

## San Francisco Peninsula Rail Program

### Memorandum

To: Executive Steering Committee  
From: Alfonso Rodriguez, DTX Project Director  
Date: October 22, 2021  
Re: Item 7, Informational Item  
Second and Howard Crossing Construction Approach Analysis  
for the Downtown Rail Extension (DTX)

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#### INTRODUCTION:

In 2017, during a presentation to the San Francisco County Transportation Authority (SFCTA) Board associated with the completion of the Supplemental Environmental Impact Statement/Environmental Impact Report (SEIS/EIR) for the Transbay Program, the SFCTA Board asked the TJPA to explore ways in which traffic and community impacts associated with cut-and-cover construction could be further mitigated during construction of the DTX. This memorandum describes an analysis of a mined alternative and alternative cut-and-cover techniques at the intersection of Second and Howard streets and states the Integrated Program Management Team's (IPMT) recommendation to retain the baseline cut-and-cover approach, with mitigations.

#### BACKGROUND:

As the DTX tunnel alignment under Second Street approaches the Salesforce Transit Center, the underground structure must widen from a three-track configuration to six-track. This area of tunnel expansion, beginning at approximately Clementina Street and ending at the Transit Center, has been commonly referred to as the "throat structure." Crossing under the intersection of Second and Howard Streets on a diagonal, the throat structure is approximately 150 feet wide with the top of the structure approximately 10 feet below street level. Subsurface soil conditions in this area are generally considered poor with a high water table. Because these conditions are unfavorable for mining underground structures, the SEIS/EIR identified a cut-and-cover construction approach for the throat structure with temporary street decking for Second and Howard Streets (the baseline approach).

In response to the SFCTA Board's request for an alternative to the baseline approach, the DTX design consultant completed a tunnel options study in 2018, which examined a mined approach to the construction of the throat structure undercrossing of Second and Howard Streets. The mined approach would require highly complex and high-risk construction of a horizontal support structure under the streets, followed by the sequential excavation of soil and construction of vertical supports to create the cavern required for the throat structure. Because of the soil conditions and shallow depth of the structure, significant ground improvement involving grouting would be required. Grouting equipment would need to occupy travel lanes for several weeks at a time, creating substantial traffic disruption. Off-street work would be conducted from properties identified for acquisition on the east side of Second Street, to the north and south of Howard Street. The mined



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approach was discussed with the contracting community during the Industry Sounding conducted in early 2021 and was universally judged to be highly risky, complex, and generally undesirable, particularly given the poor soil conditions. The mined approach would cost an additional \$250,000,000 and require an additional 23 months to construct when compared to the baseline approach.

In May of this year, the IPMT conducted a charrette during which the mined and baseline approaches were discussed. Ideas for optimizing the baseline approach were reviewed, and the relative risk, cost, schedule, and community impacts of the various construction techniques were compared. The IPMT arrived at a consensus that the baseline approach should be retained, using either decking, such as that used by the Los Angeles County Metropolitan Transportation Authority at the intersection of Wilshire Boulevard and Rodeo Drive for the Purple Line Extension, or an accelerated bridge, similar to those installed over Fremont, First, and Beale Streets in 2012–2013 during the Transit Center’s construction; see the attachment for further discussion and examples.

**NEXT STEPS:**

Staff will further develop the cut-and-cover techniques, considering the comparative cost and community impacts with the decking and accelerated bridge approaches, and work with the appropriate San Francisco municipal agencies with jurisdiction in this area.

**Attachment:** Howard Street Crossing Presentation Deck

# Transbay Program – Phase 2

## Howard Street Crossing

Executive Steering Meeting

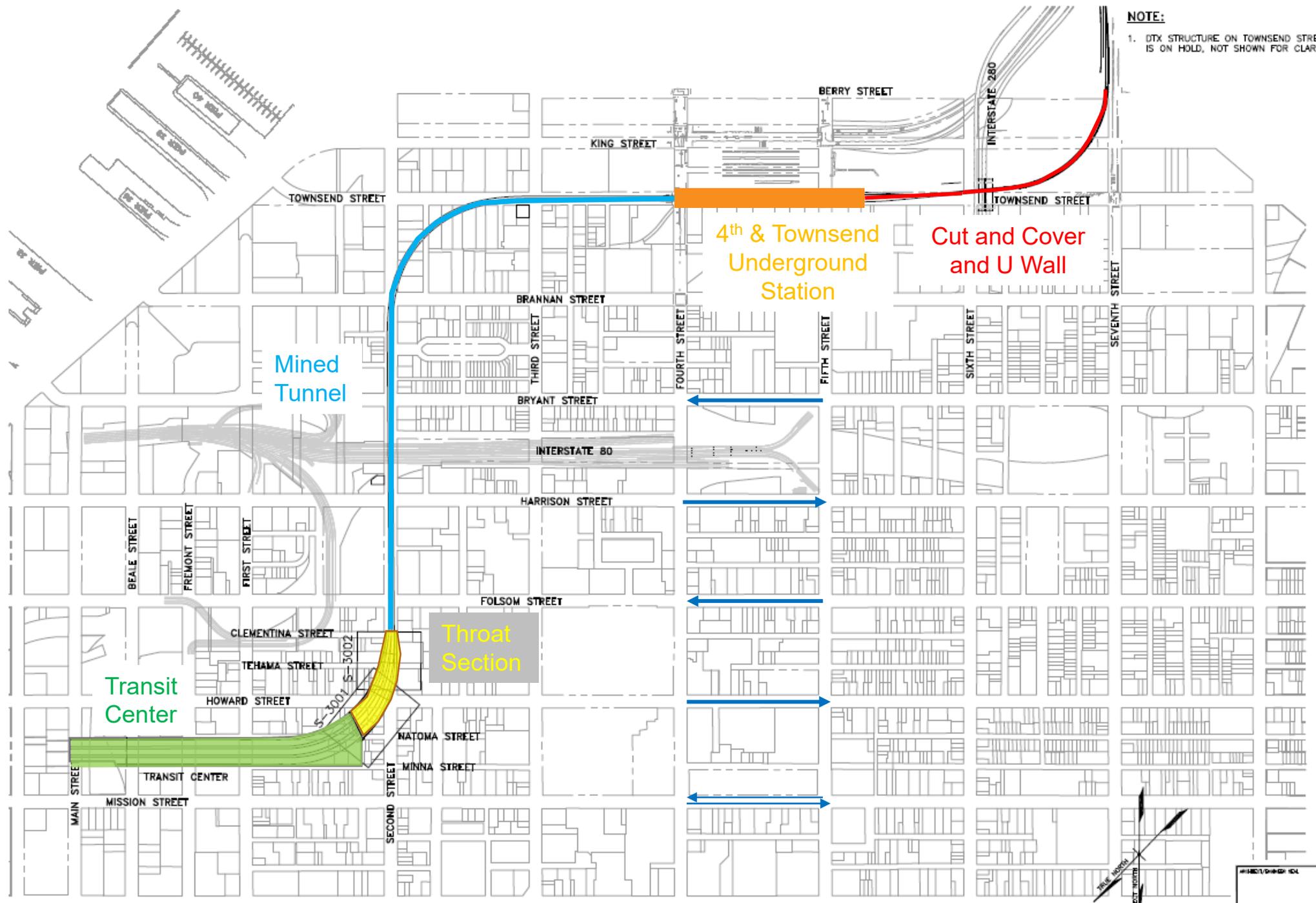
October 22, 2021



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# Agenda

- Introduction and Background
- Mining Options
- Cut and Cover Versus Mining Options
- Proposed Options for Crossing
- Feedback from Contractor Outreach
- Questions and Discussions



**NOTE:**  
 1. DTX STRUCTURE ON TOWNSEND STREET IS ON HOLD, NOT SHOWN FOR CLARITY.

Mined Tunnel

4<sup>th</sup> & Townsend Underground Station

Cut and Cover and U Wall

Throat Section

Transit Center

TRANSIT CENTER



4/18/2019 10:14

# Purpose of Presentation and Background

- Tunnel Option Study (TOS) identified separate mining options to reduce construction impacts from DTX Throat Section at 2<sup>nd</sup> and Howard Streets.
- Cost estimates determined construction costs for these options are significantly higher than cut and cover option- in excess of \$253 million (fully burdened and escalated to 2027).
- To reduce costs and traffic impacts, Howard Street crossing workshop held by TJPA on Nov 9<sup>th</sup>, 2017, to explore viable mining alternatives.
- IPMT recommended eliminating the mining option from further consideration at the Howard Street Crossing Charrette on May 25, 2021
- Purpose of today's presentation is for the ESC to review the concepts and determine if a recommendation should be made to the Board to proceed with a mining of the crossing approach or maintain baseline concept (cut and cover).

# **Mining Options – Objective and Benefits**

- Reduced surface impacts
- Full street closure not required with good planning and coordination
- Utilities relocations minimized though not completely avoided
- Reduced disturbance to adjacent owners and businesses
- Reduced issues associated with Right-of-Way acquisitions

# Mining Options - Risks

- Very large span (> 150 ft)
- Shallow ground cover (about 10 ft)
- Very weak soil above and within excavation
- High groundwater table (above excavation)
- Complex mining methods requiring delicate mining operations involving multiple mining special contractors and equipment – limited successful case study history
- Significant uncertainties that may result in construction delays, surface impacts, and claims

# Summary of Mining Options

- Mining alternative is viable but involve higher risk and associated higher costs
- Higher complexity in both design and construction operations
- Risks significantly outweigh project benefits
- Surface impacts from mining alternative not avoidable (street closures required for ground improvement, noise from ventilation fans and ground vibrations from mining operations, etc.)
- Design team and IPMT consensus: mining alternative for Howard Street Crossing not recommended

# Where Are We Now?

- Additional \$208 Million to mine under Howard Street versus baseline
- Risk is not currently fully captured in cost of the project
- Recent improvements and examples in cut and cover construction with mitigated traffic impacts
- Examination of cut and cover methods in a manner that has minimal to same traffic impacts as mined?

# Cut and Cover Concept to Reduce Impacts Project Example – LA Metro Purple Line



Roadway  
Decking at  
Wilshire/Rodeo  
Station in  
Beverly Hills for  
Purple Line Ext.

# Cut and Cover Concept to Reduce Impacts Project Example – LA Metro Purple Line



Roadway  
Decking at  
Wilshire/Rodeo  
Station in  
Beverly Hills for  
Purple Line Ext.

# LA Metro Purple Line Wilshire Boulevard



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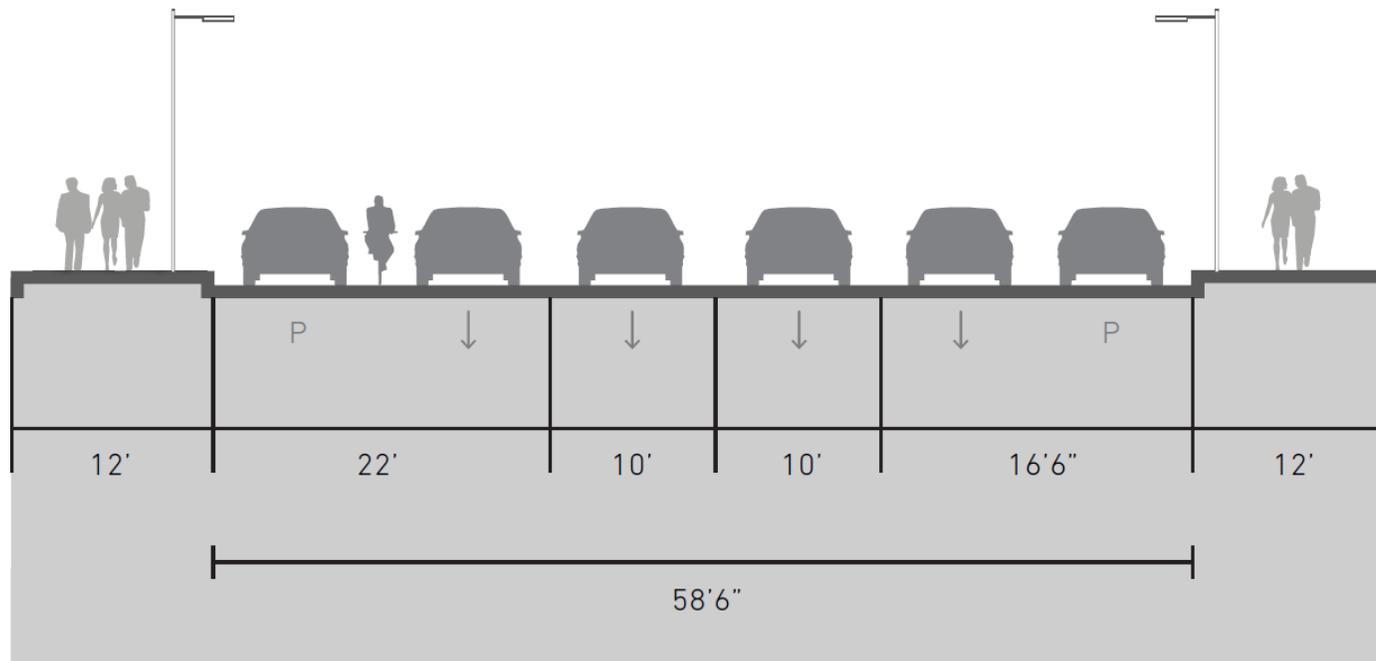
# LA Metro Purple Line Wilshire Boulevard



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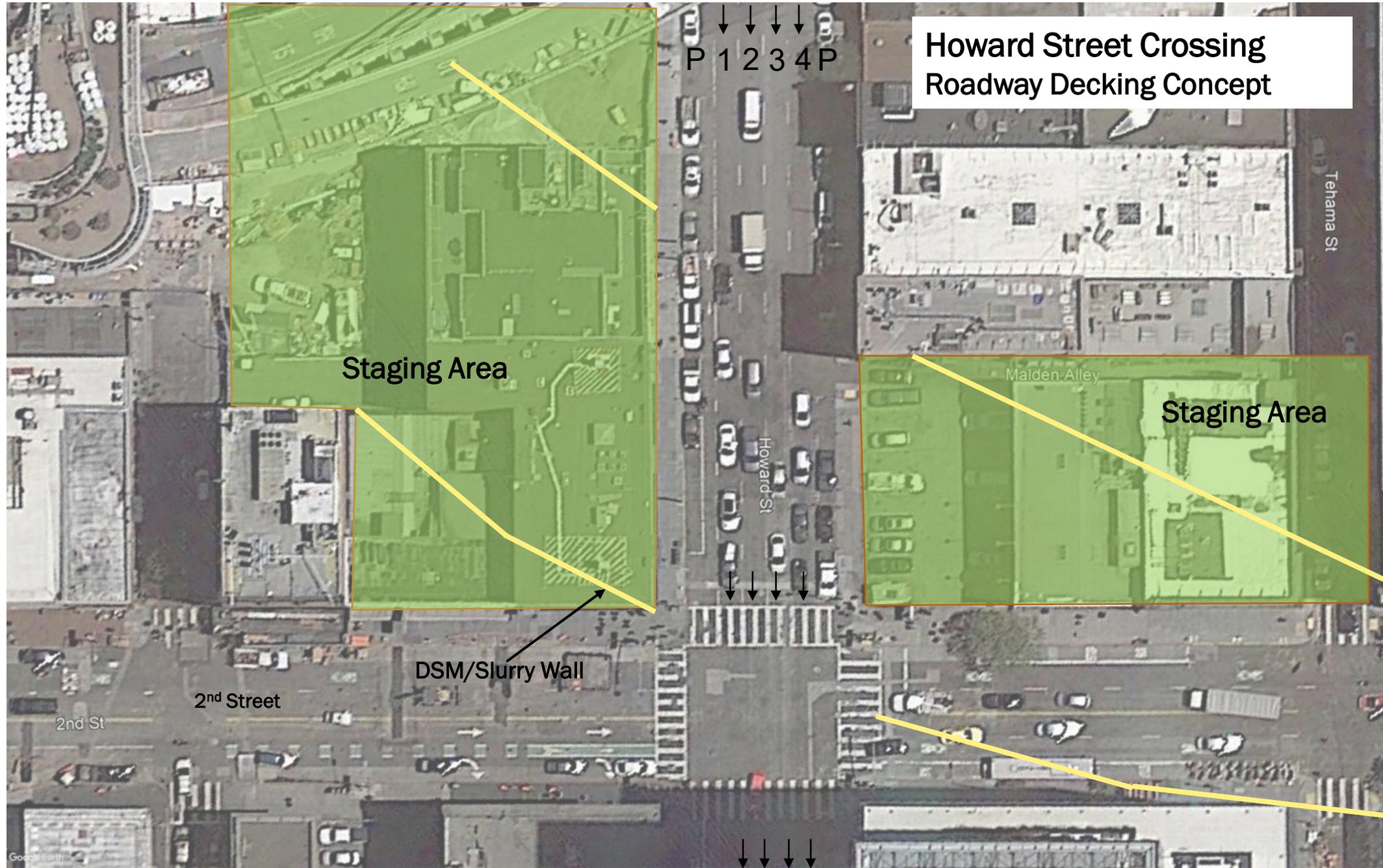
# Proposed Cut and Cover Concept to Reduce Impacts

- Implementation of baseline cut and cover concept
- Accelerated bridge construction (ABC) concept



HOWARD STREET

# Howard Street Crossing Roadway Decking Concept



# Howard Street Crossing Roadway Decking Concept

Install piles on north and south side of Howard Street. Temp shoring installed off street. No lane closures. Maintain pedestrian access.

Staging Area

Staging Area

Temp Shoring

DSM/Slurry Wall

2nd Street

2nd St

P 1 2 3 4 P

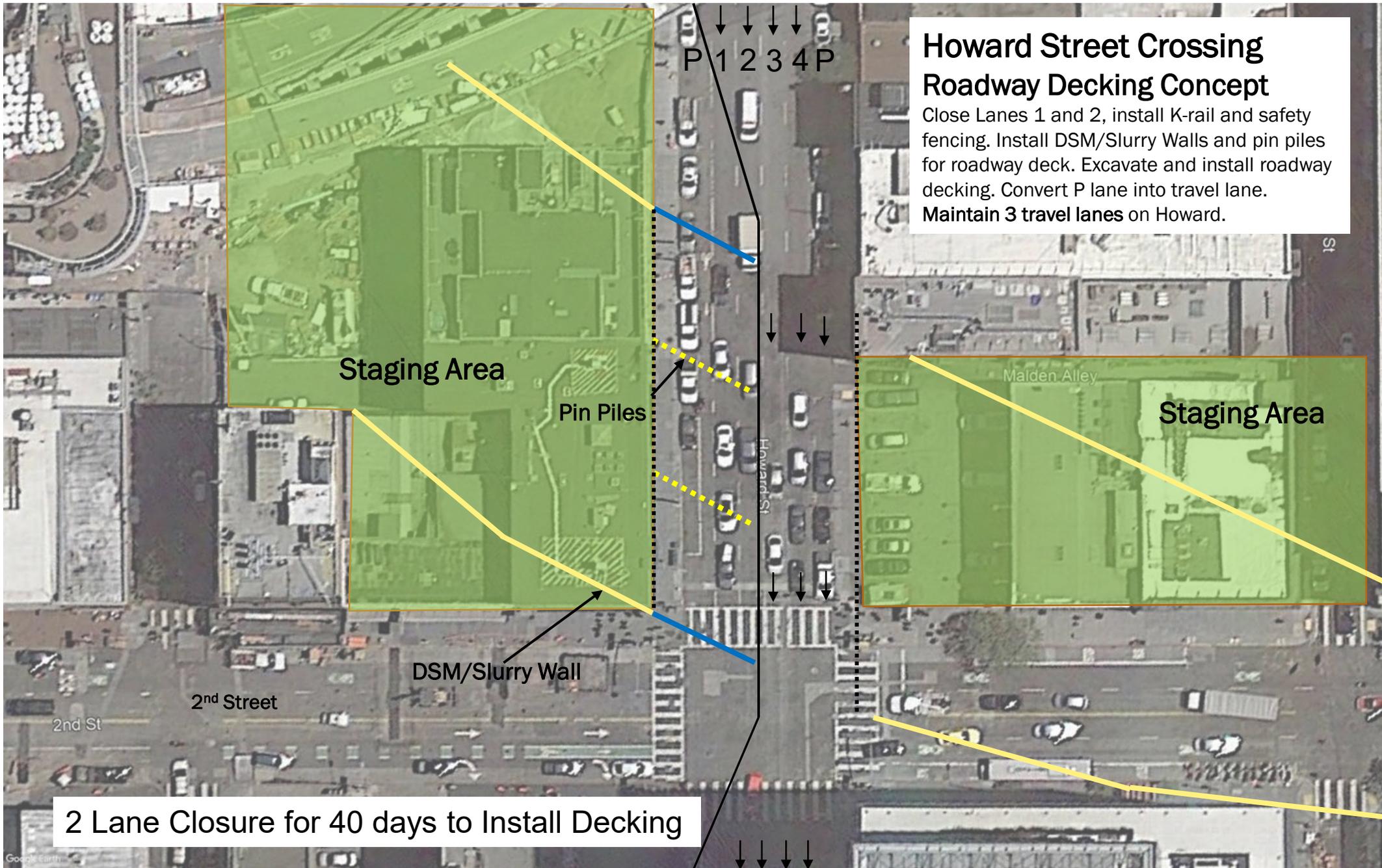
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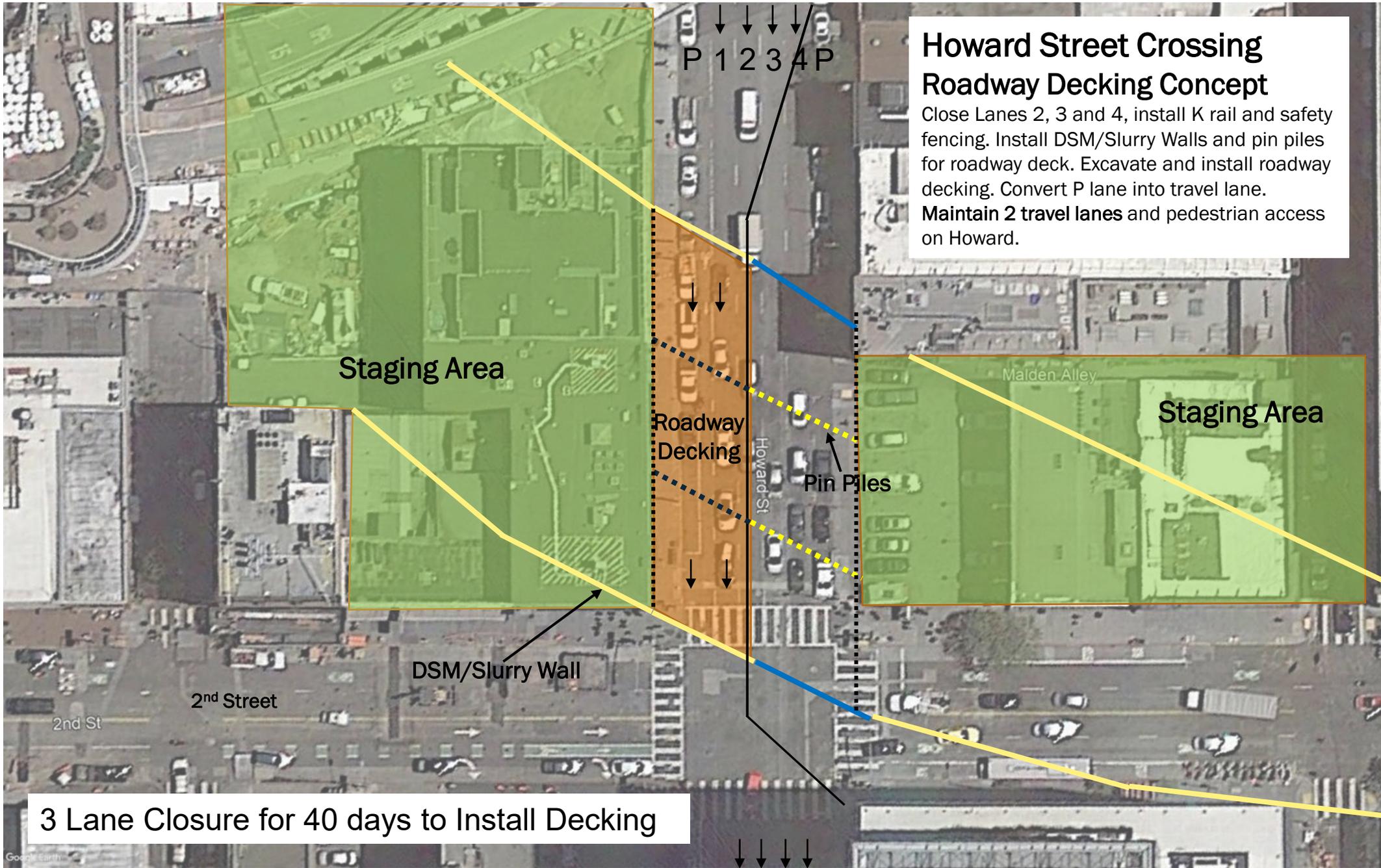
Sidewalk Closure for 2-3 weeks

## Howard Street Crossing Roadway Decking Concept

Close Lanes 1 and 2, install K-rail and safety fencing. Install DSM/Slurry Walls and pin piles for roadway deck. Excavate and install roadway decking. Convert P lane into travel lane. **Maintain 3 travel lanes on Howard.**



2 Lane Closure for 40 days to Install Decking



**Howard Street Crossing  
Roadway Decking Concept**  
Close Lanes 2, 3 and 4, install K rail and safety fencing. Install DSM/Slurry Walls and pin piles for roadway deck. Excavate and install roadway decking. Convert P lane into travel lane.  
**Maintain 2 travel lanes and pedestrian access on Howard.**

Staging Area

Roadway Decking

Staging Area

Pin Piles

DSM/Slurry Wall

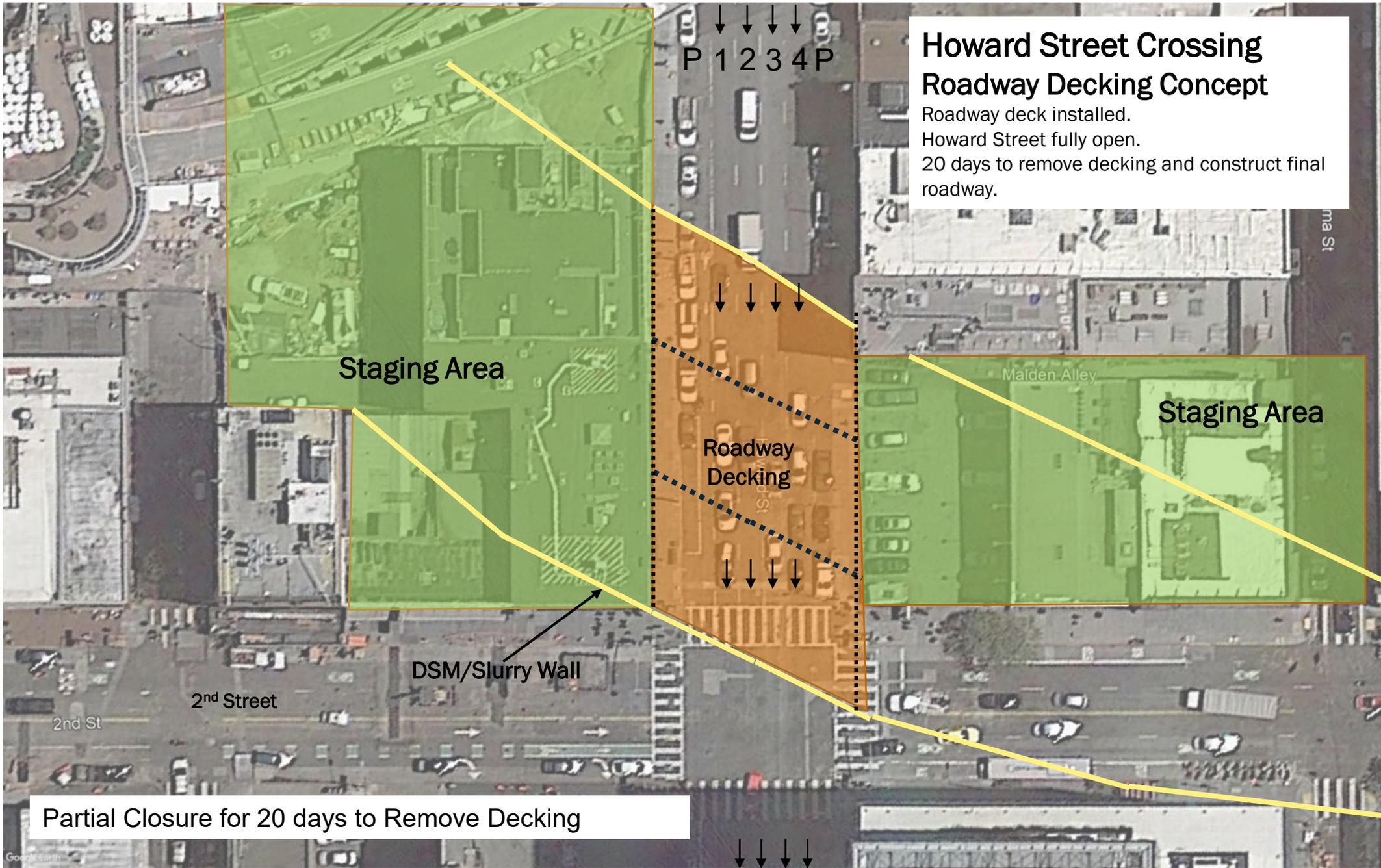
2nd Street

Malden Alley

Howard St

2nd St

3 Lane Closure for 40 days to Install Decking



# Howard Street Crossing Roadway Decking Concept

Roadway deck installed.  
Howard Street fully open.  
20 days to remove decking and construct final roadway.

Staging Area

Staging Area

Roadway  
Decking

DSM/Slurry Wall

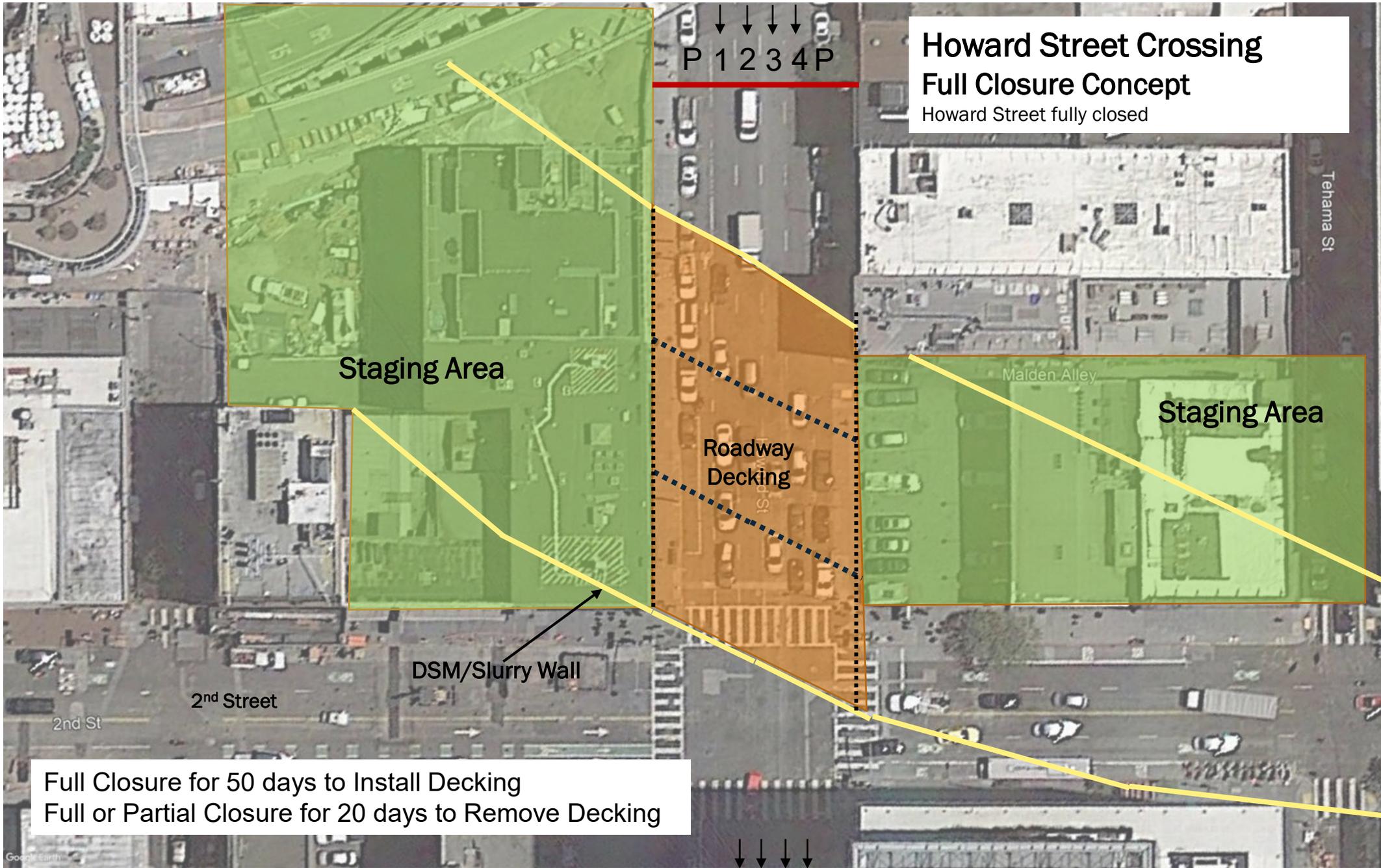
2nd Street

Malden Alley

Partial Closure for 20 days to Remove Decking

P 1 2 3 4 P

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# Howard Street Crossing Full Closure Concept

Howard Street fully closed

Staging Area

Roadway  
Decking

DSM/Slurry Wall

Staging Area

Full Closure for 50 days to Install Decking  
Full or Partial Closure for 20 days to Remove Decking

P 1 2 3 4 P

Tehama St

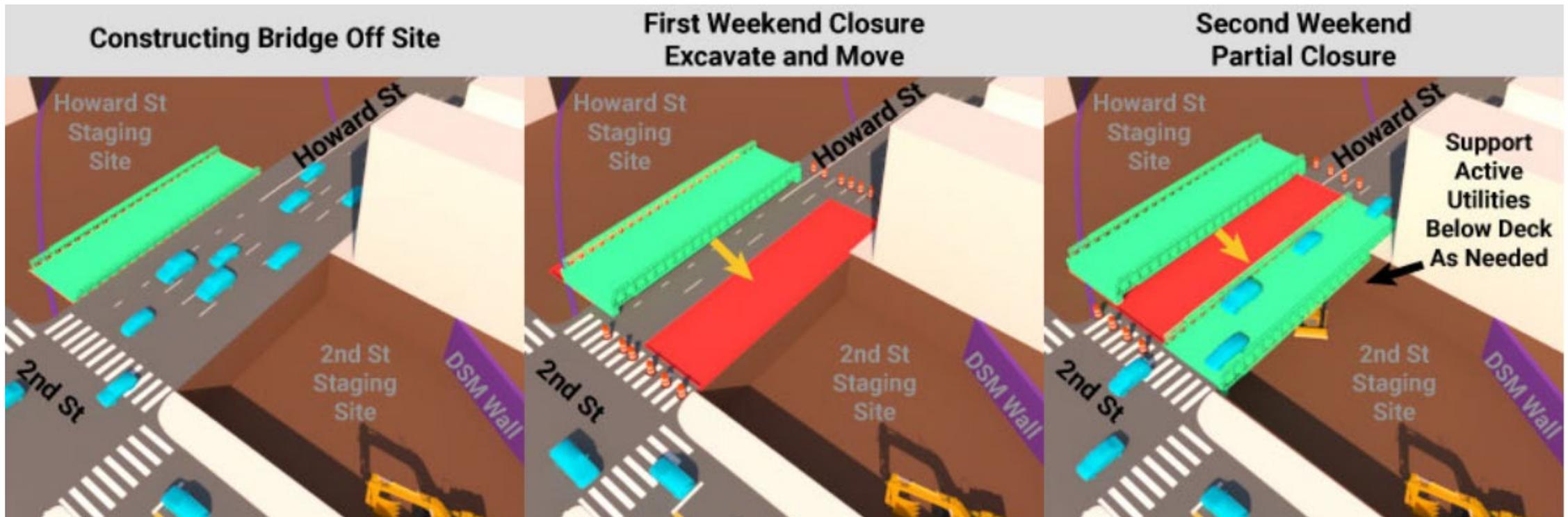
Malden Alley

2nd Street

2nd St

# Proposed Cut and Cover Concepts to Reduce Impacts - Accelerated Bridge Construction

- Span over 100 feet using pre-assembled (on-site), shallow decking to complete street decking
- After installation of support of excavation, decking can be completed over one or two weekends.



# Howard Street Crossing ABC Concept

P ↓ ↓ ↓ ↓ P

Staging Area

Staging Area

DSM/Slurry Wall

2nd Street

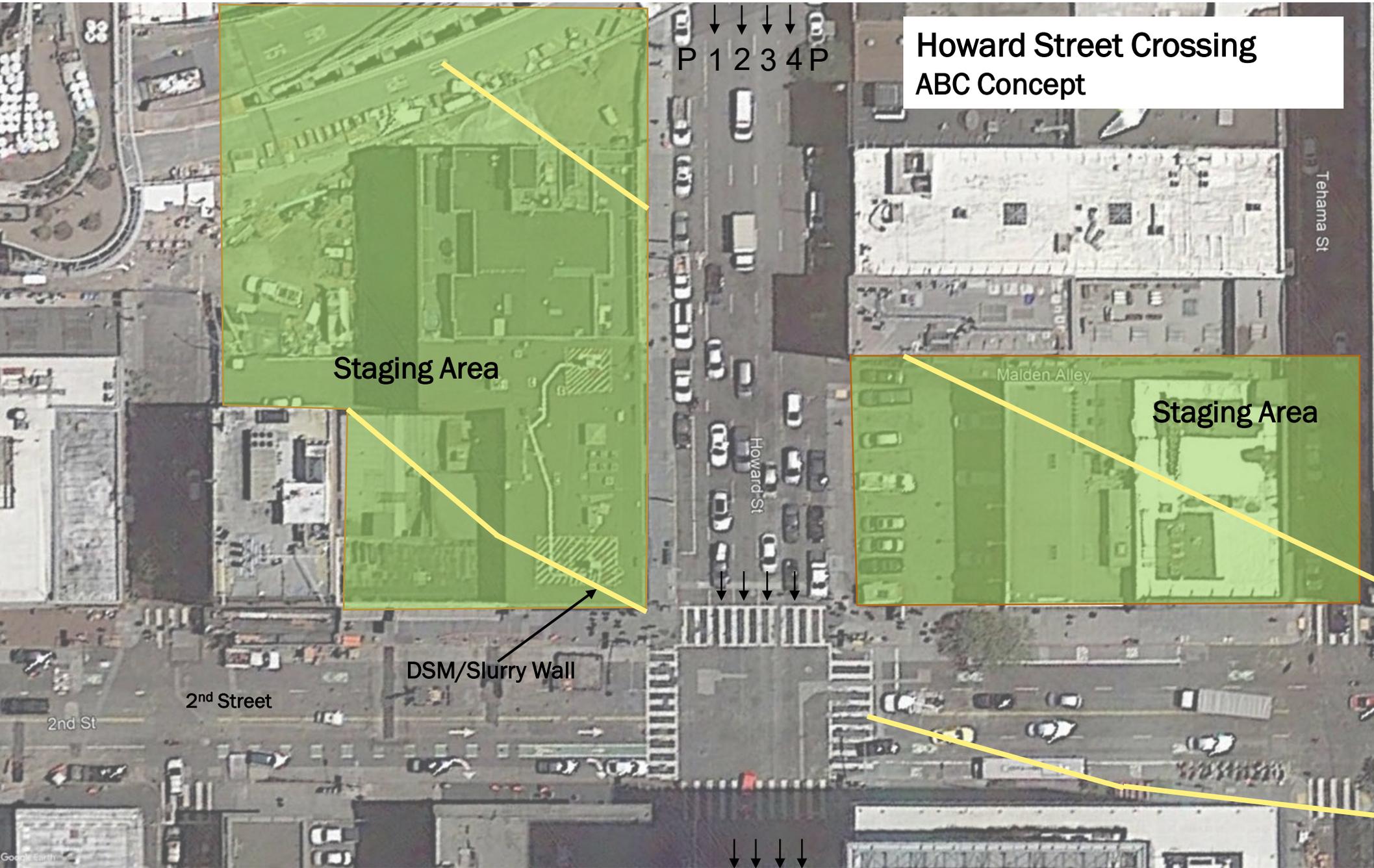
2nd St

Howard St

Malden Alley

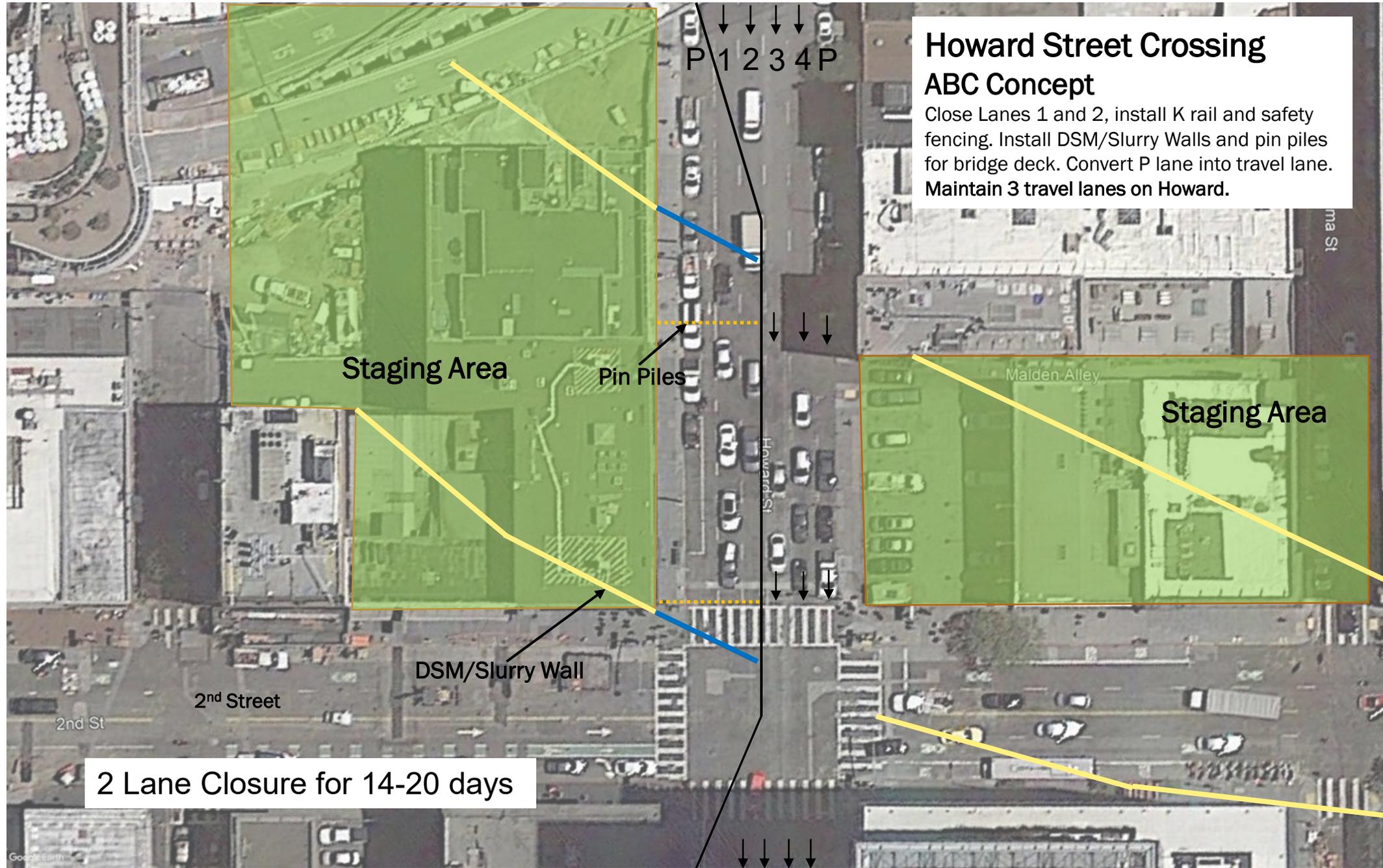
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# Howard Street Crossing ABC Concept

Close Lanes 1 and 2, install K rail and safety fencing. Install DSM/Slurry Walls and pin piles for bridge deck. Convert P lane into travel lane. **Maintain 3 travel lanes on Howard.**



Staging Area

Pin Piles

Staging Area

DSM/Slurry Wall

2 Lane Closure for 14-20 days

2nd Street

Malden Alley

ma St

# Howard Street Crossing ABC Concept

Close Lanes 2, 3 and 4, install K rail and safety fencing. Install DSM/Slurry Walls and pin piles for bridge deck. Convert P lane into travel lane. **Maintain 2 travel lanes on Howard.**

Staging Area

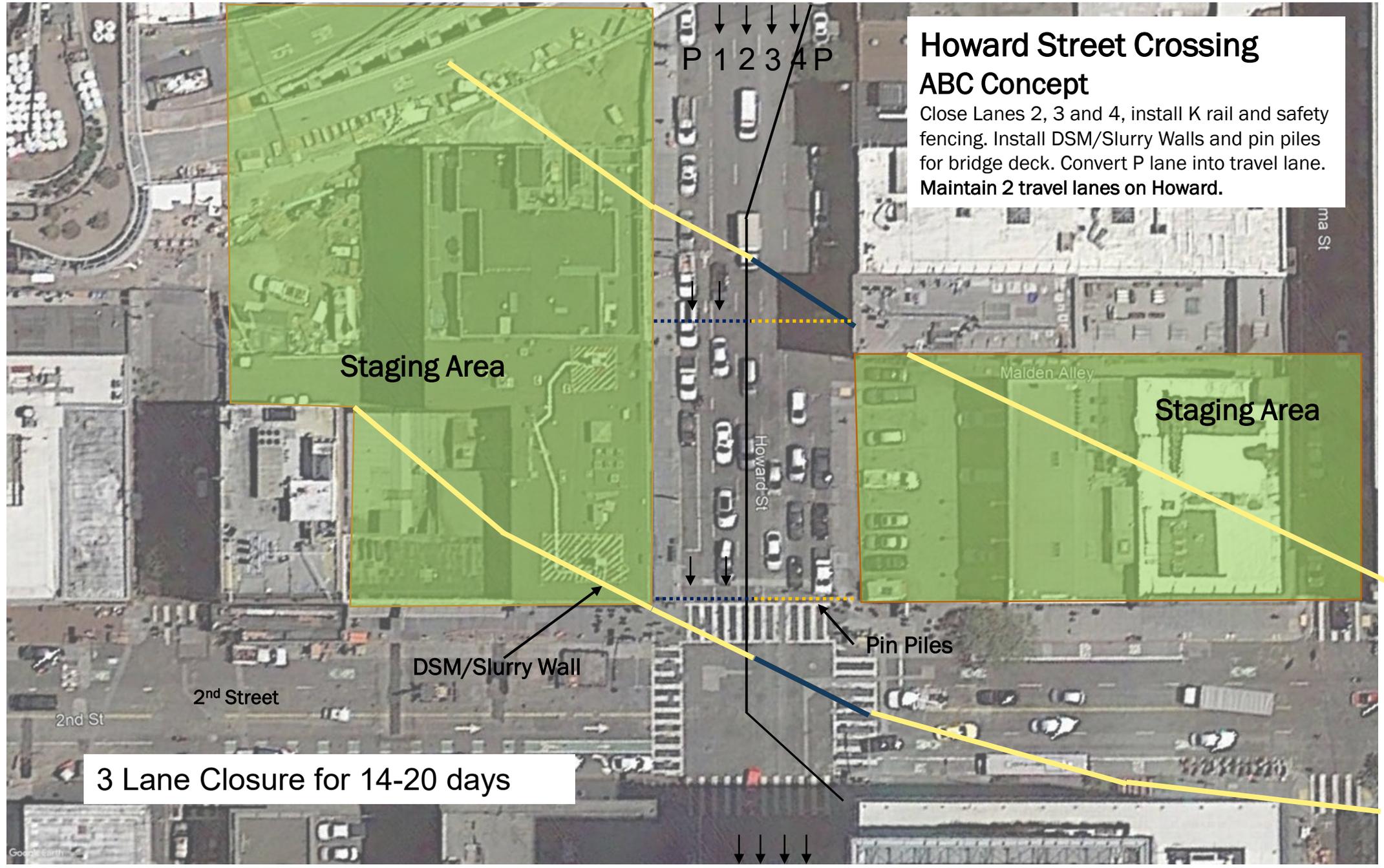
Staging Area

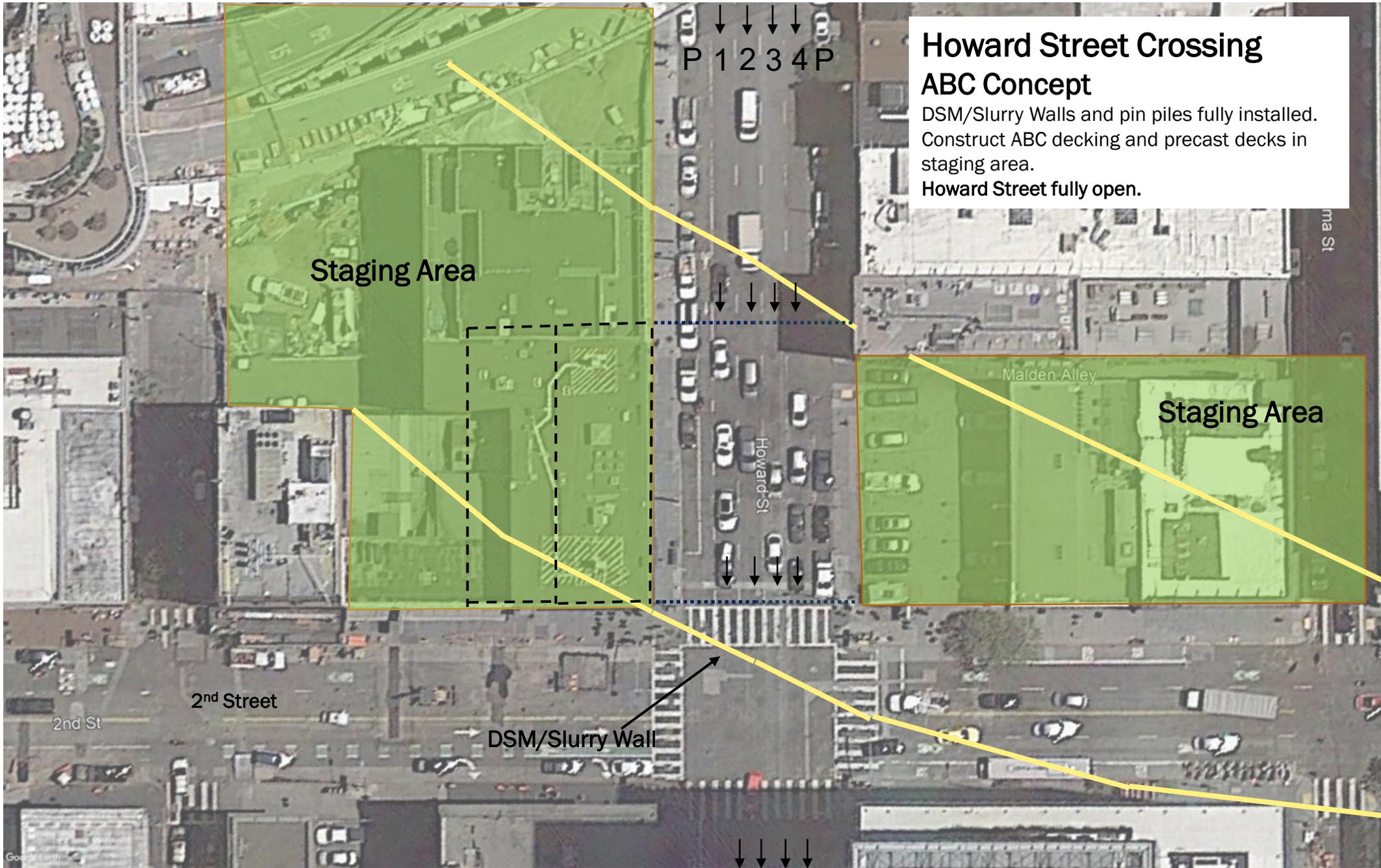
DSM/Slurry Wall

Pin Piles

3 Lane Closure for 14-20 days

P 1 2 3 4 P





## Howard Street Crossing ABC Concept

DSM/Slurry Walls and pin piles fully installed.  
Construct ABC decking and precast decks in  
staging area.  
Howard Street fully open.

Staging Area

Staging Area

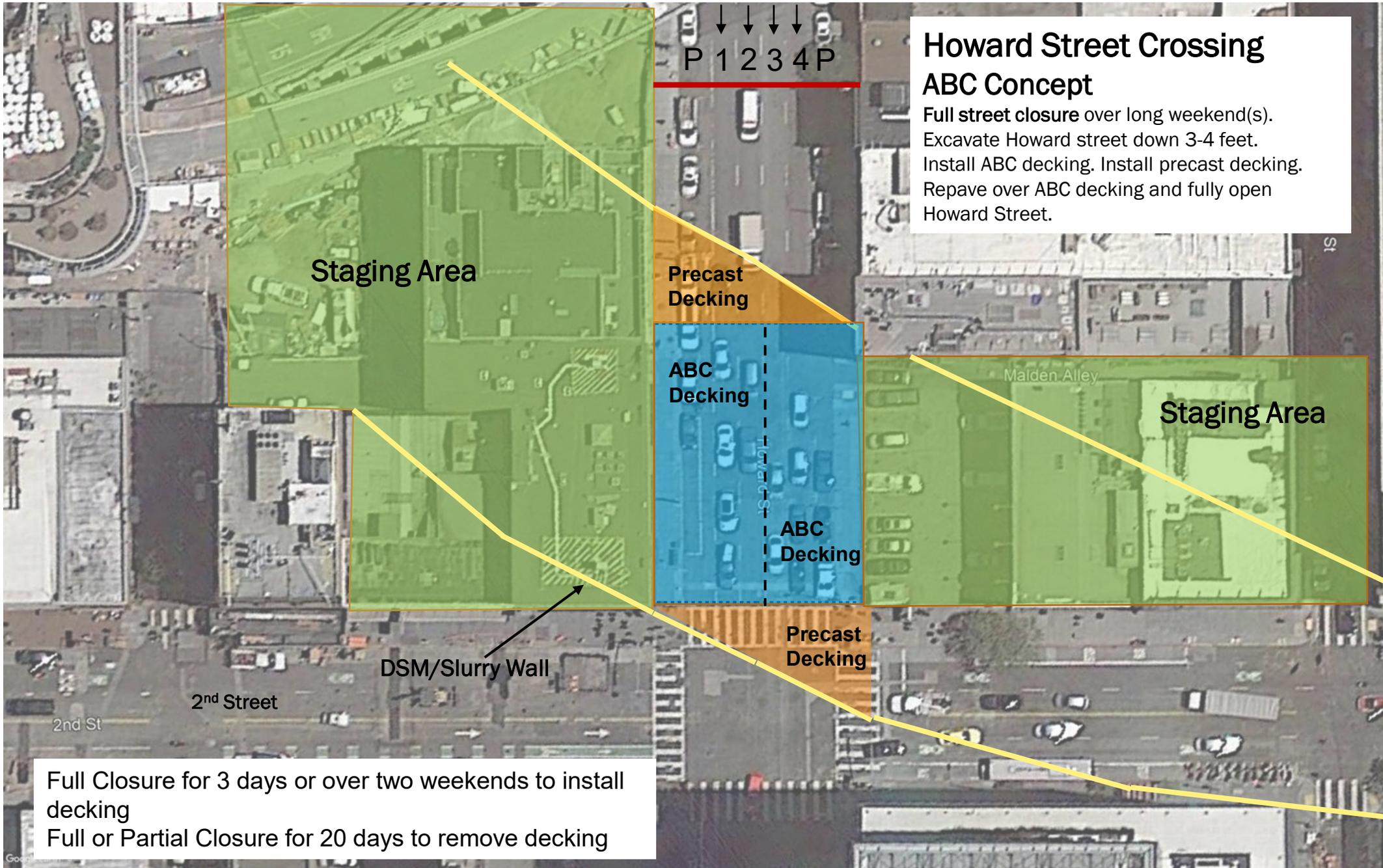
2nd Street

DSM/Slurry Wall

Howard St

Malden Alley

P 1 2 3 4 P



### Howard Street Crossing ABC Concept

Full street closure over long weekend(s).  
Excavate Howard street down 3-4 feet.  
Install ABC decking. Install precast decking.  
Repave over ABC decking and fully open  
Howard Street.

Staging Area

Precast  
Decking

ABC  
Decking

ABC  
Decking

Staging Area

DSM/Slurry Wall

Precast  
Decking

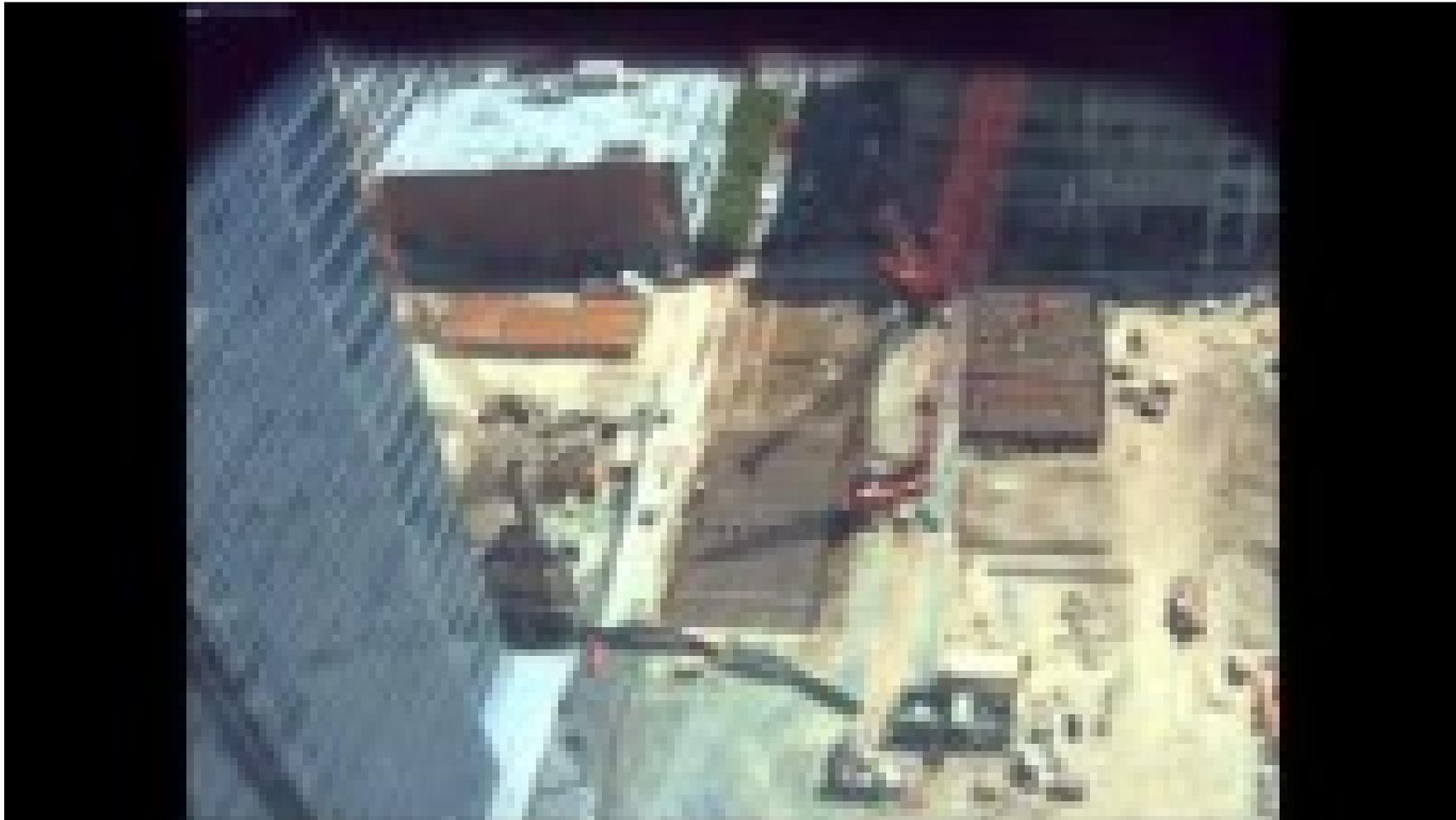
2<sup>nd</sup> Street

2nd St

Full Closure for 3 days or over two weekends to install decking  
Full or Partial Closure for 20 days to remove decking

# Cut and Cover Concepts to Reduce Impacts Accelerated Bridge Construction

Same concept used for the roadway decking for the [Salesforce Transit Center](#)



# Cost Estimates and Schedule Comparison of Cut and Cover and Mining

Crossing Option	Approx. Additional Costs (Escalated Dollars)	Approx. Traffic Impacts on Howard Street Duration
Cut and Cover Decking on Howard (Limited Closure)	Baseline	<p><b>Total: 120 days</b>  <u>North Decking (3 lanes Open): 60 Days</u>            Decking Install: 40 days            Decking Removal: 20 Days</p> <p><u>South Decking (2 lanes Open): 60 Days</u>            Decking Install: 40 days            Decking Removal: 20 Days</p>
Cut and Cover Decking on Howard (Full Street Closure)	Lower than Baseline	<p><b>Total: 70 days</b>            Decking Install: 50 days            Decking Removal: 20 Days</p>
Accelerated Bridge Concept	TBD	<p><b>Total: 51-63 days</b>            Partial Street Closure: 28-40 days            Full Street Closure: 3 days            Decking Removal: 20 days</p>
SEM Mining under Howard	+253M	Intermittent partial lane closures for ground improvement, instrumentation install: <b>30 days or more*</b>

\*Additional traffic impacts associated with mining would be unplanned and of uncertain duration

# Closing

## Mining option:

- will add \$253M in cost over the cut and cover approach
- will have much higher risks than cut and cover option
- could result in significant traffic impacts and settlement if risks are realized
- Industry feedback validated the high risk associated with mining options

## Cut and cover option

- can be designed and constructed with moderate and planned traffic impacts
- approach has much lower risk for settlement and groundwater inflows than the mined options

**IPMT and Design Team recommends eliminating further consideration of mining option**

# Questions?

