DRAFT TREASURE ISLAND FINANCIAL MODELING & ANALYSIS DOCUMENTATION MEMORANDUM

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Metropolitan Transportation Commission (MTC)
National Transit Database (NTD)
Operations and Maintenance (O&M)
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Treasure Island Mobility Management Agency (TIMMA)
Treasure Island Transportation Implementation Plan (TITIP)
Water Emergency Transportation Authority (WETA)
Yerba Buena Island (YBI)

INTRODUCTION & PROJECT BACKGROUND

This memo serves as documentation of the financial modeling and analysis for the planned transportation program on Treasure Island (TI), which is an integral component of the overall development of TI.

Two key performance goals for the transportation program include at least 50% peak transit mode share for trips off the Island and long-term financial sustainability. The financial analysis in this memo evaluates the ability of different tolling and transit scenarios to meet the financial sustainability goals.

PURPOSE OF THE STUDY AND FINANCIAL ANALYSIS

The objective of the financial modeling is to provide a long-term cost and revenue estimate to assess the financial feasibility of the transportation program. The study incorporates traffic and transit demand volumes, which drive revenue projections and some costs. Other cost categories are fixed capital, rehab, or operating costs that will be incurred regardless of demand volumes.

The main purpose of the financial analysis is to evaluate the financial viability of alternative toll policies, using travel demand forecasts and other inputs. The financial analysis also includes additional sensitivity tests that can show the impact of changes in policy or cost assumptions without running additional full travel demand scenarios.

MODELING ASSUMPTIONS AND SOURCES

There are several key documents that inform the model structure and parameters. The Treasure Island Transportation Implementation Plan (TITIP) was produced in 2011 by Treasure Island Community Development, LLC (TICD) and approved by the Treasure Island Development Authority (TIDA) Board. This initial report detailed a plan for development of TI including policies with regard to transit, congestion pricing, and parking programs. The inputs and assumptions from the TITIP served as the starting point for the financial analysis and this study worked closely with the partner agencies to verify, update, and build on the information from the TITIP.

The first demand and financial scenario (Baseline) was intended to reflect as many of the parameters and assumptions outlined in the TITIP as possible. Many of the financial modeling assumptions in the Baseline financial scenario were also gleaned from the TITIP where the TITIP provided direction. Consistencies with and deviations from the TITIP in the modeling process will be noted throughout this document.

The Disposition and Development Agreement (DDA) between TIDA and TICD and other documents furnished by TICD and TIDA defined the project timeline, phasing, goals, financing, land acquisition, and processes for the developer, some of which served as input to the financial model. Finally, other sources

of data included the transit operators, public data sources, such as the National Transit Database (NTD), and relevant elements of cost estimates provided by Parsons Brinckerhoff (PB) technical staff.

MODELING PROCESS (WITH REGARD TO DEMAND MODEL, COST ESTIMATES, ETC.)

The demand analysis conducted for this study used the SFCTA's demand model (SF-CHAMP) with an out-year forecast for 2030, at which time full development is anticipated.[1] However, the financial model produces a time-series forecast for every year between 2015 and 2040, so the demand results had to be extrapolated and interpolated using a "scaling model".

The scaling model follows the TITIP implementation scheme for service levels and inputs wherever reasonable and makes assumptions for changes in demand based on the levels of service and the number of housing units on the Island. Mainly, the scaling adjusts the 2030 travel demand using the proportion of total dwelling units that are built out, the availability of parking, and the elasticity of travel mode choice due to changes in transit frequency.

Demand for driving trips and transit in 2030 are direct inputs into the scaling and financial models. With each scenario, demand is modeled according to a variety of policy parameters (such as toll rates, tolling periods, toll coverage and exemptions, and tolling directions). The same parameters are incorporated into the scaling and financial model assumptions, so that revenue, operating, and capital costs reflect the demand parameters. Outputs of the scaling model are then fed into the financial model.

[1] At the time the modeling work commenced, TICD planned for full development "buildout" in in 2030.

MODEL STRUCTURE

TIMING AND PHASING

The forecast starts in 2015 and continues until 2040, thus capturing the entire span of TI's development and subsequent out years. The TITIP and TICD detailed a plan to build 8,000 dwelling units (DUs) over 8 phases by 2030. The phases progress upon completion of 1,000 DU increments (see Figure 1). During each phase, residents are assumed to occupy the additional DU's, which drives various operating revenues and costs associated with TI. The number of units increases by increments of 1,000 DUs over the forecast period until there are 8,000 DUs in 2030 for a total of 8 phases. Tolling is scheduled to start in 2018[2] when the first 1,000 dwelling units are occupied.

Forecast Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Dwelling Units	1,000	2,000	2,000	2,000	3,000	4,000	5,000	5,000	5,000	6,000	7,000	7,000	8,000

Figure 1: Dwelling Build-out Schedule

The demand, as well as several cost items, is tied to the occupancy and phases of TI's development, so there are significant revenue and cost increases from 2018 to 2030, but there are few large changes assumed beyond 2030 since the population of TI is assumed to be steady once the Island is fully built out.

An additional key aspect of model timing is the breakout of peak hours and non-peak hours. Using the SF-CHAMP model's period definitions, the AM peak period is 6:00 to 9:00 AM, while the PM peak is 3:30 to 6:30 PM. The time between peak periods (9:00 AM to 3:30 PM) is referred to as the midday off-peak period. The period after the PM peak is referred to as the evening off-peak period and the period before the AM peak is referred to as the early morning off-peak period. The breakout of these periods allows for the application of different toll rates and policies throughout the day in order to manage congestion. These peak/off-peak designations also refer to times when the level of transit service is higher to address demand.

INFLATION AND ESCALATION

The time span of the financial analysis warrants consideration of the inflation and escalation that should be applied to revenue and cost components. Inflation adjustments are made at the end of each fiscal year starting with the first year after the "Reference Date" per the DDA, which is June 28, 2011.

The index used in the DDA is the Consumer Price Index (CPI) for all "Urban Consumers" in the San Francisco-Oakland-San Jose region (base years 1982-1984 = 100) published by the Bureau of Labor Statistics of the United States Department of Labor. The DDA also specifies that in no event will any annual increase adjusted by the Index be less than two percent (2%) per annum or greater than five

[2] At the time of model development and forecasting, TICD anticipated that the first year of new occupied dwelling units would be 2018.

percent (5%) per annum. These DDA indexes are used to escalate the amount of developer subsidy that is available. The total developer subsidy is defined in the DDA as $30 million in 2011$, or $31,604,909 in 2013$.

The financial model utilizes several inflation factors across cost and revenue components, as they are affected by different economic levers. Capital costs are escalated annually by 2.54%, which is consistent with the San Francisco Construction Cost Index average from 1993 to 2012 (published by Engineering News Record). In years 2015 through 2019, capital costs are escalated by an additional 0.5% to capture high, short term inflation resulting from San Francisco's current construction boom. Most operating costs (see next paragraph), and all operating revenues, are escalated by 2.64% annually, which corresponds to the CPI for the San Francisco area from 1993 to 2012 (reported by Bureau of Labor Statistics). The TICD subsidies and costs are also escalated by 2.64% annually per the DDA to capture inflation and any interest in the funds.

Operating costs for AC Transit and for WETA services are escalated faster than general inflation, per guidance from those agencies. AC Transit operating costs are escalated by 4.25% annually to reflect AC Transit's operating cost escalation per vehicle revenue hour as reported in the NTD from 2008 to 2012. WETA operating costs are inflated at 4 percent annually throughout the forecast based on WETA's long-term cost escalation trends that they provided.

CAPITAL COSTS

Capital expenditures have been divided into "Initial" costs - (the start-up of programs, purchase of new vessels, and the purchase of new equipment) and "Renewal" costs (the rehabilitation, repair, or repurchase of already purchased vessels or equipment). Most cost categories contain initial and renewal capital costs. The TITIP and DDA provide guidance on various costs that are covered by sources outside the program. Additionally, the model has been built to allow expansion purchases beyond the initial start-up of operations, but that feature has not been used in this analysis. Figure 2 shows the delineation of responsibility for initial and renewal/rehab capital costs by transportation system element.

Cost Category	Responsible Party	
	Initial Capital	Renewal/Rehab
Toll System	TIMMA	TIMMA
Parking System	TICD	TIMMA
On-Island Shuttles	TICD	TIMMA
Ferry Terminal	TICD	TIMMA
Ferry Vessels	TIMMA*	TIMMA*
AC Transit Buses	TICD	TIMMA
Muni Buses	TICD and SFMTA**	SFMTA**
Bikeshare Fleet	TICD	TIMMA

Figure 2: Areas of Responsibility for Capital Costs

*The TITIP had assumed that ferry vessels would be leased and thus would not incur capital costs. As such, the DDA did not include provisions for the purchase of ferry vessels so the responsibility is assumed to rest with TIMMA.

**During the development of the TITIP, a fiscal analysis was performed to evaluate the potential additional revenue that San Francisco would generate from the development. The study found that the additional revenue would be sufficient to pay for expanded Muni service to the Island. As such, costs for Muni service are not included in this analysis.

It should be noted that pre-implementation planning and administration soft costs, such as this study, were not included as capital costs in evaluating the financial feasibility of the program. Soft costs associated with the engineering design of the toll system are included and discussed in the next section.

TOLLING

The initial tolling capital costs are divided into Planning, Civil, and Systems costs and are incurred early in the forecast period. Tolling commences with the occupancy of the first new units; at the time of modeling, this was anticipated in 2018. The tolling equipment is set up in 2017 and the planning and testing starts in 2015. Given this timeline, the initial capital costs are incurred in 2015 and 2017. The costs in 2015 are attributed to engineering design of the toll system, whereas the 2017 costs are driven by the toll system installation and equipment purchases. These dates represent current planning

assumptions regarding build-out but are subject to change during implementation. Parsons Brinckerhoff (PB) estimated the planning and design, hardware, systems, and software cost assumptions, which are divided into subcomponents each with its own cost, useful life, and quantity. The quantities and costs in Figure 3, Figure 4, and Figure 5 are based on the tolling set up where vehicles are tolled in both directions so the installation includes locations at 5 off/on access points to/from the Island.

***all costs in year 2013 $**

Planning and Design Capital Costs	Annual Cost of Task	Timing (years before tolling launch)	Duration of Task (years)
Civil Engineering	$164,687	2	1
Electrical Engineering	$35,306	2	1
Structural Engineering	$150,000	2	1
Environmental Planning and Engineering	$112,500	2	1
Business Rules & Functional Requirements	$178,652	2	1
Total Cost	**$641,145**		

Figure 3: Planning & Design Capital Costs

Civil Capital Cost Items	Unit Cost	Quanity	Total Initial Cost	Useful Life
332 Cabinet (Shoulder Area)	$2,500	10	$25,000	purhcased once
Pad for cabinets	$300	10	$3,000	purhcased once
Conduit	$6	1,000	$6,000	purhcased once
Pull Boxes	$400	15	$6,000	purhcased once
Gantries	$130,000	5	$650,000	purhcased once
Signs	$200,000	1	$200,000	15 Years
Construction Management Support Costs	$115,700	1	$115,700	only occurs in
Total Cost			**$1,005,700**	

Figure 4: Civil Capital Costs

Systems Capital Cost Items	Unit Cost	Quanity	Total Initial Cost	Useful Life
Tolling and Enforcement Lane Controller	$17,000	10	$170,000	10
Vehicle Detector- Smart Loops and per site software license	$25,000	7	$175,000	10
Uninterruptable Power Supply	$6,000	5	$30,000	5
Remote Power Management	$2,000	5	$10,000	10
ETC Readers (including antenna, cables and brackets)	$35,000	7	$245,000	10
8 Port Serial Device Server	$900	5	$4,500	10
Digital I/O Alarm	$700	5	$3,500	10
License Plate Camera, Illuminator, Light Sensor, Cable	$23,000	7	$161,000	10
24VDC Power Supplies	$300	5	$1,500	10
DIN Rail, Terminal Blocks, Misc Cables, Switches, Breakers, etc	$2,000	5	$10,000	10
Transaction Indicator Lights - Wide Angle Surface Mount LED	$500	7	$3,500	10
Network Managed Switch	$2,000	5	$10,000	10
PG&E Power Service Establishment	$10,000	1	$10,000	purchased once
Communications Service Establishment	$10,000	1	$10,000	purchased once
Total Cost			**$844,000**	

Figure 5: Tolling Systems Capital Costs

There are also renewal costs incurred to keep the tolling system in a state of good repair that occur periodically throughout the forecast period. Each piece of equipment has an assumed useful life, unless they are purchased once and assumed to last through the forecast period (see Figure 3, Figure 4, and Figure 5). At the end of the equipment's life, the renewal cost is assumed to be equal to the initial purchase cost before inflation is applied.

PARKING

Both off-street and on-street parking will be available on TI. The two types of parking differ greatly in their cost structure, with off-street parking incurring a higher share of operating costs than renewal costs, and on-street parking incurring a relatively higher share of renewal costs than operating costs.

For off-street parking, the Treasure Island Mobility Management Agency (TIMMA) will not incur costs for the initial construction but will be responsible for rehabilitation of the parking facilities. The 365 off-street surface spaces will require painting and re-finishing 13 years after their initial construction, which is assumed to cost $1,000 (2013$) per parking space. Because the assumed useful life of a parking structure is 50 years, the renewal costs for the structure do not occur within the forecast period. In addition, the assumed rehab cycle for the parking is 25 years; therefore rehab costs also occur beyond the forecast period. Because the off-street parking is assumed to be operated and managed by staff, purchase of parking meters is not necessary.

The on-street parking spaces comprise a majority of the capital costs due to the initial purchase and periodic replacement of the single-space parking meters and sensors. Per the SFMTA, the sensors have an assumed useful life of 2.5 years and cost $323 (2013$) to replace per parking space. One of the sensitivities from the financial analysis looked at the cost savings from removing the sensors. The results of that sensitivity test are presented in the second half of this memo.

As shown in Figure 6, the build-out of the parking spaces is correlated with the development stages of TI as provided by TICD. Due to the phased build-out, sensor replacement costs are incurred throughout the forecast period in varying amounts, as installation occurs over several years. Per SFMTA, the meters have a useful life of 8 years and cost $1,200 (in 2013$) per space to build and replace.

Year	2018	2019	2022	2023	2024	2027	2029	2030
Dwelling Units	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
Off-Street Surface Parking Supply	-	-	122	365	365	365	365	365
Off-Street Structure Parking Parking Supply	-	-	-	-	418	418	835	835
On-Street Parking Supply	148	296	444	592	740	888	1,035	1,035
Total Parking Supply	**148**	**296**	**566**	**957**	**1,523**	**1,671**	**2,235**	**2,235**

Figure 6: Parking Build-out Schedule (showing cumulative parking totals)

AC TRANSIT

TIDA will pay for the initial purchase costs of the AC Transit buses. However TIMMA will be responsible for replacing them, therefore the timing of the initial purchase influences the timing of the renewals and their escalated cost. The timing of bus purchases is driven by the level of service as defined in the TITIP, thus as headways decrease, more vehicles are required.

Per the TITIP, AC Transit's policy requires that 20% of the bus fleet will be out of operation as a maintenance reserve, therefore the number of buses operating at a given time will be lower than the total number of buses purchased. The vehicles required per Figure 7 include the spare vehicles that are in reserve.

Year	2018	2019	2022	2023	2024	2027	2028	2030
Dwelling Units Occupied	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
AM/PM Avg. Peak Headways (minutes)	25	25	25	20	17.5	17.5	13.5	10
Bus Purchase Schedule (buses)	5	-	-	-	1	-	2	1
Total Buses in Fleet	5	5	5	5	6	6	8	9
Buses Reqired for Operations PM Peak	4	4	4	4	5	5	6	7

Figure 7: AC Transit Bus Purchase Schedule (showing cumulative bus totals)

To accommodate the level of service in 2030, 9 buses are required. Prior to 2030, buses are purchased as the dwelling units are completed. Per AC Transit, the buses are assumed to have a useful life of 14 years, and will be fully retired after that time, thus requiring purchase of a new bus. The current assumption for buses is a 40' compressed natural gas (CNG) bus which is the closest match to the current clean diesel fleet. According to the MTC Regional Bus Price List, this type of vehicle costs an estimated $610,113 per bus (2013$).

The headway assumptions used in this financial model (see Figure 7) differ slightly from the TITIP, which states that service will run every 5 to 15 minutes when all units on TI are occupied. Based on demand forecasts, the project team determined that off-peak period headways of 30 minutes rather than 15 minutes, and peak headways of 10 minutes rather than 5, will accommodate demand.

Scenario 4 analyzed the need for all 5 of the AC Transit buses in year 2018, and found that demand for east bay transit during the first three years of the program could be met with 3 buses rather than 5. Scenario 4, including the recommended Scenario 4.4 version 3, assume a 2018 purchase of 3 buses through 2024, and an adjusted AC Transit bus purchase schedule for the remaining years.

Scenario 4.4 version 3, the recommended funding plan, incorporates an assumption that federal formula funding for AC Transit bus rehabilitation and renewal will be available for the TIMMA routes; this means that 80% of the cost of ferry rehabilitation and renewal will be funded by federal formula funds, and TIMMA will only be responsible for 20% of these costs.

WETA FERRY

During the development of the TITIP, it was assumed that TIMMA or the ferry operator would lease ferry vessels for the service to San Francisco. WETA has indicated that vessels put into service for Treasure Island should be consistent with vessel standards throughout the fleet to allow flexibility for inter-lining service and backup. Based on discussions with WETA, it was assumed that leasing may not be a viable option for the Treasure Island service because of the uncertainty of the ability of potential lease providers to meet the WETA requirements. Since the DDA did not include provisions for the purchase of new ferry vessels, it is assumed that TIMMA is responsible for both the initial purchase and the rehabilitation costs for the ferry vessels used to service the Island. Ferry operating cost assumptions were provided in the TITIP, however WETA provided alternative operating costs and new capital costs based on their recent experiences, which are used in every scenario except for Scenario 1 (Baseline). Scenario 4.4 version 3, the recommended funding plan, incorporates an assumption that federal formula funding for WETA ferry rehabilitation and renewal will be available for the TIMMA routes; this means that 80% of the cost of ferry rehabilitation and renewal will be funded by federal formula funds, and TIMMA will only be responsible for 20% of these costs.

The timing of the vessel purchases is driven by the service plan assumptions from the TITIP. The first Scenarios assumed start of ferry service in 2018; later Scenarios shifted the ferry service start date to 2022, based on further review of DDA Schedule of Performance and buildout schedule revisions from TICD. WETA also requires a spare vessel for use during maintenance or rehabilitation. The TITIP states that the vessels purchased for the TI route will be interchangeable with other WETA routes, thus the spare vehicle could be shared among the routes in the WETA system. The first financial Scenarios assume the purchase of a spare vessel for conservatism, based on input from WETA, as there is uncertainty in the potential to share vessels across the WETA system. Later Scenarios assumed that the TI service could share a spare vessel with another WETA route, and removed the purchase cost of the spare vessel.

As seen in Figure 8: Ferry Vessel Purchase Schedule, the second operating vessel is added after a majority of dwelling units are completed. The TITIP called for 15 minute peak period, and 30 minute off peak, ferry headways. During the forecasting process, WETA recommended revisions to the ferry vessel cycle time assumptions (and therefore, the number of vessels in operation necessary to provide 30 and

Year	2018	2019	2022	2023	2024	2027	2028	2030
Dwelling Units Occupied	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
Headways (in minutes)	30	30	30	30	15	15	15	15
Ferry Vessel Purchase Schedule	2	-	-	-	1	-	-	-
Vessels Required for Operations	1	1	1	1	2	2	2	2
Total Vessels in Fleet (incl. spare)	2	2	2	2	3	3	3	3
Total Vessels in Fleet per TITIP	1	2	2	2	3	3	3	3

Figure 8: Ferry Vessel Purchase Schedule

15 minute headways). These financial Scenarios assume that 1 vehicle in operations can provide 50 minute headways, and 2 vessels 20 minute headways.

In early Scenarios, WETA, provided an initial purchase cost of a 399-person vessel at $14 million (2013$); in later Scenarios, this assumption is revised to $16 million ($2013) based on new information. Each vessel has two quarter-life rehabilitations at 10% of the purchase cost and one half-life rehabilitation at 50% of the purchase cost. The quarter-life rehabs occur in 2024, 2030, and 2036, while the half-life rehabs occur in 2030 and 2036 for the initial vessels purchased at the start of operations.

TIMMA ADMINISTRATION CAPITAL COSTS

The TIMMA office will have some initial startup costs, which are estimated at $15,000 (2013$) in 2015 by PB. Additional TIMMA office facility capital costs that are assumed are based on a share of the TIMMA operating costs. This assumed incremental capital cost is 3 percent of the TIMMA staffing, administrative, facility maintenance, transportation demand management (TDM) and monitoring program, and transit center costs on a yearly basis. While these costs start in 2018 and occur each year, they are associated with capital expenses, rather than operating.

TIMMA SHUTTLE

A total of four shuttles (see Figure 9) will be purchased, by TICD, throughout the forecast period. Although TIMMA will not incur the initial purchase costs of the shuttle buses, it will be responsible for their renewal costs. Based on the MTC Regional Bus Price list for a CNG Cut-Away/Van 26'+ vehicle, each shuttle is assumed to have a useful life of 7 years, after which a new shuttle will be purchased at $185,597 (2013$) per shuttle. This deviates from the TITIP, which estimates the shuttles will cost $395,000 (2013$) each.

Year	2018	2019	2022	2023	2024	2027	2028	2029	2030
Dwelling Units Occupied	1,000	2,000	3,000	4,000	5,000	6,000	7,000	7,000	8,000
Shuttle Purchase Schedule	-	-	2	1	-	-	-	1	-

Figure 9: Shuttle Purchase Schedule

OPERATING COSTS

TOLLING FIXED COSTS

Tolling operations and maintenance (O&M) costs contain both a fixed (operating) and variable (transaction) component. There are numerous fixed costs associated with tolling that are incurred annually (see Figure 10), such as enforcement, lease line subscriptions, and toll equipment O&M, all of which are assumed constant throughout the forecast period prior to escalation. A majority of the fixed tolling costs are driven by enforcement activities, as local law enforcement will be utilized to conduct enforcement activities. HOV or other exemptions require enforcement activities, as false HOV declaration and toll evasion are potential sources of revenue leakage. These fixed costs were estimated by PB with the assistance of MTC.

Annual Fixed Tolling O&M Costs	2013$
Lease Line Annual Subscription (4 units at 18,000 each)	72,000
Tolling Enforcement Costs	250,000
Toll Systems O&M	84,000

Figure 10: Fixed Tolling O&M Costs

TOLLING TRANSACTION COSTS

The variable operating costs for tolling are driven by the type of tolling technology used in the given scenario and the number of tolled trips. The number of tolled trips is determined by the results of the demand model analysis for each scenario. An assumed per transaction cost is multiplied by the transaction volume to estimate the total tolling transaction costs.

The TITIP assumed that only TI residents would be tolled and only during peak periods (from 6:00 to 9:00 AM and 3:30 to 6:30 PM). The TITIP assumptions for the tolled population are reflected in Scenario 1, but other scenarios deviate from the TITIP.

The proposed tolling system uses two methods to recognize and bill vehicles for their driving trips. The first method is a FasTrak transponder (also known as “toll tags”), currently used on Bridges and Express Lanes throughout the Bay Area, that identifies a driver’s toll account. The FasTrak transponders are procured by BATA and billing and customer service is also provided by BATA. The software used to apply a toll rate to a detected vehicle, based on local toll policy, is developed by BATA for the Bay Area bridges, and by other toll operators for the Golden Gate Bridge, SFO parking structures, and some Bay Area Express Lanes.

The second methodology involves license plate recognition (LPR) to recognize and bill vehicles. This method is also used on the Golden Gate Bridge, which uses all electronic tolling and does not have any toll collectors at the toll booths. When license plate recognition is used, the per-transaction cost is

higher due to the need to manually check some of the video capture of the license plates that cannot be recognized by the system. Additionally, without an account for a given vehicle, the tolling agency assumes the risk of non-payment, since the vehicle may not be registered, thus unbillable, or the owner may not intend to pay.

The technology used is driven by adopted toll policies including what population is tolled. If only residents are tolled, then all resident license plates can be registered and the system can associate each license plate with a specific account. If both residents and non-residents are tolled, both LPR and transponders will be used to identify vehicles and administer the tolls. However, when expanding tolling to non-residents, not every vehicle will necessarily have a Fastrak account. Therefore, when only residents are tolled, 100% of tolled transactions are assumed to have a LPR to charge their account, resulting in a $0.40 cost per transaction according to MTC.

Alternatively, when both residents and non-residents are tolled, 12% percent of tolled transactions are assumed to use LPR without an account (according to MTC's current data), and incur a per-transaction cost of $0.88 (2013$). Transponders are also introduced as a payment method for both residents and non-residents, and are estimated to capture 88% of tolled transactions. Due to the automation in billing and reduced need for manual license-plate image reviews, the per-transaction cost for a transponder trip is only $0.16 (2013$). These per-transaction costs were provided by MTC. Business rules that would pass on the additional costs of LPR transactions to drivers without accounts can be evaluated as the system is implemented. However, no assumption that the pass-through will occur is made in the financial model.

CREDIT CARD FEES

The credit card fee expense is a function of the total tolling revenue. MTC provided the assumption that credit card fees would amount to 2% of tolling revenue collected. The parameters defined in the demand model greatly impact the credit card fees, as the toll rates, hours, and exemptions directly affect the tolling revenue.

PARKING

The TITIP assumes that all non-residential parking will generate revenue, however there are operating costs associated with these parking spaces. A majority of the parking operating expenses are incurred by the off-street spaces, with the on-street spaces resulting in lower operating cost.

Per the MTC Parking Structure Technical Report (2010), the operating and maintenance costs for an urban 3-level structure are $2,288 (2013$) per space. All other parking cost assumptions were based on information provided by SFMTA. The surface off-street parking spaces incur operations, maintenance, and cleaning costs, which total $227 (2013$) per space. Off-street parking also requires enforcement operations, which cost $194 (2013$) per space for structure parking, and $178 (2013$) per space for

surface spaces. Given the parking build-out schedules (see Figure 6), the off-street parking operating costs start in 2022.

On-street parking has the same O&M and cleaning fee of $227 per space in addition to the meter operating costs of $130 per space. The enforcement costs for on-street spaces are $178 (2013$) per space, consistent with the off-street surface spaces. Because on-street parking installation starts in 2018, operating costs begin earlier in the forecast than the off-street spaces and increase as more parking spaces are added.

AC TRANSIT

The primary driver for AC Transit operating cost is the assumed level of service. In order to provide more frequent headways over a given time period, more buses are required. AC Transit bus headways become shorter as TI occupancy increases. Thus, the level of service increases as DUs are completed. The operating cost for AC Transit is directly dependent on the number of buses required and the assumed hours of operation. An illustration of the AC Transit operating cost calculation is included in Figure 11 .

The TITIP provided a level of service expressed in operating hours per day and number of buses in service during peak hours for year 2030. The number of buses in service from Figure 7 was reduced by 20% to get the number of buses in use (accounting for spares). Because headways in the peak period are one third of the off-peak headways (10 minutes versus 30 minutes), the number of buses in use during off-peak hours is assumed to be one-third of the buses in use during peak hours.

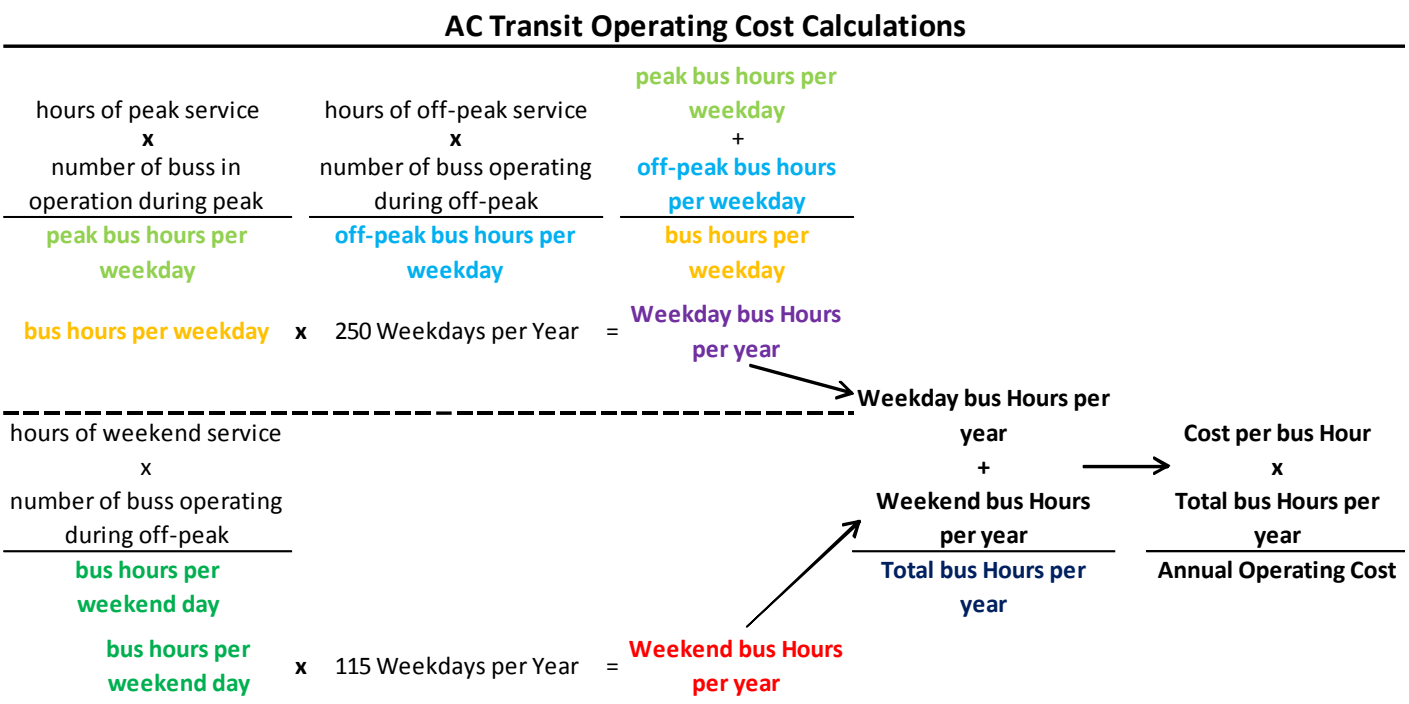
Despite the difference in headway assumptions, the financial model is consistent with the TITIP in the number of buses required for operation,[3] which is a key operations cost driver. The TITIP also specifies 17 hours of bus operation per day, from 5:00 AM to 10:00 PM.

The length of peak and off-peak periods multiplied by the respective number of buses in use yields the total operating hours per weekday. Weekends are assumed to be all off-peak bus service, so the number of buses in service is equal to the weekday off-peak service level. The average number of service hours per day is then multiplied by the number of days per year to realize the annual operating hours.

The assumed operating cost of $145 (2013$) per service hour (per the National Transit Database) is multiplied by the number of operating hours in the year to yield to annual operating cost, before escalation.

[3] The project team increased the assumed AC Transit bus cycle time due to increased congestion; therefore, the same number of buses is expected to provide somewhat less frequent service.

Figure 11: AC Transit Operating Cost Calculation



FERRY

The methodology for determining the ferry operating cost is similar to the AC Transit operating cost methodology in that it is driven by the level of service, and ultimately the service hours and operating cost per hour. An illustration of the WETA ferry operating cost calculation is included in Figure 12.

The operations cost per ferry per hour is assumed to be $1,325 (2013$) per WETA's current operating costs and is multiplied by the total ferry hours to calculate ferry operating costs in 2013$. The hourly rate is an "all-in" cost that includes labor and fuel costs for operations as well as vessel maintenance and other O&M costs. The hourly operations cost provided by WETA deviates from the TITIP, which estimates a cost of $800 per ferry hour to operate one vessel and $900 per ferry hour when operating two vessels.

The level of service for the WETA ferries is determined by the headway in a given year. According to WETA, the headways correspond directly to the number of ferries in operation. Based on revised estimates from WETA, 1 ferry can operate at a 50 minute headway, and if 2 ferries are running they can run at 20 minute headways. Figure 8: Ferry Vessel Purchase Schedule provides the number of ferries in operation at a time by phase.

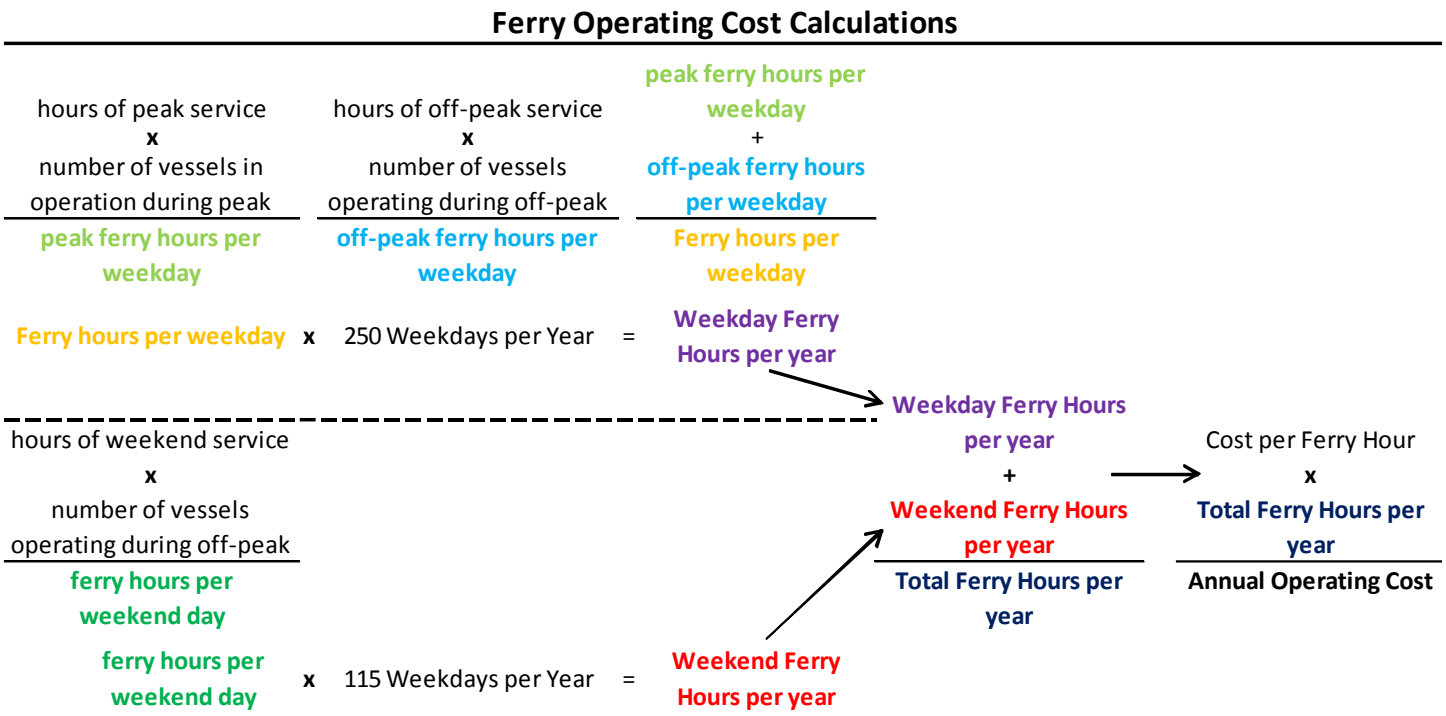
This assumption differs from the TITIP, as the TITIP varies the number of ferries in operation throughout the day and assumes that costs can be similarly scaled. However, due to the labor requirements of operating a ferry, it is most cost-effective to schedule the number of vessels in operation for 8-hour labor shifts. This means that in order to have frequent peak service in both the AM and PM peaks, the

peak level of labor is available throughout the day and the marginal cost of running the service is dramatically reduced (once the labor is already paid for) so it makes sense to run the peak headways all day. The initial financial model Scenarios make this assumption.

Later Scenarios use a revised – and more cost-effective - ferry service plan provided by WETA that draws on interlined service from other routes.

The number of ferries in operation multiplied by the hours they are in operation yield the ferry service hours. The number of ferry hours drives the total operating cost, as they are multiplied by the hourly operating cost per ferry.

Figure 12: Ferry Operating Cost Calculation



ADMIN/OTHER

TIMMA is in charge of the travel demand management for the Island and has the authority to establish congestion pricing fees. TIMMA will also work with AC Transit and WETA to set transit schedules and fares.

TIMMA operations are assumed to employ a key group of employees and consultants to manage and coordinate transportation programs. The annual labor costs associated with these employees is a fixed $1,192,220 (2013$) based on estimates by the SFCTA. While the TITIP provided TIMMA labor cost

assumption, this more refined estimate attempted to capture some of the other roles and positions that would be necessary for TIMMA.

TIMMA INTRA-ISLAND SHUTTLE

The TIMMA Intra-Island Shuttle begins daily service in 2022 (later Scenarios revised the start of service to 2023). Service is planned to be free of charge. Shuttle operating costs are driven by the total service hours and the cost per service hour, therefore the methodology for calculating the shuttle service hours is similar to AC Transit and WETA. The TITIP provided the shuttle hours required for the phases of development as well as the number of shuttle buses required for operations (see Figure 13). The

TIMMA Intra-Island Shuttle Requirements from TITIP								
Year	2018	2019	2022	2023	2024	2027	2028	2030
Dwelling Units	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
Hours of Peak Service - Daily	0	0	6	6	6	6	6	6
Buses in Service (peak hour)	0	0	2	3	3	3	4	4
Hours of Off-Peak Service - Daily	0	0	10	16	18	18	18	18
Buses in Service (off-peak hour)	0	0	2	3	3	3	4	4
Total Hours of Service	0	0	16	22	24	24	24	24

Figure 13: TIMMA Shuttle Requirements

number of required vehicles is multiplied by the time they are in service to realize the total shuttle hours. Weekends are again considered off-peak periods and require fewer shuttle hours. Like AC Transit and WETA, 250 weekdays and 115 weekend days and holidays are assumed per year. The hours per weekday are thus multiplied by 250, and hours per weekend are multiplied by 115. The assumed operating cost per service hour is $80 (2013$) based on a full-service contract that includes maintenance, per SFCTA.

OTHER OPERATING COSTS

There are several additional TIMMA operating costs in the financial model that were included in the TITIP.

The TIMMA bicycle library is both leveraged as an amenity and intended to contribute to the quality of life on TI. The transit center is critical to the operation of buses to/from the Island and the shuttles on the Island. The operating cost of the TIMMA bicycle library is based on an estimate of the cost in 2030 when all units on TI are completed. The 2030 cost of $120,025 (2013$) is based on comparable programs. The full cost is scaled to earlier years based on the percentage of the full 8000 DUs that are completed in the given year.

The TIMMA transit center is assumed to incur a fixed amount of $15,000 (2013$) in O&M costs annually, starting in 2018.

REVENUE

TOLLING

Revenue generated from tolling is one of the primary variables analyzed with the financial model. Revenue generated from tolls varies significantly with changes in toll policy and the resulting changes in forecast demand for driving. Policy variables that affect demand for driving and toll revenue include toll exemptions or discounts for certain populations such as visitors, high occupancy vehicles, or low income residents; when tolling occurs; and the toll rate. Toll revenue is also influenced by the number of residents on the Island and the share of trips made on transit. The demand for transit is provided for year 2030 by the demand model forecasts, and scaled for early years based on service levels.

The driving trip demand from the demand forecasting model is provided as demand on an average weekday. For the financial analysis, the weekday figures had to be annualized. Tolling transaction volumes were annualized using an annualization rate of 300 to account for 260 weekdays per year and additional weekend demand. The annual demand is multiplied by the toll rate to yield the tolling revenue.

Each scenario tested in the financial model modified the policy assumptions that affect toll revenue. Each scenario, its assumptions about toll policy, and the resulting effects on toll revenue are described below in the Results section.

PARKING

Parking revenue is directly related to the demand model output of trip demand which changes based on tolling and transit assumptions. The total parking trips are multiplied by the hourly fee then by the assumed duration of the parking trip. The parking rate during peak periods is $1.50 per hour and the off-peak hourly rate is $1.00. These assumptions differ from the TITIP, which assumes a constant hourly rate of $1.50 from 7:00 AM to 10:00 PM. We assume that parking rates are set based on the SF Park parking rate-setting policy.

The estimated duration of each parking trip is also a key determinant of the parking revenue, and was tested through sensitivity tests of Scenario 2. The average duration of 58 minutes used in the Baseline scenario was based on information provided by SFMTA for downtown “SFpark” facilities and may not correlate well to the nature of trips parking on TI. When investigating the types of trips that visitors would make to TI, a higher estimated average duration of 180 minutes (3 hours) seemed warranted given the high population of recreational and work-related trips.

The parking demand is expressed as an average weekday demand but for the financial analysis, the weekday figures had to be annualized. Tolling transaction volumes were annualized using an annualization rate of 300 to account for 260 weekdays per year and additional weekend demand. Fine

revenue is the second component of parking revenue and is applied when the parking fee is not paid or insufficiently paid. Parking fee revenue is assumed to be 310% of parking fine revenue based on SFMTA's current ratio of fee to fine revenue.

BUS TRANSIT

Bus transit revenue in the financial model includes the fares generated by the AC Transit bus service. The AC Transit demand is an output of the demand model for year 2030, and scaled using Island occupancy and transit headways (resulting in higher demand when headways are smaller and more people live and work on TI). The AC Transit demand provided by the demand model is expressed in trips per average weekday. To convert this demand to an annual amount, an annualization rate of 275 was used. This annualization rate is lower than the annualization rate for driving to account for different travel patterns, levels of congestion, amounts of transit services, and other factors that would generally lead to more transit use during weekdays than weekends. The annual demand is multiplied by the average bus fare of $3.05 to realize the total AC Transit revenue.

To calculate AC Transit revenue, the average transit fare, rather than the base fare, is used. The demand model requires the use of a base cash fare in 2010$, whereas the financial model uses the average fare in 2013$. MTC's clipper data provided an adjustment factor to reduce the base fare to yield the average fare, since some riders will receive a discount due to a variety of programs and passes. The TI AC Service Base Fare level equals the average fare paid on AC Transit's Transbay route, or $4.20.

The annual demand is multiplied by the average fare, which is lower than the base fare, to realize the total AC Transit revenue. Using the average fare was deemed appropriate since some riders will receive a discount due to a variety of low income programs and passes.

FERRY

Ferry revenue is driven by the ferry trip demand from the demand model. Similar to AC Transit demand, the 2030 ferry demand is scaled back to factor in the less frequent service and lower island occupancy in the early years of TI's development. The WETA ferry demand provided by the demand model is expressed in trips per average weekday. To convert this demand to an annual amount, an annualization rate of 275 was used. This annualization rate is lower than the annualization rate for driving to account for different travel patterns, levels of congestion, amounts of transit services, and other factors that would generally lead to more transit use during weekdays than weekends. The annual demand is multiplied by the ferry fare to estimate the total ferry revenue.

In later scenarios, additional recreational demand for ferry use was added to the demand output from the model, based on an expectation of unique destinations to be located on-Island that are not well captured by the demand model. The recreational demand from the existing Sausalito ferry route was used as a proxy for recreational demand for the ferry between TI and San Francisco.

To calculate WETA revenue, the average transit fare, rather than the base fare, is used. WETA provided an adjustment factor to reduce the base fare to yield the average fare, since some riders will receive a discount due to a variety of programs and passes. The base fare used in the demand model is $3.50 (2010$) and $3.75 (2013$). This base fare of $3.75 is scaled down by 73% to realize an average fare of $2.74. This ratio of base to average fares is consistent with the ratio on the existing Alameda to Oakland ferry route.

TIMMA will work with each operator in the next phase of study to determine the fare level for each service. Both the Muni route 25 service and the WETA ferry service will share an origin at the Island's Intermodal Hub and a destination in downtown San Francisco. To balance ridership and avoid crowding on these services, the fare for both services should be equal for pass holders/ frequent riders. We anticipate that the fare for AC Transit service will be a hybrid of AC Transit local and Transbay fares, since the service will have characteristics of both. To maintain fare box cost recovery targets for all services, one-time or cash fares should be set higher than pass holder fares. This fare policy will support strong ferry ridership, reduce crowding on Muni, and achieve a reasonable fare box recovery.

OTHER

TI residents of market rate units will be required to buy a monthly transit voucher. The Baseline assumption is that the voucher will be Clipper value equal to the value of a Muni monthly pass (although the specific features of the pass are to be determined). If administered as Clipper cash, the revenue from these passes will go to the operators as fares per Clipper's revenue distribution policies. The maximum value that can be stored on a Clipper card is $300. If mandatory transit pass purchases accumulate in excess of the $300 Clipper card cap, these excess funds may be redirected to TIMMA to be used for program operations. A business rule regarding the allocation of the excess funds will be adopted prior to the initiation of the program. This potential revenue has not been included in any of the financial analysis scenarios or sensitivity tests due to its uncertainty.

TICD SUBSIDY

The overall transportation program is expected to run a fiscal deficit in the early years of operation as occupancy on TI is growing. The DDA laid out two subsidies that could act as a source of funds for this project, both of which are the obligation of TICD.

The first subsidy is intended to remedy operational deficits that may occur in the early years of operation. Per the DDA and TITIP, TICD is required to pay this subsidy to make up for operational cash flow shortfalls. The subsidy fund starts with $30,000,000 (2011$) and has an annual distribution limit of $4,000,000 (non-escalating) per year. In years where operating cash flows are negative, the subsidy will be distributed to TIMMA to help close the gap and pay for the transportation system operations. As the subsidy is distributed, the balance in the subsidy account is drawn down and not replenished. The subsidy is indexed by CPI as described in the Inflation and Escalation section above while the $4 million

cap is assumed to be constant since the DDA did not specifically include a way to index it (as it did for other items).

The second subsidy is contingent on the transit mode-share. If peak auto mode-share is greater than 50% when there are 4,000 DUs on the Island then a subsidy of $1,000,000 (in YOE$) will be paid by the developer to aid in increasing transit use. The mode share is an output of the demand model and expressed as a percentage of total trips. The total amount of this subsidy is $5,000,000, thus it can be distributed over 5 years. Though this subsidy is independent of the deficit subsidy, if there are funds left over after the 5 installments have been distributed (from interest earned on the initial amount), the remaining funds are distributed at a maximum of $1 million per year.

Both subsidy funds close out at full buildout. At that time, any remaining balance in the funds is distributed to TIMMA, which results in a large subsidy balloon payment in 2030 for some scenarios. This close-out payment is treated as a one-time additional source of revenue in 2030.

The subsidy funds both accrue interest on their undistributed portions, so the total amount distributed can sum to greater than $30,000,000 or $5,000,000. The balance of the subsidy accrues interest, which results in variation across the scenarios of the total amount distributed. The assumption for interest is 2.64% annually based on historic trends in CPI.

SCALING

This section details the scaling and elasticity adjustments to year 2030 demand model outputs required to estimate the pre-2030 year revenues for the transportation system on TI. The assumptions for earlier years try to account for changes in demand that would be anticipated based on the development and service phasing assumptions provided by the TITIP and TICD. However, these are not direct travel demand model outputs and detailed transportation system implementation planning has not been undertaken for each step of TI development.

The demand model produces trips for the relevant modes by direction and time of day for the year 2030, which is when all 8,000 dwelling units are scheduled to be complete and occupied. The demand for 2030 was expressed as an average weekday value, so interpolation of demand to earlier years, as well as a conversion to annual demand was required. During these adjustments, the direction (to or from East Bay/San Francisco) and the time of day (peak or off-peak) are calculated separately to maintain granularity for input into the financial model.

TRANSIT DEMAND: AC TRANSIT BUS SERVICE

The demand for AC Transit bus service to/from TI is interpolated using both the elasticity of demand to a change in headway (time between bus departures from/to TI) and the percent of the total 8,000 dwelling units that are completed. The elasticity is necessary to adjust for lower levels of transit service in earlier years (as described above), which makes transit less attractive relative to auto travel. The adjustment for dwelling units is meant to account for the overall amount of demand for travel to/from the Island. Transportation from TI to the East Bay is limited to two modes: driving and the AC Transit bus service.

The elasticity of driving demand for a change in transit headway was calculated for peak and off-peak periods and used to phase the 2030 AC Transit Bus demand to prior years. AC Transit headways were provided in the TITIP. It is assumed that diversion from the AC Transit service due to increases in headway will directly result in an increase of single-occupant vehicle (SOV) trips (since cross-elasticities with changes to SOV and high-occupancy vehicle (HOV) trips were not available). For instance, in 2023 the time between buses traveling from TI to the East Bay is 20 minutes, which is a 100% difference from the 10 minute headway in 2030. The elasticity is 0.077% for a 1% change in headway during the peak periods, thus bus demand will decrease 7.7% in that year, and the decrease will be directly added to SOV trips. For off-peak trips the elasticity factor is 0.251%. These cross-elasticities between driving and transit were derived from the demand model and are a function of the probability that a traveler will choose to drive, the wait time coefficient, and the wait time value.

The elasticity adjustments for change in headway yield average weekday demand for the AC Transit bus service by year. These amounts are then adjusted for the portion of the 8000 total dwelling units completed over the development period, which serves as a proxy for the number of residents occupying TI and the amount of other activity on the Island. For instance, in 2023, 50% of the full 8,000 dwelling

units are constructed. The model uses this percentage to scale-back the 2023 elasticity-adjusted demand to realize the average weekday demand adjusted for TI occupancy.

TRANSIT DEMAND: WETA FERRY SERVICE

Using a methodology identical to the AC Transit bus service, the WETA demand from 2030 is adjusted for change in demand due to change in ferry headway and the portion of dwelling units completed.

The elasticity factors for peak and off-peak demand change due to headway are the same for the bus and the ferry, and are expressed as a percentage change in headway. Thus, in the early years of development, more ferry trips will be diverted to SOV driving trips as the headways are higher. Diversion from changes in ferry headway is assumed to directly convert to SOV trips at a rate consistent with AC Transit's. Elasticity factors are 0.077% for a 1% change in headway during the peak periods, and 0.251%.for off-peak periods.

After the average weekday ferry demand is adjusted for diversion due to longer headways throughout the development of TI, these yearly values are reduced according to the percentage of the total 8,000 dwelling units completed in the given year.

TRANSIT DEMAND: SAN FRANCISCO BUSES

The TITIP describes the planned bus services to San Francisco. The bus service includes the current Route 25 bus as well as a new Route, then called Route 109, that would go to the Civic Center area. Though the costs and revenue for San Francisco bus transit are not captured in the model, the frequency of the bus service would influence the transit ridership and the number of driving trips.

Route 25 serves a vast majority of the ridership, so it was assumed that the small number of trips diverted to driving would be from this route, rather than Route 109. Route 25 currently runs with short headways during peak hours, however the peak headway in 2030 is expected to be less than the current peak headway (6.25 minutes in 2030 versus the current 12.5 minutes).

The percent difference in Route 25 headways from the headways in 2030 determines the amount of diversion to driving estimated in years when headways are longer. The peak and off-peak cross-elasticities of 0.077% and 0.251% are used to determine the percentage of Route 25 trips converted to SOV trips.

VISITOR PARKING DEMAND

The demand for visitor parking is constrained by the number of spaces available, more specifically, the hours of parking those spaces can accommodate. The 2030 demand for parking accounts for the number of visitor auto trips that will terminate on the island and pay a fee of $1.50 per hour to park on TI. It is assumed that the average paid visitor parking duration will be 180 minutes (3 hours) throughout the forecast period.

The parking build out schedule provided by TICD should be aligned with the expected demand for visitor parking. As more facilities and attractions are developed, more visitors will likely come to TI and require parking. Therefore the number of parking spaces available is a proxy for the level of demand. To scale back parking demand, we assume the 2030 occupancy rates for peak and off-peak periods will apply throughout the forecast period.

RESIDENT SOV DRIVING DEMAND

The driving demand for 2030 is adjusted up by the number of trips diverted from the ferry and bus due to headway, and scaled down by the percent of dwelling units that are completed in a given year. WETA ferry and Route 25 trips that were diverted due to longer headways are added to the San Francisco SOV trips, whereas AC Transit trips that were diverted are added to East Bay SOV trips. As described above, the elasticities of transit demand determine the magnitude of the diversion of transit trips to SOV driving trips.

The elasticity-adjusted driving trips are then scaled back according to the percentage of the total 8,000 dwelling units that are completed in a given year. This adjustment uses the same methodology as the transit trips to account for lower overall demand for travel from the lower number of residents and services on the Island in earlier years.

RESIDENT HOV TRIPS

HOV trips do not incur a toll in some scenarios, and for that reason, the peak HOV volumes are necessary to interpolate due to the operational (enforcement) cost they incur on the toll collection system. These HOV trips made during the early years are scaled to prior years based on the portion of the 8,000 total dwelling units occupied in a given year. An elasticity factor due to increases in transit headway is not applied because 3+ HOV trips are not tolled, and are assumed not to be affected by changes in transit frequency or if they are affected that the changes would be relatively minor. Furthermore, the definition of what constitutes an HOV (how many occupants required) varies over the scenarios tested.

NON-RESIDENT TRIPS TERMINATING ON TREASURE ISLAND

Though the TITIP states that only residents traveling to and from TI will incur a toll, the level of congestion and transit cost warranted the tolled population to be expanded to non-residents and taxis. The demand model provides the non-resident trip volume from 2030. These non-resident trips are then scaled back according to the same occupancy-level methodology as parking demand, since non-resident trips terminating on TI will require parking.

OTHER HIGHWAY TRIPS (TAXIS)

Other highway trips are primarily comprised of taxis and are charged a toll (the demand model does not currently identify other shared-ride services such as Uber and Lyft). This is contrary to the TITIP, which assumes only TI residents will be tolled, thus taxis would travel for free. The demand in 2030 includes trips by residents and non-residents during peak and off-peak hours, however it is assumed that taxi trips will be driven primarily by the number of dwelling units on TI, rather than the available parking. The percentage of dwelling units completed was used to scale back the "Other Highway" demand to prior forecast years using the same methodology as transit.

FINANCIAL ANALYSIS RESULTS

This section of the memo lays out the results of the financial analysis. The results are presented in YOE $ for 2030 and for the full model period from 2015 to 2040. As described in the sections above, the financial analysis breaks down the costs into capital (initial and rehab/renewal) and operating and also presents the operating revenues. Finally, cash flow is looked at from an operating perspective (operating revenue minus operating costs) and net of renewal and net of all capital costs.

It should be noted that 2030 is used as an annual measure of financial performance because the demand was forecast only for that year. However, in some Scenarios, there are some anomalous expense and revenue items in 2030 that affect the financial performance. In some Scenarios, the remaining balance in the developer's subsidy is assumed to payout to the program, resulting in a source of irregular revenue. This remaining balance can vary, depending on how much of the subsidy was used in prior years. On the expense side, some Scenarios include ferry renewal capital costs that affect cash flow from operations net of renewal costs that occur in 2030.

The financial analysis includes 5 full demand model scenarios as well as several model sensitivities for some of the full demand model scenarios. Each scenario involves changes in demand model results based on policy changes in demand model inputs. Meanwhile, sensitivity tests hold demand results as constant from a specific scenario and only test the financial implications of a potential change (without accounting for dynamic demand responses). Sensitivity tests were used to help analyze what potential additional scenarios should be tested using the demand model.

After running the demand and financial model to adhere to the assumptions laid out in the TITIP, additional demand scenarios were conducted in which various assumptions were adjusted. Each new scenario uses different tolling and other parameters, thus the output from the demand modeling varies across the scenarios. The financial model analyzes the implications of these policy and demand changes.

Table 1 (below) presents a summary of the financial analysis results for each scenario. The rest of the section will describe the assumptions for each scenario and present a more detailed set of results. Additionally, sensitivity test results are presented in brief. Figure 13 describes the major changes in assumptions for each scenario and sensitivity test.

* all amounts in YOE $s	Scenario 1.1 (Corrected Baseline)	Scenario 2 (Extend Toll to Visitors)	Scenario 3 (Variable Toll Rates)	Scenario 4.0 (Extended Toll Hours)	Scenario 4.4 (Recommended Toll Policies)	Scenario 5 (Means Based Toll Discount)
Cost Categories	**2030 Results**	**2030 Results**	**2030 Results**	**2030 Results**	**2030 Results**	**2030 Results**
Capital Costs						
Parking (Renewal)	503,871	503,871	503,871	503,871	225,389	503,871
Toll System (Initial)	-	-	-	-	-	-
Toll System (Renewal)	-	-	-	-	-	-
AC Transit Bus (Expansion)	-	-	-	-	957,545	-
AC Transit Bus (Renewal)	-	-	-	-	-	-
WETA Vessel (Initial)	-	-	-	-	-	-
WETA Vessel (Renewal)	24,169,615	24,169,615	24,169,615	24,169,615	-	24,169,615
WETA Vessel Debt Service	-	-	-	-	-	-
Shuttle Bus (Expansion)	-	-	-	-	-	-
Shuttle Bus (Renewal)	291,287	291,287	291,287	291,287	873,861	291,287
Administrative (Initial)	-	-	-	-	-	-
Administrative (Ongoing)	101,193	101,193	101,193	101,193	56,472	101,193
Capital Cost Subtotal (Initial and Expansion)	-	-	-	-	957,545	-
Initial Capital Cost Contingency	-	-	-	-	191,509	-
Capital Cost Total (Initial and Expansion)	**-**	**-**	**-**	**-**	**1,149,054**	**-**
Capital Cost Subtotal (Renewal)	25,065,965	25,065,965	25,065,965	25,065,965	1,155,722	25,065,966
Renewal Capital Cost Contingency	5,013,193	5,013,193	5,013,193	5,013,193	231,144	5,013,193
Capital Cost Total (Renewal)	**30,079,159**	**30,079,159**	**30,079,159**	**30,079,159**	**1,386,866**	**30,079,159**
Capital Cost Total	**30,079,159**	**30,079,159**	**30,079,159**	**30,079,159**	**2,535,921**	**30,079,159**
Operating Costs						
Parking	4,528,844	4,528,844	4,528,844	4,528,844	4,528,844	4,528,844
Toll System Transaction Costs	2,207,420	2,297,394	1,716,704	3,282,945	3,375,753	3,380,413
Toll System Operating Costs	632,279	632,279	632,279	632,279	632,279	632,279
AC Transit	5,991,715	5,991,715	5,991,715	5,991,715	4,204,331	5,991,715
WETA	23,030,996	23,030,996	23,030,996	23,030,996	16,590,466	23,030,996
Shuttle Bus	4,365,530	4,365,530	4,365,530	4,365,530	4,365,530	4,365,530
Administrative / TDM	3,533,981	3,533,981	3,533,981	3,533,981	1,867,869	3,533,981
Low Income Subsidy	-	-	-	-	3,926,958	-
Operating Cost Subtotal	44,290,767	44,380,740	43,800,050	45,366,291	39,492,031	45,463,759
Operating Cost Contingency	8,858,153	8,876,148	8,760,010	9,073,258	7,898,406	9,092,752
Operating Cost Total	**53,148,920**	**53,256,888**	**52,560,060**	**54,439,550**	**47,390,437**	**54,556,511**
Revenue						
Parking	4,780,788	4,821,239	4,468,034	4,354,084	5,465,166	4,381,836
Parking Fines	1,536,741	1,555,073	1,456,001	1,404,503	1,781,536	1,412,577
Toll System	11,445,076	33,160,992	28,511,866	44,663,854	41,151,018	45,236,648
AC Transit	4,102,829	4,587,436	4,576,986	4,903,540	4,179,683	4,643,603
WETA	2,007,121	2,166,565	3,081,010	3,666,789	3,267,779	3,373,693
TIMMA Bikeshare	170,080	170,080	170,080	170,080	152,562	170,080
TICD Subsidy	7,146	7,146	7,146	7,944,026	-	7,791,789
Other Contributions (TICD Exchange, Grant Funding, V	-	-	-	-	-	-
Revenue Total	**24,049,781**	**46,468,530**	**42,271,124**	**67,106,877**	**55,997,744**	**67,010,226**
Net Cash Flow From Operations (after subsidy)	**(29,099,139)**	**(6,788,357)**	**(10,288,936)**	**12,667,327**	**8,607,307**	**12,453,716**
Cash Flow From Operations Net of Renewal Costs	**(59,178,297)**	**(36,867,516)**	**(40,375,240)**	**(25,355,858)**	**7,220,440**	**(25,417,232)**
Cash Flow From Operations Net of Total Capital Co	**(59,178,297)**	**(36,867,516)**	**(40,375,240)**	**(25,355,858)**	**6,071,386**	**(25,417,232)**

Table 1: Financial Results Scenario Summary

Figure 13: Policy Changes by Scenario

Scenario	Sensitivity Test		Major Policy / Input Changes
1	TITIP Baseline		Reflects assumptions of the TITIP, updated to reflect most current unit costs
	1	Corrected Baseline	WETA capital and operating cost assumptions adjusted based on WETA
			Average parking duration increased to 3 hours
2	Toll Extended		Toll extended to visitor, weekend, and midday drive trips
	1	Parking Duration	Parking duration increased to 5 hours
	2	Parking Supply	Off-street parking supply reduced to match demand
	3	Reduced Ferry	One ferry in operation at 30 minute headways
			Recreational ferry demand included
3	Variable Toll		Lower off-peak toll, higher peak toll level
	1	Parking Sensors	Automated parking occupancy sensors replaced w alternative
	2	HOV Definition	Only vanpools qualify for HOV exemption
	3	SFOBB Credit	Westbound east span drivers credited for SFOBB toll
	4	Hours of Operation	Toll hours of operation extended to match transit hours of operation
4	Extended Toll Hours		Toll hours set to match transit service hours Only vanpools qualify for HOV exemption Westbound east span direction toll set at $2
	1	Delayed Ferry Start	Ferry start assumed to begin in 2022, per DDA obligations
	2	Escalation Rates	Toll rates set to escalate as a function of transit operating costs and CPI
	3	Shared Spare Ferry	One fewer ferry vessel purchased / spare ferry to be shared
			Federal funding for transit renewal costs included
	3.3	Revised Toll Rates	Toll rates reduced in early years
			Grant funded for purchase and operations of first ferry
	4	Multimodal TAP	Multimodal Transportation Affordability Program (TAP) included
	4.3	Capital exchange	Transit service phasing adjusted in early years
			TICD vehicle obligations swapped for ferry vessel funding
5	Means-Based Toll Discount		50% Toll discount for very low income residents

SCENARIO 1.0: BASELINE

The Baseline Scenario (1.0) attempts to reflect the policies and input parameters set forth in the TITIP where possible. Some inputs were updated to reflect more up to date information but the majority of model parameters were taken directly from the TITIP. The policies in the TITIP called for only tolling residents of TI in both directions with HOVs (defined as occupancy of at least 3 passengers (HOV 3+)) exempt from paying tolls. The tolling would occur only during the morning (6 to 9 AM) and afternoon (3:30 to 6:30 PM) peak periods on weekdays at a rate of $5 (2013$) per trip each way. All trips outside of these times would not incur tolls.

Table 3 shows the results for Scenario 1. This scenario was not financially solvent in 2030 and experienced a cash flow shortfall in each forecast year. Although the scenario generally follows many of the TITIP assumptions and inputs, both the demand forecast and the system's financial performance differ significantly from the TITIP analysis. Several of the assumptions detailed in the TITIP were outdated and required revision in order to yield a reasonable set of financial results, so a revised baseline scenario (1.1) was created to address some of the outstanding cost input issues.

Many of the subsequent changes were based on discussions with the various transit operators or data from other operating experience.

Table 1: Scenario 1.0 Detailed Results

* all amounts in YOE$

Cost Categories	Unit	Scenario 1.0 (TITIP Baseline) Total (2015 - 2040)	Scenario 1.0 (TITIP Baseline) 2030 Results
Capital Costs			
Parking (Renewal)	$YOE	7,348,082	503,871
Toll System (Initial)	$YOE	2,757,996	
Toll System (Renewal)	$YOE	3,175,639	
AC Transit Bus (Renewal)	$YOE	8,361,849	4,787,726
WETA Vessel (Initial)	$YOE	33,107,461	
WETA Vessel (Renewal)	$YOE	18,011,481	
Shuttle Bus (Renewal)	$YOE	2,222,411	291,287
Administrative (Initial)	$YOE	15,849	
Administrative (Ongoing)	$YOE	2,081,120	97,897
Capital Cost Subtotal (Initial)	$YOE	35,881,306	
Initial Capital Cost Contingency	$YOE	7,176,261	
Capital Cost Total (Initial)	**$YOE**	**43,057,567**	
Capital Cost Subtotal (Renewal)	$YOE	41,200,583	5,680,781
Renewal Capital Cost Contingency	$YOE	8,240,117	1,136,156
Capital Cost Total (Renewal)	**$YOE**	**49,440,699**	**6,816,937**
Capital Cost Total	**$YOE**	**92,498,266**	**6,816,937**
Operating Costs			
Parking	$YOE	77,048,497	4,528,844
Toll System Transaction Costs	$YOE	46,320,923	2,547,024
Toll System Operating Costs	$YOE	14,380,973	632,279
AC Transit	$YOE	79,863,903	4,253,400
WETA	$YOE	601,571,599	29,093,792
Shuttle Bus	$YOE	77,584,962	4,365,530
Administrative / TDM	$YOE	72,255,583	3,424,968
Operating Cost Subtotal	$YOE	969,026,439	48,845,837
Operating Cost Contingency	$YOE	193,805,288	9,769,167
Operating Cost Total	**$YOE**	**1,162,831,727**	**58,615,005**
Revenue			
Parking	$YOE	33,592,117	1,777,473
Parking Fines	$YOE	10,899,240	573,411
Toll System	$YOE	241,909,401	13,205,857
AC Transit	$YOE	71,322,603	4,102,829
WETA	$YOE	35,547,384	2,007,121
TIMMA Bikeshare	$YOE	3,059,216	170,080
TICD Subsidy	$YOE	45,111,663	7,146
Revenue Total	**$YOE**	**441,441,623**	**21,843,917**
Net Cash Flow From Operations (after subsidy)	**$YOE**	**(721,390,104)**	**(36,771,088)**
Cash Flow From Operations Net of Renewal Costs	**$YOE**	**(770,830,803)**	**(43,588,025)**
Cash Flow From Operations Net of Total Capital Costs	**$YOE**	**(813,888,370)**	**(43,588,025)**
Cumulative Net Cash Flow From Operations	$YOE	N/A	N/A
Cumulative TICD Subsidy Expended (excl. closeout)	$YOE	N/A	N/A
Years of Cash Flow Shortfall	Years	23	1

It is worth noting that in year 2030 the remaining balance of the subsidy is paid out, sometimes resulting in a balloon payment in that year. The magnitude of this payout depends on how much of the subsidy was distributed in the early forecast years. For instance, if transit mode share met requirements, there would be a larger subsidy balance paid out in 2030 as fewer funds were distributed in the early forecast years.

SENSITIVITY TEST: SCENARIO 1.1: CORRECTED BASELINE

Scenario 1.1 was intended to reflect the major policies (on who is tolled, when and how much, and how much transit is provided) from the TITIP, but revise some of the operating assumptions to better reflect current knowledge and form a model run that would serve as an appropriate comparison to further model runs. Scenario 1.1 should be regarded as the baseline scenario that best reflects updated input information while maintaining the TITIP transportation policies.

Because ferry operations incurred substantial costs within the financial model, WETA was consulted to reevaluate several of the assumptions. Changes to the ferry assumptions made in Scenario 1.1 include a reduced hourly ferry cost, higher ferry initial purchase costs, and a reduction in the number of ferries in operation (though not the number of ferries purchased due to the need for a spare). The hourly ferry cost was revised based on advice from WETA from $1,325 (2013$) to $1,181 (2013$) per ferry hour of operation in order to reflect the current cost of operations. The initial assumption of a $9 million (2013$) purchase cost per ferry was increased to $14 million (2013$) since WETA recommended the purchase of a

Table 4: Scenario 1.1 Detailed Results

* all amounts in YOE$

Cost Categories	Unit	Scenario 1.1 (Corrected Baseline) Total (2015 - 2040)	2030 Results
Capital Costs			
Parking (Renewal)	$YOE	7,348,082	503,871
Toll System (Initial)	$YOE	2,757,996	-
Toll System (Renewal)	$YOE	3,175,639	-
AC Transit Bus (Renewal)	$YOE	6,204,354	-
WETA Vessel (Initial)	$YOE	51,267,345	-
WETA Vessel (Renewal)	$YOE	45,828,756	24,169,615
Shuttle Bus (Renewal)	$YOE	2,222,411	291,287
Administrative (Initial)	$YOE	15,849	-
Administrative (Ongoing)	$YOE	2,156,063	101,193
Capital Cost Subtotal (Initial)	$YOE	54,041,190	
Initial Capital Cost Contingency	$YOE	10,808,238	
Capital Cost Total (Initial)	**$YOE**	**64,849,428**	
Capital Cost Subtotal (Renewal)	$YOE	66,935,306	25,065,965
Renewal Capital Cost Contingency	$YOE	13,387,061	5,013,193
Capital Cost Total (Renewal)	**$YOE**	**80,322,367**	**30,079,159**
Capital Cost Total	**$YOE**	**145,171,795**	**30,079,159**
Operating Costs			
Parking	$YOE	77,048,497	4,528,844
Toll System Transaction Costs	$YOE	40,144,800	2,207,420
Toll System Operating Costs	$YOE	14,380,973	632,279
AC Transit	$YOE	115,953,527	5,991,715
WETA	$YOE	486,995,049	23,030,996
Shuttle Bus	$YOE	77,584,962	4,365,530
Administrative / TDM	$YOE	74,735,061	3,533,981
Operating Cost Subtotal	$YOE	886,842,868	44,290,767
Operating Cost Contingency	$YOE	177,368,574	8,858,153
Operating Cost Total	**$YOE**	**1,064,211,441**	**53,148,920**
Revenue			
Parking	$YOE	90,351,210	4,780,788
Parking Fines	$YOE	29,209,930	1,536,741
Toll System	$YOE	209,654,814	11,445,076
AC Transit	$YOE	71,322,603	4,102,829
WETA	$YOE	35,547,384	2,007,121
TIMMA Bikeshare	$YOE	3,059,216	170,080
TICD Subsidy	$YOE	45,111,663	7,146
Revenue Total	**$YOE**	**484,256,821**	**24,049,781**
Net Cash Flow From Operations (after subsidy)	**$YOE**	**(579,954,621)**	**(29,099,139)**
Cash Flow From Operations Net of Renewal Costs	**$YOE**	**(660,276,988)**	**(59,178,297)**
Cash Flow From Operations Net of Total Capital Costs	**$YOE**	**(725,126,415)**	**(59,178,297)**
Cumulative Net Cash Flow From Operations	$YOE	N/A	N/A
Cumulative TICD Subsidy Expended (excl. closeout)	$YOE	N/A	N/A
Years of Cash Flow Shortfall	Years	23	1

ferry with higher (399-person) capacity. These vessels also corresponded to a different rehab cycle, with 2 quarter-life and 1 half-life rehab. WETA also confirmed 2 ferries in operation could provide approximately 20 minute headways, as opposed to the 3 required in the TITIP. Therefore, the number of ferries in operation in 2030 was reduced from 3 to 2. These changes to ferry operations were applied to most future scenarios, as they are consistent with current WETA recommendations, which differed from the TITIP.

Both WETA and AC Transit provided higher escalation rates for operating costs than the standard CPI of 2.64%. AC Transit suggested an annual inflation rate of 4.25%, while WETA's suggested rate was 4%. Both rates are higher based on experienced increases in costs in recent years. Because WETA and AC Transit operating costs are a substantial portion of the program costs, these changes had a significant impact on costs.

The parking duration was also revised from 58 minutes to 3 hours per parking trip. The share of parking trips related to commuters who worked on the island indicated that 58 minutes was too conservative, and the average stay was likely longer. Due to the unique nature of visitor trip planning on TI, visitor parking may have a longer average duration compared to San Francisco. Parkers will not likely run neighborhood errands, as they might in San Francisco, but rather identify numerous sites to visit, thus adding to the total duration of their parking time. In addition, the share of work-related visitor trips warranted a higher duration, as some visitors would park on TI during their entire workday. This assumption is also extended to most future scenarios since it reflects an improved estimate from the initial assumptions based on other SFTMA properties.

This sensitivity test still resulted in negative operating cash flows in all periods but generally performed better than Scenario 1.0. These key changes were perceived as updates to the TITIP and persisted throughout most of the scenarios going forward.

SCENARIO 2.0: EXTENDED TOLL

Acknowledging the cash flow shortfalls in Scenario 1, Scenario 2 sought to increase tolling revenue by increasing the tolling hours and expanding the tolled populations. Scenario 2 assumed that both residents and non-residents are charged the toll in both directions, with the same exemption for HOV 3+ trips and transit vehicles as Scenario 1. In addition, tolling was extended to trips during the midday (9 AM to 3:30 PM) and weekends. Because the bridge experiences congestion during the midday, applying a toll to this period would both increase tolling revenue and manage recurring congestion. The same $5 one-way toll was used at all times in Scenario 2 as Scenario 1.

These changes impacted the tolling revenue, increasing it from $209 million in Scenario 1.0 to $603 million (YOE$), or by 288%, over the forecast period. Tolling revenue went up from $11.4 million to $33.2 million in 2030 (2030$). Though the volume of tolled trips increased significantly, the tolling operations costs only increased marginally from Scenario 1.0/1.1 due to the assumed adoption of both transponder and photo tolling technology that would allow residents and non-residents to be tolled. Other minor changes in the results included additional transit revenues from the mode shift of some auto users to transit when a toll was applied. Scenario 2 has positive annual cash flows in 2023, due to the receipt of a subsidy payment. Year 2023 was the only year with positive cash flows.

Table 5: Scenario 2.0 Detailed Results

* all amounts in YOE$

Cost Categories	Unit	Scenario 2 (Extended Toll) Total (2015 - 2040)	Scenario 2 (Extended Toll) 2030 Results
Capital Costs			
Parking (Renewal)	$YOE	7,348,082	503,871
Toll System (Initial)	$YOE	2,757,996	-
Toll System (Renewal)	$YOE	3,175,639	-
AC Transit Bus (Renewal)	$YOE	6,204,354	-
WETA Vessel (Initial)	$YOE	51,267,345	-
WETA Vessel (Renewal)	$YOE	45,828,756	24,169,615
Shuttle Bus (Renewal)	$YOE	2,222,411	291,287
Administrative (Initial)	$YOE	15,849	-
Administrative (Ongoing)	$YOE	2,156,063	101,193
Capital Cost Subtotal (Initial)	$YOE	54,041,190	-
Initial Capital Cost Contingency	$YOE	10,808,238	-
Capital Cost Total (Initial)	**$YOE**	**64,849,428**	**-**
Capital Cost Subtotal (Renewal)	$YOE	66,935,306	25,065,965
Renewal Capital Cost Contingency	$YOE	13,387,061	5,013,193
Capital Cost Total (Renewal)	**$YOE**	**80,322,367**	**30,079,159**
Capital Cost Total	**$YOE**	**145,171,795**	**30,079,159**
Operating Costs			
Parking	$YOE	77,048,497	4,528,844
Toll System Transaction Costs	$YOE	41,801,289	2,297,394
Toll System Operating Costs	$YOE	14,380,973	632,279
AC Transit	$YOE	115,953,527	5,991,715
WETA	$YOE	486,995,049	23,030,996
Shuttle Bus	$YOE	77,584,962	4,365,530
Administrative / TDM	$YOE	74,735,061	3,533,981
Operating Cost Subtotal	$YOE	888,499,357	44,380,740
Operating Cost Contingency	$YOE	177,699,871	8,876,148
Operating Cost Total	**$YOE**	**1,066,199,228**	**53,256,888**
Revenue		120,732,510	
Parking	$YOE	91,160,175	4,821,239
Parking Fines	$YOE	29,572,335	1,555,073
Toll System	$YOE	603,367,334	33,160,992
AC Transit	$YOE	79,693,579	4,587,436
WETA	$YOE	38,372,373	2,166,565
TIMMA Bikeshare	$YOE	3,059,216	170,080
TICD Subsidy	$YOE	45,111,663	7,146
Revenue Total	**$YOE**	**890,336,675**	**46,468,530**
Net Cash Flow From Operations (after subsidy)	**$YOE**	**(175,862,553)**	**(6,788,357)**
Cash Flow From Operations Net of Renewal Costs	**$YOE**	**(256,184,920)**	**(36,867,516)**
Cash Flow From Operations Net of Total Capital Costs	**$YOE**	**(321,034,348)**	**(36,867,516)**
Cumulative Net Cash Flow From Operations	$YOE	N/A	N/A
Cumulative TICD Subsidy Expended (excl. closeout)	$YOE	N/A	N/A
Years of Cash Flow Shortfall	Years	22	1

SENSITIVITY TEST: SCENARIO 2.1: LONGER PARKING DURATION

Scenario 2.1 was conducted to measure the potential revenue gains if vehicles are parked longer than the assumed 3 hours. For this sensitivity test, the average parking duration was changed from 3 hours to 5 hours, which increased the parking fee and fine revenue from $120 million to $221 million over the forecast period. Parking revenue went up from $6.4 million to $11.7 million in 2030 (2030$). The 5-hour duration was based on the SF-CHAMP demand model, and perceived as a high bookend for parking duration. Because a high percentage of parking trips to TI were work-related, the duration of the parking may be closer to the length of a traditional work day. The additional revenue was enough for the overall transportation system to break even in 3 years but not in 2030.

Table 6: Scenario 2.1 Detailed Results

* all amounts in YOE$

Cost Categories	Unit	Scenario 2.1 (Longer Parking Duration) Total (2015 - 2040)	2030 Results
Capital Costs			
Parking (Renewal)	$YOE	7,348,082	503,871
Toll System (Initial)	$YOE	2,757,996	-
Toll System (Renewal)	$YOE	3,175,639	-
AC Transit Bus (Renewal)	$YOE	6,204,354	-
WETA Vessel (Initial)	$YOE	51,267,345	-
WETA Vessel (Renewal)	$YOE	45,828,756	24,169,615
Shuttle Bus (Renewal)	$YOE	2,222,411	291,287
Administrative (Initial)	$YOE	15,849	-
Administrative (Ongoing)	$YOE	2,156,063	101,193
Capital Cost Subtotal (Initial)	$YOE	54,041,190	-
Initial Capital Cost Contingency	$YOE	10,808,238	-
Capital Cost Total (Initial)	**$YOE**	**64,849,428**	**-**
Capital Cost Subtotal (Renewal)	$YOE	66,935,306	25,065,965
Renewal Capital Cost Contingency	$YOE	13,387,061	5,013,193
Capital Cost Total (Renewal)	**$YOE**	**80,322,367**	**30,079,159**
Capital Cost Total	**$YOE**	**145,171,795**	**30,079,159**
Operating Costs			
Parking	$YOE	77,048,497	4,528,844
Toll System Transaction Costs	$YOE	41,801,289	2,297,394
Toll System Operating Costs	$YOE	14,380,973	632,279
AC Transit	$YOE	115,953,527	5,991,715
WETA	$YOE	486,995,049	23,030,996
Shuttle Bus	$YOE	77,584,962	4,365,530
Administrative / TDM	$YOE	74,735,061	3,533,981
Operating Cost Subtotal	$YOE	888,499,357	44,380,740
Operating Cost Contingency	$YOE	177,699,871	8,876,148
Operating Cost Total	**$YOE**	**1,066,199,228**	**53,256,888**
Revenue		221,347,092	
Parking	$YOE	167,126,987	8,838,938
Parking Fines	$YOE	54,220,105	2,851,186
Toll System	$YOE	603,367,334	33,160,992
AC Transit	$YOE	79,693,579	4,587,436
WETA	$YOE	38,372,373	2,166,565
TIMMA Bikeshare	$YOE	3,059,216	170,080
TICD Subsidy	$YOE	45,352,626	1,060,643
Revenue Total	**$YOE**	**991,192,220**	**52,835,839**
Net Cash Flow From Operations (after subsidy)	**$YOE**	**(75,007,008)**	**(421,049)**
Cash Flow From Operations Net of Renewal Costs	**$YOE**	**(155,329,376)**	**(30,500,207)**
Cash Flow From Operations Net of Total Capital Costs	**$YOE**	**(220,178,803)**	**(30,500,207)**
Cumulative Net Cash Flow From Operations	$YOE	N/A	N/A
Cumulative TICD Subsidy Expended (excl. closeout)	$YOE	N/A	N/A
Years of Cash Flow Shortfall	Years	20	1

SENSITIVITY TEST: SCENARIO 2.2: LOWER PARKING SUPPLY

Scenario 2.2 sought to measure the cost reduction of lowering parking supply to a level better suited for the demand. The forecasted parking demand in Scenario 2.0 results in relatively low parking occupancy throughout the build-out schedule. The off-street structured parking drives parking operating costs higher, so Scenario 2.2 reduced the supply for the more expensive parking options to reflect San Francisco's targeted parking occupancy rate. In Scenario 2.2, parking supply was reduced so that occupancy rates would reach 80% in the peak periods. The off-street structured parking was completely eliminated and some off-street surface spaces were also removed. This reduced the operating costs for parking from $77 million in Scenario 2.0, to $37 million (YOE$) over the forecast period. Parking costs went down from $4.5 million to $2.2 million in 2030 (2030$). However, it is important to note that the final amount of parking that will be built will be decided by TICD and TIDA and is thus outside of direct TIMMA control.

Table 7: Scenario 2.2 Detailed Results

* all amounts in YOE$

Cost Categories	Unit	Scenario 2.2 (Lower Parking Supply) Total (2015 - 2040)	2030 Results
Capital Costs			
Parking (Renewal)	$YOE	7,294,972	503,87
Toll System (Initial)	$YOE	2,757,996	-
Toll System (Renewal)	$YOE	3,175,639	-
AC Transit Bus (Renewal)	$YOE	6,204,354	-
WETA Vessel (Initial)	$YOE	51,267,345	-
WETA Vessel (Renewal)	$YOE	45,828,756	24,169,61
Shuttle Bus (Renewal)	$YOE	2,222,411	291,28
Administrative (Initial)	$YOE	15,849	-
Administrative (Ongoing)	$YOE	2,156,063	101,19
Capital Cost Subtotal (Initial)	$YOE	54,041,190	-
Initial Capital Cost Contingency	$YOE	10,808,238	-
Capital Cost Total (Initial)	**$YOE**	**64,849,428**	**-**
Capital Cost Subtotal (Renewal)	$YOE	66,882,196	25,065,96
Renewal Capital Cost Contingency	$YOE	13,376,439	5,013,19
Capital Cost Total (Renewal)	**$YOE**	**80,258,635**	**30,079,15**
Capital Cost Total	**$YOE**	**145,108,063**	**30,079,15**
Operating Costs			
Parking	$YOE	37,173,749	2,186,46
Toll System Transaction Costs	$YOE	41,913,689	2,297,27
Toll System Operating Costs	$YOE	14,380,973	632,27
AC Transit	$YOE	115,953,527	5,991,71
WETA	$YOE	486,995,049	23,030,99
Shuttle Bus	$YOE	77,584,962	4,365,53
Administrative / TDM	$YOE	74,735,061	3,533,98
Operating Cost Subtotal	$YOE	848,737,009	42,038,24
Operating Cost Contingency	$YOE	169,747,402	8,407,64
Operating Cost Total	**$YOE**	**1,018,484,410**	**50,445,88**
Revenue			
Parking	$YOE	91,170,419	4,821,23
Parking Fines	$YOE	29,578,931	1,555,24
Toll System	$YOE	604,989,734	33,159,27
AC Transit	$YOE	79,693,579	4,587,43
WETA	$YOE	38,372,373	2,166,56
TIMMA Bikeshare	$YOE	3,059,216	170,08
TICD Subsidy	$YOE	45,111,663	7,14
Revenue Total	**$YOE**	**891,975,916**	**46,466,98**
Net Cash Flow From Operations (after subsidy)	**$YOE**	**(126,508,494)**	**(3,978,90**
Cash Flow From Operations Net of Renewal Costs	**$YOE**	**(206,767,130)**	**(34,058,06**
Cash Flow From Operations Net of Total Capital Costs	**$YOE**	**(271,616,557)**	**(34,058,06**
Cumulative Net Cash Flow From Operations	$YOE	N/A	N/A
Cumulative TICD Subsidy Expended (excl. closeout)	$YOE	N/A	N/A
Years of Cash Flow Shortfall	Years	22	

SENSITIVITY TEST: SCENARIO 2.3: REDUCED FERRY SERVICE

This sensitivity test changed assumptions associated with the ferry service with the objective of lowering operating costs. Instead of 20-minute headways throughout the day, only 50-minute headways are assumed. This allows for a significant reduction in ferry operating costs, as only 1 ferry is necessary to run 50-minute service. The ferry operating costs were significantly reduced, from $486 million to $307 million (YOE$) over the forecast period, and from $23 million to $13 million in 2030 (2030$). The reduction in ferry service also reduced ferry capital costs, since one less ferry was required to meet the 30-minute headways. This reduced capital costs from $97 million to $63 million (YOE$) over the forecast period. The result of these cost reductions was a positive operating cash flow in 2030 of $17.5 million (YOE$).

In addition, a preliminary estimate of additional recreational ferry demand is added, which increases the ferry revenue. The demand model was not thought to capture off-peak recreational demand, so the existing recreational demand from the Sausalito ferry route doubled as a proxy for recreational demand from TI to San Francisco. The average weekday recreational demand for the Sausalito ferry route was scaled to an annual amount using the standard factor of 275. Before ferry service is at its full level of operations in 2024, the recreational ridership is assumed to be 50 percent lower, as TI will be less developed an attract fewer recreational trips. The reduced ferry costs resulted in cash flow shortfalls only in 5 years, a significant improvement on the baseline.

Table 8: Scenario 2.3 Detailed Results

* all amounts in YOE$

Cost Categories	Unit	Scenario 2.3 (Reduced Ferry Service) Total (2015 - 2040)	2030 Results
Capital Costs			
Parking (Renewal)	$YOE	7,348,082	503,871
Toll System (Initial)	$YOE	2,757,996	-
Toll System (Renewal)	$YOE	3,175,639	-
AC Transit Bus (Renewal)	$YOE	6,204,354	-
WETA Vessel (Initial)	$YOE	32,364,935	-
WETA Vessel (Renewal)	$YOE	30,861,047	21,972,377
Shuttle Bus (Renewal)	$YOE	2,222,411	291,287
Administrative (Initial)	$YOE	15,849	-
Administrative (Ongoing)	$YOE	2,156,063	101,193
Capital Cost Subtotal (Initial)	$YOE	35,138,780	-
Initial Capital Cost Contingency	$YOE	7,027,756	
Capital Cost Total (Initial)	**$YOE**	**42,166,536**	
Capital Cost Subtotal (Renewal)	$YOE	51,967,597	22,868,728
Renewal Capital Cost Contingency	$YOE	10,393,519	4,573,746
Capital Cost Total (Renewal)	**$YOE**	**62,361,116**	**27,442,473**
Capital Cost Total	**$YOE**	**104,527,653**	**27,442,473**
Operating Costs			
Parking	$YOE	77,048,497	4,528,844
Toll System Transaction Costs	$YOE	41,758,194	2,297,394
Toll System Operating Costs	$YOE	14,380,973	632,279
AC Transit	$YOE	115,953,527	5,991,715
WETA	$YOE	307,271,825	13,434,748
Shuttle Bus	$YOE	77,584,962	4,365,530
Administrative / TDM	$YOE	74,735,061	3,533,981
Operating Cost Subtotal	$YOE	708,733,038	34,784,491
Operating Cost Contingency	$YOE	141,746,608	6,956,898
Operating Cost Total	**$YOE**	**850,479,646**	**41,741,390**
Revenue			
Parking	$YOE	90,789,559	4,821,239
Parking Fines	$YOE	29,476,270	1,555,073
Toll System	$YOE	602,745,295	33,160,992
AC Transit	$YOE	79,693,579	4,587,436
WETA	$YOE	42,467,549	2,385,801
TIMMA Bikeshare	$YOE	3,059,216	170,080
TICD Subsidy	$YOE	46,379,013	12,552,073
Revenue Total	**$YOE**	**894,610,482**	**59,232,694**
Net Cash Flow From Operations (after subsidy)	**$YOE**	**44,130,836**	**17,491,304**
Cash Flow From Operations Net of Renewal Costs	**$YOE**	**(18,230,280)**	**(9,951,169)**
Cash Flow From Operations Net of Total Capital Costs	**$YOE**	**(60,396,816)**	**(9,951,169)**
Cumulative Net Cash Flow From Operations	$YOE	N/A	N/A
Cumulative TICD Subsidy Expended (excl. closeout)	$YOE	N/A	N/A
Years of Cash Flow Shortfall	Years	5	-

SCENARIO 3: VARIABLE TOLL

This scenario incorporates time-of-day pricing and changes the population who is charged the toll. Time-of-day pricing is intended to impact the driving behavior, by converting driving trips to transit or moving driving trips outside the peak periods. In Scenario 3, trips coming from the East Bay to TI were not charged the toll, as they already pay a toll when crossing the Bay Bridge. This exemption was introduced to address concerns that the toll for those coming from the East Bay would be prohibitive when added on top of the existing bridge toll.

The time-of-day pricing sets the peak toll rate at $8 (2013$), while the off-peak rate is reduced to $4, in contrast to the constant $5 charged in Scenarios 1 and 2. The increased peak toll rate and the reduced off-peak toll rate were intended to remain roughly revenue neutral while creating stronger incentives for people to switch their trips from the peak to the off-peak periods. The off-peak tolled period is still defined as 9AM to 3:30PM, while there is no toll on evening or overnight (the period after the PM peak and before the AM peak) trips.

Tolling revenue for Scenario 3.0 was $520 million (YOE$) over the forecast period and $28.5 million in 2030 (2030$). While Scenario 3.0 resulted in toll revenue greater than the baseline, the exemption of westbound trips from the East Bay brought the tolling revenue below the Scenario 2.0 level. The change from a flat all day toll to a variable toll increased

Table 9: Scenario 3.0 Detailed Results

* all amounts in YOE$	Scenario 3 (Variable Toll)	
Cost Categories	**Total (2015 - 2040)**	**2030 Results**
Capital Costs		
Parking (Renewal)	7,348,082	503,871
Toll System (Initial)	2,757,996	-
Toll System (Renewal)	3,175,639	-
AC Transit Bus (Renewal)	6,204,354	-
WETA Vessel (Initial)	51,267,345	-
WETA Vessel (Renewal)	45,828,756	24,169,615
Shuttle Bus (Renewal)	2,222,411	291,287
Administrative (Initial)	15,849	-
Administrative (Ongoing)	2,156,063	101,193
Capital Cost Subtotal (Initial)	54,041,190	-
Initial Capital Cost Contingency	10,808,238	-
Capital Cost Total (Initial)	**64,849,428**	**-**
Capital Cost Subtotal (Renewal)	66,935,306	25,065,965
Renewal Capital Cost Contingency	13,387,061	5,013,193
Capital Cost Total (Renewal)	**80,322,367**	**30,079,159**
Capital Cost Total	**145,171,795**	**30,079,159**
Operating Costs		
Parking	77,048,497	4,528,844
Toll System Transaction Costs	31,305,393	1,716,704
Toll System Operating Costs	14,380,973	632,279
AC Transit	115,953,527	5,991,715
WETA	486,995,049	23,030,996
Shuttle Bus	77,584,962	4,365,530
Administrative / TDM	74,735,061	3,533,981
Operating Cost Subtotal	878,003,461	43,800,050
Operating Cost Contingency	175,600,692	8,760,010
Operating Cost Total	**1,053,604,153**	**52,560,060**
Revenue		
Parking	84,605,788	4,468,034
Parking Fines	27,727,059	1,456,001
Toll System	520,270,960	28,511,866
AC Transit	79,580,020	4,576,986
WETA	56,291,733	3,081,010
TIMMA Bikeshare	3,059,216	170,080
TICD Subsidy	45,111,663	7,146
Revenue Total	**816,646,440**	**42,271,124**
Net Cash Flow From Operations (after subsidy)	**(236,957,713)**	**(10,288,936)**
Cash Flow From Operations Net of Renewal Costs	**(362,391,744)**	**(40,375,240)**
Cash Flow From Operations Net of Total Capital Costs	**(427,241,171)**	**(40,375,240)**
Cumulative Net Cash Flow From Operations	N/A	N/A
Cumulative TICD Subsidy Expended (excl. closeout)	N/A	N/A
Years of Cash Flow Shortfall	23	1

revenue slightly from Scenario 2.0 but the westbound exemption caused a larger decrease in total revenue. The operating cash flows for Scenario 3 were negative in all years, including 2030, when the forecast shows a shortfall of $10.3 million.

An additional post-model analysis was conducted to determine a revised recreational ferry fare if commuter passengers paid a lower base fare of $2 (2013$) or average fare of $1.46 (2013$). For this analysis, commuter and recreational demand was held constant despite the lower fare. The resulting recreational average fare was $7.49 (2013$) (base fare of $10.26) in 2030.

Scenario 3.1 assumes parking occupancy will be managed without the use of wireless sensors, thereby lowering costs. It is worth noting that a majority of parking operations costs are incurred by the off-street parking staff, rather than the sensors used for on-street parking.

Parking capital costs decreased from $7 million to $4 million (YOE$) over the forecast period, while parking operating costs also decreased from $77 million to $73 million (YOE$). Operating cash flows for Scenario 3.1 remain negative in 2030, at -$10 million.

SENSITIVITY TEST: SCENARIO 3.2: VANPOOL EXEMPTION

Table 10: Scenario 3.1 Detailed Results

* all amounts in YOE$	Scenario 3.1 (No Sensors)	
Cost Categories	Total (2015 - 2040)	2030 Results
Capital Costs		
Parking (Renewal)	4,338,629	278,735

Table 11: Scenario 3.2 Detailed Results

* all amounts in YOE$	Scenario 3.2 (Vanpool Exemption)	
Cost Categories	Total (2015 - 2040)	2030 Results
Capital Costs		
Parking (Renewal)	7,348,082	503,871
Toll System (Initial)	2,757,996	-
Toll System (Renewal)	3,175,639	-
AC Transit Bus (Renewal)	6,204,354	-
WETA Vessel (Initial)	51,267,345	-
WETA Vessel (Renewal)	45,828,756	24,169,615
Shuttle Bus (Renewal)	2,222,411	291,287
Administrative (Initial)	15,849	-
Administrative (Ongoing)	2,156,063	101,193
Capital Cost Subtotal (Initial)	54,041,190	-
Initial Capital Cost Contingency	10,808,238	-
Capital Cost Total (Initial)	**64,849,428**	**-**
Capital Cost Subtotal (Renewal)	66,935,306	25,065,965
Renewal Capital Cost Contingency	13,387,061	5,013,193
Capital Cost Total (Renewal)	**80,322,367**	**30,079,159**
Capital Cost Total	**145,171,795**	**30,079,159**
Operating Costs		
Parking	77,048,497	4,528,844
Toll System Transaction Costs	38,319,540	2,107,147
Toll System Operating Costs	14,380,973	632,279
AC Transit	115,953,527	5,991,715
WETA	486,995,049	23,030,996
Shuttle Bus	77,584,962	4,365,530
Administrative / TDM	74,735,061	3,533,981
Operating Cost Subtotal	885,017,608	44,190,493
Operating Cost Contingency	177,003,522	8,838,099
Operating Cost Total	**1,062,021,129**	**53,028,592**
Revenue		
Parking	84,605,788	4,468,034
Parking Fines	27,727,059	1,456,001
Toll System	629,343,298	34,583,236
AC Transit	79,580,020	4,576,986
WETA	56,291,733	3,081,010
TIMMA Bikeshare	3,059,216	170,080
TICD Subsidy	45,131,145	7,146
Revenue Total	**925,738,260**	**48,342,493**
Net Cash Flow From Operations (after subsidy)	**(136,282,870)**	**(4,686,099)**
Cash Flow From Operations Net of Renewal Costs	**(261,736,382)**	**(34,772,403)**
Cash Flow From Operations Net of Total Capital Costs	**(326,585,810)**	**(34,772,403)**
Cumulative Net Cash Flow From Operations	N/A	N/A
Cumulative TICD Subsidy Expended (excl. closeout)	N/A	N/A
Years of Cash Flow Shortfall	23	1

Scenario 3.2 limits the definition of High Occupancy Vehicle (HOV) to vanpools (HOVs with 8 or more passengers), rather than allowing any vehicle with 3 or more passengers to drive toll-free. The tolled population was significantly expanded to include all vehicle trips except for the estimated share of vanpools. The demand model did not provide direct estimates of how HOV 3+ trips are broken down by occupancy so an estimate had to be created for the share of vanpools from the number of HOV 3+ trips. The share of vanpools was estimated as 3.74% East Bay and 14.5% of San Francisco HOV 3+ trips based on vanpool data from the American Community Survey from 2006 – 2010. This resulted in an increase in tolling revenue from $520 million in Scenario 3.0 to $629 million over the forecast period (YOE$). However, operating cash flows in 2030 remained negative at -$4.6 million.

It should be noted that the demand effects of applying a toll to HOV 3+ vehicles was not incorporated into this sensitivity test. If the demand effects had been modeled, the number of HOV 3+ trips would likely have decreased.

SENSITIVITY TEST: SCENARIO 3.3: $2 EB TOLL

In Scenario 3.3 an alternative toll policy was applied to vehicles coming to TI from the East Bay in response to the feedback that paying a Bay Bridge toll in addition to the TI toll may be overly burdensome for some drivers. These drivers are credited the amount already paid during that trip for the Bay Bridge, so that the TI toll for these trip is equal to the difference between the standard TI toll and the Bay Bridge toll. For

Table 12: Scenario 3.3 Detailed Results

* all amounts in YOE$

Cost Categories	Scenario 3.3 ($2 EB Toll) Total (2015 - 2040)	2030 Results
Capital Costs		
Parking (Renewal)	7,348,082	503,871
Toll System (Initial)	2,757,996	-
Toll System (Renewal)	3,175,639	-
AC Transit Bus (Renewal)	6,204,354	-
WETA Vessel (Initial)	51,267,345	-
WETA Vessel (Renewal)	45,828,756	24,169,615
Shuttle Bus (Renewal)	2,222,411	291,287
Administrative (Initial)	15,849	-
Administrative (Ongoing)	2,156,063	101,193
Capital Cost Subtotal (Initial)	54,041,190	-
Initial Capital Cost Contingency	10,808,238	-
Capital Cost Total (Initial)	**64,849,428**	**-**
Capital Cost Subtotal (Renewal)	66,935,306	25,065,965
Renewal Capital Cost Contingency	13,387,061	5,013,193
Capital Cost Total (Renewal)	**80,322,367**	**30,079,159**
Capital Cost Total	**145,171,795**	**30,079,159**
Operating Costs		
Parking	77,048,497	4,528,844
Toll System Transaction Costs	35,396,126	1,942,014
Toll System Operating Costs	14,380,973	632,279
AC Transit	115,953,527	5,991,715
WETA	486,995,049	23,030,996
Shuttle Bus	77,584,962	4,365,530
Administrative / TDM	74,735,061	3,533,981
Operating Cost Subtotal	882,094,193	44,025,360
Operating Cost Contingency	176,418,839	8,805,072
Operating Cost Total	**1,058,513,032**	**52,830,432**
Revenue		
Parking	84,605,788	4,468,034
Parking Fines	27,727,059	1,456,001
Toll System	548,837,529	30,085,260
AC Transit	79,580,020	4,576,986
WETA	56,291,733	3,081,010
TIMMA Bikeshare	3,059,216	170,080
TICD Subsidy	45,111,663	7,146
Revenue Total	**845,213,009**	**43,844,517**
Net Cash Flow From Operations (after subsidy)	**(213,300,023)**	**(8,985,914)**
Cash Flow From Operations Net of Renewal Costs	**(338,734,054)**	**(39,072,219)**
Cash Flow From Operations Net of Total Capital Costs	**(403,583,481)**	**(39,072,219)**
Cumulative Net Cash Flow From Operations	N/A	N/A
Cumulative TICD Subsidy Expended (excl. closeout)	N/A	N/A
Years of Cash Flow Shortfall	23	1

instance, in this sensitivity test the peak period Bay Bridge toll is $6, and the peak TI toll is $8, so a trip from East Bay would pay a $2 TI toll. Between the Bay Bridge and adjusted TI toll, the trip would pay a total of $8, which is equal to the standard peak TI toll in this Scenario. In instances when the Bay Bridge toll is greater than the TI toll, trips coming from the East Bay would not pay an additional TI toll. The increase in the number of tolled trips resulted in an increase in tolling revenue from $520 million in Scenario 3.0, to $548 million over the forecast period. The demand effects of tolling this population were not incorporated into the financial model results until Scenario 4. Scenario 3.3 still had negative operating cash flows of -$8.9 million in 2030, with all other forecast years also experiencing negative cash flows.

SENSITIVITY TEST: SCENARIO 3.4: EARLY MORNING AND EVENING TOLL

In Scenario 3.4, toll hours are extended to match the "core" transit service hours, which are 5 AM to 10 PM. In this sensitivity test, revenue is captured for the incremental hours of 5AM to 6AM and 6:30 to 10 PM. These hours are tolled at the off-peak rate of $4. Total tolling revenue in Scenario 3.4 increased to $599 million over the forecast period, up $79 million from Scenario 3.0. The demand effects of extending tolling hours were not incorporated into the financial model results until Scenario 4. Operating cash flows were negative every year over the forecast period, including 2030 when the forecast yields an operating cash flow of -$5.6 million after subsidy.

Table 13: Scenario 3.4 Detailed Results

* all amounts in YOE$

Cost Categories	Scenario 3.4 (Early Morning and Evening Toll) Total (2015 - 2040)	2030 Results
Capital Costs		
Parking (Renewal)	7,348,082	503,871
Toll System (Initial)	2,757,996	-
Toll System (Renewal)	3,175,639	-
AC Transit Bus (Renewal)	6,204,354	-
WETA Vessel (Initial)	51,267,345	-
WETA Vessel (Renewal)	45,828,756	24,169,615
Shuttle Bus (Renewal)	2,222,411	291,287
Administrative (Initial)	15,849	-
Administrative (Ongoing)	2,156,063	101,193
Capital Cost Subtotal (Initial)	54,041,190	-
Initial Capital Cost Contingency	10,808,238	-
Capital Cost Total (Initial)	**64,849,428**	**-**
Capital Cost Subtotal (Renewal)	66,935,306	25,065,965
Renewal Capital Cost Contingency	13,387,061	5,013,193
Capital Cost Total (Renewal)	**80,322,367**	**30,079,159**
Capital Cost Total	**145,171,795**	**30,079,159**
Operating Costs		
Parking	77,048,497	4,528,844
Toll System Transaction Costs	37,787,684	2,077,467
Toll System Operating Costs	14,380,973	632,279
AC Transit	115,953,527	5,991,715
WETA	486,995,049	23,030,996
Shuttle Bus	77,584,962	4,365,530
Administrative / TDM	74,735,061	3,533,981
Operating Cost Subtotal	884,485,752	44,160,813
Operating Cost Contingency	176,897,150	8,832,163
Operating Cost Total	**1,061,382,902**	**52,992,976**
Revenue		
Parking	84,605,788	4,468,034
Parking Fines	27,727,059	1,456,001
Toll System	599,671,454	32,932,988
AC Transit	79,580,020	4,576,986
WETA	56,291,733	3,081,010
TIMMA Bikeshare	3,059,216	170,080
TICD Subsidy	45,111,663	7,146
Revenue Total	**896,046,934**	**46,692,246**
Net Cash Flow From Operations (after subsidy)	**(165,335,968)**	**(6,300,730)**
Cash Flow From Operations Net of Renewal Costs	**(290,769,998)**	**(36,387,035)**
Cash Flow From Operations Net of Total Capital Costs	**(355,619,426)**	**(36,387,035)**
Cumulative Net Cash Flow From Operations	N/A	N/A
Cumulative TICD Subsidy Expended (excl. closeout)	N/A	N/A
Years of Cash Flow Shortfall	23	1

SCENARIO 4: RECOMMENDED TOLLING POLICIES

Scenario 4 sought to identify which tolling policies would be necessary in order to break even from operations while operating two ferries. Scenario 4 incorporated several of the assumption changes from the Scenario 3 sensitivity tests, specifically the extension of tolling hours to match transit hours, the exemption only of vanpools, and the $2 toll for trips from the East Bay to TI. Though these parameters were tested in isolation in the Scenario 3 sensitivity tests, Scenario 4 incorporated the results of a demand model run using these policies and captured the interaction of the policy changes (e.g. tolling 3-person occupancy vehicles in the evening period).

This scenario yielded the highest revenue over the forecast period, with only a marginal increase in tolling operations costs. In addition, transit ridership increased resulting in an increase in AC Transit and WETA revenue. Over the forecast period, only 8 years experienced a cash flow shortfall, with positive cash flows realized in year 2030. This solvency is driven by the increase in toll revenue, which was $811 million (YOE $) over the forecast period and $44.7 million in 2030 (2030 $).

This demand scenario resulted in a 51% transit mode-share, thus exceeding one of the key goals for the program. As a result, the additional $5 million subsidy paid by the developer was not applied.

Table 14: Scenario 4.0 Detailed Results

* all amounts in YOE$	Scenario 4.0 (Vanpool and Evening Toll)	
Cost Categories	**Total (2015 - 2040)**	**2030 Results**
Capital Costs		
Parking (Renewal)	7,348,082	503,871
Toll System (Initial)	2,757,996	-
Toll System (Renewal)	3,175,639	-
AC Transit Bus (Renewal)	6,204,354	-
WETA Vessel (Initial)	51,267,345	-
WETA Vessel (Renewal)	45,828,756	24,169,615
Shuttle Bus (Renewal)	2,222,411	291,287
Administrative (Initial)	15,849	-
Administrative (Ongoing)	2,156,063	101,193
Capital Cost Subtotal (Initial)	54,041,190	-
Initial Capital Cost Contingency	10,808,238	-
Capital Cost Total (Initial)	**64,849,428**	**-**
Capital Cost Subtotal (Renewal)	66,935,306	25,065,965
Renewal Capital Cost Contingency	13,387,061	5,013,193
Capital Cost Total (Renewal)	**80,322,367**	**30,079,159**
Capital Cost Total	**145,171,795**	**30,079,159**
Operating Costs		
Parking	77,048,497	4,528,844
Toll System Transaction Costs	59,565,215	3,282,945
Toll System Operating Costs	14,380,973	632,279
AC Transit	115,953,527	5,991,715
WETA	486,995,049	23,030,996
Shuttle Bus	77,584,962	4,365,530
Administrative / TDM	74,735,061	3,533,981
Operating Cost Subtotal	906,263,283	45,366,291
Operating Cost Contingency	181,252,657	9,073,258
Operating Cost Total	**1,087,515,939**	**54,439,550**
Revenue		
Parking	82,474,165	4,354,084
Parking Fines	26,754,352	1,404,503
Toll System	811,280,664	44,663,854
AC Transit	85,257,373	4,903,540
WETA	66,665,911	3,666,789
TIMMA Bikeshare	3,059,216	170,080
TICD Subsidy	47,068,563	15,730,717
Revenue Total	**1,122,560,244**	**74,893,568**
Net Cash Flow From Operations (after subsidy)	**35,044,305**	**20,454,018**
Cash Flow From Operations Net of Renewal Costs	**(92,346,625)**	**(25,355,858**
Cash Flow From Operations Net of Total Capital Costs	**(157,196,053)**	**(25,355,858**
Cumulative Net Cash Flow From Operations	N/A	N/A
Cumulative TICD Subsidy Expended (excl. closeout)	N/A	N/A
Years of Cash Flow Shortfall	8	-

SENSITIVITY TEST: SCENARIO 4.1:

DELAYED FERRY START

Scenario 4.1 incorporates several timing and policy assumptions that arose from SFCTA discussions and TIDA feedback. One key change was the delay in the start of ferry operations from FY 2018 to FY 2022. This delay in starting operations reflects the outside date by which TICD is required to complete the ferry terminal infrastructure. Lowering the operating cost in the early years resulted in more years with positive net revenue. Thus, operating costs were decreased in the early forecast years when revenues were also lower. An additional effect of later ferry operations is the timing of the first ferry purchase, which occurs in FY 2021 in Scenario 4.1. In addition, the start of two-ferry operations was delayed until 2027, which also reduced operating costs.

Scenario 4 also analyzed the need for all 5 of the AC Transit buses in year 2018, and found that demand for east bay transit during the first three years of the program could be met with 3 buses rather than 5. Scenario 4, including the recommended Scenario 4.4 version 3, assume a 2018 purchase of 3 buses through 2024, and an adjusted AC Transit bus purchase schedule for the remaining years.

Table 15: Scenario 4.1 Detailed Results

* all amounts in YOE$	Scenario 4.1 (Updated Base)	
Cost Categories	**Total (2015 - 2040)**	**2030 Results**
Capital Costs		
Parking (Renewal)	7,348,082	503,871
Toll System (Initial)	2,757,996	-
Toll System (Renewal)	3,175,639	-
AC Transit Bus (Renewal)	1,240,871	-
WETA Vessel (Initial)	53,966,875	-
WETA Vessel (Renewal)	48,240,605	2,197,238
Shuttle Bus (Renewal)	2,222,411	291,287
Administrative (Initial)	15,849	-
Administrative (Ongoing)	2,156,063	101,193
Capital Cost Subtotal (Initial)	56,740,720	-
Initial Capital Cost Contingency	11,348,144	-
Capital Cost Total (Initial)	**68,088,864**	**-**
Capital Cost Subtotal (Renewal)	64,383,671	3,093,588
Renewal Capital Cost Contingency	12,876,734	618,718
Capital Cost Total (Renewal)	**77,260,405**	**3,712,306**
Capital Cost Total	**145,349,269**	**3,712,306**
Operating Costs		
Parking	77,048,497	4,528,844
Toll System Transaction Costs	59,565,215	3,282,945
Toll System Operating Costs	14,380,973	632,279
AC Transit	115,953,527	5,991,715
WETA	460,800,755	23,030,996
Shuttle Bus	77,584,962	4,365,530
Administrative / TDM	74,735,061	3,533,981
Operating Cost Subtotal	880,068,989	45,366,291
Operating Cost Contingency	176,013,798	9,073,258
Operating Cost Total	**1,056,082,787**	**54,439,550**
Revenue		
Parking	82,474,165	4,354,084
Parking Fines	26,754,352	1,404,503
Toll System	811,280,664	44,663,854
AC Transit	85,257,373	4,903,540
WETA	64,702,634	3,666,789
TIMMA Bikeshare	3,059,216	170,080
TICD Subsidy	43,186,786	23,625,769
Revenue Total	**1,116,715,190**	**82,788,620**
Net Cash Flow From Operations (after subsidy)	**60,632,404**	**28,349,070**
Cash Flow From Operations Net of Renewal Costs	**(59,814,787)**	**1,010,995**
Cash Flow From Operations Net of Total Capital Costs	**(127,903,651)**	**1,010,995**
Cumulative Net Cash Flow From Operations	N/A	N/A
Cumulative TICD Subsidy Expended (excl. closeout)	N/A	N/A
Years of Cash Flow Shortfall	5	-

SENSITIVITY TEST: SCENARIO 4.2: WEIGHTED ESCALATION

Scenario 4.2 expands on the changes introduced in Scenario 4.2, while attempting to model a potential toll rate increase policy. Due to the differences in assumed escalation rates amongst revenues and costs, costs grow at a higher rate throughout the forecast, which is a threat to revenue sufficiency throughout the forecast. The assumed cost escalation rates for WETA (4.0%) and AC Transit (4.25%) are well above the assumed CPI (revenue escalates at 2.64%).

The San Francisco Municipal Transportation Agency (SFMTA) has an Automatic Fare Indexing policy that addresses operating costs increases above the rate of the local CPI. The SFMTA policy incorporates the Bay Area CPI as well as the 2-year change in labor operating costs.

The revenue escalation modeled in Scenario 4.2 weights the operating costs in each year to calculate a

Table 16: Scenario 4.2 Detailed Results

* all amounts in YOE$

Cost Categories	Scenario 4.2 (Weighted Escalation) Total (2015 - 2040)	2030 Results
Capital Costs		
Parking (Renewal)	7,348,082	503,871
Toll System (Initial)	2,757,996	-
Toll System (Renewal)	3,175,639	-
AC Transit Bus (Renewal)	1,240,871	-
WETA Vessel (Initial)	53,966,875	-
WETA Vessel (Renewal)	48,240,605	2,197,238
Shuttle Bus (Renewal)	2,222,411	291,287
Administrative (Initial)	15,849	-
Administrative (Ongoing)	2,156,063	101,193
Capital Cost Subtotal (Initial)	56,740,720	-
Initial Capital Cost Contingency	11,348,144	-
Capital Cost Total (Initial)	**68,088,864**	**-**
Capital Cost Subtotal (Renewal)	64,383,671	3,093,588
Renewal Capital Cost Contingency	12,876,734	618,718
Capital Cost Total (Renewal)	**77,260,405**	**3,712,306**
Capital Cost Total	**145,349,269**	**3,712,306**
Operating Costs		
Parking	77,048,497	4,528,844
Toll System Transaction Costs	59,565,215	3,282,945
Toll System Operating Costs	14,380,973	632,279
AC Transit	115,953,527	5,991,715
WETA	460,800,755	23,030,996
Shuttle Bus	77,584,962	4,365,530
Administrative / TDM	74,735,061	3,533,981
Operating Cost Subtotal	880,068,989	45,366,291
Operating Cost Contingency	176,013,798	9,073,258
Operating Cost Total	**1,056,082,787**	**54,439,550**
Revenue		
Parking	97,081,721	5,019,083
Parking Fines	31,482,167	1,619,013
Toll System	956,424,930	51,485,358
AC Transit	85,257,373	4,903,540
WETA	64,702,634	3,666,789
TIMMA Bikeshare	3,059,216	170,080
TICD Subsidy	44,741,542	35,305,800
Revenue Total	**1,282,749,583**	**102,169,664**
Net Cash Flow From Operations (after subsidy)	**226,666,796**	**47,730,114**
Cash Flow From Operations Net of Renewal Costs	**104,664,849**	**8,712,008**
Cash Flow From Operations Net of Total Capital Costs	**36,575,986**	**8,712,008**
Cumulative Net Cash Flow From Operations	N/A	N/A
Cumulative TICD Subsidy Expended (excl. closeout)	N/A	N/A
Years of Cash Flow Shortfall	1	-

blended escalation rate for revenue. For instance, in FY 2025, operating costs are 55 percent WETA, 9% AC Transit, and 36 percent other operating costs. The resulting escalation factor of 1.525 is calculated using the operating cost percent weights and their respective escalation rates.

The increase in revenue over the forecast period resulted in more years of positive cash flow. Compared with 5 years of negative cash flow in Scenario 4.1, Scenario 4.2 only has 1 year.

SENSITIVITY TEST: SCENARIO 4.3: 2 FERRIES PURCHASED

Scenario 4.3 builds on the assumptions from Scenario 4.2, and eliminates the purchase of the spare ferry vessel. , while maintaining the same level of ferry operations as Scenario 4.2. Based on input from WETA, TI service may be able to share a spare vessel – or use bus service as a bridge service - during vessel drydocking periods. Rather than purchasing 2 ferries in FY 2021, only 1 vessel will be purchased (the other ferry is purchased in FY 2024). The level of service is maintained assuming Capital costs decrease in this scenario, while operating costs are unchanged

Forgoing the purchase of the third ferry vessel resulted in greater net revenues and only one year of cash flow shortfall.

Table 17: Scenario 4.3 Detailed Results

* all amounts in YOE$	Scenario 4.3 (2 Ferries Purchased)	
Cost Categories	**Total (2015 - 2040)**	**2030 Results**
Capital Costs		
Parking (Renewal)	7,348,082	503,871
Toll System (Initial)	2,757,996	-
Toll System (Renewal)	3,175,639	-
AC Transit Bus (Renewal)	1,240,871	-
WETA Vessel (Initial)	36,434,642	-
WETA Vessel (Renewal)	31,604,157	2,197,238
Shuttle Bus (Renewal)	2,222,411	291,287
Administrative (Initial)	15,849	-
Administrative (Ongoing)	2,156,063	101,193
Capital Cost Subtotal (Initial)	39,208,487	-
Initial Capital Cost Contingency	7,841,697	-
Capital Cost Total (Initial)	**47,050,184**	**-**
Capital Cost Subtotal (Renewal)	47,747,223	3,093,588
Renewal Capital Cost Contingency	9,549,445	618,718
Capital Cost Total (Renewal)	**57,296,667**	**3,712,306**
Capital Cost Total	**104,346,852**	**3,712,306**
Operating Costs		
Parking	77,048,497	4,528,844
Toll System Transaction Costs	59,565,215	3,282,945
Toll System Operating Costs	14,380,973	632,279
AC Transit	115,953,527	5,991,715
WETA	460,800,755	23,030,996
Shuttle Bus	77,584,962	4,365,530
Administrative / TDM	74,735,061	3,533,981
Operating Cost Subtotal	880,068,989	45,366,291
Operating Cost Contingency	176,013,798	9,073,258
Operating Cost Total	**1,056,082,787**	**54,439,550**
Revenue		
Parking	97,081,721	5,019,083
Parking Fines	31,482,167	1,619,013
Toll System	956,424,930	51,485,358
AC Transit	85,257,373	4,903,540
WETA	64,702,634	3,666,789
TIMMA Bikeshare	3,059,216	170,080
TICD Subsidy	44,741,542	35,305,800
Revenue Total	**1,282,749,583**	**102,169,664**
Net Cash Flow From Operations (after subsidy)	**226,666,796**	**47,730,114**
Cash Flow From Operations Net of Renewal Costs	**124,628,587**	**8,712,008**
Cash Flow From Operations Net of Total Capital Costs	**77,578,403**	**8,712,008**
Cumulative Net Cash Flow From Operations	N/A	N/A
Cumulative TICD Subsidy Expended (excl. closeout)	N/A	N/A
Years of Cash Flow Shortfall	1	-

SENSITIVITY TEST: SCENARIO 4.3: NEW TOLL RATES

The combination of policies tested in Scenario 4.2 raises more revenue than necessary to operate the mobility program. Scenario 4.3 sought to maintain two-ferry operations while keeping tolls at the lowest level possible while still meeting required O&M reserve amounts equivalent to 2 months of annual operating costs.

Tolls were reduced in the early years of the forecast when operating costs are lower. Tolls are set at the lowest rates ($5 peak / $3 off-peak in FY 2018$) in FY 2018 and escalate annually through FY 2020 prior to the start of ferry operations. When the first ferry is brought online in FY 2022 there is an assumed step increase in toll rates to ($6 peak / $4 off-peak in FY 2018$) which are then escalated through FY 2026. The final step change in tolls ($8 peak, $4 off-peak in FY 2018$) occurs when the second ferry (assumed to be purchased) begins operation in FY 2027, after which time tolls continue to increase annually to offset assumed inflation in costs.

As described in the toll rates above, version 3 assumes that the first ferry is grant-funded rather than purchased outright for the program. This reduces the necessary capital reserve in the earlier years, which allows for lower toll rates in the earlier years. An alternative could be to lease-to-own a vessel from WETA; this Scenario does not reflect the incremental increase in annual operations payments associated with leasing rather than purchasing the first

Table 18: Scenario 4.3 Detailed Results

* all amounts in YOE$

Cost Categories	Scenario 4.3 Version 3 (New Toll Rates) Total (2015 - 2040)	2030 Results
Capital Costs		
Parking (Renewal)	7,348,082	503,871
Toll System (Initial)	-	-
Toll System (Renewal)	3,175,639	-
AC Transit Bus (Renewal)	1,240,871	-
WETA Vessel (Initial)	20,379,668	-
WETA Vessel (Renewal)	32,773,911	-
Shuttle Bus (Renewal)	2,222,411	291,287
Administrative (Initial)	15,849	-
Administrative (Ongoing)	2,156,063	101,193
Capital Cost Subtotal (Initial)	20,395,517	-
Initial Capital Cost Contingency	4,079,103	-
Capital Cost Total (Initial)	**24,474,620**	**-**
Capital Cost Subtotal (Renewal)	48,916,977	896,351
Renewal Capital Cost Contingency	9,783,395	179,270
Capital Cost Total (Renewal)	**58,700,373**	**1,075,621**
Capital Cost Total	**83,174,993**	**1,075,621**
Operating Costs		
Parking	77,048,497	4,528,844
Toll System Transaction Costs	59,542,609	3,287,088
Toll System Operating Costs	13,918,475	632,279
AC Transit	115,953,527	5,991,715
WETA	437,126,371	23,030,996
Shuttle Bus	77,584,962	4,365,530
Administrative / TDM	74,735,061	3,533,981
Operating Cost Subtotal	855,909,502	45,370,434
Operating Cost Contingency	171,181,900	9,074,087
Operating Cost Total	**1,027,091,402**	**54,444,521**
Revenue		
Parking	96,920,247	5,019,083
Parking Fines	31,429,257	1,619,013
Toll System	797,493,006	44,173,079
AC Transit	85,257,373	4,903,540
WETA	63,641,512	3,666,789
TIMMA Bikeshare	3,059,216	170,080
TICD Subsidy	40,279,872	17,495,151
Revenue Total	**1,118,080,483**	**77,046,735**
Net Cash Flow From Operations (after subsidy)	**90,989,081**	**22,602,215**
Cash Flow From Operations Net of Renewal Costs	**32,288,709**	**21,526,594**
Cash Flow From Operations Net of Total Capital Costs	**7,814,089**	**21,526,594**
Cumulative Net Cash Flow From Operations	N/A	N/A
Cumulative TICD Subsidy Expended (excl. closeout)	N/A	N/A
Years of Cash Flow Shortfall	3	-

ferry. The start of two-ferry operation is also delayed to year 2027, which decreases the both the operating cost and operating revenue for years 2024-2027. The second ferry is still assumed to be purchased, however by FY 2027, the cash reserve and level of revenue result in a more viable financial outlook.

The travel demand forecasts for years other than 2030 have not been modeled as part of this exercise. Future analyses will consider the effects of lower tolls in earlier years on demand for driving and transit trips, and associated changes to revenue.

SENSITIVITY TEST: SCENARIO 4.4 VERSION 3: LONGTIME HOUSEHOLD TOLL DISCOUNT

* all amounts in YOE $s		Scenario 4.4 (Recommended Toll Policies)	
Cost Categories	Unit	Total (2015 - 2040)	2030 Results
Capital Costs			
Parking (Renewal)	$YOE	7,889,344	225,389
Toll System (Initial)	$YOE	-	-
Toll System (Renewal)	$YOE	3,175,639	-
AC Transit Bus (Expansion)	$YOE	3,814,977	957,545
AC Transit Bus (Renewal)	$YOE	1,109,638	-
WETA Vessel (Initial)	$YOE	41,610,772	-
WETA Vessel (Renewal)	$YOE	7,202,457	-
WETA Vessel Debt Service		10,378,193	-
Shuttle Bus (Expansion)	$YOE	-	-
Shuttle Bus (Renewal)	$YOE	2,254,042	873,861
Administrative (Initial)	$YOE	16,827	-
Administrative (Ongoing)	$YOE	1,223,103	56,472
Capital Cost Subtotal (Initial and Expansion)	$YOE	55,820,769	957,545
Initial Capital Cost Contingency	$YOE	11,164,154	191,509
Capital Cost Total (Initial and Expansion)	**$YOE**	**66,984,923**	**1,149,054**
Capital Cost Subtotal (Renewal)	$YOE	22,854,224	1,155,722
Renewal Capital Cost Contingency	$YOE	4,570,845	231,144
Capital Cost Total (Renewal)	**$YOE**	**27,425,069**	**1,386,866**
Capital Cost Total	**$YOE**	**94,409,992**	**2,535,921**
Operating Costs			
Parking	$YOE	69,530,055	4,528,844
Toll System Transaction Costs	$YOE	60,768,745	3,375,753
Toll System Operating Costs	$YOE	13,918,475	632,279
AC Transit	$YOE	77,577,223	4,204,331
WETA	$YOE	303,097,125	16,590,466
Shuttle Bus	$YOE	76,630,954	4,365,530
Administrative / TDM	$YOE	40,482,797	1,867,869
Low Income Subsidy		80,174,224	3,926,958
Operating Cost Subtotal	$YOE	722,179,599	39,492,031
Operating Cost Contingency	$YOE	144,435,920	7,898,406
Operating Cost Total	**$YOE**	**866,615,519**	**47,390,437**
Revenue			
Parking	$YOE	94,129,056	5,465,166
Parking Fines	$YOE	30,757,166	1,781,536
Toll System	$YOE	719,250,052	41,151,018
AC Transit	$YOE	76,824,119	4,179,683
WETA	$YOE	61,241,170	3,267,779
TIMMA Bikeshare	$YOE	2,881,796	152,562
TICD Subsidy	$YOE	39,144,502	-
Other Contributions (TICD Exchange, Grant Funding, WETA Contr.)		44,744,583	-
Revenue Total	**$YOE**	**1,068,972,443**	**55,997,744**
Net Cash Flow From Operations (after subsidy)	**$YOE**	**202,356,924**	**8,607,307**
Cash Flow From Operations Net of Renewal Costs	**$YOE**	**174,931,855**	**7,220,440**
Cash Flow From Operations Net of Total Capital Cost	**$YOE**	**107,946,932**	**6,071,386**
Years of Cash Flow Shortfall	Years	-	-

Multiple sensitivity tests were conducted within a Scenario 4.4. The purpose of Scenario 4.4 was to test the financial viability of a toll discount for longtime households (those with residents living on the Island prior to the 2011 Development Agreement). The discount would provide for one daily roundtrip toll free-of-charge for each longtime household, for a finite transition period.[4] Scenario 4.4 retains the following policies from Scenario 4.3:

- Ferry capital costs: WETA loan finances half the first ferry purchase.
- Ferry operating costs: begins in 2022 and increases to 2-ferry operation in 2027
- Toll rates: Begin at $5/$3 peak/offpeak in

[4] This discount would not continue indefinitely. Possible sunset dates include: start of ferry service; or date of household's relocation into a new permanent residence on TI.

$2018, and escalate as-needed when ferry service and ferry service expansions are introduced, rather than continuously
- Other revenue and toll rates: escalated as a function of operating cost and cost of living

Scenario 4.4 tested the following additional policies and terms:

- Change in overall TIMM Program start date to 2019
- Daily roundtrip free toll for longtime households, for a finite transition period
- Revised WETA operating plan that uses 2 crews at 8-hour shifts during years 2022-2026, and a 3-crew, 2-vessel operation starting in 2027. This is a more cost-efficient labor plan.
- Ferry capital costs: WETA loan finances half the first ferry purchase; grant funds or a swap of some of TICD's AC Transit bus obligation for ferry vessel dollars fund the other half of the first ferry vessel purchase.
- AC Transit and WETA rehab and renewal costs: availability of federal funds. Scenario 4 incorporates an assumption that federal formula funding for WETA ferry rehabilitation and renewal will be available for the TIMMA routes; this means that 80% of the cost of ferry rehabilitation and renewal will be funded by federal formula funds, and TIMMA will only be responsible for 20% of these costs.

The travel demand forecasts for years other than 2030 have not been modeled as part of this exercise. Future analyses will consider the effects of lower tolls in earlier years on demand for driving and transit trips, and associated changes to revenue.

[NEED TO ADD IN A PICTURE OF THE DETAILED FINANCIAL RESULTS FOR THIS SCENARIO; O:\Active Studies\TI MMA\200_Planning_Activities\Planning Phase\Financial Model\Scenario 4 Results and Analysis\V 4.4 2015 08 21\ 4.4C_20160324.xlsx]

SCENARIO 5: LOW INCOME TOLL DISCOUNT

Scenario 5 modeled the effect of offering a 50% discount on tolls to very low income TI residents, or all residents of households who earn 200% or less of the federal poverty line This scenario expanded on the assumptions from Scenario 4, adding only the low income toll discount. The discount lowered the revenue per transaction for low income residents, but significantly increased the number of driving trips made by low income residents. In addition, the discount resulted in a reduction of transit trips, as low income residents opted to drive.

The reduction in transit trips brought the transit mode share to barely above 50% in 2030, when the transit system is most robust (most frequent). It was assumed that in the earlier years, the transit share would be less than the 50%, so the additional $5 million subsidy was applied in this scenario.

This scenario resulted in 2 additional years of positive cash flows when compared to scenario 4. This was driven by the additional $5 million subsidy for a transit mode-share of less than 50%.

Table 19: Scenario 5 Detailed Results

* all amounts in YOE$

Cost Categories	Scenario 5.0 Total (2015 - 40)	Scenario 5.0 2030 Results
Capital Costs		
Parking (Renewal)	7,348,082	503,871
Toll System (Initial)	2,757,996	-
Toll System (Renewal)	3,175,639	-
AC Transit Bus (Renewal)	6,204,354	-
WETA Vessel (Initial)	51,267,345	-
WETA Vessel (Renewal)	45,828,756	24,169,615
Shuttle Bus (Renewal)	2,222,411	291,287
Administrative (Initial)	15,849	-
Administrative (Ongoing)	2,156,063	101,193
Capital Cost Subtotal (Initial)	54,041,190	-
Initial Capital Cost Contingency	10,808,238	-
Capital Cost Total (Initial)	**64,849,428**	**-**
Capital Cost Subtotal (Renewal)	66,935,306	25,065,965
Renewal Capital Cost Contingency	13,387,061	5,013,193
Capital Cost Total (Renewal)	**80,322,367**	**30,079,159**
Capital Cost Total	**145,171,795**	**30,079,159**
Operating Costs		
Parking	77,048,497	4,528,844
Toll System Transaction Costs	61,293,734	3,380,413
Toll System Operating Costs	14,380,973	632,279
AC Transit	115,953,527	5,991,715
WETA	486,995,049	23,030,996
Shuttle Bus	77,584,962	4,365,530
Administrative / TDM	74,735,061	3,533,981
Operating Cost Subtotal	907,991,802	45,463,759
Operating Cost Contingency	181,598,360	9,092,752
Operating Cost Total	**1,089,590,163**	**54,556,511**
Revenue		
Parking	82,992,409	4,381,836
Parking Fines	26,905,885	1,412,577
Toll System	821,237,004	45,236,648
AC Transit	80,712,463	4,643,603
WETA	61,471,694	3,373,693
TIMMA Bikeshare	3,059,216	170,080
TICD Subsidy	44,260,083	7,791,789
Revenue Total	**1,120,638,753**	**67,010,226**
Net Cash Flow From Operations (after subsidy)	**31,048,590**	**12,453,716**
Cash Flow From Operations Net of Renewal Costs	**(93,533,860)**	**(25,417,232)**
Cash Flow From Operations Net of Total Capital Costs	**(158,383,287)**	**(25,417,232)**
Cumulative Net Cash Flow From Operations	N/A	N/A
Cumulative TICD Subsidy Expended (excl. closeout)	N/A	N/A
Years of Cash Flow Shortfall	6	-

CONCLUSIONS AND NEXT STEPS

Over the course of the demand modeling and financial sensitivity tests, various policy, rate, and timing assumptions were refined in order to attain financial solvency / positive cash flows by 2030 and a peak resident transit mode share of 50 percent or more. However, the spirit of the transit mode share requirement from the TITIP is that all trips (on and off, resident and non-resident) during the tolled periods should be considered when assessing the 50 percent or greater mode share calculation.

Throughout the modeling process, the capital and operating costs posed significant challenges to the financial solvency of this program. Conversely, a majority of operating revenue came from tolling, which was the primary subject of policy and rates changes.

Based on feedback from various stakeholders and the performance of the modeled scenarios and sensitivity tests, Scenario 4.3 Version 3 met the financial requirements, while reducing toll rates in the early years of the forecast. This sensitivity test modeled alternative ferry purchasing/leasing and operations that deviated from the original TITIP document, but allowed for financial solvency.

The next steps in TI Mobility Management Program demand and financial planning will focus on the early years of the Program, starting at first occupancy in 2019. TIMMA will begin with policy recommendations and assumptions underlying Scenario 4.4 version 3. This next tranche of demand and financial modeling will analyze changes in demand from the first year of occupancy over a five year period, and provide a detailed assessment of the costs of capital and services during that 5 year period, and evaluate alternative funding and financing strategies.

Table 20: Financial Assumptions Summary

	TITIP	Scenario 1.1 (Corrected Baseline)	Scenario 2 (Extend Toll to Visitors)	Scenario 3 (Variable Toll Rates)	Scenario 4.0 (Extended Toll Hours)	Scenario 4.4 (Recommended Toll Policies)	Scenario 5 Means Based Toll Discount
Scenario Notes:	These assumptions are taken from the TITIP document published in 2011.	2 ferries in operation, hourly ferry and other costs updated, parking duration 3 hours	Tolling extended to non-resident, weekend, and midday trips	Toll rates vary with congestion (lower during midday, off-peak, weekends); Recreational demand included	Vanpools (8+ pax) toll exempt, early AM and evening period now tolled, trips from East Bay pay $2 in peak	Revenue indexed to operating cost escalation, assumes later ferry start, first ferry partially grant funded, new toll rates; adds multimodal Affordability Program	50% toll discount for very low income TI residents
ing							
Who is tolled?	only residents	only residents	residents and non-residents	same as Scenario 2	Everyone except for transit, shuttles, vanpools (8+ pax)	same as Scenario 4	same as Scenario 4
Which direction?	both directions	both directions	same as Baseline	westbound east span direction excluded	same as Baseline	same as Baseline	same as Baseline
Which times?	AM and PM peaks	AM and PM peak periods during weekdays	AM, midday, and PM peak periods all days	same as Scenario 2	6 AM - 10 PM	6 AM - 7:30 PM	same as Scenario 4
How much?	$5 each way in 2011$	$5 each way in 2013$	same as Baseline	$4 midday, $8 AM and PM peak, in 2013$	$4 off peak, $8 AM/PM peaks, in 2013$	$3 offpeak, $5 AM/PM peaks, in 2013$	same as Scenario 4; 50% toll discount for very low income TI residents
ing							
Average Duration	not specified	58 minutes	same as 1.1	same as 1.1	same as 1.1	same as 1.1	same as 1.1
Hourly Rate	$1.50 all times	$1.50 peak, $1 off-peak	same as Baseline	same as Baseline	same as Baseline	same as Baseline	same as Baseline
Parking provided offstreet	1,636 spaces	1,200 spaces (per TICD)	same as Baseline	same as Baseline	same as Baseline	same as Baseline	same as Baseline
Parking provided onstreet	1,035 spaces	1,035 spaces (per TICD)	same as Baseline	same as Baseline	same as Baseline	same as Baseline	same as Baseline
ous Transit							
Average fare	not specified	$3.05 in 2013$	same as Baseline	same as Baseline	same as Baseline	same as Baseline	same as Baseline
Base fare	not specified	$4.20 in 2013$	same as Baseline	same as Baseline	same as Baseline	same as Baseline	same as Baseline
y Transit							
Average fare	not specified	same as Baseline	same as Baseline	same as Muni for non-recreational demand, recreational fare set to offset loss	same as Muni for non-recreational demand	same as Muni for non-recreational demand	same as Muni for non-recreational demand
Base fare	not specified	$3.50 in 2010$	same as Baseline	same as Muni for non-recreational demand, recreational fare set to offset loss	same as Muni for non-recreational demand	same as Muni for non-recreational demand	same as Muni for non-recreational demand
Headways in 2030 peak	15 minutes	15 minutes	same as 1.1	same as 1.1	same as 1.1	same as 1.1	same as 1.1
Headways in 2030 off peak	30 to 60 minutes	<30 minutes	same as 1.1	same as 1.1	same as 1.1	same as 1.1	same as 1.1
Headways in 2030 weekend	30 to 60 minutes	30 minutes	same as 1.1	same as 1.1	same as 1.1	same as 1.1	same as 1.1
Ferries in operation in 2030 peak	3	2	same as 1.1	same as 1.1	same as 1.1	same as 1.1	same as 1.1
Ferries in operation in 2030 off-peak	2.2 implied by ferry service hours	2	same as 1.1	same as 1.1	same as 1.1	same as 1.1	same as 1.1
Ferries in operation in 2030 weekend	2.2 implied by ferry service hours	1	same as 1.1	same as 1.1	same as 1.1	same as 1.1	same as 1.1
Cost per service hour	$800 - $900	$1181 in 2013$	same as 1.1	same as 1.1	same as 1.1	same as 1.1	same as 1.1
Total Operating Cost in 2030	$18.4m in 2030$, $12.1 in 2013$	$23m in 2030$	same as 1.1	same as 1.1	same as 1.1	same as 1.1	same as 1.1
Ferries Purchased	4	3	same as Baseline	same as Baseline	same as Baseline	one ferry leased in FY 21, one purcahsed in FY 27	same as Baseline
er							
Escalation rate(s)	not specified	4.25% for AC Transit operating costs, 4% for WETA operating costs, 2.64% for all other operating costs, 2.54% for capital costs with an extra 0.5% during the first 5 modeled years	same as 1.1	same as 1.1	same as 1.1	same as 1.1 for costs, revenue is escalated at a blended rate based on the share of operating costs and their respective escalation rates	same as 1.1
Developer's subsidy obligations	$4m per year max up to $30m w/ accrued interest to make up for project shortfall, $5m subsidy in 5 installments if peak transit modeshare is less than 50%	same as TITIP	same as TITIP	same as TITIP	same as TITIP	same as TITIP	same as TITIP

* all amounts in YOE $s		Scenario 1.1 (Corrected Baseline)		Scenario 2 (extended toll)		Scenario 3 (variable toll)		Scenario 4.0 (Extended Toll Hours)		Scenario 4.4 (Recommended Toll Policies)		Scenario 5 (Means Based Toll Discount)	
Cost Categories	Unit	Total (2015 - 2040)	2030 Results	Total (2015 - 2040)	2030 Results	Total (2015 - 2040)	2030 Results	Total (2015 - 2040)	2030 Results	Total (2015 - 2040)	2030 Results	Total (2015 - 2040)	2030 Results
Capital Costs													
Parking (Renewal)	$YOE	7,348,082	503,871	7,348,082	503,871	7,348,082	503,871	7,348,082	503,871	7,889,344	225,389	7,348,082	503,871
Toll System (Initial)	$YOE	2,757,996	-	2,757,996	-	2,757,996	-	2,757,996	-	-	-	2,757,996	-
Toll System (Renewal)	$YOE	3,175,639	-	3,175,639	-	3,175,639	-	3,175,639	-	3,175,639	-	3,175,639	-
AC Transit Bus (Expansion)	$YOE	-	-	-	-	-	-	-	-	3,814,977	957,545	-	-
AC Transit Bus (Renewal)	$YOE	6,204,354	-	6,204,354	-	6,204,354	-	6,204,354	-	1,109,638	-	6,204,354	-
WETA Vessel (Initial)	$YOE	51,267,345	-	51,267,345	-	51,267,345	-	51,267,345	-	41,610,772	-	51,267,345	-
WETA Vessel (Renewal)	$YOE	45,828,756	24,169,615	45,828,756	24,169,615	45,828,756	24,169,615	45,828,756	24,169,615	7,202,457	-	45,828,756	24,169,615
WETA Vessel Debt Service		-	-	-	-	-	-	-	-	10,378,193	-	-	-
Shuttle Bus (Expansion)	$YOE	-	-	-	-	-	-	-	-	-	-	-	-
Shuttle Bus (Renewal)	$YOE	2,222,411	291,287	2,222,411	291,287	2,222,411	291,287	2,222,411	291,287	2,254,042	873,861	2,222,411	291,287
Administrative (Initial)	$YOE	15,849	-	15,849	-	15,849	-	15,849	-	16,827	-	15,849	-
Administrative (Ongoing)	$YOE	2,156,063	101,193	2,156,063	101,193	2,156,063	101,193	2,156,063	101,193	1,223,103	56,472	2,156,063	101,193
Capital Cost Subtotal (Initial and Expansion)	$YOE	54,041,190	-	54,041,190	-	54,041,190	-	54,041,190	-	55,820,769	957,545	54,041,190	-
Initial Capital Cost Contingency	$YOE	10,808,238	-	10,808,238	-	10,808,238	-	10,808,238	-	11,164,154	191,509	10,808,238	-
Capital Cost Total (Initial and Expansion)	**$YOE**	**64,849,428**	**-**	**64,849,428**	**-**	**64,849,428**	**-**	**64,849,428**	**-**	**66,984,923**	**1,149,054**	**64,849,428**	**-**
Capital Cost Subtotal (Renewal)	$YOE	66,935,306	25,065,965	66,935,306	25,065,965	66,935,306	25,065,965	66,935,306	25,065,965	22,854,224	1,155,722	66,935,305	25,065,966
Renewal Capital Cost Contingency	$YOE	13,387,061	5,013,193	13,387,061	5,013,193	13,387,061	5,013,193	13,387,061	5,013,193	4,570,845	231,144	13,387,061	5,013,193
Capital Cost Total (Renewal)	**$YOE**	**80,322,367**	**30,079,159**	**80,322,367**	**30,079,159**	**80,322,367**	**30,079,159**	**80,322,367**	**30,079,159**	**27,425,069**	**1,386,866**	**80,322,366**	**30,079,159**
Capital Cost Total	**$YOE**	**145,171,795**	**30,079,159**	**145,171,795**	**30,079,159**	**145,171,795**	**30,079,159**	**145,171,795**	**30,079,159**	**94,409,992**	**2,535,921**	**145,171,794**	**30,079,159**
Operating Costs													
Parking	$YOE	77,048,497	4,528,844	77,048,497	4,528,844	77,048,497	4,528,844	77,048,497	4,528,844	69,530,055	4,528,844	77,048,497	4,528,844
Toll System Transaction Costs	$YOE	40,144,800	2,207,420	41,801,289	2,297,394	31,305,393	1,716,704	59,565,215	3,282,945	60,768,745	3,375,753	61,293,734	3,380,413
Toll System Operating Costs	$YOE	14,380,973	632,279	14,380,973	632,279	14,380,973	632,279	14,380,973	632,279	13,918,475	632,279	14,380,973	632,279
AC Transit	$YOE	115,953,527	5,991,715	115,953,527	5,991,715	115,953,527	5,991,715	115,953,527	5,991,715	77,577,223	4,204,331	115,953,527	5,991,715
WETA	$YOE	486,995,049	23,030,996	486,995,049	23,030,996	486,995,049	23,030,996	486,995,049	23,030,996	303,097,125	16,590,466	486,995,049	23,030,996
Shuttle Bus	$YOE	77,584,962	4,365,530	77,584,962	4,365,530	77,584,962	4,365,530	77,584,962	4,365,530	76,630,954	4,365,530	77,584,962	4,365,530
Administrative / TDM	$YOE	74,735,061	3,533,981	74,735,061	3,533,981	74,735,061	3,533,981	74,735,061	3,533,981	40,482,797	1,867,869	74,735,061	3,533,981
Low Income Subsidy		-	-	-	-	-	-	-	-	80,174,224	3,926,958	-	-
Operating Cost Subtotal	$YOE	886,842,868	44,290,767	888,499,357	44,380,740	878,003,461	43,800,050	906,263,283	45,366,291	722,179,599	39,492,031	907,991,803	45,463,759
Operating Cost Contingency	$YOE	177,368,574	8,858,153	177,699,871	8,876,148	175,600,692	8,760,010	181,252,657	9,073,258	144,435,920	7,898,406	181,598,360	9,092,752
Operating Cost Total	**$YOE**	**1,064,211,441**	**53,148,920**	**1,066,199,228**	**53,256,888**	**1,053,604,153**	**52,560,060**	**1,087,515,939**	**54,439,550**	**866,615,519**	**47,390,437**	**1,089,590,163**	**54,556,511**
Revenue													
Parking	$YOE	90,351,210	4,780,788	91,160,175	4,821,239	84,605,788	4,468,034	82,474,165	4,354,084	94,129,056	5,465,166	82,992,409	4,381,836
Parking Fines	$YOE	29,209,930	1,536,741	29,572,335	1,555,073	27,727,059	1,456,001	26,754,352	1,404,503	30,757,166	1,781,536	26,905,885	1,412,577
Toll System	$YOE	209,654,814	11,445,076	603,367,334	33,160,992	520,270,960	28,511,866	811,280,664	44,663,854	719,250,052	41,151,018	821,237,004	45,236,648
AC Transit	$YOE	71,322,603	4,102,829	79,693,579	4,587,436	79,580,020	4,576,986	85,257,373	4,903,540	76,824,119	4,179,683	80,712,463	4,643,603
WETA	$YOE	35,547,384	2,007,121	38,372,373	2,166,565	56,291,733	3,081,010	66,665,911	3,666,789	61,241,170	3,267,779	61,471,694	3,373,693
TIMMA Bikeshare	$YOE	3,059,216	170,080	3,059,216	170,080	3,059,216	170,080	3,059,216	170,080	2,881,796	152,562	3,059,216	170,080
TICD Subsidy	$YOE	45,111,663	7,146	45,111,663	7,146	45,111,663	7,146	39,281,872	7,944,026	39,144,502	-	44,260,083	7,791,789
Other Contributions (TICD Exchange, Grant Funding, WETA Contr.)		-	-	-	-	-	-	-	-	44,744,583	-	-	-
Revenue Total	**$YOE**	**484,256,821**	**24,049,781**	**890,336,675**	**46,468,530**	**816,646,440**	**42,271,124**	**1,114,773,553**	**67,106,877**	**1,068,972,443**	**55,997,744**	**1,120,638,754**	**67,010,226**
Net Cash Flow From Operations (after subsidy)	**$YOE**	**(579,954,621)**	**(29,099,139)**	**(175,862,553)**	**(6,788,357)**	**(236,957,713)**	**(10,288,936)**	**27,257,614**	**12,667,327**	**202,356,924**	**8,607,307**	**31,048,591**	**12,453,716**
Cash Flow From Operations Net of Renewal Costs	**$YOE**	**(660,276,988)**	**(59,178,297)**	**(256,184,920)**	**(36,867,516)**	**(362,391,744)**	**(40,375,240)**	**(92,346,625)**	**(25,355,858)**	**174,931,855**	**7,220,440**	**(93,533,858)**	**(25,417,232)**
Cash Flow From Operations Net of Total Capital Cost	**$YOE**	**(725,126,415)**	**(59,178,297)**	**(321,034,348)**	**(36,867,516)**	**(427,241,171)**	**(40,375,240)**	**(157,196,053)**	**(25,355,858)**	**107,946,932**	**6,071,386**	**(158,383,286)**	**(25,417,232)**
Years of Cash Flow Shortfall	Years	23	1	22	1	23	1	8	-	-	-	6	-