Phase 2 Update

October 12, 2017

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Agenda

- Preliminary Engineering Design Submittals
  - Right-of-Way
  - BART/Muni Pedestrian Connector
- Ridership Study
- Rail Operations Study
- Tunnel Options Study
- Phase 2 Next Steps

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Preliminary Engineering Design Submittals

- 22 draft design submittals have been received since funding approved:
  - Rail: Trackwork, overhead catenary system, signals, communications, water/air
  - Civil (2nd St.): Traffic, streetwork, utilities
  - Right-of-way (2nd St.): Existing structures underpinning assessments, noise and vibration
  - BART/Muni Pedestrian Connector: Fire & life safety, streetwork, utilities, traffic, geotechnical

Right-of-Way

- Assessed impacted buildings identified in the Draft SEIS/EIR (2nd & Howard St area):
  - 171 Second Street
  - 235 Second Street
  - 589 Howard Street
- Underpinning feasible regardless of DTX construction method
- No demolition of occupied spaces will be necessary

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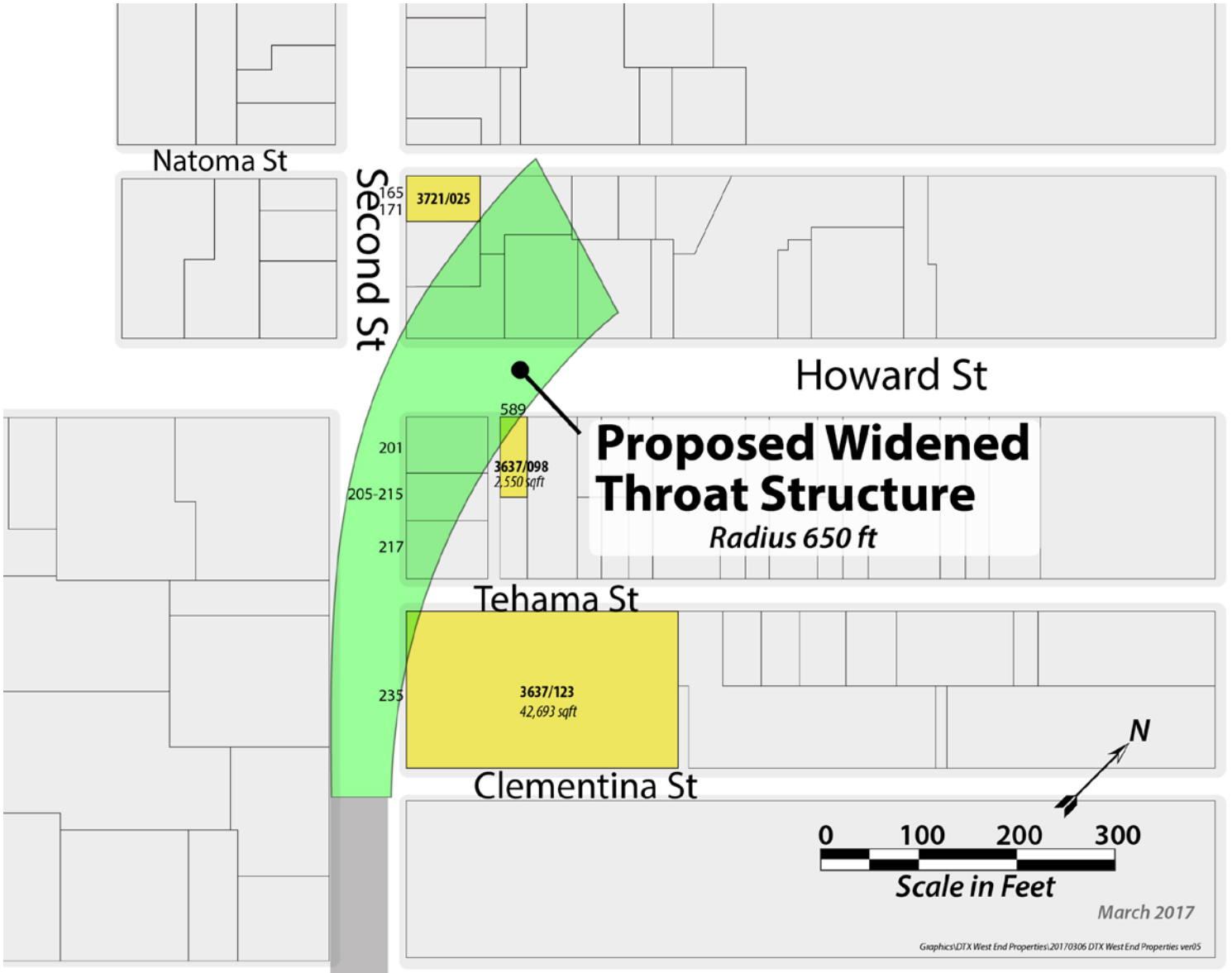
Right-of-Way



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BART/Muni Pedestrian Connector

- Plan & estimate development
- Pedestrian circulation
- Fire & life safety coordination with SFFD and BART
- October 4th presentation to BART and AC Interagency Liaison Committee (ILC) Meeting

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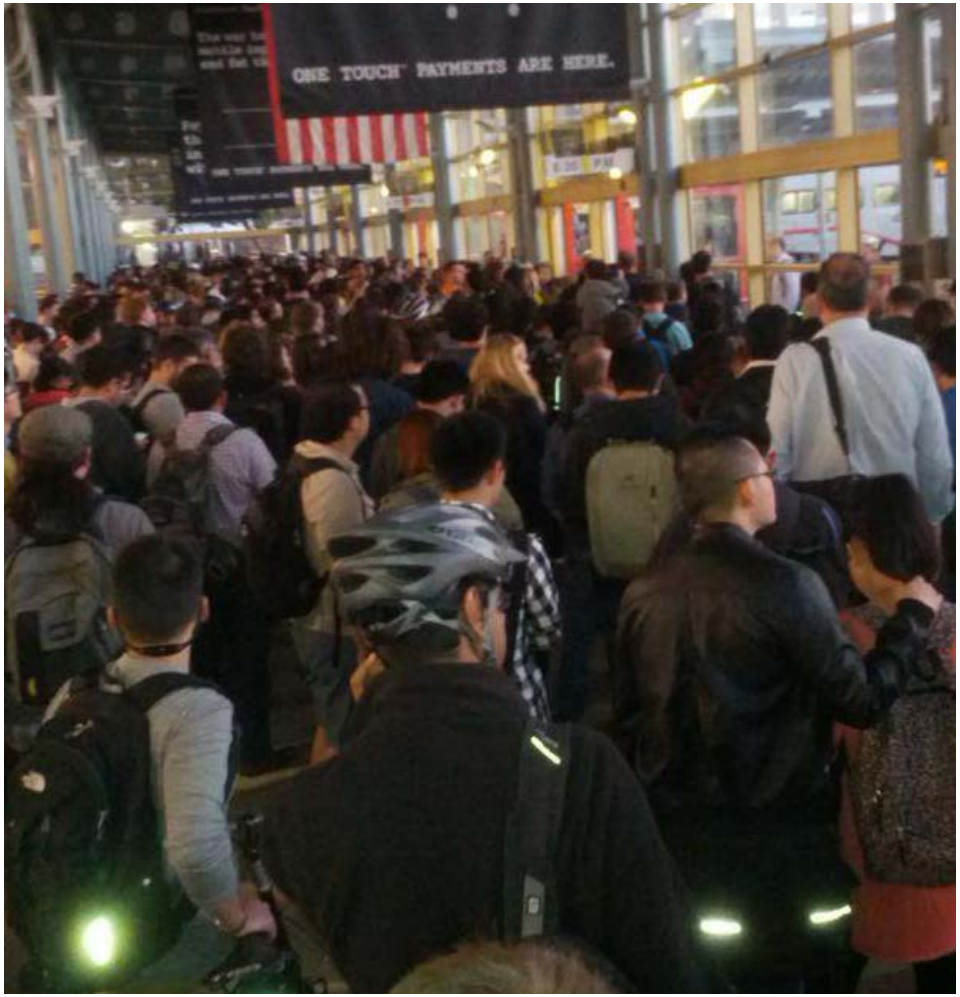
Ridership Study

- Updating ridership for: 4th/Townsend St. Station, Transit Center, & BART/Muni Pedestrian Connector
- Reviewing existing data collected in July from Caltrain, CHSRA, and SFCTA
- Anticipated to be completed in late November



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Rail Operations Study Goals

- Determine the infrastructure needs to deliver a modern rail terminal for both current and future train service
  - Design life of 100 years
  - Allow for future expansion of rail service
- Work in collaboration with CHSRA and Caltrain

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Rail Operations Study

- Analyzed both two- and three-track alignments for DTX
- Operators provided:
  - Proto-typical timetable that includes blended service to San Jose
  - Dwell times
  - Train set inputs
  - Assumed incident durations

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Rail Operations Metrics

- “Unacceptable delay” is anything that impacts the ability to deliver at least 95% on time performance.
- “Systemwide delays” means that single-tracking in San Francisco yields delay to **all** trains on the system, meaning all passengers are affected by a single event.
- Incidents that cause train delay are to be expected; they are not exceptional:
  - Medical issues
  - Longer dwells caused by bike loading/unloading or disabled passenger loading/unloading

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Rail Operations Study Conclusions

- 3 tracks are necessary. The 3rd track:
  - Reduces delay during incident scenarios impacting other tracks
  - Delivers quicker recovery to planned schedules reducing potential impacts on both CHSRA and Caltrain networks
  - Provides increased flexibility for train operations to and from the Transit Center which is critical to reliable service delivery in a modern transport hub
  - Allows for future growth

Tunnel Options Study Purpose & Goals

- Initiated to address potential 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

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Tunnel Options Study Participants

- SFCTA
- TJPA
- CHSRA / WSP
- Caltrain (briefed)
- SFMTA
- AECOM
- Brierley Associates
- Parsons
- McMillen Jacobs
- Mott MacDonald
- EPC

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Tunnel Option Study Timeline

Study Initiated/Preliminary Analysis April 25 – May 30

Analysis/Coordination with Tunneling Experts May 30 - July 27

Reporting/Cost, Schedule & Risk Assessment July 27 - September 8

Presentation of Preliminary Findings to SFCTA September 26

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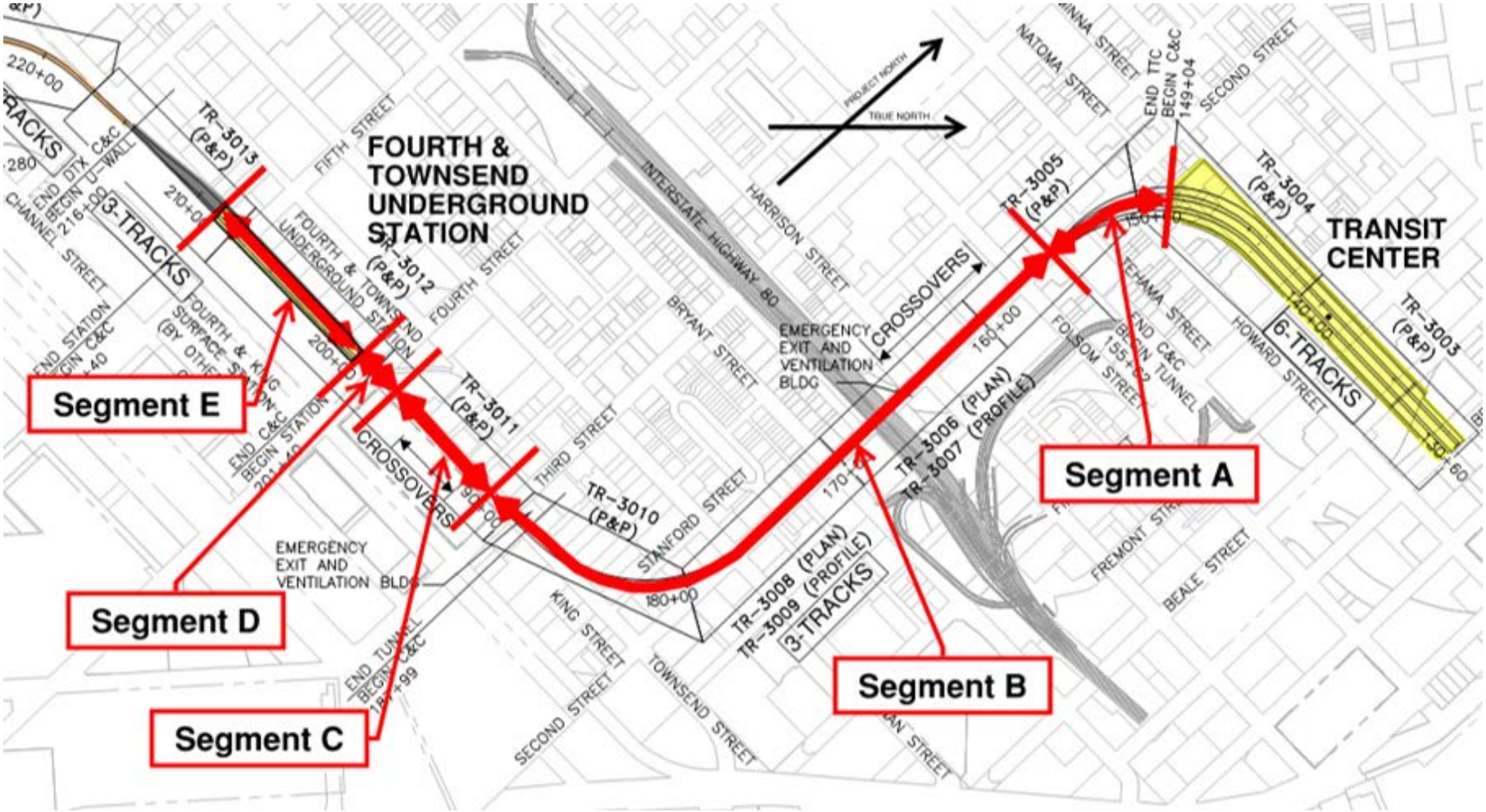
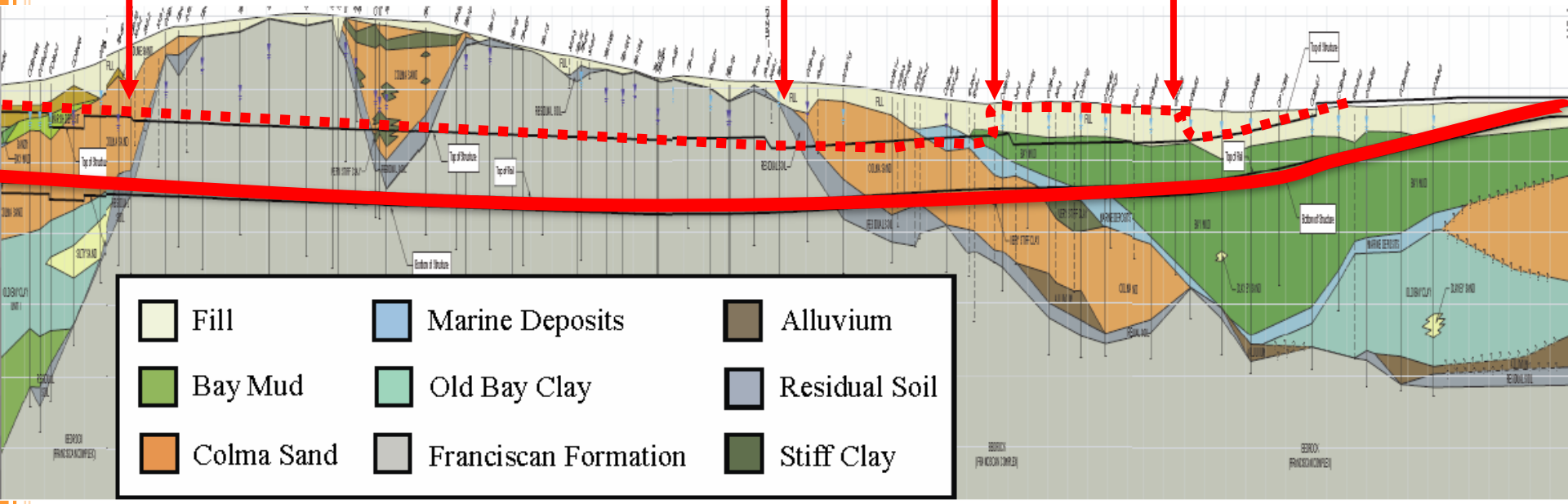
Tunnel Option Study Extents



Subsurface Conditions

Limits of baseline mined tunnel segment

4th/Townsend St Station



Tunnel Crown

Tunnel Invert

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Risk Evaluation Criteria

- Constructability *(incl. availability of staging area)*
- Design complexity *(level of effort involved to develop the design)*
- Ground & groundwater conditions
- Residential/business, traffic and utility impact
- Right-of-way and protection of existing structures
- Environmental impacts *(incl. noise, vibration, dust, visual/aesthetic issues)*
- Construction cost and schedule
- Future development potential *(over alignment)*

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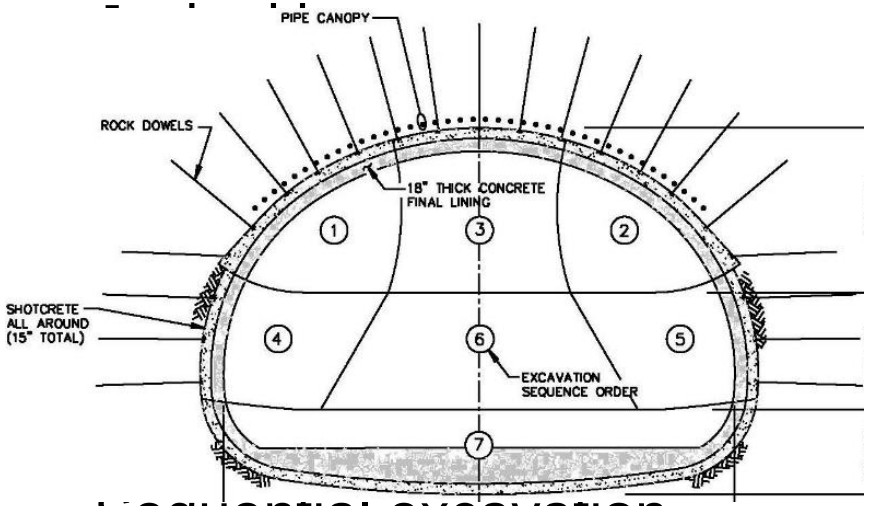
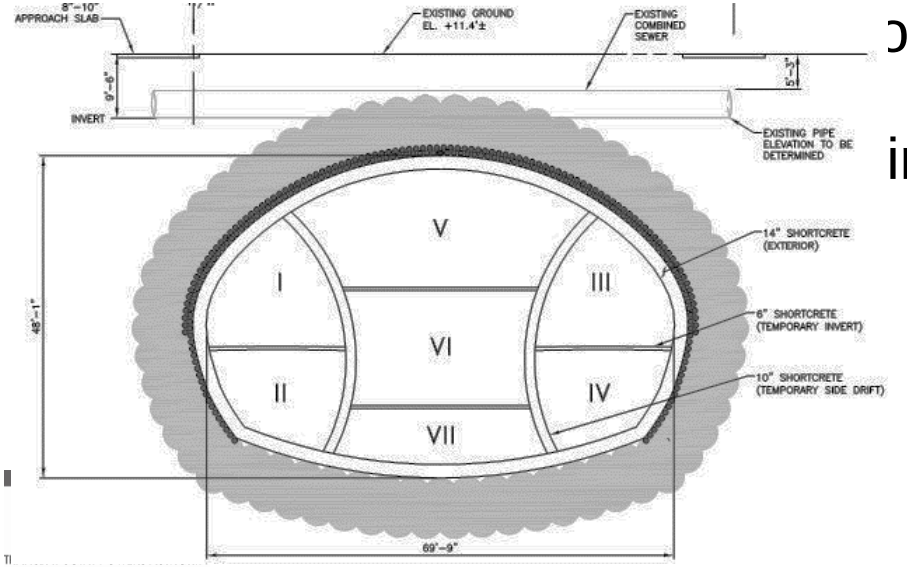
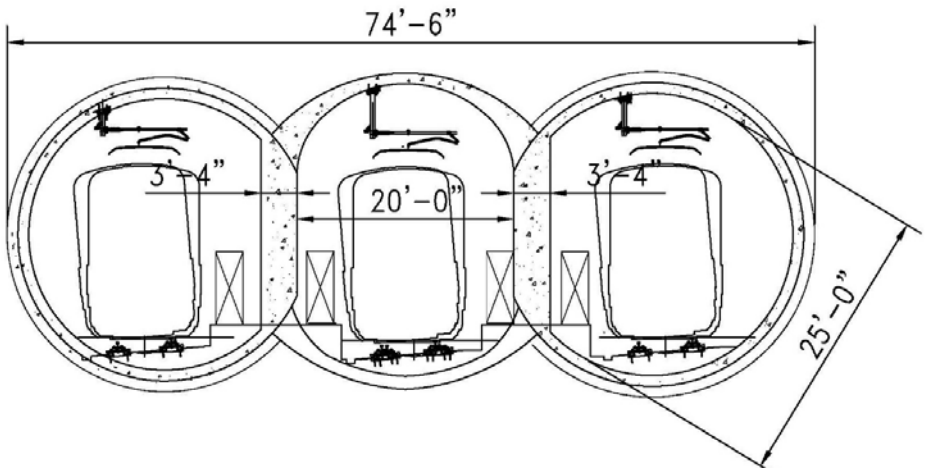
Tunneling Methods Considered

- Pipe arch without pre-support walls
- Stacked drift pre-support side walls without vertical pier supports

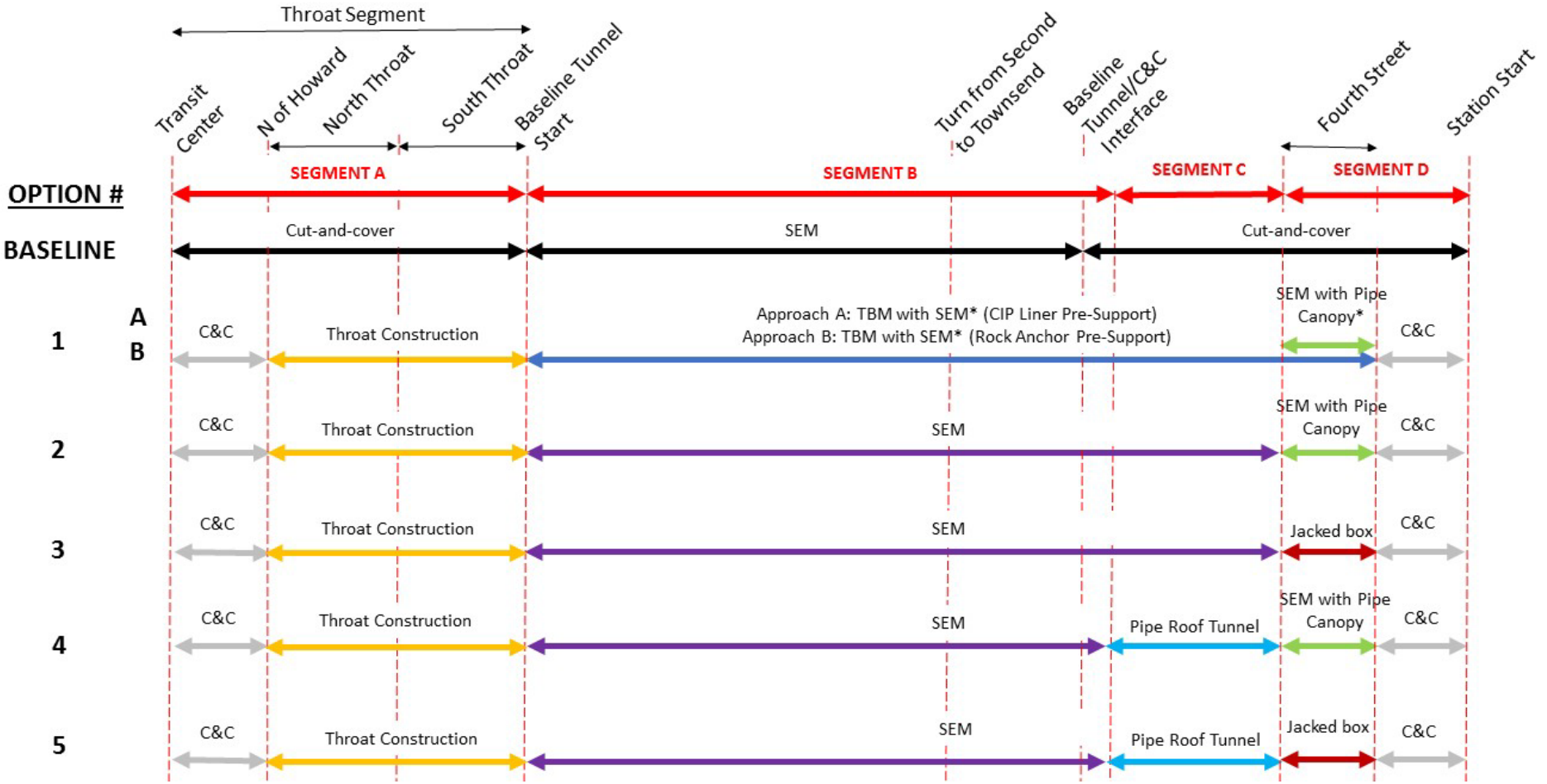


- Sequential excavation





Tunnel Options Summary



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Tunnel Options Study Preliminary Findings

- Elimination of cut-and-cover:
  - Feasible on Townsend Street up to the east end of the Fourth and Townsend Street Station at reasonable cost
  - Feasible at Throat Structure (located at Second/Howard Sts.), but costly
- Preferred tunneling options can be accomplished without significant impacts to the project schedule
- Impacts to Central Subway will be minor and can be mitigated
- The Fourth and Townsend Street Station must be constructed by cut-and-cover construction

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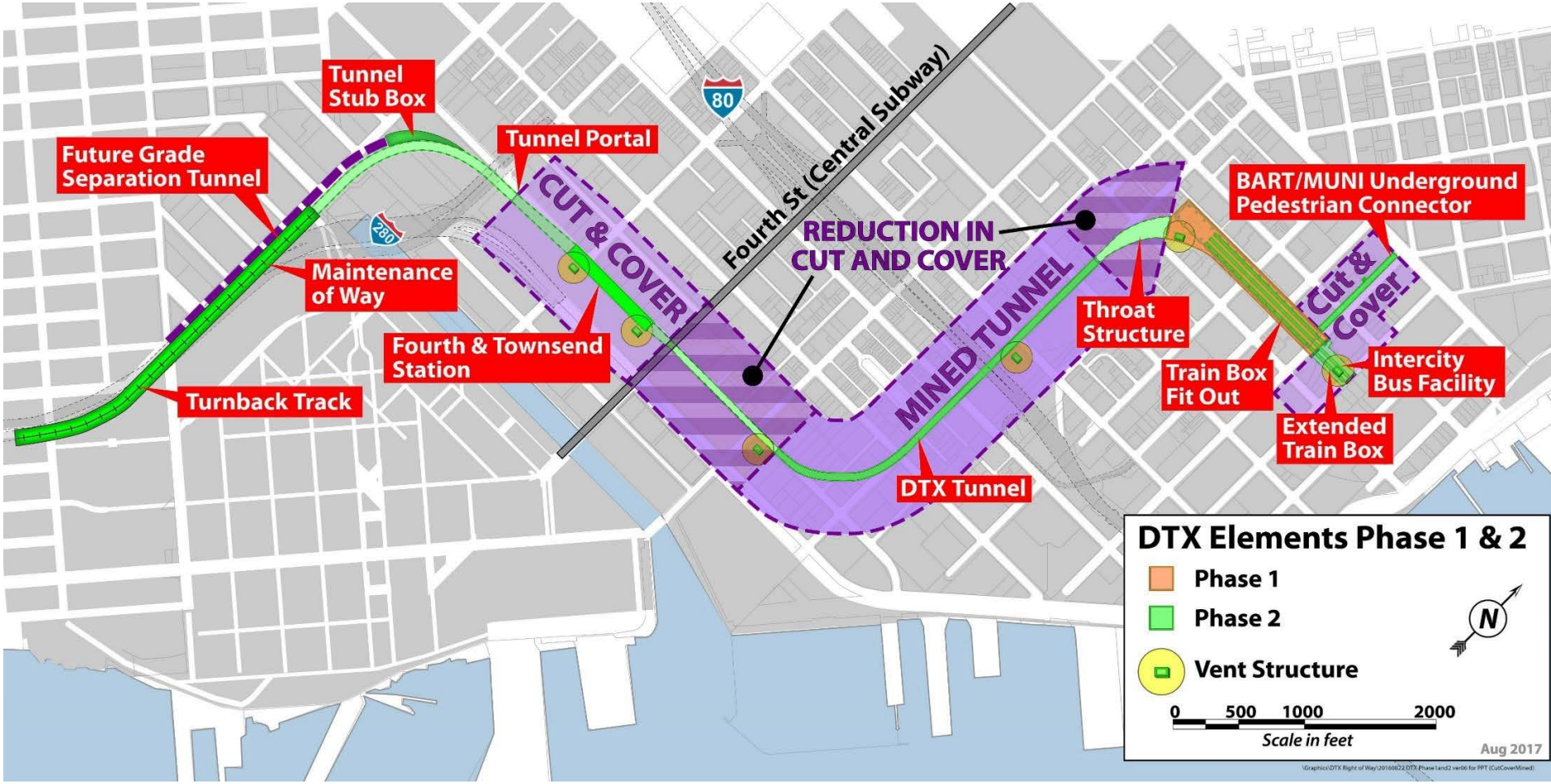
Relative Cut-and-Cover Extents (Baseline vs. Reduction)



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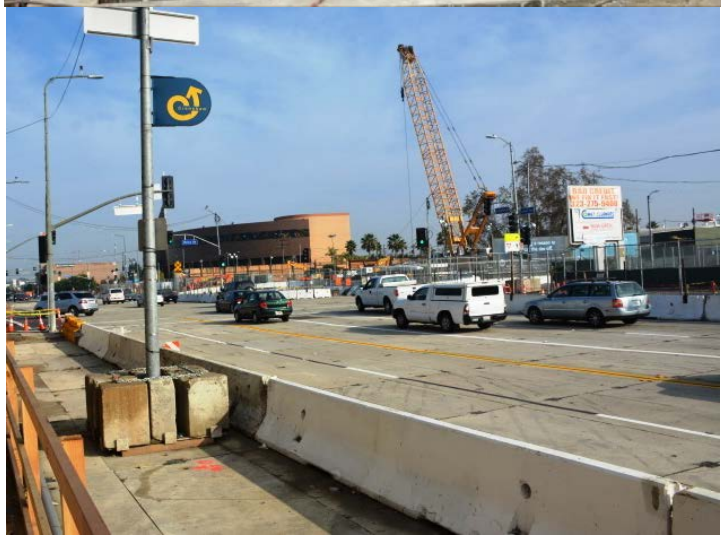
Temporary Traffic Decking

- Steel beams and concrete panels used to minimize traffic disruption by providing a temporary road surface
- Installation at nights and on weekends to limit traffic impacts
- Use:
  - Townsend St. between 4th and 6th Sts.
  - Second/Howard Streets (Throat Area)



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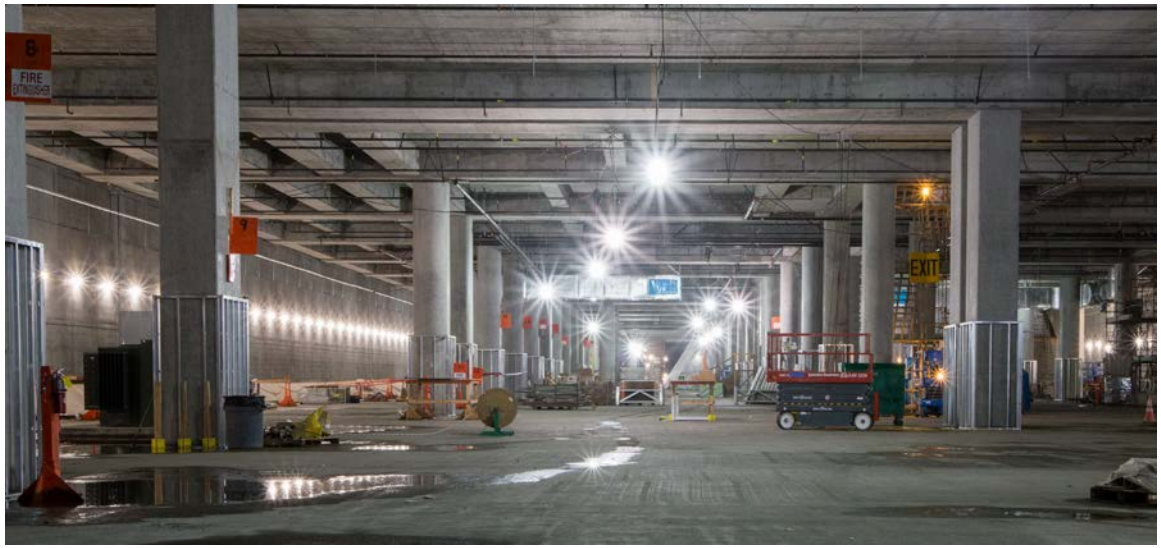
Tunnel Options Study Next Steps

- Further develop mined crossing of Howard Street to balance surface disruption and cost for the Throat Structure
- Refine the constructability and schedule for the preferred tunneling options
- Review configuration of the TBM + SEM tunneling option
- Confirm ventilation requirements

Phase 2 Next Steps

- Update funding plan with results from ridership study
- Coordinate delivery schedule with BART for the BART/Muni Pedestrian Connector and reach agreement on operation and maintenance responsibilities
- Develop delivery plan based on the results of the RAB Study



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Questions?

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