# Transbay Program Phase 2 Downtown Rail Extension (DTX)

**Tunnel Options Study Briefing** 

April 2018





# Study Purpose and Goals

- Initiated to address concerns about impacts resulting from cut-and-cover construction
- Goals:
  - Minimize surface disruption and socio-economic impacts
  - Reduce cut-and-cover tunnel extent
  - Identify feasible mined tunnel construction methods for further study
  - Identify major infrastructure constraints

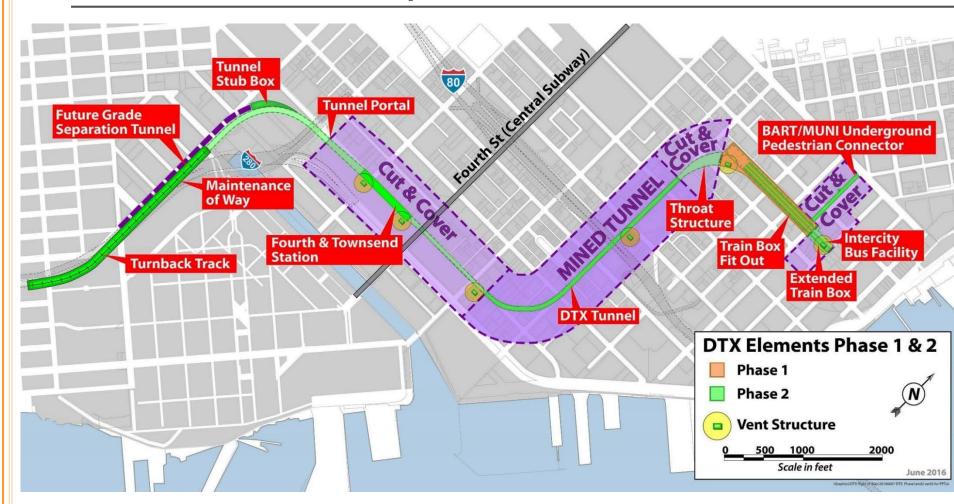


# Work Since Last Update to TJPA Board

- Further developed mined Howard Street crossing to balance the surface disruption and cost for the Throat structure
- Refined the constructability and schedule for the options
- Confirmed ventilation requirements
- Reviewed configuration of the TBM + SEM tunneling option



# **Baseline Concept**





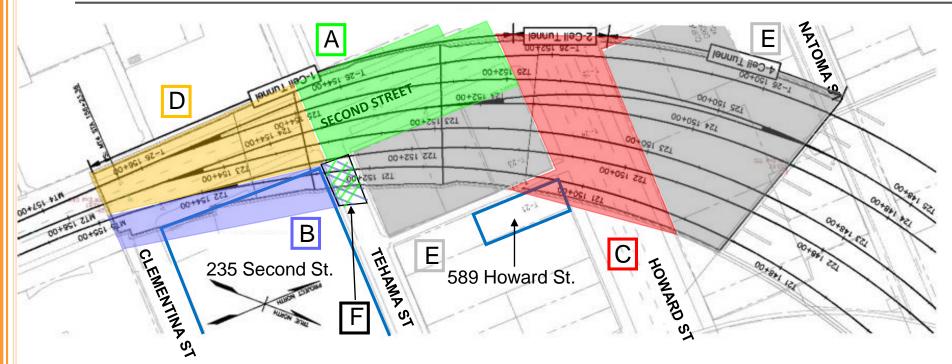
# **Tunneling Methods Options**

- Throat:
  - Full mining in the public rightof-way
  - Mining just under Howard St.
  - Mining under 2<sup>nd</sup> St. between Howard St. and Tehama St.
- Second Street:
  - Baseline Sequential
     Excavation Method (SEM)
  - Twin bore TBM with SEM

- Townsend St. ( 3<sup>rd</sup> St. to 4<sup>th</sup> St.):
  - Soft ground SEM
  - Soft ground TBM with SEM
- 4th Street/Townsend Street:
  - SEM & ground improvement
  - TBM with SEM & ground improvement
- 4<sup>th</sup> St & Townsend St. Station:
  - Cut-and-cover



#### Throat: North of Clementina St



#### Options for Partially Mining the Throat

Add-on Options

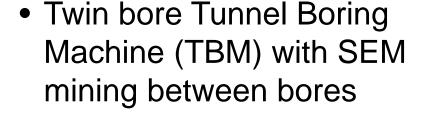
Alternate 1

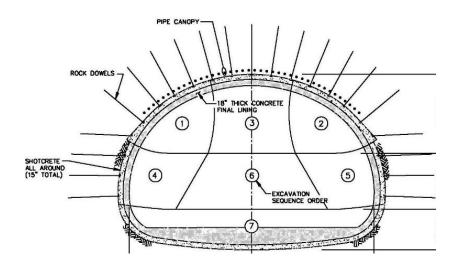
- A Pipe Roof Support for Mining under Second Street
- Extend TBM Mining Below 235 Second St. (Option 1) or Cut-and-Cover (Option 2)
- Jacked Box Mining under the Howard Street Crossing
- D Cut-and-Cover with Decking
- E Cut-and-Cover outside the public right-of-way (Open Cut)
- Cut-and-Cover with Decking (for Add-on Option A) or Extend TBM Mining (for Add-on Option B)

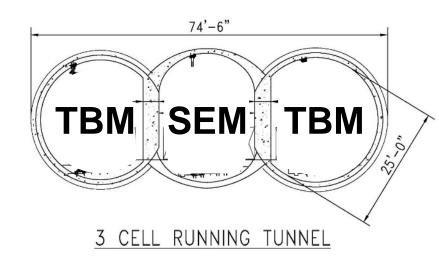


#### Second Street

 Baseline SEM Concept in Preliminary Engineering drawings





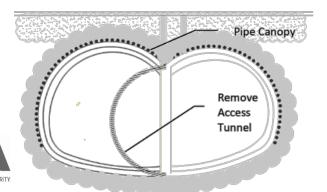




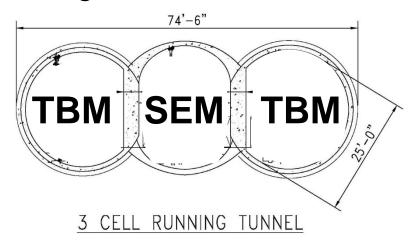
# Townsend St. between 3<sup>rd</sup>-4<sup>th</sup> Sts.

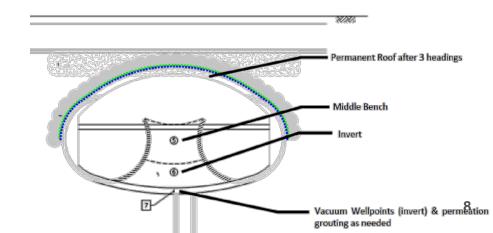
 Soft ground SEM with ground treatment





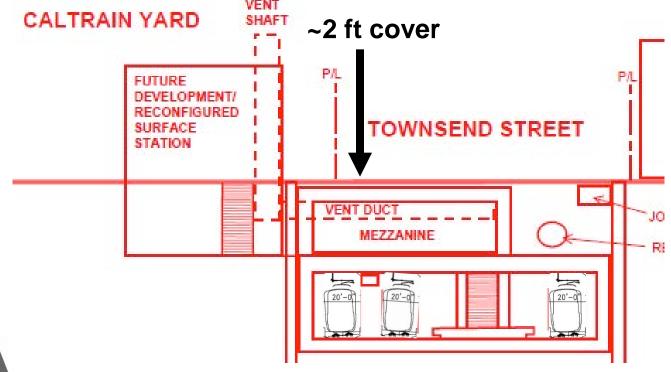
 Twin bore TBM with SEM and ground treatment





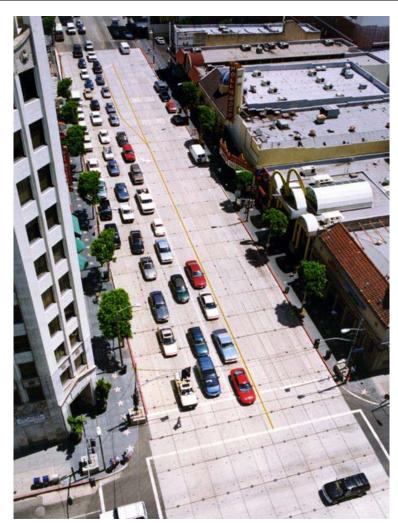
#### 4<sup>th</sup> & Townsend Street Station

- Cut-and-cover construction (with decking) necessary due to low ground cover and soil conditions
- Aligned with Townsend St. with a center platform between northernmost tracks and mezzanine connection with surface



# 4<sup>th</sup> & Townsend Street Station Traffic Decking

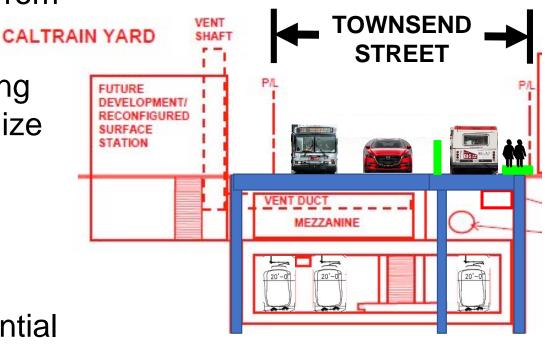
- Minimizes traffic disruption during cut-and-cover construction
- Investigating use from 4<sup>th</sup> St. to just west of 5<sup>th</sup> St.
- Installation:
  - Weekends (Fri PM Mon AM)
  - Nights at non-residential areas
  - Maintain normal traffic flow during week
  - Sequence to maintain local business access



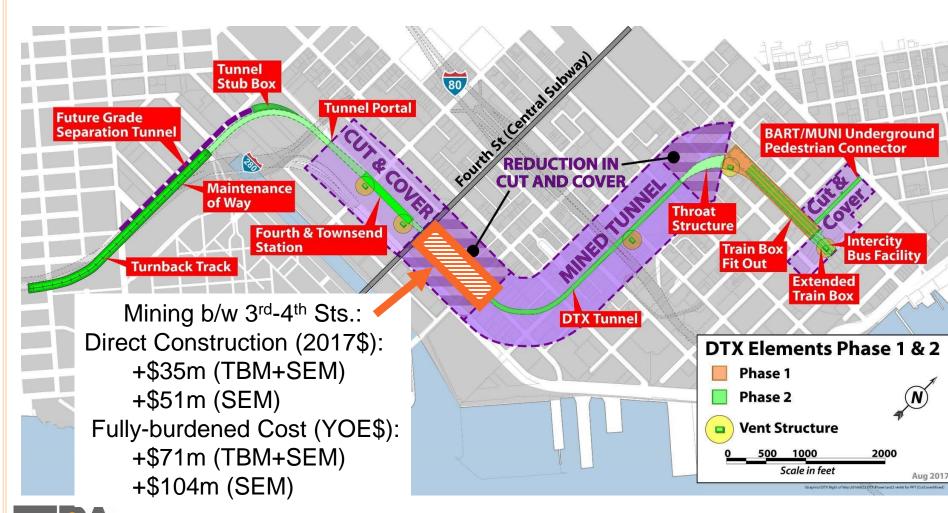
Hollywood Blvd/Highland, Los Angeles

# Townsend Street Station Traffic Decking

- Decking will ultimately conflict with roof slab from 4<sup>th</sup> to 5<sup>th</sup> Sts.
- Develop staged decking removal plan to minimize traffic impacts
- Removal:
  - Over weekends
  - Nights at non-residential areas
  - Sequence to maintain
     local business access



## Cost Premium Above Baseline for Maximum Reduction in Cut-and-Cover

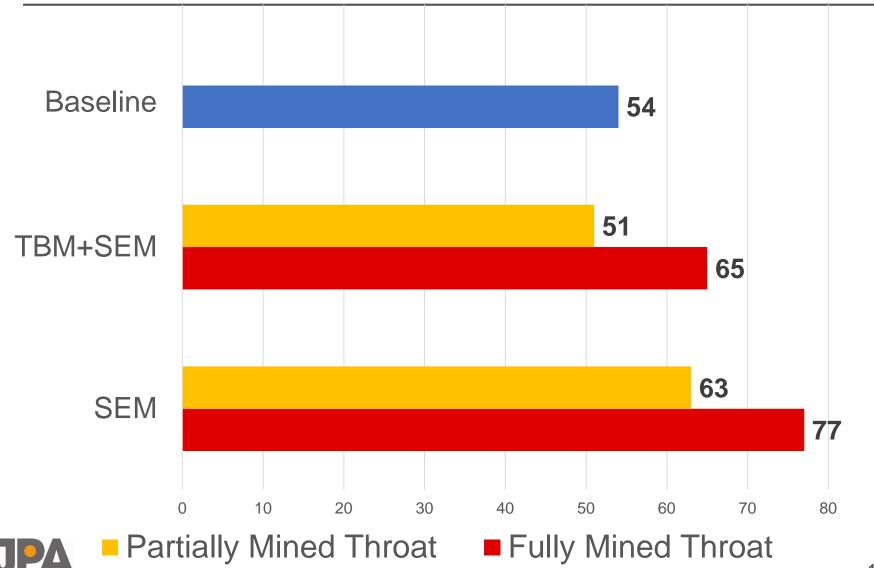


## Cost Premium of Eliminating or Reducing Cutand-Cover in the Public ROW at the Throat

Location	Direct Construction Cost (2018\$)	Fully- burdened Cost (YOE\$)
Entire Throat (Howard St, 2nd to Clementina St.)	+\$217m	+\$461m
Howard Street Crossing	+\$108m	+\$208m
Howard & 2nd St to Tehama Streets	+\$178m	+\$343m



# Relative Tunneling Schedules (Months)



#### Recommendations

Proceed with 30% Preliminary Engineering for:

- The TBM+SEM concept between Clementina Street and Fourth and Townsend Street Station. (+\$71m)
- Maintain cut-and-cover construction with decking for the Fourth and Townsend Street Station.
- Extending single-bore TBM tunneling beyond 235 Second St., maintaining undisturbed sidewalk and lane of traffic in front of 235 Second Street. (+\$23m)
- Maintaining cut-and-cover construction with decking on Second Street between Howard and Clementina Streets.
- Mining the Howard Street crossing. (+\$208m)
- Performing a value engineering exercise at the conclusion of the 30% design phase.



# Questions?

