it is essential that the NTD definition be followed. It appears that the financial plan does not include layover and recovery time, thereby including only the time that the vehicle will be in motion.**

If this is the case, then the financial plan is underreporting VRHr's for all of the projected years, and **therefore underreporting the full cost of operations.** We therefore conclude that the DTS underreported VRHr's by an average of about 12% for 2009 and 2010. This hypothesis is based on the following analysis:

1. Our first step was to "norm" the VRHr projections to the NTD definition by using the data from the two years, 2009 and 2010, that we had both actual and projection data:

Comparison of Bus Operating Speeds, NTD & Financial Plan, 2009 and 2010						
Fiscal Year	National Transit Database			Operating Plan		
	VRMi	VRHr	Speed	VRMi	VRHr	Speed
2009	18,462,093	1,398,736	13.20 MPH	19463875	1,307,190	14.89 MPH
2010	18,343,652	1,392,482	13.17 MPH	19609789	1,335,237	14.69 MPH
Total	36,805,745	2,791,218	13.19 MPH	39073664	2,642,427	14.79 MPH

2. We then used the two speed factors for the two-year period, 13.19 MPH for the NTD and 14.79 MPH for the Operating Plan, to calculate an adjustment factor – we increased the number of VRHr's in the operating plan by multiplying the VRHr's in the plan by the factor derived from the above, 14.79/13.19, or approximately a 12% increase.

Based on descriptions and calculations of the cost models that were used to assign costs to bus VRHr's, it is clear from the methodology and data sources that this model, which was prepared in accordance with standard techniques for these purposes, utilizes the NTD definition of VRHr's, which will understate total VRHr's and, therefore, understate operating costs in the financial plan.

Although we do not have the clear data trail for rail that we have for bus, it appears logical to assume that, if the bus operating cost methodology had this issue, so does the rail operating cost calculation.

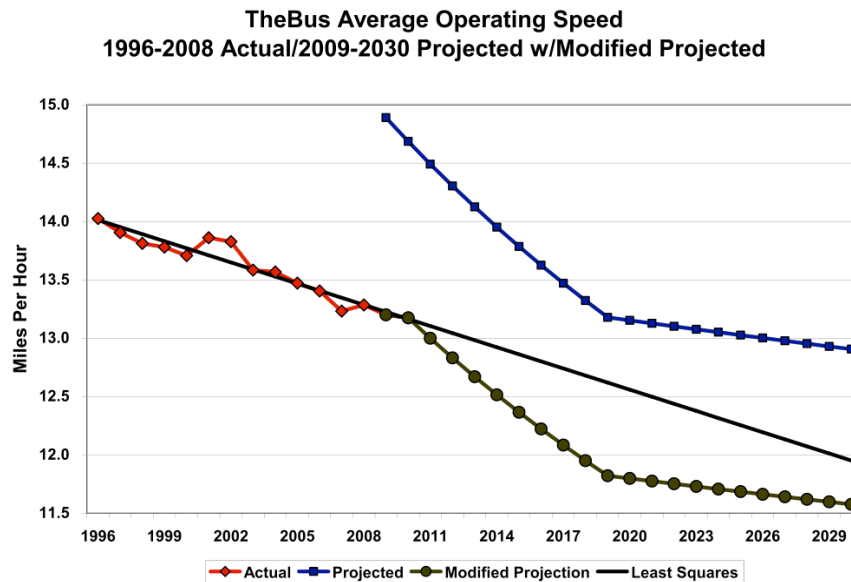
We have calculated the impact of the correction of this issue. For bus, over the 2009-2030 projection period, the year of expenditure increase in operating costs is \$311 M, an increase of

approximately 6% of the \$5,209 M in the *Financial Plan* spreadsheet. For rail, the increase is \$29 M, an increase of approximately 2% over the \$1,355 M in the spreadsheet.

While we believe that the above cumulative increase of \$340 M is a necessary and correct adjustment of the values in the financial plan, we were unable to discuss this matter with the City and its consultant to confirm our understanding and calculations.

6.3 DECREASE IN BUS OPERATING SPEED

This is at least one factor that may partially offset the VRHr calculation. In the graph below, note that projected bus operating speeds appear to be declining more quickly than the historical rate (represented by the least square black line) in the projection for the period 2011-2019 and then decreases at a lower rate thereafter.



We do not know the reasons for these surprising projections of bus operating speeds, but the graph raises the question of whether the decreases may be less than anticipated. If the speeds do not decrease as rapidly as projected, there would be a cost savings, but without understanding why the average speeds are projected in this way, we are unable to determine if a cost savings here is viable or the amount of such savings.

We suggest review of these average operating costs projections and, if appropriate, changes to the projected costs of bus operations.

6.4 FARE INCREASE PLAN

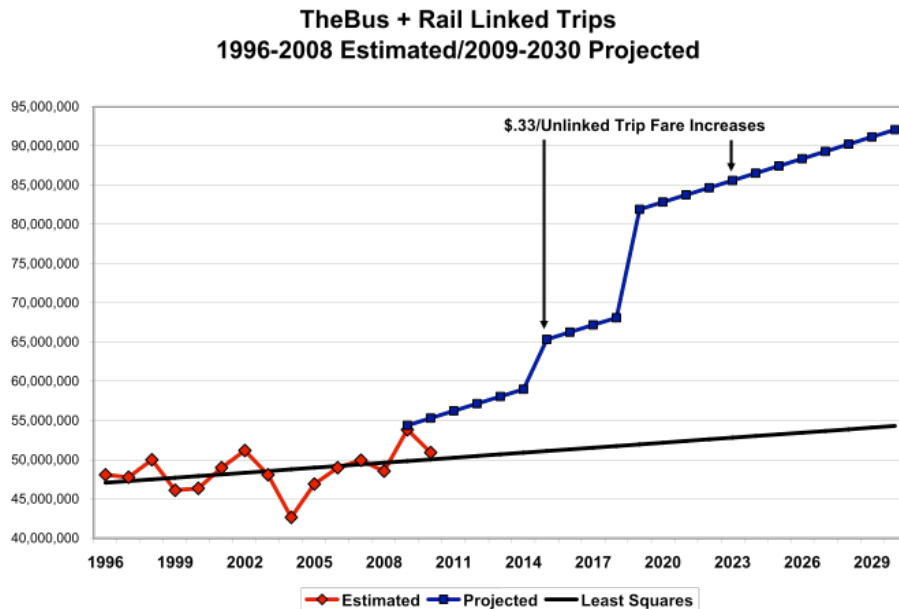
The Financial Plan for the projection period has two large fare increases, in 2015 and 2023. Our review of these plans, in combination with our review of other operating data, raises two questions:

1. Is the pattern of fare increases – two very large ones over a period of twenty years (from the 2010 fare increase to the end of the projection period in 2030) – realistic?
2. What will the impact of these fare increases be on transit ridership?

There are two large fare increases in average fare per linked trip: (1) from \$.95 in 2014 to \$1.28 in 2015, a \$.33, or 35% increase, and (2) from \$1.28 in 2022 to \$1.61 in 2023, another \$.33 increase, or 26%. Based on the experience of other transit agencies, these very large fare increases may be difficult to implement. Smaller, regular increases may be more viable in Honolulu, though some agencies have found it difficult to implement even small increases on a pre-adopted time schedule.

Transit fare increases are difficult to implement because they impact riders and because many transit riders have low incomes and few, if any, transportation alternatives. The public hearing process required for fare increases can be difficult for agency managers. Very large fare increases – and fare increases of this size are among the largest the members of the IMG Team have ever encountered – are particularly difficult.

The following graph shows unlinked passenger trips (UPT) from the historical through the projection period, with the two major fare increases marked.



Note that the *fare increases are assumed to have no impact on ridership*. In fact, the first one, in 2015, is actually accompanied by a major increase in ridership – from 59.0 to 65.3 million annual linked trips, or approximately 11% – due primarily to the opening of another section of the rail system in that year. The second shows an increase from 83.7 to 84.7 million linked trips, or approximately 1%. This runs directly counter to the landmark Simpson-Curtin study that showed that an average increase of 3% in fare will decrease ridership by 1%. In 1991, the American Public Transit Association produced its survey of surveys, *Fare Elasticity and Its Application to Forecasting Transit Demand*¹⁹, which consolidated results of before and after surveys of 52 transit systems. It found the fare elasticity for bus systems in urbanized areas of one million or more is -.36 and, in urbanized areas of less than one million, -.43. A simple application of the APTA fare elasticities suggests that the 2015 35% fare increase would produce a *reduction* in ridership of approximately 12%, vs. the 11% *increase* projected (this does *not* consider the increase in ridership that the opening of a rail extension would likely have), and the 2023 increase of 26% would produce a *decline* of approximately 9%, vs. the 1% *increase* projected.

While it is possible to debate the degree of impact of fare increases – the APTA study produced a range of elasticity's from -.117 to -.855 – to assume that there is zero impact is not supportable. We suggest that a more detailed study of the impact of fare increases on ridership be performed and the project financial model be modified as appropriate.

6.5 RAIL LINE “LENGTH”

We have found several different lengths associated with the rail project. Small differences in the assumed rail line length can lead to significant differences in estimated capital and operating costs over time.

For purposes of costing the construction of the track, the key metric is bi-directional route revenue miles. "Revenue miles" refers to track where passengers ride the trains; it excludes track to access the operating and maintenance yard, storage track, sidings, etc. It is generally measured from the opposite ends of the platforms at, in the simple case of the Honolulu system, with only one line, the two end stations.

The most authoritative document we have found for purposes of determining the length of revenue track is the *Honolulu High-Capacity Transit Corridor Project – Final Environmental Impact Statement/Section 4(f) Evaluation*, June 2010²⁰, Appendix B, "Preliminary Alignment Plans and Profiles." The plans are marked with "mileposts" to assist readers in determining location and distances. The Western-most station is East Kapolei and the Western end of the station platform appears to be at approximately 397 on Plan, Profile Sheet 1 of 27. The Eastern-most station is Ala Moana Center and the Eastern end of the station platform appears to be at approximately 1,506 on Sheet 27 of 27.

The difference, 1,506-397, is 1,109. These measurements are in hundreds of feet, so the difference of 1,109 is 110,900 feet, or almost exactly 21.00 miles.

It must be recognized that the above measurement should *not* be regarded as final. The word "preliminary" is included in the title of the document and each sheet is clearly marked.

However, we note several other track mileages for this project. Of these, the most important are likely those from the FTA's "SCC (Standard Cost Categories) Workbook" that were provided to us by the City as the most recent available versions:

- SCC Tab – Main Worksheet – Build Alternative, East Kapolei to Ala Moana Center via Airport, (Rev. 11, May 2, 2008, "Today's Date" 08/11/09), showing "Guideway & Track Elements (route miles)" of 20.48 miles.
- SCC Tab – Annualized Cost – Build Alternatives, East Kapolei to Ala Moana Center via Airport, (Rev. 11, May 2, 2008, "Today's Date" 08/11/09), showing "Guideway and Track Elements (route miles)" of 20.09 miles.
- U.S. Department of Transportation/Federal Transit Administration, Annual Report on Funding Recommendations Fiscal Year 2011 – New Starts, Small Starts, and Paul S. Sarbanes Transit in Parks Program, Appendix A, "New Starts and Small Starts Project Profiles," "High Capacity Transit Corridor Project, Honolulu, Hawaii (November 2009), page A-135 – "The City and County of Honolulu (the City) proposes to construct the High-Capacity Corridor Transit Project, a 20.1-mile rail line with 21 stations²¹." This document shows a total project cost of \$5,347.68 M, which is identical to the \$5,347,681 (000) shown in the "Main Worksheet – Build Alternative" SCC tab.
- City and County of Honolulu, *Honolulu High-Capacity Transit Corridor Project – Financial Plan for Entry Into Preliminary Engineering Submittal*²², May 2009, updated August 2009, "Project Detail," page 1-3: "The Project, on which this Financial Plan is based, is a 20.2-mile portion extending from East Kapolei in the East to the Ala Moana Center in the east ..."

The track length assumptions range from 20.09 to 20.1 to 20.2 to 20.48 miles in these four documents, compared to the 21.00 miles from the FEIS. If there is an error, it would appear that the most likely quantity would be .52 mile, which is the difference between the 21.00 miles we calculated from the FEIS and the 20.48 miles in the SCC Main Worksheet. The maximum error would appear to be .91 miles, the 21.00 miles from the FEIS vs. the 20.09 miles in the SCC Annualized Cost worksheet.

Assuming a difference of .52 mile, the cost impact would be as follows (data from SCC Build Alternative worksheet):

Year-of-Expenditure Dollars Total Cost for Guideway:	\$1,677,817,000
--	-----------------

Divided By: Route Miles	<u>21.48</u>
Cost Per Route Mile	78,110,661
Times: Potentially Non-included Miles	<u>.48</u>
Cost of Potentially Non-included Miles	37,493,117
Add: Unallocated Contingency Factor	<u>104.80%</u>
Total Cost Including Unallocated Contingency	<u>\$ 39,292,786</u>

If the error is .91 miles, the comparable cost would be \$68.7 M.

Therefore, there is at least a small possibility – likely very slim – that there is an undercosting of the construction of the rail line of \$39 M to \$69 M. While it is difficult to conceive that the personnel responsible for a project of this complexity would make an error in the length of the track that would impact the costs of the project; unfortunately, the lack of information from DTS has made it impossible to resolve this matter in advance of this report. However, because we believe that an error in the quantity of track miles is unlikely, we have not incorporated any adjustment for same in our findings. However, we do advise that this matter be properly analyzed and resolved at the earliest opportunity.

6.6 OPERATING PLAN CONCLUSIONS

While not all of the issues raised in our operating plan review will have an adverse impact on O&M and other cost estimates, some do have the potential to significantly alter the level of subsidy needed to continue operation of the rail line. Our analysis shows that the Financial Plan likely underestimates operating costs by \$340 M due to the way Vehicle Revenue Hours are calculated and significantly overestimates farebox revenues and ridership because of untenable elasticity assumptions.

The FTA's FMOC shared the concern that O&M costs might be underestimated in his evaluation of the financial plan:

"The cost estimates/planning assumptions/financial capacity subfactor is rated Medium-Low. Several observations support this rating. First, it is questionable whether the City can afford the growth in subsidies presented in this financial plan, which require a higher portion of the General Fund and Highway Fund revenues than has historically been the case. Second, the subsidies could be yet higher due to optimistic assumptions regarding operating cost growth for all services. Third, the projected cash balances of the Public Transportation System Fund, inferred from current cash plus investments and the forecasted balanced budget, fall below the 1.5 Month standard (12 percent of operating costs) that would be needed to support a higher rating. Finally, there is some

prospect that the Project's O&M costs could be understated, based on comparison to heavy rail and light rail operations in the US."

Thus, our review agrees with the FTA, and we recommend that the rail project planners consider the implications of these issues in order better understand what actual O&M and other ongoing costs will be. Failing to do so risks seriously underestimating both the operating costs and the corresponding C&C annual subsidy.



7.0 Fiscal Capacity

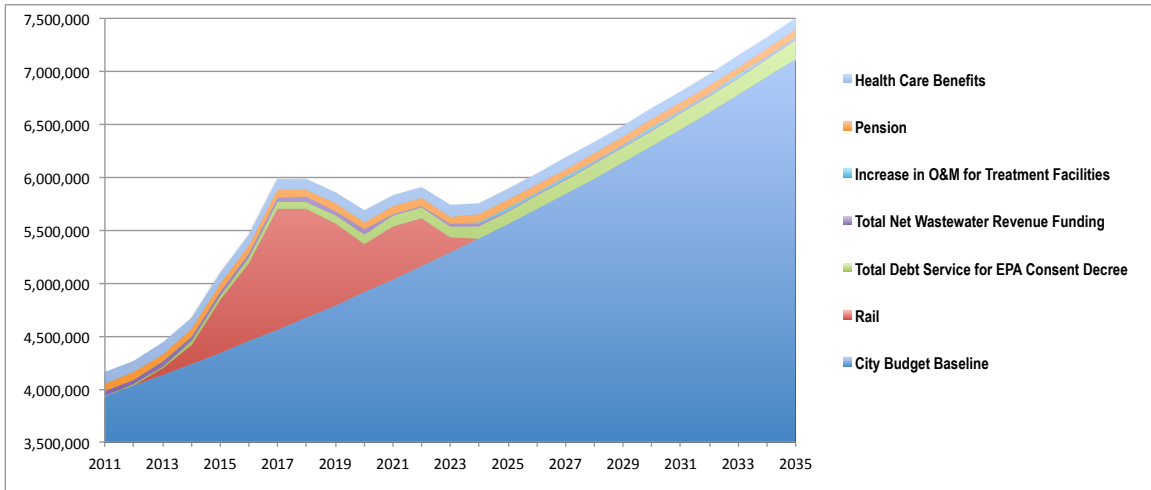
7.1 OVERVIEW OF ANALYSIS AND METHODOLOGY

The rail project will be built at a time when the City and County's fiscal resources will be strained by other substantial commitments, many of which were not fully known when the rail plan was developed. Accordingly, the IMG Team identified the major new demands and compared the magnitude to both the rail project's and the City and County's projected baseline spending level. For example, at the time the rail financial plan was developed, the EPA and Honolulu had not yet reached terms for a wastewater consent decree, which will require capital investment rivaling the Rail project as the largest infrastructure investment in Honolulu over the next 20 years. We include the consent decree compliance cost because it draws from the same economic base as city taxes, and households often equate government taxes and utility user fees when weighing their own public finance obligations. Moreover, utility revenue bond obligations also affect rating agency views of a city's overall fiscal capacity. Additionally, unfunded pension and retiree healthcare benefits for Hawaiian public employees have only recently come to light, and continue to grow with each new assessment.

7.2 BASELINE SPENDING AND PLANNED CAPITAL INVESTMENTS

The graphic below depicts obligations that the City and County of Honolulu will be responsible for through FY2035 and the level of spending associated with those obligations. It includes (1) a baseline level of spending (city budget), (2) expenditures related to rail construction, (3) additional expenses related to the recent EPA consent decree and paid through wastewater rates, and (4) actuarially calculated contributions required to keep up with the City and County's growing employee pensions and other post retirement benefit (i.e. healthcare) obligations. The areas above the City Budget Baseline level are relatively new or recently-known expenses that the city and county will likely be responsible for over the next 25 years and which they are currently not incurring (See Appendix 6 for a more detailed explanation of each category).

Projected City/County Expenditures through 2035 (\$000s)²³



This analysis is not meant to capture all of the expenditures that Honolulu will make through 2035, or to provide a precise line-by-line forecast of all spending. Instead, it places the rail project spending in the context of the other obligations. Combined, the obligations suggest the need for significant future tax and fee increases or equivalent reductions in spending.

7.3 PUBLIC PENSIONS/OTHER POST RETIREMENT BENEFITS

The Hawaii Employee Retirement System (“ERS”) manages investment funds intended to cover pension benefits accruing to city, county, and state public employees as part of their compensation package. The billions of dollars in promised pension benefits are only partially funded. Beyond pension benefits, other post retirement benefits (“OPEB”), mostly healthcare, are completely unfunded despite the fact that the state and city have billions of dollars in obligations. There has been little official comment from either the C&C or the State regarding the OPEB bill coming due, and no studies regarding the full extent of the problem, if they exist, have been made public. By all available accounts, the level of unfunded City and County retiree obligations is significant and growing rapidly.

Several specific factors create particular concern relating to public pensions and OPEB. For many years the Hawaiian legislature set the funding formula for the contributing government employers to allow any positive investment returns above the legally stipulated 8% return rate to be credited as part of their annual contributions to the ERS. The Hawaiian legislature changed its funding model in 2005 as a public employees lawsuit was reaching the Hawaiian Supreme Court.²⁴ Additionally, the new Hawaiian legislature’s current contribution formula is based on a percentage of payroll which has led to a steadily decreasing funding ratio and an unfunded liability more than

one and a half times the total public employee payroll (see “History of ERS Funding” chart below).²⁵

Finally, relating to the calculation of unfunded liabilities, whether the legislatively-established expected rate of return of 8% is a reasonable assumption has been called into question. If an 8% annual return proves optimistic, estimates for unfunded actuarial accrued liabilities (“UAAL”) and annual required contributions (“ARC”) to cover current and future obligations may be far lower than is actually the case.

7.3.1 Pensions

The City and County of Honolulu does not report the level of pension liability as separate from state obligations. Instead, city financial statements reference state actuary reports. Traditionally the C&C represents about 14.77% of total reported state liability. Below we report on total state obligations with various specific comments on the C&C. The state numbers are relevant in their own right since much of the cost for these obligations draws on the same tax base as the city obligation. Further, information and analysis related to the state situation is directly applicable to the C&C.

According to the State 2009 Actuarial Valuation Report, the UAAL for the overall state pension system alone was \$6.2 B as of the end of FY2009, up from \$5.2 B the year before. This means that the funds on hand to cover current and future benefits are 64.4% of the total liability.²⁶ These figures do not include an additional \$2.5 B that the fund has sustained in investment losses as a result of the economic recession, bringing the current total actual unfunded liability to approximately \$8.7 B.²⁷

ERS has made contributions to this fund over the past decade, yet the level of funded obligations has decreased steadily.²⁸ Governmental Accounting Standards Board (GASB) No. 25, Annual Required Contribution, requires that contributions must be able to “provide for the normal cost plus the percentage of payroll required to amortize the UAAL over a period not in excess of 30 years.” While Hawaii currently meets this standard for pension contributions, state actuaries suggest the level of contributions may need to increase in the future.²⁹

The key reasons the ARC may need to be raised are the following: 1) over \$2.5 B in investment losses have been deferred, and so are not part of the UAAL/ARC calculations, 2) ERS pensioners have had higher than anticipated salaries, 3) ERS retirees are generally living longer than anticipated, and 4) the full impact of using excess investment earnings to reduce contributions is only now being realized.³⁰ A recent GAO report on pensions concurs with the ERS actuaries, stating that “[L]ow funded ratios will eventually require action by state and local governments to improve funding and may shift costs to future generations” since “many governments have often contributed less than the amount needed to improve or maintain funded ratios.”³¹

UAAL and ARC calculations are based on an expected yearly rate of return of 8%. Many pension analysts have questioned whether this level of return is a rational assumption given the actual gains over the past decade and prospective GDP growth.³² If Hawaii ERS were to change this assumption to 7% or 7.5%, the UAAL and ARC would increase by billions of dollars.

A few steps have been taken by ERS to address the funding gap, including instituting a hybrid system which requires employees to also contribute to the pension fund.³³ But as the Chair of the Board of Trustees of State of Hawaii Employee Retirement System stated, “we foresee significant challenges in the coming years.”³⁴ A review of available data confirms this concern.

History of ERS Funding			
Valuation Date	Unfunded Actuarial Accrued Liability (UAAL) Millions	UAAL as % of Payroll	Percentage funded
1997	733.4	36.3%	90.8%
1998	585.8	27.4%	93.1%
1999	590.9	27%	93.6%
2000	494.2	21.7%	94.9%
2001	991.0	40.5%	90.6%
2002	1795.1	67.2%	84%
2003	2878.1	101.8%	75.9%
2004	3472.2	121.3%	71.7%
2005	4071.1	133.9%	68.6%
2006	5132.0	158.5%	65%
2007	5106.8	145.6%	67.5%
2008	5168.1	136.6%	68.8%
2009	6236.3	154.7%	64.6%

Source: Gabriel Roeder Smith & Company. From the Employees' Retirement System of the State of Hawaii: Report to the Board of Trustees on the 84th Annual Actuarial Valuation for the Year Beginning June 30, 2009. Publication. Vol. 84. 2009. Print. Table 11a.

7.3.2 Other Post-Employment Benefits and the City and County General Fund

Other Post-Employment Benefits are provided to public employees in addition to the pension program. These are almost entirely healthcare benefits.³⁵ Across the U.S., annual government expenditures for OPEB are increasing rapidly due to both rising medical expenses and the increasing number of retired public employees.³⁶

Honolulu and Hawaii continue to primarily fund OPEB out of general funds on a pay-as-you-go basis, meaning that all Hawaii and Honolulu OPEB obligations are 0% pre-funded.³⁷ There is no

substantial investment or other fund established to plan for future OPEB obligations beyond a minimal 2008 internal reserve of \$40 M set up by the City of Honolulu.³⁸ The City of Honolulu reports its total liability for OPEB to be approximately \$1.95 B³⁹ and state unfunded OPEB liability estimates are much higher.⁴⁰ While the reported C&C unfunded liability purports to take into account the rising cost of healthcare,⁴¹ leaving the OPEB obligations essentially 0% funded will lead to a ballooning obligation as more and more employees retire, placing ever increasing pressure on the yearly C&C budget.

In summary, rating agencies, researchers, and economists have noted Hawaii's retiree funding as a long-term liability of significant concern, particularly because Hawaii's OPEBs are completely unfunded. It is a fast-growing line item in the City and County's budget, and will continue to grow rapidly as its retiree body grows and medical inflation continues to grow faster than tax revenues. In relation to the size of Hawaii's payroll and population, ERS has one of the largest unfunded liabilities representing about one and one-third times its payroll.⁴² Additionally, the 2009 Actuarial Evaluation revealed that due to deferred investment losses, the employer contribution may not be sufficient to meet actuarial standards in FY2010, and would need to be addressed.⁴³ The actuarial report FY2010 is not yet released.

7.4 THE EPA WASTEWATER CONSENT DECREE

The City and County recently completed negotiations with the EPA and other environmental and community groups in August 2010 regarding an environmental consent decree to improve the sewer and wastewater treatment system in Honolulu. The EPA consent decree requires that Honolulu's wastewater entity perform extensive repair and replacement work on the system to address safety and public health concerns, for protection of the environment, and for regulatory compliance.⁴⁴ In total, the City and County expect to spend \$5.4 B in capital improvements to satisfy the agreement.⁴⁵

Wastewater collection system work is estimated to cost \$3.7 B and must be finished by 2020.⁴⁶ This work includes upgrading and repairing the sewer collection system and implementing an improved cleaning and maintenance program intended to eliminate overflows from the city's sewer system. These projects build on compliance obligations in a former consent decree issued in 1995.⁴⁷ Much of the work that will bring Honolulu into compliance with the collection system requirements was already required by the 1995 decree, and so was already known to some extent.⁴⁸

In addition to the upgrades and improvements to the collection system, the city will also be required to upgrade two wastewater treatment facilities, Honoliuli and Sand Island, to secondary treatment plants. These upgrades must be completed by 2024 for the Honoliuli Plant, and 2035 for the Sand Island Plant, near the end of their current useful life.⁴⁹ Costs associated with the upgrades on

these plants are estimated to be about \$1.7 B.⁵⁰ Most of these costs will be funded through revenue bonds and a portion through state revolving fund loans.⁵¹

The upgrades and repair will also increase overall O&M costs of the system. Overall, the costs could potentially double for the treatment facilities and rise significantly for the collection system as well, based upon the experience of other cities adopting similar improvements.⁵² No official estimates on these increases have been made available to the public.

As mentioned above, the city will finance much of the increased operations and capital costs through rate increases. Fitch reports that Honolulu increased rates 175% (on a cumulative basis) from 2006-2011.⁵³ While the city does not anticipate that future annual increases will be in the double-digit range, the city has stated that “steady, incremental, annual rate increases will be required.”⁵⁴ This is the same economic base that will fund the rail project, new pension liabilities, and increased retiree healthcare costs.

In recent Fitch ratings for outstanding wastewater revenue bonds, system coverage and liquidity ratios were found to be strong, showing a solid current financial position.⁵⁵ However, the report also pointed out the fact that the system is highly leveraged compared to peer systems and that debt levels are projected to increase even more in order to comply with the consent decree.⁵⁶

“Debt per customer is projected to climb from about \$9,500 currently to \$15,000, compared with Fitch ‘AA’ rating category median for water and wastewater utilities of about \$2,000 per customer.”⁵⁷ This could jeopardize the ratings of the bonds backed by the wastewater revenues. Lower ratings leads to increased debt service levels and a generally decreased ability to issue new debt.

7.5 DEBT CAPACITY AND REVENUE STREAMS

The health of the local economy and the consistency of bond ratings are considered important indicators of the debt capacity of the City. Rating agencies applauded Honolulu’s willingness to raise taxes and make budget cuts in FY2009 and FY2010, as well as to keep the general obligation debt burden relatively moderate at \$2,759 per capita.⁵⁸ However, the growing retiree obligations and the increasing overall county debt burden from large capital projects are apparently already causing bond analysts to revisit their assessments.⁵⁹

As discussed in the Financial Plan, the City’s debt capacity is limited by both state and city debt limitation laws and standards.⁶⁰ The State of Hawaii Constitution does not allow the total outstanding debt of any county to rise above 15% of the total assessed value of real property in that county⁶¹, and city guidelines require the City to: 1) keep debt service for general obligation bonds below 20% of the City’s total operating budget; 2) to keep debt service on direct debt below 20% of general fund revenues; and 3) to keep the outstanding principal of the City’s variable rate debt below 120% of the City’s short-term investments.⁶²

The 20% general obligation debt is particularly relevant for the bonds issued during the final year of rail construction where the FTA forecasts City debt to rise to 19.4% of the City operating budget.⁶³ The recent FTA review of the Rail Project reported that “it is questionable whether the operating subsidy required by the project could be absorbed by the City without tangible cuts in City services or increases in other taxes” and that the city showed “very little capacity to absorb cost increases or funding shortfalls [with] potentially significant revenue risks.”⁶⁴ As the IMG Team’s independent financial analysis shows, the rail project alone is likely to cause the City and County to exceed its statutory debt limit.

7.6 FISCAL CAPACITY CONCLUSIONS

The FTA’s Financial Management Oversight Consultant (FMOC) reached the following conclusion in his review of the Financial Plan:

“The debt financing assumptions for the project maximize the leverage that could be gained from the GET surcharge revenue stream, leaving little if any upside to debt capacity. The Project-related debt will also push the City to its limit of affordability for general obligation debt.”

We concur with the FTA’s evaluation of the C&C’s fiscal capacity, and add to it our calculation that the financial obligation of the rail project will be substantially higher than what was assumed in the Financial Plan (a concern also raised by the FMOC). Additionally, the need to comply with the EPA wastewater consent decree will impose an additional burden on Honolulu household income that will equal the new financial burden of the rail project. Finally, the C&C’s unfunded retiree obligations are likely to add several times the financial burdens posed by the rail and wastewater projects, placing vastly greater pressures on the City Budget and necessitating significant tax increases and/or spending cuts.

These events will occur in the context of GET revenue collections that will be notably lower than those assumed in the Financial Plan. There is little doubt, therefore, that the rail project’s new subsidies will significantly impair the C&C’s ability to comply with its debt service limitation and to meet its ongoing spending obligations.



8.0 Summary of Findings

The major findings of the study are summarized below:

1. Although the IMG Team did not directly incorporate the results of this peer-based risk assessment into its financial analysis Base Case, the overall “before and after” record suggests that the outputs of IMG’s models be treated as conservative estimates of the potential financial demands that the rail project is likely to place on the City and County of Honolulu.
2. We believe that the federal New Start grant assumptions in the Financial Plan are materially at risk despite FTA’s tentative approvals to date (although we have opted to include the dollar amount assumption in our own financial model, albeit over a longer period of time). Moreover, we find that the Financial Plan’s assumptions for FTA bus discretionary grants to be both unprecedented and unacceptably optimistic, a concern shared by the FTA’s independent financial consultant. Changing the assumption to a more realistic level increases the local subsidy by approximately \$227 million over 20 years.
3. GET revenues are most likely to grow at a compounded rate that is approximately 30 percent lower than the forecast included in the current Financial Plan. The gap between the Financial Plan’s GET forecast and the forecast based on historical trends is very large in project financing terms. Lenders and investors typically discount revenue forecasts that so sharply deviate from known historical relationships. In order for the Financial Plan’s forecast of GET revenue to occur, the Hawaiian economy and Honolulu’s share of it would have to experience long-term growth rates more than double population growth. This is a highly unlikely scenario.
4. Under the most likely scenario, the C&C will need to provide at least \$1.725 B more from its General Fund over 20 years to support the rail project than is forecasted in the current Financial Plan. Moreover, if construction and operating costs replicate the experience of many peer projects in cities without previous rail development, or if the optimistic federal fund assumption is not fully realized, this new and additional funding requirement could grow to nearly \$4.5 B. Total 30-year C&C General Fund support for the rail project (construction and operations) is projected to range between \$9.3 B and \$14.3 B.
5. The IMG Team identified significant concerns regarding the magnitude of the potential subsidies and the C&C’s fiscal capacity. The FTA’s independent financial consultant shared these concerns in its report evaluating the Honolulu rail project’s Financial Plan: “First, it is questionable whether the City can afford the growth in subsidies presented in

- this financial plan, which require a higher portion of the General Fund and Highway Fund revenues than has historically been the case. Second, the subsidies could be yet higher due to optimistic assumptions regarding operating cost growth for all services. Third, the projected cash balances of the Public Transportation System Fund, inferred from current cash plus investments and the forecasted balanced budget, fall below the 1.5 Month standard (12 percent of operating costs) that would be needed to support a higher rating. Finally, there is some prospect that the Project's O&M costs could be understated, based on comparison to heavy rail and light rail operations in the US."
6. The financial challenges for the rail project could be overcome by increasing the duration or size of the GET surcharge. For example, the construction shortfall could be eliminated by extending collections by 5 to 19 years (depending upon the scenario) or increasing the GET surcharge rate by between 24 and 76 percent.
 7. Post-rail transit system usage and fare revenue are likely to be substantially lower than that projected in the current Financial Plan, since the Plan's projection would require an unprecedented and unrealistic growth in transit utilization for a city that already has one of the highest transit utilization rates in the country.
 8. The FTA's financial consultant (FMOC) reached the following conclusion in his report on the Financial Plan: "The debt financing assumptions for the project maximize the leverage that could be gained from the GET surcharge revenue stream, leaving little if any upside to debt capacity. The Project-related debt will also push the City to its limit of affordability for general obligation debt." We concur with the FTA's evaluation of the C&C's fiscal capacity, and add to it our conclusion that the rail project's subsidies will need to be substantially higher than the assumptions in the Financial Plan (a concern also raised by the FMOC).
 9. The need to comply with the EPA wastewater consent decree will impose an additional burden on Honolulu household income that will equal the new financial burden of the rail project. More importantly, the C&C's unfunded retiree obligations are likely to add several times the financial burdens posed by the rail and wastewater projects, placing vastly greater pressures on Honolulu's government budget and necessitating significant tax increases and/or spending cuts. This will make it more challenging to provide the upfront and continuing subsidies for the rail project.

APPENDIX 1 – IMG Financial Model Assumptions

MODEL ASSUMPTIONS		
2009 Inflation Rate		0.52%
2010 Inflation Rate		1.62%
2011 Inflation Rate		2.20%
Long-Term Inflation Rate		2.5%
Initial year cash balance	\$	380,880,555
GET Surcharge		0.005
GET Sunset		2023
GET Surcharge Revenue Growth Rate past 2023		3.7%, 4.0%, 4.7%
City Match Funds for Ongoing Capex		20%
Ridership growth		1.01%
Fare increase		\$0.33
Fare increase years		2015, 2023, 2031, 2036, 2041
Rail O&M growth rate post-2030		2.50%
Bus O&M growth rate post-2030		2.50%
Handi-Van O&M growth rate post-2030		3.60%
Interest Income on Cash Balance		1.00%
Short-Term Debt (Commercial Paper)		
Issuance cap	\$	500,000,000
Issuance Costs		0.25%
Interest rate		1.66%
Long-Term Debt (GOs)		
Issuance Costs		1.00%
Interest Rate		3.96%
Term (paid off in)		2023
Grant Anticipation Notes (GANs)		
Issuance Costs		1.00%
Interest Rate		4.00%

APPENDIX 2 – Base Case

TOTAL SOURCES (30 Yr)		TOTAL USES (30 Yr)	
GET Surcharge Revenue	2,700,943,516	Capital Costs	5,526,098,537
New Starts 5309 Revenue	1,550,000,000	Debt Service	
5307 Formula Funds for Capex	300,718,390	Issuance Costs	33,678,278
5309 Bus Discretionary	270,400,000	Interest Payment on Short Term Financing	37,103,397
FTA 5309 FG Mod. Revenues	208,736,205	Principal Payment on Short Term Financing	2,235,144,381
5307 Formula Funds for Ongoing Capex	316,549,724	Interest Payment on LT Debt	212,433,308
Transfers to the State's Vanpool program	(51,603,963)	Principal Payment on LT Debt	1,309,041,685
5307 Formula Funds for Preventive Maintenance	722,561,932	Interest Payment on GANs	101,815,200
Gross Proceeds from Short Term Financing	2,235,144,381	Principal Payment on GANs	400,000,000
Gross Proceeds from Long-Term Debt	1,309,041,685	<i>Total Debt Service</i>	4,329,216,249
Gross Proceeds from GANs	415,000,000	Operating Expenses	
Interest Income on Cash Balance	27,107,438	Bus	8,722,042,492
Farebox revenues (bus and rail)	3,782,331,830	Fixed Guideway	2,590,176,513
Farebox revenues (handi-van)	74,443,795	Handi-Van	1,112,370,601
City Match Funds for Ongoing Capex	1,738,328,475	<i>Total OpEx</i>	12,424,589,605
City Operating Subsidy	7,845,252,049	Ongoing Capex	
Other Funding Source for Capital	909,544,246	Additional Railcar Acquisition	76,701,717
Cash	412,815,130	Rail Rehab, Replacement	371,000,000
Total Sources	24,767,314,833	Airport Alt. Bus Acquisition Costs	1,720,584,947
		Total Ongoing Bus CapEx	174,231,229
		Handi-Van Acquisitions	144,892,548
		<i>Total Ongoing CapEx</i>	2,487,410,441
		Cash	-
		Total Uses	24,767,314,833

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TOTAL SOURCES (20 Yr)		TOTAL USES (20 Yr)	
GET Surcharge Revenue	2,700,943,516	Capital Costs	5,526,098,537
New Starts 5309 Revenue	1,550,000,000	Debt Service	
5307 Formula Funds for Capex	300,718,390	Issuance Costs	33,678,278
5309 Bus Discretionary	166,400,000	Interest Payment on Short Term Financing	37,103,397
FTA 5309 FG Mod. Revenues	102,022,929	Principal Payment on Short Term Financing	2,235,144,381
5307 Formula Funds for Ongoing Capex	305,125,322	Interest Payment on LT Debt	212,433,308
Transfers to the State's Vanpool program	(35,001,515)	Principal Payment on LT Debt	1,309,041,685
5307 Formula Funds for Preventive Maintenance	270,083,023	Interest Payment on GANs	97,015,200
Gross Proceeds from Short Term Financing	2,235,144,381	Principal Payment on GANs	400,000,000
Gross Proceeds from Long-Term Debt	1,309,041,685	<i>Total Debt Service</i>	4,324,416,249
Gross Proceeds from GANs	415,000,000	Operating Expenses	
Interest Income on Cash Balance	27,107,438	Bus	5,619,799,988
Farebox revenues (bus and rail)	2,271,948,770	Fixed Guideway	1,412,853,549
Farebox revenues (handi-van)	48,955,689	Handi-Van	693,892,453
City Match Funds for Ongoing Capex	948,986,851	<i>Total OpEx</i>	7,726,545,991
City Operating Subsidy	5,135,558,508	Ongoing Capex	
Other Funding Source for Capital	909,544,246	Additional Railcar Acquisition	76,701,717
Cash	408,015,130	Rail Rehab, Replacement	131,000,000
		Airport Alt. Bus Acquisition Costs	1,066,835,034
		Total Ongoing Bus CapEx	126,221,470
		Handi-Van Acquisitions	91,775,367
		<i>Total Ongoing CapEx</i>	1,492,533,588
		Cash	-
Total Sources	19,069,594,365	Total Uses	19,069,594,365

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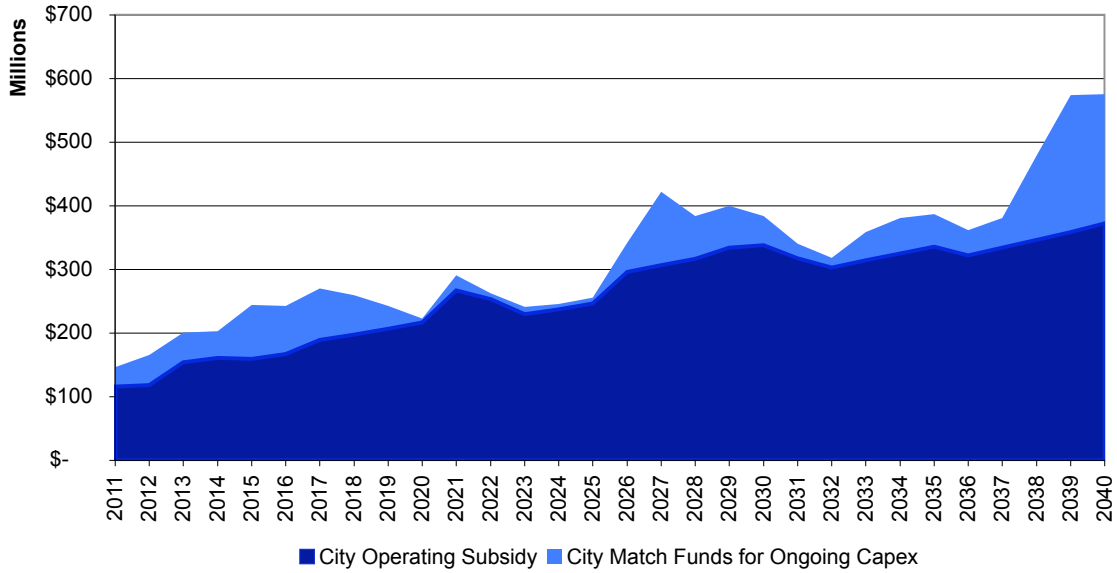
Total Capital Sources (30 Yr)	
GET Surcharge Revenue	2,700,943,516
New Starts 5309 Revenue	1,550,000,000
5307 Formula Funds for Capex	300,718,390
Gross Proceeds from Short Term Construction Fin	2,235,144,381
Gross Proceeds from Long-Term Debt	1,309,041,685
Gross Proceeds from GANs	415,000,000
Interest Income on Cash Balance	27,107,438
Other Funding Source for Capital	909,544,246
Cash	407,815,130
Total Sources	9,855,314,786
Total Capital Uses (30 Yr)	
Capital Costs	5,526,098,537
Debt Service	
Issuance Costs	33,678,278
Interest Payment on Short Term Financing	37,103,397
Principal Payment on Short Term Financing	2,235,144,381
Interest Payment on LT Debt	212,433,308
Principal Payment on LT Debt	1,309,041,685
Interest Payment on GANs	101,815,200
Principal Payment on GANs	400,000,000
Total Debt Service	4,329,216,249
Cash	-
Total Sources	9,855,314,786

Ongoing System Capital Funding Sources (30 Yr)	
5309 Bus Discretionary	270,400,000
FTA 5309 FG Mod. Revenues	208,736,205
5307 Formula Funds for Ongoing Capex	316,549,724
Transfers to the State's Vanpool program	(51,603,963)
City Match Funds for Ongoing Capex	1,738,328,475
Cash	5,000,000
Total Sources	2,487,410,441
Ongoing System Capital Uses (30 Yr)	
Additional Railcar Acquisition	76,701,717
Rail Rehab, Replacement	371,000,000
Airport Alt. Bus Acquisition Costs	1,720,584,947
Total Ongoing Bus CapEx	174,231,229
Handi-Van Acquisitions	144,892,548
Cash	-
Total Sources	2,487,410,441

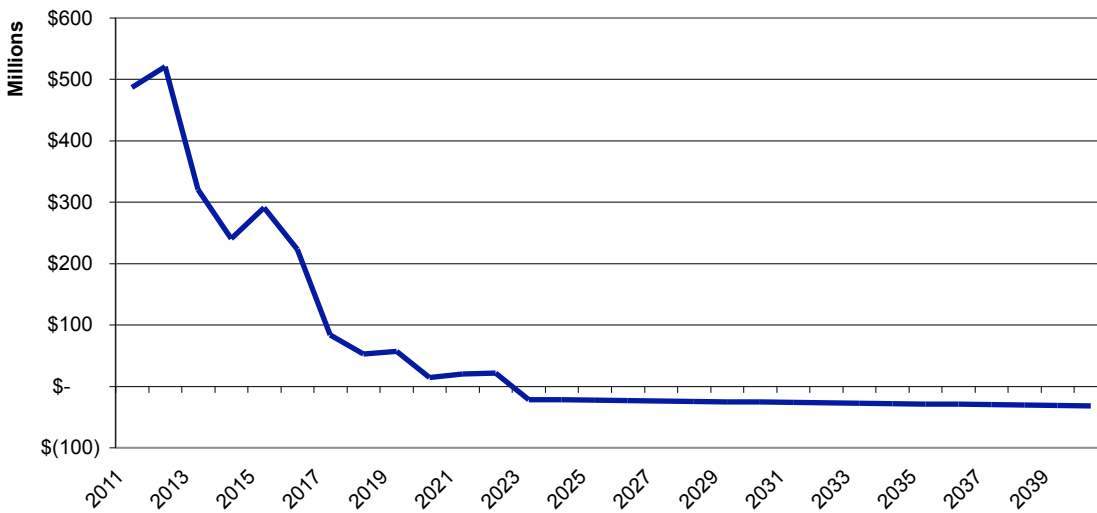
Operating Revenue (30 Yr)	
Farebox revenues (bus and rail)	3,782,331,830
Farebox revenues (handi-van)	74,443,795
5307 Formula Funds for Preventive Maintenance	722,561,932
City Operating Subsidy	7,845,252,049
Total Sources	12,424,589,605

Operating Costs (30 Yr)	
Bus	8,722,042,492
Fixed Guideway	2,590,176,513
Handi-Van	1,112,370,601
Total Sources	12,424,589,605

Base Case - City Funding Requirement



Base Case - Cash Ending Balance



APPENDIX 3 – Best Case

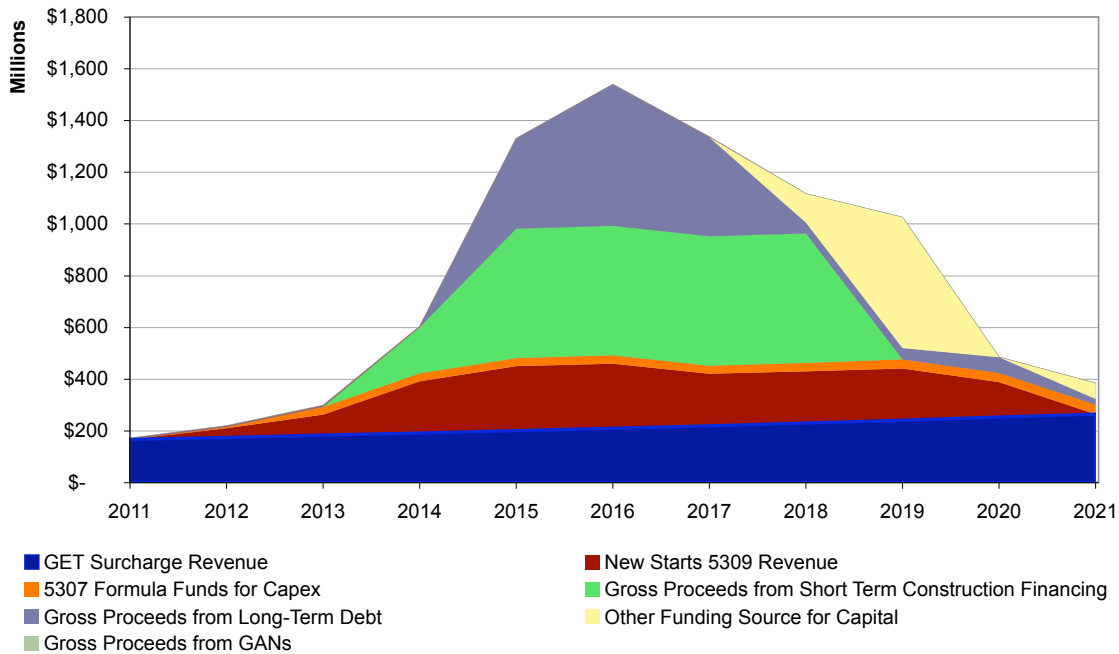
TOTAL SOURCES (30 Yr)		TOTAL USES (30 Yr)	
GET Surcharge Revenue	2,838,061,453	Capital Costs	5,526,098,537
New Starts 5309 Revenue	1,550,000,000	Debt Service	
5307 Formula Funds for Capex	300,718,390	Issuance Costs	19,840,770
5309 Bus Discretionary	299,618,637	Interest Payment on Short Term Financing	36,152,129
FTA 5309 FG Mod. Revenues	208,736,205	Principal Payment on Short Term Financing	2,177,839,100
5307 Formula Funds for Ongoing Capex	316,549,724	Interest Payment on LT Debt	224,448,898
Transfers to the State's Vanpool program	(51,603,963)	Principal Payment on LT Debt	1,439,617,268
5307 Formula Funds for Preventive Maintenance	722,561,932	Interest Payment on GANs	-
Gross Proceeds from Short Term Financing	2,177,839,100	Principal Payment on GANs	-
Gross Proceeds from Long-Term Debt	1,439,617,268	<i>Total Debt Service</i>	3,897,898,165
Gross Proceeds from GANs	-	Operating Expenses	
Interest Income on Cash Balance	23,970,302	Bus	8,245,859,193
Farebox revenues (bus and rail)	4,046,196,737	Fixed Guideway	2,535,503,820
Farebox revenues (handi-van)	74,443,795	Handi-Van	1,112,370,601
City Match Funds for Ongoing Capex	1,597,487,679	<i>Total OpEx</i>	11,893,733,614
City Operating Subsidy	7,050,531,151	Ongoing Capex	
Other Funding Source for Capital	678,256,434	Additional Railcar Acquisition	76,701,717
Cash	417,955,915	Rail Rehab, Replacement	256,800,000
Total Sources	23,690,940,758	Airport Alt. Bus Acquisition Costs	1,720,584,947
		Total Ongoing Bus CapEx	174,231,229
		Handi-Van Acquisitions	144,892,548
		<i>Total Ongoing CapEx</i>	2,373,210,441
		Cash	-
		Total Uses	23,690,940,758

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TOTAL SOURCES (20 Yr)		TOTAL USES (20 Yr)	
GET Surcharge Revenue	2,838,061,453	Capital Costs	5,526,098,537
New Starts 5309 Revenue	1,550,000,000	Debt Service	
5307 Formula Funds for Capex	300,718,390	Issuance Costs	19,840,770
5309 Bus Discretionary	282,174,335	Interest Payment on Short Term Financing	36,152,129
FTA 5309 FG Mod. Revenues	102,022,929	Principal Payment on Short Term Financing	2,177,839,100
5307 Formula Funds for Ongoing Capex	305,125,322	Interest Payment on LT Debt	224,448,898
Transfers to the State's Vanpool program	(35,001,515)	Principal Payment on LT Debt	1,439,617,268
5307 Formula Funds for Preventive Maintenance	270,083,023	Interest Payment on GANs	-
Gross Proceeds from Short Term Financing	2,177,839,100	Principal Payment on GANs	-
Gross Proceeds from Long-Term Debt	1,439,617,268	Total Debt Service	3,897,898,165
Gross Proceeds from GANs	-	Operating Expenses	
Interest Income on Cash Balance	23,970,302	Bus	5,320,422,106
Farebox revenues (bus and rail)	2,389,512,484	Fixed Guideway	1,383,703,077
Farebox revenues (handi-van)	48,955,689	Handi-Van	693,892,453
City Match Funds for Ongoing Capex	809,590,356	Total OpEx	7,398,017,636
City Operating Subsidy	4,689,466,440	Ongoing Capex	
Other Funding Source for Capital	678,256,434	Additional Railcar Acquisition	76,701,717
Cash	417,955,915	Rail Rehab, Replacement	104,800,000
		Airport Alt. Bus Acquisition Costs	1,066,835,034
		Total Ongoing Bus CapEx	126,221,470
		Handi-Van Acquisitions	91,775,367
		Total Ongoing CapEx	1,466,333,588
		Cash	-
Total Sources	18,288,347,927	Total Uses	18,288,347,927

Best Case - Project Construction Funding Sources



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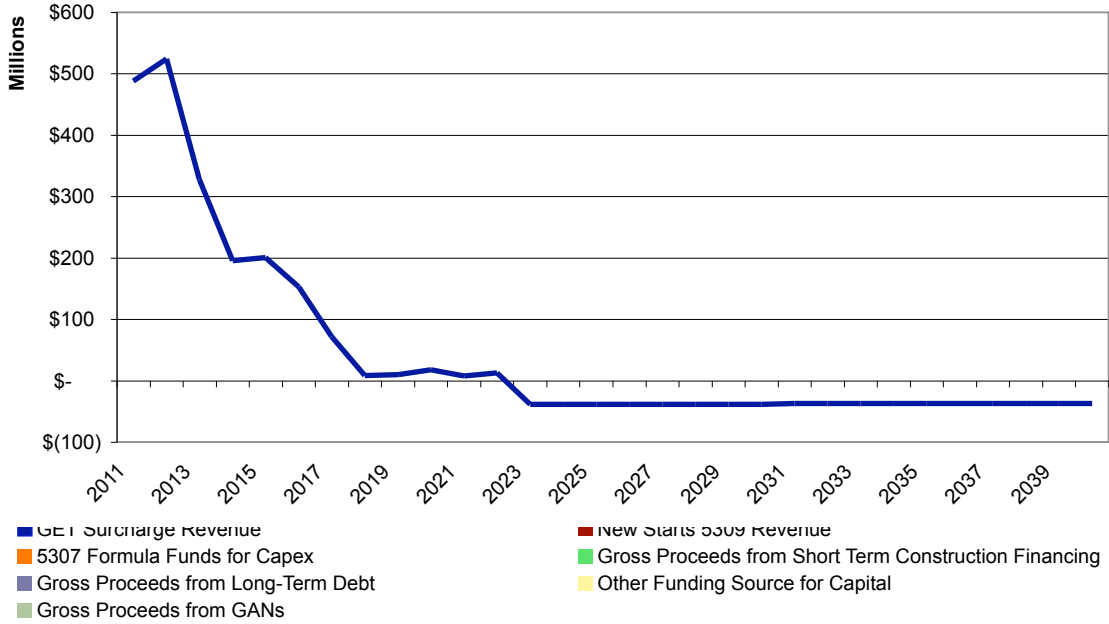
Total Capital Sources (30 Yr)	
GET Surcharge Revenue	2,838,061,453
New Starts 5309 Revenue	1,550,000,000
5307 Formula Funds for Capex	300,718,390
Gross Proceeds from Short Term Construction Fin	2,177,839,100
Gross Proceeds from Long-Term Debt	1,439,617,268
Gross Proceeds from GANs	-
Interest Income on Cash Balance	23,970,302
Other Funding Source for Capital	678,256,434
Cash	415,533,755
Total Sources	9,423,996,703
Total Capital Uses (30 Yr)	
Capital Costs	5,526,098,537
Debt Service	
Issuance Costs	19,840,770
Interest Payment on Short Term Financing	36,152,129
Principal Payment on Short Term Financing	2,177,839,100
Interest Payment on LT Debt	224,448,898
Principal Payment on LT Debt	1,439,617,268
Interest Payment on GANs	-
Principal Payment on GANs	-
Total Debt Service	3,897,898,165
Cash	-
Total Sources	9,423,996,703

Ongoing System Capital Funding Sources (30 Yr)	
5309 Bus Discretionary	299,618,637
FTA 5309 FG Mod. Revenues	208,736,205
5307 Formula Funds for Ongoing Capex	316,549,724
Transfers to the State's Vanpool program	(51,603,963)
City Match Funds for Ongoing Capex	1,597,487,679
Cash	2,422,160
Total Sources	2,373,210,441
Ongoing System Capital Uses (30 Yr)	
Additional Railcar Acquisition	76,701,717
Rail Rehab, Replacement	256,800,000
Airport Alt. Bus Acquisition Costs	1,720,584,947
Total Ongoing Bus CapEx	174,231,229
Handi-Van Acquisitions	144,892,548
Cash	-
Total Sources	2,373,210,441

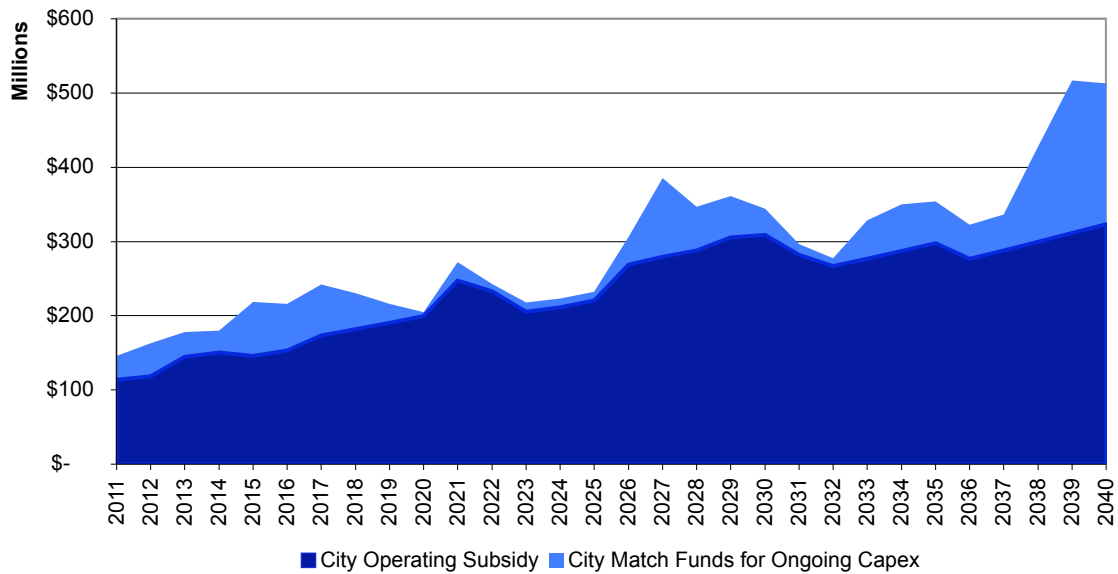
Operating Revenue (30 Yr)	
Farebox revenues (bus and rail)	4,046,196,737
Farebox revenues (handi-van)	74,443,795
5307 Formula Funds for Preventive Maintenance	722,561,932
City Operating Subsidy	7,050,531,151
Total Sources	11,893,733,614

Operating Costs (30 Yr)	
Bus	8,245,859,193
Fixed Guideway	2,535,503,820
Handi-Van	1,112,370,601
Total Sources	11,893,733,614

Best Case - Cash Ending Balance



Best Case - City Funding Requirement



APPENDIX 4 – Downside Case

TOTAL SOURCES (30 Yr)		TOTAL USES (30 Yr)	
GET Surcharge Revenue	2,306,439,863	Capital Costs	6,367,750,975
New Starts 5309 Revenue	1,550,000,000	Debt Service	
5307 Formula Funds for Capex	300,718,390	Issuance Costs	30,599,240
5309 Bus Discretionary	135,200,000	Interest Payment on Short Term Financing	34,461,714
FTA 5309 FG Mod. Revenues	208,736,205	Principal Payment on Short Term Financing	2,076,006,859
5307 Formula Funds for Ongoing Capex	316,549,724	Interest Payment on LT Debt	170,142,272
Transfers to the State's Vanpool program	(51,603,963)	Principal Payment on LT Debt	1,040,922,292
5307 Formula Funds for Preventive Maintenance	722,561,932	Interest Payment on GANs	101,815,200
Gross Proceeds from Short Term Financing	2,076,006,859	Principal Payment on GANs	400,000,000
Gross Proceeds from Long-Term Debt	1,040,922,292	<i>Total Debt Service</i>	3,853,947,576
Gross Proceeds from GANs	415,000,000	Operating Expenses	
Interest Income on Cash Balance	38,986,868	Bus	10,050,453,174
Farebox revenues (bus and rail)	2,720,347,575	Fixed Guideway	2,984,673,346
Farebox revenues (handi-van)	79,235,050	Handi-Van	1,281,790,205
<i>City Match Funds for Ongoing Capex</i>	<i>1,775,374,204</i>	<i>Total OpEx</i>	<i>14,316,916,725</i>
<i>City Operating Subsidy</i>	<i>10,794,772,169</i>	Ongoing Capex	
<i>Other Funding Source for Capital</i>	<i>1,701,802,819</i>	Additional Railcar Acquisition	80,348,883
Cash	1,177,811,048	Rail Rehab, Replacement	553,200,000
Total Sources	27,308,861,034	Airport Alt. Bus Acquisition Costs	1,802,398,762
		Total Ongoing Bus CapEx	182,515,924
		Handi-Van Acquisitions	151,782,188
		<i>Total Ongoing CapEx</i>	<i>2,770,245,758</i>
		Cash	-
		Total Uses	27,308,861,034

Financial Plan Assessment
 Feasibility and Fiscal Implications of the
 Honolulu Rail Transit Project

December 1, 2010

TOTAL SOURCES (20 Yr)		TOTAL USES (20 Yr)	
GET Surcharge Revenue	2,306,439,863	Capital Costs	6,367,750,975
New Starts 5309 Revenue	1,550,000,000	Debt Service	
5307 Formula Funds for Capex	300,718,390	Issuance Costs	30,599,240
5309 Bus Discretionary	83,200,000	Interest Payment on Short Term Financing	34,461,714
FTA 5309 FG Mod. Revenues	102,022,929	Principal Payment on Short Term Financing	2,076,006,859
5307 Formula Funds for Ongoing Capex	305,125,322	Interest Payment on LT Debt	170,142,272
Transfers to the State's Vanpool program	(35,001,515)	Principal Payment on LT Debt	1,040,922,292
5307 Formula Funds for Preventive Maintenance	270,083,023	Interest Payment on GANs	97,015,200
Gross Proceeds from Short Term Financing	2,076,006,859	Principal Payment on GANs	400,000,000
Gross Proceeds from Long-Term Debt	1,040,922,292	<i>Total Debt Service</i>	3,849,147,576
Gross Proceeds from GANs	415,000,000	Operating Expenses	
Interest Income on Cash Balance	38,986,868	Bus	6,475,723,626
Farebox revenues (bus and rail)	1,691,203,128	Fixed Guideway	1,628,038,209
Farebox revenues (handi-van)	41,139,547	Handi-Van	799,575,743
City Match Funds for Ongoing Capex	1,139,530,599	<i>Total OpEx</i>	8,903,337,578
City Operating Subsidy	6,900,911,880	Ongoing Capex	
Other Funding Source for Capital	1,701,802,819	Additional Railcar Acquisition	80,348,883
Cash	835,618,635	Rail Rehab, Replacement	217,200,000
		Airport Alt. Bus Acquisition Costs	1,117,563,040
		Total Ongoing Bus CapEx	132,223,301
		Handi-Van Acquisitions	96,139,286
		<i>Total Ongoing CapEx</i>	1,643,474,510
		Cash	-
Total Sources	20,763,710,639	Total Uses	20,763,710,639

Financial Plan Assessment
Feasibility and Fiscal Implications of the
Honolulu Rail Transit Project

December 1, 2010

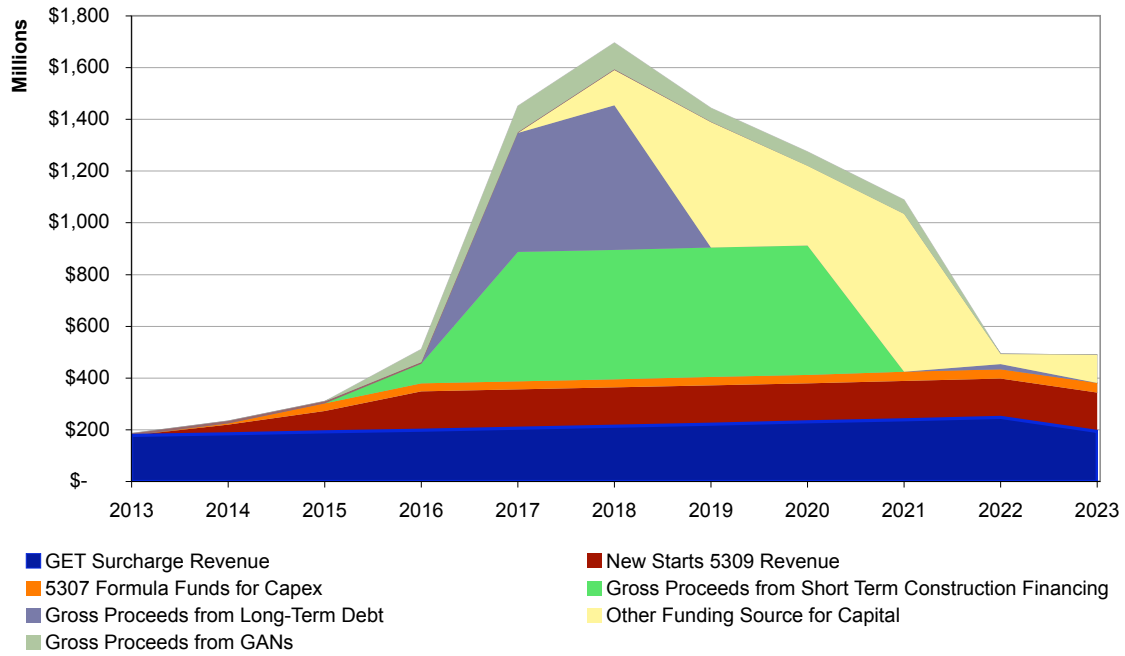
Total Capital Sources (30 Yr)	
GET Surcharge Revenue	2,306,439,863
New Starts 5309 Revenue	1,550,000,000
5307 Formula Funds for Capex	300,718,390
Gross Proceeds from Short Term Construction Fin	2,076,006,859
Gross Proceeds from Long-Term Debt	1,040,922,292
Gross Proceeds from GANs	415,000,000
Interest Income on Cash Balance	38,986,868
Other Funding Source for Capital	1,701,802,819
Cash	791,821,460
Total Sources	10,221,698,551
Total Capital Uses (30 Yr)	
Capital Costs	6,367,750,975
Debt Service	
Issuance Costs	30,599,240
Interest Payment on Short Term Financing	34,461,714
Principal Payment on Short Term Financing	2,076,006,859
Interest Payment on LT Debt	170,142,272
Principal Payment on LT Debt	1,040,922,292
Interest Payment on GANs	101,815,200
Principal Payment on GANs	400,000,000
Total Debt Service	3,853,947,576
Cash	-
Total Sources	10,221,698,551

Ongoing System Capital Funding Sources (30 Yr)	
5309 Bus Discretionary	135,200,000
FTA 5309 FG Mod. Revenues	208,736,205
5307 Formula Funds for Ongoing Capex	316,549,724
Transfers to the State's Vanpool program	(51,603,963)
City Match Funds for Ongoing Capex	1,775,374,204
Cash	385,989,588
Total Sources	2,770,245,758
Ongoing System Capital Uses (30 Yr)	
Additional Railcar Acquisition	80,348,883
Rail Rehab. Replacement	553,200,000
Airport Alt. Bus Acquisition Costs	1,802,398,762
Total Ongoing Bus CapEx	182,515,924
Handi-Van Acquisitions	151,782,188
Cash	-
Total Sources	2,770,245,758

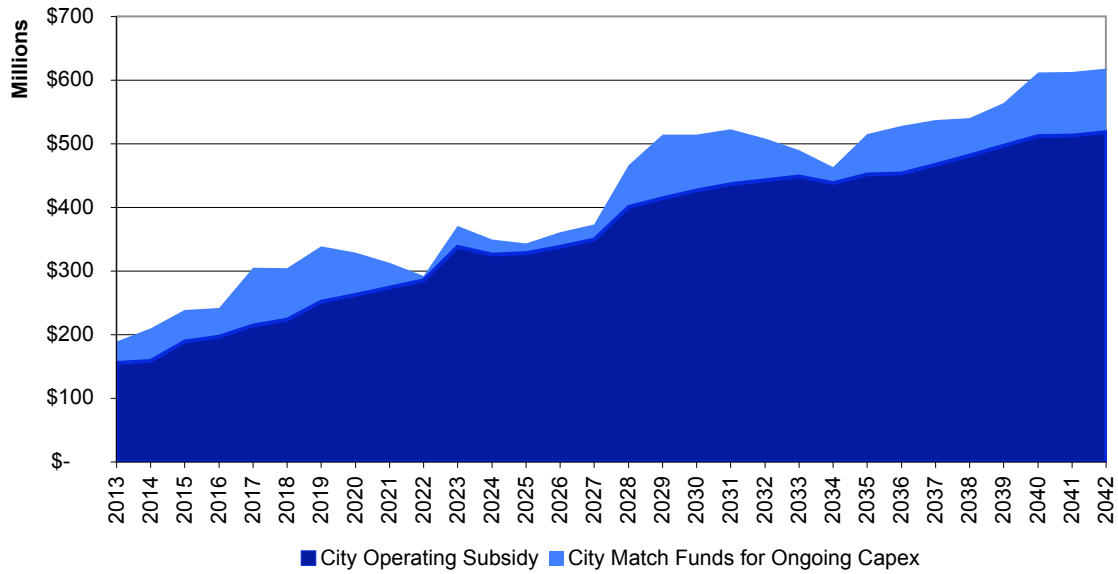
Operating Revenue (30 Yr)	
Farebox revenues (bus and rail)	2,720,347,575
Farebox revenues (handi-van)	79,235,050
5307 Formula Funds for Preventive Maintenance	722,561,932
City Operating Subsidy	10,794,772,169
Total Sources	14,316,916,725

Operating Costs (30 Yr)	
Bus	10,050,453,174
Fixed Guideway	2,984,673,346
Handi-Van	1,281,790,205
Total Sources	14,316,916,725

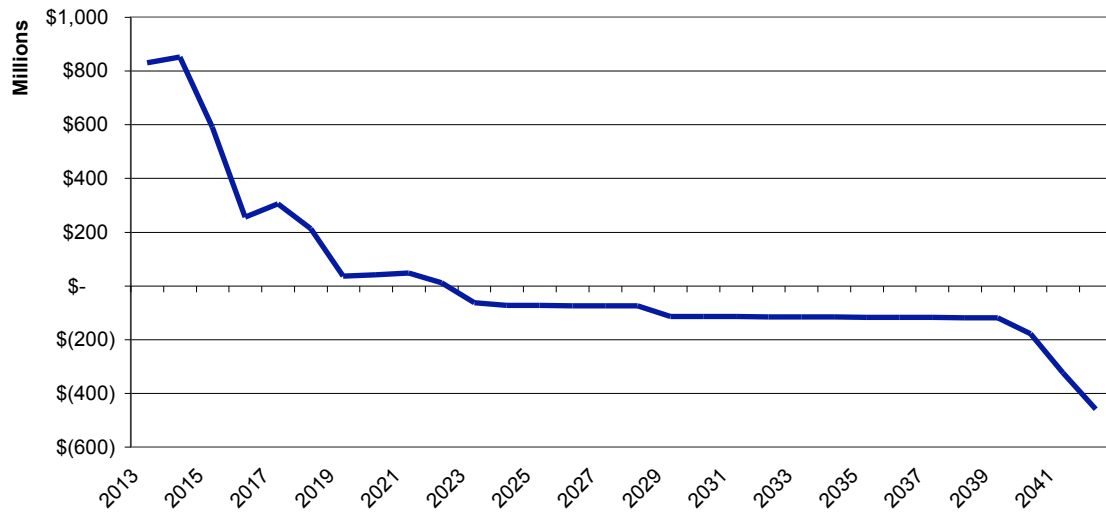
Downside Case - Project Construction Funding Sources



Downside Case - City Funding Requirement



Downside Case - Cash Ending Balance



APPENDIX 5 – Rail Project Case Studies

The following case studies detail a number of recent major U.S. rail transit projects that had outcomes substantially different from their plans. While it would be incorrect to state that all such projects have negative outcomes, even from the ones we have highlighted below, it should be obvious that such results are not at all uncommon. We start with several projects that we wish to specifically highlight because they were particularly good examples of projects that went over budget. Following that discussion is a set of case studies that presents information on how projects have performed relative to their own estimates and where the major problem areas are. Finally, we conclude with a summary of the major areas of concern and risk factors, especially those specified in the cited FTA reports, that cause projects to miss their estimates.

RAIL TRANSIT PROJECTS WITH MAJOR NEGATIVE VARIANCES FROM PLAN

Some rail projects had outcomes that were on average further from projections than others. Each of the projects below is discussed in more detail in the "Case Studies" section of this report, but we felt that it would be useful to call special attention to the following:

1. **Denver Regional Transit District FasTracks** – FasTracks was approved by the voters in 2004 as a \$4.7 B guideway transit expansion program for nine corridors to be implemented over a 12-year period financed by a .4% sales tax rate increase. It is now believed to have a shortfall of at least \$2.4 billion, which would mean that the program would be delayed over 25 years or, alternatively, a doubling of the sales tax would be required for somewhat faster completion.
2. Los Angeles County Metropolitan Transportation Authority (Metro):
 - a. **Long Beach to Los Angeles Blue Line** – Los Angeles' first modern rail line was the Long Beach light rail line, which opened in 1990. The original planning construction cost was \$125 M, the first published cost was \$146 M, the environmental clearance document cost was approximately \$399 M, the final project budget was \$595 M, and the actual construction cost was \$863.9 M. The Blue Line is the most heavily utilized light rail line in the U.S., but this is largely due to the very low fares, particularly for long end-to-end rides. The high ridership, while welcome, forced many additional charges, such as having to extend stations to handle three-car trains, and the unanticipated high demand for rail cars forcing Metro to buy cars that it had not intended to buy for Green Line operations, and to build the Green Line operating yard because there was not sufficient rail car storage space at the Blue Line operating yard.
 - b. **Green Line** – The first published planning capital cost for the Green Line, which opened in 1995, was \$178 M. The cost increased significantly when approximately three miles of additional track – the most expensive to construct – were added, and when it was found that an unplanned operating and maintenance

yard would be required. The total project cost was \$712 M – not including \$106 M for the rail cars to operate the line and \$4 M to fix a Green Line station built on unstable ground.

- c. **Red Line** – The Red Line, now known as the Red/Purple Line, is the Los Angeles heavy rail system, all subway, opened in four segments between 1993 and 2000. It was planned and budgeted in three segments: (a) Minimum Operating Segment One (MOS-1) was budgeted at \$1.250 B; final cost was approximately \$1.440 B; (b) MOS-2 was budgeted at \$1.446 B; actual construction cost was approximately \$1.796 B – much of the increase appears to be due to the collapse of the subway tunnel under Hollywood Boulevard; (c) MOS-3 was budgeted at \$1.311 B, actual cost appears to be approximately \$80 M higher due to various MOS-3 construction costs that Metro treated as separate budget line items. The daily ridership used to sell the Red Line to the public and the Federal and State funding partners was 376,000. After a change in alignment, the ridership projection was reduced to 298,000 for the line as built for the year 2000, when the Red Line opened. Ridership appears to have peaked at approximately 150,000 – and much of this ridership appears due to the low fares for long rail trips, far lower fares than were assumed when the 376,000/298,000 projections were made.
- d. **Gold Line** – Two segments of the Gold Line have opened to date: (a) The Pasadena Gold Line (2003), was delayed several years after Metro had to stop construction due to financial limitations in the mid-1990's. Construction was turned over to a newly formed special-purpose agency that committed to complete the project for the funding that was available at the time, but the total construction cost of \$755 M (not including railcars, which the new agency was not responsible for) was approximately \$71 M over budget. The construction costs were reduced by a variety of techniques, such as elimination of propulsion power stations that Metro almost immediately put back into its capital budget after completion of the line. (b) The Eastside Gold Line (2009), is advertised at coming in on its \$899 construction budget, but Metro has a separate budget line item for "MGL Eastside Station Enhancements" for \$51.4 M – mostly for the construction of new High School to replace one demolished at the inside corner of a key turn in the route.
- e. **Taxation** – After no less than 18 different plans for a modern rail transit system in Los Angeles, originally to replace the Red Car/Yellow Car system, later to provide non-auto transportation options, all failed, in 1980, the Los Angeles County electorate passed a one-half cent sales tax to fund eleven rail lines. In 1990, it passed a second half-cent sales tax and, in 2008, a third. While there have been some rail improvements not contemplated in the original 1980 sales tax justification, particularly the seven-line Metrolink commuter rail system covering six Southern California counties paid for by the 1990 sales tax measure, the projects to be completed by the 2008 sales tax would leave Los Angeles County with an

urban rail system roughly comparable to that in the 1980 sales tax proposal, to be completed in approximately 2038.

- f. **Ridership** – Part of the attraction of Proposition A, the 1980 half-cent sales tax measure, was the promise of a fifty-cent fare for three years. The legal challenges to Proposition A produced a delay in starting the fifty-cent fare, when the reduction from the former 85¢ fare had an immediate huge impact. Over the full three-year period, ridership increased over 40% – and this even though bus service miles only increased by 1.5% and the severe overcrowding produced the highest average passenger loads in post-World War II U.S. transit history. After the fifty-cent fare was cancelled in July 1985, and the funds utilized for it (slightly under 20% of the half-cent sales tax) were shifted to rail construction, ridership immediately decreased significantly, losing approximately 25% over the next eleven years – when a consent decree settling a Federal Civil rights legal action was entered, requiring Metro to stop increasing bus fares, to increase bus service to relieve extreme overcrowding, and to replace the overage bus fleet, which was suffering frequent breakdowns in service. Ridership immediately turned around, and, until the Consent Decree expired, continued to increase steadily. However, Metro has never reached the 1985 transit ridership peak of the 50-cent fare, even before consideration of the 20% increase in population between 1985 and 2010.
3. **Minneapolis/Saint Paul Metro Hiawatha Line** – The budget for this project has not varied from the \$675.43 million in the Full-Funding Grant Agreement, but a change to a station location and design added \$40 million to the cost, net of elimination of two rail cars, which saved approximately \$6 million. In addition, there were approximately \$50 M of project related costs paid by other governmental agency and local utility rate payers.
 4. New Jersey Transit Corporation:
 - a. **Access to the Region's Core (ARC)** – ARC was to be an \$8.7 billion dollar addition of twin 9.0-mile commuter rail tunnels under the Hudson River, and related supporting infrastructure improvements, from New Jersey to near Penn Station, to relieve the overcrowded and aging existing tunnels. Construction began in 2009, but, recently, after the New Jersey Governor learned that the construction cost estimates had increased to \$10.9-13.7 B, with the State responsible for substantially all of the overrun, he cancelled the project, forfeiting the largest single FTA grant ever made, \$3.0 B, even though this means that the State may have to repay the Federal government as much as \$300 M.
 - b. **Hudson-Bergen Light Rail** – Hudson-Bergen was originally approved for a three-phase, 20.1-mile, 30-station light rail line that would carry 94,500 daily riders at a construction cost of \$2.0 B. Two phases, with 14.4 miles of track and 23 stations, have been completed at a cost of \$2,208 M. The 2009 ridership of 42,350 is approximately 68% of the year 2010 projections for the two segments that have been placed in service. There are no active plans to complete the third segment.

disclosed that the true overrun was likely to be approximately \$2 billion, the FFGA was withdrawn and Sound Transit began to plan for a new first segment, leaving the difficult tunneling under Capital Hill for the next phase. That segment was approved at \$2,437 for 13.9 miles and opened for revenue service in July 2009. The second segment, which includes the tunnel segment that was the primary cause of problems in the original FFGA, has been approved at \$1,947 million for 3.1 miles, with opening expected in 2017. In total, compared to the Sound Transit promise of 21 miles opening in 2006 for \$1.8 billion, Seattle now has 17.0 miles opening by 2017 for \$4.384 billion. Rather than Sound Transit considering reducing its .4% sales tax in 2006, when the construction of the major segment of Central Link was to have been completed, in 2008, Sound Transit returned to the voters for an additional .5% sales tax for the foreseeable future.

OTHER CASE STUDIES

The write-ups of the following projects highlight some potential challenges that arise when making forecasts of these key New Starts data. Nearly all of the data presented in this section, including analysis, can be found in the FTA documents cited. The FTA requires that projects applying for Federal New Starts funding report projections on capital costs, operating costs, and ridership at various stages of development as well as after revenue operations have begun. This information is valuable for an analysis of potential points of concern for cost and ridership estimates relating to the Honolulu Rail Plan. We also include discussion of pertinent projects that did not have Federal New Starts funding when we were able to find enough information to create a useful case study.

Atlanta MARTA North Line Extension

The north extension to Atlanta's MARTA rail system is composed of three stations and just over three miles of track. The three stations connect the North Springs area to the Medical Center station. The project opened up for revenue operations in 2000, and the actual results of capital costs, ridership data, and operating expenses varied quite a bit from what was predicted in the DEIS, FEIS and FFGA.⁶⁵

For example, while the FEIS predicted total capital costs at \$337.1 million, the as-built capital costs came to \$427.7 million, or 140% of the estimate. Even adjusting these figures to midpoint dollars we find that the FEIS estimates were 121% of the actual capital costs.⁶⁶ The following table shows the difference between the actual capital costs and estimates from the DEIS and the FFGA.

Predicted and Actual Capital Costs - Atlanta North Line Extension⁶⁷

	Total Capital Cost (millions)				Ratio of Actual to Predicted Costs (%)		
	AA/DEIS	FEIS	FFGA	As-Built	As-Built vs. AA/DEIS	As-Built vs. FEIS	As-Built vs. FFGA
As Estimated	\$370.2 (1988 \$)	\$337.1 (1990 \$)	\$327.3 (1994 \$)	\$472.7	128%	140%	144%
Adjusted to Year of Opening (1996 \$)	\$439.5	\$389.7	\$352.0	472.7*	108%	121%	134%

*Note: The FFGA Amended Budget is \$463.2 million. Also, the As-built cost shown of \$472.7 million includes the \$9.45 million in locally funding system enhancements that MARTA elected to implement in the latter stages of the Project, which were not reflected in the FFGA Budget.

A “Revised and Restated Full Funding Grant Agreement” set out a new scope for the project toward the end of project construction, including adding 28 passenger vehicles at a cost of \$72 million⁶⁸, and the conversion of the North Springs Station parking facility into a multi level structure, and changes to the right of way impacts and security/convenience enhancements at two of the three stations. It also offered a cost estimate that came fairly close to actual capital expenditures.⁶⁹ However, these numbers were produced at the very end of the project when most of the expenditures had been made and when predicting remaining costs was far simpler (revenue operations started about a year later).

Operating costs did come in under budget,⁷⁰ though ridership data was quite optimistic, perhaps partly due to the reduction in headway times in 2002.⁷¹

CTA Brown Line Capacity Expansion Project

The Brown Line in Chicago’s transit system has been in operation for over 100 years and has been one of CTA’s busiest rail routes. Its 19 stations serve more than 80,000 daily riders, offering service between Kimball and downtown Chicago. The expansion project was meant to relieve congestion by lengthening the station platforms to be able to accommodate eight car trains rather than six car trains. It also sought to make Brown Line stations accessible in accordance with the Americans Disabilities Act.

The FTA reported (in 2001) that the estimated capital costs for the project would be \$327 million with three quarters of the funding coming from federal New Starts Funding.⁷² CTA’s website currently reports that the actual capital costs for the project were \$530 million when the project was finished in 2009,⁷³ making it CTA’s single largest capital improvement project.⁷⁴

The original plan for the construction period was to not disrupt any station operations. It was promised that all stations would remain open during the construction period. Due to budgetary constraints, CTA was forced to find cost savings of \$152 million. Obtaining land and air rights needed for the expansion proved to be more expensive than expected. They began by eliminating janitorial and communications rooms, decided to refurbish some assets instead of replacing them, etc. However, CTA found that these savings were not going to be enough.

Finally CTA admitted that substantial overruns were certain due to their efforts to keep the stations open during the reconstruction. It was very costly to not give contractors full access to the site, which led to closing stations for limited amounts of time while they were in construction and providing bus service to make up the difference as the only option to keep the project within budget. This produced outrage from the community and politicians, but CTA had no option but to renege on its promise to keep the stations open in order to keep costs within the FFGA.⁷⁵

Denver Regional Transportation District: FasTracks

FasTracks is the (originally) \$4.7 billion transit expansion program that Denver Regional Transportation District (RTD) presented to the voters in 2004, along with the .4% sales tax increase to implement it⁷⁶:

"The RTD FasTracks Program is a multi-billion dollar, 12-year program to build 122 miles of new commuter rail and light rail, 18 miles of bus rapid transit service, 21,000 new parking spaces at rail and bus stations, and enhance bus service for easy, convenient bus/rail connections across the eight-county district. The program consists of the following six new rapid transit corridors and three existing corridor extensions: Central Corridor Extension, East Corridor, Gold Line, I-225 Corridor, North Metro Corridor, Northwest Rail Corridor, Southeast Corridor Extension, Southwest Corridor Extension, US 36 BRT Corridor, West Corridor. FasTracks also includes funding for the redevelopment of Denver Union Station into a multi-modal transportation hub at the center of the FasTracks system⁷⁷."

The combination of economic downturn – which meant that the assumed high and continual growth in sales tax revenues is not being achieved – and cost increases have forced the RTD Board (which is one of only three directly elected transit boards in the U.S.) to choose between delay of project initiation and operation, elimination of projects, and finding new revenue sources. The original FasTracks plan had assumed Federal funding for many projects, existing and potential funding partners were also negatively impacted by the economic downturn, which leaves RTD to its own devices on funding.

The RTD governing board is, understandably, reluctant to return to the voters for a new tax:

"RTD [Board of Directors](#) decided at a Special Board Meeting, April 13, not to pursue a 2010 sales tax election for the FasTracks transit expansion program. For months, the agency has been evaluating cost, schedule and polling data, and considering public feedback on whether to seek an increase in the RTD sales tax of an additional four-tenths of a percent (four pennies on a \$10 purchase) to complete the FasTracks program by 2017. ... RTD has a \$2.4 billion budget gap to complete the FasTracks program, and has determined that a sales tax increase is needed to complete the program sooner rather than later. The RTD Board will continue to consider a sales tax increase every year until FasTracks is fully funded. If RTD does not secure additional revenues, current estimates indicate that the entire FasTracks system will not be completed until 2042⁷⁸."

Hudson-Bergen Light Rail Project

The Hudson-Bergen Light Rail Project was originally proposed as a three-phase construction project along the New Jersey side of the Hudson River from the Southern tip of the Bayonne Peninsula opposite Northern Staten Island to the Vince Lombardi Park-and-Ride lot in Bergen County, approximately due West of 145th Street and Broadway in Manhattan.

The schedule below shows the original projections for the full three-phase project and the actual data for the two (Southernmost) phases that have actually been completed to date:

HUDSON-BERGEN LIGHT RAIL PROJECT				
Phase	Track Miles	Stations	Daily Ridership Projections	Cost (Millions)
MOS-1 ⁷⁹	9.3	16	27,000	\$ 992.14
MOS-2 ⁸⁰	5.1	7	34,900	1,215.40
MOS-1+MOS-2	14.4	23	61,900	2,207.54
Original Projections ⁸¹	20.1	30	94,500	\$2.0 billion
Actual – Original Projections	(5.7)	(7)	(32,600)	\$ 207.54

As of the third quarter of 2009, just shy of the 2010 date for the daily ridership projections above, Hudson-Bergen ridership was 42,350⁸², 68% of the ridership projected for the actually constructed MOS-1 + MOS-2 combined, and 45% of the projected ridership for the entire three-phase line.

The third phase is currently dormant, not being listed at all in the *FTA Annual Report 2010*⁸³, not even as a "Project Development" project, the entry phase, even though MOS-2 went into revenue service in February 2006⁸⁴.

In summary, to date, 72% of the track miles and 77% of the stations in the original project have been constructed, and the project is carrying 45% of the projected full project ridership, for 110% of the projected cost – and there is no current work to begin the planning for the final segment.

Los Angeles County Metropolitan Transportation Authority

Capital renewal and replacement programs of major transit fixed guideway systems are simply too large and complex for any project and operating team to foresee all the events that may occur and their consequences. This is why there are always large contingencies built into the plans for such systems. Very frequently, however, even these contingencies are not sufficient. The fixed guideway transit projects of the Los Angeles County Metropolitan Transportation Authority (Metro) provide many examples of why this is so.

Metro was formed in 1993 by the merger of the former Southern California Rapid Transit District (SCRTD), the major transit operator in Los Angeles County, and the Los Angeles County Transportation Commission (LACTC), the planning and funding agency for the County. The merger produced a single entity with County-wide responsibility for planning and funding of both transit and road transportation, operating the third-largest transit operator in the nation, design and construction of a massive fixed guideway public transit system, oversight over more than a dozen other transit agencies, and many additional responsibilities as the major surface transportation agency for the most populous county in the United States.

Many of the various issues that arise in major guideway transit project construction, operations, and finance do not become widely known outside of the agency, and often the complex interrelationships of these different issues is not widely appreciated. The following narrative was prepared by a member of the IMG Team who has been closely associated with transportation in Los Angeles for over three decades as a consultant and auditor to SCRTD and LACTC, as the head of project management oversight for the construction of the Long Beach-Los Angeles Blue Line, the first rail line that went into service in the modern era, as the chief financial officer of SCRTD, and as an expert/expert witness in several Metro legal actions.

Since 1980, Metro and its predecessor agencies has planned, designed, constructed, and operated far more new guideway transit systems than any other transit agency in the U.S., including 18 separate light rail, heavy rail, bus rapid transit lines and extensions.

In 1980, following the failure of 18 different serious proposals since 1911 for comprehensive modern rail systems in Southern California, the electorate of Los Angeles passed Proposition A by a 54% majority⁸⁵ -- and LACTC began implementing its major rail planning and design initiatives.

Red Line Ridership

The most interesting post-construction element of the Red/Purple Line is its ridership. The projection for the original alignment of 376,000 daily riders was reduced to 298,000, in the year 2000, for the line as built.

However, this projection was altered by Metro just prior to opening day – first to 125,000⁸⁶, then to 100,000⁸⁷, and finally to 80,000⁸⁸. Metro then claimed a great success when Red Line ridership hit 120,516⁸⁹. As it turned out, Metro was using an improper method of passenger sampling, which increased reported ridership by approximately 35% – so the actual ridership in 2000 was likely more on the order of 90,000⁹⁰.

Since then, ridership has increased in recent years, averaging approximately 150,000⁹¹ on working weekdays – or about half the 298,000 daily ridership projection for the year 2000 in the final EIS.

However, any comparison of the actual to the projected ridership must consider that the 298,000 assumed the zone fare structure originally proposed for the Blue Line – and the Blue Line ridership took a huge jump when the flat fare was instituted instead, as it was for the Red Line.

Also, in retrospect, given that the Red Line has the highest average passenger load of any heavy rail system in the U.S.⁹², it is obvious that the Red Line never had the capacity to carry anything remotely close to 298,000 daily riders, let alone 376,000. To give an idea of the practical issues with the higher projections, consider that, in 2008, the San Francisco Bay Area Rapid Transit District carried 384,000 daily riders on 104.5 bi-directional miles of track in 540 vehicles in peak service, vs. the 15.9 mile Red Line with 70 vehicles in peak service⁹³.

Program Budget

Proposition A in 1980, the one-half cent sales tax, included a map and list of no less than eleven rail lines. Although there is not a specific promise in Proposition A to build all eleven, that did become the general understanding of both the electorate and most local elected officials. This, however, proved totally impossible.

LACTC expected to receive up to 80% of the costs of certain rail lines, particularly the Red Line, paid by the Federal government; however, in the end, this has funded under a third of the costs of new rail lines in Los Angeles.

Unfortunately, when many LACTC officials were looking at low costs for the Blue Line in the early 1980's, they decided that Proposition A funds would be sufficient to fund the entire construction of the line – but what may have been possible when the Blue Line cost was \$125 or \$146 million was not workable when it was over \$850 million.

This put the LACTC in the difficult position of appearing to promise to build eleven rail lines, but, by 1990, having sufficient funding to complete the construction of the Blue Line, pay for MOS-1 and MOS-2 of the Red Line, and most, but not all, of the Green Line – and then not having sufficient funding to pay for their operations while the huge debt service payments on the amounts borrowed to build these lines was still a significant cash outflow and would mean almost no funding availability for either construction of additional rail lines or operating of existing lines for many years.

So, in 1990, LACTC went back to the voters with Proposition C, a second one-half cent sales tax. It had a very effective sales program – everything for everybody – and was approved by the voters (but not by a two-thirds majority – although the then-50%+1 majority that was applied for the 1980 Proposition A election was not even challenged, and Proposition C survived the legal action against it).

Unfortunately, almost immediately after it passed, one of the longest running periods of economic growth was coming to an end – and many people, all over Los Angeles, were waiting for "their" rail line to be built – as they believed had been promised.

Even before Proposition C was passed, LACTC had begun work on what became known as the *30-Year Integrated Transportation Plan*. By the time it was finalized in April, 1992, it included the promise of no less than twelve rail lines or segments in operation by 2000, with six more in construction, funded by \$100 billion in revenues over the first 20 years of the Plan.

However, by October 1994, when the planning was commencing for the update of the *30-Year Plan*, the first presentation was an update of that \$100 billion projection – to \$64 billion. (The \$64 billion later turned out to be overstated.)

By 1998, MTA had to admit that it was seriously overextended. The Blue Line, Green Line, and Red Line MOS-1 and MOS-2 had been completed, but MOS-3 – which had been expanded to three different segments – was narrowed to one segment, dropping the East Los Angeles and Mid-City extensions, with neither ever entering construction, the East LA segment being the first new starts project ever to not be constructed after receiving a full-funding grant agreement. Construction of what later became the Pasadena Gold Line, which was well into construction, was halted, and the next major project, the San Fernando Valley East-West subway, was abandoned prior to serious design work beginning (but not before MTA has spent over \$150 million to buy a lightly used freight rail line in the Valley to build the subway under).

Of the 18 rail lines or segments that were to be completed or in construction by 2000, five were actually in operation and one more was in construction by the end of that year⁹⁴.

In 2008, the voters of Los Angeles County passed a third half-cent sales tax in order to, over the next 30 years, complete most of the eleven rail lines in the original Proposition A map, with some modifications – if it proves successful, which is already proving very questionable.

Minneapolis/Saint Paul Hiawatha Corridor Light Rail Transit Project

This project was originally authorized by a FFGA executed in January 2001 and began revenue service in 2004. The total project cost was shown as \$675.43 – the amount of the FFGA – for every year that it has been reported⁹⁵ since the FFGA was signed. However, the cost of the project is shown as \$715.3 million, an increase of slightly under \$40 million, in a press release issued by Metro Transit, the owner of the project and Federal Grantee⁹⁶. To understand what happened, we can go to the web site of the Minnesota Department of Transportation, which built the Hiawatha Corridor Light Rail Line. In “A Better Light-rail Connection to Mall of America⁹⁷,” we have a discussion of how the alignment was revised to bring the light rail station at Mall of America – the largest shopping mall in the U.S. – closer to the actual mall and to increase the number of park-and-ride parking spaces. The additional cost of these changes is shown as \$39.9 million.

This change in scope, while very clearly an improvement, does represent an increase in cost of the project – and the project owner/Federal grantee and the governmental agency that is building the project both agree – but the cost was not reported in the Federal *New Starts* reports⁹⁸.

Experienced users of the Federal *New Starts* reports are very well aware that there are many types of costs that appear to be increases in project costs that never make it to this report, or to any other public document, in a manner where the cost increases are clearly identified with the guideway transit project they relate to. To give one other example of this type of cost that could impact the cost of the Hiawatha Corridor LRT, there was a major dispute between Metro Transit and a local utility regarding how certain utility relocation costs were to be handled. The common standard for most such public works projects is that the utility is repaid for its costs (in most cases, the utilities prefer to do their own design and construction work on their utility lines, working in conjunction with the public entity that is making the civil work improvement), but, in Minnesota, there is a State statutory provision that requires utilities to pay certain such relocation costs out of their own funds, particularly, as was the case here, where the location of the utility plant that required relocation was in a public street right-of-way. This case went to trial, and Xcel Energy – the utility that was claiming \$18 to \$20 million for its costs⁹⁹ – lost (which meant that, rather than the utility relocation costs being paid by the Metro taxpayers, they were paid by the utility ratepayers – who are, to a large degree, the same people as the Metro taxpayers), but Metro undoubtedly incurred substantial legal costs in this legal battle. It is possible that these costs were covered out of the project contingency, but the fact that the budget remained nearly exactly the same in multiple annual reports indicates that full accounting of the cost increases was not being applied to the project.

Returning to the MN-DOT web site announcement, we see, “**No new state funding is needed.** (Bold in original) Improvements would be paid for with \$30 million of federal funds awarded

annually to Metro Transit on the basis of metro area population. These funds have previously been used to replace old buses and buy new buses for service expansion. ... The \$9.9 million balance includes the value of land being donated by the Mall of America as well as the value of other previous local contributions.”

The above points out two common impacts of cost overruns on projects of this type. The \$30 million referred to above is evidently part of the annual “formula” grant funding (49 USC 5307) awarded to the Twin Cities area and would have been utilized for buying buses, or perhaps for other capital or operating uses allowed by the grant legislation and regulations. This is *not* additional funding awarded to the Twin Cities because light rail was being constructed, it is funding that the area would have received if light rail was being constructed or not. Therefore, it was funding “in hand” that was diverted from other potential uses in order to pay for cost increases on the light rail project. Second, the statement references previous local contributions that were provided before the overrun occurred.

Also, one common method to keep projects of this type within budget is to reduce the scope of the project. For example, for this project, two rail cars were eliminated from the order and an escalator was eliminated at the Mall of America station (a major “trip generator” and a terminal station)¹⁰⁰ – a total value of approximately \$10 million. It is important to realize that this type of “project budget balancing,” while perhaps helping to keep the revenues and expenditures in balance, means that the public will be getting a lesser project than was originally planned. It may also mean that the costs of the project are not really reduced, but only delayed in time to when the same costs – or, usually, higher costs – can be expended for the original purpose, but in a manner that is not easy to identify with the original project – and the ability of the project owner to control costs.

Finally, a closer review of the *total* costs of the Hiawatha Corridor Light Rail project shows a very common situation in the implementation of such rail projects – extensive costs related to the rail project that are paid out of “non-rail” budgets, often by “related” and/or separate governmental units. For this project, these “off the books” expenditures include¹⁰¹:

City of Minneapolis, Downtown/Metrodome Underground Parking Garage with Footing for Office Building:	\$17 million
Riverside Station Transit Oriented Development Subsidy For Low-Income Residents:	\$ 9.3 million
City of Minneapolis, Retaining Wall and Footing for Possible Development at Franklin Avenue Station:	\$.9 million
Metropolitan Council ¹⁰² , Franklin Avenue Station, Emergency Call Boxes/Lighting/Sidewalks	\$.3 million
46 th Street Station Master Plan	\$.14 million
City of Minneapolis, Longfellow Community, light-rail planning Metropolitan Council, Lake Street/Midtown and Franklin Avenue Stations, Planning, Site Assembly, and Preparation Work for	\$.04 million

Development	\$ 1.5 million
City of Minneapolis, Lake Street/Midtown Station, Pledge of Use of Tax-Increment Financing and/or other Funds for Development	(unknown)

The story discussed a number of potential real estate development projects or sites along the light rail alignment that would require up to \$38.5 million (for one project) of public funding to get going. These types of public sector costs, related to rail transit projects but not actually identified as part of the transit project or its budget, can often be a very major percentage of the actual identified project costs.

New Jersey Transit Corporation River Line

The River Line project in New Jersey is an example of a transit project that had very significant challenges in every important phase of its development, from concept to operations. This project is different from the other projects cited in this report in that there was no Federal funding, and thus no FFGA or standard reporting for costs. The project sponsor, the New Jersey Transit Corporation, has included no information on its website¹⁰³ regarding capital or operating expenditures. The following information, therefore, has been taken from print media accounts.

The original planning cost projections were \$314 million¹⁰⁴, the approved construction cost projections were approximately \$450 million¹⁰⁵, the actual contracts were let for \$604 million¹⁰⁶, and the final costs appear to be in the range of \$800 million to \$1.2 billion¹⁰⁷. Utilizing a point cost estimate of \$850 million, and based on a \$450 million starting point, this would be a cost overrun of approximately \$400 million, or approximately 89%.

It should be noted that ridership on this line is so low that it had been seriously suggested to not collect fares because the cost of fare collection could exceed the value of the fares collected.

San Francisco BART Colma Station and SFO/Millbrae Extensions

The BART heavy rail system in the San Francisco Bay area began service in 1972. The Colma Station and Extension to San Francisco International Airport and Millbrae are the latest additions opened, in 1996 and 2003, respectively. The SFO extension, 8.7 miles of track, four stations, and an operating and maintenance facility, is basically the third and final phase of a plan to extend the system to the airport and beyond. The one-mile extension to the Colma Station was the second, with the tail track storage line South from Daly City Station the first (not comprehended by this case study). Ridership data for these two projects, therefore, are very interrelated.

Colma Station

This project consisted of a one-mile track extension and one new station with a bus transfer facility and a five-level, 1,400-space parking garage¹⁰⁸. County voters overwhelmingly approved the project in 1985, and the planning process began shortly thereafter. Between the time of the EIS

reports and the finish of the project the scope was decreased in terms of length and surface parking and was increased in terms of underground rail (up .08 miles) and elevated track (about .06 miles).¹⁰⁹

Estimates contained in the DEIS and FEIS reports in terms of capital expenditures were far below the actual costs incurred as is seen in the following table. This is due principally to the changes in scope. Increased raised rail and subway sections add to cost dramatically. The FFGA, however, was a reliable estimation of the final capital expenditure levels.

Predicted and Actual Capital Costs - BART Colma Extension¹¹⁰

	Total Capital Cost (millions)				Ratio of Actual to Predicted Costs (%)		
	AA/DEIS	FEIS	FFGA	As-Built	As-Built vs. AA/DEIS	As-Built vs. FEIS	As-Built vs. FFGA
As Estimated	\$94.9 (1986 \$)	\$120.7 (1990 \$)	\$170.2 (1993 \$)	\$179.9	189.6%	149.1%	105.7%
Adjusted to Year of Opening (1996 \$)	\$112.5	\$130.1	\$171.6	\$179.9	159.9%	138.2%	104.9%

While ridership estimates were higher than actual ridership, they came within about 10% of the actual as built levels. It is presumed that the difference is due to service levels being 33% below what was estimated in the DEIS and FEIS. O&M Costs as compared to estimated costs are considered “reasonable” by the FTA.¹¹¹

Because the BART system had been operating in the San Francisco Bay Area since 1972, and because there was considerable experience in planning and building rail systems and extensions, estimates for BART Colma were quite accurate. The FTA put it this way: “This project was a one station extension of a long operating existing heavy rail system with ample data regarding the existing travel patterns. High quality data and long experience with the transit market near the extension surely helped to facilitate accurate forecasts.”¹¹² BART planners in this case were able to come within 10% of true ridership numbers and FFGA estimates were within 5% of the as-built capital cost.¹¹³

SFO/Millbrae Extension

This project extended the BART heavy rail system to San Francisco Airport and further South to Millbrae from the COLMA station, an addition of 8.7 miles and four stations.¹¹⁴ This project is an example of how cost estimates often go up significantly over the course of the planning period between AA/DEIS, FEIS, FFGA, and actual construction. The overall scope of this project also changed between DEIS and actual construction.

In 1990, a preferred alternative was selected that included a three station, 6.4 mile rail extension with a locally funded, on-airport, light rail system, and was initially expected to cost \$960 million (YOE). Three years later the DEIS was amended to take on a larger scope. The project was now expected to construct an 8.2 mile, four station extension, with a cost of \$1.11 billion (YOE). Following a June 1996 FEIS, project cost had escalated further to \$1.17 billion. This is the same amount specified in the 1997 FFGA, with a total federal New Starts obligation of \$750 million and an expected revenue date of September 30, 2001.¹¹⁵

Within two years expected YOE cost was \$1.51 billion and delays were expected.¹¹⁶ One important change to the project at this time was upgrading five existing rail yards instead of buying rail vehicles. Besides this the contractor experienced delays due to weather, there was an unexpected requirement to increase the size of the aerial structures to withstand earthquakes, as well as some environmental impact mitigation requirements that were not foreseen.¹¹⁷ When the project finally opened for revenue two years late, the cost of completion had run to \$1.55 billion. Because the amounts of Federal and State of California (\$152 million) did not increase as the project cost increased, the entire amount of the overrun – \$382 million – was paid from local sources, for a total of \$650 million (not including finance charges), over 240% of the originally projected local share of \$268 million.¹¹⁸

Much of the increase in cost was due to the decision to bring the line directly into the airport proper – where it connects to a people-mover to move passengers around the terminal – rather than extending the people-mover to a station on the direct line to Millbrae on the West side of the Bayshore freeway (US101). This decision also led to very clumsy operations – both the SFO and Millbrae stations are "one-way" in/out, so the operator has to shift to the other end of the train before leaving – and direct Millbrae-SFO service is no longer operated, forcing passengers with destinations at either of these stations to wait for the proper train, and longer headways for those departing these two stations.

Not only did project costs come in well over what was initially envisioned for this extension, ridership was very far below what was expected. Both the DEIS and FEIS forecasted average weekday boardings of approximately 68,000 by 2010. The first year of operations (2003) saw only 17,965 average weekday boardings. This number grew to only 26,284 by 2007 and is expected to fall far short of the 2010 forecast.¹¹⁹ Taking the most recently projected weekday exit numbers for 2010 and doubling them gives a 29,886 boardings; less than half of planning projections.¹²⁰

The SFO extension is in many ways closely linked to the Colma Station extension, and it can be difficult to parse out the ridership numbers for these two projects. The predicted ridership levels for Colma according to DEIS and FEIS estimates was to be 15,200 by the year 2000.¹²¹ This prediction was about 1,500 average daily boardings over the actual numbers,¹²² or within 10% of estimates. However, ridership at Colma dropped off significantly after the 2003 opening of the SFO

extension, with only 12,664 in 2003 and dropping further to 6,974 by 2009.¹²³ Apparently the SFO extension cannibalized a large portion of the Colma ridership.

Taking the projections for both the Colma and SFO/Millbrae projects together, we would expect to have well over 80,000 daily riders by 2010, but the 2009 actuals were 36,860. Because much of the Colma ridership apparently shifted to the SFO extension upon completion, the 80,000 estimate obviously double counts many of the riders that would utilize any of these stops. While we would not predict that level of ridership now, this double counting did go into the “sales pitch” used to gain public support for the projects and to obtain federal funding.

The BART Colma/SFO/Millbrae extensions required \$1,730 million and had 35,806 daily boardings – many of which were previous BART riders who transferred to a closer station, and most of which only traveled part of their trip on these two BART extensions – in 2009.

Because the SFO/Millbrae extension service was not breaking even on operating costs, the San Mateo County Transit District (SamTrans) was obligated to pay BART for the subsidies. This led to reductions in BART service levels on this extension¹²⁵ and these unbudgeted costs had negative impacts on SamTrans riders; chiefly line cancellations, service reductions, and fare increases, although SamTrans has maintained that there is not a direct connection to the BART SFO/Millbrae extension¹²⁶.

Puerto Rico Tren Urbano Heavy Rail Project

San Juan, Puerto Rico’s Heavy Rail system is an obvious peer for the proposed Honolulu rail system. Both are heavy rail with significant portions of raised guideway. Both are “rookie” locations, where no previous rail line had been constructed or was operating, and both are island locations. Puerto Rico’s experiences should be of unique consideration in contemplating the Honolulu proposal.

Capital cost overruns plagued the Puerto Rico project. The 1996 estimate in the FFGA was \$1.250 billion with an amended 1999 estimate at \$1.676 billion. Over the next five years, that projection was revised 80% higher, coming in at \$2.250 billion.¹²⁷

There are several reasons for these overruns. As happens in many of these projects, contractor bids and right-of-way costs were significantly higher than originally estimated. Project delays due to insufficient qualified construction personnel, coordination issues, and unexpected changes in design all significantly increased the cost of the project. Three hurricanes during the construction also created long delays in the construction.¹²⁸ The project opened part of its revenue operations in late 2004 and was fully operational in mid 2006, four years behind the original schedule.

Besides the budget overruns on capital costs, ridership estimates were optimistic and the implemented fare was far below what was assumed in the FFGA. Ridership was originally forecast at 82,000 weekday rail passengers in 2001, increasing to over 113,000 in 2010. Actual ridership in the first year of full operations (2005) was 24,700 and 26,900 in the second year, and ridership levels do not appear to be rising quickly. Tren Urbano reached 27,567 in 2007, less than a quarter of the 2010 projection of 113,000¹²⁹ and FY2010 actual ridership was 27% of the projection.¹³⁰

The model overestimated the use of rail over auto and bus commuting alternatives as well as the amount of inter-modal integration. Less than half the predicted number of rail riders arrived at the rail system by bus. The model also assumed a population growth rate that was much higher than what Census data actually revealed.^{131 132}

Sound Transit Central Link (Seattle)

Undoubtedly the most spectacular example of cost overruns following the award of a FFGA by FTA is the Seattle Central Link light rail project.

During 2000, the Central Puget Sound Regional Transit Authority (dba "Sound Transit") completed its approval process for the first segment of a \$3.1 billion, 23.5 mile light rail project through central Seattle known as "Central Link." This first segment, the most difficult and expensive 7.2 miles, with extensive tunneling, was projected to cost \$1,674.00 million¹³³.

During the planning, design, and project plan adoption process, a variety of external critics of this project presented detailed objections, stating that the costs were significantly understated, but Sound Transit leadership continued to state, in the strongest possible terms, that the project was properly budgeted and that the critics' warnings were unfounded. In the late Summer of 2000, FTA approved the project for a FFGA.

The final step in the FFGA execution process is a 60-day waiting period to allow Congressional oversight. During this period, Sound Transit was forced to admit that the bids for the most difficult segment of the project had come in hundreds of millions over engineering estimates – and that it had known of this and other problems for many months¹³⁴. Sound Transit quickly changed its previous project cost and schedule and, in January, 2001, FTA executed a FFGA for Central Link's first segment with a project budget of \$2,602.60 million¹³⁵ – an increase in the project budget of \$928.6 million, or over 55%, *without one spade of dirt being turned*. However, the concerns of critics continued and, eventually, Sound Transit was forced to admit that the actual projected overrun from the previously approved plan was actually well over \$2 billion and that the project, as proposed, was no longer feasible – as a result, this was one of the very rare cases of an executed FFGA being cancelled.

On October 24, 2003, after significant changes in project design, a new FFGA was executed for this project with a cost of \$2,436.90 million for a 13.9 mile segment¹³⁶. While this is a longer track

alignment than the two previous FTA-approved projects, it does *not* include the most costly segments of the proposed line which involve extensive, difficult, and very expensive tunneling. Subsequently, Sound Transit has gained Federal approval for the 3.1-mile University Link LRT Extension, at a projected cost of \$1,948 million, as the second of three segments, with revenue operations scheduled to begin in 2017¹³⁷. These two projects, at \$4,551 million for 17.0 miles of track, are at 46% over the original budget for the entire 23.5-mile, \$3.1 billion project, with over one-quarter of the track length left to be addressed.

Going back further, the original plan submitted to the voters in 1996 called for somewhat longer first two segments of 21 miles, at a cost of \$1.8 billion, in service by 2006¹³⁸.

The full history of this, and other, Sound Transit Projects, and their finances, is most enlightening.

After a number of attempts, the plan that was ultimately adopted by the Central Puget Sound Regional Transit Authority Board, and approved by the voters in 1996, was called "Sound Moves." The 1996 plan was to be paid for via a .4% sales tax and a .3% vehicle license tab tax (the sales tax provides far more revenue than the vehicle license tax, well over eight times more for 2011¹³⁹) for total spending of \$3.914 billion¹⁴⁰. All of the segments of the initial plan, including the two Southernmost segments of Central Link, along with the Tacoma Link streetcar, Sounder – the commuter rail system for the Sound Transit area, and various bus and other transportation improvements, were to be completed and in operations by 2006.

Sound Moves was represented to the voters as follows:

"Sound Moves is based on extremely conservative cost and ridership assumptions and methodologies reviewed by an independent expert review panel appointed by the governor, the state Legislature, and the state Transportation Department. In addition, the RTA has adopted strict cost management control principles to make certain Sound Moves stays on schedule and within budget¹⁴¹."

The original sales and motor vehicle taxes were to be "considered" for reduction after 2006, when the first phase work was to have been completed. However, they have been extended indefinitely by Sound Transit and, in 2008, after a failed attempt in 2007 for a somewhat similar somewhat update of the regional transportation plan, the voters approved an additional .5% sales tax for Sound Transit¹⁴².

Sonoma Marin Area Rail Transit Project

Sonoma-Marine Area Rail Transit (SMART) led an initiative to approve a 70-mile, 14-station commuter rail line along the U.S. 101 corridor to the Larkspur Ferry Terminal in central Marin County. After several previous attempts to have voters in these two counties north of the Golden Gate Bridge approve this project failed, in November 2008 the voters approved a quarter-cent sales tax that was projected to be sufficient to construct and operate this line, along with 71 miles of bicycle and pedestrian pathways or pathway improvements. The basic plan was to upgrade and

utilize a partially discontinued, single-track freight rail line, adding stations, parking, passing sidings, and maintenance and operating facilities.¹⁴³ Voters approved the tax with the expectation that all other financing¹⁴⁴ had been worked out and that the rail line would be completed by 2014.¹⁴⁵

Almost immediately after the passage of the taxes, it became clear that there were major problems. The weakening of the economy significantly reduced the amount of debt that can be issued to finance construction and more detailed engineering estimates have significantly increased many construction costs estimates. The most recent projection is that the original \$540 million project cost and financing plan is facing an estimated shortfall of approximately \$350 million,^{146 147 148} and efforts to find other sources of funds have thus far been unsuccessful.

The economic crisis is causing very serious problems for SMART in developing an action plan. Attempts to start the project by cutting back on the original scope of the project by originally not building at either the extreme North end in the less-densely populated Sonoma County and/or at the Southern end to San Rafael, the Marin County seat and largest city, and the extension to the Larkspur Ferry Terminal and its connection to the San Francisco central business district are causing major divides among the SMART constituents based on residence, particularly since, even with the delay of line segments originally to be part of the system to be operational in 2014, there will still be no source of funding to complete these segments at a later date,¹⁴⁹ and proposed elimination or reduction in the bike paths is objectionable to those segments of the community that backed the commuter rail line and tax based on the promise of their inclusion.¹⁵⁰

No matter what solutions are eventually agreed to, there is no doubt that the cost of the project will be significantly higher than the voters were told when they were asked to approve the tax, the line will be, at least initially, far shorter than proposed and missing major promised connections, the project will be significantly delayed, and ridership will be significantly reduced from projections, at least until the entire proposed line is completed, if ever.

Appendix 6—Fiscal Capacity Graph Assumptions

City Budget	The city budget for 2011 was taken from the most recent official city budget (FY2011) and grown at a very conservative inflationary rate of 2.5% ¹⁵¹ (CAGR since 2007 is 16.02% per year).
Rail Expenses	The rail expenses mirror the level of capital expenses expected according to the model created by Parsons Brinkerhoff.
EPA Consent Decree	The three categories depicting the EPA consent decree spending are Total Debt Service, Total Net Revenue Funding/Other, and Increase in O&M. Because much of the \$5.4 billion estimated cost of compliance is associated with projects that were already planned, only 50% of the full amount is part of the cost above the baseline city budget ¹⁵² (we were unable to obtain a city estimate for this value). Total debt service describes the level of yearly debt service with the same terms as the most recent wastewater revenue bonds from Honolulu. Total Net Revenue Funding/Other is composed of the portion of the cost of compliance with the EPA consent order that will not be financed through bonds. This portion will be funded through rate increases, the state revolving fund, or some other means. The increase in O&M describes the increase in O&M costs associated with both the upgraded treatment facilities as well as the repair/replacement work on the sewer lines.
Pension System	This line describes the actuarially calculated annual required contribution needed to pay for pension obligations so far earned by city/county employees assuming an 8% market rate of return. The city does not publish this data and so we used the historical contribution percentage of 14.77% to calculate this number. ¹⁵³
Pension Health Care Benefits	This line describes the actuarially calculated annual required contribution needed to pay for the health care benefits earned by city/county employees assuming an 8% return. ¹⁵⁴ Currently, Honolulu pays these expenses on a pay-as-you go method meaning that long term health care benefit obligations are currently 0% funded.

APPENDIX 7– End Notes

¹ Unless otherwise noted, the following information is taken from DOT/FTA, *Contractor Performance Assessment Report – 2007* (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).

² Unless otherwise noted, the following information is taken from DOT/FTA, *Contractor Performance Assessment Report – 2007* (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).

³ *Urban Rail Transit Projects: Forecast Versus Actual Ridership and Cost (1990)*

⁴ DOT/FTA, *Contractor Performance Assessment Report – 2007* (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).

⁵ DOT/FTA, *Contractor Performance Assessment Report – 2007* (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).

⁶ Id.

⁷ Numbers extrapolated from information found at DOT/FTA, *Contractor Performance Assessment Report – 2007* (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).

⁸ Unless otherwise noted, the following information is taken from DOT/FTA, *Contractor Performance Assessment Report – 2007* (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).

⁹ Id.

¹⁰ DOT/FTA, *Contractor Performance Assessment Report – 2007*, page 19 (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).

¹¹ DOT/FTA, *Contractor Performance Assessment Report – 2007* (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).

¹² See http://www.fta.dot.gov/funding/grants/grants_financing_3561.html

¹³ See http://www.fta.dot.gov/funding/apportionments/grants_financing_11647.html

¹⁴ UZA's are contiguous metropolitan regions, defined by the Census Bureau, that are not defined by, and may cross, city, county, and state boundaries.

¹⁵ See http://www.fta.dot.gov/funding/grants/grants_financing_3558.html

¹⁶ http://www.fta.dot.gov/funding/grants/grants_financing_3558.html

¹⁷ Federal Transit Administration, "Grants and Financing - Financing - Annual Appropriations: for each year, accessed November 11, 2010:

http://www.fta.dot.gov/funding/grants_financing_38.html

¹⁸ Letter from Wayne Y. Yoshioka, Director of Department of Transportation Services, to the Honorable Todd K. Apo Chair and Members of the Honolulu City Council, July 8, 2010.

¹⁹ Jim Linsalata and Larry H. Pham, August 1991, accessed May 10, 2009:

http://apta.com/resources/reportsandpublications/Documents/Pham_Linsalata_Fare_Elasticity_1991.pdf

²⁰ Accessed September 25, 2010:

<http://www.honolulutransit.org/>

²¹ Accessed November 17, 2010:

http://www.fta.dot.gov/documents/NewStarts_Appendix_A_Jan_2010.pdf

²² Accessed October 30, 2010:

http://www.honolulutransit.org/library/files/hhctcp_pe_11aug2009.pdf

²³ See assumptions for this graphic in appendix 6

²⁴ Brown, Laura, and Malia Zimmerman. "Hawaii Employees Retirement System \$6.2 B in the Hole – Will Taxpayers Have to Make Up the Difference? | Hawaii Reporter." Hawaii Reporter. 9 July 2010. Web. <<http://www.hawaiireporter.com/hawaii-employees-retirement-system-6-2-billion-in-the-hole-will-taxpayers-have-to-make-up-the-difference>>.

²⁵ Gabriel Roeder Smith & Company. From the Employees' Retirement System of the State of Hawaii: Report to the Board of Trustees on the 84th Annual Actuarial Valuation for the Year Beginning June 30, 2009. Publication. Vol. 84th. 2009. Print. Actuarial Valuation.

²⁶ Hawaii Employees' Retirement System. "Hawaii Employees' Retirement System: Holomua for Retirees, February 2010." Hawaii Employees' Retirement System. Feb. 2010. Web. Oct. 2010. (The U.S. Government Accountability Office suggests an 80% pension funding benchmark.) <www4.hawaii.gov/ers/Publications/Holomua201002Ret.pdf>.

²⁷ The Hawaii ERS spreads gains and losses from each year over a four year spread in order to decrease volatility in actuarial predictions of future obligations. For more information, see Gabriel Roeder Smith & Company. From the Employees' Retirement System of the State of Hawaii: Report to the Board of Trustees on the 84th Annual Actuarial Valuation for the Year Beginning June 30, 2009. Publication. Vol. 84th. 2009. Print. Actuarial Valuation.

²⁸ Gabriel Roeder Smith & Company. From the Employees' Retirement System of the State of Hawaii: Report to the Board of Trustees on the 84th Annual Actuarial Valuation for the Year Beginning June 30, 2009. Publication. Vol. 84th. 2009. Print. Actuarial Valuation.

²⁹ Gabriel Roeder Smith & Company. From the Employees' Retirement System of the State of Hawaii: Report to the Board of Trustees on the 84th Annual Actuarial Valuation for the Year Beginning June 30, 2009. Publication. Vol. 84th. 2009. Print. Actuarial Valuation.

³⁰ Gabriel Roeder Smith & Company. From the Employees' Retirement System of the State of Hawaii: Report to the Board of Trustees on the 84th Annual Actuarial Valuation for the Year Beginning June 30, 2009. Publication. Vol. 84. 2009. Print.

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⁶⁵ DOT/FTA, *Contractor Performance Assessment Report – 2007*, page 49 (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).

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⁶⁷ DOT/FTA, *Contractor Performance Assessment Report – 2007*, page 49 (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).

⁶⁸ Total purchase price for 100 railcar order, \$257 million; David Pendered, *Atlanta Journal-Constitution*, "MARTA Adding 100 New Rail Cars by 2002," January 27, 1998.

⁶⁹ DOT/FTA, *Contractor Performance Assessment Report – 2007*, page 48 (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).

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⁷² "Funding for Preliminary Engineering." *Federal Transit Administration*. Web. 03 Nov. 2010. <http://www.fta.dot.gov/publications/reports/planning_environment_2883.html>.

⁷³ "Capacity Expansion." *Countdown To A New Brown | The Brown Line Capacity Expansion Project*. Web. 03 Nov. 2010. <<http://www.ctabrownline.com/capacity.html>>.

⁷⁴ "Brown Line." *Chicago "L".org*. Web. 03 Nov. 2010. <<http://www.chicago-l.org/operations/lines/brown.html>>.

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⁷⁶ *ColoradoBiz*, "FasTracks at a Crossroads: Metro Voters Mull Ticket to Ride," October 1, 2004.

⁷⁷ RTD, "FasTracks – Projects," accessed November 19, 2010:http://www.rtd-fastracks.com/main_30

⁷⁸ RTD, "Board decides against 2010 FasTracks tax vote," accessed November 17, 2010:
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⁷⁹ U.S. Department of Transportation/Federal Transit Administration, *Annual Report on New Starts – Proposed Allocation of Funds for Fiscal Year 2005 – Report of the Secretary of Transportation to the United States Congress Pursuant to 49 U.S.C. 5309(0)(1)*, January 28, 2004, Appendix A, "Hudson-Bergen MOS-1" and "Hudson-Bergen MOS-2," pp. A-59 and A-63, respectively, accessed October 30, 2010:

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⁸⁰ Id.

⁸¹ *FTA Annual Report 2002*, Appendix A, "Northern New Jersey/Hudson-Bergen MOS-1," accessed October 30, 2010:

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⁸² New York Metropolitan Transportation Council (NYMTC), **2009 - 3rd Qtr - Travel Patterns for the New York Metropolitan Area, May 11, 2010, accessed October 30, 2010:**

http://www.nymtc.org/files/Travel_Patterns_3Q_2009.pdf

⁸³ *FTA Annual Report 2010*, "Table of Contents," pp. A-2/3, accessed October 30, 2010:

http://www.fta.dot.gov/documents/20090508_Release_FY_2010_Annual_Report.pdf

⁸⁴ *FTA Annual Report 2007*, "Hudson-Bergen MOS-2," page A-35, accessed October 30, 2010:

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⁸⁵ The California Supreme Court later reversed itself in *Santa Clara County v. Guardino*, 1997.

⁸⁶ Metro, press release, "L.A. city College Art Students Do Best Impression of Picasso By Creating Stunning Subway Posters, Judgment Day Nears," April 26, 1999.

⁸⁷ Jeffery L. Rabin, "Hollywood Subway a Box Office Bust," *Los Angeles Times*, March 19, 2000.

The 100,000 figure was under the assumption that Metro would *not* cancel its express bus services from the San Fernando Valley to downtown, which it *did* do prior to the Red Line opening. This should have resulted in actual ridership higher than 100,000 as the express bus riders shifted to the Red Line.

⁸⁸ Metro, *Proposed Budget For the Fiscal Year Ending June 30, 2001*, Appendix 5:FY01 Modal Operating Statistics." This shows Heavy Rail (Red Line) boardings of 24,952,000 for the year. Converting the annualized ridership to working weekday ridership by using the ratio of 313,243 calculated from Metro's 1999 National Transit Database submission to FTA produces 79,657 daily – rounded to 80,000.

⁸⁹ Metro, press release, "Daily Ridership on Metro Red Line Subway Nearly Doubles," July 3, 2000.

⁹⁰ Metro, Excel™ spreadsheet, "Historical Ridership Data," obtained October 27, 2008 via e-mail from Metro "Help Desk."

⁹¹ Metro, graph, "Trend in Metro Red Line Average Weekday Boardings," accessed November 16, 2010:

<http://www.metro.net/news/pages/ridership-statistics/>

⁹² FTA, National Transit Database 2008, calculated by dividing passenger miles by vehicle revenue miles.

⁹³ FTA, National Transit Database 2008, "Profiles" for BART and Metro.

⁹⁴ Thomas A. Rubin, Environmental Justice And Transportation Decisions – The Los Angeles Experience,

A Presentation To The Transportation Research Board Annual Meeting, January 12, 2000

⁹⁵ DOT/FTA, *New Starts 2002-2005*.

⁹⁶ Metro Transit, press release, "First Week of Rail Ridership Exceeds Expectation," July 6, 2004.

⁹⁷ <http://www.dot.state.mn.us/metro/lrt/archivedarticles/ABetterLight-railConnectionToMallofAmerica.html>,

undated.

⁹⁸ The final *New Starts* report in which this project was mentioned was the 2005 one, where the same \$675.43 capital cost was reported – as far as the DOT/FTA *New Starts* reports are concerned, the additional cost for this scope modification never occurred.

⁹⁹ *Star-Tribune*, “Cuts to Keep LRT on Track,” June 18, 2002.

¹⁰⁰ *Star Tribune*, 6/18/02.

¹⁰¹ Mike Kaszuba, “DOWN THE LINE/Who foots the bill?,” *Star Tribune*, April 4, 2004.

¹⁰² Metro Transit’s “parent” organization.

¹⁰³ <http://www.njtransit.com/>

¹⁰⁴ Jennifer Moroz, “Long-awaited River Line rolls in,” *philly.com*, March 14, 2004.

¹⁰⁵ Richard Pearsall, “Long-delayed light rail line set to begin operations on Feb. 15,” *CourierPostOnline.com*, November 13, 2003.

¹⁰⁶ Kathleen Cannon, “Probe vindicates light-rail project,” *phillyBurbs.com*, June 11, 2004.

¹⁰⁷ We have created this range based on data contained in various print media accounts. The low range of \$800 million is based on older cost projections (Richard Pearsall, “S.J. light rail planning is fraught with questions,” April 22, 2001) and does *not* include approximately \$200 million in financing (interest) costs discussed in that story. Financing costs were shown as 268 million in a later story (Cannon, 6/11/04). The high range of \$1.2 million is based on more recent accounts of total “firm” costs in the \$1.1 billion range (Moroz, 3/14/04), which *does* include financing costs, plus all of an estimated \$100 million in outstanding claims (Cannon, 6/11/04).

In an effort to be conservative, here we are using a point estimate of \$850 million, which is based on the “older” estimate of \$800 million, *without* financing charges, plus an additional factor for what appears to be non-financing cost growth to the more recent cost projections, plus a small additional factor to prepare to litigate and/or settle the outstanding claims. While, under both Generally Accepted Accounting Principles and a State Statute (PUC 130500 *et seq.*, among others) that applies to at least some California transit guideway projects, certain financing charges should be included in capital costs, none of the other projects examined have included them, so they are being eliminated here for consistency.

¹⁰⁸ San Francisco Bay Area Rapid Transit District, April 15, 1993, "BART Chronology," accessed November 8, 2010:

<http://www.bart.gov/docs/BARTHistory.pdf>

¹⁰⁹ DOT/FTA, *Contractor Performance Assessment Report – 2007*, page 69 (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).

¹¹⁰ DOT/FTA, *Contractor Performance Assessment Report – 2007*, page 72 (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).

¹¹¹ DOT/FTA, *Contractor Performance Assessment Report – 2007*, page 73 (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).

¹¹² DOT/FTA, *Contractor Performance Assessment Report – 2007*, page 72 (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).

¹¹³ DOT/FTA, *Contractor Performance Assessment Report – 2007*, page 73 (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).

¹¹⁴ DOT/FTA, *The Predicted and Actual Impacts of New Starts Projects – 2007*, page 131.

¹¹⁵ DOT/FTA, *The Predicted and Actual Impacts of New Starts Projects – 2007*, page 132, 3.

¹¹⁶ DOT/FTA, *The Predicted and Actual Impacts of New Starts Projects – 2007*, page 132.

¹¹⁷ DOT/FTA, *The Predicted and Actual Impacts of New Starts Projects – 2007*, page 135.

¹¹⁸ DOT/FTA, *The Predicted and Actual Impacts of New Starts Projects – 2007*, page 135.

¹¹⁹ See DOT/FTA, *The Predicted and Actual Impacts of New Starts Projects – 2007*, page 134.

¹²⁰ Bay Area Rapid Transit, *BART Fiscal Year Weekday Average Exits*, available at <http://www.bart.gov/docs/WeekdayExits.pdf>.

¹²¹ DOT/FTA, *Contractor Performance Assessment Report – 2007*, page 72 (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).

¹²² DOT/FTA, *Contractor Performance Assessment Report – 2007*, page 72 (available at: http://fta.dot.gov/publications/publications_9204.html, accessed November 3, 2010).

¹²³ <http://www.bart.gov/docs/WeekdayExits.pdf>

¹²⁴ Metropolitan Transportation Commission, "Baby Bullet Trains Debut," June 2004, accessed November 8, 2010:

http://www.mtc.ca.gov/news/info/baby_bullet.htm

¹²⁵ Michael Cabanatuan, "BART's Directors Approve Plan to Trim Service to S.F. Airport," San Francisco Chronicle/SFGate.com, August 12, 2005, accessed November 8, 2010

http://articles.sfgate.com/2005-08-12/bay-area/17384394_1_samtrans-bart-directors-blue-line

¹²⁶ Edward Carpenter, "SamTrans Struggles with Fiscal Woes," San Francisco Examiner, July 27, 2006, accessed November 8, 2010:

http://www.sfexaminer.com/local/samtrans_struggles_with_fiscal_woes2006-07-27T09_00_00.html

¹²⁷ DOT/FTA, *2008 Before and After Studies of New Starts Projects*, page 7 (available at:

http://fta.dot.gov/publications/publications_9197.html, accessed November 3, 2010).

¹²⁸ DOT/FTA, *2008 Before and After Studies of New Starts Projects*, page 7 (available at:

http://fta.dot.gov/publications/publications_9197.html, accessed November 3, 2010).

¹²⁹ DOT/FTA, *The Predicted and Actual Impacts of New Starts Projects – 2007*, page 141.

¹³⁰ NTD Profile for 2008 shows 8,699,611 annual heavy rail ridership. There is no daily ridership for heavy rail alone, but for the entire system, which is 80.6% heavy rail, the annual:working weekday ratio is 290.5:1. This implies weekday ridership of 29,950. Going to the APTA quarterly reports,

<http://apta.com/resources/statistics/Pages/RidershipArchives.aspx>, for FY10 (they have a 6/30 year end, so you need four reports, second quarter 2010 and second and fourth quarters 2009; go to the second page, which is heavy rail), the annual count was 8,872.9 million; for F09, 9,367.1 million. Using the same annual: daily ratio, that's 30,544 and 32,245, respectively (27% of projection for 2010).

¹³¹ DOT/FTA, *2008 Before and After Studies of New Starts Projects*, page 8 (available at:

http://fta.dot.gov/publications/publications_9197.html, accessed November 3, 2010).

¹³² All info for this section from DOT/FTA, *2008 Before and After Studies of New Starts Projects* (available at: http://fta.dot.gov/publications/publications_9197.html, accessed November 3, 2010).

¹³³ Department of Transportation Office of Inspector General, "Interim Report on the Seattle Central Link Light Rail Project," April 4, 2001 (IN-2001-051).

¹³⁴ DOT OIG, 4/2/01, pages 1-2.

¹³⁵ DOT OIG 4/2/01 and U.S. Department of Transportation/Federal Transit Administration, *Annual Report on New Starts – Proposed Allocation of Funds for Fiscal Year 2002*, pp. A-111/2.

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¹³⁶ DOT/FTA, *New Starts*, pp. A-103/4.

¹³⁷ DOT/FTA, *New Starts, 2011*, accessed November 17, 2010, page A-39/41:

http://fta.dot.gov/documents/NewStarts_Appendix_A_Jan_2010.pdf

¹³⁸ Sound Transit, "Sound Move," accessed November 19, 2010:

<http://www.soundtransit.org/Projects-and-Plans/System-Planning-and-History/Planning-History/Sound-Move.xml>

¹³⁹ Sound Transit, *Proposed 2011 Budget*, page 25, accessed November 20, 2010:

<http://www.soundtransit.org/Documents/pdf/about/financial/2010/Proposed2011Budget.pdf>

¹⁴⁰ "Sound Move."

¹⁴¹ *Sound Move*, page 31.

¹⁴² Sound Transit, "Sound Transit District," accessed November 19, 2010:

<http://www.soundtransit.org/About-Us/Sound-Transit-District.xml>

¹⁴³ DEIS, page ES-1, available at <http://www.sonomamarintrain.org/index.php/docs/eir/#DSEIR> and last accessed November 4, 2010.

¹⁴⁴ For the financial plan, see <http://www.sonomamarintrain.org/userfiles/file/Funding%20Plan%20-%202007-15-08%20Final%20Version.pdf>

¹⁴⁵ DEIS, page ES-1, available at <http://www.sonomamarintrain.org/index.php/docs/eir/#DSEIR> and last accessed November 4, 2010.

¹⁴⁶ <http://www.pressdemocrat.com/article/20101103/ARTICLES/101109798/1033/news?p=1&tc=pg&tc=ar>

¹⁴⁷ Id.

¹⁴⁸ http://www.marini.com/marinnews/ci_16516005?IADID=Search-www.marini.com-www.marini.com

¹⁴⁹ See SMART Special Board Meeting Workshop Agenda at

<http://www.sonomamarintrain.org/userfiles/file/Board%20Workshop%20Agenda%20Packet2.pdf>

¹⁵⁰ Id.

¹⁵¹ "Fiscal Year 2011 Executive Program and Budget, Official Web Site for The City and County of Honolulu." *City and County of Honolulu, Official Web Site for The City and County of Honolulu*. Web. 19 Nov. 2010.

<<http://www.honolulu.gov/budget/execbgt/index1.htm>>.

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¹⁵⁴ "2009 Comprehensive Annual Financial Report." *City and County of Honolulu, Official Web Site for The City and County of Honolulu*. Web. 19 Nov. 2010. <<http://www.honolulu.gov/budget/cafr.htm>>.