

**STAFF REPORT FOR CALENDAR ITEM NO.: 13
FOR THE MEETING OF: June 9, 2016**

TRANSBAY JOINT POWERS AUTHORITY

BRIEF DESCRIPTION:

Presentation of the cost estimate, budget, delivery plan, and funding plan for Phase 2 of the Transbay Transit Center Program.

REPORT:

The Transbay Transit Center Program (Program) will connect eleven bus and rail transit agencies under one roof in a state-of-the-art multimodal transit center in downtown San Francisco, to be constructed in two phases. Upon completion of Phase 1, scheduled for late 2017, eight local and regional bus agencies will begin operations at the Transit Center. Commuter and high-speed rail will be added in Phase 2, which will complete the design and construction of the Downtown Rail Extension (DTX) tunnel and the build-out of the below-grade train station facilities at the Transit Center. Phase 2 will also build a new underground station along the DTX alignment, an intercity bus facility, and a pedestrian tunnel between the Transit Center and the Embarcadero BART/Muni Metro station.

Phase 2 Components and Current State of Design

The Program’s Phase 2 infrastructure is shown in Figure 1 and described as follows:

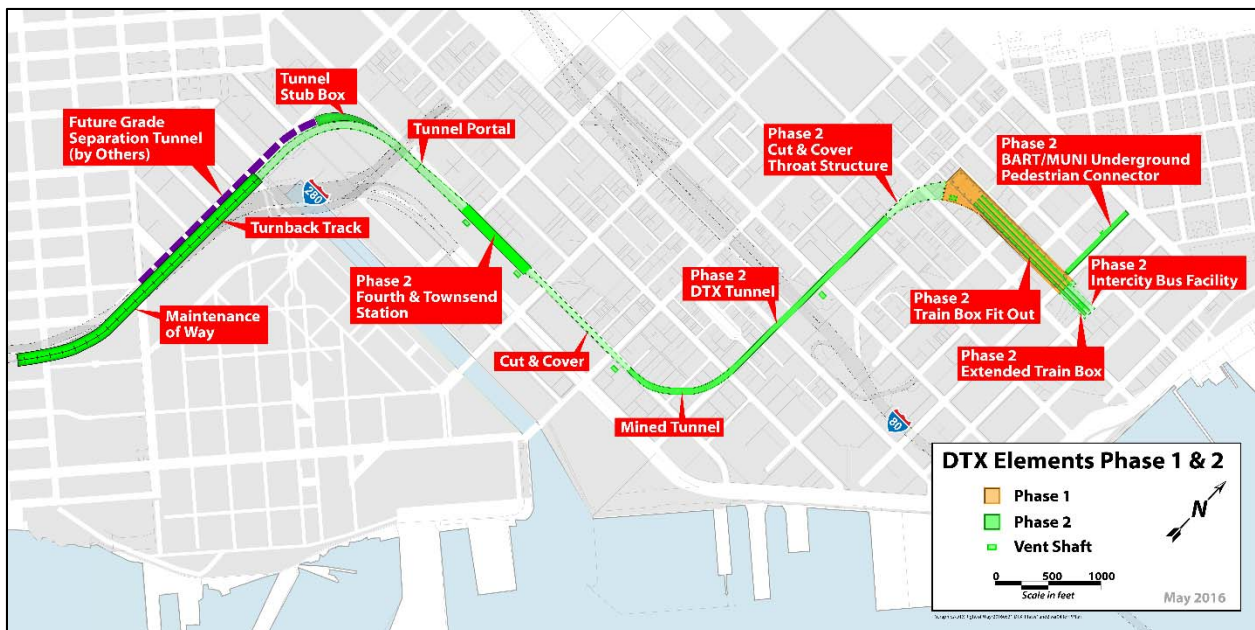


Figure 1, Phase 2 Scope Elements

Downtown Rail Extension. The DTX will extend Caltrain commuter rail from its current terminus at Fourth and King streets, as well as provide the tracks to deliver California High-Speed Rail Authority’s (CHSRA) future high-speed service to the new Transit Center. The three-track, 1.3-mile rail extension (1.95 miles total) will be constructed principally below grade using cut-and-cover and sequential excavation method (SEM) tunneling methods

underneath Townsend and Second streets. The alignment also includes a “U-wall” section, which is a retained cut to bring the trains from current at-grade level into the underground tunnel section. The DTX includes six structures for emergency exit and ventilation along the alignment (four of which are colocated with stations), at-grade trackwork, utility relocations, and rail systems work. A “tunnel stub,” located in the Caltrain yard at Fourth and King streets, was added to the DTX scope as a connection point to allow construction of a future underground extension of the DTX southward without disruption to train operations. The future extension of the DTX southward would provide grade separation at Mission Bay Drive and 16th Street. Preliminary engineering (PE) (30% design level) for many components of the DTX, including the Fourth and Townsend Street Station, was completed in July 2010. Subsequently, new requirements by CHSRA, as well as other factors, have added or modified elements of the DTX. These additions and modifications are included in a draft Supplemental Environmental Impact Statement/Environmental Impact Report (SEIS/EIR) released in December 2015 for public comment. Further design work on these new or modified elements will be required to return the full DTX design to the 30% PE level.

Fourth and Townsend Street Station. The new underground station at Fourth and Townsend streets will serve Caltrain commuters. The street level station entrances and exits along the north and south sides of Townsend Street will lead to two levels below grade: a concourse mezzanine and a train platform level. The concourse level will accommodate passenger amenities such as ticketing machines, a staffed station agent booth, maps and schedule information, restrooms, and a bicycle shop and storage. This level will also house mechanical and electrical rooms and Caltrain staff areas. The train platform level will feature a center platform with one passing track on the south side. The relatively shallow depth of the station will provide efficient passenger walk times and high flow volumes between entrances and the platform. The design was at 30% PE in 2010, but has been modified due to requests from the City and Caltrain. Modifications are described in the draft SEIS/EIR. Further design work will be required to return the design to the 30% PE level.

Phase 2 Transit Center. The Transit Center’s two below-grade levels will be built out during Phase 2; the structural shell of the below-grade levels was completed as a part of the Phase 1 work. The Lower Concourse will house rail ticketing, passenger waiting areas, and support spaces for Caltrain and CHSRA, the primary tenants, as well as leasable retail space. One level down, the Train Platform level will contain six tracks and three platforms for commuter and high-speed rail service. Back-of-house support spaces will also be built on this level to support rail service. The Phase 2 Transit Center Design was completed to a 50% construction documents level in 2011. Modifications to the design will be necessary to incorporate changes in Phase 1 that impact Phase 2, and programmatic requirements by CHSRA and Caltrain once they are available.

Intercity Bus Facility. The Intercity Bus Facility (IBF), across the street from the east end of the Transit Center between Beale and Main streets, will be dedicated to intercity bus services, such as Greyhound and Amtrak. These bus services will initially operate from the Transit Center bus deck during Phase 1, but will need to relocate to the IBF in Phase 2 to accommodate the operational needs and anticipated increase in ridership of the Transit Center’s primary bus agency tenant. The IBF’s main public entrances will be located along Beale and Natoma streets, and the building will include a bus canopy on its north side where a bus parking and passenger-loading zone are planned. The facility will house a passenger

waiting area, ticketing counters, retail space, transit agency operations space, and mechanical space. An escalator and elevator located in the lobby will lead to the Lower Concourse of the Transit Center, giving passengers direct access to rail ticketing and waiting areas. An exterior escalator and elevator on Beale Street will descend directly to the Transit Center's Lower Concourse. The IBF is currently at the schematic design level and included in the draft SEIS/EIR.

BART/Muni Pedestrian Connector. The BART/Muni Pedestrian Connector will connect the east end of the Transit Center's Lower Concourse with the Embarcadero BART/Muni Metro station, providing passengers with a direct connection between the two stations. The block-long pedestrian tunnel will run down the center of the Beale Street right-of-way, entering the Embarcadero Station at the mezzanine level outside paid fare zones. The design is currently at the conceptual level. The connector's current alignment is included in the draft SEIS/EIR.

One property has been acquired to preserve right-of-way for Phase 2, though additional right-of-way, including easements, will be needed for construction of the DTX tunnel and the IBF, including a parcel to be transferred from the City and multiple permanent underground easements at the throat structure of the tunnel, where the alignment turns into the Transit Center, and along the mined tunnel segment.

Tunnel Operational Needs

In 2013, TJPA received approval by the Federal Railroad Administration, CHSRA, and Caltrain on the current track alignment in the DTX tunnel and the Transit Center. The alignment that was approved is a three-track tunnel connecting to a six-track station in the Transit Center through the throat structure. The operational needs of Caltrain and CHSRA necessitate a three-track tunnel as explained below:

- Train operations at higher frequencies will often require staging two trains entering the DTX tunnel, while the third track is used for outbound trains.
- A disabled train in the three-track tunnel can be bypassed using the other two tracks. By contrast, a two-track tunnel is vulnerable to a single point of failure, which limits capacity.
- High-speed trains must be able to bypass stopped Caltrain commuter trains at the Fourth and Townsend Street Station.
- The third track facilitates the free movement of trains to any platform, as the requirement for common boarding heights allows both high-speed and commuter trains to use any platform.

Tunneling Methodologies

The operational needs of Caltrain and CHSRA require the tunnel to have three tracks with a throat structure that widens to six tracks in the Transit Center. Given the required cross-section geometry and the ground conditions along the alignment, TJPA's technical consultants explored the feasibility of all available tunneling technology for the mined tunnel segment including the sequential excavation method (SEM), also called the "New Austrian Tunneling Method" (NATM), and use of a tunnel boring machine (TBM) to determine the best value to TJPA for managing construction, schedule and risk.

It was determined that the throat structure, the Fourth and Townsend Street Station, and the tunnel stub will require cut-and-cover construction regardless of the method of tunneling used along the rest of the alignment. The throat structure geometry with a varying width from 51 feet to 148 feet cannot be accomplished by mining, while the Fourth and Townsend Street Station includes a mezzanine level and will be constructed in very soft clay, making a cavern infeasible. The tunnel stub includes shallow and complicated geometry, which make mined tunneling infeasible.

SEM is a mined tunneling method whereby the tunnel is excavated and supported sequentially, and support methods can be varied in the field to efficiently and effectively address the specific ground conditions being encountered. TBMs are machines that excavate tunnels with circular cross sections through a variety of soil and rock strata. A TBM is used in conjunction with a prefabricated ground support system consisting of pre-cast concrete segments that are bolted and gasketed to form the tunnel lining.

There are several technical reasons why SEM tunneling was found to be optimum for the DTX:

- SEM tunneling can handle complex and changing cross sections, including widening a cross section on a curve where the dynamic train envelope requires greater clearances and along the tunnel where utility alcoves are required. SEM tunneling is also much more feasible for tighter turns, which will result in fewer required right-of-way easements. Available right-of-way is limited in downtown San Francisco. The design aims to stay in the public right-of-way as much as possible to limit private property acquisitions and permanent underground easements. The cross section of the DTX tunnel must be wide enough to fit three double-deck trains, overhead catenary wires to power the trains, emergency egress walkways, and the required safe distance between passing trains (called the “train envelope”). SEM tunneling allows for a cross section that can be wider than it is tall (see Figure 2). Unlike a circular cross section, this shape minimizes the amount of excavation required and allows for minimal wasted space below the tracks and a smaller tunnel width, because the cross section of the SEM tunnel would provide the necessary overhead room on the outer edges to accommodate the outside tracks and the overhead catenary system. By contrast, a TBM-mined tunnel has a uniform cross section throughout the tunnel, meaning that the TBM must be large enough to accommodate the largest required cross section regardless of how long or short of a distance that cross section is required.

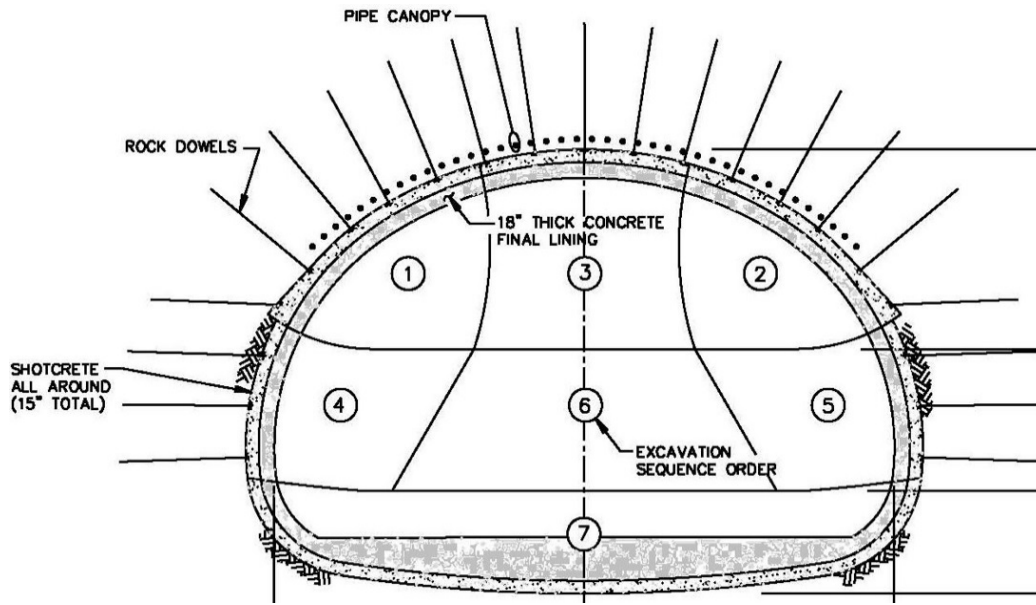


Figure 2, SEM Cross Section

- With SEM, the tunnel is sequentially excavated and supported. The support types can be varied in the field to efficiently and effectively address the specific ground conditions being encountered. With SEM, support methods and installation timing are tailored to the specific ground being excavated, and the tunnel supports capitalize on the inherent strength of the ground. The geotechnical profile along the alignment varies greatly, from very soft clay to rock. While TBMs that can handle mixed ground conditions do exist (called “earth pressure balance (EPB) machines”), currently, the largest EPB machine in the world is not large enough for the required DTX tunnel cross section. The current DTX design includes SEM tunneling while in rock, and cut-and-cover while in clay. There are approximately 1,800 feet of cut-and-cover tunnel (not including the throat structure or the Fourth and Townsend Street Station). This length of cut-and-cover tunnel is separated into two segments by the Fourth and Townsend Street Station, meaning that if used the TBM would need to be “walked” through the station box—a time consuming and labor intensive process.
- TBM are expensive, and a TBM for the DTX would be the largest ever built to accommodate a three-track tunnel. TBMs are generally used for long tunneling projects because they are not cost effective for shorter tunnels. The DTX tunnel, with 3,210 feet of mining currently planned, may not be long enough to justify the expense of a TBM, and unless the TBM can later be used on another project of the same diameter, significant cost savings from the sale of a refurbished a machine from the DTX project would be lost.
- SEM can provide for reduced schedule risk by allowing mining to take place from multiple access points (called “headings”) along the alignment. For the DTX tunnel, mining is expected to progress from three headings, both ends as well as from the central ventilation shaft. If there is a difficulty encountered at one heading, mining progress can still be achieved from the other headings, reducing the risk of schedule delays. A TBM is a non-redundant piece of equipment and carries greater risk of schedule delays because all excavation, support, service, and maintenance activities are linear (one heading). Additionally, tunneling could commence significantly earlier in the project schedule using SEM, due to the long-lead time to acquire a TBM.

- SEM tunneling has a track record of success in the Bay Area, with several tunnels recently constructed successfully using SEM: the fourth bore of the Caldecott Tunnel, the Claremont Tunnel Seismic Improvements Project, and the Devil’s Slide tunnels.

While the design of the DTX does not prescribe or preclude any tunneling methodology, as this will likely be dictated by the means and methods of the contractor and may vary depending on the procurement method selected, the DTX design team believes that the use of SEM tunneling offers the best value to TJPA for managing construction, schedule, and risk based on the analysis and design conducted to date.

Phase 2 Budget and Cost Estimates

A Phase 2 Baseline Budget of \$2.996 billion was presented to the TJPA Board of Directors and adopted by the Board on March 20, 2008. The scope of the 2008 budget included the below-grade levels of the Transit Center terminating at Beale Street, tail tracks off the east end of the Transit Center, an underground station at Fourth and Townsend streets, and tracks leading to the at-grade existing Caltrain tracks along Seventh Street (refer to Figure 3). The 2008 adopted budget was based on the conceptual designs and a direct construction cost estimate of \$1.48 billion (\$369 million for the Phase 2 elements of the Transit Center and \$1,110 million for the DTX, including design contingency and excluding escalation). The budget assumed a design-bid-build delivery method and anticipated the beginning of construction in 2011, with Caltrain operations beginning in 2018.

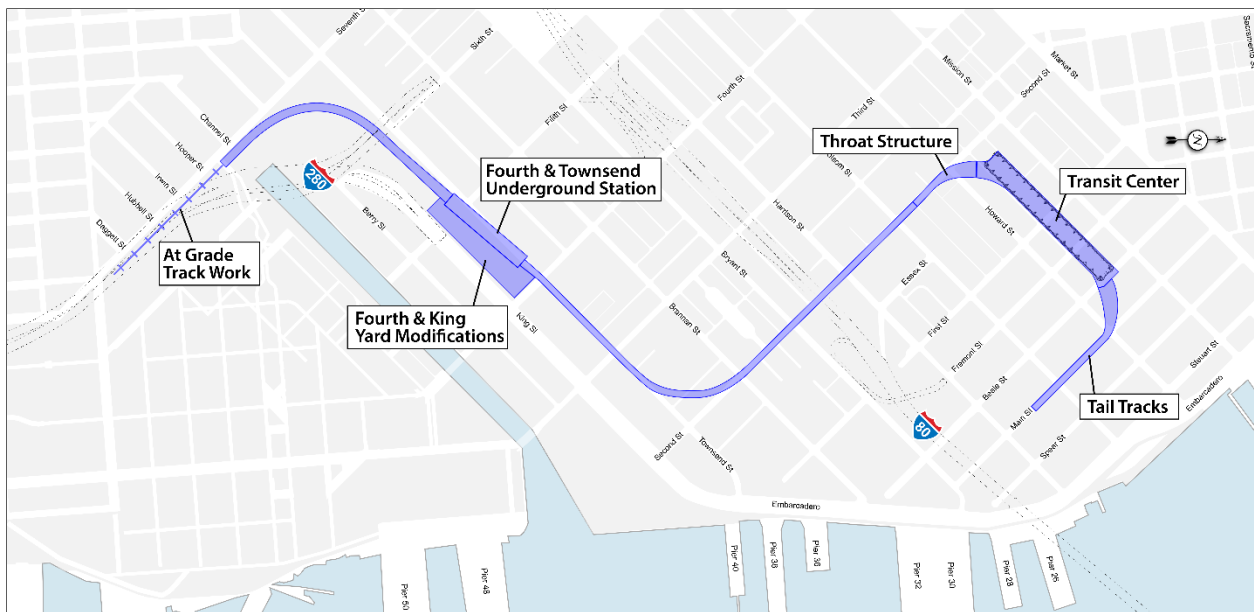


Figure 3, 2008 Phase 2 Baseline Budget Scope

In May 2010, TJPA reallocated the train box scope to Phase 1 by adopting a “bottom up” construction approach in anticipation of the award of \$400 million in American Recovery and Reinvestment Act (ARRA) funding from the Federal Railroad Administration. This revised the Phase 2 budget to \$2.596 billion. By successfully securing the ARRA grant and thus adopting a “bottom up” construction approach, TJPA was able to construct the train box using a traditional construction method and avoid the significant risks associated with the previously planned “top-down” method whereby the train box would have been excavated underneath the Transit Center building in Phase 2 after the building had been put into operation. The two-phase

implementation strategy, with the top-down method, was adopted by the TJPA Board in June 2006.

Since the Phase 2 budget was approved in 2008, construction cost estimates for various Phase 2 elements have been completed at intervals generally corresponding to scope refinements and Program milestones.

- In July 2010, DTX designer, Parsons Transportation Group (Parsons), completed the 30% PE documents and estimated construction at \$1,171.1 million (in 2010 base year dollars including design contingency and excluding escalation). This scope included the DTX tunnel, trackwork, and systems; a below-grade station at Fourth and Townsend streets, and reconstruction of construction-affected facilities at the Caltrain surface station and yard at Fourth and King streets.
- In April 2011, Parsons updated the 30% PE documents and construction cost estimate to remove the at-grade track work and the U-wall to allow for a direct connection to a CHSRA tunnel at Sixth and Townsend streets. The estimate also included the cost to widen the throat structure to accommodate CHSRA's design criteria, which had been made available since the 2010 engineering was completed. The tail tracks off the east end of the Transit Center were also removed from the scope at this time. The total direct construction cost of this estimate was \$1,109.6 million (including design contingency and excluding escalation) due to the reduced scope.
- In June 2012, Pelli Clarke Pelli Architects (PCPA), the Transit Center designer, completed the 50% construction documents for Phase 2 of the Transit Center and provided an estimated construction cost of \$194.3 million (in 2011 base year dollars including design contingency) for the Phase 2 Transit Center elements, including fit-out of the train box, train box extension, and the IBF. Both the train box extension (to accommodate CHSRA's design criteria) and the IBF represented new scope since the 2008 budget was produced.

In October 2013, TJPA produced a full Phase 2 cost estimate update that combined the 2012 Transit Center construction cost estimate with the 2011 DTX construction cost estimate and included the cost of the U-wall from the 2010 DTX cost estimate. TJPA added \$99.9 million to the estimate for the new tunnel stub scope. These scope changes were incorporated into the revised estimate, which increased the right-of-way acquisition budget. The revised estimate assumed a 2024 operations date, and revised the escalation from 4% to 3%, consistent with the Consumer Price Index 10-year average, which is 2.4%; CHSRA's escalation rate, which was 2% for 2013-15 and 3% for 2016 and beyond; and the escalation rate of 2.2% used in the Metropolitan Transportation Commission's (MTC) Plan Bay Area. The 2013 Phase 2 cost estimate, including right-of-way costs, soft costs, and Program Reserve and contingency, was \$3.004 billion, with the estimated construction cost at \$1.290 billion, as shown in the following table.

2013 Phase 2 Cost Estimate (in year of expenditure dollars, in \$ millions)

	Cost
Construction	\$1,290,320
Design Contingency	\$205,816
Subtotal	\$1,496,136
Escalation	\$449,240
Construction Cost w/Design Contingency and Escalation	\$1,945,376
ROW	\$266,200
Programwide	\$418,590
Program Cost	\$2,630,166
Construction Contingency	\$183,819
Program Reserve	\$190,750
Subtotal Contingency and Reserve	\$374,569
Total Program Cost	\$3,004,735

Metropolitan Transportation Commission Phase 2 Cost Review

In November 2015, the MTC produced the *Phase 2 Cost Review and Project Procurement Analysis Report*. The MTC's review focused on the construction cost estimate and primarily on the preliminary engineering plans and cost estimate prepared by Parsons in 2010, taking into consideration subsequent design, scope and estimate changes. The MTC recommended increasing the escalation from 3% to 5% (adding \$433 million to the cost estimate); increasing the contractor fee from 5% to 10% (adding \$100 million); increasing the project contingency from 23% to 27% (adding \$93 million); and adding items that had previously not been identified including traffic decking on Townsend Street and temporary utility relocation, new scope items including turnback and maintenance-of-way tracks (adding \$58 million), and the BART/Muni Pedestrian Connector, which was not included in the Phase 2 Baseline Budget or in subsequent cost estimates (adding \$120 million to \$310 million). The total adjusted estimate (including soft costs and the BART/Muni Pedestrian Connector) was \$3.809 billion to \$3.999 billion, \$3.688 billion without the BART/Muni Pedestrian Connector.

MTC's Recommended Program Construction Capital Estimate Adjustment Summary

	Cost
Project Escalation	\$433,296,270
Fee/Profit	\$100,148,877
Indirect Cost Markup	\$0
Items not included in 2010 estimate*	\$57,781,934
Project Contingency	\$92,862,800
Total Adjustments (YOE)	\$684,089,881
TJPA Base Estimate (YOE)	\$3,004,731,000
Adjusted Estimate (less BART/Muni Pedestrian Connector)	\$3,688,820,881
BART/Muni Pedestrian Connector	\$120,000,000–\$310,000,000
TOTAL Adjusted Estimate	\$3,808,820,881–\$3,998,820,881

* Protective traffic cover, a turnback and maintenance of way tracks, and temporary utility relocation

Phase 2 Cost Estimate Refresh

At the February 11, 2016, TJPA Board Meeting, the TJPA Board requested a refresh of the Phase 2 cost estimate. The TJPA team has subsequently worked to produce a refreshed estimate that reflects the current level of design (discussed further below) and current market rates for labor and materials. The current estimate refresh was produced by reviewing scope elements from the 2010 and 2011 DTX cost estimates line item by line item, and updating the costs for labor and materials based on current market rates. The current estimate includes the following scope: turnback and maintenance-of-way tracks, at-grade trackwork, reconstruction of facilities impacted by DTX construction in the Fourth and King Caltrain Yard, the tunnel stub, the U-wall, cut-and-cover along Townsend Street, an underground station at Fourth and Townsend streets, an SEM tunnel along Townsend and Second streets, ventilation and emergency egress structures, a cut-and-cover widened throat structure, fit-out of the below-grade levels of the Transit Center, the extension of the train box to Main Street, the IBF, and the BART/Muni Pedestrian Connector. The refreshed estimate also utilizes the recommendations from the MTC Phase 2 cost review.

However, there are several limitations to the current estimate approach. While the estimate does include all the elements in the current design, including those in the SEIS/EIR, some elements of the design are not at the same level of design as others. The following items have been modified, or the scope has been changed or added since the 2010 PE drawings and cost estimate were prepared, and therefore are not at a 30% design level.

- BART/Muni Pedestrian Connector
- Widened throat structure
- Ventilation/emergency egress structures
- Fourth and Townsend Street Station
- Tunnel stub
- Turnback and maintenance-of-way tracks

For the above elements that are not at the 30% design level, either their designs from the 2010 PE estimate have been used to update the labor/materials to current market rates (widened throat structure, Fourth and Townsend Street Station), or rough-order-of-magnitude costs have been provided (BART/Muni Pedestrian Connector, ventilation/emergency egress structures, tunnel stub, and turnback and maintenance-of-way (MOW) tracks). To provide a more complete estimate, TJPA will need to undertake further engineering on these elements.

In addition, the estimate of the right-of-way costs could not be updated at this time, as the effort to do so is time-consuming and requires a detailed assessment. This effort was therefore deferred to the next steps.

The following table shows the 2016 Phase 2 cost estimate refresh, which assumes a year of operation of 2025 and a 5% escalation rate.

2016 Phase 2 Cost Estimate (in year of expenditure dollars)

		Direct Costs	Design Contingency	Total Cost
Phase 2 Construction				
DTX				\$1,467,777,900
	Segment 10 Fourth and King Surface Station and Yard Upgrade	\$0		\$0
	Segment 9 At Grade Trackway	\$707,000		\$707,000
	Segment 8 U-Wall Segment	\$57,906,000		\$57,906,000
	Segment 7 Cut and Cover West of Fifth St	\$92,220,000		\$92,220,000
	Segment 6 Cut and Cover Fourth & Townsend Underground Station	\$123,721,000		\$123,721,000
	Segment 5 Cut and Cover East of Fourth St	\$82,069,000		\$82,069,000
	Segment 4 NATM Mined Tunnel	\$387,981,000		\$387,981,000
	Segment 3 Cut and Cover Throat Structure	\$151,037,000		\$151,037,000
	Segment 2 Transit Center	\$889,000		\$889,000
	Trackworks	\$82,775,000		\$82,775,000
	Systems	\$92,662,000		\$92,662,000
	Allowances	\$90,162,000		\$90,162,000
	Design Contingency		\$199,551,900	\$199,551,900
	Allowance for Properties Demolition	\$3,000,000		\$3,000,000
	Tunnel Stub Box	\$99,876,000	included	\$99,876,000
	DTX Vent Structures (heighting of structures)	\$3,222,000	included	\$3,222,000
Transit Center Building (TCB)				
	Transit Center Fit Out	\$150,255,780	\$7,512,576	\$157,768,356
	Allowance for RVA for above at 5%	\$7,512,789		\$7,512,789
	Train Box Extension	\$55,631,840	\$2,782,176	\$58,414,016
	Allowance for RVA for above at 5%	\$2,781,592	\$514,738	\$3,296,330
	IBF - PCPA 95% CD Estimate item 2.3 plus 16.8% for escalation to 2016	\$12,582,864	\$629,552	\$13,212,416
	Allowance for IBF Escalator and Elevator from Beale street to Below Grade Train Box	\$5,000,000		\$5,000,000
	Allowance for Main Street Utility Relocation	\$2,000,000		\$2,000,000
	Subtotal DTX and TCB Construction excluding escalation	\$1,503,991,865	\$210,990,942	\$1,714,981,807
	DTX and TCB Construction Escalation at 5% to mid construction (2023)			\$583,257,836
	Subtotal DTX and TCB Construction including escalation			\$2,298,239,643
	ROW**			\$266,200,000
	Programwide @ 22.5% of above excluding ROW			\$517,103,920
	Subtotal Program Costs			\$3,081,543,562
	Construction Contingency @ 10%			\$229,823,964
	Program Reserve @ 15% of Subtotal Program Costs			\$462,231,534
	Total Program Cost excluding BART/Muni Pedestrian Connector			\$3,773,599,061
	BART/Muni Pedestrian Connector - Direct Construction Cost	\$109,525,767	included	\$109,525,767
	BART/Muni Pedestrian Connector - Escalation			\$37,249,236
	BART/Muni Pedestrian Connector - Construction Contingency			\$14,677,500
	BART/Muni Pedestrian Connector Total Cost			\$161,452,503
	Total Program Cost including BART/Muni Pedestrian Connector	\$1,613,517,632	\$210,990,942	\$3,935,051,564

* Total Contingency/Reserves is \$903 million or 29.3% of Total Program Costs excluding BART/Muni Pedestrian Connector

** ROW number was last updated with the 2013 Phase 2 cost estimate

Figure 4 shows the location and construction cost of each DTX segment and Transit Center building component for the refreshed 2016 Phase 2 cost estimate (refer to the detail in the preceding table). Note: The direct construction cost for the ventilation structures is included in various segments depending on their location.

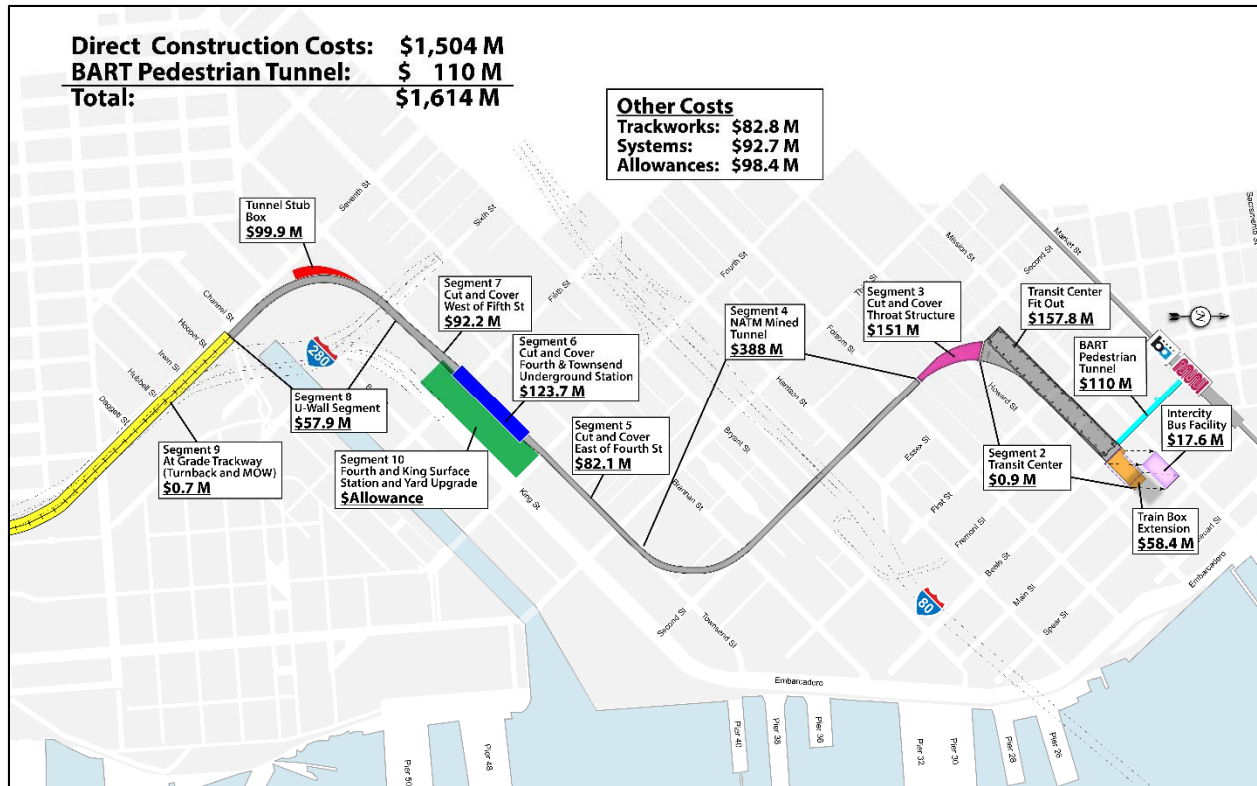


Figure 4, 2016 Estimated Direct Construction Costs for Phase 2 Scope Elements

The table below shows how the MTC’s recommendations were addressed in the 2016 cost estimate:

MTC Cost Review Findings & Recommendations

Item	MTC Cost Review	2016 Phase 2 Cost Estimate Refresh
7-year Construction Schedule	Found to be reasonable	No change
Indirect Cost Markup (Overhead)	Found to be reasonable at 26%	Used 54% for tunnel scope and 26% for other scope
Escalation	Recommended 5%	Used 5%
Contractor Fee	Recommended 10%	Used 15% for tunneling and 5% for other scope
Total Project Contingency	Recommended 27%	Used 29.2%
Scope	Recommended adding \$58M: Townsend Street traffic decking (\$22.5M), turnback/MOW tracks (\$33.8M), temporary utility relocation (\$1.9M)	Included in estimate based on current market rates
Other	Recommended review of productivity rates in final design	No change, will review in final design phase

Budget & Estimate Summary

The following table summarizes the 2013 cost estimate, the MTC's recommended adjustment, and the 2016 cost estimate refresh:

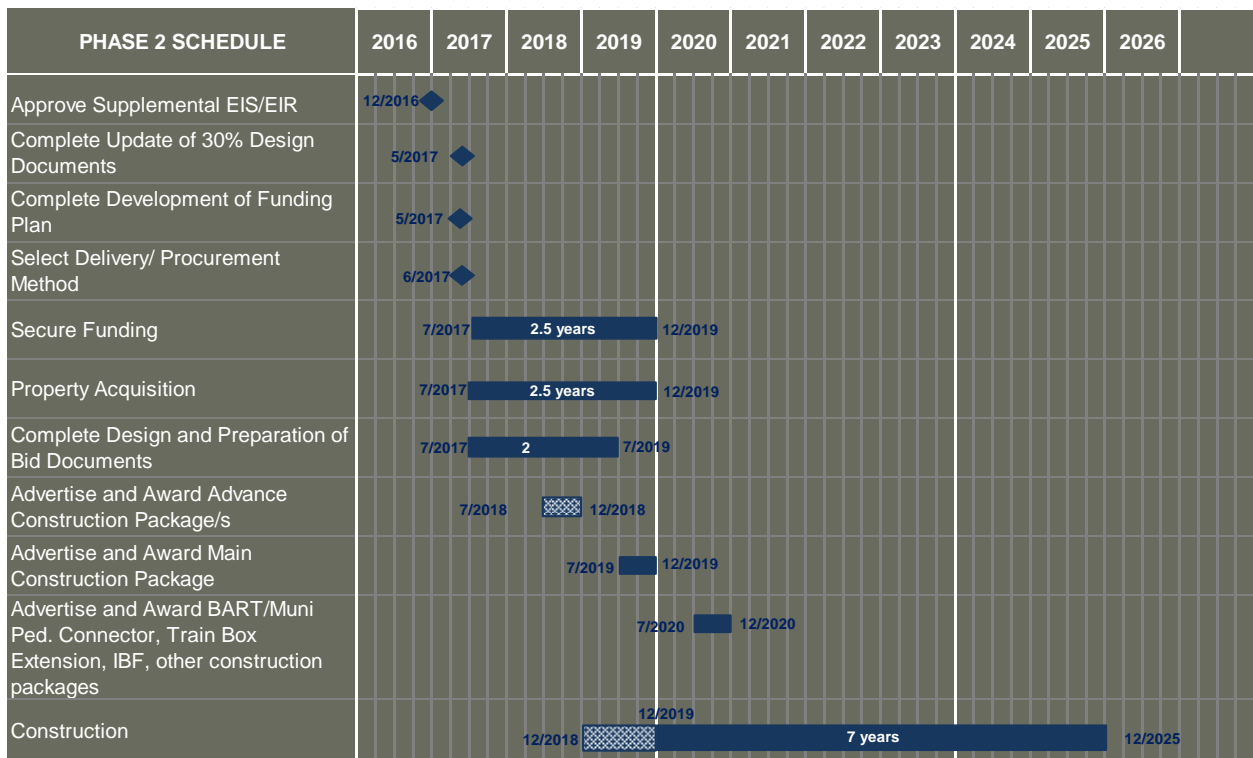
Comparison of 2013 Phase 2 Cost Estimate, MTC's 2015 Recommended Adjustment & 2016 Phase 2 Cost Estimate Refresh (year of expenditure dollars, in \$ millions)

	Total Phase 2 (October 2013)	MTC Cost Estimate (November 2015)	Total Phase 2 (June 2016)	Variance of MTC vs June 2016 Estimate
Construction	\$1,290	\$1,448	1,504	\$56
Design Contingency	\$206	\$206	\$211	\$5
Subtotal	\$1,496	\$1,654	\$1,715	\$61
Construction Escalation	\$449	\$722	\$583	\$(139)
Construction Cost w/Design Contingency and Escalation	\$1,945	\$2,376	2,298	\$(78)
ROW**	\$266	\$266	\$266	-
Programwide	\$419	\$418	\$517	\$100
Program Cost	\$2,630	\$3,060	\$3,082	\$22
Construction Contingency	\$184	\$184	\$230	\$46
Program Reserve	\$191	\$444	\$462	\$18
Subtotal Contingency and Reserve	\$375	\$628	\$692	\$64
Total Program Cost	\$3,005	\$3,688	\$3,774	\$86
BART/Muni Pedestrian Connector	\$120	\$120-\$310	\$161	-
Total	\$3,125	\$3,808-3,998	\$3,935	\$86

**ROW number was last updated with 2013 Phase 2 cost estimate

Delivery Plan

The construction of Phase 2 using a traditional design-bid-build procurement method will take an estimated total of 7 years to complete. Below is a delivery plan based on design-bid-build procurement. Based on this delivery plan, train operations at the Transit Center could commence by the end of 2025 or beginning of 2026.



A design-build procurement method could reduce the length of construction by 6 to 12 months. Staff has undertaken a study evaluating the potential delivery options including design-build and will present the results of the study to the Board in July 2016.

Funding Plan

TJPA's Phase 2 funding sources will become available to TJPA both during the construction period and over a considerable length of time after substantial completion of Phase 2. This is typical in multibillion-dollar transit projects. Currently, it is assumed that Phase 2 will have a construction start date of 2019, with a seven-year construction period, and with revenue commencement and operations starting in 2026. The table below summarizes the current funding plan:

Potential Funding Sources Identified for Phase 2 (\$ millions)

Source	Amount (Range)	Assumed Term	Status
San Francisco County Sales Tax	\$83	2016-2019	Committed
San Mateo County Sales Tax	\$19	N/A	Committed and spent
Committed MTC/BATA Bridge Tolls	\$7	N/A	Committed and spent
Tax Increment (after repayment of existing TIFIA loan)	\$200-\$340	2019-2050	Committed
Mello-Roos Special Tax	\$275-\$375	2020-2025	Committed
Regional Transportation Improvement Program	\$18	N/A	Committed
Future San Francisco County Sales Tax	\$350	2019-2026	Subject to SFCTA or voter approval
FTA New Starts	\$650	2019-2026	Subject to federal approval
New MTC/BATA Bridge Tolls	\$300	2019-2026	Subject to MTC/BATA and voter approval
Future California High Speed Rail Funds	\$557	2019-2026	Subject to federal/state approval
Land Sales	\$45	2018	Contingent upon sale
Potential Passenger Facility Charges or Maintenance Contribution	\$865-\$1,920	2026-2060	Subject to CHSRA and/or Caltrain approval
Total	\$3,369-\$4,664		

As of December 31, 2015, approximately \$76 million of the committed funding has been spent on the design, predevelopment and environmental work for Phase 2. These amounts were funded by committed bridge tolls from MTC, and sales tax receipts from San Francisco County Transportation Authority (SFCTA) and San Mateo County Transportation Authority. The remaining \$33 million of the aggregate of \$109 million to come from these sources will be utilized requested to complete the Phase 2 environmental process and advance the project before construction begins. Staff also anticipates that the net proceeds generated from selling the final formerly state-owned parcel Block 4 (currently a portion of the Temporary Transbay Terminal) will be available for Phase 2 before construction begins.

Phase 2 has two other committed funding sources that are currently providing funds for Program development: net tax increment revenues and Mello-Roos special tax assessments. Although the net tax increment revenues are pledged to repay TJPA's loan with U.S. Department of Transportation's Transportation Infrastructure Innovation and Financing Act (TIFIA) credit assistance program to fund Phase 1, the revenues remaining after loan repayment will be used for Phase 2. Similarly, certain Mello-Roos special tax assessments will fund the Phase 1 completion, but the remaining revenues will be used for Phase 2. Although these tax increment revenues and Mello-Roos special assessments will be generated for a significant period after the proposed

Phase 2 construction period, TJPA has assumed that it will be able to use long-term financings to generate proceeds during the construction period.

Analysis by TJPA's financial consultant indicates that in 2019 (the anticipated start of construction) approximately \$1,998 million of the funding needed will be available to TJPA. In 2026 (the anticipated completion of construction), approximately \$4,570 million will be available to TJPA.

Passenger facility charges (PFC) for Caltrain and/or CHSRA rail passengers into the Transit Center will be possible sources of funding for Phase 2. These small surcharges on tickets for trips ending at the Transit Center have been contemplated going back to the project's 2004 environmental clearance documents. The implementation of a PFC would need to be negotiated between TJPA and rail operators and would likely be based on the operators' share of the overall operations and maintenance costs for the facility and any upfront capital contribution from the operators. The following tables show four funding scenarios in 2026 using a range of PFCs.

TJPA Phase 2 Funding Scenario 1: Caltrain PFC of \$2.00 (\$2026) and HSR PFC of \$8.00 (\$2026)

	Low		High		Notes	Timeframe
	Total Funds	Net Proceeds	Total Funds	Net Proceeds		
San Francisco County Sales Tax*	\$ 83,000,000	\$ 83,000,000	\$ 83,000,000	\$ 83,000,000	Committed; \$50 million spent	2016-2019
San Mateo County Sales Tax*	\$ 19,000,000	\$ 19,000,000	\$ 19,000,000	\$ 19,000,000	Committed; spent	N/A
Committed MTC/BATA Bridge Tolls*	\$ 7,000,000	\$ 7,000,000	\$ 7,000,000	\$ 7,000,000	Committed; spent	N/A
Tax Increment ¹	\$ 665,000,000	\$ 200,000,000	\$ 735,000,000	\$ 340,000,000	Committed	2021-2050
Mello-Roos Special Tax ²	\$ 275,000,000	\$ 275,000,000	\$ 375,000,000	\$ 375,000,000	Committed	2020-2025
Regional Transportation Improvement Program	\$ 18,000,000	\$ 18,000,000	\$ 18,000,000	\$ 18,000,000	Committed	2030
Future San Francisco County Sales Tax ⁴	\$ 350,000,000	\$ 350,000,000	\$ 350,000,000	\$ 350,000,000	Subject to SFCTA or voter approval	2019-2026
FTA New Starts ⁴	\$ 650,000,000	\$ 650,000,000	\$ 650,000,000	\$ 650,000,000	Subject to federal approval	2019-2026
New MTC/BATA Bridge Tolls ^{3,4}	\$ 300,000,000	\$ 300,000,000	\$ 300,000,000	\$ 300,000,000	Subject to MTC/BATA and voter approval	2019-2026
Future California High Speed Rail Funds ⁴	\$ 557,000,000	\$ 557,000,000	\$ 557,000,000	\$ 557,000,000	Subject to federal/state approval	2019-2026
Land Sales (Block 4) ^{5*}	\$ 45,000,000	\$ 45,000,000	\$ 45,000,000	\$ 45,000,000	Contingent upon sales	2018
Passenger Facility Charges (PFCs) ⁶	\$ 2,510,000,000	\$ 865,000,000	\$ 5,430,000,000	\$ 1,365,000,000	Subject to CHSRA and Caltrain approval	2026-2060
	\$ 5,479,000,000	\$ 3,369,000,000	\$ 8,569,000,000	\$ 4,109,000,000		
Assumptions						
Core funding assumptions are committed funds and Plan Bay Area (highlighted in grey)						
All statistics other than spent funds are approximated						
Value is rounded to the nearest five million						
* Funds have already been spent or will be provided by 2019						
1. Assumes refinancing of existing Phase 1 TIFIA loan at lower rate and capture of additional tax increment debt capacity for Phase 2 in high scenario						
2. Assumes certain Mello Roos funds are used for Phase 1 (Train Box and Park) and Phase 1 is fully funded; figures are being revised in conjunction with City Financing						
3. Assumes Measure voted by 2020.						
4. Assumes funds will be provided as needed in amounts shown						
5. Assumes Block 4 Sale after Phase 1 completion; value based on Block 4 Option Agreement.						
6. Assumes 35 years of operations						

TJPA Phase 2 Funding Scenario 2: Caltrain PFC of \$2.25 (\$2026) and HSR PFC of \$9.00 (\$2026)

	Low		High		Notes	Timeframe
	Total Funds	Net Proceeds	Total Funds	Net Proceeds		
San Francisco County Sales Tax*	\$ 83,000,000	\$ 83,000,000	\$ 83,000,000	\$ 83,000,000	Committed; \$50 million spent	2016-2019
San Mateo County Sales Tax*	\$ 19,000,000	\$ 19,000,000	\$ 19,000,000	\$ 19,000,000	Committed; spent	N/A
Committed MTC/BATA Bridge Tolls*	\$ 7,000,000	\$ 7,000,000	\$ 7,000,000	\$ 7,000,000	Committed; spent	N/A
Tax Increment ¹	\$ 665,000,000	\$ 200,000,000	\$ 735,000,000	\$ 340,000,000	Committed	2021-2050
Mello-Roos Special Tax ²	\$ 275,000,000	\$ 275,000,000	\$ 375,000,000	\$ 375,000,000	Committed	2020-2025
Regional Transportation Improvement Program	\$ 18,000,000	\$ 18,000,000	\$ 18,000,000	\$ 18,000,000	Committed	2030
Future San Francisco County Sales Tax ⁴	\$ 350,000,000	\$ 350,000,000	\$ 350,000,000	\$ 350,000,000	Subject to SFCTA or voter approval	2019-2026
FTA New Starts ⁴	\$ 650,000,000	\$ 650,000,000	\$ 650,000,000	\$ 650,000,000	Subject to federal approval	2019-2026
New MTC/BATA Bridge Tolls ^{3,4}	\$ 300,000,000	\$ 300,000,000	\$ 300,000,000	\$ 300,000,000	Subject to MTC/BATA and voter approval	2019-2026
Future California High Speed Rail Funds ⁴	\$ 557,000,000	\$ 557,000,000	\$ 557,000,000	\$ 557,000,000	Subject to federal/state approval	2019-2026
Land Sales (Block 4) ⁵	\$ 45,000,000	\$ 45,000,000	\$ 45,000,000	\$ 45,000,000	Contingent upon sales	2018
Passenger Facility Charges (PFCs) ⁶	\$ 2,830,000,000	\$ 1,030,000,000	\$ 6,110,000,000	\$ 1,530,000,000	Subject to CHSRA and Caltrain approval	2026-2060
	\$ 5,799,000,000	\$ 3,534,000,000	\$ 9,249,000,000	\$ 4,274,000,000		
Assumptions						
Core funding assumptions are committed funds and Plan Bay Area (highlighted in grey)						
All statistics other than spent funds are approximated						
Value is rounded to the nearest five million						
* Funds have already been spent or will be provided by 2019						
1. Assumes refinancing of existing Phase 1 TIFIA loan at lower rate and capture of additional tax increment debt capacity for Phase 2 in high scenario						
2. Assumes certain Mello Roos funds are used for Phase 1 (Train Box and Park) and Phase 1 is fully funded; figures are being revised in conjunction with City Financing						
3. Assumes Measure voted by 2020.						
4. Assumes funds will be provided as needed in amounts shown						
5. Assumes Block 4 Sale after Phase 1 completion; value based on Block 4 Option Agreement.						
6. Assumes 35 years of operations						

TJPA Phase 2 Funding Scenario 3: Caltrain PFC of \$2.50 (\$2026) and HSR PFC of \$10.00 (\$2026)

	Low		High		Notes	Timeframe
	Total Funds	Net Proceeds	Total Funds	Net Proceeds		
San Francisco County Sales Tax*	\$ 83,000,000	\$ 83,000,000	\$ 83,000,000	\$ 83,000,000	Committed; \$50 million spent	2016-2019
San Mateo County Sales Tax*	\$ 19,000,000	\$ 19,000,000	\$ 19,000,000	\$ 19,000,000	Committed; spent	N/A
Committed MTC/BATA Bridge Tolls*	\$ 7,000,000	\$ 7,000,000	\$ 7,000,000	\$ 7,000,000	Committed; spent	N/A
Tax Increment ¹	\$ 665,000,000	\$ 200,000,000	\$ 735,000,000	\$ 340,000,000	Committed	2021-2050
Mello-Roos Special Tax ²	\$ 275,000,000	\$ 275,000,000	\$ 375,000,000	\$ 375,000,000	Committed	2020-2025
Regional Transportation Improvement Program	\$ 18,000,000	\$ 18,000,000	\$ 18,000,000	\$ 18,000,000	Committed	2030
Future San Francisco County Sales Tax ⁴	\$ 350,000,000	\$ 350,000,000	\$ 350,000,000	\$ 350,000,000	Subject to SFCTA or voter approval	2019-2026
FTA New Starts ⁴	\$ 650,000,000	\$ 650,000,000	\$ 650,000,000	\$ 650,000,000	Subject to federal approval	2019-2026
New MTC/BATA Bridge Tolls ^{3,4}	\$ 300,000,000	\$ 300,000,000	\$ 300,000,000	\$ 300,000,000	Subject to MTC/BATA and voter approval	2019-2026
Future California High Speed Rail Funds ⁴	\$ 557,000,000	\$ 557,000,000	\$ 557,000,000	\$ 557,000,000	Subject to federal/state approval	2019-2026
Land Sales (Block 4) ⁵	\$ 45,000,000	\$ 45,000,000	\$ 45,000,000	\$ 45,000,000	Contingent upon sales	2018
Passenger Facility Charges (PFCs) ⁶	\$ 3,140,000,000	\$ 1,195,000,000	\$ 6,790,000,000	\$ 1,695,000,000	Subject to CHSRA and Caltrain approval	2026-2060
	\$ 6,109,000,000	\$ 3,699,000,000	\$ 9,929,000,000	\$ 4,439,000,000		
Assumptions						
Core funding assumptions are committed funds and Plan Bay Area (highlighted in grey)						
All statistics other than spent funds are approximated						
Value is rounded to the nearest five million						
* Funds have already been spent or will be provided by 2019						
1. Assumes refinancing of existing Phase 1 TIFIA loan at lower rate and capture of additional tax increment debt capacity for Phase 2 in high scenario						
2. Assumes certain Mello Roos funds are used for Phase 1 (Train Box and Park) and Phase 1 is fully funded; figures are being revised in conjunction with City Financing						
3. Assumes Measure voted by 2020.						
4. Assumes funds will be provided as needed in amounts shown						
5. Assumes Block 4 Sale after Phase 1 completion; value based on Block 4 Option Agreement.						
6. Assumes 35 years of operations, TIFIA loan in High Scenario assumes 33% of Project Cost (\$3.954bn)						

TJPA Phase 2 Funding Scenario 4: Caltrain PFC of \$2.74 (\$2026) and HSR PFC of \$10.96 (\$2026)

	Low		High		Notes	Timeframe
	Total Funds	Net Proceeds	Total Funds	Net Proceeds		
San Francisco County Sales Tax*	\$ 83,000,000	\$ 83,000,000	\$ 83,000,000	\$ 83,000,000	Committed; \$50 million spent	2016-2019
San Mateo County Sales Tax*	\$ 19,000,000	\$ 19,000,000	\$ 19,000,000	\$ 19,000,000	Committed; spent	N/A
Committed MTC/BATA Bridge Tolls*	\$ 7,000,000	\$ 7,000,000	\$ 7,000,000	\$ 7,000,000	Committed; spent	N/A
Tax Increment ¹	\$ 665,000,000	\$ 200,000,000	\$ 735,000,000	\$ 340,000,000	Committed	2021-2050
Mello-Roos Special Tax ²	\$ 275,000,000	\$ 275,000,000	\$ 375,000,000	\$ 375,000,000	Committed	2020-2025
Regional Transportation Improvement Program	\$ 18,000,000	\$ 18,000,000	\$ 18,000,000	\$ 18,000,000	Committed	2030
Future San Francisco County Sales Tax ⁴	\$ 350,000,000	\$ 350,000,000	\$ 350,000,000	\$ 350,000,000	Subject to SFCTA or voter approval	2019-2026
FTA New Starts ⁴	\$ 650,000,000	\$ 650,000,000	\$ 650,000,000	\$ 650,000,000	Subject to federal approval	2019-2026
New MTC/BATA Bridge Tolls ^{3,4}	\$ 300,000,000	\$ 300,000,000	\$ 300,000,000	\$ 300,000,000	Subject to MTC/BATA and voter approval	2019-2026
Future California High Speed Rail Funds ⁴	\$ 557,000,000	\$ 557,000,000	\$ 557,000,000	\$ 557,000,000	Subject to federal/state approval	2019-2026
Land Sales (Block 4) ⁵	\$ 45,000,000	\$ 45,000,000	\$ 45,000,000	\$ 45,000,000	Contingent upon sales	2018
Passenger Facility Charges (PFCs) ⁶	\$ 3,440,000,000	\$ 1,240,000,000	\$ 8,025,000,000	\$ 1,920,000,000	Subject to CHSRA and Caltrain approval	2026-2060
	\$ 6,409,000,000	\$ 3,744,000,000	\$ 11,164,000,000	\$ 4,664,000,000		
Assumptions						
Core funding assumptions are committed funds and Plan Bay Area (highlighted in grey)						
All statistics other than spent funds are approximated						
Value is rounded to the nearest five million						
* Funds have already been spent or will be provided by 2019						
1. Assumes refinancing of existing Phase 1 TIFIA loan at lower rate and capture of additional tax increment debt capacity for Phase 2 in high scenario						
2. Assumes certain Mello Roos funds are used for Phase 1 (Train Box and Park) and Phase 1 is fully funded; figures are being revised in conjunction with City Financing						
3. Assumes Measure voted by 2020.						
4. Assumes funds will be provided as needed in amounts shown						
5. Assumes Block 4 Sale after Phase 1 completion; value based on Block 4 Option Agreement.						
6. Assumes 35 years of operations, TIFIA loan in High Scenario assumes 33% of Project Cost (\$4.453bn)						

Staff assumes that funding sources included in MTC's Plan Bay Area will be available in full when needed before or during construction. Funds that are generated from tax increment, the Mello-Roos special tax, and PFCs that will be collected after construction is completed will require financing to be available during the construction period. Based on input from TJPA's financial consultant, it is assumed that federal loan programs such as the TIFIA program or the Railroad Rehabilitation and Improvement Financing (RRIF) program will be able to capture these revenues under favorable financing terms. The time horizon for both the TIFIA and RRIF programs is 35 years, so funding levels in the various scenarios are based on financing 35 years of PFC revenues.

The amount of the proposed PFCs for Caltrain trips ending at the Transit Center is based on variations of the average fare for a bus trip from Caltrain's current terminus at Fourth and King streets to the Transit Center. The proposed PFC for high-speed rail trips ending at the Transit Center is four times the Caltrain amount, which tracks the ratios used in the project's 2004 environmental clearance documents. The high-speed rail PFCs also compare well with current PFCs for air travel from San Francisco to Los Angeles, as well as fares for an Uber, Lyft, or taxi trip from the current terminus at Fourth and King to the Transit Center (it is assumed that high-speed rail passengers from Southern California would likely have luggage and therefore would prefer not to take a bus).

Although TJPA continues to focus on identifying potential funding sources for Phase 2, it is evident that not all of the required funding will be collected and available at the beginning of construction. A strategy for funding will be required and could include an alternative delivery option that includes financing. As noted above, staff has undertaken a study evaluating the potential delivery options and will present the results of the study to the Board in July 2016.

Next Steps

TJPA staff recommends taking the following next steps over the next year:

- Complete 30% PE drawings
- Update ROW estimate
- Update ridership study
- Perform risk assessment
- Peer review funding plan
- Peer review 2016 budget estimate
- Update Program cost estimate
- Complete development of funding plan
- Select delivery method
- Update budget
- Continue coordination with the City on the Railyard Alternatives and I-280 Boulevard Feasibility Study, Caltrain and CHSRA

RECOMMENDATION:

Information only.



Phase 2 Update

June 9, 2016

Transbay Transit Center

TJPA





Transbay Transit Center



Train Box



Agenda

- Project Overview
 - Scope
 - Construction Methodology
- Budget & Cost Estimate History
- Status of Cost Estimate Refresh Effort
- Delivery Plan
- Funding Plan
- Next Steps



Transbay Transit Center

Project Overview: Scope

The DTX extends rail service to downtown San Francisco (1.95 miles of construction)

Transbay Transit Center

Existing Caltrain Station

Downtown Core





Phase 2 Status

- Supplemental EIS/EIR issued for public comment December 2015; Record of Decision anticipated by end 2016
- DTX 30% Preliminary Engineering (PE) completed in 2010; modifications included in SEIS/EIR require further design
- TTC design at the 50% Construction Documents (CD) level
- Obtained final sign-off by Federal Railroad Administration (FRA), California High-Speed Rail Authority (CHSRA), and Caltrain for modifications to accommodate high-speed rail
- Alternative delivery options to be presented in July
- On-going coordination with the Railyard Alternatives and I-280 Boulevard Feasibility (RAB) study, FTA, Caltrain, and CHSRA



Phase 2 Scope



Element added (*) or modified (**) in the SEIS/EIR

Added/Modified Scope in SEIS/EIR

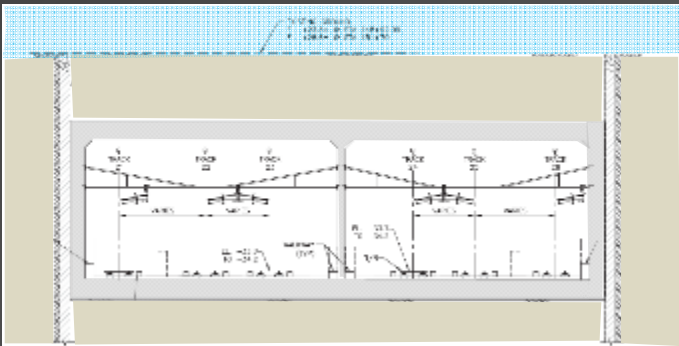
1. Extended train box
2. Added ventilation structures
3. Added Intercity Bus Facility
4. Defined alignment for BART/Muni Pedestrian Connector
5. Widened throat structure
6. Modified Fourth and Townsend Underground Station
7. Added tunnel stub for future grade separation
8. Added turnback and maintenance-of-way (MOW) tracks



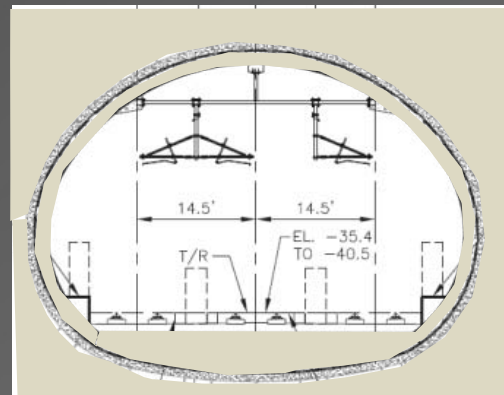


DTX Typical Cross Sections

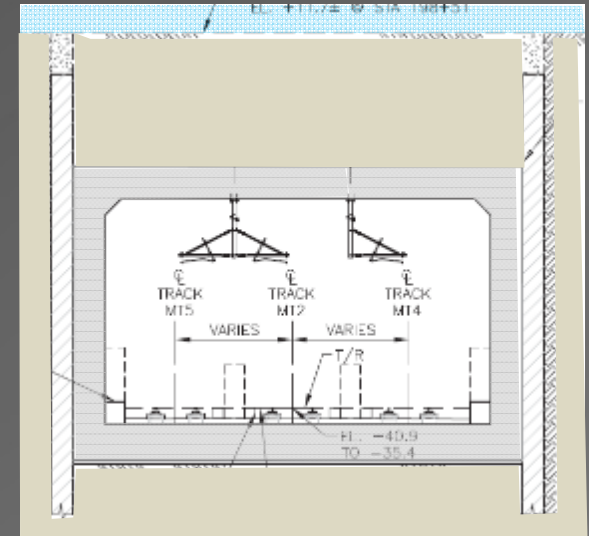
Cut-and-Cover
Throat Structure
Expands from three to six tracks



Mined Tunnel
(sequential excavation method)
Three tracks



Cut-and-Cover
in Townsend Street
Expands from two to three tracks





Why 3 Tracks?

- Operations analysis demonstrated requirement for three tracks and was approved by FRA, Caltrain & CHSRA.
- Allows two tracks to be used for staging inbound trains during peak periods.
- Allows inbound and outbound trains to bypass a disabled train.
- Allows high-speed trains to bypass stopped Caltrain trains at the Fourth and Townsend Station.
- Facilitates the free movement of trains to any platform, maximizing the benefit of common level boarding heights.



Transbay Transit Center

Phase 2 Transit Center



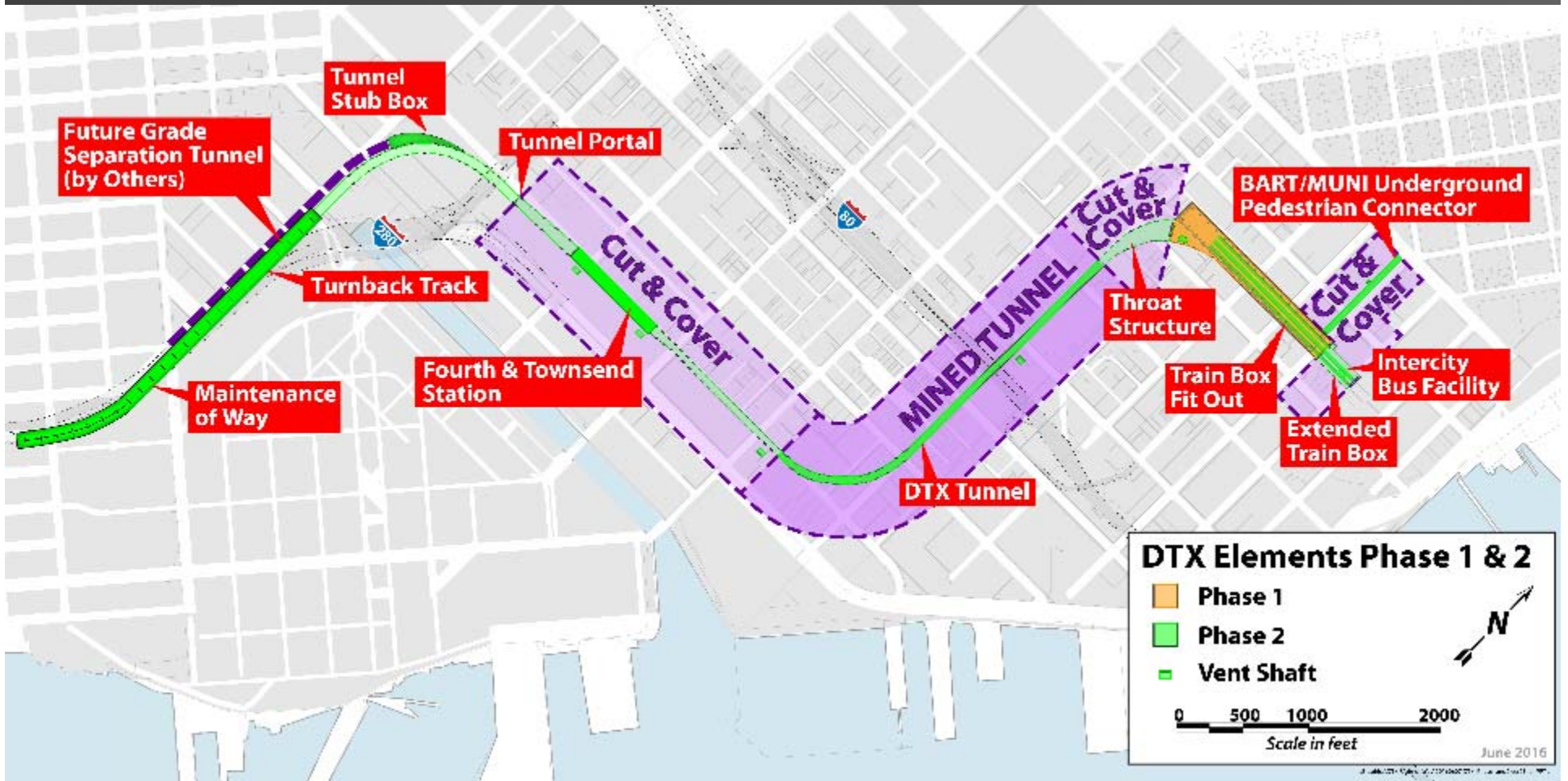


Project Overview: Construction Methodology



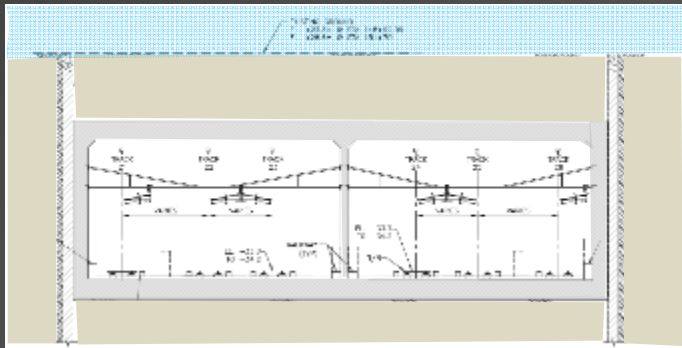


DTX Tunneling Methodologies



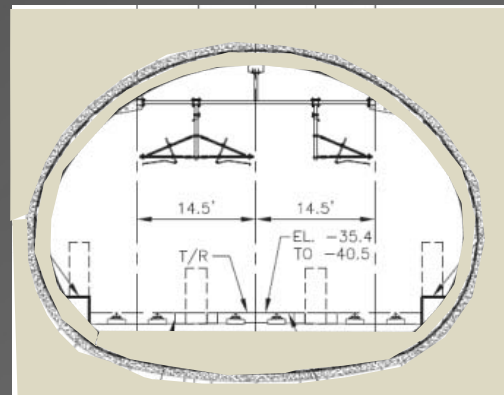
DTX Tunneling Methodologies

Cut-and-Cover
Throat Structure
Expands from three to six tracks



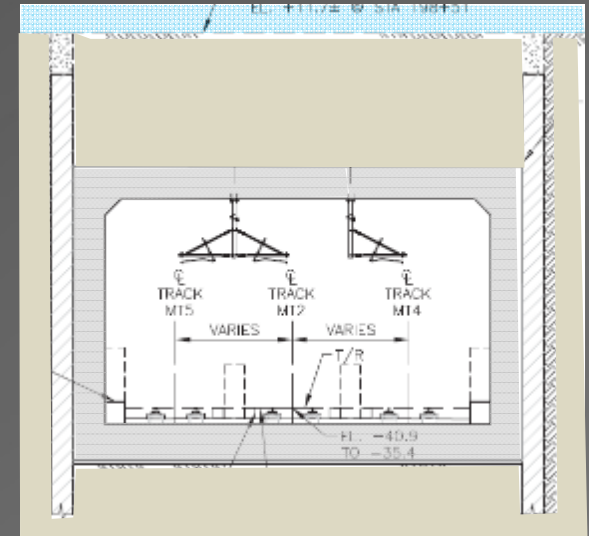
~155'

Mined Tunnel
(sequential excavation method)
Three tracks



~55' typical

Cut-and-Cover
in Townsend Street
Expands from two to three tracks

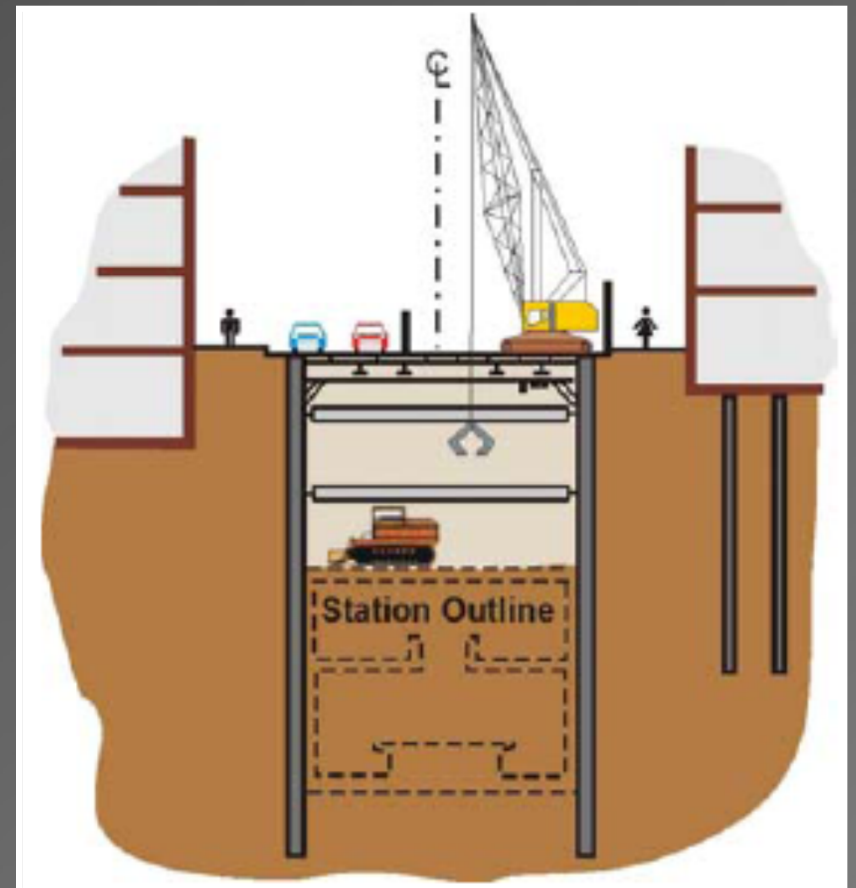


~80'



DTX Tunneling Cut & Cover Structures

- Deep soil mix support of excavation
- Internal bracing
- Street decking
- Excavation depth 40' to 85'
- Cast-in-place concrete box





Transbay Transit Center

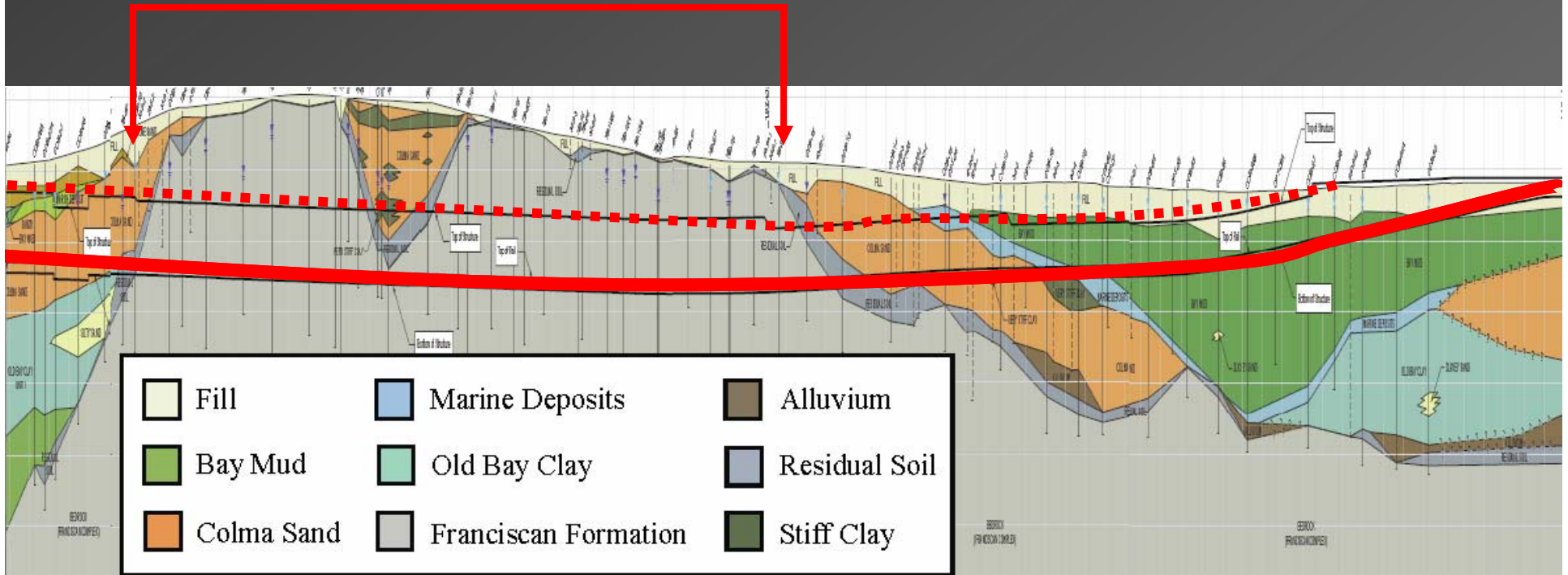
Ground Conditions





Geotechnical Soil Profile

Limits of mined tunnel segment

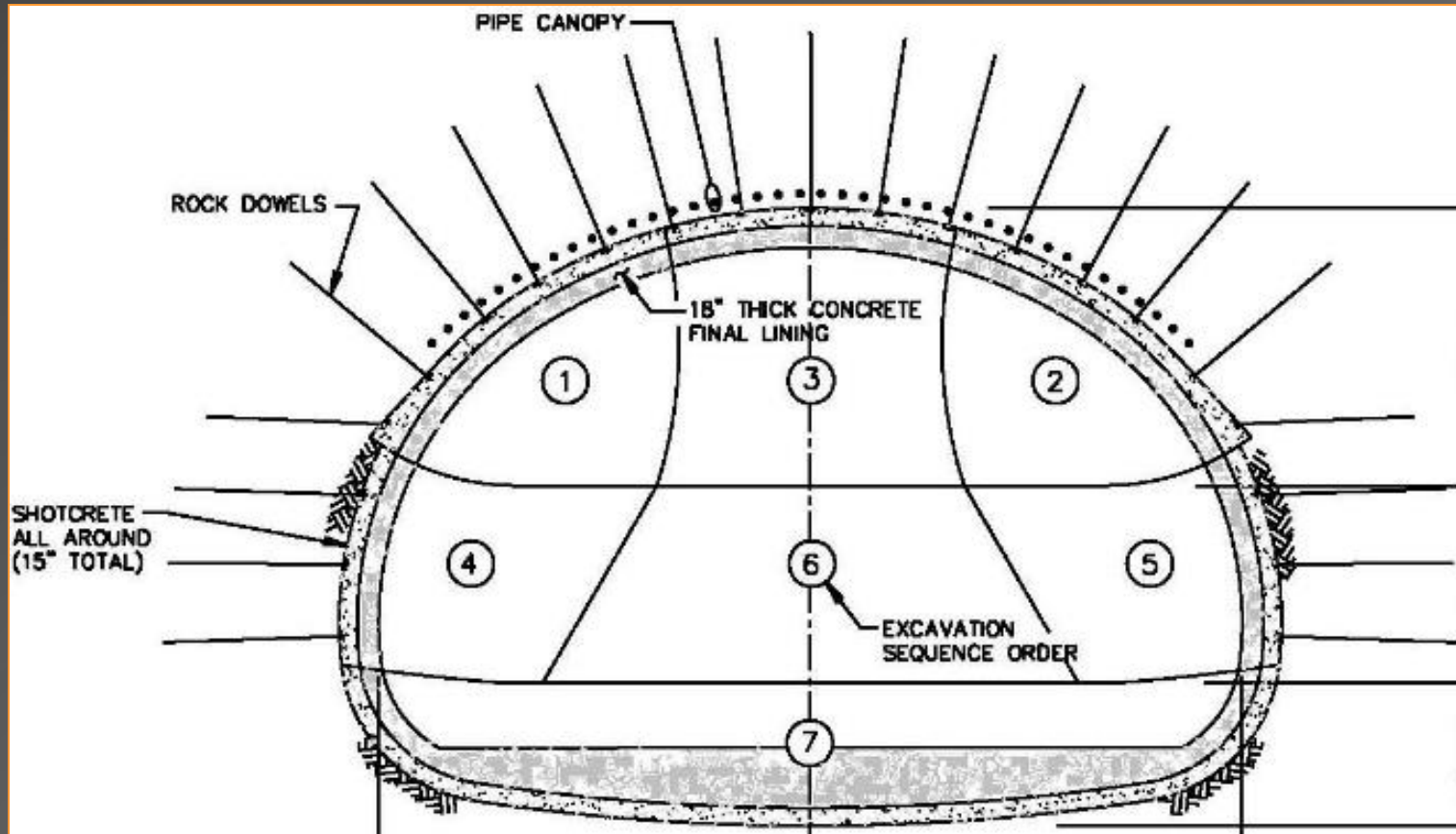


..... Tunnel Crown
 ——— Tunnel Invert



DTX Tunneling Mined Tunnel

- 3,210 ft mined tunnel
- Sequential Excavation Method (SEM) offers best value to owner for managing construction, schedule and risk





SEM: Side Drift Headings





Why SEM for DTX?

- Complex, challenging, changing, and shallow cross sections.
- Risk of settlement is minimized by SEM geometry.
- Support is tailored to ground conditions in real time.
- Equipment procurement is streamlined and economized.
- Schedule can benefit from multiple headings and flexibility.



Potential DTX SEM Headings



← Potential headings



Transbay Transit Center

Bay Area SEM Tunnel Successes



Caldecott Tunnel Fourth Bore



Devil's Slide Tunnels



Claremont Tunnel



Transbay Transit Center

Budget & Cost Estimate History



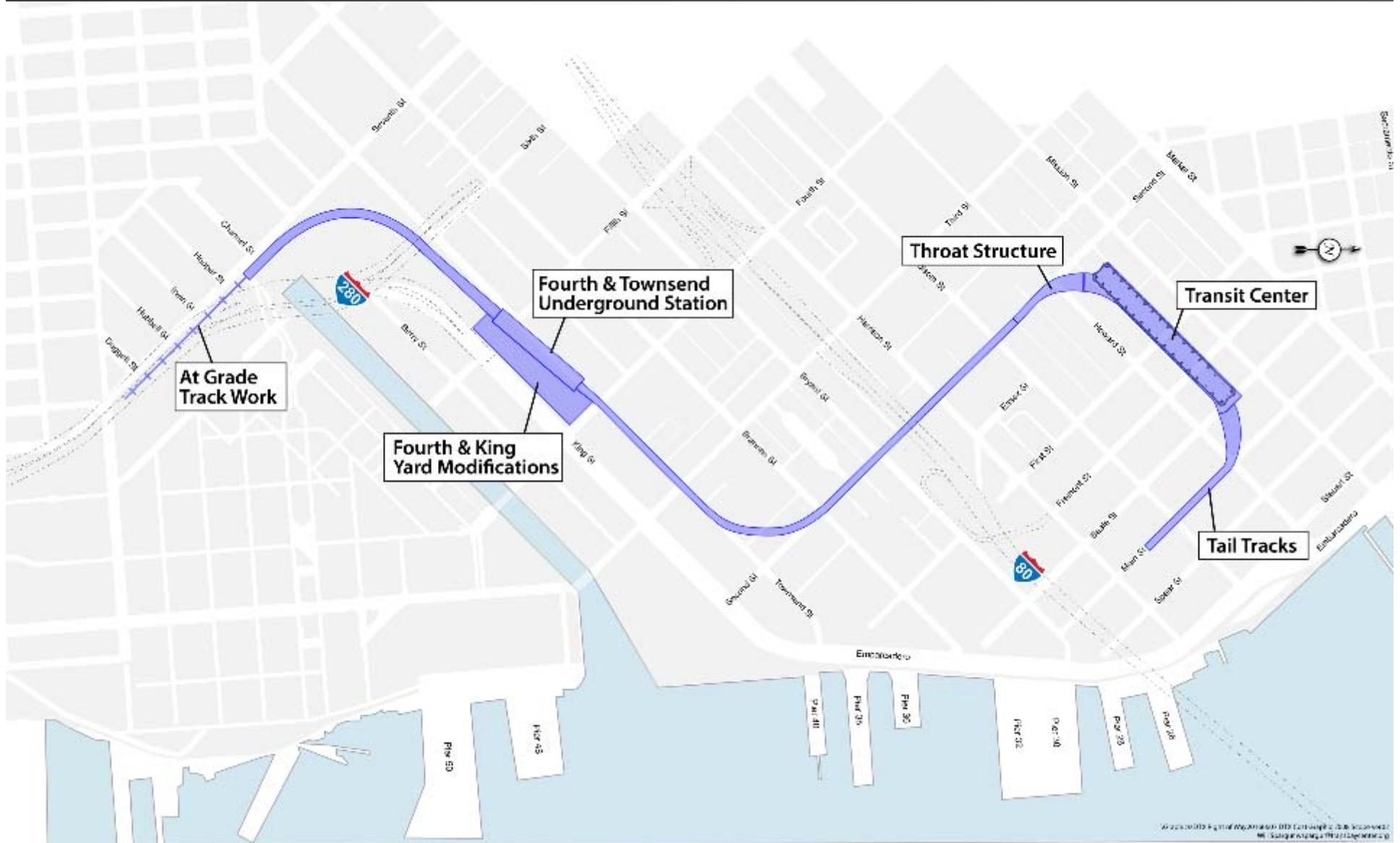
March 2008 Phase 2 Budget

- On March 20, 2008, TJPA Board approved a Phase 2 budget of \$2.996 billion (based on scope in 2004 FEIS/EIR).
- Budget Assumptions:
 - Scope:
 - Downtown Rail Extension (DTX)
 - Transit Center below grade train box and station (top down)
 - Tail Tracks
 - Delivery Method
 - Design Bid Build
 - Schedule
 - Construction begins 2011
 - Testing and commissioning 2017
 - Caltrain operations 2018
 - Escalation: 4%



Transbay Transit Center

2008 Phase 2 Budget Configuration



2008 Phase 2 Budget Summary

	Transit Center	DTX	Total Phase 2
<i>in \$ millions</i>			
Construction	\$310	\$956	\$1,265
Design Contingency	\$60	\$154	\$214
Subtotal	\$369	\$1,110	\$1,479
Escalation (4%)	\$113	\$340	\$453
Total Construction Cost	\$482	\$1,450	\$1,932
ROW	-	\$163	\$163
Programwide	\$123	\$430	\$553
Program Cost	\$606	\$2,042	\$2,648
Construction Contingency	\$48	\$145	\$193
Program Reserve	\$39	\$116	\$155
Subtotal Contingency & Reserve	\$87	\$261	\$348
Total Program Cost	\$692	\$2,303	\$2,996

Estimate prepared in December \$2007



2010 Revised Phase 2 Baseline Budget

- In May 2010, the train box scope was reallocated to Phase 1 in anticipation of the \$400 million in ARRA funding.

Revised Phase 2 Baseline Budget from \$2.996B to \$2.596B

- Budget Assumptions:
 - Revised Scope:
 - Downtown Rail Extension
 - **Transit Center below grade station fit-out only (bottom up)**
 - Tail Tracks
 - Delivery Method
 - Design Bid Build
 - Schedule
 - Construction begins 2011
 - Testing and commissioning 2017
 - Caltrain operations 2018



Phase 2 Cost Estimate History

- **July 2010:**
Parsons completed DTX 30% PE estimate
DTX Construction Estimate: \$1.171B
- **June 2012:**
Pelli Clarke Pelli Architects (PCPA) completed Transit Center 50% CD estimate
 - Train box fit-out including the Intercity Bus Facility construction estimate: \$146.6M
 - Train box below-grade extension construction estimate: \$47.7M
 - Total Phase 2 Transit Center construction estimate: \$194.3M



2013 Combined Phase 2 Cost Estimate Revision

Major Revisions since the 2008 Baseline Budget:

- Deleted tail tracks
- Added train box extension and widened existing throat structure
- Added above-grade Intercity Bus Facility
- Added tunnel stub to accommodate future underground extension of DTX and allow grade separation
- Increased depth of Fourth and Townsend Street Station
- Increased TJPA contribution to railyard reconstruction
- Increased ROW acquisition budget
- Revised train operations date to 2024
- Revised escalation from 4% to 3%



Transbay Transit Center 2013 Phase 2 Cost Estimate





	Cost
	<i>in \$ thousands</i>
Construction Cost (DTX & Transit Center)	\$1,290,320
Design Contingency	\$205,816
Subtotal	\$1,496,136
Escalation (3%)	\$449,240
Construction Cost	\$1,945,376
ROW	\$266,200
Programwide	\$418,590
Program Cost	\$2,630,166
Construction Contingency	\$183,819
Program Reserve	\$190,750
Subtotal Contingency and Reserve	\$374,569
Total Program Cost	\$3,004,735

Estimate Date: October 2013; Delivery Method: DBB ; Year of Operation: 2024

Excludes BART/Muni Pedestrian Connector



Phase 2 MTC Cost Review

- **Construction Schedule: 7 years found to be reasonable**
- **Indirect Cost Markup (Overhead): 26% found to be reasonable**
- **Increase Escalation: 3%  5%**
- **Increase Contractor Fee: 5%  10%**
- **Increase Project Contingency: 23%  27%**
- **Added scope items:  \$58 M**
 - Townsend Street traffic decking (\$22.46 M)
 - Turnback / Maintenance of Way tracks (\$33.8 M)
 - Temporary utility relocation (\$1.85 M)



Summary of Potential Adjustments to Phase 2 Cost Estimate

Item	(\$ millions)
TJPA Base Estimate (YOE)	\$3,005
Escalation (using 5%, instead of 3%)	\$433
Fee adjustment (assuming 10%, instead of 5%)	\$100
Contingency (using 27%, instead of 24%)	\$93
Missing items	\$58
Total Adjustments	\$684
Add BART/Muni Pedestrian Connector	\$120-310
Total Adjusted Estimate	\$3,809-3,999



Status of Cost Estimate Refresh Effort



2016 Phase 2 Estimate Refresh Methodology

- Parsons, PCPA, and the TJPA produced a refreshed estimate that reflects the current level of design and current market rates for labor and materials.
- Scope elements designed to 30% level in the 2010 and 2011 DTX cost estimates were updated line item by line item to current market rates.
- Rough order of magnitude estimates were used for elements that have not reached a 30% PE design level.
- Refreshed estimate uses recommendations from the MTC Phase 2 cost review.
- Programwide costs and contingencies are % based.
- ROW cost was not updated due to time constraints.



2016 Phase 2 Cost Estimate

	Total Phase 2
	<i>in \$ millions</i>
Construction	\$1,504
Design Contingency*	\$211
Subtotal Construction	\$1,715
Escalation 5% to mid construction (2023)	\$583
Total Construction Cost	\$2,298
ROW**	\$266
Programwide @ 22.5%	\$517
Program Cost	\$3,082
Construction Contingency* @ 10%	\$230
Program Reserve* @ 15%	\$462
Subtotal Contingency and Reserve	\$692
Total Program Cost	\$3,774
BART/Muni Pedestrian Connector (\$110M direct cost + \$51M escalation & construction contingency)	\$161
Total Program Cost	\$3,935

*Total Contingency/Reserves is \$903 million or 29.3% of Subtotal Program Costs

**ROW number has not be updated

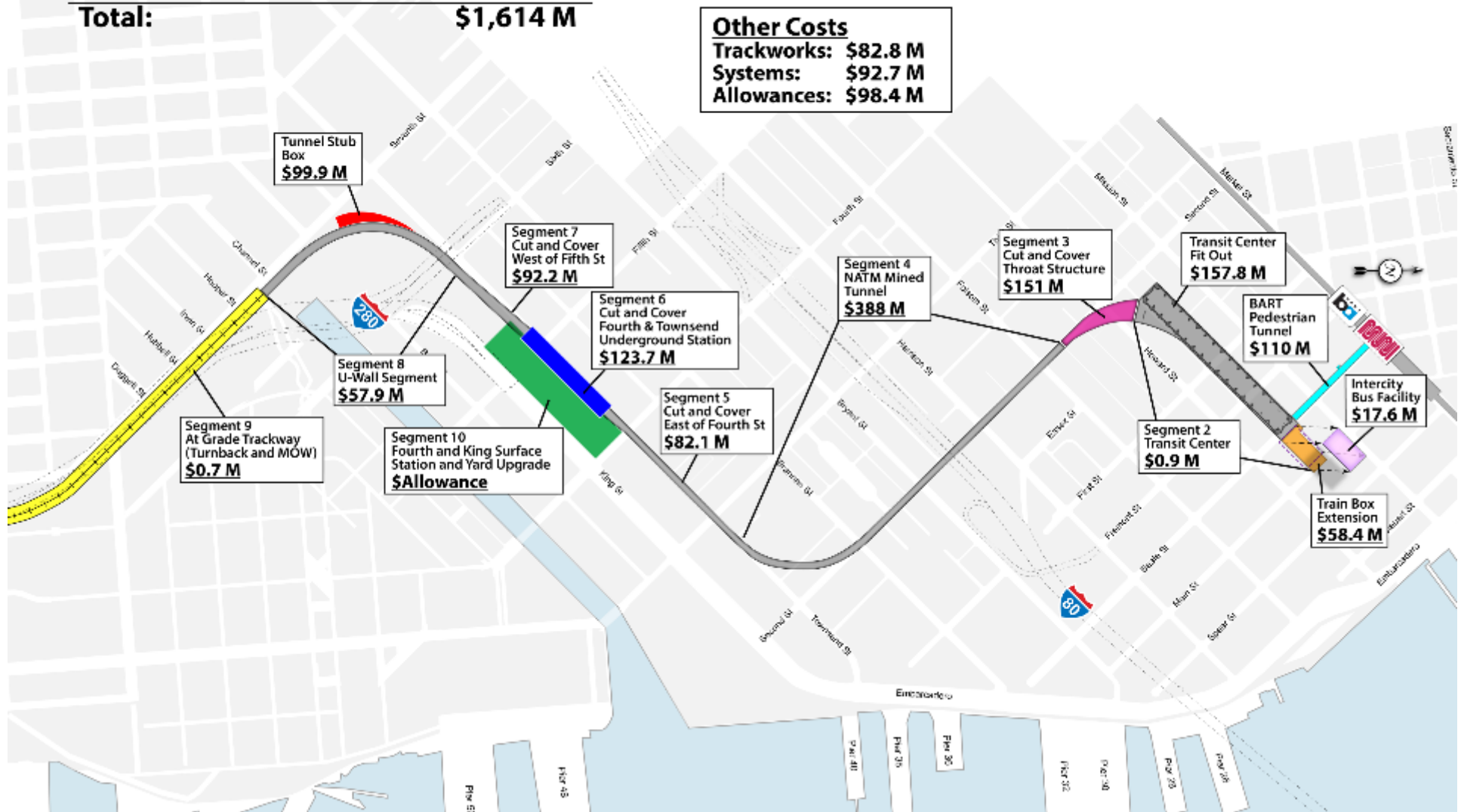


Transbay Transit Center

Phase 2 Direct Construction Cost Estimate Breakdown

Direct Construction Costs: \$1,504 M
BART Pedestrian Tunnel: \$ 110 M
Total: \$1,614 M

Other Costs
Trackworks: \$82.8 M
Systems: \$92.7 M
Allowances: \$98.4 M





Phase 2 Estimate Refresh vs MTC Cost Review

Item	MTC Cost Review	Cost Estimate Refresh
7-year construction schedule	Found to be reasonable	No change
Indirect cost markup (overhead)	Found to be reasonable at 26%	Used 54% for tunnel scope and 26% for other scope
Escalation	Recommended 5%	Used 5%
Contractor fee	Recommended 10%	Used 15% for tunneling and 5% for other scope
Total project contingency	Recommended 27%	Used 29.2%
Scope	Recommended adding \$58M: - Townsend St. traffic decking (\$22.5M) - turnback/MOW tracks (\$33.8M) - temporary utility relocation (\$1.9M)	Included in estimate based on current market rates
Other	Recommended review of productivity rates in final design	No change, will review in final design phase



2016 Phase 2 Cost Estimate

	Total Phase 2 (Oct 2013)	MTC Cost Estimate (Nov 2015)	Total Phase 2 (Jun 2016)	Variance of MTC vs June 2016 Estimate
<i>In \$ millions</i>				
Construction	\$1,290	\$1,448	\$1,504	\$56
Design Contingency	\$206	\$206	\$211	\$5
Subtotal	\$1,496	\$1,654	\$1,715	\$61
Escalation	\$449	\$722	\$583	-\$139
Construction Cost	\$1,945	\$2,376	\$2,298	-\$78
Other Program Cost (ROW, Programwide, Contingencies)	\$1,060	\$1,312	\$1,475	\$163
Total Program Cost	\$3,005	\$3,688	\$3,774	\$86
BART/Muni Pedestrian Connector	\$120	\$120-310	\$161	\$0
Total	\$3,125	\$3,808-\$3,998	\$3,935	\$86

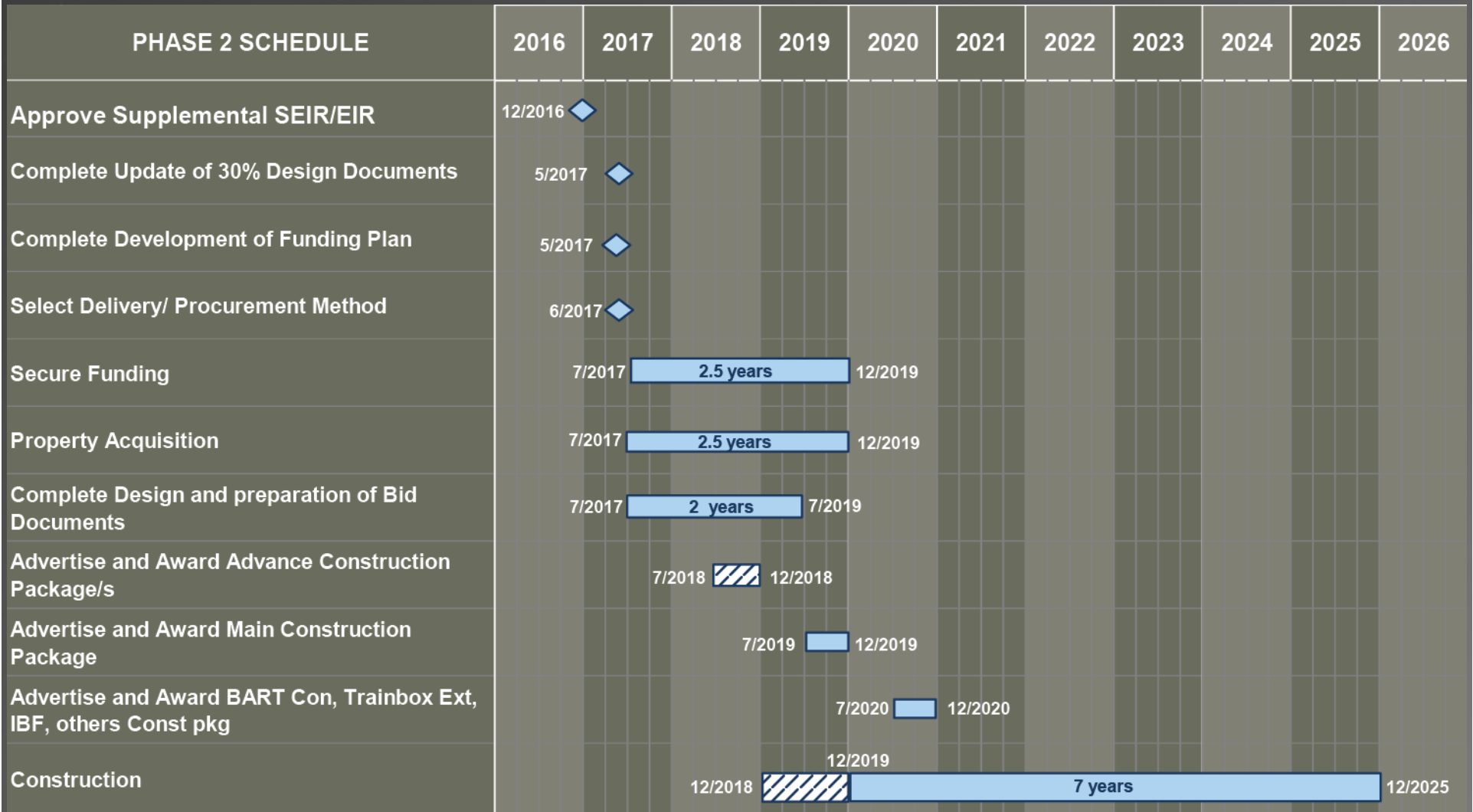
In its 2015 cost review, MTC added \$433 million to the 2013 total escalation amount of \$632 million (this difference has been prorated between construction and other Program costs, at \$273 million and \$160 million respectively). ROW has not been updated.



Transbay Transit Center

Delivery Plan

Phase 2 Draft Delivery Schedule

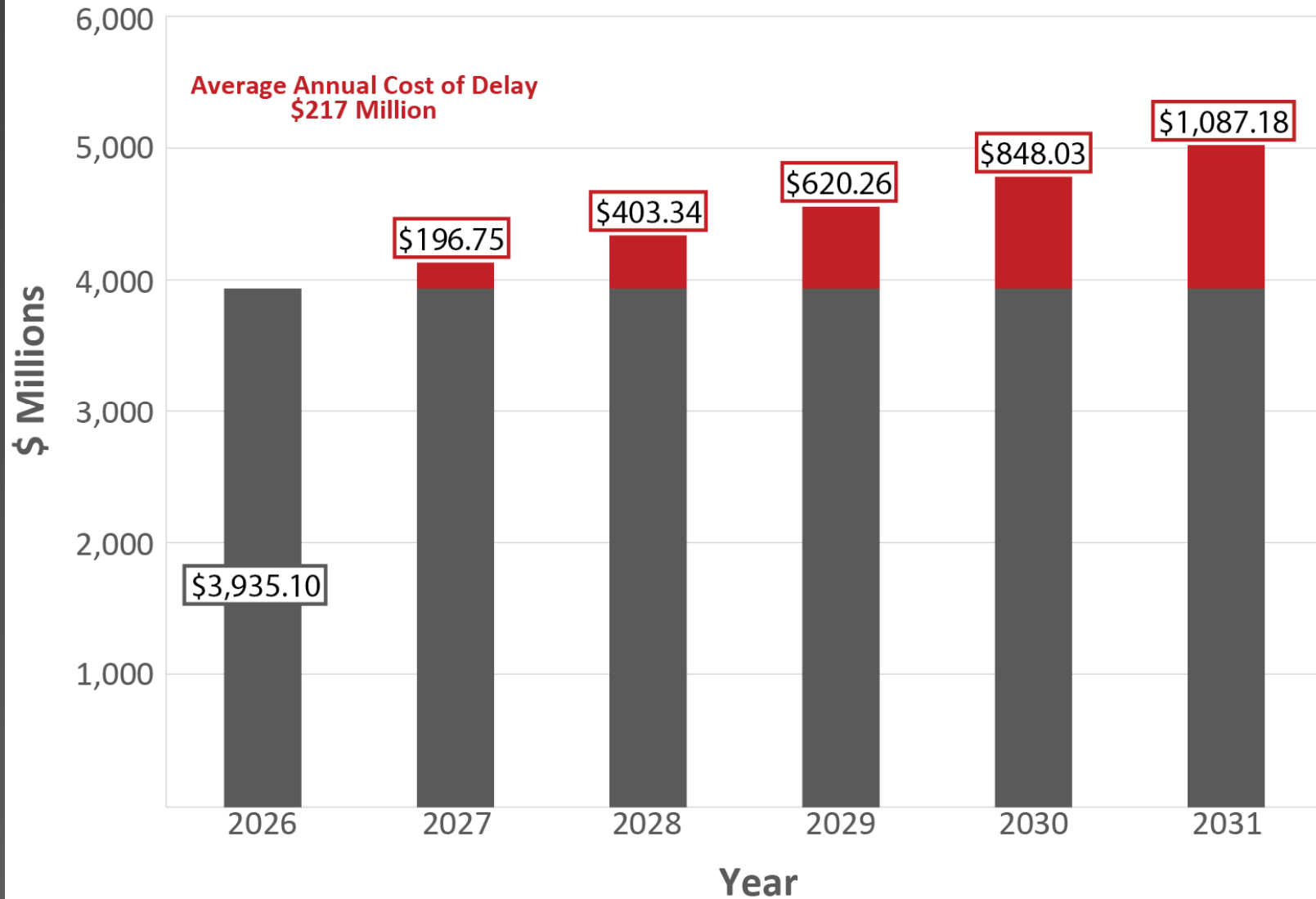


Delivery schedule timelines are based on Design Bid Build procurement



Cost of Delay to Phase 2

Phase 2 Delay Costs at 5% Escalation





Funding Plan



Investment Strategy #4:

New Starts / Small Starts: Region's Next Generation

- Proposed Plan Bay Area funding plan for 5 projects, including New Starts / Small Starts recommendation totaling ~\$1.8 billion:

"Big" Starts		Proposed Funding Strategy						
Project	Cost (YOE\$, Millions)	Committed Funding	New Starts	New Bridge Toll	HSR	Sales Tax Extensions/ Other Local	Express Lanes	Joint Development
BART to San Jose/Santa Clara (Phase 2: Berryessa to Santa Clara)	3,962	1,504	1,100		378	298	682	0
Transbay Transit Center - Phase 2B (Caltrain Downtown Extension)	2,596	639	650	300	557	350		100
TOTAL	6,558	2,143	1,750	300	935	648	682	100

"Small" Starts		Proposed Funding Strategy		
Project	Cost (YOE\$, Millions)	Committed Funding	Small Starts	New/ Augmented Sales Tax
AC Transit Grand-MacArthur BRT	37	0	30	7
Van Ness BRT	126	67	30	29
AC Transit East Bay BRT	205	115	28	63
TOTAL	368	181	88	99

- Proposal retains ~\$660 million reserve for projects in planning stages for future consideration and discussion



Macro Assumptions

- Construction start date: December 2018
- Construction period: 7 years
- Commencement of operations: December 2025
- Core funding assumptions are committed funds and Plan Bay Area (highlighted in grey)
 - All statistics other than spent funds are approximated
 - Present value is rounded to the nearest five million

Phase 2 Funding Scenario 1 Summary

TJPA Phase 2 Funding: Caltrain PFC of \$2.00 (\$2026) and HSR PFC of \$8.00 (\$2026)

Funding Outputs

Total Project Funding (\$ Year of Expenditure)	Low		High		Notes	Timeframe
	Total Funds	Net Proceeds	Total Funds	Net Proceeds		
San Francisco County Sales Tax*	\$ 83,000,000	\$ 83,000,000	\$ 83,000,000	\$ 83,000,000	Committed; \$50 million spent	2016-2019
San Mateo County Sales Tax*	\$ 19,000,000	\$ 19,000,000	\$ 19,000,000	\$ 19,000,000	Committed; spent	N/A
Committed MTC/BATA Bridge Tolls*	\$ 7,000,000	\$ 7,000,000	\$ 7,000,000	\$ 7,000,000	Committed; spent	N/A
Tax Increment ¹	\$ 665,000,000	\$ 200,000,000	\$ 735,000,000	\$ 340,000,000	Committed	2021-2050
Mello-Roos Special Tax ²	\$ 275,000,000	\$ 275,000,000	\$ 375,000,000	\$ 375,000,000	Committed	2020-2025
Regional Transportation Improvement Program	\$ 18,000,000	\$ 18,000,000	\$ 18,000,000	\$ 18,000,000	Committed	2030
Future San Francisco County Sales Tax ⁴	\$ 350,000,000	\$ 350,000,000	\$ 350,000,000	\$ 350,000,000	Subject to SFCTA or voter approval	2019-2026
FTA New Starts ⁴	\$ 650,000,000	\$ 650,000,000	\$ 650,000,000	\$ 650,000,000	Subject to federal approval	2019-2026
New MTC/BATA Bridge Tolls ^{3,4}	\$ 300,000,000	\$ 300,000,000	\$ 300,000,000	\$ 300,000,000	Subject to MTC/BATA and voter approval	2019-2026
Future California High Speed Rail Funds ⁴	\$ 557,000,000	\$ 557,000,000	\$ 557,000,000	\$ 557,000,000	Subject to federal/state approval	2019-2026
Land Sales (Block 4) ⁵	\$ 45,000,000	\$ 45,000,000	\$ 45,000,000	\$ 45,000,000	Contingent upon sales	2018
Passenger Facility Charges (PFCs) ⁶	\$ 2,510,000,000	\$ 865,000,000	\$ 5,430,000,000	\$ 1,365,000,000	Subject to CHSRA and Caltrain approval	2026-2060
	\$ 5,479,000,000	\$ 3,369,000,000	\$ 8,569,000,000	\$ 4,109,000,000		
Assumptions						
Core funding assumptions are committed funds and Plan Bay Area (highlighted in grey)						
All statistics other than spent funds are approximated						
Value is rounded to the nearest five million						
* Funds have already been spent or will be provided by 2019						
1. Assumes refinancing of existing Phase 1 TIFIA loan at lower rate and capture of additional tax increment debt capacity for Phase 2 in high scenario						
2. Assumes certain Mello Roos funds are used for Phase 1 (Train Box and Park) and Phase 1 is fully funded; figures are being revised in conjunction with City Financing						
3. Assumes Measure voted by 2020.						
4. Assumes funds will be provided as needed in amounts shown						
5. Assumes Block 4 Sale after Phase 1 completion; value based on Block 4 Option Agreement.						
6. Assumes 35 years of operations						

Phase 2 Funding Scenario 2 Summary

TJPA Phase 2 Funding: Caltrain PFC of \$2.25 (\$2026) and HSR PFC of \$9.00 (\$2026)

Funding Outputs

Total Project Funding (\$ Year of Expenditure)	Low		High		Notes	Timeframe
	Total Funds	Net Proceeds	Total Funds	Net Proceeds		
San Francisco County Sales Tax*	\$ 83,000,000	\$ 83,000,000	\$ 83,000,000	\$ 83,000,000	Committed; \$50 million spent	2016-2019
San Mateo County Sales Tax*	\$ 19,000,000	\$ 19,000,000	\$ 19,000,000	\$ 19,000,000	Committed; spent	N/A
Committed MTC/BATA Bridge Tolls*	\$ 7,000,000	\$ 7,000,000	\$ 7,000,000	\$ 7,000,000	Committed; spent	N/A
Tax Increment ¹	\$ 665,000,000	\$ 200,000,000	\$ 735,000,000	\$ 340,000,000	Committed	2021-2050
Mello-Roos Special Tax ²	\$ 275,000,000	\$ 275,000,000	\$ 375,000,000	\$ 375,000,000	Committed	2020-2025
Regional Transportation Improvement Program	\$ 18,000,000	\$ 18,000,000	\$ 18,000,000	\$ 18,000,000	Committed	2030
Future San Francisco County Sales Tax ⁴	\$ 350,000,000	\$ 350,000,000	\$ 350,000,000	\$ 350,000,000	Subject to SFCTA or voter approval	2019-2026
FTA New Starts ⁴	\$ 650,000,000	\$ 650,000,000	\$ 650,000,000	\$ 650,000,000	Subject to federal approval	2019-2026
New MTC/BATA Bridge Tolls ^{3,4}	\$ 300,000,000	\$ 300,000,000	\$ 300,000,000	\$ 300,000,000	Subject to MTC/BATA and voter approval	2019-2026
Future California High Speed Rail Funds ⁴	\$ 557,000,000	\$ 557,000,000	\$ 557,000,000	\$ 557,000,000	Subject to federal/state approval	2019-2026
Land Sales (Block 4) ^{5*}	\$ 45,000,000	\$ 45,000,000	\$ 45,000,000	\$ 45,000,000	Contingent upon sales	2018
Passenger Facility Charges (PFCs) ⁶	\$ 2,830,000,000	\$ 1,030,000,000	\$ 6,110,000,000	\$ 1,530,000,000	Subject to CHSRA and Caltrain approval	2026-2060
	\$ 5,799,000,000	\$ 3,534,000,000	\$ 9,249,000,000	\$ 4,274,000,000		

Assumptions

Core funding assumptions are committed funds and Plan Bay Area (highlighted in grey)

All statistics other than spent funds are approximated

Value is rounded to the nearest five million

* Funds have already been spent or will be provided by 2019

1. Assumes refinancing of existing Phase 1 TIFIA loan at lower rate and capture of additional tax increment debt capacity for Phase 2 in high scenario

2. Assumes certain Mello Roos funds are used for Phase 1 (Train Box and Park) and Phase 1 is fully funded; figures are being revised in conjunction with City Financing

3. Assumes Measure voted by 2020.

4. Assumes funds will be provided as needed in amounts shown

5. Assumes Block 4 Sale after Phase 1 completion; value based on Block 4 Option Agreement.

6. Assumes 35 years of operations

Phase 2 Funding Scenario 3 Summary

TJPA Phase 2 Funding: Caltrain PFC of \$2.50 (\$2026) and HSR PFC of \$10.00 (\$2026)

Funding Outputs

Total Project Funding (\$ Year of Expenditure)						
	Low		High		Notes	Timeframe
	Total Funds	Net Proceeds	Total Funds	Net Proceeds		
San Francisco County Sales Tax*	\$ 83,000,000	\$ 83,000,000	\$ 83,000,000	\$ 83,000,000	Committed; \$50 million spent	2016-2019
San Mateo County Sales Tax*	\$ 19,000,000	\$ 19,000,000	\$ 19,000,000	\$ 19,000,000	Committed; spent	N/A
Committed MTC/BATA Bridge Tolls*	\$ 7,000,000	\$ 7,000,000	\$ 7,000,000	\$ 7,000,000	Committed; spent	N/A
Tax Increment ¹	\$ 665,000,000	\$ 200,000,000	\$ 735,000,000	\$ 340,000,000	Committed	2021-2050
Mello-Roos Special Tax ²	\$ 275,000,000	\$ 275,000,000	\$ 375,000,000	\$ 375,000,000	Committed	2020-2025
Regional Transportation Improvement Program	\$ 18,000,000	\$ 18,000,000	\$ 18,000,000	\$ 18,000,000	Committed	2030
Future San Francisco County Sales Tax ⁴	\$ 350,000,000	\$ 350,000,000	\$ 350,000,000	\$ 350,000,000	Subject to SFCTA or voter approval	2019-2026
FTA New Starts ⁴	\$ 650,000,000	\$ 650,000,000	\$ 650,000,000	\$ 650,000,000	Subject to federal approval	2019-2026
New MTC/BATA Bridge Tolls ^{3,4}	\$ 300,000,000	\$ 300,000,000	\$ 300,000,000	\$ 300,000,000	Subject to MTC/BATA and voter approval	2019-2026
Future California High Speed Rail Funds ⁴	\$ 557,000,000	\$ 557,000,000	\$ 557,000,000	\$ 557,000,000	Subject to federal/state approval	2019-2026
Land Sales (Block 4) ^{5*}	\$ 45,000,000	\$ 45,000,000	\$ 45,000,000	\$ 45,000,000	Contingent upon sales	2018
Passenger Facility Charges (PFCs) ⁶	\$ 3,140,000,000	\$ 1,195,000,000	\$ 6,790,000,000	\$ 1,695,000,000	Subject to CHSRA and Caltrain approval	2026-2060
	\$ 6,109,000,000	\$ 3,699,000,000	\$ 9,929,000,000	\$ 4,439,000,000		

Assumptions

Core funding assumptions are committed funds and Plan Bay Area (highlighted in grey)

All statistics other than spent funds are approximated

Value is rounded to the nearest five million

* Funds have already been spent or will be provided by 2019

1. Assumes refinancing of existing Phase 1 TIFIA loan at lower rate and capture of additional tax increment debt capacity for Phase 2 in high scenario

2. Assumes certain Mello Roos funds are used for Phase 1 (Train Box and Park) and Phase 1 is fully funded; figures are being revised in conjunction with City Financing

3. Assumes Measure voted by 2020.

4. Assumes funds will be provided as needed in amounts shown

5. Assumes Block 4 Sale after Phase 1 completion; value based on Block 4 Option Agreement.

6. Assumes 35 years of operations; TIFIA loan in High Scenario assumes 33% of Project Cost (\$3.954bn)

Phase 2 Funding Scenario 4 Summary

TJPA Phase 2 Funding: Caltrain PFC of \$2.74 (\$2026) and HSR PFC of \$10.96 (\$2026)

Funding Outputs

Total Project Funding (\$ Year of Expenditure)	Low		High		Notes	Timeframe
	Total Funds	Net Proceeds	Total Funds	Net Proceeds		
San Francisco County Sales Tax*	\$ 83,000,000	\$ 83,000,000	\$ 83,000,000	\$ 83,000,000	Committed; \$50 million spent	2016-2019
San Mateo County Sales Tax*	\$ 19,000,000	\$ 19,000,000	\$ 19,000,000	\$ 19,000,000	Committed; spent	N/A
Committed MTC/BATA Bridge Tolls*	\$ 7,000,000	\$ 7,000,000	\$ 7,000,000	\$ 7,000,000	Committed; spent	N/A
Tax Increment ¹	\$ 665,000,000	\$ 200,000,000	\$ 735,000,000	\$ 340,000,000	Committed	2021-2050
Mello-Roos Special Tax ²	\$ 275,000,000	\$ 275,000,000	\$ 375,000,000	\$ 375,000,000	Committed	2020-2025
Regional Transportation Improvement Program	\$ 18,000,000	\$ 18,000,000	\$ 18,000,000	\$ 18,000,000	Committed	2030
Future San Francisco County Sales Tax ⁴	\$ 350,000,000	\$ 350,000,000	\$ 350,000,000	\$ 350,000,000	Subject to SFCTA or voter approval	2019-2026
FTA New Starts ⁴	\$ 650,000,000	\$ 650,000,000	\$ 650,000,000	\$ 650,000,000	Subject to federal approval	2019-2026
New MTC/BATA Bridge Tolls ^{3,4}	\$ 300,000,000	\$ 300,000,000	\$ 300,000,000	\$ 300,000,000	Subject to MTC/BATA and voter approval	2019-2026
Future California High Speed Rail Funds ⁴	\$ 557,000,000	\$ 557,000,000	\$ 557,000,000	\$ 557,000,000	Subject to federal/state approval	2019-2026
Land Sales (Block 4) ^{3*}	\$ 45,000,000	\$ 45,000,000	\$ 45,000,000	\$ 45,000,000	Contingent upon sales	2018
Passenger Facility Charges (PFCs) ⁶	\$ 3,440,000,000	\$ 1,240,000,000	\$ 8,025,000,000	\$ 1,920,000,000	Subject to CHSRA and Caltrain approval	2026-2060
	\$ 6,409,000,000	\$ 3,744,000,000	\$ 11,164,000,000	\$ 4,664,000,000		

Assumptions

Core funding assumptions are committed funds and Plan Bay Area (highlighted in grey)

All statistics other than spent funds are approximated

Value is rounded to the nearest five million

* Funds have already been spent or will be provided by 2019

1. Assumes refinancing of existing Phase 1 TIFIA loan at lower rate and capture of additional tax increment debt capacity for Phase 2 in high scenario

2. Assumes certain Mello Roos funds are used for Phase 1 (Train Box and Park) and Phase 1 is fully funded; figures are being revised in conjunction with City Financing

3. Assumes Measure voted by 2020.

4. Assumes funds will be provided as needed in amounts shown

5. Assumes Block 4 Sale after Phase 1 completion; value based on Block 4 Option Agreement.

6. Assumes 35 years of operations, TIFIA loan in High Scenario assumes 33% of Project Cost (\$4.453bn)



Phase 2 Funding Scenario

Key Assumptions

- Passenger facility charge (PFC) is assumed to be enacted by Caltrain and/or CHSRA Board by 2019.
- Plan Bay Area funds are assumed to be provided on an as-needed basis and are not discounted or escalated.
- Financings assume securing PFCs and/or TI using a Federal credit program or loan with a 35-year repayment period.
- All funds shown are amounts available after Phase 1 is fully paid for.



Next Steps



Next Steps

- Complete 30% PE drawings
- Update ROW estimate
- Update ridership study
- Perform risk assessment
- Update Program cost estimate (& peer review)
- Complete development of funding plan (& peer review)
- Select delivery method
- Update budget
- Continue coordination with RAB study, Caltrain and CHSRA

Questions?



Transbay Joint Powers Authority

201 Mission Street, Suite 2100

San Francisco, CA 94105

(415) 597-4620

www.transbaycenter.org

info@transbaycenter.org