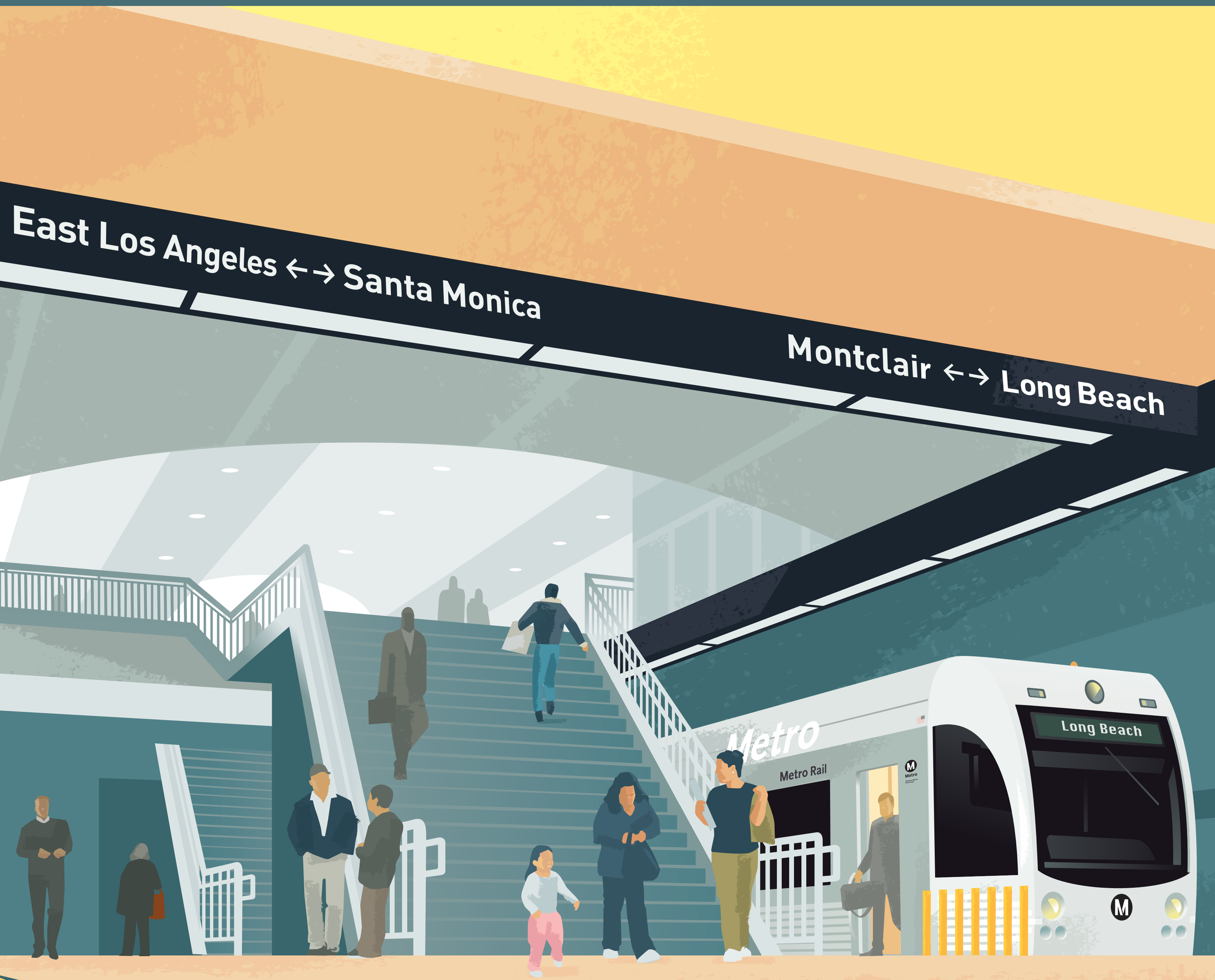
Los Angeles County
Metropolitan Transportation Authority

Regional Connector Transit Corridor

Final Supplemental Environmental Impact Statement (SEIS) and Supplemental Record of Decision (ROD)

December 2015



Metro

U.S. Department of Transportation
Federal Transit Administration

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATMENT

for the

REGIONAL CONNECTOR TRANSIT CORRIDOR PROJECT

prepared by the

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL TRANSIT ADMINISTRATION

and the

LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

Submitted pursuant to:

The National Environmental Policy Act of 1969, 42 U.S.C. §§ 42 U.S.C. 4321 et. seq, 23 CFR 771, and the Order re Plaintiffs' Combined Motion for Summary Judgment and Defendants' Motion and Cross-Motion for Summary Judgment, dated May 28, 2014 and Order re Plaintiff Today's IV, Inc. and 515/555 Flower Associates, LLC's Motion for Injunctive Relief, dated September 12, 2014, issued by the U.S. District Court in Today's IV. Inc. v. FTA et. al. (Today's IV), Case No. LA CV13-00378 JAK (PLAx), Japanese Village, LLC v. FTA et al. (Japanese Village), Case No. LA CV13-00396 JAK (PLAx), 515/555 Flower Assoc., LLC v. FTA (Flower Associates), Case No. LA CV00453 JAK (PLAx) and the Judgments issued on October 24, 2014 by the U.S. District Court in Today's IV and Flower Associates).

This Final Supplemental Environmental Impact Statement and Supplemental Record of Decision document has been prepared pursuant to Pub. L. 114-94, 23 USC 139 (n)(2)(A).

Leslie T. Rogers
Region IX Regional Administrator
Federal Transit Administration

Date: DEC 16 2015

Phillip Washington
Chief Executive Officer
Los Angeles County
Metropolitan Transportation Authority

Date: 12/16/2015

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Abbreviations/Acronyms

AA — Alternative Analysis
ACHP – Advisory Council on Historic Preservation
APE – Area of Potential Effect
BID – Business Improvement District
CEQA – California Environmental Quality Act
CHL – California Historic Landmarks
CRHR – California Register of Historic Resources
EA – Environmental Assessment
EIR – Environmental Impact Report
EIS – Environmental Impact Statement
EPA – Environmental Protection Agency
EPBM — Earth Pressure Balance Method
FEIR — Final Environmental Impact Report
FEIS — Final Environmental Impact Statement
FHWA — Federal Highway Administration
FTA – Federal Transit Administration
GBV – Ground-borne vibration
KOPs — Key Observation Points
LADOT — Los Angeles Department of Transportation
LOS — Level of Service
LPA – Locally Preferred Alternative
LRT — Light Transit Rail
LRTP — Long Range Transportation Plan
LTCC – Little Tokyo Community Council
LTWG – Little Tokyo Working Group
METRO — Los Angeles County Metropolitan Transportation Authority
MMRP — Mitigation Monitoring and Reporting Plan
MOA – Memorandum of Agreement
MPH — Miles Per Hour
MPO — Metropolitan Planning Organization
MRDC — Metro Rail Design Criteria
NAEP – National Association of Environmental Professionals
NEPA – National Environmental Policy Act
NHPA – National Historic Preservation Act
NOA – Notice of Availability
NRHP – National Register of Historic Places
NTP — Notice To Proceed
PPP – Public Participation Plan
PPV – Peak Particle Velocity
ROD — Record of Decision
ROW — Right-Of-Way
RTP — Regional Transportation Plan
SAFETEA-LU — Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users
SCAG — Southern California Association of Governments
SEA — Supplemental Environmental Assessment
SEIS — Supplemental Environmental Impact Statement
SEM — Sequential Excavation Method

SHPO – State Historic Preservation Office
SR — State Route
TBM — Tunnel Boring Machine
TIFIA — Transportation Infrastructure Finance and Innovative Action
TSM — Transportation Systems Management
USDA — United States Department of Agriculture
USDOI — United States Department of Interior
USDOT — United States Department of Transportation
USFS — United States Forest Service
CCAA — California Clean Air Act
NAAQS — National Ambient Air Quality Standards
CO — Carbon Monoxide
P_b — lead
NO_2 — Nitrogen dioxide
O_3 — Ozone (commonly known as smog)
PM_{10} — Particulate matter smaller than 10 microns
$PM_{2.5}$ — Particulate matter smaller than 2.5 microns
SO_2 — Sulfur Dioxide
VOC — Volatile Organic Compounds
NOx— Oxides of nitrogen
CAA— Clean Air Act
Ppm— parts per million of air
Ppb — parts per billion by volume
AAM — Annual Arithmetic Mean
SoCAB — The South Coast Air Basin

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This Supplemental Environmental Impact Statement (SEIS) was prepared to address the Order of the United States District Court for the Central District of California in *Today's IV, Inc. vs. Federal Transit Administration et al* and *515/555 Flower Associates, LLC vs. Federal Transit Administration et al (submitted pursuant to The National Environmental Policy Act of 1969, 42 U.S.C. §§ 42 U.S.C. 4321 et. seq, 23 CFR 771, and the Order re Plaintiffs' Combined Motion for Summary Judgment and Defendants' Motion and Cross-Motion for Summary Judgment, dated May 28, 2014 and Order re Plaintiff Today's IV, Inc. and 515/555 Flower Associates, LLC's Motion for Injunctive Relief, dated September 12, 2014, issued by the U.S. District Court in Today's IV. Inc. v. FTA et. al. (Today's IV), Case No. LA CV13-00378 JAK (PLAx), Japanese Village, LLC v. FTA et al. (Japanese Village), Case No. LA CV13-00396 JAK (PLAx), 515/555 Flower Assoc., LLC v. FTA (Flower Associates), Case No. LA CV00453 JAK (PLAx) and the Judgments issued on October 24, 2014 by the U.S. District Court in Today's IV and Flower Associates).*

The Judgment and Order for Partial Injunctive Relief by the Honorable John A. Kronstadt on May 28, 2014 and September 9, 2014, respectively, require that the Federal Transit Administration (FTA) as the federal lead agency pursuant to the National Environmental Policy Act (NEPA) with the Los Angeles County Metropolitan Transportation Authority (Metro) explain why open-face tunneling alternatives were rejected on the Lower Flower Segment in downtown Los Angeles. This SEIS is intended to provide more information on the tunnel construction alternatives on Flower Street that were withdrawn from consideration, specifically Open-Face Shield and Sequential Excavation Method (SEM) tunneling for the Flower Street portion of the Regional Connector project alignment between 4th Street and the 7th Street/Metro Center Station, as required by the Judgment.

This Final Supplemental Environmental Impact Statement and Supplemental Record of Decision document has been prepared pursuant to Pub. L. 114-94, 23 USC 139 (n)(2)(A) as amended by the Fixing America's Surface Transportation Act. The Supplemental ROD can be found in Appendix K.

Alternatives Evaluated in this Supplemental Environmental Document

The two tunneling method alternatives identified and evaluated in the SEIS propose different combinations of underground construction as options to the cut and cover method planned for the Project between south of 4th Street and south of 6th Street along Flower Street:

- Alternative A – a combination of Earth Pressure Balance Tunnel Boring Machine (EPBM), Open-Face Shield, and SEM construction methods; and with similar horizontal and vertical alignment profiles to that of the Project.
- Alternative B – a combination of EPBM and SEM construction methods with a similar horizontal alignment profile, but a lower vertical alignment profile, than that of the Project.

The tunneling alternatives have the following alignment variations from that of the Project in order to address geologic conditions and other subsurface project constraints along Flower Street:

- Horizontal alignment – Along Flower Street, Alternatives A and B remain located under the existing street right-of-way. The horizontal alignments of these alternatives continue on tangent track from the 2nd/Hope Station south through the 4th Street Bridge foundation piles to 5th Street. The alignments then would transition from a wider oval track center to a narrow track center as the alignment approaches the planned double crossover immediately north of the narrow, rectangular 7th Street/Metro Center Station tail tracks structure.

  The tunneling method alternatives would have a short horizontal transition distance from the 5th Street section of the alignment to the double crossover located before the existing tail tracks structure which would limit the operating speed to 35 miles per hour (mph) as compared to the 55 mph provided by the Project.

Figure ES.1: Alternative A – EPBM/Open-Face Shield/SEM Project Profile Alternative

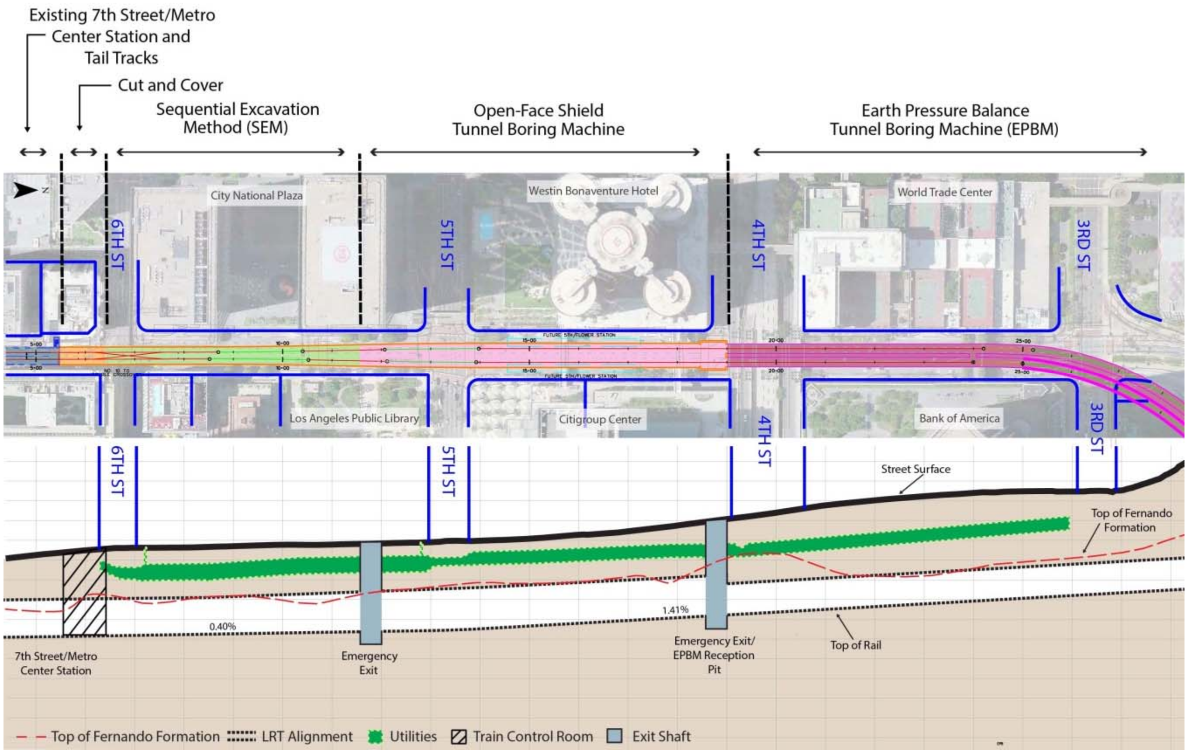
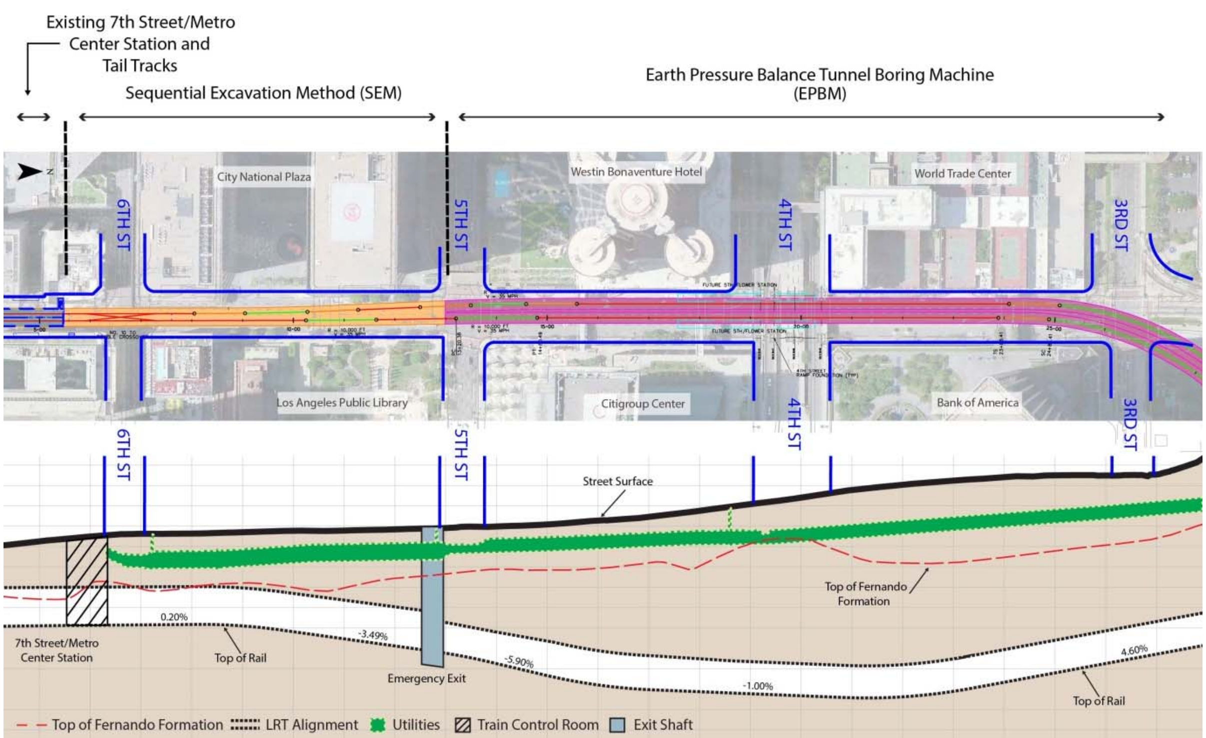


Figure ES.2: Alternative B – EPBM/SEM Low Alignment Alternative



- Vertical alignment – Alternative A would have the same vertical profiles as the Project with an average depth of 40 feet to top of rail (TOR) below ground level. The vertical alignment of Alternative B has a "sag" or low point of 105 feet to TOR below ground level. The sag alignment reduces the probability of the tunnel alignment impacting the 4th Street Bridge foundations, and encountering tie-backs located under Flower Street between 4th Street and just south of 5th Street. Alternative B's lower alignment profile results in a greater depth for the 2nd/Hope Station (128 feet) compared to the Project and Alternative A (96 feet).

Summary of Findings

Based on the environmental analysis in the SEIS and the engineering analysis documented in the *Final Flower Street Tunneling Methods Alternatives Report*, the construction method alternatives would not perform as well as the Project in meeting purpose and need, would impact Metro operations, would pose construction and safety risks, and would result in environmental impacts, as summarized below.

- **Purpose and Need** – Alternatives A and B would not perform as well as the Project in meeting the purpose and need identified for the Regional Connector project. While they would provide an improved regional connection, implementation of these options would result in reduced operating speeds on the Flower Street segment – 35 mph compared to 55 mph provided by the Project. There would be a corresponding increase in travel times for Gold, Blue, and Exposition Line passengers, as well as for passengers transferring from the Red and Purple Lines. The speed reduction resulting from the tunneling method alternatives would have permanent negative operational effects over the Project due to increased travel times for the operational life of the Regional Connector project.
- **Construction and Risk Considerations** – Construction along the Flower Street segment must address significant challenges including physical operational challenges, difficult surface and underground conditions, and challenging geologic conditions. The geologic conditions include the presence of groundwater, unstable soils, a challenging geologic interface between different soil and rock strata (mixed-face), and hazardous gases. The Project was defined to address those constraints given the segment's high risk and challenges. The tunneling methods proposed by Alternatives A and B would result in significantly higher construction risks, a longer construction schedule, and a higher project cost. The higher construction risks include increased risks of ground instability, loss, and settlement which could threaten public and worker safety.
- **Operational Considerations** – The speed reduction resulting from Alternatives A and B would have negative impacts on rail service headways, run times, and operations over the Project. With a slower operating speed – one-third slower than Metro operational requirements – Alternatives A and B would negatively impact passengers using the Gold, Blue, and Exposition Lines, as well as passengers transferring from the Red and Purple Lines at the 7th Street/Metro Center Station. Metro would be required to operate additional trains and increase the fleet size by approximately six vehicles with a corresponding increase in capital and operational costs. It should be noted that the Project and Alternatives A and B have been

designed to allow for a future 5th/Flower Station. Construction of this station would result in slower operating speeds in the Flower Street segment as the closer station spacing would not allow the LRT trains to reach the desired 55 mph speed. While both alternatives would allow for a future 5th/Flower Street Station, the resulting station configuration for Alternatives A and B would not allow for cross-platform transfers negatively impacting passenger convenience, especially for visitors and infrequent users. Implementation of Alternatives A and B would result in a permanent, substandard operating segment at the heart of the region's LRT system.

- **Schedule Impacts** – Implementation of Alternatives A and B would delay start of revenue service by a minimum of 3.0 years beyond the Project's schedule. The increase in schedule is partially due to longer construction timeframes – 15 and 7 months for Alternatives A and B respectively. In addition, both alternatives would require an additional 29 months over the Project's schedule for pre-construction activities required to revise the engineering design and re-procure the design-build construction contract. A longer construction time would increase the project cost and delay operation of this much needed segment in the region's LRT system.
- **Cost and Funding Considerations** – Based on a cost analysis similar to that performed for the Project, the higher risk for Alternatives A and B translates to $67 to $123 million more for the baseline Year of Expenditure (YOE) cost for the Flower Street segment beyond the cost identified for the Project. Given the higher risk level, a range of an additional $276 to $403million would be required for the construction of Alternatives A and B beyond that identified for the Project. Funding for these additional costs will need to be identified among limited federal, state, and local sources.
- **Environmental Considerations** – The two tunneling method alternatives shift a majority of the effects resulting from the handling of excavation materials from the Flower Street segment, a high-rise commercial district with wide streets, to Little Tokyo, a low to mid-rise mixed use district with visitor and cultural destinations, and identified as an environmental justice community. Use of grouting equipment, required for Flower Street segment ground stabilization for construction of the two alternatives would result in adverse visual, noise and vibration, air quality, and traffic effects during construction.

Based on the above conclusions, it was determined that the proposed tunneling alternatives in Alternatives A and B would result in a higher safety risk, would cost more money, would take longer to construct, and would result in additional adverse environmental effects than the Project. Even with the proposed methods to reduce construction risk associated with tunneling in the weak ground conditions under Flower Street, the tunneling method alternatives have a high risk of ground settlement problems. While implementing Alternatives A and B may be technically possible, for the reasons stated in this paragraph and above, those alternatives were considered infeasible as a matter of sound public policy, and thus were withdrawn from further consideration.[1]

[1] *See Res. Ltd., Inc. v. Robertson, 35 F.3d 1300, 1307 (9th Cir. 1997)*

Table ES.1: Overview of Environmental Impacts Due to Construction of the Tunneling Method Alternatives

Resource Area	The Project	Alternative A	Alternative B
Transportation/ Circulation Flower Street Impacts Little Tokyo Impacts	• 3 to 4 travel lanes available on Flower Street during construction • Even with mitigation, the intersections of 4th, 5th and 6th and Flower Streets would be adversely affected during the AM peak hour. With mitigation, the resulting effect would not be adverse under NEPA.	• 2 travel lanes available on Flower Street during grouting and construction. • Longer duration of traffic lane closure due to 12 months (possibly up to 24 months) of grouting activities. • Increases and extends construction truck impacts on Little Tokyo by 15 months.	• 3 travel lanes available on Flower Street: 4th to 5th Streets; 2 travel lanes 5th to 6th Streets. • Longer duration of traffic lane closure due to 8 months (possibly 16 months) of grouting activities. • Increases and extends construction truck impacts on Little Tokyo by 7 months.
Visual Quality	• Construction staging area along the east side of Flower Street would have negative impacts on the visual quality/character that can be screened.	• Construction and grouting staging areas along east side of Flower Street would have adverse impacts on visual quality/character. • Impacts cannot be mitigated due to size of grouting and plant equipment (over 100 feet tall). • With two grouting areas, this alternative would have a more adverse effect than Alternative B.	• Construction and grouting staging areas along east side of Flower Street would have adverse impacts on visual quality/character. • Impacts cannot be mitigated due to size of grouting and plant equipment (over 100 feet tall). • With only one grouting area, this alternative would have less impact than Alternative A, but more than the Project.
Air Quality Peak daily emissions	• During construction, regional construction emissions of VOC, NO_x, and CO will be adverse, significant and unavoidable under NEPA. With mitigation, localized construction emissions will be reduced to less than significant.	• Higher emissions during construction due to use of grouting equipment. • Longer duration of construction emissions by 12 months (up to 24 months) on Flower Street; and by 15 months over the Project.	• Higher emissions during construction due to use of grouting equipment. • Longer duration of construction emissions by 7 months (up to 16 months) on Flower Street; and by 7 months in Little Tokyo over the Project. • With only one grouting area, this alternative would have less impact than Alternative A.
Climate Change MTCO2e/year	• 2017[1] GHG emissions would be 4,870.	• 2017[1] GHG emissions would be 8,040. • Higher GHG emissions than the Project due to use of grouting equipment.	• 2017[1] GHG emissions would be 4,950. • Higher GHG emissions than the Project due to use of grouting equipment. • Less GHG emissions than Alternative A due to need for only one grouting area.
Noise and Vibration Flower Street Impacts	• Noise may inadvertently exceed FTA significance criteria during construction; mitigation measures will control exceedances.	• Results in increased construction noise level over the Project due to use of grouting equipment. • Possible minor increase in vibration impacts due to TBM use further south on Flower Street.	• Results in some noise level increases over the Project due to use of grouting equipment. • Results in lower noise level than Alternative A due to need for only one grouting area.

Note: [1] Mid-point of construction.

1.0 BACKGROUND, PURPOSE AND SCOPE OF THE SEIS

1.1 Background

The Regional Connector Transit Corridor Project approval and certification of the Final Environmental Impact Statement/Environmental Impact Report (Final EIS/EIR) was the culmination of prior planning and environmental studies and projects completed in the past two decades. The Federal Transit Administration (FTA) is the federal lead agency pursuant to the National Environmental Policy Act (NEPA), with the Los Angeles County Metropolitan Transportation Authority (Metro) as the joint lead agency. The Final EIS/EIR was prepared for the Board-designated Locally Preferred Alternative (LPA known as the "Project") and was completed in February 2012, with Metro Board of Directors approval of the Project on April 26, 2012. A Record of Decision (ROD) was issued by FTA on June 29, 2012.

This Supplemental Environmental Impact Statement (SEIS) was prepared to address the Order of the United States District Court for the Central District of California in *Today's IV, Inc. vs. Federal Transit Administration et al* and *515/555 Flower Associates, LLC vs. Federal Transit Administration et al*. The Judgment and Order for Partial Injunctive Relief by the Honorable John A. Kronstadt on May 28, 2014 and September 9, 2014, respectively, require that the FTA and Metro, prepare a supplemental analysis under NEPA that addresses the feasibility of Open-Face Shield and SEM tunneling alternatives. This SEIS is intended to provide more information on the tunnel construction alternatives on Flower Street that were withdrawn from consideration, specifically Open-Face Shield and Sequential Excavation Method (SEM) tunneling for the Flower Street portion of the Regional Connector project alignment between 4th Street and the 7th Street/Metro Center Station, as required by the Judgment.

This SEIS supplements the Final EIS/EIR, pursuant to FTA NEPA implementation procedures (23 CFR 771.130), to address the court's determinations in those orders, which are discussed in further detail below (submitted pursuant to The National Environmental Policy Act of 1969, 42 U.S.C. §§ 42 U.S.C. 4321 et. seq, 23 CFR 771, and the Order re Plaintiffs' Combined Motion for Summary Judgment and Defendants' Motion and Cross-Motion for Summary Judgment, dated May 28, 2014 and Order re Plaintiff Today's IV, Inc. and 515/555 Flower Associates, LLC's Motion for Injunctive Relief, dated September 12, 2014, issued by the U.S. District Court in Today's IV. Inc. v. FTA et. al. (Today's IV), Case No. LA CV13-00378 JAK (PLAx), Japanese Village, LLC v. FTA et al. (Japanese Village), Case No. LA CV13-00396 JAK (PLAx), 515/555 Flower Assoc., LLC v. FTA (Flower Associates), Case No. LA CV00453 JAK (PLAx) and the Judgments issued on October 24, 2014 by the U.S. District Court in Today's IV and Flower Associates). This Final Supplemental Environmental Impact Statement and Supplemental Record of Decision document has been prepared pursuant to Pub. L. 114-94, 23 USC 139 (n)(2)(A) as amended by the Fixing America's Surface Transportation Act.

1.2 Purpose and Scope of this Supplemental Environmental Document

The preparation of this SEIS is consistent with 23 CFR 771.130(f) which states that a supplemental EIS may be required to address issues of limited scope, such as the extent of proposed mitigation of the evaluation of location or design variations for a limited portion of the overall project. This SEIS is a limited-scope document that provides additional detail on tunneling methods not selected for construction along Flower Street, specifically Open-Face Shield and SEM tunneling for the Flower Street portion of the Regional Connector project alignment between 4th Street and the 7th Street/Metro Center Station. The two tunneling method alternatives identified and evaluated in the SEIS propose different combinations of underground construction as options to the cut and cover method planned for the Project between south of 4th Street and south of 6th Street along Flower Street:

- Alternative A – a combination of Earth Pressure Balance Tunnel Boring Machine (EPBM), Open-Face Shield, and SEM construction methods; and with similar horizontal and vertical alignment profiles to that of the Project.
- Alternative B – a combination of EPBM and SEM construction methods with a similar horizontal alignment profile, but a lower vertical alignment profile than that of the Project.

The SEIS evaluation effort focuses on the effects of proposed construction method changes to the Flower Street segment of the Regional Connector project, as described above, and the corresponding impacts on the Mangrove portal site in Little Tokyo, which may result from the use of different combinations of underground construction along the Flower Street segment. There is no change in the location of the Project or the Project Area studied, which remains as presented in the Final EIS/EIR.

Potential effects related to the two tunnel method construction alternatives were assessed and areas with possible adverse effects were studied in the SEIS as presented in Chapter 3, Transportation and Circulation and Chapter 4, Affected Environment and Environmental Consequences. The following environmental impact areas were identified as potentially being effected by the tunneling method alternatives and were studied in the SEIS:

- Transportation and Circulation
- Visual Quality
- Air Quality
- Climate Change
- Noise and Vibration
- Geotechnical
- Energy Resources
- Historic Resources
- Environmental Justice
- Cumulative

All of the other environmental topic areas were evaluated in the Final EIS/EIR, and no additional impacts were identified as resulting from implementation of either of the tunneling method alternatives under evaluation. A Section 4(f) evaluation was documented in Chapter 5 of the Final EIS/EIR. Due to the fact there is no change in the location of the Project or the Project Area studied, which remains as presented in the Final EIS/EIR, no further Section 4(f) analysis is necessary. Therefore, a Section 4(f) section was not included in the SEIS.

1.3 Environmental Review Process

1.3.1 Public Review Period of the Draft SEIS

The Draft SEIS was distributed for public review and comment prior to the issuance of this Final SEIS. The review period for the Draft SEIS was initiated on June 12, 2015 and ended July 27, 2015. Comments were submitted during the 45-day Draft SEIS review period to FTA or Metro. FTA and Metro held two public hearings on the content and findings of the Draft SEIS. The Notice of Availability (NOA) alerted the public and interested Federal, State, tribal, regional and local government agencies of the availability of the DSEIS, and invited comment on the DSEIS. Refer to Chapter 6, Public Outreach, for detailed information on the public outreach process including noticing, newspaper ads, and public hearing information.

1.3.2 Final SEIS and Supplemental ROD

The Final SEIS includes and responds to all of the comments received during the circulation of the Draft SEIS. The responses to comments are included in Appendix J. This document is a Final SEIS and Supplemental Record of Decision (ROD) document prepared pursuant to Pub. L. 114-94, 23 USC 139 (n)(2)(A). The Supplemental ROD can be found in Appendix K. Coordination with participating and non-participating agencies was also initiated and detailed information can be found in Chapter 6, Public Outreach.

1.4 Project Schedule

The Project schedule reflected in the SEIS was based on initiation of final design and construction by the Design-Build Contractor with a Notice to Proceed (NTP) date of July 7, 2014 and a Revenue Service Date to occur in mid 2020. Implementation of either of the tunneling method alternatives studied in this SEIS would extend the total project schedule from start of construction to revenue service by a minimum of 36 months or three years over the Project's schedule. The longer schedule duration for the tunneling method alternatives is due to: 1) new pre-construction activities related to updating the engineering design and re-procuring of the construction contract; and 2) an extended construction duration due to muck removal for the tunneling alternative on Flower Street through the westbound tunnel to the Mangrove portal, which is more time-consuming than cut and cover construction. Extending the duration of muck removal from the Mangrove would also delay the construction of all station facilities, which are dependent on the completion of tunneling operations.

CHAPTER 2

Alternatives Considered

2.0 ALTERNATIVES CONSIDERED

This chapter provides the background of the Regional Connector Project (Project) and the two alternatives for tunnel construction on the Flower Street segment as directed by the U.S. District Court in the Summary Judgment Order, Order re Injunctive Relief and Judgment. The Regional Connector Project, including the Flower Street Segment evaluated in this SEIS, is illustrated in Figure 2.1-1. The Flower Street segment extends north from the existing 7th Street/Metro Center Station tail tracks structure to the south side of 4th Street. The northern limit for the Flower Street segment was identified as 4th Street as this is the location where construction of the Project and the two tunnel construction alternatives changes from tunnel boring machine to various construction techniques south to connect with the existing tail tracks structure of the 7th Street/Metro Center Station. There is no change in the location of the Project or the Project Area studied, which remains as presented in the Final Environmental Impact Statement/Environmental Impact Report (EIS/EIR).

This chapter provides a discussion of: 1) the **Project Background** with an overview of the Regional Connector Project study process, including a discussion of the alternative development and evaluation process, which resulted in the identification of the Locally Preferred Alternative (the Project), and a description of the construction methods and staging needs of the Project along the Flower Street Segment; 2) **Development of Alternatives** discussing the basis for the identification and evaluation of the tunneling method alternatives, including Flower Street segment surface and underground constraints, and the tunneling construction methods considered; and 3) **Alternatives Considered in the SEIS** providing a description of the two alternatives for tunnel construction identified as the tunneling method alternatives in this SEIS.

2.1 PROJECT BACKGROUND

This section provides an overview of the Regional Connector Project study efforts leading to the identification of the Locally Preferred Alternative (LPA) or the Project, in actions taken by the Metro Board of Directors and as documented in the ROD issued by the FTA. A description of the Project's construction methods and staging needs is provided.

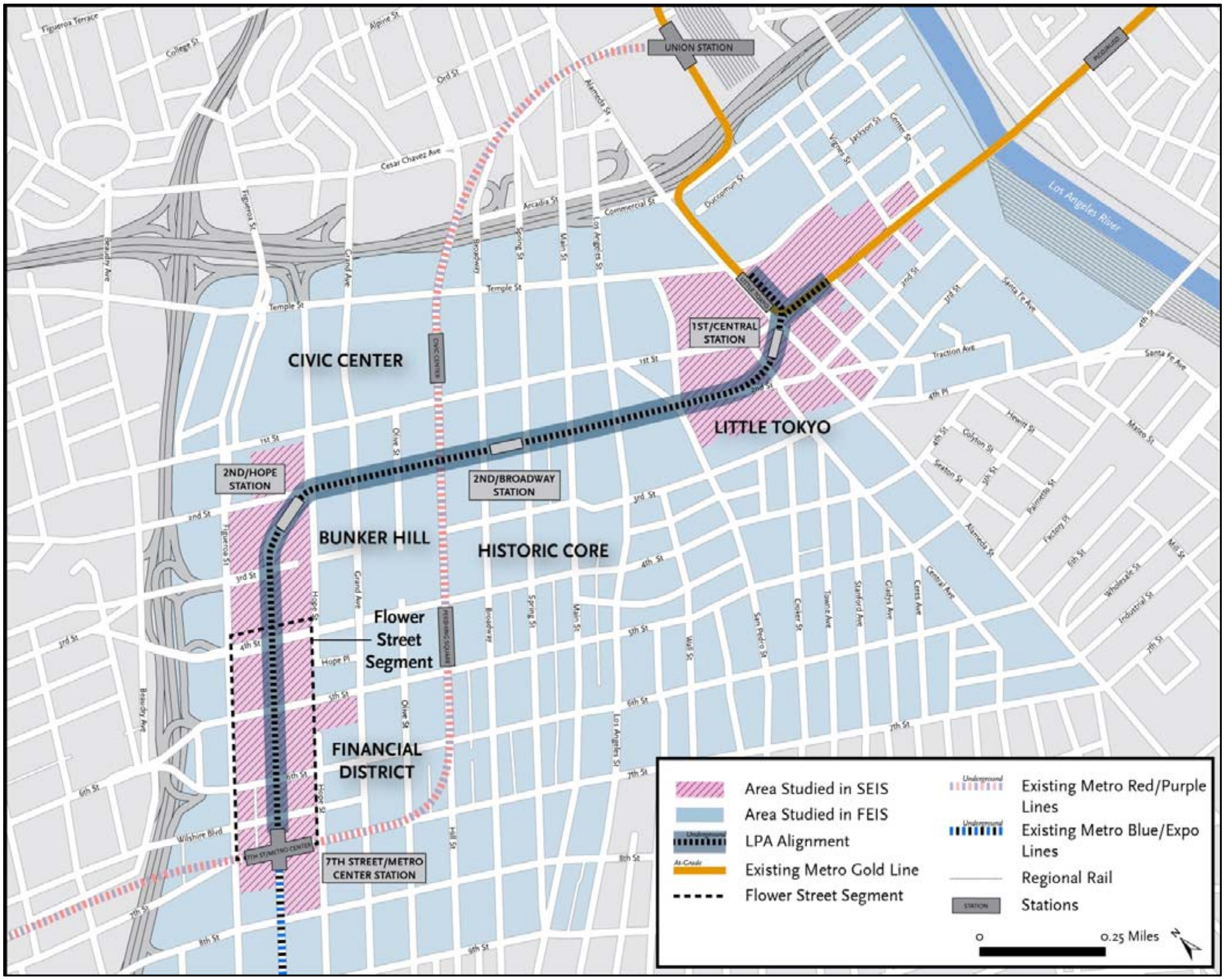
2.1.1 Efforts Leading to the Identification of the Project

Alternatives for the Regional Connector Project were identified and evaluated as documented in the *Final Alternatives Analysis Report (December 2008)*, the *Draft EIS/Environmental Impact Report (EIR) (2010)*, the *Supplemental EA/Recirculated EIR (2011),* and the *Final EIS/EIR (2012)*.

During the Alternatives Analysis (AA) study phase, an extensive outreach, research, and analytical process included the following activities:

- Comments received from community involvement activities, including meetings with stakeholders, public agencies, local jurisdictions, and the public.
- Analysis of the engineering and geographic constraints of building new infrastructure in a dense central business district.

Figure 2.1-1: Project Area from the Final EIS/EIR for the Locally Preferred Alternative



- Surveys of land use and travel patterns to determine the most ideal routes and station locations.

The AA process identified and screened 36 potential transportation alternatives in light of the project's purpose and need, goals, and objectives. The process included initial technical analyses and community and public agency feedback gathered at meetings and public workshops. Alternatives considered in the AA represented the full spectrum of reasonable means of achieving the goals and objectives of the Regional Connector project. The AA evaluated the potential alternatives based on their environmental impacts, efficiency, cost, effectiveness, and equity.

From the AA effort, the No Build, Transportation System Management, and three build light rail transit (LRT) alternatives emerged which were analyzed further in the Draft EIS and were confirmed and refined based on a unique and intense community engagement process. Based on this extensive public outreach effort, the Fully Underground LRT Alternative evolved to more adequately address the community of Little Tokyo's concerns. The Metro Board of Directors voted in February 2010 to add this alternative to the Draft EIS analysis.

On October 28, 2010, the Metro Board concurred with staff's recommendation to designate the Fully Underground LRT Alternative as the LPA, with elimination of the 5th/Flower Station, and authorized the project to proceed into the Final EIS phase. The LPA is essentially the same configuration as the Fully Underground LRT Alternative as analyzed in the Draft EIS, except that the LPA does not include the 5th/Flower Station and it has been further refined to reduce impacts. Key refinements in the Flower Street segment included creation of an enhanced pedestrian walkway along the east side of Flower Street between 4th Street and the existing 7th Street/Metro Center Station entrance. Changes were made in the Little Tokyo area, including the decision to insert the Tunnel Boring Machine (TBM) at the Mangrove property (formerly known as the Nikkei development) where it would begin excavating westward. Tunnel boring activities from the Mangrove property insertion site would allow tunneling to proceed farther down Flower Street to 4th Street instead of ending at the proposed 2nd/Hope Station.

Metro published a Supplemental Environmental Assessment (EA) document to formally introduce refinements made to the LPA (the Project) after the publication of the Draft EIS in July 2011. The Supplemental EA was recirculated through a 45-day comment period from July 22, 2011 to September 6, 2011. The preparation of the Final EIS/EIR was completed in January 2012, and the Metro Board of Directors approved the Project on April 26, 2012 with a ROD issued by the FTA on June 29, 2012.

2.1.2 Construction Methods of the Project

As discussed in the Final EIS/EIR, the Flower Street segment of the Project would be constructed with a combination of cut and cover and a tunneling method known as earth pressure balance tunnel boring machine (EPBM) method as summarized below and illustrated in Figure 2.1-2:

- 2nd/Hope Station to 4th Street – EPBM construction would be used to bore a single tunnel south to 4th Street where a reception pit would allow for the extraction of the EPBM for reuse on the second parallel tunnel drive. The use of EPBM tunneling was identified as the most viable tunneling method given the unique underground conditions along this portion of the alignment, discussed in detail below, and to be in conformance with Metro tunneling policies. The depth of the tunnel was designed to avoid conflicts with abandoned construction tie-backs and adverse impacts to the existing 4th Street Bridge foundations, to accommodate a future 5th/Flower Station, and to provide sufficient ground cover over the tunnel at the reception pit south of 4th Street. Retrieval of the EPBM would be through a reception pit that would be backfilled as part of cut and cover tunnel construction project completion activities.
- 4th Street to the 7th Street/Metro Center Station Tail Tracks – This section of the Flower Street alignment would be built with the cut and cover construction method, which would require the relocation of utilities and the installation of soldier piles to create the required alignment structure box in Flower Street from 4th to 6th Street. Excavation of the top portion of the street and provision of a temporary concrete decking system between the solider piles would

occur in a phased approach to minimize impacts to Flower Street traffic by allowing a minimum of three traffic lanes to remain open during the day time period.

2.1.3 Construction Staging for the Project

During construction, the Project, similar to any tunneling project, would require construction staging areas for:

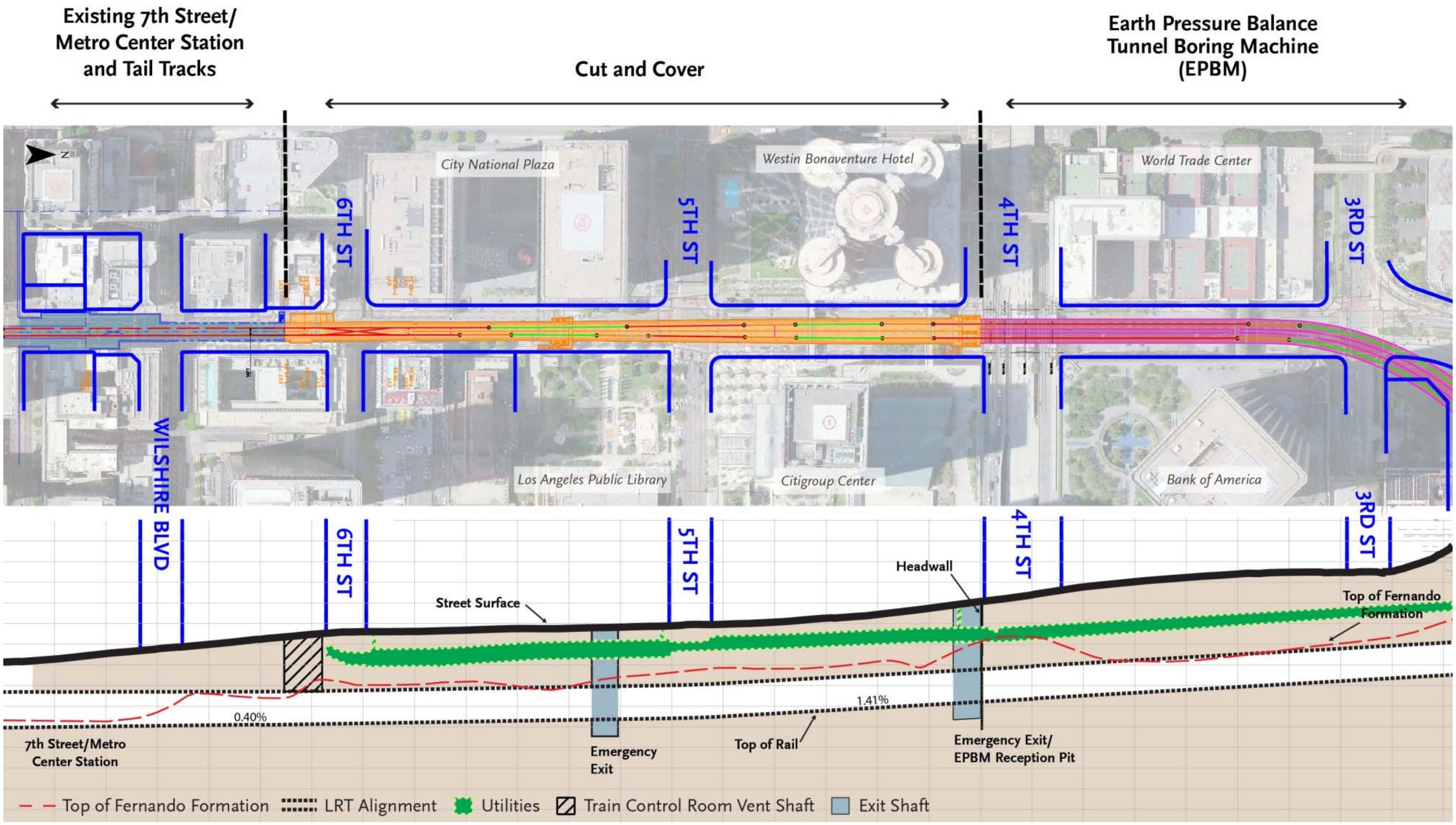
- Equipment assembly and storage
- Construction materials delivery and storage
- Materials production
- Dewatering activities
- Construction worker parking
- Access roads
- Temporary trailer offices
- Demolition staging
- Removal of excavated materials, including truck staging areas
- Other related construction activities.

Construction staging areas are temporary as they would only be required during duration of construction activities, which is estimated to be 37 months on Flower Street and 38 months in Little Tokyo for the Project. Staging areas would be located either within the street right-of-way or in off-street locations. As documented in the Final EIS/EIR, construction staging activities in the Flower Street segment from 4th and 6th Streets would be accommodated through temporary two lane traffic lane closures for the duration of construction as illustrated in Figure 2.1-3, with some additional short-term closures for specific construction activities, such as for solder pile efforts for cut and cover construction. Street detours and closures would be coordinated with the Los Angeles Department of Transportation (LADOT).

During construction of the Project, removal of tunneling material excavated in this segment would be handled from the construction staging areas along Flower Street, while tunnel boring spoils would be transported back along the alignment within the newly constructed tunnels and removed at the Mangrove site (former Nikkei site) located at the northeast corner of 1st and Alameda Streets in Little Tokyo. As illustrated in Figure 2.1-3, the Project would use two locations within the cut and cover excavation area along the eastern side of Flower Street to remove excavation materials and allow access to construction activities under the temporary concrete decking:

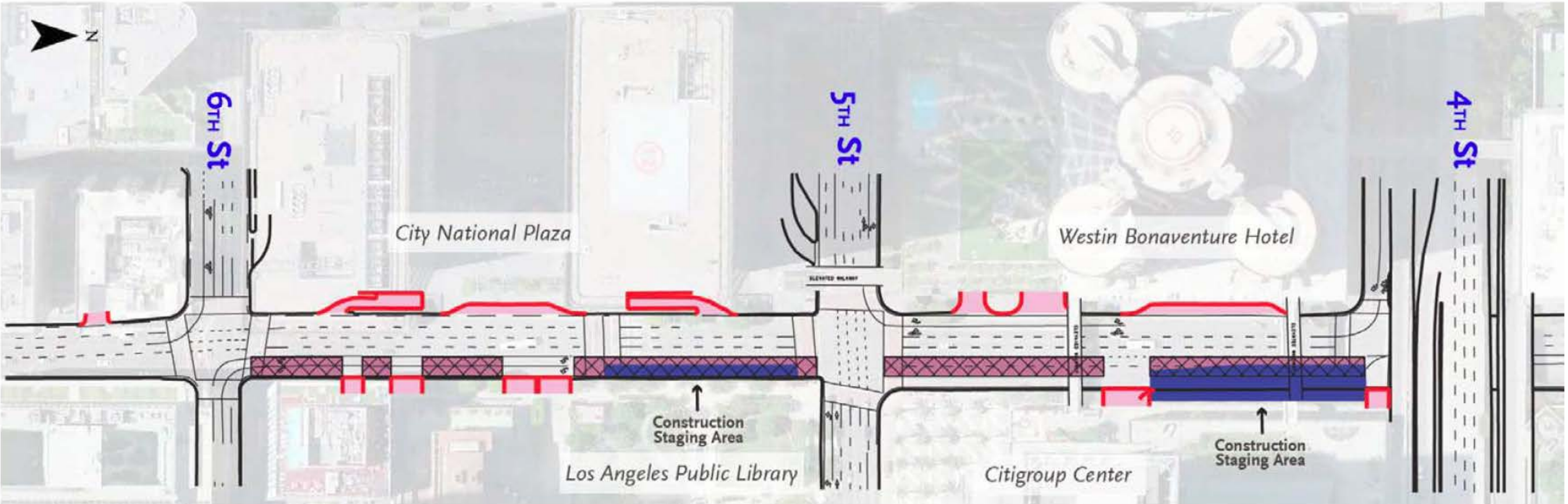
- Location 1: On Flower Street, just south of 4th Street; and
- Location 2: On Flower Street, just south of 5th Street.

Figure 2.1-2: Flower Street Segment Construction Methods of the Project



Metro

Figure 2.1-3: The Project – Construction Staging Areas



LEGEND

- 2-Lane closure for duration of construction
- Existing Driveways
- Underground Construction Access Locations

2.2 DEVELOPMENT OF ALTERNATIVES

This section presents the basis for identifying and evaluating the tunneling method alternatives in the SEIS. It includes a discussion of the Flower Street segment surface and underground constraints, Metro Rail Design Criteria (MRDC), and the tunneling construction methods that shaped the Project and the tunneling method alternatives. This section's discussion draws on and reflects the *Final Flower Street Tunneling Method Alternatives Report (2015)* (Appendix A) prepared to document engineering and construction study efforts to identify and evaluate viable tunneling method options. This effort resulted in the identification of two possible tunneling method alternatives for further evaluation. The alternatives presented in the following section of this chapter, Alternatives A and B, are the same as Alternatives A and B discussed in the tunneling method alternatives report.

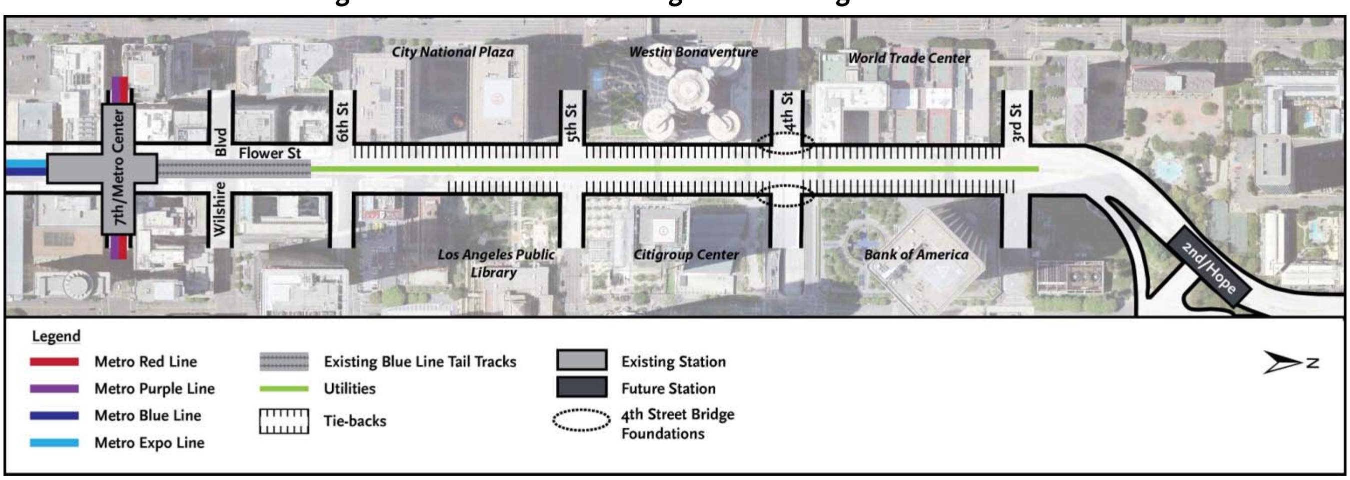
Alternatives A and B propose different combinations of underground construction methods as alternatives to the cut and cover method planned for the Project along Flower Street between 4th Street and 7th Street:

- Alternative A considers an open-face tunnel shield to construct a portion of the tunnels from 4th Street south to approximately 5th street followed by SEM construction of the balance of the tunnels and double crossover to the existing 7th/Street Metro Center Station.
- Alternative B considers extending EPBM tunneling on a lower alignment to avoid tie-backs from 4th Street south to approximately 5th Street followed by SEM construction of the balance of the tunnels and double crossover to the existing 7th/Street Metro Center Station.

2.2.1 Flower Street Existing Conditions

There are a significant number of surface and underground constraints combined with the requirements of the MRDC and desired future operations of the Regional Connector Project that have framed the design and construction of the Flower Street section, as illustrated in Figure 2.2-1.

Figure 2.2-1: Flower Street Segment Existing Conditions



2.2.1.1 Flower Street Segment Surface Context and Constraints

Flower Street has surface constraints to future subway construction which includes possible impacts to vehicular, bus, and shuttle traffic, impacts to pedestrian and bicycle circulation, and restricted access to off-street parking and adjacent properties. Flower Street is a one-way southbound major arterial ranging in width from five lanes between 3rd and 6th Streets to four lanes south of 6th Street. The street is heavily used by cars, local delivery trucks, buses, shuttles, and bicycles without a designated bike lane. There is heavy pedestrian activity on the sidewalks on both sides of the street, which is heaviest on weekdays with growing activity on weekends due to increasing numbers of residents and visitors.

Flower Street is lined with a diverse land use mix including high and mid-rise buildings consisting of commercial, office, hotel, and residential properties. Some of the specific properties include the Citigroup Center and Bank of America along the east side of the street, and the City National Plaza and World Trade Center on the west side; mid-rise office buildings converted to residential uses; the Standard Hotel and Westin Bonaventure Hotel; the California Club and Maguire Gardens; and the Los Angeles Central Library garage.

2.2.1.2 Flower Street Underground Context and Constraints

There are significant underground constraints which pose challenges to the design and construction of the future rail tunnel on the Flower Street segment of the Regional Connector Project. These constraints include: 1) connecting with the existing narrow, shallow rectangular tail tracks structure of the 7th Street/Metro Center Station; 2) numerous abandoned underground tie-backs (used to support the excavation of building foundations) extending into the path of the future rail tunnel from adjacent building foundations along both sides of Flower Street south of 3rd Street; 3) unstable soil conditions; 4) many utilities; and 5) the 4th Street Bridge foundations which restrict the location of a future rail tunnel to a narrow vertical and horizontal corridor between the foundation piers.

Metro Rail Design Criteria (MRDC) has been developed and documented to reduce construction risks and to ensure the design and construction of rail system projects will meet Metro's long-term operational requirements. For the Flower Street segment of the Regional Connector project, MRDC criteria were used to design the Project and to evaluate the two tunneling method alternatives. In addition to the very constrained physical setting noted above, the design of the Project and two tunnel alternatives included rail transit operational considerations to address: 1) the alignment and grade of the connection with the existing 7th Street/Metro Center Station; 2) provisions for a new track crossover; 3) accommodation of a future 5th/Flower Station; and 4) design of the vertical alignment to facilitate the final operational speed of this vital central regional segment in the Metro light rail transit (LRT) system which will carry more trains than any other rail segment in Los Angeles. Changes to the vertical alignment will have potential impacts to the depth of the 2nd/Hope Station.

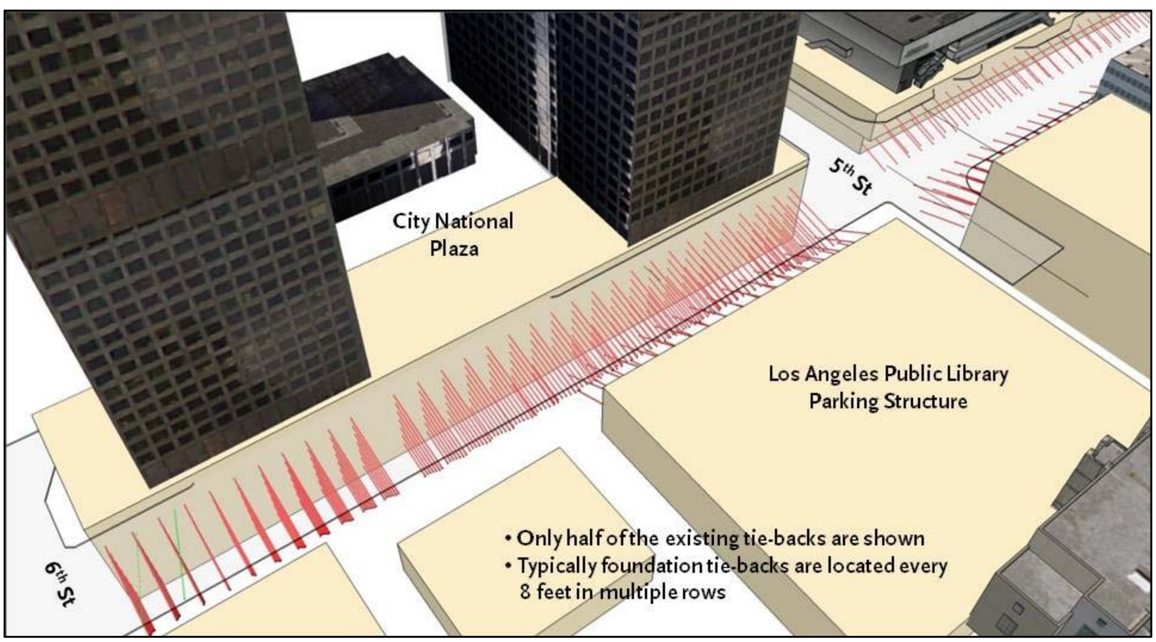
Connection to Existing 7th Street/Metro Center Station

In the Flower Street segment, the Regional Connector project alignment will connect with and operate from the existing 7th Street/Metro Center Station tail tracks structure located just north of the station's side loading platforms. Any tunneling connection must be designed to consider the fit with the geometry and size of the tail tracks structure as well as the alignment gradient required to ensure a smooth operational connection. In addition, a new double track crossover will be necessary north of the existing tail tracks as the Regional Connector project is a trunk system which will accommodate a significant number of LRT system trains. As identified in the MRDC, this new double crossover with No. 10 turnouts will provide operational flexibility during single-track operations, such as when one track is required to store a disabled train.

Tie-Backs

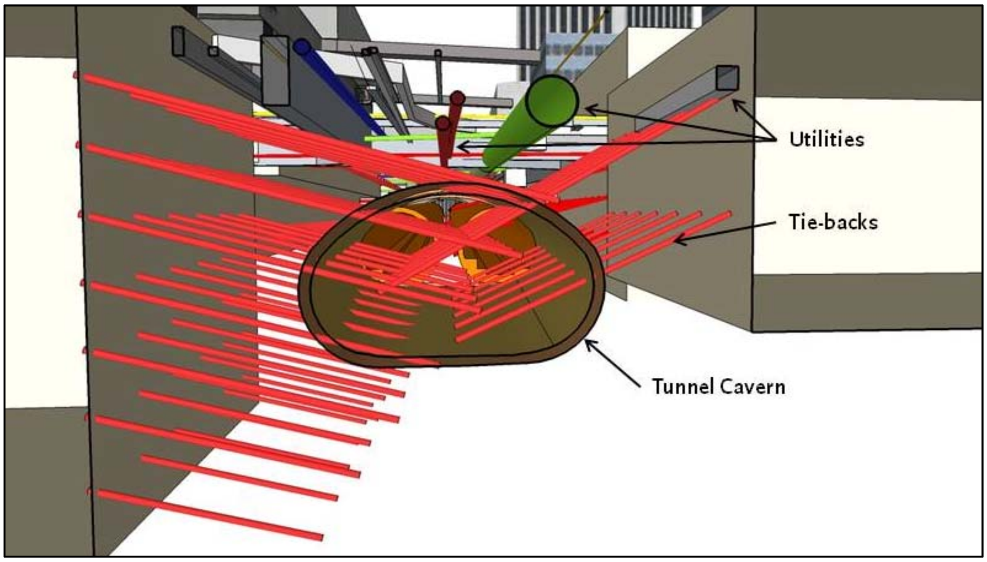
Tie-backs consisting of steel bars or cables grouted in the ground were used to laterally support the excavations for and construction of parking and building foundations for the Los Angeles Central Library garage, the Citigroup Center, and Bank of America along the east side of Flower Street, and the City National Plaza, Westin Bonaventure Hotel, and World Trade Center on the west side as shown in Figures 2.2-1, 2.2-2, and 2.2-3. Following industry practice, these tie-backs were abandoned within the street after construction was complete but it is uncertain if the tie-backs were de-tensioned. Along Flower Street, steel tie-backs are typically located every six to eight feet, and range in size from 30 to 90 feet in length, and extend below ground at a 15 to 45 degree angle across the width of the street right-of-way from both sides. There are multiple rows consisting of hundreds of tie-backs forming a “mesh” that are located within the Flower Street segment tunnel alignment, particularly south of 4th Street and with an even higher density south of 5th Street.

Figure 2.2-2: Overview of Flower Street Tie-back Locations



These tie-backs pose a major obstruction to tunnel construction under Flower Street, particularly for tunnel boring machines whose cutter heads could become entangled with the steel and cable tie-backs. Any construction method used on Flower Street must address removal of tie-backs by torch cutting or avoidance through a deeper alignment. Tie-backs pose another risk to tunneling activities as many of the existing tie-backs were installed when quality control of hole drilling and concreting was not as well-developed as it is today, and the tie-backs may become pathways for surface or groundwater to flow into the tunnels or excavation areas. During tunneling, groundwater flow along the edge of the tie-back can erode the surrounding soil resulting in potentially large amounts of soil and water flowing into the tunnel. If uncontrolled, this can progressively lead to ground settlement, which if allowed to continue can create a sinkhole at the ground surface.

Figure 2.2-3: Flower Street Segment Cross Section at Tunnel Cavern before Transition to Twin Tunnels (South of 5th Street) showing Tie-backs



Ground Conditions

The geologic conditions include the presence of groundwater, unstable soils, a challenging geologic interface between different soil or rock strata (mixed face), and hazardous gases. A description of these conditions and the challenges they pose to tunneling are presented below.

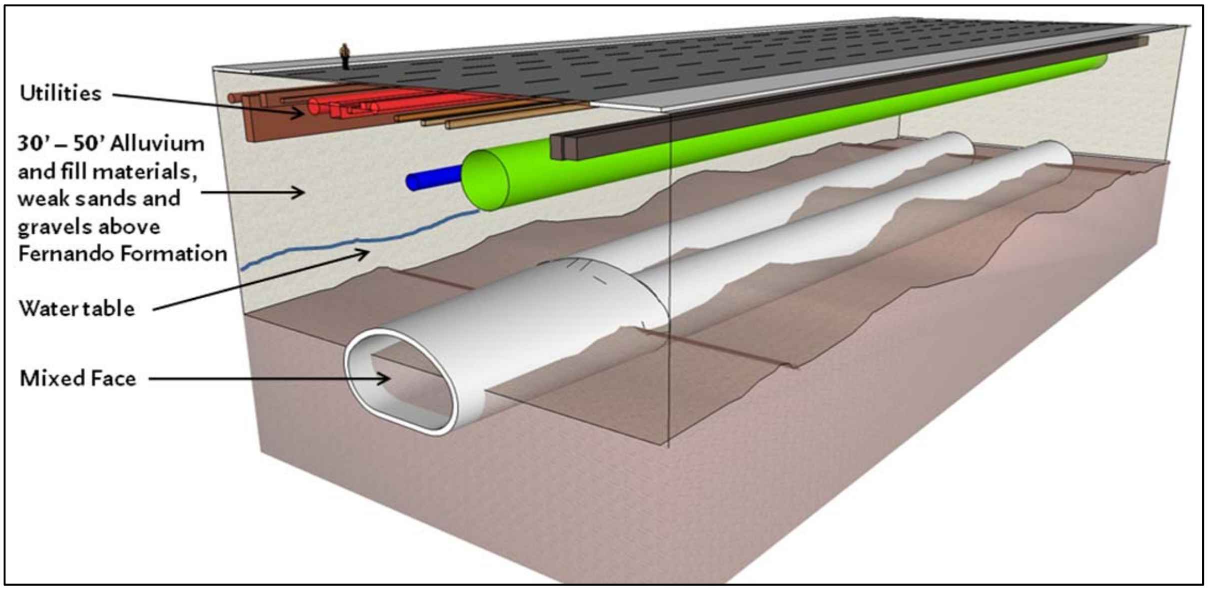
Before development of downtown Los Angeles, Flower Street served as a natural drainage path which became a stream during rainfall with seasonal variations of groundwater below ground. Today, development has affected groundwater flow due to cuts and fills altering the street's topography, the leveling and paving of streets, and constructing of buildings with deep parking structures. Groundwater is anticipated to follow the historic underground water course and pose problems for the stability of open-face tunnel excavations. Borings made for building sites along Flower Street between 5th and 7th Streets have encountered groundwater seepage at relatively shallow depths ranging from 15 to 35 feet, which is close to or within the proposed tunnel envelope. Groundwater within the lower portion of the alluvial deposits, most likely perched above the Fernando Foundation, has been reported at depths of 18 to 27 feet adjacent to Flower Street between 2nd and 5th Streets.

Ground conditions under Flower Street consist of fill and alluvial soils overlaying the Fernando Formation found at approximately 40 feet below ground surface, as shown in Figure 2.2-4:

- The fill is a combination of gravel, sand, silt, and clay mixed with construction debris. The depth of fill material varies along Flower Street.
- The water-bearing alluvial deposit consists of interlayered silty clays, sandy silts, clayey sands, and silty sands, with some sand layers containing variable gravel and cobbles.

- The Fernando Formation is primarily comprised of weak to very weak siltstone/claystone.

Figure 2.2-4: Flower Street Segment Ground Conditions



The Fernando Formation is comprised of a "weak" to "very weak" mix of siltstone and claystone which is a qualitative statement about its relative strength to support tunneling based on its unconfined compressive strength and the rock strength category of the International Society of Rock Mechanics (1978). The siltstone and claystone are weakly cemented or held together, which does not provide a strong condition for tunneling with an unsupported face, especially near the interface between the fill and alluvial soils and the Fernando Formation.

The geologic interface where the alluvial soils meet the Fernando Formation is a recognized geologic tunneling hazard. If the tunnel is located fully below the geologic interface, and there is adequate depth in the Fernando Formation (one tunnel diameter or approximately 22 feet) between the top of the tunnel and interface, tunneling risks are reduced. High tunneling risks occur when the geologic interface is located just above the tunnel, or within the face ("mixed face") of the tunnel being excavated.

When tunneling through weak rocks, the "stand-up" time, or the time the rock could accommodate an unsupported tunnel face, would not be long enough to avoid a collapse and ground loss resulting in tunnel failure without ground stabilization. Ideal tunneling conditions are competent ground void of water without any mixed-face conditions or obstructions with good "standup" time that accommodates an unsupported mining face for several hours without the risk of ground loss and resultant settlement. The existing top layer of alluvium, fill materials, sands, and gravels is unstable and not suitable for tunneling purposes without significant ground stabilization efforts as discussed below in Section 2.2.3.5. Even with extensive ground stabilization, such as grouting, total ground stability is not assured given the geologic conditions along Flower Street.

The major ground condition hazard on Flower Street is the alluvial materials running in an uncontrolled flow into the tunnel, and with the presence of groundwater, that risk is increased.

Typically these risks are mitigated by either modifying the soft ground using grouting techniques to create ground conditions that inhibit water flow or through the use of pressurized-face (closed-face) TBMs, which can safely deal with such conditions with limited risk of ground loss.

In the past, both sides of the current I-110 Freeway were lined with oil wells. Today, construction still encounters methane and hydrogen sulfide (H2S), with recent methane gas occurrences observed during construction of the Wilshire Grand Plaza located at Figueroa and 7th Streets one block west of the Flower Street alignment. Several sections of the project tunnels will be constructed through Methane Buffer Zones; and Cal/OSHA has classified all of the underground construction for the Regional Connector as "potentially gassy." Metro requires specific designs and tunneling methods where gassy conditions are present including the use of pressurized face tunnel boring machines and the installation of double-gasketed segmental precast tunnel lining to prevent methane from entering the tunnels.

The aforementioned geologic conditions on Flower Street can contribute to ground instability, ground loss, and settlement if not addressed by the construction method including cut-and-cover or tunneling with ground stabilization techniques, such as grouting, to reduce the risks. Even with grouting, total ground stability during tunneling is not assured given the geologic conditions along Flower Street.

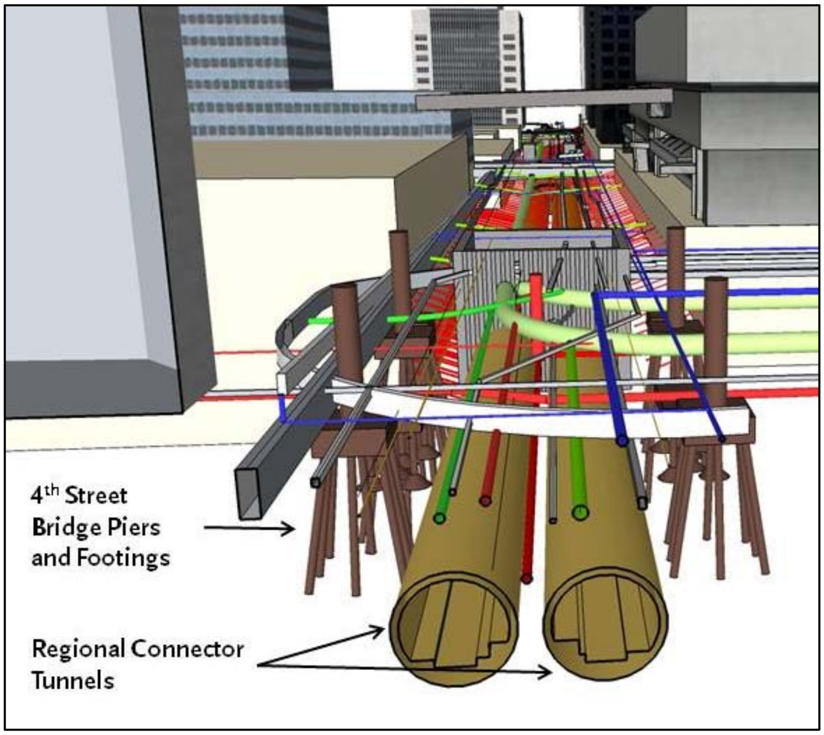
Utilities

Construction of underground stations and guideway tunnel structures would result in impacts to existing utilities located under Flower Street. The utilities include gas, electricity, water, sewer, communication lines, and storm drains. The storm drains range in size up to an 84-inch diameter reinforced concrete pipe approximately 18 feet below the ground surface. Utility relocation will be required as part of the project for impacted utilities, regardless of the construction technique. Impact mitigation to existing utilities is typically provided by relocating and/or protecting the utilities in place. For the Project, utilities would be protected by hanging them underneath the street decking system provided in the cut and cover sections on Flower Street with construction occurring below the utilities. The exception is those utilities that are in conflict with installation of the street decking and support of excavation structures. For the other identified tunneling methods, such as the use of tunnel boring machines, utility relocation would be necessary for utilities that are located within a three to four foot zone known as the "support of excavation system corridor" around the tunnel. As discussed below in Section 2.2.3, tunneling methods other than cut and cover in the Flower Street segment have been identified as requiring ground stabilization due to poor ground conditions as discussed above and illustrated in Figure 2.2-4. The recommended ground stabilization technique is high-pressure grouting to stabilize ground conditions to enable tunneling.

4th Street Bridge Foundations

The 4th Street Bridge crosses Flower Street at a raised elevation to connect the west side of downtown with the higher Bunker Hill area to the east. The bridge is built on four sets of bridge piers located on either side of Flower Street with foundations that extend 64 feet below the surface on the west side and 83 feet below on the east side as shown in Figure 2.2-5. These foundations include piles that are "battered" or slanted at approximately 10 degrees from the vertical. Any tunnel located in this portion of Flower Street must "thread the needle" between these piers, or use a deeper alignment to avoid impacting the piers.

Figure 2.2-5: Flower Street Segment: 4th Street Bridge Foundations Looking South from 3rd Street



Future 5th/Flower Station

While the 5th/Flower Station is not included in the funded Regional Connector project, the Flower Street segment is required by action of the Metro Board of Directors to be designed and constructed so as not to preclude a future 5th/Flower Station. This station would be constructed between 4th and 5th Streets under Flower Street. Based on the MRDC, the future station should be built on a 370-foot long tangent alignment with a maximum vertical grade of one percent. The Project alignment using cut and cover construction allows for the construction of a station in the future. The ability of each of the tunneling alternatives to accommodate a future 5th/Flower Station is discussed in Section 2.3 of this chapter.

2nd/Hope Station

The Flower Street portion of the Regional Connector project has the challenge of connecting at one end with the existing and relatively shallow 7th Street/Metro Center Station tail tracks structure (42 feet from the surface to top of rail) and at the other end with the future 2nd/Hope Station located under Bunker Hill at a depth of 96 feet from top of rail (TOR) to the ground surface. This proposed station depth is due to the significant elevation variation from Flower Street to the higher Bunker Hill area where the 2nd/Hope Station is located. As the TOR elevation is fixed at the existing station and tail tracks, any modification to the project's vertical alignment depth along Flower Street, such as proposing a deeper alignment to avoid conflicts with the hundreds of tie-backs located under the street, may impact the elevation of the future 2nd/Hope Station. A deeper alignment along Flower Street would require shifting the 2nd/Hope Station even deeper resulting in higher risks associated with the construction of a deeper station.

2.2.2 Little Tokyo

Any changes to tunneling methods on Flower Street would have impacts in the Little Tokyo area. A deeper tunnel alignment to avoid tie backs in order to tunnel further under Flower Street than proposed in the Project would increase the amount of tunnel excavation materials to be handled through the tunnel portal at the Mangrove site in Little Tokyo. Under the Project, 81 percent of the tunnel excavation materials from construction of the Flower Street segment would be handled on Flower Street and 19 percent through the Mangrove site. Any reduction in cut and cover construction and the related reduction in the handling of the excavation materials along the Flower Street segment would increase the quantity of tunnel muck excavation materials at the Mangrove site in Little Tokyo.

2.2.3 Tunnel Construction Methods

This section provides an overview of tunnel construction methods considered for the Flower Street portion of the Regional Connector, both through the AA/DEIS/FEIS process described in Section 2.1.1 and for this SEIS as documented and supported in the *Final Flower Street Tunneling Method Alternatives Report (2015)* (Appendix A). This report documented engineering and construction evaluation efforts to identify viable tunneling method options if possible to the planned cut and cover construction, and resulted in the identification of two possible construction method alternatives for further evaluation in this SEIS. As discussed below, the alternative construction methods considered include: earth pressure balance pressurized face tunneling, sequential excavation method, and open-face shield tunneling. Ground improvement techniques required to support implementation of the proposed tunneling alternatives are also discussed.

2.2.3.1 Cut and Cover Method

Cut and cover is a tunneling excavation method in which a concrete deck is installed over the underground construction site to minimize disruption to surface street operations, while allowing for construction activities to occur below. The excavation support system provides temporary support for the adjacent ground while the permanent cast-in-place concrete structures are constructed. The deck is then removed and the excavation is backfilled and the street is restored. This construction method involves a sequence of five activities illustrated in Figure 2.2-6. Cut and cover has been successfully used on past Metro rail projects, where the excavation support system of braced soldier pile and lagging minimized settlement and accommodated surface traffic operations and underground utility requirements. This construction technique is relatively unaffected by the variations and uncertainty related to the presence of man-made and natural obstructions and geologic conditions, such as those that exist along Flower Street.

Key benefits of this method for the Flower Street segment is that it allows for the easy removal (cut in place) of tie-backs as they are encountered during excavation, and that the support system can be revised to adapt to unforeseen underground conditions. Given the challenging geologic conditions in this segment, including perched groundwater and a geologic strata consisting of fill and alluvium over "weak rock," can be managed based on past cut and cover construction experience in downtown Los Angeles. The presence of weak rock, which is generally stiffer than the alluvium, provides for positive conditions for excavation stability with the soldier piles drilled into the relatively stiff Fernando Formation.

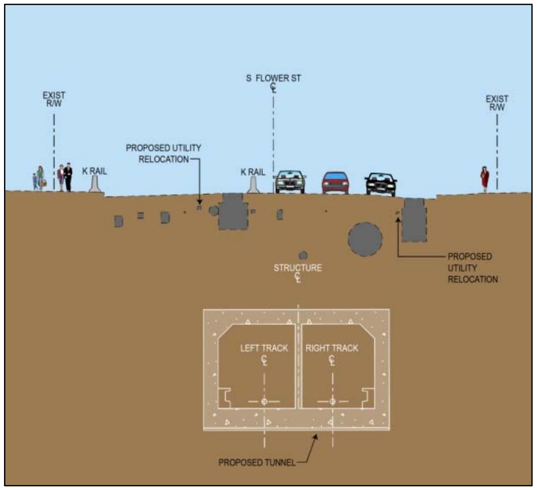
As this method has been used successfully for construction of all of the underground transit stations and major modern buildings in downtown Los Angeles, cut and cover was identified as the preferred construction method for the Flower Street segment of the Project north from the 7th Street/Metro Center Station tail tracks structure to the southern side of 4th Street, where tunnel construction would shift to the use of an EPBM tunnel boring machine. Small segments of the tunneling method alternatives studied in this SEIS also would be constructed with the cut and cover method, including shafts for tunnel boring machine retrieval, emergency exits, and a train control room.

2.2.3.2 Earth Pressure Balance Tunnel Boring Machine Method

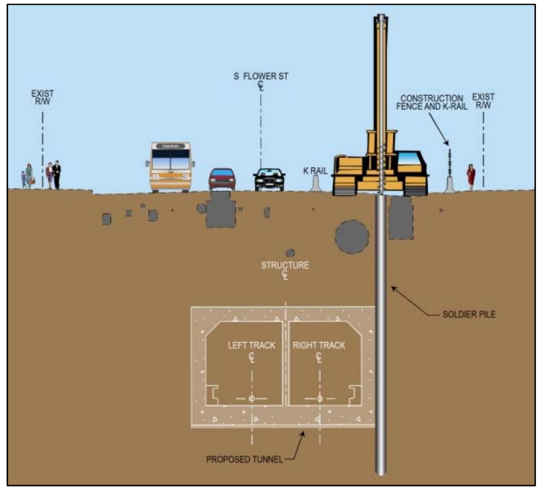
Earth pressure balance tunnel boring machines, commonly known as EPBMs, are one type of a pressurized face tunnel boring machine. EPBM refers to a pressurized closed-face TBM with the ability to apply pressure in the cutterhead chamber that is equal to the pressure of the ground being excavated by the rotating cutterhead located at the front of the machine as shown in Figure 2.2-7. The cylindrical shield behind the cutterhead is sealed and provides ground support accommodating safe installation of the tunnel lining. The soil excavated by the cutterhead is removed as a semi-solid in muck cars by rail or a conveyor as shown in Figure 2.2-8. EPBMs are most suitable for tunneling through soft soil and weak rock. They are the preferred type of tunnel boring machine for tunneling in the Los Angeles area due to past experience.

Pressurized face tunnel boring machines became the tunneling method of choice for underground rail projects in the Los Angeles area following the Metro Red Line construction experience with open-face tunneling, which resulted in excessive settlement on Hollywood Boulevard. Based on the recommendations of a specially convened Metro Tunnel Advisory Panel in 1995 the Metro Board instituted the policy to reduce or avoid construction risk of excessive settlement resulting from use of open-face tunnel shields by requiring pressurized-face (EPBM) tunneling. Since then, pressurized closed-face TBMs, and specifically EPBMs, have been used successfully for Metro Projects, such as the Metro Gold Line Eastside Extension project.

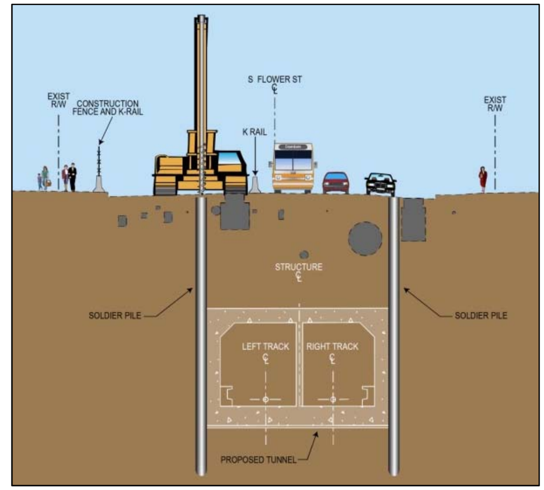
Figure 2.2-6: Cut and Cover Construction Method Stages



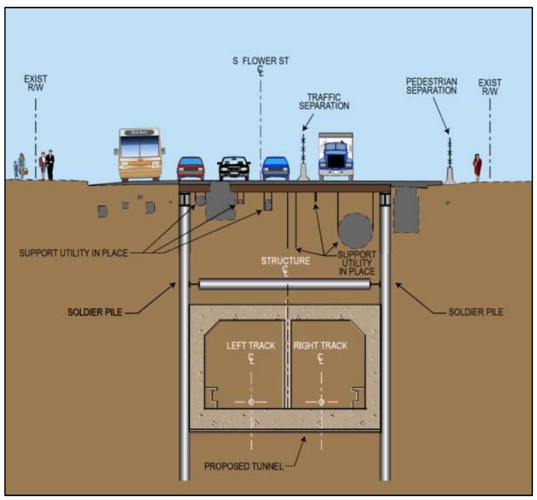
STAGE 1: Relocate Utilities



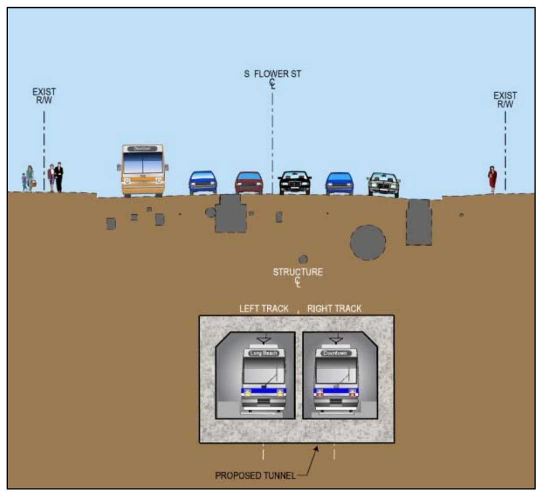
STAGE 2: Install soldier piles and construction shoring system



STAGE 3: Complete shoring system and excavate down from ground surface

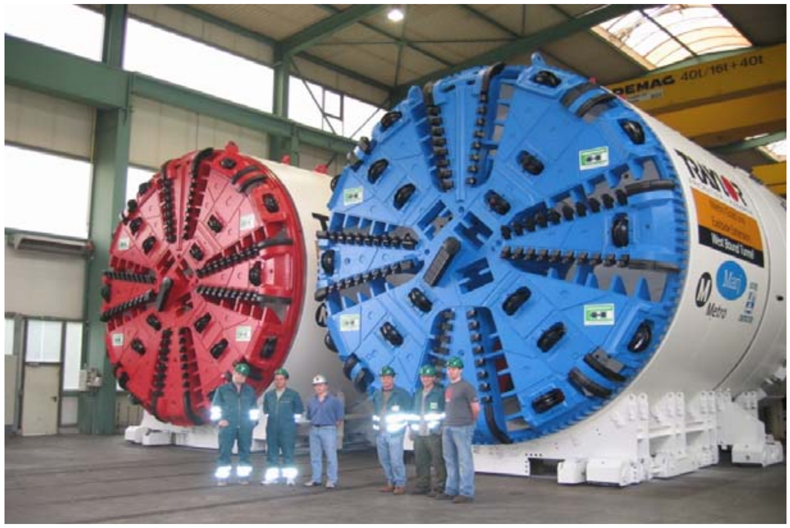


STAGE 4: Place a temporary concrete deck over excavated area and construct rail tunnel



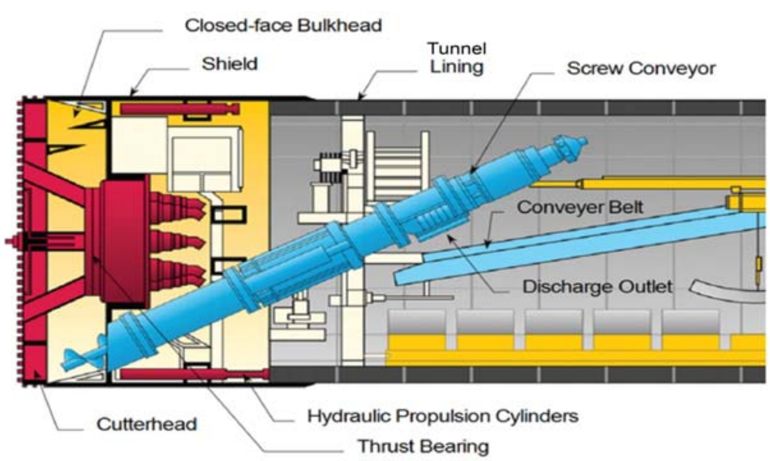
STAGE 5: Backfill and restore surface once tunnel box is complete

Figure 2.2-7: EPBMs Used for Construction of Los Angeles Eastside LRT Tunnels



The primary risk to the use of EPBMs under Flower Street is the presence of the many tie-backs. These represent a hazard to closed-face tunneling as the cutterhead is not capable of "chewing-up" or otherwise processing the steel tie-backs. If tie-backs were to become entangled with the cutterhead, the entangled and displaced tie-backs could disturb surrounding soils causing raveling of the adjacent ground resulting in settlement beneath utilities, roadway surfaces, and adjacent structures. To remove tie-backs in advance of the EPBM requires a very hazardous and time consuming process working through the spokes of the cutterhead or ahead of the cutterhead to manually cut and remove the tie-backs. For the Project, the overall risk in encountering the numerous tie-backs along Flower Street will be reduced through the recommended use of cut and cover construction south from 4th Street with EPBM tunneling only north of this location where tie-back locations are minimal and fairly well known.

Figure 2.2-8: Cross-section of Typical EPBM



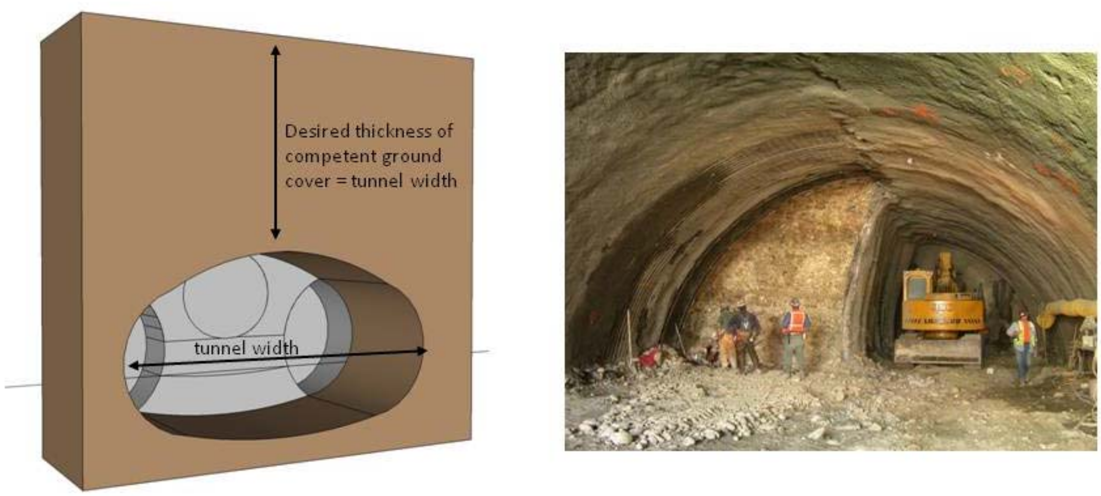
For the Project, EPBM tunneling has been recommended for use along Flower Street between the south side of 4th Street north to the 2nd/Hope Station with the provision that limited number of tie-backs are identified and removed in advance of tunneling by excavating tie-back removal pits with cut and cover techniques to remove the tie-backs within the tunnel corridor.

The two tunneling method alternatives studied in the SEIS assume that tunneling from Little Tokyo to the 4th and Flower Street intersection would be constructed as defined in the Project using EPBMs. Alternative B evaluates the extension of EPBM tunneling activities further south to the south side of 5th Street.

2.2.3.3 Sequential Excavation Method

Sequential Excavation Method (SEM) is a tunnel mining method that involves a sequence of excavation and installation of initial ground support systems, shown in Figure 2.2-9. In soft ground conditions, it typically uses conventional excavation equipment, such as excavators or roadheaders, together with an initial ground support system including lattice girders and sprayed-on concrete (shotcrete). SEM was considered for the Flower Street portion of the Project, but was identified as having a high risk for creating possible ground collapse and settlement conditions due to the shallow tunnel cover and unstable soil conditions. It is preferable to use SEM in deep tunnel alignments with adequate ground cover and favorable ground conditions not requiring extensive ground stabilization, such as through the use of grouting.

Figure 2.2-9: SEM Construction Technique



Industry practice: Ground cover should be no less than the width of the tunnel excavation.

Small tunnel sections are excavated and temporarily supported in a specific sequence.

SEM risk is reduced with a layer of competent ground cover above the tunnel equal to or greater than the width of the tunnel. Less cover increases the risk of ground settlement and large ground loss, and requires the use of extensive pre-support and ground stabilization efforts. If used on Flower Street, the SEM excavation would be approximately 60 feet in width to accommodate the two track system and double crossover. An SEM excavation of this size would require a suitable ground cover of 60 feet or more. Due to the alignment and grade constraints, an SEM tunnel on Flower Street would only have approximately 20 feet or less of poor soil cover. The low cover combined with ground water and gas conditions and a close proximity to utilities result in a high risk for excessive ground settlement, subsidence, or collapse. In addition, SEM relies upon the natural arching effect of the ground, and minimal arching is anticipated under Flower Street due to low ground cover, poor ground, and existing utilities. Use of SEM would require extensive use of ground stabilization, such as grouting discussed below. Even with grouting, total ground stabilization is not assured given the geologic conditions along Flower Street, and the high risk for ground settlement would remain.

While tie-backs, shown in Figure 2.2-10, would be directly removed from the tunnel face under SEM, the absence of a tunnel shield, which stabilizes the soil, increases the risk of creating unstable conditions where mixed-face conditions are present, as they are along Flower Street. Tie-backs can act as conduits for water to enter tunnel excavations, and may block effective grouting efforts.

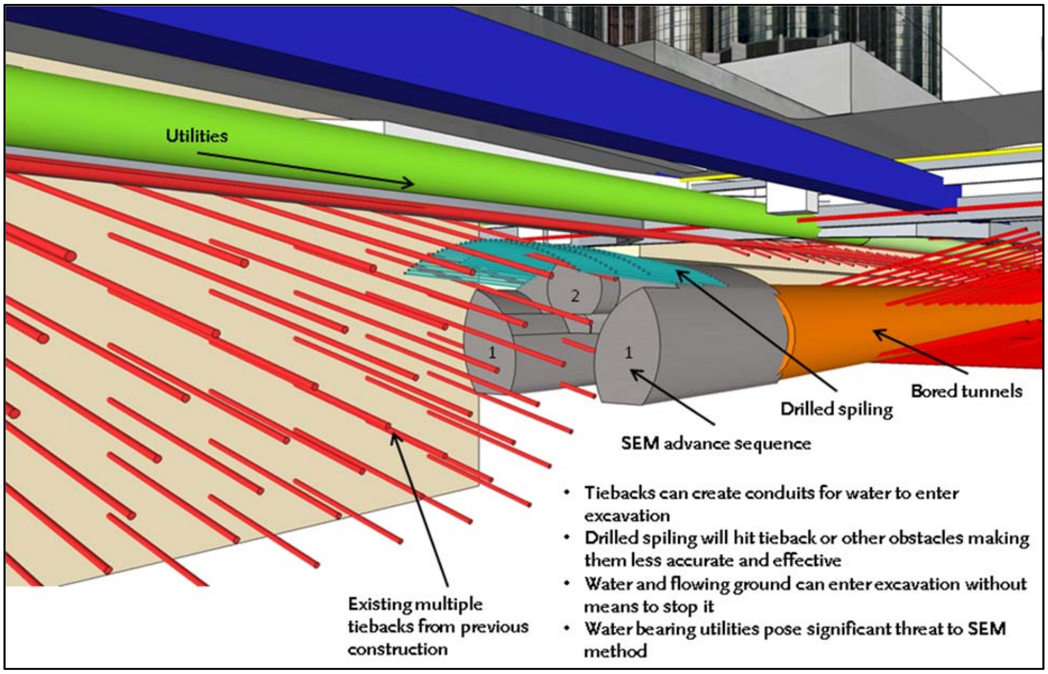
For the Project, SEM has been recommended for use in portions of the project alignment with stronger soil conditions and for smaller spaces, such as cross passages. Use of SEM has been identified and evaluated for construction of the two tunneling method alternatives in the portion of the Flower Street alignment that connects south from 5th Street to the 7th Street/Metro Center Station and tail tracks structure as described in Section 2.3, Alternatives Considered in the SEIS as follows:

- Alternative A – Open-face shield tunneling to just south of 5th Street where construction would change to SEM for one block to the south side of 6th Street where construction would become cut and cover to provide the connection to the existing 7th Street/Metro Center station tail tracks structure; and
- Alternative B – Earth pressure balance tunnel boring machine (EPBM) to the south side of 5th Street where construction would change to SEM for approximately one-and-a-half blocks to connect with the existing 7th Street/Metro Center station tail tracks structure.

During initial preparation of this SEIS, an alternative using SEM construction for the Flower Street segment from south of 4th Street south to the 7th Street/Metro Center Station, or possibly a full SEM alternative was considered. The use of SEM construction in the 4th to 5th Street Flower Street segment or further north to 3rd Street was identified as having a significantly higher risk than construction using an open-face shield or EPBM tunnel boring machine due to the existing ground conditions, and was removed from further consideration.

An SEM alternative would have a high risk for excessive settlement, uncontrolled subsidence, or collapse due to the width of the tunnel compared to the minimal thickness of poor soil cover possible along Flower Street. SEM increases the risk of tunnel collapse and threatens public and worker safety due to the absence of a tunnel boring machine (TBM) shield which assists in supporting the Flower Street segment's weak ground. Potential mitigation against subsidence or tunnel collapse with SEM methods, such as a pipe canopy or other support system, would be inadequate and too costly and slow to implement an SEM alternative.

Figure 2.2-10: SEM Construction Through Flower Street Tie-backs Looking North



2.2.3.4 Open-Face Shield Tunneling

An open-face TBM also called a "digger shield," is a steel shield equipped with an excavator like a backhoe to excavate the tunnel. The excavated material (muck) is moved by the excavator through the shield to muck cars or conveyor systems behind the shield. The shield provides ground support for erection of the precast segmental lining behind the excavator as the machine advances forward. The disadvantage of open-face tunnel boring machines compared to a pressurized closed-face TBM is the inability to support the face and prevent ground loss and groundwater and gas inflows. Ground control risks are always present when an open tunnel face is in alluvium and where water is present, or where a mixed-face heading is present, such as alluvium over the Fernando Formation, as occurs along Flower Street, as shown in Figure 2.2-4. In such conditions, the ground at the heading of the open-face shield could become unstable with a high risk of unacceptable loss of ground, raveling, running, or flowing of disturbed soil into the tunnel heading all of which can result in excessive ground settlement and possible creation of a sinkhole at the ground surface.

This was the case during the construction of the Metro Red Line A146 contract (segment between Pershing Square and 7th Street/Metro Center stations) when the tunnel was constructed using the open "digger" shield shown in Figure 2.2-11. In portions of the alignment, the upper part of the tunnel encountered cohesionless sand, which ran uncontrolled into the tunnel face and created a void ahead of and over the tunnel shield. A number of ground losses occurred during tunneling with volumes as great as 36 cubic yards (more than the size of a full-size automobile). Further surface settlement was avoided by a soil stabilization program consisting of holes drilled from the ground surface to backfill the voids created by the ground losses with concrete, known as compaction grouting.

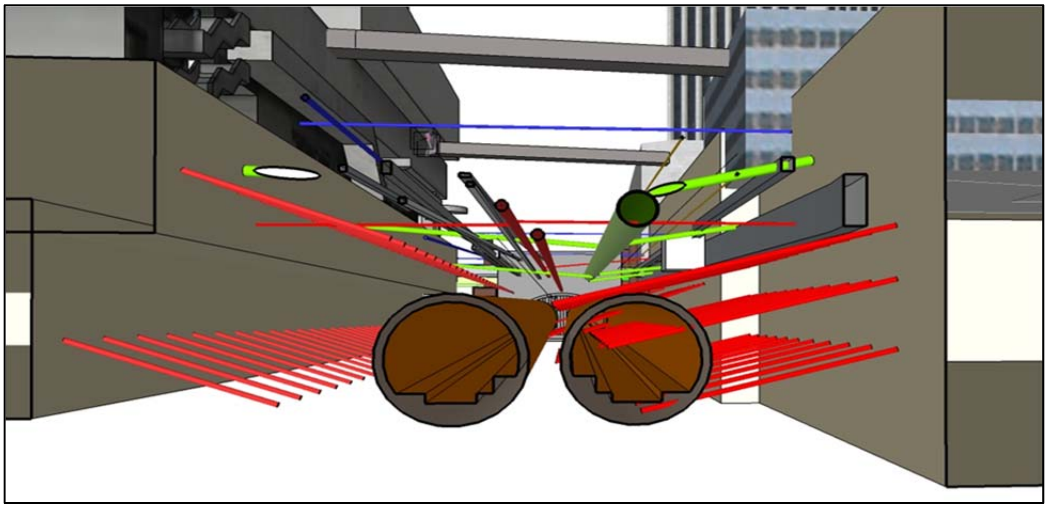
Figure 2.2-11: Open-Face of Digger Shield used to Construct Metro Red Line Contract A146 Tunnels

Open-face shield tunneling has the advantage that when an obstruction, such as a tie-back is encountered, it can be more easily removed via openings in the shield as illustrated in Figure 2.2-12. The tunnel face is accessible and the tie-back can be removed in pieces manually by torch cutting or metal cut-off saw. It is a time-consuming effort that requires grouting where unstable soils are present.

The Metro Red Line Hollywood experience with ground loss and collapse using open-face shield tunneling served as the baseline example of the methods and risks that the Metro Board of Directors has directed staff to avoid on future subway projects. Based on that Metro tunneling experience, open-face tunnel shields, and any tunneling method that would have to rely upon grouting from inside the tunnel to ensure safe construction, with the exception of grouting for cross passage construction, are now deemed by Metro to result in an unacceptable level of risk to workers and the public. Grouting from the tunnel face does not reliably provide the needed ground improvement beneath streets and utilities, particularly under large storm drains similar to the one located in the center of Flower Street, and would result in "windows" of ungrouted soil which would become unstable as shown in Figure 2.2-13.

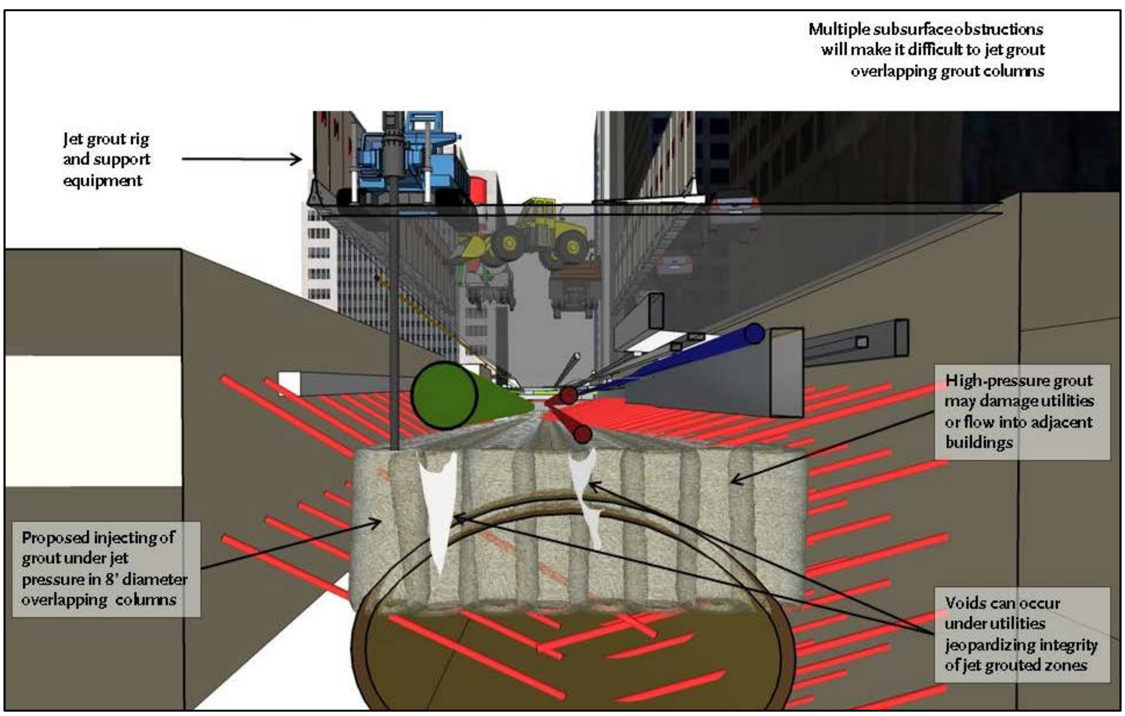
For the Regional Connector Project, open-face shield tunneling was considered and rejected for the Project due to high risks related to possible uncontrolled settlement in the alluvial and fill materials underlying the street and the mixed-face geologic conditions identified along Flower Street. The resulting instability of the tunnel face would pose unacceptable risks without complete soil stabilization, such as the use of grouting. Even with grouting, total ground stabilization is not assured with the geologic conditions along Flower Street, and the risk for ground settlement would remain.

Figure 2.2-12: Open-Face Shield Tunnel Construction Through Flower Street Tie-backs (at SEM Cavern Interface with Twin Tunnels)



Open-face shield tunneling was considered and evaluated in Alternative A for construction of an approximately one block portion of the tunnels between 4th and 5th Streets. The balance of the underground construction considered in Alternative A from the end of the open-face shield tunneling at 5th Street to the 7th Street/Metro Center Station evaluated the SEM method of underground construction using the constructed tunnels at 5th Street for underground access.

Figure 2.2-13: Possible Grouting Impacts Related to SEM Construction



2.2.3.5 Ground Improvement Methods

Given weak ground soils, perched groundwater, and mixed-face geologic interface conditions along the Flower Street segment, ground improvement methods have been identified and evaluated for SEM, open-face shield, or EPBM tunneling south along Flower Street from 4th Street. These ground improvement methods include permeation grouting, ground freezing, compaction grouting, compensation grouting, and jet grouting, and would be performed from the ground surface as discussed below.

Permeation Grouting

Permeation grouting involves filling the pore spaces in soil with chemicals or fine cement, while individual soil grains are not disturbed or moved, to solidify the soil and reduce the capacity for water to flow through the soil. The structure and dimension of the soil pore spaces dictate the type of grout that can be effectively used. Generally, permeation grouting is suitable for sandy soils containing less than 10 to 20 percent silt or clay. As documented in *The Geotechnical Baseline Report*, the silt and clay content varies from 70 percent in the alluvial soils layer to greater than 90 percent in the Fernando Formation.

For tunneling projects, permeation grouting is done from the ground surface or, when unusual or extreme conditions dictate, from the tunnel face. This grouting method requires drilling and injecting grout into the targeted ground areas requiring stabilization. Typical drilling spacing is four to six feet between grout holes. Working from the surface permits control of the grouting to the targeted ground requiring improvement. Permeation grouting from the tunnel face requires horizontal and sub-horizontal grout holes which can easily miss the targeted areas, and therefore not able to achieve the required ground improvement. In addition, the resulting grouting may be compromised by the many tie-backs and utilities located under Flower Street. Locating conflicting utilities to avoid issues with grouting efforts would be similar to cut and cover utility relocation efforts and would require additional time and cost, and still may result in extensive construction impacts due to the unknown exact location of some utilities.

This ground stabilization technique was not recommended for further consideration on Flower Street due to the soils content (silt and clay) of the alluvial conditions which would limit the extent of grout permeation, making it difficult to improve the ground conditions. The interlayered nature of the sands and fine soils would also make it difficult to achieve a uniformly grouted condition, and some areas would not be groutable or marginally groutable due to soil conditions. With so many utility lines located under Flower Street, there is a high risk that permeation grouting would damage or penetrate existing and relocated utility lines causing service disruptions and halting construction. The inherent and unavoidable but temporary impact from permeation grouting is the significant surface disturbance due to grouting equipment and possible grouting spillage.

Ground Freezing

Ground freezing is based on withdrawing heat from the ground soil as the process converts in-situ water in the soil pore spaces into ice. The ice binds the soil particles imparting strength to the frozen soil mass. For the creation of a frozen soil body, a pattern of vertical, and sometimes horizontal, freeze pipes are installed in drilled holes. Each freeze pipe consists of an open-end inner pipe and a closed-end freeze pipe. The inner pipe is filled with a cooling medium, usually brine or liquid nitrogen. The coolant removes the heat from the soil, and the freeze takes place over time as the frost penetrates the soil. Setting up for the freeze, establishing the freeze, tunneling, and demobilizing the freezing is time-consuming taking months to complete and would occupy a minimum of two to three traffic lanes on the surface. It is not feasible to do freezing from an underground position due to the challenges in drilling shafts to position the pipes at exactly the right location around the future tunnel envelope. There is also a significant challenge in obtaining a full freeze zone coverage due to the significant number of utilities and tie-backs located under this street segment.

This ground stabilization technique was not recommended for further consideration and was identified as not feasible on this project. In the Flower Street segment, once the limited perched groundwater is frozen, the freeze could not continue because the alluvial soils are substantially dry and do not contain a sufficient quantity of water to freeze. Along Flower Street, the freeze would be incomplete, not uniform and continuous, and would provide insufficient ground stability for tunneling.

Compaction Grouting

Compaction grouting involves injection of very stiff grout at a high pressure into the ground creating grout columns and densifying the surrounding soils at the injection points. The grout holes are typically vertical and spaced on a grid of six to 12 feet apart. The resulting grout columns are not designed to overlap or even touch each other, as the soils left in place between the columns are presumed to be densified. Developed in the 1970s, compaction grouting has had limited use as subsequent compensation grouting development provided a more manageable and effective technique for tunneling applications. Today, compaction grouting is seldom used as a tunneling settlement mitigation method. The introduction of pressurized-face tunneling has reduced tunneling ground losses, which further decreases the need for the use of this technique.

This ground stabilization technique was not recommended for further consideration as it was seen as not being effective for preventing large ground loss and reducing the risk of surface subsidence along Flower Street if tunneling were continued south of 4th Street. The alluvial deposits located along the Flower Street segment would be difficult to improve by compaction grouting and would not prevent an unstable tunnel face with raveling or running ground. Keeping the placement of the grout in a globular mass sufficient to provide density required for tunneling would be difficult due to the interlayered nature of the ground soils, as well as the many utilities and abandoned tie-backs located under Flower Street. Relocation of utilities would require additional time and cost, and may still result in extensive construction impacts due to the unknown precise location of some utilities.

Compensation Grouting

Compensation grouting is used concurrently with tunneling or excavation to mitigate ground settlement resulting from excavation or tunneling activities. Steel or plastic grout pipes with sleeve ports are installed in holes drilled from the surface or grout pits prior to tunneling. Compensation grouting displaces the surrounding soils at the grouting points along the grout pipe to compensate for settlement caused by construction activities. As the grout penetrates the ground, it forms a network of wedges and displaces and "heaves" the ground to compensate for settlement. As tunneling advances and settlement occurs, compensation grouting is activated to maintain settlement within acceptable limits. Once the ground movement is stabilized, the grouting pipes and equipment are abandoned in place. Implementation along Flower Street would require shafts to be drilled within the street ROW to install the grout pipes, whose placement may be constrained by the tie-backs and utilities located under Flower Street. Similar to other grouting techniques, utility relocation would require additional time and cost, and may still result in extensive construction impacts due to the unknown precise location of some utilities.

This ground stabilization technique was not recommended for further consideration to provide ground improvement in support of tunneling efforts on Flower Street. Compensation grouting would be only suitable for mitigation of settlement of utilities along this segment of the project, and would be completely ineffective in avoiding ground loss and collapse of the tunnel face leading to a sinkhole in the street by open-faced TBM or SEM tunneling.

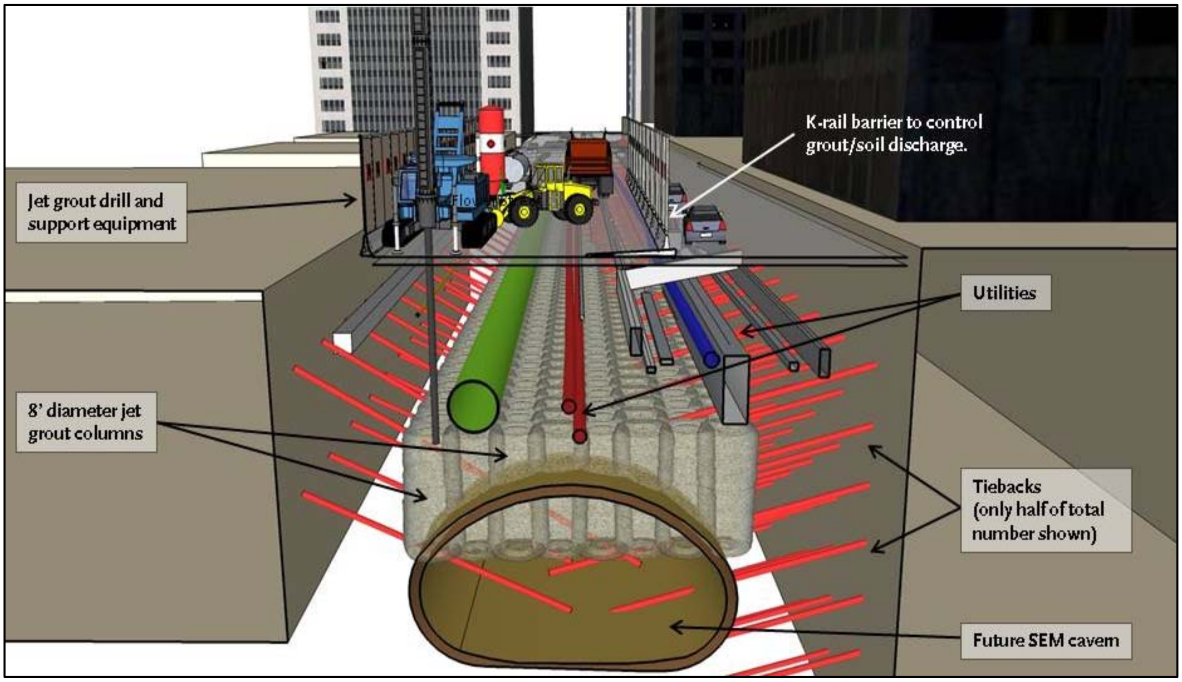
Jet Grouting

Jet grouting mixes cement grout with the in-situ soil to result in a stronger mixed grout-soil material. With jet grouting, the weak soils under Flower Street would be strengthened resulting in "firm" ground conditions that would allow for tunneling and in some cases, reduce tunneling risks. The technique requires drilling grout holes on a five- to-10 foot spacing throughout the area to be grouted such that the neighboring grout-soil mix columns would overlap or touch each other. Grout holes would typically extend from the ground surface creating vertical grout-soil mix columns extending approximately 40 feet from the ground surface to reach the relatively stronger Fernando Formation, as shown in Figure 2.2-14. The resulting grout columns would improve ground stability, but may be compromised by the many tie-backs and utilities along Flower Street.

Jet grouting was identified as the most suitable method to improve the existing soil conditions along Flower Street, and to provide adequate strength given the width and depth of the required grout-soil mix block above the tunnel crown. The method has relatively good control over assuring the quality of grouted soil blocks but has remaining concerns of extensive environmental impacts on the street, the risk of utility damages, and the risk of incomplete ground improvement. A jet grouting canopy, installed by horizontal drilling, alone would not provide adequate support for the tunnel under Flower Street. A major risk is the interference created by utilities that prevent full coverage by jet grouting. As previously illustrated in Figure 2.2-13, it would not be possible to fully jet grout below the 84-inch diameter storm drain and a "window" of ungrouted ground would be present above the tunnel. The ungrouted ground would tend to transmit groundwater and, if intersected by the tunnel excavation using SEM or open-face shield methods, would be the point where an uncontrollable run or flow of soil in the tunnel would start, which in turn could lead to a sinkhole at the street surface.

Ground stabilization through jet grouting would be required for the open-face shield tunneling and SEM tunnel construction portions of both tunneling alternatives A and B primarily due to the unstable soil conditions along Flower Street. Without an extensive jet grouting program, construction of these alternatives would have a substantial risk of tunnel face instability with the high potential for soil runs during tunneling by open-face shield or SEM, particularly when dealing with tie-backs.

Figure 2.2-14: Grouting Equipment and Impacts



This method has extensive street level environmental impacts due to the type and size of grouting equipment required for grout production and delivery, and the challenge in controlling grouting activities. Grouting equipment includes grout drilling rigs, a mixing plant, compressors, pumps, generators, cement delivery trucks, and support machinery. The drilling rigs are typically more than 100 feet in height. Jet grouting requires high grouting pressure, typically 6,000 pounds per square inch (psi), and this high pressure makes it difficult to control spills and unintended grout discharges. Grouting spills and discharges typically occur when uncoupling hoses and when the grout under pressure breaks out either around the grout pipe casing or through the ground. With so many utility lines located under Flower Street, there is a high risk that high pressure grouting can damage or penetrate into the utility lines causing major service disruptions and halting construction. An example of probable jet grouting equipment and resulting impacts are shown in Figure 2.2-15 for a similar LRT tunneling project when under construction in San Francisco for the MUNI system.

As discussed in Section 2.3 of this chapter and in Chapter 3, Transportation and Circulation, Section 4.1 Visual Quality, Section 4.2 Air Quality, Section 4.2 Climate Change, Section 4.4 Noise and Vibration, 4.6 Energy Resources, and Chapter 5, Comparison of the Alternatives, grouting would have traffic and transit, air quality, climate change, noise and vibration, visual and aesthetic, historic resource, and environmental justice impacts.

Figure 2.2-15: Grouting Equipment and Impacts (San Francisco, MUNI LRT Tunneling, 2013)

Metro

2.3 ALTERNATIVES CONSIDERED IN THE SEIS

As analyzed and documented in the *Final Flower Street Tunneling Method Alternatives Report (2015)* (Appendix A) and summarized in Table 2.3-1, Alternatives A and B propose different combinations of underground construction methods as alternatives to the cut and cover method planned for the Project along Flower Street between 4th Street and 7th Street. This section presents an overview of the construction methods for each of the tunneling method alternatives, including the need for ground stabilization for the proposed construction methods along the Flower Street segment, construction staging requirements, and an evaluation of the tunneling method alternatives.

2.3.1 Construction Methods and Staging for Tunneling Method Alternatives

Construction methods for Alternatives A and B propose different combinations of underground construction methods as alternatives to the cut and cover method planned for the Project along Flower Street between 4th Street and 7th Street.

1. EPBM/Open-Face Shield/SEM Project Profile Alternative (Alternative A) – a combination of EPBM, Open-Face Shield and SEM construction methods; and with similar horizontal and vertical alignment profiles to that of the Project.
2. EPBM/SEM Low Alignment Alternative (Alternative B) – a combination of EPBM and SEM construction methods with a similar horizontal alignment profile, but a lower vertical alignment profile, than that of the Project.

The two tunneling alternatives have the following alignment variations from that of the Project in order to address geologic conditions and other subsurface project constraints as previously discussed:

- Horizontal alignment – Along Flower Street, Alternatives A and B remain located under the existing street right-of-way. The horizontal alignments of these alternatives continue on tangent track from the 2nd/Hope Station south through the 4th Street Bridge foundation piles to 5th Street. The alignments then would transition from a wider oval track center to a narrow track center as the alignment approaches the planned double crossover immediately north of the narrow, rectangular 7th Street/Metro Center Station tail tracks structure.

  As further discussed below in Section 2.3.2.1 describing Alternative A and Section 2.3.2.2 presenting Alternative B, these alternatives would have a short horizontal transition distance from the 5th Street section of the alignment to the double crossover located before the existing tail tracks structure, which would limit the LRT operating speed to 35 mph as compared to the 55 mph specified by the MRDC Operating Standards, and provided by the Project.

- Vertical alignment – Alternative A would have the same vertical profile as the Project with an average depth of 40 feet to top of rail (TOR) below ground level. The vertical alignment of Alternative B has a “sag” or a low point of 105 feet to TOR below ground level. The sag alignment reduces the probability of the tunnel alignment impacting the 4th Street Bridge foundations and encountering tie-backs located under Flower Street between 4th Street and just south of 5th Street. The abandoned steel tie-backs typically range from 30 to 90 feet in length, and extend below ground at a 15 to 45 degree angle to a depth of approximately 45 to

64 feet across the width of the street right-of-way from both sides. The 4th Street Bridge foundations extend 64 feet below the surface on the west side and 83 feet on the east side. Alternative B's lower alignment profile at 105 feet to TOR avoids tunneling impacts from the tie-backs and bridge foundations. It does result in a greater depth for the 2nd/Hope Station (128 feet) compared to the station depth for the Project and Alternative A (96 feet).

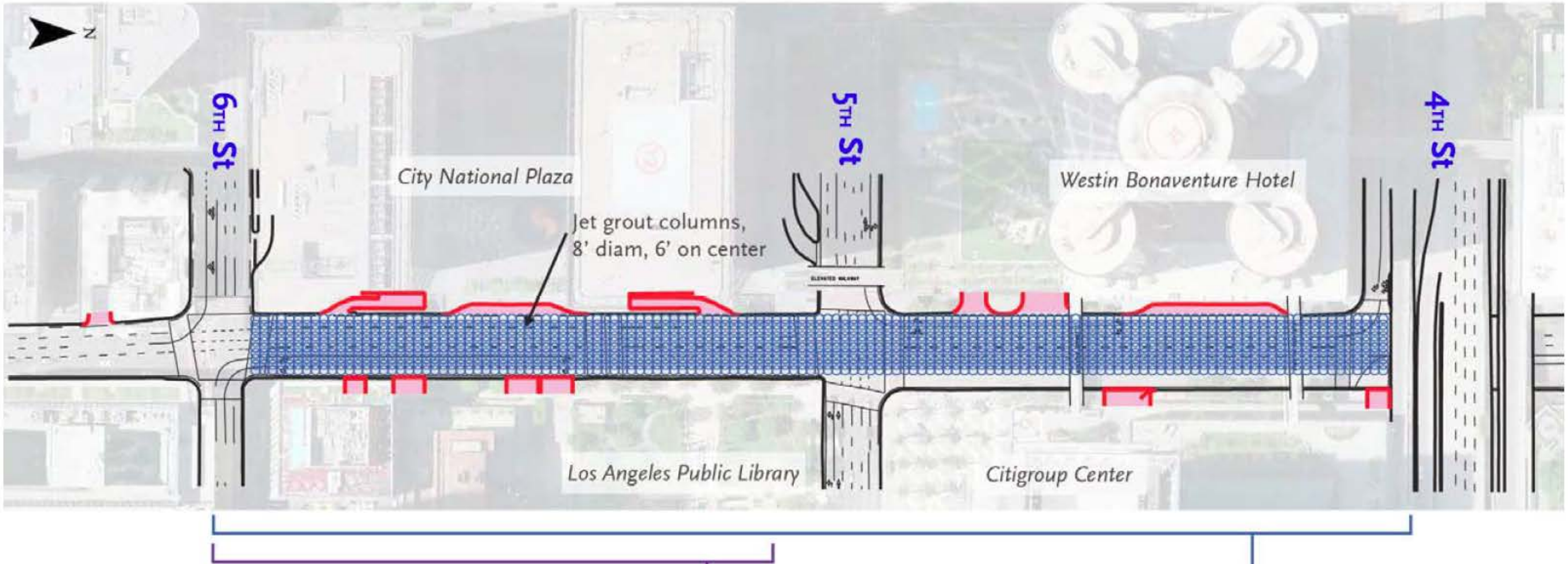
In addition to the construction methods described above, the tunneling method alternatives would require small segments of cut and cover construction for shafts to allow for emergency exits, tunnel boring machine retrieval, and train control room ventilation. Both alternatives would require the use of grouting to stabilize Flower Street soil conditions to allow for tunnel construction as shown in Figure 2.3-1. Alternative-specific shaft requirements are described in the discussions about each alternative below.

Table 2.3-1: Comparison of Project and Tunneling Method Alternatives

	The Project	Alternative A EPBM/Open-Face Shield/SEM Project Profile	Alternative B EPBM/SEM Low Alignment
Construction Description[1]	• EPBM to south of 4th Street • C&C from 4th Street to 7th Street/Metro Center Station tail tracks	• EPBM to 4th Street • Open-face shield TBM to 5th Street • SEM from 5th to 7th Street/Metro Center Station tail tracks	• EPBM to south of 5th Street • SEM from 5th Street to 7th Street/Metro Center Station tail tracks
Horizontal Alignment	Baseline	Slight shift to west of Project alignment	Slight shift to west of Project alignment
Depth To Top of Rail	40’	40’	40’ to 105’ (at sag)
Mucking Locations	• Flower Street • Mangrove site in Little Tokyo	• Flower Street (for emergency exits and train control room vent only) • Mangrove site in Little Tokyo	• Flower Street (for emergency exit and train control room vent only) • Mangrove site in Little Tokyo
Handling of Flower Street Segment Excavation Materials (by location)	Flower Street Site: 81% Mangrove Site: 19%	Flower Street Site: 25% Mangrove Site: 75%	Flower Street Site: 20% Mangrove Site: 80%
Corresponding Excavation Materials/ Construction Trucks Per Day	On Flower Street segment: 32 In Little Tokyo: 8	On Flower Street segment: 18 In Little Tokyo: 22	On Flower Street segment: 8 In Little Tokyo: 32
Construction Shaft	TBM retrieval shaft at 4th Street (part of cut and cover construction)	TBM retrieval shaft south of 4th St.	EPBM removed through Mangrove portal
Permanent Shafts	• Emergency exit south of 4th Street • Emergency exit south of 5th Street • Train control room vent shaft 7th Street/ Metro Center tail tracks structure	• Emergency exit south of 4th Street • Emergency exit south of 5th Street • Train control room vent shaft 7th Street/ Metro Center Station tail tracks structure	• Emergency exit south of 5th Street • Train control room vent shaft 7th Street/ Metro Center Station tail tracks structure
2nd/Hope Station Depth	96’	96’	128’
Maximum Design Speed	55 mph	35 mph	35 mph
Double Track Crossover Before 7th Street/Metro Center Station	Yes	Yes	Yes
Future 5th/Flower Station	Center platform with mezzanine	Side platform with no mezzanine	Side platform with mezzanine Requires tunnel reconstruction
Project Delivery Duration (months) • **Construction** • **Pre-Construction Activities**[2] • **Total Duration (difference)**	78 -- 78	93 (+ 15 months) 29 122 (44 months or 3.7 years longer)	85 (+ 7 months) 29 114 (36 months or 3 years longer)
Project Cost (Millions, YOE)3	$171	$295-332[4] (+$124 to $161 more than the Project)	$295-332[4] (+$67 to $95 more than the Project)

Notes: [1] **Construction Techniques** include C&C - Cut and cover; EPBM- earth pressure balance tunnel boring machine; SEM- sequential excavation method. [2] **Pre-construction Activities** include engineering design revisions and re-procurement of the design-build construction contract. [3] **Project Cost YOE** is the year of expenditure using 2017 as mid-point of construction. [4] **Project Cost** Range for two alternatives provides a low and high cost estimate based on risk. The range does not include increased costs resulting from procurement delay, construction delay, or escalation due to delays.

Figure 2.3-1: Grout Holes Required on Flower Street for Alternatives A and B



LEGEND

- Jet Grout Column
- Existing Driveways

Alternative B:

- Jet grouting south of 5th St to 6th St
- Two lane closure required at a time
- Grouting duration estmated to be a total of 8 months (possibly up to 16 months depending on underground conditions encountered) for this alternative assuming 2 drill rigs and the following:
  - 5-day mobilization
  - 5 working days per week
  - One ten-hour shift per day
  - 3-holes per shift per rig
- Grouting is performed concurrent with construction

Alternative A:

- Jet grouting south of 4th St to 6th St
- Two lane closure required at a time
- Grouting duration estmated to be a total of 12 months (possibly up to 24 months depending on undergound conditions encountered) assuming 2-4 drill rigs and the following:
  - 5-day mobilization
  - 5 working days per week
  - One ten-hour shift per day
  - 3-holes per shift per rig
- Grouting is performed concurrent with construction

2.3.1.1 Construction Staging Areas

Similar to the Project as discussed in section 2.1.3, Alternatives A and B would require construction staging areas. Construction staging areas are temporary for the duration of construction, and would be located either within the street right-of-way or in off-street locations. Potential construction staging areas have been identified for Alternatives A and B and are summarized in Table 2.3-2 in comparison to the Project. Two grouting phases are required for the tunneling method alternatives to allow for the shifting of grouting activities from one side of Flower Street to the other to accommodate the reach of the grouting rigs. The two phases of grouting activities are illustrated in Figures 2.3-2 and 2.3-3 with construction and grouting staging activities in the Flower Street segment accommodated through temporary traffic lane closures between 4th and 6th Streets. Detours and closures would be coordinated with the LADOT.

During construction of the two tunneling method alternatives, removal of excavated materials in the Flower Street segment would be handled either along Flower Street or would be transported back along the alignment within the newly constructed tunnels and removed at the Mangrove site in Little Tokyo. As shown in Table 2.3-3, the two alternatives would significantly decrease the amount of tunnel excavation materials handled along Flower Street and correspondingly increase the materials handled through the Mangrove site. Under the Project, the higher percentage (81 percent) of the total excavation materials from the Flower Street segment handled along Flower Street is due to cut and cover construction that would be loaded into trucks on-site. With the reduction in cut and cover construction proposed by the two alternatives, the increase in tunneling would be handled with tunnel boring spoils transported back along the alignment within the newly constructed tunnels and removed at the Mangrove site at the northeast corner of 1st and Alameda Streets where it would be removed by trucks traveling through Little Tokyo.

Under Alternative B, extending EPBM tunneling to 5th Street, along with a deeper alignment, is proposed under Flower Street. The deeper alignment would require lowering the 2nd/Hope Station deeper from 96 feet to 128 feet below the ground surface. This added tunnel length and alignment depth would result in an increased quantity of tunnel excavation materials to be handled through the Mangrove site. The additional excavated materials for the deeper 2nd/Hope Station also would be removed from the station site.

Figure 2.3-2: Alternatives A and B – Grouting Activities Phase I

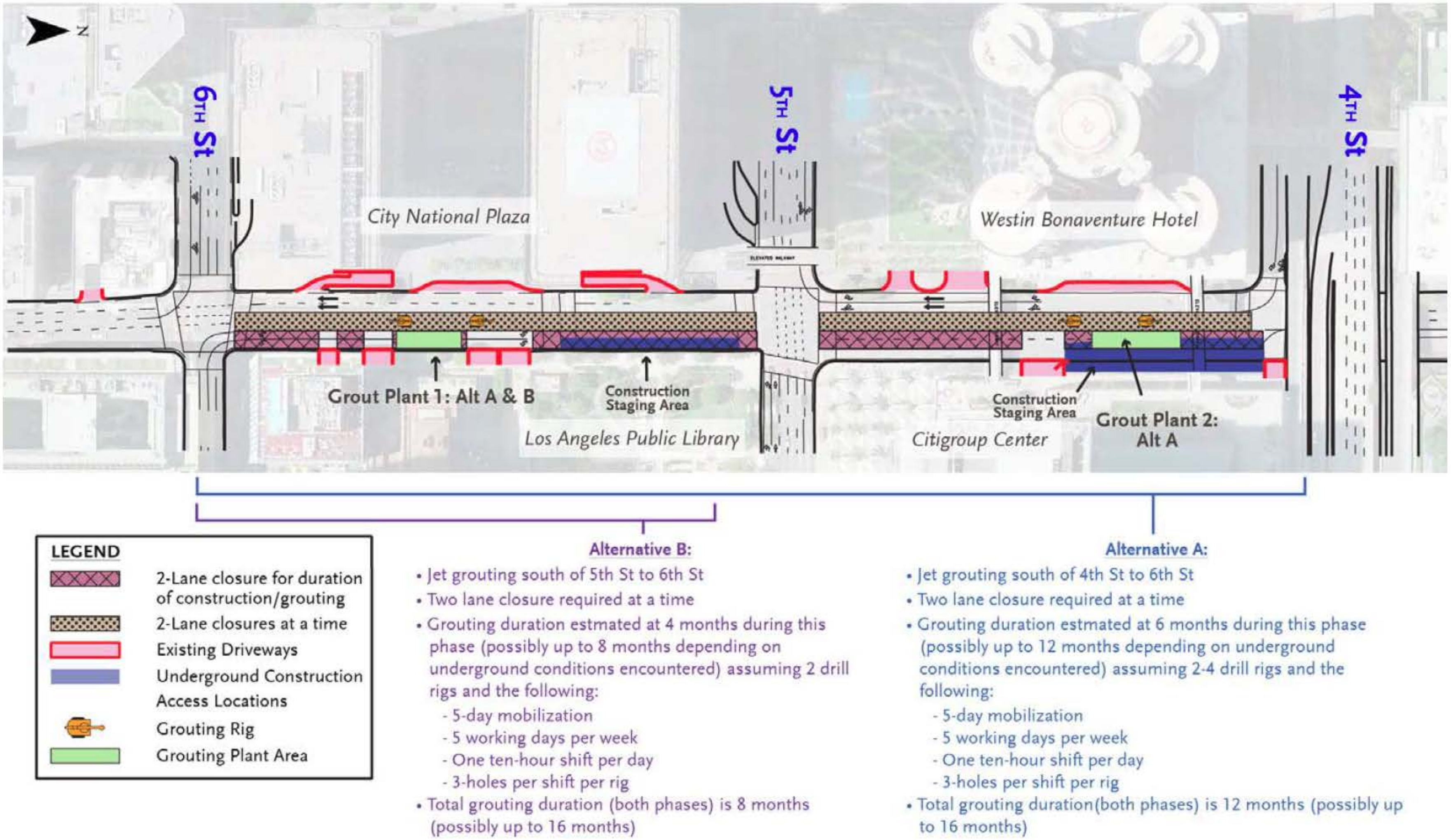
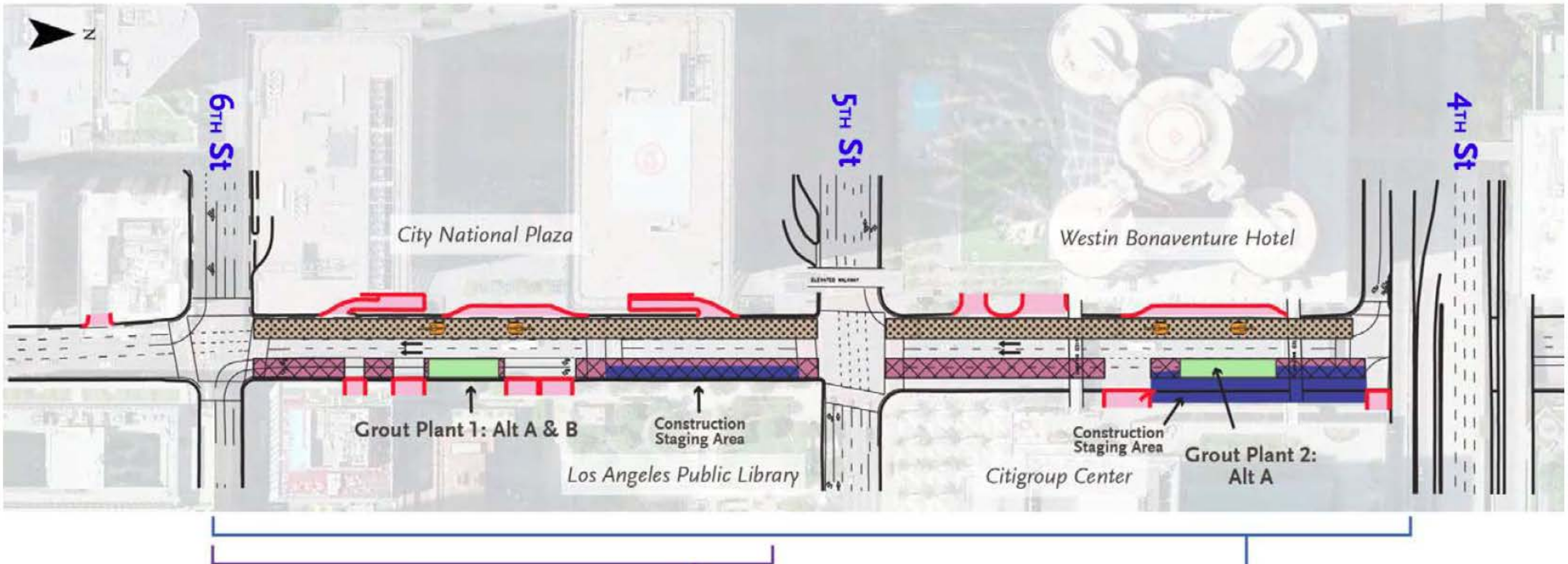


Figure 2.3-3: Alternatives A and B – Grouting Activities Phase II



LEGEND

- 2-Lane closure for duration of construction/grouting
- 2-Lane closures at a time
- Existing Driveways
- Underground Construction Access Locations
- Grouting Rig
- Grouting Plant Area

Alternative B:

- Jet grouting south of 5th St to 6th St
- Two lane closure required at a time
- Grouting duration estmated at 4 months during this phase (possibly up to 8 months depending on underground conditions encountered) assuming 2 drill rigs and the following:
  - 5-day mobilization
  - 5 working days per week
  - One ten-hour shift per day
  - 3-holes per shift per rig
- Total grouting duration (both phases) is 8 months (possibly up to 16 months)

Alternative A:

- Jet grouting south of 4th St to 6th St
- Two lane closure required at a time
- Grouting duration estmated at 6 months during this phase (possibly up to 12 months depending on underground conditions encountered) assuming 2-4 drill rigs and the following:
  - 5-day mobilization
  - 5 working days per week
  - One ten-hour shift per day
  - 3-holes per shift per rig
- Total grouting duration(both phases) is 12 months (possibly up to 16 months)

Technically every station along the project alignment could serve as a tunnel spoil removal site, but the Final EIS/EIR restricts tunnel spoil removal to the Mangrove site due to the potential for additional impacts the other station locations and the right-of-way constraints. Handling tunnel spoils at the 2nd/Hope station area adjacent to the Disney Hall, the Music Center, the Colburn School of Music, the Broad Museum, the Museum of Contemporary Art, and two high-rise residential buildings would be difficult given the built-out nature of this station area with noise-sensitive land uses. Similarly, the 2nd/Broadway Station cannot serve as a spoils removal location due to the built out nature of surrounding land uses. In addition, the right of way is narrow and congested at this segment of 2nd Street.

Spoil removal under Alternatives A and B assumes that the excavated materials by tunneling methods under Flower Street are removed through the bored tunnels to the portal at Little Tokyo using the tunneling conveyor or muck transport systems in the tunnels which are not designed to accommodate discharge at 2nd/Broadway station. Changing the muck conveyance system to discharge at 2nd/Broadway station would adversely affect the construction of the 2nd/Broadway cut and cover station causing significant delay to the project. Additionally, the 2nd and Broadway station site is a narrow site in a heavily built up area with limited surface area to accommodate muck handling and disposal operations from the tunnel.

Table 2.3-2: Flower Street Construction and Grouting Staging and Grouting Activity Areas for the Project and Tunneling Method Alternatives

	Construction Staging Two locations occupying two travel lanes on east side of Flower Street: • South of 4th Street • South of 5th Street	**Grouting Staging Areas** Two locations occupying two travel lanes on east side of Flower Street: • South of 4th Street • Between 5th and 6th Streets	**Grouting Activities** Two phases occupying two travel lanes at a time: • Phase I – two middle travel lanes • Phase II – two travel lanes on west side of street
The Project	Both locations	--	--
Alternative A	Both locations	Both locations	Both phases
Alternative B	Both locations	North of 6th street only	Both phases

A comparison of the quantity of Flower Street segment excavation materials that would be handled either along Flower Street or through the Mangrove site by Alternatives A and B as compared to the Project is provided in Table 2.3-3. As discussed below in the description of each tunneling method alternatives, with the extension of tunneling further south on Flower Street, there would be a major shift in the handling of excavated materials from Flower Street to Little Tokyo. This would have a corresponding increase in the number of excavation trucks required to handle the higher quantity of excavated materials at the Mangrove site. Under Alternative A, Flower Street truck activity would be approximately cut in half, while the number of trucks operating through Little Tokyo would more than double. Alternative B has a more significant impact on Little Tokyo with quadruple the number of trucks. For both alternatives, the duration of the impacts would increase by 7 months under Alternative B to 15 months under Alternative A.

Table 2.3-3: Comparison of Flower Street Segment Excavation Materials Handling

Impact	The Project	Alternative A	Alternative B
Hauling of Excavated Materials from Flower Street			
- On Flower Street • Percentage of total Flower Street excavation materials • Duration of hauling activities	81% 9 Months	25% 1 Month	20% 1 Month
- In Little Tokyo • Percentage of total excavation materials • Duration of hauling activities	19% 2.5 Months	75% 19 Months	80% 17 Months
Excavation/Construction Trucks Per Day			
- On Flower Street	32	18	8
- In Little Tokyo	8	22	32
Duration of Truck Impacts (for hauling excavated materials)	9 Months	19 Months (10 months longer than the Project)	17 Months (8 months longer than the Project)

Source: *Final Flower Street Tunneling Method Alternatives Report (2015)*

2.3.2 Description of Tunneling Method Alternatives

2.3.2.1 Alternative A – EPBM/Open-Face Shield/SEM Profile Alternative

Alternative A would extend tunneling south to the 7th Street/Metro Center Station through the use of a combination of open shield tunnel boring and sequential excavation method (SEM) construction techniques. The EPBM/Open-Face Shield/SEM Project Profile Alternative, as illustrated in Figure 2.3-4, is defined as follows:

> EPBM-bored tunnels are constructed following the Project alignment to south of 4th Street, then open-face shield tunnel excavation from 4th Street to 5th Street (abandoning the shields underground), and SEM tunnel construction from 5th Street to the 7th/Metro Center Station tail tracks structure

The Flower Street horizontal alignment of this alternative would remain similar to the Project with a slight shift to the west with the alignment continuing south on tangent track from the 2nd/Hope Station through the 4th Street Bridge piles to 5th Street. It would transition from a wider track center to a narrow track center by the time the alignment approaches the required double crossover immediately north of the narrow 7th Street/Metro Center Station tail tracks structure.

The vertical alignment for this alternative would be similar to that of the Project with a tunnel alignment depth of approximately 40 feet to TOR below the street surface. Alternative A would allow for construction of a double track crossover and a future 5th/Flower Street Station; and the 2nd/Hope Station would be located at the same depth (96 feet) as the Project. For this alternative, the operational speed would be limited to 35 mph due to the short horizontal transition distance from the 5th Street segment to the double crossover before the existing tail tracks structure. The future 5th/Flower Street Station configuration would have to be a side platform station without a mezzanine, as the narrow center-to-center spacing of the twin tunnels would preclude construction of a center platform, and the relatively shallow depth would not provide sufficient distance for a mezzanine. Passengers would not be able to make cross-platform transfers, but would have to exit the station to transfer from one travel direction to the other. Deviations would be required from Metro rail design standards to accommodate the site-specific conditions.

Alternative A would require three separate cut and cover excavation sites for: 1) emergency exit construction and tunnel boring machine retrieval shaft south of 4th Street; 2) an emergency exit construction located south of 5th Street; and 3) a train control room vent shaft south of the 7th Street/Metro Center Station tail tracks structure. Similar to the Project, cut and cover excavation materials would be handled from the construction staging sites located along Flower Street, while tunnel muck would be removed through the bored tunnel to the Mangrove portal site in Little Tokyo.

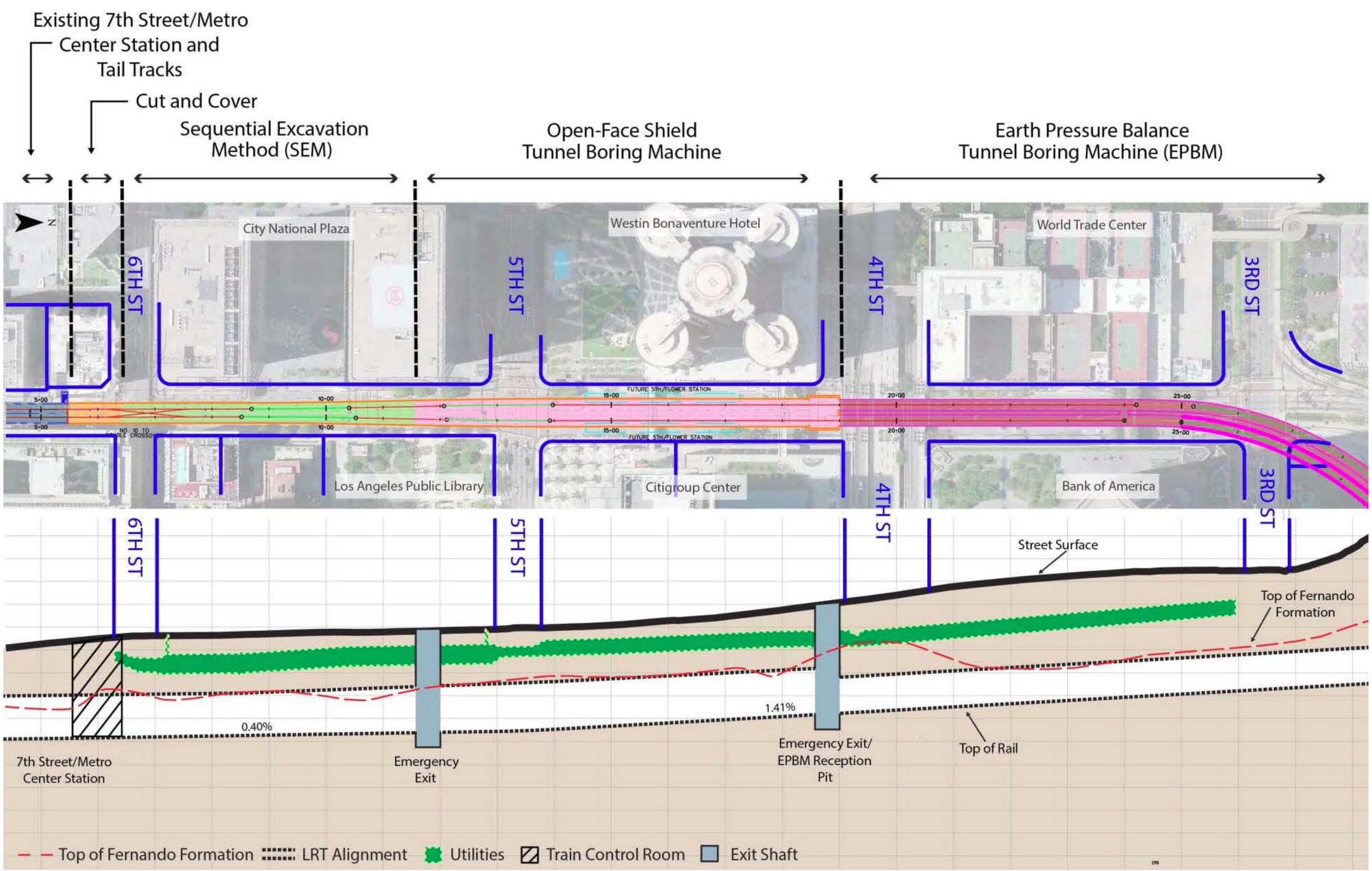
With the lengthening of tunnel boring activities further south on Flower Street, there would be a corresponding increase in the amount of excavated materials handled through the Mangrove site over the Project conditions. For Alternative A, it is estimated that 25 percent (compared to 81 percent for the Project) of the excavated materials would be handled from locations along Flower Street, with an increase to 75 percent (compared to 19 percent under Project conditions) of tunneling materials would be accommodated through the Little Tokyo site.

Construction Method Risks and Need for Grouting

The Flower Street SEM excavation for the crossover may be as wide as 60 feet, but would only have approximately 20 feet thickness or less of poor soil cover combined with close proximity to utilities, ground water, and methane gas conditions making it a very high risk for excessive settlement, uncontrolled subsidence or collapse. SEM relies on the natural arching effect of the ground, and not much arching can be expected along Flower Street due to the low ground cover, poor soils conditions, and many utilities. In such poor ground conditions, SEM construction is more susceptible to earthquake forces and its seismic design requirements would be greater compared than those for cut and cover excavation.

Due to the use of a combination of open-face shield tunnel boring and SEM tunnel construction techniques, the use of extensive jet grouting would be required from south of 4th Street to 6th Street for Alternative A. Without grouting, this alternative has substantial risk of tunnel face instability with the high potential for soil runs during tunneling by open-face shield or SEM, particularly when dealing with tie-backs. There would be approximately five feet of the Fernando Formation above the open-face shield section. Based on the limited number of borings, the location of the Fernando Formation has substantial uncertainty and the stability of the open-face shield tunnel face is not guaranteed. Ground improvement would be required. In addition, the open-face shield tunneling would encounter the Pacific Electric tunnel which may include pea gravel backfill between its final lining and the surrounding ground as commonly used in earlier tunneling methods. As the open-face shield tunnel approaches, this backfill may run into the new tunnel creating large voids around the Pacific Electric tunnel directly underneath Flower Street and the adjacent properties. For the SEM portion of the

Figure 2.3-4: EPBM/Open-Face Shield/SEM Profile (Alternative A)



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tunneling, the single twin-tunnel is larger and the tunnel will have varying amounts of mixed face conditions in the tunnel heading. In this situation, there would be a high risk of subsidence creating sinkholes on Flower Street and therefore jet grouting would be required.

The jet grouting for the open-face shield and SEM portions would require drilling grout holes on a six-foot by six-foot pattern throughout the area to be grouted as previously shown in Figure 2.3-1. Grout holes would extend from the ground surface through the weak fill and alluvial soils to just into the relatively stronger Fernando Formation, a distance of more than 40 feet. Alternative A would require a 50-foot-wide zone in Flower Street to be grouted. Depending on the number of required grout holes, two to four drill rigs would be utilized to drill and grout this area. Approximately 1,900 jet holes are expected for Alternative A and would require approximately 12 months (with a risk of doubling the effort for up to 24 months) using two drill rigs.

For Alternative A, the horizontal tunnel alignment is shifted slightly to the east between 5th and 6th Streets, and the tunnel alignment occupies the middle of Flower Street between 4th and 5th Streets. Therefore, the jet grouting staging areas would occupy the east side of Flower Street during a majority of the jet grouting activities. As previously presented, Figures 2.3-2 and 2.3-3 illustrate the grouting and staging areas required along Flower Street for Phases I and II of grouting activities for this alternative. As shown in the figures, construction of Alternative A would require long term closure of two travel lanes on the east side of Flower Street for location of the grouting plant and equipment storage, along with an additional two lane closure on the west side to accommodate grouting activities. A total of four lanes would be closed for 12 months, possibly up to 24 months due to unforeseen underground conditions, when grouting is taking place.

Schedule Impacts

Implementation of Alternative A would extend the project construction duration by 15 months over the Project, and the longer construction duration is due only to construction changes along Flower Street and related impacts to Little Tokyo. Under the Project, cut and cover excavation and construction work would occur concurrently with the excavation of the bored tunnels and other construction activities throughout the alignment. For Alternative A, the primarily tunneling work needs to be performed sequentially, which results in a longer construction timeframe. While the required grouting activity can be performed concurrently with the EPBM tunneling work, but not the SEM effort, grouting activity will further impact construction duration with Alternative A requiring two to four grouting rigs for approximately 12 months, and possibly up to 24 months depending on the underground conditions experienced along Flower Street during construction. In addition, muck removal for this alternative would occur through the westbound track tunnel to the Mangrove portal, and with the extension of tunneling further south on Flower Street, would require longer tunnel runs with increased amounts of excavated materials over those of the Project. Extending the use of the westbound tunnel track would delay the construction of all station facilities, which are dependent on the completion of tunneling operations.

The resulting construction method-related schedule changes are not simply add-ons to the construction schedule duration identified for the Project. The Regional Connector project construction schedule is complex and involves the carefully considered interrelationships between many activities, some that can be performed concurrently, while other activities are sequential. Due to the need to remove all Flower Street segment tunnel spoils through the Mangrove portal, the tunneling operation would continue until excavation and construction of the Flower Street segment. This would hold the start of station construction work for the 2nd/Hope and 2nd/Broadway stations and all cross passages until after the Flower Street segment tunneling is complete.

Table 2.3-4: Construction Duration Comparison

	Project (Months)	Alternative A (Months)	Alternative B (Months)
Pre-construction[1]	--[2]	29	29
Construction	78	93	85
Total Duration	78	122	114
Duration Difference Compared to the Project			
Months	--	44	36
Years	--	3.7	3.0
Revenue Service Date	Mid 2020	Early 2024	Mid 2023

Note: [1] Pre-construction Activities include engineering design revisions and re-procurement of the design-build construction contract.
[2] Pre-construction activities already completed
Source: *Final Flower Street Tunneling Method Alternatives Report (2015)*

As shown in Table 2.3-4, implementation of Alternative A would require 44 months over the Project's schedule. The longer duration is due to: 1) an additional 29 months for pre-construction activities; and 2) a longer construction duration by 15 months. Pre-construction activities for this alternative would include the preparation of detailed engineering design plans, re-procurement activities for the design-build project contract, and re-permitting efforts. As the Project is currently under construction, implementation of either tunneling method alternative would require stopping current construction activities and re-mobilization efforts for the new alternative project configuration using different construction techniques and equipment than the Project. Alternative A would have a longer construction duration as the identified tunneling excavation and construction activities would have to be performed sequentially rather than concurrently as under the Project. Additional construction time would be required for the jet grouting activities that must be performed prior to tunneling efforts to provide needed ground stabilization. In summary, under Alternative A, the duration of construction activities along the Flower Street segment would be reduced, while the duration of construction activities in Little Tokyo would increase. For this alternative, the total project schedule from initiation of construction to start of revenue service would be 10.2 years compared to 6.5 years for the Project.

2.3.2.2 Alternative B – EPBM/SEM Low Alignment Alternative

Alternative B would extend tunneling south to the 7th Street/Metro Center Station through the use of a combination of earth pressure balance tunnel boring machine (EPBM) and sequential excavation method (SEM) construction techniques. The EPBM/SEM Low Alignment Alternative, as shown in Figure 2.3-5, is defined as follows:

EPBM-bored tunnels are constructed on a deep alignment to south of 5th Street and then when the track centers are too close to permit use of EPBMs, construction changes to SEM tunneling the remaining distance to the 7th/Metro Center Station tail track structure.

The Flower Street horizontal alignment of this alternative would remain similar to the Project with a slight shift to the west with the alignment continuing south on tangent track from the 2nd/Hope Station through the 4th Street Bridge piles to 5th Street, and transitioning from a wider track center to a narrow track center by the time the alignment approaches the required double crossover immediately north of the narrow 7th Street/Metro Center Station tail tracks structure. The operational speed would be limited to 35 mph due to the short horizontal transition distance from 5th Street to the double crossover before the existing tail tracks structure.

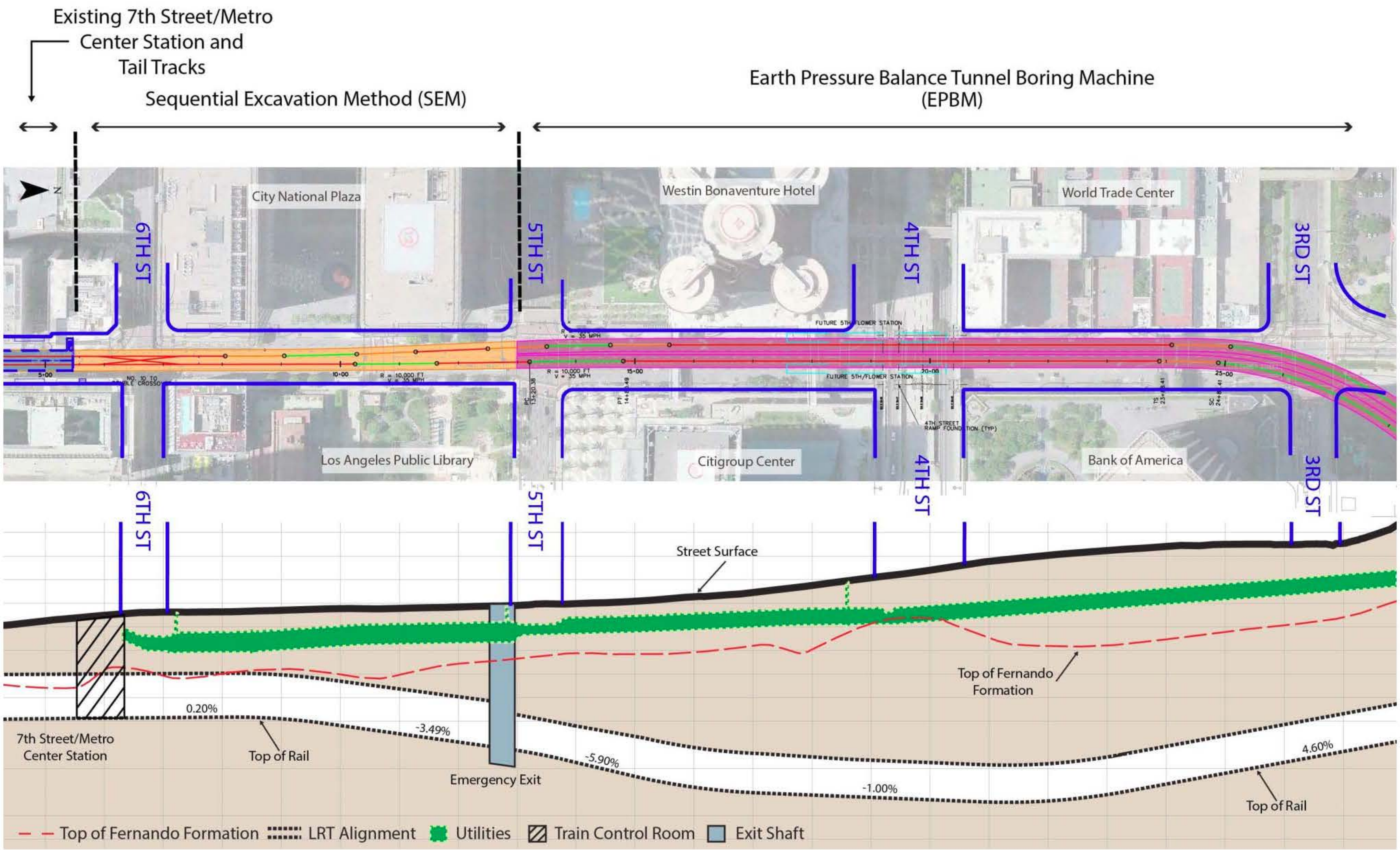
The vertical alignment for Alternative B would be designed with a modified "sag" to reduce the probability of the tunnel alignment encountering tie-backs located under Flower Street between 4th Street and impacting the 4th Street Bridge foundations. This alternative's vertical alignment design would result in an alignment depth varying from 40 feet at the high point to 105 feet to TOR below street surface at the low point. The resulting 5.9 percent gradient on the south end and a 4.6 percent gradient on the north end of the sag would also contribute to the reduction of the Flower Street segment's operational speed from 55 mph under the Project to 35 mph for this alternative.

On steep grades, Metro design criteria limits the grade of the track profile for three-car LRT trains to prevent train slippage. The design criteria identifies a maximum grade of five percent grade change for a track length of 500 to 1,000 feet between vertical points of intersection with flatter segments, and six percent for a grade length of less than 500 feet between vertical points of intersection. Provision of horizontal and vertical curves in the same track segment further reduce the maximum allowable grades. A track profile that does not follow the criteria can result in a reduced design speed that may not meet the Metro Design Criteria requirement for operating headways. The desired operational speed for the Flower Street segment is 55 miles per hour (mph), as identified by MRDC Section 10 – Operations, which is provided by the Project.

The deeper alignment proposed by Alternative B would have significant impacts on the future 5th/Flower and the 2nd/Hope stations:

- The modified sag provides for a flat spot at a one percent grade to accommodate a future 5th/Flower Station. The future station would have to be configured as a side platform since the narrow center-to-center spacing of the twin tunnels would preclude construction of a center platform. The depth of this alternative's tunnels would accommodate construction of a mezzanine. Construction of the future station side platforms would require demolition of a portion of each tunnel in order to provide an opening to connect with the two side platforms.

Figure 2.3-5: EPBM/SEM Low Alignment Alternative (Alternative B)



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Transit service would be interrupted for a substantial length of time to permit this major construction work to take place. Deviations would be required from Metro rail design standards to accommodate the site-specific conditions.

- Due to this alternative's greater depth, the 2nd/Hope Station would be shifted down by 32 feet from the Project station depth (96 feet) to 128 feet from TOR to the street surface. This station location would be deeper because the low point in Alternative B was shifted to the north to accommodate a future 5th/Flower Station. The greater station depth would have an increased risk to stability and safety of excavation shoring; this is an unprecedented depth for work of this nature in Los Angeles, which is not addressed by Metro Support of Excavation standards. Excavating at this depth would increase the difficulty in ventilating the excavation pit during construction, and increase the risk of exposure to hazardous gases. The greater depth would increase the amount of spoils (23,000 cubic yards) handled at the 2nd/Hope station site.

Alternative B would require a minor amount of cut and cover construction for two shafts: 1) an emergency exit south of 5th Street; and 20 a train control room vent shaft north of the 7th Street/ Metro Center Station rail tracks structure. This alternative would not require a tunnel boring machine retrieval shaft as the EPBM would be disassembled and removed through the tunnel to the Mangrove site in Little Tokyo with the EPBM shield left in place. Similar to the Project, cut and cover excavation materials would be handled from excavation sites located along Flower Street, while tunnel muck would be handled through the construction tunnel to the Mangrove portal site in Little Tokyo.

With the extension of tunneling activities further south on Flower Street, there would be a corresponding increase in the amount of excavated materials handled through the Mangrove site over the Project conditions. For Alternative B, it is estimated that 20 percent (compared to 81 percent for the Project) of the excavated materials would be handled from locations along Flower Street, with an increase to 80 percent (compared to 19 percent under Project conditions) of the tunneling would be accommodated through the Little Tokyo site.

Construction Method Risks and Need for Grouting

For Alternative B, ground stabilization would be required for the SEM section of the tunneling, but not the EPBM portion. For the SEM portion of the tunneling, the single twin-track tunnel is larger and the tunnel will have varying amounts of mixed-face geologic conditions in the tunnel heading. In this situation, there would be a high risk of creating sinkholes or subsidence on Flower Street. Mitigation by jet grouting would be required.

The jet grouting for the SEM portion would require drilling grout holes on a six-foot by six-foot pattern throughout the area to be grouted as previously shown in Figure 2.3-1. Grout holes would extend from the ground surface through the weak fill and alluvial soils to just into the relatively stronger Fernando Formation, a distance of more than 40 feet. Alternative B would require a 50-foot-wide zone in Flower Street to be grouted. Approximately 1,000 jet holes would be drilled and grouted for this alternative requiring require approximately 8 months (with a risk of doubling the effort for up to 16 months) using two drill rigs as shown in Figure 2.3-1.

The SEM tunneling and related grouting activities for Alternative B would be located between south of 5th Street to just south of 6th Street. As shown in Figures 2.3-2 and 2.3-3, the jet grouting staging areas would occupy the east side of Flower Street during a majority of the jet grouting activities. As shown in the figures, construction of Alternative B would require long term closure of two travel lanes on the east side of Flower Street to house the grouting plant and for equipment storage, along with an additional two closure on the west side to accommodate grouting activities. A total of four lanes would be temporarily closed for eight months, possibly extending to 16 months due to unforeseen underground conditions, when grouting is taking place.

Schedule Impacts

Implementation of Alternative B would extend the project construction duration by seven (7) months over the Project, and the longer construction duration is due only to changes on Flower Street and related impacts to Little Tokyo. As stated previously, under the Project, cut and cover excavation and construction work would occur concurrently with the excavation of the bored tunnels and other construction activities throughout the alignment. For Alternative B, the primarily tunneling work needs to be performed sequentially, which results in a longer construction timeframe. While the required grouting activity can be performed concurrently with the EPBM tunneling work, but not the SEM work, grouting activity will further impact construction duration with Alternative B requiring two grouting rigs for approximately eight months, and possibly up to 16 months depending on the underground conditions experienced along Flower Street during construction. Due to the need to remove all Flower Street segment tunnel spoils through the Mangrove portal, the tunneling operation would continue until the SEM work is complete. This would hold the start of station construction work for the 2nd/Hope and 2nd/Broadway stations, and of the 2nd/Broadway SEM cavern and all cross passages until after the Flower Street segment tunneling is complete.

The resulting construction method-related scheduled changes are not simply add-ons to the Project construction schedule. As shown previously in Table 2.3-4, implementation of Alternative B would require 36 months over the Project's schedule. The longer duration is due to: 1) an additional 29 months for pre-construction activities; and 2) a longer construction duration by seven (7) months. Pre-construction activities for this alternative would include the preparation of detail engineering design plans, re-procurement activities for the design-build project contract, and re-permitting efforts. As the Project is currently under construction, implementation of this alternative would require stopping current construction activities and re-mobilization efforts for the new alternative project configuration using different construction techniques and equipment than the Project. Alternative B would have a longer construction duration as the identified tunneling excavation and construction activities would have to be performed sequentially rather than concurrently as under the Project. Additional construction time would be required for the jet grouting activities that must be performed prior to tunneling efforts to provide needed ground stabilization. In summary, under Alternative B, the duration of construction activities along the Flower Street segment would be reduced under this alternative, while the duration of construction activities in Little Tokyo would increase. For Alternative B, the total project schedule from initiation of construction to start of revenue service would be 9.5 years compared to 6.5 years for the Project.

CHAPTER 3

Transportation and Circulation

3.0 TRANSPORTATION AND CIRCULATION

This chapter evaluates traffic circulation, transit, parking, pedestrian, bicycle, and rail operational conditions in the Project Area, and the resulting impacts from Alternatives A and B compared to the Project. In order to compare potential impacts during construction of the tunneling method alternatives, only impacts from construction activities along Flower Street and in Little Tokyo were analyzed. Impacts from construction activities for other portions of the project alignment were not analyzed as they would be similar for the tunneling method alternatives as for the Project.

3.1 Affected Environment

This section identifies the existing conditions being evaluated for the Project Area transportation environment. The transportation environment consists of transit, traffic circulation, parking, other modes (e.g., pedestrians and bicycles), and operations.

3.1.1 Transit

Existing bus and rail transit services, including destinations, existing headways, service characteristics, and operating time periods, remain unchanged from those documented in the Final EIS/EIR.

3.1.2 Traffic Circulation

This section describes the existing (2014) traffic conditions in the Project Area.

3.1.2.1 Roadway Network

Traffic was evaluated along Flower Street and key roadways within the Little Tokyo area that could potentially be impacted by changes in construction methods proposed by Alternatives A and B. The evaluated roadway segments are listed below:

1. Flower Street north of 5th Street
2. Flower Street north of 6th Street
3. First Street at Alameda Street
4. Alameda Street at First Street
5. Alameda Street at Temple Street
6. Central Street south of First Street
7. San Pedro Street at First Street
8. San Pedro Street at Second Street
9. Temple Street at Alameda Street
10. Temple Street at Judge John Aiso Street

Level of Service (LOS) is the measurement used to relate the quality of traffic service, and is used to analyze roadways by assigning quality levels of traffic based on measurements such as speed, density, etc. The LOS categories are shown in Table 3.1-1. Table 3.1-2 shows the existing LOS at each of the ten study area roadway segments along Flower Street and in Little Tokyo.

Table 3.1-1: Level of Service (LOS) Categories and Criteria

Level of Service	Average Vehicle Delay (in seconds)	Definition
A	<10.0	EXCELLENT. No vehicle waits longer than one red light and no approach phase is fully used.
B	>10.0 and <20.0	VERY GOOD. An occasional approach phase is fully utilized; many drivers begin to feel somewhat restricted within groups of vehicles.
C	>20.0 and <35.0	GOOD. Occasionally, drivers may have to wait through more than one red light; backups may develop behind turning vehicles.
D	>35.0 and <55.0	FAIR. Delays may be substantial during portions of the rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups.
E	>55.0 and <80.0	POOR. Represents the most vehicles that intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.
F	>80.0	FAILURE. Backups from nearby intersections or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Tremendous delays with continuously increasing queue lengths.

As shown in Table 3.1-1, all ten study area roadway segments currently operate at an acceptable LOS C or better during both the morning (AM) and evening (PM) peak hours.

3.1.2.2 Parking

For the SEIS, the affected Flower Street and Little Tokyo street segments for each of the two tunneling method alternatives were surveyed to review the existing number of parking spaces and associated peak period parking restriction information to provide a baseline for assessing impacts. There are no changes to the parking information presented in the Final EIS/EIR. In summary, there is limited on-street parking along Flower Street and adjacent to the Mangrove site in Little Tokyo. On Flower Street, metered two hour parking (8:00 AM to 8:00 PM) is provided only on the east side of the street in two locations between: 1) 4th and 5th Streets; and 2) 6th Street and Wilshire Boulevard.

3.1.2.3 Pedestrians

The central downtown area experiences heavy pedestrian traffic on weekdays, particularly during the commute and lunch hours. Much of the pedestrian traffic occurs in areas with daytime employment, such as Bunker Hill, the Financial District, and the Historic Core. Pedestrian movement also occurs between the Civic Center and Little Tokyo along Temple, 1st, and 2nd Streets.

Table 3.1-2: Existing Roadway Level of Service (LOS) Analysis (2014)

No.	Roadway	No. of Lanes	Peak Hour Capacity[1]	AM Peak Hour			PM Peak Hour		
				Volume	V/C[2]	LOS	Volume	V/C	LOS
1	Flower St n/o 5th St	6	4,800	1,239	0.258	A	1,595	0.332	A
2	Flower St n/o 6th St	6	4,800	1,219	0.254	A	1,651	0.344	A
3	First St at Alameda St	4	3,200	1,385	0.433	A	1,756	0.549	A
4	Alameda St at First St	4	3,200	2,218	0.693	B	1,976	0.618	B
5	Alameda St at Temple St	4	3,200	2,395	0.748	C	2,177	0.680	B
6	Central St s/o First St	3	2,400	858	0.358	A	1,142	0.476	A
7	San Pedro St at First St	4	3,200	570	0.178	A	847	0.265	A
8	San Pedro St at Second St	4	3,200	1,093	0.342	A	1,299	0.406	A
9	Temple St at Alameda St	4	3,200	697	0.218	A	1,092	0.341	A
10	Temple St at Judge John Aiso	4	3,200	1,050	0.328	A	1,302	0.407	A

Notes:
[1] Capacity values of 800 vehicles per hour per through lane for arterial segment analysis based on 2010 Los Angeles Congestion Management Plan (CMP), Appendix D guidelines
[2] V/C = volume to capacity ratio
Source: Los Angeles City Department of Transportation, 2014; Los Angeles CMP; and AECOM, 2014

Despite heavy pedestrian activity, analysis of the area near the evaluated alternatives along Flower Street between 3rd and 6th Streets, including the Project, did not reveal any particularly problematic pedestrian crossings (insufficient crosswalks, sidewalk overcrowding, inadequate pedestrian walk signal time, etc.).

The Financial District attracts a high number of pedestrians during weekdays. Seventh Street experiences large volumes of pedestrians due to Metro rail portals and bus stops, the location of hotels (Sheraton, The Standard, and the Los Angeles Athletic Club), major retail and restaurant row along 7th Street (The Bloc/former Macy's Plaza and 7th at Fig Shopping Center), and employment centers throughout. While weekend pedestrian activity has increased as well, weekday volumes are still higher. Unlike years past where pedestrian activity decreased at night in the central downtown area as a majority of the daytime population left after business hours, downtown has experienced a resurgence of nighttime activity due to residents and visitors. The growing residential population has activated the evening pedestrian experience, as have tourists, convention center attendees, and LA Live entertainment venue visitors. Previous pedestrian hubs remain, such as Little Tokyo and the Arts District, that have high evening activity due to increases in housing and a solid commercial base of restaurants and cultural destinations.

3.1.2.4 Bicycles

There are no exclusive bike lanes on Flower Street or adjacent to the Mangrove site in Little Tokyo. There are bike lanes in/around the vicinity of the Financial District along Figueroa Street. In Little Tokyo, there is a shared-lane or sharrowed bike route along 1st and 2nd Streets. These streets in both areas are used by bicyclists, particularly along Flower Street near City National Plaza, where bicycle messengers assemble in between delivery assignments.

3.1.2.5 Operational Impacts

The operational impacts resulting from implementation of the tunneling method alternatives on traffic circulation, transit, parking, pedestrian, and bicycle is discussed, along with the resulting quality of rail system operational performance.

3.2 Environmental Consequences

This section describes the potential impacts of Alternatives A and B on transit, traffic circulation, parking, pedestrians, and bicyclists during construction and operation. Impact conclusions for the tunneling method alternatives are based on the thresholds identified in Appendix B – Regulatory Framework Section 1.1 of this document.

3.2.1 Alternative A – EPBM/Open Face Shield/SEM Project Profile

3.2.1.1 Construction Impacts

Alternative A would result in an increase in the level and duration of excavation-related activity in Little Tokyo over Project conditions, as previously presented in Table 2.3-1, and would have corresponding construction-related transportation impacts. Even though surface-related excavation activities along Flower Street under Alternative A are reduced in comparison to conditions under the Project, the required grouting operations would result in the closure of two additional travel lanes at a time to provide space for grouting equipment and staging areas for the two phases of grouting activity. Alternative A would decrease the share of excavation materials handled on Flower Street from 81 percent under the Project to 25 percent. Correspondingly, it would increase the quantity of Flower

Street excavation materials handled in Little Tokyo from 19 percent under the Project to 75 percent, and would increase the duration of those activities and impacts by 15 months. It should be noted that these percentages reflect the volume of excavated materials from the Flower Street segment only, not of the entire Regional Connector project.

For Alternative A, a minor amount of cut and cover construction would be required for three shafts: an emergency exit and tunnel boring machine retrieval shaft south of 4th Street, an emergency exit south of 5th Street, and a train control room vent shaft north of the 7th Street/Metro Center Station tail tracks structure. The excavated materials of these shafts would be primarily handled along Flower Street.

In order to stabilize the ground for open-face shield and SEM excavations, extensive jet grouting will be required from south of 4th to 6th Streets. Construction of Alternative A would require the closure of two travel lanes at a time for approximately 12 months to accommodate the two phases of grouting activities. Grouting activities could extend up to approximately 24 months due to unforeseen underground conditions. Figure 3.1 shows driveway access, traffic circulation impacts, and staging areas required for the Project, and Figures 3.2 and 3.3 illustrate the grouting areas, as well as equipment staging areas, required along Flower Street for Alternatives A and B. During Phase I, construction of Alternative A would require the closure of two lanes on the east side of Flower Street for construction and grouting equipment staging, as well as closure of the two center travel lanes for grouting activities. During Phase II, the two lanes on the west side of Flower Street would be used for grouting activities along with the two lanes on the east side for equipment staging. A total of four lanes would be temporarily closed during periods when grouting is taking place for approximately 12, possibly up to 24 months.

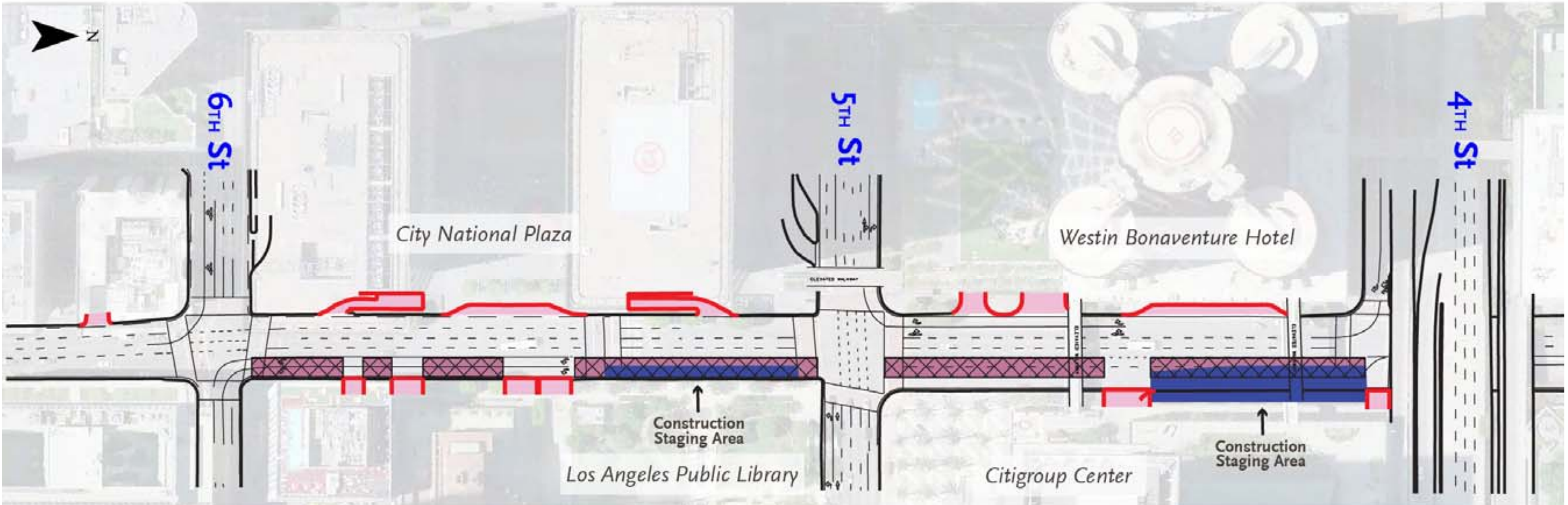
Additionally, as discussed in Chapter 2, there is potential for encountering tie-backs along Flower Street. There are multiple rows consisting of hundreds of tie-backs forming a “mesh” that are located within the Flower Street segment tunnel alignment, particularly south of 4th Street and with an even higher density south of 5th Street. If this were to occur, garage and driveway access could be affected by emergency work related to tie-backs.

Transit

Alternative A may require relocation of two Flower Street bus stops between 4th and 6th Streets due to Phase II grouting activities along the eastern side of the street. Although construction would occur during nighttime and weekend hours, under the two phased grouting scenario (shown in Figures 3.2 and 3.3), construction would require the use of two traffic lanes at a time for grouting equipment during weekday hours. Additionally, bus service may need to be rerouted in the case of night closures of Flower Street in its entirety.

Alternative A would have an adverse transit effect on Flower Street between 4th and 6th Streets due to the need for additional lane closures compared to the Project.

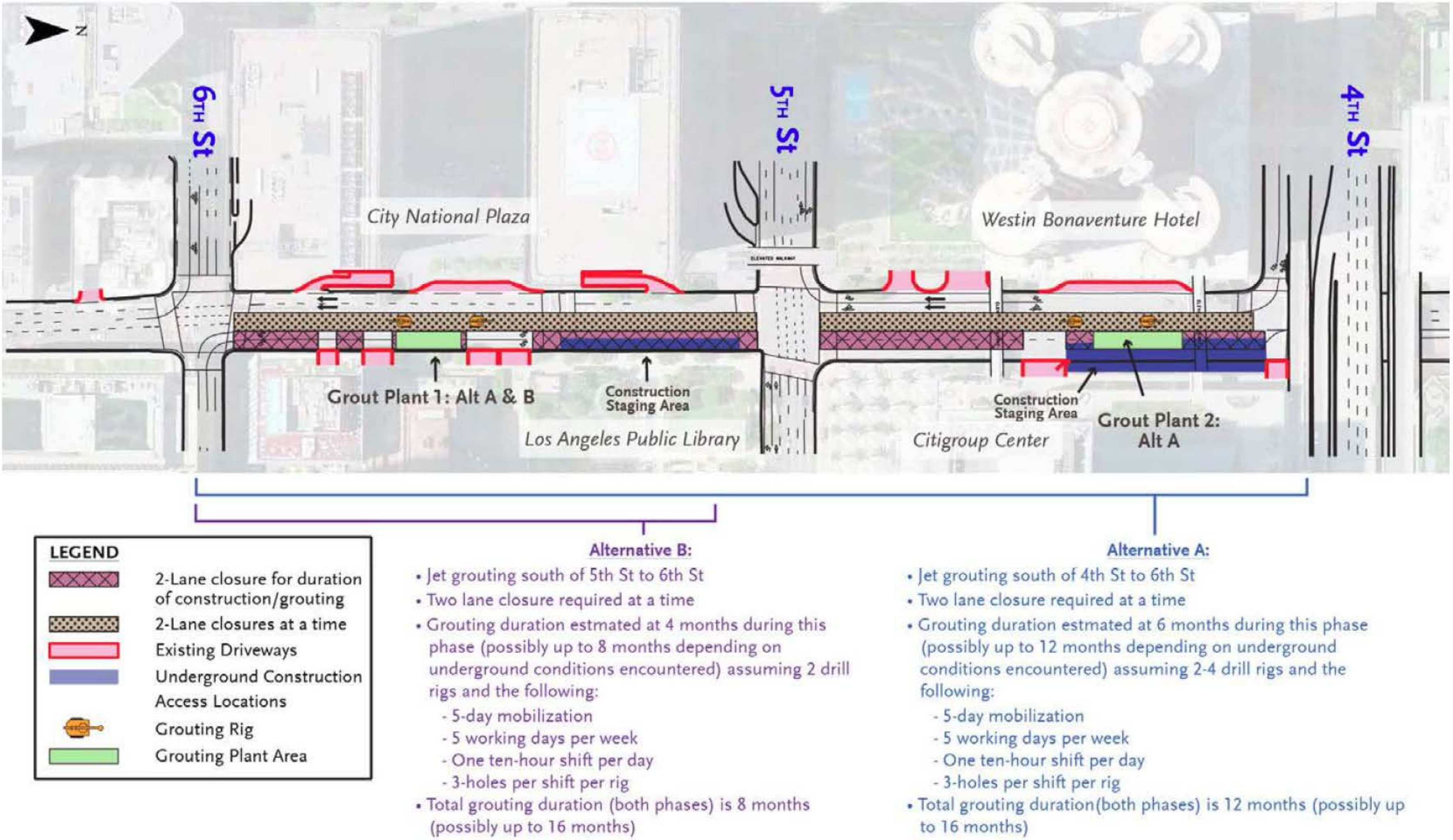
Figure 3.1: Driveway Access, Traffic Circulation Impacts, and Staging Areas during Construction – The Project



LEGEND

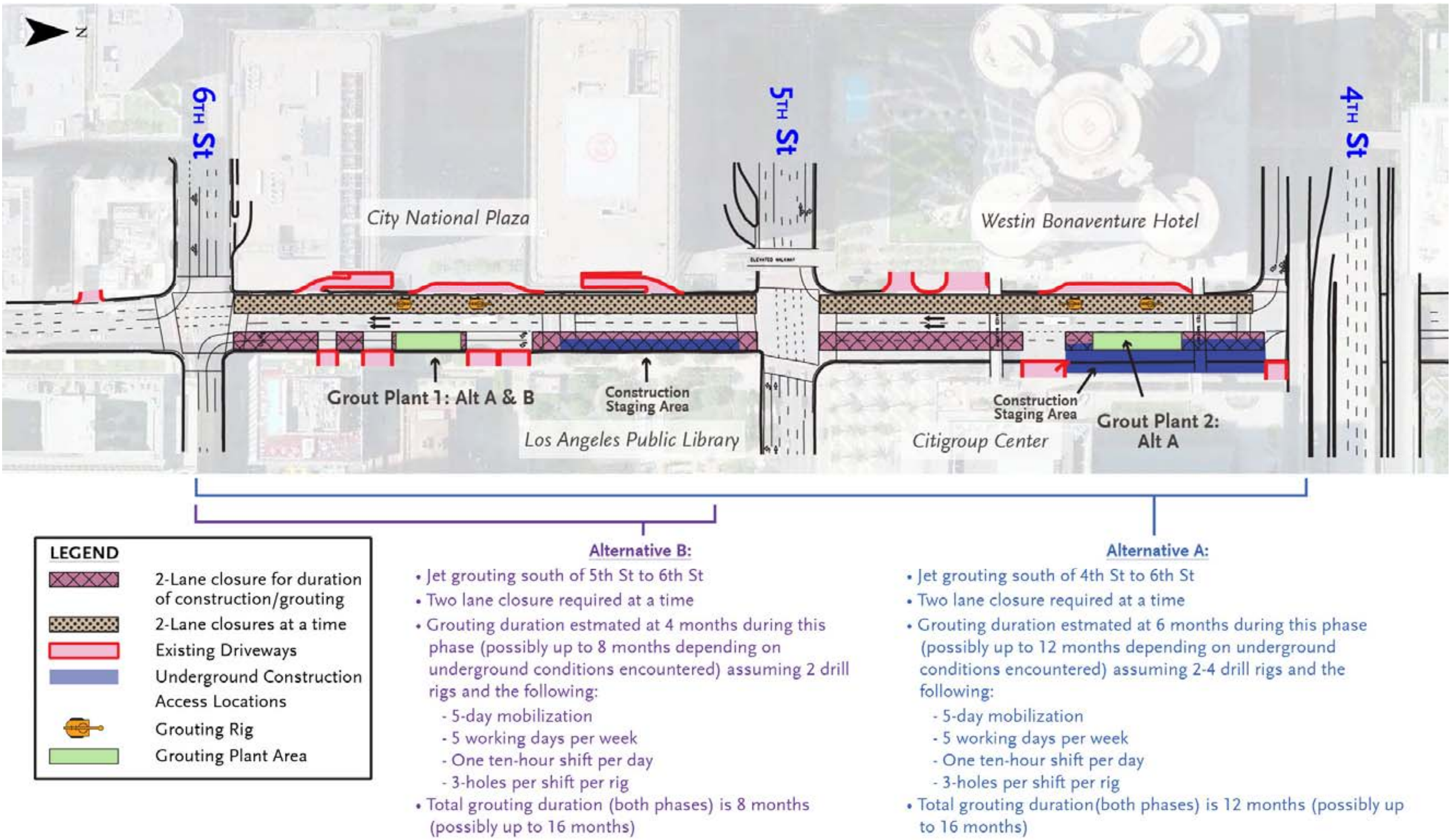
- 2-Lane closure for duration of construction
- Existing Driveways
- Underground Construction Access Locations

Figure 3.2: Driveway Access, Traffic Circulation Impacts, Construction Staging, and Grouting Areas (Phase I) – Alternatives A and B



Note: Figure is representative of a concept grouting operation. The final grouting and traffic plans would be dependent on the Contractor's design.

Figure 3.3: Driveway Access, Traffic Circulation Impacts, Construction Staging, and Grouting Areas (Phase II) – Alternatives A and B



Note: Figure is representative of a concept grouting operation. The final grouting and traffic plans would be dependent on the Contractor's design.

Traffic Circulation

Under Alternative A, handling of Flower Street segment excavation materials on Flower Street would decrease from 81 percent under the Project to 25 percent, with a corresponding increase in the amount of Flower Street segment materials handled through the Mangrove portal site in Little Tokyo. The number of soils excavation and construction trucks using the Flower Street route would decrease to 18 trucks per day compared to 32 for the Project, while the number of trucks using the Little Tokyo haul routes would increase to 22 trucks per day versus eight trucks under the Project.

Table 3.2-1 shows the effect of the shift in excavation truck trips from Flower Street to Little Tokyo on study area roadway segments. Table 3.2-1 also reflects the reduction in capacity on Flower Street from six lanes to two lanes to accommodate construction and grouting equipment staging. Figures 3.4 and 3.5 provide a comparison of the Project and Alternative A in the Flower Street and Little Tokyo study areas, respectively.

Figure 3.4: Flower Street LOS for Each Alternative (During Construction, 2014-2017)

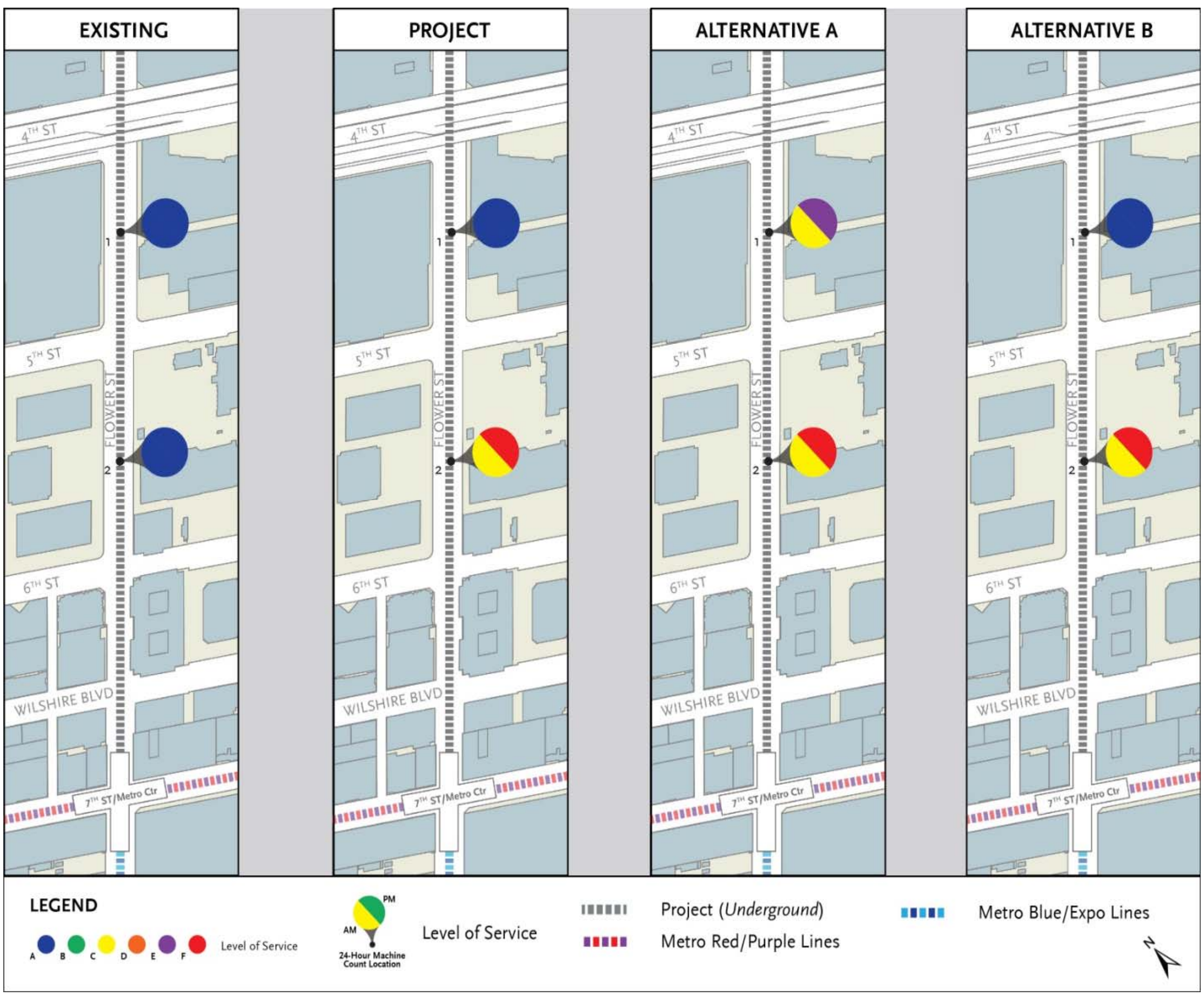


Figure 3.5: Little Tokyo LOS for Each Alternative (During Construction, 2014-2017)

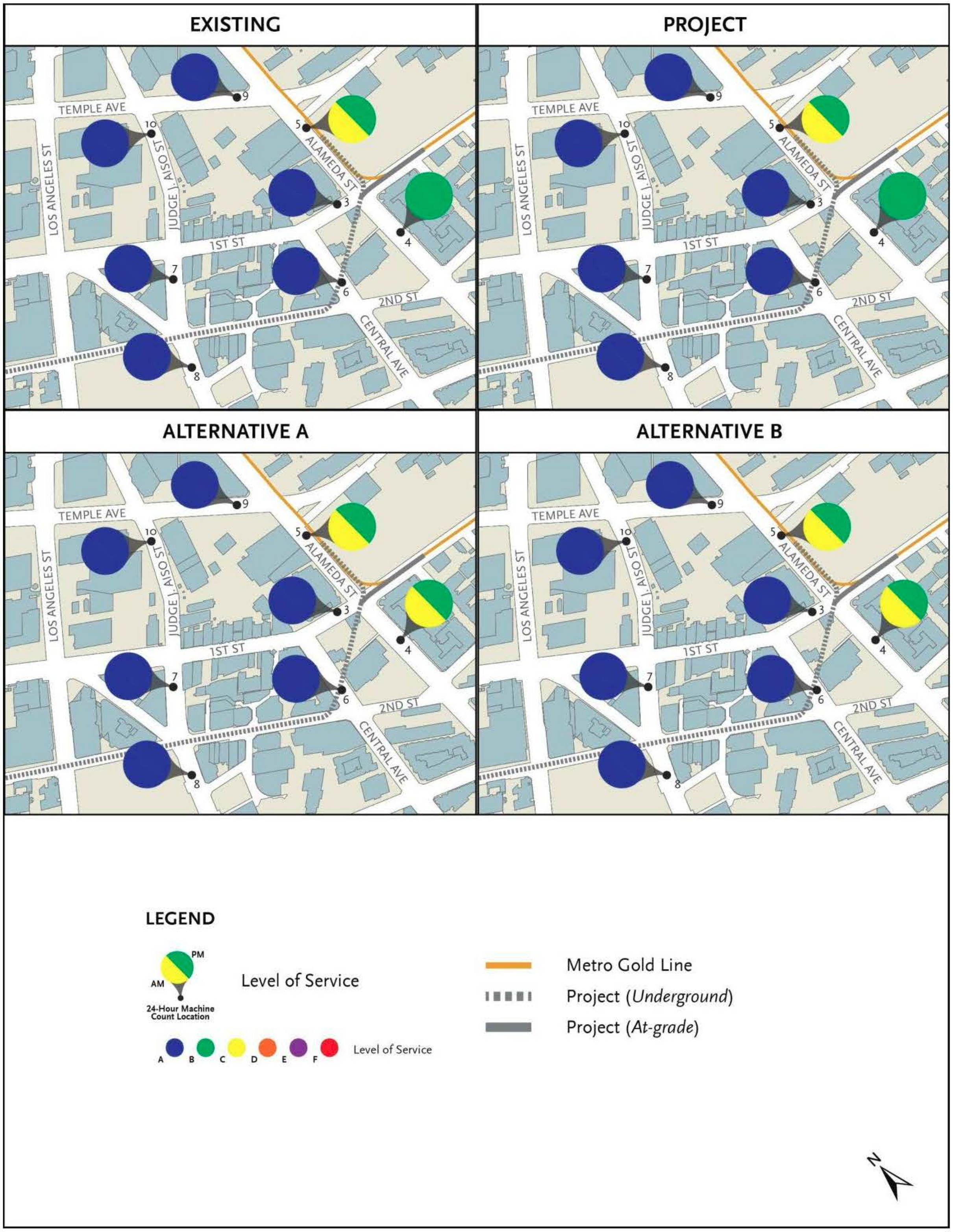


Table 3.2-1: Alternative A – Level of Service Analysis (During Construction, 2014-2017)

No.	Roadway	No. of Lanes	Peak Hour Capacity[1]	AM Peak Hour			PM Peak Hour		
				Volume	V/C[2]	LOS	Volume	V/C	LOS
1	Flower St n/o 5th St	2	1,600	1,217	0.761	C	1,573	0.983	**E**
2	Flower St n/o 6th St	2	1,600	1,197	0.748	C	1,629	1.018	**F**
3	First St at Alameda St	4	3,200	1,407	0.440	A	1,778	0.556	A
4	Alameda St at First St	4	3,200	2,240	0.700	C	1,998	0.624	B
5	Alameda St at Temple St	4	3,200	2,417	0.755	C	2,199	0.687	B
6	Central St s/o First St	3	2,400	880	0.367	A	1,164	0.485	A
7	San Pedro St at First St	4	3,200	592	0.185	A	869	0.272	A
8	San Pedro St at Second St	4	3,200	1,115	0.348	A	1,321	0.413	A
9	Temple St at Alameda St	4	3,200	719	0.225	A	1,114	0.348	A
10	Temple St at Judge John Aiso	4	3,200	1,072	0.335	A	1,324	0.414	A

Notes:
[1] Capacity values of 800 vehicles per hour per through lane for arterial segment analysis based on 2010 Los Angeles Congestion Management Plan Appendix D guidelines
[2] V/C = volume to capacity ratio
Bolded and shaded intersections operate at or approaching an unacceptable LOS E or worse, per City guidelines
Source: Los Angeles City Department of Transportation, 2014; Los Angeles Congestion Management Plan (CMP); AECOM, 2014

During construction, evening peak period traffic operations along Flower Street north of 5th Street and north of 6th Street would degrade to unacceptable LOS E and F, respectively, due to the additional two lane closure required for construction activities, compared to LOS A for the Project.

While the LOS would remain unchanged with the shift in excavation truck trips from Flower Street to Little Tokyo – with only a slight increase in the volume/capacity ratio – travel times may increase for vehicles circulating along the Little Tokyo haul routes. Under Alternative A, the duration of these impacts would be 15 months longer than the Project.

Construction of Alternative A would have an adverse effect on traffic on Flower Street between 4th and 5th Streets when compared to the Project. Although the majority of the impacts identified under Alternative A would be temporary, they would be adverse and unavoidable.

Parking

There is limited on-street parking along Flower Street and adjacent to the Mangrove site in Little Tokyo, and there are no changes from the conditions identified in the Final EIS/EIR. Under Alternative A, construction-related parking impacts along the Flower Street segment would be similar to those identified for the Project. As stated in the Final EIS/EIR, parking effects would be considered adverse before mitigation only in the Little Tokyo community portion of the alignment – in street segments where reduction in traffic lanes and roadway space would be utilized for street enhancements and/or underground station construction; however parking impacts would not be adverse after implementation of mitigation identified in the Final EIS/EIR.

Other Modes

Pedestrian access along Flower Street to adjoining properties and bicycle traffic movements would be maintained during construction of Alternative A. Portions of sidewalks may be temporarily closed for decking construction at cut and cover shaft locations similar to the Project. Bicycle riders could be affected by uneven roadway surfaces, cracks, metal surfaces, or other dangerous conditions, due to the different construction methods proposed under this alternative.

Temporary closures of sidewalks and crosswalks may be necessary. Lane reductions and street closures could inhibit the flow of bicycle traffic during construction, particularly along Flower Street during grouting activities on the central and eastern sides of the street. Although temporary, the identified potential impacts during construction on pedestrian and bicycle movements would be adverse and unavoidable similar to the Project.

3.2.1.2 Operational Impacts

There would be no operational impacts from implementation of Alternative A on traffic circulation, transit, parking, or other modes beyond those identified for the Project.

There would be a reduction in the light rail transit (LRT) operational speed in the Flower Street segment for Alternative A, which would be reduced to 35 mph from 55 mph under the Project and identified as required by Metro Rail Design Criteria, Section 10 Operations. The speed reduction would have impacts on rail headway and runtimes compared to the Project, and Alternative A would offer less travel time savings than the Project. Increased travel times may result in a reduction in project ridership, and a corresponding decrease in air quality and climate change benefits as SOV drivers are not attracted to shift to rail service.

3.2.2 Alternative B – EPBM/SEM Low Alignment Alternative

3.2.2.1 Construction Impacts

Alternative B would result in an increase in the level and duration of excavation-related activity in Little Tokyo over the Project, as previously presented in Table 2.3-1, and would have corresponding construction-related transportation impacts. Even though surface-related excavation activities along Flower Street under Alternative B are reduced in comparison to conditions under the Project, the required grouting operations would result in the closure of two additional travel lanes at a time to provide space for grouting equipment and staging areas for the two phases of grouting activity. Alternative B would decrease the share of excavation materials handled on Flower Street from 81 percent under the Project to 20 percent. Correspondingly, it would increase the quantity of Flower Street excavation materials handled in Little Tokyo from 19 percent under the Project to 80 percent, and would increase the duration of those activities and impacts by seven months. It should be noted that these percentages reflect the volume of excavated materials from the Flower Street segment only, not of the entire Regional Connector project.

For Alternative B, a minor amount of cut and cover construction would be required for two shafts: an emergency exit south of 5th Street, and a train control room vent shaft north of the 7th Street/Metro Center Station tail tracks structure. The excavated materials of these shafts would be handled along Flower Street. The excavated materials of these shafts would be primarily handled along Flower Street.

In order to stabilize the ground for SEM and extension of EPBM tunneling further south on Flower Street, extensive jet grouting will be required from 5th Street to 6th Street. Construction of Alternative B would require the closure of two travel lanes at a time for approximately eight months to accommodate the two phases of grouting activities. Grouting activities could extend up to approximately 16 months due to unforeseen underground conditions. Figures 3.2 and 3.3 illustrate the grouting area, as well as the equipment staging areas, required along Flower Street for Phases I and II. During Phase I, construction of Alternative B would require the closure of two lanes on the east side for construction and grouting equipment staging , as well as closure of the two center travel lanes for grouting activities. During Phase II, the lanes on the west side of Flower Street would be used for grouting activities along with the two lanes on the east side for equipment staging. A total of four lanes would be temporarily closed when grouting is taking place for approximately for a total of eight months, possibly up to 16 months.

Additionally, as discussed in Chapter 2, there is potential for encountering tie-backs along Flower Street. There are multiple rows consisting of hundreds of tie-backs forming a “mesh” that are located within the Flower Street segment tunnel alignment, particularly south of 4th Street and with an even higher density south of 5th Street. If this were to occur, garage and driveway access could be affected by emergency work related to tie-backs.

Transit

Alternative B may require relocation of one major Flower Street bus stop between 5th and 6th Streets due to Phase II grouting activities along the eastern side of the street. Although construction would occur during nighttime and weekend hours, under the two phased grouting scenario (shown in Figures 3.2 and 3.3), construction would require the use of two traffic lanes at a time for grouting equipment during weekday hours. Additionally, bus service may need to be rerouted in the case of night closures of Flower Street in its entirety.

Alternative B would have an adverse transit effect on Flower Street between 5th and 6th Streets due to the need for additional lane closures compared to the Project.

Traffic Circulation

Under Alternative B, handling of Flower Street segment excavation materials on Flower Street would be decreased from 81 percent under the Project to 20 percent, with a corresponding increase in the amount of Flower Street segment materials handled through the Mangrove portal site in Little Tokyo. The number of excavation trucks using the Flower Street route would decrease by 24 trucks to eight trucks per day, while the number of trucks using the Little Tokyo haul routes would increase to 32 trucks per day versus eight for the Project.

Table 3.2-2 shows the effect of the shift in excavation truck trips from Flower Street to Little Tokyo on study area roadway segments. Table 3.2-2 also reflects the reduction in capacity on Flower Street from six lanes to two lanes to accommodate the two-phased construction and grouting equipment staging, as previously shown in Figures 3.2 and 3.3.

Traffic operations along Flower Street between 5th and 6th Streets would degrade to unacceptable LOS F during the PM peak due to the two lane closure required to accommodate construction and grouting equipment. In Little Tokyo, although the LOS would remain relatively unchanged with the shift in excavation truck trips from Flower Street to Little Tokyo – with only a slight increase in the volume/capacity ratio – travel times may increase for vehicles circulating along the Little Tokyo haul routes. Under Alternative B, the duration of these traffic impacts would be seven months longer than the Project.

Construction of Alternative B would have an adverse effect on traffic on Flower Street between 5th and 6th Streets when compared to the Project. Although the majority of the impacts identified under Alternative B would be temporary, they would be adverse and unavoidable.

Parking

There is limited on-street parking along Flower Street and adjacent to the Mangrove site in Little Tokyo, and there are no changes from conditions identified in the Final EIS/EIR. Under Alternative B, construction-related parking impacts would be similar to those identified for the Project. As stated in the Final EIS/EIR, parking effects would be considered adverse before mitigation only in the Little Tokyo community portion of the alignment, in portions where reduction in traffic lanes and roadway space would be utilized for street enhancements and/or underground station construction; however parking impacts would not be adverse after implementation of mitigation identified in the Final EIS/EIR.

Other Modes

Pedestrian access along Flower Street to adjoining properties and bicycle traffic movements would be maintained during construction of Alternative B; however, portions of sidewalks may be temporarily closed for decking construction at cut and cover shaft locations similar to the Project. Bicycle riders could be affected by uneven roadway surfaces, cracks, metal surfaces, or other dangerous conditions, due to different construction methods.

Table 3.2-2: Alternative B – Level of Service Analysis (During Construction, 2014-2017)

No.	Roadway	No. of Lanes	Peak Hour Capacity[1]	AM Peak Hour			PM Peak Hour		
				Volume	V/C[2]	LOS	Volume	V/C	LOS
1	Flower St n/o 5th St	4	3,200	1,215	0.380	A	1,571	0.491	A
2	Flower St n/o 6th St	2	1,600	1,195	0.747	C	1,627	1.017	**F**
3	First St at Alameda St	4	3,200	1,409	0.440	A	1,780	0.556	A
4	Alameda St at First St	4	3,200	2,242	0.701	C	2,000	0.625	B
5	Alameda St at Temple St	4	3,200	2,419	0.756	C	2,201	0.688	B
6	Central St s/o First St	3	2,400	882	0.368	A	1,166	0.486	A
7	San Pedro St at First St	4	3,200	594	0.186	A	871	0.272	A
8	San Pedro St at Second St	4	3,200	1,117	0.349	A	1,323	0.413	A
9	Temple St at Alameda St	4	3,200	721	0.225	A	1,116	0.349	A
10	Temple St at Judge John Aiso	4	3,200	1,074	0.336	A	1,326	0.414	A

Notes:
[1] Capacity values of 800 vehicles per hour per through lane for arterial segment analysis based on 2010 Los Angeles CMP Appendix D guidelines
[2] V/C = volume to capacity ratio
Bolded and shaded intersections operate at or approaching an unacceptable LOS E or worse, per City guidelines
Source: Los Angeles City Department of Transportation, 2014; Los Angeles CMP; AECOM, 2014

Temporary closures of sidewalks and crosswalks may be necessary. Lane reductions and street closures could inhibit the flow of bicycle traffic during construction, particularly along Flower Street during grouting activities on the central and eastern sides of the street. Although temporary, the identified potential impacts during construction on pedestrian and bicycle movements would be adverse and unavoidable similar to the Project.

3.2.2.2 Operational Impacts

There would be no operational impacts from implementation of Alternative B on traffic circulation, transit, parking, or other modes beyond those identified for the Project.

There would be a reduction in the resulting LRT operational speed in the Flower Street segment for Alternative B, which would be reduced to 35 mph from 55 mph under the Project and identified as required by Metro Rail Design Criteria, Section 10 Operations. This speed reduction would have permanent negative operational impacts on headway and runtimes compared to the Project, and Alternative B would offer less travel time savings than the Project. Increased travel times may result in a reduction in project ridership, and a corresponding decrease in air quality and climate change benefits as SOV drivers are not attracted to shift to rail service.

3.3 Mitigation Measures

Mitigation measures to reduce potential transportation impacts during construction were identified in the Final EIS/EIR. Implementation of mitigation measures TR-1 through TR-13 from the Final EIS/EIR for the Project would apply for Alternatives A and B. Below is a summary of these mitigation measures, and a detailed description can be found in Appendix H:

- TR-1: Prior to construction, traffic management and construction mitigation plans shall be devised outlining access routes, haul truck activity, street closures, etc
- TR-2: Haul truck routes confirmed during final design and all haul truck activity
- TR-3: Construction worker parking and designated contractor designated areas
- TR-4: Implementation of safe pedestrian detours and crosswalks with ADA compliance
- TR-5: Proper signage for bicyclists of detours, travel lanes, and alternate routes
- TR-6: Permanently restriping Flower Street at the 4th Street intersection
- TR-7: Permanently restriping Flower Street at the 5th Street intersection
- TR-8: Permanently restriping Flower Street at the 6th Street intersection
- TR-9: Continued shuttle service and bus drop-off areas at City National Plaza
- TR-10: Design and implementation of linkages to the proposed Broadway Streetcar
- TR-11: Enhanced pedestrian walkways along Flower Street to better connect Financial District
- TR-12: Maintaining access to bus stops whenever possible and adequate signage
- TR-13: Temporary relocation of bus stops to nearby alternative locations

As with the Project, potentially adverse construction-related effects to traffic, transit, bicycle, and pedestrian circulation would remain after implementation of these mitigation measures for Alternative A and B, which would have additional transportation impacts along Flower Street and in Little Tokyo beyond those identified for the Project. Parking effects would be considered adverse before mitigation in the Little Tokyo area.

CHAPTER 4

Affected Environment and Environmental Consequences

4.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The following sections discuss the impacts associated with environmental resources for the tunneling method Alternatives A and B. The construction methods described in Chapter 2.0, Alternatives Considered have varying construction impacts along the focused Flower Street segment and Little Tokyo area analyzed in this SEIS. For some environmental resource areas, operational impacts are not changed from those identified in the Final EIS/EIR and are not discussed further. Resource areas with no additional operational impacts beyond those identified for the Project in the Final EIS/EIR include:

- Visual Quality
- Air Quality
- Climate Change
- Geotechnical
- Energy Resources
- Historical Resources
- Cumulative

In order to identify potential impacts during construction of the tunneling method alternatives, possible effects from construction activities along Flower Street and in Little Tokyo were analyzed. Impacts from construction activities for other portions of the Project Area from the Final EIS/EIR were not analyzed because they would be the same for these alternatives as for the Project.

4.1 VISUAL QUALITY

This section summarizes the existing visual and aesthetic environment within the Study Area for this SEIS and evaluates the potential visual and aesthetic impacts resulting from construction of Alternatives A and B. Potential visual impacts to historic resources are summarized in Section 4.7 Historic Resources of this SEIS.

4.1.1 Affected Environment

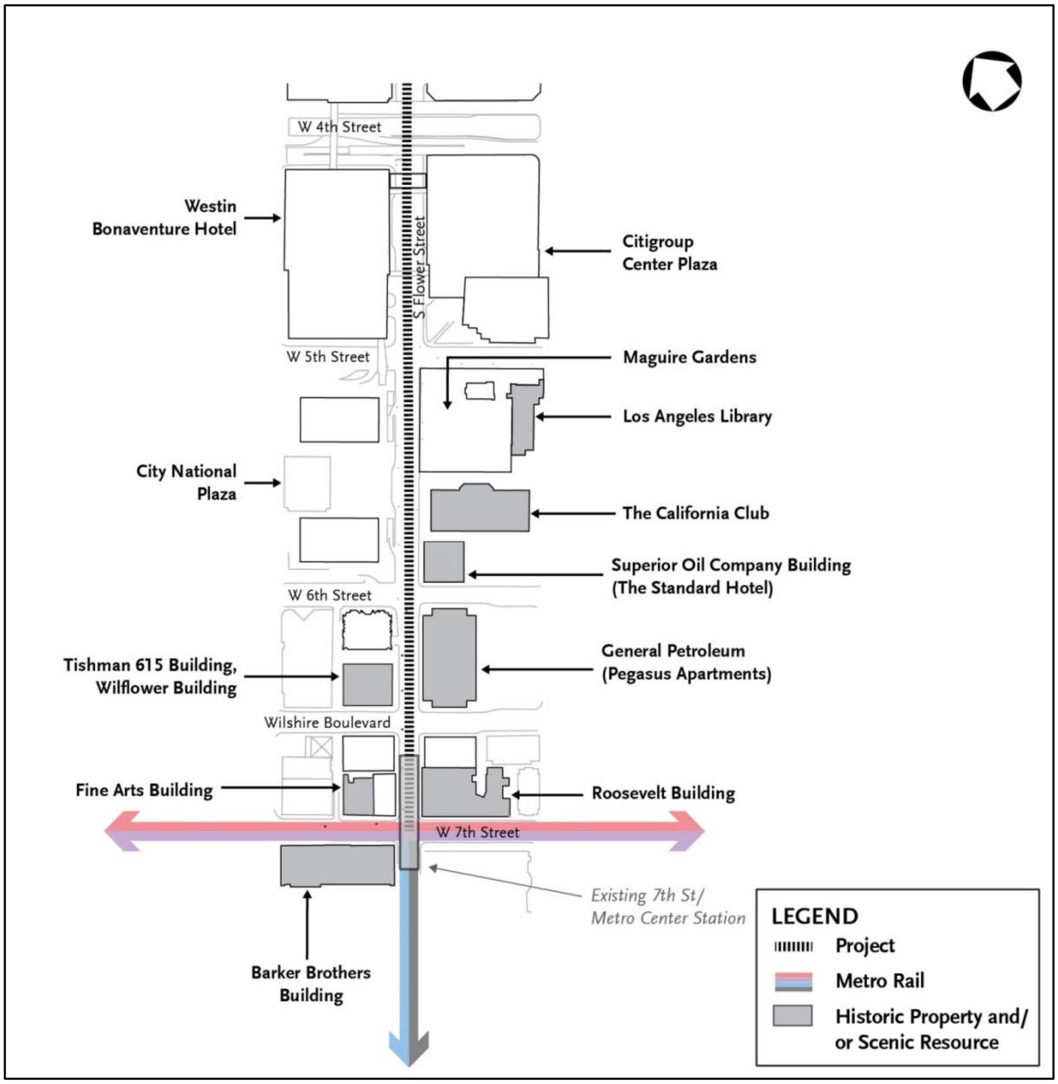
As identified in Section 4.4 Visual and Aesthetic Impacts of the Final EIS/EIR, the area for the visual impact analysis consists of the area one city block adjacent to each side of the two tunneling method alternatives along the Flower Street segment between 4th Street and 7th Street/Metro Center Station in the Financial District, and the Mangrove portal site in Little Tokyo.

4.1.1.1 Visual Resources

The existing visual and aesthetic environment is characterized by an established urban landscape. Research was completed to locate visual and aesthetic resources. These resources include, but are not limited to, structures of architectural or historic significance or visual prominence; public plazas, art, and gardens; heritage oaks or other trees or plants protected by the City of Los Angeles; consistent design elements (such as setbacks, massing, height, and signage) along a street or district; pedestrian amenities; and landscaped medians or park areas. Based on site reviews, the predominant visual resources along Flower Street and in Little Tokyo are recognized historic buildings. Figures 4.1-1 and

4.1-2 illustrate identify Flower Street and Little Tokyo buildings respectively that are recognized as historic or visual resources adjacent to the proposed Alternative A and B alignments.

Figure 4.1-1: Historic Properties and Scenic Resources along Flower Street



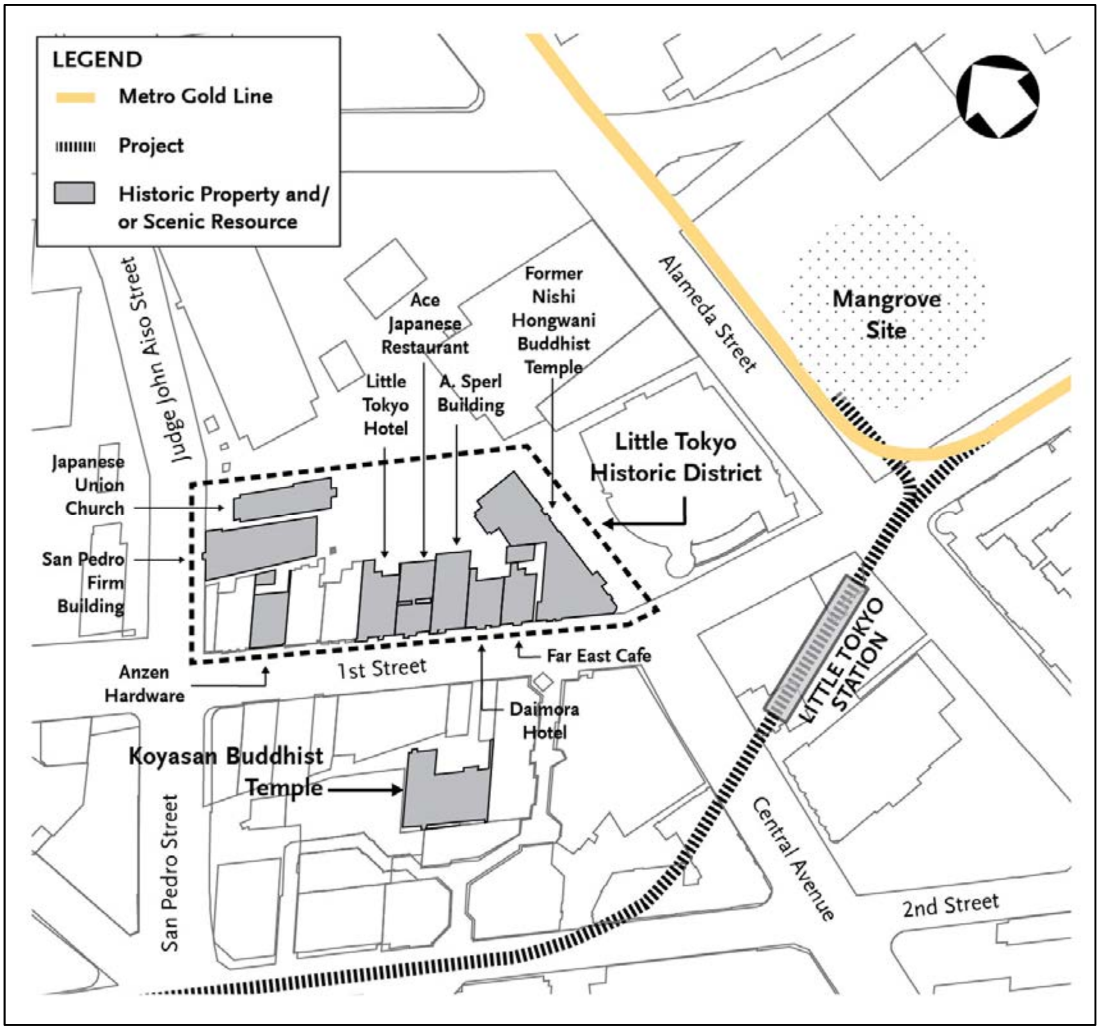
Along Flower Street:

- Pegasus Apartments, 612 South Flower Street
- The Standard Hotel, 550 South Flower Street
- The California Club, 538 South Flower Street
- Los Angeles Central Library and Maguire Gardens, 630 West 5th Street
- Tishman 615 Building , 811 Wilshire Boulevard
- Roosevelt Building, 727 West 7th Street
- Barker Brothers Building, 818 West 7th Street

In the Little Tokyo Area:

- Little Tokyo Historic District
- Los Angeles Hompa Hongwanji Temple
- Union Center Arts

Figure 4.1-2: Historic Properties and Scenic Resources in Little Tokyo



4.1.1.2 Scenic Vistas

The City of Los Angeles General Plan and the Scenic Highways Plan within the General Plan's Circulation Element state that there are no scenic highways in downtown Los Angeles. Although Objective 11 of the General Plan's Circulation Element is to "preserve and enhance access to scenic resources and regional open space," there are no such features adjacent to the alternatives under evaluation along Flower Street or in the Little Tokyo area.

4.1.2 Environmental Consequences

Potential impacts to historic resources are evaluated in Section 4.7 Historic Resources of this SEIS. Scenic byways, scenic vistas, and protected public view corridors are not located along the Flower Street segment or Mangrove portal site in Little Tokyo, the Study Area for this SEIS. Therefore, the two tunneling method alternatives would neither impede views from any nationally recognized scenic highways, designated scenic routes, corridors, or parkways nor would they affect any otherwise recognized or valued public viewing locations.

Methodology

The extent of the potential impact from a particular visual change is subjective and depends upon the degree of alteration, the scenic quality of the area disturbed, and the sensitivity of the viewers. The degree of alteration refers to the extent of change, including changes to a structure height, landscaping, and setback, as well as the introduction of construction equipment. Scenic quality is often indicated by a city's special zoning and planning overlay zones, but can also be assessed based on memorability of the view, and unity of the elements within the view.

Due to the location of the tunneling method alternatives in downtown Los Angeles, construction activities would be visible to several different groups of people. To assess their potential responses to the tunneling method alternatives, it is important to identify and categorize different types of viewers depending on their sensitivity to change in the landscape. Viewer groups who currently experience the Study Area include local residents of downtown Los Angeles; patrons and employees of businesses and public facilities in the Financial District and Little Tokyo, and motorists passing through the Study Area. Viewer sensitivity varies depending on the location of the viewer at the time the view is experienced, the duration of that view, the typical activities being undertaken while the view is experienced, and the number of viewers in the sensitive viewer group. A description of each viewer group follows, in order from the most to least sensitive.

The Pegasus Apartments and Roosevelt Building are multi-family residences located directly adjacent to the project alignment along Flower Street and currently have views of the project site in the Financial District. In addition, a multi-family residential complex (Savoy Community Association) is located at the southeast corner of the intersection of Alameda and 1st Streets, directly across the street from the Mangrove site in Little Tokyo.

Patrons and employees of Los Angeles Central Library and Maguire Gardens, California Club, Standard Hotel, City National Plaza, Citigroup Center Plaza, and 811 Wilshire Boulevard currently have direct views of the project site along Flower Street. In addition, patrons and employees of businesses and community facilities currently have direct and indirect views of the Mangrove site in Little Tokyo. Patrons and employees are typically considered less sensitive viewers because they would generally continue to patronize and work in the area despite negative impacts and aesthetics of the area and project site. Patrons and employees at these locations would have a moderate sensitivity to changes in the Study Area.

Motorists pass through the project site along the Flower Street segment in the Financial District, as well as the Mangrove site in Little Tokyo. Motorists are generally considered to be the least sensitive of the viewers identified here as views are fleeting and temporary. However, motorists traveling in the Study Area during peak traffic periods may have a longer duration of views while waiting at traffic signals.

4.1.2.1 Alternative A – EPBM/Open Face Shield/SEM Project Profile

4.1.2.1.1 Construction Impacts

Scenic Resources

There would be no impact from Alternative A to either Flower Street or in the Little Tokyo area as there are no adjacent scenic resources within view from a scenic highway. Potential impacts to visual character and setting, including the setting of historic resources are discussed below.

Construction of Alternative A would not result in adverse effects to scenic resources. Therefore, construction of this alternative would not contribute to a cumulative scenic resource impact

Visual Quality/Visual Character

During construction of Alternative A, activities occurring aboveground in roadways and along sidewalks would temporarily alter the existing visual character and views along Flower Street and in the vicinity of the Mangrove property in Little Tokyo. Construction equipment and staging locations would be visible to nearby land uses and passersby; however, the construction sites themselves would be screened from public view by temporary construction barriers to the extent possible.

Flower Street Impacts

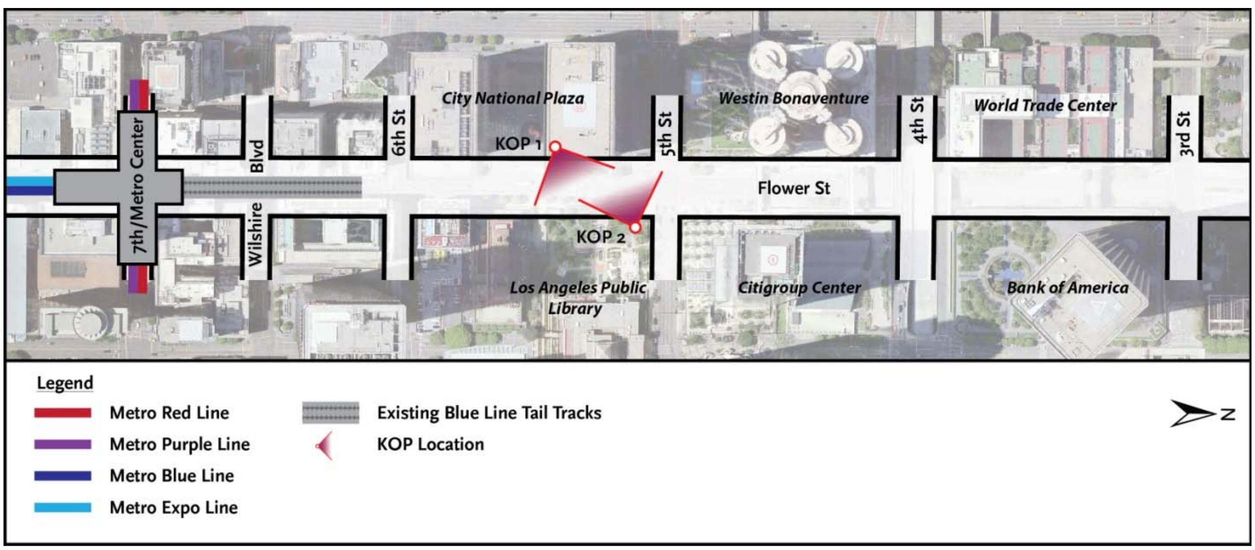
As previously mentioned, highly visible jet grouting and mixing equipment, with certain pieces over 100 feet tall, are of a size, type, and quantity that could not be entirely screened. The proposed grouting rigs to be used for construction of Alternative A are similar in size to the drill rigs and cranes to be used for cut and cover construction under the Project. The difference is due to the number of grouting rigs and supporting equipment, and the duration of grouting compared to cut and cover construction. Grouting rigs are supported by cement and water silos that are similar in size to the rigs, and require mixing and electrical generation equipment to facilitate the mixing and flow of the grouting material.

The construction and grouting staging sites are proposed to be located generally in the travel lanes along the east side of Flower Street, from south of 4th Street to 6th Street as discussed and illustrated in Chapter 2, Alternatives Considered. Staging locations were not located on east-west streets such as 5th Street as they typically provide access to the north-bound and south-bound I-110 Freeway two blocks to the west of Flower Street. In the case of 5th Street, while the street is five lanes in width, taking two lanes for equipment storage would reduce the peak period carrying capacity and operations of the street, while Flower Street serves only south-bound downtown traffic and has more capacity to store equipment. In addition, locating construction and grouting activities on 5th Street would result in access impacts to the Los Angeles Central Library and a restaurant business that would need to be closed for the duration of construction due to equipment blocking both views of the business and parking/valet access for the building.

On Flower Street, grouting equipment would be located directly adjacent to the previously identified visual resources, including the Los Angeles Central Library and Maguire Gardens, California Club, The Standard Hotel, and the Pegasus Apartments. As a result of the numerous types, amount, and scale of the equipment associated with grouting, this segment of Flower Street would exhibit an altered visual environment.

As part of a visual character analysis, several viewpoints or key observation points (KOPs) were selected that represented valued views along this segment of Flower Street. The two KOPs, KOP 1 and KOP 2, are located along Flower Street, between 5th and 6th Streets. Each of these KOPs represents public pedestrian, transit rider, and vehicle driver views along Flower Street of nearby valued visual resources such as the Los Angeles Central Library and Maguire Gardens, and the California Club. Figure 4.1-3 shows the locations of KOP 1 and KOP 2.

Figure 4.1-3: Location of Flower Street Key Observation Points (KOPs) 1 and 2



Figures 4.1-4 through 4.1-7 illustrate "before and after" visual simulations, which compare the existing affected environment (before) to the visual character of the use of jet grouting and mixing and other construction equipment (after). The "after" representations of the construction equipment to be used under Alternative A are considered to be conceptual at this time and may not represent the exact construction equipment and/or conditions that would occur if Alternative A were to be constructed.

The view from KOP 1, illustrated in Figures 4.1-4 and 4.1-5, includes an east-facing view of the Los Angeles Central Library and Maguire Gardens, and the California Club along Flower Street from City National Plaza on the west side of Flower Street. The Los Angeles Central Library building is not clearly visible in the view; however, the associated Maguire Gardens includes the mature trees on the left side. The California Club building includes a historic red-brick building toward the right side of the view. This view is representative of the experience of local residents, patrons, and employees, and passing motorists and pedestrians. Both the Los Angeles Central Library and the California Club and Maguire Gardens are considered to be visual resources.

Figure 4.1-4: Before View of Flower Street Facing East Between 5th and 6th Streets

Figure 4.1-5: After View of Flower Street with Construction and Grouting Equipment Facing East Between 5th and 6th Streets

The before and after views from KOP 2, shown in Figures 4.1-6 and 4.1-7, includes a west-facing view of City National Plaza from within the Maguire Gardens grounds on the east side of Flower Street. The angular orange sculpture is visible within the center of the plaza and is the Plaza's iconic artwork.

This view is representative of the experience specifically of patrons and employees, and passing pedestrians of Maguire Gardens. City National Plaza is considered to be a visual resource.

Figure 4.1-6: Before View of Flower Street Facing West Between 5th and 6th Streets

Figure 4.1-7: After View of Flower Street with Construction and Grouting Equipment Facing West Between 5th and 6th Streets

Although it is not uncommon to have construction activities in a heavily urbanized environment consisting of high- and mid-rise buildings, construction of Alternative A would require the use of large-scale jet grouting and mixing equipment along Flower Street that would noticeably reduce the visual quality or alter viewing context from the perspective of KOP 1 and KOP 2. From KOP 1, views of the mature trees and garden setting of Maguire Gardens, as well as the California Club would be disrupted and blocked by construction activities. Similarly, from KOP 2, west-facing views from within Maguire Gardens toward City National Plaza would be blocked. The visual intrusion of the construction and grouting equipment from the perspective of both KOPs would dominate views for all viewer groups. Temporary construction impacts on visual character along Flower Street would be adverse. Mitigation may not be available to reduce these impacts due to the size, type, and quantity of the construction and grouting equipment.

Little Tokyo Impacts

For Alternative A, construction activities proposed for the Mangrove site would result in an increased number of muck trucks driving through the Little Tokyo area. Although the trucks would not directly impact the visual environment, view of the truck would be temporary and fleeting. Views of the Mangrove site during construction may alter the visual environment for residents, area patrons and employees, as well as passing motorists. Temporary construction impacts on visual character near the Mangrove site would not be reduced with screening to not adverse.

In summary, unlike the Project which does not require the use of grouting, construction of Alternative A would alter the visual quality of the street due to major equipment being located adjacent to historic properties during the entire duration of grouting, approximately 12 months and possibly up to 24 months. Overall, Alternative A would result in more intense, but temporary impacts to the visual character along Flower Street as compared to the Project. Therefore, it would contribute to a temporary cumulative visual impact. All other visual and aesthetic effects from construction of this alternative would not be substantially adverse. Alternative A would result in temporary construction-related adverse effects on the visual character of Flower Street between 4th and 6th Streets that could not effectively be mitigated. Therefore, it would contribute to a temporary cumulative visual character impact. There would be no impacts beyond those identified for the Project, in Little Tokyo.

Nighttime Lighting/Shade and Shadow

During construction of Alternative A, nighttime lighting would predominantly consist of security lighting that would be directed on-site. Construction is expected to occur in two shifts per day, while grouting activities are currently anticipated to take place in one ten-hour, daytime shift per day. Depending on the final contractor work schedule, which may include a second nighttime grouting shift, there would be a potential for nighttime lighting impacts on hotels and businesses along Flower Street. Lighting from construction activity would be limited to the street level, which is currently highly lighted during the night. These construction impacts would be temporary.

The construction of Alternative A would not result in adverse nighttime lighting or shade and shadow impacts along Flower Street based on a single daytime grouting shift. While there would be an increase in truck activity level and duration in Little Tokyo, the trucks would only be operated during the day. Therefore, this alternative would not contribute to cumulative nighttime lighting or shade and shadow impacts.

4.1.2.2 Alternative B – EPBM/SEM Low Alignment

4.1.2.2.1 Construction Impacts

Scenic Resources

There would be no impact from Alternative B to either Flower Street or in the Little Tokyo area as there are no adjacent scenic resources within view from a scenic highway. Potential impacts to visual character and setting, including the setting of historic resources are discussed below.

Construction of Alternative B would not result in adverse impacts to scenic resources. Therefore, construction of this alternative would not contribute to a cumulative scenic resource impact.

Visual Quality/Visual Character

During construction of Alternative B, activities occurring aboveground in roadways and along sidewalks would temporarily alter the existing visual character and views along Flower Street and adjacent to the Mangrove property in Little Tokyo in similar ways to those identified for Alternative A.

Flower Street Impacts

As previously discussed for Alternative A, highly visible jet grouting and mixing equipment, with certain pieces over 100 feet tall, are of a size, type, and quantity that could not be entirely screened. While the proposed grouting rigs to be used for construction of Alternative B are similar in size to the drill rigs and cranes to be used for the Project's cut and cover construction, the number of grouting rigs and supporting equipment, and the duration of the grouting compared to cut and cover construction would have additional impacts over those of the Project.

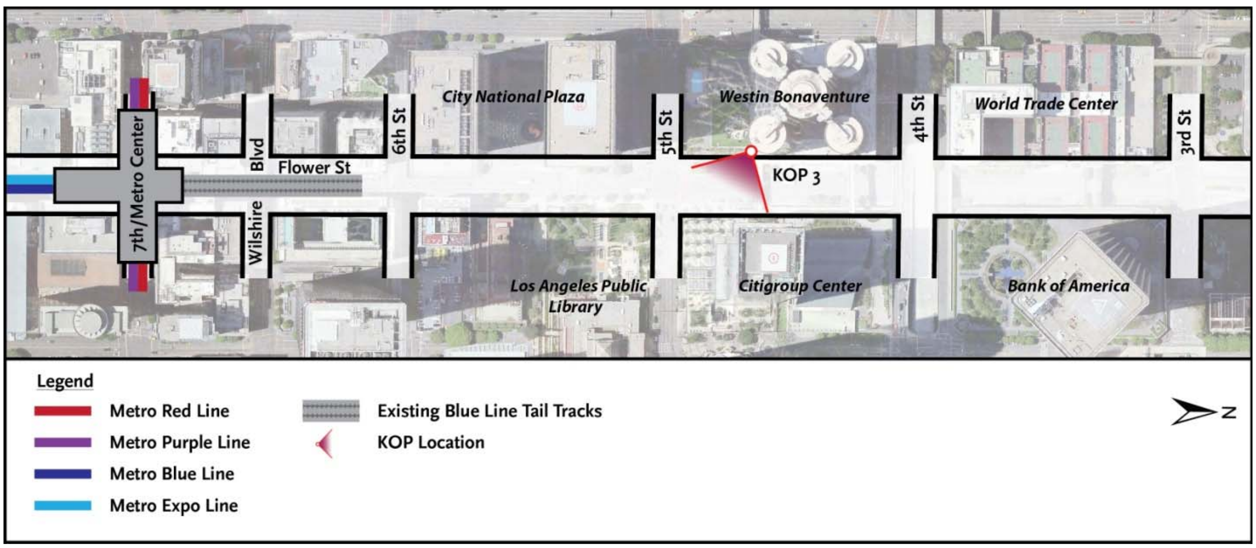
For Alternative B, the single construction and grouting staging site required for this alternative is proposed to be located generally in the travel lanes along the east side of Flower Street between just south of 5th Street to 6th Street as discussed and illustrated in Chapter 2, Alternatives Considered. Staging locations were not located on east-west streets such as 5th Street as they typically provide access to the north-bound and south-bound I-110 Freeway two blocks to the west of Flower Street. Taking of two lanes on east-west streets for equipment storage would reduce the peak period carrying capacity and operations of the street, while Flower Street serves only south-bound downtown traffic and has more capacity to store equipment. Similar to Alternative A, locating construction and grouting activities on 5th Street would result in access impacts to the Los Angeles Central Library and a restaurant business that would need to be closed for the duration of construction.

On Flower Street, grouting equipment would be located directly adjacent to the previously identified visual resources, including the Los Angeles Central Library and Maguire Gardens, California Club, The Standard Hotel, and the Pegasus Apartments. As a result of the numerous types, amount, and scale of the equipment associated with grouting, this segment of Flower Street would exhibit an altered visual environment.

Construction staging locations would be visible to nearby land uses and passersby; however, the construction sites themselves would be sheltered from direct public view by temporary construction barriers. As previously mentioned, highly visible jet grouting equipment, with certain pieces over 100 feet tall that could not be screened, would be located in travel lanes along the east side of Flower Street, from south of 5th Street to just south of 6th Street. As a result of the numerous types, amount, and scale of the equipment associated with jet grouting and mixing, this segment of Flower Street would exhibit an altered visual environment.

As part of the visual character analysis for Alternative B, one KOP was selected that represented a valued view along this segment of Flower Street, and the location where construction conditions along the street would change versus those of the Project. Construction activities in/around the Little Tokyo area remain unchanged, with the exception being the increased length of time of associated construction haul activities due to changes in construction along Flower Street. Figure 4.1-8 illustrates the location of the KOP 3, which is located along Flower Street between 5th and 6th Streets.

Figure 4.1-8: Location of Flower Street KOP 3



The before and after views from KOP 3, illustrated in Figures 4.1-9 and 4.1-10, represents public pedestrian, transit rider, and vehicle driver views along Flower Street of valued visual resources such as the Los Angeles Central Library and Maguire Gardens, and the California Club. The figures compare the existing affected environment (before) to the visual character of the use of jet grouting, mixing, and other construction equipment (after). The “after” representation of the construction equipment to be used under Alternative B are considered to be conceptual at this time and may not represent the exact construction conditions that would occur if Alternative B were constructed.

Figure 4.1-9: Before View of Flower Street Facing Southeast North of 5th Street

Figure 4.1-10: After View of Flower Street Facing Southeast North of 5th Street

Although it is not uncommon to have construction activities in a heavily urbanized environment consisting of high- and mid-rise buildings, the construction of Alternative B, including the use of large-scale jet grouting equipment, would noticeably reduce visual quality or alter viewing context from the perspective of KOP 3. Views of the mature trees of the Citigroup Center Plaza, and Maguire Gardens, as well as the California Club would be disrupted and blocked by construction activities. The visual intrusion of the construction equipment would dominate views for all viewer groups. Furthermore, temporary construction impacts on visual character would be adverse. Mitigation may not be available to reduce these impacts due to the size of the equipment.

Little Tokyo Impacts

For Alternative B, construction activities proposed for the Mangrove site would result in an increased number of muck trucks driving through the Little Tokyo area. Although the trucks would not impact the visual environment, as views of the truck would be temporary. Views of the Mangrove site during construction may alter the visual environment for residents, area patrons and employees, as well as passing motorists. Temporary construction impacts on visual character near the Mangrove site would not be adverse with mitigation similar to the Project. All other visual and aesthetic effects from construction of this alternative would not be substantially adverse.

In summary, unlike the Project which does not require the use of grouting, construction of Alternative B would alter the visual quality of the street due to major equipment being located adjacent to historic properties during the entire duration of grouting, approximately 8 months and possibly up to 16 months. Overall, Alternative B would result in more intense, but temporary impacts to the visual character along Flower Street during construction as compared to the Project. Alternative B would result in temporary construction-related adverse effects on the visual character of Flower Street between 5th and 6th Streets. Therefore, it would contribute to a temporary cumulative visual character impact. There would be no impacts, beyond those identified for the Project, in Little Tokyo.

Nighttime Lighting/Shade and Shadow

During construction of Alternative B, nighttime lighting would predominantly consist of security lighting that would be directed on-site. Construction is expected to occur in two shifts per day, while grouting activities are currently anticipated to take place in one ten-hour, daytime shift per day. If the contractor adds a second nighttime grouting shift were added, there would be a potential for nighttime lighting impacts on hotels and businesses along Flower Street. Lighting from construction activity would be limited to the street level, which is currently highly lighted during the night. These construction impacts would be temporary.

The construction of Alternative B would not result in adverse nighttime lighting or shade and shadow impacts along Flower Street based on a single daytime grouting shift. While there would be an increase in truck activity level and duration in Little Tokyo, the trucks would only be operated during the day. Therefore, this alternative would not contribute to cumulative nighttime lighting or shade and shadow impacts.

4.1.3 Mitigation Measures

Mitigation measures to reduce potential visual quality impacts during construction were identified in the Final EIS/EIR for the Project. Implementation of mitigation measures VA-1 through VA-5 from the Final EIS/EIR would apply for Alternatives A and B. Below is a summary of the identified mitigation measures and a detailed description can be found in Appendix H:

- VA-1: Co-ordination with station area communities
- VA-2: Appropriate integration of urban design elements for the LRT at the street level
- VA-3: Minimizing lighting impacts during construction through shielding
- VA-4: Appropriately locating stockpiles in less visually sensitive locations
- VA-5: Placement of construction sheds and barricades to avoid obstructing views

Alternatives A and B would have additional visual quality impacts along Flower Street beyond those identified for the Project due to the type, size, and quantity of grouting and support equipment required for construction of these alternatives. Mitigation may not be available to reduce these impacts during construction due to the size of the equipment. As with the Project, Alternative A and B would have no adverse effects after implementation of the mitigation measures and the removal of construction grouting equipment.

4.2 AIR QUALITY

This section describes the existing air quality conditions in the Project Area from the Final EIS/EIR or Study Are for the SEIS, and the potential impacts from construction of the tunneling method alternatives compared to the Project. This section focuses on the evaluation of the tunnel method alternatives compared to what was previously analyzed as part of the Final EIS/EIR. The analysis focuses on potential short-term impacts of emissions during construction of the tunneling method alternatives compared to the Project. While short-term construction impacts associated with the Project, Alternative A and Alternative B could result in potentially adverse air quality impacts, operation of the new transit project would result in a long-term air quality benefit compared to existing conditions due to decreased regional vehicle miles travelled.

Operationally, a qualitative assessment found that reduced emissions in some locations for Alternative B, the deeper alternative, would be more than offset by increased emissions associated with long term operational demands entering the 7th/Metro station and slower and less efficient transit operations.

4.2.1 Affected Environment

Section 93.123(c)(5) of EPA's Transportation Conformity regulation does not require CO, PM10 and PM2.5 hot-spot analyses for construction-related activities for temporary increases in emissions if such increases occur for less than five years at any individual site. Both construction method alternatives have an expected duration of less than five years. In order to examine potential air quality impacts during construction, this analysis draws on South Coast Air Quality Management District's (SCAQMD) regional CEQA thresholds of significance and Localized Significance Thresholds (LST's).

The air quality area of analysis includes the four-county region covered by the South Coast Air Basin (SoCAB), which includes all of Orange County and the urban, non-desert portions of Los Angeles, Riverside, and San Bernardino Counties. The SoCAB area has high levels of air pollution, particularly from June through September. Pollutant concentrations in the SoCAB vary by location, season, and time of day. Concentrations of O_3, for example, tend to be lower along the coast and in far inland areas of the basin and adjacent desert and higher in and near inland valleys.

Over the past 30 years, substantial progress has been made in reducing air pollution levels in Southern California. Previously, the Environmental Protection Agency (EPA) designated SoCAB as a non-attainment area for all National Ambient Air Quality Standards (NAAQS) except sulfur dioxide (SO_2) (the SoCAB was designated as an attainment/maintenance area for SO_2 in 1979). The EPA now designates SoCAB as in attainment for nitrogen dioxide (NO_2), SO_2, and CO. Particulate matter (PM_{10} and $PM_{2.5}$), Pb (lead), and ozone (O_3) levels, while reduced substantially from their peak, remain above relevant NAAQS and California Ambient Air Quality Standards (CAAQS), and PM_{10} levels also remain above the CAAQS.

4.2.2 Environmental Consequences

In order to compare potential impacts during construction of the tunneling method alternatives to the Project, impacts from construction activities along Flower Street and Little Tokyo were analyzed. Impacts from construction activities for other portions of the Project Area were not analyzed because they would be the same for these alternatives as for the Project. The construction methods that would be employed for each of the alternatives are described in Chapter 2, Alternatives Considered.

Construction emissions from the two tunneling method alternatives were estimated using the same methodology that was used for the Final EIS/EIR, which is described in more detail in the Air Quality Impacts and Health Risk Assessment Technical Memorandum, which is incorporated into the Final EIS/EIR as Appendix Q. The emission calculations include reductions from the mitigation measures listed in Chapter 4.5, Air Quality, of the Final EIS/EIR.

4.2.2.1 Alternative A – EPBM/Open Face Shield/SEM Project Profile

Short-term regional and localized air quality impacts generated during construction were evaluated by comparing estimated peak daily emissions to SCAQMD's regional CEQA thresholds of significance and LST's, consistent with the Final EIS/EIR. The emissions estimate includes the following sources: off-road construction equipment, fugitive dust, construction worker commuting, and haul truck transport.

4.2.2.1.1 Construction Impacts

The estimated construction equipment use, soil excavation quantities, number of daily haul truck trips (for removal of excavation materials) and number of construction workers for each phase of Alternative A is listed in Table 4.2-1.

Air Quality Plan Consistency

Because construction of Alternative A would not result in a population increase, Alternative A would not conflict with the growth projections used to develop the 2012 Air Quality Management Plan (AQMP). Growth projections from local general plans adopted by cities in the SoCAB and VMT projections developed by the SCAG are some of the inputs used to develop the AQMP. Construction of Alternative A would not conflict with the implementation of the AQMP, and there would be no impact.

Ambient Air Quality Standard Violation

Peak daily emissions from activities along Flower Street during construction of Alternative A are compared to SCAQMD's CEQA significance thresholds to evaluate potential regional air quality impact, as presented in Table 4.2-2. The emissions estimate includes the following sources: off-road construction equipment, construction worker commuting, haul truck trips, and fugitive dust from earthmoving activities.

As presented in Table 4.2-2, peak daily emissions for construction activities along Flower Street exceed the SCAQMD's regional CEQA significance threshold for NOx of 100 pounds per day. With implementation of proposed mitigation measures, mass daily emissions of NOx would be reduced but would remain adverse. Therefore, emissions of NOx generated during construction of Alternative A have the potential to contribute substantially to an existing or projected air quality violation. Regional air quality impacts related to emissions of NOx remain adverse and unavoidable.

Table 4.2-1: Estimated Construction Equipment, Soil Excavation, and Vehicle Trips for Alternative A

Construction Phase	Construction Equipment	Soil Excavation (cubic yards)	Daily Haul Truck Trips	Construction Workers
Alternative A				
Earth Pressure Boring Under Flower Street, West Bound	2 dozers (357 hp) 4 excavators (168 hp) 2 cranes (399 hp) 5 flatbeds (479 hp)	13,917	20	20
Earth Pressure Boring Under Flower Street, East Bound	2 dozers (357 hp) 4 excavators (168 hp) 2 cranes (399 hp) 5 flatbeds (479 hp)	13,917	20	20
Jet Grouting on Flower Street	4 drill/injection rigs (755 hp) 4 generators (689 hp) 4 compressors (207 hp) 5 flatbeds (479 hp)	0	0	40
Open Face/Shield Tunneling Under Flower Street	2 dozers (357 hp) 4 excavators (168 hp) 2 cranes (399 hp) 5 flatbeds (479 hp)	17,373	20	20
Sequential Excavation Method Tunneling Under Flower Street	2 dozers (357 hp) 4 excavators (168 hp) 2 cranes (399 hp) 5 flatbeds (479 hp)	19,097	20	20
Cut and Cover Along Flower Street	2 dozers (357 hp) 4 excavators (168 hp) 2 cranes (399 hp) 1 drill rig (291 hp) 5 flatbeds (479 hp)	20,925	20	30

Source: The Connector Partnership, 2014

With implementation of mitigation measures, construction of Alternative A, similar to the Project, would still result in a cumulatively considerable contribution to regional air quality. Therefore, regional air quality impacts under NEPA would be adverse.

Peak daily on-site emissions during each construction phase for Alternative A were also compared with the emissions from the SCAQMD Localized Significance Thresholds (LST) look-up tables, as presented in Table 3-4 of the Air Quality Appendix C. The emissions used from the SCAQMD look-up tables were for a one-acre site and a distance of 25 meters to the closest receptor, because these were the smallest size and shortest distance available in the LST look-up tables. Note that the LST values in Tables 3-1 through 3-5 of Appendix C have been updated using the 1-acre values consistent with the guidance from the SCAQMD. However, the updates do not change the impact determination and mitigation measures described in the Draft SEIS and discussed below. Peak daily on-site emissions from construction of Alternative A did not exceed the values from the look-up tables. Therefore, on-site construction emissions from Alternative A would not be anticipated to cause an LST to be exceeded.

Table 4.2-2: Peak Daily Construction Emissions (Mitigated), lb/day – Alternative A

Emission Source	VOC	NOx	CO	SO_2	PM_{10}	$PM_{2.5}$
Construction Equipment[1]	45.5	**307.7**	360.4	1.7	7.4	0.1
Construction Worker Commuting	0.2	0.6	7.0	0.0	3.3	0.0
Haul Trucks	1.7	7.4	7.6	0.0	0.7	0.7
Total =	47	**316**	375	2	11	1
SCAQMD Significance Threshold	75	100	550	150	150	55

Note: Values that exceed the SCAQMD significance threshold are in **bold** and shaded.
[1] Fugitive dust emissions generated during earthmoving activities are included in the daily PM10 and PM2.5 emissions for construction equipment.
Source: AECOM, 2014

Cumulatively Considerable Air Quality Impact

The SoCAB is classified as nonattainment for O_3, PM_{10} and $PM_{2.5}$. Table 4.2-2 shows that peak daily emissions of NOx, which is an O_3 precursor, exceed the SCAQMD's CEQA significance threshold. Therefore, construction of Alternative A could result in a cumulatively considerable net increase of O_3 precursor emissions. These impacts would occur over the duration of construction and would be temporary. Mitigation measures including use of model year 2014 off-road equipment would be implemented, which would reduce NOx construction emissions, but impacts would remain adverse. Thus, the cumulative impact from these emissions is expected to remain adverse and unavoidable.

Sensitive Receptor Exposure to Substantial Pollutant Concentrations

Construction activities would include operation of diesel-fueled off-road equipment, resulting in emissions of diesel particulate matter (DPM), a recognized toxic air contaminant (TAC). However, because carcinogenic DPM health risk is estimated using the annual average concentration over long exposure periods (40 to 70 years), the Office of Environmental Health Hazard Assessment (OEHHA) does not suggest estimating carcinogenic health risk for exposure periods less than nine years. Construction of Alternative A, over an estimated duration of approximately 4 years, would be less than the nine-year exposure period indicated by OEHHA. The most conservative distance to evaluate exposure to sensitive receptors is 25 meters (80 feet). As discussed above, emissions generated during construction of Alternative A would not exceed the LSTs and, therefore, would not substantially affect nearby receptors. The impact would not be adverse.

Objectionable Odors

Construction of Alternative A would not result in any major sources of odor, and would not involve operation of any of the common types of facilities that are known to produce odors (e.g., landfill, coffee roaster, wastewater treatment facility). Diesel exhaust, which could be considered an objectionable odor source, would be associated with construction equipment operation, but it would be intermittent and temporary and would dissipate rapidly from the source with an increase in distance. Thus, Alternative A construction would not expose sensitive receptors to odorous impacts, and this impact would not be adverse.

4.2.2.2 Alternative B – EPBM/SEM Low Alignment

As described in Section 4.2.2.3, short-term regional and localized air quality impacts generated during construction were evaluated by comparing estimated peak daily emissions to SCAQMD's regional CEQA thresholds of significance and LST's, are consistent with the Final EIS/EIR.

4.2.2.2.1 Construction Impacts

The estimated construction equipment use, soil excavation quantities, number of daily haul truck trips and number of construction workers for each phase of Alternative B is listed in Table 4.2-3.

Table 4.2-3: Estimated Construction Equipment, Soil Excavation, and Vehicle Trips for Alternative B

Construction Phase	Construction Equipment	Soil Excavation (cubic yards)	Daily Haul Truck Trips	Construction Workers
Alternative B				
Earth Pressure Boring Under Flower Street	2 dozers (357 hp) 4 excavators(168 hp) 2 cranes (399 hp) 5 flatbeds (479 hp)	44,292	20	20
Jet Grouting on Flower Street	2 drill/injection rigs (755 hp) 2 generators (689 hp) 2 compressors (207 hp) 5 flatbeds (479 hp)	0	0	20
Sequential Excavation Method Tunneling Under Flower Street	2 dozers (357 hp) 4 excavators(168 hp) 2 cranes (399 hp) 5 flatbeds (479 hp)	22,487	20	20

Table 4.2-3: Estimated Construction Equipment, Soil Excavation, and Vehicle Trips for Alternative B

Construction Phase	Construction Equipment	Soil Excavation (cubic yards)	Daily Haul Truck Trips	Construction Workers
Cut and Cover Along Flower Street	2 dozers (357 hp) 4 excavators (168 hp) 2 cranes (399 hp) 1 drill rig (291 hp) 5 flatbeds (479 hp)	16,231	20	30

Source: Regional Connector Partnership, 2014

Air Quality Plan Consistency

Because construction of Alternative B would not result in a population increase, Alternative B would not conflict with the growth projections used to develop the 2012 AQMP. Growth projections from local general plans adopted by cities in the SoCAB and VMT projections developed by the SCAG are some of the inputs used to develop the AQMP. Construction of Alternative B would not conflict with the implementation of the AQMP, and there would be no impact.

Ambient Air Quality Standard Violation

Peak daily emissions from activities along Flower Street during construction of Alternative B were compared to SCAQMD's regional CEQA significance thresholds to evaluate potential air quality impacts, as presented in Table 4.2-4. Peak daily emissions include the following sources: off-road construction equipment, construction worker commuting, haul truck trips, and fugitive dust from earthmoving activities.

Table 4.2-4: Peak Daily Construction Emissions (Mitigated), lb/day – Alternative B

Emission Source	VOC	NOx	CO	SO_2	PM_{10}	$PM_{2.5}$
Construction Equipment[1]	37.0	**186.8**	256.3	1.2	4.4	4.0
Construction Worker Commuting	0.1	0.4	5.3	0.0	0.1	0.3
Haul Trucks	1.1	7.4	4.5	0.0	2.9	0.3
Total =	38	**195**	266	1	7	5
SCAQMD Significance Threshold	75	100	550	150	150	55

Note: Values that exceed significance threshold are in **bold** and shaded.
[1] Fugitive dust emissions generated during earthmoving activities are included in the daily PM10 and PM2.5 emissions for construction equipment.
Source: AECOM, 2014

As presented in Table 4.2-4, peak daily emissions for construction activities along Flower Street exceed the CEQA significance threshold for NOx of 100 pounds per day. With implementation of proposed mitigation measures, mass daily emissions of NOx would be reduced but would remain adverse Therefore, emissions of NOx generated during construction of Alternative B have the potential to contribute substantially to an existing or projected air quality violation. Regional air quality impacts related to emissions of NOx remain adverse and unavoidable.

With implementation of mitigation measures, emissions of peak daily NOx would not be reduced below a level of significance. With implementation of mitigation measures, construction of Alternative B, similar to the Project, would still result in a cumulatively considerable contribution to regional air quality. Therefore, regional air quality impacts under NEPA would be adverse.

Peak daily on-site emissions during each construction phase for Alternative B were also compared with the emissions from the SCAQMD LST look-up tables, as presented in Table 3-5 of the Air Quality Appendix C. The emissions used from the SCAQMD look-up tables were for a one-acre site and a distance of 25 meters to the closest receptor, because these were the smallest size and shortest distance available in the LST look-up tables. Note that the LST values in Tables 3-1 through 3-5 of Appendix C have been updated using the 1-acre values consistent with the guidance from the SCAQMD. However, the updates do not change the impact determination and mitigation measures described in the Draft SEIS and discussed below. Peak daily on-site emissions from construction of Alternative B would not exceed the values from the look-up tables. Therefore, on-site construction emissions from Alternative B would not be anticipated to cause an LST to be exceeded.

Cumulatively Considerable Air Quality Impact

The SoCAB is classified as nonattainment for O_3, PM_{10} and $PM_{2.5}$. Table 4.2-4 shows that peak daily emissions of NOx, which is an O_3 precursor, exceed the SCAQMD's CEQA significance threshold. Therefore, construction of Alternative B could result in a cumulatively considerable net increase of O_3 precursor emissions. These impacts would occur over the duration of construction and would be temporary. Mitigation measures including use of model year 2014 off-road equipment would be implemented, which would reduce NOx construction emissions, but would remain adverse. Thus, the cumulative impact from these emissions is expected to remain adverse and unavoidable.

Sensitive Receptor Exposure to Substantial Pollutant Concentrations

Construction activities would include operation of diesel-fueled off-road equipment, resulting in emissions of DPM, a recognized TAC. However, because carcinogenic DPM health risk is estimated using the annual average concentration over long exposure periods (40 to 70 years), OEHHA does not suggest estimating carcinogenic health risk for exposure periods less than nine years. Construction of Alternative B, over an estimated duration of approximately 4 years, would be less than the nine-year exposure period indicated by OEHHA. The most conservative distance to evaluate exposure to sensitive receptors is 25 meters (80 feet). As discussed above, emissions generated during construction of Alternative B would not exceed the LSTs and, therefore, would not substantially affect nearby receptors. The impact would not be adverse.

Objectionable Odors

Construction of Alternative B would not result in any major sources of odor, and would not involve operation of any of the common types of facilities that are known to produce odors (e.g., landfill, coffee roaster, wastewater treatment facility). Diesel exhaust, which could be considered an objectionable odor source, would be associated with construction equipment operation, but it would be intermittent and temporary and would dissipate rapidly from the source with an increase in distance. Thus, Alternative B construction would not expose sensitive receptors to odorous impacts, and this issue would not be adverse.

4.2.3 Mitigation Measures

Mitigation measures to reduce the potential regional air quality impacts during construction were identified in the Final EIS/EIR. Implementation of mitigation measures AQ-1 through AQ-22 from the Final EIS/EIR for the Project would apply for Alternatives A and B. Below is a summary of these mitigation measures and a detailed description can be found in Appendix H:

- AQ-1: Adherence to SCAQMD standards for off-road engine emissions
- AQ-2: Requirement to use equipment that meets current standards for criteria pollutant emissions
- AQ-3: Adherence to SCAQMD Rule 403 for fugitive dust
- AQ-4: Dirt at construction sites to not exceed 25 feet and street sweeping shall be co-ordinated with local businesses
- AQ-5: Requirement of contractor to utilize SCAQMD Rule 403 Section(d)(5) for material removal
- AQ-6: Haul trucks shall not fill materials all the way to the top during removal of sand, soil, etc
- AQ-7: Haul trucks shall be covered during removal of sand, soil, etc
- AQ-8: Traffic speeds on unpaved roads to be restricted to 15 mph
- AQ-9: Proper implementation of SCAQMD Rule 403 when gusts exceed 25 mph
- AQ-10: Suspension of heavy equipment operations during second stage smog alerts
- AQ-11: Watering and/or covering of on-site debris, dirt, or rusty materials
- AQ-12: Utilization of LADWP electricity rather than diesel or gas generators
- AQ-13: Heavy-duty trucks shall not idle and regular inspections shall be performed
- AQ-14: Construction worker parking shall be configured to minimize traffic interference
- AQ-15: Construction activity that affects traffic flow shall be limited to off-peak hours
- AQ-16: Ongoing maintenance and adherence of specifications of construction equipment
- AQ-17: Dedicated turn lanes for movement of trucks where appropriate
- AQ-18: Requirement of construction equipment to meet EPA standards
- AQ-19: Maintenance and cleanliness of all trucks and construction equipment
- AQ-20: Use of low-sulfur fuel where possible
- AQ-21: Stations and project to be constructed consistent with Energy and Sustainability Policy
- AQ-22: Appropriate detour routes for minimal idling

As with the Project, potentially adverse construction related air quality effects would remain after implementation of these mitigation measures for Alternatives A and B.

4.3 CLIMATE CHANGE

This section evaluates the existing climate change conditions and greenhouse gas (GHG) emission levels in the project area, and the potential impacts from construction of the tunneling method alternatives compared to the Project. The analysis only addresses GHG emissions during construction as operations and the associated climate change impacts would be nearly identical under the Project and the tunneling method alternatives.

Regional vehicle miles travelled (VMT) reductions from implementation of the Project and the tunneling method alternatives would result from increased transit ridership and a corresponding reduction in miles travelled from single occupancy vehicles. These reductions in regional VMT would not be substantially impacted by implementation of either of the tunneling method alternatives, which represent variations in construction method only. For the two tunneling method alternatives, the regional reduction in GHG emissions due to traffic congestion relief is greater than the new emissions associated with operation of the Project and the tunneling method alternatives. The environmental analysis assumes a conservative, worst-case, condition when determining potential impacts. Section 4.6, Climate Change, of the Final EIS/EIR describes GHG emissions from existing regional transportation sources in the Project Area and analyzes the potential climate change impacts of the Project. The Final EIS/EIR determined that no adverse climate change impacts would be associated with the Project since a regional decrease of GHG emissions will result from its implementation.

4.3.1 Affected Environment

The following analysis identifies existing GHG emission levels generated by the transportation sector based on 2014 forecasted VMT within the Los Angeles region. Data on VMT in the region and emission factors from the EMFAC2007 model were used to estimate emissions of GHG. Since the EMFAC model only generates emissions of carbon dioxide (CO_2) and methane (CH_4), the California Climate Action Registry (CCAR) General Reporting Protocol was used to estimate emissions of nitrous oxide (N_2O). Table 4.3-1 summarizes the results of existing, regional GHG emissions from the transportation sector.

Table 4.3-1: Existing (2014) Conditions – GHG Emissions from Regional Traffic

Regional Vehicle Miles Travelled (VMT/yr)[1]	GHG Emission Factor (grams per mile)			GHG Emissions (Metric Tons per year)			Total ($MTCO_2e$/Yr)
	CO_2	CH_4	N_2O	CO_2	CH_4	N_2O	
147,037,695,000	365.21	0.028	0.173	53,699,637	4,117	25,438	53,729,191
Global Warming Potential =				1	21	310	61,671,726

Note:
[1] Regional VMT data obtained from the SCAG's 2012-2035 Regional Transportation Plan, Transportation Conformity Analysis Appendix Table 11 (2014 data for SCCAB and SCAB). Available at: http://rtpscs.scag.ca.gov/Documents/2012/final/SR/2012fRTP_TransportationConformityReport.pdf .
Source: AECOM, 2014

4.3.2 Environmental Consequences

The following discussion summarizes the evaluation of potential climate change adverse effects for each of the tunneling method alternative. Construction of the alternatives and the Project would result in GHG emissions predominately in the form of carbon dioxide (CO_2) during operation of construction equipment, excavation materials haul trucks, and worker commuting. Construction emissions were estimated using the California Air Resources Board's (CARB's) OFFROAD and EMFAC emissions model, for diesel and gasoline mobile source emission factors, respectively, and the proposed construction schedule. The GHG emissions from construction are presented for the construction duration of the tunneling method for Alternative A and Alternative B compared to the Project and amortized over the operational lifetime of the project assumed to be 30-years in duration as recommended by the SCAQMD.

4.3.2.1 Alternative A – EPBM/Open Face Shield/SEM Project Profile

4.3.2.1.1 Construction Impacts

Analysis of potential climate change and GHG-related construction impacts from Alternative A was based on estimated GHG emissions from operation of construction equipment, excavation material haul trucks, and workers commuting to and from the project site. Estimated GHG emissions that may occur during construction of Alternative A are presented in Table 4.3-2.

Table 4.3-2: Alternative A – Construction GHG Emissions (2014-2017)

GHG Emission Source	Annual GHG Emissions (MTCO2e/yr)				Total Project (MTCO2e/Project)	Amortized Emissions (MTCO2e/30-yr Project Lifetime)
	2014	2015	2016	2017		
Construction Equipment	2,373	16,277	7,663	8,658	34,971	1,166
Construction Worker Commuting	20	148	86	94	348	11
Excavation Materials Haul Trucks	0	119	288	305	712	24
Total =	**2,393**	**16,544**	**8,037**	**9,057**	**36,031**	**1,201**

Source: AECOM, 2014
Note: SCAQMD recommends for construction-related GHG emissions to be amortized over the operational lifetime of the project, which is recommended by SCAQMD as 30-years in duration

Construction of Alternative A along the Flower Street segment would result in a net increase in GHG emissions over a finite period (less than four years). For this analysis, amortized construction-related GHG emissions were compared to SCAQMD's proposed threshold for industrial projects of 10,000 $MTCO_2e$/yr to determine impact significance. As presented in Table 4.3-2, construction of Alternative A would result in approximately 36,031 metric tons of carbon dioxide equivalent ($MTCO_2e$), which would result in an amortized value of 1,201 $MTCO_2e$. Therefore, GHG emissions generated during construction of Alternative A would not have an adverse effect on climate change.

In addition, the CEQ recommends a reference point of 25,000 MT per year of direct GHG emissions as a "useful indicator" of when federal agencies should evaluate climate change impacts in their NEPA documents. The amortized construction emissions for Alternative A would be below the threshold recommended by CEQ and therefore further evaluation of climate change impacts are not warranted.

In summary, operation of Alternative A would result in a net decrease in regional GHG emissions. Temporary construction-related GHG emissions, as presented in Table 4.3-2, would be offset by long-term reductions in regional VMT and associated GHG emissions, as presented in Section 4.6, Climate Change, of the Final EIS/EIR. Furthermore, amortized construction-related GHG emissions for Alternative A would be less than the SCAQMD's proposed threshold for industrial projects of 10,000 $MTCO_2e$/yr. Therefore, project-related GHG emissions resulting from implementation of Alternative A would not have an adverse effect on climate change.

4.3.2.2 Alternative B – EPBM/SEM Low Alignment

4.3.2.2.1 Construction Impacts

Analysis of potential climate change and GHG-related construction impacts from Alternative B was based on estimated GHG emissions from operation of construction equipment, excavation material haul trucks, and worker commuting to and from the project site. Estimated GHG emissions that may occur during construction of Alternative B are presented in Table 4.3-4.

Table 4.3-3: Alternative B Construction GHG Emissions (2014-2017)

GHG Emission Source	Annual GHG Emissions (MTCO2e/yr)				Total Project (MTCO2e/Project)	Amortized Emissions (MTCO2e/30-yr Project Lifetime)
	2014	2015	2016	2017		
Construction Equipment	0	9,093	10,058	4,383	23,534	784
Construction Worker Commuting	0	81	335	262	678	23
Excavation Materials Haul Trucks	0	118	508	305	931	31
Total =	**0**	**9,292**	**10,901**	**4,950**	**25,143**	**838**

Source: AECOM, 2014

Note: SCAQMD recommends for construction-related GHG emissions to be amortized over the operational lifetime of the project, which is recommended by SCAQMD as 30-years in duration

Construction of Alternative B along the Flower Street segment would result in a net increase in GHG emissions over a finite period (three years). For this analysis, amortized construction-related GHG emissions were compared to SCAQMD's proposed threshold for industrial projects of 10,000 $MTCO_2e$/yr to determine impact significance. As presented in Table 4.3-3, construction of Alternative B would result in approximately 25,143 metric tons of carbon dioxide equivalent ($MTCO_2e$/), which would result in an amortized value of 838 $MTCO_2e$. Therefore, GHG emissions generated during construction of Alternative B would not have an adverse effect on climate change.

In addition, the CEQ recommends a reference point of 25,000 MT per year of direct GHG emissions as a "useful indicator" of when federal agencies should evaluate climate change impacts in their NEPA documents. The amortized construction emissions for Alternative B would be below the threshold recommended by CEQ and therefore further evaluation of climate change impacts are not warranted.

Operation of Alternative B would result in a net decrease in regional GHG emissions. Temporary construction-related GHG emissions, as presented in Table 4.3-3, would be offset by long-term reductions in regional VMT and associated GHG emissions, as presented in Section 4.6, Climate Change, of the Final EIS/EIR. Furthermore, amortized construction-related GHG emissions for Alternative B would be less than the SCAQMD's proposed threshold for industrial projects of 10,000 $MTCO_2e$/yr. Therefore, project-related GHG emissions resulting from implementation of Alternative B would not have an adverse effect on climate change

4.3.3 Mitigation Measures

Mitigation measures identified in the Final EIS/EIR, under air quality, including use of newer, more efficient off-road vehicles during construction would result in GHG emission reductions. As described in the analysis above, the long-term reduction in GHG emissions and regional VMT from implementation of the Regional Connector project would result in a net benefit to the regional GHG emissions inventory and associated climate change impacts. Therefore, potential construction-related impacts from the Project or the tunneling method alternatives would not be adverse.

4.4 NOISE AND VIBRATION

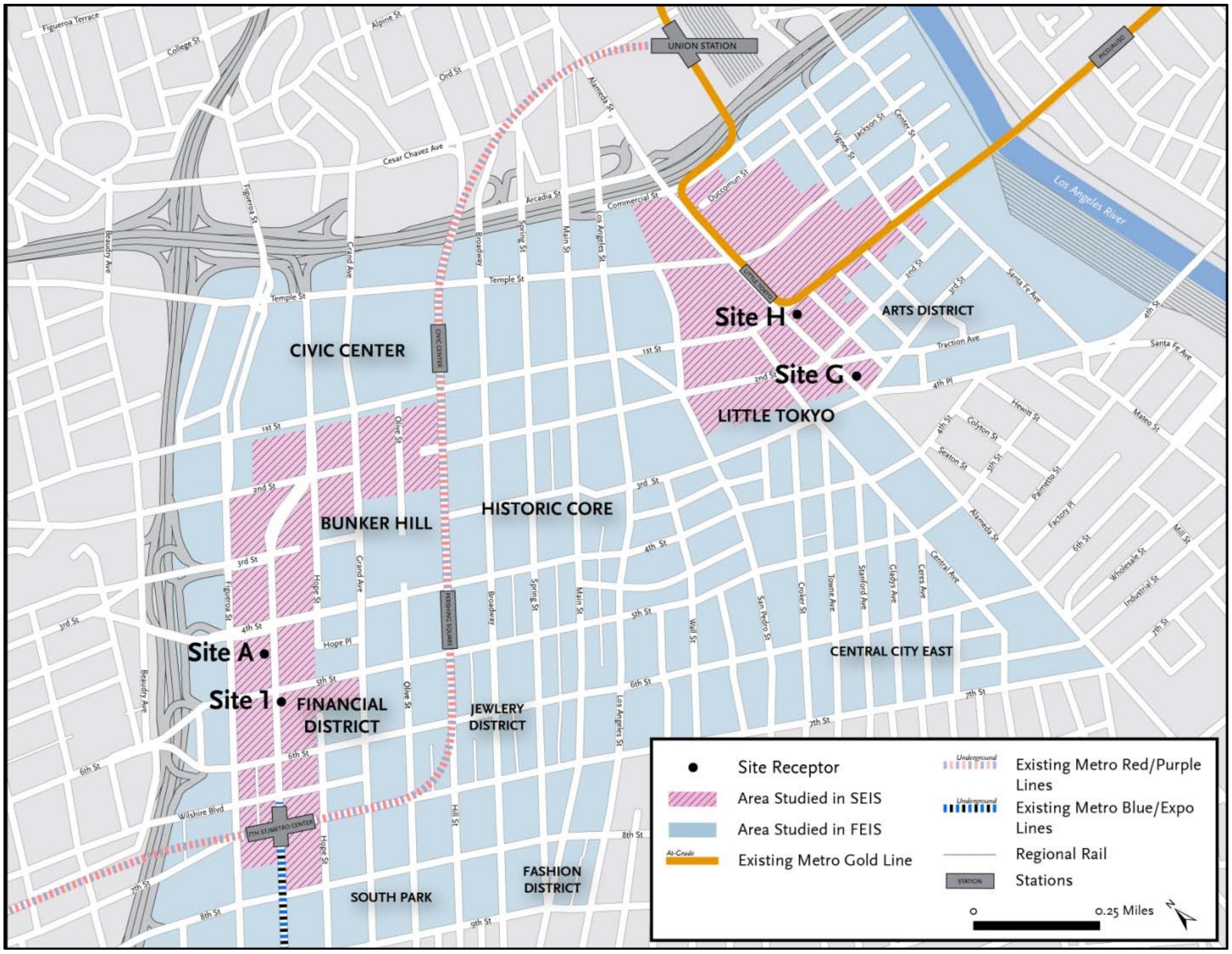
This section discusses the existing noise and vibration environment within the Study Area for the SEIS and evaluates the potential noise and vibration impacts resulting from construction of Alternatives A and B. The construction methods that would be employed for each of the tunneling method alternatives are described in Chapter 2, Alternatives Considered. Operation and operational impacts of Alternatives A and B would be the same as the Project; therefore no operational noise analysis was performed. Noise and vibration conditions and analytical information related to the Project and the entire project alignment is described in Chapter 4.7, Noise and Vibration of the Final EIS/EIR.

4.4.1 Affected Environment

During the Final EIS/EIR analysis efforts, noise levels were measured at two locations along Flower Street (Sites 1 and A) and two locations in Little Tokyo at the Savoy apartment building (Sites G and H), as shown in Figure 4.4-1. Although the changes in construction methods on Flower Street are the focus of this noise and vibration analysis, an evaluation of potential impacts to Little Tokyo as a result of increased muck truck activity, was also conducted. Measurements included the following:

- Site 1: A short-term (10-minute) measurement was conducted at Maguire Gardens at the Los Angeles Central Library on Flower Street. A one-hour Leq of 67 dBA was measured at 2:00 PM. and a peak-hour Leq of 68 dBA was estimated at this location based on the 24-hour measurement obtained at the Westin Bonaventure. Noise levels at this location are dominated by traffic noise from Flower and 5th Streets.
- Site A: A 24-hour measurement was conducted on the pool deck of the fourth floor of the Westin Bonaventure on Flower Street. An Ldn of 71 dBA and a peak-hour Leq of 68 dBA was measured at 6:00 AM.
- Site G: A 24-hour measurement was conducted at ground level to approximate noise in certain units of the Savoy Condominium in Little Tokyo where traffic noise levels are dominated by street traffic on Alameda Street. An Ldn of 73 dBA and a peak hour Leq of 75 dBA were measured at 7:00 PM.
- Site H: A 24-hour measurement was conducted at ground level to approximate noise in certain condo units in the Savoy Condominium building where noise levels are dominated by the traffic on 1st Street and train noise from Metro Gold Line operations. An Ldn of 72 dBA and a peak hour Leq of 72 dBA were measured at 7:00 PM.

Figure 4.4-1: Noise Measurement Locations Evaluated in the Final EIS/EIR and this SEIS



4.4.2 Environmental Consequences

Noise and vibration effects during construction of Alternatives A and B were evaluated using the FTA's detailed guidance manual on *Transit Noise and Vibration Impacts Assessment (May 2006).* No operational impacts analysis was included in the SEIS as operations under both alternatives would remain the same as the Project.

Mitigation measures for construction were identified, evaluated, and documented as part of the detailed assessments conducted as part of the Final EIS/EIR. In general, any impact resulting from the construction of Alternatives A and B would require the same or similar mitigation measures as was identified and recommended as part of the Final EIS/EIR. Therefore, where impacts are predicted during construction, the mitigation measures proposed are based on the control measures identified in the Final EIS/EIR, and other supplementary documents prepared in support of the Project.

Methodology

The various noise and vibration modeling assumptions, source reference levels for each of the proposed construction equipment and other operating characteristics (such as equipment usage factors) are described below. These data are based on FTA data, as well as information included in the Final EIS/EIR and other supplemental support documents. Qualification of a receptor as “sensitive” under FTA standards depends on the distance of the receptor from the proposed facility, and on the type of facility. Detailed information on significant thresholds is found in Appendix B – Regulatory Framework. In this SEIS effort, the following evaluation parameters were used:

- For each construction scenario, worst case or conservative parameters were applied:
  - All equipment was applied to the closest distance from each of the receptors;
  - Construction activities and phases were evaluated when all potential pieces of equipment were active (Source: Final EIS/EIR, Appendix K: Description of Construction); and receptors;
  - All construction scenarios included drilled holes rather than pile driving.

- Construction equipment noise reference levels and usage factors from both the FTA and the Federal Highway Administration (FHWA) guidelines were used for all noise sources except:
  - Grouting Plant – applied maximum usage of 100 percent; and,
  - Grouting Drill Rigs – applied maximum usage of 100 percent.

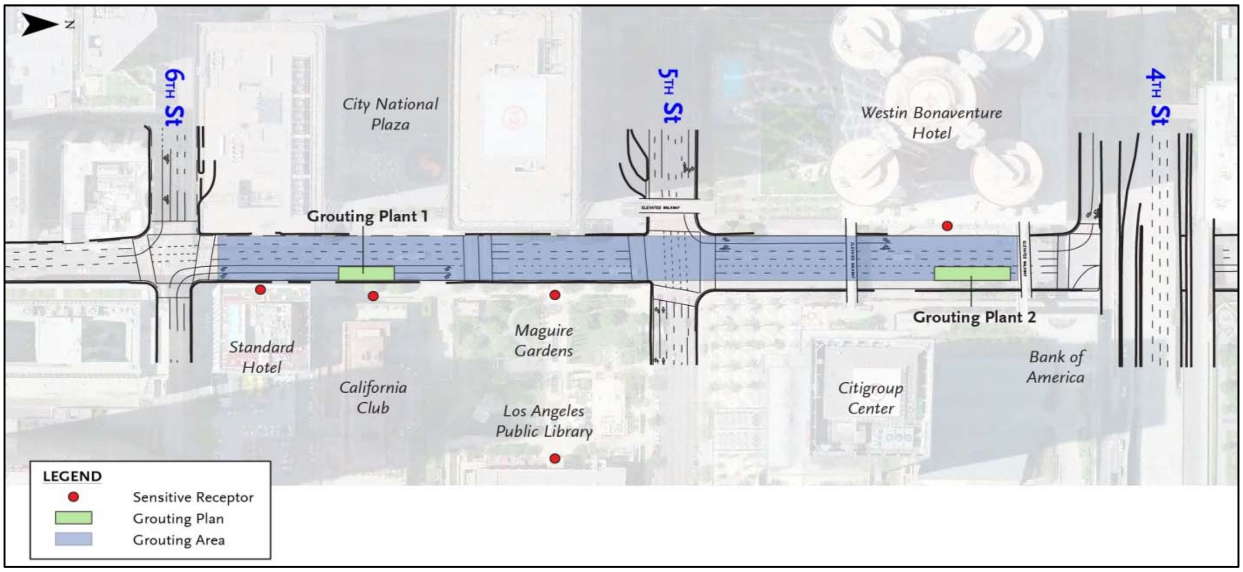
Additionally, the analysis considered impacts to historic resources along Flower Street and in Little Tokyo, as identified from the National Historic Register, from the Final EIS/EIR and confirmed in the SEIS.

In the grouting activity scenarios, two grouting plants were assumed for Alternative A and one for Alternative B. These plants were modeled to include compressors, pumps, generators, a mixing plant, and two grouting drill rigs per plant as discussed in Section 2.3.1, Construction Methods and Staging for Tunneling Method Alternatives, and Figures 2.3-2 and 2.3-3.

Figure 4.4-2 illustrates the Flower Street segment with identified sensitive receptors and construction scenarios which were assumed for this SEIS analysis. Construction detail considered in the analysis also included muck removal truck volumes developed by taking total trips per day and dividing by the estimated work day. Additionally, the TBM was assumed to be 22-feet in diameter, and was modeled at the shallowest point of each alternative’s vertical alignment in order to capture the maximum predicted noise and vibration caused by the TBM operations at the street level.

Similar to the Project, Alternatives A and B would have two construction staging areas located on the east side of Flower Street: 1) just south of 4th Street; and 2) just south of 5th Street. In addition to the two construction staging sites, and as shown in Figure 4.4-2: Alternative A would have two grouting plants located on the east side of Flower Street: 1) between 5th and 6th Streets (Grouting Plant 1); and 2) just south of 4th Street (Grouting Plant 2). Alternative B would have a single grouting plant located between 5th and 6th Streets (Grouting Plant 1).

Figure 4.4-2: Representative Sensitive Receptors and Grouting Areas along Flower Street – Alternatives A and B



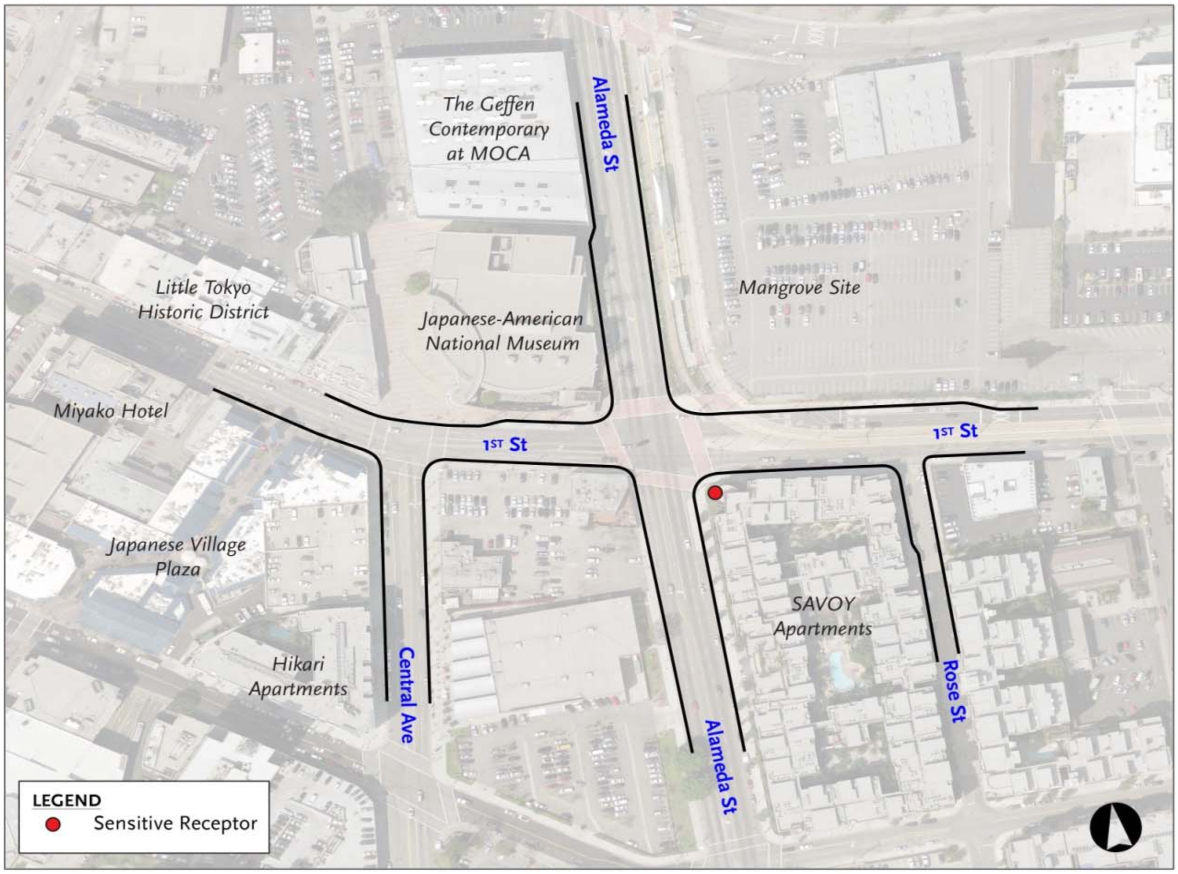
Little Tokyo

The Mangrove property in Little Tokyo, shown below in Figure 4.4-3, was identified under the Project and remains the location for the removal of the tunnel excavation materials by truck for Alternatives A and B. For purposes of the noise and vibration analysis, the duration of the construction methods identified for Alternatives A and B was taken into account for identifying impacts to sensitive receptors in the Little Tokyo area, due to extended construction and haul truck activities. Alternatives A and B would shift a majority of muck truck activities from Flower Street to this site in Little Tokyo and for a longer duration than the Project resulting in increased exposure to truck noise and vibration. As shown in Table 4.4-1, the construction duration for Alternative A would be 15 months longer than the Project and 7 months longer for Alternative B.

Table 4.4-1: Summary of Construction Impacts

Alternative	Muck Truck Activity		Excavation Duration
	Flower Street	Little Tokyo	Difference over Project (Months)
Project	81%	19%	--
Alternative A	25%	75%	15
Alternative B	20%	80%	7

Figure 4.4-3: Representative Sensitive Receptor at the Staging Area in Little Tokyo



4.4.2.1 Alternative A – EPBM/Open Face Shield/SEM Project Profile

4.4.2.1.1 Construction Impacts

Under Alternative A, maximum cumulative noise levels (L_{eq}) from street and surface construction activities along Flower Street are predicted to occur from the construction and grouting staging sites that would be located in front of the Maguire Gardens and the Los Angeles Central Library, and between 4th and 5th Streets adjacent to the Citigroup Center and The Westin Bonaventure Hotel.

The construction noise levels under Alternative A are anticipated to be 3 to 6 dBA greater than the levels predicted under the Project. The increase in noise levels is due to the use of four grouting rigs required by this alternative to provide ground stabilization. Grouting activities would operate from: 1) a joint construction and grouting staging site located between 4th and 5th Streets; and 2) a grout plant located adjacent to the construction staging area between 5th and 6th Streets. Construction is expected to occur in two shifts per day, while grouting activities are currently planned to take place in one ten-hour, daytime shift per day for a 12 month time period, possibly extending up to 24 months due to unforeseen underground conditions. Depending on the final contractor work schedule, a second nighttime grouting shift may be added.

Except for Maguire Gardens, all of the identified sensitive receptors include indoor land uses. Although the noise levels predicted at the exterior facade of the Flower Street buildings would be reduced for interior spaces due to the buildings' transmission loss of 20 to 25 dBA, implementation of the control measures identified in the Final EIS/EIR are recommended to minimize any exceedances of the FTA construction noise criteria. Mitigating noise generated by grouting equipment would be challenging due to the size of the equipment, with the grouting rigs more than 100 feet in height.

Implementation of mitigation measures identified for the Project would reduce adverse noise effects to sensitive or historic buildings to not substantially adverse, though impacts would remain due to the size of the grouting equipment. Due to daytime-only grouting operations, construction of Alternative A is expected to result in noise levels below the "severe" impacts level identified by FTA noise criteria, and would not result in adverse noise effects on sensitive land uses under NEPA. Refer to Appendix F for noise and vibration prediction model outputs for Alternative A.

Under Alternative A, maximum vibration levels from both surface and tunneling construction activities are predicted to range from 0.003 in/sec PPV at the Los Angeles Central Library to 0.118 in/s PPV at the Westin Bonaventure Hotel. The higher vibration level at the Westin Bonaventure Hotel is due to the TBM operations, which are estimated to occur approximately 45 feet from the hotel's Flower Street building edge, and at a higher depth than that of the Project at approximately 30 feet below street level. Overall, the construction vibration levels under Alternative A are predicted to be essentially equal to the levels predicted under the Project. No exceedances of the vibration damage threshold of 0.5 in/sec for sensitive properties or 0.2 in/sec for fragile historic properties are predicted. Similarly, most of the identified receptors include indoor land-uses, except for Maguire Gardens. With regard to the physical structure of the gardens, Alternative A would not result in any adverse effects or damage due to construction-related activities. Therefore, the ground-borne vibration levels predicted at the Los Angeles Central Library's exterior façade would not be adverse due to the coupling loss at the building's foundation of approximately 10 VdB.

In summary, adverse noise or vibration effects from construction of Alternative A to sensitive land uses or historic resources are not anticipated. The Little Tokyo alignment remains unchanged; however the duration of construction noise would be extended.

4.4.2.2 Alternative B – EPBM/SEM Low Alignment

4.4.2.2.1 Construction Impacts

Under Alternative B, the construction noise levels are predicted to be 6 to 7 dBA greater than the noise levels predicted under the Project. The increase in noise levels is due to the use of two grouting rigs required by this alternative to provide ground stabilization. Grouting activities would operate from a single joint construction and grouting staging site located on the east side of Flower Street between 4th and 5th Streets. Construction is expected to occur in two shifts per day, while grouting activities are currently planned to take place in one ten-hour, daytime shift per day for an 8 month time period, possibly extending up to 16 months due to unforeseen underground conditions. Depending on the final contractor work schedule, a second nighttime grouting shift may be added.

Except for Maguire Gardens, all of the selected receptors include indoor land uses. Similar to Alternative B, Although the noise levels predicted at the exterior facade of the Flower Street buildings would be reduced for interior spaces due to the buildings' transmission loss of 20 to 25 dBA, implementation of the control measures identified in the Final EIS/EIR are recommended to minimize any exceedances of the FTA construction noise criteria. Mitigating noise generated by grouting equipment would be challenging due to the size of the equipment, with the grouting rigs more than 100 feet in height. With daytime operation of the grouting equipment, noise effects would be below "severe" impact levels identified under FTA criteria.

Implementation of mitigation measures identified for the Project would reduce adverse noise effects to sensitive or historic buildings to not substantially adverse, though impacts would remain due to the size of the grouting equipment. Due to daytime-only grouting operations, construction of Alternative B is expected to result in noise levels below the "severe" impacts level identified by FTA noise criteria, and would not result in adverse noise effects on sensitive land uses under NEPA. Refer to Appendix F for noise and vibration prediction model outputs for Alternative A.

Under Alternative B, the construction vibration levels from both surface and tunneling construction activities are predicted to be essentially equal to the levels predicted under the Project. No exceedances of the vibration damage threshold of 0.5 in/sec for sensitive properties or 0.2 in/sec for fragile historic properties are predicted. Similarly, most of the selected receptors include indoor land-uses (except Maguire Gardens at Site R5). Therefore, the ground-borne vibration levels predicted at the exterior facade of the Los Angeles Central Library would not be adverse due to the coupling loss at the building's foundation of approximately 10 VdB.

In summary, adverse noise or vibration effects from construction of Alternative B to sensitive land uses or historic resources are not anticipated. The Little Tokyo alignment remains unchanged; however the duration of construction noise would be extended.

4.4.3 Mitigation Measures

Mitigation measures to reduce potential noise and vibration impacts during construction were identified in the Final EIS/EIR. Implementation of mitigation measures NV-1 through NV-29 from the Final EIS/EIR for the Project would apply for Alternatives A and B. Below is a summary of these mitigation measures, and a detailed description can be found in Appendix H:

- NV-1: Monitoring for sensitive and/or historic structures within 21 feet of construction
- NV-2: Preparation of vibration monitoring plan for sensitive buildings
- NV-3: Appropriate distances maintained during construction to vibration-sensitive locations
- NV-4: Use of less vibration-sensitive equipment near sensitive locations
- NV-5: Heavy construction vehicles routed away from vibration-sensitive locations
- NV-6: Earthmoving equipment to be operated far from vibration-sensitive locations
- NV-7: Sequencing of vibration producing construction activities
- NV-8: Avoidance of nighttime construction near vibration-sensitive locations
- NV-9: Use of minimal impact devices

- NV-10: Use of non-impact demolition methods near vibration-sensitive locations
- NV-11: Use of building protection measures to prevent deterioration
- NV-12: Use of pavement breakers, vibratory rollers, and packers far from sensitive locations
- NV-13: Appropriate procedures for noise complaints and measures to reduce construction noise below FTA criteria
- NV-14: Temporary noise barriers around construction sites and equipment
- NV-15: Use of back-up alarms/warning procedures where feasible
- NV-16: Use of mufflers for construction equipment near sensitive land uses
- NV-17: Portable noise sheds for smaller construction equipment
- NV-18: Specific requirements in/around vicinity of the Walt Disney Concert Hall
- NV-19: Maintenance and operation of TBM by contractor to minimize vibration impacts
- NV-20: Coordination and notification of TBM use in/around vicinity of Disney Concert Hall, Colburn School, and Broad Art Foundation Museum
- NV-21: Delivery train speed in/around Disney Concert Hall, Colburn School, and Broad Art Foundation Museum
- NV-22: Use of resilient system to support and fasten delivery train tracks
- NV-23: Use of conveyor system on delivery train if exceedances of FTA annoyance criteria
- NV-24: Coordination of delivery train during vacancies at Disney Concert Hall, Colburn School, and Broad Art Foundation Museum
- NV-25: Coordination and notification of tunneling activities prior to commencement
- NV-26: Appropriate notification strategies in/around Little Tokyo and monitoring ground borne noise (GBN)/ground borne vibration (GBV) levels during TBM activity
- NV-27: Implementation of measures around Disney Concert Hall and Colburn School as needed to reduce GBN
- NV-28: During final design, conduct engineering studies to verify GBN and implement appropriate measures if needed, in/around Hikari Lofts and Nakamura Tetsujiro Building
- NV-29: During final design, conduct engineering studies to verify GBN and implement appropriate measures if needed, in/around the Japanese Village Plaza and Broad Art Foundation Museum.

As with the Project, there would be no potentially construction-related adverse effects after implementation of these mitigation measures for Alternatives A and B. However, the alternatives may have additional noise impacts along Flower Street beyond those identified for the Project due to the size and type of grouting and support equipment required for ground stabilization. Additionally, Alternative A and B would increase the muck truck activity in Little Tokyo for a longer duration than the Project.

4.5 GEOTECHNICAL, SUBSURFACE, AND SEISMIC HAZARDS

This section discusses the geology, soils, seismicity, hazardous materials, and subsurface obstructions along Flower Street, and evaluates their potential impacts on the construction and operation of Alternatives A and B. The information presented in this section is based on the following documents that provided the basis for the Final EIS/EIR:

1. Geotechnical-Subsurface-Seismic-Hazardous Materials Technical Memorandum (Appendix U) in the Metro Regional Connector Transit Corridor Final EIS/EIR.
2. Final Geotechnical Data Report, Rev. 1 (GDR), Regional Connector Transit Corridor Project, March 30, 2013.
3. Geotechnical Baseline Report, Rev. 1a (GBR), Regional Connector Transit Corridor Project, August 1, 2013.

4.5.1 Affected Environment

Generally, conditions related to geologic, subsurface, seismicity, and hazardous materials along the Flower Street portion of the Project and two tunneling method alternatives have remained unchanged from those discussed in the Final EIS/EIR Chapter 4.09 Geotechnical/Subsurface/Seismic/Hazardous Materials and in Appendix U in the Final EIS/EIR. This section provides a more focused discussion on the Flower Street conditions, and the construction techniques considered for the two tunneling method alternatives and evaluation of potential impacts. There are no construction changes to the Little Tokyo portion of the project due to the two tunneling method alternatives.

4.5.1.1 Geology

Along the Flower Street segment of the alignment, alluvium and fill materials overlie the Fernando Formation consisting primarily of weak to very weak clayey siltstone. The alluvial deposit consists of interlayered silty clays, sandy silts, clayey sands, and silty sands with some sand layers containing variable gravel and few cobbles. The fill materials consist of a mixture of gravel, sand, silt, and clay mixed with construction debris. The depth of fill material varies along Flower Street with the maximum fill depth estimated to be about 40 feet below ground surface. Occasional boulders are also present in the alluvium. The principal geologic conditions on Flower Street that control tunneling risk are: groundwater, geologic interface of different soil or weak rock strata, and hazardous gases.

Groundwater seepage at relatively shallow depths (ranging from approximately 15 to 35 feet below ground surface) was encountered in geotechnical borings drilled for the many building sites lining Flower Street between 5th and 7th Streets. Within the lower portion of the alluvial deposits adjacent to Flower Street between 2nd and 5th Streets, groundwater (most probably perched above the Fernando Formation) has been reported at depths from approximately 18 to 27 feet below ground surface, which is close to or within the tunnel vertical alignment horizon. Groundwater problems would be magnified at the alluvium-Fernando interface.

Along Flower Street, the geologic interface of alluvial soils over the weak rock of Fernando Formation, as illustrated in Figure 4.5-1, is a geologic tunneling hazard. If tunneling is located fully below the geological interface, and there is some Fernando Formation between the tunnel and interface, there exists a reduced potential hazard. If the interface is located just above the tunnel, or within the face of the tunnel being excavated, the hazard is that the alluvial materials would run uncontrolled into the tunnel during construction. With the presence of ground water, this condition would cause an uncontrolled flow into the tunnel under construction. Tunneling through alluvium conditions with open face or SEM techniques has a high risk of losing control of the tunneling face due to the lack of face support, which can result in an uncontrolled flow of alluvium and other soils into the tunnel. The uncontrolled flow of soils into the tunnel creates a void in front of and above the tunnel heading causing substantial subsidence of the ground surface including possible sink holes open to the surface. Additionally, the void created in an uncontrolled flow of material into the tunnel can cause significant settlement and damage to existing utilities and adjacent structures. Most importantly, an uncontrolled flow of ground into the tunnel creates a serious safety hazard with a potential for serious injuries or death to the underground construction workers and public on the surface.

Geologic conditions may be mitigated by grouting to create non-running/non-flowing ground conditions, or by using another method, such as use of earth pressure balance machines (EPBMs), which inherently can safely address with Flower Street segment geotechnical conditions. The *Final Flower Street Tunneling Method Alternatives Report (2015)* identified that even when jet grouting is used, substantial risks of utility damages would remain due to the grouting operation, along with risks of excessive settlement and tunnel failures due to incomplete coverage of the grouted mass or migration of groundwater along abandoned tie-backs located under Flower Street.

Methane and hydrogen sulfide (H_2S) are anticipated to be encountered as described in the Geotechnical Baseline Report (GBR) prepared for the Final EIS/EIR, and experienced on recent construction projects in the project area (Wilshire Grand Plaza at 7th Street/Figueroa Street). Several sections of the tunnels are to be constructed through Methane Buffer Zones. Cal/OSHA has classified all of the underground construction for the Regional Connector project as "potentially gassy." Geotechnical investigations performed during Advanced Conceptual Engineering, Preliminary Engineering, and Advanced Preliminary Engineering indicate the various presence of methane gas (CH_4) and hydrogen sulfide (H_2S) in the ground along Flower Street. For example, a maximum field H_2S reading of 5 parts per million (ppm) was detected in Boring E2-2, which is located near the intersection of Flower Street and 3rd Street. Close to this location, a methane gas concentration of 1,000 ppm was detected in Boring MB2. In addition, a methane gas concentration as high as 87 percent was detected during the basement excavation of the Los Angeles Central Library located on the southeast corner of Flower Street and 5th Street. Hydrogen sulfide is highly toxic and could result in human health effects to individuals who are exposed, particularly construction workers. Methane is explosive if allowed to accumulate to a range of five to twelve percent at atmospheric oxygen level.

Metro Rail Design Criteria (MRDC) requires specific underground designs where gassy conditions are present. In order to prevent the entry of gases into the tunnel and underground stations, a gas barrier must be incorporated into the design either with the use of EPBMs, and installation of a double-gasket, segmental precast tunnel lining, or encasing the station and tunnel cast-in-place structures with a high density polyethylene (HDPE) membrane.

4.5.2 Environmental Consequences

The following sections summarize the evaluation of potential impacts of geotechnical conditions, soils, seismicity, hazardous materials, and subsurface obstructions that would occur with construction of Alternatives A and B.

4.5.2.1 Alternative A – EPBM/Open Face Shield/SEM Project Profile

In this alternative, EPBM-bored tunnels would be constructed following the Project alignment to south of 4th Street, with open-face shield tunnel excavation from 4th Street to 5th Street, and SEM tunnel construction from 5th Street to the 7th Street/Metro Center Station tail tracks structure.

Sequential Excavation Method (SEM) tunneling for the segment south of 4th Street would allow for removal of tie-backs through the face of the shield or within the SEM excavation. However, without the undertaking of special mitigating measures, such as complete ground stabilization, Alternative A would have a high level of risk of tunnel face instability with the potential for soil runs during tunneling by open-face shield or SEM, particularly when dealing with the tie-backs under Flower Street. The open-face shield section of the alignment would occur in the diminishing thickness of the Fernando Formation above the shield. There would be approximately five feet of Fernando Formation cover above the open-face shield section.

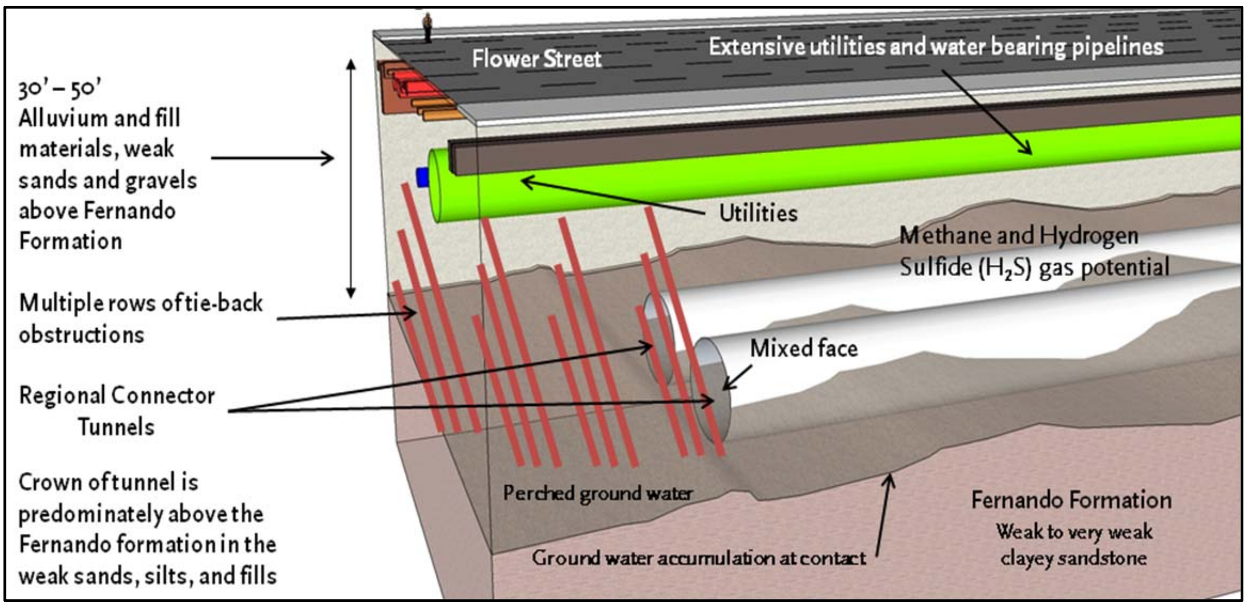
In addition, the top of the Fernando Formation is an erosional surface, and the geologic profile is based on a limited number of borings. Thus the thickness of the Fernando Formation above the tunnel has uncertainty and the stability of the ground surface on Flower Street is not guaranteed. Significant ground improvement would be required as previously discussed in Chapter 2, Alternatives Considered. For the SEM portion of the tunneling, the single twin-track tunnel diameter is very large and the tunnel would have varying amounts of mixed face geologic conditions in the tunnel heading. In this situation, there would be a high risk of creating sinkholes or subsidence on Flower Street. Ground improvement by jet grouting would be required for Alternative A. Mitigation of impacts may not be successful given the complexity and severity of the Flower Street underground conditions.

The jet grouting for the SEM portion of this alternative would require drilling grout holes on a six-by-six foot pattern throughout the area to be grouted as illustrated in Figure 2.3-1. Grout holes would extend from the ground surface through weak fill and alluvial soils to just into the relatively stronger Fernando Formation. A 50-foot-wide zone in Flower Street would be grouted and requires setting up a grout plant on Flower Street. Depending on the number of required grout holes, two to four drill rigs would be utilized to drill and grout. For Alternative A, a total of approximately 1,900 grout holes would be drilled and grouted.

Although jet grouting would improve the ground conditions for ground control during SEM tunneling, significant risk of ground loss and excessive settlement due to SEM would remain, and these risks cannot be mitigated. This is primarily because grouting must be done through a series of borings designed to have overlapping grout columns. Given mixed face soil conditions, ground water inflows and ground loss can still occur which would damage utilities and existing buildings, basements, and other structures and pose a safety threat to workers, the public, and construction operations. Also, with the significant number of existing utilities under the street and with a dense grout pipe pattern required, the existing utilities would have a high risk of being damaged by the high pressure grouting operation, which could result in adverse impacts or interruption of utility services even before the tunneling starts. Alternative A is not located within the 100-year flood hazard area.

Due to the potential gassy conditions under Flower Street, using SEM tunneling, or open-shield TBM, would increase risks of hazardous gas for construction and likely require significant additional measures to mitigate these safety issues. An open face shield allows hazardous gasses into the tunnel at the tunnel face. SEM has greater safety risk of gas on account of greater exposure to the excavated ground. Whereas hazardous gas can be safely handled in a cut and cover excavation, a SEM-mined cavern would need significant ventilation to meet Cal/OSHA standards.

Figure 4.5-1: Flower Street Subsurface Conditions



In summary, construction of Alternative A would require ground improvement along Flower Street utilizing jet grouting for mitigation of mixed face instability and potential excess ground settlements associated with Open Face Shield and SEM tunneling. The risk assessment provided in *Final Flower Street Tunneling Method Alternatives Report (2015)* identified that even when jet grouting is used, a high level of risk resulting in utility damages would remain due to the grouting operation, along with the high level risks of excessive settlement and tunnel failures due to incomplete coverage of the grouted mass or migration of groundwater along abandoned tie-backs located under Flower Street.

Implementation of Alternative A would result in high risk of adverse effects due to mixed face instability and potential excess ground loss, settlement, and sinkholes.

4.5.2.2 Alternative B – EPBM/SEM Low Alignment

For this alternative, EPBM-bored tunnels would be constructed on a deep alignment to south of 5th Street transitioning to SEM tunneling from south of 5th Street to the 7th Street/Metro Center Station tail tracks. The EPBM-bored tunnels would be extended to south of 5th Street in a deeper alignment to avoid abandoned tie-backs. The EPBM would be disassembled and removed through the tunnel to the Mangrove portal site with the EPBM shield left in place. For the SEM tunneling section, the single twin-track tunnel has a larger diameter and the tunnel will have varying amounts of mixed face geologic conditions in the tunnel heading. In this situation, there would be a high risk of creating sinkholes or subsidence on Flower Street. Ground improvement by jet grouting would be required for Alternative B, with approximately 1,000 grout holes required as illustrated in Figure 2.3-1.

With extension of tunneling further south to the 7th Street/Metro Center Station tail tracks structure through the use of SEM, there would be a significant increase in the amount of excavated materials being handled through the Mangrove site in Little Tokyo over the Project conditions. Cut and cover excavation materials would be handled from locations along Flower Street under the Project, while tunnel muck from the EPBM and SEM operations would be handled through Little Tokyo.

In addition, due to the potential gassy conditions under Flower Street, using SEM tunneling would have a high level of construction risks related to hazardous gas and likely require significant additional measures to mitigate these safety issues. SEM would also have a higher level of safety risk for workers due to gas conditions from the greater exposure to excavated ground. Whereas hazardous gas can be safely handled in a cut and cover excavation, a SEM-excavated cavern would require significant ventilation to meet Cal/OSHA standards. Alternative B is not located within the 100-year flood hazard area.

In summary, construction of Alternative B would require ground improvement along Flower Street utilizing jet grouting for mitigation of mixed face instability and potential excess ground settlements associated with SEM tunneling. The risk assessment provided in the *Final Flower Street Tunneling Method Alternatives Report (2015)* identified that even when jet grouting is used, a high level risk of utility damages would remain due to the grouting operation, along with the risks of excessive settlement and tunnel failures due to incomplete coverage of the grouted mass or migration of groundwater along tie-backs located under Flower Street.

Implementation of Alternative B would result in a high risk of adverse effects due to mixed face soils instability and potential excess ground loss, settlement, and sinkholes.

4.5.3 Mitigation Measures

Mitigation measures to reduce potential geotechnical impacts during construction were identified in the Final EIS/EIR for the Project; implementation of mitigation measures GT-1 through GT-21 would apply for Alternatives A and B. Below is a summary of these mitigation measures and a detailed description can be found in Appendix H:

- GT-1: Before construction, survey of structures and geotechnical/ settlement monitoring plans in place as well as gathering of soil data during and after final design
- GT-2: Use of ground improvement methods such as grouting where potential settlement during excavation

- GT-3: Grouting of tunnel alignment prior to construction to minimize settlement
- GT-4: Monitoring of settlement and leveling surveys prior to tunneling to monitor ground movement
- GT-5: Description of tunneling monitoring requirements in contract documents and soil documentation of soils encountered during construction in Geotechnical Baseline Report
- GT-6: Preparation of a Contaminated Soil/Groundwater Management Plan
- GT-7: Notification to appropriate agencies if contaminated soil or groundwater is encountered
- GT-8: Sampling of soil and/or groundwater if impacted by hazardous materials
- GT-9: Procedures for proper handling of contaminated soil and/or groundwater with regulatory agencies
- GT-10: Use of dust control measures shall be implemented for contaminated soil
- GT-11: Proper collection, treatment, and discharge of groundwater per applicable standards
- GT-12: Preparation of a Worker Health and Safety Plan
- GT-13: Appropriate measures, such as impermeable grout, to avoid spreading of contaminated groundwater
- GT-14: Testing for subsurface gases conducted along all portions of underground alignment
- GT-15: Construction will be consistent with City of Los Angeles Methane Mitigation Standards
- GT-16: Specialized excavation methods shall be implemented to protect workers and public
- GT-17: Surveying of asbestos prior to demolition and appropriate removal
- GT-18: Implementation by contractor of Best Management Practices (BMPs)
- GT-19: Consistency with municipal code requirements for structures within methane/buffer zones
- GT-20: Development by Metro of an Environmental Site Assessment program
- GT-21: Development and implementation of plans by Metro for pre-demolition and demolition abatement of hazardous building materials

The mitigated impacts of Alternatives A and B are expected to be greater than those of the Project, as even when jet grouting is used, the possibility of substantial risk of utility damages due to the grouting operation and excessive settlement would remain high.

Table 4.5-1: Summary of Benefits and Challenges of Alternative A and B

Alternative	Description	Advantages	Disadvantages
Alternative A	• EPBM to 4th Street • Open face shield TBM to 5th Street • SEM from 5th to 7th Street/Metro Center Station • Depth to top of rail: 40' • 2nd/Hope Station depth: 96'	• Total amount of excavation materials is reduced due to replacement of cut and cover section.	• High risk of excessive settlement on Flower Street due to removal of existing tie-backs encountered by digger shield and SEM. • Removal of tie-backs encountered by digger shield and SEM would be time consuming and result in a significant delay to the project schedule. • Jet grouting is required to mitigate ground instability for digger shield and SEM excavations. • High risk of sinkholes and subsidence on Flower Street exists because of the large SEM cross section and potential imperfection of grouted ground mass; risk of tunnel collapse cannot be mitigated. • High risk of existing utilities being damaged due to jet grouting operations. • High risk of hazardous gas impacts due to open face shield and SEM excavations. • Major increase in tunnel spoils handled through Mangrove Site; would result in higher level of environmental impacts in Little Tokyo.
Alternative B	• EPBM to south of 5th Street • SEM from 5th Street to 7th Street/ Metro Center • Depth to top of rail: 40' to 105' (at sag) • 2nd/Hope Station depth: 128'	• Total amount of excavation materials is reduced due to replacement of cut and cover section. • Conflicts with existing tie-backs between 3rd and 4th Streets would be minimized.	• Jet grouting is required to mitigate ground instability for SEM section. • High risk of sinkholes and subsidence on Flower Street exists because of the large SEM cross section and potential imperfection of grouted ground mass; risk of tunnel collapse cannot be mitigated. • High risk of existing utilities being damaged due to jet grouting operation • High risk of hazardous gas impacts due to SEM excavations. • 2nd/Hope Station depth increase of 32 feet would increase project construction cost. • Major increase in spoils handled through Mangrove Site; would result in higher level of environmental impacts in Little Tokyo.

Note: EPBM – earth pressure balance tunnel boring machine; SEM – sequential excavation method

4.6 ENERGY RESOURCES

This section evaluates the existing energy resources in the Project Area, and the energy usage impacts from construction of the tunneling method alternatives compared to the Project. The analysis only addresses energy usage during construction because operations of the Project and the evaluated alternatives would have nearly identical associated energy resource impacts. The environmental analysis assumes a conservative, worst-case, condition when determining potential impacts. Section 4.11, Energy Resources of the Final EIS/EIR describes energy demand of existing transportation sources in the project area and analyzes the potential energy resource impacts of the Project. This section focuses on the evaluation of construction methods along Flower Street compared to what was previously analyzed for the Project in Final EIS/EIR.

4.6.1 Affected Environment

This section identifies existing annual energy usage by the transportation sector within the Los Angeles region. Transportation in Los Angeles County continues to be dominated by single-occupancy automobiles. In 2010, 72.3 percent of all people in the Southern California region drove alone to work (US Census Bureau). High percentages of single-occupancy vehicles result in higher vehicle miles travelled (VMT) throughout the state. In turn, high VMT translates into high energy use and increased air pollutants throughout the Southern California Association of Government (SCAG) region.

Metro's electricity use is split between powering the rail system and its transit facilities (Metro 2009). For both rail and facility electricity requirements, Metro buys power from the Los Angeles Department of Water and Power (LADWP), Southern California Edison (SCE), and Pasadena Water and Power (Metro 2009b). In 2008, Metro rail consumed 175 million kilowatt hours (kWh) of electricity (approximately 597 billion British Thermal Units [BTUs]) and Metro facilities consumed 69 million kWh (approximately 235 thousand BTUs) (Metro 2009). Metro would purchase additional electricity from its current providers to operate the proposed project. Metro's *2009 Baseline Sustainability Report* presents goals and recommendations for tracking and improving these performance measures. Appendix W, Energy Resources Technical Memorandum in the Final EIS/EIR provides detailed information regarding existing energy supplies and usage.

4.6.2 Environmental Consequences

The following discussion summarizes the evaluation of potential energy resource impacts for the tunneling method alternatives. Energy impact conclusions for each alternative are based on the significance criteria identified in Appendix B – Regulatory Framework.

In order to compare potential energy resource impacts during construction of the tunneling method alternatives to the Project, energy use impacts from construction activities along Flower Street and the associated construction activities at Little Tokyo were analyzed. Impacts from construction activities for other portions of the Regional Connector project were not analyzed as they would be the same for the evaluated alternatives as for the Project in the Final EIS/EIR.

Construction-related impacts from the evaluated alternatives and the Project were estimated using the Input-Output Approach developed by The California Department of Transportation (Caltrans, 1983), which is the same methodology used for the Final EIS/EIR, and is described in Appendix W of the Final EIS/EIR. This method assigns an energy-to-dollar ratio to various roadway construction activities, which converts construction dollars into energy consumption. Construction-related impacts were estimated by applying a highway construction energy factor to the total estimated direct construction cost for the evaluated alternatives and the Project; indirect cost including contractor fees and schedule delay costs were not considered in this analysis. The estimated construction costs, in 2013 dollars, were based on engineering assumptions and unit price per construction component.

4.6.2.1 Alternative A – EPBM/Open Face Shield/SEM Project Profile

4.6.2.1.1 Construction Impacts

Analysis of potential energy resource-related construction impacts was based on direct costs estimated for construction of Alternative A. Indirect costs such as contractor markup fees and schedule delay costs do not contribute to energy consumption and therefore were not considered in the analysis. Potential energy impacts that may occur during construction of Alternative A are presented in Table 4.6-1. The energy impacts for Alternative A would be temporary for the 15 month extension in duration of construction activities.

Table 4.6-1: Estimated Energy Consumption from Construction for Alternatives A and B

Construction Description	Construction Year Dollars (thousands)[1]	Energy Consumption Factor (Btu/2013$)	Total Btu Consumption[2] (billions)
Alternative A			
Flower Street: • EPBM with Open Face Shield tunnel excavation • SEM tunnel construction	$64,359	5,017	323
Alternative B:			
Flower Street: • EPBM • SEM tunnel construction	$58,726	5,017	295

Acronyms: Btu = British thermal unit; Btu/2013$ = British thermal unit per 2013 dollars; EPBM = earth pressure balance machine; SEM = sequential excavation method

Note:

1. Construction year dollars were estimated based on unit price as of 2013. Construction costs presented in the table do not include indirect costs associated with contractor markup fees and project schedule delay costs.
2. Inputs and supporting energy calculations are provided in Appendix B.

Source: AECOM 2014

In summary, construction of Alternative A would result in short-term, temporary energy usage within the project area due to fuel and electricity usage during equipment operation. The short-term energy usage would be offset by the energy resource benefits from project operation due to reduced VMT from commuter vehicles. As the long-term energy resource benefits exceed the short-term energy usage impacts during construction, the construction-related energy resource impacts would not be adverse.

4.6.2.2 Alternative B – EPBM/SEM Low Alignment

4.6.2.2.1 Construction Impacts

Analysis of potential energy resource-related construction impacts was based on direct costs estimated for construction of Alternative B. Indirect costs such as contractor markup fees and schedule delay costs do not contribute to energy consumption and therefore were not considered in the analysis. Potential energy impacts that may occur during construction of Alternative B are presented in Table 4.6-1. The energy impacts for Alternative B would be temporary for the seven month extension in duration of construction activities.

In summary, construction of Alternative B would result in short-term, temporary energy usage within the project area due to fuel and electricity usage during equipment operation. The short-term energy usage would be offset by the energy resource benefits from project operation due to reduced VMT from commuter vehicles. As the long-term energy resource benefits exceed the short-term energy usage impacts during construction, the construction-related energy resource impacts would not be adverse.

4.6.3 Mitigation Measures

Mitigation measures identified in the Final EIS/EIR, under air quality, including use of newer, more efficient off-road vehicles would result in reduced energy consumption and ensure energy resources were not consumed in an a wasteful or inefficient manner. As described in this analysis, the long-term reduction in energy use from implementation of the Regional Connector project would result in a net benefit to existing energy resources.

4.7 HISTORIC RESOURCES

This section evaluates potential impacts of Alternatives A and B to historic properties along Flower Street and in Little Tokyo. The Final EIS/EIR identified the baseline condition for historic resources within a Project Area of Potential Effects (APE). The Flower Street and Little Tokyo areas, which together comprise the APE of the two alternatives evaluated in this SEIS, were included in the Project APE. As the baseline condition is essentially unchanged since approval of the Final EIS/EIR, it is used herein for the current impact assessment. Historic resources were defined as built environment, archaeological, and paleontological resources. The affected environment for archaeological resources and paleontological resources was considered further only for potential additional impacts related to the change in the vertical limits of excavation under Alternative B (excavation under Alternative A would remain within the limits of the Project APE). In this SEIS, only built environment historic resources located in the APE of the two alternatives have been revisited for potential project impacts or effects. The current study describes the built environment historic properties within the SEIS Study Area, a subset of the Project APE located along Flower Street and in Little Tokyo.

The SEIS is intended to meet the requirements of the court order (as discussed in Chapter 1) to provide information on the construction method alternatives that were previously withdrawn from consideration. There is no change to the APE of the Project. However, information on the SEIS and the construction method alternatives and their potential impacts to historic resources were provided to SHPO. There are no changes to the APE relating to the tunneling method alternatives nor is there potential for Alternatives A and B to have impacts on historic properties that may be different from those identified in the Final EIS/EIR for the Project. The Final EIS/EIR states that in areas where new underground tunnel boring machine segments will be constructed, avoidance of paleontological resources will not be feasible.

For archaeological resources, five possible resources are identified in the Project Area in the Final EIS/EIR, including the Los Angeles Zanja System which crosses Flower Street south of 9th Street. Along Flower Street segment of the Regional Connector project, possible archaeological impacts are not anticipated to occur due to the ground conditions, which consist of fill from other downtown locations to support development in this portion of the street corridor. This corridor has been heavily-developed since the early 1920s, which also would have destroyed any archeological resources that may have been located in the area. From a historic resource perspective, the former Pacific Electric tunnel will be negatively impacted by any underground project on Flower Street. However, any additional impacts on archaeological resources would be minimized with implementation of the established mitigation measures in the Memorandum of Agreement (MOA) between Metro and the State Historic Preservation Officer (SHPO), in the Mitigation Monitoring and Reporting Program (MMRP) for the Project (see Section 8, Mitigation Monitoring and Reporting Program, of the Final EIS/EIR), and in the Cultural Resources Mitigation Management Plan (CRMMP).

The potential impacts on historic properties that are further considered are those caused by noise and vibration generated from the construction and operation of the project. As Alternatives A and B propose different construction methods and some modifications to the vertical and horizontal alignment along Flower Street, the potential impacts of these alternatives on historic properties may be different from those identified in the Final EIS/EIR for the Project. Supplemental noise and vibration analysis for these tunneling method alternatives has been performed as discussed in Section 4.4, Noise and Vibration Technical Report. In addition, analysis for potential impacts on visual quality caused by the two tunneling method alternatives was conducted as discussed in Section 4.1, Visual Quality.

This section references the mitigation measures for historic properties under NHPA Section 106 in the MOA between Metro and SHPO, and mitigation measures carried forward and included in the MMRP for the Project (see Section 8, Mitigation Monitoring and Reporting Program, of the Final EIS/EIR) and in the CRMMP for historic properties under NHPA and NEPA.

4.7.1 Affected Environment

4.7.1.1 SEIS Study Area

FTA and Metro, with concurrence from SHPO as part of Section 106 consultation, established the original Area of Potential Effect (APE) to ensure identification of historic properties under NEPA and NHPA that may be directly or indirectly affected by the project. The APE was analyzed in the Final EIS/EIR. Changes to the APE relating to the Project and the tunneling method alternatives were submitted to SHPO.

Because the tunneling method alternatives propose different construction methods within the same project location, the SEIS Study Area is a focused sub-area within the APE where those changed construction methods would be used. Figures 4.7-1 and 4.7-2 show the SEIS Study Area within a portion of the APE. The map illustrates the project APE with the boundaries of the "direct APE" and an "indirect APE" to show the limits of ground disturbance and adjacent areas in the project vicinity that may be impacted. This differentiation is only for informational purposes, as the established APE included both the direct and indirect areas. The direct APE is the area where resources would be physically impacted by construction activities, while the indirect APE includes the larger area where project impacts might include pollutant noise and vibration impacts to historic properties, changes to their visual or historic setting, or limitations on access during construction. The maps also show the location of built environment resources that were identified as historic properties under NEPA and NHPA in the Final EIS/EIR.

4.7.1.2 Built Environment Resources

Sixteen historic properties that were identified by the Project analysis are located within the SEIS Study Area. These were identified and evaluated through intensive survey. An analysis of the potential adverse effects to historic properties under NHPA was also conducted in support of the Final EIS/EIR. On June 1, 2010, SHPO concurred with FTA's determination of eligibility and finding of effects. The built environment technical studies and SHPO correspondence that supported these results are contained in the Final EIS/EIR. For the current analysis, because the results of the Project analysis are less than five years old, and there have been no apparent changes to the historic properties in the APE, the affected environment in the Project analysis is used as the baseline in the SEIS analysis.

The SEIS Study Area contains 16 historic properties (15 of which are individual buildings or structures) that are either listed in or determined eligible for listing in the NRHP (Table 4.7-1). This includes the Little Tokyo Historic District, of which ten contributing buildings are located within the SEIS Study Area (see Figure 4.7-2). Therefore, there are 16 historic properties composed of 25 historic buildings or structures within the analysis area.

4.7.2 Environmental Consequences

The following analysis examines potential adverse effects of the tunneling method alternatives to historic properties. The Regulatory Framework for the analysis can be found in Appendix B - Regulatory Framework. This analysis also incorporates the findings of the Section 4.7 Noise and Vibration, from the Final EIS/EIR, to inform the assessment of potential impacts and effects related to ground borne vibration (GBV) and ground borne noise (GBN) on historic properties and it also incorporates the findings of the visual quality analysis related to potential visual intrusion on historic properties.

Figure 4.7-1: SEIS Study Area – Flower Street

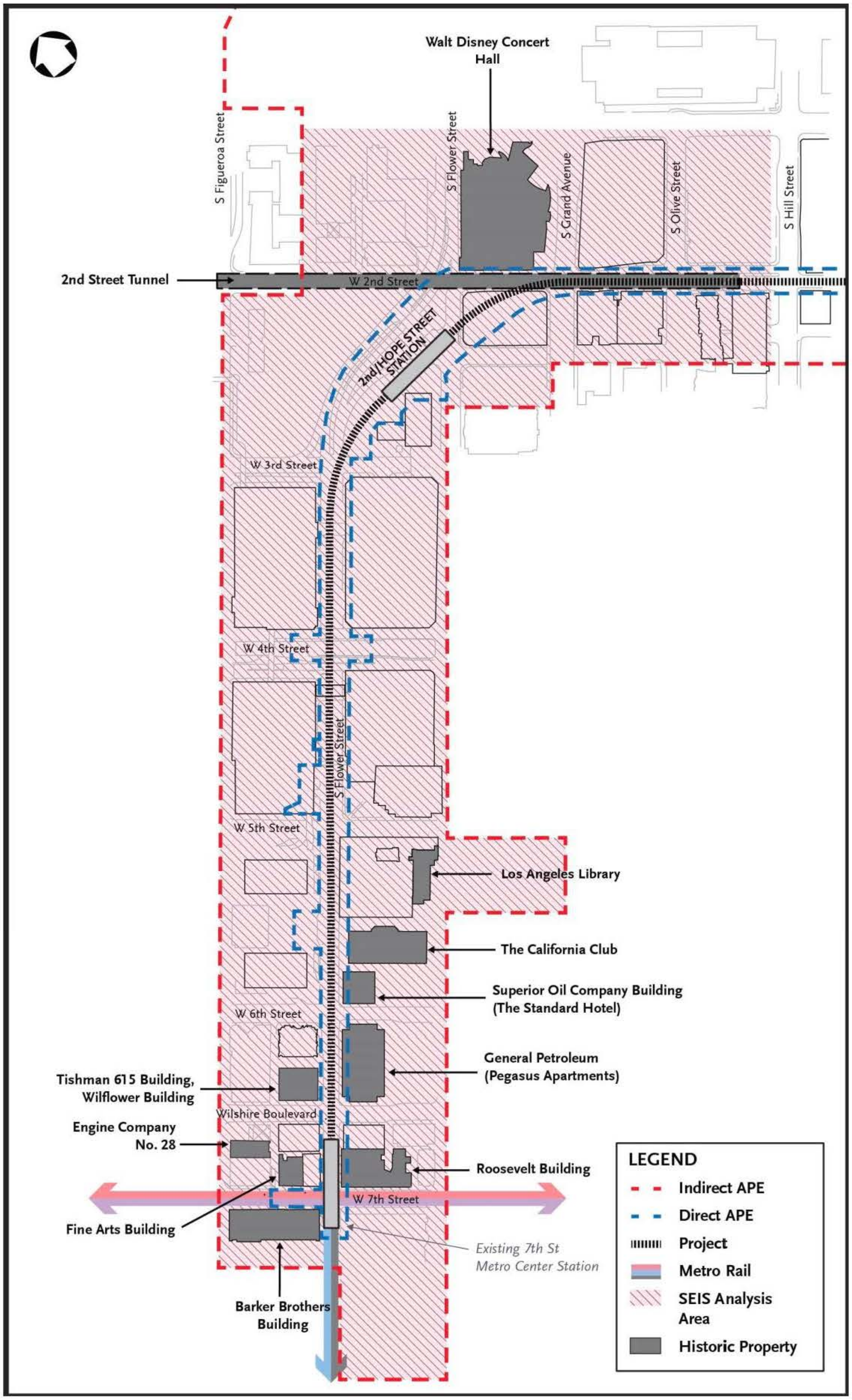


Figure 4.7-2: SEIS Study Area – Little Tokyo

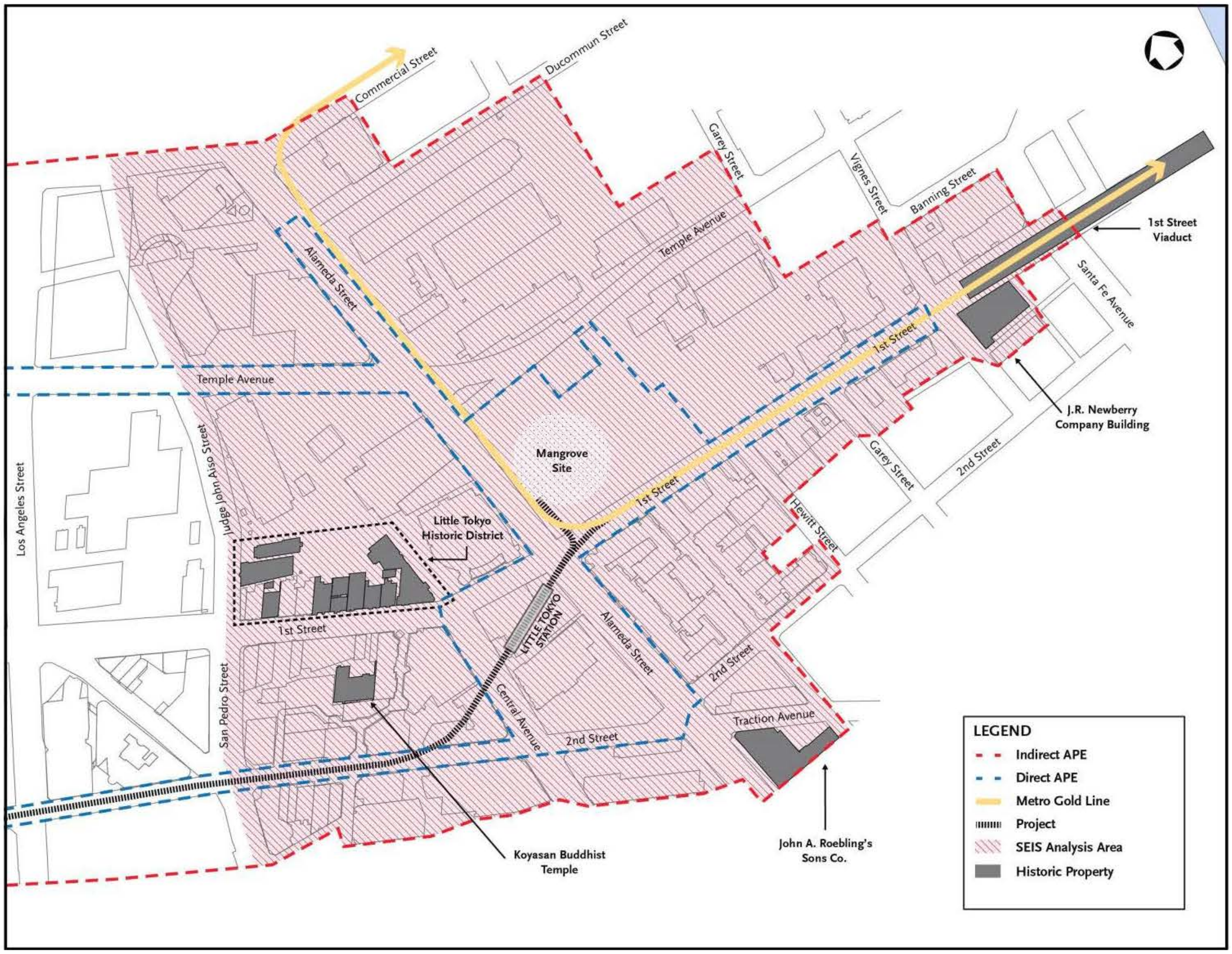


Table 4.7-1: Historic Properties within the SEIS Study Area

Resource Name	Address	NRHP Eligibility	Distance to the Alignment
Barker Brothers	818 West 7th Street	Eligible	30 ft
Fine Arts Building	811 W. 7th Street	Eligible	76 ft
Engine Company No. 28	644 S. Figueroa Street	Listed	206 ft
Roosevelt Building	727 West 7th Street	Listed	5 ft
General Petroleum-Mobil Oil Building	612 South Flower Street	Listed	10 ft
Tishman 615 Building, Wildflower Building	811 Wilshire Blvd.	Eligible	27 ft
Superior Oil Company Building	550 South Flower Street	Listed	13 ft
The California Club	538 South Flower Street	Eligible	38 ft
Los Angeles Central Library	630 West 5th Street	Listed	255 ft
2nd Street Tunnel, Bridge (tunnel) #53C 1318	2nd Street, between Grand Avenue and Figueroa Street	Eligible	Crosses over alignment
Walt Disney Concert Hall	111 South Grand Avenue	Eligible	77 ft
Little Tokyo Historic District (10 contributing buildings, below)	Various (bounded by San Pedro Street, 1st Avenue, and Central Avenue)	Listed (National Historic Landmark)	
Japanese Union Church of Los Angeles	*120 North San Pedro Street*	*Listed*	*658 ft*
San Pedro Firm Building	*108-116 North San Pedro Street*	*Listed*	*585 ft*
Mark Kuwata Real Estate	*301 East 1st Street, 104-106 North San Pedro Street, 104-106 Judge John Aiso Street*	*Eligible*	*472 ft*
1-3 story commercial building, Anzen Hardware	*309-313 East 1st Street*	*Listed*	*472 ft*
1-3 story commercial building, Little Tokyo Hotel	*325 East 1st Street*	*Listed*	*448 ft*
1-3 story commercial building, Ace Japanese Restaurant	*331-335 East 1st Street*	*Listed*	*453 ft*
A. Sperl Building	*337-339 East 1st Street*	*Listed*	*440 ft*
3+ story commercial building, Daimora Hotel	*341-345 East 1st Street*	*Listed*	*421 ft*
Far East Café Building	*347-353 East 1st Street*	*Listed*	*300 ft*
Former Nishi Hongwanji Buddhist Temple	*119 North Central Avenue*	*Listed*	*181 ft*
Koyasan Buddhist Temple	342 East 1st Street	Eligible	105 ft
John A. Roebling's Sons Co.	216 South Alameda Street	Eligible	828 ft
J.R. Newberry Company Building	900 East 1st Street	Eligible	170 ft
1st Street Viaduct	1st Street between Vignes Street and Mission Road	Eligible	1,173 ft

Note: The California SHPO concurred with FTA's determination of eligibility for these properties on June 1, 2010.

No changes to the proposed demolition, partial take, subsurface easement, or alteration of a historic property is anticipated within the SEIS Study Area under the Project and two tunneling method alternatives. Short-term impacts from construction including dirt, unintended damage, traffic congestion, limited parking and access, and visual changes are anticipated to be temporary. The Project analysis indicated that Metro would employ BMPs to minimize these changes and they should be short-term. These conditions are the same under the tunneling method alternatives. Cumulative impacts to built environment historic properties are not anticipated to change from the Project conditions, and can be found in Section 4.19 Cumulative Impacts, in the Final EIS/EIR.

Noise and Vibration

Historic properties that are close to the cut and cover construction activities and which may be affected by construction-related vibration include:

- Barker Brothers
- Roosevelt Building
- General Petroleum-Mobil Oil Building (The Pegasus Apartments)
- Superior Oil Building (The Standard Hotel)
- The California Club
- Los Angeles Central Library
- 2nd Street Tunnel
- Walt Disney Concert Hall

In the Project analysis, detailed potential GBN impacts resulting from the operation of the Project were identified at the Walt Disney Concert Hall, in addition to other sensitive historic buildings. Both "frequent" one Light Rail Transit (LRT) vehicle pass-by scenarios and "occasional/infrequent" two LRT vehicle pass-by scenarios would occur, generating GBN levels that would potentially exceed the FTA annoyance criterion for the Walt Disney Concert Hall. Project operation would result in GBV levels that would not exceed the FTA criteria for the most sensitive use at the Walt Disney Concert Hall. Mitigation measures were confirmed to reduce the GBN impact. Moderate noise effects/impacts from other project activities would not exceed the FTA criteria; therefore, no adverse effects to historic properties are anticipated from project operations in the Project analysis after implementation of confirmed mitigation measures in the MOA and MMRP.

Visual Quality

The Project analysis concluded that the construction activities occurring aboveground would only temporarily alter the visual character and setting of historic properties along Flower Street and in Little Tokyo. Temporary construction staging locations and equipment would be visible, but would not have a permanent adverse effect that would diminish the integrity of the historic properties. Therefore, there would be no adverse effects from visual intrusion related to the construction of the project.

Differential Settlement

The Project analysis identified cut and cover and TBM construction activities may have potential differential settlement impacts on historic properties/historic resources. According to the Description of Construction in the Final EIS/EIR, buildings situated near cut and cover and tunneling excavation that would be susceptible to differential settlement include:

- Superior Oil Company Building (now The Standard Hotel)
- The California Club
- 2nd Street Tunnel
- Walt Disney Concert Hall
- Former Nishi Hongwanji Buddhist Temple (Little Tokyo Historic District)

The MOA and the MMRP outline several mitigation measures related to the protection of historic properties including measures to address potential noise and vibration and differential settlement.

4.7.2.1 Alternative A – EPBM/Open Face Shield/SEM Project Profile

The two tunneling method alternatives would be built entirely with tunneling construction techniques and, based on the Final EIS/EIR findings, would have impacts on paleontological resources. Under Alternative A, which has a vertical profile similar to the Project, in areas where new underground EPBM/Open Face Shield/SEM segments would be constructed, avoidance of impacts to paleontological resources will not be feasible.

Nevertheless, any new impacts along the Flower Street segment Alternative A would be minimized with the implementation of mitigation measures included in the Final EIS/EIR and the protocols defined in the project Paleontological Monitoring and Mitigation Plan.

4.7.2.1.1 Construction Impacts

Noise and Vibration

Under Alternative A, the construction noise levels are predicted to be 3 to 6 dBA greater than the levels predicted under the Project due to the presence of grouting along Flower Street (see Section 4.4, Noise and Vibration). No exceedances of the vibration damage threshold of 0.5 in/sec for sensitive properties or 0.2 in/sec for fragile historic properties are predicted.

Differential Settlement

As discussed in Section 4.5 Geotechnical, Subsurface and Seismic Hazards, risk of ground loss and excessive settlement due to the open-face Shield and SEM tunneling will remain even when jet grouting is employed to improve the ground conditions along Flower Street. The risk of tunnel collapse cannot be ruled out. This is because grout columns do not always overlap in practice and there is no guarantee that all of the ground within the columns will be adequately grouted. Groundwater inflows and ground loss can still occur which could damage utilities and existing buildings, basements, structures and provide a safety threat to workers, the public, and building operations.

Visual Quality

As discussed in Section 4.1 Visual Quality, although Alternative A would noticeably reduce visual quality or alter the viewing context of historic properties along Flower Street due to the presence of large and tall grouting equipment, the impact would be temporary and would not result in an adverse effect once construction equipment was removed.

4.7.2.1.2 Section 106 Effects Analysis for Historic Properties

Alternative A does not pose any additional effects to historic properties in the SEIS Study Area. The resulting impacts and effects would be essentially the same as previously analyzed. There would be no additional adverse effects with implementation of confirmed mitigation measures identified in the MMRP and MOA Implementation of the MMRP and MOA would specify the requirements for pre- and post-construction surveys, geotechnical investigations, building protection measures, and TBM specifications. Mitigation measures for noise and vibration during operation and construction would further reduce potential effects to historic properties so they fall below FTA impact threshold criteria for noise and vibration. If these mitigation measures are properly implemented, construction of this alternative would not directly alter a characteristic of these historic properties in a manner that would diminish the integrity of the historic properties' location, design, setting, materials, workmanship, feeling, or association.

Alternative A would have adverse impacts on archaeological resources that would not be feasible to mitigate, and thus the construction and cumulative impact will be adverse and unavoidable.

4.7.2.2 Alternative B – EPBM/SEM Low Alignment

4.7.2.2.1 Construction Impacts

The two tunneling method alternatives would be built entirely with tunneling construction techniques and, based on the Final EIS/EIR findings, would have unavoidable impacts on paleontological resources. Alternative B would potentially have greater impact on paleontological resources than the Project due to a deeper vertical profile that would be 45 or 65 feet deeper, respectively, along the Flower Street segment and 32 feet deeper, respectively, at the 2nd/Hope Station location. On the basis of current geologic maps, the surface geology underlying the Flower Street segment is almost entirely Younger Quaternary alluvial-fan deposits of low paleontological sensitivity. However, these deposits likely overly Older Quaternary alluvial deposits of Pleistocene age with the potential to contain vertebrate fossils. The potential sensitivity of these deposits increases with depth. Therefore, the potential for Alternative B to impact paleontological deposits is greater than that of the Project. In addition, the mapped surface geology underlying the 2nd/Hope Station location is a composite of paleontologically sensitive Puente and Fernando Formations bordered by Older Quaternary alluvium to the east. Both the Puente and Fernando Formations were identified in the Final EIS/EIR as having high paleontological sensitivity with the potential to contain marine and terrestrial mammals and other fossils. Deeper excavations into these formations have the potential to impact paleontological resources that would not be impacted by the shallower excavations planned for the Project. Avoidance of paleontological resources would not be feasible.

Nevertheless, any new impacts along the Flower Street segment and at the planned 2nd/Hope Station location caused by the deeper vertical profile proposed for Alternative B would be minimized with the implementation of mitigation measures included in the Final EIS/EIR and the protocols defined in the project Paleontological Monitoring and Mitigation Plan.

Noise and Vibration

Under Alternative B, the construction noise levels are predicted to be 6 to 7 dBA greater than the noise levels predicted under the Project due to the presence of grouting activity along Flower Street. . No exceedances of the vibration damage threshold of 0.5 in/sec for sensitive properties or 0.2 in/sec for fragile historic properties are predicted.

Differential Settlement

Qualitatively, EPBM-bored tunneling typically causes less differential settlement impact on adjacent buildings and structures than cut and cover construction. Therefore, the extension of the EPBM-bored tunnel to south of 5th Street under this alternative would reduce the different settlement impacts on some historic properties located adjacent to this EPBM-bored tunnel section (but would be adjacent to cut and cover section under the Project). However, risk of ground loss and excessive settlement due to SEM tunneling will remain even when jet grouting is employed to improve the ground conditions along Flower Street. The risk of tunnel collapse cannot be ruled out. This is because grout columns do not always overlap in practice and there is no guarantee that all of the ground within the columns will be adequately grouted. Groundwater inflows and ground loss can still occur which could damage utilities and existing buildings, basements, structures and provide a safety threat to workers, the public, and building operations.

Visual Quality

Under Alternative B, a larger amount of excavated materials from the Flower Street portion of the project would be handled from Little Tokyo. Unlike the Project, the construction of Alternative B would also include the use of jet grouting equipment associated with the SEM construction technique proposed along Flower Street from south of 5th Street to just south of 6th Street. Highly visible jet grouting equipment would be located generally along the eastern traffic lanes of Flower Street, from south of 5th Street to 6th Street. Although Alternative B construction would noticeably reduce visual quality or alter the viewing context of historic properties, it would be a temporary impact, and would not result in an adverse effect once construction equipment was removed.

4.7.2.2.2 Section 106 Effects Analysis for Historic Properties

Alternative B does not pose any additional impacts or effects to historic properties in the SEIS Study Area. The resulting impacts and effects would be essentially the same as previously analyzed and identified for the Project. There would be no additional adverse effects with implementation of confirmed mitigation measures identified in the MMRP and MOA. Implementation of the MMRP and MOA would specify the requirements for pre- and post-construction surveys, geotechnical investigations, building protection measures, and TBM specifications. Mitigation measures for noise and vibration during operation and construction would further reduce potential effects to historic properties so they fall below FTA impact threshold criteria for noise and vibration. If these mitigation measures are properly implemented, construction of this alternative would not directly alter a characteristic of these historic properties in a manner that would diminish the integrity of the historic properties' location, design, setting, materials, workmanship, feeling, or association.

Alternative B would have adverse impacts on archaeological resources that would not be feasible to mitigate, due to the use of EPBM for a longer segment along Flower Street versus Alternative A in addition to the deeper vertical depth, and thus the construction and cumulative impact will be adverse and unavoidable.

4.7.3 Mitigation Measures

Implementation of mitigation measures CR/B-1 through CR/B-6, CR/A-1 through CR/A-6, CR/P-1 through CR/P-6, from the Final EIS/EIR for the Project would apply for Alternatives A and B. Below is a summary of these mitigation measures and a detailed description can be found in Appendix H:

- CR/B-1: Appropriate documentation and co-ordination with historic resource archives to adversely affected properties/resources
- CR/B-2: Surveying of historic properties and/or resources within 21 feet of vibration producing construction
- CR/B-3: Review of historical protection measures by qualified architectural historian
- CR/B-4: Reference to MOA and specific requirements for historic properties adversely impacted
- CR/B-5: Removal and incorporation of historic buildings for 1st/Central Station
- CR/B-6: Proper protection from dirt for adjacent historic properties
- CR/A-1: Construction personnel to be trained by qualified lead archaeologist
- CR/A-2: Presence of archaeological monitor during ground-disturbing activities
- CR/A-3: Native American cultural resources consultant to be present during ground-disturbing activities
- CR/A-4: Halting of work should human remains be found during ground-disturbing activities
- CR/A-5: Preparation of an Archaeological Resource Management Report with findings
- CR/A-6: Appropriate identification and documentation program for any disturbance of historic resources
- CR/P-1: Preparation of a Paleontological Monitoring Report by a qualified paleontologist with monitoring specifications
- CR/P-2: Monitoring of Puente Formation, Fernando Formation, and Quatemary alluvium and deposits during construction
- CR/P-3: The use of field data forms at fossil locals for samples and collections
- CR/P-4: Testing for microfossils at Puente Formation and Fernando Formation
- CR/P-5: Recovered fossils to be listed in database and repositioned at the Natural History Museum (NHM) of Los Angeles
- CR/P-6: Paleontologist to prepare final monitoring and mitigation report

4.8 ENVIRONMENTAL JUSTICE

This section describes the existing Environmental Justice communities in the Study Area for the SEIS and presents the results of the evaluation of the potential construction impacts of the tunneling method alternatives. The environmental analysis assumes a conservative, worst-case, condition when determining potential impacts. Background information in this section is based on the Environmental Justice Technical Memorandum (Appendix EE) and Section 4.17 Environmental Justice Impacts presented in the Final EIS/EIR.

4.8.1 Affected Environment

This section describes the affected environment as it relates to an analysis of environmental justice for the two tunneling method alternatives being analyzed in this SEIS. General construction activities for the Project for locations other than along Flower Street and the Mangrove site area in Little Tokyo remain unchanged from the Final EIS/EIR.

The general boundaries of the Study Area are illustrated in Figure 4.8-1. While the Study Area encompasses those census blocks within the general boundaries, the purpose of this SEIS effort is to analyze potential impacts of the two tunneling method alternatives. Environmental justice analysis conducted for the two tunneling alternatives pertains specifically to those populations located along Flower Street and in Little Tokyo.

The affected environment along Flower Street includes the alignment-adjacent areas of the Financial District and Bunker Hill in downtown Los Angeles. These areas are characterized largely by business activities with high rise office buildings, hotels, and commercial properties. A limited number of high rise apartment buildings are located on Flower Street, along with the Los Angeles Public Library, the California Club, and smaller ground floor retail businesses. The Mangrove portal site is located on the eastern edge of Little Tokyo – a thriving historic and cultural destination characterized by a mix of retail businesses, housing, and cultural institutions.

The Final EIS/EIR was based on 2008 census information. The analytical information presented and used in this SEIS has been updated to reflect 2010 census information, which has identified significant growth in downtown residential population and employment since 2008.

Minority Populations

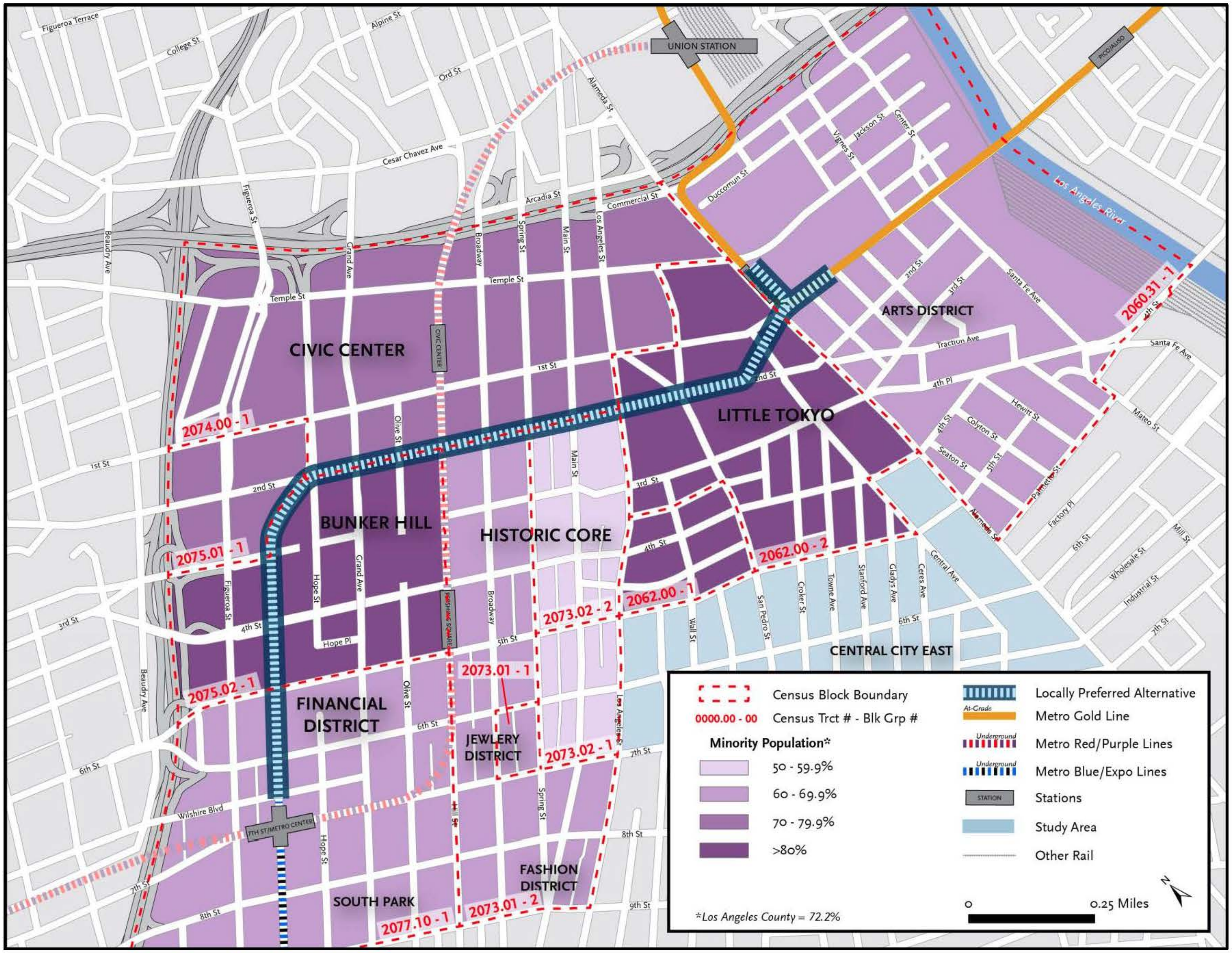
The racial and ethnic character of the populations within the Study Area by census block is listed in Table 4.8-1 (Racial and Ethnic Character by Census Block, 2008 to 2012), and shown on Figure 4.8-1 (Minority Populations in the Study Area by Census Block, 2008 to 2012). Based on U.S. Census Bureau data, all census block groups in the study area were identified as environmental justice areas due to higher minority averages in comparison to the surrounding community (i.e., Los Angeles County), or because 50 percent or more of the population was considered minority. However, census blocks are much larger than the area affected by the Project and tunneling method alternatives. Field work confirmed that the Flower Street corridor is predominantly commercial and has limited residents, while Little Tokyo is an identified environmental justice community.

Table 4.8-1: Racial and Ethnic Character by Census Block, 2008 to 2012

Census Tract	Census Block Group	Total Population	White	Black or African American	Asian	Hispanic or Latino	Amer. Indian/ Alaskan Native	Nat. Hawaiian/ Other Pacific Islander	Other Races	Two or More Races	Percent Minority
2060.31	1	2,088	31.4%	4.8%	50.1%	9.2%	0.1%	0.1%	0.6%	3.7%	**68.6%**
2062	1	1,028	16.4%	47.5%	2.4%	31.1%	0.7%	0.1%	0.1%	1.7%	**83.6%**
2062	2	2,358	10.4%	16.5%	55.8%	14.5%	0.3%	0.1%	0.2%	2.3%	**89.6%**
2073.01	1	1,115	34.5%	24.5%	10.6%	25.2%	1.0%	0.1%	0.2%	4.0%	**65.5%**
2073.01	2	3,406	38.1%	18.8%	17.5%	19.4%	0.9%	0.2%	0.3%	4.8%	**61.9%**
2073.02	1	2,209	48.7%	18.4%	8.9%	17.5%	1.0%	0.0%	0.4%	5.3%	**51.4%**
2073.02	2	1,501	45.6%	20.0%	9.6%	19.7%	1.1%	0.1%	0.6%	3.3%	**54.4%**
2074	1	1,363	20.6%	21.9%	7.3%	48.4%	0.3%	0.0%	0.2%	1.3%	**79.4%**
2075.01	1	2,218	27.6%	7.9%	46.3%	14.5%	0.3%	0.1%	0.2%	3.1%	**72.5%**
2075.02	1	2,589	19.9%	4.9%	60.0%	12.4%	0.1%	0.2%	0.2%	2.4%	**80.2%**
2077.1	1	2,490	35.0%	11.7%	34.5%	15.5%	0.2%	0.2%	0.2%	2.7%	**65.0%**
Total Study Area		**22,446**	**30.4%**	**15.6%**	**31.1%**	**18.6%**	**0.5%**	**0.1%**	**0.3%**	**3.3%**	**69.6%**
Los Angeles County		9,818,605	27.8%	8.3%	13.5%	47.7%	0.2%	0.2%	0.3%	2.0%	**72.2%**

Note: EJ – Environmental Justice; N/A – Not Applicable
Source: U.S. Census Bureau, American Community Survey 5-Year Estimate (2008-2012)

Figure 4.8-1: Minority Populations in the Study Area by Census Block, 2008 to 2012



Low-Income Households

The median household income and households living below the poverty level (i.e., low-income households) within the Study Area are listed in Table 4.8-2 (Low-Income Households by Census Block, 2008 to 2012) and shown on Figure 4.8-2 (Low-Income Households in the Project Area by Census Block, 2008 to 2012). The average median household income is $32,076. Table 4.8-2 also shows the percentage of households in each block group that are transit-dependent. All census block groups except one have greater percentages of transit-dependent households than Los Angeles County. Field work identifies that the project-adjacent areas of Flower Street and Little Tokyo do not appear to meet the criterion of being below the Los Angeles County median income level, as there is no low-income housing, rather both areas have only moderate and high rent housing.

Table 4.8-2: Low-Income Households by Census Block, 2008 to 2012

Census Tract	Census Block Group	Total Households	Median Household Income	Percent Households Living Below Poverty Level	Percent Households Transit-Dependent
2060.31	1	932	$61,042	18.9%	7.0%
2062	1	226	$4,589	76.6%	88.1%
2062	2	1,204	$17,320	36.5%	47.3%
2073.01	1	861	$7,682	65.7%	74.0%
2073.01	2	2,191	$21,753	31.5%	46.4%
2073.02	1	1,266	$32,241	24.0%	24.6%
2073.02	2	890	$30,990	37.2%	49.7%
2074	1	15	$10,795	100.0%	100.0%
2075.01	1	1,353	$56,169	8.1%	22.5%
2075.02	1	1,741	$19,698	35.8%	41.6%
2077.1	1	1,553	$51,803	19.3%	30.4%
Total Study Area		**12,232**	**$32,076**	**30.5%**	**38.9%**
Los Angeles County		3,218,511	$56,241	15.6%	9.7%

Notes: EJ – Environmental Justice; N/A – Not Applicable
Source: U.S. Census Bureau, American Community Survey 5-Year Estimate (2008-2012)

Little Tokyo

Los Angeles's Little Tokyo is one of only three remaining "Japantowns" in the US, and is a historic cultural center of national importance. Prior to World War II, Little Tokyo was the largest Japanese American community in the country. Its Japanese-American population has since decreased in size as a majority of the Japanese-American population has migrated to the suburbs, but Little Tokyo remains a historic and cultural focal point for Japanese Americans both in Los Angeles and throughout the US. It houses important cultural institutions, such as the Japanese American National Museum (JANM), and a portion of the neighborhood is designated as a historic district on the National Register of Historic Places. Impacts to Little Tokyo would affect not only local residents, but also the cultural footings of Japanese-Americans nationwide.

Throughout the planning and environmental review process for the Regional Connector project, residents of Little Tokyo have continuously expressed concern that construction of the project alternatives would negatively affect the community's cultural identity and economic viability. The Little Tokyo community has experience based on the impacts from the three-year construction effort for the Metro Gold Line Eastside Extension. This included the construction of a new Little Tokyo/Arts District Station, as well as construction along Alameda Street between US-101 and 1st Street.

4.8.2 Environmental Consequences

This section summarizes the potential construction impacts of the two tunneling method alternatives evaluated in this SEIS as compared to the Project. The mitigation measures identified in the Final EIS/EIR for the Project would apply for Alternative A and B, and are described below in Section 4.8.3.

4.8.2.1 Alternative A – EPBM/Open Face Shield/SEM Project Profile

4.8.2.1.1 Construction Impacts

Transit

Under Alternative A , there are no impacts to transit services in Little Tokyo beyond those identified for the Project. A majority of the potential construction impacts of Alternative A would be temporary and unavoidable. There would be no disproportionate adverse effect to Little Tokyo EJ populations with implementation of mitigation measures.

Traffic Circulation

Construction of Alternative A would increase the excavation truck trips in Little Tokyo from 19 percent under the Project to 75 percent, and would occur for 15 months longer than the Project. Under Alternative A, the number of trucks using the Flower Street route would decrease to approximately 10 trucks per day, while the number of trucks using the Little Tokyo haul routes would increase to approximately 30 trucks per day. Although the Level of Service (LOS) in the affected roadway segments would remain unchanged, travel times are expected to increase for vehicles traveling along the Little Tokyo haul routes. These increased travel times in and around Little Tokyo would be disproportionately borne by this community.

In summary, Alternative A would have a disproportionate adverse effect to the environmental justice population in Little Tokyo due to increased truck activity, and the longer duration of that truck activity as compared to the Project. This adverse effect would be temporary and unavoidable. This would be a disproportionate adverse effect to the Little Tokyo EJ community.

Parking

Parking impacts identified during construction of the Project would remain unchanged under construction of Alternative A. Parking would be adverse only in the Little Tokyo community portion of the alignment, but, there would be no disproportionate adverse effect to EJ populations with implementation of mitigation measures.

Other Modes

Pedestrian access to adjoining properties in Little Tokyo and bicycle traffic movements would be maintained during construction of Alternative A; however, portions of sidewalks may be temporarily closed adjacent to construction locations. Temporary closures of sidewalks and crosswalks may be necessary. Lane reductions and street closures would restrict bicycle traffic flow during construction. Impacts would be reduced after implementation of proposed mitigation. There would be no disproportionate adverse effect to EJ populations with implementation of mitigation measures.

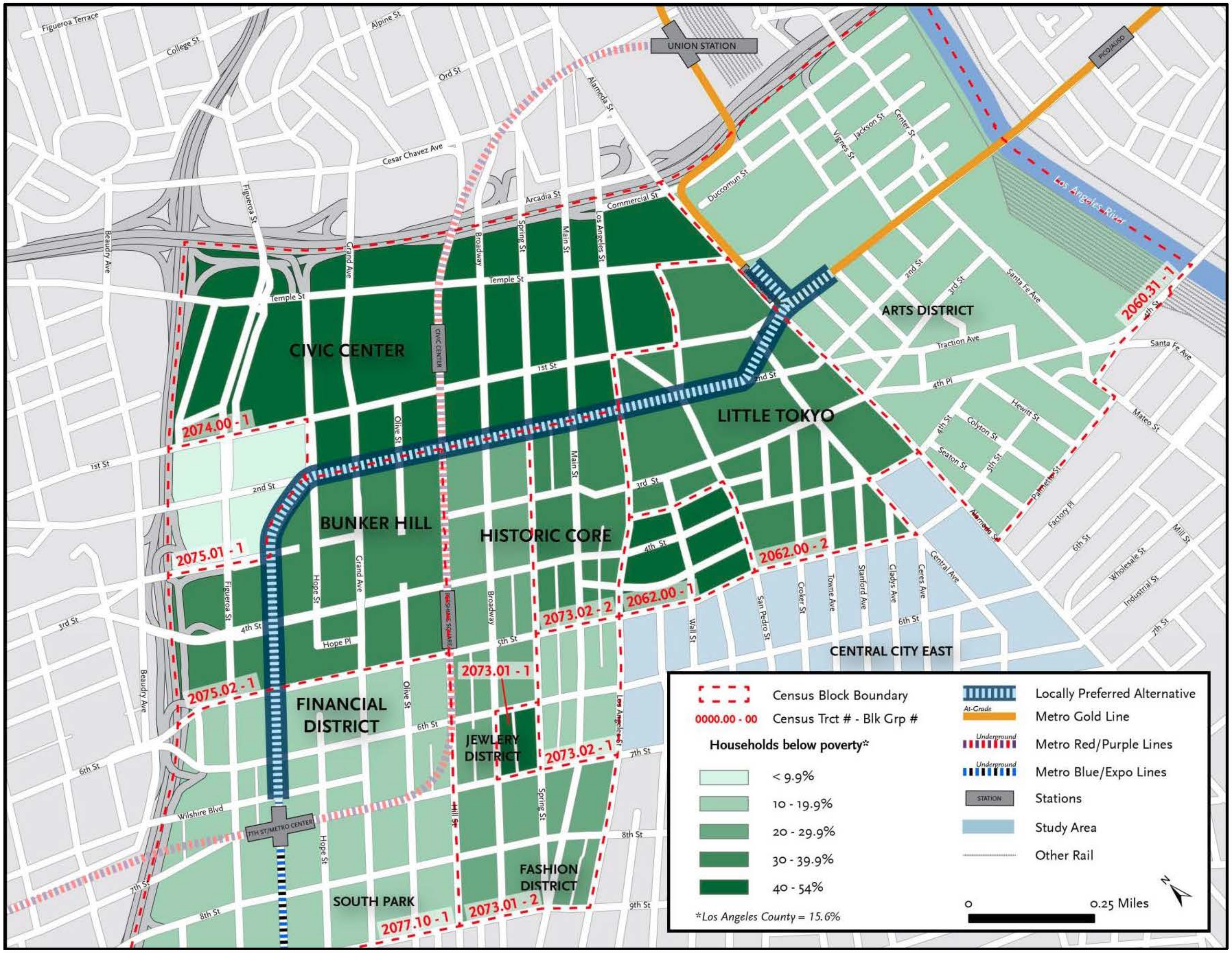
Visual Quality

As described in Section 4.1, construction of Alternative A would not result in impacts to scenic resources or in nighttime lighting or shade and shadow impacts over the Project in Little Tokyo. Construction equipment and staging set ups for Alternative A would have an adverse effect, however they would be temporary. Therefore, there would be no disproportionate adverse effect to EJ populations with implementation of mitigation measures.

Air Quality

As described in Section 4.2, along with Sections 2.3 and 3.0, during construction of Alternative A there may be no additional truck impacts to Little Tokyo beyond those of the Project. There would be an increase in the number and duration of daily truck traffic handling tunnel muck materials from the Flower Street segment. These impacts will not be adverse or have a disproportionate adverse effect on EJ populations with implementation of mitigation measures.

Figure 4.8-2: Low-Income Households in the Study Area by Census Block, 2008 to 2012



Metro

Noise and Vibration

As discussed in Section 4.4, Alternative A would shift muck truck activity from Flower Street to Little Tokyo for 15 months longer than the Project. The duration of construction and excavation efforts identified for Alternative A were taken into account for identifying impacts to receptors in the Little Tokyo area, due to extended duration of construction and increased haul truck activities. Although this is a temporary construction impact, this would be adverse to an environmental justice community. There would be no disproportionate adverse effect to EJ populations with implementation of mitigation measures.

Energy

Construction of Alternative A would result in a temporary energy demand of 323 billion Btu's, which would be higher than the energy demand estimated for the Project. As discussed in Section 4.6, this impact would be temporary for the short-term duration of construction activities and would be offset by the long-term, beneficial decreases in energy use associated with operations. There would be no disproportionate adverse effect to EJ populations with implementation of mitigation measures.

Historic Resources

As presented in Section 4.7, Alternative A would have essentially the same impacts and effects on historic properties as identified for the Project in the Final EIS/EIR, and, therefore, the confirmed mitigation measures in the Memorandum of Agreement (MOA) and the Mitigation Monitoring and Reporting Plan (MMRP) would reduce effects to no adverse effect when implemented. There would be no disproportionate adverse effect to EJ populations with implementation of mitigation measures.

4.8.2.2 Alternative B – EPBM/SEM Low Alignment

4.8.2.2.1 Construction Impacts

Transit

Under Alternative B, there would be no impacts to transit services in Little Tokyo beyond those identified for the Project. A majority of the potential construction impacts would be temporary and unavoidable. There would be no disproportionate adverse effect to Little Tokyo EJ populations with implementation of mitigation measures.

Traffic Circulation

Construction of Alternative B would increase excavation truck trips in Little Tokyo from 19 percent under the Project to 80 percent, and would occur for seven months longer than the Project. Conversely, the truck trips on Flower Street would decrease from 81 percent under the Project to 20 percent in Alternative B. Under this alternative, the number of trucks using the Flower Street route would decrease to 8 trucks (versus 32 trucks under the Project), while the number of trucks using the Little Tokyo haul routes would increase to 32 trucks (versus 8 trucks under the Project). Travel times are expected to increase for vehicles travelling along the Little Tokyo haul routes. These increased travel times in and around Little Tokyo would be disproportionately borne by this community.

In summary, Alternative B would have a disproportionate adverse effect to the environmental justice population in Little Tokyo due to increased truck activity, and the longer duration of that truck activity compared to the Project. This adverse effect would be temporary and unavoidable. This would be a disproportionate adverse effect to the Little Tokyo EJ community.

Parking

Parking impacts identified during construction of the Project would remain unchanged under construction of Alternative B. Parking would only be affected in the Little Tokyo community portion of the alignment, but, there would be no disproportionate adverse effect to EJ populations with implementation of mitigation measures.

Other Modes

Pedestrian access to properties in Little Tokyo and bicycle traffic movements would be maintained during construction of Alternative B; however, portions of sidewalks may be temporarily closed adjacent to construction locations. Temporary closures of sidewalks and crosswalks may be necessary. Lane reductions and street closures could inhibit bicycle traffic flow during construction. Impacts would be reduced after implementation of proposed mitigation. There would be no disproportionate adverse effect to EJ populations with implementation of mitigation measures.

Visual Quality

As described in Section 4.1, construction of Alternative B would not result in impacts to scenic resources or in nighttime lighting or shade and shadow impacts over the Project in Little Tokyo. There would be no impact to Little Tokyo. Therefore, there would be no disproportionate adverse effect to EJ populations with implementation of mitigation measures.

Air Quality

As described in Section 4.2, along with Sections 2.3 and 3.0, during construction of Alternative B there may be no additional truck impacts to Little Tokyo beyond those of the Project. There would be an increase in the number and duration of daily truck traffic handling tunnel muck materials from the Flower Street segment. These impacts will not be adverse or have a disproportionate adverse effect on EJ populations with implementation of mitigation measures.

Noise and Vibration

As described in Section 4.4, Alternative B would shift muck truck activity from Flower Street to Little Tokyo and increase the duration of impacts by an additional 7 months over Project conditions. Although this is a temporary construction impact, this would be adverse to an environmental justice community. There would be no disproportionate adverse effect to EJ populations with implementation of mitigation measures.

Energy

Construction of Alternative B would result in a temporary energy demand of 295 billion Btu's, which would be lower than the energy demand estimated for the Project. This impact would be temporary for the short-term duration of construction activities and would be offset by the long-term, beneficial decreases in energy use associated with operations of this alternative. There would be no disproportionate adverse effect to EJ populations with implementation of mitigation measures.

Historic Resources

Alternative B would have essentially the same impacts and effects on historic properties as identified for the Project in the Final EIS/EIR, and, therefore, the confirmed mitigation measures in the MOA and the MMRP would reduce to no adverse effect when implemented. There would be no disproportionate adverse effect to EJ populations with implementation of mitigation measures.

4.8.3 Mitigation Measures

Mitigation measures to reduce potential environmental justice impacts during construction were identified in the Final EIS/EIR. Implementation of mitigation measures EJ-1 through EJ-35 identified for the Project would be followed for Alternatives A and B. Below is a summary of these mitigation measures and a detailed description can be found in Appendix H:

- EJ-1:Replacement of bus loading spaces on Alameda Street for JANM during construction
- EJ-2: Unmet demand for parking eliminated in Little Tokyo during construction shall be replaced within one block on reliant land uses
- EJ-3: Metro shall provide two acres of land on Mangrove property as alternative parking during construction
- Ej-4: Proper notices by Metro of traffic control plans, parking relocation, through typical communication devices
- EJ-5: Metro shall support efforts to curb non-legitimate use of disabled parking spaces
- EJ-6: Metro shall coordinate to develop a parking reservation system during construction
- EJ-7: Coordination with LADOT to open city parking lots for short-term use
- EJ-8: Coordination with the City to reduce impacts of government vehicles along 2nd Street during construction
- EJ-9: Coordination with the City and Little Tokyo Business Improvement District to facilitate financial incentives and priority parking to Little Tokyo patrons
- EJ-10: Coordination with Little Tokyo restaurants interested in curbside pickup
- EJ-11: Metro shall conduct annual parking needs assessment prior to construction and proper notification strategies to communicate parking to visitors and patrons
- EJ-12: Coordination to maintain visibility for businesses during construction
- EJ-13: Shall parcels used for construction staging be proposed for future redevelopment, Metro shall comply with the Joint Development Policy to involve the community
- EJ-14: Displaced commercial spaces in Little Tokyo shall be replaced with high quality commercial development consistent with community identity
- EJ-15: Coordination with Little Tokyo, Arts District, and City CRA to create joint development opportunities
- EJ-16: Metro shall implement various strategies to support affected services/businesses in Little Tokyo

- EJ-17: Surface level construction activities to be curtailed to extent possible during major Little Tokyo festivities and outdoor events
- EJ-18: Metro shall work with Little Tokyo Business Association to help offset neighborhood impacts associated with reduced revenue during construction
- EJ-19: Metro shall work with Little Tokyo community to minimize adverse impacts during utility relocation and protection of utilities
- EJ-20: Communication and advertising on transit buses and other means to announce construction plans and alternatives to travel and parking in Little Tokyo
- EJ-21: Avoidance of haul routes along 1st or Alameda Streets between 3rd St and US-101
- EJ-22: Publishing of safety and security information at stations in Japanese, Korean, and Spanish
- EJ-23: Publishing of project's safety education campaign in Japanese, Korean, and Spanish
- EJ-24: Involvement of Little Tokyo's Public Safety Association in development of safety and security plans
- EJ-25: Monitoring of committed mitigations designed to address safety and security concerns
- EJ-26: Appropriate orientation of system's ventilation equipment and minimizing of noise
- EJ-27: Implementation of receptor-based mitigation where needed to reduce construction-related pollutant levels
- EJ-28: maximize opportunities for enhancing access from existing land uses to new station
- EJ-29: Design of underground facilities to avoid subsurface impacts to buildings
- EJ-30: Proper monitoring of newly planted trees to ensure healthy growing
- EJ-31: Providing Little Tokyo and Arts District opportunities for input on 1st/Central design processes
- EJ-32: All information to be made available in Japanese and Korean
- EJ-33:TBM operations to be performed by contractor in 48 months
- EJ-34: Appropriate procedures for rapid shut-down should vibration thresholds be reached
- EJ-35: Preparation of a cost-benefit analysis of using one versus two TBMs

Adverse effects would remain after implementation of these mitigation measures for the tunneling method alternatives, which would have additional adverse effects beyond those identified for the Project primarily due to the increased level and duration of the construction impacts on the Little Tokyo community.

Impacts after Mitigation and Environmental Justice Determination

For the Project, there would be no disproportionately high and adverse effects to Environmental Justice populations after mitigation measures identified in the Final EIS/EIR are implemented for construction effects.

Little Tokyo would experience expanded traffic congestion and travel times due to an increase in truck activity handling a greater proportion of the tunneling excavation materials. Construction of both Alternatives A and B would have a longer duration than that of the Project, which would be disproportionately experienced in the Little Tokyo community (over impacts of other communities) and would be considered disproportionately high and adverse to residents of Little Tokyo.

4.9 CUMULATIVE IMPACTS

This section summarizes potential cumulative impacts that would result from the Regional Connector Transit Corridor project in combination with identified past, present and reasonably foreseeable projects. The information presented in this SEIS provides an update to prior reports developed as part of Final EIS/EIR including the Cumulative Impacts Technical Memorandum prepared for the project contained in Appendix GG, Cumulative Impacts Technical Memorandum.

Updated information in this section includes new renovation, construction, institutional/public facility, and transportation projects. Since completion of the Final EIS/EIR, eight new renovation, construction, and institutional/public facility projects are now anticipated to be completed by 2014, and 13 new projects will be under construction during 2014 to 2020. While all of these projects are located in the Project Area, only two projects will impact the Flower Street and Little Tokyo areas affected by the two tunneling methods alternatives: renovation of the former mixed-use Macy's Plaza, now known as the Bloc, located at 7th Street and Flower Street; and the new Wilshire Grand Hotel under construction at 7th Street and Figueroa Street.

Both projects will increase pedestrian activity and contribute to higher Metro Rail ridership in the Flower Street portion of the Project. From a transportation project perspective, there have been significant changes to rail transit project implementation schedules since completion of the Final EIS/EIR. In addition, with the anticipated operation of the Regional Connector project, Metro has identified future operational changes such that Gold Line service will provide a one-seat ride for travel from East Los Angeles to Santa Monica, and the Blue Line from Azusa to Long Beach. Reflecting this future operational change, information on other rail lines to be served by the Regional Connector Transit Corridor project has been added to this cumulative section. These lines include the Gold Line Foothill Extension, Crenshaw/LAX, and Purple Line Extension projects.

4.9.1 Affected Environment

The cumulative context includes the geographic area, timeframe, and/or type of projects that would contribute to the potential cumulative effect. This context differs for each discipline. Each discipline identifies a relevant geographic area for evaluation of direct, indirect, and cumulative impacts. The geographic range considered for the cumulative analysis can vary based on the resource area. For example, the geographic range over which air quality impacts would occur would not necessarily be the same as the geographic range considered for traffic impacts.

In addition, for some disciplines the scope of analysis for cumulative impacts is based on a list of reasonably foreseeable related projects while for others it is be based on general trends in demographics or other regional forecasts. The forecast approach was used in the analysis of cumulative operational impacts for the transportation and air quality disciplines. This approach was also used in the analysis of cumulative impacts for the climate change discipline, which combined construction and operational emissions per the South Coast Air Quality Management District's recommendation. The general geographic range used to forecast cumulative conditions for these three disciplines was the Southern California Association of Government (SCAG) region, which also assumed operation of the rail projects identified in Figure 4.9-2. All other disciplines used the list of reasonably foreseeable related projects as the scope of analysis for cumulative impacts, including the cumulative construction impacts analysis for the transportation and air quality disciplines for the Final EIS/EIR.

The purpose of this SEIS is to study the potential environmental consequences associated with construction and operation of the tunneling method alternatives as compared to the Project. Therefore, the evaluation of cumulative impacts is focused on specific disciplines identified as potentially being impacted by proposed construction method changes to the Flower Street segment of the Regional Connector project. For these disciplines, the general geographic range considered for the cumulative analysis are shown in Figure 4.9-1, along with the rail projects identified in Figure 4.9-2.

4.9.1.1 Project Time Frames

The following project-related time frames were used to identify project-related cumulative impacts.

Construction Period: 2014 – 2020

The project construction period has been identified as extending from initiation of construction to 2020. A worst-case (i.e., maximum potential impact) scenario was assumed for each resource area. For example, it is assumed that all other related projects for which there is no current construction schedule will be under construction during the project construction period. Related projects within the general project area that may be under construction during this project's proposed construction period of 2014 to 2020, which were not previously analyzed as part of the Final EIS/EIR are listed in Tables 4.9-3 through 4.9-6.

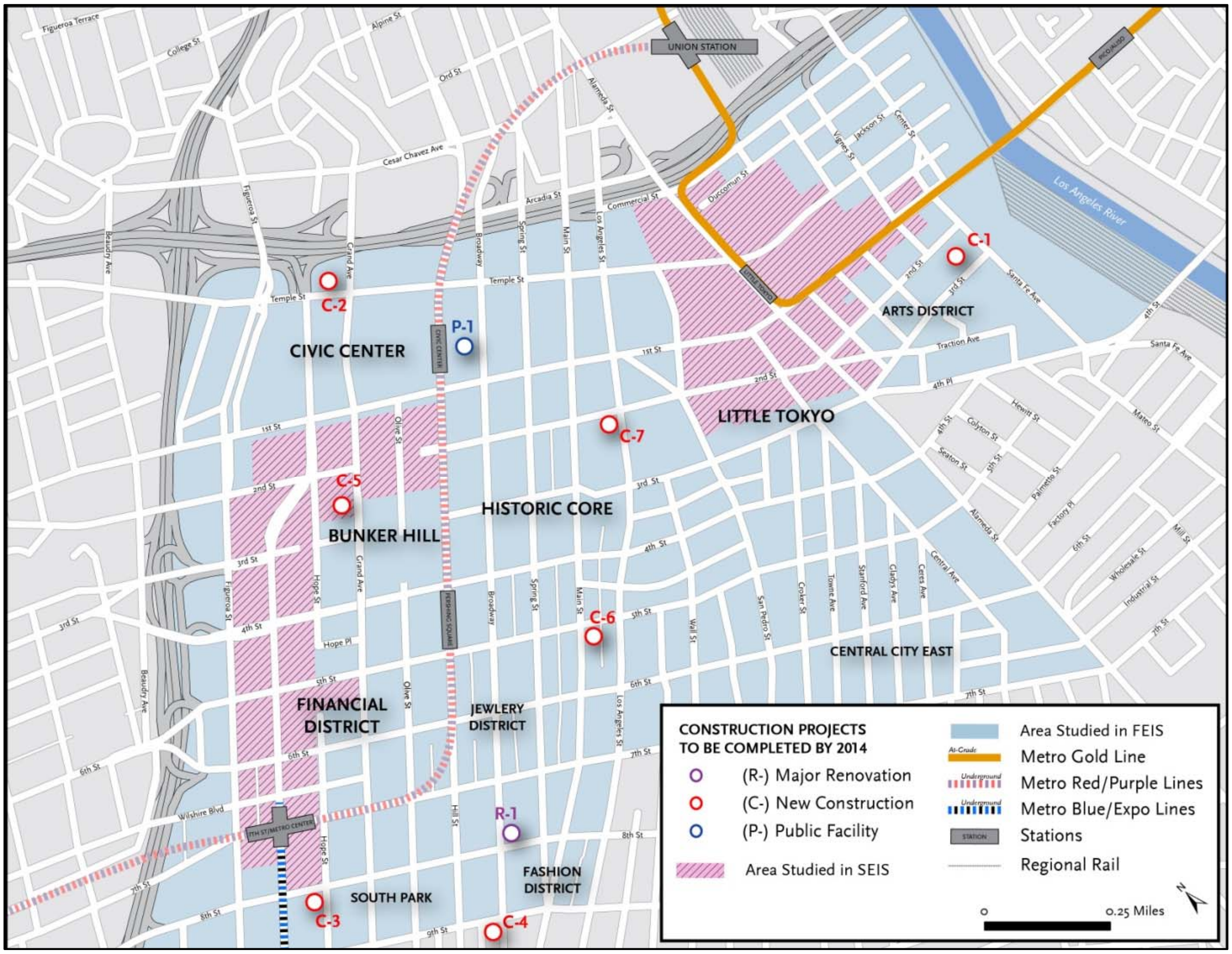
Year of Opening: 2020

With initiation of Project revenue operations anticipated in 2020, potential effects from operation of the Project would begin to be seen. The planning horizon identified for the project is 2035, reflective of the planning horizon used in the two documents that guide Los Angeles County transportation investment decisions – Metro's adopted 2009 Long Range Transportation Plan (LRTP) and SCAG's adopted 2012 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS).

4.9.1.2 Current and Reasonably Foreseeable Related Actions

There are two ways to address the question of what is reasonably foreseeable within the Project Area. The first is to evaluate the project effects in combination with a summary of projections contained in an adopted local, regional, or statewide plan, or related planning document, that describes or evaluates conditions contributing to the cumulative effect. The second method is to generally review a list of past, present, and probable future projects within the Project Area that are expected to be under construction or in operation during the same time frames as the Project. The most appropriate method may vary by discipline.

Figure 4.9-1: Projects Anticipated to be Completed Prior to 2014



Source: SCAG, 2012 Regional Transportation Plan

Forecasts for elements such as population, employment, land use, air quality, and transportation from regional plans were used in the analysis. Regional plans prepared by SCAG and general plans prepared by the City and County of Los Angeles and other nearby cities provided information on trends and forecasts relevant to the impact analysis for specific disciplines.

The following tables identify projects within the general Project Area that are either anticipated to be completed prior to start of construction in 2014, or which may be under construction during this project's proposed construction period of 2014 to 2020. The projects identified in this section include additional projects not previously analyzed as part of the Draft and Final EIS/EIR. There are several subcategories identified, including major renovations, new construction, transportation, and utility projects. The locations of the new additional construction projects are also identified in Figure 4.9-3.

The project lists were developed from information available from the Los Angeles Downtown Center Business Improvement District's (DCBID) fourth quarter 2014 project database and the City of Los Angeles' utility district Capital Improvements Program (CIP). The Community Redevelopment Agency (CRA) of the City of Los Angeles was dissolved per Assembly Bill 1x-26 which took effect in February

2012. Therefore, updated lists of potential projects in the Downtown Los Angeles and Little Tokyo CRA study areas are no longer available. However, it would appear that the projects listed in the DCBID database better meet the definition of "reasonably foreseeable". Many of these potential projects are only in the conceptual planning stages and the timing of construction or operations are unknown. Projects that do not have reported completion dates have been compiled in the tables of projects assumed to be under construction or completed between 2014 and 2020 as a worst-case scenario.

4.9.1.3 Projects Anticipated to be Completed Prior to 2014

Many of the projects identified in Tables 4.9-1, 4.9-2, and 4.9-3 are currently under construction and have identified completion dates prior to 2014. These lists may also include some projects which have recently been completed. The locations of related projects anticipated to be completed prior to 2014 are illustrated in Figure 4.9-1. The following projects listed below include capital improvements which were not previously included or have been modified since the release of the Final EIS/EIR.

Transportation

The following transportation capital improvements within the Project Area are currently identified as funded under Metro's 2009 LRTP and SCAG's 2012 RTP/SCS. The transit projects listed in this section have been or are anticipated to be completed prior to 2014, and are shown in Figure 4.9-2. The project listed below was included in the Final EIS/EIR, but its construction and operational schedule has been modified since the release of the document.

- Metro Exposition Transit Corridor, Phase 1 to Culver City. The first phase of this project, a nine mile light rail transit (LRT) line extending from the 7th Street/Metro Center Station to downtown Culver City, opened in 2012. In addition, Phase 2 extending service to Santa Monica started construction in 2012.

Major Renovations

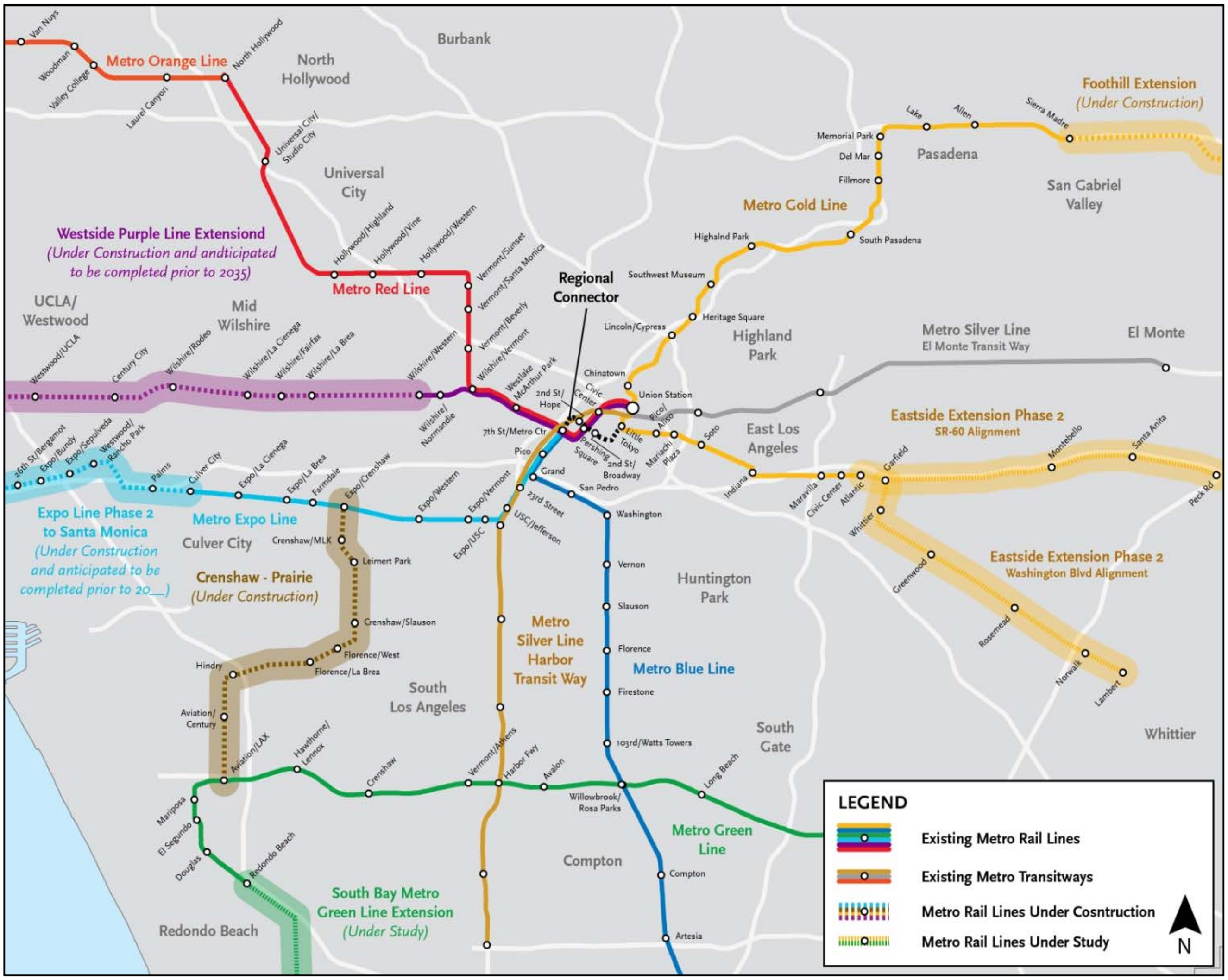
As listed in Table 4.9-1, there is one project located within the Project Area that proposes to convert offices to residential housing and/or which involve a major renovation of an existing structure.

Table 4.9-1: Major Renovation Project Anticipated to be Completed Prior to 2014

Number	Project Name	Address	Land Use	Units	Completion
R-1	Singer Sewing Building	806 S. Broadway	Mixed Use	9	Late 2014

Note: All projects are located within the City of Los Angeles
Source: DCBID project list, 4th quarter 2014

Figure 4.9-2: Year 2035 Rail Transit Projects



Source: Metro, 2014

New Construction

Table 4.9-2 lists new potential construction projects in the Project Area. New construction encompasses building new structures on vacant lots, as well as any demolition of older structures needed to clear the lots for construction. None of these projects are located along Flower Street or in Little Tokyo.

Table 4.9-2: New Construction Estimated to be Completed Prior to 2014

Number	Project Name	Address	Land Use	Units	Completion
C-1	One Santa Fe	1 N. Santa Fe Ave	Mixed Use	4	Completed
C-2	Da Vinci	909 W. Temple St	Mixed Use	630	Late 2014
C-3	8th & Hope	801 S. Hope St	Mixed Use	290	Late 2014
C-4	Olympic & Hill	915 W. Hill St	Mixed Use	281	Late 2014
C-5	The Emerson	225 S. Grand Ave	Mixed Use	271	Completed
C-6	Pershing Apartments	502 S. Main Street	Mixed Use	69	Late 2014
C-7	Ava Phase 2	210 E. 2nd St	Mixed Use	280	Late 2014

Note: All projects are located within the City of Los Angeles
Source: DCBID project list, 4th quarter 2014

Utility Projects

The City of Los Angeles maintains an extensive project list of public works projects. No additional major utility projects have been identified for completion by 2014, and there do not appear to be any planned within the Project Area. Most of the planned projects within the City are related to ongoing maintenance or replacement in-kind of existing infrastructure.

Institutional and Public Facility

Institutional and public facility projects located within the project area are listed in Table 4.9-3. This project is not located in the study areas covered by this SEIS.

Table 4.9-3: Institutional and Public Facility Projects to be Completed Prior to 2014

Number	Project Name	Address	Land Use	Completion
P-1	1st & Broadway Civic Center Park	1st & Broadway	Public	Fall 2014

Note: All projects are located within the City of Los Angeles
Source: DCBID project list, 4th quarter 2014

4.9.1.4 Projects Potentially Under Construction 2014 to 2020

Tables 4.9-4, 4.9-5, and 4.9-6 list projects which are currently in some stage of conceptual planning, but which do not have a defined schedule. Given the uncertainties of project development, the probability that these projects will occur is unknown. It may be reasonable to assume that this compilation of projects represents a worst-case condition for the construction period. The locations of these related projects are shown in Figure 4.9-3. The listed and illustrated projects include capital improvements which were not previously included, or have been modified since the release of the Final EIS/EIR.

Transportation

The following transportation capital improvements, while not located within the Project Area, will have significant impacts to the Regional Connector Transit Corridor Project. They are all currently identified as funded under Metro's 2009 LRTP and SCAG's 2012 RTP/SCS. The projects listed below were either not previously included in the Final EIS/EIR, or their construction schedule has been modified since the release of the document. In addition, as mentioned above, Metro's future LRT system operational plans call for Gold Line service to provide one-seat travel from East Los Angeles to Santa Monica, and the Blue Line from Azusa to Long Beach.

- Exposition Transit Corridor, Phase 2 to Santa Monica. The second phase of this project, extending service from the Culver City station to downtown Santa Monica, initiated construction in 2012 and is scheduled for completion by 2015.
- Crenshaw/LAX Transit Project. This line, extending LRT service from the Exposition Line at Crenshaw and Exposition Boulevards to the existing Green Line Aviation/LAX station, started construction in 2014 and has a planned completion date of 2018.
- Gold Line Foothill Extension, Phase 2A Pasadena to Azusa. This project will extend existing Gold Line service east from its current Pasadena terminus to Montclair in two phases. The first phase (Phase 2A), extending service to Azusa, began construction in 2011 and is projected to open for service in 2016. Engineering design and environmental clearance for the second phase (Phase 2B) is underway and a construction schedule will be established.
- Purple Line Westside, Section 1 to Wilshire/La Cienega. Extension of the Purple Line to the Westside from the existing Wilshire/Western Station is scheduled to be built in three phases. Section 1 to Wilshire/La Cienega started construction in 2014 with revenue service operations anticipated for 2023. Pre-construction activities for Section 2, continuing the Line further west to Century City, are planned to start in 2017 and be completed in 2026.

Institutional and Public Facility

The single institutional and public facility project located in the Project Area is listed in Table 4.9-3.

Table 4.9-4: Institutional and Public Facility Projects Potentially Under Construction 2014-2020

Number	Project Name	Address	Land Use	Completion
P-1	110 Freeway Overcrossing Art Phase II	Los Angeles & Main St. between Arcadia and Aliso St.	Public	N/A

Note: Project located within the City of Los Angeles
Source: DCBID project list, 4th quarter 2014

Major Renovations

The project located within the Project Area, The Bloc (former Macy's Plaza), involves a major renovation of an existing retail, hotel, and office structure, including an underground pedestrian linkage to the 7th Street Metro Station.

Table 4.9-5: Major Renovation Projects Anticipated Potentially Under Construction 2014-2020

Number	Project Name	Address	Land Use	Completion
R-1	The Bloc	7th & Flower	Retail, Hotel, Office, Underground Pedestrian Linkage	Late 2015

Note: All projects are located within the City of Los Angeles
Source: DCBID project list, 4th quarter 2014

New Construction

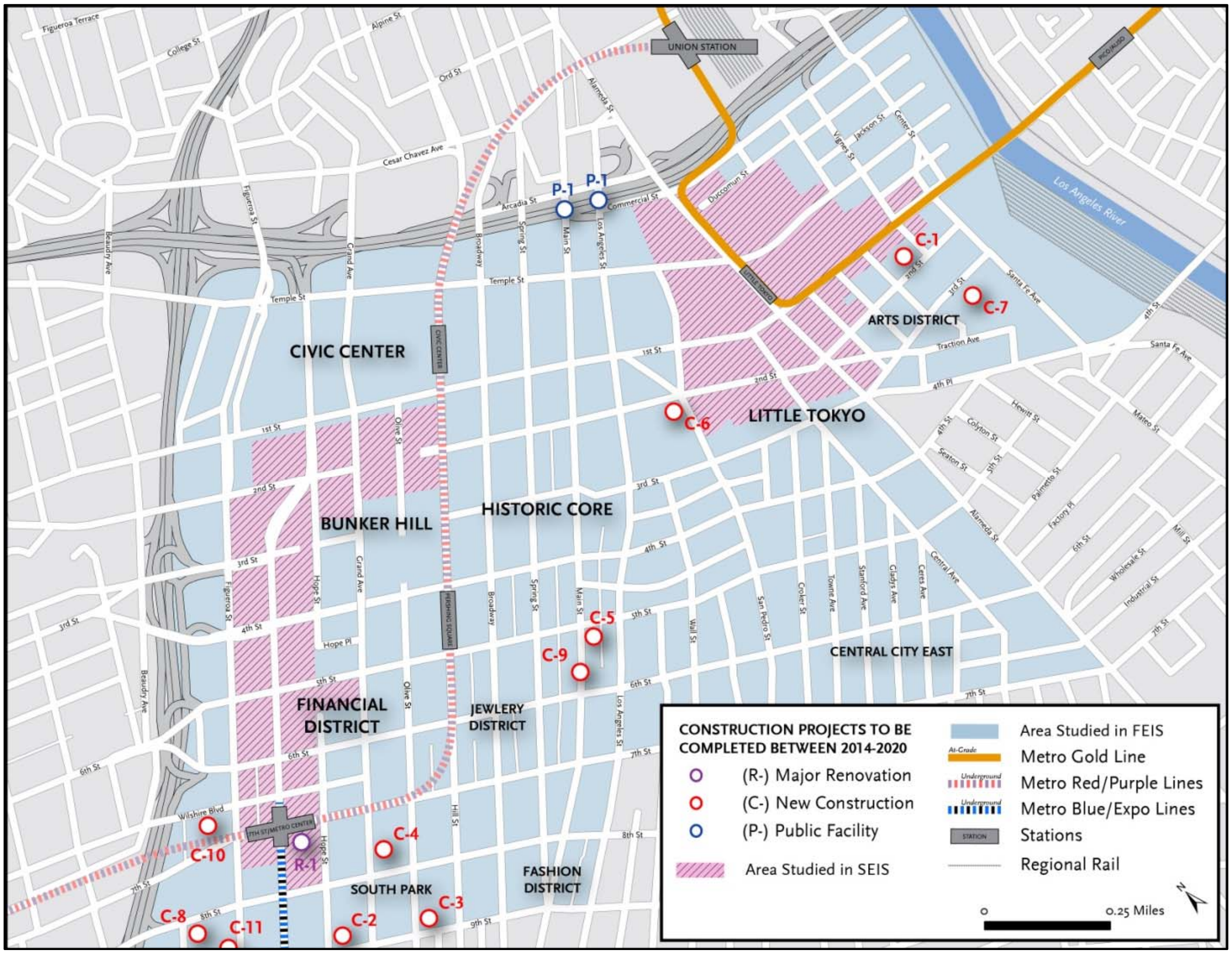
Figure 4.9-3 provides a map of the location of new potential construction projects in the project area. New construction encompasses building new structures on vacant lots, as well as any demolition of older structures needed to clear the lots for construction. Table 4.9-6 includes a list of additional new projects which are identified to be in construction from 2014-2020. The list only includes those projects with identified construction schedules or in the entitlement process which were not previously included in the Final EIS/EIR, or where modifications to the project have been made. The list does not include projects in early conceptual planning phases where construction schedules are not identified.

Table 4.9-6: New Construction Projects Potentially Under Construction 2014-2020

Number	Project Name	Address	Land Use	Units	Completion
C-1	Megatoys/Garey Building	905 E. 2nd St	Mixed Use	320	Fall 2015
C-2	Valencia/888 Hope	888 Hope St	Mixed Use	218	2016
C-3	Onni Tower	888 Olive St	Mixed Use	283	Q1 2015
C-4	8th & Grand	770 S. Grand Ave	Mixed Use	700	Fall 2015
C-5	Metropolis Phase I	502 S. Main Street	Mixed Use	69	Fall 2016
C-6	Sares-Regis Little Tokyo/Block 8-D	2nd & San Pedro St	Mixed Use	240	Fall 2015
C-7	950 E Third St	950 E Third St	Residential	472	N/A
C-8	Metropolis Phase 2	8th & Francisco	Mixed Use	1020	N/A
C-9	Topaz	550 S. Main	Mixed Use	159	N/A
C-10	Wilshire Grand Hotel	930 Wilshire Blvd	Hotel, Retail, Office	900	2017
C-11	Metropolis Hotel	9th and Francisco	Hotel, Retail, Office	350	2016

Note: All projects are located within the City of Los Angeles
Source: DCBID project list, 4th quarter 2014

Figure 4.9-3: Projects Potentially Under Construction 2014 to 2020



Source: SCAG, 2012 Regional Transportation Plan

Utility Projects

The City of Los Angeles maintains an extensive list of public works projects. No major utility projects have been identified within the Project Area during the construction period of 2014 to 2020. However, there do not appear to be many projects planned after 2014 within the City and there do not appear to be any planned within the project area. Most of the planned projects within the City are related to ongoing maintenance or replacement of in-kind of existing infrastructure.

4.9.1.5 Projects Potentially Under Construction Post-2020

Transportation

The following transportation capital improvements within the Project Area and/or interfacing with the Project are funded under Metro's 2009 LRTP and SCAG's 2012 RTP/SCS project list. The projects listed below were: not previously included in the Final EIS/EIR, the construction schedule has been modified since the release of the document, or have increased importance to the Regional Connector Transit Corridor project due to Metro's future LRT system operational plans.

- Gold Line Eastside Transit Corridor Phase 2 – Extension of Gold Line Eastside service from its current terminus in East Los Angeles to communities farther east is being studied through preparation of a Draft EIS report planned for completion in 2014. The study evaluates two LRT alternatives along two service alignments, along SR-60 to Peck Road in South El Monte, and Washington Boulevard to Lambert Road in Whittier. The selected alternative is anticipated to be operational by 2035. The SCAG 2012 RTP/SCS includes implementation of one branch alternative in the Financially-Constrained RTP project list, and construction of the second alternative in the Strategic Plan, which represents projects for which the region would pursue additional funding.
- Gold Line Foothill Extension, Phase 2B to Montclair. Construction of the second phase from Azusa to Montclair is anticipated to be completed and in operation post-2020.
- Purple Line Westside, Section 1, service to Wilshire/La Cienega is planned to start operation in 2023. Section 2 to Century City is planned for revenue service in 2026. Building Section 3, west to a future Westwood/VA Hospital Station, will commence with pre-construction activities in 2025 and revenue service operation slated for 2035.

4.9.2 Environmental Consequences

Impact conclusions for all of the alternatives are based on the thresholds identified in Appendix B (Regulatory Framework) of this SEIS. Appendix GG, Cumulative Impacts Technical Memorandum of the Final EIS/EIR, summarizes the potential cumulative impacts that could result from the Regional Connector Transit Corridor project in combination with the identified past, present and reasonably foreseeable projects. The cumulative impacts analysis includes positive impacts as well as adverse effects, particularly with respect to the enhancements in regional mobility.

Additional analysis conducted for this SEIS includes analysis of the following resource areas:

- Transit, Traffic, Circulation, Parking, Pedestrian, and Other Modes
- Visual Quality
- Air Quality Impacts
- Climate Change
- Noise and Vibration
- Geotechnical
- Energy
- Historic Resources
- Environmental Justice

Cumulative impacts were analyzed in more detail for each of the resource areas within the Study Area for the SEIS. Alternatives A and B would have increased truck activity, reduction in lane capacities, transit rerouting, increased construction duration and intensity compared to the Project. Cumulatively, these adverse effects would be unavoidable under traffic, transit, and environmental justice communities.

Although construction activities are temporary, under cumulative conditions, Alternatives A and B would affect vehicle travel times and traffic operations. The impacts would also cumulatively effect construction of development projects from 2014 to 2020 though none are located on Flower Street. Mitigation measures were identified; however the impacts would be unavoidable.

During operation with Alternatives A and B, the Project would have reduced operating speeds and increased travel times. Cumulative impacts from Alternatives A and B would result in decreased benefits of improved access and connectivity when compared to the Project.

Cumulative impacts and mitigation for the Project are provided in the Final EIS/EIR. Technical Memoranda prepared for the Final EIS/EIR provides additional analysis detail on Project cumulative effects. Cumulative impacts and related mitigation measures for each of the resource areas identified above that would occur with implementation of the alternatives are described in Chapter 2, Alternatives Considered of this SEIS. The following provides a summary of the cumulative adverse effects/impacts for the Project with Alternatives A and B.

4.9.2.1 Alternative A - EPBM/Open Face Shield/SEM Project Profile

As presented in Chapter 2, Alternatives Considered, Alternative A would be constructed with a combination of EPBM and SEM construction methods, and with a similar vertical alignment profile to that of the Project.

With implementation of mitigation, construction of Alternative A would contribute to cumulative effects associated with bus transit, traffic circulation, and environmental justice communities based on the increase truck activity, reduction in lane capacities, transit rerouting, and increased construction duration and intensity compared to the Project. All other cumulative effects would not be adverse, or not adverse after mitigation.

4.9.2.2 Alternative B – EPBM/SEM Low Alignment

Alternative B would be built with a combination of EPBM and SEM construction methods with a lower vertical alignment profile than the Project. Chapter 2 provides detailed information on Alternatives Considered for this SEIS.

With implementation of mitigation, construction of Alternative B would contribute to cumulative effects associated with bus transit, traffic circulation, and environmental justice communities based on the increase truck activity, reduction in lane capacities, transit rerouting, and increased construction duration and intensity compared to the Project. All other cumulative effects would not be adverse, or not adverse after mitigation.

4.9.3 Mitigation Measures

Mitigation measures listed for the Project contained within the specific Final EIS/EIR section for each environmental resource have been carried forward and included in the MMRP for the Project. They are the final committed mitigation measures for the Project and apply to results of this SEIS.

CHAPTER 5

Comparison of the Tunneling Method Alternatives Versus the Project

5.0 COMPARISON OF THE TUNNELING METHOD ALTERNATIVES VERSUS THE PROJECT

This chapter presents a summary of the consequences associated with the construction and operation of the two tunneling method alternatives, Alternatives A and B. Information provided includes an overview of the construction descriptions of the two alternatives, and their resulting construction risk considerations, operational impacts, cost and schedule impacts, and environmental effects as valuated and documented in the SEIS.

5.1 Introduction

A summary discussion of the resulting information from the *Final Flower Street Tunneling Method Alternatives Report (2015)* and the SEIS is provided to allow for informed decision-making. The viability of a transportation system investment typically is based on the following planning, operational, and environmental factors, which are discussed in the following sections:

- **Purpose and Need** – Meeting the project purpose and need as identified in the project study efforts leading up to the Final EIS/EIR and summarized in Chapter 1, Background, Purpose and Scope of the SEIS.
- **Construction and Risk Considerations** – Identifying appropriate construction methods and associated risks, and resulting project schedule impacts.
- **Operational Considerations** – Meeting Metro's operational goals for light rail transit service from a customer and rail system operational perspective.
- **Cost and Funding Considerations** – Developing cost estimates to reflect the construction methods and risks of the two alternatives.
- **Environmental Considerations** – Identifying and assessing environmental and community impacts and benefits.

5.2 Description of the Project And Tunneling Method Alternatives

Within the urban and densely built setting along the Flower Street portion of the Regional Connector project alignment, the Project proposes a combination of cut and cover from the 7th Street/Metro Center Station tail tracks structure to 4th Street, and EPBM tunneling north from 4th to 3rd Street. Two tunneling method alternatives (Alternatives A and B) were identified and evaluated in the SEIS that propose different combinations of underground construction as options to the cut and cover method planned for the Project. These alternatives were developed using a variety of tunneling techniques to assess opportunities to reduce the use of cut and cover.

The SEIS is a limited-scope document that provides additional detail on tunneling methods not selected for construction along Flower Street, specifically Open-Face Shield and SEM tunneling for the Flower Street portion of the Regional Connector project alignment between 4th Street and the 7th Street/Metro Center Station. The two tunneling method alternatives identified and evaluated in the

SEIS propose different combinations of underground construction as options to the cut and cover method planned for the Project:

- Alternative A – a combination of Earth Pressure Balance Tunnel Boring Machine (EPBM), Open-Face Shield, and SEM construction methods; and with similar horizontal and vertical alignment profiles to that of the Project.
- Alternative B – a combination of EPBM and SEM construction methods with a similar horizontal alignment profile, but a lower vertical alignment profile, than that of the Project.

Table 5.2-1 summarizes and compares the descriptions for the Project and Alternatives A and B.

5.3 Effectiveness in Meeting Purpose and Need

As discussed in Chapter 1, Purpose and Need in the Final EIS/EIR, the purpose of the Regional Connector project is to improve the region's public transit service and mobility by improving travel times and connecting the light rail transit (LRT) service of the Metro Gold Line and the Metro Blue Line. As identified in the Final EIS/EIR, this rail link would serve communities across the region, allowing greater accessibility while serving population and employment growth in downtown Los Angeles. With operation of the Regional Connector, Gold Line service will provide a one-seat ride for travel from East Los Angeles to Santa Monica, and the Blue Line from Azusa to Long Beach.

The Project and tunneling method alternatives would improve the region's public transit service and mobility, and improve service to the growing population and employment in downtown Los Angeles; however, the transit service provided by the Project versus the tunneling method alternatives is superior. Construction and implementation of the Project would result in 55 miles per hour (mph) operations in the Flower Street segment meeting the requirements of Metro Rail Design Criteria (MRDC), Section 10 Operations as discussed below in Section 5.6, Operational Considerations. Alternatives A and B would result in a speed reduction in this key LRT system to 35 mph as discussed in Chapter 2, Alternatives Considered. Slowing rail operations makes rail transit a less attractive option for potential riders and may impact LRT line and system ridership, and reduce air quality and climate change benefits compared to the Project.

5.4 Construction and Risk Considerations

There are a significant number of surface and underground constraints combined with the requirements of the MRDC and desired future operations of the Project that have framed the design and construction of the Flower Street section. Flower Street surface constraints to future subway construction include possible impacts to vehicular, bus, and shuttle traffic, impacts to pedestrian and bicycle circulation, and restricted access to off-street parking and adjacent properties.

As discussed in Section 2.2.1 of the SEIS, underground constraints that the design and construction of a tunnel along the Flower Street segment must address include:

Table 5.2-1: Comparison of Project and Tunneling Method Alternatives

	The Project	Alternative A EPBM/Open-Face Shield/SEM Project Profile	Alternative B EPBM/SEM Low Alignment
Construction Description[1]	• EPBM to south of 4th Street • C&C from 4th Street to 7th Street/Metro Center Station tail tracks	• EPBM to 4th Street • Open-face shield TBM to 5th Street • SEM from 5th to 7th Street/Metro Center Station tail tracks	• EPBM to south of 5th Street • SEM from 5th Street to 7th Street/Metro Center Station tail tracks
Horizontal Alignment	Baseline	Slight shift to west of Project alignment	Slight shift to west of Project alignment
Depth To Top of Rail	40'	40'	40' to 105' (at sag)
Mucking Locations	• Flower Street • Mangrove site in Little Tokyo	• Flower Street (for emergency exit and train control room only) • Mangrove site in Little Tokyo	• Flower Street (emergency exit and train control room only) • Mangrove site in Little Tokyo
Handling of Flower Street Segment Excavation Materials (by location)	Flower Street Site: 81% Mangrove Site: 19%	Flower Street Site: 25% Mangrove Site: 75%	Flower Street Site: 20% Mangrove Site: 80%
Corresponding Excavation Materials/ Construction Trucks Per Day	On Flower Street segment: 32 In Little Tokyo: 8	On Flower Street segment: 18 In Little Tokyo: 22	On Flower Street segment: 8 In Little Tokyo: 32
Construction Shaft	TBM retrieval shaft at 4th Street (part of cut and cover construction)	TBM retrieval shaft south of 4th Street	EPBM removed thru Mangrove portal
Permanent Shafts	• Emergency exit south of 4th Street • Emergency exit south of 5th Street • Train control room vent shaft 7th Street/ Metro Center Station tail tracks structure	• Emergency exit south of 4th Street • Emergency exit south of 5th Street • Train control room shaft 7th Street/ Metro Center Station tail tracks	• Emergency exit south of 5th Street • Train control room shaft 7th Street/ Metro Center Station tail tracks
2nd/Hope Station Depth	96'	96'	128'
Maximum Design Speed	55 mph	35 mph	35 mph
Double Track Crossover Before 7th Street/Metro Center Station	Yes	Yes	Yes
Future 5th/Flower Station	Center platform with mezzanine	Side platform with no mezzanine	Side platform with mezzanine Requires tunnel reconstruction
Project Delivery Duration (months) • Construction • Pre-Construction Activities[2] • Total Duration (difference)	78 -- 78	93 (+ 15 months) 29 122 (44 months or 3.7 years longer)	85 (+ 7 months) 29 114 (36 months or 3 years longer)
Project Cost (Millions, YOE)[3]	$171	$295-332[4] (+$124 to $161 more than the project)	$238-266[4] (+$67 to $95 more than the project)

Notes: [1] **Construction Techniques** include C&C - Cut and cover; EPBM- earth pressure balance tunnel boring machine; SEM- sequential excavation method. [2] **Pre-Construction Activities** include engineering design revisions and re-procurement of the design-build construction contract. [3] **Project Cost YOE** is the year of expenditure using 2017 as the mid-point of construction. [4] **Project Costs** Range for two alternatives provides a low and high cost estimate based on risk. The range does not include increased costs resulting from procurement delay, construction delay, or escalation due to delays.

- **Physical operational challenges**, including connecting to the existing narrow and shallow rectangular 7th Street/Metro Center Station tail tracks structure, providing a new double track crossover before the tail tracks connection, and accommodating a future 5th/Flower Station.
- **Significant underground constraints**, including: a large number of abandoned steel tie-backs ranging from 30 to 90 feet in length and extending across the street right-of-way from both sides; existing utilities and sewer lines ranging in size up to an 84-inch diameter reinforced concrete pipe approximately 18 feet below the ground surface; and 4th Street Bridge foundations and piles that extend 64 feet below the surface on the west side of Flower Street and 83 feet on the east side.
- **Challenging geologic ground conditions,** which require thorough consideration in the evaluation of tunneling feasibility within acceptable risks. Flower Street geologic conditions include the presence of groundwater, unstable soils, a challenging geologic interface between different soil or rock strata (mixed face), and hazardous gases. Before development of downtown Los Angeles, Flower Street served as a natural drainage path which became a stream during rainfall with seasonal variations of groundwater below ground. Groundwater is anticipated to follow the historic underground water course and pose problems for the stability of open-face tunnel excavation. Borings made for building sites along Flower Street between 5th and 7th Streets have encountered water seepage at relatively shallow depths ranging from 15 to 35 feet, which is close to or within the proposed tunnel envelope. Groundwater within the lower portion of the alluvial deposits, most likely perched above the Fernando Formation, has been reported at depths of 18 to 27 feet on sites adjacent to the Flower Street right-of-way between 2nd and 5th Streets. All of these factors result in conditions that are difficult to tunnel through without risking ground instability, ground loss, and settlement if not addressed by the tunneling construction method and/or ground stabilization techniques. Both alternatives would require the use of jet grouting to stabilize soil conditions in the Flower Street segment to allow for tunneling construction.

The construction methods identified for the Project represent the tunneling methods that best address the significant underground constraints and lessen the construction risk along Flower Street, and have proven to be successful on other Metro projects, such as for the Gold Line Eastside Extension tunneling effort.

5.5 Summary of Impacts of Alternatives versus the Project

The SEIS analysis identified that Alternatives A and B would have the following major impacts when compared to the project:

1. Delay of Regional Connector Project completion;
2. Increased construction impacts to the Little Tokyo community and increased duration of those impacts;
3. Increased risks of excessive settlement, sinkholes and utility service disruption along Flower Street; and
4. Increased construction risks along the Flower Street segment.

Project Completion Delay

It is estimated that both tunneling method alternatives would delay the project completion schedule by a minimum of 3.0 years beyond the Project's schedule. Under the Project, the cut and cover construction along Flower Street would require only minimal ground improvement and could be carried out concurrently with construction of the remainder of the project. The Open-Face Shield and SEM tunneling methods proposed by Alternatives A and B would require a substantial jet grouting program prior to open face TBM and SEM construction due to Flower Street geologic conditions. The grouting activities would delay construction of the project's other underground stations until the tunneling is completed as excavated materials from the Flower Street segment would be transported to the Mangrove site in Little Tokyo using conveyors through the tunnels.

Increased Construction Impacts to Little Tokyo

Under the Project conditions, a majority of excavated materials from the Flower Street segment would be handled through construction sites on Flower Street and only muck from EPBM-bored tunnels would be handled through the Mangrove site. For Alternatives A and B, all of the muck generated from open-face shield and SEM tunneling would be transported to the Mangrove site through the tunnel, and only a minor quantity of excavated materials from shafts along Flower Street would be handled from construction sites on Flower Street. This would result in a significant increase in the quantity of spoils handled through the Mangrove site.

Alternative A would increase excavation-related truck activity in Little Tokyo and would extend the duration of those impacts by 15 months. Alternative B would increase the excavation-related truck activity in Little Tokyo and would extend the duration of those impacts by 7 months. The increased quantity and duration of the muck handling activities would increase construction impacts to Little Tokyo, which is an environmental justice community.

Increased Risks along Flower Street

As discussed in Chapter 2, Alternatives Considered, there are significant underground constraints which pose challenges to the design and construction of the future rail tunnel on the Flower Street segment of the Regional Connector Project. These constraints include: 1) connecting with the existing narrow, shallow rectangular tail tracks structure of the 7th Street/Metro Center Station; 2) numerous abandoned underground tie-backs (used to support the excavation of building foundations) extending into the path of the future rail tunnel from adjacent building foundations along both sides of Flower Street south of 3rd Street; 3) unstable soil conditions; 4) many utilities; and 5) the 4th Street Bridge foundations which restrict the location of a future rail tunnel to a narrow vertical and horizontal corridor between the foundation piers.

The tunneling method alternatives would increase construction risks related to excessive ground surface settlement, sinkholes, and utility service interruption along Flower Street. These risks are mainly associated with the open-face shield and SEM tunneling in an area with significant underground infrastructure constraints and poor ground conditions.

5.6 Operational Considerations

With operation of the Regional Connector project, Gold Line service will provide a one-seat ride for travel from East Los Angeles to Santa Monica, and the Blue Line from Azusa to Long Beach. The Regional Connector will serve as the trunk section for these two Metro LRT corridors. As identified by MRDC operating criteria, the required operational speed for the Flower Street segment is 55 mph. The Project provides a 55 mph operating speed in the Flower Street segment, meeting Metro's operating criteria, while Alternatives A and B would result in a speed reduction in this key LRT system segment to 35 mph, as shown in Table 5.2-1. Reduction of the maximum operating speed in this key system link would decrease rail service headways, operational efficiency, and operating capacity for the entire Metro LRT system. These impacts would be permanently adverse.

Due to the slower speeds provided by Alternatives A and B, passengers would have a longer travel time of approximately 1.2 minutes per one-way trip over the travel time provided by the Project. While this may appear minor based on individual perception, the cumulative impact for the forecast 90,000 daily boardings would be significant – approximately 1,800 hours of daily delay. Slowing rail operations makes rail transit a less attractive option for potential riders and may impact LRT line and system ridership, and reduce air quality and climate change benefits compared to the Project.

This slower speed in the heart of the region's LRT system would result in permanent operational constraints, including slower operations providing less capacity and the need for Metro to operate more trains to provide the same capacity as the Project. For Alternatives A and B, the additional trip time is estimated to require an increase in the fleet size of six vehicles with a corresponding increase in capital and operating costs.

It should be noted that the Project and Alternatives A and B have designed to allow for a future 5th/Flower Station. Construction of this station would result in slower operating speeds in the Flower Street segment for the Project and Alternatives A and B as the closer station spacing would not allow the LRT vehicles to reach the desired 55 mph operational speed. While there currently is no funding for this station, construction funding priorities may change in the future and implementation of this station would be evaluated as a separate project.

For Alternative B, the resulting 5.9 and 4.6 percent gradients due to its "sag" to avoid underground obstructions would result in increased maintenance requirements from the resulting increase in friction between the rail tracks and train wheels. The Flower Street segment of the alignment would require more frequent track maintenance efforts to ensure operations remain below the desired noise threshold.

A key element in designing the Flower Street segment of the project is to allow for future provision of a 5th/Flower Street Station. While Alternatives A and B are designed to accommodate construction of a future station, the resulting stations would be substandard and not as convenient for passengers. Under the Project, a central platform is provided allowing for ease of cross-platform transfers for passengers. For Alternatives A and B there is insufficient room between the twin tunnels to allow for a future center platform, and side platforms would be provided. Under Alternative B, passengers desiring to travel in the reverse direction would need to circulate up to the mezzanine level, and then take an escalator or elevator down to the platform to complete their transfer. Alternative A would not have a mezzanine and passengers desiring to transfer would need to circulate up to the ground level and then back down again to complete their transfer. Alternatives A and B would result in a significant decrease in passenger convenience, especially for visitors and infrequent users who may not know the Metro LRT system well.

Table 5.6-1: Operational Summary of the Project and the Tunneling Method Alternatives – Flower Street Segment

	The Project	Alternative A	Alternative B
Maximum Speed (miles per hour)	55 mph	35 mph	35 mph
Travel Time[1]	2.1	3.3	3.3
Double Track Crossover	Yes	Yes	Yes
Future 5th/Flower Station	Center platform with mezzanine	Side platform with no mezzanine	Side platform with mezzanine

Note: [1] minutes to travel between 7th Street/Metro Center and 2nd/Hope stations

5.7 Schedule Impacts

A detailed discussion of the Project schedule impacts resulting from the tunneling method alternatives was developed in the *Final Flower Street Tunneling Method Alternatives Report (2015)*. Table 5.7-1 presents a summary of the resulting implementation schedules for Alternatives A and B.

Table 5.7-1: Comparison of Schedules for the Project and Tunneling Method Alternatives

	Construction Duration	Change in Construction Duration (Over Project)	Required Pre-construction Activities	Total Project Delivery Duration	Revenue Service Date	Total Project Delivery Delay	
Alternative	**Months**	**Months**	**Months**	**Months**	**Date**	**Months**	**Years**
The Project	78	--	--	78	Mid-2020	--	--
Alternative A	93	15	29	122	Early-2024	44	3.7
Alternative B	85	7	29	114	Mid-2023	36	3.0

Source: *Final Flower Street Tunneling Method Alternatives Report (2015)*

Table 5.7-2, on the following page, provides an overview of the construction and risk factors that would contribute to the lengthening of the total project delivery schedules for Alternatives A and B and correspondingly the Revenue Service Date (RSD), when compared to the Project.

Table 5.7-2: Overview of Construction and Risk Factors Impacting the Construction Schedules for the Project and Tunneling Method Alternatives

	Project	Alternative A	Alternative B
Construction Factors	• Cut and cover section along Flower Street can occur concurrently with excavation of bored tunnels and other construction activities, including station construction.	• Requires extensive jet grouting along Flower Street between 4th and 6th Streets. • Higher level of muck truck activity in Little Tokyo than the Project • Extends duration of muck truck impacts in Little Tokyo. • Delays station construction. Removal of excavation materials through the tunnel to the Mangrove portal would delay start of station construction work until after tunneling is complete. • With extension of tunneling further south on Flower Street, longer tunnel runs would be required for excavated materials than the Project, and would extend construction duration.	• Requires extensive jet grouting along Flower Street between 5th and 6th Streets. • Higher level of muck truck activity in Little Tokyo than the Project and Alternative A. • Extends duration of muck truck impacts in Little Tokyo. • Delays the start of station construction work and 2nd/ Broadway SEM cavern/cross passages until tunneling is complete. • Removal of excavation materials through the Mangrove portal via the westbound tunnel would continue until SEM work is complete. • SEM can occur concurrently with one of the EPBM tunnels.

Alternative A Schedule Impacts

Implementation of Alternative A would require 44 months over the Project's project delivery schedule. The increased duration is due to: 1) an additional 29 months for pre-construction activities; and 2) a longer construction duration by 15 months. Pre-construction activities for this alternative would include the preparation of detailed engineering design plans; re-procurement activities for the existing design-build contract; and re-permitting efforts. As the Project is currently under construction, implementation of either tunneling method alternative would require stopping current construction activities, and initiation of re-procurement and follow-on-mobilization efforts for the new project configuration using different construction techniques and equipment than the Project. Given the design-build contract currently in place, Metro evaluated what would be required contractually to accommodate the construction changes identified by the two alternatives. Based on the magnitude in the difference of the Flower Street segment construction contract value, ranging between approximately $276 and $403 million for the two alternatives over the awarded Project cost for the same segment (as presented below in Table 5.8-1, re-procurement of the project design-build contract was recommended.

Alternative A would have a longer construction duration as the identified tunneling excavation and construction activities would need to be performed sequentially, rather than concurrently as under the Project. Additional construction time would be required for the jet grouting activities that must be performed prior to and during tunneling efforts to provide needed ground stabilization. The estimated construction duration reflects 12 months of grouting activities with the caveat that grouting work may increase up to 24 months due to unforeseen underground conditions.

In summary, the total project schedule impact for Alternative A would be 44 months or 3.7 years longer than the Project from initiation of construction to start of revenue service. As discussed in Section 2.3.1.1, the duration of construction activities for this alternative along the Flower Street segment would be reduced, while the duration of construction-related activities in Little Tokyo would increase.

Alternative B Schedule Impacts

Implementation of Alternative B would require 36 months over the Project's project delivery schedule. Similar to Alternative A, the increased duration is due to required pre-construction activities and an increased construction duration by seven months over the Project's schedule. Pre-construction activities would include preparation of detailed engineering design plans; re-procurement activities for the existing design-build contract; and re-permitting efforts. During construction of the Project, cut and cover excavation and construction work would occur concurrently with the excavation of the bored tunnels and other construction activities throughout the alignment. For Alternative B, the primarily tunneling work would be performed sequentially as the tunnel boring machine bores one tunnel towards the 7th Street/Metro Center station box, and then is turned back towards Little Tokyo to bore the second parallel tunnel, which would increase the construction schedule. Due to the need to remove all Flower Street segment tunnel spoils through the Mangrove portal, the tunneling operation would continue until the SEM work is complete. This would hold the start of station construction work for the cavern and all cross passages until after the Flower Street segment tunneling is complete. Start of station construction work would be delayed for the 2nd/Hope and 2nd/Broadway stations, and of the 2nd/Broadway SEM cavern and all cross passages until after the Flower Street segment tunneling is complete. Additional construction time would be required for the jet grouting activities that must be performed prior to and during tunneling efforts to provide needed ground stabilization. The estimated construction duration reflects eight months of grouting work with the caveat that grouting work may increase up to 16 months due to unforeseen underground conditions.

In summary, the total schedule impact would be 36 months or 3.0 years longer than the Project from initiation of construction to start of revenue service. As discussed in section 2.3.1.1, the duration of construction activities along the Flower Street segment would be reduced under this alternative, while the duration of construction-related activities in Little Tokyo would increase.

5.8 Cost and Funding Considerations

Capital cost estimates for the Flower Street portion of the two tunneling method alternatives were identified based on the efforts discussed below and documented in the *Final Flower Street Tunneling Method Alternatives Report (2015)*. Capital costs are the expenses associated with the design and construction of a proposed transit system, with the project costs falling in one of two areas:

1. Construction Costs – including track and guideway elements, stations, and vehicle control and power system equipment.

2. Non-construction Costs – including engineering, environmental, agency, and construction management services; permits; surveying, geotechnical, and other testing; vehicles; and insurance.

Capital cost estimates were developed for the two tunneling method alternatives using cost information identified for the Project as documented in Metro Contract No. C0980 Design Build contract as it represented the most current cost information available from a design-build project similar in scope and location. Construction of the two alternatives would be substantially similar to the Project, except for the Flower Street segment south from 4th Street to the 7th Street/Metro Center Station. New cost information was developed for the revised tunneling construction techniques proposed by each alternative by estimating the quantities for the individual line items required to build the two alternatives along the Flower Street segment. The costs applicable to the estimated quantities were derived from the bid information in Contract C0980. New construction costs, such as for SEM tunnel construction and grouting activities, were identified and alternative-specific quantities and costs were developed. Non-construction costs, similar to those identified for the Project, were included in the cost estimates for the two alternatives.

The resulting cost estimates were compiled in the Standardized Cost Categories (SCC) analytical format developed by the FTA. The SCC format identifies total project costs through nine project line item categories with the first five (10-50) detailing construction costs; the second set (60 ROW, Land, Existing Conditions; 70 Vehicles; and 80 Professional Services) delineating non-construction costs; and Line Item 90 identifying the Unallocated Contingency provision. Each line item has separate allocated contingency amounts.

The cost estimates for the two tunnel method alternatives included contingency factors similar to those identified for the Project. Contingency is a necessary part of the budget for this type of project in order to account for unknowable costs, based on project construction experience on similar projects. Contingency addresses risks including market volatility, unforeseen conditions, and outside influences to the successful progression and completion of a project within the forecasted budget and schedule. It is expected that a portion of the budgeted contingency will be required to cover costs incurred during construction of the project. Contingency factors (percentages) were identified by Metro based on agency experience on similar tunneling projects. Similar to the Project cost estimate, allocated contingencies were applied to each of the SCC construction cost line items based on the risk profile associated with each SCC classification. An overall project cost provision for unallocated contingency was captured in SCC Line Item 90. The unallocated contingency percentages used for the two tunneling method alternatives were the same as those identified for the Project in the C0980 cost estimate.

The cost estimating effort for the two alternatives took into consideration schedule delays and higher risks related to the tunneling methods proposed by the two alternatives. As the Project is currently under construction, implementation of either tunneling method alternative would require stopping current construction activities and pursuing a new contract procurement process to incorporate the new tunneling construction techniques.

Construction of either tunneling method alternative would require new pre-construction services, including preparation of detailed engineering design plans for the selected tunneling method alternative, revised environmental documentation based on the final plans, re-permitting, and re-mobilization of construction staff and equipment. These pre-construction activities were estimated to delay re-initiation of construction activities by approximately 29 months for either tunneling method alternative. The increased construction duration for the two alternatives is due to the identified tunneling excavation and construction method activities having to be performed sequentially, rather than concurrently, as included in the Project's construction plan described in detail in Section 2.1.2 and summarized above in Section 5.7. The increased construction duration would have related delay and escalation costs due to the suspension of construction activities and the typical inflationary increase in construction costs during the extended project period.

In addition, as presented above in Table 5.7-2, the construction methods proposed by the two tunneling alternatives would have higher risks related to the significant number of underground constraints and the unstable geologic conditions along Flower Street. Underground constraints include tunneling activities encountering the hundreds of tie-backs that anchor existing building and parking structure foundations which form a "mesh" within the proposed Flower Street segment tunnel alignment. The geologic conditions include the presence of groundwater, unstable soils, a challenging geologic interface between different soil or rock strata (mixed face), and hazardous gases, which would present less risk with cut and cover construction for the Project.

The cost estimates for each alternative, presented in Table 5.8-1, were prepared taking into account the tunnel construction method changes and related schedule delays and risks. Cost adjustments addressed the proposed SEM and Open Face Shield construction methods, which would require extensive jet grouting for ground stabilization. A schedule analysis was performed to identify the construction schedule for each alternative, with extended construction for Alternatives A and B taking into account the proposed construction techniques, along with pre-construction activities. An initial risk assessment resulted in the re-assessment of allocated and unallocated contingency percentages to address increased risk conditions presented by the two alternatives. A range of costs was identified for the two alternative, with a low and high cost estimates, to reflect the higher risk associated with construction of the two alternatives due to challenging subsurface conditions and obstructions.

Costs related to the identified pre-construction and construction schedule delays resulting from implementation of either of the two alternatives were identified and included in the project cost estimates presented in Table 5.8-1:

1. Additional Construction Duration Cost – reflecting the design-build contractor's increased overhead costs due to an extended construction duration by a minimum of 3.0 years.
2. Cost of Procurement Delay – costs for the engineering re-design, environmental review, re-procurement, re-permitting, and re-mobilization activities required for the two alternatives.
3. Escalation Costs due to Redesign and SEIS Delay – escalation costs for construction materials, equipment, and labor due to a minimum of a 3.0 year delay from the current Project schedule.

4. Construction Delay Cost to Overall Project – agency costs for the added delay to complete the overall project.

The cost estimating effort resulted in the identification of both baseline construction only and total project cost estimates for the two tunneling method alternatives. The total Flower Street segment cost ranges between $510 and 575 million for Alternative A, and $447 and 503 million for Alternative B, as compared to $171 million for the Project.

Table 5.8-1: Year of Expenditure[1] Dollar Cost Estimate for the Flower Street Segment for the Tunneling Method Alternatives ($Million)

SCC Category	SCC Line Item	Project	Alternative A		Alternative B	
			Low	High	Low	High
10.06	Guideway – Underground Cut and Cover	93.1	9.9	9.9	7.0	7.0
10.07	Guideway – Underground Tunnel SEM	--	50.0	68.3	57.1	77.9
10.07	Guideway – Underground EPBM	31.5	46.6	46.6	50.1	52.5
10.07	Guideway – Underground Tunnel Open Face TBM	--	41.8	56.9	--	--
20.03	Underground station, stop, platform	--	--	--	30.6	32.0
40.02	Site Utilities, Utility Relocation	9.6	7.5	7.5	7.5	7.5
40.04	Environmental mitigation	0.1	0.4	0.4	0.5	0.5
40.07	Auto, bus, van access, including roads, parking lots	0.6	0.2	0.2	0.2	0.2
40.08	Temporary Facilities and other indirect costs during construction	0.4	0.1	0.1	0.1	0.1
	Total SCC 10-50	135.3	156.5	189.9	153.1	177.7
80.02	Final Design	11.2	19.0	19.4	15.4	15.7
80.04	Project & Construction Management	6.8	11.5	11.7	9.3	9.5
80.06	Legal Permits, Survey, Testing, Inspection	1.3	2.3	2.3	1.8	1.9
	Total SCC 10-80	154.7	189.3	223.3	179.6	204.8
90.00	Unallocated Contingency	16.7	20.5	24.2	19.5	22.1
	Total SCC 10-90	171.4	209. 8	247.5	199.1	226.9
	Additional Construction Duration Cost (Contractor's extended overhead)	--	84.7	84.7	39.0	39.0
	Subtotal[2]	**171.4**	**294.5**	**332.2**	**238.1**	**265.9**
	Cost for Procurement Delay	--	47.0	47.0	47.0	47.0
	Escalation Costs due to Redesign/SEIS Delay	--	139.9	139.9	134.2	134.2
	Construction Delay Cost to Overall Project	--	27.8	55.7	27.8	55.7
	Total	**$171.4**	**$509.2**	**$574.8**	**$447.1**	**$502.8**

Notes: [1] YOE – Year of Expenditure: 2017, as the mid-point of construction for the Project, was used to calculate the SCC 10- 50 line item costs
[2] Range for two alternatives provides a low and high cost estimate based on risk. The range does not include increased costs resulting from procurement delay, construction delay, or escalation due to delays.
Source: *Final Flower Street Tunneling Method Alternatives Report, Appendix B: Cost Risk Analysis Model for Baseline and Each Alternative (2015)*

5.9 Environmental Consequences

Based on guidance provided in NEPA, this SEIS provides an analysis of the environmental consequences associated with construction and operation of the tunneling method alternatives. The following environmental impact areas were studied in the SEIS:

- Transportation and Circulation
- Visual Quality
- Air Quality
- Climate Change
- Noise and Vibration
- Geotechnical
- Energy Resources
- Historic Resources
- Environmental Justice
- Cumulative

In summary, the environmental analysis documented in the SEIS shows that construction of either of the two tunneling method alternatives would have adverse environmental effects, many of which could not be mitigated. These include shifting of a majority of the truck handling of tunnel excavation materials from the Flower Street segment, a high-rise commercial district with wide streets, to Little Tokyo, a low to mid-rise, mixed use district with visitor and cultural destinations, and identified as an environmental justice community. Implementation of Alternatives A and B would extend the duration of construction impacts in Little Tokyo by a minimum of 3.0 years over the Project.

Construction of Alternatives A and B would require the use of jet grouting for ground stabilization with extensive equipment requirements, including jet grouting rigs and mixing plants more than 100 feet in height, along with mixers, compressor, generators, and related support equipment. The grouting equipment would require use of the two travel lanes on the east side of Flower Street between 4th and 6th Streets for Alternative A, and between 5th and 6th Streets for Alternative B, for the duration of the grouting activities. Grouting efforts would require the use of two travel lanes for eight to 16 months further reducing street capacity. The construction impacts on Flower Street would result in significant traffic and circulation, visual, air quality, climate change, and noise impacts that would be difficult to mitigate or could not be mitigated. Alternatives A and B do not provide reduced environmental impacts during construction to those identified for the Project. In addition, the tunneling method alternatives would have higher and longer construction-related adverse environmental justice effects on Little Tokyo, as shown in Table 5.9-1.

Table 5.9-1: Comparison of Environmental Effects During Construction in Little Tokyo

Impact	The Project	Alternative A	Alternative B
Hauling of Excavated Materials from Flower Street			
- On Flower Street • Percentage of total Flower Street materials • Duration of hauling activities	81% 9 Months	25% 1 Month	20% 1 Month
- In Little Tokyo • Percentage of total excavation activities • Duration of hauling activities	19% 2.5 Months	75% 19 Months	80% 17 Months
Excavation/Construction Trucks Per Day			
- On Flower Street	32	18	8
- In Little Tokyo	8	22	32
Duration of Truck Impacts (for hauling excavated materials)	9 Months	19 Months 10 months longer	17 Months 8 months longer

Source: *Final Flower Street Tunneling Method Alternatives Report (2015)*

5.10 Summary of Findings

Based on the environmental analysis in the SEIS and the engineering analysis documented in the *Final Flower Street Tunneling Methods Alternatives Report (2015)*, the construction method alternatives would not perform as well as the Project in meeting purpose and need, would impact Metro operations, would pose construction and safety risks, and would result in environmental impacts, as summarized below, and presented in Table 5.10-1.

- **Purpose and Need** – Alternatives A and B would not perform as well as the Project in meeting the purpose and need identified for the Regional Connector project. While they would provide an improved regional connection, implementation of these options would result in reduced operating speeds on the Flower Street segment – 35 mph compared to 55 mph provided by the Project. There would be a corresponding increase in travel times for Gold, Blue, and Exposition Line passengers, as well as for passengers transferring from the Red and Purple Lines. The speed reduction resulting from the tunneling method alternatives would have permanent adverse operational effects over the Project due to increased travel times for the operational life of the Regional Connector project.

- **Construction and Risk Considerations** – Construction along the Flower Street segment must address significant challenges including physical operational challenges, difficult surface and underground conditions, and challenging geologic conditions. The geologic conditions include the presence of groundwater, unstable soils, a challenging geologic interface between different soil and rock strata (mixed-face), and hazardous gases. The Project was defined to address those constraints given the segment's high risk and challenges. The tunneling methods proposed by Alternatives A and B would result in significantly higher construction risks, a longer construction schedule, and a higher project cost. The higher construction risks include increased risks of ground instability, loss, and settlement which could threaten public and worker safety.

Table 5.10-1: Overview of Environmental Impacts Due to Construction of the Tunneling Method Alternatives

Resource Area	The Project	Alternative A	Alternative B
Transportation/ Circulation Flower Street Impacts	• 3 to 4 travel lanes available on Flower Street during construction • Even with mitigation, the intersections of 4th, 5th and 6th and Flower Streets would be adversely affected during the AM peak hour. With mitigation, the resulting effect would not be adverse under NEPA.	• 2 travel lanes available on Flower Street during grouting and construction. • Longer duration of traffic lane closure due to 12 months (possibly up to 24 months) of grouting activities.	• 3 travel lanes available on Flower Street: 4th to 5th Streets; 2 travel lanes 5th to 6th Streets. • Longer duration of traffic lane closure due to 8 months (possibly 16 months) of grouting activities.
Little Tokyo Impacts		• Increases and extends construction truck impacts on Little Tokyo by 15 months.	• Increases and extends construction truck impacts on Little Tokyo by 7 months.
Visual Quality	• Construction staging area along the east side of Flower Street would have negative impacts on the visual quality/character that can be screened.	• Construction and grouting staging areas along east side of Flower Street would have adverse impacts on visual quality/character. • Impacts cannot be mitigated due to size of grouting and plant equipment (over 100 feet tall). • With two grouting areas, this alternative would have a more adverse effect than Alternative B.	• Construction and grouting staging areas along east side of Flower Street would have adverse impacts on visual quality/character. • Impacts cannot be mitigated due to size of grouting and plant equipment (over 100 feet tall). • With only one grouting area, this alternative would have less impact than Alternative A, but more than the Project.
Air Quality Peak daily emissions	• During construction, regional construction emissions of VOC, NO_x, and CO will be adverse, significant and unavoidable under NEPA. With mitigation, localized construction emissions will be reduced to less than significant.	• Higher emissions during construction due to use of grouting equipment. • Longer duration of construction emissions by 12 months (up to 24 months) on Flower Street; and by 15 months over the Project.	• Higher emissions during construction due to use of grouting equipment. • Longer duration of construction emissions by 7 months (up to 16 months) on Flower Street; and by 7 months in Little Tokyo over the Project. • With only one grouting area, this alternative would have less impact than Alternative A.
Climate Change MTCO2e/year	• 2017[1] GHG emissions would be 4,870.	• 2017[1] GHG emissions would be 8,040. • Higher GHG emissions than the Project due to use of grouting equipment.	• 2017[1] GHG emissions would be 4,950. • Higher GHG emissions than the Project due to use of grouting equipment. • Less GHG emissions than Alternative A due to need for only one grouting area.
Noise and Vibration Flower Street Impacts	• Noise may inadvertently exceed FTA significance criteria during construction; mitigation measures will control exceedances.	• Results in increased construction noise level over the Project due to use of grouting equipment. • Possible minor increase in vibration impacts due to TBM use further south on Flower Street.	• Results in some noise level increases over the Project due to use of grouting equipment. • Results in lower noise level than Alternative A due to need for only one grouting area.

Note: [1] Mid-point of construction

- **Operational Considerations** – The speed reduction resulting from Alternatives A and B would have negative impacts on rail service headways, run times, and operations over the Project. With a slower operating speed – one-third slower than Metro operational requirements – Alternatives A and B would negatively impact passengers using the Gold, Blue, and Exposition Lines, as well as passengers transferring from the Red and Purple Lines at the 7th Street/Metro Center Station. Metro would be required to operate additional trains and increase the fleet size by approximately six vehicles with a corresponding increase in capital and operational costs. It should be noted that the Project and Alternatives A and B have been designed to allow for a future 5th/Flower Station. Construction of this station would result in slower operating speeds in the Flower Street segment as the closer station spacing would not allow the LRT trains to reach the desired 55 mph speed. While both alternatives would allow for a future 5th/Flower Street Station, the resulting station configuration for Alternatives A and B would not allow for cross-platform transfers negatively impacting passenger convenience, especially for visitors and infrequent users. Implementation of Alternatives A and B would result in a permanent, substandard operating segment in the heart of the region's LRT system.

- **Schedule Impacts** – Implementation of Alternatives A and B would delay start of revenue service by a minimum of 3.0 years beyond the Project's schedule. The increase in schedule is partially due to longer construction timeframes – 15 and 7 months for Alternatives A and B respectively. In addition, both alternatives would require an additional 29 months over the Project's schedule for pre-construction activities required to revise the engineering design and re-procure the design-build construction contract. A longer construction time would increase the project cost and delay operation of this much needed segment in the region's LRT system.

- **Cost and Funding Considerations** – Based on a cost analysis similar to that performed for the Project, the higher risk for Alternatives A and B translates to $67 to $123 million more for the baseline Year of Expenditure (YOE) cost for the Flower Street segment beyond the cost identified for the Project. Given the higher risk level along this segment, a range of total project costs identified an additional $276 to $403 million would be required for the construction of Alternatives A and B beyond that identified for the Project. Funding for these additional costs will need to be identified among limited federal, state, and local sources.

- **Environmental Considerations** – The two tunneling method alternatives shift a majority of the effects resulting from the handling of excavation materials from the Flower Street segment, a high-rise commercial district with wide streets, to Little Tokyo, a low to mid-rise mixed use district with visitor and cultural destinations, and identified as an environmental justice community. Use of grouting equipment, required for Flower Street segment ground stabilization for construction of the two alternatives would result in adverse visual, noise and vibration, air quality, and traffic effects that may not be mitigated.

Alternatives A and B would result in a higher safety risk, would cost more money, would take longer to construct, and would result in additional adverse environmental effects than the Project. Even with the proposed methods to reduce construction risk associated with tunneling in the weak ground conditions under Flower Street, the tunneling method alternatives have a high chance of ground settlement problems and thus, were not carried forward as part of the Regional Connector project. While implementing Alternatives A and B may be technically possible, for the reasons stated in this paragraph and above, those alternatives were considered infeasible as a matter of sound public policy, and thus were withdrawn from further consideration.[i]

[i] *See Res. Ltd. v. Robertson, 35. ,3d 1300, 1307 (9th Cir. 1997)*

CHAPTER 6

Public and Agency Outreach

6.0 PUBLIC AND AGENCY OUTREACH

6.1 Introduction

The Regional Connector Transit Corridor Project approval and certification of the Final EIS/EIR was the culmination of prior planning and environmental studies and projects completed in the past two decades. Per court order (Submitted pursuant to the National Environmental Policy Act of 1969, 42 U.S.C. §§ 42 U.S.C. 4321 et. seq, 23 CFR 771, and the Order re Plaintiffs' Combined Motion for Summary Judgment and Defendants' Motion and Cross-Motion for Summary Judgment, dated May 29, 2014 and Order re Plaintiff Today's IV, Inc. and 515/555 Flower Associates, LLC's Motion for Injunctive Relief, dated September 12, 2014 issued by the U.S. District Court in *Today's IV. Inc. v. FTA et. al.* (*Today's IV*), Case No. LA CV13-00378 JAK (PLAx), *Japanese Village, LLC v. FTA et al.* (*Japanese Village*), Case No. LA CV13-00396 JAK (PLAx), *515/555 Flower Assoc., LLC v. FTA* (*Flower Assoc.*), Case No. LA CV00453 JAK (PLAx) and the Judgments issued on October 24, 2014 by the U.S. District Court in *Today's IV* and *Flower Assoc.*), this SEIS is intended to provide more information on tunnel construction alternatives not pursued and to provide additional detail on tunneling methods not selected for use along Flower Street, specifically Open Face Shield and SEM tunneling for the Flower Street portion of the Regional Connector project alignment between 4th Street and the 7th Street/Metro Center Station. This Final Supplemental Environmental Impact Statement and Supplemental Record of Decision document has been prepared pursuant to Pub. L. 114-94, 23 USC 139 (n)(2)(A) as amended by the Fixing America's Surface Transportation Act.

Public Outreach for this SEIS was focused on the two areas affected by the construction tunneling alternatives, Flower Street and Little Tokyo. Public notice of the availability of the Draft SEIS, a 45-day public review period and notification of the completion of the Final SEIS was provided in compliance with the National Environmental Policy Act (NEPA)(23 CFR 771.130).

6.2 Highlights of Previous Outreach Efforts

The Regional Connector Transit Corridor Project has garnered considerable stakeholder interest throughout the environmental process during including the AA, Draft EIS, and Final EIS phases. Recognizing the unique challenges and opportunities of the proposed project, as well as its potential benefits beyond the immediate downtown Los Angeles area, Metro developed a creative approach to ensure an inclusive, engaging and transparent outreach process. The community outreach effort was designed to build awareness and understanding of the project, provide opportunities for ongoing stakeholder involvement, and assist in the identification of potential mitigation measures.

Outreach included the engagement of a wide diversity of stakeholders and opinion leaders including business organizations, chambers of commerce, business improvement districts (BIDs), neighborhood councils, community councils, arts organizations, and residents groups in downtown Los Angeles. Particular outreach was done in the Little Tokyo community, located within the Project Area, one of the only three remaining "Japantowns" in the United States, and an environmental justice community. The Little Tokyo Working Group (LTWG) was created and included Metro staff and leaders of the Little Tokyo Community Council (LTCC), which represented over 100 business and community organizations.

A collaborative effort, the group developed alternatives acceptable to the Little Tokyo community and appropriate mitigation measures to address construction and operational impacts. This collaboration led to the development of the Fully Underground LRT as the only acceptable alternative for the community. In 2010 the Metro Board approved the addition of the Fully Underground LRT Alternative to the Draft EIS for full environmental evaluation. Following the completion of the Draft EIS public review period, the Metro Board of Directors designated the Fully Underground LRT Alternative as the Locally Preferred Alternative (LPA) at the October 28, 2010 meeting.

Metro published a Supplemental Environmental Assessment (EA) document to introduce refinements made to the LPA in July 2011. The preparation of the Final EIS/EIR was completed in January 2012, and the Metro Board of Directors approved the Project on April 26, 2012. A Record of Determination (ROD) was issued by the FTA on June 29, 2012.

The formation and success of the LTWG, accompanied by Metro's desire to implement a transparent and proactive process in engaging this community, collectively provided an extraordinary opportunity for stakeholder engagement to defuse potentially volatile environmental justice issues, and in the process build trust, widespread enthusiasm, and support for a critical transit project.

Additionally, in April 2014 Metro was nominated for the Public Involvement/Partnership Award by the Environmental Protection Agency (EPA), an award given by the National Association of Environmental Professionals (NAEP), recognizing the community outreach efforts and proactive engagement of the Little Tokyo community in a focused and collaborative dialogue during the NEPA process in order to address their concerns.

6.3 Public Participation Plan (PPP)

A detailed Public Participation Plan (PPP) was developed at the commencement of the environmental effort, and included a stakeholder database, communications protocols, public input tracking, and a schedule for interfacing with the public, and recommendations for how meetings should be conducted. All elements of the PPP were applicable to this SEIS effort. The full PPP is provided in the Final Scoping Report as Appendix G in the Final EIS/EIR.

Project notifications, mailers, and updates for this SEIS followed the specification outlined in the PPP, including newspaper ads, media outreach, and in appropriate languages. Public meeting notifications were published in local newspapers and held in the Study Area.

6.4 Agency Coordination

The extensive consultation process with various cultural groups and agencies to identify traditional cultural properties and cultural practices was conducted during all phases of the environmental planning process has been documented for the Section 106 consultation process and detailed information can be found in Chapter 7, Public and Agency Outreach, of the Final EIS/EIR. This co-ordination has continued through this SEIS phase. Communication with the State Historic

Preservation Office (SHPO) was undertaken by FTA staff. Metro provided a letter to SHPO on June 4, 2015 explaining the purpose of the SEIS, court order, and the alternatives under evaluation. The letter included information on the alternatives considered but withdrawn from consideration and discussion of anticipated impacts. SHPO submitted no comments pertaining to the alternatives considered in this SEIS.

Various informational documents including meeting notices, electronic e-blast, mail post cards, and other collateral materials provided the public with project information during the Draft SEIS process. Letters were also sent to participating, non-participating, and reviewing agencies. Participating letters were sent on June 2, 2015 and included a copy of the Notice of Availability (NOA).

Table 6-1: Agency Distribution for the Draft SEIS

Resources Agency	
Department of Fish and Wildlife, Region 5	Resources, Recycling and Recovery
Office of Historic Preservation	California Highway Patrol
Department of Parks and Recreation	Caltrans, District 7
Department of Water Resources	Air Resources Board, Transportation Projects
Regional Water Quality Control Board, Region 4	Department of Toxic Substances Control
Native American Heritage Commission	Public Utilities Commission
Office of Emergency Services, California	

6.4.1 Mailings, Flyers, and Electronic Mailings

Notification of public hearings was sent via postal mail to the addresses on the stakeholder database. Postcards were sent by a mail house to households and businesses located within a 1 mile radius of the project. Additionally, notices were posted on Metro's website. Refer to Appendix I for copies of the published notification and post cards.

6.4.2 Website and Media Outreach

The project website (http://www.metro.net/regionalconnector/) serves as a central point where stakeholders can readily access current project-related information. The project website was initially used for the AA phase and was updated regularly during the Draft EIS, the Final EIS phases, and the current SEIS phase. Website content for the Regional Connector includes a project overview, schedule of upcoming meetings, summaries of past meetings and collateral materials including fact sheets, presentations materials, and other information from both the current and previous project phases. The website is updated at key study milestones.

6.5 Public Review Period

The Draft SEIS was distributed for public review and comment prior to the issuance of this Final SEIS. Comments were submitted during the 45-day Draft SEIS review period to FTA or Metro. FTA and

Metro held two public hearings on the content and findings of the Draft SEIS during the 45-day public review period. The NOA alerted the public and interested Federal, State, tribal, regional and local government agencies of the availability of the DSEIS, and invite comment on the DSEIS. The NOA also provided notice that the FTA may issue a single Final Supplemental Environmental Impact Statement and Record of Decision document pursuant to Pub. L. 112-141, 126 Stat. 405, Section 1319(b) unless the FTA determines statutory criteria or practicability considerations preclude issuance of the combined document pursuant to Section 1319. In that case, FTA would issue a Final Supplemental Environmental Impact Statement followed by a supplement to the Record of Decision, as needed. All substantive comments on the content of the Draft SEIS are addressed in this Final SEIS.

6.5.1 Public Hearings

The Draft SEIS public participation process was initiated on June 12, 2015 and lasted for 45 days, ending July 27, 2015. The NOA was filed with the County Clerk on June 11, 2015. Ads, in English, Spanish, and Japanese, were published in local newspapers providing project information and the public comment period, and public hearings. Local newspaper publications included Rafu Shimpo (local Japanese publication), La Opinion (local Spanish publication), The Downtown News, and The Daily News. Copies of ads and postings can be found in Appendix I. During this time, there were two public hearings held within the study area, one in the Financial District and one in Little Tokyo. The public hearings were held:

- June 30, 2015 from 12:00 pm to 1:30 pm at the Los Angeles Central Library, Mark Taper Auditorium, 630 W. 5th Street, Los Angeles, CA 90071
- July 7, 2015 from 6:30 pm to 8:00 pm at the Japanese American National Museum, 100 N. Central Avenue, Los Angeles, CA 90012

6.5.2 Public and Agency Comment

A total of 13 public and agency comment letters were received during the public review period, including written materials submitted at the two public hearings. Comments were also submitted in the form of oral testimony at those hearings. A total of 2 public testimonies were recorded at the public hearings. Overall, a total of 6 comments by individuals (not agencies) were received on the Regional Connector Transit Corridor Project Draft SEIS.

Appendix J of this Final SEIS contains copies of all written comments, both mailed and comment cards from the public hearings, court transcripts, and responses to all comments received on the Draft SEIS.

APPENDIX A

FINAL FLOWER STREET TUNNELING METHOD ALTERNTIVES REPORT

REGIONAL CONNECTOR TRANSIT CORRIDOR PROJECT

Final Flower Street Tunneling Method Alternatives

Prepared for:

Metro

Prepared by:
The Connector Partnership
432 East Temple Street
Los Angeles, California 90012

The Connector Partnership

Review Copy		
	Date	Initials
Originator	7/2/2014	JC/DD/XY
Checker	8/19/2014	WHH
Back checker (for Final)	8/19/2014	JC/DD/XY
Approved by	12/07/2015	JSP

December 7, 2015

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1.0 PREFACE

The Connector Partnership Joint Venture (CPJV), engaged by Los Angeles County Metropolitan Transportation Authority (LACMTA), conducted a tunnel feasibility and environmental assessment for Flower Street construction methods and alignment alternatives for the Regional Connector Transit Corridor Project. This effort was undertaken to evaluate feasibility of tunneling along Flower Street in response to community concerns about cut-and-cover construction impacts in this area.

This report builds on previous analysis to evaluate tunneling alternatives along Flower Street and supports preparation of a Supplemental Environmental Impact Statement (SEIS) for the Regional Connector Transit Corridor Project. A draft report was issued August 19, 2014 and this final report is issued with no changes in technical content. The environmental assessment of the tunneling alternatives is conducted and discussed in the SEIS.

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2.0 EXECUTIVE SUMMARY

In an effort to address concerns from the Financial District, regarding the potential construction impacts along Flower Street, the LACMTA Board, in April 2012, directed staff to examine various value engineering and cost saving methods to determine if certain specific construction methods and design features could be incorporated, to mitigate potential construction impacts along Flower Street, without causing an increase to the Life of Project (LOP) budget. The Board further directed staff that, if the analysis determined that the methods exceeded the LOP budget, the construction methods and design features should be included, as bid options, during the construction procurement to allow design-build proposers a process to include each feature and determine if it could be accomplished within the LOP budget.

At the time of the April 2012 Board Meeting, the Flower Street mitigation method under consideration was referred to as the “Low Alignment.” This alignment, with a deeper segment between 4th and 5th Streets, would extend pressurized-face TBM tunneling from the Baseline termination, at south of 4th Street, to a point south of 5th Street, which would subsequently reduce the length of the cut-and-cover section with street decking system along Flower Street. The Low Alignment was considered as Alternative B in this study.

The Baseline and two alternatives have been evaluated in this study in order to fully respond to stakeholders concerns for tunneling alternatives along Flower Street. The Baseline consists of earth pressure balance machine (EPBM) tunneling to south of 4th Street and the cut-and-cover with street decking system to the 7th/Metro Center Station along the Locally Preferred Alternative (LPA) vertical profile. Alternative A would extend tunneling south to the 7th/Metro Center Station along the LPA profile through the use of a combination of EPBM, open-face shield tunneling, and sequential excavation method (SEM) construction techniques in series. Alternative B would extend tunneling south toward the 7th/Metro Center Station along a lower profile (Low Alignment) through the use of a combination of EPBM and SEM construction technique. Both Alternatives A and B would minimize cut-and-cover construction, limiting it to the tie-in with the 7th/Metro Center tail tracks and street-surface exit shafts.

It was determined based on this study that it is not feasible to use pressurized-face tunnel boring machines (Earth Pressure Balance Machines [EPBM]) for tunneling where tiebacks are present. Unacceptable risks of excessive subsidence from ground loss are associated with open-face shield and SEM tunneling in mixed face geologic conditions with the tieback obstructions. The substantial amount of drilling from the ground surface for ground improvement by grouting that would be required to mitigate the hazard of mixed-face conditions and tiebacks would negate the benefit intended of avoiding street surface impacts by tunneling.

This study supports the environmental assessment presented in the Supplemental Environmental Impact Statement (SEIS). Based on this environmental assessment, no changes to the Project are being recommended. The assessment demonstrates that there are a variety of construction, operation, cost, and schedule concerns that make the tunneling alternatives infeasible, and that while some environmental impacts may be reduced along Flower Street, other impacts are similar along Flower Street and/or shifted to the other end of the alignment, in Little Tokyo area, which is an environmental justice community.

3.0 DEVELOPMENT OF PROJECT CONFIGURATION

The project configuration on Flower Street between 2nd/Hope Station and the existing Blue Line tail tracks at 7th/Metro Center Station has progressed from preparation of the Draft Environmental Impact Statement/Draft Environmental Impact Report (DEIS/DEIR) through the Final Environmental Impact Statement/Final Environmental Impact Report (FEIS/FEIR). From the engineering perspective, the work encompassed Conceptual Engineering, Advanced Conceptual Engineering, and Preliminary Engineering.

3.1 Conceptual Engineering and DEIS/DEIR October 2010

The project went through a number of design iterations, which have been significantly influenced by mitigation measures in the environmental process. This section presents the design and construction methods carried in the project at the conclusion of Conceptual Engineering and preparation of the DEIS/DEIR.

The DEIS/DEIR alignment under Flower Street included a pocket track between 3rd and 4th Streets and an underground station between 4th and 5th Streets. Both elements would require large cut-and-cover excavation over long sections of the alignment along Flower Street. The combined length and arrangement of these major structures and the cut-and-cover connection to the existing 7th/Metro Center structure left only short construction sections deemed not practical or cost effective to construct by tunneling. This left no practical section of the alignment to be constructed by tunneling, either by conventional tunneling techniques or pressurized-face Tunnel Boring Machines (TBM). See Sections 4.3, 4.4, and 4.6 for the descriptions of different tunneling techniques. Therefore, a cut-and-cover construction scheme was developed for this part of the Regional Connector project as has been typical for the underground station sites on the Los Angeles Metro system, including the existing 7th/Flower Street Blue Line tail tracks.

An additional construction consideration along Flower Street at the time of the DEIS/DEIR preparation is the existence of tiebacks that were abandoned in place after construction of many of the adjacent buildings along the Flower Street portion of the alignment. Use of tiebacks that extend into the public right-of-way was permitted upon approval by the City of Los Angeles for construction of the buildings. The tiebacks were used to temporarily support the ground for excavations required to construct the building foundations, or other underground structures, such as the ARCO Plaza (505 and 515 South Flower Street), 444 South Flower Street, Bank of America, Westin Bonaventure Hotel, and the Library Parking Garage.

Cost of transit structure is minimized by having the stations and tunnels deep enough to avoid existing utilities and to permit construction of the station in accordance with LACMTA standards with a concourse (mezzanine). However, in the case of Flower Street, the tunnel profile (depth below street) was dictated by the tie-in elevation to existing track at 7th/Metro Center Station and the minimum depth required for the 5th/Flower Station to be under the existing utilities. Also, the foundations for 4th Street ramps (bridge structures) placed a limit on tunnel depth to avoid impacting the existing drilled shaft bridge foundations. Alternative construction methods were not credible for this area, i.e. tunneling by pressurized-face TBMs at this shallow depth would encounter numerous tieback obstructions; and tunneling by SEM (see Section 4.4) would have greater risks.

Tunnel construction using a pressurized-face TBM was identified in conceptual engineering to be used only between the 2nd/Hope Station and the 1st/Central Station. Direction of tunneling and associated environmental impacts had not been determined at that time. The direction of the tunnel drive would be either from west to east from 2nd/Hope Station or east to west from a shaft in 2nd Street between Central and San Pedro Streets.

In summary, during the conceptual engineering, the cut-and-cover method was considered to facilitate removal of existing tiebacks that are known to be present on Flower Street with the least cost and schedule impacts. Alternative construction methods, such as open face shield tunneling, were reviewed but rejected. See Section 4.8 for more description of tiebacks and their relevance to feasible construction methods on Flower Street. Cut-and-cover was determined to be the most appropriate construction method for the alignment between 3rd Street (2nd/Hope Station) and the tie in to the 7th/Metro Center Station.

On October 28, 2010, the LACMTA Board accepted the Draft EIS/EIR for the Regional Connector Transit Corridor and designated the Locally Preferred Alternative (LPA) as the Fully Underground LRT Alternative, which was used in the Baseline and Alternative A alignments described in this report. At that time the 5th/Flower Street Station was eliminated from the project definition due to cost considerations. However, the Board further stipulated the design and alignment should not preclude future construction of a 5th/Flower Street station.

3.2 Advanced Conceptual Engineering March 30, 2011

Implementing LACMTA Board direction, the Advanced Conceptual Engineering design was revised to eliminate the 5th/Flower Street Station, but did not preclude its construction in the future. The track alignment through the 2nd/Hope Station was refined to use larger radius curves that would improve rail operations and also allow for TBM tunneling through the station area. At the same time, the pocket track was moved to south of 4th Street. This allowed the TBM tunneling to be extended south to 4th and Flower Streets, thereby reducing the amount of cut-and-cover construction and increasing tunneling to reduce cost by optimizing usage of the pressurized-face TBM.

The continuation of pressurized-face TBM construction south of 4th Street was precluded by the presence of abandoned tiebacks south of 4th Street, the need for a box structure for a crossover, and the fixed elevation of the existing rail at the 7th/Metro Center tail tracks. As was the case for Conceptual Engineering (Section 3.1), the combined length and arrangement of these major structures left only short construction sections deemed not practical or cost effective to construct by tunneling.

During Advanced Conceptual Engineering, the presence of tiebacks on Flower Street continued to be recognized as a hazard for pressurized-face tunneling. As stated above, extending pressurized-face TBM tunnel to just south of 4th/Flower Streets was limited by the presence of tiebacks associated with construction of the Westin-Bonaventure Hotel. Had there been no tiebacks, or if tiebacks would have not been encountered by pressurized-face TBM tunneling (the tiebacks being either below or above the tunnel), the tunnel would have been extended. Such was not the case. See Section 4.8 for the full discussion of tiebacks and how their presence negatively affects the feasibility of tunneling and the great risks if attempting to tunnel through tiebacks.

In summary, a result of the refinements during Advanced Conceptual Engineering, major project configuration changes were:

- No station at 5th/Flower (but did not preclude future station construction)
- Pocket Track moved to south of 4th Street
- 2nd/Hope Station track geometry revised (horizontally and vertically) for operations and tunneling
- Pressurized-face TBM tunneling extended to south of 4th Street bridge (south of 4th and Flower Street intersection)

3.3 Draft (June 29, 2011) and Pre-Final (September 29, 2011) Preliminary Engineering (PE) Submittals

Project advancements and value engineering (VE) further refined the project configuration. As a specific VE recommendation to reduce costs, the rail elevation and station platform were raised at the 2nd/Hope Station by approximately 14 ft. The station depth reduction saved construction cost with shorter construction time, less excavation support, and significantly less station structure with one less flight of long escalators for this deep station.

LACMTA also determined that a pocket track for car storage was not required within the subsurface area of the project alignment. A possible storage track location was identified at Division 21, which is located north of the Metro Gold Line Chinatown Station. Eliminating the pocket track narrows the width of cut-and-cover construction from 4th Street to the 7th/Metro Center Blue Line tail tracks by several feet thus reducing potential construction impacts on Flower Street. LACMTA considered reducing construction impacts further by eliminating the underground cross over. However, crossovers are still required within the Flower Street section of the project to mitigate service delays to allow LACMTA to manage the operational impacts of disabled trains and track maintenance.

During this time, to address the cost, construction duration, and impact on the community, a raised deck over the cut-and-cover excavation was reviewed to minimize relocations of existing utilities. In addition in response to community concerns, LACMTA limited the height to approximately 10 inches that the “raised deck” could be constructed above the existing roadway. The low raised deck has less impact to adjacent properties and maintenance of street use. At the same time, design development eliminated construction work areas on private properties and work staging was restricted to the public right-of-way. Some work on adjacent properties would be needed to construct and maintain access at driveways and entryways, but by temporary easements, or rights of entry, rather than permanent “takes.”

The Pre-Final PE Submittal of September 29, 2011 was the project configuration that LACMTA issued for Industry Review on October 20, 2011.

In summary, changes incorporated in the Pre-Final PE September 29, 2011 were as follows:

- Pocket track no longer on Flower Street
- Crossover (previously part of pocket track) on Flower Street located south of 5th Street
- Raised 2nd/Hope Station by 14 ft

- "Raised decking" along Flower Street limited in height, which reduced overall Flower Street construction impact and activity, while maintaining significant reduction in utility relocations and associated impacts.

- Modified construction staging areas to reduce private property easement requirements

3.4 Draft Final PE December 20, 2011

Station designs were refined to site-specific conditions, which included establishing street and traffic layouts in the 2nd/Hope Street Station area. Design/build technical requirements (performance specifications) were drafted. Characterization of existing utilities and utility relocations were refined. No changes were made to the project configuration on Flower Street.

3.5 Final PE March 30, 2012

The Final documents submitted March 30, 2012 did not change the configuration on Flower Street from the December 20, 2011 Draft.

3.6 PE and FEIS/FEIR

During Preliminary Engineering and preparation of the FEIS/FEIR, four major changes established the project configuration and tunneling limits. LACMTA's actions listed below document the fact that LACMTA considered and implemented changes that fine tuned the project configuration to further mitigate the construction impact to the public. This would result in the least public impact possible within the available budget.

First, the tunnel alignment was refined through Little Tokyo, resulting in a relocated station at 1st/Central Avenue. This new station site was initially proposed for the pressurized-face TBM tunnel shaft. In parallel with preparation of the FEIS/FEIR, the "Mangrove Site" at the northeast corner of 1st and Alameda Streets became available for a TBM tunnel work shaft when a development rights lease expired. As a mitigation of impact on the Little Tokyo community, the commitment was made by LACMTA that the Mangrove Site would be the main site for staging of tunneling operations. The pressurized-face TBMs would be assembled and launched from that site and tunneling would proceed to the west.

Second, two major structures, 5th/Flower Street Station and the pocket track, were not included in the preliminary design. As cost saving actions, the LACMTA Board eliminated the 5th/Flower Street Station when approving the Locally Preferred Alternative (LPA) (with the stipulation to not preclude future construction) and the pocket track was eliminated during PE. Deletion of these major structures reduced construction impact with a much narrower structure and reduced property takes or temporary construction easements along Flower Street.

Third, tunneling was extended south from the 2nd/Hope Street Station to 4th and Flower Streets where the TBMs would be removed through a shaft south of 4th Street. In addition to the mitigation of less construction impact, cost savings resulted from efficiencies with longer length of tunneling and avoiding the deep cut-and-cover construction between 3rd and 4th Streets. Tunneling also eliminated the impact of cut-and-cover construction to the community and reduced the construction impact to the 4th Street bridge foundations.

Fourth, during PE, LACMTA continued to search documentation of all tiebacks on Flower Street. LACMTA confirmed that hundreds of tiebacks currently exist in Flower Street that are obstructions to tunneling, especially pressurized-face TBM tunneling. Existing records show the number of tiebacks along this segment as over 500 and potentially up to 800. (See Section 4.8 for more description of tiebacks and their relevance to feasible construction methods on Flower Street.) The major impacts from tieback obstructions for tunneling south of 4th Street were avoided by specifying construction by cut-and-cover. Due to the confirmed presence of numerous existing (abandoned) tiebacks along Flower Street south of 4th Street, the need for a box structure for a crossover, and the fixed elevation of the existing rail at the 7th/Metro Center tail tracks, pressurized-face TBM tunneling could not be extended farther south under Flower Street for the FEIS/FEIR alignment. This profile is presented in the FEIS/FEIR and in the Preliminary Engineering documents.

3.7 Record of Decision/ Procurement Documentation Pre-Construction Activities

In June 29, 2012, the FTA issued a Record of Decision (ROD) for the project. The ROD includes further commitments to mitigate adverse effects of the project as it proceeds and are described in the Mitigation Monitoring and Reporting Plan (MMRP). Contract documentation was initiated to procure a design build contractor. Subsequent to the ROD, three parties along Flower Street submitted challenges to the EIS/EIR for the Regional

3.8 Procurement and Start of Construction

Metro started procurement for a Request for Qualifications (RFQ) in 2012. Qualified teams were issued a Request for Proposals (RFP) on January 7, 2013. Construction Contract No. C0980 was Awarded May 6, 2014 and Notice to Proceed was July 7, 2014 and has started Final Design. Current construction activities include utility relocation by Contract No. C0981R along the project alignment. Mitigations are being implemented as appropriate per the MMRP to help minimize construction impacts.

4.0 MAJOR CONSIDERATIONS FOR CONSTRUCTION METHOD

This section presents several engineering and practical construction topics addressed during development of the Regional Connector Transit Corridor Project configuration in general and specifically on Flower Street. Mitigation of environmental impacts is addressed in the FEIS/FEIR/SEIS.

Major factors considered were:

- Geologic Conditions (Section 4.1)
- Transit Structure Configuration (Operations) (Section 4.7)
- Underground Obstructions to Tunneling – Tiebacks (Section 4.8)
- Schedule (Section 6.0)
- Cost (Section 7.0)
- Risk (Section 8.0)

4.1 Geologic Conditions

Along Flower Street, alluvium and fill materials overlie the Fernando Formation consisting primarily of weak to very weak clayey siltstone. The alluvial deposit consists of interlayered silty clays, sandy silts, clayey sands, and silty sands with some sand layers containing variable gravel and few cobbles. The fill consists of mixtures of gravel, sand, silt, and clay with construction debris. The depth of fill material varies along Flower Street with maximum fill depth estimated to be about 40 ft below ground surface. Occasional boulders are also present in the alluvium. The principle geologic conditions on Flower Street that control tunneling feasibility and risk are groundwater, geologic interface of different soil or weak rock strata, and hazardous gases.

Groundwater seepage at relatively shallow depths that ranged from approximately 15 to 35 ft below ground surface was encountered in historical borings drilled for many building sites adjacent to Flower Street between 5th and 7th Streets. Groundwater within the lower portion of the alluvial deposits, most probably perched above the Fernando Formation, has been reported at depths from approximately 18 to 27 ft below ground surface adjacent to Flower Street in the area between 2nd and 5th Streets, which is close to or within the tunnel horizon. Groundwater problems will be magnified at the Alluvium–Fernando interface. Before development of downtown Los Angeles, Flower Street was more recognizable as a natural drainage path (stream during rainfall) with seasonal variations of groundwater in the Alluvium. In present day, development has affected the groundwater regime as a result of cuts and fills altering the topography, paving streets, and constructing buildings with deep basements. However, groundwater is still anticipated to follow the ancient underground water course and pose problems for stability of open-face tunnel excavations.

Along Flower Street, the geologic interface of alluvial soils over the Fernando Formation (weak rock) is a recognized geologic tunneling hazard. If tunneling is fully below the geological interface and there is adequate Fernando Formation (one tunnel diameter, which is about 22 ft) between the tunnel and interface, there exists a reduced potential hazard. On the other hand, if the interface is just above the tunnel or within the face of the tunnel being excavated, the major hazard is the alluvial materials running uncontrolled into the tunnel. In the presence of ground water, this could cause an uncontrolled flow into the tunnel under construction. Both conditions are unacceptable risks that must be mitigated by grouting to create non-running/non-flowing ground conditions, or mitigated by using another method, such as pressurized-face TBM, which inherently can safely deal with such conditions.

Methane and hydrogen sulfide (H2S) are expected as described in the Geotechnical Baseline Report (GBR). Several sections of the tunnels are to be constructed through Methane Buffer Zones. Cal/OSHA has classified all of the underground construction for the Regional Connector as “potentially gassy.” Metro requires specific designs where gassy conditions are present. The use of EPBMs for tunneling and installation of a double gasketed segmental precast tunnel lining provides a robust barrier to resist entry of methane into the tunnels. SEM or open-shield tunneling would increase risks of hazardous gas for construction and likely require significant additional measures to mitigate these safety issues. An open-face shield allows hazardous gasses into the tunnel at the tunnel face. SEM has greater safety risk of gas on account of greater exposure to the excavated ground. Hazardous gases in a cut-and-cover excavation also need to be safely handled, but open excavation allows easier control of hazardous gases.

4.2 Cut-and-Cover Construction Method

Cut-and-cover is the usually preferred method of constructing relatively large underground transit structures such as stations, crossovers, and pocket tracks. Becoming less so in current times, cut-and-cover has also been used extensively to construct relatively shallow running tunnels. The type of cut-and-cover construction along Flower Street is recognized to be a suitable method and has extensive precedent with construction of all major modern buildings in downtown Los Angeles, as well as transit stations.

On past LACMTA rail projects, the excavation support system consisted of braced soldier piles and lagging which minimized settlement of adjacent ground and facilities and accommodates utilities and traffic control requirements. An additional benefit of this method, which installs soldier piles in drilled holes at 6 to 8 ft spacing, is that the system can be revised to adapt to circumstances during construction, for instance, by changing soldier pile spacing. Cut-and-cover is the basis of construction on Flower Street in the FEIS/FEIR and for Preliminary Engineering.

The soldier piles are structural steel members placed in pre-bored (vertical) holes, which are than filled with concrete such that piles are encased in concrete. As excavation takes place, lagging is placed horizontally between the soldier piles. Traditional local Los Angles practice is to use timber lagging. Lateral support is either by tiebacks where real estate conditions permit or by structural steel struts across the excavation.

Regardless of type of excavation support system, to minimize public disruption on the street surface, a precast concrete deck is installed over the excavation to maintain street traffic and allow construction activities beneath. The excavation support system provides temporary support for the adjacent ground until the permanent structure is constructed. After the permanent cast-in-place concrete structures are completed, the deck beams are removed, the excavation is backfilled and the street is restored.

Cut-and-cover is relatively unaffected by the variations and uncertainty regarding the presence of man-made and natural obstructions and geologic conditions. Obstructions, in the form of abandoned tiebacks, can be dealt with directly as they are encountered during excavation. The geologic conditions along Flower Street are known to have perched groundwater and a distinct change in geologic strata consisting of fill and alluvium over weak rock. For cut-and-cover construction, past experience in downtown Los Angeles indicates groundwater can be managed by pumping from sumps in the excavation or, in rare instances, from dewatering wells. The presence of “weak rock,” which is generally stiffer than the alluvium, can be considered a positive condition for excavation stability where soldier piles would be founded within the relatively stiff Fernando Formation (the “weak rock”).

In summary, the existing tiebacks and geologic conditions pose no extraordinary challenges for cut-and-cover construction, whereas for tunneling, the variations and uncertainty regarding the presence of man-made obstructions (tiebacks) and geologic conditions pose substantial construction hazards as elaborated subsequently in this document.

4.3 Open-Face Shield Tunneling

Tunnel construction with open-face machines (also called a “digger shield”) was considered for the Regional Connector but was rejected as not being a satisfactory method of construction to mitigate risks of uncontrolled settlement in this mixed face geologic profile (condition) along Flower Street (and anticipated in Little Tokyo).

Ground control hazards are always present when an open tunnel face is in alluvium and where water is present, or where a mixed face heading is present (alluvium over Fernando Formation). The ground at the heading of the open-face shield could become unstable and subject to unacceptable loss of ground, raveling, running, or flowing of disturbed soil uncontrolled into the tunnel face, all of which could result in surface subsidence. This was the case during the construction of the Metro Red Line A146 contract when the tunnel was constructed using the digger shield shown in Figure 4-1. In much of the alignment, the upper part of the tunnel encountered cohesionless sand which ran uncontrolled into the tunnel face and created a void ahead of and over the tunnel shield. A number of ground losses occurred during tunneling with volumes as great as 36 cubic yards, or more than the size of a full-size automobile. Significant surface settlement was avoided by a soil stabilization program consisting of holes drilled from the ground surface to backfill with concrete the voids created by the ground losses. The Red Line case serves as an example of what methods and risks LACMTA will not accept for future projects: Open-face tunnel shields and any project that would have to rely upon grouting from inside the tunnel for safe construction are now deemed to have unacceptable risk. To avoid this geologic hazard, ground improvement by grouting from the ground surface (“preconditioned ground” in the Tunnel Advisory Report) would be required as a risk mitigation measure. Such grouting is costly, time consuming to undertake, and would create substantial construction impacts at the surface (street level) that were intended to be avoided with tunneling.

Figure 4-1: Digger Shield Used to Construct Metro Red Line Contract A146 Tunnels

A characteristic of a digger shield is that, when an obstruction such as a tieback is encountered during tunneling, the tunnel face is accessible and the tieback can be removed in pieces manually by torch cutting or metal cut-off saw. Special powered equipment operated remotely by miners would likely be used to assist in tieback removal to some extent. Regardless of possible mechanized assistance, manual labor would be required and job-specific safety hazards would exist for tieback removal.

The heading of an open-face shield would need to remain stable for sufficient time without sloughing and raveling into the tunnel face to permit workers to safely remove some tiebacks. Generally, tiebacks are installed on a downward angle and are expected to run downward across the face of the tunnel shield. Where the tunnel face is in uniform ground conditions, a portion of a tieback that intersects in the upper part of the tunnel would be relatively easy to remove, compared to tiebacks at lower depth, on the basis there being the least amount of soil to excavate. On the other hand, any part of the tieback that intersects the open-face shield at the lower part of the tunnel would be buried; gaining safe access for miners would be difficult. To do so would require stopping tunneling and then manually excavating and supporting the tunnel face until the tieback can be manually dug out. The tunnel shield would be about 22 ft in diameter and the tunnel face requiring support would be as high as a two-story building.

A very difficult condition would exist where an open-face shield encounters the mixed-face conditon of the Alluvium-Fernando geologic contact with perched water in the face of the tunnel. In this case an attempt to remove a tieback that intersects in the upper part of the tunnel would likely lead to an uncontrolled loss of disturbed soil and water into the tunnel, settlement, and possibly a sinkhole at the ground surface. Tunneling safely in such conditon requires mitigation by ground improvement of the Alluvium by grouting or other measures to create firm ground conditions. See Section 4.8.3 Tieback Hazard for Open Face Shield or SEM Tunneling.

Although open-face shield construction may be technically feasible, this method likely require soil stabilization from the street surface causing major disruption along Flower Street to locate a grout plant and manage (control) the grouting spoils. This would further complicate traffic management, have major impact on existing utilities, and potentially limit building access and have impacts similar to cut-and-cover construction.

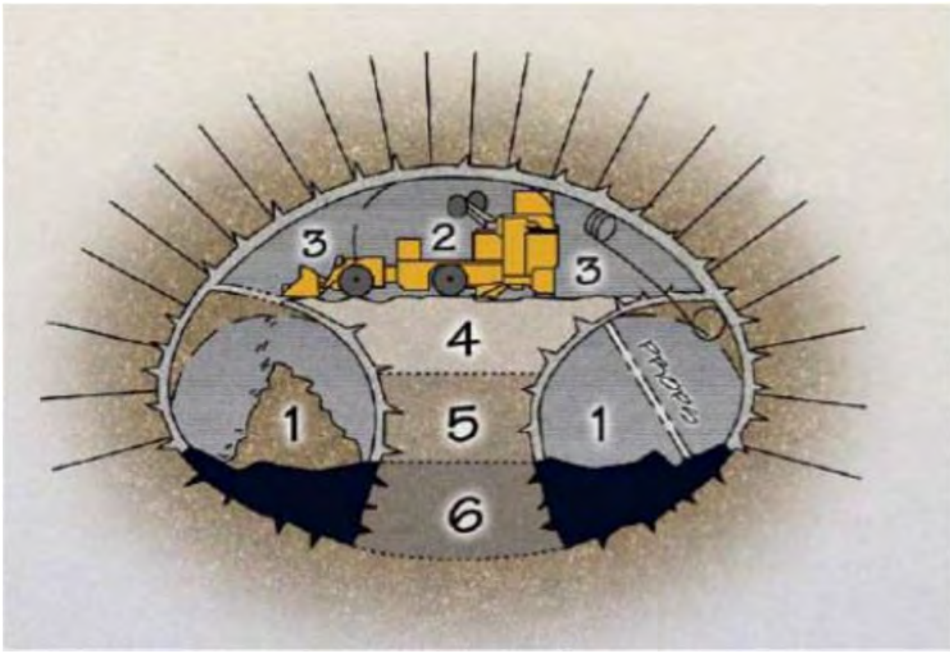
Grouting from inside the tunnel is much more costly and is not considered to be a viable alternative to pre-grouting from the ground surface along Flower Street. Moreover, grouting from the tunnel face could not reliably provide the needed ground improvement beneath utilities, particularly the large storm drain, leaving “windows” of ungrouted soil which would become potential zones of unstable soil. Grouting from the tunnel face (from inside of the tunnel) will simply not provide the adequate ground improvement to ensure control of settlement for utilities and roadway surface.

The above describes difficulties typically experienced when the soil in the face of the TBM is mostly loose water-bearing alluvium. Generally a mixed face condition (water bearing alluvium over Fernando Formation) is even more difficult to control because the alluvium tends to ravel and flow into the face on top of the more stable Fernando Formation. However, a much more risky situation is created when any unfavorable soil condition is encountered unexpectedly because the ground control measure being implemented cannot be changed quickly enough. It should be noted that the crown of the tunnel alignment discussed in this report is very close to the alluvium/Fernando interface creating a significant risk of hazardous conditions with uncontrolled soils coming into the tunnel resulting in excessive settlement and possibly creation of a sinkhole at the ground surface.

4.4 Sequential Excavation Method (SEM)

Another tunneling technique is the Sequential Excavation Method (SEM), which is used globally for underground construction. The excavation is performed by mechanical excavators in a prescribed sequence with the initial ground support typically consisting of sprayed-on concrete (shotcrete). Figure 4-2 shows a typical SEM excavation sequence.

Figure 4-2: Sequential Excavation Method (SEM) Tunneling



For safe SEM operations, it is desirable to have a competent layer of good ground as thick as the width of the tunnel over the tunnels, i.e., 20 ft of good ground above a 20 ft diameter transit (running) tunnel. Less cover and weaker soils greatly increase the risk of settlement and large ground loss resulting in runs and flowing of ground that rapidly rise to the surface and form sinkholes. In order to mitigate this risk, tunneling would require more ground modification and a greater number of excavation sequences with slower advance rates. Such situations typically also require the use of extensive pre-support measures, which include ground improvement and/or forepoling or spiling. Forepoling is a conventional, ground pre-support method to advance tunnels in loose, caving, or running ground by driving pipes, timbers, steel sections, or concrete slabs ahead of the tunnel excavation. Similarly, spiling is a ground pre-support method by installing untensioned reinforcement (spiles) in drilled holes. Spiles consist of deformed steel reinforcing bars, steel pipe, or self-drilling bars, grouted in place. They are typically installed without end hardware in a row or multiple overlapping rows above the tunnel crown at a low angle to the longitudinal axis of the tunnel. See Figure 4-6 showing an SEM excavation with a canopy of spiles created by jet grouting.

As shown in cross-section in Figure 4-9, Flower Street SEM excavation for the crossover may be as wide as 60 ft but will only have about 20 ft thickness or less of poor soil cover combined with close proximity to utilities and ground water in potentially gassy conditions making it a very high risk for excessive settlement, uncontrolled subsidence, or collapse. SEM relies upon the natural arching effect of the ground. Not much arching can be expected in Flower Street because of the low ground cover, poor ground, and existing utilities. Use of SEM would require major ground improvements and/or forepoling or spiling work, which would have major impacts on both Flower Street and the construction schedule.

Compared to constructing the Metro guideway tunnels by cut-and-cover on Flower Street, SEM construction has more risk. It is preferable to use SEM in deep alignments with adequate ground cover and favorable ground conditions, and where extensive ground modification is not required. Typically, machine bored tunneling is chosen because of its rapid advance rates and efficiency in long runs; whereas, the slower SEM method is considered for short runs and excavation of non-circular shapes. In another area of the Regional Connector project along 2nd Street, the track crossover cavern is fully within the Fernando Formation (with Fernando cover of approximately 35 ft above the tunnel crown), which makes use of SEM for construction at that location possible with acceptable risk.

4.5 Ground Improvement and Tunneling

Ground improvement is the general term used for the construction methods that make poor soil conditions stronger and/or less pervious. Poor soils include pervious soils below the ground water table and weak or loose soils. Where poor soils conditions are present, successful tunneling often relies on various methods to “improve the ground” in order to reduce or eliminate many risks associated with tunneling in such conditions. Implemented before tunneling, the ground improvement methods are either grouting or freezing:

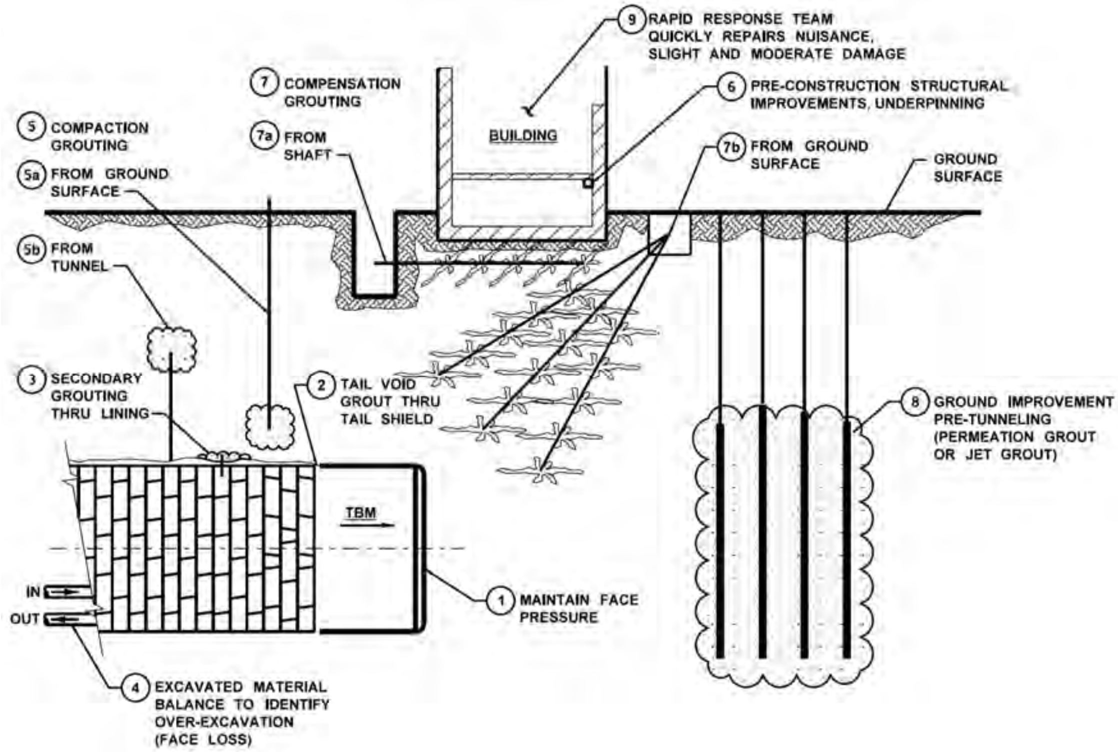
- Permeation Grouting
- Jet Grouting
- Ground Freezing

Grouting techniques implemented during tunneling are:

- Compensation Grouting
- Compaction Grouting

As a guide to where and how ground improvement is implemented for tunneling, Figure 4-3 shows various methods. As can be seen on the figure, some methods are done well in advance of tunneling and some during tunneling. A closed, pressurized-face TBM is shown. In the detailed descriptions of each method below, use of various grouting techniques associated with open-faced TBMs and SEM tunneling are addressed, where applicable.

Figure 4-3: Grouting Methods for Tunneling



In the broad scope of geotechnical engineering and ground improvement, other methods exist that are not typically used in tunneling or the Regional Connector site conditions, such that they are not remotely applicable. They are mentioned here for the record, but are not elaborated further in this report. These other methods include vibro-compaction (insertion of vibrating probe in sands below water table, commonly used in marine construction), dynamic compaction (dropping very large weight to compact loose soils), wick drains (insertion of geotextile filters to increase rate of consolidation of poorly consolidated soils below the ground water table), and use of explosives to density loose soils. Dewatering is often considered a type of ground improvement where tunneling is below the ground water table. However for the Regional Connector, much of the tunnel alignment has little to no groundwater or groundwater is perched groundwater. Any tunneling scheme will have to accommodate groundwater. On its own, dewatering in the absence of other mitigating measures would not result in an improvement of site conditions that would make a specific tunneling method constructible, where it was not constructible before.

4.5.1 Permeation Grouting: Chemical or Cement

Permeation grouting involves filling the soil pore spaces with chemicals or fine cement, while individual soil grains are not disturbed or moved. The structure and dimension of the soil pore spaces dictate the type of grout that can be effectively used. Generally, permeation grouting is suitable for sandy soils containing less than 10 to 20% silt or clay.

For tunneling application, permeation grouting is done from the ground surface or, when unusual or extreme conditions dictate, from the tunnel face. Permeation grouting performed from the ground surface in most cases is the only practical scheme compared to grouting at the tunnel face. Permeation grouting requires drilling and injecting grout to the targeted ground. The drilling pattern depends on the soil pore space structure. Typical spacing of the drilling pattern is two to six feet between grout holes. See Figure 4-4 for a drill hole pattern for grouting from the ground surface. Working from the ground surface permits control of the grouting and provide substantial assurance of the targeted tunneling ground being improved. The inherent and unavoidable impact is the ground surface disturbance by grouting from surface.

Figure 4-4: Permeation Grouting from Surface

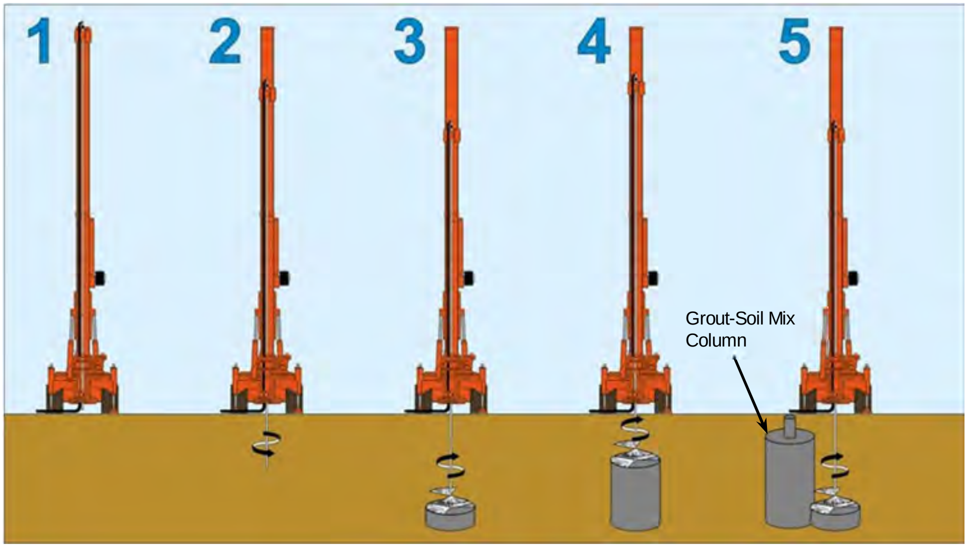
On the other hand, permeation grouting from tunnel will have essentially no impact on the ground surface; however, working from the confines of the tunnel face, it is difficult to assure satisfactory improvement of the soils targeted for ground improvement. In addition, when grouting from the tunnel face, the tunnel advance rate will be significantly reduced with the introduction of the drilling and grouting operations to the tunneling cycle. Grouting from the tunnel face is only possible with open-face TBMs or SEM tunneling.

Regardless of where the permeation grouting is done, the alluvial deposits along South Flower Street would be difficult to be improved by permeation grouting. The content of fines (silt and clay) would limit the extent of grout permeation and would require closer drill hole spacing. The interlayered nature of the sands and fine soils would also make it difficult to achieve a uniformly grouted condition. Some zones would be not groutable or marginally groutable. Particularly, the horizontal and sub-horizontal grout holes drilled from tunnel face could easily miss the targeted pervious layers and would not be able to achieve the ground improvement intended. Overall for grouting from the tunnel face, it would be difficult to control the quality of a zone intended to be grouted, which in turn creates a tunneling hazard.

4.5.2 Jet Grouting

Jet grouting mixes cement grout with the in-situ soil to result in a mixed grout-soil material. With jet grouting, weak soils would be changed to a stronger grout-soil mixture and create “firm” ground conditions. Figure 4-5 shows the jet grouting procedure creating series of grout-soil mix columns in the ground.

Figure 4-5: Jet Grouting Sequence



The technique requires drilling grout holes on a 5 to 10 ft spacing throughout the area to be grouted such that the neighboring grout-soil mix columns would overlap or touch each other. Grout holes would typically extend from the ground surface creating vertical grout-soil mix columns. In rare cases, horizontal jet grouting is used to create grout-soil material canopy over a tunneling course to provide pre-supported tunneling ground in front of the face (see Figure 4-6). On account of its brute-force approach of replacing weak soils with grouted soil, jet grouting is a method that has control over achieving a high degree of improvement of the targeted ground, and achieving the required strength of the soils. However, the surface disturbance would be significant requiring a large staging area and a messy grouting operation. Figure 4-7 shows the jet grout plant set up on the street, and Figure 4-8 shows a jet grouting operation on urban streets.

Figure 4-6: Jet Grouting Canopy by Horizontal Drilling

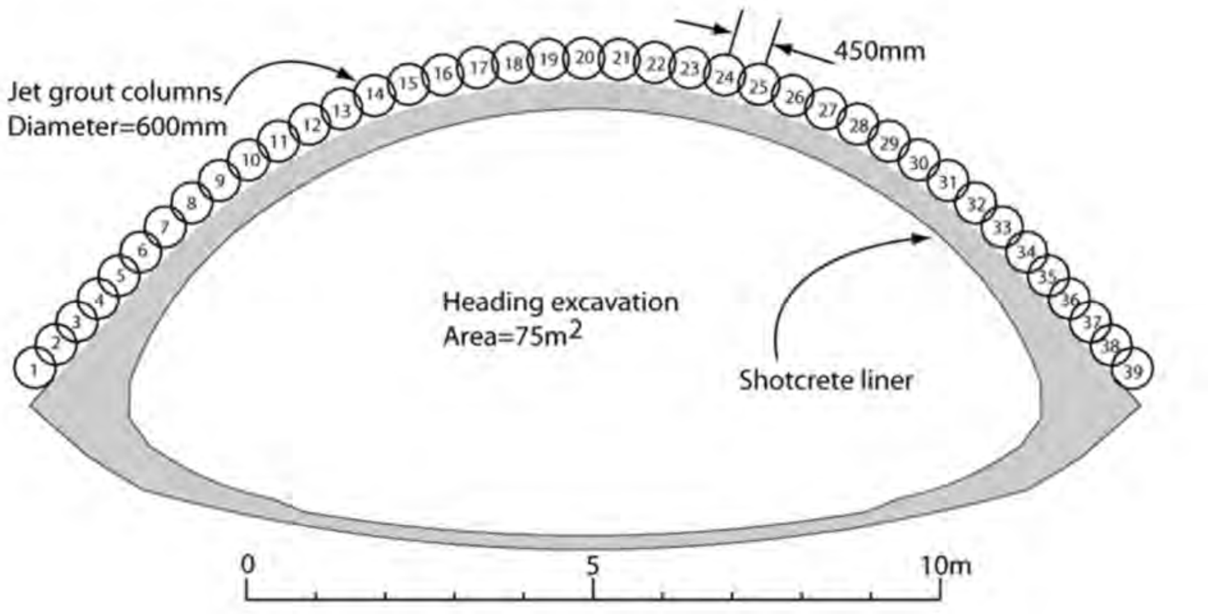


Figure 4-7: Staging for Jet Grouting Operation

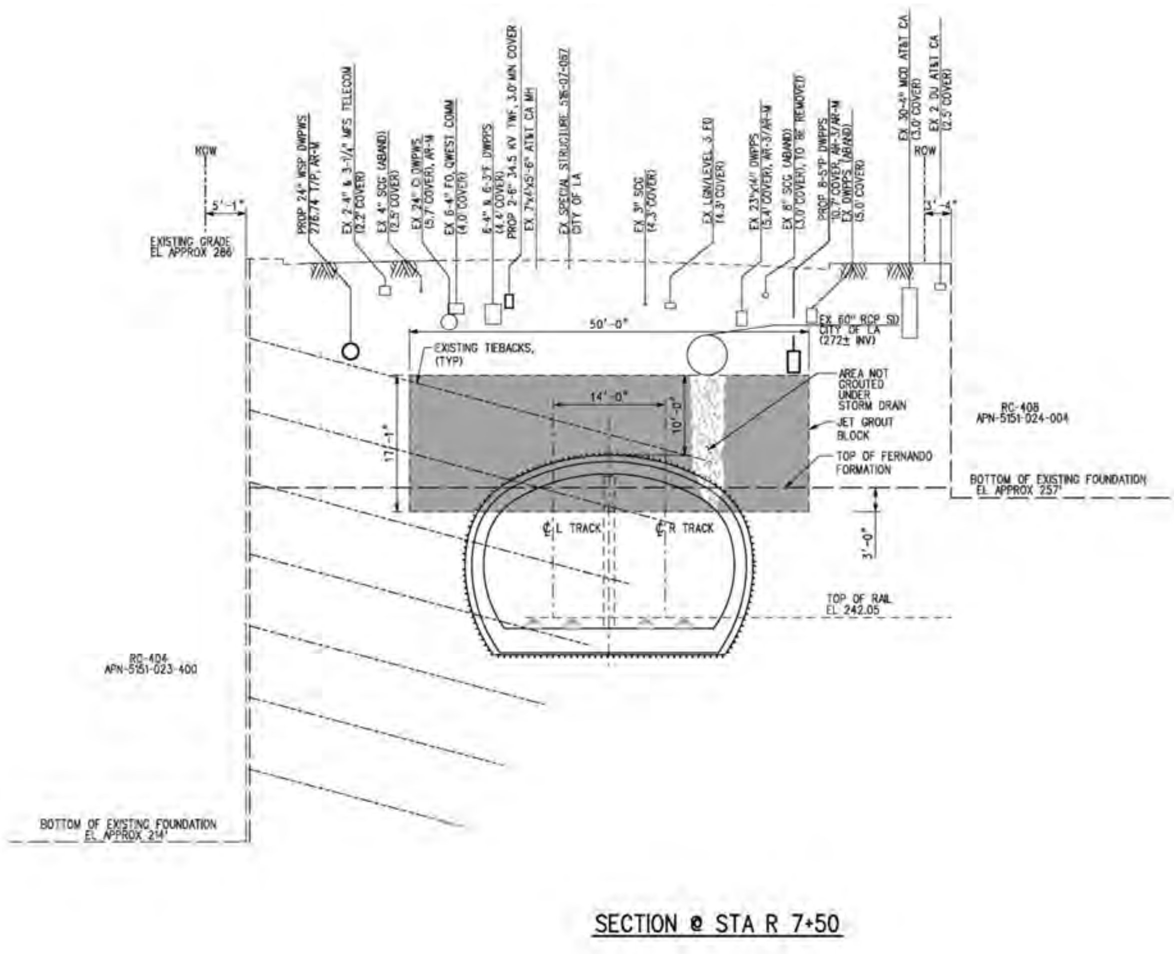
Figure 4-8: Surface Jet Grouting Operation

Along the Flower Street, vertical jet grouting would be the most effective technique to improve the ground conditions to permit tunneling with open-face shields or SEM. Jet grouting is considered the most suitable for the soil conditions in this area and would provide adequate strength and size of the grout-soil mix block above the tunnel crown. The method has relatively good control over assuring the quality of grouted soil blocks. Yet, the extensive environmental impacts on the street, the risk of utility damages, and the risk of incomplete ground improvement remain. Figure 4-9 shows typical jet grout zone that could be installed from the street above SEM tunneling section with abandoned tiebacks intersecting the tunnel and various utilities within the subsurface. A major risk is the interference created by utilities that prevent full coverage by jet grouting. As can be seen in Figure 4-9, it would not be possible to fully jet grout below the 60 inch diameter storm drain and a "window" of ungrouted ground would be present above the tunnel. The ungrouted ground would tend to transmit groundwater, and if intersected by the tunneling, would be the point where an uncontrollable run or flow of soil into the tunnel would start, which in turn can progressively lead to a sinkhole at the street surface.

The use of jet grouting canopy by horizontal drilling alone (see Figure 4-6). would not be considered feasible for the tunnel under the Flower Street. This technique is rarely used in North

America. As tunneling takes place, it would be necessary to drill the holes out at an angle from the heading every few rounds over the length of the tunnel drive. This process is a very slow and difficult operation in order to achieve and ensure adequate coverage and full support of the ground.

Figure 4-9: Jet Grout Zone above SEM Tunnel on Flower Street



4.5.3 Ground Freezing

Ground freezing is based on withdrawing heat from the soil. The process converts in-situ pore water into ice. The ice binds the soil particles imparting strength to the frozen soil mass. For the creation of a frozen soil body, a pattern of vertical (in very special instances horizontal or inclined) freeze pipes have to be installed in drill holes. Each freeze pipe (or freeze "pile: as referred to in the industry) consists of the open-end inner pipe and the closed-end freeze pipe. The inner pipe is used for the supply of a cooling medium, usually brine, or liquid nitrogen. The inner pipe is connected to the supply line and the outer pipe to the return line (when brine is used) or the exhaust line (when liquid nitrogen is used). The coolant flows through the inner pipe. On its way back through the annulus, the coolant picks up heat from the soil. The freeze takes place over time as the frost penetrates the soil and a ring of frozen soil grows around the pipes. Figure 4-10 shows the individual freeze pipe arrangement.

The freeze pipes are arranged to achieve the required shape of frozen soil mass. The initial setup and freezing time of ground freezing operation must be considered for significant schedule impact. Figure 4-11 and Figure 4-12 show freeze pipe installation and ground freezing operation in an urban area. Setting up for the freeze, establishing the freeze, tunneling, and finally demobilizing the freeze would take months of time and occupy at least two to three traffic lanes.

Along the Flower Street section of the Regional Connector, feasibility of ground freezing has a fatal flaw of the being substantially dry and, in a sense, “not freeze-able,” and thus not suitable to mitigate unstable ground conditions during tunneling. The groundwater within the alluvium along the Flower Street is perched groundwater. Once the limited perched groundwater is frozen, the freeze would not continue. In this situation, the freeze would be incomplete as non-uniform and discontinuous, and would not provide the sufficient ground stability for tunneling under Flower Street. Also, as can be seen in Figure 4-13, ground freezing would block off several lanes of the traffic for months of time in order to set up for the freeze, tunnel, demobilized, and restore the street. In addition, were there enough groundwater present, ground freezing from the surface would have extensive surface impacts and problems getting full coverage with utilities in the way. To freeze from underground, pipes installed horizontally would need to be drilled large distances from a large excavation (shaft) in order to position them properly around the tunnel. Such a scheme is impractical and ineffective.

Figure 4-10: Individual Freeze Pipe Arrangement

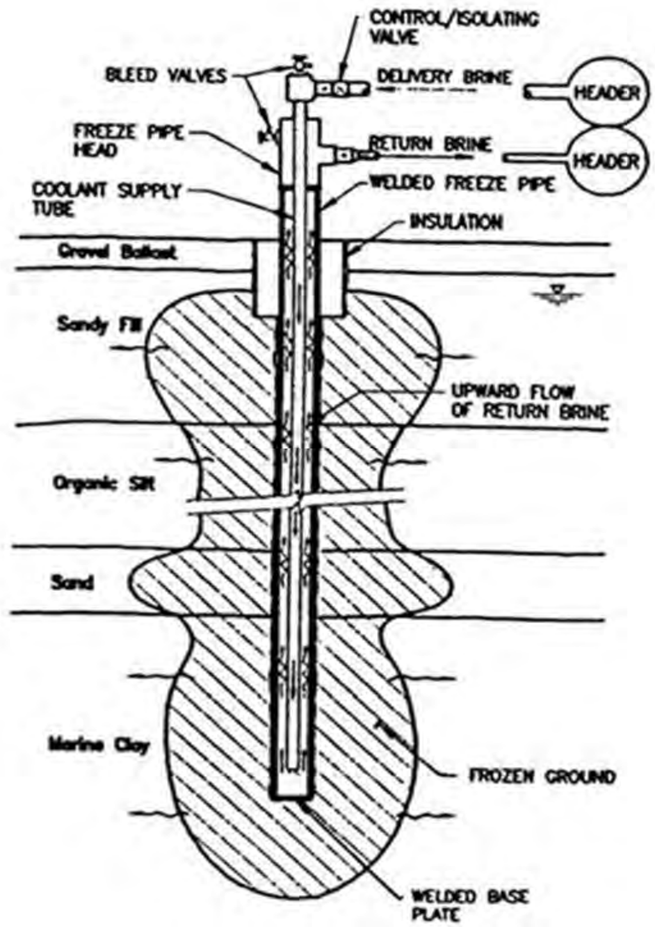


Figure 4-11: Ground Freezing Pipe Installation in New York City, Prior to Starting Freeze

Figure 4-12: Ground Freezing Operation

Figure 4-13: Freeze Pipe Array

4.5.4 Compensation Grouting

Compensation grouting is known as correctional measures, rather than a preventive measure to mitigate ground settlement due to the excavation or tunneling. For compensation grouting, steel or plastic grout pipes with sleeve ports are installed in the holes drilled from the ground surface or grout pits prior to tunneling. Typical application for protection of buildings is shown in Figure 4-3, items 7a and 7b. Compensation grouting displaces the surrounding soils at grouting points along the grout pipe to compensate for settlement caused by construction activities, such as tunneling. A fluid grout mix is used to hydro-fracture the ground, and fills any pre-existing discontinuities and the fractures created in the process. As the grout penetrates the ground it forms a network of wedges and displaces/heaves the ground, “compensating” for settlement. As tunneling advances and settlement occurs, compensation grouting is activated to keep the settlement within the acceptable limit. Once the ground movement is stabilized, the grouting pipes and equipment are typically abandoned in place. Grout pipes are typically limited to a maximum length of 200 ft. Compensation grouting would be only suitable for mitigation of settlement of utilities by open-faced TBM tunneling or SEM tunneling along Flower Street. Implementation would require shafts in the street required to install grout pipes. Compensation grouting would be completely ineffective in avoiding excessive ground loss and collapse of the tunnel face leading to a sinkhole in the street.

4.5.5 Compaction Grouting

Compaction grouting involves injection of very stiff grout with low mobility at high pressure creating grout columns and densifying surrounding soils at the injection points. Grout holes are usually vertical and spaced on a grid of 6 to 12 ft. The grout bulbs are not designed to overlap or contact with each other, as the soils left in place between grout columns are presumed to be densified. Inclined holes if required to avoid utilities, should be no more than about 20 degree from the vertical line. An inclined or horizontal hole provides a greater horizontal effective area resulting refusal at low grout pressure due to surface/utility heave and resulting incomplete ground improvement. In general, a vertical column of grout and the resulting compacted soil provide the better support than inclined. Key to successful compaction grouting is deposition of the grout in such a manner that it remains in a globular mass at the injection point such that the surrounding soil can be radially densified.

Compaction grouting is a technique developed in the 1970’s and has had limited use. Subsequent development of compensation grouting provided a more manageable and effective technique for tunneling applications. Compaction grouting is seldom a preferred choice in today’s practice, or even considered at all, as a tunneling settlement mitigation method. Also, the advent of pressurized face tunneling, which has reduced tunneling ground losses, has decreased the need. Compaction grouting is shown in Figure 4-3 for completeness to illustrate the various methods. For the specific case shown, use from inside a very large tunnel (54 foot diameter Alaskan Way Tunnel) is proposed to mitigate settlement for a very specific situation where grouting from the ground surface would not be possible (under existing railway tunnel at depth of over 100 ft). However, the compaction grouting for the referenced tunnel has not yet taken place.

The alluvial deposits along South Flower Street would be difficult to improve by compaction grouting. Keeping the deposition of the grout in a globular mass would be difficult because of the interlayered nature of the soils. The high pressure grout may just crack the weak soil layers creating thin lenses of grout. Also, trying to grout effectively at high pressures above a wide SEM excavation cannot be done ahead of the face, and would not prevent running ground. Essentially, compaction grout would only be used at low pressures to fill voids that have already developed. The SEM tunnel depth along the Flower Street is too shallow and there is no arresting layer above the tunnel that would stop a void so that the void could be filled before it reached the surface. Thus this technique is considered to be not effective for preventing large ground loss and reducing the risk of surface subsidence if Flower Street were to be tunneled.

4.5.6 Summary and Conclusions on Ground Improvement for Tunneling

Ground improvement using jet grout, compaction grout, permeation grout, compensation grout, or ground freezing would have to be employed from the ground surface for tunneling with an open face shield or by SEM under the Flower Street. However, as was the case on LACMTA’s construction along Lankershim Street for the Red Line, the grouting operations will create extensive environmental impacts involving lane closures and multiple equipment operations. There is also significant possibility for damage to utilities, basements, and at the street level due to grout pressure and grout flowing into unplanned or undesirable locations. Similarly, the ground freezing operations will also create extensive environmental impacts on the street and may cause damage to utilities, basements, and at the street level. In fact, the numerous utilities will be obstructions to the grouting and ground freezing operations increasing the risk of incomplete ground improvement. The existing utilities along the Flower Street include an 84-in diameter reinforced concrete storm drain which has the invert level as deep as 18 ft below ground surface. Additionally, extensive geotechnical instrumentation and monitoring points will need to be installed and monitored for any ground improvement operation.

4.5.7 Summary of Feasible Ground Improvement Methods

The following Table 4-1 summarizes the evaluation of various ground improvement methods discussed above.

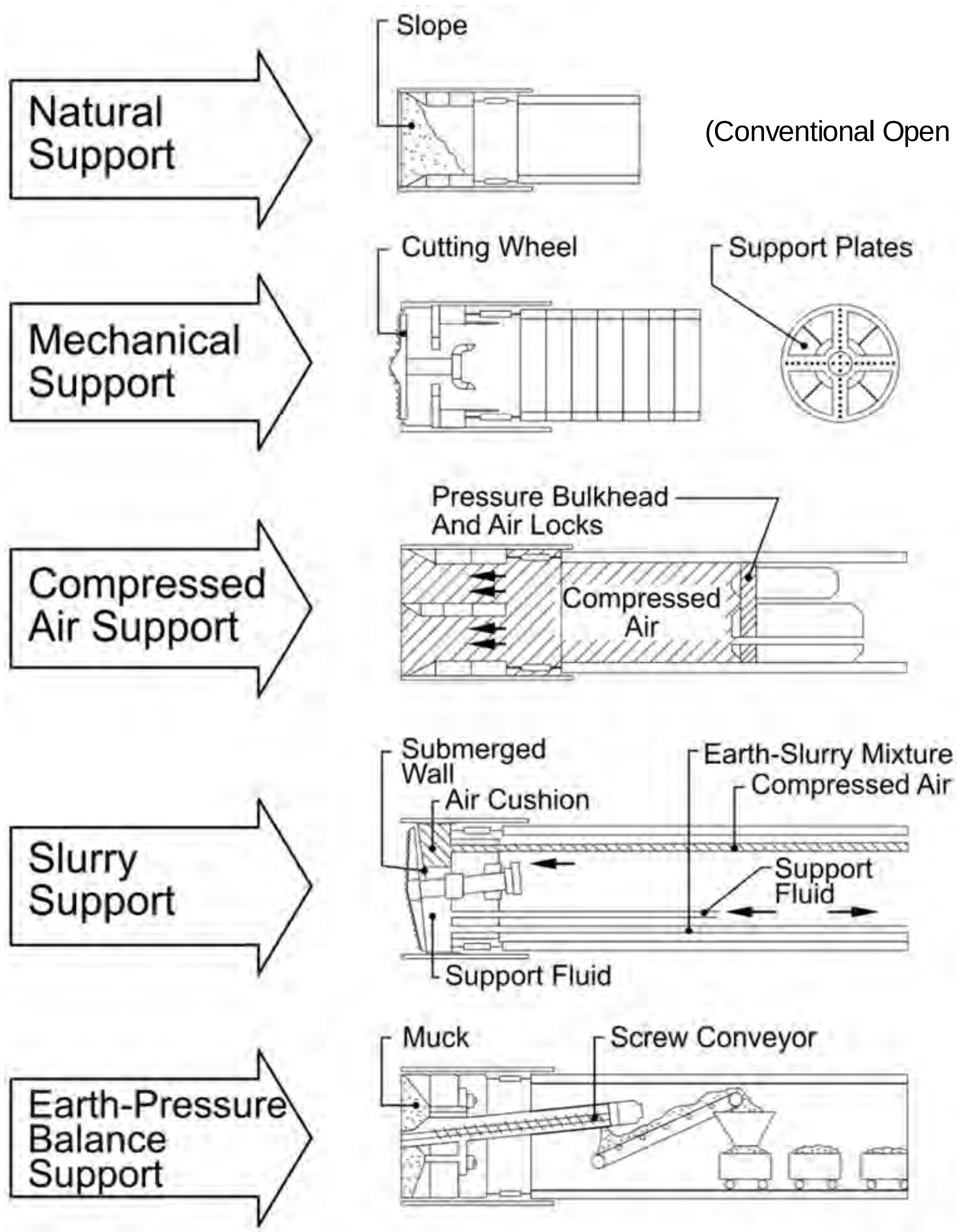
Table 4-1: Summary of Evaluation of Ground Improvement Techniques

Ground Improvement Technique	From Ground Surface	From Inside Tunnel
Permeation Grouting	• Difficult to permeate grout through the soil because of fine contents • Non-uniform grout block because of the interlayered soil structure • Difficult to control QAQC • High surface disturbance • Low tunneling schedule impact	• Difficult to permeate grout through the soil because of fine contents • Non-uniform grout block because of the interlayered soil structure • Very difficult to control QAQC • Low surface disturbance • High tunneling schedule impact
Jet Grouting	• Widely applicable for soil conditions • Relatively uniform grout block • Better control on QAQC • High surface disturbance • Low tunneling schedule impact	• Widely applicable for soil conditions • Insufficient grout block size • Better control on QAQC • Low surface disturbance • High tunneling schedule impact
Ground Freezing	• Insufficient quantity of groundwater • Non-uniform frozen mass because of the interlayered soil structure and perched groundwater condition • Difficult to control QAQC • High surface disturbance • High tunneling schedule impact	• Insufficient quantity of groundwater • Non-uniform frozen mass because of the interlayered soil structure and perched groundwater condition • Difficult to control QAQC • Low surface disturbance • High tunneling schedule impact
Compensation Grouting	• Extensive set up before tunneling • Correctional measures rather than prevention measures • Not recommended for high riser buildings • High surface disturbance • Low tunneling schedule impact	• Not applicable: Must be prepared and ready prior to tunneling.
Compaction Grouting	• Correctional measures rather than prevention measures • Difficult to control QAQC • High surface disturbance • Low tunneling schedule impact	• Difficult to control QAQC • Moderate surface disturbance (heave) • High tunneling schedule impact

4.6 Pressurized-Face (Closed-Face Shield) Tunneling

Tunneling with a shield refers to use of a circular tunnel shield with either an open face or a closed face ("pressurized face"). Types of tunnel shields are shown in Figure 4-14.

Figure 4-14: Types of Shield Machines



The cylindrical shield provides ground support and permits safe installation of a tunnel lining. Open-face shield tunneling is discussed in Section 4.3 of this report. Closed-face tunnel shields are the modern-day evolution of a tunnel shield that once used compressed air to stabilize the ground and control groundwater. A closed-face tunnel boring machine, also generically termed “pressurized-face,” has a rotating cutter head inside a sealed chamber at the front of the machine. There are two general types: slurry type, where the excavated soil is removed by mixing with slurry injected into the cutterhead chamber and pumped out of the tunnel as slurry, and earth pressure balance type, where pressure is maintained on the soil itself and the soil is removed as a semi-solid in muck cars by rail or by a conveyor. These two types of machines are known as Slurry Machines and Earth Pressure Balance Machines (EPBM).

In recent decades, pressurized-face TBMs have become the tunneling method of choice for projects in the Los Angeles area. The recent Eastside Extension project was successfully constructed using pressurized-face TBMs. The use of pressurized-face TBMs for LACMTA projects follows the recommendation in the 1995 report of a specially convened Tunneling Advisory Panel (TAP) entitled “Report on Tunneling Feasibility and Performance,” wherein it is recommended that “…[LACMTA] for future tunneling, consideration be given to application of earth pressure balance tunnel boring machines….” The report further states “The choice of whether to permit an open face shield in preconditioned ground or require an earth pressure balance machine will depend on the degree of risk [Metro] wishes to share and on the overall cost.” Preconditioned ground assumes the use of specific grouting techniques whereby soil stabilizing material such as cement is injected to reinforce the strength of the earth where tunneling may occur. Such preconditioning is used where ground conditions are less than desirable for TBM activity such as open face tunneling. The LACMTA Board accepted TAP’s recommendation and LACMTA has instituted the policy to reduce or avoid construction risk of excessive settlement with open face tunnel shields by requiring pressurized-face tunneling. Since the Eastside Extension project, LACMTA’s practice for soft ground tunneling has been to use pressurized-face tunneling equipment to control ground and prevent subsidence. Figure 4-15 shows the EPBMs used for tunneling of the LA Metro Eastside Extension Project Contract No. CO800. Figure 4-16 shows a typical EPBM in cross section.

Figure 4-15: EPBMs Used for Constructing Los Angeles Eastside LRT Tunnels

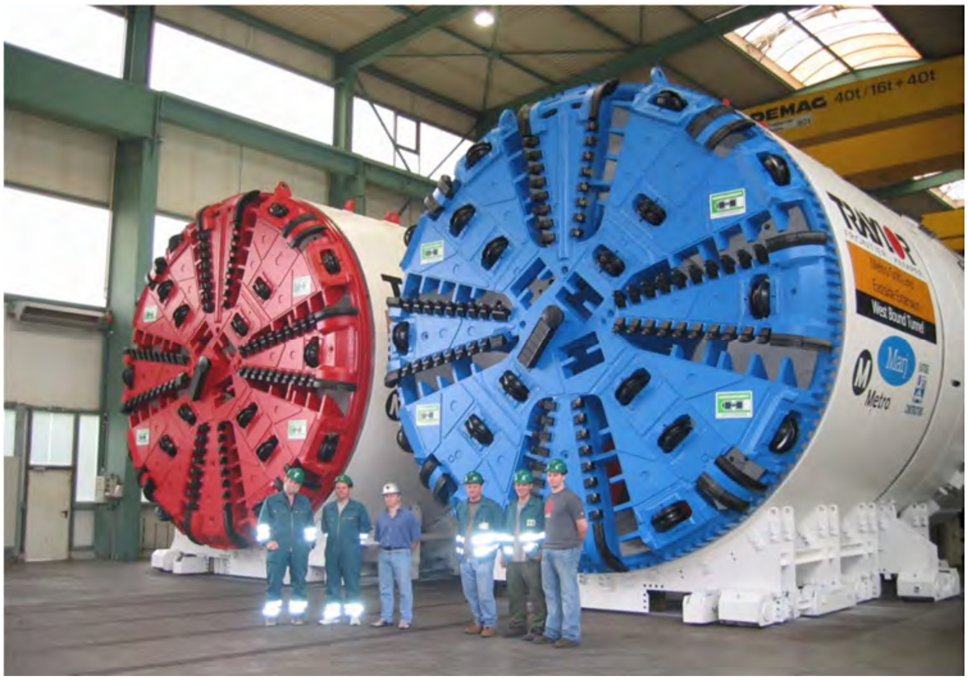
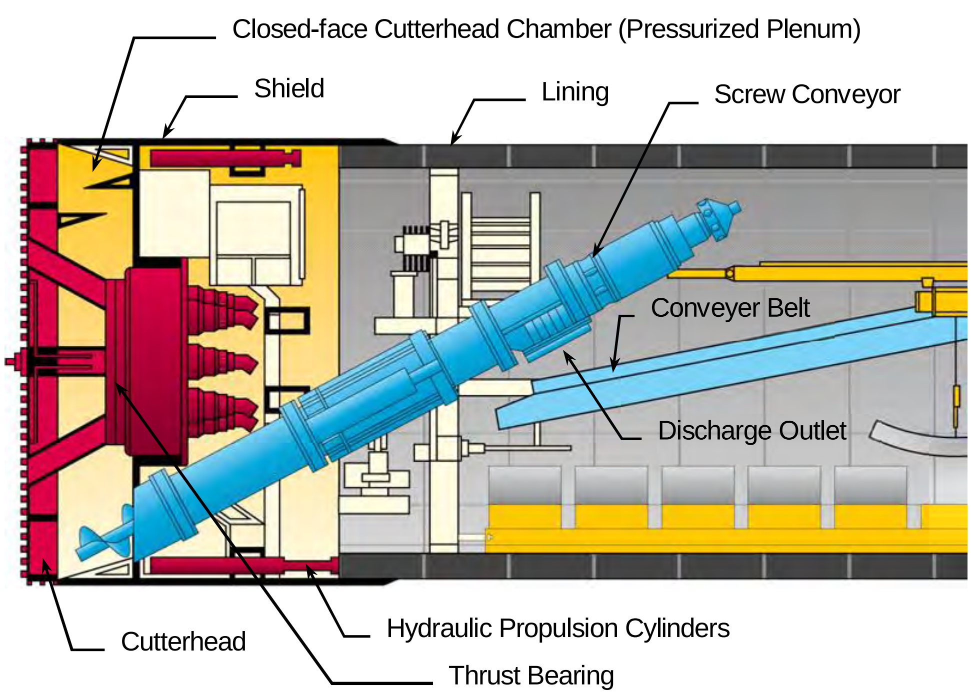


Figure 4-16: Cross-Section of Typical EPBM



4.7 Transit Structure Configuration

The design of underground structures along Flower Street has gone through various design iterations including double-track box for line track sections (close track centers of 14 ft), double crossover for operational purposes, 5th/Flower Street Station, and a pocket track. As stated in Section 4.2, practical construction of these structures is by cut-and-cover. Although the pocket track has been eliminated, a crossover is still needed between 2nd/Hope and 7th/Metro Center Station and is located at 6th & Flower Street, immediately North of the existing Blue Line tail tracks.

4.7.1 Deferred 5th/Flower Street Station

The DEIS/DEIR alignment included the underground 5th/Flower Street Station between 4th and 5th Streets under Flower Street. According to Metro's Design Criteria, the future station should be constructed on a 370 ft long tangent alignment with maximum vertical grade of one percent. The 5th/Flower Street Station, however, was eliminated due to cost considerations with LACMTA Board's direction for the design and alignment not to preclude future construction of a 5th/Flower Street station. The Advance Conceptual Engineering and the FEIS/FEIR documented the Locally Preferred Alternative (LPA) and the elimination of the future station with LACMTA Board's direction. Deletion of the future station resulted in a reduction of construction impact along Flower Street. The Baseline alignment using cut-and-cover construction allows the construction of a station in the future from the street surface. Discussion on each alternative with respect to the future 5th/Flower Street station is presented in Section 5.

4.7.2 Pocket Track

LACMTA Rail Operations at the onset of the project indicated a need to have a pocket track within the Regional Connector system to accommodate trains going out of service, systems disruption, or peak service. A pocket track permits a managed, quick recovery of the system when a train has to be taken out of service, so the required level of service can be maintained. The pocket track was deleted from the subsurface project area configuration and will be provided elsewhere in the system. The elimination of the pocket track enabled narrowing the width of cut-and-cover along Flower Street, thereby reducing construction impacts.

4.7.3 Profile Requirements for Rail Operations

Metro Design Criteria limits the grade of the track profile for 3-car trains. The ruling (maximum) grade is 5% for grade length of 500 to 1,000 ft between vertical points of intersection and 6% for grade length of less than 500 ft between vertical points of intersection. Simultaneous horizontal and vertical curves further reduce the maximum allowable grades, as can other operational considerations. Also the track profile can result in a reduced design speed that may not meet Metro Design Criteria requirement for operating headway. The grade constraints limit the track profile and the depth that can be considered for tunneling.

4.7.4 Crossovers

LACMTA Rail operations require a double crossover on Flower Street for operational flexibility. The project includes a double crossover with standard No. 10 turnouts, which will allow higher operating speed through the crossover during single track operations.

4.7.5 Tie-in at 7th/Metro Center Station

The Regional Connector must meet the existing tail tracks at the north end of the 7th/Metro Center Station. The existing tail track location and elevation is a control point for the project. The end wall of the existing 7th/Metro Center Station structure has a "knock-out panel" (a section of wall with minimal or no steel reinforcing). The knock-out panel facilitates extending the transit line by making it easy to demolish the panel without compromising the integrity of the structural tunnel walls. With the shallow cover over the existing structure, of about 20 ft, the future connection was expected to be made from a cut-and-cover excavation.

It is not possible to change the existing tail track elevation without reconstructing the entire existing structure, significantly and unacceptably impacting the active rail operations of the Blue and Expo Lines and likely closing down 7th/Metro Center Station. When the Expo Line is extended to Santa Monica in late 2015, LACMTA will operate two of the heaviest ridership LRT lines in the country. Re-configuration of 7th/Metro Center Station on a long-term basis of a year or more would not be acceptable. Reconstruction of the existing tail track was not addressed in the EIR and is outside the limits of the Regional Connector project. If this were proposed it would have major environmental, cost, and schedule impacts.

4.7.6 2nd/Hope Street Station

The 2nd/Hope Street Station in the northern end of the Flower Street section of the project is fixed in its horizontal plan location. The alignment proposed at this station has physical and right-of-way constraints. The minimum radius of curvature at both ends of the station is 583 ft for both right and left track centerline, which is the minimum radius a tunnel boring machine can operate. Curve radii cannot be increased because of the horizontal alignment and right-of-way constraints. Within certain limitations, vertical adjustments are possible.

4.7.7 4th Street Bridge Foundations

The existing 4th Street bridge foundations are on both sides of Flower Street, beneath the sidewalks and partially within the street footprint. It is understood that a seismic retrofit has been performed on the bridge structure.

In the LPA, the tunnels pass between the bridges' drilled shaft and battered pile foundations. During Preliminary Engineering an analysis was performed to evaluate the Regional Connector's pressurized-face TBM tunnel impact to the bridge foundations. As a result of this analysis, it was determined that there would be no significant impact to the bridge foundations.

The Low Alignment, discussed in details in Section 5.0, requires the pressurized-face TBMs to pass beneath the pile foundations. Further engineering analysis would be required to assess the impacts and design requirements for possible temporary support of the bridge foundations during construction, for example installation of foundation underpinning. The structure may also require permanent foundation modifications due to possible changes in foundation soil support. Temporary and permanent bridge modifications would require extensive coordination with and approvals by the City of Los Angeles. It is concluded based on the above discussions that there is substantial risk of mitigations being more costly with the Low Alignment than with LPA.

4.8 Underground Obstructions to Tunneling – Tiebacks

4.8.1 Tiebacks on Flower Street

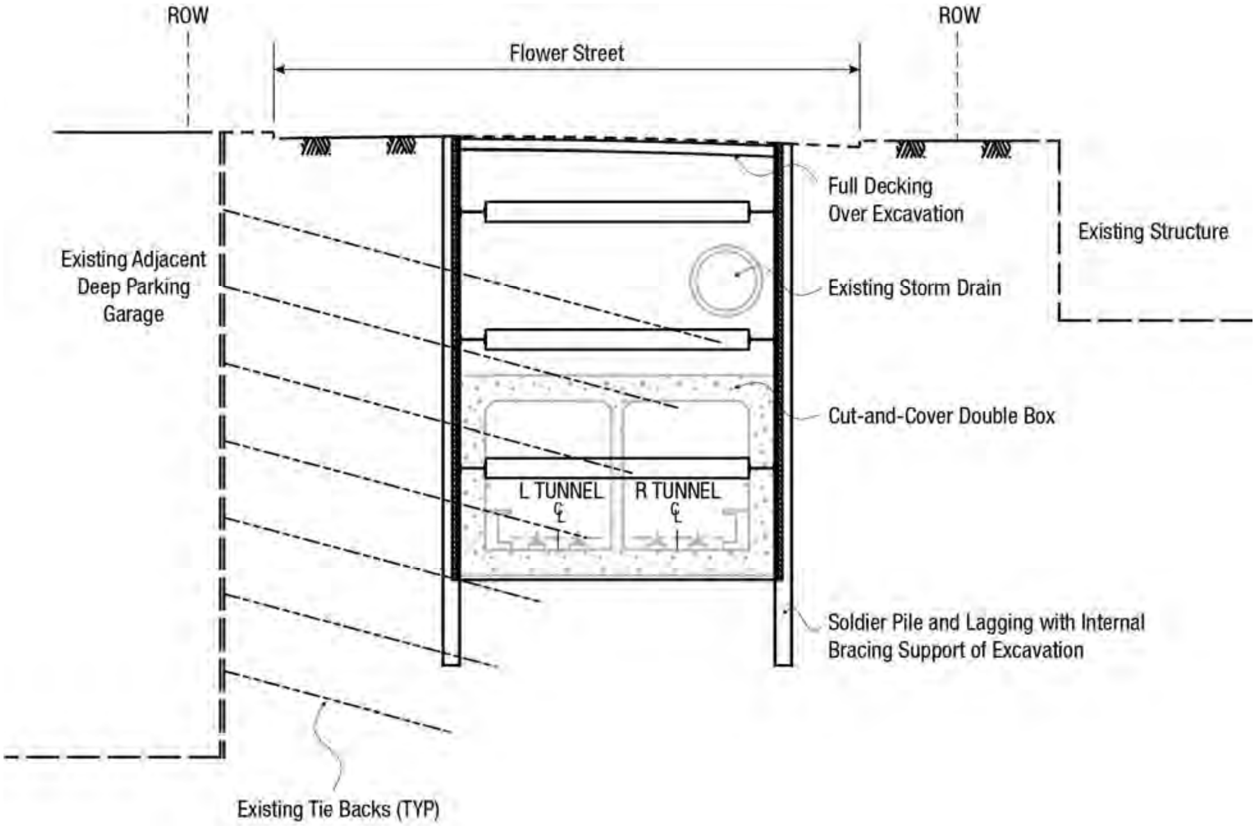
The existing deep basement/parking garages along Flower Street used tiebacks (steel bars or cables grouted in the ground) to laterally support the original excavations during construction. The steel tiebacks extend deep below ground across the width of Flower Street from both sides along the alignment and have been abandoned in place. Tiebacks exist every six to eight feet in this reach of the project. There are hundreds of tiebacks that impact the alignment, particularly south of 4th Street and even more so south of 5th Street. Existing records show the number of tiebacks along Flower Street segment of the Regional Connector as over 500 and potentially up to 800. Figure 4-17 shows a typical arrangement of existing tiebacks under the Flower Street.

It is commonly considered an unnecessary effort to remove the tieback and industry practice is that tiebacks are left beneath the streets but untensioned. Also, where removal is intended for construction reasons or required by regulations, removal is not assured since the force required for removal has to overcome the tieback bond with the ground. Failure of the tieback tendon can occur, leaving the tieback irretrievably in the ground.

Use of tiebacks for temporary support of excavations came into practice in Los Angeles in the 1970's. The initial method of construction was to drill a large-diameter drill hole (12 inches, possibly larger), similar to that used to construct drilled-shaft foundations with or without an enlarged end, commonly called a belled end. In Los Angeles, the "Old Alluvium" and Fernando Formation constitute firm ground conditions, and resulted in stable drill holes without casing. The tieback tendon was cast in the concrete filled drill hole. Later developments in the construction industry led to smaller diameter drill holes (6 inch or less) and a pressure-grouted anchorage.

It has been found that exposed tiebacks can be pathways for water to flow into excavations or tunnels. Also, it should be noted that many of the existing tiebacks were installed relatively soon after tieback technology developed when quality control of drilling and concreting the holes was likely not well developed, thus adding to the numbers of leaky tiebacks. When encountered during tunneling, groundwater seepage along the periphery of the tieback could erode the soil, bringing soil and water into the tunnel. If uncontrolled, this can progressively lead to excessive settlement, which if allowed to continue can create a sinkhole at the ground surface.

Figure 4-17: Existing Tiebacks on Flower Street



4.8.2 Tieback Hazard for Pressurized-face Tunneling

In either the tensioned or untensioned state, tiebacks are a hazard to closed-face (pressurized-face) tunneling as the cutter head will be entangled in the tiebacks which can damage the machine, stall advancement of the excavation, and create excessive ground loss. Uncontrolled efforts to extract the tiebacks would lead to excessive ground loss (more soil excavated than tunnel size), which in turn leads to unacceptable settlements beneath utilities, roadway surfaces and overlying structures. If tiebacks were entangled with the cutterhead, the entangled and displaced tiebacks could disturb surrounding soils and raveling of the adjacent ground could occur, causing settlement and potential damage to overlying structures.

The TBM cutterhead is not capable of “chewing-up” or otherwise processing a steel tieback. The TBM will need to stop advancing and substantial down time will be required to work within or ahead (in front) of the TBM cutterhead to manually remove a tieback which could lead to ground loss. As can be seen in the photo of typical pressurized-face TBMs in Figure 4-15, the cutterhead is a huge barrier between tunnel workers and a tieback that would have to be removed. The pressurized-face machine is designed to control excavation of the soils, which in reverse, practically prohibits tunnel worker access ahead of the machine. The machines are designed with sectional doors in the cutterhead and/or a man-way hatch that can be used to access the ground and cutterhead interface to find, cut and remove a tieback. This design feature is to make access possible, but does not make the process easy or automatically safe.

Working through the spokes of the cutterhead (see Figure 4-15) or ahead of the cutterhead will add significant delay to the construction schedule, even if firm ground conditions are present. If ground water is present and soils are unstable, grouting would be required to create firm ground conditions or the work would have to be done under compressed air (hyperbaric conditions) with appropriate safety cautions instituted. Removal of one tieback would likely have to be done in several sections to free the steel tendon from the ground and cutterhead. Dealing with one or two tiebacks in this manner might be practical. The result would still be a substantial delay and significant cost increase. Encountering hundreds of tiebacks, which is the case here in this section of Flower Street, renders the use of a pressurized-face TBM not viable.

4.8.3 Tieback Hazard for Open Face Shield or SEM Tunneling

Tiebacks in the face of an open-face shield can be removed in a more direct manner compared to the pressurized-face TBM since the ground is directly accessible. However, instability of the face and potential for soil runs poses unacceptable risks and makes the method unsuitable for use in alluvial and fill materials without complete soil stabilization or ground treatment. An open-face shield to get access to tiebacks requires removing the soil from the tunnel face in the shield, thus there is no protection from the hood and breasting or from the excavated soils sloping on the breast tables or in the pan at the front of the shield. This can lead to runs in the sandy silty soils. Another complication is that the tiebacks would cross the tunnel face at an angle. Removal of a tieback in the top heading (upper part of the tunnel face) would be relatively straight forward in comparison to the remaining portion of the tieback that went fully across the tunnel face. In the latter case, the tunnel heading would have to be excavated; the ground would have to be supported to exhume the tieback; and the tieback would be cut off at the tunnel shield periphery. A time consuming effort, including ground improvement for the unstable soil conditions, will be required. During construction of the Seattle Bus Tunnel, hundreds of tiebacks were removed from an open shield but there was substantial loss of ground and two sinkholes. See also discussion of risks associated with open-face shield tunneling in Section 4.3.

For SEM construction, tiebacks would be directly removable from the tunnel face. Absence of a shield, however, has consequences of increased risk of creating unstable conditions, where mixed-face soil conditions are present and any complications resulting from removal of tiebacks.

4.8.4 Advance Tieback Removal to Mitigate Tunneling Hazard

Removal of tiebacks in advance of tunneling can be done by constructing tieback removal pits or trenches to mitigate the tieback hazard. In practice, the location of tiebacks would need to be identified. Where their location is fairly well known, a few tiebacks encountered by TBM tunneling can be removed in advance where the value of more tunneling greatly outweighs the cost of proactive advance removal. This situation exists along Flower Street next to the Bank of America building (tunnel reach between Sta 19+00 and Sta 28+00). In this area, up to twenty tiebacks can be extracted by trenching, which allows tunneling a block further to the south. In this specific instance, mitigation by excavation and removal in advance of tunneling is planned.

A complicating condition is that as-built records may not be available or not reliably documented to be able to plan and execute such temporary works for advance tieback removal. Geophysical techniques, such as a magnetometer survey performed in the tunnel might be able to find some tiebacks, but if used in drilled holes, would be like “looking for a needle in a haystack.” A geophysical method at the ground surface is not known to exist that can reliably and simply find the tiebacks at depths of possibly 40 to 80 ft below the ground surface. Thus even with rigorous study of records and field investigation, the risk of not finding and removing all the tiebacks to eliminate the tieback hazards would remain. Also, even if the tunnel profile were to be established to avoid existing tiebacks with a specific clearance of several feet, there would still be the risk of encountering during tunneling a tieback that was installed longer than indicated by available records. The only feasible direct method to remove tiebacks for the substantial extent that are known to exist for safety on Flower Street would require an independent excavation, a trench with suitable ground support to explore, cut, and remove tiebacks. The task of digging trenches along Flower Street would have significant impacts to traffic and pedestrian disruption and may require utility relocations. In effect, it would have impacts like cut-and-cover construction.

5.0 ALTERNATIVE ALIGNMENTS AND TUNNELING METHODS

In February 2012, stakeholders on Flower Street requested LACMTA to investigate extending the bored tunnels further south, along Flower Street, and reduce the length of the cut-and-cover construction. To address the stakeholder concerns, an alternate lower tunnel profile ("Low Alignment") was developed to allow continuation of tunneling south of 4th Street, to a point south of 5th Street, which simultaneously reduced the overall length of the cut and cover construction. Based on then available existing building tieback information, the lower profile was developed to permit the extension of bored tunnels, at a Low Alignment, avoiding potential conflict with these tiebacks.

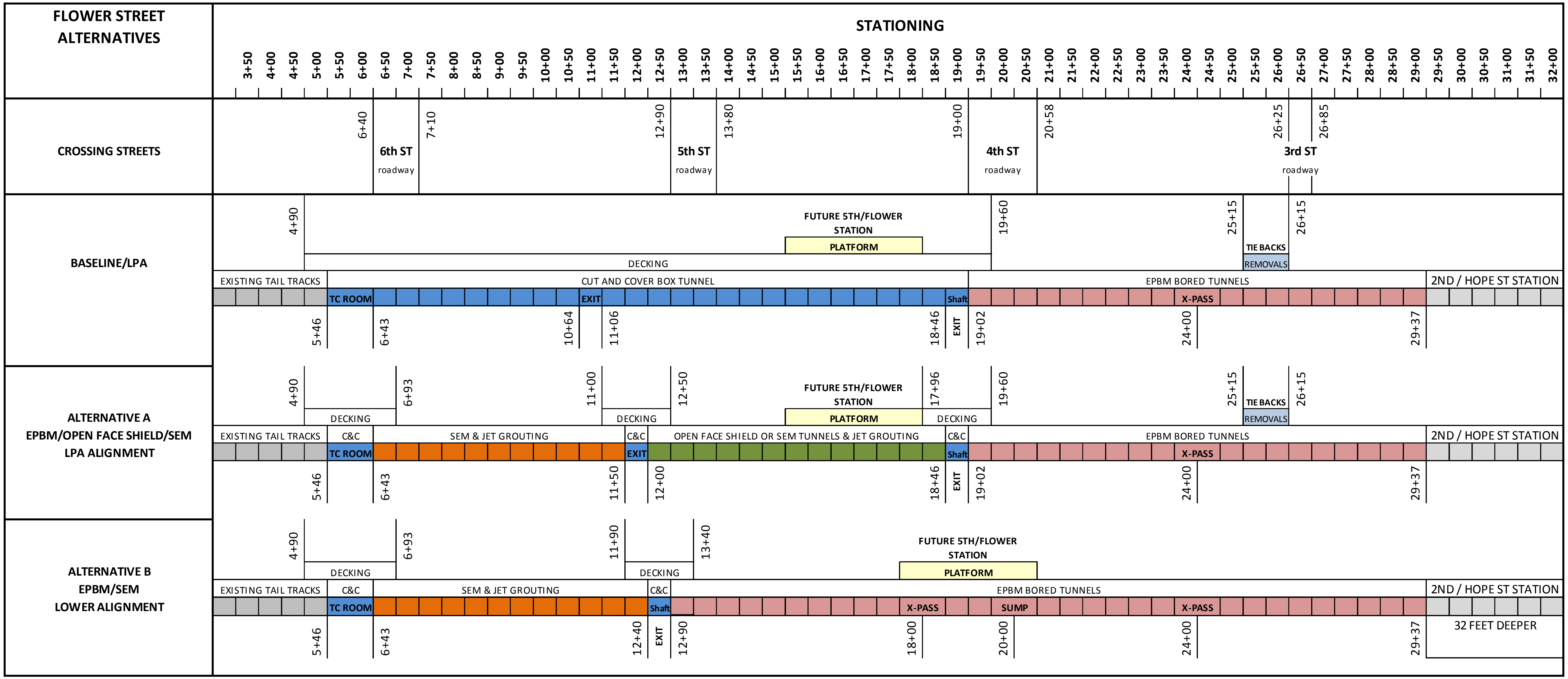
In the April 2012 LACMTA Board meeting, the Board approved the Project definition (the "Base Design" referred to herein as "Baseline") for the Regional Connector Transit Corridor Project. At this meeting, the Board directed staff to examine various value engineering and cost saving methods to determine if certain specific construction methods and design features could be incorporated to mitigate potential construction impacts along Flower Street, without causing an increase to the Life of Project (LOP) budget. If it can be completed within the current LOP budget then amend the Locally Preferred Alternative (LPA) of the Regional Connector Transit Corridor Project to include the design features. The Board further directed staff that if the analysis determined that the methods exceeded the LOP budget, the construction methods and design features shall be included during construction procurement, as bid options, to allow design-build proposers a process to include each feature and determine if it could be accomplished within the LOP budget.

At the time of the April 2012 Board Meeting the Flower Street mitigation method under consideration was the "Low Alignment". This alignment would extend tunneling from the termination of tunneling at south of 4th Street, to a point south of 5th Street, and would subsequently reduce the length of the cover and cut section along Flower Street. Construction impacts in the block between 4th and 5th Streets would be further mitigated by limiting the construction ingress and egress to points south of 5th Street.

Two tunneling Alternatives, A and B, have been advanced to determine if they reduce or mitigate construction impacts or lower the risks to construction safety, cost, and schedule compared to the Baseline. The Baseline consists of EPBM tunneling to south of 4th Street and the cut-and-cover with street decking system to the 7th/Metro Center Station along the LPA profile. Alternative A ("EPBM/Open Face Shield/SEM LPA Profile") would extend tunneling south to the 7th/Metro Center Station through the use of a combination of EPBM, open-face shield, and SEM tunneling along the LPA profile. Alternative B ("EPBM/SEM Low Alignment") would extend tunneling south of the 7th/Metro Center Station through the use of a combination of EPBM and SEM tunneling along the Low Alignment. Both Alternatives A and B would minimize cut-and-cover construction, limiting it to the tie-in with the 7th/Metro Center tail tracks and street-surface exit shafts.

In summary, the types of construction for the Baseline and these two tunneling alternatives are shown in Figure 5-1.

Figure 5-1: Baseline and Tunneling Alternatives



5.1 Baseline Alignment and Profile

The Baseline alignment is as presented in the Final Preliminary Engineering design. The Baseline alignment profile is presented in Figure 5-2.

This configuration assumes EPBM construction between the 2^{nd}/Hope Street Station and 4^{th} Street where a reception pit allows for the extraction of the EPBM for reuse on the second tunnel drive. In conformance with LACMTA's policies, and the ground conditions along the alignment, a pressurized closed-face TBM would be designated for the bored tunnel construction. Per the EIS/EIR, material excavated through the use of pressurized face TBM through 4^{th} Street will be transported back along the alignment within the newly constructed tunnels and removed at the TBM insertion site in Little Tokyo at the northeast corner of 1^{st} and Alameda. The depth of the tunnel was selected to avoid direct conflicts with and adverse impacts on the existing 4^{th} Street bridge foundations, avoid most existing tiebacks between 3^{rd} and 4^{th} Streets, and provide sufficient ground cover over the tunnel at the reception pit south of 4^{th} Street. Refer to Section 4.8 for discussion of tunneling and tiebacks.

Cut-and-cover methods of construction are assumed between 4^{th} Street and the existing 7^{th}/Metro Center Station interface. This will require the relocation of some utilities, and the installation of soldier piles which will begin to create the alignment structure box in Flower Street from 4^{th} to 6^{th} Street. In addition, the existing Pacific Electric tunnel will be encountered in the cut-and-cover section. Its portion within the cut-and-cover excavation will be demolished by top-down excavation. Excavation of the top portion of the street and a temporary concrete decking system between the soldier piles will take place using a phased approach to minimize impacts to traffic by allowing at least three lanes to remain open during the day time period. The Baseline alignment uses two locations within the cut-and-cover excavation along Flower Street to remove soil and construct the temporary and permanent structures. The alignment allows for construction of a track crossover, does not preclude the construction of a future station at 5^{th} and Flower Streets, and allows for simple extraction of the existing tiebacks. An additional open cut excavation pit will be required for removal of existing abandoned tiebacks in the course of approximately 100 ft of EPBM tunneling south of 3^{rd} Street along Flower Street.

The alignment is designed for light rail operating speed of 55 miles per hour (mph) along the Flower Street portion.

Metro Rail Design Criteria (MRDC) Section 10-Operations state the following requirements:

a. Light Rail operational headway to be no greater than 5-minute interval for single-line normal operations at the branch line, and 2-1/2 minute at the trunk segment and through junctions.

b. Light Rail design headway to be no greater than 200 seconds for single-line normal operations, and no greater than 100 seconds for trunk segments and through junctions.

The Baseline alignment satisfies the operational requirements listed above.

5.2 EPBM/Open Face Shield/SEM LPA Profile Alternative (Alternative A)

This alternative extends tunneling south to the 7th/Metro Center Station through the use of a combination of EPBM, open-face shield tunnel boring, and sequential excavation method (SEM) construction techniques in series.

Alternative A, as shown in Figure 5-3 is defined as follows: EPBM-bored tunnels are constructed following the Baseline/LPA alignment to south of 4th Street, then open face shield tunnel excavation from 4th Street to 5th Street (abandoning the shields underground), and SEM tunnel construction from 5th Street to the 7th/Metro Center Station tail tracks structure.

Without taking special mitigating measures, this alternative has substantial risk of instability of the tunnel face with the potential for soil runs during tunneling by open-face shield or SEM, particularly when dealing with tiebacks. The open-face shield section of the alignment has diminishing thickness of the Fernando Formation above the shield. There would be about 1 to 7 ft of Fernando Formation cover over the open-face shield section as shown on Figure 5-3. However, the top of the Fernando Formation is an erosional surface and the geologic profile is based on a limited number of borings. Thus the thickness of the Fernando Formation above the tunnel has substantial uncertainty and stability of the open-face shield tunnel face is not guaranteed. Ground improvement by jet grouting would be required.

The open-face shield tunneling in this alternative would encounter the Pacific Electric tunnel which may include pea gravel backfill between its final lining and the surrounding ground as commonly used in earlier tunneling methods. As the open-face shield tunnel approaches, this backfill may run into the new tunnel creating large voids around the Pacific Electric tunnel directly underneath Flower Street. Backfill will be necessary under this alternative at the location of the Pacific Electric tunnel to permit practical tunneling and minimize this risk.

For the SEM portion of the tunneling, the single twin-track tunnel is larger. The tunnel will have varying amounts of mixed geologic conditions in the tunnel face, and at portion of the tunnel crown will be in the alluvium. In this situation, there would be an unacceptable risk of creating subsidence or even sinkholes on Flower Street (see Section 4.1). Mitigation by jet grouting would be required, however it would encounter difficulties as discussed in Section 4.5.2. In addition significant risks are associated with the construction schedule and cost for this alternative. Switching among three tunneling techniques (EPBM, open-face shield, and SEM) for the relatively short tunnel drive in difficult ground conditions would cause significant schedule delay and cost increase due to equipment, labor, and procedure adjustments.

The jet grouting for the open-face shield and SEM portions would require drilling grout holes on a 6 foot by 6 foot pattern throughout the area to be grouted. Grout holes would extend from the ground surface through weak fill and alluvial soils to just into the relatively stronger Fernando Formation. A 50-foot-wide zone in Flower Street would be grouted and requires setting up a grout plant on Flower Street. Depending on the number of required grout holes, two to four drill rigs would be utilized to drill and grout. For Alternative A, approximately 1,900 grout holes would be drilled and grouted, and approximately 12 months (with risk of doubling to 24 months) would be anticipated to complete using two drill rigs as a feasible mitigation effort.

Although the jet grouting would improve the ground conditions for ground control during SEM tunneling, significant risk of ground loss and excessive settlement due to SEM will remain. The risk of tunnel collapse cannot be ruled out. This is because grouting must be done through a series of borings designed to have overlapping grout columns which do not always overlap in practice and there is no guarantee that all of the ground within the columns will be adequately grouted. Ground water inflows and ground loss can still occur which could damage utilities and existing buildings/basements/structures and provide a safety threat to workers, the public, and building operations. Before tunneling, utility services may also be adversely impacted and interrupted by pressure grouting.

The vertical alignment for this alternative would be the same as that of the Baseline/LPA with the tunnel alignment located at a depth of approximately 40 ft to top of rail below street surface. The proposed horizontal alignment would differ from the Baseline/LPA and reduce the operational speed in the Flower Street section between 5th Street and the 7th/Metro Center Station from 55 mph under the Baseline/LPA to 35 mph for this alternative. The speed reduction in this segment is due to the constraints of the horizontal and vertical alignments to accommodate a future 5th/Flower Station and to miss the bridge foundation piles under 4th Street. The short distance available for transition from the wider track centers of the open-face shield tunnels at 5th Street to a narrower track center spacing to connect with the proposed double crossover north of the 7thMetro Center Station limits the design speed to 35 mph. The speed reduction will have negative operational impacts on headway and runtimes. Under Alternative A, the 2nd/Hope Street Station would be at the same depth (96 ft) as the Baseline/LPA.

Configuration of a future 5th/Flower Street Station would have to be as a side platform station without a concourse. The center to center spacing of the tunnels do not permit construction of the center platform. The relatively shallow depth does not give sufficient distance for a concourse. Transit service would have to be interrupted for substantial lengths of time to permit some elements of construction to take place. Deviations would be required from Metro standards for the site-specific conditions.

There would be four separate cut-and-cover excavation sites: 1) for the train control room construction and connection at the end of the existing tail track tunnel south of 6th Street; 2) for emergency exit construction located south of 5th Street; 3) for emergency exit construction and EPBM retrieval south of 4th Street, and 4) an open cut excavation pit for removal of existing abandoned tiebacks in the course of approximately 100 ft of EPBM tunneling south of 3rd Street along Flower Street. Similar to the Baseline/LPA, cut-and-cover excavation materials would be handled from locations along Flower Street, while tunnel muck from the EPBM, open-face shield, and SEM operations would be handled through the Mangrove site in Little Tokyo. With a lengthening of tunneling further south on Flower Street using open face shield and SEM tunneling, there would be a corresponding increase in the excavated materials handled through Little Tokyo, an environmental justice community, over the Baseline/LPA conditions, and a corresponding decrease in excavated materials handled on Flower Street.

5.3 EPBM/SEM Low Alignment Alternative (Alternative B)

Alternative B extends tunneling south to the 7th/Metro Center Station through the use of a combination of EPBM and SEM construction techniques.

Alternative B, as shown in Figure 5-4, is defined as follows: EPBM-bored tunnels are constructed on a deep alignment to south of 5th Street and then when the track centers are too close to permit use of EPBMs, construction changes to SEM tunneling the remaining distance to the 7th/Metro Center Station tail track structure.

This alternative's horizontal alignment along Flower Street would be similar to the Baseline/LPA with the vertical alignment designed with a "sag" resulting in an alignment depth varying from 40 ft at the shallowest point to 105 ft to top of rail below street surface at the low point. This sag provides for a flat spot at a one percent grade to accommodate the future 5th/Flower Station. Based on the provision of a double crossover north of 6th/Flower, a future 5th/Flower Street Station, and the maximum operational grades required at the approach/departure of a crossover, there is insufficient distance to provide horizontal and vertical alignments that support 55 mph operations. Therefore this segment's design speed of 55 mph under the Baseline/LPA is reduced to 35 mph under this alternative, which will have negative operational impacts with increased runtimes. Due to this alternative's greater depth, the alignment will not intersect the Pacific Electric tunnel but the 2nd/Hope Street Station would need to be lowered by 32 ft from the Baseline alignment and would have a depth to top of rail of 128 ft.

For the SEM portion of the tunneling, the single twin-track tunnel is larger and the tunnel will have varying amounts of mixed geologic conditions in the tunnel face. At some locations, the tunnel crown will be in the alluvium. In this situation, there would be an unacceptable risk of creating subsidence or even sinkholes on Flower Street. Mitigation by jet grouting would be required, however would encounter difficulties discussed in Section 4.5.2. Refer to the discussion on jet grouting in Section 4.5. For Alternative B, approximately 1,000 grout holes would be drilled and grouted, and approximately 8 months (with risk of doubling to 16 months) would be anticipated to complete using two drill rigs.

The EPBM would be disassembled and removed through the tunnel to the Mangrove portal site with the EPBM shield left in place. With the extension of the tunneling further south to the 7th/Metro Center Station through the use of SEM, there would be a significant increase in excavated materials being handled through the Mangrove site in Little Tokyo over the Baseline/LPA conditions. Cut-and-cover excavation materials would be handled from locations along Flower Street, while tunnel muck from the EPBM and SEM operations would be handled through the Mangrove site in Little Tokyo. With a lengthening of tunneling further south on Flower Street using the EPBM and then SEM tunneling, there would be a corresponding increase in the excavated materials handled through Little Tokyo, an environmental justice community, over the Baseline/LPA conditions, and a corresponding decrease in excavated materials handled on Flower Street.

Configuration of a future 5th/Flower Street Station would have to be as a side platform station since the center to center spacing of the tunnels do not permit construction of the center platform. The tunnels are sufficiently deep such that a concourse can be constructed The tunnel profile would need to be flattened, which will mean demolishing the previously constructed tunnels and establishing the invert of the new station. Transit service would have to be interrupted for substantial lengths of time (years) to permit this major construction work to take place. Deviations would be required from Metro standards for the site-specific conditions.

Figure 5-2: Baseline/Locally Preferred Alternative Alignment Profile

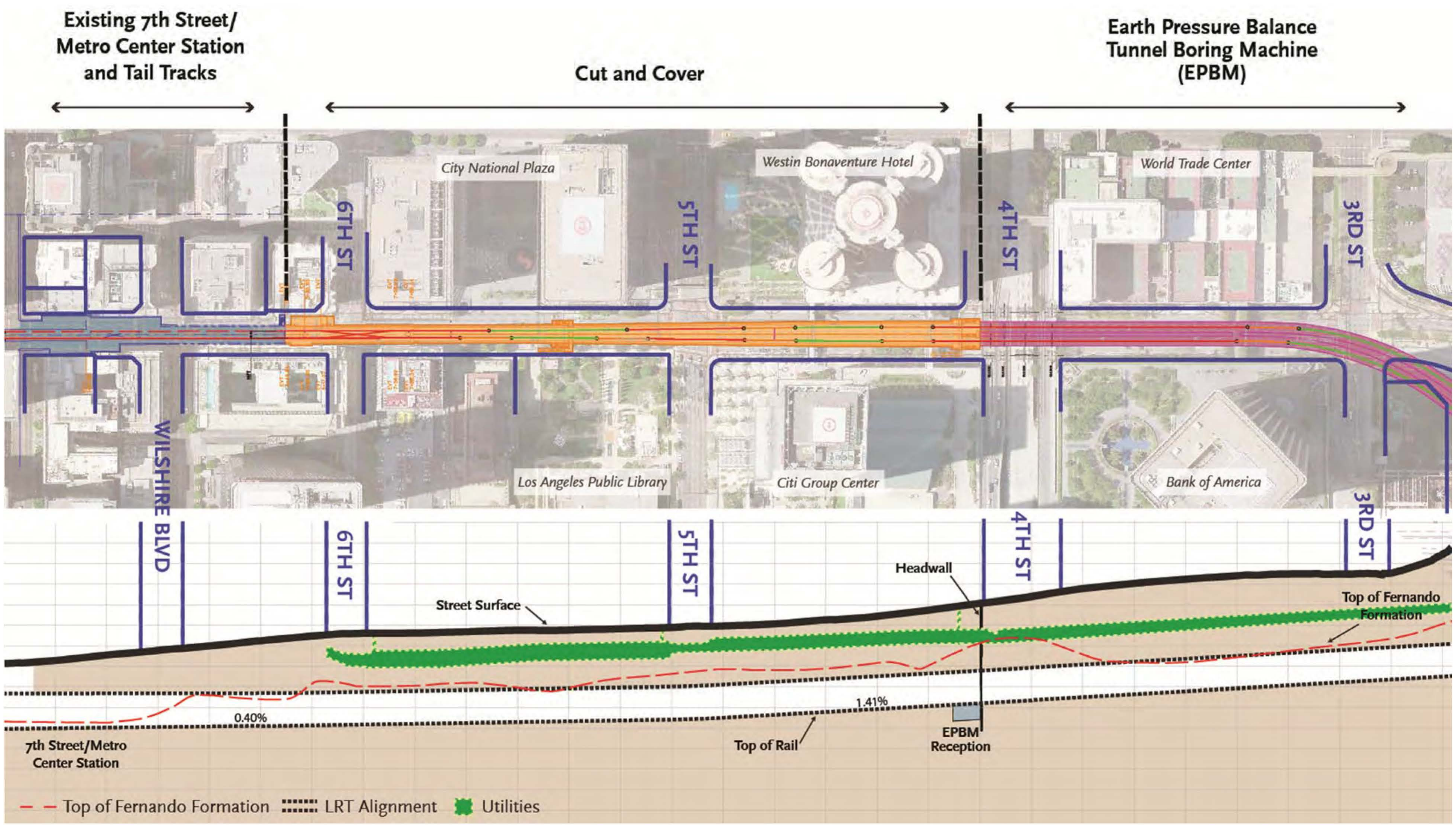


Figure 5-3: EPBM/Open Face Shield SEM LPA Profile (Alternative A)

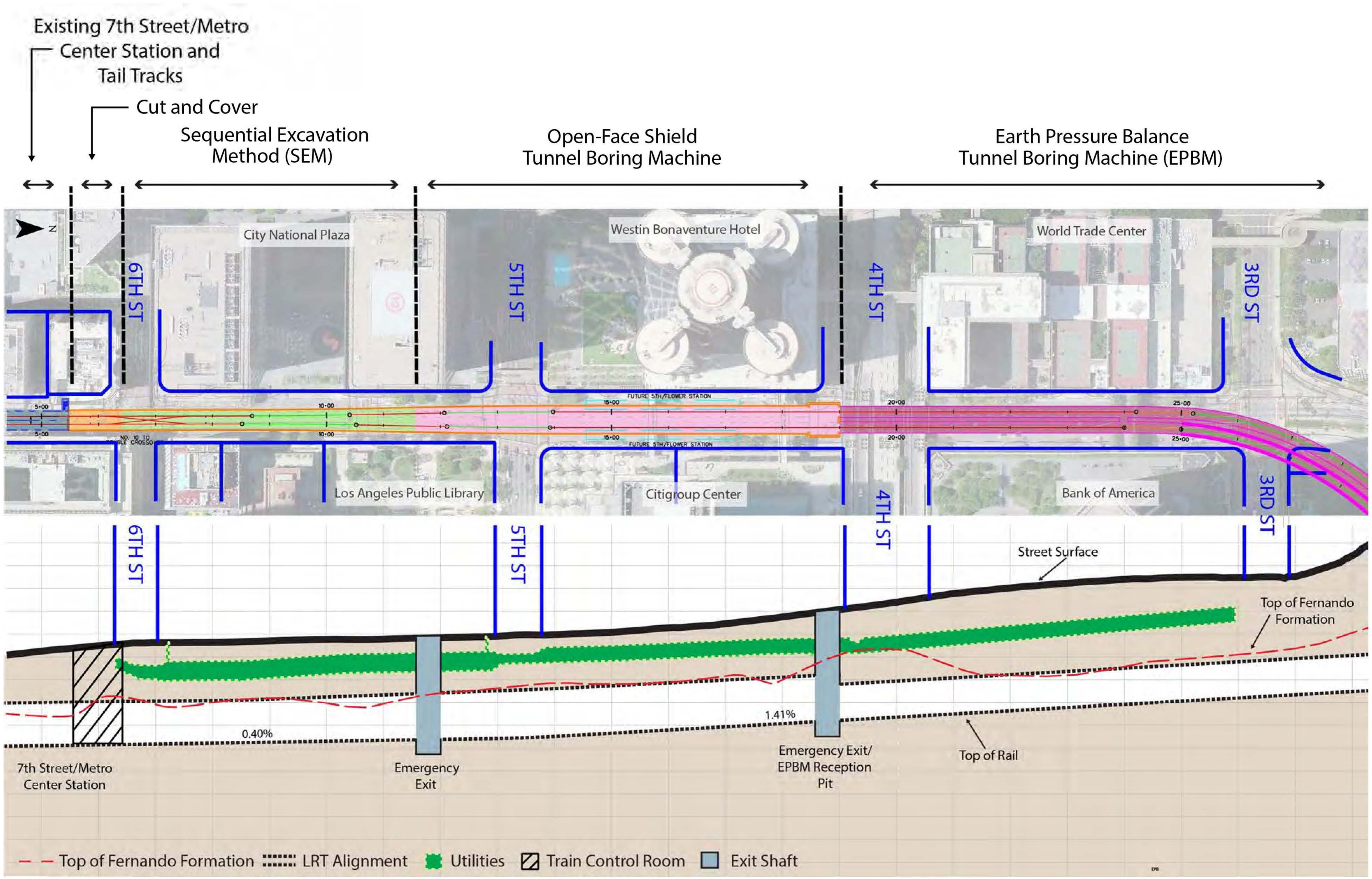
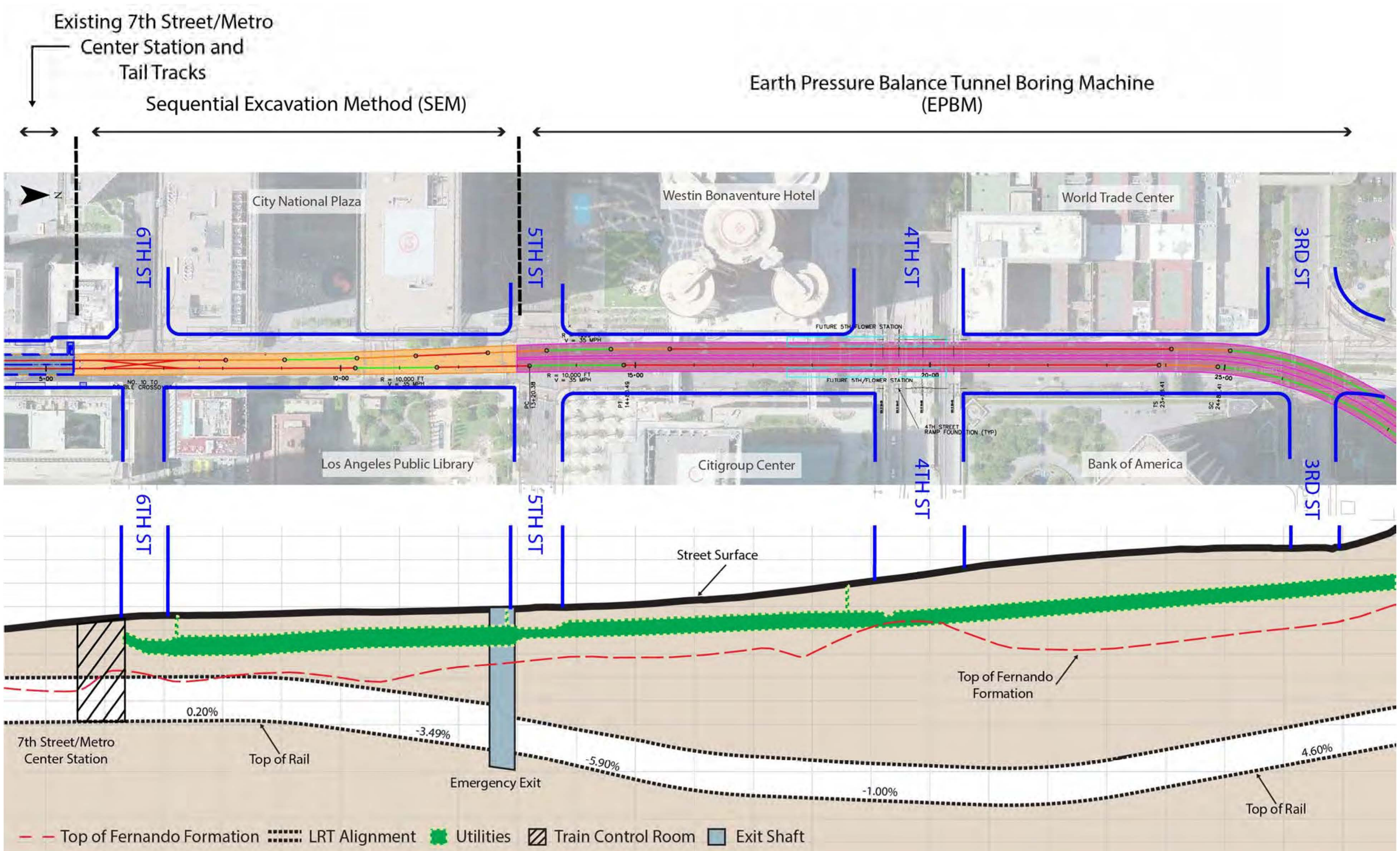


Figure 5-4: EPBM/SEM Low Alignment Alternative (Alternative B)



6.0 SCHEDULE

6.1 General

The following key dates have been used in the development of the alternative schedules:

- NTP Construction – 21 March 2014
- Start of Tunneling – 22 June 2015 (about 15 months after NTP)

Schedules were developed for each alignment and compared against the Baseline schedule. In all cases, it was assumed the contractor would utilize one EPBM and, for Alternative A only, one Open-Face Shield. To facilitate direct comparison of the construction schedules among Baseline, Alternative A, and Alternative B, the schedules are presented in this report with a common date for start of tunneling. As will be shown below, Alternative A and Alternative B have longer construction durations than the Baseline by 15 months and 7 months, respectively. These schedules are "as if" the alternative were being constructed instead of the Baseline without a delay and are not intended to match actual Metro Contract No. C0980 project status.

The schedules shown in Sections 6.3 through 6.4 encompass only the actual construction activities and do not include allowances for any potential schedule delays for, amongst others, any environmental process or resolutions of existing or potential future legal challenges. Influencing the cost and schedule impacts is the delay to the project due to any required environmental clearance documentation needed to allow LACMTA to incorporate any of these alternatives into construction. Cancellation of the current procurement and a reopening of the environmental documents would result in large delays to the project.

6.2 Environmental Process Schedule

Assuming that LACMTA is required to conduct a SEIS/SEIR in order to evaluate one or more of these alignment and construction method alternatives, a Notice of Preparation and Notice of Intent (NOP/NOI) per NEPA and CEQA would be developed in parallel with the decision making process to conduct the SEIS/SEIR. Effectively as of May 29, 2014, Metro started this process in advance of a firm determination of need for a SEIS/SEIR. Once provided a notice to proceed by the LACMTA Board of Directors, the NOP/NOI would be immediately filed with Federal, State and local agencies for public notice. There are a number of Regional Connector public meetings currently being held on a monthly basis. A scoping meeting could be held within the first month after the NOP/NOI is published. In parallel, a number of environmental technical studies can be initiated. This report contains sufficient detail and description of the alignment and construction methods to determine which technical studies need to be developed and what potential impacts need to be evaluated. It is anticipated that the studies would include Transportation/Traffic, Air Quality, Noise/Vibration, and Environmental Justice. These studies can be completed in approximately three months.

Post completion of the technical studies, an Administrative Draft SEIS/SEIR would be developed over a month and reviews by LACMTA and FTA would take approximately two months. FTA normally requires at least six weeks review for environmental documents. Upon completion of the review, the Draft SEIS/SEIR would be released for public circulation and comment for a 45 day period. A selection of one of the alignment and construction method alternatives would be made considering public comment and a Final SEIS/SEIR would be developed in order to respond to the comments. The Final SEIS/SEIR would require up to three months to complete, again assuming at least a six week review by FTA before completion. After review by LACMTA and FTA, the document would be completed and available to the public. The Final SEIS/SEIR would go to the LACMTA Board, a two month process, in order to certify the SEIS/SEIR and approve the final project.

The SEIS/SEIR process (assuming no new major public issues) will take about 13 months from preparation to approval by LACMTA Board. After the SEIS/SEIR approval, LACMTA can begin to initiate design of the selected alignment and construction method alternative in preparation for a new procurement process. In parallel, the FTA will review the SEIS/SEIR and prepare a Record of Decision on the SEIS/SEIR. The design and procurement processes are estimated to take 16 months.

The total potential delay is 29 months (13 + 16 months) due to the time required for SEIS/SEIR, design, and procurement processes for Alternatives A and B described below in Sections 6.4 and 6.5. This delay has been included in the cost analysis described in Section 8.0 of this report.

6.3 Baseline Schedule

The Baseline schedule is based on the Final Preliminary Engineering design alignment (plan and profile) with a scheduled NTP Date of 21 March 2014. The schedule anticipates that the construction of the cut-and-cover section, along Flower Street, would occur concurrently with the excavation of the bored tunnels and other construction activities throughout the alignment. See Figure 6-1**.**

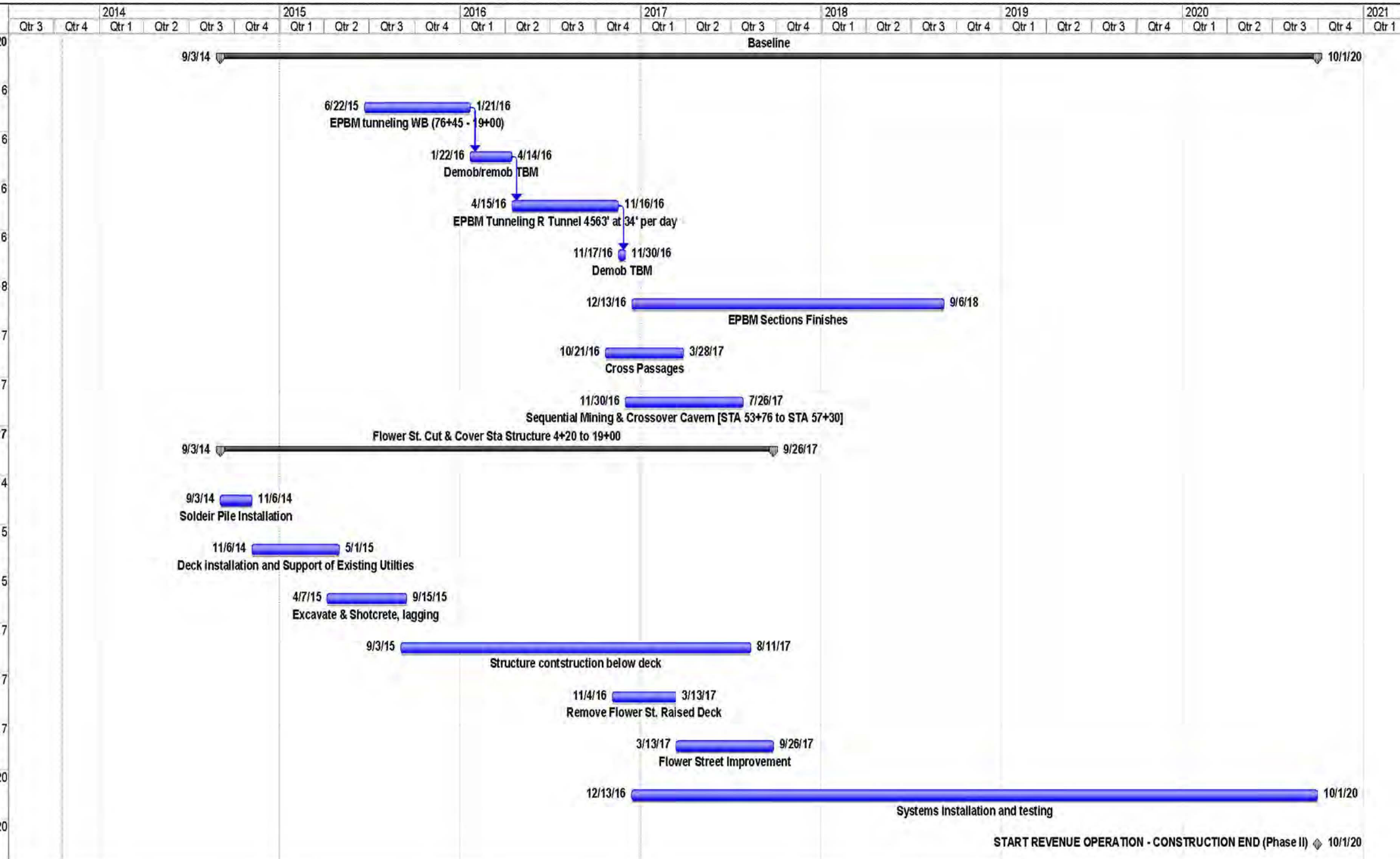
For the Flower Street segment of the Project, the schedule is based on the construction of 1,035 ft of twin bored tunnel between the 2nd and Hope Street Station and immediately south of the 4th Street Bridge, where a reception pit would be constructed for the extraction of the TBM. The balance of the segment is 1,356 ft of cut-and-cover construction between the TBM reception pit and the existing 7th/Metro Center Station interface. Construction would be facilitated by utilizing two excavation shafts along Flower Street to remove excavated soil and construct temporary and permanent structures for all the cut-and-cover section.

The alignment allows for construction of a track crossover, protection in place of utilities, and does not preclude the construction of a future station at 5th and Flower Streets, and allows for simple extraction of existing building tiebacks.

Figure 6-1: Baseline Summary Schedule

Flower Street Baseline/LPA Schedule

Task Name	Start	Finish
Baseline	**Wed 9/3/14**	**Thu 10/1/20**
EPBM tunneling WB (76+45 - 19+00)	Mon 6/22/15	Thu 1/21/16
Demob/remob TBM	Fri 1/22/16	Thu 4/14/16
EPBM Tunneling R Tunnel 4563' at 34' per day	Fri 4/15/16	Wed 11/16/16
Demob TBM	Thu 11/17/16	Wed 11/30/16
EPBM Sections Finishes	Tue 12/13/16	Thu 9/6/18
Cross Passages	Fri 10/21/16	Tue 3/28/17
Sequential Mining & Crossover Cavern [STA 53+76 to STA 57+30]	Wed 11/30/16	Wed 7/26/17
Flower St. Cut & Cover Sta Structure 4+20 to 19+00	**Wed 9/3/14**	**Tue 9/26/17**
Soldeir Pile Installation	Wed 9/3/14	Thu 11/6/14
Deck installation and Support of Existing Utlities	Thu 11/6/14	Fri 5/1/15
Excavate & Shotcrete, lagging	Tue 4/7/15	Tue 9/15/15
Structure contstruction below deck	Thu 9/3/15	Fri 8/11/17
Remove Flower St. Raised Deck	Fri 11/4/16	Mon 3/13/17
Flower Street Improvement	Mon 3/13/17	Tue 9/26/17
Systems Installation and testing	Tue 12/13/16	Thu 10/1/20
START REVENUE OPERATION - CONSTRUCTION END	Thu 10/1/20	Thu 10/1/20



6.4 EPBM/Open Face Shield/SEM LPA Profile Schedule (Alternative A)

This alternative minimizes the amount of cut-and-cover construction on Flower Street by utilizing open-face shield for excavation of a portion of the guideway and SEM excavation for other portion of the underground guideway on Flower Street. It is based on the Final Preliminary Engineering horizontal alignment, with horizontal and vertical adjustments. See Figure 6-2 for the construction schedule.

With this alternative, EPBM bored tunnels are excavated on the LPA alignment to a 4th street shaft similar to the Baseline. Open face shields are used to excavate tunnels from the 4th Street shaft to 5th Street abandoning the shields underground and constructing the balance of the tunnels by SEM tunneling methods to the 7th/Metro Station. This method requires muck removal through the westbound track (westbound for operations, designated the L track in design) tunnel to the Mangrove portal and thereby delays the construction of station facilities which are dependent on the completion of all tunneling operations. Jet grouting is required to improve the ground conditions above the open-face shield and SEM tunnels. See Section 4.5.

The length of the bored tunnels with EPBM is the same as in the Baseline alignment. Approximately 646 ft of twin tunnels are constructed using open-face shield and approximately 507 ft are constructed using sequential excavation method (SEM) techniques using the westbound tunnel and the Mangrove portal for tunnel excavation mucking and support. The alignment allows for the construction of a track crossover, and would not preclude the construction of a future station at 5th and Flower Streets. See comment on constructing a future station in Section 5.2.

The Open-face shield and SEM approach requires extensive jet grouting to improve the ground conditions for tunneling between 4th Street and the 7th/Metro Station. The jet grouting can be performed concurrently with the EPBM tunneling and will have duration of approximately 12 to 24 months. Due to the requirement to remove spoils through the Mangrove portal, the westbound tunneling operation will continue until the SEM excavation work is complete thereby holding the start of station construction work until after tunneling is complete and holding the start of the 2nd/Broadway SEM cavern and cross passages. This will result in a total additional construction duration compared to the Baseline of approximately 15 months.

Figure 6-2: EPBM/Open Face Shield SEM LPA Profile Alternative Summary Schedule (Alternative A)

Alternate A analysis

ID	Task Name	Duration	Start	Finish
1	**Alternate A - Open Face shield / SEM tunneling**	**1867.22 days**	**Mon 11/3/14**	**Wed 12/29/21**
2	EPBM tunneling WB (76+45 - 19+00)	154 days	Mon 6/22/15	Thu 1/21/16
3	Remove EPBM, Sacrifice shield, and remob on R tunnel	30 days	Fri 1/22/16	Thu 3/3/16
4	Jet Grout Flower Street (19+00 - 6+46) - 50' wide	265 days	Mon 11/3/14	Fri 11/6/15
5	Install open face TBM	30 days	Fri 3/4/16	Thu 4/14/16
6	Excavate 646' of L tunnel at 10 fpd	65 days	Fri 4/15/16	Thu 7/14/16
7	Demob/remob EPBM	60 days	Fri 7/15/16	Thu 10/6/16
8	EPBM tunneling EB (76+45 - 19+00)	154 days	Fri 10/7/16	Wed 5/10/17
9	Demob TBM - sacrifice shield	20 days	Fri 7/15/16	Thu 8/11/16
10	Excavate 646' of R tunnel at 10 fpd	65 days	Fri 8/12/16	Thu 11/10/16
11	Remove TBM, Sacrifice shield	20 days	Fri 11/11/16	Thu 12/8/16
12	**SEM Tunnel from open face TBM tunnels to 7th and flower station**	**269.35 days**	**Fri 12/9/16**	**Thu 12/21/17**
13	**8' excavated section of cavern at 793 sf area**	**9.35 days**	**Fri 12/9/16**	**Thu 12/22/16**
22	SEM excavation and support for balance of tunnel @ 2.14 fpd	260 days	Thu 12/22/16	Thu 12/21/17
23	Cross Passages	112 days	Thu 12/21/17	Mon 5/28/18
24	Sequential Mining & Crossover Cavern [STA 53+76 to STA 57+30]	170.25 days	Thu 12/21/17	Thu 8/16/18
25	EPBM Sections Finishes	451.75 days	Thu 12/21/17	Mon 9/16/19
26	Station construction after EPBM tunneling completed	779 days	Mon 3/12/18	Fri 3/5/21
27	Systems Installation and testing	991.63 days	Mon 3/12/18	Wed 12/29/21
28	START REVENUE OPERATIONS - CONSTRUCTION END (Phas III)	0 days	Wed 12/29/21	Wed 12/29/21

6.5 EPBM/SEM Low Alignment Schedule (Alternative B)

The EPBM and SEM excavation approach proposes a deep alignment profile of the EPBM bored tunnels on the LPA horizontal alignment to a location south of 5th Street from which an SEM cavern will be constructed for the balance of the guideway to the 7th/Metro station. This approach minimizes cut-and-cover work on Flower Street but requires jet grouting operations to modify the ground for the SEM tunneling between 5th Street and the 7th/Metro station. See Figure 6-3 for the construction schedule.

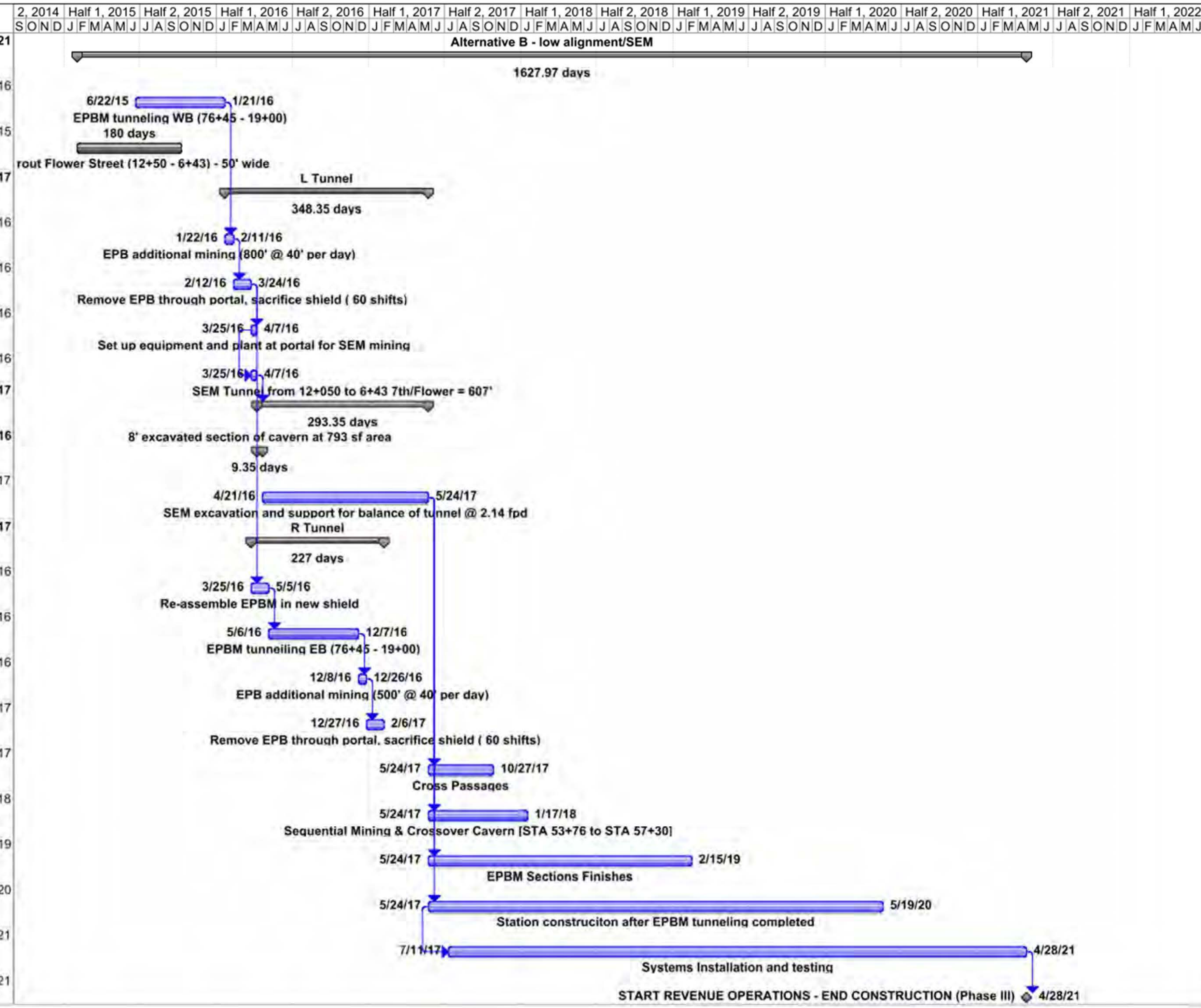
This approach extends the EPBM bored tunnels along Flower Street from 1,035 to 1,647 ft and constructs approximately 597 ft of SEM cavern from the end of the EPBM bored tunnels. The method requires removing the EPBM through the portal at Mangrove abandoning the shields in place. When the westbound EPBM tunnel is completed and the EPBM removed, the westbound tunnel will be used to support the excavation and support of the SEM cavern from south of 5th Street to the 7th/Metro station. The alignment allows for the construction of a track crossover, and would not preclude the construction of a future station at 5th and Flower Streets. See comment on constructing a future station in Section 5.3.

The SEM tunnel section requires extensive jet grouting to improve the ground conditions for tunneling between 5th Street and the 7th/Metro Station. The jet grouting can be performed concurrently with the EPBM tunneling and will have duration of approximately 8 to 16 months. Due to the requirement to remove spoils through the Mangrove portal, the tunneling operation will continue until the SEM excavation work is complete thereby holding the start of station construction work and holding the start of the 2nd/Broadway SEM cavern and all cross passages after tunneling is completed. This will require additional construction duration of approximately 7 months.

Figure 6-3: EPBM/SEM Low Alignment Summary Schedule (Alternative B)

Alternate B analysis

ID	Task Name	Duration	Start	Finish
1	**Alternative B - low alignment/SEM**	**1627.97 days**	**Mon 2/2/15**	**Wed 4/28/21**
2	EPBM tunneling WB (76+45 - 19+00)	154 days	Mon 6/22/15	Thu 1/21/16
3	Jet Grout Flower Street (12+50 - 6+43) - 50' wide	180 days	Mon 2/2/15	Fri 10/9/15
4	**L Tunnel**	**348.35 days**	**Fri 1/22/16**	**Wed 5/24/17**
5	EPB additional mining (800' @ 40' per day)	15 days	Fri 1/22/16	Thu 2/11/16
6	Remove EPB through portal, sacrifice shield (60 shifts)	30 days	Fri 2/12/16	Thu 3/24/16
7	Set up equipment and plant at portal for SEM mining	10 days	Fri 3/25/16	Thu 4/7/16
8	Reinstal removed utilities in tunnel	10 days	Fri 3/25/16	Thu 4/7/16
9	**SEM Tunnel from 12+050 to 6+43 7th/Flower = 607'**	**293.35 days**	**Fri 4/8/16**	**Wed 5/24/17**
10	**8' excavated section of cavern at 793 sf area**	**9.35 days**	**Fri 4/8/16**	**Thu 4/21/16**
19	SEM excavation and support for balance of tunnel @ 2.14 fpd	284 days	Thu 4/21/16	Wed 5/24/17
20	**R Tunnel**	**227 days**	**Fri 3/25/16**	**Mon 2/6/17**
21	Re-assemble EPBM in new shield	30 days	Fri 3/25/16	Thu 5/5/16
22	EPBM tunneiling EB (76+45 - 19+00)	154 days	Fri 5/6/16	Wed 12/7/16
23	EPB additional mining (500' @ 40' per day)	13 days	Thu 12/8/16	Mon 12/26/16
24	Remove EPB through portal, sacrifice shield (60 shifts)	30 days	Tue 12/27/16	Mon 2/6/17
25	Cross Passages	112 days	Wed 5/24/17	Fri 10/27/17
26	Sequential Mining & Crossover Cavern [STA 53+76 to STA 57+30]	170.25 days	Wed 5/24/17	Wed 1/17/18
27	EPBM Sections Finishes	451.75 days	Wed 5/24/17	Fri 2/15/19
28	Station construciton after EPBM tunneling completed	779 days	Wed 5/24/17	Tue 5/19/20
29	Systems Installation and testing	991.63 days	Tue 7/11/17	Wed 4/28/21
30	START REVENUE OPERATIONS - END CONSTRUCTION (Phase III)	0 days	Wed 4/28/21	Wed 4/28/21



6.6 Summary of Schedule Impacts

The delay in start of revenue operations including the delay necessary for SEIS/SEIR is summarized in Table 6-1.

Table 6-1 Summary of Construction Duration and Schedule Delay

	Duration of Construction (Months)	Extended Construction (Months)	SEIS Delay (Months)	Total Project Delay (Months)
Baseline	78	-	-	-
Alternative A	93	15	29	44
Alternative B	85	7	29	35

Both alternatives take longer to construct, 15 months for Alternative A, and 7 months for Alternative B. Both alternatives have the same 29 month delay for a change resulting from the SEIS/SEIR, design updates, and re-procurement. In round numbers the combined, total delay is 3 or more years until the public would have the benefit of the project.

7.0 COST ESTIMATE

Cost estimates for alternatives were prepared on the basis of conceptual designs. The cost estimates utilized values and comparable unit prices from the detailed engineer's cost estimate prepared for the Baseline design in August 2013. See Table 7-1 below. This table summarizes the base cost estimates for the Flower Street section only. The estimated costs are based on design and construction of each alternative starting in 2014 and allow for costs of additional construction duration, where applicable, but do not include additional costs to construct the project in later years if the schedule is delayed due to a supplemental environmental process.

Table 7-1: Base Cost Estimate for Flower Street Baseline and Alternatives Including Contingency ($M)

	Baseline	Alternative A	Alternative B
Base Year Dollars	$152	$250	$206
Year-Of-Expenditure (YOE) Dollars	$171	$294	$238

8.0 RISK IDENTIFICATION AND ASSESSMENT

8.1 Preface

This section describes the process used for identification and quantification of specific risks for the Flower Street tunneling alternatives. The objective is for the risk process to assist LACMTA in making an informed evaluation of the potential cost of each alternative.

In addition the intention is to provide the Board and the FTA with the confidence that LACMTA have made a significant effort in determining the potential cost for each alternative.

The structured process by which this study has been undertaken, with the involvement, consideration, and agreement, in the analysis and results of this study, by the study participants, provides the best current assessment of risk exposure for each alignment.

The risk assessment records and models the views of LACMTA and their consultant team during the study. The risk assessment addresses, at the point in time, issues that could arise on the alternatives given the experiences of LACMTA and their consultant team associated with the study.

The study is based on credible ranges of costs and possible schedule deviation.

8.2 Risk Assessment Methodology

At a Risk Assessment Workshop, held on June 19, 2012, a number of alternatives were analyzed for potential risks and a summary level risk register was developed which contained 13 specific risks to each alternative. Subsequent to this risk assessment, Alternatives A and B have been added to the study of Flower Street construction alternatives.

Similar to the risk analysis conducted in June 2012, Alternatives A and B were analyzed for potential risks and the risk register was further expanded to include a total of 17 risks pertaining to these alignment alternatives.

The identified specific risks for each alignment alternative, shown in Table 8-1 are itemized and include a description of the risk along with a discussion of the identified risks.

Table 8-1: Allocation of Risks per Alternative

ID	Description	Comments	Baseline	Alt A	Alt B
1	Additional CEQA challenges from stakeholders	The construction staging and TBM recovery pit will change from base configurations within the FEIS/FEIR and could lead to CEQA challenges from stakeholders		X	X
2	The FEIS/FEIR may have to be re-opened.	Additional spoils to Little Tokyo and environmental justice issues would also be a basis for re-opening the environmental document. (Alternatives A and B)		X	X
3	Tiebacks could be encountered during tunnel construction of Alternative B.	The tunnel depth in Alternative B from 4th street to 5th street is designed to avoid potential tiebacks in this section. However there is still a possibility that tiebacks could be encountered thus delaying tunnel work.			X
4	Increased number of tiebacks to be removed	Both Baseline and Alternative A have risk of encountering more tiebacks than anticipated. Alternative A tunnels through tiebacks., while Baseline is open excavation. Both situations could lead to construction delays.	X	X	
5	4th Street Bridge Settlement analysis still to be approved by City of Los Angeles. Additional requirements may be required.	The base alternative anticipates that the construction will only induce a 3/8" settlement to 4th Street Bridge piers which is within acceptable tolerance. The analysis is still to be approved and agreed with City of Los Angeles	X	X	X
6	4th Street Bridge retrofit requirement not fully understood	Baseline and all Alternatives anticipate that some retrofit to the 4th Street Bridge will be required and allowances are carried in each estimate. However exact requirement is unknown and allowances could increase with final designs.	X	X	X
7	Late approval of 4th Street Bridge retrofit designs by City of Los Angeles. Approval from City of LA for bridge retrofit designs	4th Street Bridge retrofit designs will require City of Los Angeles approval which could delay construction start date.	X	X	X

ID	Description	Comments	Baseline	Alt A	Alt B
8	Limited worksite and laydown area. Further analysis required to assess construction impacts	Both Alternatives A and B requires shaft constructions at Blue Line connection and the emergency exit shaft at 5th Street. This will increase construction interface with public and traffic.		X	X
9	Increased depth of 2nd and Hope Station.	Alternatives B will increase the overall depth of 2nd and Hope Station by 32 ft. The estimate has been increased to allow for the deeper excavation. And a soldier pile and timber lagging excavation support system is anticipated.			X
10	Depth of emergency exit shaft excavation increases overall construction risk	There is risk in support of excavation especially in deep sections.			X
11	Ground improvement (jet grouting)	Messy operation, utility impacts. Application from inside tunnel often difficult and time consuming.		X	X
12	SEM Construction on Flower Street	Gas, settlement, and tunnel instability leading to collapse		X	X
13	Using Open Face Shield	Gas, settlement, and tunnel face instability leading to collapse		X	
14	TBM goes through existing Pacific Electric (PE) tunnel, Alternative A.	The PE is an obstruction, which may have disturbed ground outside of the lining. The PE is also a void, through which the TBM has to pass through. There is a risk of excessive surface settlement associated with tunneling in this complicated situation.		X	
15	Operational requirements	Increase operational time, vehicle maintenance (need larger queuing area), fire life safety (emergency exits from station)		X	X
16	Impact to revenue service date	Longer construction duration.		X	X
17	Unacceptable excessive settlement possibly leading to collapse	Uncertain ground conditions with respect to alluvium-Fernando interface.		X	X

8.3 Cost Risk Analysis

In order to determine the potential cost range of each Flower Street alternative, a cost risk model was developed by the LACMTA Risk Manager.

8.3.1 Calculation of Capital Cost Estimate Allocated and Unallocated Contingency Ranges

For each alignment alternative, the cost model applies variance against a minimum and maximum percentage value, of the allocated contingency, for the Flower Street segment of the alternative only.

8.3.2 Delay/Consequential Cost Analysis

For each alignment alternative it is anticipated that the project would be required to execute a further SEIS process with subsequent re-design and procurement activities which could delay a construction contract NTP by 29 months, which was carried in this analysis as an approximate 3-year delay, for Alternatives A and B. The delay will result in an additional cost for environmental, engineering and agency support activities. This cost has been added as an additional cost within the model.

A delay of 3 years for construction NTP will incur an additional cost escalation factor as project construction will be moved out by an additional 3 years. For each alignment alternative the 3 years of additional escalation has been calculated into the cost risk model at a compounding factor of 3.5% per annum.

Per Section 6, Alternatives A and B would take longer than the current estimated duration of the Flower Street section with subsequent delay to the overall project completion. This anticipated additional duration has been factored into the base cost estimate for each alternative.

8.3.3 Comparison of Total Project Estimate for Each Alternative

Table 8-2 summarizes the results of the cost adjustments and risk analysis for the Flower Street tunneling alternatives, as set out above.

Table 8-2: Summary Risk Analysis Results ($M)

	Base Cost YOE Estimate with Contingency	Min Expected Cost	Max Expected Cost
Alternative A	$294	$509	$575
Alternative B	$238	$447	$503

APPENDIX B

REGULATORY FRAMEWORK

1.1 Transportation Regulatory Framework

The "Regulatory Framework" in the 2010 Regional Connector Final EIS/EIR has remained unchanged and is hereby incorporated by reference. The 2010 Final EIS/EIR addressed the federal, state, regional, and local regulations, laws, policies, ordinances, and guidelines listed below.

Federal and State

- National Environmental Protection Agency (NEPA)
- California Environmental Quality Act (CEQA)

Regional and Local

- Los Angeles County Department of Transportation (LADOT)
- City of Los Angeles General Plan Circulation Element

The determination of whether a project may have a significant effect on the environment calls for careful judgement on the part of the public agency involved, based to the extent possible on scientific and factual data. There are few quantitative standards of significance related to transportation effects. The measurement and prediction of level of service (LOS) at potentially affected intersections is a standard that is used to evaluate the significance of potential traffic impacts. Predicted changes in level of service provide indications of how well road-based movements may function under the different alternatives, which may have implications for vehicular traffic, and certain types of transit and non-motorized transportation.

To represent the affected environment from a traffic operations perspective, only locations affected by the changes to the project description (extension of tunneling activities further south on Flower Street and the increase of muck truck activity to the Little Tokyo area) were analyzed. Updated 2014 traffic counts at key locations on Flower Street and within Little Tokyo were obtained from the LADOT. Additional count data was referenced from nearby projects and applicable growth rates were utilized where necessary.

1.1.1 Transit

Existing transit services within the project area that parallel the Regional Connector alignment were identified and tabulated to show destinations, existing headways, service characteristics, and operating time periods. No NEPA, or local thresholds are available for determining the significance of impacts to transit service. Changes to the transit network are described for each alternative in Section 3.3. This section analyzes transit impacts and benefits for each project refinement alternative by examining changes in transit performance. Transit performance includes travel speeds and times, transit service reliability, transit ridership, and passenger comfort and convenience. Evaluation criteria included:

- Transit travel times,
- Speed and reliability,
- Transit ridership, and
- Passenger comfort and convenience.

1.1.2 Traffic Circulation

Significant impacts generated by the project refinement alternatives were identified by comparing the LOS results to the Project. The reason for this is to determine the potential increase or decrease in significant impacts of the proposed alternatives compared to those already identified as part of the Project.

For purposes of this analysis, a focused study area was defined to be the locations where the changes to the project description could potentially affect LOS. Per the LADOT *Traffic Study Policies and Procedures* (June 2013), volume-to-capacity (v/c ratios) are used to analyze traffic operation conditions at study roadway segments.

Updated count data (counts taken in 2013 and 2014) for roadway segments within the Flower Street and Little Tokyo study areas were provided by LADOT in the form of daily traffic volumes (no intersection turning movements were provided). The roadway segment analysis was performed using these counts compared to the roadway capacity derived from the City's General Plan designations. Due to the nature of construction the proposed project (reduced lane capacity on Flower Street and increased truck traffic in Little Tokyo), only roadway segment impacts were considered. In the event that roadway segment impacts are identified, the intersections along the impacted segments would also be considered impacted.

Traffic circulation impacts at study roadway segments were evaluated based on the project-related increase in v/c ratio beyond the Project. Table 1-1 presents the applicable thresholds for this evaluation. For example, an alternative would have a significant impact at a roadway segment with existing LOS C if it increases the v/c ratio by 0.020. If a roadway segment continues to operate at LOS A or B during construction or after implementation of an alternative, the alternative is considered to have no substantial adverse impact on that facility.

More information regarding the methodology used for traffic circulation impact evaluation is available in Appendix L, Transportation Technical Memorandum of the Final EIS/EIR.

Table 1-1: Roadway Significance Thresholds

Final LOS with Project	Roadway Thresholds Change in v/c from LPA	Intersection Thresholds Change in Delay (in seconds) from LPA
LOS A	-----	-----
LOS B	-----	-----
LOS C	equal to or greater than 0.040	6.0
LOS D	equal to or greater than 0.020	4.0
LOS E	equal to or greater than 0.010	2.5

LOS F	equal to or greater than 0.010	2.5

Source: Los Angeles Department of Transportation, June 2013

1.1.3 Parking

An on-street parking evaluation was conducted to assess the number of spaces that may be removed due to each of the project refinement alternatives, compared to the Project. The analysis included a field inventory of the number of available on-street parking and loading spaces and identification of peak period parking restrictions, if applicable. No NEPA or local thresholds are available to guide the determination of the significance of impacts to parking. Reductions in parking are described for each alternative in Section 3.3. Evaluation of potential parking impacts included consideration of:

- The availability of parking within one-half mile walking distance; and
- The availability of loading zones in relation to the location of commercial enterprises.

Refer to Section 4.2, Displacement and Relocation in the Final EIS/EIR, for analysis of off-street parking impacts.

1.1.4 Other Modes

Bicycle and pedestrian circulation was evaluated as part of this transportation analysis. No NEPA or local thresholds are available to guide the determination of significance of impacts to bicycle and pedestrian circulations. Changes to the bicycle and pedestrian network are described for each alternative in Section 3.3. Evaluation of potential impacts to bicycle and pedestrian circulation included consideration of:

- Detours that might lengthen bicycle commutes or pedestrian routes (which would increase travel time); and
- Safety of alternate routes.

1.2 Visual Quality Regulatory Framework

Guidance for assessing potential visual impacts of the tunneling alternatives is identified in the National Historic Preservation Act (NHPA), and was used to evaluate potential visual and aesthetic effects under NEPA and findings for the Project are from the Final EIS/EIR. Multiple federal agencies have developed analytical frameworks for visual resource management, including:

- United States Department of Agriculture (USDA), Forest Service (USFS 1974, 1995)
- United States Department of Interior (USDOI), Bureau of Land Management (BLM 1978)
- United States Department of Transportation (USDOT), Federal Highway Administration (FHWA 1981)

The methodology and assumptions used to assess visual and aesthetic impacts of these alternatives build on the guidance developed by these federal agencies, as described in the Final EIS/EIR.

Analyzing potential visual impacts includes evaluating the following effects of implementing an infrastructure project:

- Conflicts with or compliments the existing visual character
- Changes in visual quality
- Intrudes on or blocks sensitive views (emphasizes views protected by local jurisdictions)
- Creation of shadows
- Creation of new light or glare sources

1.2.1 Thresholds of Significance

This analysis examines whether the alternatives under evaluation have the potential to cause significant visual impacts. Though NEPA offers no definition for "significance," the CEQA Guidelines define a significant impact as "... a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project, including ... objects of ... aesthetic significance." The methodology applied to this assessment expands upon the CEQA definition and draws from methodology recommendations included in the Los Angeles CEQA Thresholds Guide, as followed in the Final EIS/EIR.

As outlined in Appendix G of the CEQA Guidelines, determination of a significant impact to visual and aesthetic resources is based on the following thresholds:

- Would the project have a substantial, adverse effect on a scenic vista?
- Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within [view from] a state scenic highway?
- Would the project substantially degrade the existing visual character or quality of a site and its surroundings?
- Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?

The City of Los Angeles CEQA Thresholds Guide includes the following criteria for identifying and evaluating potentially significant visual resources impacts from proposed actions occurring within the City:

- Would project-related structures result in the shading of shadow-sensitive uses for more than three hours between the hours of 9:00 a.m. and 3:00 p.m. Pacific Standard Time (between late October and early April), or for more than four hours between the hours of 9:00 a.m. and 5:00 p.m. Pacific Standard Time (between early April and late October)?

Additional background information regarding visual resource evaluation methodology is available in Visual and Aesthetic Impacts Technical Memorandum (Appendix P) of the Final EIS/EIR.

1.3 Air Quality Regulatory Framework

The Regulatory Framework in the 2010 Regional Connector Final EIS/EIR has remained unchanged and is hereby incorporated by reference. The Final EIS/EIR addressed the federal and state regulations listed below:

- Clean Air Act
    - Clean Air Act 40 CFR 93, Subpart A Transportation Conformity Regulations
- California Clean Air Act

The Final EIS/EIR addressed the local plans and regulations listed below:

- Southern California Association of Governments (SCAG) Regional Transportation Plan;
- SCAG Regional Transportation Improvement Program; and
- South Coast Air Quality Management District (SCAQMD) Air Quality Management Plans

1.3.1. Standards of Significance

National ambient air quality standards (NAAQS) are used to determine air quality impacts under NEPA. The most recent CEQA thresholds of significance published by the SCAQMD were released in 2011. These thresholds supersede the City of Los Angeles thresholds; therefore, this analysis uses the most recent significance thresholds from the SCAQMD to determine construction air quality impacts under CEQA. CEQA thresholds of significance are also used to analyze NEPA compliance because NEPA does not contain thresholds specific to construction. Since CEQA has stricter requirements than NEPA, this is a conservative assumption. The SCAQMD construction significance thresholds include daily emission thresholds for regional air quality impacts, as listed in Table 1.3-1. These thresholds apply to total daily emissions from both on-site sources, such as construction equipment exhaust, and off-site sources, such as haul truck and worker commuting vehicle exhaust.

Table 1.3-1: SCAQMD CEQA Construction Daily Emission Thresholds

Pollutant	Daily Emission Threshold (pounds/day)
VOC	75
NOx	100
CO	550
SO2	150
PM10	150
PM2.5	55

The SCAQMD has also developed significance thresholds for local air quality impacts. Localized significance thresholds (LSTs) are applicable to the following criteria pollutants: NOx, CO, PM10 and PM2.5. LSTs are analogous to NAAQS and CAAQS (pollutant levels below LSTs necessarily do not violate NAAQS and CAAQs). The SCAQMD has used dispersion modeling to develop LST emission look-up tables. The emission values in the tables depend on the size of the construction or operation area, the distance to the nearest receptor and the geographic source-receptor area. If the maximum daily on-site emissions are less than the emissions in the look-up tables, the emissions would not cause the LST to be exceeded.

1.4 Climate Change Regulatory Framework

The Regulatory Framework in the Final EIS/EIR hereby incorporated by reference. The 2010 Final EIS/EIR addressed the federal, state, and local regulations and policies listed below:

- Massachusetts et al. v. Environmental Protection Agency et al.
- Mandatory GHG Reporting Rule (U.S. Environmental Protection Agency (USEPA))
- Endangerment Finding (USEPA)
- American Clean Energy and Security Act of 2009
- Clean Energy Jobs and American Power Act
- California Assembly Bill 1493
- California Executive Order S-3-05
- Global Warming Solutions Act of 2006 (Assembly Bill 32)
- Senate Bill 97
- California Air Resources Board (CARB) Interim Significance Thresholds
- Senate Bill 375
- SCAQMD Guidelines and Regulations

Additional local plans related to climate change and GHG emission reductions recently adopted are described below:

- Los Angeles County Metropolitan Transportation Authority's Climate Action and Adaptation Plan, finalized in June 2012, identifies the regional GHG emissions inventory along with goals for future GHG emission reductions due to operation of Metro facilities.
- Los Angeles County Metropolitan Transportation Authority's Countywide Sustainability Planning Policy and Implementation Plan, adopted in December 2012, establishes goals for sustainable transportation solutions including provisions for clean-fueled, efficient, long-term transportation systems while minimizing material and resource use through conservation, re-use, recycling and re-purposing.

Metro Polices/City of LA Policies

The Council on Environmental Quality (CEQ) dictates requirements for reporting environmental consequences under the National Environmental Policy Act (NEPA). While there are no specific NEPA criteria for analyzing climate change impacts, the CEQ developed draft guidance that directs environmental impact statements (EISs) to consider "the GHG emissions effects of a proposed action and alternative actions" and "the relationship of climate change effects to a proposed action or alternative, including the relationship to proposal design, environmental impacts, mitigation and adaptation measures." In addition, the South Coast Air Quality Management District (SCAQMD) developed *Interim GHG Significance Threshold Staff Proposal* (SCAQMD 2008) which states that an evaluation of project-level GHG emissions should be conducted and include direct, indirect, and, if possible, life-cycle emissions during construction and operation. The SCAQMD's recommendations regarding the quantification of emissions were followed for this project; however, the SCAQMD interim thresholds are largely geared towards industrial, residential, and commercial projects, and do not specifically address transportation projects. Therefore, to establish additional context for considering the magnitude of a project alternative's construction-related GHG emissions, this analysis considers the following guidelines for identifying the levels of GHG emissions that would constitute a cumulatively considerable incremental contribution to the impact on climate change:

- Any residential, commercial, or industrial project that would generate more than 900 MT CO_2e per year would make a cumulatively considerable incremental contribution to climate change.
- Facilities (i.e., stationary, continuous sources of GHG emissions) that generate more than 25,000 MT CO_2e per year must report their GHG emissions to ARB, pursuant to AB 32.

The following additional significance criteria are based on Appendix G of the state CEQA Guidelines. The proposed project alternatives would result in a significant climate change and GHG emissions impact if they would:

- Result in an increase or reduce GHG emissions as compared to the existing environmental setting;
- Result in project emissions in excess of a threshold of significance that the lead agency determines applies to the project; or
- Result in non-conformance with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions. Such requirements must be adopted by the relevant public agency through a public review process and must reduce or mitigate the project's incremental contribution of GHG emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.

In order to evaluate the affected environment from a climate change perspective, GHG emissions from construction activities associated with the changes to the project description (extension of tunneling activities further south on Flower Street and the increase of muck truck activity to the Little Tokyo area) were analyzed.

1.5 Noise and Vibration Regulatory Framework

The Federal Noise Control Act of 1972 (Public Law 92-574) requires that all federal agencies administer their programs in a manner that promotes an environment free from noises that could jeopardize public health or welfare. The operational impacts were evaluated using the guidelines set forth by the FTA's guidance manual on *Transit Noise and Vibration Assessment* (May 2006).

1.5.1 Construction Noise and Vibration Criteria

FTA guidelines address the potential for noise and vibration impacts during construction. In the absence of local criteria, construction noise may be evaluated using the FTA criteria summarized in Table 1.5-1. Similarly, the FTA guidelines also address the potential for construction-activity-induced vibration to damage buildings. The potential for ground-borne vibration to cause damage to a building varies by the type of materials and structural techniques used to construct each building. FTA vibration damage criteria for various structural categories are shown in Table 1.5-2. The same criteria shown in Table 1.5-2 are also used to assess human annoyance and interference.

Table 1.5-1: FTA Construction Airborne-Noise Criteria

	General Assessment		Detailed Assessment		
	1-hour Leq (dBA)		8-hour Leq (dBA)		Ldn (dBA)
Land Use	Day	Night	Day	Night	30-day Avg.
Residential	90	80	80	70	75[a]
Commercial	100	100	85	85	80[b]
Industrial	100	100	90	90	85[b]

a - In urban areas with very high ambient noise levels (Ldn > 65 dB), Ldn from construction operations should not exceed existing ambient + 10 dB.
b - Twenty-four-hour Leq, not Ldn.

Table 1.5-2: FTA Construction Vibration Damage Criteria

Building Category	PPV (in/sec)	RMS (in VdB)[1]
I. Reinforced-concrete, steel or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

1 RMS velocity in decibels (VdB) re 1 micro-inch/second

1.6 Geotechnical Regulatory Framework

Currently there are no federal regulations regarding geology, soils and seismicity issues. The International Building Code is modified by the State of California and incorporated into the California Building Code, which by state law must be used as minimum level of effort for designing structures in California. The design standards of these codes are also incorporated into Metro's design guidelines and safety standards. There are several hazardous materials regulatory agencies and policies in place that would apply to the monitoring and compliance of the Project and refinement alternatives including:

- United States Environmental Protection Agency (USEPA)
- Resources Conservation and Recovery Act (RCRA)
- Comprehensive Environmental Response, Compensation, and Liability Act (CERLA)
- Superfund Amendments and Reauthorization Act (SARA)
- Toxic Substances Control Act (TSCA)
- Federal Occupational Safety and Health Act (OSHA)

Detailed information on each can be found in Section 3.1.1 in the Final EIS/EIR. There have been no new regulatory updates from publication of the Final EIS/EIR to the evaluation of the two tunneling method alternatives that would apply.

The National Environmental Policy Act (NEPA) does not have specific requirements related to geologic hazards or soils. NEPA requires an evaluation of potential impacts related to hazardous materials, which may be categorized in two different ways. First, there is potential for hazardous materials associated with previous land use to pose an impact for the proposed project. Second, there is potential for the proposed project to generate hazardous material impacts to the surrounding human and natural environments. Impacts associated with hazardous materials may occur during construction or operation of the project.

1.6.1 Evaluation Methodology

In general, impacts related to hazardous materials associated with current or previous land use are most relevant to the project alternatives that entail property acquisition and/or construction and thus have the potential to encounter hazardous materials, including contaminated soil and/or groundwater that may exist in the area of potential impact. Generally, conditions along the Flower Street portion of the two tunneling method alternatives, compared to the Project, have remained unchanged. A reconnaissance of the regulatory database, field observations, historical information, and supplemental materials described in the Final EIS/EIR was completed. In addition, the Hazardous Materials Investigation and Analysis report (CDM 2009) identified sites along Flower Street and surrounding properties and provided a determination regarding level of concern associated with environmental contaminants and/or naturally occurring hazardous substances. The Hazardous Materials Investigation and Analysis report, and the Tunnel Feasibility Report form the basis of the evaluation of the two tunneling method alternatives and the potential for new impacts associated with any of these alternatives.

1.7 Energy Resources Regulatory Framework

The Regulatory Framework in the Final EIS/EIR has remained unchanged and is hereby incorporated by reference (Final EIS/EIR, pages 4-223 to 4-224). The 2010 Final EIS/FEIR addressed the federal, state, and local regulations and policies listed below:

- The Energy Policy and Conservation Act of 1975
- The Alternative Fuels Act of 1988
- Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)
- Senate Bill 1389
- Executive Order S-3-05
- Metro’s Energy and Sustainability Policy

The Council on Environmental Quality (CEQ) dictates requirements for reporting environmental consequences under the National Environmental Policy Act (NEPA). While there are no specific NEPA criteria for analyzing impacts to energy resources, 40 CFR § 1502.16(e) directs that environmental impact statements (EISs) include a discussion of the “energy requirements and conservation potential of various alternatives,” “natural or depletable resource requirements and conservation potential of various alternatives,” and potential mitigation measures. In addition, the following significance criteria are based on Appendix G of the state CEQA Guidelines and the Los Angeles CEQA Thresholds Guide (2006). The tunneling alternatives would result in a significant impact to energy resources if they would:

- Require new (off-site) energy supply facilities and distribution infrastructure or capacity enhancing alterations to existing facilities
- Conflict with adopted energy conservation plans
- Use nonrenewable resources in a wasteful and inefficient manner
- Result in a need for new systems or substantial alterations to power or natural gas

In order to evaluate the affected environment from an energy resource perspective, energy usage from construction activities associated with the changes to the project description (extension of tunneling activities further south on Flower Street and the increase of muck truck activity to the Little Tokyo area) were analyzed.

1.8 Historic Resources Regulatory Framework

This SEIS specifically addresses requirements for environmental review under NEPA and NHPA. NEPA guidelines include compliance with related federal laws that require identification of historic properties and consideration of project-related effects on those properties. Section 106 of NHPA and NEPA procedures, particularly through involvement of Native American and other public constituents in the identification, evaluation, and mitigation processes, might address impact resolution required under other federal laws.

For historic resources, including built environment and archaeological resources, the most relevant laws, regulations, and standards include:

- National Environmental Policy Act of 1969 (NEPA)
- National Historic Preservation Act of 1966 (NHPA)
- FTA Transit Vibration and Noise Standards

1.8.1 NEPA and NHPA

Federal agencies must consider the effects of proposed projects on historic properties. Lead agencies evaluate potential impacts under NEPA and potential effects under NHPA to "historic properties" that are defined as resources that are listed in or eligible for listing in the National Register of Historic Places (NRHP) in an effort to avoid potential significant impacts and adverse effects. Resources that may be eligible for listing in the NRHP include districts, sites, buildings, structures, and objects that are at least 50 years old and are significant in American history, prehistory, architecture, archaeology, engineering, and culture. To be eligible for listing, the resource must meet one of the NRHP Criteria for Evaluation (36 CFR 60.4):

- Criterion A: A property is associated with events that have made a significant contribution to the broad patterns of our history; or
- Criterion B: A property is associated with the lives of a person or persons significant in our past; or
- Criterion C: A property embodies the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possesses high artistic values, or that represents a significant and distinguishable entity whose components may lack individual distinction; or
- Criterion D: A property has yielded, or may be likely to yield, information important in prehistory or history.

In addition, resources must possess integrity of location, design, setting, material, workmanship, feeling and association. Resources less than 50 years old may be eligible if they have exceptional importance and meet Criteria Consideration G, as described in the NPS's Bulletin No. 22, "How to Evaluate and Nominate Potential National Register Properties That Have Achieved Significance Within the Last 50 Years." Other types of resources that are typically not eligible for the NRHP, including religious properties, moved properties, birthplaces or graves, cemeteries, reconstructed properties, and commemorative properties may be eligible under other specific NRHP criteria considerations.

NEPA requires that environmental impacts to historic properties be evaluated and addressed during the EIS process, in coordination with procedures established by Section 106 of NHPA to address effects on historic properties. A significant impact and/or an adverse effect would occur if the project would directly or indirectly diminish any of the characteristics that qualify a historic property for NRHP eligibility or listing. Under NEPA, a significant impact may be resolved with mitigation measures to avoid the impact or to reduce the impact to a level of less-than-adverse. Under Section 106 of NHPA, adverse effects must be resolved through a consultation process between the federal lead agency, SHPO, interested parties, and the Advisory Council on Historic Preservation (ACHP). If an adverse effect cannot be avoided, mitigation may be agreed upon and documented in a signed MOA to resolve the adverse effect. If mitigation is not agreed upon through the Section 106 process, consultation is terminated and the ACHP may make comments on the procedure.

As part of the original EIS/EIR study for the Project and the tunneling method alternatives, historic properties located in the APE were identified, evaluated for NRHP eligibility, and assessed for effects under Section 106 of NHPA and the Criteria of Adverse Effects as contained in 36 CFR Part 800.5 (a)(1). On June 1, 2010, SHPO concurred with the determinations of eligibility and finding of effects by the FTA. An MOA was prepared and signed in September 2011 to address adverse effects. Section 106 consultation is an on-going process, and project changes may require further consultation and potential amendments to the existing signed MOA.

1.8.2 FTA Transit Noise and Vibration Impact Assessment

FTA's *Transit Noise and Vibration Impact Assessment Manual* (FTA-VA-90-1003-06) (Hanson 2006) provides standards by which it can be determined whether noise and ground-borne vibration (GBV) will cause damage to adjacent buildings and structures. Noise generated by construction equipment can cause adverse effects to historic properties and significant impacts to historical resources when exposure exceeds the "severe level" as established by FTA (Hanson 2006). Noise that reaches a severe level that cannot be reduced through mitigation or other measures may cause a reduction in use or access to historic properties or historical resources, and thus cause an adverse effect to historic properties or a significant impact to historical resources. For properties or resources where the sense of quiet represents a characteristic of its historical significance, increases in noise may also cause adverse effects and/or significant impacts. GBV generated by construction equipment can also cause adverse effects to historic properties and significant impacts to historical resources that are close to construction activities. Construction-related vibration can cause damage ranging from minor cosmetic damage to interior plaster or woodwork damage to major structural damage. Thus, GBV can harm the characteristics that make historic properties eligible for the NRHP and historical resources eligible for the CRHR.

GBV is established by measuring the vibratory potential of construction equipment, the distance between the equipment and a sensitive receptor (i.e., historical resource or historic property), and the structural category of the historic property and/or historical resource. When assessing the potential for building damage, GBV is usually expressed in terms of the peak particle velocity (PPV) in units of inches per second. FTA vibration damage criteria for various structural categories are listed in Table 1.8-1. The FTA threshold for Category IV buildings (i.e., buildings that are extremely susceptible to vibration damage) of 0.12 inches per second PPV.

Table 1.8-1: FTA Construction Vibration Damage Criteria

Building Category and Description	PPV (in/sec)
I. Reinforced-concrete, steel, or timber (no plaster)	0.5
II. Engineered concrete and masonry (no plaster)	0.3
III. Non-engineered timber and masonry buildings	0.2
IV. Buildings extremely susceptible to vibration damage	0.12

Source: U.S. Federal Transit Administration's Transit Noise and Vibration Impact Assessment Manual, May 2006. FTA-VA-90-1003-06. Table 12-3.

FTA guidelines address the potential for construction-activity-induced vibration to damage buildings. Project construction activities that have the potential for construction-related noise and vibration impacts include cut-and-cover construction, SEM construction, and TBM tunneling. Equipment, such as large bulldozers and drill rigs, would be the main source of construction vibration that could have the potential to cause vibration damage. Based on the FTA's minimum safe distances identified for Category IV buildings of 0.12 inches per second PPV, the minimum safe distance between construction activities (involving large bulldozers and drill rigs) and buildings would be 21 feet. As a result, historic buildings within 21 feet of construction may be susceptible to vibration damage, and were identified in the MOA and MMRP.

1.9 Environmental Justice Regulatory Framework and Methodology

Executive Order (EO) 12898, **Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,** signed by President Clinton on April 11, 1994 directs federal agencies to take appropriate and necessary steps to identify and address disproportionately high and adverse environmental effects of federal agency actions (including transportation projects) on minority and low-income populations. Following is a summary of other guidance and procedures that are used in the environmental justice analysis:

- **Environmental Justice Guidance under the National Environmental Policy Act (CEQ 1997):** Established guidance to assist federal agencies in effectively integrating the issue of environmental justice into their project development procedures.
- **United States Department of Transportation (USDOT) Updated Final Order on Environmental Justice, 5610.2(a) (USDOT 2012):** Provides detailed procedures for identifying environmental justice populations and for determining disproportionately high and adverse effects to the targeted populations.
- **FTA Circular 4703.1 Environmental Justice Policy Guidance for Federal Transit Administration Recipients (FTA 2012):** Provides guidance for incorporating environmental justice principles into plans, projects, and activities receiving funding from FTA.

The strategies developed under **FTA Circular 4703.1** are intended to ensure that communities are offered the opportunity to provide input on the planning and design of a federal action, as well as effects and mitigation measures, and disproportionately high and adverse effects on minority or low-income populations are appropriately addressed. The general methodology for addressing EO 12898 involves identifying the environmental justice populations within the study area and assessing whether the Project would result in disproportionately high and adverse effects on environmental justice populations, taking into consideration mitigation and enhancement measures and Project benefits, as appropriate. As part of the project, future public outreach efforts could include involvement of environmental justice groups when the outreach efforts are initiated given potential impacts to the Little Tokyo area.

The study area for the environmental justice analysis includes the Census block groups that fall within 1/4-mile of a proposed alignment. The assessment of the potential for disproportionate high and adverse effects is based upon the environmental impact information developed for the overall Project. Using the results of the technical studies conducted for the Project, the physical locations of adverse impacts were identified, and a map analysis was conducted to determine whether patterns or concentrations of adverse effects occurred in areas with environmental justice populations.
The data sources used in this SEIS analysis for the identification of minority, low-income, and LEP populations was the American Community Survey (ACS) 5-year average data for 2008-2012.

1.9.1 Identifying Low-Income and Minority Populations

The USDOT Order on Environmental Justice (5610.2a) and FTA Circular 4703.1 provide definitions of minority and low-income populations. These populations are as follows:

- **Minority Populations:** Any readily identifiable groups of minority persons who live in geographic proximity, and if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who would be similarly affected by a proposed FTA program, policy, or activity. Minority includes persons who are American Indian or Alaskan Native, Asian American, Native Hawaiian or Other Pacific Islander, Black (not of Hispanic Origin), and Hispanic or Latino.
- **Low-Income Population:** Any readily identifiable group of low-income persons whose household income is at or below the US Department of Health and Human Services (DHHS) poverty guidelines, and if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who would be similarly affected by a proposed USDOT program, policy, or activity. As established by the DHHS, the poverty guidelines in 2012 are shown in Table 1.9-1 (Health and Human Services Poverty Guidelines, 2012).

Table 1.9-1: Health and Human Services Poverty Guidelines, 2012

Persons in Family	Annual Median Household Income Poverty Levels in 48 Contiguous States and Washington, D.C.
1	$11,170
2	$15,130
3	$19,090
4	$23,050
5	$27,010
6	$30,970
7	$34,930
8	$38,890
For each additional person, add	$3,960

SOURCE: *Federal Register*, Vol. 77, No. 17, January 26, 2012, pp. 4034-4035.

When identifying environmental justice communities of concern, FTA calls for the analyses to include "reasonable efforts to identify the presence of distinct minority and/or low-income communities residing both within, and in close proximity to, the proposed project, or activity." The first step in the process relied on the use of thresholds based on CEQ guidance provided in *Environmental Justice Guidance under NEPA* (CEQ 1997). An environmental justice community was defined to include any Census block group in which the minority or low-income population meets either of the following thresholds:

a) Minority population or low-income households in the Census block group exceeds 50 percent;

b) Percentage of a minority population in the affected area is meaningfully greater than the lowest percentage in either the county or study area; and

c) Percentage of low-income households in the affected area is meaningfully greater than the lowest percentage in either the county or the study area. For low-income populations, FTA encourages the use of a locally developed threshold, such as that used for FTA's grant program (Public Law 112-141), or a percentage of median income for the area, provided that the threshold is at least as inclusive as the DHHS poverty guidelines.

The CEQ guidance does not define the specific percentage that should be used for determining if the minority or low-income household is "meaningfully greater" than the average in the surrounding jurisdiction. However, it is consistent with the CEQ guidance to set a threshold that is higher than (not the same as) the average of the low-income or minority population in the surrounding jurisdictions. For this Project, it was determined that the minority or low-income population is "meaningfully greater" than the average in the surrounding jurisdictions if it is higher than the average for the Los Angeles County.

Minority population and low-income household data from the U.S. Census Bureau were compiled at the state, county, and study area levels to provide a basis for identifying areas with high levels of environmental justice populations. Geographic Information System (GIS) maps were developed to illustrate the minority and income characteristics of the population in the study area.

Evaluating Potential Effects on Minority and Low-Income Populations

Disproportionately High and Adverse Effect on Minority and Low-income Populations means an adverse effect that:

- Is predominantly borne by a minority population and/or a low-income population; or
- Will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population.

Determinations of whether a project would have disproportionately high and adverse effects must take into consideration "mitigation and enhancements measures that will be taken and all offsetting benefits to the affected minority and low-income populations…" (USDOT Order, Section 8.b). The FTA Circular explains how benefits are considered in making this determination:

> *"…your analysis also should include consideration of offsetting benefits to the affected minority and low-income populations. This is particularly important for public transit projects because they often involve both adverse effects (such as short-term construction impacts, increases in bus traffic, etc.) and positive benefits (such as increased transportation options, improved connectivity, or overall improvement in air quality). The NEPA environmental justice analysis will include a review of the totality of the circumstances before determining whether there will be disproportionately high and adverse effects on environmental justice populations."* (See FTA Circular 4703.1, p. 46.)

The potential environmental impacts related to operations would remain the same as was determined in the Final EIS/EIR for the Project. As such, analysis of potential environmental justice-related impacts focused on the potential construction impacts of each alternative. Section 2 describes the alternatives that are evaluated in this document.

1.10 NEPA Guidance

An analysis of cumulative impacts is required by NEPA, as defined in 40 CFR 1508.7. The NEPA analysis of cumulative impacts follows the guidance of the Council on Environmental Quality (CEQ) 1997 document, Considering Cumulative Effects under the National Environmental Policy Act. In accordance with this guidance, the significance of impacts is evaluated based on context and intensity. Considerations of context and intensity also include a discussion of the severity of the impacts and the likelihood of their occurrence. The standards of significance for cumulative impacts depend on "the type of resource being analyzed, the condition of the resource, and the importance of the resource as an issue (as identified through scoping)" (CEQ 1997, p.45). Therefore, the standards of significance used for cumulative impacts are discipline-specific and may follow the same standards of significance established for the direct and indirect impacts of the project on each resource area. For some resources, limited details about other projects may prevent analysis from reaching the level of precision implied in the standards of significance for the direct and indirect impacts.

APPENDIX C

AIR QUALITY

Metro's Regional Connector Transit Corridor Supplemental Environmental Impact Study - Air Quality Appendix

Prepared June 2014

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Table 1-2	Summary of Annual Construction Emissions - Locally Preferred Alternative
[redacted]	[redacted]
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[redacted]	[redacted]
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[redacted]	[redacted]
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Table 1-1: Summary of Maximum Daily Emissions

Alternative	Daily Emissions (lbs/day)					
	VOC	NOx	CO	SO2	PM10	PM2.5
Locally Preferred Alternative	32	124	257	1	6	3
[redacted]						
Alternative A	47	316	375	2	11	1
Alternative B	38	195	266	1	7	5
Threshold of Significance	75	100	550	150	150	55

Note:
If threshold exceeded, then cell highlighted red.

Table 1-2: Summary of Annual Construction Emissions - Locally Preferred Alternative

Locally Preferred Alternative/Baseline

YEAR	2014												2015											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	ROG Emissions (lbs/day)												ROG Emissions (lbs/day)											
Construction Equipment Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.54	9.54	9.54	9.54	12.77	12.77	12.77	12.77	24.91	24.91	24.91	24.91	24.91	24.91	24.91	24.91
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*9.54*	*9.54*	*9.54*	*9.54*	*12.77*	*12.77*	*12.77*	*12.77*	*24.91*	*24.91*	*24.91*	*24.91*	*24.91*	*24.91*	*24.91*	*24.91*
Construction Worker Commuting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.12	0.12	0.12	0.10	0.10	0.10	0.10	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Haul Truck Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	0.71	0.71	0.71	0.63	0.63	0.63	0.63	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27
Offsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.83*	*0.83*	*0.83*	*0.83*	*0.73*	*0.73*	*0.73*	*0.73*	*1.43*	*1.43*	*1.43*	*1.43*	*1.43*	*1.43*	*1.43*	*1.43*
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**10.36**	**10.36**	**10.36**	**10.36**	**13.51**	**13.51**	**13.51**	**13.51**	**26.35**	**26.35**	**26.35**	**26.35**	**26.35**	**26.35**	**26.35**	**26.35**

YEAR	2014												2015											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	NOx Emissions (lbs/day)												NOx Emissions (lbs/day)											
Construction Equipment Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.46	53.46	53.46	53.46	54.90	54.90	54.90	54.90	108.11	108.11	108.11	108.11	108.11	108.11	108.11	108.11
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*53.46*	*53.46*	*53.46*	*53.46*	*54.90*	*54.90*	*54.90*	*54.90*	*108.11*	*108.11*	*108.11*	*108.11*	*108.11*	*108.11*	*108.11*	*108.11*
Construction Worker Commuting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.34	0.34	0.34	0.30	0.30	0.30	0.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Haul Truck Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.46	8.46	8.46	8.46	7.39	7.39	7.39	7.39	14.77	14.77	14.77	14.77	14.77	14.77	14.77	14.77
Offsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*8.79*	*8.79*	*8.79*	*8.79*	*7.69*	*7.69*	*7.69*	*7.69*	*15.28*	*15.28*	*15.28*	*15.28*	*15.28*	*15.28*	*15.28*	*15.28*
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**62.26**	**62.26**	**62.26**	**62.26**	**62.59**	**62.59**	**62.59**	**62.59**	**123.39**	**123.39**	**123.39**	**123.39**	**123.39**	**123.39**	**123.39**	**123.39**

YEAR	2014												2015											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	CO Emissions (lbs/day)												CO Emissions (lbs/day)											
Construction Equipment Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	116.01	116.01	116.01	116.01	121.32	121.32	121.32	121.32	236.47	236.47	236.47	236.47	236.47	236.47	236.47	236.47
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*116.01*	*116.01*	*116.01*	*116.01*	*121.32*	*121.32*	*121.32*	*121.32*	*236.47*	*236.47*	*236.47*	*236.47*	*236.47*	*236.47*	*236.47*	*236.47*
Construction Worker Commuting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.17	4.17	4.17	4.17	3.80	3.80	3.80	3.80	6.33	6.33	6.33	6.33	6.33	6.33	6.33	6.33
Haul Truck Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.24	3.24	3.24	3.24	2.84	2.84	2.84	2.84	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.68
Offsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*7.41*	*7.41*	*7.41*	*7.41*	*6.64*	*6.64*	*6.64*	*6.64*	*12.01*	*12.01*	*12.01*	*12.01*	*12.01*	*12.01*	*12.01*	*12.01*
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**123.42**	**123.42**	**123.42**	**123.42**	**127.96**	**127.96**	**127.96**	**127.96**	**248.49**	**248.49**	**248.49**	**248.49**	**248.49**	**248.49**	**248.49**	**248.49**

YEAR	2014												2015											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	SO2 Emissions (lbs/day)												SO2 Emissions (lbs/day)											
Construction Equipment Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.52*	*0.52*	*0.52*	*0.52*	*0.52*	*0.52*	*0.52*	*0.52*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Construction Worker Commuting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Haul Truck Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Offsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.02*	*0.02*	*0.02*	*0.02*	*0.02*	*0.02*	*0.02*	*0.02*	*0.04*	*0.04*	*0.04*	*0.04*	*0.04*	*0.04*	*0.04*	*0.04*
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.54**	**0.54**	**0.54**	**0.54**	**0.54**	**0.54**	**0.54**	**0.54**	**1.05**	**1.05**	**1.05**	**1.05**	**1.05**	**1.05**	**1.05**	**1.05**

YEAR	2014												2015											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	PM10 Emissions (lbs/day)												PM10 Emissions (lbs/day)											
Construction Equipment Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.84	0.84	0.84	0.84	0.91	0.91	0.91	0.91	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Onsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.96*	*0.96*	*0.96*	*0.96*	*1.03*	*1.03*	*1.03*	*1.03*	*1.94*	*1.94*	*1.94*	*1.94*	*1.94*	*1.94*	*1.94*	*1.94*
Construction Worker Commuting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	2.79	2.79	2.79	2.79	2.79	2.79	2.79	2.79
Haul Truck Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.69	0.69	0.69	0.65	0.65	0.65	0.65	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Offsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*2.37*	*2.37*	*2.37*	*2.37*	*2.32*	*2.32*	*2.32*	*2.32*	*4.08*	*4.08*	*4.08*	*4.08*	*4.08*	*4.08*	*4.08*	*4.08*
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.33**	**3.33**	**3.33**	**3.33**	**3.35**	**3.35**	**3.35**	**3.35**	**6.02**	**6.02**	**6.02**	**6.02**	**6.02**	**6.02**	**6.02**	**6.02**

YEAR	2014												2015											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	PM2.5 Emissions (lbs/day)												PM2.5 Emissions (lbs/day)											
Construction Equipment Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.78	0.78	0.78	0.84	0.84	0.84	0.84	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Onsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.79*	*0.79*	*0.79*	*0.79*	*0.86*	*0.86*	*0.86*	*0.86*	*1.65*	*1.65*	*1.65*	*1.65*	*1.65*	*1.65*	*1.65*	*1.65*
Construction Worker Commuting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
Haul Truck Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.35	0.35	0.35	0.31	0.31	0.31	0.31	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
Offsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.63*	*0.63*	*0.63*	*0.63*	*0.59*	*0.59*	*0.59*	*0.59*	*1.09*	*1.09*	*1.09*	*1.09*	*1.09*	*1.09*	*1.09*	*1.09*
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.43**	**1.43**	**1.43**	**1.43**	**1.45**	**1.45**	**1.45**	**1.45**	**2.74**	**2.74**	**2.74**	**2.74**	**2.74**	**2.74**	**2.74**	**2.74**

Table 1-2: Summary of Annual Construction Emissions - Locally Preferred Alternative

Locally Preferred Alternative/Baseline

YEAR	2016												2017											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	ROG Emissions (lbs/day)												ROG Emissions (lbs/day)											
Construction Equipment Emissions	31.05	31.05	31.05	31.05	31.05	31.05	31.05	31.05	31.05	31.05	31.05	15.89	18.90	18.90	18.90	18.90	18.90	18.90	18.90	18.90	18.90	0.00	0.00	0.00
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	31.05	31.05	31.05	31.05	31.05	31.05	31.05	31.05	31.05	31.05	31.05	15.89	18.90	18.90	18.90	18.90	18.90	18.90	18.90	18.90	18.90	0.00	0.00	0.00
Construction Worker Commuting	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.09	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.00	0.00	0.00
Haul Truck Emissions	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	0.57	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.00	0.00	0.00
Offsite Subtotal	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	0.66	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.00	0.00	0.00
Total	32.34	32.34	32.34	32.34	32.34	32.34	32.34	32.34	32.34	32.34	32.34	16.55	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	0.00	0.00	0.00

YEAR	2016												2017											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	NOx Emissions (lbs/day)												NOx Emissions (lbs/day)											
Construction Equipment Emissions	110.86	110.86	110.86	110.86	110.86	110.86	110.86	110.86	110.86	110.86	110.86	56.29	57.62	57.62	57.62	57.62	57.62	57.62	57.62	57.62	57.62	0.00	0.00	0.00
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	110.86	110.86	110.86	110.86	110.86	110.86	110.86	110.86	110.86	110.86	110.86	56.29	57.62	57.62	57.62	57.62	57.62	57.62	57.62	57.62	57.62	0.00	0.00	0.00
Construction Worker Commuting	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.27	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.00	0.00	0.00
Haul Truck Emissions	13.08	13.08	13.08	13.08	13.08	13.08	13.08	13.08	13.08	13.08	13.08	6.54	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	0.00	0.00	0.00
Offsite Subtotal	13.54	13.54	13.54	13.54	13.54	13.54	13.54	13.54	13.54	13.54	13.54	6.81	6.09	6.09	6.09	6.09	6.09	6.09	6.09	6.09	6.09	0.00	0.00	0.00
Total	124.39	124.39	124.39	124.39	124.39	124.39	124.39	124.39	124.39	124.39	124.39	63.10	63.71	63.71	63.71	63.71	63.71	63.71	63.71	63.71	63.71	0.00	0.00	0.00

YEAR	2016												2017											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	CO Emissions (lbs/day)												CO Emissions (lbs/day)											
Construction Equipment Emissions	246.58	246.58	246.58	246.58	246.58	246.58	246.58	246.58	246.58	246.58	246.58	126.45	131.38	131.38	131.38	131.38	131.38	131.38	131.38	131.38	131.38	0.00	0.00	0.00
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	246.58	246.58	246.58	246.58	246.58	246.58	246.58	246.58	246.58	246.58	246.58	126.45	131.38	131.38	131.38	131.38	131.38	131.38	131.38	131.38	131.38	0.00	0.00	0.00
Construction Worker Commuting	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	3.49	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	0.00	0.00	0.00
Haul Truck Emissions	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	2.52	2.26	2.26	2.26	2.26	2.26	2.26	2.26	2.26	2.26	0.00	0.00	0.00
Offsite Subtotal	10.87	10.87	10.87	10.87	10.87	10.87	10.87	10.87	10.87	10.87	10.87	6.01	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	0.00	0.00	0.00
Total	257.45	257.45	257.45	257.45	257.45	257.45	257.45	257.45	257.45	257.45	257.45	132.46	136.84	136.84	136.84	136.84	136.84	136.84	136.84	136.84	136.84	0.00	0.00	0.00

YEAR	2016												2017											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	SO2 Emissions (lbs/day)												SO2 Emissions (lbs/day)											
Construction Equipment Emissions	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.00	0.00	0.00
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.00	0.00	0.00
Construction Worker Commuting	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Haul Truck Emissions	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00	0.00	0.00
Offsite Subtotal	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00	0.00	0.00
Total	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.00	0.00	0.00

YEAR	2016												2017											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	PM10 Emissions (lbs/day)												PM10 Emissions (lbs/day)											
Construction Equipment Emissions	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	0.98	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	0.00	0.00	0.00
Fugitive Dust Emissions	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	--	--	--
Onsite Subtotal	2.07	2.07	2.07	2.07	2.07	2.07	2.07	2.07	2.07	2.07	2.07	1.10	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	0.00	0.00	0.00
Construction Worker Commuting	2.79	2.79	2.79	2.79	2.79	2.79	2.79	2.79	2.79	2.79	2.79	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	0.00	0.00	0.00
Haul Truck Emissions	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	0.61	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.00	0.00	0.00
Offsite Subtotal	4.02	4.02	4.02	4.02	4.02	4.02	4.02	4.02	4.02	4.02	4.02	2.29	2.26	2.26	2.26	2.26	2.26	2.26	2.26	2.26	2.26	0.00	0.00	0.00
Total	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.08	3.38	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	0.00	0.00	0.00

YEAR	2016												2017											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	PM2.5 Emissions (lbs/day)												PM2.5 Emissions (lbs/day)											
Construction Equipment Emissions	1.74	1.74	1.74	1.74	1.74	1.74	1.74	1.74	1.74	1.74	1.74	0.90	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.00	0.00	0.00
Fugitive Dust Emissions	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	--	--	--
Onsite Subtotal	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	0.92	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.00	0.00	0.00
Construction Worker Commuting	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.00	0.00	0.00
Haul Truck Emissions	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.28	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.00	0.00	0.00
Offsite Subtotal	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	0.56	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.00	0.00	0.00
Total	2.79	2.79	2.79	2.79	2.79	2.79	2.79	2.79	2.79	2.79	2.79	1.48	1.51	1.51	1.51	1.51	1.51	1.51	1.51	1.51	1.51	0.00	0.00	0.00

Table 1-5: Summary of Annual Construction Emissions - Alternative A

Alternative A

YEAR	2014												2015											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	ROG Emissions (lbs/day)												ROG Emissions (lbs/day)											
Construction Equipment Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.74	20.74	25.84	25.84	25.84	25.84	25.84	37.99	37.99	37.99	37.99	37.99	37.99	12.14
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*20.74*	*20.74*	*25.84*	*25.84*	*25.84*	*25.84*	*25.84*	*37.99*	*37.99*	*37.99*	*37.99*	*37.99*	*37.99*	*12.14*
Construction Worker Commuting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.16	0.13	0.13	0.13	0.13	0.13	0.20	0.20	0.20	0.20	0.20	0.20	0.07
Haul Truck Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.63	0.63	0.63	0.63	0.63	0.63
Offsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.16*	*0.16*	*0.13*	*0.13*	*0.13*	*0.13*	*0.13*	*0.84*	*0.84*	*0.84*	*0.84*	*0.84*	*0.84*	*0.70*
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**20.90**	**20.90**	**25.98**	**25.98**	**25.98**	**25.98**	**25.98**	**38.82**	**38.82**	**38.82**	**38.82**	**38.82**	**38.82**	**12.84**

YEAR	2014												2015											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	NOx Emissions (lbs/day)												NOx Emissions (lbs/day)											
Construction Equipment Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	254.93	254.93	254.47	254.47	254.47	254.47	254.47	307.68	307.68	307.68	307.68	307.68	307.68	53.21
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*254.93*	*254.93*	*254.47*	*254.47*	*254.47*	*254.47*	*254.47*	*307.68*	*307.68*	*307.68*	*307.68*	*307.68*	*307.68*	*53.21*
Construction Worker Commuting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.45	0.40	0.40	0.40	0.40	0.40	0.61	0.61	0.61	0.61	0.61	0.61	0.20
Haul Truck Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.39	7.39	7.39	7.39	7.39	7.39	7.39
Offsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.45*	*0.45*	*0.40*	*0.40*	*0.40*	*0.40*	*0.40*	*7.99*	*7.99*	*7.99*	*7.99*	*7.99*	*7.99*	*7.59*
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**255.37**	**255.37**	**254.87**	**254.87**	**254.87**	**254.87**	**254.87**	**315.67**	**315.67**	**315.67**	**315.67**	**315.67**	**315.67**	**60.80**

YEAR	2014												2015											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	CO Emissions (lbs/day)												CO Emissions (lbs/day)											
Construction Equipment Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	198.48	198.48	202.14	202.14	202.14	202.14	202.14	317.29	317.29	317.29	317.29	317.29	317.29	115.15
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*198.48*	*198.48*	*202.14*	*202.14*	*202.14*	*202.14*	*202.14*	*317.29*	*317.29*	*317.29*	*317.29*	*317.29*	*317.29*	*115.15*
Construction Worker Commuting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.56	5.56	5.07	5.07	5.07	5.07	5.07	7.60	7.60	7.60	7.60	7.60	7.60	2.53
Haul Truck Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.84	2.84	2.84	2.84	2.84	2.84	2.84
Offsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*5.56*	*5.56*	*5.07*	*5.07*	*5.07*	*5.07*	*5.07*	*10.44*	*10.44*	*10.44*	*10.44*	*10.44*	*10.44*	*5.37*
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**204.03**	**204.03**	**207.20**	**207.20**	**207.20**	**207.20**	**207.20**	**327.73**	**327.73**	**327.73**	**327.73**	**327.73**	**327.73**	**120.52**

YEAR	2014												2015											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	SO2 Emissions (lbs/day)												SO2 Emissions (lbs/day)											
Construction Equipment Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.18	1.18	1.17	1.17	1.17	1.17	1.17	1.65	1.65	1.65	1.65	1.65	1.65	0.48
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.18*	*1.18*	*1.17*	*1.17*	*1.17*	*1.17*	*1.17*	*1.65*	*1.65*	*1.65*	*1.65*	*1.65*	*1.65*	*0.48*
Construction Worker Commuting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Haul Truck Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Offsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.02*
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.19**	**1.19**	**1.18**	**1.18**	**1.18**	**1.18**	**1.18**	**1.68**	**1.68**	**1.68**	**1.68**	**1.68**	**1.68**	**0.50**

YEAR	2014												2015											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	PM10 Emissions (lbs/day)												PM10 Emissions (lbs/day)											
Construction Equipment Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.37	6.37	6.59	6.59	6.59	6.59	6.59	7.44	7.44	7.44	7.44	7.44	7.44	0.85
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Onsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*6.37*	*6.37*	*6.59*	*6.59*	*6.59*	*6.59*	*6.59*	*7.49*	*7.49*	*7.49*	*7.49*	*7.49*	*7.49*	*0.90*
Construction Worker Commuting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.23	2.23	2.23	2.23	2.23	2.23	2.23	3.34	3.34	3.34	3.34	3.34	3.34	1.11
Haul Truck Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Offsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*2.23*	*2.23*	*2.23*	*2.23*	*2.23*	*2.23*	*2.23*	*3.99*	*3.99*	*3.99*	*3.99*	*3.99*	*3.99*	*1.76*
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**8.60**	**8.60**	**8.82**	**8.82**	**8.82**	**8.82**	**8.82**	**11.49**	**11.49**	**11.49**	**11.49**	**11.49**	**11.49**	**2.67**

YEAR	2014												2015											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	PM2.5 Emissions (lbs/day)												PM2.5 Emissions (lbs/day)											
Construction Equipment Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.02
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Onsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.05*	*0.05*	*0.05*	*0.05*	*0.05*	*0.05*	*0.02*
Construction Worker Commuting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.02
Haul Truck Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Offsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.31*	*0.31*	*0.31*	*0.31*	*0.31*	*0.31*	*0.28*
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.06**	**0.06**	**0.06**	**0.06**	**0.06**	**0.06**	**0.06**	**0.37**	**0.37**	**0.37**	**0.37**	**0.37**	**0.37**	**0.30**

Table 1-5: Summary of Annual Construction Emissions - Alternative A

Alternative A

YEAR	2016												2017											
MONTH	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Phase	**ROG Emissions (lbs/day)**												**ROG Emissions (lbs/day)**											
Construction Equipment Emissions	15.16	15.16	30.32	15.16	15.16	15.16	15.16	15.16	15.16	30.32	30.32	45.48	36.15	36.15	36.15	36.15	36.15	18.07	18.07	18.07	18.07	18.07	18.07	36.97
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	*15.16*	*15.16*	*30.32*	*15.16*	*15.16*	*15.16*	*15.16*	*15.16*	*15.16*	*30.32*	*30.32*	*45.48*	*36.15*	*36.15*	*36.15*	*36.15*	*36.15*	*18.07*	*18.07*	*18.07*	*18.07*	*18.07*	*18.07*	*36.97*
Construction Worker Commuting	0.06	0.06	0.12	0.06	0.06	0.06	0.06	0.06	0.06	0.12	0.12	0.17	0.10	0.10	0.10	0.10	0.10	0.05	0.05	0.05	0.05	0.05	0.05	0.12
Haul Truck Emissions	0.57	0.57	1.15	0.57	0.57	0.57	0.57	0.57	0.57	1.15	1.15	1.72	1.05	1.05	1.05	1.05	1.05	0.53	0.53	0.53	0.53	0.53	0.53	1.05
Offsite Subtotal	*0.63*	*0.63*	*1.26*	*0.63*	*0.63*	*0.63*	*0.63*	*0.63*	*0.63*	*1.26*	*1.26*	*1.89*	*1.15*	*1.15*	*1.15*	*1.15*	*1.15*	*0.57*	*0.57*	*0.57*	*0.57*	*0.57*	*0.57*	*1.17*
Total	**15.79**	**15.79**	**31.58**	**15.79**	**15.79**	**15.79**	**15.79**	**15.79**	**15.79**	**31.58**	**31.58**	**47.37**	**37.29**	**37.29**	**37.29**	**37.29**	**37.29**	**18.65**	**18.65**	**18.65**	**18.65**	**18.65**	**18.65**	**38.14**

YEAR	2016												2017											
MONTH	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Phase	**NOx Emissions (lbs/day)**												**NOx Emissions (lbs/day)**											
Construction Equipment Emissions	54.57	54.57	109.14	54.57	54.57	54.57	54.57	54.57	54.57	109.14	109.14	163.71	111.76	111.76	111.76	111.76	111.76	55.88	55.88	55.88	55.88	55.88	55.88	113.50
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	*54.57*	*54.57*	*109.14*	*54.57*	*54.57*	*54.57*	*54.57*	*54.57*	*54.57*	*109.14*	*109.14*	*163.71*	*111.76*	*111.76*	*111.76*	*111.76*	*111.76*	*55.88*	*55.88*	*55.88*	*55.88*	*55.88*	*55.88*	*113.50*
Construction Worker Commuting	0.18	0.18	0.37	0.18	0.18	0.18	0.18	0.18	0.18	0.37	0.37	0.55	0.33	0.33	0.33	0.33	0.33	0.17	0.17	0.17	0.17	0.17	0.17	0.42
Haul Truck Emissions	6.54	6.54	13.08	6.54	6.54	6.54	6.54	6.54	6.54	13.08	13.08	19.62	11.68	11.68	11.68	11.68	11.68	5.84	5.84	5.84	5.84	5.84	5.84	11.68
Offsite Subtotal	*6.72*	*6.72*	*13.44*	*6.72*	*6.72*	*6.72*	*6.72*	*6.72*	*6.72*	*13.44*	*13.44*	*20.17*	*12.01*	*12.01*	*12.01*	*12.01*	*12.01*	*6.01*	*6.01*	*6.01*	*6.01*	*6.01*	*6.01*	*12.09*
Total	**61.29**	**61.29**	**122.58**	**61.29**	**61.29**	**61.29**	**61.29**	**61.29**	**61.29**	**122.58**	**122.58**	**183.88**	**123.77**	**123.77**	**123.77**	**123.77**	**123.77**	**61.89**	**61.89**	**61.89**	**61.89**	**61.89**	**61.89**	**125.60**

YEAR	2016												2017											
MONTH	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Phase	**CO Emissions (lbs/day)**												**CO Emissions (lbs/day)**											
Construction Equipment Emissions	120.13	120.13	240.27	120.13	120.13	120.13	120.13	120.13	120.13	240.27	240.27	360.40	249.89	249.89	249.89	249.89	249.89	124.95	124.95	124.95	124.95	124.95	124.95	256.33
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	*120.13*	*120.13*	*240.27*	*120.13*	*120.13*	*120.13*	*120.13*	*120.13*	*120.13*	*240.27*	*240.27*	*360.40*	*249.89*	*249.89*	*249.89*	*249.89*	*249.89*	*124.95*	*124.95*	*124.95*	*124.95*	*124.95*	*124.95*	*256.33*
Construction Worker Commuting	2.33	2.33	4.65	2.33	2.33	2.33	2.33	2.33	2.33	4.65	4.65	6.98	4.26	4.26	4.26	4.26	4.26	2.13	2.13	2.13	2.13	2.13	2.13	5.32
Haul Truck Emissions	2.52	2.52	5.05	2.52	2.52	2.52	2.52	2.52	2.52	5.05	5.05	7.57	4.53	4.53	4.53	4.53	4.53	2.26	2.26	2.26	2.26	2.26	2.26	4.53
Offsite Subtotal	*4.85*	*4.85*	*9.70*	*4.85*	*4.85*	*4.85*	*4.85*	*4.85*	*4.85*	*9.70*	*9.70*	*14.55*	*8.78*	*8.78*	*8.78*	*8.78*	*8.78*	*4.39*	*4.39*	*4.39*	*4.39*	*4.39*	*4.39*	*9.85*
Total	**124.99**	**124.99**	**249.97**	**124.99**	**124.99**	**124.99**	**124.99**	**124.99**	**124.99**	**249.97**	**249.97**	**374.96**	**258.68**	**258.68**	**258.68**	**258.68**	**258.68**	**129.34**	**129.34**	**129.34**	**129.34**	**129.34**	**129.34**	**266.18**

YEAR	2016												2017											
MONTH	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Phase	**SO2 Emissions (lbs/day)**												**SO2 Emissions (lbs/day)**											
Construction Equipment Emissions	0.48	0.48	0.97	0.48	0.48	0.48	0.48	0.48	0.48	0.97	0.97	1.45	0.97	0.97	0.97	0.97	0.97	0.48	0.48	0.48	0.48	0.48	0.48	1.00
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	*0.48*	*0.48*	*0.97*	*0.48*	*0.48*	*0.48*	*0.48*	*0.48*	*0.48*	*0.97*	*0.97*	*1.45*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.48*	*0.48*	*0.48*	*0.48*	*0.48*	*0.48*	*1.00*
Construction Worker Commuting	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Haul Truck Emissions	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.05	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03
Offsite Subtotal	*0.02*	*0.02*	*0.04*	*0.02*	*0.02*	*0.02*	*0.02*	*0.02*	*0.02*	*0.04*	*0.04*	*0.06*	*0.04*	*0.04*	*0.04*	*0.04*	*0.04*	*0.02*	*0.02*	*0.02*	*0.02*	*0.02*	*0.02*	*0.04*
Total	**0.50**	**0.50**	**1.01**	**0.50**	**0.50**	**0.50**	**0.50**	**0.50**	**0.50**	**1.01**	**1.01**	**1.51**	**1.01**	**1.01**	**1.01**	**1.01**	**1.01**	**0.50**	**0.50**	**0.50**	**0.50**	**0.50**	**0.50**	**1.05**

YEAR	2016												2017											
MONTH	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Phase	**PM10 Emissions (lbs/day)**												**PM10 Emissions (lbs/day)**											
Construction Equipment Emissions	0.92	0.92	1.83	0.92	0.92	0.92	0.92	0.92	0.92	1.83	1.83	2.75	1.96	1.96	1.96	1.96	1.96	0.98	0.98	0.98	0.98	0.98	0.98	2.02
Fugitive Dust Emissions	0.05	0.05	0.12	0.06	0.06	0.06	0.06	0.06	0.06	0.13	0.13	0.18	0.12	0.12	0.12	0.12	0.12	0.05	0.05	0.05	0.05	0.05	0.05	0.31
Onsite Subtotal	*0.97*	*0.97*	*1.95*	*0.98*	*0.98*	*0.98*	*0.98*	*0.98*	*0.98*	*1.96*	*1.96*	*2.93*	*2.08*	*2.08*	*2.08*	*2.08*	*2.08*	*1.03*	*1.03*	*1.03*	*1.03*	*1.03*	*1.03*	*2.33*
Construction Worker Commuting	1.12	1.12	2.23	1.12	1.12	1.12	1.12	1.12	1.12	2.23	2.23	3.35	2.23	2.23	2.23	2.23	2.23	1.12	1.12	1.12	1.12	1.12	1.12	2.79
Haul Truck Emissions	0.61	0.61	1.23	0.61	0.61	0.61	0.61	0.61	0.61	1.23	1.23	1.84	1.17	1.17	1.17	1.17	1.17	0.58	0.58	0.58	0.58	0.58	0.58	1.17
Offsite Subtotal	*1.73*	*1.73*	*3.46*	*1.73*	*1.73*	*1.73*	*1.73*	*1.73*	*1.73*	*3.46*	*3.46*	*5.19*	*3.40*	*3.40*	*3.40*	*3.40*	*3.40*	*1.70*	*1.70*	*1.70*	*1.70*	*1.70*	*1.70*	*3.96*
Total	**2.70**	**2.70**	**5.41**	**2.71**	**2.71**	**2.71**	**2.71**	**2.71**	**2.71**	**5.42**	**5.42**	**8.12**	**5.47**	**5.47**	**5.47**	**5.47**	**5.47**	**2.73**	**2.73**	**2.73**	**2.73**	**2.73**	**2.73**	**6.29**

YEAR	2016												2017											
MONTH	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Phase	**PM2.5 Emissions (lbs/day)**												**PM2.5 Emissions (lbs/day)**											
Construction Equipment Emissions	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.05	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.04
Fugitive Dust Emissions	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.05
Onsite Subtotal	*0.02*	*0.02*	*0.05*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.05*	*0.05*	*0.08*	*0.05*	*0.05*	*0.05*	*0.05*	*0.05*	*0.02*	*0.02*	*0.02*	*0.02*	*0.02*	*0.02*	*0.09*
Construction Worker Commuting	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.05	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.04
Haul Truck Emissions	0.23	0.23	0.46	0.23	0.23	0.23	0.23	0.23	0.23	0.46	0.46	0.69	0.40	0.40	0.40	0.40	0.40	0.20	0.20	0.20	0.20	0.20	0.20	0.40
Offsite Subtotal	*0.25*	*0.25*	*0.49*	*0.25*	*0.25*	*0.25*	*0.25*	*0.25*	*0.25*	*0.49*	*0.49*	*0.74*	*0.43*	*0.43*	*0.43*	*0.43*	*0.43*	*0.22*	*0.22*	*0.22*	*0.22*	*0.22*	*0.22*	*0.44*
Total	**0.27**	**0.27**	**0.54**	**0.27**	**0.27**	**0.27**	**0.27**	**0.27**	**0.27**	**0.55**	**0.55**	**0.82**	**0.48**	**0.48**	**0.48**	**0.48**	**0.48**	**0.24**	**0.24**	**0.24**	**0.24**	**0.24**	**0.24**	**0.53**

Table 1-6: Summary of Annual Construction Emissions - Alternative B

Alternative B

YEAR	2014												2015											
MONTH	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Phase	**ROG Emissions (lbs/day)**												**ROG Emissions (lbs/day)**											
Construction Equipment Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.04	16.04	16.04	16.04	16.04	28.19	28.19	28.19	28.19	12.14	12.14
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*16.04*	*16.04*	*16.04*	*16.04*	*16.04*	*28.19*	*28.19*	*28.19*	*28.19*	*12.14*	*12.14*
Construction Worker Commuting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.07	0.07	0.13	0.13	0.13	0.13	0.13	0.07	0.07
Haul Truck Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.63	0.63	0.63	0.63	0.63	0.63
Offsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.07*	*0.07*	*0.07*	*0.07*	*0.77*	*0.77*	*0.77*	*0.77*	*0.77*	*0.70*	*0.70*
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**16.11**	**16.11**	**16.11**	**16.11**	**16.81**	**28.95**	**28.95**	**28.95**	**28.95**	**12.84**	**12.84**

YEAR	2014												2015											
MONTH	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Phase	**NOx Emissions (lbs/day)**												**NOx Emissions (lbs/day)**											
Construction Equipment Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	133.54	133.54	133.54	133.54	133.54	186.75	186.75	186.75	186.75	53.21	53.21
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*133.54*	*133.54*	*133.54*	*133.54*	*133.54*	*186.75*	*186.75*	*186.75*	*186.75*	*53.21*	*53.21*
Construction Worker Commuting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.20	0.20	0.40	0.40	0.40	0.40	0.40	0.20	0.20
Haul Truck Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.39	7.39	7.39	7.39	7.39	7.39	7.39
Offsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.20*	*0.20*	*0.20*	*0.20*	*7.79*	*7.79*	*7.79*	*7.79*	*7.79*	*7.59*	*7.59*
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**133.75**	**133.75**	**133.75**	**133.75**	**141.33**	**194.54**	**194.54**	**194.54**	**194.54**	**60.80**	**60.80**

YEAR	2014												2015											
MONTH	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Phase	**CO Emissions (lbs/day)**												**CO Emissions (lbs/day)**											
Construction Equipment Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	124.42	124.42	124.42	124.42	124.42	239.57	239.57	239.57	239.57	115.15	115.15
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*124.42*	*124.42*	*124.42*	*124.42*	*124.42*	*239.57*	*239.57*	*239.57*	*239.57*	*115.15*	*115.15*
Construction Worker Commuting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.53	2.53	2.53	2.53	5.07	5.07	5.07	5.07	5.07	2.53	2.53
Haul Truck Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.84	2.84	2.84	2.84	2.84	2.84	2.84
Offsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*2.53*	*2.53*	*2.53*	*2.53*	*7.91*	*7.91*	*7.91*	*7.91*	*7.91*	*5.37*	*5.37*
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**126.95**	**126.95**	**126.95**	**126.95**	**132.33**	**247.48**	**247.48**	**247.48**	**247.48**	**120.52**	**120.52**

YEAR	2014												2015											
MONTH	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Phase	**SO2 Emissions (lbs/day)**												**SO2 Emissions (lbs/day)**											
Construction Equipment Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	0.71	0.71	0.71	0.71	1.20	1.20	1.20	1.20	0.48	0.48
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.71*	*0.71*	*0.71*	*0.71*	*0.71*	*1.20*	*1.20*	*1.20*	*1.20*	*0.48*	*0.48*
Construction Worker Commuting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00
Haul Truck Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Offsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.02*	*0.02*
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.72**	**0.72**	**0.72**	**0.72**	**0.74**	**1.22**	**1.22**	**1.22**	**1.22**	**0.50**	**0.50**

YEAR	2014												2015											
MONTH	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Phase	**PM10 Emissions (lbs/day)**												**PM10 Emissions (lbs/day)**											
Construction Equipment Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.53	3.53	3.53	3.53	3.53	4.38	4.38	4.38	4.38	0.85	0.85
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Onsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*3.53*	*3.53*	*3.53*	*3.53*	*3.61*	*4.46*	*4.46*	*4.46*	*4.46*	*0.93*	*0.93*
Construction Worker Commuting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.11	1.11	1.11	1.11	2.23	2.23	2.23	2.23	2.23	1.11	1.11
Haul Truck Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Offsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.11*	*1.11*	*1.11*	*1.11*	*2.88*	*2.88*	*2.88*	*2.88*	*2.88*	*1.76*	*1.76*
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.64**	**4.64**	**4.64**	**4.64**	**6.49**	**7.34**	**7.34**	**7.34**	**7.34**	**2.69**	**2.69**

YEAR	2014												2015											
MONTH	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Phase	**PM2.5 Emissions (lbs/day)**												**PM2.5 Emissions (lbs/day)**											
Construction Equipment Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.25	3.25	3.25	3.25	3.25	4.03	4.03	4.03	4.03	0.78	0.78
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Onsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*3.25*	*3.25*	*3.25*	*3.25*	*3.51*	*4.30*	*4.30*	*4.30*	*4.30*	*1.05*	*1.05*
Construction Worker Commuting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.02	0.02
Haul Truck Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Offsite Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.02*	*0.02*	*0.02*	*0.02*	*0.30*	*0.30*	*0.30*	*0.30*	*0.30*	*0.28*	*0.28*
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.26**	**3.26**	**3.26**	**3.26**	**3.81**	**4.59**	**4.59**	**4.59**	**4.59**	**1.33**	**1.33**

Table 1-6: Summary of Annual Construction Emissions - Alternative B

Alternative B

YEAR	2016												2017											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	ROG Emissions (lbs/day)												ROG Emissions (lbs/day)											
Construction Equipment Emissions	15.16	15.16	15.16	30.32	30.32	30.32	30.32	30.32	30.32	30.32	30.32	30.32	36.15	36.15	18.07	18.07	36.97	18.90	18.90	0.00	0.00	0.00	0.00	0.00
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	*15.16*	*15.16*	*15.16*	*30.32*	*30.32*	*30.32*	*30.32*	*30.32*	*30.32*	*30.32*	*30.32*	*30.32*	*36.15*	*36.15*	*18.07*	*18.07*	*36.97*	*18.90*	*18.90*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Construction Worker Commuting	0.06	0.06	0.06	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.10	0.10	0.05	0.05	0.12	0.07	0.07	0.00	0.00	0.00	0.00	0.00
Haul Truck Emissions	0.57	0.57	0.57	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.05	1.05	0.53	0.53	1.05	0.53	0.53	0.00	0.00	0.00	0.00	0.00
Offsite Subtotal	*0.63*	*0.63*	*0.63*	*1.26*	*1.26*	*1.26*	*1.26*	*1.26*	*1.26*	*1.26*	*1.26*	*1.26*	*1.15*	*1.15*	*0.57*	*0.57*	*1.17*	*0.60*	*0.60*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Total	**15.79**	**15.79**	**15.79**	**31.58**	**31.58**	**31.58**	**31.58**	**31.58**	**31.58**	**31.58**	**31.58**	**31.58**	**37.29**	**37.29**	**18.65**	**18.65**	**38.14**	**19.50**	**19.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

YEAR	2016												2017											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	NOx Emissions (lbs/day)												NOx Emissions (lbs/day)											
Construction Equipment Emissions	54.57	54.57	54.57	109.14	109.14	109.14	109.14	109.14	109.14	109.14	109.14	109.14	111.76	111.76	55.88	55.88	113.50	57.62	57.62	0.00	0.00	0.00	0.00	0.00
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	*54.57*	*54.57*	*54.57*	*109.14*	*109.14*	*109.14*	*109.14*	*109.14*	*109.14*	*109.14*	*109.14*	*109.14*	*111.76*	*111.76*	*55.88*	*55.88*	*113.50*	*57.62*	*57.62*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Construction Worker Commuting	0.18	0.18	0.18	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.33	0.33	0.17	0.17	0.42	0.25	0.25	0.00	0.00	0.00	0.00	0.00
Haul Truck Emissions	6.54	6.54	6.54	13.08	13.08	13.08	13.08	13.08	13.08	13.08	13.08	13.08	11.68	11.68	5.84	5.84	11.68	5.84	5.84	0.00	0.00	0.00	0.00	0.00
Offsite Subtotal	*6.72*	*6.72*	*6.72*	*13.44*	*13.44*	*13.44*	*13.44*	*13.44*	*13.44*	*13.44*	*13.44*	*13.44*	*12.01*	*12.01*	*6.01*	*6.01*	*12.09*	*6.09*	*6.09*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Total	**61.29**	**61.29**	**61.29**	**122.58**	**122.58**	**122.58**	**122.58**	**122.58**	**122.58**	**122.58**	**122.58**	**122.58**	**123.77**	**123.77**	**61.89**	**61.89**	**125.60**	**63.71**	**63.71**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

YEAR	2016												2017											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	CO Emissions (lbs/day)												CO Emissions (lbs/day)											
Construction Equipment Emissions	120.13	120.13	120.13	240.27	240.27	240.27	240.27	240.27	240.27	240.27	240.27	240.27	249.89	249.89	124.95	124.95	256.33	131.38	131.38	0.00	0.00	0.00	0.00	0.00
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	*120.13*	*120.13*	*120.13*	*240.27*	*240.27*	*240.27*	*240.27*	*240.27*	*240.27*	*240.27*	*240.27*	*240.27*	*249.89*	*249.89*	*124.95*	*124.95*	*256.33*	*131.38*	*131.38*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Construction Worker Commuting	2.33	2.33	2.33	4.65	4.65	4.65	4.65	4.65	4.65	4.65	4.65	4.65	4.26	4.26	2.13	2.13	5.32	3.19	3.19	0.00	0.00	0.00	0.00	0.00
Haul Truck Emissions	2.52	2.52	2.52	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	4.53	4.53	2.26	2.26	4.53	2.26	2.26	0.00	0.00	0.00	0.00	0.00
Offsite Subtotal	*4.85*	*4.85*	*4.85*	*9.70*	*9.70*	*9.70*	*9.70*	*9.70*	*9.70*	*9.70*	*9.70*	*9.70*	*8.78*	*8.78*	*4.39*	*4.39*	*9.85*	*5.46*	*5.46*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Total	**124.99**	**124.99**	**124.99**	**249.97**	**249.97**	**249.97**	**249.97**	**249.97**	**249.97**	**249.97**	**249.97**	**249.97**	**258.68**	**258.68**	**129.34**	**129.34**	**266.18**	**136.84**	**136.84**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

YEAR	2016												2017											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	SO2 Emissions (lbs/day)												SO2 Emissions (lbs/day)											
Construction Equipment Emissions	0.48	0.48	0.48	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.48	0.48	1.00	0.52	0.52	0.00	0.00	0.00	0.00	0.00
Fugitive Dust Emissions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Onsite Subtotal	*0.48*	*0.48*	*0.48*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.48*	*0.48*	*1.00*	*0.52*	*0.52*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Construction Worker Commuting	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Haul Truck Emissions	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.03	0.02	0.02	0.00	0.00	0.00	0.00	0.00
Offsite Subtotal	*0.02*	*0.02*	*0.02*	*0.04*	*0.04*	*0.04*	*0.04*	*0.04*	*0.04*	*0.04*	*0.04*	*0.04*	*0.04*	*0.04*	*0.02*	*0.02*	*0.04*	*0.02*	*0.02*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Total	**0.50**	**0.50**	**0.50**	**1.01**	**1.01**	**1.01**	**1.01**	**1.01**	**1.01**	**1.01**	**1.01**	**1.01**	**1.01**	**1.01**	**0.50**	**0.50**	**1.05**	**0.54**	**0.54**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

YEAR	2016												2017											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	PM10 Emissions (lbs/day)												PM10 Emissions (lbs/day)											
Construction Equipment Emissions	0.92	0.92	0.92	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.96	1.96	0.98	0.98	2.02	1.04	1.04	0.00	0.00	0.00	0.00	0.00
Fugitive Dust Emissions	0.08	0.08	0.08	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.06	0.06	0.26	0.20	0.20	--	--	--	--	--
Onsite Subtotal	*0.99*	*0.99*	*0.99*	*1.97*	*1.97*	*1.97*	*1.97*	*1.97*	*1.97*	*1.97*	*1.97*	*1.97*	*2.09*	*2.09*	*1.04*	*1.04*	*2.28*	*1.24*	*1.24*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Construction Worker Commuting	1.12	1.12	1.12	2.23	2.23	2.23	2.23	2.23	2.23	2.23	2.23	2.23	2.23	2.23	1.12	1.12	2.79	1.67	1.67	0.00	0.00	0.00	0.00	0.00
Haul Truck Emissions	0.61	0.61	0.61	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.17	1.17	0.58	0.58	1.17	0.58	0.58	0.00	0.00	0.00	0.00	0.00
Offsite Subtotal	*1.73*	*1.73*	*1.73*	*3.46*	*3.46*	*3.46*	*3.46*	*3.46*	*3.46*	*3.46*	*3.46*	*3.46*	*3.40*	*3.40*	*1.70*	*1.70*	*3.96*	*2.26*	*2.26*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Total	**2.72**	**2.72**	**2.72**	**5.43**	**5.43**	**5.43**	**5.43**	**5.43**	**5.43**	**5.43**	**5.43**	**5.43**	**5.49**	**5.49**	**2.74**	**2.74**	**6.24**	**3.50**	**3.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

YEAR	2016												2017											
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Phase	PM2.5 Emissions (lbs/day)												PM2.5 Emissions (lbs/day)											
Construction Equipment Emissions	0.84	0.84	0.84	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.80	1.80	0.90	0.90	1.86	0.96	0.96	0.00	0.00	0.00	0.00	0.00
Fugitive Dust Emissions	0.23	0.23	0.23	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.40	0.40	0.20	0.20	0.40	0.20	0.20	--	--	--	--	--
Onsite Subtotal	*1.07*	*1.07*	*1.07*	*2.15*	*2.15*	*2.15*	*2.15*	*2.15*	*2.15*	*2.15*	*2.15*	*2.15*	*2.20*	*2.20*	*1.10*	*1.10*	*2.26*	*1.16*	*1.16*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Construction Worker Commuting	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.04	0.02	0.02	0.00	0.00	0.00	0.00	0.00
Haul Truck Emissions	0.23	0.23	0.23	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.40	0.40	0.20	0.20	0.40	0.20	0.20	0.00	0.00	0.00	0.00	0.00
Offsite Subtotal	*0.25*	*0.25*	*0.25*	*0.49*	*0.49*	*0.49*	*0.49*	*0.49*	*0.49*	*0.49*	*0.49*	*0.49*	*0.43*	*0.43*	*0.22*	*0.22*	*0.44*	*0.22*	*0.22*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Total	**1.32**	**1.32**	**1.32**	**2.64**	**2.64**	**2.64**	**2.64**	**2.64**	**2.64**	**2.64**	**2.64**	**2.64**	**2.64**	**2.64**	**1.32**	**1.32**	**2.70**	**1.39**	**1.39**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Table 2-1: Hourly, Daily and Annual Emissions Summary (Construction Equipment) - Locally Preferred Alternative

Inputs: Locally Preferred Alternative/Baseline

		Hours per	Start	End	Duration (months)				Number of Equipment							
Phase	**Description**	**Day**	**Month**	**Month**	**2014**	**2015**	**2016**	**2017**	**Dozer**	**Excavator**	**Crane**	**Drill**	**Grout Drill**	**Grout Comp**	**Grout Gen**	**Flatbed**
1	EPBM Flower	20	May-15	Nov-16	--	7	11	--	2	4	2	0	0	0	0	5
2	Cut & Cover Along Flower Street	20	Sep-14	Sep-17	4	12	12	9	2	4	2	1	0	0	0	5

Table 2-1: Hourly, Daily and Annual Emissions Summary (Construction Equipment) - Locally Preferred Alternative

Hourly Emissions by Equipment

Phase	Description	Year	ROG Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.082	0.162	0.051	0.000	0.000	0.000	0.000	0.312
1	EPBM Flower	2016	0.102	0.200	0.061	0.000	0.000	0.000	0.000	0.395
2	Cut & Cover Along Flower Street	2014	0.061	0.123	0.041	0.026	0.000	0.000	0.000	0.226
2	Cut & Cover Along Flower Street	2015	0.082	0.162	0.051	0.031	0.000	0.000	0.000	0.312
2	Cut & Cover Along Flower Street	2016	0.102	0.200	0.061	0.037	0.000	0.000	0.000	0.395
2	Cut & Cover Along Flower Street	2017	0.122	0.236	0.071	0.041	0.000	0.000	0.000	0.474

Table 2-1: Hourly, Daily and Annual Emissions Summary (Construction Equipment) - Locally Preferred Alternative

Hourly Emissions by Equipment

			CO Emissions (pounds per hour)							
Phase	Description	Year	Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.666	2.265	0.492	0.000	0.000	0.000	0.000	2.335
1	EPBM Flower	2016	0.692	2.368	0.505	0.000	0.000	0.000	0.000	2.442
2	Cut & Cover Along Flower Street	2014	0.639	2.157	0.479	0.301	0.000	0.000	0.000	2.224
2	Cut & Cover Along Flower Street	2015	0.666	2.265	0.492	0.309	0.000	0.000	0.000	2.335
2	Cut & Cover Along Flower Street	2016	0.692	2.368	0.505	0.316	0.000	0.000	0.000	2.442
2	Cut & Cover Along Flower Street	2017	0.718	2.467	0.518	0.322	0.000	0.000	0.000	2.545

Table 2-1: Hourly, Daily and Annual Emissions Summary (Construction Equipment) - Locally Preferred Alternative

Hourly Emissions by Equipment

Phase	Description	Year	NOx Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.181	1.714	0.135	0.000	0.000	0.000	0.000	0.631
1	EPBM Flower	2016	0.186	1.754	0.137	0.000	0.000	0.000	0.000	0.652
2	Cut & Cover Along Flower Street	2014	0.176	1.673	0.132	0.083	0.000	0.000	0.000	0.609
2	Cut & Cover Along Flower Street	2015	0.181	1.714	0.135	0.085	0.000	0.000	0.000	0.631
2	Cut & Cover Along Flower Street	2016	0.186	1.754	0.137	0.086	0.000	0.000	0.000	0.652
2	Cut & Cover Along Flower Street	2017	0.191	1.791	0.140	0.087	0.000	0.000	0.000	0.672

Table 2-1: Hourly, Daily and Annual Emissions Summary (Construction Equipment) - Locally Preferred Alternative

Hourly Emissions by Equipment

			SO2 Emissions (pounds per hour)							
Phase	**Description**	**Year**	**Dozer**	**Excavator**	**Crane**	**Drill**	**Grout Drill**	**Grout Comp**	**Grout Gen**	**Flatbed**
1	EPBM Flower	2015	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
1	EPBM Flower	2016	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
2	Cut & Cover Along Flower Street	2014	0.004	0.005	0.003	0.002	0.000	0.000	0.000	0.013
2	Cut & Cover Along Flower Street	2015	0.004	0.005	0.003	0.002	0.000	0.000	0.000	0.013
2	Cut & Cover Along Flower Street	2016	0.004	0.005	0.003	0.002	0.000	0.000	0.000	0.013
2	Cut & Cover Along Flower Street	2017	0.004	0.005	0.003	0.002	0.000	0.000	0.000	0.013

Table 2-1: Hourly, Daily and Annual Emissions Summary (Construction Equipment) - Locally Preferred Alternative

Hourly Emissions by Equipment

Phase	Description	Year	PM10 Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
1	EPBM Flower	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
2	Cut & Cover Along Flower Street	2014	0.006	0.007	0.005	0.003	0.000	0.000	0.000	0.022
2	Cut & Cover Along Flower Street	2015	0.007	0.008	0.005	0.003	0.000	0.000	0.000	0.023
2	Cut & Cover Along Flower Street	2016	0.007	0.008	0.005	0.003	0.000	0.000	0.000	0.025
2	Cut & Cover Along Flower Street	2017	0.008	0.009	0.005	0.003	0.000	0.000	0.000	0.027

Table 2-1: Hourly, Daily and Annual Emissions Summary (Construction Equipment) - Locally Preferred Alternative

Hourly Emissions by Equipment

			PM2.5 Emissions (pounds per hour)							
Phase	Description	Year	Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.006	0.007	0.004	0.000	0.000	0.000	0.000	0.022
1	EPBM Flower	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
2	Cut & Cover Along Flower Street	2014	0.006	0.007	0.004	0.003	0.000	0.000	0.000	0.020
2	Cut & Cover Along Flower Street	2015	0.006	0.007	0.004	0.003	0.000	0.000	0.000	0.022
2	Cut & Cover Along Flower Street	2016	0.007	0.008	0.005	0.003	0.000	0.000	0.000	0.023
2	Cut & Cover Along Flower Street	2017	0.007	0.008	0.005	0.003	0.000	0.000	0.000	0.025

Table 2-1: Hourly, Daily and Annual Emissions Summary (Construction Equipment) - Locally Preferred Alternative

Hourly Emissions by Equipment

Daily Emissions

Phase	Description	Year	Emissions (pounds per day)					
			ROG	CO	NOx	SO2	PM10	PM2.5
1	EPBM Flower	2015	12.14	115.15	53.21	0.48	0.85	0.78
1	EPBM Flower	2016	15.16	120.13	54.57	0.48	0.92	0.84
2	Cut & Cover Along Flower Street	2014	9.54	116.01	53.46	0.52	0.84	0.78
2	Cut & Cover Along Flower Street	2015	12.77	121.32	54.90	0.52	0.91	0.84
2	Cut & Cover Along Flower Street	2016	15.89	126.45	56.29	0.52	0.98	0.90
2	Cut & Cover Along Flower Street	2017	18.90	131.38	57.62	0.52	1.04	0.96

Annual Emissions

Phase	Description	Year	Emissions (tons per year)					
			ROG	CO	NOx	SO2	PM10	PM2.5
1	EPBM Flower	2015	0.94	8.87	4.10	0.04	0.07	0.06
1	EPBM Flower	2016	1.83	14.54	6.60	0.06	0.11	0.10
2	Cut & Cover Along Flower Street	2014	0.42	5.10	2.35	0.02	0.04	0.03
2	Cut & Cover Along Flower Street	2015	1.69	16.01	7.25	0.07	0.12	0.11
2	Cut & Cover Along Flower Street	2016	2.10	16.69	7.43	0.07	0.13	0.12
2	Cut & Cover Along Flower Street	2017	1.87	13.01	5.70	0.05	0.10	0.09

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Source:

Construction equipment emission factors from OFFROAD2007

PM10 Size Fraction: CARB Speciation Profiles http://www.arb.ca.gov/ei/speciate/dnldopt.htm

Table 2-4: Hourly, Daily and Annual Emissions Summary (Construction Equipment) - Alternative A

Inputs: Alternative 3

		Hours per	Start	End	Duration (months)				Number of Equipment							
Phase	**Description**	**Day**	**Month**	**Month**	**2014**	**2015**	**2016**	**2017**	**Dozer**	**Excavator**	**Crane**	**Drill**	**Grout Drill**	**Grout Comp**	**Grout Gen**	**Flatbed**
1	EPBM Flower WB	20	Jun-15	Mar-16	--	7	3	--	2	4	2	0	0	0	0	5
2	EPBM Flower EB	20	Oct-16	May-17	--	--	3	5	2	4	2	0	0	0	0	5
3	Grouting on Flower	20	Nov-14	Nov-15	2	11	--	--	0	0	0	0	4	4	4	5
4	Open Face/Shield on Flower	20	Mar-16	Dec-16	--	--	9	--	2	4	2	0	0	0	0	5
5	SEM on Flower	20	Dec-16	Dec-17	--	--	1	12	2	4	2	0	0	0	0	5
6	Cut & Cover Along Flower Street	20	Dec-17	Feb-18	--	--	--	1	2	4	2	1	0	0	0	5

Work days per month 22

Table 2-4: Hourly, Daily and Annual Emissions Summary (Construction Equipment) - Alternative A

Hourly Emissions by Equipment

Phase	Description	Year	ROG Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower WB	2015	0.082	0.162	0.051	0.000	0.000	0.000	0.000	0.312
1	EPBM Flower WB	2016	0.102	0.200	0.061	0.000	0.000	0.000	0.000	0.395
2	EPBM Flower EB	2016	0.102	0.200	0.061	0.000	0.000	0.000	0.000	0.395
2	EPBM Flower EB	2017	0.122	0.236	0.071	0.000	0.000	0.000	0.000	0.474
3	Grouting on Flower	2014	0.000	0.000	0.000	0.000	0.573	0.055	0.182	0.226
3	Grouting on Flower	2015	0.000	0.000	0.000	0.000	0.701	0.065	0.215	0.312
4	Open Face/Shield on Flower	2016	0.102	0.200	0.061	0.000	0.000	0.000	0.000	0.395
5	SEM on Flower	2016	0.102	0.200	0.061	0.000	0.000	0.000	0.000	0.395
5	SEM on Flower	2017	0.122	0.236	0.071	0.000	0.000	0.000	0.000	0.474
6	Cut & Cover Along Flower Street	2017	0.122	0.236	0.071	0.041	0.000	0.000	0.000	0.474
2	Cut & Cover Along Flower Street	2015	0.082	0.162	0.051	0.000	0.000	0.000	0.000	0.312
2	Cut & Cover Along Flower Street	2016	0.102	0.200	0.061	0.000	0.000	0.000	0.000	0.395
2	Cut & Cover Along Flower Street	2017	0.122	0.236	0.071	0.000	0.000	0.000	0.000	0.474

Table 2-4: Hourly, Daily and Annual Emissions Summary (Construction Equipment) - Alternative A

Hourly Emissions by Equipment

Phase	Description	Year	CO Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower WB	2015	0.666	2.265	0.492	0.000	0.000	0.000	0.000	2.335
1	EPBM Flower WB	2016	0.692	2.368	0.505	0.000	0.000	0.000	0.000	2.442
2	EPBM Flower EB	2016	0.692	2.368	0.505	0.000	0.000	0.000	0.000	2.442
2	EPBM Flower EB	2017	0.718	2.467	0.518	0.000	0.000	0.000	0.000	2.545
3	Grouting on Flower	2014	0.000	0.000	0.000	0.000	4.695	0.694	2.310	2.224
3	Grouting on Flower	2015	0.000	0.000	0.000	0.000	4.713	0.707	2.352	2.335
4	Open Face/Shield on Flower	2016	0.692	2.368	0.505	0.000	0.000	0.000	0.000	2.442
5	SEM on Flower	2016	0.692	2.368	0.505	0.000	0.000	0.000	0.000	2.442
5	SEM on Flower	2017	0.718	2.467	0.518	0.000	0.000	0.000	0.000	2.545
6	Cut & Cover Along Flower Street	2017	0.718	2.467	0.518	0.322	0.000	0.000	0.000	2.545
2	Cut & Cover Along Flower Street	2015	0.666	2.265	0.492	0.000	0.000	0.000	0.000	2.335
2	Cut & Cover Along Flower Street	2016	0.692	2.368	0.505	0.000	0.000	0.000	0.000	2.442
2	Cut & Cover Along Flower Street	2017	0.718	2.467	0.518	0.000	0.000	0.000	0.000	2.545

Table 2-4: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative A
<u>Hourly Emissions by Equipment</u>

Phase	Description	Year	NOx Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower WB	2015	0.181	1.714	0.135	0.000	0.000	0.000	0.000	0.631
1	EPBM Flower WB	2016	0.186	1.754	0.137	0.000	0.000	0.000	0.000	0.652
2	EPBM Flower EB	2016	0.186	1.754	0.137	0.000	0.000	0.000	0.000	0.652
2	EPBM Flower EB	2017	0.191	1.791	0.140	0.000	0.000	0.000	0.000	0.672
3	Grouting on Flower	2014	0.000	0.000	0.000	0.000	11.306	0.192	0.639	0.609
3	Grouting on Flower	2015	0.000	0.000	0.000	0.000	11.251	0.194	0.647	0.631
4	Open Face/Shield on Flower	2016	0.186	1.754	0.137	0.000	0.000	0.000	0.000	0.652
5	SEM on Flower	2016	0.186	1.754	0.137	0.000	0.000	0.000	0.000	0.652
5	SEM on Flower	2017	0.191	1.791	0.140	0.000	0.000	0.000	0.000	0.672
6	Cut & Cover Along Flower Street	2017	0.191	1.791	0.140	0.087	0.000	0.000	0.000	0.672
2	Cut & Cover Along Flower Street	2015	0.181	1.714	0.135	0.000	0.000	0.000	0.000	0.631
2	Cut & Cover Along Flower Street	2016	0.186	1.754	0.137	0.000	0.000	0.000	0.000	0.652
2	Cut & Cover Along Flower Street	2017	0.191	1.791	0.140	0.000	0.000	0.000	0.000	0.672

Table 2-4: Hourly, Daily and Annual Emissions Summary (Construction Equipment) - Alternative A

Hourly Emissions by Equipment

Phase	Description	Year	SO2 Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower WB	2015	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
1	EPBM Flower WB	2016	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
2	EPBM Flower EB	2016	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
2	EPBM Flower EB	2017	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
3	Grouting on Flower	2014	0.000	0.000	0.000	0.000	0.028	0.004	0.014	0.013
3	Grouting on Flower	2015	0.000	0.000	0.000	0.000	0.028	0.004	0.014	0.013
4	Open Face/Shield on Flower	2016	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
5	SEM on Flower	2016	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
5	SEM on Flower	2017	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
6	Cut & Cover Along Flower Street	2017	0.004	0.005	0.003	0.002	0.000	0.000	0.000	0.013
2	Cut & Cover Along Flower Street	2015	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
2	Cut & Cover Along Flower Street	2016	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
2	Cut & Cover Along Flower Street	2017	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013

Table 2-4: Hourly, Daily and Annual Emissions Summary (Construction Equipment) - Alternative A

Hourly Emissions by Equipment

Phase	Description	Year	PM10 Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower WB	2015	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
1	EPBM Flower WB	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
2	EPBM Flower EB	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
2	EPBM Flower EB	2017	0.008	0.009	0.005	0.000	0.000	0.000	0.000	0.027
3	Grouting on Flower	2014	0.000	0.000	0.000	0.000	0.269	0.007	0.022	0.022
3	Grouting on Flower	2015	0.000	0.000	0.000	0.000	0.277	0.007	0.022	0.023
4	Open Face/Shield on Flower	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
5	SEM on Flower	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
5	SEM on Flower	2017	0.008	0.009	0.005	0.000	0.000	0.000	0.000	0.027
6	Cut & Cover Along Flower Street	2017	0.008	0.009	0.005	0.003	0.000	0.000	0.000	0.027
2	Cut & Cover Along Flower Street	2015	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
2	Cut & Cover Along Flower Street	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
2	Cut & Cover Along Flower Street	2017	0.008	0.009	0.005	0.000	0.000	0.000	0.000	0.027

Table 2-4: Hourly, Daily and Annual Emissions Summary (Construction Equipment) - Alternative A

Hourly Emissions by Equipment

Phase	Description	Year	PM2.5 Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower WB	2015	0.006	0.007	0.004	0.000	0.000	0.000	0.000	0.022
1	EPBM Flower WB	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
2	EPBM Flower EB	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
2	EPBM Flower EB	2017	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
3	Grouting on Flower	2014	0.000	0.000	0.000	0.000	0.247	0.006	0.020	0.020
3	Grouting on Flower	2015	0.000	0.000	0.000	0.000	0.255	0.006	0.021	0.022
4	Open Face/Shield on Flower	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
5	SEM on Flower	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
5	SEM on Flower	2017	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
6	Cut & Cover Along Flower Street	2017	0.007	0.008	0.005	0.003	0.000	0.000	0.000	0.025
2	Cut & Cover Along Flower Street	2015	0.006	0.007	0.004	0.000	0.000	0.000	0.000	0.022
2	Cut & Cover Along Flower Street	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
2	Cut & Cover Along Flower Street	2017	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025

Table 2-4: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative A
Daily Emissions

Phase	Description	Year	Emissions (pounds per day) ROG	CO	NOx	SO2	PM10	PM2.5
1	EPBM Flower WB	2015	12.14	115.15	53.21	0.48	0.85	0.78
1	EPBM Flower WB	2016	15.16	120.13	54.57	0.48	0.92	0.84
2	EPBM Flower EB	2016	15.16	120.13	54.57	0.48	0.92	0.84
2	EPBM Flower EB	2017	18.07	124.95	55.88	0.48	0.98	0.90
3	Grouting on Flower	2014	20.74	198.48	254.93	1.18	6.37	5.86
3	Grouting on Flower	2015	25.84	202.14	254.47	1.17	6.59	6.06
4	Open Face/Shield on Flower	2016	15.16	120.13	54.57	0.48	0.92	0.84
5	SEM on Flower	2016	15.16	120.13	54.57	0.48	0.92	0.84
5	SEM on Flower	2017	18.07	124.95	55.88	0.48	0.98	0.90
6	Cut & Cover Along Flower Street	2017	18.90	131.38	57.62	0.52	1.04	0.96

Annual Emissions - Alternative 3a (2nd/Hope Station (SEM))

Phase	Description	Year	Emissions (tons per year) ROG	CO	NOx	SO2	PM10	PM2.5
1	EPBM Flower WB	2015	0.94	8.87	4.10	0.04	0.07	0.06
1	EPBM Flower WB	2016	0.50	3.96	1.80	0.02	0.03	0.03
2	EPBM Flower EB	2016	0.50	3.96	1.80	0.02	0.03	0.03
2	EPBM Flower EB	2017	0.99	6.87	3.07	0.03	0.05	0.05
3	Grouting on Flower	2014	0.46	4.37	5.61	0.03	0.14	0.13
3	Grouting on Flower	2015	3.13	24.46	30.79	0.14	0.80	0.73
4	Open Face/Shield on Flower	2016	1.50	11.89	5.40	0.05	0.09	0.08
5	SEM on Flower	2016	0.17	1.32	0.60	0.01	0.01	0.01
5	SEM on Flower	2017	2.39	16.49	7.38	0.06	0.13	0.12
6	Cut & Cover Along Flower Street	2017	0.21	1.45	0.63	0.01	0.01	0.01

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Source:
Construction equipment emission factors from OFFROAD2007
PM10 Size Fraction: CARB Speciation Profiles http://www.arb.ca.gov/ei/speciate/dnldopt.htm

Table 2-5: Hourly, Daily and Annual Emissions Summary (Construction Equipment) - Alternative B

Inputs: Alternative 4

		Hours per	Start	End	Duration (months)				Number of Equipment							
Phase	**Description**	**Day**	**Month**	**Month**	**2014**	**2015**	**2016**	**2017**	**Dozer**	**Excavator**	**Crane**	**Drill**	**Grout Drill**	**Grout Comp**	**Grout Gen**	**Flatbed**
1	EPBM Flower	20	Jun-15	Feb-17	--	7	12	2	2	4	2	0	0	0	0	5
2	Grouting on Flower	20	Feb-15	Oct-15	--	8	--	--	0	0	0	0	2	2	2	5
3	SEM on Flower	20	Apr-16	May-17	--	--	9	5	2	4	2	0	0	0	0	5
4	Cut & Cover Along Flower Street	20	May-17	Jul-17	--	--	--	2	2	4	2	1	0	0	0	5

Work days per month 22

Table 2-5: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative B

Hourly Emissions by Equipment

Phase	Description	Year	ROG Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.082	0.162	0.051	0.000	0.000	0.000	0.000	0.312
1	EPBM Flower	2016	0.102	0.200	0.061	0.000	0.000	0.000	0.000	0.395
1	EPBM Flower	2017	0.122	0.236	0.071	0.000	0.000	0.000	0.000	0.474
2	Grouting on Flower	2015	0.000	0.000	0.000	0.000	0.350	0.032	0.107	0.312
3	SEM on Flower	2016	0.102	0.200	0.061	0.000	0.000	0.000	0.000	0.395
3	SEM on Flower	2017	0.122	0.236	0.071	0.000	0.000	0.000	0.000	0.474
4	Cut & Cover Along Flower Street	2017	0.122	0.236	0.071	0.041	0.000	0.000	0.000	0.474

Table 2-5: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative B

Hourly Emissions by Equipment

Phase	Description	Year	CO Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.666	2.265	0.492	0.000	0.000	0.000	0.000	2.335
1	EPBM Flower	2016	0.692	2.368	0.505	0.000	0.000	0.000	0.000	2.442
1	EPBM Flower	2017	0.718	2.467	0.518	0.000	0.000	0.000	0.000	2.545
2	Grouting on Flower	2015	0.000	0.000	0.000	0.000	2.356	0.353	1.176	2.335
3	SEM on Flower	2016	0.692	2.368	0.505	0.000	0.000	0.000	0.000	2.442
3	SEM on Flower	2017	0.718	2.467	0.518	0.000	0.000	0.000	0.000	2.545
4	Cut & Cover Along Flower Street	2017	0.718	2.467	0.518	0.322	0.000	0.000	0.000	2.545

Table 2-5: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative B

Hourly Emissions by Equipment

Phase	Description	Year	NOx Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.181	1.714	0.135	0.000	0.000	0.000	0.000	0.631
1	EPBM Flower	2016	0.186	1.754	0.137	0.000	0.000	0.000	0.000	0.652
1	EPBM Flower	2017	0.191	1.791	0.140	0.000	0.000	0.000	0.000	0.672
2	Grouting on Flower	2015	0.000	0.000	0.000	0.000	5.625	0.097	0.324	0.631
3	SEM on Flower	2016	0.186	1.754	0.137	0.000	0.000	0.000	0.000	0.652
3	SEM on Flower	2017	0.191	1.791	0.140	0.000	0.000	0.000	0.000	0.672
4	Cut & Cover Along Flower Street	2017	0.191	1.791	0.140	0.087	0.000	0.000	0.000	0.672

Table 2-5: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative B

Hourly Emissions by Equipment

Phase	Description	Year	SO2 Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
1	EPBM Flower	2016	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
1	EPBM Flower	2017	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
2	Grouting on Flower	2015	0.000	0.000	0.000	0.000	0.014	0.002	0.007	0.013
3	SEM on Flower	2016	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
3	SEM on Flower	2017	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
4	Cut & Cover Along Flower Street	2017	0.004	0.005	0.003	0.002	0.000	0.000	0.000	0.013

Table 2-5: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative B

Hourly Emissions by Equipment

Phase	Description	Year	PM10 Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
1	EPBM Flower	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
1	EPBM Flower	2017	0.008	0.009	0.005	0.000	0.000	0.000	0.000	0.027
2	Grouting on Flower	2015	0.000	0.000	0.000	0.000	0.138	0.003	0.011	0.023
3	SEM on Flower	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
3	SEM on Flower	2017	0.008	0.009	0.005	0.000	0.000	0.000	0.000	0.027
4	Cut & Cover Along Flower Street	2017	0.008	0.009	0.005	0.003	0.000	0.000	0.000	0.027

Table 2-5: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative B

Hourly Emissions by Equipment

Phase	Description	Year	PM2.5 Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.006	0.007	0.004	0.000	0.000	0.000	0.000	0.022
1	EPBM Flower	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
1	EPBM Flower	2017	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
2	Grouting on Flower	2015	0.000	0.000	0.000	0.000	0.127	0.003	0.010	0.022
3	SEM on Flower	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
3	SEM on Flower	2017	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
4	Cut & Cover Along Flower Street	2017	0.007	0.008	0.005	0.003	0.000	0.000	0.000	0.025

Table 2-5: Hourly, Daily and Annual Emissions Summary (Construction Equipment) - Alternative B

Daily Emissions

Phase	Description	Year	Emissions (pounds per day)					
			ROG	CO	NOx	SO2	PM10	PM2.5
1	EPBM Flower	2015	12.14	115.15	53.21	0.48	0.85	0.78
1	EPBM Flower	2016	15.16	120.13	54.57	0.48	0.92	0.84
1	EPBM Flower	2017	18.07	124.95	55.88	0.48	0.98	0.90
2	Grouting on Flower	2015	16.04	124.42	133.54	0.71	3.53	3.25
3	SEM on Flower	2016	15.16	120.13	54.57	0.48	0.92	0.84
3	SEM on Flower	2017	18.07	124.95	55.88	0.48	0.98	0.90
4	Cut & Cover Along Flower Street	2017	18.90	131.38	57.62	0.52	1.04	0.96

Annual Emissions - Alternative B

Phase	Description	Year	Emissions (tons per year)					
			ROG	CO	NOx	SO2	PM10	PM2.5
1	EPBM Flower	2015	0.94	8.87	4.10	0.04	0.07	0.06
1	EPBM Flower	2016	2.00	15.86	7.20	0.06	0.12	0.11
1	EPBM Flower	2017	0.40	2.75	1.23	0.01	0.02	0.02
2	Grouting on Flower	2015	1.41	10.95	11.75	0.06	0.31	0.29
3	SEM on Flower	2016	1.50	11.89	5.40	0.05	0.09	0.08
3	SEM on Flower	2017	0.99	6.87	3.07	0.03	0.05	0.05
4	Cut & Cover Along Flower Street	2017	0.42	2.89	1.27	0.01	0.02	0.02

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Source:

Construction equipment emission factors from OFFROAD2007

PM10 Size Fraction: CARB Speciation Profiles http://www.arb.ca.gov/ei/speciate/dnldopt.htm

Table 2-6: Daily and Annual Emissions Summary (Haul Trucks) - Locally Preferred Alternative

Inputs: Locally Preferred Alternative/Baseline

Phase	Description	Truck Trips	Daily VMT	Start Month	End Month	Total	Duration (months) 2014	2015	2016	2017
1	EPBM Flower	20	400	May-15	Nov-16	19	--	8	11	--
2	Cut & Cover Along Flower Street	20	400	Sep-14	Sep-17	37	4	12	12	9

Daily vehicle miles traveled (round-trip) 20 *(estimated value)* Default value from URBEMIS

Daily Emissions

			Emissions (lb/day)													
							PM10					PM2.5				
Phase	Description	Year	ROG	CO	NOx	SO2	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust
1	EPBM Flower	2015	0.63	2.84	7.39	0.02	0.65	0.27	0.03	0.02	0.33	0.31	0.25	0.01	0.01	0.05
1	EPBM Flower	2016	0.57	2.52	6.54	0.02	0.61	0.23	0.03	0.02	0.33	0.28	0.21	0.01	0.01	0.05
2	Cut & Cover Along Flower Street	2014	0.71	3.24	8.46	0.02	0.69	0.31	0.03	0.02	0.33	0.35	0.29	0.01	0.01	0.05
2	Cut & Cover Along Flower Street	2015	0.63	2.84	7.39	0.02	0.65	0.27	0.03	0.02	0.33	0.31	0.25	0.01	0.01	0.05
2	Cut & Cover Along Flower Street	2016	0.57	2.52	6.54	0.02	0.61	0.23	0.03	0.02	0.33	0.28	0.21	0.01	0.01	0.05
2	Cut & Cover Along Flower Street	2017	0.53	2.26	5.84	0.02	0.58	0.20	0.03	0.02	0.33	0.25	0.19	0.01	0.01	0.05

Annual Emissions

			Emissions (tons per year)													
							PM10					PM2.5				
Phase	Description	Year	ROG	CO	NOx	SO2	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust
1	EPBM Flower	2015	5.57E-02	2.50E-01	6.50E-01	1.40E-03	5.71E-02	2.34E-02	2.79E-03	2.17E-03	2.87E-02	2.75E-02	2.16E-02	6.98E-04	9.31E-04	4.31E-03
1	EPBM Flower	2016	6.95E-02	3.05E-01	7.91E-01	1.92E-03	7.43E-02	2.80E-02	3.84E-03	2.99E-03	3.95E-02	3.39E-02	2.57E-02	9.60E-04	1.28E-03	5.92E-03
2	Cut & Cover Along Flower Street	2014	3.11E-02	1.43E-01	3.72E-01	6.98E-04	3.06E-02	1.37E-02	1.40E-03	1.09E-03	1.44E-02	1.56E-02	1.26E-02	3.49E-04	4.66E-04	2.15E-03
2	Cut & Cover Along Flower Street	2015	8.36E-02	3.75E-01	9.75E-01	2.10E-03	8.57E-02	3.52E-02	4.19E-03	3.26E-03	4.31E-02	4.13E-02	3.24E-02	1.05E-03	1.40E-03	6.46E-03
2	Cut & Cover Along Flower Street	2016	7.58E-02	3.33E-01	8.63E-01	2.10E-03	8.10E-02	3.05E-02	4.19E-03	3.26E-03	4.31E-02	3.70E-02	2.81E-02	1.05E-03	1.40E-03	6.46E-03
2	Cut & Cover Along Flower Street	2017	5.20E-02	2.24E-01	5.78E-01	1.57E-03	5.78E-02	1.99E-02	3.14E-03	2.44E-03	3.23E-02	2.50E-02	1.83E-02	7.86E-04	1.05E-03	4.85E-03

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Comments:

INDEX formula used to look-up emission factor from "EMFAC_Construction.xlsx" spreadsheet.

MATCH formula used to identify row number and column number for each year-pollutant combination.

Paved Road PM10 Emission Factors

	Emission Factor (g/VMT)		
Condition	High-ADT	Low-ADT	Average
Average	0.37	1.3	0.81
Worst-Case	0.64	3.9	2.1

PM Size Fractions

PM10	0.4572
PM2.5	0.0686
PM2.5 EF	0.06

Source:

Midwest Research Institute (MRI). 1996. *Improvement of Specific Emission Factors (BADM Project No. 1)* . Final Report. March 29. Table ES-3.

PM10 and PM 2.5 Size Fractions: CARB Speciation Profiles. Profile Number 471 (PAVED ROAD DUST, 97 N AFTER)
http://www.arb.ca.gov/ei/speciate/dnldopt.htm

Table 2-9: Daily and Annual Emissions Summary (Haul Trucks) - Alternative A

Inputs: Alternative 3

Phase	Description	Truck Trips	Daily VMT	Start Month	End Month	Total	Duration (months) 2014	2015	2016	2017
1	EPBM Flower WB	20	400	Jun-15	Mar-16	10	--	7	3	--
2	EPBM Flower EB	20	400	Oct-16	May-17	8	--	--	3	5
3	Grouting on Flower	0	0	Nov-14	Nov-15	13	2	11	--	--
4	Open Face/Shield on Flower	20	400	Mar-16	Dec-16	10	--	--	10	--
5	SEM on Flower	20	400	Dec-16	Dec-17	13	--	--	1	12
6	Cut & Cover Along Flower Street	20	400	Dec-17	Feb-18	3	--	--	--	1

Daily vehicle miles traveled (round-trip) 20 *(estimated value)* Default value from URBEMIS

Daily Emissions

			Emissions (lb/day)															
									PM10					PM2.5				
Phase	Description	Year	ROG	CO	NOx	SO2	CO2	CH4	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust
1	EPBM Flower WB	2015	0.63	2.84	7.39	0.02	1696.86	0.03	0.65	0.27	0.03	0.02	0.33	0.31	0.25	0.01	0.01	0.05
1	EPBM Flower WB	2016	0.57	2.52	6.54	0.02	1696.86	0.03	0.61	0.23	0.03	0.02	0.33	0.28	0.21	0.01	0.01	0.05
2	EPBM Flower EB	2016	0.57	2.52	6.54	0.02	1696.86	0.03	0.61	0.23	0.03	0.02	0.33	0.28	0.21	0.01	0.01	0.05
2	EPBM Flower EB	2017	0.53	2.26	5.84	0.02	1696.86	0.02	0.58	0.20	0.03	0.02	0.33	0.25	0.19	0.01	0.01	0.05
3	Grouting on Flower	2014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Grouting on Flower	2015	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Open Face/Shield on Flower	2016	0.57	2.52	6.54	0.02	1696.86	0.03	0.61	0.23	0.03	0.02	0.33	0.28	0.21	0.01	0.01	0.05
5	SEM on Flower	2016	0.57	2.52	6.54	0.02	1696.86	0.03	0.61	0.23	0.03	0.02	0.33	0.28	0.21	0.01	0.01	0.05
5	SEM on Flower	2017	0.53	2.26	5.84	0.02	1696.86	0.02	0.58	0.20	0.03	0.02	0.33	0.25	0.19	0.01	0.01	0.05
6	Cut & Cover Along Flower Street	2017	0.53	2.26	5.84	0.02	1696.86	0.02	0.58	0.20	0.03	0.02	0.33	0.25	0.19	0.01	0.01	0.05

Annual Emissions

			Emissions (tons per year)															
									PM10					PM2.5				
Phase	Description	Year	ROG	CO	NOx	SO2	CO2	CH4	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust
1	EPBM Flower WB	2015	4.88E-02	2.19E-01	5.69E-01	1.22E-03	130.66	2.24E-03	5.00E-02	2.05E-02	2.44E-03	1.90E-03	2.51E-02	2.41E-02	1.89E-02	6.11E-04	8.15E-04	3.77E-03
1	EPBM Flower WB	2016	1.89E-02	8.33E-02	2.16E-01	5.24E-04	56.00	8.73E-04	2.03E-02	7.62E-03	1.05E-03	8.15E-04	1.08E-02	9.24E-03	7.01E-03	2.62E-04	3.49E-04	1.62E-03
2	EPBM Flower EB	2016	1.89E-02	8.33E-02	2.16E-01	5.24E-04	56.00	8.73E-04	2.03E-02	7.62E-03	1.05E-03	8.15E-04	1.08E-02	9.24E-03	7.01E-03	2.62E-04	3.49E-04	1.62E-03
2	EPBM Flower EB	2017	2.89E-02	1.25E-01	3.21E-01	8.73E-04	93.33	1.36E-03	3.21E-02	1.11E-02	1.75E-03	1.36E-03	1.79E-02	1.39E-02	1.02E-02	4.37E-04	5.82E-04	2.69E-03
3	Grouting on Flower	2014	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	Grouting on Flower	2015	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	Open Face/Shield on Flower	2016	6.31E-02	2.78E-01	7.19E-01	1.75E-03	186.65	2.91E-03	6.75E-02	2.54E-02	3.49E-03	2.72E-03	3.59E-02	3.08E-02	2.34E-02	8.73E-04	1.16E-03	5.39E-03
5	SEM on Flower	2016	6.31E-03	2.78E-02	7.19E-02	1.75E-04	18.67	2.91E-04	6.75E-03	2.54E-03	3.49E-04	2.72E-04	3.59E-03	3.08E-03	2.34E-03	8.73E-05	1.16E-04	5.39E-04
5	SEM on Flower	2017	6.94E-02	2.99E-01	7.71E-01	2.10E-03	223.98	3.26E-03	7.71E-02	2.65E-02	4.19E-03	3.26E-03	4.31E-02	3.34E-02	2.44E-02	1.05E-03	1.40E-03	6.46E-03
6	Cut & Cover Along Flower Street	2017	5.78E-03	2.49E-02	6.42E-02	1.75E-04	18.67	2.72E-04	6.42E-03	2.21E-03	3.49E-04	2.72E-04	3.59E-03	2.78E-03	2.04E-03	8.73E-05	1.16E-04	5.39E-04

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Comments:

INDEX formula used to look-up emission factor from "EMFAC_Construction.xlsx" spreadsheet.

MATCH formula used to identify row number and column number for each year-pollutant combination.

Paved Road PM10 Emission Factors

	Emission Factor (g/VMT)		
Condition	High-ADT	Low-ADT	Average
Average	0.37	1.3	0.81
Worst-Case	0.64	3.9	2.1

PM Size Fractions

PM10	0.4572
PM2.5	0.0686
PM2.5 EF	0.06

Source:

Midwest Research Institute (MRI). 1996. *Improvement of Specific Emission Factors (BADM Project No. 1)* . Final Report. March 29. Table ES-3.

PM10 and PM 2.5 Size Fractions: CARB Speciation Profiles. Profile Number 471 (PAVED ROAD DUST, 97 N AFTER)

http://www.arb.ca.gov/ei/speciate/dnldopt.htm

Table 2-10: Daily and Annual Emissions Summary (Haul Trucks) - Alternative B

Inputs: Alternative 4

Phase	Description	Truck Trips	Daily VMT	Start Month	End Month	Total	Duration (months) 2014	2015	2016	2017
1	EPBM Flower	20	400	Jun-15	Feb-17	21	--	7	12	2
2	Grouting on Flower	0	0	Feb-15	Oct-15	9	--	9	--	--
3	SEM on Flower	20	400	Apr-16	May-17	14	--	--	9	5
4	Cut & Cover Along Flower Street	20	400	May-17	Jul-17	3	--	--	--	3
5	SEM on Flower	20	400	Dec-16	Dec-17	13	--	--	1	12
6	Cut & Cover Along Flower Street	20	400	Dec-17	Feb-18	3	--	--	--	1

Daily vehicle miles traveled (round-trip) 20 *(estimated value)* Default value from URBEMIS

Daily Emissions

			Emissions (lb/day)															
									PM10					PM2.5				
Phase	Description	Year	ROG	CO	NOx	SO2	CO2	CH4	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust
1	EPBM Flower	2015	0.63	2.84	7.39	0.02	1696.86	0.03	0.65	0.27	0.03	0.02	0.33	0.31	0.25	0.01	0.01	0.05
1	EPBM Flower	2016	0.57	2.52	6.54	0.02	1696.86	0.03	0.61	0.23	0.03	0.02	0.33	0.28	0.21	0.01	0.01	0.05
1	EPBM Flower	2017	0.53	2.26	5.84	0.02	1696.86	0.02	0.58	0.20	0.03	0.02	0.33	0.25	0.19	0.01	0.01	0.05
2	Grouting on Flower	2015	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	SEM on Flower	2016	0.57	2.52	6.54	0.02	1696.86	0.03	0.61	0.23	0.03	0.02	0.33	0.28	0.21	0.01	0.01	0.05
3	SEM on Flower	2017	0.53	2.26	5.84	0.02	1696.86	0.02	0.58	0.20	0.03	0.02	0.33	0.25	0.19	0.01	0.01	0.05
4	Cut & Cover Along Flower Street	2017	0.53	2.26	5.84	0.02	1696.86	0.02	0.58	0.20	0.03	0.02	0.33	0.25	0.19	0.01	0.01	0.05
5	SEM on Flower	2016	0.57	2.52	6.54	0.02	1696.86	0.03	0.61	0.23	0.03	0.02	0.33	0.28	0.21	0.01	0.01	0.05
5	SEM on Flower	2017	0.53	2.26	5.84	0.02	1696.86	0.02	0.58	0.20	0.03	0.02	0.33	0.25	0.19	0.01	0.01	0.05
6	Cut & Cover Along Flower Street	2017	0.53	2.26	5.84	0.02	1696.86	0.02	0.58	0.20	0.03	0.02	0.33	0.25	0.19	0.01	0.01	0.05

Annual Emissions

			Emissions (tons per year)															
									PM10					PM2.5				
Phase	Description	Year	ROG	CO	NOx	SO2	CO2	CH4	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust
1	EPBM Flower	2015	4.88E-02	2.19E-01	5.69E-01	1.22E-03	130.66	2.24E-03	5.00E-02	2.05E-02	2.44E-03	1.90E-03	2.51E-02	2.41E-02	1.89E-02	6.11E-04	8.15E-04	3.77E-03
1	EPBM Flower	2016	7.58E-02	3.33E-01	8.63E-01	2.10E-03	223.98	3.49E-03	8.10E-02	3.05E-02	4.19E-03	3.26E-03	4.31E-02	3.70E-02	2.81E-02	1.05E-03	1.40E-03	6.46E-03
1	EPBM Flower	2017	1.16E-02	4.98E-02	1.28E-01	3.49E-04	37.33	5.43E-04	1.28E-02	4.42E-03	6.98E-04	5.43E-04	7.18E-03	5.56E-03	4.07E-03	1.75E-04	2.33E-04	1.08E-03
2	Grouting on Flower	2015	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	SEM on Flower	2016	5.68E-02	2.50E-01	6.47E-01	1.57E-03	167.99	2.62E-03	6.08E-02	2.29E-02	3.14E-03	2.44E-03	3.23E-02	2.77E-02	2.10E-02	7.86E-04	1.05E-03	4.85E-03
3	SEM on Flower	2017	2.89E-02	1.25E-01	3.21E-01	8.73E-04	93.33	1.36E-03	3.21E-02	1.11E-02	1.75E-03	1.36E-03	1.79E-02	1.39E-02	1.02E-02	4.37E-04	5.82E-04	2.69E-03
4	Cut & Cover Along Flower Street	2017	1.73E-02	7.47E-02	1.93E-01	5.24E-04	56.00	8.15E-04	1.93E-02	6.63E-03	1.05E-03	8.15E-04	1.08E-02	8.34E-03	6.11E-03	2.62E-04	3.49E-04	1.62E-03
5	SEM on Flower	2016	5.68E-02	2.50E-01	6.47E-01	1.57E-03	167.99	2.62E-03	6.08E-02	2.29E-02	3.14E-03	2.44E-03	3.23E-02	2.77E-02	2.10E-02	7.86E-04	1.05E-03	4.85E-03
5	SEM on Flower	2017	2.89E-02	1.25E-01	3.21E-01	8.73E-04	93.33	1.36E-03	3.21E-02	1.11E-02	1.75E-03	1.36E-03	1.79E-02	1.39E-02	1.02E-02	4.37E-04	5.82E-04	2.69E-03
6	Cut & Cover Along Flower Street	2017	1.73E-02	7.47E-02	1.93E-01	5.24E-04	56.00	8.15E-04	1.93E-02	6.63E-03	1.05E-03	8.15E-04	1.08E-02	8.34E-03	6.11E-03	2.62E-04	3.49E-04	1.62E-03

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Comments:

INDEX formula used to look-up emission factor from "EMFAC_Construction.xlsx" spreadsheet.

MATCH formula used to identify row number and column number for each year-pollutant combination.

Paved Road PM10 Emission Factors

	Emission Factor (g/VMT)		
Condition	High-ADT	Low-ADT	Average
Average	0.37	1.3	0.81
Worst-Case	0.64	3.9	2.1

PM Size Fractions

PM10	0.4572
PM2.5	0.0686
PM2.5 EF	0.06

Source:

Midwest Research Institute (MRI). 1996. *Improvement of Specific Emission Factors (BADM Project No. 1)* . Final Report. March 29. Table ES-3.

PM10 and PM 2.5 Size Fractions: CARB Speciation Profiles. Profile Number 471 (PAVED ROAD DUST, 97 N AFTER)

http://www.arb.ca.gov/ei/speciate/dnldopt.htm

Table 2-11: Daily and Annual Emissions Summary (Worker Commute) - Locally Preferred Alternative

Inputs: Locally Preferred Alternative/Baseline

Phase	Description	No. of Crew	Daily VMT	Start Month	End Month	Total	Duration (months) 2014	2015	2016	2017
1	EPBM Flower	20	600	May-15	Nov-16	19	--	8	11	--
2	Cut & Cover Along Flower Street	30	900	Sep-14	Sep-17	37	4	12	12	9

Daily vehicle miles traveled (round-trip) 30 *(estimated value)*

Daily Emissions

			Emissions (lb/day)													
							PM10					PM2.5				
Phase	Description	Year	ROG	CO	NOx	SO2	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust
1	EPBM Flower	2015	0.07	2.53	0.20	0.00	1.11	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16
1	EPBM Flower	2016	0.06	2.33	0.18	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16
2	Cut & Cover Along Flower Street	2014	0.12	4.17	0.34	0.01	1.67	0.02	0.02	0.03	1.61	0.28	0.02	0.00	0.01	0.24
2	Cut & Cover Along Flower Street	2015	0.10	3.80	0.30	0.01	1.67	0.02	0.02	0.03	1.61	0.28	0.02	0.00	0.01	0.24
2	Cut & Cover Along Flower Street	2016	0.09	3.49	0.27	0.01	1.67	0.02	0.02	0.03	1.61	0.28	0.02	0.00	0.01	0.24
2	Cut & Cover Along Flower Street	2017	0.07	3.19	0.25	0.01	1.67	0.02	0.02	0.03	1.61	0.28	0.02	0.00	0.01	0.24

Annual Emissions

			Emissions (tons per year)													
							PM10					PM2.5				
Phase	Description	Year	ROG	CO	NOx	SO2	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust
1	EPBM Flower	2015	5.94E-03	2.23E-01	1.78E-02	4.07E-04	9.81E-02	1.34E-03	9.31E-04	1.51E-03	9.43E-02	1.62E-02	1.28E-03	2.33E-04	5.82E-04	1.41E-02
1	EPBM Flower	2016	6.96E-03	2.82E-01	2.22E-02	5.60E-04	1.35E-01	1.92E-03	1.28E-03	2.08E-03	1.30E-01	2.23E-02	1.76E-03	3.20E-04	8.00E-04	1.95E-02
2	Cut & Cover Along Flower Street	2014	5.28E-03	1.83E-01	1.48E-02	3.06E-04	7.36E-02	1.00E-03	6.98E-04	1.13E-03	7.07E-02	1.22E-02	9.60E-04	1.75E-04	4.37E-04	1.06E-02
2	Cut & Cover Along Flower Street	2015	1.34E-02	5.02E-01	3.99E-02	9.17E-04	2.21E-01	3.01E-03	2.10E-03	3.40E-03	2.12E-01	3.65E-02	2.88E-03	5.24E-04	1.31E-03	3.18E-02
2	Cut & Cover Along Flower Street	2016	1.14E-02	4.61E-01	3.63E-02	9.17E-04	2.21E-01	3.14E-03	2.10E-03	3.40E-03	2.12E-01	3.65E-02	2.88E-03	5.24E-04	1.31E-03	3.18E-02
2	Cut & Cover Along Flower Street	2017	7.07E-03	3.16E-01	2.47E-02	6.88E-04	1.66E-01	2.36E-03	1.57E-03	2.55E-03	1.59E-01	2.74E-02	2.16E-03	3.93E-04	9.82E-04	2.39E-02

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Comments:
INDEX formula used to look-up emission factor from "EMFAC_Construction.xlsx" spreadsheet.
MATCH formula used to identify row number and column number for each year-pollutant combination.

Paved Road PM10 Emission Factors

	Emission Factor (g/VMT)		
Condition	High-ADT	Low-ADT	Average
Average	0.37	1.3	0.81
Worst-Case	0.64	3.9	2.1

PM Size Fractions

PM10	0.4572
PM2.5	0.0686
PM2.5 EF	0.12

Source:
Midwest Research Institute (MRI). 1996. *Improvement of Specific Emission Factors (BADM Project No. 1)* . Final Report. March 29. Table ES-3.

PM10 and PM 2.5 Size Fractions: CARB Speciation Profiles. Profile Number 471 (PAVED ROAD DUST, 97 N AFTER)
http://www.arb.ca.gov/ei/speciate/dnldopt.htm

Table 2-14: Daily and Annual Emissions Summary (Worker Commute) - Alternative A

Inputs: Alternative 3

Phase	Description	No. of Crew	Daily VMT	Start Month	End Month	Duration (months) Total	2014	2015	2016	2017
1	EPBM Flower WB	20	600	Jun-15	Mar-16	10	--	7	3	--
2	EPBM Flower EB	20	600	Oct-16	May-17	8	--	--	3	5
3	Grouting on Flower	40	1,200	Nov-14	Nov-15	13	2	11	--	--
4	Open Face/Shield on Flower	20	600	Mar-16	Dec-16	10	--	--	10	--
5	SEM on Flower	20	600	Dec-16	Dec-17	13	--	--	1	12
6	Cut & Cover Along Flower Street	30	900	Dec-17	Feb-18	3	--	--	--	1

Daily vehicle miles traveled (round-trip) 30 *(estimated value)*

Daily Emissions

			Emissions (lb/day)													
							PM10					PM2.5				
Phase	Description	Year	ROG	CO	NOx	SO2	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust
1	EPBM Flower WB	2015	0.07	2.53	0.20	0.00	1.11	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16
1	EPBM Flower WB	2016	0.06	2.33	0.18	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16
2	EPBM Flower EB	2016	0.06	2.33	0.18	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16
2	EPBM Flower EB	2017	0.05	2.13	0.17	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16
3	Grouting on Flower	2014	0.16	5.56	0.45	0.01	2.23	0.03	0.02	0.03	2.14	0.37	0.03	0.01	0.01	0.32
3	Grouting on Flower	2015	0.13	5.07	0.40	0.01	2.23	0.03	0.02	0.03	2.14	0.37	0.03	0.01	0.01	0.32
4	Open Face/Shield on Flower	2016	0.06	2.33	0.18	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16
5	SEM on Flower	2016	0.06	2.33	0.18	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16
5	SEM on Flower	2017	0.05	2.13	0.17	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16
6	Cut & Cover Along Flower Street	2017	0.07	3.19	0.25	0.01	1.67	0.02	0.02	0.03	1.61	0.28	0.02	0.00	0.01	0.24

Table 2-14: Daily and Annual Emissions Summary (Worker Commute) - Alternative A

Annual Emissions

Phase	Description	Year	Emissions (tons per year)													
							PM10					PM2.5				
			ROG	CO	NOx	SO2	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust
1	EPBM Flower WB	2015	5.19E-03	1.95E-01	1.55E-02	3.56E-04	8.58E-02	1.17E-03	8.15E-04	1.32E-03	8.25E-02	1.42E-02	1.12E-03	2.04E-04	5.09E-04	1.24E-02
1	EPBM Flower WB	2016	1.90E-03	7.68E-02	6.05E-03	1.53E-04	3.68E-02	5.24E-04	3.49E-04	5.67E-04	3.54E-02	6.09E-03	4.80E-04	8.73E-05	2.18E-04	5.31E-03
2	EPBM Flower EB	2016	1.90E-03	7.68E-02	6.05E-03	1.53E-04	3.68E-02	5.24E-04	3.49E-04	5.67E-04	3.54E-02	6.09E-03	4.80E-04	8.73E-05	2.18E-04	5.31E-03
2	EPBM Flower EB	2017	2.62E-03	1.17E-01	9.13E-03	2.55E-04	6.13E-02	8.73E-04	5.82E-04	9.46E-04	5.89E-02	1.02E-02	8.00E-04	1.46E-04	3.64E-04	8.84E-03
3	Grouting on Flower	2014	3.52E-03	1.22E-01	9.84E-03	2.04E-04	4.90E-02	6.69E-04	4.66E-04	7.57E-04	4.71E-02	8.12E-03	6.40E-04	1.16E-04	2.91E-04	7.07E-03
3	Grouting on Flower	2015	1.63E-02	6.13E-01	4.88E-02	1.12E-03	2.70E-01	3.68E-03	2.56E-03	4.16E-03	2.59E-01	4.47E-02	3.52E-03	6.40E-04	1.60E-03	3.89E-02
4	Open Face/Shield on Flower	2016	6.33E-03	2.56E-01	2.02E-02	5.09E-04	1.23E-01	1.75E-03	1.16E-03	1.89E-03	1.18E-01	2.03E-02	1.60E-03	2.91E-04	7.28E-04	1.77E-02
5	SEM on Flower	2016	6.33E-04	2.56E-02	2.02E-03	5.09E-05	1.23E-02	1.75E-04	1.16E-04	1.89E-04	1.18E-02	2.03E-03	1.60E-04	2.91E-05	7.28E-05	1.77E-03
5	SEM on Flower	2017	6.29E-03	2.81E-01	2.19E-02	6.11E-04	1.47E-01	2.10E-03	1.40E-03	2.27E-03	1.41E-01	2.44E-02	1.92E-03	3.49E-04	8.73E-04	2.12E-02
6	Cut & Cover Along Flower Street	2017	7.86E-04	3.51E-02	2.74E-03	7.64E-05	1.84E-02	2.62E-04	1.75E-04	2.84E-04	1.77E-02	3.05E-03	2.40E-04	4.37E-05	1.09E-04	2.65E-03

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Comments:

INDEX formula used to look-up emission factor from "EMFAC_Construction.xlsx" spreadsheet.

MATCH formula used to identify row number and column number for each year-pollutant combination.

Paved Road PM10 Emission Factors

Condition	Emission Factor (g/VMT)		
	High-ADT	Low-ADT	Average
Average	0.37	1.3	0.81
Worst-Case	0.64	3.9	2.1

PM Size Fractions

PM10	0.4572
PM2.5	0.0686
PM2.5 EF	0.12

Source:

Midwest Research Institute (MRI). 1996. *Improvement of Specific Emission Factors (BADM Project No. 1)* . Final Report. March 29. Table ES-3.

PM10 and PM 2.5 Size Fractions: CARB Speciation Profiles. Profile Number 471 (PAVED ROAD DUST, 97 N AFTER)

http://www.arb.ca.gov/ei/speciate/dnldopt.htm

Table 2-15: Daily and Annual Emissions Summary (Worker Commute) - Alternative B

Inputs: Alternative 4

Phase	Description	No. of Crew	Daily VMT	Start Month	End Month	Total	Duration (months) 2014	2015	2016	2017
1	EPBM Flower	20	600	Jun-15	Feb-17	21	--	7	12	2
2	Grouting on Flower	20	600	Feb-15	Oct-15	9	--	9	--	--
3	SEM on Flower	20	600	Apr-16	May-17	14	--	--	9	5
4	Cut & Cover Along Flower Street	30	900	May-17	Jul-17	3	--	--	--	3
5	SEM on Flower	20	600	Dec-16	Dec-17	13	--	--	1	12
6	Cut & Cover Along Flower Street	20	600	Dec-17	Feb-18	3	--	--	--	1

Daily vehicle miles traveled (round-trip) 30 *(estimated value)*

Daily Emissions

Phase	Description	Year	Emissions (lb/day) ROG	CO	NOx	SO2	PM10 Total	PM10 Exhaust	PM10 Tire Wear	PM10 Brake Wear	PM10 Paved Road Dust	PM2.5 Total	PM2.5 Exhaust	PM2.5 Tire Wear	PM2.5 Brake Wear	PM2.5 Paved Road Dust
1	EPBM Flower	2015	0.07	2.53	0.20	0.00	1.11	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16
1	EPBM Flower	2016	0.06	2.33	0.18	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16
1	EPBM Flower	2017	0.05	2.13	0.17	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16
2	Grouting on Flower	2015	0.07	2.53	0.20	0.00	1.11	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16
3	SEM on Flower	2016	0.06	2.33	0.18	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16
3	SEM on Flower	2017	0.05	2.13	0.17	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16
4	Cut & Cover Along Flower Street	2017	0.07	3.19	0.25	0.01	1.67	0.02	0.02	0.03	1.61	0.28	0.02	0.00	0.01	0.24
5	SEM on Flower	2016	0.86	3.79	9.81	0.02	0.92	0.35	0.05	0.04	0.49	0.51	0.32	0.01	0.02	0.16
5	SEM on Flower	2017	0.79	3.40	8.76	0.02	0.88	0.30	0.05	0.04	0.49	0.47	0.28	0.01	0.02	0.16
6	Cut & Cover Along Flower Street	2017	0.79	3.40	8.76	0.02	0.88	0.30	0.05	0.04	0.49	0.47	0.28	0.01	0.02	0.16

Table 2-15: Daily and Annual Emissions Summary (Worker Commute) - Alternative B

Annual Emissions

			Emissions (tons per year)													
							PM10					PM2.5				
Phase	Description	Year	ROG	CO	NOx	SO2	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust
1	EPBM Flower	2015	5.19E-03	1.95E-01	1.55E-02	3.56E-04	8.58E-02	1.17E-03	8.15E-04	1.32E-03	8.25E-02	1.42E-02	1.12E-03	2.04E-04	5.09E-04	1.24E-02
1	EPBM Flower	2016	7.60E-03	3.07E-01	2.42E-02	6.11E-04	1.47E-01	2.10E-03	1.40E-03	2.27E-03	1.41E-01	2.44E-02	1.92E-03	3.49E-04	8.73E-04	2.12E-02
1	EPBM Flower	2017	1.05E-03	4.68E-02	3.65E-03	1.02E-04	2.45E-02	3.49E-04	2.33E-04	3.78E-04	2.36E-02	4.06E-03	3.20E-04	5.82E-05	1.46E-04	3.54E-03
2	Grouting on Flower	2015	6.68E-03	2.51E-01	2.00E-02	4.58E-04	1.10E-01	1.51E-03	1.05E-03	1.70E-03	1.06E-01	1.83E-02	1.44E-03	2.62E-04	6.55E-04	1.59E-02
3	SEM on Flower	2016	5.70E-03	2.30E-01	1.81E-02	4.58E-04	1.10E-01	1.57E-03	1.05E-03	1.70E-03	1.06E-01	1.83E-02	1.44E-03	2.62E-04	6.55E-04	1.59E-02
3	SEM on Flower	2017	2.62E-03	1.17E-01	9.13E-03	2.55E-04	6.13E-02	8.73E-04	5.82E-04	9.46E-04	5.89E-02	1.02E-02	8.00E-04	1.46E-04	3.64E-04	8.84E-03
4	Cut & Cover Along Flower Street	2017	2.36E-03	1.05E-01	8.22E-03	2.29E-04	5.52E-02	7.86E-04	5.24E-04	8.51E-04	5.30E-02	9.14E-03	7.20E-04	1.31E-04	3.27E-04	7.96E-03
5	SEM on Flower	2016	8.53E-02	3.75E-01	9.71E-01	2.36E-03	9.11E-02	3.43E-02	4.71E-03	3.67E-03	4.85E-02	5.02E-02	3.16E-02	1.18E-03	1.57E-03	1.59E-02
5	SEM on Flower	2017	4.34E-02	1.87E-01	4.82E-01	1.31E-03	4.82E-02	1.66E-02	2.62E-03	2.04E-03	2.69E-02	2.56E-02	1.53E-02	6.55E-04	8.73E-04	8.84E-03
6	Cut & Cover Along Flower Street	2017	2.60E-02	1.12E-01	2.89E-01	7.86E-04	2.89E-02	9.95E-03	1.57E-03	1.22E-03	1.62E-02	1.54E-02	9.17E-03	3.93E-04	5.24E-04	5.31E-03

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Comments:
INDEX formula used to look-up emission factor from "EMFAC_Construction.xlsx" spreadsheet.
MATCH formula used to identify row number and column number for each year-pollutant combination.

Paved Road PM10 Emission Factors

	Emission Factor (g/VMT)		
Condition	High-ADT	Low-ADT	Average
Average	0.37	1.3	0.81
Worst-Case	0.64	3.9	2.1

PM Size Fractions

PM10	0.4572
PM2.5	0.0686
PM2.5 EF	0.12

Source:
Midwest Research Institute (MRI). 1996. *Improvement of Specific Emission Factors (BADM Project No. 1)* . Final Report. March 29. Table ES-3.

PM10 and PM 2.5 Size Fractions: CARB Speciation Profiles. Profile Number 471 (PAVED ROAD DUST, 97 N AFTER)
http://www.arb.ca.gov/ei/speciate/dnldopt.htm

Table 2-16: Daily and Annual Fugitive Dust Emissions Summary - Locally Preferred Alternative

Locally Preferred Alternative

Description	Soil (cy)	Start Month	End Month	Duration (months) Total	2014	2015	2016	2017	Duration (days) Total	2014	2015	2016	2017
EPBM Flower	27,834	May-15	Nov-16	19	--	8	11	--	418	n/a	176	242	n/a
Cut & Cover Along Flower Street	118,231	Sep-14	Sep-17	37	4	9	--	--	814	88	198	n/a	n/a

Note:

Construction Schedule: 22 days/month

(assumes 5 days per week)

Material Hauling Emissions

Description		PM10 Annual Emissions (tons per year) Total	2014	2015	2016	2017	PM2.5 Annual Emissions (tons per year) Total	2014	2015	2016	2017	Daily Emissions (lbs/day) PM10	PM2.5
EPBM Flower		1.13E-02	n/a	4.78E-03	6.57E-03	n/a	1.72E-03	n/a	7.23E-04	9.94E-04	n/a	5.43E-02	8.22E-03
Cut & Cover Along Flower Street		4.82E-02	5.21E-03	1.17E-02	n/a	n/a	7.30E-03	7.89E-04	1.77E-03	n/a	n/a	1.18E-01	1.79E-02
	Total	5.95E-02	5.21E-03	1.65E-02	6.57E-03	0.00E+00	9.01E-03	7.89E-04	2.50E-03	9.94E-04	0.00E+00	1.73E-01	2.61E-02

Number of drops: 3

Note:

Yellow text - assumed value.

Daily emission calculations assume that emissions are spread evenly throughout construction period.

Table 2-19: Daily and Annual Fugitive Dust Emissions Summary - Alternative A

Alternative A

Description	Soil (cy)	Start Month	End Month	Duration (months) Total	2014	2015	2016	2017	Duration (days) Total	2014	2015	2016	2017
EPBM Flower WB	13,917	Jun-15	Mar-16	10	--	7	3	--	220	n/a	154	66	n/a
EPBM Flower EB	13,917	Oct-16	May-17	8	--	--	3	5	176	n/a	n/a	66	110
Grouting on Flower	0	Nov-14	Nov-15	13	2	11	--	--	286	44	242	n/a	n/a
Open Face/Shield on Flower	17,373	Mar-16	Dec-16	10	--	--	10	--	220	n/a	n/a	220	n/a
SEM on Flower	19,097	Dec-16	Dec-17	13	--	--	1	12	286	n/a	n/a	22	264
Cut & Cover Along Flower Street	20,925	Dec-17	Feb-18	3	--	--	--	1	66	n/a	n/a	n/a	22

Note:
Construction Schedule: 22 days/month
(assumes 5 days per week)

Material Hauling Emissions

Description	PM10 Annual Emissions (tons per year) Total	2014	2015	2016	2017	PM2.5 Annual Emissions (tons per year) Total	2014	2015	2016	2017	Daily Emissions (lbs/day) PM10	PM2.5
EPBM Flower WB	5.67E-03	n/a	3.97E-03	1.70E-03	n/a	8.59E-04	n/a	6.01E-04	2.58E-04	n/a	5.16E-02	7.81E-03
EPBM Flower EB	5.67E-03	n/a	n/a	2.13E-03	3.54E-03	8.59E-04	n/a	n/a	3.22E-04	5.37E-04	6.45E-02	9.76E-03
Grouting on Flower	0.00E+00	0.00E+00	0.00E+00	n/a	n/a	0.00E+00	0.00E+00	0.00E+00	n/a	n/a	0.00E+00	0.00E+00
Open Face/Shield on Flower	7.08E-03	n/a	n/a	7.08E-03	n/a	1.07E-03	n/a	n/a	1.07E-03	n/a	6.44E-02	9.75E-03
SEM on Flower	7.78E-03	n/a	n/a	5.99E-04	7.18E-03	1.18E-03	n/a	n/a	9.07E-05	1.09E-03	5.44E-02	8.24E-03
Cut & Cover Along Flower Street	8.53E-03	n/a	n/a	n/a	2.84E-03	1.29E-03	n/a	n/a	n/a	4.30E-04	2.58E-01	3.91E-02
Total	3.47E-02	0.00E+00	3.97E-03	1.15E-02	1.36E-02	5.26E-03	0.00E+00	6.01E-04	1.74E-03	2.06E-03	4.93E-01	7.47E-02

Number of drops: 3
Note:
Yellow text - assumed value.
Daily emission calculations assume that emissions are spread evenly throughout construction period.

Table 2-20: Daily and Annual Fugitive Dust Emissions Summary - Alternative B

Alternative B

Description	Soil (cy)	Start Month	End Month	Duration (months) Total	2014	2015	2016	2017	Duration (days) Total	2014	2015	2016	2017
EPBM Flower	44,292	Jun-15	Feb-17	21	--	7	12	2	462	n/a	154	264	44
Grouting on Flower	0	Feb-15	Oct-15	9	--	9	--	--	198	n/a	198	n/a	n/a
SEM on Flower	22,487	Apr-16	May-17	14	--	--	9	5	308	n/a	n/a	198	110
Cut & Cover Along Flower Street	16,231	May-17	Jul-17	3	--	--	--	3	66	n/a	n/a	n/a	66
SEM on Flower	19,097	Dec-16	Dec-17	13	--	--	1	12	286	n/a	n/a	22	264
Cut & Cover Along Flower Street	20,925	Dec-17	Feb-18	3	--	--	--	1	66	n/a	n/a	n/a	22

Note:
Construction Schedule: 22 days/month
(assumes 5 days per week)

Material Hauling Emissions

Description	PM10 Annual Emissions (tons per year) Total	2014	2015	2016	2017	PM2.5 Annual Emissions (tons per year) Total	2014	2015	2016	2017	Daily Emissions (lbs/day) PM10	PM2.5
EPBM Flower	1.81E-02	n/a	6.02E-03	1.03E-02	1.72E-03	2.73E-03	n/a	9.11E-04	1.56E-03	2.60E-04	7.81E-02	1.18E-02
Grouting on Flower	0.00E+00	n/a	0.00E+00	n/a	n/a	0.00E+00	n/a	0.00E+00	n/a	n/a	0.00E+00	0.00E+00
SEM on Flower	9.16E-03	n/a	n/a	5.89E-03	3.27E-03	1.39E-03	n/a	n/a	8.92E-04	4.96E-04	5.95E-02	9.01E-03
Cut & Cover Along Flower Street	6.61E-03	n/a	n/a	n/a	6.61E-03	1.00E-03	n/a	n/a	n/a	1.00E-03	2.00E-01	3.04E-02
SEM on Flower	7.78E-03	n/a	n/a	5.99E-04	7.18E-03	1.18E-03	n/a	n/a	9.07E-05	1.09E-03	5.44E-02	8.24E-03
Cut & Cover Along Flower Street	8.53E-03	n/a	n/a	n/a	2.84E-03	1.29E-03	n/a	n/a	n/a	4.30E-04	2.58E-01	3.91E-02
Total	5.01E-02	0.00E+00	6.02E-03	1.68E-02	2.16E-02	7.59E-03	0.00E+00	9.11E-04	2.54E-03	3.28E-03	6.51E-01	9.86E-02

Number of drops: 3
Note:
Yellow text - assumed value.
Daily emission calculations assume that emissions are spread evenly throughout construction period.

Localized Air Quality Impact Assessment - Localized Significance Thresholds (LST)

Table 3-1: LST Analysis - Locally Preferred Alternative/Baseline

		Mitigated			
		Maximum Daily Onsite Emissions (lbs/day)			
ID	Phase	NOx	CO	PM10	PM2.5
1	EPBM Flower	55	120	1	1
2	Cut & Cover Along Flower Street	58	131	1	1
	Allowable Emissions	74	680	5	3

[redacted]

Table 3-4: LST Analysis - Alternative A

		Mitigated			
		Maximum Daily Onsite Emissions (lbs/day)			
ID	Phase	NOx	CO	PM10	PM2.5
1	EPBM Flower WB	55	120	1	1
2	EPBM Flower EB	56	125	1	1
3	Grouting on Flower	64	51	2	2
4	Open Face/Shield on Flower	55	120	1	1
5	SEM on Flower	56	125	1	1
6	Cut & Cover Along Flower Street	58	131	1	1
	Allowable Emissions	74	680	5	3

Table 3-5: LST Analysis - Alternative B

		Mitigated			
		Maximum Daily Onsite Emissions (lbs/day)			
ID	Phase	NOx	CO	PM10	PM2.5
1	EPBM Flower	56	125	1	1
2	Grouting on Flower	67	62	2	2
3	SEM on Flower	56	125	1	1
4	Cut & Cover Along Flower Street	58	131	1	1
	Allowable Emissions	74	680	5	3

APPENDIX D

GREEN HOUSE GASES

Metro's Regional Connector Transit Corridor Supplemental Environmental Impact Study - Greenhouse Gas Emission Calculations Appendix

Prepared June 2014

Greenhouse Gas Emission Calculations - Appendix Index	
Table No.	**Table Name**
Table 1-1	GHG Emissions Summary - Locally Preferred Alternative
[redacted]	[redacted]
Table 1-4	GHG Emissions Summary - Alternative A
Table 1-5	GHG Emissions Summary - Alternative B
Table 2-1	Hourly, Daily and Annual GHG Emissions Summary (Construction Equipment) - Locally Preferred Alternative
[redacted]	[redacted]
Table 2-4	Hourly, Daily and Annual GHG Emissions Summary (Construction Equipment) - Alternative A
Table 2-5	Hourly, Daily and Annual GHG Emissions Summary (Construction Equipment) - Alternative B
Table 2-6	Daily and Annual GHG Emissions Summary (Haul Trucks) - Locally Preferred Alternative
[redacted]	[redacted]
Table 2-9	Daily and Annual GHG Emissions Summary (Haul Trucks) - Alternative A
Table 2-10	Daily and Annual GHG Emissions Summary (Haul Trucks) - Alternative B
Table 2-11	Daily and Annual GHG Emissions Summary (Worker Commute) - Locally Preferred Alternative
[redacted]	[redacted]
Table 2-14	Daily and Annual GHG Emissions Summary (Worker Commute) - Alternative A
Table 2-15	Daily and Annual GHG Emissions Summary (Worker Commute) - Alternative B

Table 1-1: GHG Emissions Summary - Locally Preferred Alternative						
GHG Emission Source	**Annual GHG Emissions (MTCO2e/yr)**				**Total Project**	**Amortized Emissions**
	2014	**2015**	**2016**	**2017**		
Construction Equipment	2,060	9,533	11,449	4,636	27,679	923
Construction Worker Commuting	31	132	147	69	379	13
Haul Trucks	68	339	390	152	948	32
Total =	**2,159**	**10,004**	**11,986**	**4,857**	**29,006**	**967**
Acronyms: MTCO2e = metric tons of carbon dioxide equivalent; MTCO2e/yr = metric tons of carbon dioxide equivalent per year						

[redacted]

Table 1-4: GHG Emissions Summary - Alternative A						
GHG Emission Source	**Annual GHG Emissions (MTCO2e/yr)**				**Total Project**	**Amortized Emissions**
	2014	**2015**	**2016**	**2017**		
Construction Equipment	2,373	16,277	7,663	8,658	34,972	1,166
Construction Worker Commuting	20	148	86	94	348	12
Haul Trucks	0	119	288	305	712	24
Total =	**2,394**	**16,543**	**8,038**	**9,057**	**36,032**	**1,201**
Acronyms: MTCO2e = metric tons of carbon dioxide equivalent; MTCO2e/yr = metric tons						

Table 1-5: GHG Emissions Summary - Alternative B						
GHG Emission Source	**Annual GHG Emissions (MTCO2e/yr)**				**Total Project**	**Amortized Emissions**
	2014	**2015**	**2016**	**2017**		
Construction Equipment	0	9,093	10,058	4,383	23,534	784
Construction Worker Commuting	0	81	335	262	678	23
Haul Trucks	0	119	508	305	931	31
Total =	**0**	**9,293**	**10,901**	**4,950**	**25,144**	**838**
Acronyms: MTCO2e = metric tons of carbon dioxide equivalent; MTCO2e/yr = metric tons						

Table 2-1: Hourly, Daily, Annual GHG Emissions Summary - Locally Preferred Alternative

Locally Preferred Alternative/Baseline

Phase	Description	Hours per Day	Start Month	End Month	Duration (months) 2014	2015	2016	2017	Number of Equipment Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	20	May-15	Nov-16	--	7	11	--	2	4	2	0	0	0	0	5
2	Cut & Cover Along Flower Street	20	Sep-14	Sep-17	4	12	12	9	2	4	2	1	0	0	0	5

Work days per month 22

Hourly Emissions by Equipment

			CO2 Emissions (pounds per hour)								CH4 Emissions (pounds per hour)							
Phase	Description	Year	Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed	Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	377.84	430.55	287.24	0.00	0.00	0.00	0.00	1303.32	0.007	0.015	0.005	0.000	0.000	0.000	0.000	0.028
1	EPBM Flower	2016	377.83	430.54	287.18	0.00	0.00	0.00	0.00	1303.29	0.009	0.018	0.006	0.000	0.000	0.000	0.000	0.036
2	Cut & Cover Along Flower Street	2014	377.92	430.55	287.22	181.02	0.00	0.00	0.00	1303.29	0.006	0.011	0.004	0.002	0.000	0.000	0.000	0.020
2	Cut & Cover Along Flower Street	2015	377.84	430.55	287.24	180.98	0.00	0.00	0.00	1303.32	0.007	0.015	0.005	0.003	0.000	0.000	0.000	0.028
2	Cut & Cover Along Flower Street	2016	377.83	430.54	287.18	180.99	0.00	0.00	0.00	1303.29	0.009	0.018	0.006	0.003	0.000	0.000	0.000	0.036
2	Cut & Cover Along Flower Street	2017	377.93	430.54	287.14	181.03	0.00	0.00	0.00	1303.26	0.011	0.021	0.006	0.004	0.000	0.000	0.000	0.043

Daily Emissions

			Emissions (pounds per day)	
Phase	Description	Year	CO2	CH4
1	EPBM Flower	2015	47978.74	1.10
1	EPBM Flower	2016	47977.00	1.37
2	Cut & Cover Along Flower Street	2014	51599.76	0.86
2	Cut & Cover Along Flower Street	2015	51598.31	1.15
2	Cut & Cover Along Flower Street	2016	51596.84	1.43
2	Cut & Cover Along Flower Street	2017	51598.13	1.71

Annual Emissions by Phase

			Emissions (tons per year)		CO2e Emissions (tons per year)			MTCO2e/Yr
Phase	Description	Year	CO2	CH4	CO2	CH4:CO2	CO2e	
1	EPBM Flower	2015	3694.36	0.08	3694.36	1.77	3696.13	3352.39
1	EPBM Flower	2016	5805.22	0.17	5805.22	3.48	5808.69	5268.48
2	Cut & Cover Along Flower Street	2014	2270.39	0.04	2270.39	0.80	2271.18	2059.96
2	Cut & Cover Along Flower Street	2015	6810.98	0.15	6810.98	3.19	6814.17	6180.45
2	Cut & Cover Along Flower Street	2016	6810.78	0.19	6810.78	3.97	6814.76	6180.99
2	Cut & Cover Along Flower Street	2017	5108.22	0.17	5108.22	3.55	5111.76	4636.37

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Source:

Construction equipment emission factors from OFFROAD2007

21 GWP of CH4:CO2

0.907 tons/MT

Table 2-1: Hourly, Daily, Annual GHG Emissions Summary - Locally Preferred Alternative

Annual GHG Emissions Summary

Year	Description	MTCO2e
2014	Cut & Cover Along Flower Street	2059.96
	2014 Total, MTCO2e/Yr =	2059.96
2015	EPBM Flower	3352.39
	Cut & Cover Along Flower Street	6180.45
	2015 Total, MTCO2e/Yr =	9532.85
2016	EPBM Flower	5268.48
	Cut & Cover Along Flower Street	6180.99
	2016 Total, MTCO2e/Yr =	11449.47
2017	Cut & Cover Along Flower Street	4636.37
	2017 Total, MTCO2e/Yr =	4636.37

Table 2-4: Hourly, Daily, Annual GHG Emissions Summary - Alternative A

Alternative 3

Phase	Description	Hours per Day	Start Month	End Month	Duration (months) 2014	2015	2016	2017	Number of Equipment Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower WB	20	Jun-15	Mar-16	--	7	3	--	2	4	2	0	0	0	0	5
2	EPBM Flower EB	20	Oct-16	May-17	--	--	3	5	2	4	2	0	0	0	0	5
3	Grouting on Flower	20	Nov-14	Nov-15	2	11	--	--	0	0	0	0	4	4	4	5
4	Open Face/Shield on Flower	20	Mar-16	Dec-16	--	--	9	--	2	4	2	0	0	0	0	5
5	SEM on Flower	20	Dec-16	Dec-17	--	--	1	12	2	4	2	0	0	0	0	5
6	Cut & Cover Along Flower Street	20	Dec-17	Feb-18	--	--	--	1	2	4	2	1	0	0	0	5

Work days per month 22

Hourly Emissions by Equipment

Phase	Description	Year	CO2 Emissions (pounds per hour) Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed	CH4 Emissions (pounds per hour) Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower WB	2015	377.84	430.55	287.24	0.00	0.00	0.00	0.00	1303.32	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.03
1	EPBM Flower WB	2016	377.83	430.54	287.18	0.00	0.00	0.00	0.00	1303.29	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.04
2	EPBM Flower EB	2016	377.83	430.54	287.18	0.00	0.00	0.00	0.00	1303.29	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.04
2	EPBM Flower EB	2017	377.93	430.54	287.14	0.00	0.00	0.00	0.00	1303.26	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.04
3	Grouting on Flower	2014	0.00	0.00	0.00	0.00	2820.76	420.62	1400.03	1303.29	0.00	0.00	0.00	0.00	0.05	0.00	0.02	0.02
3	Grouting on Flower	2015	0.00	0.00	0.00	0.00	2762.11	420.57	1399.88	1303.32	0.00	0.00	0.00	0.00	0.06	0.01	0.02	0.03
4	Open Face/Shield on Flower	2016	377.83	430.54	287.18	0.00	0.00	0.00	0.00	1303.29	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.04
5	SEM on Flower	2016	377.83	430.54	287.18	0.00	0.00	0.00	0.00	1303.29	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.04
5	SEM on Flower	2017	377.93	430.54	287.14	0.00	0.00	0.00	0.00	1303.26	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.04
6	Cut & Cover Along Flower Street	2017	377.93	430.54	287.14	181.03	0.00	0.00	0.00	1303.26	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.04
2	Cut & Cover Along Flower Street	2015	377.84	430.55	287.24	0.00	0.00	0.00	0.00	1303.32	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.03
2	Cut & Cover Along Flower Street	2016	377.83	430.54	287.18	0.00	0.00	0.00	0.00	1303.29	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.04
2	Cut & Cover Along Flower Street	2017	377.93	430.54	287.14	0.00	0.00	0.00	0.00	1303.26	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.04

Daily Emissions

Phase	Description	Year	Emissions (pounds per day) CO2	CH4
1	EPBM Flower WB	2015	47,978.74	1.10
1	EPBM Flower WB	2016	47,977.00	1.37
2	EPBM Flower EB	2016	47,977.00	1.37
2	EPBM Flower EB	2017	47,977.47	1.63
3	Grouting on Flower	2014	118,893.76	1.87
3	Grouting on Flower	2015	117,717.56	2.33
4	Open Face/Shield on Flower	2016	47,977.00	1.37
5	SEM on Flower	2016	47,977.00	1.37
5	SEM on Flower	2017	47,977.47	1.63
6	Cut & Cover Along Flower Street	2017	51,598.13	1.71

Table 2-4: Hourly, Daily, Annual GHG Emissions Summary - Alternative A

Annual Emissions by Phase - Alternative 3a (2nd/Hope Station (SEM))

			Emissions (tons per year)		CO2e Emissions (tons per year)			
Phase	Description	Year	CO2	CH4	CO2	CH4:CO2	CO2e	MTCO2e/Yr
1	EPBM Flower WB	2015	3,694.36	0.08	3,694.36	1.77	3,696.13	3,352.39
1	EPBM Flower WB	2016	1,583.24	0.05	1,583.24	0.95	1,584.19	1,436.86
2	EPBM Flower EB	2016	1,583.24	0.05	1,583.24	0.95	1,584.19	1,436.86
2	EPBM Flower EB	2017	2,638.76	0.09	2,638.76	1.88	2,640.64	2,395.06
3	Grouting on Flower	2014	2,615.66	0.04	2,615.66	0.86	2,616.53	2,373.19
3	Grouting on Flower	2015	14,243.82	0.28	14,243.82	5.93	14,249.75	12,924.52
4	Open Face/Shield on Flower	2016	4,749.72	0.14	4,749.72	2.84	4,752.57	4,310.58
5	SEM on Flower	2016	527.75	0.02	527.75	0.32	528.06	478.95
5	SEM on Flower	2017	6,333.03	0.22	6,333.03	4.52	6,337.55	5,748.15
6	Cut & Cover Along Flower Street	2017	567.58	0.02	567.58	0.39	567.97	515.15

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Source:

Construction equipment emission factors from OFFROAD2007

21 GWP of CH4:CO2

0.907 tons/MT

Annual GHG Emissions Summary

Year	Description	MTCO2e
2014	Grouting on Flower	2,373.19
	2014 Total, MTCO2e/Yr =	2,373.19
2015	EPBM Flower WB	3,352.39
	Grouting on Flower	12,924.52
	2015 Total, MTCO2e/Yr =	16,276.92
2016	EPBM Flower WB	1,436.86
	EPBM Flower EB	1,436.86
	Open Face/Shield on Flower	4,310.58
	SEM on Flower	478.95
	2016 Total, MTCO2e/Yr =	7,663.25
2017	EPBM Flower EB	2,395.06
	SEM on Flower	5,748.15
	Cut & Cover Along Flower Street	515.15
	2017 Total, MTCO2e/Yr =	8,658.37

Table 2-5: Hourly, Daily, Annual GHG Emissions Summary - Alternative B

Alternative 4

Phase	Description	Hours per Day	Start Month	End Month	Duration (months) 2014	2015	2016	2017	Number of Equipment Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	20	Jun-15	Feb-17	--	7	12	2	2	4	2	0	0	0	0	5
2	Grouting on Flower	20	Feb-15	Oct-15	--	8	--	--	0	0	0	0	2	2	2	5
3	SEM on Flower	20	Apr-16	May-17	--	--	9	5	2	4	2	0	0	0	0	5
4	Cut & Cover Along Flower Street	20	May-17	Jul-17	--	--	--	2	2	4	2	1	0	0	0	5

Work days per month 22

Hourly Emissions by Equipment

Phase	Description	Year	CO2 Emissions (pounds per hour) Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed	CH4 Emissions (pounds per hour) Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	377.837	430.546	287.238	0.000	0.000	0.000	0.000	1303.316	0.007	0.015	0.005	0.000	0.000	0.000	0.000	0.028
1	EPBM Flower	2016	377.834	430.544	287.184	0.000	0.000	0.000	0.000	1303.288	0.009	0.018	0.006	0.000	0.000	0.000	0.000	0.036
1	EPBM Flower	2017	377.933	430.544	287.140	0.000	0.000	0.000	0.000	1303.256	0.011	0.021	0.006	0.000	0.000	0.000	0.000	0.043
2	Grouting on Flower	2015	0.000	0.000	0.000	0.000	1381.056	210.286	699.939	1303.316	0.000	0.000	0.000	0.000	0.032	0.003	0.010	0.028
3	SEM on Flower	2016	377.834	430.544	287.184	0.000	0.000	0.000	0.000	1303.288	0.009	0.018	0.006	0.000	0.000	0.000	0.000	0.036
3	SEM on Flower	2017	377.933	430.544	287.140	0.000	0.000	0.000	0.000	1303.256	0.011	0.021	0.006	0.000	0.000	0.000	0.000	0.043
4	Cut & Cover Along Flower Street	2017	377.933	430.544	287.140	181.033	0.000	0.000	0.000	1303.256	0.011	0.021	0.006	0.004	0.000	0.000	0.000	0.043

Daily Emissions

Phase	Description	Year	Emissions (pounds per day) CO2	CH4
1	EPBM Flower	2015	47978.74	1.10
1	EPBM Flower	2016	47977.00	1.37
1	EPBM Flower	2017	47977.47	1.63
2	Grouting on Flower	2015	71891.94	1.45
3	SEM on Flower	2016	47977.00	1.37
3	SEM on Flower	2017	47977.47	1.63
4	Cut & Cover Along Flower Street	2017	51598.13	1.71

Annual Emissions - Alternative B

Phase	Description	Year	Emissions (tons per year) CO2	CH4	CO2e Emissions (tons per year) CO2	CH4:CO2	CO2e	MTCO2e/Yr
1	EPBM Flower	2015	3694.36	0.08	3694.36	1.77	3696.13	3352.39
1	EPBM Flower	2016	6332.96	0.18	6332.96	3.79	6336.76	5747.44
1	EPBM Flower	2017	1055.50	0.04	1055.50	0.75	1056.26	958.03
2	Grouting on Flower	2015	6326.49	0.13	6326.49	2.67	6329.17	5740.55
3	SEM on Flower	2016	4749.72	0.14	4749.72	2.84	4752.57	4310.58
3	SEM on Flower	2017	2638.76	0.09	2638.76	1.88	2640.64	2395.06
4	Cut & Cover Along Flower Street	2017	1135.16	0.04	1135.16	0.79	1135.95	1030.30

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Source:

Construction equipment emission factors from OFFROAD2007

21 GWP of CH4:CO2

0.907 tons/MT

Table 2-5: Hourly, Daily, Annual GHG Emissions Summary - Alternative B

Annual GHG Emissions Summary

Year	Description	MTCO2e
2014	No Activity	0.00
	2014 Total, MTCO2e/Yr =	0.00
2015	EPBM Flower	3,352.39
	Grouting on Flower	5,740.55
	2015 Total, MTCO2e/Yr =	9,092.95
2016	EPBM Flower	5,747.44
	SEM on Flower	4,310.58
	2016 Total, MTCO2e/Yr =	10,058.02
2017	EPBM Flower	958.03
	SEM on Flower	2,395.06
	Cut & Cover Along Flower Street	1,030.30
	2017 Total, MTCO2e/Yr =	4,383.39

Table 2-6: Daily and Annual GHG Emissions (Haul Trucks) - Locally Preferred Alternative

Locally Preferred Alternative/Baseline

Phase	Description	Truck Trips	Daily VMT	Start Month	End Month	Total	Duration (months) 2014	2015	2016	2017
1	EPBM Flower	20	400	May-15	Nov-16	19	--	8	11	--
2	Cut & Cover Along Flower Street	20	400	Sep-14	Sep-17	37	4	12	12	9

Daily vehicle miles traveled (round-trip) 20 *(estimated value)* Default value from URBEMIS

Daily Emissions

Phase	Description	Year	Emissions (lb/day) CO2	CH4
1	EPBM Flower	2015	1,696.86	0.03
1	EPBM Flower	2016	1,696.86	0.03
2	Cut & Cover Along Flower Street	2014	1,696.86	0.03
2	Cut & Cover Along Flower Street	2015	1,696.86	0.03
2	Cut & Cover Along Flower Street	2016	1,696.86	0.03
2	Cut & Cover Along Flower Street	2017	1,696.86	0.02

Annual Emissions by Phase - Haul Trucks

Phase	Description	Year	Emissions (tons per year) CO2	CH4	CO2e Emissions (tons per year) CO2	CH4:CO2	CO2e	MTCO2e/Yr
1	EPBM Flower	2015	149.32	2.56E-03	149.32	0.05	149.38	135.48
1	EPBM Flower	2016	205.32	3.20E-03	205.32	0.07	205.39	186.29
2	Cut & Cover Along Flower Street	2014	74.66	1.44E-03	74.66	0.03	74.69	67.75
2	Cut & Cover Along Flower Street	2015	223.98	3.84E-03	223.98	0.08	224.07	203.23
2	Cut & Cover Along Flower Street	2016	223.98	3.49E-03	223.98	0.07	224.06	203.22
2	Cut & Cover Along Flower Street	2017	167.99	2.44E-03	167.99	0.05	168.04	152.41

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Comments:

INDEX formula used to look-up emission factor from "EMFAC_Construction.xlsx" spreadsheet.

MATCH formula used to identify row number and column number for each year-pollutant combination.

21 GWP of CH4:CO2

0.907 tons/MT

Annual GHG Emissions Summary - Haul Trucks

Year	Description	MTCO2e
2014	Cut & Cover Along Flower Street	67.75
	2014 Total, MTCO2e/Yr =	67.75
2015	EPBM Flower	135.48
	Cut & Cover Along Flower Street	203.23
	2015 Total, MTCO2e/Yr =	338.71
2016	EPBM Flower	186.29
	Cut & Cover Along Flower Street	203.22
	2016 Total, MTCO2e/Yr =	389.51
2017	Cut & Cover Along Flower Street	152.41
	2017 Total, MTCO2e/Yr =	152.41

Table 2-9: Daily and Annual GHG Emissions (Haul Trucks) - Alternative A

Alternative 3

Phase	Description	Truck Trips	Daily VMT	Start Month	End Month	Duration (months) Total	2014	2015	2016	2017
1	EPBM Flower WB	20	400	Jun-15	Mar-16	10	--	7	3	--
2	EPBM Flower EB	20	400	Oct-16	May-17	8	--	--	3	5
3	Grouting on Flower	0	0	Nov-14	Nov-15	13	2	11	--	--
4	Open Face/Shield on Flower	20	400	Mar-16	Dec-16	10	--	--	10	--
5	SEM on Flower	20	400	Dec-16	Dec-17	13	--	--	1	12
6	Cut & Cover Along Flower Street	20	400	Dec-17	Feb-18	3	--	--	--	1

Daily vehicle miles traveled (round-trip) 20 *(estimated value)* Default value from URBEMIS

Daily Emissions

Phase	Description	Year	Emissions (lb/day) CO2	CH4
1	EPBM Flower WB	2015	1696.86	0.03
1	EPBM Flower WB	2016	1696.86	0.03
2	EPBM Flower EB	2016	1696.86	0.03
2	EPBM Flower EB	2017	1696.86	0.02
3	Grouting on Flower	2014	0.00	0.00
3	Grouting on Flower	2015	0.00	0.00
4	Open Face/Shield on Flower	2016	1696.86	0.03
5	SEM on Flower	2016	1696.86	0.03
5	SEM on Flower	2017	1696.86	0.02
6	Cut & Cover Along Flower Street	2017	1696.86	0.02

Annual Emissions

Phase	Description	Year	Emissions (tons per year) CO2	CH4	CO2e Emissions (tons per year) CO2	CH4:CO2	CO2e	MTCO2e/ Yr
1	EPBM Flower WB	2015	130.66	2.24E-03	130.66	0.05	130.70	118.55
1	EPBM Flower WB	2016	56.00	8.73E-04	56.00	0.02	56.01	50.81
2	EPBM Flower EB	2016	56.00	8.73E-04	56.00	0.02	56.01	50.81
2	EPBM Flower EB	2017	93.33	1.36E-03	93.33	0.03	93.36	84.67
3	Grouting on Flower	2014	0.00	0.00E+00	0.00	0.00	0.00	0.00
3	Grouting on Flower	2015	0.00	0.00E+00	0.00	0.00	0.00	0.00
4	Open Face/Shield on Flower	2016	186.65	2.91E-03	186.65	0.06	186.72	169.35
5	SEM on Flower	2016	18.67	2.91E-04	18.67	0.01	18.67	16.94
5	SEM on Flower	2017	223.98	3.26E-03	223.98	0.07	224.05	203.22
6	Cut & Cover Along Flower Street	2017	18.67	2.72E-04	18.67	0.01	18.67	16.93

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Comments:

INDEX formula used to look-up emission factor from "EMFAC_Construction.xlsx" spreadsheet.

MATCH formula used to identify row number and column number for each year-pollutant combination.

21 GWP of CH4:CO2

0.907 tons/MT

Annual GHG Emissions Summary - Haul Trucks

Year	Description	MTCO2e
2014	Grouting on Flower	0.00
	2014 Total, MTCO2e/Yr =	0.00
2015	EPBM Flower WB	118.55
	Grouting on Flower	0.00
	2015 Total, MTCO2e/Yr =	118.55
2016	EPBM Flower WB	50.81
	EPBM Flower EB	50.81
	Open Face/Shield on Flower	169.35
	SEM on Flower	16.94
	2016 Total, MTCO2e/Yr =	287.90
2017	EPBM Flower EB	84.67
	SEM on Flower	203.22
	Cut & Cover Along Flower Street	16.93
	2017 Total, MTCO2e/Yr =	304.82

Table 2-10: Daily and Annual GHG Emissions (Haul Trucks) - Alternative B

Alternative 4

Phase	Description	Truck Trips	Daily VMT	Start Month	End Month	Duration (months) Total	2014	2015	2016	2017
1	EPBM Flower	20	400	Jun-15	Feb-17	21	--	7	12	2
2	Grouting on Flower	0	0	Feb-15	Oct-15	9	--	9	--	--
3	SEM on Flower	20	400	Apr-16	May-17	14	--	--	9	5
4	Cut & Cover Along Flower Street	20	400	May-17	Jul-17	3	--	--	--	3
5	SEM on Flower	20	400	Dec-16	Dec-17	13	--	--	1	12
6	Cut & Cover Along Flower Street	20	400	Dec-17	Feb-18	3	--	--	--	1

Daily vehicle miles traveled (round-trip) 20 *(estimated value)* Default value from URBEMIS

Daily Emissions

Phase	Description	Year	Emissions (lb/day) CO2	CH4
1	EPBM Flower	2015	1696.86	0.03
1	EPBM Flower	2016	1696.86	0.03
1	EPBM Flower	2017	1696.86	0.02
2	Grouting on Flower	2015	0.00	0.00
3	SEM on Flower	2016	1696.86	0.03
3	SEM on Flower	2017	1696.86	0.02
4	Cut & Cover Along Flower Street	2017	1696.86	0.02
5	SEM on Flower	2016	1696.86	0.03
5	SEM on Flower	2017	1696.86	0.02
6	Cut & Cover Along Flower Street	2017	1696.86	0.02

Annual Emissions

Phase	Description	Year	Emissions (tons per year) CO2	CH4	CO2e Emissions (tons per year) CO2	CH4:CO2	CO2e	MTCO2e/ Yr
1	EPBM Flower	2015	130.66	2.24E-03	130.66	0.05	130.70	118.55
1	EPBM Flower	2016	223.98	3.49E-03	223.98	0.07	224.06	203.22
1	EPBM Flower	2017	37.33	5.43E-04	37.33	0.01	37.34	33.87
2	Grouting on Flower	2015	0.00	0.00E+00	0.00	0.00	0.00	0.00
3	SEM on Flower	2016	167.99	2.62E-03	167.99	0.06	168.04	152.42
3	SEM on Flower	2017	93.33	1.36E-03	93.33	0.03	93.36	84.67
4	Cut & Cover Along Flower Street	2017	56.00	8.15E-04	56.00	0.02	56.01	50.80
5	SEM on Flower	2016	167.99	2.62E-03	167.99	0.06	168.04	152.42
5	SEM on Flower	2017	93.33	1.36E-03	93.33	0.03	93.36	84.67
6	Cut & Cover Along Flower Street	2017	56.00	8.15E-04	56.00	0.02	56.01	50.80

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Comments:

INDEX formula used to look-up emission factor from "EMFAC_Construction.xlsx" spreadsheet.

MATCH formula used to identify row number and column number for each year-pollutant combination.

21 GWP of CH4:CO2

0.907 tons/MT

Annual GHG Emissions Summary - Haul Trucks

Year	Description	MTCO2e
2014	No Activity	0.00
	2014 Total, MTCO2e/Yr =	0.00
2015	EPBM Flower	118.55
	Grouting on Flower	0.00
	2015 Total, MTCO2e/Yr =	118.55
2016	EPBM Flower	203.22
	SEM on Flower	152.42
	SEM on Flower	152.42
	2016 Total, MTCO2e/Yr =	508.05
2017	EPBM Flower	33.87
	SEM on Flower	84.67
	Cut & Cover Along Flower Street	50.80
	SEM on Flower	84.67
	Cut & Cover Along Flower Street	50.80
	2017 Total, MTCO2e/Yr	304.82

Table 2-11: Daily and Annual GHG Emissions Summary (Worker Commute) - Locally Preferred Alternative

Locally Preferred Alternative/Baseline

Phase	Description	No. of Crew	Daily VMT	Start Month	End Month	Total	Duration (months) 2014	2015	2016	2017
1	EPBM Flower	20	600	May-15	Nov-16	19	--	8	11	--
2	Cut & Cover Along Flower Street	30	900	Sep-14	Sep-17	37	4	12	12	9

Daily vehicle miles traveled (round-trip) 30 *(estimated value)*

Daily Emissions

			Emissions (lb/day)	
Phase	Description	Year	CO2	CH4
1	EPBM Flower	2015	509.81	0.02
1	EPBM Flower	2016	509.18	0.02
2	Cut & Cover Along Flower Street	2014	765.81	0.04
2	Cut & Cover Along Flower Street	2015	764.71	0.04
2	Cut & Cover Along Flower Street	2016	763.77	0.03
2	Cut & Cover Along Flower Street	2017	762.89	0.03

Annual Emissions

			Emissions (tons per year)		CO2e Emissions (tons per year)			MTCO2e/ Yr
Phase	Description	Year	CO2	CH4	CO2	CH4:CO2	CO2e	
1	EPBM Flower	2015	4.49E+01	2.10E-03	44.86	0.04	44.91	40.73
1	EPBM Flower	2016	6.16E+01	2.64E-03	61.61	0.06	61.67	55.93
2	Cut & Cover Along Flower Street	2014	3.37E+01	1.75E-03	33.70	0.04	33.73	30.60
2	Cut & Cover Along Flower Street	2015	1.01E+02	4.71E-03	100.94	0.10	101.04	91.64
2	Cut & Cover Along Flower Street	2016	1.01E+02	4.32E-03	100.82	0.09	100.91	91.52
2	Cut & Cover Along Flower Street	2017	7.55E+01	3.04E-03	75.53	0.06	75.59	68.56

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Comments:

INDEX formula used to look-up emission factor from "EMFAC_Construction.xlsx" spreadsheet.

MATCH formula used to identify row number and column number for each year-pollutant combination.

21 GWP of CH4:CO2

0.907 tons/MT

Annual GHG Emissions Summary - Worker Commute

Year	Description	MTCO2e
2014	Cut & Cover Along Flower Street	30.60
	2014 Total, MTCO2e/Yr =	30.60
2015	EPBM Flower	40.73
	Cut & Cover Along Flower Street	91.64
	2015 Total, MTCO2e/Yr =	132.37
2016	EPBM Flower	55.93
	Cut & Cover Along Flower Street	91.52
	2016 Total, MTCO2e/Yr =	147.46
2017	Cut & Cover Along Flower Street	68.56
	2017 Total, MTCO2e/Yr =	68.56

Table 2-14: Daily and Annual GHG Emissions Summary (Worker Commute) - Alternative A

Alternative A

Phase	Description	No. of Crew	Daily VMT	Start Month	End Month	Total	Duration (months) 2014	2015	2016	2017
1	EPBM Flower WB	20	600	Jun-15	Mar-16	10	--	7	3	--
2	EPBM Flower EB	20	600	Oct-16	May-17	8	--	--	3	5
3	Grouting on Flower	40	1,200	Nov-14	Nov-15	13	2	11	--	--
4	Open Face/Shield on Flower	20	600	Mar-16	Dec-16	10	--	--	10	--
5	SEM on Flower	20	600	Dec-16	Dec-17	13	--	--	1	12
6	Cut & Cover Along Flower Street	30	900	Dec-17	Feb-18	3	--	--	--	1

Daily vehicle miles traveled (round-trip) 30 *(estimated value)*

Daily Emissions

Phase	Description	Year	Emissions (lb/day) CO2	CH4
1	EPBM Flower WB	2015	509.81	0.02
1	EPBM Flower WB	2016	509.18	0.02
2	EPBM Flower EB	2016	509.18	0.02
2	EPBM Flower EB	2017	508.59	0.02
3	Grouting on Flower	2014	1021.08	0.05
3	Grouting on Flower	2015	1019.61	0.05
4	Open Face/Shield on Flower	2016	509.18	0.02
5	SEM on Flower	2016	509.18	0.02
5	SEM on Flower	2017	508.59	0.02
6	Cut & Cover Along Flower Street	2017	762.89	0.03

Annual Emissions

Phase	Description	Year	Emissions (tons per year) CO2	CH4	CO2e Emissions (tons per year) CO2	CH4:CO2	CO2e	MTCO2e/ Yr
1	EPBM Flower WB	2015	3.93E+01	1.83E-03	3.93E+01	3.85E-02	3.93E+01	3.56E+01
1	EPBM Flower WB	2016	1.68E+01	7.20E-04	1.68E+01	1.51E-02	1.68E+01	1.53E+01
2	EPBM Flower EB	2016	1.68E+01	7.20E-04	1.68E+01	1.51E-02	1.68E+01	1.53E+01
2	EPBM Flower EB	2017	2.80E+01	1.13E-03	2.80E+01	2.37E-02	2.80E+01	2.54E+01
3	Grouting on Flower	2014	2.25E+01	1.16E-03	2.25E+01	2.44E-02	2.25E+01	2.04E+01
3	Grouting on Flower	2015	1.23E+02	5.76E-03	1.23E+02	1.21E-01	1.23E+02	1.12E+02
4	Open Face/Shield on Flower	2016	5.60E+01	2.40E-03	5.60E+01	5.04E-02	5.61E+01	5.08E+01
5	SEM on Flower	2016	5.60E+00	2.40E-04	5.60E+00	5.04E-03	5.61E+00	5.08E+00
5	SEM on Flower	2017	6.71E+01	2.71E-03	6.71E+01	5.68E-02	6.72E+01	6.09E+01
6	Cut & Cover Along Flower Street	2017	8.39E+00	3.38E-04	8.39E+00	7.10E-03	8.40E+00	7.62E+00

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Comments:

INDEX formula used to look-up emission factor from "EMFAC_Construction.xlsx" spreadsheet.

MATCH formula used to identify row number and column number for each year-pollutant combination.

21 GWP of CH4:CO2

0.907 tons/MT

Annual GHG Emissions Summary - Worker Commute

Year	Description	MTCO2e
2014	Grouting on Flower	20.40
	2014 Total, MTCO2e/Yr =	20.40
2015	EPBM Flower WB	35.64
	Grouting on Flower	112.01
	2015 Total, MTCO2e/Yr =	147.65
2016	EPBM Flower WB	15.25
	EPBM Flower EB	15.25
	Open Face/Shield on Flower	50.85
	SEM on Flower	5.08
	2016 Total, MTCO2e/Yr =	86.44
2017	EPBM Flower EB	25.39
	SEM on Flower	60.94
	Cut & Cover Along Flower Street	7.62
	2017 Total, MTCO2e/Yr =	93.95

Table 2-15: Daily and Annual GHG Emissions Summary (Worker Commute) - Alternative B

Alternative B

Phase	Description	No. of Crew	Daily VMT	Start Month	End Month	Total	2014	2015	2016	2017
						Duration (months)				
1	EPBM Flower	20	600	Jun-15	Feb-17	21	--	7	12	2
2	Grouting on Flower	20	600	Feb-15	Oct-15	9	--	9	--	--
3	SEM on Flower	20	600	Apr-16	May-17	14	--	--	9	5
4	Cut & Cover Along Flower Street	30	900	May-17	Jul-17	3	--	--	--	3
5	SEM on Flower	20	600	Dec-16	Dec-17	13	--	--	1	12
6	Cut & Cover Along Flower Street	20	600	Dec-17	Feb-18	3	--	--	--	1

Daily vehicle miles traveled (round-trip) 30 *(estimated value)*

Daily Emissions

Phase	Description	Year	Emissions (lb/day) CO2	CH4
1	EPBM Flower	2015	509.81	0.02
1	EPBM Flower	2016	509.18	0.02
1	EPBM Flower	2017	508.59	0.02
2	Grouting on Flower	2015	509.81	0.02
3	SEM on Flower	2016	509.18	0.02
3	SEM on Flower	2017	508.59	0.02
4	Cut & Cover Along Flower Street	2017	762.89	0.03
5	SEM on Flower	2016	2545.28	0.04
5	SEM on Flower	2017	2545.28	0.04
6	Cut & Cover Along Flower Street	2017	2545.28	0.04

Annual Emissions

			Emissions (tons per year)		CO2e Emissions (tons per year)			MTCO2e/ Yr
Phase	Description	Year	CO2	CH4	CO2	CH4:CO2	CO2e	
1	EPBM Flower	2015	39.26	0.00	39.26	0.04	39.29	35.64
1	EPBM Flower	2016	67.21	0.00	67.21	0.06	67.27	61.02
1	EPBM Flower	2017	11.19	0.00	11.19	0.01	11.20	10.16
2	Grouting on Flower	2015	50.47	0.00	50.47	0.05	50.52	45.82
3	SEM on Flower	2016	50.41	0.00	50.41	0.05	50.45	45.76
3	SEM on Flower	2017	27.97	0.00	27.97	0.02	28.00	25.39
4	Cut & Cover Along Flower Street	2017	25.18	0.00	25.18	0.02	25.20	22.85
5	SEM on Flower	2016	251.98	0.00	251.98	0.08	252.07	228.62
5	SEM on Flower	2017	139.99	0.00	139.99	0.04	140.03	127.01
6	Cut & Cover Along Flower Street	2017	83.99	0.00	83.99	0.03	84.02	76.21

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Comments:

INDEX formula used to look-up emission factor from "EMFAC_Construction.xlsx" spreadsheet.

MATCH formula used to identify row number and column number for each year-pollutant combination.

21 GWP of CH4:CO2

0.907 tons/MT

Annual GHG Emissions Summary - Worker Commute

Year	Description	MTCO2e
2014	No Activity	0.00
	2014 Total, MTCO2e/Yr =	0.00
2015	EPBM Flower	35.64
	Grouting on Flower	45.82
	2015 Total, MTCO2e/Yr =	81.46
2016	EPBM Flower	61.02
	SEM on Flower	45.76
	SEM on Flower	228.62
	2016 Total, MTCO2e/Yr =	335.40
2017	EPBM Flower	10.16
	SEM on Flower	25.39
	Cut & Cover Along Flower Street	22.85
	SEM on Flower	127.01
	Cut & Cover Along Flower Street	76.21
	2017 Total, MTCO2e/Yr =	261.62

APPENDIX E

ENERGY RESOURCES

Regional Connector - Supplemental Environmental Impact Study (SEIS)

Supporting Energy Calculations

Prepared May 2014

Regional Connector SEIS - Construction Energy Impacts (Indirect)

Construction Description	Construction Cost, Engineer's Estimate (2013$)			Conversion Factors		Construction Energy Factor	Construction Energy Consumption		
	Construction Cost Summary ($)[1] (thousands)			Dollar-to-Energy Factor[2]	2013 Price Escalation[3]		Units		
	Direct	Indirect*	Total	(Btu/1973$)	1973$/2013$	Btu/2013$	Btu	MMBtu	Billion Btu
Baseline/LPA									
Earth Pressure Balance Tunnel Boring Machine (EPBM) Bored Tunnels, Cut-and-Cover	$63,162	$21,475	$84,637	24,600	0.204	5,017	316,869,876	316,870	317
[redacted]									
Alternative A									
EPBM Bored Tunnels on LPA Alignment; Open Face Shield Tunnel Excavation; Sequential Excavation Method (SEM) Tunnel Construction; and Mucking	$64,359	$50,502	$114,861	24,600	0.204	5,017	322,875,529	322,876	323
Alternative B									
EPBM Bored Tunnels on Deep Alignment; Remove EPBMs through Tunnel Portal, SEM Tunnel Construction; and Mucking	$58,726	$39,047	$97,773	24,600	0.204	5,017	294,618,122	294,618	295

Notes

* = Indirect costs include contractor mark-up fees and project schedule delay costs and are not included in the energy consumption analysis.

Methodology:

Construction Energy Consumption

Input/Output Approach for Urban Conventional Highway Construction (CalTrans' Energy and Transportation Systems, July 1983)

Construction Energy Formula

E = C x EF x DC

E = Energy consumed (Btu)

C = Cost of a particular construction activity (2007$)

DEF = Dollar-to-Energy Factor for Urban Freeway Widen (Btu/1973$)

DC = Dollar Conversion (1973$/2013$)

Conversation Factors

2013 Price Escalation

1973$/2013$ = 19.8/97.09 = 0.203934494

References and Source:

[1] Construction Cost Estimate obtained from Metro, dated 4/12/13

[2] Caltrans Construction Activity, Energy and Transportation Systems, 1983, State of California Department of Transportation

[3] Price Index for Selected Construction Items, Caltrans. Obtained from http://www.dot.ca.gov/hq/esc/oe/cost_index/historical_reports/CCI_4QTR_2013.pdf. Accessed May 23, 2014.

APPENDIX F

NOISE AND VIBRATION PREDICTION MODEL OUTPUTS

Table A.1: Construction Noise Predictions - Summary

Alternative No. *LPA/Baseline*
Description EPBM Bored tunnels to 4th St, C&C from 4th St to 7th/Metro

		LPA		***Alternative A***		***Alternative B***	
		Noise (dBA)		Noise (dBA)		Noise (dBA)	
ID	**REC**	**Lmax**	**LeqSum**	**Lmax**	**LeqSum**	**Lmax**	**LeqSum**
1	Standard Hotel	85	86	85	90	85	90
2	City National Plaza	84	86	84	90	84	90
3	California Club	85	86	85	90	85	90
4	Los Angeles Public Library	70	71	70	78	70	77
5	Los Angeles Public Library Park	85	86	87	94	87	94
6	Citi Group Center	76	77	76	83	76	80
7	Westin Bonaventure Hotel	89	91	92	97	89	91
8	Hynes Property	79	81	79	85	79	81
9	Savoy Apartments (Little Tokyo)	68	83	68	89	68	89

Predicted exceedance

NB1: LeqDAY applied to evening period between 6-10PM (daytime construction is exempt).
NB2: Equipment reference noise levels were taken from the FHWA RCNM database, Table 1 (pg. 3).

Table A.2: Construction Vibration Predictions - Summary

Alternative No. *LPA/Baseline*
Description EPBM Bored tunnels to 4th St, C&C from 4th St to 7th/Metro

		LPA		***Alternative A***		***Alternative B***	
		Vibration Level (Max)		Vibration Level (Max)		Vibration Level (Max)	
ID	**REC**	**VdB**	**PPV (in/s)**	**VdB**	**PPV (in/s)**	**VdB**	**PPV (in/s)**
1	Standard Hotel	78	0.031	78	0.031	78	0.031
2	City National Plaza	77	0.027	77	0.027	77	0.027
3	California Club	78	0.031	78	0.031	78	0.031
4	Los Angeles Public Library	55	0.002	61	0.003	60	0.003
5	Los Angeles Public Library Park	78	0.031	78	0.031	78	0.031
6	Citi Group Center	64	0.006	70	0.010	69	0.009
7	Westin Bonaventure Hotel	85	0.068	91	0.118	85	0.068
8	Hynes Property	69	0.012	75	0.018	72	0.013
9	Savoy Apartments (Little Tokyo)	65	0.006	65	0.006	65	0.006

Predicted exceedance

NB1: LeqDAY applied to evening period between 6-10PM (daytime construction is exempt).
NB2: Equipment reference noise levels were taken from the FHWA RCNM database, Table 1 (pg. 3).

Table A.3: Receptor Distances

ID	REC	Description	Distance (ft)					
			4th St - 6th St	*5th St. - 6th St.*	*4th St. - 5th St.*	*5th St. - 6th St.*	*4th St. - 5th St.*	*Little Tokyo Portal*
			General Construction	Grouting Plant 1	Grouting Plant 2	Grouting Rigs 1	Grouting Rigs 2	Muck Removal
1	R1	Standard Hotel	50	320	880	50	550	N/A
2	R2	City National Plaza	55	90	500	55	192	N/A
3	R3	California Club	50	160	715	50	400	N/A
4	R4	Los Angeles Public Library	285	265	480	285	300	N/A
5	R5	Los Angeles Public Library Park	50	30	390	50	108	N/A
6	R6	Citi Group Center	145	240	155	240	145	N/A
7	R7	Westin Bonaventure Hotel	30	345	65	278	20	N/A
8	R8	Hynes Property	97	477	117	417	97	N/A
9	R9	Savoy Apartments (Little Tokyo)	N/A	N/A	N/A	N/A	N/A	130

Table A.4: Construction Noise and Vibration Predictions - R1

Receiver No.	1
ID	R1
Description	Standard Hotel
Distance (ft)	
General Construction	50
Grouting Plant 1	320
Grouting Plant 2	880
Grouting Rigs 1	50
Grouting Rigs 2	550
Little Tokyo Muck Remov	N/A

GB-NZ: Typical Soil	
-35	TDH Converted RMS to PPV

NOISE | VIBRATION

									Maximum	Cumulative					Max_VdB	Max_PPV	Max_GBNZ
Alternative No.	***LPA/Baseline***								85.0	86.4					78.0	0.031	43.0
Description	EPBM Bored tunnels to 4th St, C&C from 4th St to 7th/Metro																
							A-weighted Noise Levels (in dBA)										
No.	**Equipment Grouping**	**Surface Equipment**	**FHWA Equiv**	**Amount**	**Distance**	**Usage**	**LmaxRef**	**Shielding**	**LmaxCalc**	**Leq**	**Contribution**	**FTA Equiv**	**LvRef (RMS)**	**PPV_Ref**	**Lv (VdB)**	**PPV (ips)**	**GBNZ (dBA)**
	5	2	6	3	4	8	7						5	3			
1	General Construction	Bulldozer	Dozer	1	50	40%	85	0	85.0	81.0	29%	Small Bulldozer	58	0.003	49.0	0.001	14.0
2	General Construction	Excavator	Excavator	1	50	40%	85	0	85.0	81.0	29%	Large Bulldozer	87	0.089	78.0	0.031	43.0
3	General Construction	Crane	Crane	1	50	16%	85	0	85.0	77.0	12%	MIN (Sm. Dozer)	79	0.035	70.0	0.012	35.0
4	General Construction	Drill Rig	Drill Rig Truck	1	50	20%	84	0	84.0	77.0	12%	Caisson drilling	87	0.089	78.0	0.031	43.0
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	50	40%	79	0	79.0	75.0	7%	Loaded Trucks	86	0.076	77.0	0.027	42.0
6	General Construction	Muck Removal	Dump Truck	3	50	40%	76	0	76.0	77.1	12%	Loaded Trucks	86	0.076	77.0	0.027	42.0

									Maximum	Cumulative					Max_VdB	Max_PPV	Max_GBNZ
Alternative No.		***A - EPBM/Open-Face Shield/SEM Profile Alternative***							85.0	89.6					78.0	0.0	43.0
Description		EPBM bored tunnels on LPA alignment to 4th street shaft, open face shield tunnel excavation on 5th St shaft abandoning shields underground, SEM tunnel construction from 5th St shaft to 7th Metro mucking through L tunnel															
							A-weighted Noise Levels (in dBA)										
No.	**Powered By**	**Surface Equipment**	**FHWA Equiv**	**Amount**	**Distance**	**Usage**	**LmaxRef**	**Shielding**	**LmaxCalc**	**Leq**	**Contribution**	**FTA Equiv**	**LvRef (RMS)**	**PPV_Ref**	**Lv (VdB)**	**PPV (ips)**	**GBNZ (dBA)**
	5	2	6	3	4	8	7						5	3			
1	General Construction	Bulldozer	Dozer	1	50	40%	85	0	85.0	81.0	14%	Small Bulldozer	58	0.003	49.0	0.001	14.0
2	General Construction	Excavator	Excavator	1	50	40%	85	0	85.0	81.0	14%	Large Bulldozer	87	0.089	78.0	0.031	43.0
3	General Construction	Crane	Crane	1	50	16%	85	0	85.0	77.0	6%	MIN (Sm. Dozer)	79	0.035	70.0	0.012	35.0
4	General Construction	Drill Rig	Drill Rig Truck	1	50	20%	84	0	84.0	77.0	6%	Caisson drilling	87	0.089	78.0	0.031	43.0
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	50	40%	79	0	79.0	75.0	3%	Loaded Trucks	86	0.076	77.0	0.027	42.0
6	General Construction	Muck Removal	Dump Truck	1	50	40%	76	0	76.0	72.0	2%	Loaded Trucks	86	0.076	77.0	0.027	42.0
7	Grouting Plant 1	Compressor 1	Compressor (air)	1	320	100%	80	0	63.9	63.9	0%	Small Bulldozer	58	0.003	24.8	0.000	0.0
8	Grouting Plant 1	High-Pressure Pump 1	Pumps	1	320	100%	77	0	60.9	60.9	0%	Small Bulldozer	58	0.003	24.8	0.000	0.0
9	Grouting Plant 1	Diesel Generator 1	Generator	1	320	100%	82	0	65.9	65.9	0%	Small Bulldozer	58	0.003	24.8	0.000	0.0
10	Grouting Plant 1	Mixing Plant 1	Concrete Batch Plant	1	320	100%	83	0	66.9	66.9	1%	Small Bulldozer	58	0.003	24.8	0.000	0.0
11	Grouting Plant 2	Compressor 2	Compressor (air)	1	880	100%	80	0	55.1	55.1	0%	Small Bulldozer	58	0.003	11.6	0.000	0.0
12	Grouting Plant 2	High-Pressure Pump 2	Pumps	1	880	100%	77	0	52.1	52.1	0%	Small Bulldozer	58	0.003	11.6	0.000	0.0
13	Grouting Plant 2	Diesel Generator 2	Generator	1	880	100%	82	0	57.1	57.1	0%	Small Bulldozer	58	0.003	11.6	0.000	0.0
14	Grouting Plant 2	Mixing Plant 2	Concrete Batch Plant	1	880	100%	83	0	58.1	58.1	0%	Small Bulldozer	58	0.003	11.6	0.000	0.0
15	Grouting Rigs 1	Hydraulic Drill Rig 1	Drill Rig Truck	2	50	100%	84	0	84.0	87.0	55%	Hydromill (slurry wall), in soil	66	0.008	57.0	0.003	22.0
16	Grouting Rigs 2	Hydraulic Drill Rig 2	Drill Rig Truck	2	550	100%	84	0	63.2	66.2	0%	Hydromill (slurry wall), in soil	66	0.008	25.7	0.000	0.0
17	General Construction	TBM	N/A	1	555	N/A	N/A	N/A	N/A	N/A	N/A	TBM	93	0.142	52.6	0.001	17.6

									Maximum	Cumulative					Max_VdB	Max_PPV	Max_GBNZ
Alternative No.		***B - EPBM/SEM Low Alignment Alternative***							85.0	89.6					78.0	0.0	43.0
Description		EPBM bored tunnels on deep alignment to south of 5th street, remove EPBM's through mangrove portal, SEM tunnel construction from 5th street shaft to 7th/Metro. Mucking through L tunnel to Mangrove portal															
							A-weighted Noise Levels (in dBA)										
No.	**Powered By**	**Surface Equipment**	**FHWA Equiv**	**Amount**	**Distance**	**Usage**	**LmaxRef**	**Shielding**	**LmaxCalc**	**Leq**	**Contribution**	**FTA Equiv**	**LvRef (RMS)**	**PPV_Ref**	**Lv (VdB)**	**PPV (ips)**	**GBNZ (dBA)**
	5	2	6	3	4	8	7						5	3			
1	General Construction	Bulldozer	Dozer	1	50	40%	85	0	85.0	81.0	14%	Small Bulldozer	58	0.003	49.0	0.001	14.0
2	General Construction	Excavator	Excavator	1	50	40%	85	0	85.0	81.0	14%	Large Bulldozer	87	0.089	78.0	0.031	43.0
3	General Construction	Crane	Crane	1	50	16%	85	0	85.0	77.0	6%	MIN (Sm. Dozer)	79	0.035	70.0	0.012	35.0
4	General Construction	Drill Rig	Drill Rig Truck	1	50	20%	84	0	84.0	77.0	6%	Caisson drilling	87	0.089	78.0	0.031	43.0
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	50	40%	79	0	79.0	75.0	3%	Loaded Trucks	86	0.076	77.0	0.027	42.0
6	General Construction	Muck Removal	Dump Truck	1	50	40%	76	0	76.0	71.1	1%	Loaded Trucks	86	0.076	77.0	0.027	42.0
7	Grouting Plant 1	Compressor 1	Compressor (air)	1	320	100%	80	0	63.9	63.9	0%	Small Bulldozer	58	0.003	24.8	0.000	0.0
8	Grouting Plant 1	High-Pressure Pump 1	Pumps	1	320	100%	77	0	60.9	60.9	0%	Small Bulldozer	58	0.003	24.8	0.000	0.0
9	Grouting Plant 1	Diesel Generator 1	Generator	1	320	100%	82	0	65.9	65.9	0%	Small Bulldozer	58	0.003	24.8	0.000	0.0
10	Grouting Plant 1	Mixing Plant 1	Concrete Batch Plant	1	320	100%	83	0	66.9	66.9	1%	Small Bulldozer	58	0.003	24.8	0.000	0.0
11	Grouting Rigs 1	Hydraulic Drill Rig 1	Drill Rig Truck	2	50	100%	84	0	84.0	87.0	55%	Hydromill (slurry wall), in soil	66	0.008	57.0	0.003	22.0
12	General Construction	TBM	N/A	1	560	N/A	N/A	N/A	N/A	N/A	N/A	TBM	93	0.142	52.5	0.001	17.5

Table A.5: Construction Noise and Vibration Predictions - R2

Receiver No.	2		
ID	R2		
Description	City National Plaza		
Distance (ft)		*GB-NZ: Typical Soil*	
General Construction	55	-35	TDH Converted RMS to PPV
Grouting Plant 1	90		
Grouting Plant 2	500		
Grouting Rigs 1	55		
Grouting Rigs 2	192		
Little Tokyo Muck Remov	N/A		

NOISE

VIBRATION

									Maximum	Cumulative						Max_VdB	Max_PPV	Max_GBNZ
Alternative No.	***LPA/Baseline***								84.2	85.6						76.7	0.027	41.7
Description	EPBM Bored tunnels to 4th St, C&C from 4th St to 7th/Metro																	
							A-weighted Noise Levels (in dBA)											
No.	**Equipment Grouping**	**Surface Equipment**	**FHWA Equiv**	**Amount**	**Distance**	**Usage**	**LmaxRef**	**Shielding**	**LmaxCalc**	**Leq**	**Contribution**		**FTA Equiv**	**LvRef (RMS)**	**PPV_Ref**	**Lv (VdB)**	**PPV (ips)**	**GBNZ (dBA)**
	5	2	6	3	4	8	7							5	3			
1	General Construction	Bulldozer	Dozer	1	55	40%	85	0	84.2	80.2	29%		Small Bulldozer	58	0.003	47.7	0.001	12.7
2	General Construction	Excavator	Excavator	1	55	40%	85	0	84.2	80.2	29%		Large Bulldozer	87	0.089	76.7	0.027	41.7
3	General Construction	Crane	Crane	1	55	16%	85	0	84.2	76.2	12%		MIN (Sm. Dozer)	79	0.035	68.7	0.011	33.7
4	General Construction	Drill Rig	Drill Rig Truck	1	55	20%	84	0	83.2	76.2	11%		Caisson drilling	87	0.089	76.7	0.027	41.7
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	55	40%	79	0	78.2	74.2	7%		Loaded Trucks	86	0.076	75.7	0.023	40.7
6	General Construction	Muck Removal	Dump Truck	3	55	40%	76	0	75.2	76.2	12%		Loaded Trucks	86	0.076	75.7	0.023	40.7

									Maximum	Cumulative						Max_VdB	Max_PPV	Max_GBNZ
Alternative No.		***A - EPBM/Open-Face Shield/SEM Profile Alternative***							84.2	89.7						76.7	0.0	41.7
Description		EPBM bored tunnels on LPA alignment to 4th street shaft, open face shield tunnel excavation on 5th St shaft abandoning shields underground, SEM tunnel construction from 5th St shaft to 7th Metro mucking through L tunnel																
							A-weighted Noise Levels (in dBA)											
No.	**Powered By**	**Surface Equipment**	**FHWA Equiv**	**Amount**	**Distance**	**Usage**	**LmaxRef**	**Shielding**	**LmaxCalc**	**Leq**	**Contribution**		**FTA Equiv**	**LvRef (RMS)**	**PPV_Ref**	**Lv (VdB)**	**PPV (ips)**	**GBNZ (dBA)**
	5	2	6	3	4	8	7							5	3			
1	General Construction	Bulldozer	Dozer	1	55	40%	85	0	84.2	80.2	11%		Small Bulldozer	58	0.003	47.7	0.001	12.7
2	General Construction	Excavator	Excavator	1	55	40%	85	0	84.2	80.2	11%		Large Bulldozer	87	0.089	76.7	0.027	41.7
3	General Construction	Crane	Crane	1	55	16%	85	0	84.2	76.2	4%		MIN (Sm. Dozer)	79	0.035	68.7	0.011	33.7
4	General Construction	Drill Rig	Drill Rig Truck	1	55	20%	84	0	83.2	76.2	4%		Caisson drilling	87	0.089	76.7	0.027	41.7
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	55	40%	79	0	78.2	74.2	3%		Loaded Trucks	86	0.076	75.7	0.023	40.7
6	General Construction	Muck Removal	Dump Truck	1	55	40%	76	0	75.2	71.2	1%		Loaded Trucks	86	0.076	75.7	0.023	40.7
7	Grouting Plant 1	Compressor 1	Compressor (air)	1	90	100%	80	0	74.9	74.9	3%		Small Bulldozer	58	0.003	41.3	0.000	6.3
8	Grouting Plant 1	High-Pressure Pump 1	Pumps	1	90	100%	77	0	71.9	71.9	2%		Small Bulldozer	58	0.003	41.3	0.000	6.3
9	Grouting Plant 1	Diesel Generator 1	Generator	1	90	100%	82	0	76.9	76.9	5%		Small Bulldozer	58	0.003	41.3	0.000	6.3
10	Grouting Plant 1	Mixing Plant 1	Concrete Batch Plant	1	90	100%	83	0	77.9	77.9	7%		Small Bulldozer	58	0.003	41.3	0.000	6.3
11	Grouting Plant 2	Compressor 2	Compressor (air)	1	500	100%	80	0	60.0	60.0	0%		Small Bulldozer	58	0.003	19.0	0.000	0.0
12	Grouting Plant 2	High-Pressure Pump 2	Pumps	1	500	100%	77	0	57.0	57.0	0%		Small Bulldozer	58	0.003	19.0	0.000	0.0
13	Grouting Plant 2	Diesel Generator 2	Generator	1	500	100%	82	0	62.0	62.0	0%		Small Bulldozer	58	0.003	19.0	0.000	0.0
14	Grouting Plant 2	Mixing Plant 2	Concrete Batch Plant	1	500	100%	83	0	63.0	63.0	0%		Small Bulldozer	58	0.003	19.0	0.000	0.0
15	Grouting Rigs 1	Hydraulic Drill Rig 1	Drill Rig Truck	2	55	100%	84	0	83.2	86.2	44%		Hydromill (slurry wall), in soil	66	0.008	55.7	0.002	20.7
16	Grouting Rigs 2	Hydraulic Drill Rig 2	Drill Rig Truck	2	192	100%	84	0	72.3	75.3	4%		Hydromill (slurry wall), in soil	66	0.008	39.4	0.000	4.4
17	General Construction	TBM	N/A	1	191	N/A	N/A	N/A	N/A	N/A	N/A		TBM	93	0.142	66.5	0.007	31.5

									Maximum	Cumulative						Max_VdB	Max_PPV	Max_GBNZ
Alternative No.		***B - EPBM/SEM Low Alignment Alternative***							84.2	89.5						76.7	0.0	41.7
Description		EPBM bored tunnels on deep alignment to south of 5th street, remove EPBM's through mangrove portal, SEM tunnel construction from 5th street shaft to 7th/Metro. Mucking through L tunnel to Mangrove portal																
							A-weighted Noise Levels (in dBA)											
No.	**Powered By**	**Surface Equipment**	**FHWA Equiv**	**Amount**	**Distance**	**Usage**	**LmaxRef**	**Shielding**	**LmaxCalc**	**Leq**	**Contribution**		**FTA Equiv**	**LvRef (RMS)**	**PPV_Ref**	**Lv (VdB)**	**PPV (ips)**	**GBNZ (dBA)**
	5	2	6	3	4	8	7							5	3			
1	General Construction	Bulldozer	Dozer	1	55	40%	85	0	84.2	80.2	11%		Small Bulldozer	58	0.003	47.7	0.001	12.7
2	General Construction	Excavator	Excavator	1	55	40%	85	0	84.2	80.2	11%		Large Bulldozer	87	0.089	76.7	0.027	41.7
3	General Construction	Crane	Crane	1	55	16%	85	0	84.2	76.2	4%		MIN (Sm. Dozer)	79	0.035	68.7	0.011	33.7
4	General Construction	Drill Rig	Drill Rig Truck	1	55	20%	84	0	83.2	76.2	4%		Caisson drilling	87	0.089	76.7	0.027	41.7
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	55	40%	79	0	78.2	74.2	3%		Loaded Trucks	86	0.076	75.7	0.023	40.7
6	General Construction	Muck Removal	Dump Truck	1	55	40%	76	0	75.2	70.2	1%		Loaded Trucks	86	0.076	75.7	0.023	40.7
7	Grouting Plant 1	Compressor 1	Compressor (air)	1	90	100%	80	0	74.9	74.9	3%		Small Bulldozer	58	0.003	41.3	0.000	6.3
8	Grouting Plant 1	High-Pressure Pump 1	Pumps	1	90	100%	77	0	71.9	71.9	2%		Small Bulldozer	58	0.003	41.3	0.000	6.3
9	Grouting Plant 1	Diesel Generator 1	Generator	1	90	100%	82	0	76.9	76.9	5%		Small Bulldozer	58	0.003	41.3	0.000	6.3
10	Grouting Plant 1	Mixing Plant 1	Concrete Batch Plant	1	90	100%	83	0	77.9	77.9	7%		Small Bulldozer	58	0.003	41.3	0.000	6.3
11	Grouting Rigs 1	Hydraulic Drill Rig 1	Drill Rig Truck	2	55	100%	84	0	83.2	86.2	44%		Hydromill (slurry wall), in soil	66	0.008	55.7	0.002	20.7
12	General Construction	TBM	N/A	1	204	N/A	N/A	N/A	N/A	N/A	N/A		TBM	93	0.142	65.6	0.006	30.6

Table A.6: Construction Noise and Vibration Predictions - R3

Receiver No.	3
ID	R3
Description	California Club
Distance (ft)	
General Construction	50
Grouting Plant 1	160
Grouting Plant 2	715
Grouting Rigs 1	50
Grouting Rigs 2	400
Little Tokyo Muck Remov	N/A

GB-NZ: Typical Soil: -35

TDH Converted RMS to PPV

NOISE / VIBRATION

Alternative No. ***LPA/Baseline***

Description: EPBM Bored tunnels to 4th St, C&C from 4th St to 7th/Metro

Noise: Maximum 85.0, Cumulative 86.4 — Vibration: Max_VdB 78.0, Max_PPV 0.031, Max_GBNZ 43.0

No.	Equipment Grouping	Surface Equipment	FHWA Equiv	Amount	Distance	Usage	LmaxRef	Shielding	LmaxCalc	Leq	Contribution	FTA Equiv	LvRef (RMS)	PPV_Ref	Lv (VdB)	PPV (ips)	GBNZ (dBA)
	5	2	6	3	4	8	7						5	3			
1	General Construction	Bulldozer	Dozer	1	50	40%	85	0	85.0	81.0	29%	Small Bulldozer	58	0.003	49.0	0.001	14.0
2	General Construction	Excavator	Excavator	1	50	40%	85	0	85.0	81.0	29%	Large Bulldozer	87	0.089	78.0	0.031	43.0
3	General Construction	Crane	Crane	1	50	16%	85	0	85.0	77.0	12%	MIN (Sm. Dozer)	79	0.035	70.0	0.012	35.0
4	General Construction	Drill Rig	Drill Rig Truck	1	50	20%	84	0	84.0	77.0	12%	Caisson drilling	87	0.089	78.0	0.031	43.0
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	50	40%	79	0	79.0	75.0	7%	Loaded Trucks	86	0.076	77.0	0.027	42.0
6	General Construction	Muck Removal	Dump Truck	3	50	40%	76	0	76.0	77.1	12%	Loaded Trucks	86	0.076	77.0	0.027	42.0

Alternative No. ***A - EPBM/Open-Face Shield/SEM Profile Alternative***

Description: EPBM bored tunnels on LPA alignment to 4th street shaft, open face shield tunnel excavation on 5th St shaft abandoning shields underground, SEM tunnel construction from 5th St shaft to 7th Metro mucking through L tunnel

Noise: Maximum 85.0, Cumulative 89.8 — Vibration: Max_VdB 78.0, Max_PPV 0.0, Max_GBNZ 43.0

No.	Powered By	Surface Equipment	FHWA Equiv	Amount	Distance	Usage	LmaxRef	Shielding	LmaxCalc	Leq	Contribution	FTA Equiv	LvRef (RMS)	PPV_Ref	Lv (VdB)	PPV (ips)	GBNZ (dBA)
	5	2	6	3	4	8	7						5	3			
1	General Construction	Bulldozer	Dozer	1	50	40%	85	0	85.0	81.0	13%	Small Bulldozer	58	0.003	49.0	0.001	14.0
2	General Construction	Excavator	Excavator	1	50	40%	85	0	85.0	81.0	13%	Large Bulldozer	87	0.089	78.0	0.031	43.0
3	General Construction	Crane	Crane	1	50	16%	85	0	85.0	77.0	5%	MIN (Sm. Dozer)	79	0.035	70.0	0.012	35.0
4	General Construction	Drill Rig	Drill Rig Truck	1	50	20%	84	0	84.0	77.0	5%	Caisson drilling	87	0.089	78.0	0.031	43.0
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	50	40%	79	0	79.0	75.0	3%	Loaded Trucks	86	0.076	77.0	0.027	42.0
6	General Construction	Muck Removal	Dump Truck	1	50	40%	76	0	76.0	72.0	2%	Loaded Trucks	86	0.076	77.0	0.027	42.0
7	Grouting Plant 1	Compressor 1	Compressor (air)	1	160	100%	80	0	69.9	69.9	1%	Small Bulldozer	58	0.003	33.8	0.000	0.0
8	Grouting Plant 1	High-Pressure Pump 1	Pumps	1	160	100%	77	0	66.9	66.9	1%	Small Bulldozer	58	0.003	33.8	0.000	0.0
9	Grouting Plant 1	Diesel Generator 1	Generator	1	160	100%	82	0	71.9	71.9	2%	Small Bulldozer	58	0.003	33.8	0.000	0.0
10	Grouting Plant 1	Mixing Plant 1	Concrete Batch Plant	1	160	100%	83	0	72.9	72.9	2%	Small Bulldozer	58	0.003	33.8	0.000	0.0
11	Grouting Plant 2	Compressor 2	Compressor (air)	1	715	100%	80	0	56.9	56.9	0%	Small Bulldozer	58	0.003	14.3	0.000	0.0
12	Grouting Plant 2	High-Pressure Pump 2	Pumps	1	715	100%	77	0	53.9	53.9	0%	Small Bulldozer	58	0.003	14.3	0.000	0.0
13	Grouting Plant 2	Diesel Generator 2	Generator	1	715	100%	82	0	58.9	58.9	0%	Small Bulldozer	58	0.003	14.3	0.000	0.0
14	Grouting Plant 2	Mixing Plant 2	Concrete Batch Plant	1	715	100%	83	0	59.9	59.9	0%	Small Bulldozer	58	0.003	14.3	0.000	0.0
15	Grouting Rigs 1	Hydraulic Drill Rig 1	Drill Rig Truck	2	50	100%	84	0	84.0	87.0	53%	Hydromill (slurry wall), in soil	66	0.008	57.0	0.003	22.0
16	Grouting Rigs 2	Hydraulic Drill Rig 2	Drill Rig Truck	2	400	100%	84	0	65.9	68.9	1%	Hydromill (slurry wall), in soil	66	0.008	29.9	0.000	0.0
17	General Construction	TBM	N/A	1	400	N/A	N/A	N/A	N/A	N/A	N/A	TBM	93	0.142	56.9	0.002	21.9

Alternative No. ***B - EPBM/SEM Low Alignment Alternative***

Description: EPBM bored tunnels on deep alignment to south of 5th street, remove EPBM's through mangrove portal, SEM tunnel construction from 5th street shaft to 7th/Metro. Mucking through L tunnel to Mangrove portal

Noise: Maximum 85.0, Cumulative 89.8 — Vibration: Max_VdB 78.0, Max_PPV 0.0, Max_GBNZ 43.0

No.	Powered By	Surface Equipment	FHWA Equiv	Amount	Distance	Usage	LmaxRef	Shielding	LmaxCalc	Leq	Contribution	FTA Equiv	LvRef (RMS)	PPV_Ref	Lv (VdB)	PPV (ips)	GBNZ (dBA)
	5	2	6	3	4	8	7						5	3			
1	General Construction	Bulldozer	Dozer	1	50	40%	85	0	85.0	81.0	13%	Small Bulldozer	58	0.003	49.0	0.001	14.0
2	General Construction	Excavator	Excavator	1	50	40%	85	0	85.0	81.0	13%	Large Bulldozer	87	0.089	78.0	0.031	43.0
3	General Construction	Crane	Crane	1	50	16%	85	0	85.0	77.0	5%	MIN (Sm. Dozer)	79	0.035	70.0	0.012	35.0
4	General Construction	Drill Rig	Drill Rig Truck	1	50	20%	84	0	84.0	77.0	5%	Caisson drilling	87	0.089	78.0	0.031	43.0
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	50	40%	79	0	79.0	75.0	3%	Loaded Trucks	86	0.076	77.0	0.027	42.0
6	General Construction	Muck Removal	Dump Truck	1	50	40%	76	0	76.0	71.1	1%	Loaded Trucks	86	0.076	77.0	0.027	42.0
7	Grouting Plant 1	Compressor 1	Compressor (air)	1	160	100%	80	0	69.9	69.9	1%	Small Bulldozer	58	0.003	33.8	0.000	0.0
8	Grouting Plant 1	High-Pressure Pump 1	Pumps	1	160	100%	77	0	66.9	66.9	1%	Small Bulldozer	58	0.003	33.8	0.000	0.0
9	Grouting Plant 1	Diesel Generator 1	Generator	1	160	100%	82	0	71.9	71.9	2%	Small Bulldozer	58	0.003	33.8	0.000	0.0
10	Grouting Plant 1	Mixing Plant 1	Concrete Batch Plant	1	160	100%	83	0	72.9	72.9	2%	Small Bulldozer	58	0.003	33.8	0.000	0.0
11	Grouting Rigs 1	Hydraulic Drill Rig 1	Drill Rig Truck	2	50	100%	84	0	84.0	87.0	53%	Hydromill (slurry wall), in soil	66	0.008	57.0	0.003	22.0
12	General Construction	TBM	N/A	1	407	N/A	N/A	N/A	N/A	N/A	N/A	TBM	93	0.142	56.7	0.002	21.7

Table A.7: Construction Noise and Vibration Predictions - R4

Receiver No.	4
ID	R4
Description	Los Angeles Public Library
Distance (ft)	
General Construction	285
Grouting Plant 1	265
Grouting Plant 2	480
Grouting Rigs 1	285
Grouting Rigs 2	300
Little Tokyo Muck Remov	N/A

GB-NZ: Typical Soil: -35

TDH Converted RMS to PPV

NOISE

VIBRATION

Alternative No. ***LPA/Baseline***

Description: EPBM Bored tunnels to 4th St, C&C from 4th St to 7th/Metro

	Maximum	Cumulative	Max_VdB	Max_PPV	Max_GBNZ
LPA/Baseline	69.9	71.3	55.3	0.002	20.3

No.	Equipment Grouping	Surface Equipment	FHWA Equiv	Amount	Distance	Usage	LmaxRef	Shielding	LmaxCalc	Leq	Contribution	FTA Equiv	LvRef (RMS)	PPV_Ref	Lv (VdB)	PPV (ips)	GBNZ (dBA)
	5	2	6	3	4	8	7						5	3			
1	General Construction	Bulldozer	Dozer	1	285	40%	85	0	69.9	65.9	29%	Small Bulldozer	58	0.003	26.3	0.000	0.0
2	General Construction	Excavator	Excavator	1	285	40%	85	0	69.9	65.9	29%	Large Bulldozer	87	0.089	55.3	0.002	20.3
3	General Construction	Crane	Crane	1	285	16%	85	0	69.9	61.9	12%	MIN (Sm. Dozer)	79	0.035	47.3	0.001	12.3
4	General Construction	Drill Rig	Drill Rig Truck	1	285	20%	84	0	68.9	61.9	11%	Caisson drilling	87	0.089	55.3	0.002	20.3
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	285	40%	79	0	63.9	59.9	7%	Loaded Trucks	86	0.076	54.3	0.002	19.3
6	General Construction	Muck Removal	Dump Truck	3	285	40%	76	0	60.9	62.0	12%	Loaded Trucks	86	0.076	54.3	0.002	19.3

Alternative No. ***A - EPBM/Open-Face Shield/SEM Profile Alternative***

Description: EPBM bored tunnels on LPA alignment to 4th street shaft, open face shield tunnel excavation on 5th St shaft abandoning shields underground, SEM tunnel construction from 5th St shaft to 7th Metro mucking through L tunnel

	Maximum	Cumulative	Max_VdB	Max_PPV	Max_GBNZ
A - EPBM/Open-Face Shield/SEM Profile Alternative	69.9	78.2	60.6	0.0	25.6

No.	Powered By	Surface Equipment	FHWA Equiv	Amount	Distance	Usage	LmaxRef	Shielding	LmaxCalc	Leq	Contribution	FTA Equiv	LvRef (RMS)	PPV_Ref	Lv (VdB)	PPV (ips)	GBNZ (dBA)
	5	2	6	3	4	8	7						5	3			
1	General Construction	Bulldozer	Dozer	1	285	40%	85	0	69.9	65.9	6%	Small Bulldozer	58	0.003	26.3	0.000	0.0
2	General Construction	Excavator	Excavator	1	285	40%	85	0	69.9	65.9	6%	Large Bulldozer	87	0.089	55.3	0.002	20.3
3	General Construction	Crane	Crane	1	285	16%	85	0	69.9	61.9	2%	MIN (Sm. Dozer)	79	0.035	47.3	0.001	12.3
4	General Construction	Drill Rig	Drill Rig Truck	1	285	20%	84	0	68.9	61.9	2%	Caisson drilling	87	0.089	55.3	0.002	20.3
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	285	40%	79	0	63.9	59.9	1%	Loaded Trucks	86	0.076	54.3	0.002	19.3
6	General Construction	Muck Removal	Dump Truck	1	285	40%	76	0	60.9	56.9	1%	Loaded Trucks	86	0.076	54.3	0.002	19.3
7	Grouting Plant 1	Compressor 1	Compressor (air)	1	265	100%	80	0	65.5	65.5	5%	Small Bulldozer	58	0.003	27.2	0.000	0.0
8	Grouting Plant 1	High-Pressure Pump 1	Pumps	1	265	100%	77	0	62.5	62.5	3%	Small Bulldozer	58	0.003	27.2	0.000	0.0
9	Grouting Plant 1	Diesel Generator 1	Generator	1	265	100%	82	0	67.5	67.5	9%	Small Bulldozer	58	0.003	27.2	0.000	0.0
10	Grouting Plant 1	Mixing Plant 1	Concrete Batch Plant	1	265	100%	83	0	68.5	68.5	11%	Small Bulldozer	58	0.003	27.2	0.000	0.0
11	Grouting Plant 2	Compressor 2	Compressor (air)	1	480	100%	80	0	60.4	60.4	2%	Small Bulldozer	58	0.003	19.5	0.000	0.0
12	Grouting Plant 2	High-Pressure Pump 2	Pumps	1	480	100%	77	0	57.4	57.4	1%	Small Bulldozer	58	0.003	19.5	0.000	0.0
13	Grouting Plant 2	Diesel Generator 2	Generator	1	480	100%	82	0	62.4	62.4	3%	Small Bulldozer	58	0.003	19.5	0.000	0.0
14	Grouting Plant 2	Mixing Plant 2	Concrete Batch Plant	1	480	100%	83	0	63.4	63.4	3%	Small Bulldozer	58	0.003	19.5	0.000	0.0
15	Grouting Rigs 1	Hydraulic Drill Rig 1	Drill Rig Truck	2	285	100%	84	0	68.9	71.9	23%	Hydromill (slurry wall), in soil	66	0.008	34.3	0.000	0.0
16	Grouting Rigs 2	Hydraulic Drill Rig 2	Drill Rig Truck	2	300	100%	84	0	68.4	71.4	21%	Hydromill (slurry wall), in soil	66	0.008	33.6	0.000	0.0
17	General Construction	TBM	N/A	1	301	N/A	N/A	N/A	N/A	N/A	N/A	TBM	93	0.142	60.6	0.003	25.6

Alternative No. ***B - EPBM/SEM Low Alignment Alternative***

Description: EPBM bored tunnels on deep alignment to south of 5th street, remove EPBM's through mangrove portal, SEM tunnel construction from 5th street shaft to 7th/Metro. Mucking through L tunnel to Mangrove portal

	Maximum	Cumulative	Max_VdB	Max_PPV	Max_GBNZ
B - EPBM/SEM Low Alignment Alternative	69.9	76.6	60.2	0.0	25.2

No.	Powered By	Surface Equipment	FHWA Equiv	Amount	Distance	Usage	LmaxRef	Shielding	LmaxCalc	Leq	Contribution	FTA Equiv	LvRef (RMS)	PPV_Ref	Lv (VdB)	PPV (ips)	GBNZ (dBA)
	5	2	6	3	4	8	7						5	3			
1	General Construction	Bulldozer	Dozer	1	285	40%	85	0	69.9	65.9	6%	Small Bulldozer	58	0.003	26.3	0.000	0.0
2	General Construction	Excavator	Excavator	1	285	40%	85	0	69.9	65.9	6%	Large Bulldozer	87	0.089	55.3	0.002	20.3
3	General Construction	Crane	Crane	1	285	16%	85	0	69.9	61.9	2%	MIN (Sm. Dozer)	79	0.035	47.3	0.001	12.3
4	General Construction	Drill Rig	Drill Rig Truck	1	285	20%	84	0	68.9	61.9	2%	Caisson drilling	87	0.089	55.3	0.002	20.3
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	285	40%	79	0	63.9	59.9	1%	Loaded Trucks	86	0.076	54.3	0.002	19.3
6	General Construction	Muck Removal	Dump Truck	1	285	40%	76	0	60.9	55.9	1%	Loaded Trucks	86	0.076	54.3	0.002	19.3
7	Grouting Plant 1	Compressor 1	Compressor (air)	1	265	100%	80	0	65.5	65.5	5%	Small Bulldozer	58	0.003	27.2	0.000	0.0
8	Grouting Plant 1	High-Pressure Pump 1	Pumps	1	265	100%	77	0	62.5	62.5	3%	Small Bulldozer	58	0.003	27.2	0.000	0.0
9	Grouting Plant 1	Diesel Generator 1	Generator	1	265	100%	82	0	67.5	67.5	9%	Small Bulldozer	58	0.003	27.2	0.000	0.0
10	Grouting Plant 1	Mixing Plant 1	Concrete Batch Plant	1	265	100%	83	0	68.5	68.5	11%	Small Bulldozer	58	0.003	27.2	0.000	0.0
11	Grouting Rigs 1	Hydraulic Drill Rig 1	Drill Rig Truck	2	285	100%	84	0	68.9	71.9	23%	Hydromill (slurry wall), in soil	66	0.008	34.3	0.000	0.0
12	General Construction	TBM	N/A	1	309	N/A	N/A	N/A	N/A	N/A	N/A	TBM	93	0.142	60.2	0.003	25.2

Table A.8: Construction Noise and Vibration Predictions - R5

Receiver No.	5			
ID	R5			
Description	Los Angeles Public Library Park			
Distance (ft)			*GB-NZ: Typical Soil*	
General Construction	50		*-35*	TDH Converted RMS to PPV
Grouting Plant 1	30			
Grouting Plant 2	390			
Grouting Rigs 1	50			
Grouting Rigs 2	108			
Little Tokyo Muck Remov	N/A			

NOISE

VIBRATION

									Maximum	Cumulative					Max_VdB	Max_PPV	Max_GBNZ
Alternative No.	***LPA/Baseline***								85.0	86.4					78.0	0.031	43.0
Description	EPBM Bored tunnels to 4th St, C&C from 4th St to 7th/Metro																
							A-weighted Noise Levels (in dBA)										
No.	**Equipment Grouping**	**Surface Equipment**	**FHWA Equiv**	**Amount**	**Distance**	**Usage**	**LmaxRef**	**Shielding**	**LmaxCalc**	**Leq**	**Contribution**	**FTA Equiv**	**LvRef (RMS)**	**PPV_Ref**	**Lv (VdB)**	**PPV (ips)**	**GBNZ (dBA)**
	5	2	6	3	4	8	7						5	3			
1	General Construction	Bulldozer	Dozer	1	50	40%	85	0	85.0	81.0	29%	Small Bulldozer	58	0.003	49.0	0.001	14.0
2	General Construction	Excavator	Excavator	1	50	40%	85	0	85.0	81.0	29%	Large Bulldozer	87	0.089	78.0	0.031	43.0
3	General Construction	Crane	Crane	1	50	16%	85	0	85.0	77.0	12%	MIN (Sm. Dozer)	79	0.035	70.0	0.012	35.0
4	General Construction	Drill Rig	Drill Rig Truck	1	50	20%	84	0	84.0	77.0	12%	Caisson drilling	87	0.089	78.0	0.031	43.0
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	50	40%	79	0	79.0	75.0	7%	Loaded Trucks	86	0.076	77.0	0.027	42.0
6	General Construction	Muck Removal	Dump Truck	3	50	40%	76	0	76.0	77.1	12%	Loaded Trucks	86	0.076	77.0	0.027	42.0

									Maximum	Cumulative					Max_VdB	Max_PPV	Max_GBNZ
Alternative No.		***A - EPBM/Open-Face Shield/SEM Profile Alternative***							87.4	93.9					78.0	0.0	43.0
Description		EPBM bored tunnels on LPA alignment to 4th street shaft, open face shield tunnel excavation on 5th St shaft abandoning shields underground, SEM tunnel construction from 5th St shaft to 7th Metro mucking through L tunnel															
							A-weighted Noise Levels (in dBA)										
No.	**Powered By**	**Surface Equipment**	**FHWA Equiv**	**Amount**	**Distance**	**Usage**	**LmaxRef**	**Shielding**	**LmaxCalc**	**Leq**	**Contribution**	**FTA Equiv**	**LvRef (RMS)**	**PPV_Ref**	**Lv (VdB)**	**PPV (ips)**	**GBNZ (dBA)**
	5	2	6	3	4	8	7						5	3			
1	General Construction	Bulldozer	Dozer	1	50	40%	85	0	85.0	81.0	5%	Small Bulldozer	58	0.003	49.0	0.001	14.0
2	General Construction	Excavator	Excavator	1	50	40%	85	0	85.0	81.0	5%	Large Bulldozer	87	0.089	78.0	0.031	43.0
3	General Construction	Crane	Crane	1	50	16%	85	0	85.0	77.0	2%	MIN (Sm. Dozer)	79	0.035	70.0	0.012	35.0
4	General Construction	Drill Rig	Drill Rig Truck	1	50	20%	84	0	84.0	77.0	2%	Caisson drilling	87	0.089	78.0	0.031	43.0
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	50	40%	79	0	79.0	75.0	1%	Loaded Trucks	86	0.076	77.0	0.027	42.0
6	General Construction	Muck Removal	Dump Truck	1	50	40%	76	0	76.0	72.0	1%	Loaded Trucks	86	0.076	77.0	0.027	42.0
7	Grouting Plant 1	Compressor 1	Compressor (air)	1	30	100%	80	0	84.4	84.4	11%	Small Bulldozer	58	0.003	55.6	0.002	20.6
8	Grouting Plant 1	High-Pressure Pump 1	Pumps	1	30	100%	77	0	81.4	81.4	6%	Small Bulldozer	58	0.003	55.6	0.002	20.6
9	Grouting Plant 1	Diesel Generator 1	Generator	1	30	100%	82	0	86.4	86.4	18%	Small Bulldozer	58	0.003	55.6	0.002	20.6
10	Grouting Plant 1	Mixing Plant 1	Concrete Batch Plant	1	30	100%	83	0	87.4	87.4	23%	Small Bulldozer	58	0.003	55.6	0.002	20.6
11	Grouting Plant 2	Compressor 2	Compressor (air)	1	390	100%	80	0	62.2	62.2	0%	Small Bulldozer	58	0.003	22.2	0.000	0.0
12	Grouting Plant 2	High-Pressure Pump 2	Pumps	1	390	100%	77	0	59.2	59.2	0%	Small Bulldozer	58	0.003	22.2	0.000	0.0
13	Grouting Plant 2	Diesel Generator 2	Generator	1	390	100%	82	0	64.2	64.2	0%	Small Bulldozer	58	0.003	22.2	0.000	0.0
14	Grouting Plant 2	Mixing Plant 2	Concrete Batch Plant	1	390	100%	83	0	65.2	65.2	0%	Small Bulldozer	58	0.003	22.2	0.000	0.0
15	Grouting Rigs 1	Hydraulic Drill Rig 1	Drill Rig Truck	2	50	100%	84	0	84.0	87.0	20%	Hydromill (slurry wall), in soil	66	0.008	57.0	0.003	22.0
16	Grouting Rigs 2	Hydraulic Drill Rig 2	Drill Rig Truck	2	108	100%	84	0	77.3	80.3	4%	Hydromill (slurry wall), in soil	66	0.008	46.9	0.001	11.9
17	General Construction	TBM	N/A	1	102	N/A	N/A	N/A	N/A	N/A	N/A	TBM	93	0.142	74.7	0.017	39.7

									Maximum	Cumulative					Max_VdB	Max_PPV	Max_GBNZ
Alternative No.		***B - EPBM/SEM Low Alignment Alternative***							87.4	93.6					78.0	0.0	43.0
Description		EPBM bored tunnels on deep alignment to south of 5th street, remove EPBM's through mangrove portal, SEM tunnel construction from 5th street shaft to 7th/Metro. Mucking through L tunnel to Mangrove portal															
							A-weighted Noise Levels (in dBA)										
No.	**Powered By**	**Surface Equipment**	**FHWA Equiv**	**Amount**	**Distance**	**Usage**	**LmaxRef**	**Shielding**	**LmaxCalc**	**Leq**	**Contribution**	**FTA Equiv**	**LvRef (RMS)**	**PPV_Ref**	**Lv (VdB)**	**PPV (ips)**	**GBNZ (dBA)**
	5	2	6	3	4	8	7						5	3			
1	General Construction	Bulldozer	Dozer	1	50	40%	85	0	85.0	81.0	5%	Small Bulldozer	58	0.003	49.0	0.001	14.0
2	General Construction	Excavator	Excavator	1	50	40%	85	0	85.0	81.0	5%	Large Bulldozer	87	0.089	78.0	0.031	43.0
3	General Construction	Crane	Crane	1	50	16%	85	0	85.0	77.0	2%	MIN (Sm. Dozer)	79	0.035	70.0	0.012	35.0
4	General Construction	Drill Rig	Drill Rig Truck	1	50	20%	84	0	84.0	77.0	2%	Caisson drilling	87	0.089	78.0	0.031	43.0
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	50	40%	79	0	79.0	75.0	1%	Loaded Trucks	86	0.076	77.0	0.027	42.0
6	General Construction	Muck Removal	Dump Truck	1	50	40%	76	0	76.0	71.1	1%	Loaded Trucks	86	0.076	77.0	0.027	42.0
7	Grouting Plant 1	Compressor 1	Compressor (air)	1	30	100%	80	0	84.4	84.4	11%	Small Bulldozer	58	0.003	55.6	0.002	20.6
8	Grouting Plant 1	High-Pressure Pump 1	Pumps	1	30	100%	77	0	81.4	81.4	6%	Small Bulldozer	58	0.003	55.6	0.002	20.6
9	Grouting Plant 1	Diesel Generator 1	Generator	1	30	100%	82	0	86.4	86.4	18%	Small Bulldozer	58	0.003	55.6	0.002	20.6
10	Grouting Plant 1	Mixing Plant 1	Concrete Batch Plant	1	30	100%	83	0	87.4	87.4	23%	Small Bulldozer	58	0.003	55.6	0.002	20.6
11	Grouting Rigs 1	Hydraulic Drill Rig 1	Drill Rig Truck	2	50	100%	84	0	84.0	87.0	20%	Hydromill (slurry wall), in soil	66	0.008	57.0	0.003	22.0
12	General Construction	TBM	N/A	1	125	N/A	N/A	N/A	N/A	N/A	N/A	TBM	93	0.142	72.0	0.013	37.0

Table A.9: Construction Noise and Vibration Predictions - R6

Receiver No.	6		
ID	R6		
Description	Citi Group Center		
Distance (ft)		*GB-NZ: Typical Soil*	
General Construction	145	-35	TDH Converted RMS to PPV
Grouting Plant 1	240		
Grouting Plant 2	155		
Grouting Rigs 1	240		
Grouting Rigs 2	145		
Little Tokyo Muck Remov	N/A		

NOISE / VIBRATION

Alternative No. ***LPA/Baseline*** — Maximum 75.8, Cumulative 77.2 — Max_VdB 64.1, Max_PPV 0.006, Max_GBNZ 29.1

Description: EPBM Bored tunnels to 4th St, C&C from 4th St to 7th/Metro

No.	Equipment Grouping	Surface Equipment	FHWA Equiv	Amount	Distance	Usage	LmaxRef	Shielding	LmaxCalc (A-weighted Noise Levels (in dBA))	Leq	Contribution	FTA Equiv	LvRef (RMS)	PPV_Ref	Lv (VdB)	PPV (ips)	GBNZ (dBA)
	5	2	6	3	4	8	7						5	3			
1	General Construction	Bulldozer	Dozer	1	145	40%	85	0	75.8	71.8	29%	Small Bulldozer	58	0.003	35.1	0.000	0.1
2	General Construction	Excavator	Excavator	1	145	40%	85	0	75.8	71.8	29%	Large Bulldozer	87	0.089	64.1	0.006	29.1
3	General Construction	Crane	Crane	1	145	16%	85	0	75.8	67.8	11%	MIN (Sm. Dozer)	79	0.035	56.1	0.003	21.1
4	General Construction	Drill Rig	Drill Rig Truck	1	145	20%	84	0	74.8	67.8	11%	Caisson drilling	87	0.089	64.1	0.006	29.1
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	145	40%	79	0	69.8	65.8	7%	Loaded Trucks	86	0.076	63.1	0.005	28.1
6	General Construction	Muck Removal	Dump Truck	3	145	40%	76	0	66.8	67.8	12%	Loaded Trucks	86	0.076	63.1	0.005	28.1

Alternative No. ***A - EPBM/Open-Face Shield/SEM Profile Alternative*** — Maximum 75.8, Cumulative 83.1 — Max_VdB 70.0, Max_PPV 0.0, Max_GBNZ 35.0

Description: EPBM bored tunnels on LPA alignment to 4th street shaft, open face shield tunnel excavation on 5th St shaft abandoning shields underground, SEM tunnel construction from 5th St shaft to 7th Metro mucking through L tunnel

No.	Powered By	Surface Equipment	FHWA Equiv	Amount	Distance	Usage	LmaxRef	Shielding	LmaxCalc (A-weighted Noise Levels (in dBA))	Leq	Contribution	FTA Equiv	LvRef (RMS)	PPV_Ref	Lv (VdB)	PPV (ips)	GBNZ (dBA)
	5	2	6	3	4	8	7						5	3			
1	General Construction	Bulldozer	Dozer	1	145	40%	85	0	75.8	71.8	7%	Small Bulldozer	58	0.003	35.1	0.000	0.1
2	General Construction	Excavator	Excavator	1	145	40%	85	0	75.8	71.8	7%	Large Bulldozer	87	0.089	64.1	0.006	29.1
3	General Construction	Crane	Crane	1	145	16%	85	0	75.8	67.8	3%	MIN (Sm. Dozer)	79	0.035	56.1	0.003	21.1
4	General Construction	Drill Rig	Drill Rig Truck	1	145	20%	84	0	74.8	67.8	3%	Caisson drilling	87	0.089	64.1	0.006	29.1
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	145	40%	79	0	69.8	65.8	2%	Loaded Trucks	86	0.076	63.1	0.005	28.1
6	General Construction	Muck Removal	Dump Truck	1	145	40%	76	0	66.8	62.8	1%	Loaded Trucks	86	0.076	63.1	0.005	28.1
7	Grouting Plant 1	Compressor 1	Compressor (air)	1	240	100%	80	0	66.4	66.4	2%	Small Bulldozer	58	0.003	28.5	0.000	0.0
8	Grouting Plant 1	High-Pressure Pump 1	Pumps	1	240	100%	77	0	63.4	63.4	1%	Small Bulldozer	58	0.003	28.5	0.000	0.0
9	Grouting Plant 1	Diesel Generator 1	Generator	1	240	100%	82	0	68.4	68.4	3%	Small Bulldozer	58	0.003	28.5	0.000	0.0
10	Grouting Plant 1	Mixing Plant 1	Concrete Batch Plant	1	240	100%	83	0	69.4	69.4	4%	Small Bulldozer	58	0.003	28.5	0.000	0.0
11	Grouting Plant 2	Compressor 2	Compressor (air)	1	155	100%	80	0	70.2	70.2	5%	Small Bulldozer	58	0.003	34.2	0.000	0.0
12	Grouting Plant 2	High-Pressure Pump 2	Pumps	1	155	100%	77	0	67.2	67.2	3%	Small Bulldozer	58	0.003	34.2	0.000	0.0
13	Grouting Plant 2	Diesel Generator 2	Generator	1	155	100%	82	0	72.2	72.2	8%	Small Bulldozer	58	0.003	34.2	0.000	0.0
14	Grouting Plant 2	Mixing Plant 2	Concrete Batch Plant	1	155	100%	83	0	73.2	73.2	10%	Small Bulldozer	58	0.003	34.2	0.000	0.0
15	Grouting Rigs 1	Hydraulic Drill Rig 1	Drill Rig Truck	2	240	100%	84	0	70.4	73.4	11%	Hydromill (slurry wall), in soil	66	0.008	36.5	0.000	1.5
16	Grouting Rigs 2	Hydraulic Drill Rig 2	Drill Rig Truck	2	145	100%	84	0	74.8	77.8	29%	Hydromill (slurry wall), in soil	66	0.008	43.1	0.001	8.1
17	General Construction	TBM	N/A	1	146	N/A	N/A	N/A	N/A	N/A	N/A	TBM	93	0.142	70.0	0.010	35.0

Alternative No. ***B - EPBM/SEM Low Alignment Alternative*** — Maximum 75.8, Cumulative 79.6 — Max_VdB 68.6, Max_PPV 0.0, Max_GBNZ 33.6

Description: EPBM bored tunnels on deep alignment to south of 5th street, remove EPBM's through mangrove portal, SEM tunnel construction from 5th street shaft to 7th/Metro. Mucking through L tunnel to Mangrove portal

No.	Powered By	Surface Equipment	FHWA Equiv	Amount	Distance	Usage	LmaxRef	Shielding	LmaxCalc (A-weighted Noise Levels (in dBA))	Leq	Contribution	FTA Equiv	LvRef (RMS)	PPV_Ref	Lv (VdB)	PPV (ips)	GBNZ (dBA)
	5	2	6	3	4	8	7						5	3			
1	General Construction	Bulldozer	Dozer	1	145	40%	85	0	75.8	71.8	7%	Small Bulldozer	58	0.003	35.1	0.000	0.1
2	General Construction	Excavator	Excavator	1	145	40%	85	0	75.8	71.8	7%	Large Bulldozer	87	0.089	64.1	0.006	29.1
3	General Construction	Crane	Crane	1	145	16%	85	0	75.8	67.8	3%	MIN (Sm. Dozer)	79	0.035	56.1	0.003	21.1
4	General Construction	Drill Rig	Drill Rig Truck	1	145	20%	84	0	74.8	67.8	3%	Caisson drilling	87	0.089	64.1	0.006	29.1
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	145	40%	79	0	69.8	65.8	2%	Loaded Trucks	86	0.076	63.1	0.005	28.1
6	General Construction	Muck Removal	Dump Truck	1	145	40%	76	0	66.8	61.8	1%	Loaded Trucks	86	0.076	63.1	0.005	28.1
7	Grouting Plant 1	Compressor 1	Compressor (air)	1	240	100%	80	0	66.4	66.4	2%	Small Bulldozer	58	0.003	28.5	0.000	0.0
8	Grouting Plant 1	High-Pressure Pump 1	Pumps	1	240	100%	77	0	63.4	63.4	1%	Small Bulldozer	58	0.003	28.5	0.000	0.0
9	Grouting Plant 1	Diesel Generator 1	Generator	1	240	100%	82	0	68.4	68.4	3%	Small Bulldozer	58	0.003	28.5	0.000	0.0
10	Grouting Plant 1	Mixing Plant 1	Concrete Batch Plant	1	240	100%	83	0	69.4	69.4	4%	Small Bulldozer	58	0.003	28.5	0.000	0.0
11	Grouting Rigs 1	Hydraulic Drill Rig 1	Drill Rig Truck	2	240	100%	84	0	70.4	73.4	11%	Hydromill (slurry wall), in soil	66	0.008	36.5	0.000	1.5
12	General Construction	TBM	N/A	1	163	N/A	N/A	N/A	N/A	N/A	N/A	TBM	93	0.142	68.6	0.009	33.6

Table A.10: Construction Noise and Vibration Predictions - R7

Receiver No.	7
ID	R7
Description	Westin Bonaventure Hotel
Distance (ft)	
General Construction	30
Grouting Plant 1	345
Grouting Plant 2	65
Grouting Rigs 1	278
Grouting Rigs 2	20
Little Tokyo Muck Remov	N/A

GB-NZ: Typical Soil: -35 | TDH Converted RMS to PPV

NOISE

VIBRATION

Alternative No. ***LPA/Baseline***

Description: EPBM Bored tunnels to 4th St, C&C from 4th St to 7th/Metro

Noise: Maximum 89.4, Cumulative 90.8 | Vibration: Max_VdB 84.6, Max_PPV 0.068, Max_GBNZ 49.6

No.	Equipment Grouping	Surface Equipment	FHWA Equiv	Amount	Distance	Usage	LmaxRef	Shielding	LmaxCalc (A-weighted Noise Levels (in dBA))	Leq	Contribution	FTA Equiv	LvRef (RMS)	PPV_Ref	Lv (VdB)	PPV (ips)	GBNZ (dBA)
	5	2	6	3	4	8	7						5	3			
1	General Construction	Bulldozer	Dozer	1	30	40%	85	0	89.4	85.5	29%	Small Bulldozer	58	0.003	55.6	0.002	20.6
2	General Construction	Excavator	Excavator	1	30	40%	85	0	89.4	85.5	29%	Large Bulldozer	87	0.089	84.6	0.068	49.6
3	General Construction	Crane	Crane	1	30	16%	85	0	89.4	81.5	12%	MIN (Sm. Dozer)	79	0.035	76.6	0.027	41.6
4	General Construction	Drill Rig	Drill Rig Truck	1	30	20%	84	0	88.4	81.4	12%	Caisson drilling	87	0.089	84.6	0.068	49.6
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	30	40%	79	0	83.4	79.5	7%	Loaded Trucks	86	0.076	83.6	0.058	48.6
6	General Construction	Muck Removal	Dump Truck	3	30	40%	76	0	80.4	81.5	12%	Loaded Trucks	86	0.076	83.6	0.058	48.6

Alternative No. ***A - EPBM/Open-Face Shield/SEM Profile Alternative***

Description: EPBM bored tunnels on LPA alignment to 4th street shaft, open face shield tunnel excavation on 5th St shaft abandoning shields underground, SEM tunnel construction from 5th St shaft to 7th Metro mucking through L tunnel

Noise: Maximum 92.0, Cumulative 96.6 | Vibration: Max_VdB 91.4, Max_PPV 0.1, Max_GBNZ 56.4

No.	Powered By	Surface Equipment	FHWA Equiv	Amount	Distance	Usage	LmaxRef	Shielding	LmaxCalc (A-weighted Noise Levels (in dBA))	Leq	Contribution	FTA Equiv	LvRef (RMS)	PPV_Ref	Lv (VdB)	PPV (ips)	GBNZ (dBA)
	5	2	6	3	4	8	7						5	3			
1	General Construction	Bulldozer	Dozer	1	30	40%	85	0	89.4	85.5	8%	Small Bulldozer	58	0.003	55.6	0.002	20.6
2	General Construction	Excavator	Excavator	1	30	40%	85	0	89.4	85.5	8%	Large Bulldozer	87	0.089	84.6	0.068	49.6
3	General Construction	Crane	Crane	1	30	16%	85	0	89.4	81.5	3%	MIN (Sm. Dozer)	79	0.035	76.6	0.027	41.6
4	General Construction	Drill Rig	Drill Rig Truck	1	30	20%	84	0	88.4	81.4	3%	Caisson drilling	87	0.089	84.6	0.068	49.6
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	30	40%	79	0	83.4	79.5	2%	Loaded Trucks	86	0.076	83.6	0.058	48.6
6	General Construction	Muck Removal	Dump Truck	1	30	40%	76	0	80.4	76.5	1%	Loaded Trucks	86	0.076	83.6	0.058	48.6
7	Grouting Plant 1	Compressor 1	Compressor (air)	1	345	100%	80	0	63.2	63.2	0%	Small Bulldozer	58	0.003	23.8	0.000	0.0
8	Grouting Plant 1	High-Pressure Pump 1	Pumps	1	345	100%	77	0	60.2	60.2	0%	Small Bulldozer	58	0.003	23.8	0.000	0.0
9	Grouting Plant 1	Diesel Generator 1	Generator	1	345	100%	82	0	65.2	65.2	0%	Small Bulldozer	58	0.003	23.8	0.000	0.0
10	Grouting Plant 1	Mixing Plant 1	Concrete Batch Plant	1	345	100%	83	0	66.2	66.2	0%	Small Bulldozer	58	0.003	23.8	0.000	0.0
11	Grouting Plant 2	Compressor 2	Compressor (air)	1	65	100%	80	0	77.7	77.7	1%	Small Bulldozer	58	0.003	45.6	0.001	10.6
12	Grouting Plant 2	High-Pressure Pump 2	Pumps	1	65	100%	77	0	74.7	74.7	1%	Small Bulldozer	58	0.003	45.6	0.001	10.6
13	Grouting Plant 2	Diesel Generator 2	Generator	1	65	100%	82	0	79.7	79.7	2%	Small Bulldozer	58	0.003	45.6	0.001	10.6
14	Grouting Plant 2	Mixing Plant 2	Concrete Batch Plant	1	65	100%	83	0	80.7	80.7	3%	Small Bulldozer	58	0.003	45.6	0.001	10.6
15	Grouting Rigs 1	Hydraulic Drill Rig 1	Drill Rig Truck	2	278	100%	84	0	69.1	72.1	0%	Hydromill (slurry wall), in soil	66	0.008	34.6	0.000	0.0
16	Grouting Rigs 2	Hydraulic Drill Rig 2	Drill Rig Truck	2	20	100%	84	0	92.0	95.0	69%	Hydromill (slurry wall), in soil	66	0.008	68.9	0.011	33.9
17	General Construction	TBM	N/A	1	28	N/A	N/A	N/A	N/A	N/A	N/A	TBM	93	0.142	91.4	0.118	56.4

Alternative No. ***B - EPBM/SEM Low Alignment Alternative***

Description: EPBM bored tunnels on deep alignment to south of 5th street, remove EPBM's through mangrove portal, SEM tunnel construction from 5th street shaft to 7th/Metro. Mucking through L tunnel to Mangrove portal

Noise: Maximum 89.4, Cumulative 90.5 | Vibration: Max_VdB 84.6, Max_PPV 0.1, Max_GBNZ 49.6

No.	Powered By	Surface Equipment	FHWA Equiv	Amount	Distance	Usage	LmaxRef	Shielding	LmaxCalc (A-weighted Noise Levels (in dBA))	Leq	Contribution	FTA Equiv	LvRef (RMS)	PPV_Ref	Lv (VdB)	PPV (ips)	GBNZ (dBA)
	5	2	6	3	4	8	7						5	3			
1	General Construction	Bulldozer	Dozer	1	30	40%	85	0	89.4	85.5	8%	Small Bulldozer	58	0.003	55.6	0.002	20.6
2	General Construction	Excavator	Excavator	1	30	40%	85	0	89.4	85.5	8%	Large Bulldozer	87	0.089	84.6	0.068	49.6
3	General Construction	Crane	Crane	1	30	16%	85	0	89.4	81.5	3%	MIN (Sm. Dozer)	79	0.035	76.6	0.027	41.6
4	General Construction	Drill Rig	Drill Rig Truck	1	30	20%	84	0	88.4	81.4	3%	Caisson drilling	87	0.089	84.6	0.068	49.6
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	30	40%	79	0	83.4	79.5	2%	Loaded Trucks	86	0.076	83.6	0.058	48.6
6	General Construction	Muck Removal	Dump Truck	1	30	40%	76	0	80.4	75.5	1%	Loaded Trucks	86	0.076	83.6	0.058	48.6
7	Grouting Plant 1	Compressor 1	Compressor (air)	1	345	100%	80	0	63.2	63.2	0%	Small Bulldozer	58	0.003	23.8	0.000	0.0
8	Grouting Plant 1	High-Pressure Pump 1	Pumps	1	345	100%	77	0	60.2	60.2	0%	Small Bulldozer	58	0.003	23.8	0.000	0.0
9	Grouting Plant 1	Diesel Generator 1	Generator	1	345	100%	82	0	65.2	65.2	0%	Small Bulldozer	58	0.003	23.8	0.000	0.0
10	Grouting Plant 1	Mixing Plant 1	Concrete Batch Plant	1	345	100%	83	0	66.2	66.2	0%	Small Bulldozer	58	0.003	23.8	0.000	0.0
11	Grouting Rigs 1	Hydraulic Drill Rig 1	Drill Rig Truck	2	278	100%	84	0	69.1	72.1	0%	Hydromill (slurry wall), in soil	66	0.008	34.6	0.000	0.0
12	General Construction	TBM	N/A	1	78	N/A	N/A	N/A	N/A	N/A	N/A	TBM	93	0.142	78.2	0.026	43.2

Table A.11: Construction Noise and Vibration Predictions - R8																			
Receiver No.	8																		
ID	R8																		
Description	Hynes Property																		
Distance (ft)														*GB-NZ: Typical Soil*					
General Construction	97													*-35*		TDH Converted RMS to PPV			
Grouting Plant 1	477																		
Grouting Plant 2	117																		
Grouting Rigs 1	417																		
Grouting Rigs 2	97																		
Little Tokyo Muck Remov	N/A																		
				NOISE													**VIBRATION**		
									Maximum	Cumulative							Max_VdB	Max_PPV	Max_GBNZ
Alternative No.	***LPA/Baseline***								79.2	80.6							69.3	0.012	34.3
Description	EPBM Bored tunnels to 4th St, C&C from 4th St to 7th/Metro																		
									A-weighted Noise Levels (in dBA)										
No.	**Equipment Grouping**	**Surface Equipment**	**FHWA Equiv**	**Amount**	**Distance**	**Usage**	**LmaxRef**	**Shielding**	**LmaxCalc**	**Leq**	**Contribution**			**FTA Equiv**	**LvRef (RMS)**	**PPV_Ref**	**Lv (VdB)**	**PPV (ips)**	**GBNZ (dBA)**
	5	2	6	3	4	8	7								5	3			
1	General Construction	Bulldozer	Dozer	1	97	40%	85	0	79.2	75.3	29%			Small Bulldozer	58	0.003	40.3	0.000	5.3
2	General Construction	Excavator	Excavator	1	97	40%	85	0	79.2	75.3	29%			Large Bulldozer	87	0.089	69.3	0.012	34.3
3	General Construction	Crane	Crane	1	97	16%	85	0	79.2	71.3	12%			MIN (Sm. Dozer)	79	0.035	61.3	0.005	26.3
4	General Construction	Drill Rig	Drill Rig Truck	1	97	20%	84	0	78.2	71.3	12%			Caisson drilling	87	0.089	69.3	0.012	34.3
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	97	40%	79	0	73.2	69.3	7%			Loaded Trucks	86	0.076	68.3	0.010	33.3
6	General Construction	Muck Removal	Dump Truck	3	97	40%	76	0	70.2	71.3	12%			Loaded Trucks	86	0.076	68.3	0.010	33.3
									Maximum	Cumulative							Max_VdB	Max_PPV	Max_GBNZ
Alternative No.		***A - EPBM/Open-Face Shield/SEM Profile Alternative***							79.2	85.4							75.1	0.0	40.1
Description		EPBM bored tunnels on LPA alignment to 4th street shaft, open face shield tunnel excavation on 5th St shaft abandoning shields underground, SEM tunnel construction from 5th St shaft to 7th Metro mucking through L tunnel																	
									A-weighted Noise Levels (in dBA)										
No.	**Powered By**	**Surface Equipment**	**FHWA Equiv**	**Amount**	**Distance**	**Usage**	**LmaxRef**	**Shielding**	**LmaxCalc**	**Leq**	**Contribution**			**FTA Equiv**	**LvRef (RMS)**	**PPV_Ref**	**Lv (VdB)**	**PPV (ips)**	**GBNZ (dBA)**
	5	2	6	3	4	8	7								5	3			
1	General Construction	Bulldozer	Dozer	1	97	40%	85	0	79.2	75.3	10%			Small Bulldozer	58	0.003	40.3	0.000	5.3
2	General Construction	Excavator	Excavator	1	97	40%	85	0	79.2	75.3	10%			Large Bulldozer	87	0.089	69.3	0.012	34.3
3	General Construction	Crane	Crane	1	97	16%	85	0	79.2	71.3	4%			MIN (Sm. Dozer)	79	0.035	61.3	0.005	26.3
4	General Construction	Drill Rig	Drill Rig Truck	1	97	20%	84	0	78.2	71.3	4%			Caisson drilling	87	0.089	69.3	0.012	34.3
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	97	40%	79	0	73.2	69.3	2%			Loaded Trucks	86	0.076	68.3	0.010	33.3
6	General Construction	Muck Removal	Dump Truck	1	97	40%	76	0	70.2	66.3	1%			Loaded Trucks	86	0.076	68.3	0.010	33.3
7	Grouting Plant 1	Compressor 1	Compressor (air)	1	477	100%	80	0	60.4	60.4	0%			Small Bulldozer	58	0.003	19.6	0.000	0.0
8	Grouting Plant 1	High-Pressure Pump 1	Pumps	1	477	100%	77	0	57.4	57.4	0%			Small Bulldozer	58	0.003	19.6	0.000	0.0
9	Grouting Plant 1	Diesel Generator 1	Generator	1	477	100%	82	0	62.4	62.4	1%			Small Bulldozer	58	0.003	19.6	0.000	0.0
10	Grouting Plant 1	Mixing Plant 1	Concrete Batch Plant	1	477	100%	83	0	63.4	63.4	1%			Small Bulldozer	58	0.003	19.6	0.000	0.0
11	Grouting Plant 2	Compressor 2	Compressor (air)	1	117	100%	80	0	72.6	72.6	5%			Small Bulldozer	58	0.003	37.9	0.000	2.9
12	Grouting Plant 2	High-Pressure Pump 2	Pumps	1	117	100%	77	0	69.6	69.6	3%			Small Bulldozer	58	0.003	37.9	0.000	2.9
13	Grouting Plant 2	Diesel Generator 2	Generator	1	117	100%	82	0	74.6	74.6	8%			Small Bulldozer	58	0.003	37.9	0.000	2.9
14	Grouting Plant 2	Mixing Plant 2	Concrete Batch Plant	1	117	100%	83	0	75.6	75.6	11%			Small Bulldozer	58	0.003	37.9	0.000	2.9
15	Grouting Rigs 1	Hydraulic Drill Rig 1	Drill Rig Truck	2	417	100%	84	0	65.6	68.6	2%			Hydromill (slurry wall), in soil	66	0.008	29.3	0.000	0.0
16	Grouting Rigs 2	Hydraulic Drill Rig 2	Drill Rig Truck	2	97	100%	84	0	78.2	81.3	38%			Hydromill (slurry wall), in soil	66	0.008	48.3	0.001	13.3
17	General Construction	TBM	N/A	1	99	N/A	N/A	N/A	N/A	N/A	N/A			TBM	93	0.142	75.1	0.018	40.1
									Maximum	Cumulative							Max_VdB	Max_PPV	Max_GBNZ
Alternative No.		***B - EPBM/SEM Low Alignment Alternative***							79.2	80.7							72.3	0.0	37.3
Description		EPBM bored tunnels on deep alignment to south of 5th street, remove EPBM's through mangrove portal, SEM tunnel construction from 5th street shaft to 7th/Metro. Mucking through L tunnel to Mangrove portal																	
									A-weighted Noise Levels (in dBA)										
No.	**Powered By**	**Surface Equipment**	**FHWA Equiv**	**Amount**	**Distance**	**Usage**	**LmaxRef**	**Shielding**	**LmaxCalc**	**Leq**	**Contribution**			**FTA Equiv**	**LvRef (RMS)**	**PPV_Ref**	**Lv (VdB)**	**PPV (ips)**	**GBNZ (dBA)**
	5	2	6	3	4	8	7								5	3			
1	General Construction	Bulldozer	Dozer	1	97	40%	85	0	79.2	75.3	10%			Small Bulldozer	58	0.003	40.3	0.000	5.3
2	General Construction	Excavator	Excavator	1	97	40%	85	0	79.2	75.3	10%			Large Bulldozer	87	0.089	69.3	0.012	34.3
3	General Construction	Crane	Crane	1	97	16%	85	0	79.2	71.3	4%			MIN (Sm. Dozer)	79	0.035	61.3	0.005	26.3
4	General Construction	Drill Rig	Drill Rig Truck	1	97	20%	84	0	78.2	71.3	4%			Caisson drilling	87	0.089	69.3	0.012	34.3
5	General Construction	Concrete Truck	Concrete Mixer Truck	1	97	40%	79	0	73.2	69.3	2%			Loaded Trucks	86	0.076	68.3	0.010	33.3
6	General Construction	Muck Removal	Dump Truck	1	97	40%	76	0	70.2	65.3	1%			Loaded Trucks	86	0.076	68.3	0.010	33.3
7	Grouting Plant 1	Compressor 1	Compressor (air)	1	477	100%	80	0	60.4	60.4	0%			Small Bulldozer	58	0.003	19.6	0.000	0.0
8	Grouting Plant 1	High-Pressure Pump 1	Pumps	1	477	100%	77	0	57.4	57.4	0%			Small Bulldozer	58	0.003	19.6	0.000	0.0
9	Grouting Plant 1	Diesel Generator 1	Generator	1	477	100%	82	0	62.4	62.4	1%			Small Bulldozer	58	0.003	19.6	0.000	0.0
10	Grouting Plant 1	Mixing Plant 1	Concrete Batch Plant	1	477	100%	83	0	63.4	63.4	1%			Small Bulldozer	58	0.003	19.6	0.000	0.0
11	Grouting Rigs 1	Hydraulic Drill Rig 1	Drill Rig Truck	2	417	100%	84	0	65.6	68.6	2%			Hydromill (slurry wall), in soil	66	0.008	29.3	0.000	0.0
12	General Construction	TBM	N/A	1	123	N/A	N/A	N/A	N/A	N/A	N/A			TBM	93	0.142	72.3	0.013	37.3

Table A.12: Construction Noise and Vibration Predictions - R9																			
Receiver No.	9																		
ID	R9																		
Description	Savoy Apartments (Little Tokyo)																		
Distance (ft)														*GB-NZ: Typical Soil*					
General Construction	N/A													*-35*		TDH Converted RMS to PPV			
Grouting Plant 1	N/A																		
Grouting Plant 2	N/A																		
Grouting Rigs 1	N/A																		
Grouting Rigs 2	N/A																		
Little Tokyo Muck Remov	130																		
NOISE														**VIBRATION**					
									Maximum	Cumulative							Max_VdB	Max_PPV	Max_GBNZ
Alternative No.	***LPA/Baseline***								67.7	82.8							64.5	0.006	29.5
Description	EPBM Bored tunnels to 4th St, C&C from 4th St to 7th/Metro																		
							A-weighted Noise Levels (in dBA)							**FTA Equiv**	**LvRef (RMS)**	**PPV_Ref**	**Lv (VdB)**	**PPV (ips)**	**GBNZ (dBA)**
No.	**Equipment Grouping**	**Surface Equipment**	**FHWA Equiv**	**Amount**	**Distance**	**Usage**	**LmaxRef**	**Shielding**	**LmaxCalc**	**Leq**	**Contribution**				5	3			
	5	2	6	3	4	8	7												
6	Little Tokyo Muck Removal	Muck Removal	Dump Truck	1	130	40	76	0	67.7	82.8	99%			Loaded Trucks	86	0.076	64.5	0.006	29.5
									Maximum	Cumulative							Max_VdB	Max_PPV	Max_GBNZ
Alternative No.		***A - EPBM/Open-Face Shield/SEM Profile Alternative***							67.7	88.5							64.5	0.006	29.5
Description		EPBM bored tunnels on LPA alignment to 4th street shaft, open face shield tunnel excavation on 5th St shaft abandoning shields underground, SEM tunnel construction from 5th St shaft to 7th Metro mucking through L tunnel																	
							A-weighted Noise Levels (in dBA)							**FTA Equiv**	**LvRef (RMS)**	**PPV_Ref**	**Lv (VdB)**	**PPV (ips)**	**GBNZ (dBA)**
No.	**Powered By**	**Surface Equipment**	**FHWA Equiv**	**Amount**	**Distance**	**Usage**	**LmaxRef**	**Shielding**	**LmaxCalc**	**Leq**	**Contribution**				5	3			
	5	2	6	3	4	8	7												
6	Little Tokyo Muck Removal	Muck Removal	Dump Truck	3	130	40	76	0	67.7	88.5	100%			Loaded Trucks	86	0.076	64.5	0.006	29.5
									Maximum	Cumulative							Max_VdB	Max_PPV	Max_GBNZ
Alternative No.		***B - EPBM/SEM Low Alignment Alternative***							67.7	88.8							64.5	0.006	29.5
Description		EPBM bored tunnels on deep alignment to south of 5th street, remove EPBM's through mangrove portal, SEM tunnel construction from 5th street shaft to 7th/Metro. Mucking through L tunnel to Mangrove portal																	
							A-weighted Noise Levels (in dBA)							**FTA Equiv**	**LvRef (RMS)**	**PPV_Ref**	**Lv (VdB)**	**PPV (ips)**	**GBNZ (dBA)**
No.	**Powered By**	**Surface Equipment**	**FHWA Equiv**	**Amount**	**Distance**	**Usage**	**LmaxRef**	**Shielding**	**LmaxCalc**	**Leq**	**Contribution**				5	3			
	5	2	6	3	4	8	7												
6	Little Tokyo Muck Removal	Muck Removal	Dump Truck	3	130	40	76	0	67.7	88.8	99%			Loaded Trucks	86	0.076	64.5	0.006	29.5

Table A.13: Construction Equipment 50-Foot Noise Emission Limits (FHWA Table 2)

Equipment Category	Lmax Level (dBA, slow)	Type
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact
Impact Pile Driver	95	Impact
In situ Soil Sampling Rig	84	Continuous
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous
Pumps	77	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous
Soil Mix Drill Rig	80	Continuous
Street Sweeper	80	Continuous
Tractor	84	Continuous
Truck (dump, delivery)	84	Continuous
Vacuum Excavator Truck (vac-truck)	85	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

Section 01575 Construction Noise and Vibration Control (February 2009)

Table A.14: CA/T Noise Emission Reference Levels and Usage Factors

Equipment Description	Impact Device?	Acoustical Use Factor (%)	Spec 721.560 Lmax@50ft (dBA, slow)	Actual Measured Lmax@50ft (dBA, slow)	No. of Actual Data Samples (Count, samples averaged)
All Other Equipment >5 HP	No	50	85	--N/A--	0
Auger Drill Rig	No	20	85	84	36
Backhoe	No	40	80	78	372
BarBender	No	20	80	--N/A--	0
Blasting	Yes	--N/A--	94	--N/A--	0
Boring Jack Power Unit	No	50	80	83	1
Chain Saw	No	20	85	84	46
Clam Shovel (dropping)	Yes	20	93	87	4
Compactor (ground)	No	20	80	83	57
Compressor (air)	No	40	80	78	18
Concrete Batch Plant	No	15	83	--N/A--	0
Concrete Mixer Truck	No	40	85	79	40
Concrete Pump Truck	No	20	82	81	30
Concrete Saw	No	20	90	90	55
Crane	No	16	85	81	405
Dozer	No	40	85	82	55
Drill Rig Truck	No	20	84	79	22
Drum Mixer	No	50	80	80	1
Dump Truck	No	40	84	76	31
Excavator	No	40	85	81	170
Flat Bed Truck	No	40	84	74	4
Front End Loader	No	40	80	79	96
Generator	No	50	82	81	19
Generator (<25KVA,VMSsigns)	No	50	70	73	74
Gradall	No	40	85	83	70
Grader	No	40	85	--N/A--	0
Grapple (on backhoe)	No	40	85	87	1
Horizontal Boring Hydr. Jack	No	25	80	82	6
Hydra Break Ram	Yes	10	90	--N/A--	0
Impact Pile Driver	Yes	20	95	101	11
Jackhammer	Yes	20	85	89	133
Man Lift	No	20	85	75	23
Mounted Impact Hammer (hoe ram)	Yes	20	90	90	212
Pavement Scarafier	No	20	85	90	2
Paver	No	50	85	77	9
Pickup Truck	No	40	55	75	1
Pneumatic Tools	No	50	85	85	90
Pumps	No	50	77	81	17
Refrigerator Unit	No	100	82	73	3
Rivit Buster/chipping gun	Yes	20	85	79	19
Rock Drill	No	20	85	81	3
Roller	No	20	85	80	16
Sand Blasting (Single Nozzle)	No	20	85	96	9
Scraper	No	40	85	84	12
Shears (on backhoe)	No	40	85	96	5
Slurry Plant	No	100	78	78	1
Slurry Trenching Machine	No	50	82	80	75
Soil Mix Drill Rig	No	50	80	--N/A--	0
Tractor	No	40	84	--N/A--	0
Vacuum Excavator (Vac-truck)	No	40	85	85	149
Vacuum Street Sweeper	No	10	80	82	19
Ventilation Fan	No	100	85	79	13
Vibrating Hopper	No	50	85	87	1
Vibratory Concrete Mixer	No	20	80	80	1
Vibratory Pile Driver	No	20	95	101	44
Warning Horn	No	5	85	83	12
Welder/Torch	No	40	73	74	5

Source: Roadway Construction Noise Model (RCNM 1.0), filename:EQUIPLST.xls (revised: 7/26/05)

Table A.15: Vibration Source Levels for Construction Equipment (FTA Table 12-2)

	PPV at 25 ft (in/sec)		Approx. Lv at 25 ft (VdB)	
Equipment	**Upper Range**	**Typical**	**Upper Range**	**Typical**
Pile Driver (impact)	1.518	0.644	112	104
Pile Driver (sonic)	0.734	0.170	105	93
Clam shovel drop (slurry wall)		0.202		94
Hydromill (slurry wall), in soil		0.008		66
Hydromill (slurry wall), in rock		0.017		75
Vibratory Roller		0.210		94
Hoe Ram		0.089		87
Large Bulldozer		0.089		87
Caisson drilling		0.089		87
Loaded trucks		0.076		86
Jackhammer		0.035		79
Small Bulldozer		0.003		58
MIN (Sm. Dozer)		0.035		79
Locomotive		0.126		90

Note: TDH estimate from FTA FIG 10-1

Table A.16: FTA Construction Equipment Source Reference Levels - Noise

Equipment	Typical Noise Level (dBA) 50 ft from Source
Air Compressor	81
Backhoe	80
Ballast Equalizer	82
Ballast Tamper	83
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Concrete Vibrator	76
Crane, Derrick	88
Crane, Mobile	83
Dozer	85
Generator	81
Grader	85
Impact Wrench	85
Jack Hammer	88
Loader	85
Paver	89
Pile-driver (Impact)	101
Pile-driver (Sonic)	96
Pneumatic Tool	85
Pump	76
Rail Saw	90
Rock Drill	98
Roller	74
Saw	76
Scarifier	83
Scraper	89
Shovel	82
Spike Driver	77
Tie Cutter	84
Tie Handler	80
Tie Inserter	85
Truck	88

NB: Table based on an EPA Report (4), measured data from railroad construction equipmenttaken
Note: FTA Table 12-1. Construction Equipment Noise Emission Levels

Table A.17: Truck Activity

Alternative	Average Trucks Per Day	Percent of Excavated Materials Removed from each Location		Estimated Breakdown in Distribution of Average Daily Trucks		Max Hourly Trucks (total/10)	
		Flower Street	Little Tokyo	Flower Street	Little Tokyo	Flower Street	Little Tokyo
Baseline/LPA	40	81%	19%	32	8	3	1
A: EPBM/Open-Face Shield/ SEM Profile Alternative	40	25%	75%	10	30	1	3
B: EPBM/SEM Low Alignment Alternative	40	20%	80%	8	32	1	3

Table A.18: Tunnel Depth Distance Adjustments

Alternative	Min	Max	Adjust_Tunnel_Hgt	Depth
LPA	40	40	20	20
A	40	40	20	20
B	95	105	20	75

	Lateral	LPA	A	B
Standard Hotel	555	555.4	555.4	560.0
City National Plaza	190	191.0	191.0	204.3
California Club	400	400.5	400.5	407.0
Los Angeles Public Library	300	300.7	300.7	309.2
Los Angeles Public Library Park	100	102.0	102.0	125.0
Citi Group Center	145	146.4	146.4	163.2
Westin Bonaventure Hotel	20	28.3	28.3	77.6
Hynes Property	97	99.0	99.0	122.6
Savoy Apartments (Little Tokyo)	N/A	N/A	N/A	N/A

Table A.18: Tunnel Depth Distance Adjustments

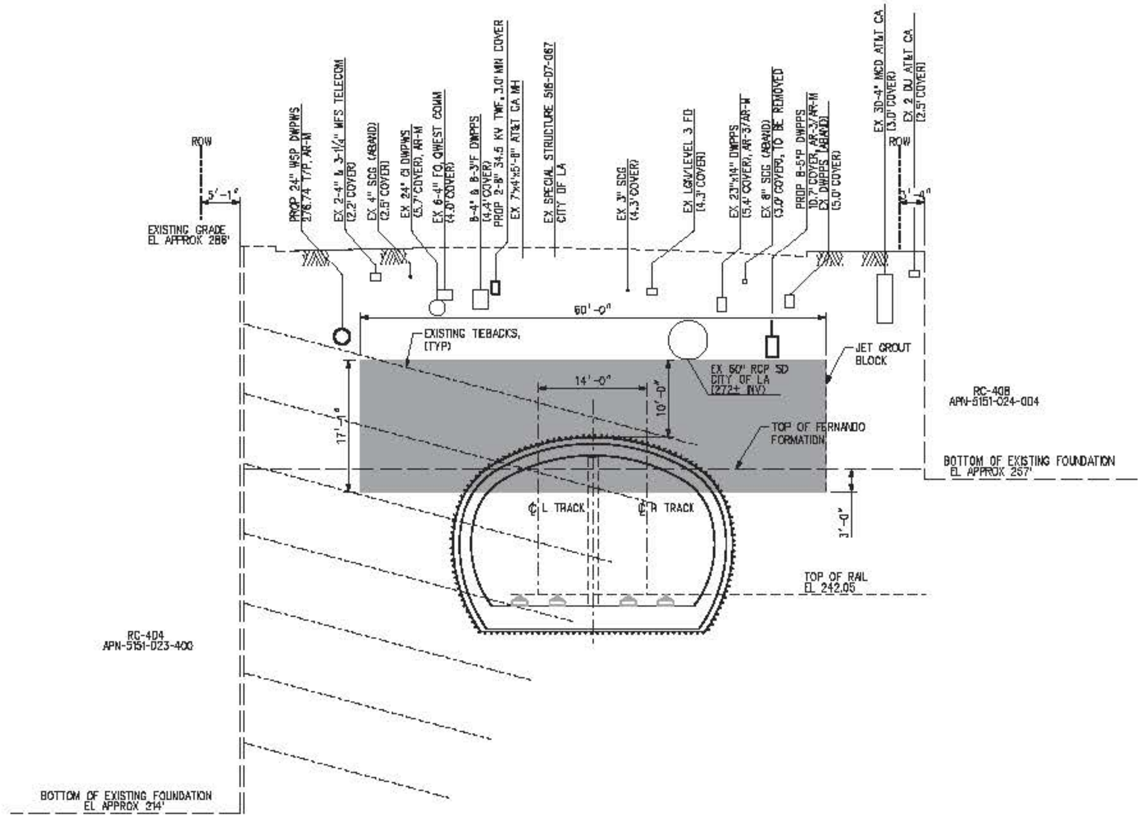
Alternative	Min	Max	Adjust_Tunnel_Hgt	Depth
LPA	40	40	20	20
A	40	40	20	20
B	95	105	20	75

	Lateral	LPA	A	B
Standard Hotel	555	555.4	555.4	560.0
City National Plaza	190	191.0	191.0	204.3
California Club	400	400.5	400.5	407.0
Los Angeles Public Library	300	300.7	300.7	309.2
Los Angeles Public Library Park	100	102.0	102.0	125.0
Citi Group Center	145	146.4	146.4	163.2
Westin Bonaventure Hotel	20	28.3	28.3	77.6
Hynes Property	97	99.0	99.0	122.6
Savoy Apartments (Little Tokyo)	N/A	N/A	N/A	N/A

APPENDIX G

ENGINEERING DRAWINGS

Alternative A



SECTION @ STA R 7+50

0 4' 8' 16'

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA

REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

DESIGNED BY
DRAWN BY
CHECKED BY
IN CHARGE
DATE 8/27/2013

LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

Metro

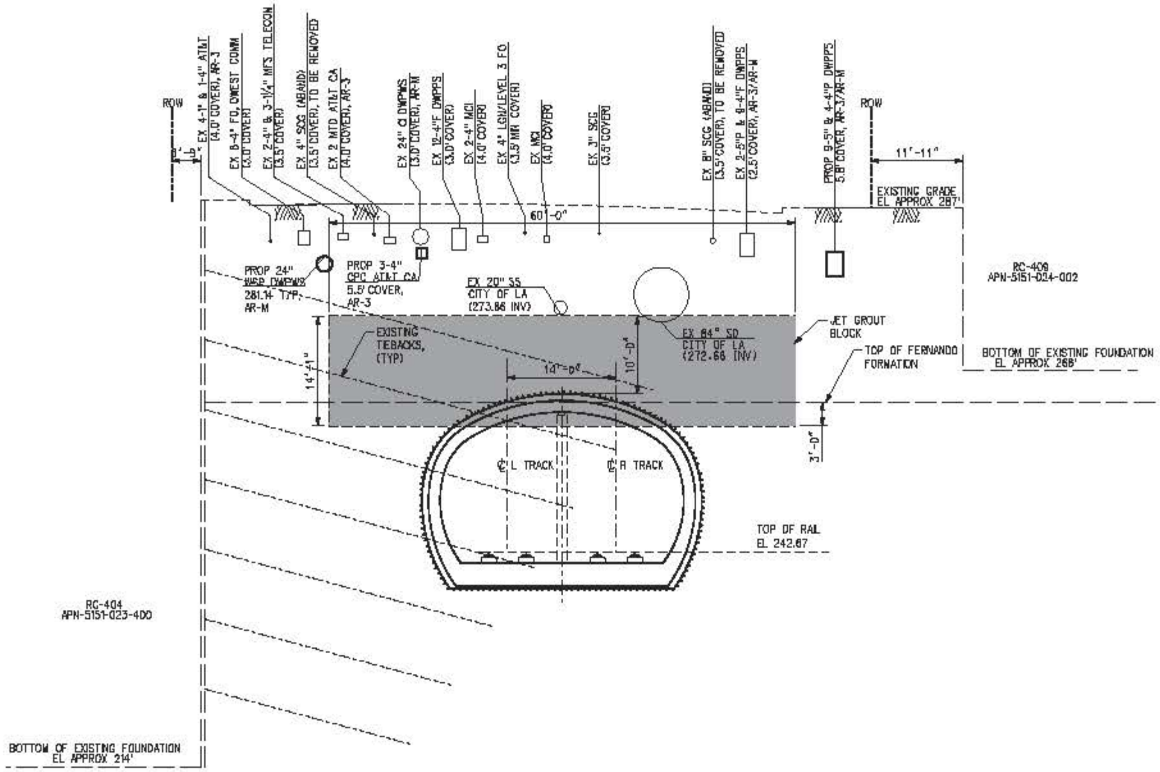
The Connector Partnership

777 S. FIGUEROA STREET
10TH FLOOR
LOS ANGELES, CA 90017
T 213-312-3100
F 213-312-3114

REGIONAL CONNECTOR TRANSIT CORRIDOR
FLOWER STREET
RE EVALUATION
OPTION 4
SECTION AT STATION R 7+50

CONTRACT NO C0980
DRAWING NO AS-401
REV
SCALE 1" = 8'
SHEET NO

Model Name= Default



SECTION @ STA R 9+05

0 4' 8' 16'

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA

REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

DESIGNED BY
DRAWN BY
CHECKED BY
IN CHARGE
DATE

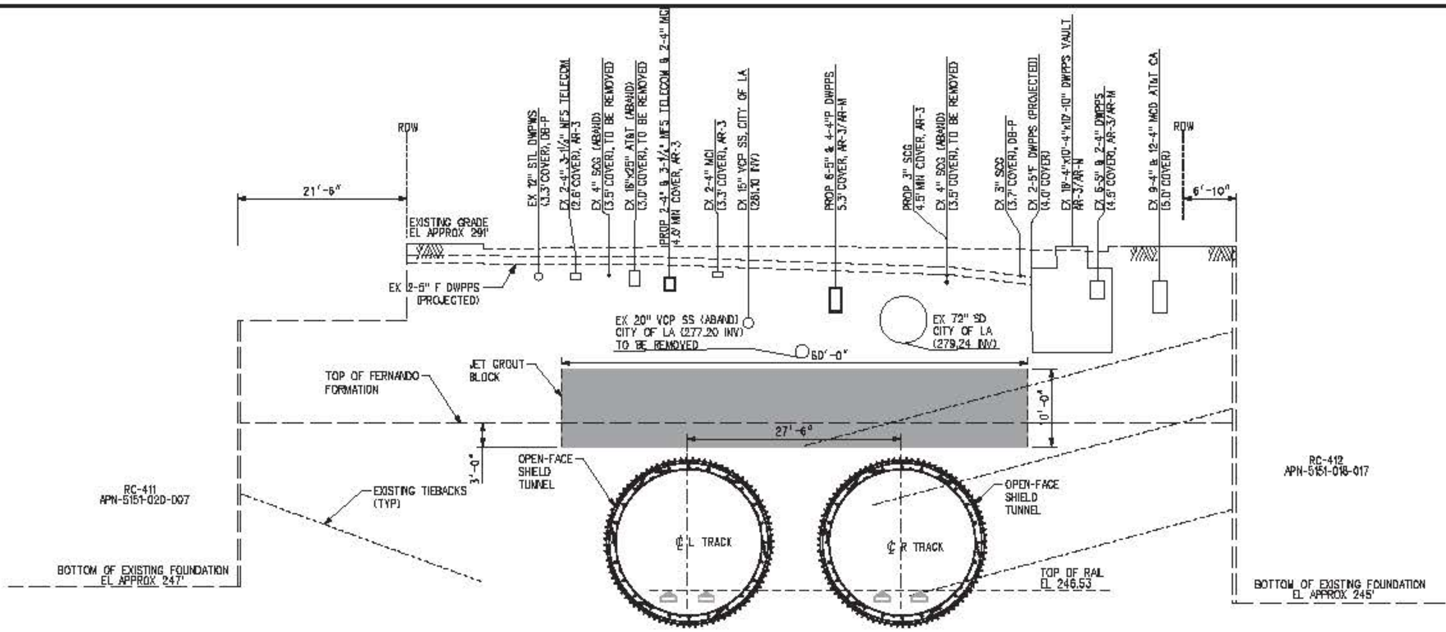
Metro
LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

The Connector Partnership
777 S. FIGUEROA STREET
10TH FLOOR
LOS ANGELES, CA 90017
T 213-312-3100
F 213-312-3114

REGIONAL CONNECTOR TRANSIT CORRIDOR
FLOWER STREET
RE EVALUATION
OPTION 4
SECTION AT STATION 9+05

CONTRACT NO C0980
DRAWING NO AS-402
REV
SCALE 1" = 8'
SHEET NO

Model Name= Default



SECTION @ STA R 14+96

0 4' 8' 16'

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.

REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

DESIGNED BY
DRAWN BY
CHECKED BY
IN CHARGE
DATE 8/27/2013

Metro
LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

The Connector Partnership
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F 213-312-3114

REGIONAL CONNECTOR TRANSIT CORRIDOR
FLOWER STREET
RE EVALUATION
OPTION 4
SECTION AT STATION 14+96

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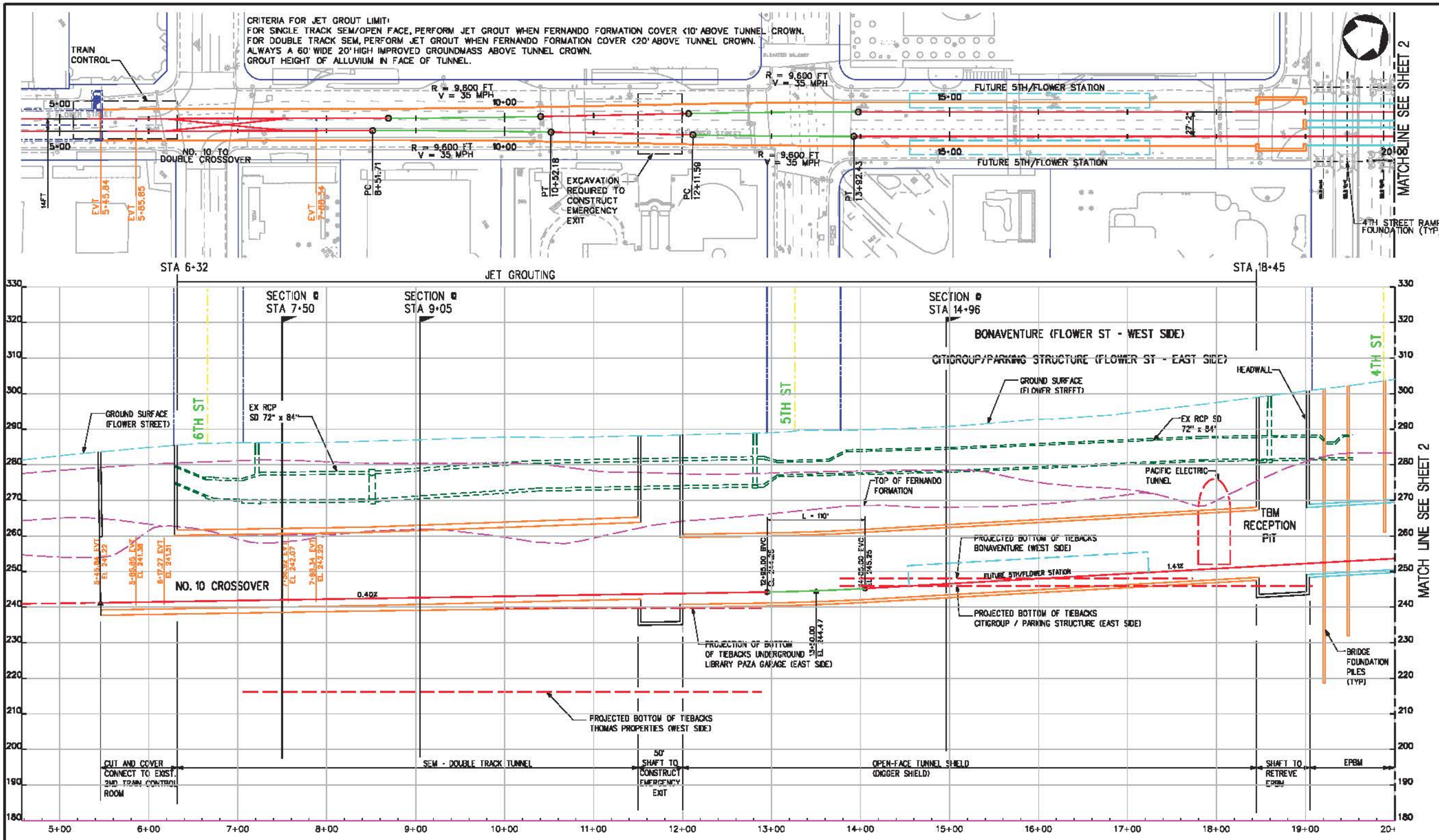


THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA

REV	DATE	BY	APP	REQ NO	EXPIRES	SEAL HOLDER	DESCRIPTION

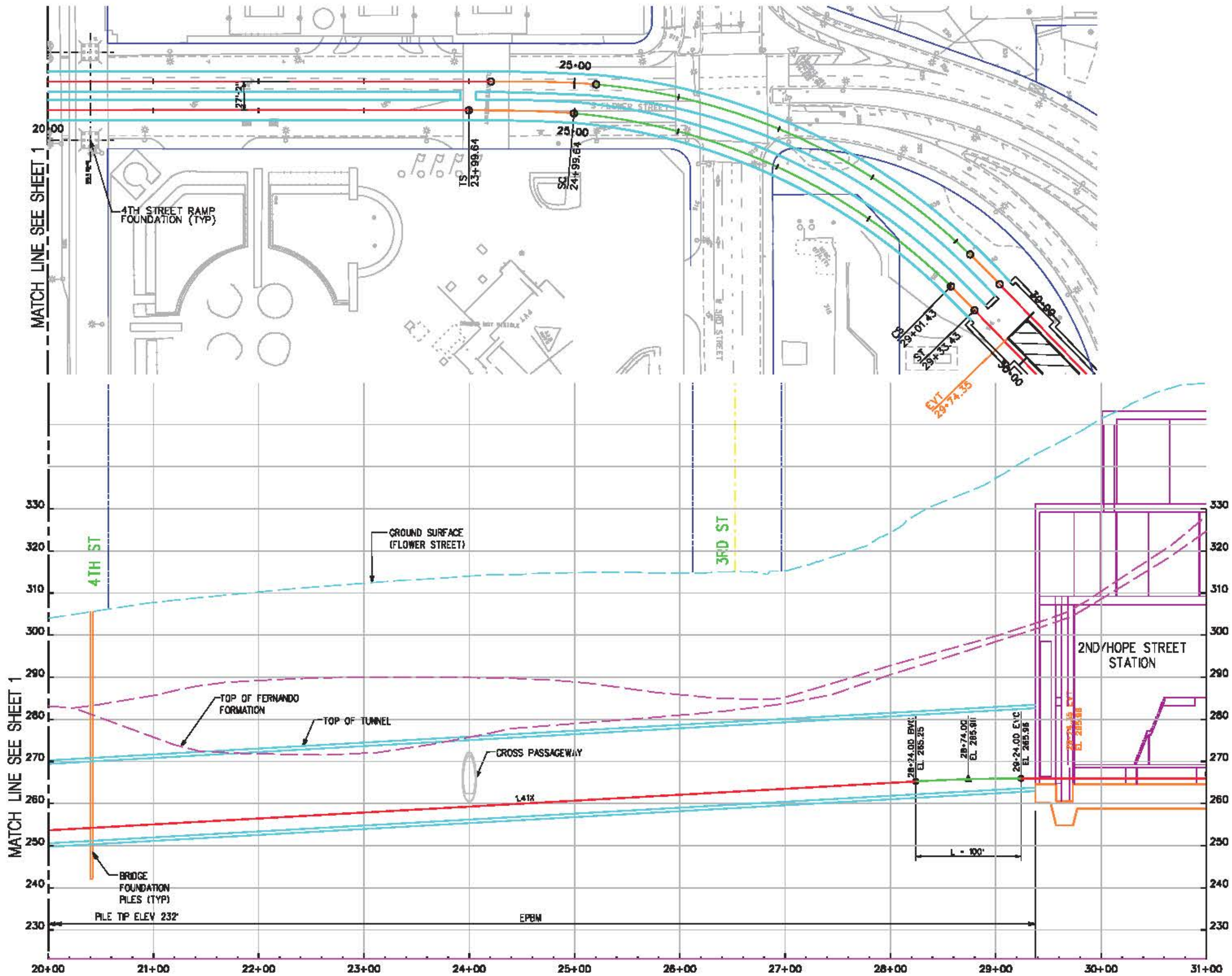
DESIGNED BY
DRAWN BY
CHECKED BY
IN CHARGE
DATE 8/23/2013

Metro
LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY
777 S. FIGUEROA STREET 10TH FLOOR LOS ANGELES, CA 90017

REGIONAL CONNECTOR TRANSIT CORRIDOR
FLOWER STREET
RE EVALUATION
OPTION 4
OPEN FACE TBM/SEM ALTERNATIVE

CONTRACT NO
DRAWING NO
REV
SCALE
SHEET NO 1 OF 2

Model Name: Opt4 Sht1



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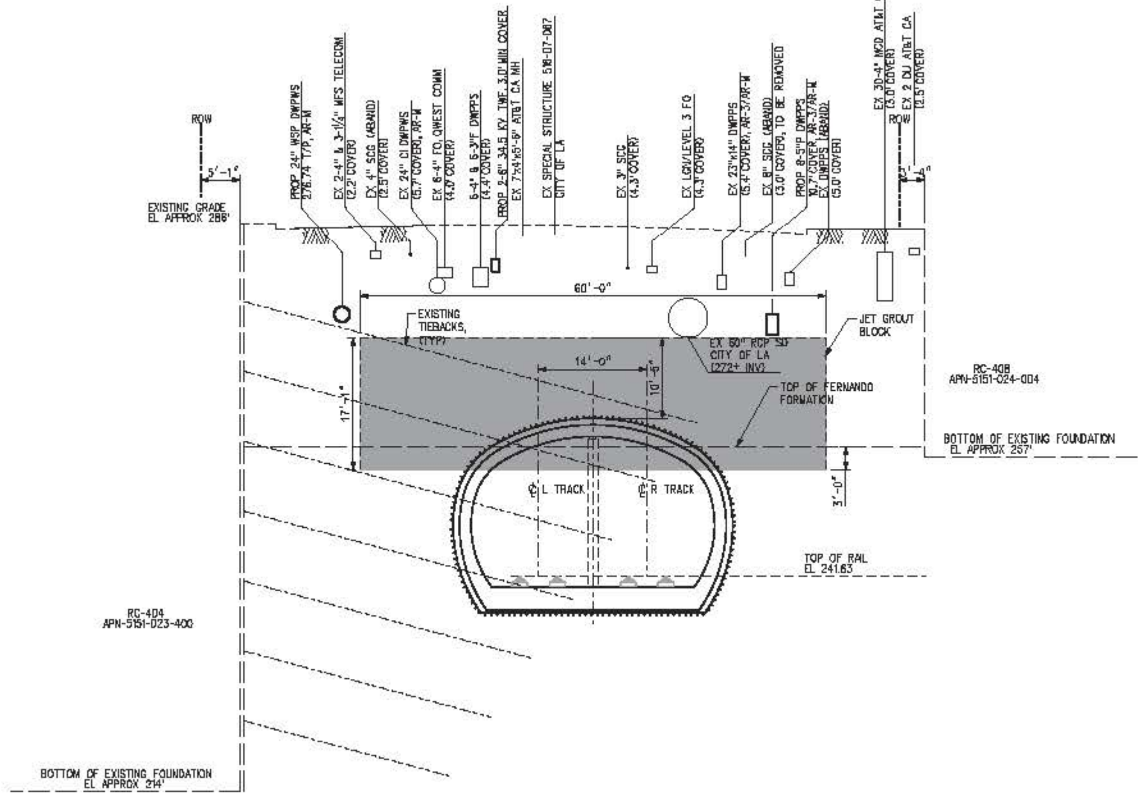
Metro
LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY
777 S. FIGUEROA STREET 10TH FLOOR LOS ANGELES, CA 90017 T 213-312-3100 F 213-312-3114

REGIONAL CONNECTOR TRANSIT CORRIDOR
FLOWER STREET
RE EVALUATION
OPTION 4
OPEN FACE TBM/SEM ALTERNATIVE

CONTRACT NO
DRAWING NO
REV
SCALE
SHEET NO 2 OF 2

Model Name: Opt4 Sht2

Alternative B



SECTION @ STA R 7+50

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REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

DESIGNED BY
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IN CHARGE
DATE 8/23/2013

Metro
LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

The Connector Partnership
777 S. FIGUEROA STREET 10TH FLOOR LOS ANGELES, CA 90017 T 213-312-3100 F 213-312-3114

REGIONAL CONNECTOR TRANSIT CORRIDOR
FLOWER STREET
RE EVALUATION
OPTION 5
SECTION AT STATION 7+50

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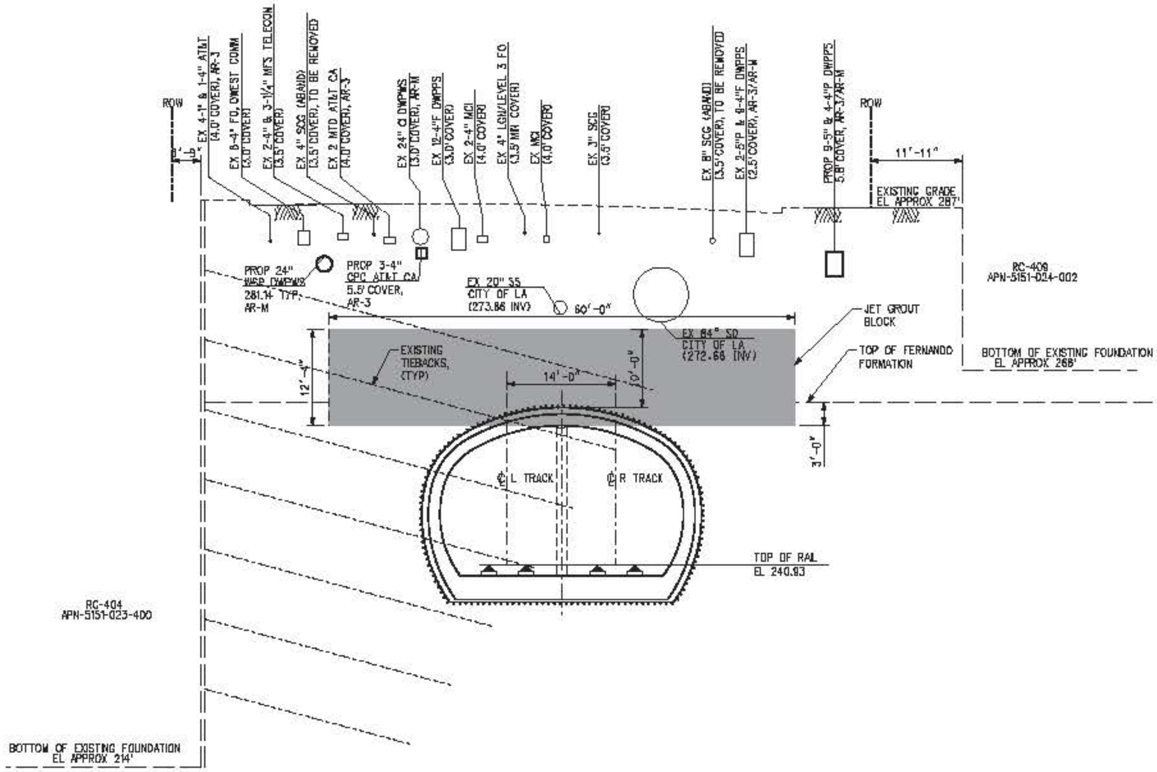

SECTION @ STA R 9+05

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REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

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Metro
LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

The Connector Partnership
777 S. FIGUEROA STREET 10TH FLOOR LOS ANGELES, CA 90017 T 213-312-3100 F 213-312-3114

REGIONAL CONNECTOR TRANSIT CORRIDOR
FLOWER STREET
RE EVALUATION
OPTION 5
SECTION AT STATION 9+05

CONTRACT NO C0980
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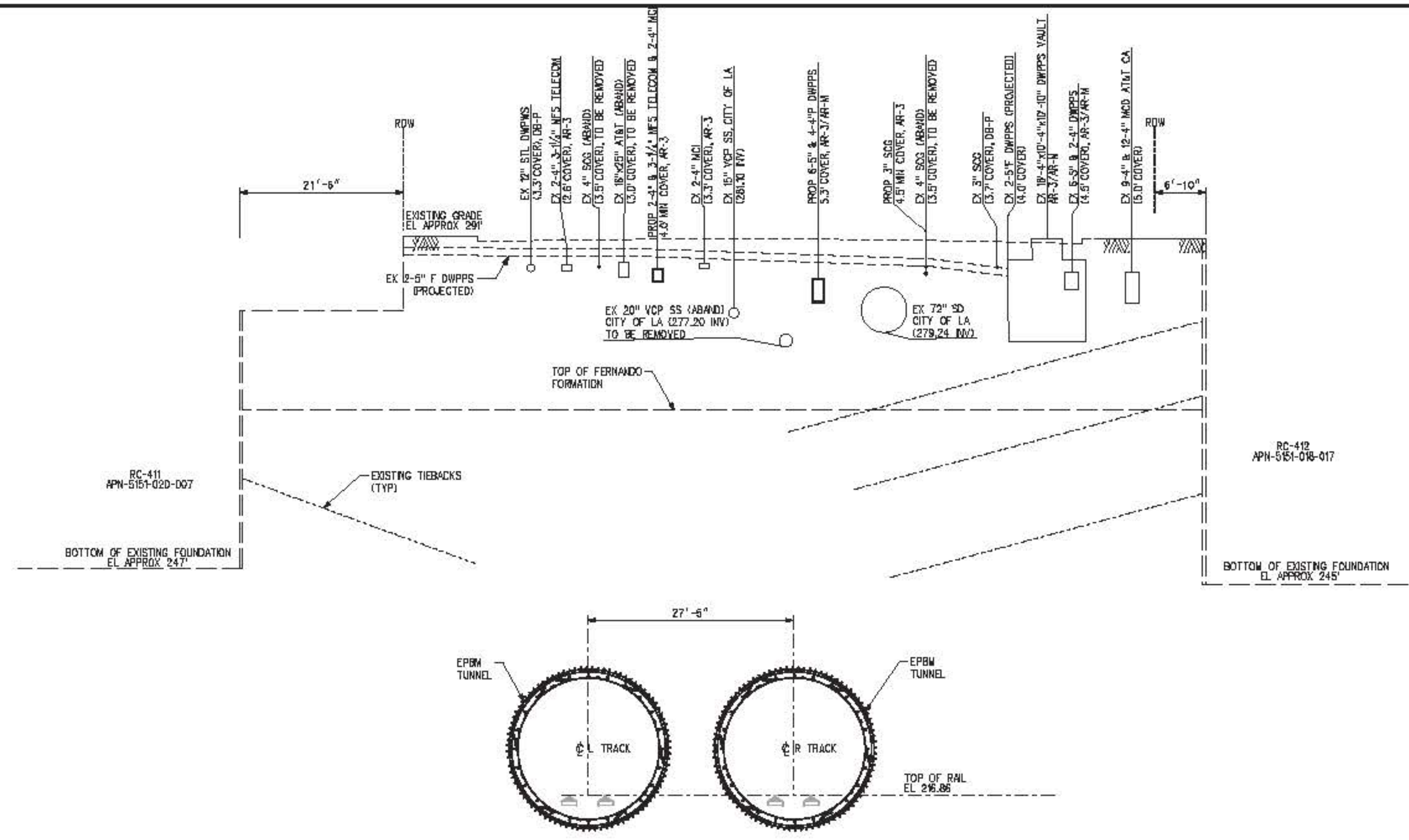

SECTION @ STA R 14+96

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REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

DESIGNED BY
DRAWN BY
CHECKED BY
IN CHARGE
DATE 8/23/2013

Metro
LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

The Connector Partnership
777 S. FIGUEROA STREET
10TH FLOOR
LOS ANGELES, CA 90017
T 213-312-3100
F 213-312-3114

REGIONAL CONNECTOR TRANSIT CORRIDOR
FLOWER STREET
RE EVALUATION
OPTION 5
SECTION AT STATION 14+96

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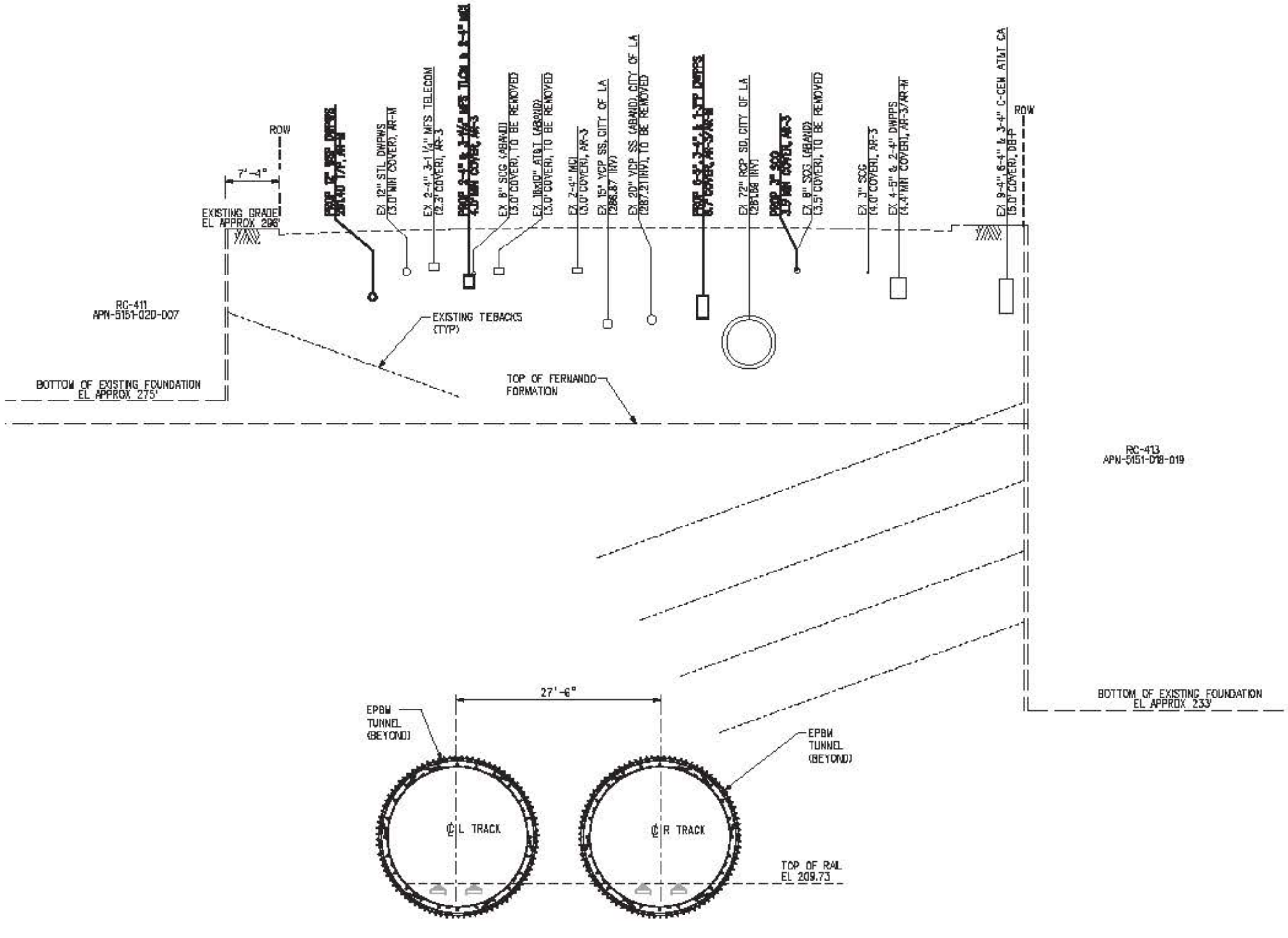

SECTION @ STA R 17+00

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REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

DESIGNED BY
DRAWN BY
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IN CHARGE
DATE

Metro

LOS ANGELES COUNTY
METROPOLITAN TRANSPORTATION AUTHORITY

The Connector Partnership
777 S. FIGUEROA STREET
10TH FLOOR
LOS ANGELES, CA 90017
T 213-312-3100
F 213-312-3114

REGIONAL CONNECTOR TRANSIT CORRIDOR
FLOWER STREET
RE EVALUATION
OPTION 5
SECTION AT STA 17+00

CONTRACT NO C0980
DRAWING NO AS-505
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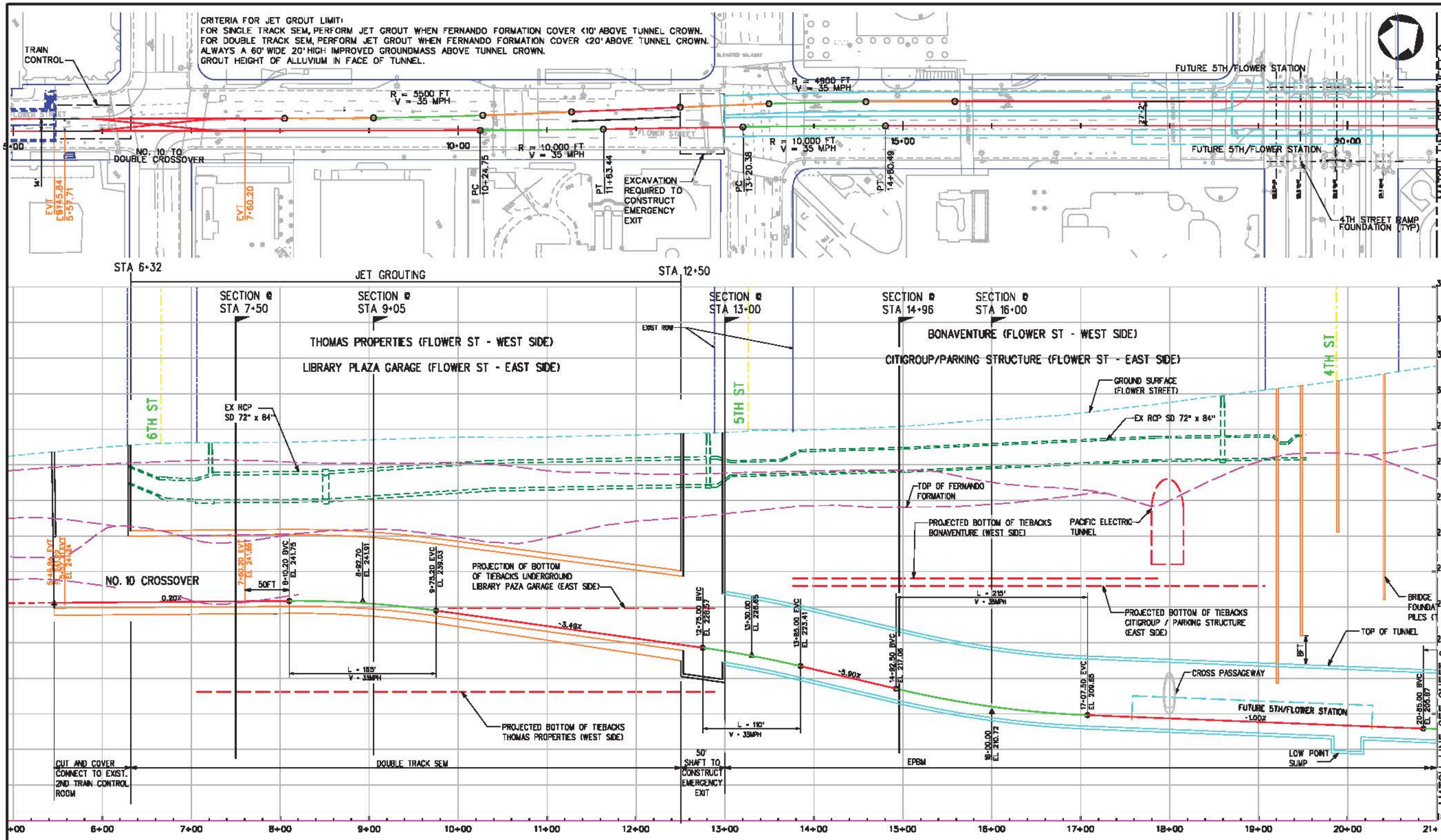

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REV	DATE	BY	APP	REQ NO	EXPIRES	SEAL HOLDER	DESCRIPTION

DESIGNED BY
DRAWN BY
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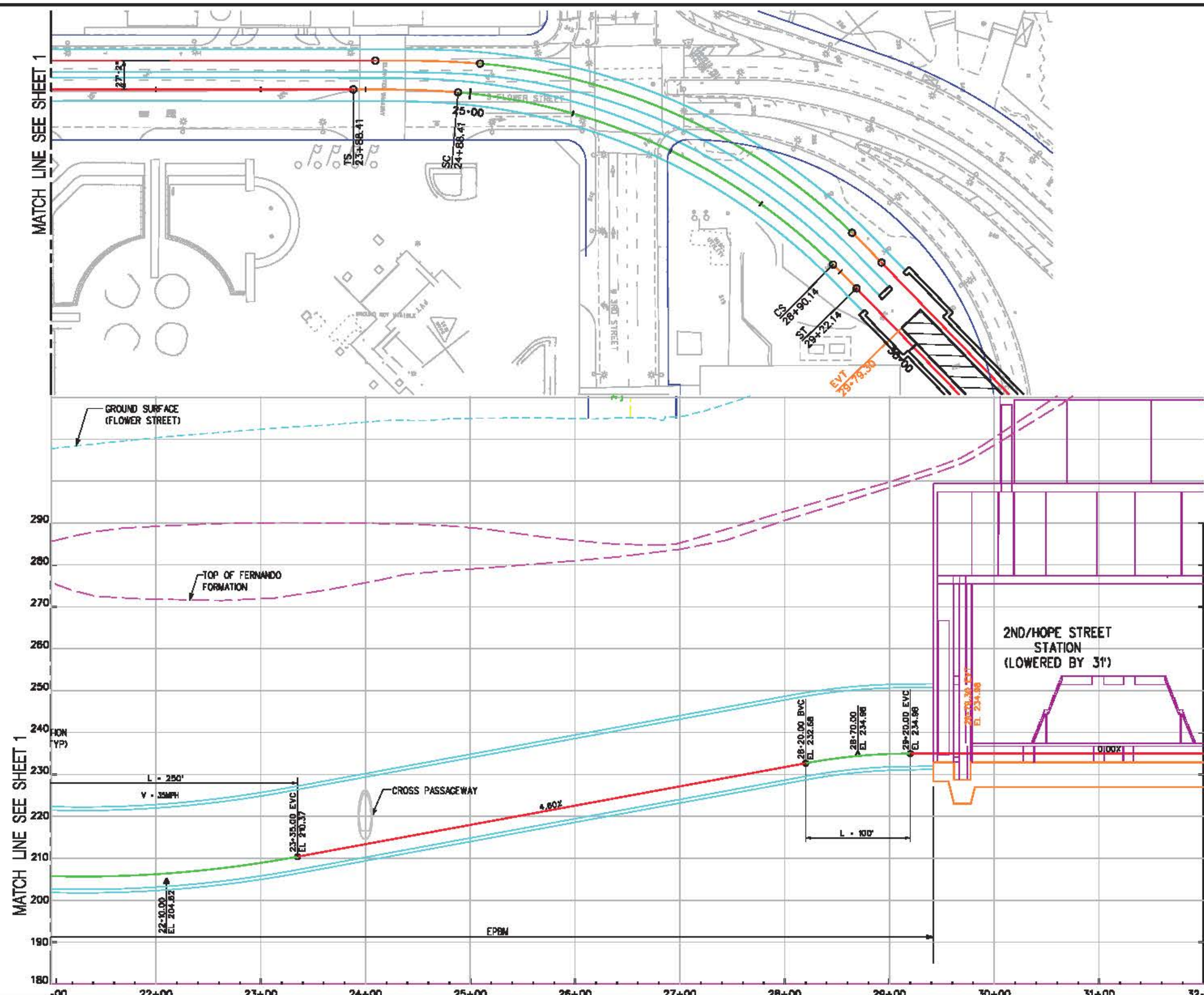
IN CHARGE
DATE 8/23/2013

Metro
LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY
777 S. FIGUEROA STREET, 10TH FLOOR, LOS ANGELES, CA 90017

REGIONAL CONNECTOR TRANSIT CORRIDOR
FLOWER STREET RE EVALUATION
OPTION 5
SEM LOW ALIGNMENT ALTERNATIVE

CONTRACT NO
DRAWING NO
REV
SCALE
SHEET NO 1 OF 2

Model Name: Opt5 Sht1



THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA

REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

DESIGNED BY

DRAWN BY

CHECKED BY

IN CHARGE

DATE 8/22/2013

Metro

LOS ANGELES COUNTY
METROPOLITAN TRANSPORTATION AUTHORITY

777 S. FIGUEROA STREET
10TH FLOOR
LOS ANGELES, CA 90017
T 213-312-3100
F 213-312-3114

REGIONAL CONNECTOR TRANSIT CORRIDOR
FLOWER STREET
RE EVALUATION
OPTION 5
SEM LOW ALIGNMENT ALTERNATIVE

CONTRACT NO

DRAWING NO

REV

SCALE

SHEET NO
2 OF 2

Model Name= Opt5 Sht2

APPENDIX H

MITIGATION MONITORING AND REPORTING PROGRAM

Metro

MITIGATION MONITORING AND REPORTING PROGRAM FOR THE LOCALLY PREFERRED ALTERNATIVE

REGIONAL CONNECTOR TRANSIT CORRIDOR PROJECT

All mitigation measure herein shall be implemented and monitored by Metro. A mitigation measure field report (see attached form) for each mitigation measure shall be filed at least twice annually as needed. A summary of mitigation monitoring activities shall be provided to the Metro Board of Directors twice annually. Issues identified during monitoring shall be discussed with the Regional Connector Community Leadership Council (RCCLC) monthly.

*Due to a clerical error, some LACMTA Board adopted mitigation measures which are included in the MMRP and in the Project were unintentionally left out of the original ROD MMRP attachment; the Board adopted mitigations have been inserted into the MMRP below and marked to indicate so. Mitigation measures are TR-1, NV-21, NV-23

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Transportation Impacts						
Traffic circulation disruption would occur during construction.	TR-1: Prior to the initiation of localized construction activities, a traffic management and construction mitigation plan shall be devised. The closure schedules in the construction traffic plan shall be coordinated to minimize impacts to residences, businesses, special events, and traffic flow. During these times, traffic shall be re-routed to adjacent streets via clearly marked detours. The traffic management and construction mitigation plan shall identify, for instance, proposed closure schedules and detour routes; construction traffic routes, including haul truck route, and hours so as to avoid peak hours where feasible. It shall also account for the provisions below. Traffic flow shall be maintained, particularly during peak hours, to the degree feasible. Access to adjacent businesses shall be maintained via existing or temporary driveways at all times during business hours, and residences at all times. Traffic flow shall be maintained via existing or temporary driveways at all times during business hours, and residences at all times. Access to the Japanese Village Plaza parking garage located on Central Avenue shall be maintained from the existing entry and exit points on Central Avenue at all times. Access to the Japanese Village Plaza service alley shall be maintained from the existing entry and exit point on Second Street at all times*. Metro shall provide signage to indicate new ways to access businesses and community facilities affected by construction. Metro shall post advance notice signs prior to construction in areas where business access could be affected. Metro shall also notify Los Angeles Department of Transportation (LADOT) in advance of street closures, detours, or temporary lane reductions. Metro shall also inform advisory committees of known road closures during regularly scheduled meetings. If, for whatever reason, Metro is unable to maintain access to the Japanese Village Parking garage from the existing entry and exit points on Central Avenue at all times, Metro shall provide valet parking from vehicle pickup/drop-off points immediately adjacent to Japanese Village Plaza*.	Check design contract documents for compliance	Metro	Final Design	Traffic Control Plans	LADOT/Metro
		Monitor construction activities for compliance.	Metro	Construction	Traffic Control Plans	LADOT/Metro
	See also CN-1 through CN-3 and CN-5.					
Construction haul routes along project area streets would be needed.	TR-2: Haul routes for trucks shall be confirmed during the final design phase of the project. The routes shall be located to minimize noise, vibration, and other possible impacts to adjacent businesses and neighborhoods. Truck trips shall be primarily scheduled at times when they would be least disruptive to the community. Lighted or reflective signage shall direct truck drivers to the haul routes. If physical damage to the haul route roads occurs due to project-related traffic, the roads shall be restored to their pre-construction condition as quickly as is practicable. Haul routes shall be discussed with and approved by the City of Los Angeles through the Transportation Construction Traffic Management Committee (TCTMC).	Verify that community input into hauling schedule has occurred	Metro	Final Design	Haul Routes	LADOT/Metro
		Verify that TCTMC input into haul routes has occurred.	Metro, City of Los Angeles TCTMC	Final Design	Haul Routes	LADOT/Metro
		Check design contract documents for compliance.	Metro	Final Design	Haul Routes	LADOT/Metro
		Monitor construction activities for compliance.	Metro	Construction	Haul Routes	LADOT/Metro
		Verify whether roadway deterioration due to project traffic has occurred, and ensure that it is repaired.	Metro	Construction		Metro
Street parking would need to be temporarily removed during construction.	TR-3: To avoid impacts to neighborhood parking supplies, Metro shall require the contractor to designate areas for construction/contractor employee parking and shall not allow employees to park in other lots or unauthorized areas. Metro shall identify and implement measures to reduce the need for parking by construction workers, including carpool incentives, transit passes, or designated on-site or off-site parking. Metro shall direct construction workers not to park on the street.	Check design contract documents for compliance.	Metro	Final Design	Parking Plans	Metro
		Monitor construction activities for compliance.	Metro	Construction		Contractor/Metro
	See also DR-4 and DR-5.					
Re-routing of pedestrian and bicycle traffic would be needed during construction.	TR-4: Safe pedestrian detours with handrails, fences, k-rail, canopies, and walkways shall be provided as needed. When a crosswalk is closed due to construction activities, pedestrians shall be directed to nearby alternate crosswalks. Access shall be Americans with Disabilities Act (ADA) accessible at all times per existing Metro policy.	Check design contract documents for compliance.	Metro	Final Design	Pedestrian Access Plan	Contractor/Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	TR-5: Bicyclists shall be encouraged through signage to ride carefully in streets near construction activities, ride carefully on sidewalks (as City of Los Angeles municipal code permits), or choose nearby alternate routes around construction sites. Detours shall be provided as needed. Metro shall provide signage showing the alternate bicycle routes. Pedestrian and bicycle circulation, and travel lanes temporarily impacted during construction shall be restored to their permanent configurations at the conclusion of the construction period and prior to operations.	Check design contract documents for compliance.	Metro	Final Design	Bicycle Plans	LADOT/Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Permanent reductions in intersection performance on Flower Street from 4th to 6th Streets would occur.	TR-6: At the intersection of 4th and Flower Streets, Metro, in coordination with LADOT, shall permanently restripe the southbound Flower Street approach to provide one shared left-turn/through lane and two through lanes. Metro, in coordination with LADOT, shall also optimize the signal splits.	Verify that LADOT coordination has occurred.	Metro	Final Design	Design Drawings	LADOT/Metro
		Check design contract documents for compliance.	Metro	Final Design	Design Documents	LADOT/Metro
		Verify that the restriping has occurred after the street has been restored from cut and cover activities.	Metro	Construction		Metro
	TR-7: At the intersection of 5th and Flower Streets, Metro, in coordination with LADOT, shall permanently restripe the southbound Flower Street approach to provide three through lanes and one exclusive right-turn lane. Metro, in coordination with LADOT, shall also optimize the signal splits.	Verify that LADOT coordination has occurred.	Metro	Final Design	Design Drawings	LADOT/Metro
		Check design contract documents for compliance.	Metro	Final Design	Design Drawings	Metro
		Verify that restriping has occurred after the street has been restored from cut and cover activities.	Metro	Construction		Metro
	TR-8: At the intersection of 6th and Flower Streets, Metro, in coordination with LADOT, shall permanently restripe the eastbound 6th Street approach to provide three through lanes and two exclusive right-turn lanes. Metro, in coordination with LADOT, shall also optimize the signal splits.	Verify that LADOT coordination has occurred.	Metro	Final Design	Design Drawings	LADOT/Metro
		Check design contract documents for compliance.	Metro	Final Design	Design Drawings	Metro
		Verify that the restriping has occurred after the street has been restored from cut and cover activities.	Metro	Construction		Metro
Shuttle bus drop-off areas for City National Plaza could be affected by construction activities.	TR-9: Metro shall ensure that shuttle bus drop-off areas at City National Plaza are provided throughout construction.	Check design contract documents for compliance.	Metro	Final Design	Design Drawings	Metro
		Verify that the restriping has occurred after the street has been restored from cut and cover activities.	Metro	Construction		Metro
Connectivity with other transit lines and pedestrian systems would be needed.	TR-10: Metro shall design and implement linkages with the proposed streetcar project and Bringing Back Broadway project at the 2nd/Broadway station. The project shall also provide a knockout panel to the west side of Flower Street at 3rd Street to connect to the pedestrian system previously designed by the City of Los Angeles.	Check design contract documents for compliance.	Metro	Final Design	Design Drawings	Metro
	TR-11: Metro shall construct an enhanced pedestrian walkway along the east side of Flower Street between 4th and 7th Streets to better connect the Financial District to the improved transit services available at the existing 7th Street/Metro Center Station.	Check design contract documents for compliance.	Metro	Final Design	Design Drawings	Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Access to some bus stops would be restricted during construction.	TR-12: Metro shall maintain access to bus stops and provide adequate signage to guide bus users to accessible stops. Metro shall minimize temporary closures or relocations of bus stops and layover zones. Metro shall provide notices of closures and relocations on its website, smart phone apps, and other modes typically used to communicate service announcements. When closures of other bus operators' stops are needed, Metro shall work closely with the affected operators to provide notices.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Construction Notices	Metro
		Monitor construction activities and bus stop operation for compliance.	Metro	Construction		Metro
Some bus stops would need to be temporarily relocated due to street closures during construction, and buses may need to be re-routed around construction areas.	TR-13: As needed, Metro shall temporarily relocate bus stops to nearby alternative locations based on the re-routing of bus service, and provide adequate signage and notices at strategic locations indicating the relocated bus stops. Metro shall provide notices of relocations on its website, smart phone apps, and other modes typically used to communicate service announcements. Metro shall coordinate with municipal transit providers to temporarily relocate non-Metro bus stops. When bus re-routing is necessary, buses shall be re-routed to adjacent streets in a manner that minimizes inconvenience to bus passengers and to affected neighborhoods.	Check design contract documents for compliance.	Metro	Final Design	Construction Notices	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Displacement and Relocation Impacts						
Partial taking of parking and primary access to the Central Plant (APN 5151-014-032, 703 W. 3rd Street).	DR-1: For parcels in which parking is displaced by the project, Metro shall provide replacement parking elsewhere on the parcel or on a nearby parcel during construction.	Check design contract documents for compliance.	Metro	Final Design	Design Drawings	Metro
		Monitor construction activities and parking lot use to ensure that replacement parking is maintained.	Metro	Construction		Metro
	DR-2: In using parcel APN 5151014032 for construction staging, Metro shall maintain access to the Central Plant located on that parcel at all times during construction.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Drawings	LADOT/Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Some privately-owned parcels needed for construction staging currently contain buildings, but would be owned by Metro and may be vacant after construction.	DR-3: Upon completion of construction, property needed for construction but not required to maintain the physical infrastructure or necessary for access shall be included in the Metro Joint Development Program for possible development. Any development shall be environmentally and separately cleared from this project and shall undergo its own community input process. Until a development is approved, the remaining underutilized property may be used for public parking spaces or at the very least shall be graded and fenced to a higher standard that reflects the community's identity and character more than typical gravel and chain link. Per Metro's Joint Development Policy, the community shall be included in the development process.	Oversee Metro Joint Development Program and ensure compliance.	Metro	Post-Construction	Joint Development Documents	Metro
Public parking spaces would be lost in Little Tokyo during construction.	DR-4: Metro shall work with the City to develop a parking mitigation program to mitigate the loss of public parking spaces during construction. This would include, but is not limited to, restriping the existing street to allow for diagonal parking, reducing the number of restricted parking areas, phasing construction activities in a way that minimizes parking disruption, and increasing the time limits for on-street parking. Restriping would occur on portions of Temple Street, Alameda Street, 1st Street, 2nd Street, Central Avenue, San Pedro Street, Judge John Aiso Street, 3rd Street, and Traction Avenue. Such parking mitigation shall be implemented on a temporary, tiered basis pending findings of the annual parking analysis described in EJ-11.	Check design contract documents for compliance.	Metro, LADOT	Final Design	Parking Plans	LADOT/Metro
		Monitor construction activities for compliance.	Metro, LADOT	Construction		LADOT/Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	DR-5: Metro shall not hinder access to other public parking lots during construction.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		
	See also EJ-2 through EJ-9, EJ-11, and EF-1.					
Access to the Little Tokyo Library and other community destinations could be affected by construction.	DR-6: Metro shall maintain access to the Little Tokyo Library and other community facilities at all times during construction.	Check design contract documents for compliance.	Metro	Final Design	Construction Plans	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	DR-7: Metro shall develop a Construction Mitigation Program that includes protocol for community notification of construction activities, including traffic control measures, schedule of activities, and duration of operations, with written communications to the community translated into appropriate languages.	Ensure that an adequate Construction Mitigation Program has been developed.	Metro	Final Design	Community Outreach Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Displacement and relocation of businesses would be necessary.	DR-8: Metro shall provide relocation assistance and compensation as required by the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.	Verify qualifications of property appraiser.	Metro	Pre-Construction	Reacquisition Plans	Metro
		Ensure provision of relocation assistance and payment of affected owners just compensation not less than the appraised market value for their property.	Metro	Pre-Construction		Metro
A portion of the LADWP site on parcels 5173-007-901 and 5173-006-900 would need to be permanently acquired for right-of-way.	DR-9: Metro shall consult Los Angeles Department of Water and Power (LADWP) during the design phase to accommodate its operational needs during construction and operation of the project.	Check design contract documents for compliance and documentation of consultation with LADWP.	Metro, LADWP	Final Design		DWP/Metro
		Monitor construction activities for compliance.	Metro, LADWP	Construction		
Community and Neighborhood Impacts						
Disruption of traffic patterns during construction would affect access to residences and businesses, which could affect the economic vitality of some businesses.	CN-1: Accessible detours shall be provided whenever possible. Detours shall be compliant with the ADA. Signage shall be provided in those languages most commonly spoken in the immediate community. Signs shall mark detours in accordance with the Manual on Uniform Traffic Control Devices, and other applicable local and state requirements. Detours shall be designed to minimize cut-through traffic in adjacent residential areas.	Check design contract documents for compliance.	Metro	Final Design	Traffic Control Plans	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	CN-2: Early notification of traffic disruption shall be given to emergency service providers. Work plans and traffic control measures shall be coordinated with emergency responders to prevent impacts to emergency response times.	Verify that plans were developed in conjunction with emergency responders.	Metro, emergency service providers	Final Design	Traffic Control Plans	Metro
		Monitor construction activities for compliance.	Metro, emergency service providers	Construction		

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	CN-3: Traffic management and construction mitigation plans shall be developed in coordination with the community to minimize disruption and limit construction activities during special events. Worksite Traffic Control Plans shall be developed in conjunction with LADOT and surrounding communities to minimize impacts to traffic, businesses, residents, and other stakeholders. Crossing guards and other temporary traffic controls shall be provided in the vicinity of construction sites, haul routes, and other relevant sites as proposed in California DOT Traffic Manual, Section 10-07.3, Warrants for Adult Crossing Guards, and as appropriate to maintain traffic flow during construction.	Monitor Final Design process and check documents for compliance.	Metro, LADOT	Final Design	Traffic Control Plans	LADOT/Metro
		Monitor construction activities for compliance.	Metro, LADOT	Construction		LADOT/Metro
	CN-4: A 24-hour live hotline for community concerns regarding construction shall be provided, as well as a project office within the Little Tokyo community. Residents and businesses shall also be provided with comment/complaint forms during construction. A construction office shall also be placed within the community to provide in-person assistance and services. Metro shall negotiate with the Japanese American National Museum (JANM) to locate the office within the museum's historic building on 1st Street. The hotline and office shall enable Metro to maintain day-to-day contact with the community during construction and provide community members with all project details that may be relevant to the public.	Verify continuous operation of hotline and construction office.	Metro	Construction	Community Outreach Plan	Metro
	CN-5: A community outreach plan shall be developed and implemented to notify local communities and the general public of construction schedules and road and sidewalk detours. Metro shall coordinate with local communities during preparation of the traffic management plans to minimize potential construction impacts to community resources and special events. Construction activities shall be coordinated with special events.	Verify preparation of community outreach plan.	Metro	Final Design	Community Outreach Plan	Metro
		Verify preparation of traffic management plans in conjunction with community stakeholders.	Metro	Final Design	Traffic Management Plans	LADOT/Metro
		Check design contract documents for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	CN-6: Metro shall develop a construction mitigation plan with community input to directly address specific construction impacts in the project area. Metro shall establish and receive input from the RCCLC in developing the construction mitigation plan. The RCCLC shall consist of representatives from all parts of the alignment area. Metro shall work with the RCCLC in developing the outreach plan.	Establish RCCLC.	Metro, Community stakeholders	Preliminary Engineering	Community Outreach Plan	Metro
		Verify preparation of construction mitigation plan and outreach plan in conjunction with community stakeholders.	Metro	Final Design	Community Outreach Plan	Metro
		Check design contract documents for compliance.	Metro	Final Design	Design Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	See also DR-4 and DR-5.					
Construction sites could have a negative impact on the community if left unsecured.	CN-7: Barriers shall be erected and security personnel provided during construction to minimize trespassing and vandalism. Barriers shall be enhanced with culturally-relevant artwork, attractive design features, and advertisements for parking locations and businesses. Signage shall also identify that businesses are open during construction. Community input shall be sought in determining artwork and design features.	Verify incorporation of community input into artwork and design feature plans.	Metro	Final Design	Traffic Control Plans	Metro
		Check design contract documents for compliance.	Metro	Final Design	Design Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
The 1st/Central Avenue station should incorporate the Arts District's identity, in addition to Little Tokyo.	CN-8: Metro shall implement urban design improvements in the form of an "Arts District Path" linking the Arts District to the 1st/Central Avenue station. Metro shall invite Southern California Institute of Architecture and other local students to participate in the path's design. The path shall include sidewalk enhancements, design elements, way finding signage, and crosswalk improvements. The design of the station shall enhance pedestrian circulation.	Verify incorporation of Arts District input into art path design.	Metro	Preliminary Engineering, Final Design	Design Documents	Metro
	CN-9: Design of the 1st/Central Avenue station shall encourage connections and pedestrian travel to the Japanese Village Plaza (JVP), Los Angeles Hompa Hongwanji Temple, the JANM, and businesses south of 2nd Street.	Check design contract documents for compliance.	Metro	Final Design	Design Documents	Metro
Temporary intermittent utility disruption could occur as part of construction.	CN-10: Metro shall field verify (by potholing or other methods) the exact locations and depths of underground utilities and conduct condition checks prior to utility relocation.	Check design contract documents for compliance.	Metro	Final Design	Utility Plans	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	CN-11: Metro shall coordinate closely with utility providers to develop a service plan as needed to address planned and unplanned utility service interruptions. Should an unplanned outage occur as a result of construction activities, Metro shall contact the appropriate utility provider immediately to restore service. Metro shall also maintain access to utilities for providers' technicians. Metro shall provide protective measures such as pipe and conduit support systems, vibration and settlement monitoring, trench sheeting, and shoring during construction to avoid potential damage to utilities.	Verify that utility provider coordination has occurred.	Metro	Final Design	Utility Plans	Metro
		Check design contract documents for compliance.	Metro	Final Design	Design Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Visual and Aesthetic Impacts						
Prominent street-level features would be installed, including station entrances and tunnel portals. Visual character of the corridor could change slightly.	VA-1: Metro shall coordinate with the station area communities to obtain input on the urban design of the project within the community.	Verify that community input has been incorporated into urban design.	Metro	Preliminary Engineering	Design Documents	Metro
		Check preliminary engineering and design contract documents for compliance.	Metro	Preliminary Engineering and Final Design		Metro
	VA-2: Urban design measures shall be developed to integrate the light rail transit (LRT) facilities (stations, portals, entrances, etc.) into each community as appropriate. Designs might address elements such as materials and colors. This process has already begun with community urban design workshops, and Metro shall continue to involve communities in this process. Metro shall coordinate with the City of Los Angeles Department of Planning staff during the design process and regarding urban design elements.	Check preliminary engineering and Final Design drawings for compliance.	Metro	Preliminary Engineering and Final Design	Design Documents	Metro Community Outreach
Temporary visual impacts could occur during construction, but would be less than significant.	VA-3: Metro shall shield temporary lighting during construction to reduce spillover lighting.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Construction Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	VA-4: Metro shall locate stockpile areas (storage areas for construction equipment, supplies, and excavated soil) primarily in less visually sensitive locations, where they are not visible from the road or to businesses or residents.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	VA-5: Temporary construction sheds and barricades shall be located so as to avoid obscuring significant views of historic properties.	Compare design contract documents and construction specifications to Final EIS/EIR to determine compliance.	Metro	Final Design	Design Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Air Quality						
Construction emissions of VOC, NOX, CO, PM2.5, and dust would occur.	AQ-1: Contractors shall be required to adhere to South Coast Air Quality Management District (SCAQMD) standards for off-road engine emissions (refer to Section 4.5.1.1). Examples of how the contractors could ensure adherence include retrofitting off-road engines with add-on control devices such as catalytic oxidizers and diesel particulate filters where feasible.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	AQMD Regulations	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	AQ-2: Metro shall require contractors to use equipment that meets up-to-date specifications (equivalent to models manufactured from 2013 to 2017) for pollutant emissions during project construction.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	BMPs	AQMD/Metro
		Monitor construction activities for compliance.	Metro	Construction		AQMD/Metro
	AQ-3: Contractors shall be required to adhere to SCAQMD standards for dust emissions such as SCAQMD Rule 403. Examples of how the contractors could ensure adherence include applying water or a stabilizing agent to exposed surfaces in sufficient quantity to prevent generation of dust plumes.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	BMPs	AQMD/Metro
		Monitor construction activities for compliance.	Metro	Construction		AQMD/Metro
	AQ-4: Dirt from construction equipment shall not extend 25 feet or more from an active operation, and shall be removed at the conclusion of each workday (refer to Section 4.5.3.3). Street sweeping services shall be coordinated with construction activity to minimize impacts to surrounding businesses and residences.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	BMPs	AQMD/Metro
		Monitor construction activities for compliance.	Metro	Construction		AQMD/Metro
	AQ-5: Contractors shall be required to utilize at least one of the measures set forth in SCAQMD Rule 403 Section (d)(5) to remove bulk material from tires and vehicle undercarriages before vehicles exit the project site.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	BMPs	AQMD/Metro
		Monitor construction activities for compliance.	Metro	Construction		AQMD/Metro
	AQ-6: All haul trucks hauling soil, sand, and other loose materials shall maintain at least six inches of freeboard (not filling trucks all the way to the top) in accordance with California Vehicle Code 23114.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	BMPs	AQMD/Metro
		Monitor construction activities for compliance.	Metro	Construction		AQMD/Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	AQ-7: All haul trucks hauling soil, sand, and other loose materials shall be covered (e.g., with tarps or other enclosures that would reduce dust emissions) (refer to Section 4.5.1.1).	Check design contract documents and construction specifications for compliance.	Metro	Final Design	BMPs	AQMD/Metro
		Monitor construction activities for compliance.	Metro	Construction		AQMD/Metro
	AQ-8: Traffic speeds on unpaved roads shall be limited to 15 MPH.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Contract Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	AQ-9: To control fugitive dust, especially during high wind situations, Metro shall require the contractor to implement the following provisions, consistent with the requirements of SCAQMD Rule 403, as they apply to each of the construction activities identified below: When wind gusts exceed 25 MPH, in areas where earth-moving activities are occurring: (1A) Cease all active operations; or (2A) Apply water to soil not more than 15 minutes prior to moving such soil. Disturbed surface areas: (OB) On the last day of active operations prior to a weekend or holiday: apply water with a mixture of chemical stabilizer diluted with not less than 1/20 of the concentration required to maintain a stabilized surface for a period of six months; or (1B) Apply chemical stabilizers prior to wind event; or	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Contract Documents	Metro
	(2B) Apply water to all unstabilized disturbed areas three times per day. If there is evidence of wind driven fugitive dust, watering frequency is increased to a minimum of four times per day; or (3B) Establish a vegetative ground cover within 21 days after active operations have ceased. Ground cover must be sufficient density to expose less than 30 percent of unstabilized ground within 90 days of planting, and at all times thereafter; or (4B) Utilize any combination of control actions (1B), (2B), and (3B) such that, in total, these actions apply to all disturbed surface areas. Unpaved roads: (1C) Apply chemical stabilizers prior to wind event expected to exceed 25 MPH; or (2C) Apply water twice per hour during active operation; or (3C) Stop all vehicular traffic. Open storage piles: (1D) Apply water twice per hour; or (2D) Install temporary coverings. Paved road track-out: (1E) Cover all haul vehicles; or (2E) Comply with vehicle freeboard requirements of Section 23114 of the California Vehicle Code for both public and private roads. All categories: (1F) Any other control measures approved by the Executive Officer and the United States Environmental Protection Agency as equivalent to the methods specified may be used.	Monitor construction activities for compliance.	Metro	Construction	BMPs	AQMD/Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	AQ-10: Heavy equipment operations shall be suspended during second stage smog alerts as issued by SCAQMD.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	BMPs	AQMD/Metro
		Monitor construction activities for compliance.	Metro	Construction		AQMD/Metro
	AQ-11: On-site stockpiles of debris, dirt, or rusty materials shall be covered or watered at least two times per day.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	BMPs	AQMD/Metro
		Monitor construction activities for compliance.	Metro	Construction		AQMD/Metro
	AQ-12: Contractors shall utilize electricity supplied by LADWP rather than temporary diesel or gasoline generators, as feasible.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Construction Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	AQ-13: Heavy-duty trucks shall be prohibited from idling in excess of five minutes, both on- and off-site. Metro shall employ California Air Resources Board anti-idling requirements during construction. Metro shall require the contractor to regularly perform unscheduled inspections of construction equipment and activities to ensure minimization of associated air quality impacts.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	BMPs	AQMD/Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	AQ-14: Construction worker parking shall be configured to minimize traffic interference. This measure would minimize vehicle idling time, which would reduce emissions generated from construction vehicles.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Contract Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	AQ-15: Construction activity that affects traffic flow on the arterial system, including the transportation of excavated materials, shall be primarily limited to off-peak hours. This measure would minimize vehicle idling time, which would reduce emissions generated from construction vehicles.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Traffic Plans	LADOT/Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	AQ-16: Metro shall require ongoing maintenance and adherence to manufacturer's specifications for all construction equipment engines and vehicles.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Construction Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	AQ-17: Dedicated turn lanes for the movement of trucks and equipment to and from construction sites shall be provided where appropriate. This measure would minimize vehicle idling time, which would reduce emissions generated from construction vehicles.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Traffic Plans	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	AQ-18: Metro shall require on-site construction equipment to meet EPA Tier 2 or higher emission standards according to the January 1, 2012 to December 31, 2014 and post-January 15, 2015 criteria.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Construction Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	AQ-19: Metro shall maintain and clean all trucks and construction equipment as needed.	Monitor construction activities for compliance.	Metro	Construction		Contractor/ Metro
	AQ-20: Metro shall use low-sulfur fuel where possible.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Contract Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	AQ-21: The project and stations shall be designed and constructed in a manner consistent with Metro's sustainability policies (such as Metro's Energy and Sustainability Policy and Metro's Sustainability Implementation Plan).	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Construction-related lane closures and intersection improvements would result in increased emissions, particularly CO emissions, at the major points of delay.	AQ-22: Detour routes shall be designed to ensure that traffic does not idle for extended periods of time, thus reducing the potential for localized exceedence of federal CO/CO2 standards.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Traffic Control Plans	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Noise and Vibration						
Sensitive or historic buildings within 21 feet of construction may be susceptible to vibration damage.	NV-1: Mitigation Measure CR/B-2 shall also apply to sensitive, non-historic structures (Category I, II, III, IV buildings as defined in Table 4.7-4) located within 21 feet of vibration producing construction activity. However, design contract documents shall not require input or review by an architectural historian or historical architect under this mitigation measure.	Verify that an adequate survey of sensitive properties has been performed.	Metro	Preliminary Engineering	Noise and Vibration Control Plan	Contractor/ Metro
	See CR/B-2 and CR/B-4.					
	NV-2: A vibration monitoring plan shall be developed during final design to ensure appropriate measures are taken to avoid any damage to sensitive buildings (Category I, II, III, IV buildings as defined by FTA in Table 4.7-4) or historic buildings due to construction--induced vibration. This shall include pre-construction surveys of all buildings within 21 feet of vibration producing construction activity to confirm the building category (Category I, II, III, IV buildings as defined in Table 4.7-4), structural condition of the building, and to provide a baseline for monitoring of ground-borne vibration (GBV) and measuring the potential for GBV to cause damage where needed. Any damage caused by Metro's construction activities shall be repaired.	Verify that pre-construction surveys have been performed where needed.	Metro	Final Design	Noise and Vibration Control Plan	Contractor/ Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Moderate (but not significant) GBV could cause annoyance to sensitive land uses during construction.	NV-3: Distances greater than those provided in EIS/EIR Table 4.7-5 shall be maintained near vibration-sensitive locations to avoid potential construction-related vibration impacts.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-4: Less vibration-intensive construction equipment or techniques shall be used near vibration-sensitive locations.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Contractor/ Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-5: Heavily laden vehicles shall be routed away from vibration-sensitive locations.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-6: Earthmoving equipment shall be operated as far as possible from vibration-sensitive locations.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-7: Construction activities that produce vibration, such as demolition, excavation, earthmoving, and ground impacting shall be sequenced so that the vibration sources do not operate simultaneously.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-8: Nighttime construction activities that produce noticeable vibration shall be avoided near vibration-sensitive locations.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	City of LA/Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-9: Devices with the least impact shall be used to accomplish necessary tasks.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-10: Non-impact demolition and construction methods, such as saw or torch cutting and removal for off-site demolition, chemical splitting, and hydraulic jack splitting, shall be used instead of high impact methods near vibration-sensitive locations.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	NV-11: Building protection measures such as underpinning, soil grouting, or other forms of ground improvement shall be used where needed to prevent deterioration of building condition due to construction.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-12: Pavement breakers, vibratory rollers, and packers shall operate as far as possible from vibration-sensitive locations.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Noise may inadvertently exceed FTA significance criteria during construction.	NV-13: The construction mitigation plan shall prohibit noise levels generated during construction from exceeding the FTA construction noise criteria. This could include prohibiting simultaneous operation of major pieces of construction equipment if simultaneous operation exceeds FTA construction noise criteria. If a noise complaint is filed during project construction, noise monitoring shall be conducted in the vicinity of the area in question. Although it is not expected to do so with the application of appropriate BMPs, if monitored noise levels exceed FTA construction noise criteria, the contractor shall use all or a combination of the following measures (NV-14 through NV-17) to reduce construction noise levels below FTA construction noise criteria.	Monitor construction activities for compliance.	Metro	Construction	Noise Variance	City of LA/Metro
	NV-14: Temporary noise barriers around the construction sites and localized barriers around specific items of equipment or smaller areas shall be provided as needed.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-15: Alternative back-up alarms/warning procedures shall be used where feasible as needed.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-16: Higher performance mufflers shall be used on equipment used during nighttime hours as needed near sensitive land uses.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-17: Portable noise sheds for smaller, noisy equipment, such as air compressors, dewatering pumps, and generators shall be provided as needed.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Significant ground-borne noise (GBN) impacts could occur during construction at Walt Disney Concert Hall, and the Broad Art Foundation Museum, which is currently under construction. Mitigation for the Walt Disney Concert Hall has been modified to cover the Colburn School as well, in an abundance of caution. Particular mitigation measures NV-19 and NV-21 to NV-23 apply to Japanese Village Plaza in Little Tokyo.	NV-18: Construction of the project, in the vicinity of the Walt Disney Concert Hall, shall be done in accordance with the Memorandum of Agreement (MOA) between FTA and the State Historic Preservation Officer (SHPO), which includes stipulations that outline the specific requirements for consultation and decision-making between the lead federal agency and consulting parties, specify the level of Historic American Building Survey/Historic American Engineering Record (HABS/HAER) recordation, and outline specific requirements for pre- and post-construction surveys, geotechnical investigations, building protection measures, and tunnel boring machine (TBM) specifications (for the Walt Disney Concert Hall only).	Confirm provisions of the MOA.	Metro	Preliminary Engineering	MOA	SHPO/Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	Tunnel Boring Machine:					
	NV-19: Maintenance and Operation: The construction contractor shall minimize vibration from jacking or pressing operations (if applicable, the action could be smoothed out to avoid a sharp push), and maintain machinery in good working order.	Monitor construction activities for compliance.	Metro	Construction	Noise and Vibration Control Plan	Metro
	NV-20: Coordination and Notification: There would be times when the Main Auditorium of the Walt Disney Concert Hall is vacant or not used for a noise-sensitive activity, thereby eliminating any noise impact from TBM. Similarly, there would be times at the Los Angeles Philharmonic Association Conference Room (and offices) of the Walt Disney Concert Hall and at the recording/performance halls of the Colburn School when activities are not particularly noise-sensitive. Metro shall coordinate closely with the Walt Disney Concert Hall, the Colburn School, and the Broad Art Foundation Museum, which is currently under construction, to ensure that the noise-generating parts of TBM operations shall be conducted to avoid noise-sensitive periods.	Monitor construction activities for compliance.	Metro	Construction	Noise and Vibration Control Plan	Metro
	Delivery Train:					
Significant GBN impacts could occur during construction at Japanese Village Plaza	NV-21: Speed: Delivery train speed shall be limited to 5 MPH in the vicinity of the Walt Disney Concert Hall, the Colburn School, and the Broad Art Foundation Museum, currently under construction, which would reduce the GBN to the lower range, or 5 dBA from the maximum range. At the Japanese Village Plaza, one of the following or similar mitigations shall be used: a resilient mat or limiting train speeds to 5 MPH*.	Monitor construction activities for compliance.	Metro	Construction	MOA	SHPO/Metro
	NV-22: Resilient Mat: A resilient system to support and fasten the delivery train tracks shall be used during construction, which would reduce GBN levels by at least 4 dBA. Such as system shall include a) resilient mat under the tracks and b) a resilient grommet or bushing under the heads of any track fasteners (assuming some kind of anchor or bolt system). The hardness of the resilient mat shall be in the 40 to 50 durometer range, and be about one to two inches thick, depending on how heavily loaded the cars would be. The contractor shall select the mat thickness so that the rail does not bottom out during a car pass-by.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		
	NV-23: Conveyor: The delivery train shall be replaced with a conveyor system to transport materials in the tunnel if GBN exceeds the FTA annoyance criteria at the Walt Disney Concert Hall, the Colburn School, or the Broad Art Foundation Museum, which is currently under construction. At the Japanese Village Plaza, one of the following or a similar method shall be used: a resilient mat, slower train speeds, or a conveyor system*.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		
	NV-24: Coordination and Notification: There would be times when the Main Auditorium and Choral Hall of the Walt Disney Concert Hall and the recording/performance halls of the Colburn School are vacant or not used for noise-sensitive activities, thereby eliminating any noise impact from the delivery train. Metro shall coordinate closely with the Walt Disney Concert Hall, the Colburn School, and the Broad Art Foundation Museum, which is currently under construction, to ensure that the delivery train pass-bys would be conducted to avoid noise-sensitive periods.	Monitor construction activities for compliance.	Metro	Construction	Design Documents	Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Significant GBN impacts and GBV could occur during construction at the Hikari Lofts, offices in JVP, and the Nakamura Tetsujiro Building.	NV-25: Metro shall provide advance notice and coordinate with the affected property owners regarding schedules for tunneling and other activities prior to the commencement of those activities.	Monitor construction activities for compliance.	Metro	Construction	Design Documents	Metro
	NV-26: Metro shall provide advanced notification and coordination by doing the following: • Metro shall establish a Construction Community Relation Program to inform and coordinate construction activities including notification to all occupants at the Hikari Lofts, the interior designer office at the JVP, and the Nakamura Tetsujiro Building about the schedule of tunneling activities at least one month prior to the start of the activities. • Metro shall monitor GBN and GBV levels in the in the building adjacent to TBM activity during its operation in that area. • During the few days the TBM will be operating in this area, should GBN or GBV measurements exceed FTA annoyance criteria for short-term impacts during construction, Metro shall offer to temporarily relocate affected residents.	Monitor construction activities for compliance.	Metro	Construction	Community Outreach Plan	Metro Community Relations
Significant GBN impacts could occur during operations at Walt Disney Concert Hall, Hikari Lofts, offices in JVP, the Nakamura Tetsujiro Building, and the Broad Art Foundation Museum, currently under construction.	NV-27: In the vicinity of the Walt Disney Concert Hall, the Japanese Village Plaza, and the Colburn School, Metro shall implement resiliently supported fasteners, isolated slab track, or other appropriate measures as needed to eliminate impacts and to reduce GBN below FTA annoyance criteria.	Verify that preliminary engineering studies have been completed.	Metro	Preliminary Engineering	Design Documents	Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
Mitigation for the Walt Disney Concert Hall has been modified to cover the Colburn School as well, in an abundance of caution.	NV-28: In the vicinity of the Hikari Lofts and Nakamura Tetsujiro Building, Metro shall conduct engineering studies during final design to verify initial estimates of GBN and shall implement high compliance resilient fasteners, floating slab trackbed, or other appropriate measures as needed to eliminate impacts and to reduce GBN below FTA annoyance criteria.	Verify that Final Design studies have been completed.	Metro	Preliminary Engineering	Engineering Study	Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design	Specifications	Metro
	NV-29: In the vicinity of the offices at JVP and the Broad Art Foundation Museum, currently under construction, Metro shall conduct engineering studies during final design to verify initial estimates of GBN and shall implement high compliance resilient fasteners or other appropriate measures as needed to eliminate impacts and reduce GBN below FTA annoyance criteria.	Verify that Final Design studies have been completed.	Metro	Preliminary Engineering	Engineering Study	Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design	Contract Documents	Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Ecosystems/Biological Resources						
Some trees in the project area would be removed or disturbed during construction.	EB-1: The construction contractor shall minimize disturbance to trees through avoidance or fencing.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Documents Landscape Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	EB-2: If disturbance is unavoidable, the construction contractor shall trim individual trees instead of removing them completely where feasible to reduce the scale of disturbance.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Landscape Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	EB-3: The construction contractor shall replant or replace disturbed or removed trees as soon as practicable.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Some tree removal and trimming may need to occur during the bird breeding season, from February 1 to August 31.	EB-4: The construction contractor shall schedule necessary tree removal and trimming activities that would affect bird nesting outside of the bird breeding season, which can extend from February 1 to August 31.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Landscape Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	EB-5: If it is not feasible to avoid tree removal and trimming related to construction during the breeding bird season from February 1 to August 31, breeding bird surveys shall be conducted as recommended by the California Department of Fish and Game. A qualified biologist shall conduct two biological surveys, one 15 days prior and a second 72 hours prior to construction activities that would remove or disturb suitable nesting habitat. The biologist would prepare survey reports documenting the presence or absence of active nests of any protected native bird (as identified in the Migratory Bird Treaty Act) in the habitat to be removed and any other such habitat within 300 feet of the construction work area (within 500 feet for raptors).	Verify qualifications of biologist.	Metro	Pre-Construction	Landscape Plan Bird Survey	Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	EB-6: If an active native bird species nest is located, construction within 300 feet of the nest (500 feet for raptor nests) shall be postponed or modified in consultation with the qualified biologist until the nest is vacated, juveniles have fledged, and there is no evidence of a second attempt at nesting.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Bird Survey	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
		Verify concurrence of qualified biologist.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Some of the trees that need to be removed may be native trees.	EB-7: After detailed engineering and design plans are prepared, a tree survey shall be conducted by a qualified arborist to identify native trees that could be affected by project construction. If construction of the project requires removal of any of the native trees located along the proposed alignment and stations for the approved project, the following mitigation measure shall be applied: A removal permit shall be obtained from the Los Angeles Board of Public Works in accordance with the City of Los Angeles Native Tree Protection Ordinance. Tree replacement shall comply with the ordinance and the terms of the removal permit. If construction would require pruning of any protected native tree, the pruning shall be performed in a manner that does not cause permanent damage or adversely affect the health of the trees.	Verify that permit has been obtained.	Metro	Final Design	Tree Survey	Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	See also EJ-30.					
Geotechnical/Subsurface/Seismic/Hazardous Materials						
Potential exists for ground movement associated with cut and cover construction and potential ground loss due to tunneling.	GT-1: While engineering designs are being finalized, but before any construction, a survey of structures within the anticipated zone of construction influence shall be conducted in order to establish baseline conditions. A geotechnical instrumentation and settlement monitoring plan and mitigation measures shall be developed and adhered to during construction to ensure appropriate measures are taken to address any construction-induced movement.	Verify that design criteria have been established.	Metro	Final Design	Structures Survey	Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Verify that additional geotechnical studies have been completed.	Metro	Final Design		Metro
	GT-1 (Continued): If assessments indicate the necessity to proactively protect nearby structures, additional support for the structures by underpinning or other ground improvement techniques shall be required prior to the underground construction. Metro shall require the construction contractor to limit movement to less than acceptable threshold values for vertical, horizontal, and angular deformation as a performance standard. These acceptable threshold values shall be established such that the risk of damage to buildings and utilities will be negligible to very slight. For buildings, these threshold values will be based on the relationship of building damage to angular distortion and horizontal strain consistent with Boscardin and Cording (1989) and qualitative factors including but not limited to the type of structure and its existing condition. For utility mains, these threshold values shall be those established by the utility owners. Additional data and survey information shall be gathered during final design for each building and utility main to enable assessment of the tolerance of potentially affected structures and utilities. Additional engineering and design level geotechnical studies shall be performed to define the nature of the soils and to refine the means of achieving each performance specification.	Monitor construction activities for compliance.	Metro	Construction	Structures Survey	Metro
	GT-2: Ground improvement such as grouting or other methods shall be required to fill voids where appropriate and offset potential settlement when excess material has been removed during excavation. The criteria for implementing grouting or ground improvement measures shall be based on the analysis described in mitigation measure GT-1.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Structures Survey	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	GT-3: The tunnel alignment shall be grouted in advance to provide adequate soil support and minimize settlement as geotechnical conditions require.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	GT-4: Settlement along the project alignment shall be monitored using a series of measuring devices above the route of the alignment. Leveling surveys shall be conducted prior to tunneling to monitor for possible ground movements.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Structures Survey	Metro
		Verify that adequate leveling surveys have been completed.	Metro	Pre-Construction		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	GT-5: Tunnel construction monitoring requirements shall be described and defined in design contract documents. Additional geotechnical provisions shall be included to the extent feasible, including use of an Earth Pressure Balance or Slurry TBM for tunnel construction to minimize ground loss. During tunnel construction, the soils encountered shall be monitored relative to anticipated soil conditions as described in a Geotechnical Baseline Report.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Contract	Metro
		Verify that an adequate Geotechnical Baseline Report has been prepared.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	See also CR/B-2.					
Contaminated soil or groundwater may be encountered during construction.	GT-6: Once a specific alignment is selected, and detailed engineering plans are being prepared a Contaminated Soil/Groundwater Management Plan shall be implemented during construction to establish procedures to follow if contamination is encountered in order to minimize associated risks to assure that applicable statutory and regulatory standards and requirements are satisfied. The plan shall be prepared during the final design phase of the project, and the construction contractor shall be held to the level of performance specified in the plan. The plan shall include procedures for the implementation of mitigation measures GT-7 through GT-11.	Verify that an adequate Contaminated Soil/Groundwater Management Plan has been prepared.	Metro	Final Design	Contaminated Soil / Ground Water Plan	DTSC/Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	GT-7: Appropriate regulatory agencies, identified in the Contaminated Soil/Groundwater Management Plan, shall be contacted if contaminated soil or groundwater is encountered.	Check construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	GT-8: Sampling and analysis of soil and/or groundwater known or suspected to be impacted by hazardous materials shall be conducted in accordance with the procedures detailed in the Contaminated Soil/Groundwater Management Plan.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	GT-9: Procedures for the legal and proper handling, storage, treatment, transport, and disposal of contaminated soil and/or groundwater shall be delineated and conducted in consultation with regulatory agencies and in accordance with established statutory and regulatory requirements as explained with specificity in the Contaminated Soil/Groundwater Management Plan.	Verify that consultation with appropriate regulatory agencies has occurred.	Metro, regulatory agencies	Final Design	Contaminated Soil / Ground Water Plan	DTSC/Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	GT-10: Dust control measures such as soil wetting, wind screens, etc. shall be implemented for contaminated soil.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Dust Control Plan	AQMD/Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	GT-11: Groundwater collection, treatment, and discharge shall be performed according to applicable standards and procedures (refer to Section 4.10.1).	Check design contract documents and construction specifications for compliance and consistency with Contaminated Soil/Groundwater Management Plan.	Metro	Final Design	RWQCB/ Regulations	RWQCB/Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	GT-12: Worker Health and Safety Plan shall be implemented prior to the start of construction activities. All workers shall be required to review the plan, receive training if necessary, and sign the plan prior to starting work. The plan shall identify properties of concern, the nature and extent of contaminants that could be encountered during excavation activities, appropriate health and environmental protection procedures and equipment, emergency response procedures including the most direct route to a hospital, contact information for the Site Safety Officer.	Verify that an adequate Contaminated Soil/Groundwater Management Plan has been prepared.	Metro	Final Design	Health and Safety Plan	Contractor/ Metro
		Verify that training has occurred and workers have signed the plan.	Metro	Pre-Construction		Contractor/ Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	GT-13: Impermeable grout and other appropriate measures shall be used where necessary to fill gaps between the tunnels and the surrounding earth to address the potential for creation of a preferential pathway and resulting spread of existing contaminated groundwater.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Hazardous Waste Soils/ Ground Water Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Subsurface gases associated with oilfields in the vicinity of the project area may be encountered during construction.	GT-14: Testing for subsurface gases particularly methane shall be conducted before and during construction along all portions of the underground alignment.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Hazardous Waste Soils/ Ground Water Plan	Metro
		Verify that adequate testing has occurred.	Metro	Final Design		Metro
	GT-15: Construction of the project shall be consistent with the City of Los Angeles Methane Mitigation Standards, established in accordance with City of Los Angeles Ordinance No. 175790 and No. 180619, which provide detailed installation procedures, design parameters, and test protocols for the methane gas mitigation system as well as methods to control methane intrusion emanating from geologic formations.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Hazardous Waste Soils/ Ground Water Plan	City / Metro
		Monitor construction activities for compliance.	Metro	Construction	Methane Mitigation	City / Metro
	GT-16: Specialized excavation methods shall be implemented to protect workers and the public from exposure to toxic gases and prevent explosions. For instance, pressurized closed-face TBMs and other equipment outfitted with ventilation systems would be used, as needed, to excavate the tunnels associated with the project, including Slurry Face Machines (SFMs) and Earth Pressure Balance Machines (EPBMs). During tunneling, the volume of gas (or water containing dissolved gas) released from the soil is confined to the excavated material chamber of the TBM because of the closed-face and gas-tight lining that is installed immediately behind the TBM. The project shall also be consistent with the City's Methane Mitigation Standards, which include provisions to protect workers and the public.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		City / Metro
		Monitor construction activities for compliance.	Metro	Construction		City / Metro
Asbestos and lead may be encountered during building demolition.	GT-17: Prior to building demolition, surveys of asbestos containing materials and lead-based paint shall be conducted. If necessary, destructive sampling shall be used. All asbestos containing materials and lead-based paint would be removed or otherwise abated prior to demolition in accordance with all applicable laws and regulations.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Lead and Asbestos Surveys	Metro
		Verify that adequate surveys have been completed.	Metro	Final Design		Metro
		Monitor construction activities for compliance and verify that any necessary abatement has been completed before demolition begins.	Metro	Construction		Metro
Potential exists for accidental release of construction-related hazardous materials.	GT-18: The construction contractor shall be required to implement best management practices (BMPs) for handling hazardous materials in compliance with existing regulations. These shall include requirements for proper use, storage, and disposal of chemical products and hazardous materials used in construction; spill control and countermeasures, including employee spill prevention/response training; vehicle fueling procedures to avoid overtopping construction equipment fuel tanks; procedures for routine maintenance of construction equipment, including the proper containment and removal of grease and oils; procedures for the proper disposal of discarded containers of fuels and other chemicals.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Hazardous Waste Management Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Potential exists for intrusion of subsurface gases into the underground portions of the alignment.	GT-19: Structures within methane zones and buffer zones shall be consistent with municipal code requirements for gas concentration/pressure testing on a specified frequency and, based on the results, appropriate mitigation measures or controls to be included in the design. These measures may include the use of gas-impermeable liners and venting to reduce or eliminate gas intrusion into stations and along the length of the underground segments.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
		Verify that gas concentration and pressure testing is performed according to specified frequency.	Metro	Operation		Metro
Potential exists for hazardous materials to be encountered during excavation and construction activities.	GT-20: Prior to the onset of demolition and construction, Metro shall develop and implement an Environmental Site Assessment program in accordance with appropriate laws and regulations (refer to Section 4.9.1) to assess the potential for hazardous materials that may be encountered during construction.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Environmental Site Assessment Report	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Potential exists for hazardous building materials to be encountered during demolitions.	GT-21: Prior to the onset of demolition and construction, Metro shall develop and implement plans for pre-demolition and demolition abatement of hazardous building materials (i.e., asbestos, lead-based paint, PCB-light ballasts) in accordance with appropriate laws and regulations such as the Toxic Substances Control Act (refer to Section 4.9.1).	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Hazardous Material / Lead and Asbestos Removal Plans	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Water Resources						
Potential exists for excess erosion to occur during construction.	WR-1: An erosion control plan shall be prepared prior to construction and shall specify procedures for implementing mitigation measures WR-2 through WR-5.	Verify that an adequate erosion control plan has been prepared.	Metro	Final Design		Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design	SWPPP/ SUSMPS	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	WR-2: Natural drainage, detention ponds, sediment ponds, or infiltration pits shall be used to allow runoff to collect and reduce or prevent erosion.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	SWPPP/ SUSMPS	City / Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	WR-3: Barriers shall be used to direct and slow the rate of runoff and to filter out large-sized sediments.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	SWPPP	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	WR-4: Down-drains or chutes shall be used to carry runoff from the top of a slope to the bottom.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	SWPPP	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	WR-5: Use of water for irrigation and dust control shall be controlled so as to avoid off-site runoff.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	SWPPP	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Impacts to water quality stemming from both construction and operation of the project could occur.	WR-6: Project design shall include properly designed and maintained biological oil and grease removal systems in new storm drain systems to treat water before it leaves project sites.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	SUSMPS	City / Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	WR-7: Hazardous materials shall be stored properly and in accordance with applicable law to prevent contact with precipitation and runoff.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Hazardous Material Management Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
		Monitor operations and maintenance for compliance.	Metro	Operation		Metro
	WR-8: Prior to the onset of demolition or construction an effective monitoring and cleanup program for spills and leaks of hazardous materials shall be developed and maintained.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Hazardous Material Management Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
		Monitor operations and maintenance for compliance.	Metro	Operation		Metro
	WR-9: Equipment to be repaired or maintained shall be placed in covered areas on a pad of absorbent material to contain leaks, spills, or small discharges.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Hazardous Material Management Plan + SWPPP	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	WR-10: Periodic and consistent removal of landscape and construction debris shall be performed.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Contract Specifications	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
		Monitor operations and maintenance for compliance.	Metro	Operation		Metro
	WR-11: Any significant chemical residue on the project sites shall be removed through appropriate methods.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Hazardous Material Management Plan + SWPPP	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
		Monitor operations and maintenance for compliance.	Metro	Operation		Metro
	WR-12: Non-toxic alternatives for any necessary applications of herbicides or fertilizers shall be used.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
		Monitor operations and maintenance for compliance.	Metro	Operation		Metro
	WR-13: Detention basins shall be installed to remove suspended solids by settlement.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	SUSMPS	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	WR-14: Water quality or runoff shall be periodically monitored before discharge from project sites and into the storm drainage system.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	SWPPP	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Cultural Resources - Built Environment						
Construction-related direct and indirect adverse impacts to historical resources could occur.	CR/B-1: Documentation of historic properties and historical resources adversely affected by the project shall consist of the development of individual HABS/HAER submissions. The appropriate level of recordation shall be established in consultation with the California SHPO and formalized as a part of a Memorandum of Agreement as described in Section 4.12.1.4.5 of the Draft EIS/EIR and included in Appendix 3 of this Final EIS/EIR. The HABS/HAER documents shall be offered to the Library of Congress and the documents shall be prepared so that the original archival-quality documentation would be suitable for inclusion in the Library of Congress if the National Park Service accepts these materials. Archival copies of the documentation shall also be offered for donation to local repositories, including the Los Angeles Central Library and the Los Angeles Conservancy.	Verify that adequate HABS/HAER documents have been prepared.	Metro, SHPO	Preliminary Engineering	CRMMP / Historic Properties Inventory	SHPO / Metro
		Verify level of recordation established by SHPO and MOA has been met.	Metro, SHPO	Preliminary Engineering	CRMMP / SHPO MOA	SHPO / Metro
	CR/B-2: During preliminary engineering and final design of the project, a more detailed survey of historic properties and/or historical resources within 21 feet of vibration producing construction activity shall be conducted to confirm the building category, and to provide a baseline for monitoring of GBV and the potential for GBV to cause damage. The survey shall also be used to establish baseline, pre-construction conditions for historic properties and historical resources. During preliminary engineering and final design of the project, additional subsurface (geotechnical) investigations shall be undertaken to further evaluate soil, groundwater, seismic, and environmental conditions along the alignment. The analysis shall assist in the selection and development of appropriate support mechanisms for cut and cover construction areas and any sequential excavation method (mining) construction areas, in accordance with industry standards and the Building Code. The subsurface investigation shall also identify areas that could experience differential settlement as a result of using a TBM in close proximity to historic properties and/or historical resources. An architectural historian or historical architect who meets the Secretary of Interior's Professional Qualification Standards shall provide input and review of design contract documents prior to implementation of the mitigation measures.	Verify that an adequate survey of historic properties and/or historical resources has been performed.	Metro	Preliminary Engineering	CRMMP / Historic Properties Inventory	SHPO / Metro
		Verify that adequate subsurface investigations have occurred.	Metro	Preliminary Engineering		Metro
		Verify qualifications of architectural historian or historical architect, and ensure that review of design contract documents occurs prior to implementation of mitigation measures.	Metro	Final Design		Metro
	CR/B-3: The historic property and historical resource protection measures as well as the geotechnical and vibration monitoring program shall be reviewed by an architectural historian or historical architect who meets the Secretary of Interior's Professional Qualification Standards to ensure that the measures would adequately protect the properties/resources. A post-construction survey shall also be undertaken to ensure that adverse effects or significant impacts have not occurred to historic properties or historical resources.	Verify qualifications of architectural historian or historical architect, and ensure that review of protection measures has occurred.	Metro	Final Design	CRMMP	SHPO / Metro
		Verify that post-construction survey has occurred and no adverse effects or significant impacts would occur.	Metro	Post-Construction		Metro
	CR/B-4: For those historic properties and historical resources where adverse impacts are anticipated, a MOA has been developed to resolve those adverse effects consistent with 36 CFR 800. This agreement, developed by FTA and Metro in consultation with the California SHPO and other consulting parties shall resolve and/or avoid, minimize, or mitigate potential effects to historic properties and/or historical resources. The agreement includes stipulations that outline the specific requirements for consultation and decision-making between the lead federal agency and consulting parties, specify the level of HABS/HAER recordation, and outline specific requirements for pre- and post-construction surveys, geotechnical investigations, building protection measures, and TBM specifications. See Appendix 3 (MOA) of this Final EIS/EIR for specific requirements.	Confirm provisions of the MOA.	Metro, FTA, SHPO	Preliminary Engineering	CRMMP/ MOA	Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	CR/B-5: The S. Kamada Restaurant, Atomic Café, Señor Fish, and Coast Imports building (to be removed) shall be offered for a period of one year following certification of the Final EIS/EIR for the price of $1 to any party willing to move it off of the 1st/Central Avenue station site at their own expense. Should no parties come forward, Metro shall incorporate materials from the building into the project facilities. Metro shall explore keeping portions of the building intact for use in the 1st/Central Avenue station. Metro shall also offer to provide an exhibit commemorating the building at the JANM, the 1st/Central Avenue station site, or other suitable location. An individual HABS/HAER submission shall be developed.	Verify that the offer to sell is extended for one year.	Metro	Pre-Construction	Real Estate / Construction Specifications	Metro
		Verify that HABS/HAER submission is completed.	Metro	Pre-Construction		Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	CR/B-6: Facades of historic buildings adjacent to the construction areas shall be protected from accumulation of excessive dirt or shall be cleaned in an appropriate manner periodically while construction activities are occurring nearby.	Monitor construction activities for compliance.	Metro	Construction, Post-Construction		Metro
	See also GT-1 through GT-5.					
Significant GBN impacts could occur during construction and operations at Walt Disney Concert Hall.	See NV-18 through NV-24 and NV-27.					
Built environment mitigation measures included in the MOA between the SHPO, Metro, and FTA shall be implemented as part of this MMRP. The full text of the MOA is attached to this MMRP.	See attached MOA.					
Cultural Resources - Archaeology						
Unknown archaeological resources could be disturbed during construction.	CR/A-1: Construction personnel shall be trained on proper procedures by a qualified lead archaeologist.	Verify qualifications of lead archaeologist.	Metro	Pre-Construction	CRMMP	Metro
		Verify that training occurs.	Metro	Pre-Construction		Metro
	CR/A-2: An archaeological monitor shall be present during ground-disturbing activities. The archaeological monitor shall have authority to halt operations to examine potential resources and recover artifacts using professional archaeological methods.	Verify qualifications of archaeological monitor.	Metro	Pre-Construction	CRMMP	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	CR/A-3: A Native American cultural resources consultant from the Gabrielino/Tongva San Gabriel Band of Mission Indians and/or the Tongva Ancestral Territorial Tribal Nation shall be contacted to monitor ground-disturbing work if Native American cultural resources are discovered.	Identify a qualified Native American cultural resources consultant.	Metro, Gabrielino/Tongva San Gabriel Band of Mission Indians, and Tongva Ancestral Territorial Tribal Nation	Pre-Construction	CRMMP	Metro
		Monitor construction activities for compliance.	Metro	Pre-Construction		Metro
	CR/A-4: Work shall stop if human remains are found, and the Los Angeles County Coroner shall be notified immediately. If the remains are determined to be prehistoric, the Coroner shall notify the Native American Heritage Commission (NAHC), which will arrange for a Most Likely Descendent (MLD) to inspect the site within 48 hours and issue recommendations for scientific removal and nondestructive analysis.	Monitor construction activities for compliance.	Metro	Construction	CRMMP	Metro
		Identify MLD and ensure timely inspection occurs.	NAHC	Construction		Metro
	CR/A-5: If no cultural resources are discovered during construction monitoring, the archaeological monitor shall submit a brief letter to that effect. If previously unidentified cultural resources are discovered in the course of construction monitoring, a report shall be prepared following Archaeological Resource Management Report (OHP 1990) guidelines that documents field and analysis results and interprets the data within an appropriate research context.	Verify that a letter or report has been prepared as appropriate.	Metro	Post-Construction	CRMMP	Metro
Disturbance of the Los Angeles Zanja System (CA-LAN-887H and other unnumbered zanjas), and sites CA-LAN-3588, P-19-003338, and P-19-003339 could occur during construction.	CR/A-6: A proactive identification and documentation program that would facilitate preservation or mitigation in a cost-effective manner shall be undertaken. This shall include using documentary research to identify, as accurately as possible, the precise alignments of the zanjas within the area of potential effect. Where these alignments are expected to be affected by the proposed project, particularly where cut and cover or other near-surface construction techniques are planned in the vicinity of mapped zanja segments, full-time archaeological monitoring would be instituted to ensure documentation consistent with Section 4.12.2.4.2 of the Draft EIS/EIR.	Verify that the identification and documentation program has been prepared.	Metro	Final Design	CRMMP	Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Archaeological mitigation measures included in the MOA between the SHPO, Metro, and FTA shall be implemented as part of this MMRP. The full text of the MOA is attached to this MMRP.	See attached MOA.	Verify implementation of MOA mitigation measures.	Metro	Final Design, Construction	CRMMP	Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Cultural Resources - Paleontology						
Previously undiscovered paleontological resources may be disturbed during construction.	CR/P-1: A qualified paleontologist shall prepare a Paleontological Monitoring and Mitigation Plan for the proposed project and supervise monitoring of construction excavations within sensitive geologic sediments. The monitor shall have authority to temporarily divert grading away from exposed fossils to professionally and efficiently recover the fossil specimens and collect associated data.	Verify qualifications of paleontologist.	Metro	Final Design		Metro
		Verify that an adequate Paleontological Monitoring and Mitigation Plan has been prepared.	Metro	Final Design	CRMMP	Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro, Paleontological monitor	Construction		Metro
	CR/P-2: All project-related ground disturbances that could potentially affect the Puente Formation, Fernando Formation, and Quaternary older alluvium and terrace deposits would be monitored by a qualified paleontological monitor on a full-time basis (where feasible) because these geologic sediments are determined to have a high paleontological sensitivity. Very shallow surficial excavations (less than five feet) within Quaternary younger alluvium would be monitored on a part-time basis to ensure that underlying sensitive units are not adversely affected. Construction monitoring during any tunneling activity is not warranted as any potential fossil specimens present within sensitive geologic units would be crushed and destroyed by the nature of tunneling methodology.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	CRMMP	Metro
		Monitor construction activities for compliance.	Metro	Construction	CRMMP	Metro
	CR/P-3: At each fossil locality, field data forms shall be used to record pertinent geologic data, stratigraphic sections shall be measured, and appropriate sediment samples shall be collected and submitted for analysis.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	CRMMP	Metro
		Monitor construction activities for compliance.	Metro, Paleontological monitor	Construction		Metro
	CR/P-4: Due to the likelihood of the presence of microfossils, matrix samples shall be collected and tested within the Puente Formation and Fernando Formation. Testing for microfossils shall consist of screen-washing samples (approximately 30 pounds) to determine if significant fossils are present. Productive tests shall result in screen-washing of additional bulk matrix up to a maximum of 2,000 pounds per locality to ensure recovery of a scientifically significant sample.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro, Paleontological monitor	Construction		Metro
	CR/P-5: Recovered fossils shall be prepared to the point of curation, identified by qualified experts listed in a database to facilitate analysis, and reposited in a designated paleontological curation facility such as the Natural History Museum of Los Angeles County.	Verify that a suitable repository has been identified and recovered fossils are reposited appropriately.	Metro	Construction		Metro
	CR/P-6: The paleontologist shall prepare a final monitoring and mitigation report to be filed, at a minimum, with Metro and the identified repository.	Verify that an adequate report has been filed.	Metro	Post-Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Parklands and Other Community Facilities						
Restriction of access to public services could occur due to construction activities.	PC-1: Where feasible, temporary restriping of the roadway to maximize the vehicular capacity at locations affected by construction closures shall be performed. Metro shall provide notices of closures and relocations on its website, smart phone apps, and other modes typically used to communicate service announcements.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	PC-2: Where feasible and necessary, temporary removal of on-street parking to maximize the vehicular capacity at locations affected by construction closures shall be performed. Where temporarily eliminated, parking spaces will be restored to their prior striped or signed condition at the conclusion of the construction period.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Traffic Control Plans	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	See also AQ-15, CN-1, CN-3, CN-5, CN-6, TR-4, TR-5, DR-6, and EJ-1.					
Economic and Fiscal Impacts						
Economic and fiscal impacts of business and parking displacement due to project acquisitions.	See DR-4 through DR-8.					
	EF-1: Metro shall develop measures to assist business owners significantly impacted by construction. These shall include temporary parking, marketing programs, and other measures developed jointly between Metro and affected businesses.	Oversee joint working group between Metro and affected business owners. Work individually with each business.	Metro, Joint working group	Preliminary Engineering, Final Design	Metro Community Outreach Plan	Metro
		Verify that all feasible, appropriate measures identified by the joint effort are implemented.	Metro, Joint working group	Construction		Metro
Safety and Security						
Safety and security concerns should be further minimized during operations through BMPs.	SS-1: Fire alarm protection shall be provided within station areas as required by applicable laws, regulations, and standards.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Verify that system is maintained in working order.	Metro	Operation		Metro
	SS-2: A minimum of two fire emergency routes shall be provided from each station as required by applicable laws, regulations, and standards.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Fire Life Safety Criteria	Metro
		Maintain exits in working order.	Metro	Operation		Metro
	SS-3: Adequate emergency ventilation and lighting shall be provided in each station in accordance with Metro Fire/Life Safety Standards and City of Los Angeles building codes.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Fire Life Safety Criteria	Metro
		Verify that system is maintained in working order.	Metro	Operation		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	SS-4: Communication systems between adjoining fire agencies shall be provided as required by applicable laws, regulations, and standards.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Fire Life Safety Criteria	Metro
		Verify that system is maintained in working order.	Metro	Operation		Metro
	SS-5: A methane detection system shall be provided in each station as required by applicable laws, regulations, and standards.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Fire Life Safety Criteria	Metro
		Verify that system is maintained in working order.	Metro	Operation		Metro
	SS-6: Building construction for underground stations shall not be less than Type I Construction as defined in the Uniform Building Code. All stations with more than two levels below-grade or where the lowest occupied level is more than 80 feet below-grade shall have protected level separation or other protection features to provide safe egress to exits.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Specifications	Metro
	SS-7: All proposed mitigation measures regarding safety and security shall be implemented in a manner conformant to Metro's Rail Transit Design Criteria and Standards and Fire/Life Safety Criteria. A combination of the following measures shall be implemented as indicated by the Threat and Vulnerability Assessment: closed-circuit television system, emergency push-button call system for patrons, intrusion detection system, dedicated security patrol protocols and procedures, and crime prevention through environmental design.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Fire Life Safety Criteria	Metro
	SS-8: Proposed station designs shall not include design elements that obstruct visibility or observation, nor provide discrete locations favorable to crime. Proposed stations shall be lighted to avoid shadows. Pedestrian pathways shall include clear sight lines whenever feasible. Project sidewalk widths and placements shall be appropriately designed to accommodate a wide variety of users. The following criteria shall be used when designing project sidewalks: sidewalk and pedestrian bridge widths shall be designed with the widest dimensions feasible (at least ten feet) in conformance with Metro's adopted land use and transportation policies; minimum sidewalk widths shall not be less than those allowed by the State of California Title 24 access requirements or the ADA design recommendations; where practicable, pedestrian movements and flows shall be favored over other transportation modes, such as automobile access; and stations shall be fully accessible as defined by ADA.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Specifications	Metro
	SS-9: An ADA accessible connection for the 2nd/Hope Street station to Upper Grand Avenue shall be provided. The future Broad Art Foundation Museum, currently under construction, is projected to include a plaza above General Thaddeus Kosciuszko Way connecting to Upper Grand Avenue. In order to provide access from the 2nd/Hope Street station to Upper Grand Avenue, an elevator from the station entrance to the plaza shall be built as part of this alternative if one is not already provided. If the plaza is not built, a pedestrian connection (such as a pedestrian bridge) shall be constructed. The connection shall reduce conflicts between pedestrians and vehicles.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Specifications	Metro
	SS-10: Adequate pedestrian queuing and refuge areas shall be provided at the proposed stations to facilitate pedestrian mobility. Adequately wide crosswalks shall be provided in the areas immediately around the proposed stations.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Specifications	Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	SS-11: All proposed stations shall be equipped with monitoring equipment, which shall primarily consist of video surveillance to monitor strategic areas of the stations and walkways and/or be monitored by Metro security personnel on a regular basis.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Specifications	Metro
		Verify that system is maintained in working order.	Metro	Operation		
	SS-12: Metro shall implement a security plan for LRT operations to include both in-car and station surveillance by Metro security or other local jurisdiction security personnel. Metro shall coordinate and consult with the Los Angeles Fire Department, Los Angeles Police Department, and the Los Angeles County Sheriff Department as appropriate to develop safety and security plans for the proposed alignment and station areas.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Fire Life Safety Criteria	Metro
		Verify that system is maintained in working order.	Metro	Operation		Metro
	SS-13: Trains and/or platforms shall be equipped with safety features that reduce the potential for persons to contact the vehicle coupler and/or fall under the train.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Verify that features are maintained in working order.	Metro	Operation		Metro
	SS-14: Fire separations shall be provided and maintained in public occupancy areas as required by regulation.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Verify that features are maintained in working order.	Metro	Operation		Metro
Safety and security concerns should be further minimized during construction through BMPs.	SS-15: Metro shall protect public use of work areas involving sidewalks, entrances to buildings, lobbies, corridors, aisles, stairways, and vehicular roadways with appropriate guardrails, barricades, temporary fences, overhead protection, temporary partitions, shields, and adequate visibility. Metro shall keep sidewalks, entrances to buildings, lobbies, corridors, aisles, doors, or exits that remain in use by the public clear of obstructions. Metro shall post appropriate warnings, signs, and instructional safety signs. These requirements shall be included in the construction specifications.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Construction Specifications	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	SS-16: An education safety and outreach campaign shall be implemented during construction to address public safety awareness in the vicinity of the project. The campaign would target the diverse community in the project area to educate them on proper system use and benefits of LRT ridership.	Monitor construction activities for compliance.	Metro	Construction		Metro
	See also CN-1 through CN-3, TR-4, and DR-7.					

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Environmental Justice						
Temporary bus re-routing or stop closures may be needed in Little Tokyo during construction.	See TR-12 and TR-13.					
Disproportionate amounts of parking spaces would be temporarily removed in Little Tokyo during construction (i.e., more parking spaces would be removed in Little Tokyo than in other parts of the project area). This could impact the community, including businesses.	EJ-1: The temporary displacement of three bus loading spaces on Alameda Street for the JANM shall be replaced nearby for the duration of construction activities. Metro shall work with JANM to confirm locations of temporary loading spaces.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Traffic Control Plans	City / Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	EJ-2: Any unmet demand for parking spaces eliminated in Little Tokyo during construction shall be temporarily replaced within one block of the land uses that rely on those spaces, or through a combination of measures DR-4, and EJ-3 through EJ-9.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Traffic Control Plans	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	EJ-3: Metro shall provide two acres of land on the Mangrove property (northeast of 1st and Alameda Streets) for the purposes of providing alternative parking services during construction, which could include satellite parking served by shuttle buses, valet parking from vehicle pick-up/drop-off in the central business areas of Little Tokyo, and standard self-parking. The number of spaces provided would range from 200 standard spaces to approximately 300 spaces when supplemental parking services are operating. Any parking services shall be operated by a licensed/bonded parking company and shall be selected through a competitive request for proposal (RFP) process. Cost to park shall be comparable with current cost to park. The appropriate parking service provided will be determined with the participation of the Regional Connector Community Leadership Council (RCCLC) and/or other subcommittee. Through the RCCLC, LTCC, and other community groups it shall be assessed the feasibility of establishing a shuttle service connecting local parking lots and Little Tokyo/Arts District with destinations in downtown. This shall offset the temporary loss of parking available to patrons of Little Tokyo businesses, and other visitors, during construction.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Lease	Metro/Real Estate
		Monitor construction activities for compliance.	Metro, Parking Contractor	Construction		Metro
	EJ-4: Metro shall provide notices of traffic control plans and parking relocations on its website, smart phone apps, and other modes typically used to communicate service announcements.	Verify implementation of noticing procedures.	Metro	Construction	Community Outreach Plan	Metro Community Relations
	EJ-5: Metro shall support efforts to curb non-legitimate use of disabled parking spaces.	Verify agency support.	Metro	Construction, Operation		Metro
	EJ-6: Metro shall work with LADOT, owners of private parking lots, and businesses to develop an advanced parking reservation system at cooperative and suitable locations during construction.	Verify that agency and community coordination has occurred.	Metro, LADOT, Little Tokyo stakeholders	Final Design		LADOT / Metro
		Verify implementation and maintenance of system.	Metro	Construction		LADOT / Metro
	EJ-7: Metro shall work with LADOT to open city parking lots for short-term use on evenings and weekends during construction in the vicinity of Little Tokyo.	Verify that agency coordination has occurred.	Metro	Final Design		LADOT / Metro
		Verify parking lot adherence to extended hours.	Metro	Construction		LADOT / Metro
	EJ-8: Metro shall work with the City of Los Angeles to reduce impacts of government vehicles parking on 2nd Street during construction, such as identification of alternate parking areas.	Verify that agency coordination has occurred.	Metro	Final Design		LADOT / Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	EJ-9: Metro shall work with the City of Los Angeles and the Little Tokyo Business Improvement District to facilitate creation of financial incentives such as parking validation programs to prioritize parking for Little Tokyo customers, residents, and businesses during construction.	Verify that agency coordination has occurred.	Metro	Final Design		LADOT / Metro
		Monitor implementation of any financial incentive parking programs.	Metro	Construction		Metro
	EJ-10: Metro shall identify which restaurants within Little Tokyo would be interested in establishing curbside pickup. Metro shall work with the City of Los Angeles to allow temporary curbside parking during construction, which would allow Metro to establish curbside pickup for Little Tokyo restaurants.	Verify that community and City of Los Angeles coordination has occurred.	Metro, LADOT, Little Tokyo stakeholders	Final Design	Community Outreach Plan	Metro
		Check design contract documents for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	EJ-11: Prior to construction, Metro shall conduct an annual parking needs assessment in Little Tokyo. Metro shall provide replacement parking for spaces lost as a result of the project as described in EJ-3 and to respond to the needs identified in the parking needs assessment. Metro shall work with Little Tokyo and surrounding communities to educate visitors and residents where parking is available during construction. Metro shall monitor parking, and the parking analysis shall be conducted on an annual basis throughout the duration of construction. This effort shall include new signage and other wayfinding features as appropriate.	Verify that an independent parking needs assessment has been performed.	Metro	Final Design	Parking Plan	Metro
		If demand exceeds supply, check design contract documents for permanent replacement parking provisions.	Metro	Final Design		Metro
		If demand exceeds supply, verify that replacement parking has been opened.	Metro	Pre-Construction		Metro
		If demand exceeds supply, verify that replacement parking is maintained.	Metro	Construction		Metro
		If supply exceeds demand, verify that meetings with the Little Tokyo community and surrounding communities have occurred.	Metro	Final Design		Metro
		If supply exceeds demand, verify that signage and any other appropriate way finding features have been placed and are maintained.	Metro	Pre-Construction, Construction		Metro
	See also DR-4 through DR-5.					
Disproportionate community and neighborhood impacts could occur in Little Tokyo during construction.	EJ-12: Metro shall provide assistance for businesses to maintain visibility during construction, including signage and advertisements.	Verify that signage and advertisements have been placed and are maintained.	Metro	Construction	Traffic Control Plans	Metro
	See also CN-1 through CN-7, DR-6, DR-7, TR-1, TR-2, TR-4, TR-5, EJ-2 through EJ-10, EJ-15, EJ-16, EJ-17, and EJ-19.					

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Disproportionate reductions of access to community facilities and businesses could occur in Little Tokyo during construction.	See TR-1 and EJ-1.					
Disproportionate property acquisitions and business relocations would occur in Little Tokyo.	EJ-13: Should parcels used for construction staging be proposed for redevelopment in the future, Metro is committed to involving the community in the redevelopment of construction staging areas following completion of construction activities. Metro shall do this through its established Joint Development Policy.	Verify that community input has been incorporated into redevelopment proposals.	Metro, Little Tokyo stakeholders	Construction, Post-Construction		Metro
	See also DR-8 and EJ-15.					
Disproportionate long-term displacement of commercial space could result in Little Tokyo.	EJ-14: Displaced commercial space in Little Tokyo shall be replaced with high quality commercial development opportunities consistent with Little Tokyo's community identity. This could include development at the 1st/Central Avenue station site. Depending on the type of new development, it would potentially create at least as many jobs as had been displaced.	Verify that opportunities for development of the 1st/Central Avenue station site and the Mangrove property are being actively sought.	Metro	Post-Construction		Metro / Joint Development
	EJ-15: Metro shall work with the Little Tokyo and Arts District communities and the Community Redevelopment Agency of the City of Los Angeles (CRA/LA) to create joint development opportunities for the 1st/Central Avenue station site.	Verify that input from CRA/LA and the Little Tokyo community has been received and incorporated into potential joint development opportunities.	Metro, CRA/LA, Little Tokyo stakeholders	Construction, Post-Construction		Metro / Joint Development
	See also EJ-13.					
Disproportionate visual alteration of the Little Tokyo neighborhood could occur due to removal of structures for the 1st/Central Avenue station.	See CN-7, EJ-14 and EJ-15.					
Disproportionate GBV impacts could occur in Little Tokyo during construction.	See NV-25 and NV-26.					

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Disproportionate economic and fiscal impacts to businesses in Little Tokyo could occur during construction.	EJ-16: Metro shall provide services to support affected Little Tokyo businesses and organizations during construction such as targeted advertising and marketing campaigns, Metro-sponsored coupons, incentives for construction worker patronage, and Metro-sponsored community events. Metro shall provide free technical support assistance (i.e., website development) to local businesses on strategies for business development that can minimize any adverse impacts of construction. This can include, but not be limited to, assistance with accounting or advertising. Metro shall work with the RCCLC including businesses, tenants, property owners, and government agencies with jurisdiction to make policy to resolve issues arising from adverse business issues during all phases of construction. The committee shall work to develop an implementation plan for these services and determine their content. The committee shall also be kept apprised of construction progress and upcoming transit, parking, or access changes. Metro shall provide maps showing existing and planned access during all phases of construction. Metro shall also provide directional signage to temporary parking facilities. An MOU agreement shall be developed to implement and compensate the process. The MOU will include but not be limited to provide the following: marketing and merchant support, technical and business assistance, Business Interruption Program to provide an expeditious standard for claims resolution and reimbursement, marketing services and branding campaign, merchant discounts and incentives/rewards program, signage (for business and access), and special event planning (including support). These activities shall be conducted in a manner consistent with the similar program developed for the Crenshaw Transit Corridor Project.	Verify that community input has been incorporated into implementation plan.	Metro, Little Tokyo stakeholders	Final Design	Community Outreach Plan	Metro / Community Relations
		Verify implementation of specified services and ongoing involvement of the RCCLC.	Metro	Construction		Metro / Community Relations
	EJ-17: Surface level construction activities shall be curtailed to the extent feasible during major Little Tokyo festivals and outdoor events to ensure that noise, air quality, traffic, and parking issues do not adversely affect these economically vital events. Metro shall request a list of events and festivities from the Little Tokyo community.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro / Community Relations
		Verify that community has provided a schedule of events.	Metro, Little Tokyo stakeholders	Final Design, Construction		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	See also CN-3 and EJ-2 through EJ-12.					
	EJ-18: Metro shall work with the Little Tokyo Business Association to help offset the neighborhood impacts associated with reduced revenue from the Business Improvement District funds during construction due to the removal of acquired businesses. Metro shall also offer the services described in EJ-16. Metro shall use Metro's existing claims process to address physical damage (utility interruption, for example).	Verify that community input has been incorporated into implementation plan.	Metro, Little Tokyo stakeholders	Final Design		Metro / Community Relations
		Verify implementation of specified services.	Metro	Construction		Metro
	EJ-19: Metro shall work with the Little Tokyo community businesses to minimize adverse impacts to business operations associated with utility relocation and protection of existing utilities. Metro shall offer the services described in TR-4, EJ-12, and CN-4.	Verify that community input has been incorporated into implementation plan.	Metro, Little Tokyo stakeholders	Final Design		Metro
		Verify implementation of specified services.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Disproportionate adverse transportation impacts could occur in Little Tokyo during construction.	EJ-20: Metro shall provide advertising on its transit buses and other typical means of communication publicizing construction plans and alternatives to travel and park in Little Tokyo during the construction period. Metro shall also place these advertisements on construction site walls if the community desires.	Verify implementation of advertisement services.	Metro	Construction		Metro
	EJ-21: Metro shall avoid haul routes along 1st Street or along Alameda Street between 3rd Street and US 101 where possible. Haul routes shall be confirmed with the input of the community.	Verify that community input into haul routes has occurred.	Metro	Final Design	Haul Routes	Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	See also EJ-1, EJ-2 through EJ-12, EJ-16, EJ-17, CN-3, and CN-7.					
Construction activities would be disproportionately centered in Little Tokyo, as would the associated safety and security needs.	EJ-22: Metro shall publish safety and security information at stations in Japanese, Korean, and Spanish. This includes both written and verbal announcements at stations.	Verify implementation and maintenance of signage and announcements.	Metro	Construction, Operation	Safety and Security Plans	Metro / Community Outreach
	EJ-23: Metro shall publish materials for the project's safety education campaign in Japanese, Korean, and Spanish.	Verify publication of materials.	Metro	Construction, Operation		Metro / Community Outreach
	EJ-24: Metro shall involve the Little Tokyo Public Safety Association in the development of safety and security plans.	Verify that input from Little Tokyo Public Safety Association has been incorporated.	Metro, Little Tokyo Public Safety Association	Final Design, Construction	Safety and Security Plans	Metro
		Monitor construction and operation for compliance.	Metro	Construction, Operation		Metro
	EJ-25: Metro shall monitor and ensure implementation of committed mitigation measures designed to address safety and security concerns.	Verify implementation and maintenance of measures.	Metro	Construction		Metro
	See also EJ-18.					
More operation noise may be audible in Little Tokyo than other parts of the alignment due to the portals and open-roof station.	EJ-26: Depending on the potential location and scope of the system's ventilation equipment, orient the exhaust away from downwind receptors to minimize noise from ventilation as well as underground train horns and related operational sounds.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Construction activities would be disproportionately centered in Little Tokyo, as would the associated air quality impacts.	EJ-27: Metro shall implement receptor-based mitigation where needed to reduce construction-related pollutant levels below significance thresholds. This could include installation of high efficiency particulate air filters on HVAC equipment at downwind receptors during construction activities.	Verify implementation of receptor-based mitigation measures.	Metro	Pre-Construction, Construction		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	See also AQ-1 through AQ-5, AQ-7, AQ-8, AQ-10, EJ-17, and EJ-26.					

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Land use impacts could occur in Little Tokyo.	EJ-28: Metro shall maximize opportunities to the extent feasible for enhancing access from existing land uses to the new station.	Verify implementation of program.	Metro	Final Design, Construction		Metro
	See also EJ-15 and EJ-26.					
Tunneling beneath existing buildings in Little Tokyo would introduce the potential risk of subsurface impacts.	EJ-29: Design of underground facilities shall avoid potential subsurface impacts to adjacent buildings.	Check preliminary engineering documents for compliance.	Metro	Preliminary Engineering	Design	Metro
	See also GT-1 through GT-5.					
Tree removal would occur in Little Tokyo.	EJ-30: New trees planted at station locations shall be regularly monitored by Metro to ensure healthy growth and development. Metro shall replace trees as close as possible to original locations.	Monitor trees.	Metro	Operation	Landscape Plan	Metro ECSD
	EJ-31: Metro shall provide the Little Tokyo and Arts District communities with opportunities for input into the development of landscape plans for the 1st/Central Avenue station throughout the preliminary engineering and final design processes.	Verify incorporation of Little Tokyo Community Council input into landscape plans.	Metro	Preliminary Engineering, Final Design	Landscape Plan	Metro ECSD
Foreign-language speakers would need to access project meetings and information.	EJ-32: Information shall be made available in Japanese and Korean, and flyers for project meetings shall indicate that there will be both Japanese and Korean translators present.	Verify provision of information in Japanese and Korean.	Metro	Ongoing		Metro Community Relations
TBM operations would be disproportionately concentrated in the vicinity of Little Tokyo.	EJ-33: Metro shall require the construction contractor to perform TBM operations for a period not extending beyond 48 months. This limit may need to be raised should circumstances arise that are beyond the control of Metro and the construction contractor. The community shall be notified if such a situation occurs.	Monitor construction activities for compliance.	Metro	Construction	Contract Documents	Metro
	EJ-34: Metro shall prepare a procedure for rapid shut-down of construction should maximum acceptable vibration thresholds be reached.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	EJ-35: Metro shall prepare a cost-benefit analysis of using one versus two TBMs, and shall select the least impactful cost-effective solution.	Check preliminary engineering documents for compliance.	Metro	Preliminary Engineering		Metro
Construction Impacts						
Mitigation measures for construction-related impacts are discussed in the preceding sections.						

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Per Board Action (April 26,2012)						
74.A.1	Create an enhanced pedestrian walkway along the east side of Flower Street between 4th and 7th Streets.					
74.A.2	Relocate the Little Tokyo/Arts District underground station to minimize property required and eliminate the cut-and-cover segment on 2nd Street in Little Tokyo originally required for construction.					
74.A.3	Launch TBM from northeast corner of 1st and Alameda (Mangrove) instead of 2nd Street.					
74.A.4	Tunnel to Flower and 4th Streets in the Financial District to further reduce cut/cover in the area.					
74.A.5	Maintain access from Flower Street between 5th and 6th Streets to the West Lawn Garage.					
74.A.6	Any areas adjacent to the Maguire Gardens and Central Library impacted by construction will be returned to their original or improved state, with oversight by the Library Gardens Committee.					
74.A.7	The width and length of any construction worksite on Flower Street south of 4th Street will be minimized to the greatest extent feasible.					
74.A.8	South of 4th Street, construction decking shall be no higher than 10", if feasible, above the existing grade, and flush with existing curb on the east and west side of Flower Street with a maximum cross gradient of 3%.					
74.A.9	No construction worker parking on Flower and adjacent streets during construction. Consider obtaining temporary parking in the West Lawn Garage for construction workers.					
74.A.10	Enhancements to the pedestrian walkway along the east side of Flower Street between 4th and 7th Streets shall not permanently eliminate a southbound traffic land on Flower Street.					
74.A.11	Preserve the opportunity to install a future station north of 5th and Flower Streets.					
74.A.12	Restore Flower Street travel lanes after construction to the existing six lane condition from 4th to 6th Streets and the existing four lane condition from 6th to 7th Streets.					
74.A.13	Along Flower Street, accelerate the construction schedule to the greatest extent feasible, consistent with budgetary and other constraints.					
74.A.14	Minimize surface disruptions along Flower Street from truck trips, utility relocation, decking installation and removal, street restoration, or TBM removal, when feasible.					
74.A.15	Detailed surveys of Flower Street properties shall be performed prior to and at the end of construction.					
74.A.16	Shoring design for cut and cover construction along Flower Street will account for adjacent buildings.					
74.A.17	Noise and vibration levels will be monitored at Flower Street properties.					
74.A.18	If construction and/or operational ground-borne noise limits or ground-borne vibration limits are exceeded according to CEQA's significance thresholds, Metro will take action to reduce noise and vibration to less than significant levels at the property lines of sensitive uses.					
74.A.19	No pile drivers will be used along Flower Street during construction. If necessary, piles will be drilled or vibrated, but not driven.					
74.A.20	With property owners' consent, install and monitor deformation monitoring systems along Flower Street during construction.					
74.A.21	Reduced noise mufflers, air-inlet silencers, shrouds or sound walls will be used for generators, compressors, fans, exhaust systems and other inherently noisy construction equipment.					
74.A.22	Provide assistance for Flower Street businesses to maintain visibility during construction, including signage and advertisements.					
74.A.23	Ensure there is daily cleaning/washing during non-peak hours of Financial District streets affected by excavation and hauling.					
74.A.24	Provide protective measures, such as pipe and conduit support systems, vibration and settlement monitoring, trench sheeting, and shoring to avoid potential damage to utilities during construction.					
74.A.25	Maintain access to utilities for technicians, at all times during construction.					
74.A.26	Assign a full-time ombudsperson who is authorized to resolve complaints relative to the Project.					
74.C.1	Extend the use of a tunnel boring machine (TBM) under Flower Street to include the area between 4th and 5th Streets up to the intersection of 5th Street and Flower Street.					
74.C.2	On Flower Street between 5th and 6th Streets, where cut and cover is necessary, maintain four travel lanes between 6 AM and 8PM during weekdays during the "steady state". The steady state is defined as the period between the completion of the decking installation to the commencement of removal of decking.					
74.C.3	On Flower Street between 5th and 6th Streets, maintain no less than two travel lanes between 8pm and 6am, except for those times when further street restrictions are reqiured to facilitate decking installation and removal.					
74.C.4	Require that any public spaces, gardens, plaza, walkways, sidewalks, trees, street furniture, landscaping, hardscaping or pedestrian areas, including but not limited to the Library Gardens and the Citigroup Plaza, which are impacted, damaged or altered as a result of construction activity and/or staging, be reconstructed, replanted, repaired, and replaced like-for-like at the end of construction activity in that vicinity.					
74.C.5	Conduct various value engineering and cost methods determine if the aforementioned mitigation methods can be incorporated without an increase in the Life of Project 9 (LOP) Budget and report back in 60 days.					
74.C.6	Amend the LPA to include the design features if it can be completed within the current LOP budget. If staff determines that inclusion of these design features will exceed the LOP budget, the design features shall be included as proposal options during the construction procurement to allow proposers a process to include each feature and deterimine if it can be accomplished within the LOP budget.					
74.D.5	The designation of a Construction Relations Manager to serve as the point person for all community concerns regarding the project prior to construction. This person will be responsible for the entire project area and funded from the project budget.					
74.D.6	Reports will be made to the Board in June and August 2012 with the implementation strategy for the above activities, with quarterly reports to the Board thereafter, and throughout the duration of the construction period.					

APPENDIX I

NOTIFICATION AND COLLATERAL MATERIALS

LOS ANGELES COUNTY
METROPOLITAN TRANSPORTATION AUTHORITY

NOTICE OF AVAILABILITY
FOR THE
REGIONAL CONNECTOR TRANSIT CORRIDOR PROJECT
FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

The Federal Transit Administration (FTA) and the Los Angeles County Metropolitan Transportation Authority (Metro) have prepared a combined Final Supplemental Environmental Impact Statement (FSEIS) and Supplemental Record of Decision (ROD) for the Regional Connector Transit Corridor Project, a proposed underground light rail system that will connect the existing Metro Gold, Blue, and Expo Lines in downtown Los Angeles, California. This notice shall alert interested parties and Federal, State, tribal, regional, and local government agencies to the availability of the FSEIS and Supplemental ROD.

This Final Supplemental Environmental Impact Statement and Supplemental Record of Decision document has been prepared pursuant to Pub.L.114-94, 23 USC 139 (n)(2) as amended by the Fixing America's Surface Transportation Act. The Judgment and Order for Partial Injunctive Relief by the Honorable John A. Kronstadt on May 28, 2014 and September 9, 2014, respectively, require that the FTA as the federal lead agency pursuant to NEPA, with Metro, prepare a supplemental analysis under the National Environmental Policy Act (NEPA) to address the feasibility of Open Face Shield and Sequential Excavation Method (SEM) tunneling alternatives. Comments received during the public review period of the Draft SEIS are addressed in the FSEIS.

PROJECT BACKGROUND: The Regional Connector light rail transit (LRT) project lies entirely within the City of Los Angeles. It is generally bound by U.S. Highway 101 on the north, 7th Street on the south, Alameda Street on the east, and State Route 110 on the west. The length of the proposed light rail project would be just under two miles. It would have three new stations (2nd/Hope, 2nd/Broadway, and 1st/Central). The Regional Connector Transit Corridor Project would provide a direct link connecting several light rail lines in operation or in construction, including the Metro Gold Line to Pasadena, the Metro Gold Line Eastside Extension, the Metro Blue Line, and the Metro Expo Line. The proposed project would provide a rail link through downtown Los Angeles such that LRT service would provide a one-seat ride for travel from East Los Angeles to Santa Monica, and from Azusa to Long Beach. With implementation of the Project, these LRT lines would share tracks and stations in downtown Los Angeles.

The LPA remains as identified in the certified 2012 Final Environmental Impact Statement/Environmental Impact Report (Final EIS/EIR) and the Record of Decision (ROD) certified by FTA on June 29, 2012. The LPA will be constructed with cut and cover construction along Flower Street from south of 4th Street to the 7th Street/Metro Center Station. It will be constructed entirely underground until connecting with existing above grade lines, and would traverse under Flower Street north from existing LRT tail tracks located north of the existing underground 7th Street/Metro Center Station. At 3rd Street, it would turn east to operate under 2nd Street between Flower Street and Central Avenue serving stations at 2nd/Hope and 2nd/Broadway. At Central Avenue, it would connect to a new station (1st/Central) located between Central Avenue and Alameda Street in Little Tokyo.

ALTERNATIVES: The FSEIS provides additional detail on tunneling methods not selected along Flower Street, specifically Open Face Shield and SEM tunneling and additional detail regarding why these construction alternatives were not selected. The remainder of the project alignment is not changed and is not under consideration as part of the FSEIS.

<u>EPBM/Open Face Shield/SEM LPA Profile Alternative (Alternative A):</u> Alternative A would replace cut and cover construction by tunneling south to the 7th Street/Metro Center Station through the use of a combination of Open Face Shield tunnel boring and sequential excavation method (SEM) construction techniques. This alternative proposes the use of an earth pressure balance boring machine (EPBM) to bore twin tunnels generally following the horizontal and vertical alignment of the LPA from 3rd Street to south of 4th Street, with Open Face Shield tunnel excavation from 4th Street to 5th Street, and SEM tunnel construction from 5th Street to the existing 7th Street/Metro Center Station tail tracks structure.

<u>EPBM/ SEM Low Alignment Alternative (Alternative B):</u> Alternative B would replace cut and cover construction by tunneling south to the 7th Street/Metro Center Station through the use of a combination of EPBM and SEM construction techniques. This alternative proposes the use of EPBM to bore twin tunnels generally following the horizontal alignment of the LPA, but with a deeper vertical alignment than the LPA. The EPBM method would be used to tunnel to just south of 5th Street, with SEM tunnel construction from south of 5th Street to the 7th Street/Metro Center Station tail tracks structure.

DOCUMENT LOCATIONS: The FSEIS will be available for public review at the Metro Transportation Library at One Gateway Plaza, 15th floor, Los Angeles, CA 90012; and at the following public library locations:

- Los Angeles Central Library, 630 W. 5th Street, Los Angeles, CA 90071
- Little Tokyo Branch Library, 203 S. Los Angeles Street, Los Angeles, CA 90012
- Chinatown Branch Library, 639 N. Hill Street, Los Angeles, CA 90012
- Von KleinSmid Center (VKC), University of Southern California, University Park Campus, Los Angeles, CA 90089
- Pasadena Central Library, 285 E. Walnut Street, Pasadena, CA 91101
- East Los Angeles Library, 4837 E. 3rd Street, Los Angeles, CA 90022
- Santa Monica Public Library, 601 Santa Monica Boulevard, Santa Monica, CA 90401
- Long Beach Public Library (Main Library), 101 Pacific Avenue, Long Beach, CA 90822

It will also be available on Metro's website at www.metro.net/projects/connector.

FOR FURTHER INFORMATION CONTACT: Ms. Mary Nguyen, Environmental Protection Specialist, Los Angeles Metropolitan Office, Federal Transit Administration, Region IX, 888 South Figueroa Street, Suite 2170, Los Angeles, CA 90017, phone (213) 202-3960, email mary.nguyen@dot.gov; or Ms. Dolores Roybal Saltarelli, Project Manager, Los Angeles County Metropolitan Transportation Authority (Metro), One Gateway Plaza, MS 99-19-6, Los Angeles, CA 90012, phone (213) 922-3024, email roybald@metro.net.

CONTACT THE PROJECT TEAM OR OBTAIN FURTHER INFORMATION FROM:
Project hotline: (213) 922-7277
Project e-mail: regionalconnector@metro.net
Project website: metro.net/connector.

LOS ANGELES COUNTY
METROPOLITAN TRANSPORTATION AUTHORITY

NOTICE OF AVAILABILITY
FOR THE
REGIONAL CONNECTOR TRANSIT CORRIDOR PROJECT
DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

The Federal Transit Administration (FTA) and the Los Angeles County Metropolitan Transportation Authority (Metro) have prepared a Draft Supplemental Environmental Impact Statement (DSEIS) for the Regional Connector Transit Corridor Project, a proposed underground light rail system that will connect the existing Metro Gold, Blue, and Expo Lines in downtown Los Angeles, California. FTA and Metro have prepared a DSEIS for the Regional Connector Transit Corridor Project pursuant to FTA National Environmental Policy Act (NEPA) implementation procedures (23 CFR 771.130). FTA is serving as the federal lead agency for the purpose of NEPA environmental clearance. As directed by U.S. District Court Judge Kronstadt on May 29, 2014, the DSEIS has been prepared solely to provide additional detail on tunneling methods not selected along the Flower Street portion of the Project between 4th Street and the 7th Street/Metro Center Station. The tunneling methods discussed are Open Face Shield and Sequential Excavation Method (SEM).

This notice shall alert interested parties to the availability of the DSEIS, describe the two tunneling method alternatives evaluated in the DSEIS, explain why they were not selected as the Locally Preferred Alternative (LPA), and invite public comments. This notice shall alert interested Federal, State, tribal, regional, and local government agencies of the availability of the DSEIS, and invite agency comments on the DSEIS.

The FTA may issue a single Final Supplemental Environmental Impact Statement and Record of Decision document pursuant to Pub. L. 112-141, 126 Stat. 405, Section 1319(b) unless the FTA determines statutory criteria or practicability considerations preclude issuance of the combined document pursuant to Section 1319. In that case, FTA would issue a Final Supplemental Environmental Impact Statement followed by a supplement to the Record of Decision, as needed.

PROJECT BACKGROUND: The light rail transit (LRT) project lies entirely within the City of Los Angeles. It is generally bound by U.S. Highway 101 on the north, 7th Street on the south, Alameda Street on the east, and State Route 110 on the west. The length of the proposed light rail project would be just under two miles. It would have three new stations (2nd/Hope, 2nd/Broadway, and 1st/Central). The Regional Connector Transit Corridor Project would provide a direct link connecting several light rail lines in operation or in construction, including the Metro Gold Line to Pasadena, the Metro Gold Line Eastside Extension, the Metro Blue Line, and the Metro Expo Line. The proposed project would provide a rail link through downtown Los Angeles such that LRT service would provide a one-seat ride for travel from East Los Angeles to Santa Monica, and from Azusa to Long Beach. With implementation of the Project, these LRT lines would share tracks and stations in downtown Los Angeles.

The LPA remains as identified in the certified 2012 Final Environmental Impact Statement/Environmental Impact Report (Final EIS/EIR) and the Record of Decision (ROD) certified by FTA on June 29, 2012. The LPA will be constructed with cut and cover construction along Flower Street from south of 4th Street to the 7th Street/Metro Center Station. It would constructed entirely underground until connecting with existing above grade lines, and would traverse under Flower Street north from existing LRT tail tracks located north of the existing underground 7th Street/Metro Center Station. At 3rd Street, it would begin to turn east to operate under 2nd Street between Flower Street and

Central Avenue serving stations at 2nd/Hope and 2nd/Broadway. At Central Avenue, it would connect to a new station (1st/Central) located between Central Avenue and Alameda Street in Little Tokyo.

ALTERNATIVES: The DSEIS provides additional detail on tunneling methods not selected along Flower Street, specifically Open Face Shield and SEM tunneling. The remainder of the project alignment is not changed and is not under consideration as part of the DSEIS.

<u>**EPBM/Open Face Shield/SEM LPA Profile Alternative (Alternative A):**</u> Alternative A would replace cut and cover construction by tunneling south to the 7th Street/Metro Center Station through the use of a combination of Open Face Shield tunnel boring and sequential excavation method (SEM) construction techniques. This alternative proposes the use of an earth pressure balance boring machine (EPBM) to bore twin tunnels generally following the horizontal and vertical alignment of the LPA from 3rd Street to south of 4th Street, with Open Face Shield tunnel excavation from 4th Street to 5th Street, and SEM tunnel construction from 5th Street to the existing 7th Street/Metro Center Station tail tracks structure.

<u>**EPBM/ SEM Low Alignment Alternative (Alternative B):**</u> Alternative B would replace cut and cover construction by tunneling south to the 7th Street/Metro Center Station through the use of a combination of EPBM and SEM construction techniques. This alternative proposes the use of EPBM to bore twin tunnels generally following the horizontal alignment of the LPA, but with a deeper vertical alignment than the LPA. The EPBM method would be used to tunnel to just south of 5th Street, with SEM tunnel construction from south of 5th Street to the 7th Street/Metro Center Station tail tracks structure.

DATES: The public review and comment period for the DEIS begins on June 12, 2015 and lasts for 45 days, ending on July 27, 2015. Please provide written comments to Ms. Dolores Roybal Saltarelli of Metro at One Gateway Plaza, MS 99-22-2, Los Angeles, CA 90012, or send email comments to regionalconnector@metro.net. Comments must be received by 5pm on July 27, 2015.

PUBLIC MEETINGS: Comments may also be submitted at two public hearings. One public hearing will be held on June 30, 2015 from 12:00pm to 1:30pm at the Los Angeles Central Library, Mark Taper Auditorium, 630 W. 5th Street, Los Angeles, CA 90071, and one will be held on July 7, 2015 from 6:30pm to 8:00pm at the Japanese American National Museum, 100 N. Central Avenue, Los Angeles, CA 90012.

DOCUMENT LOCATIONS: The DSEIS will be available for public review at the Metro Transportation Library at One Gateway Plaza, 15th floor, Los Angeles, CA 90012; and at the following public library locations:

- Los Angeles Central Library, 630 W. 5th Street, Los Angeles, CA 90071
- Little Tokyo Branch Library, 203 S. Los Angeles Street, Los Angeles, CA 90012
- Chinatown Branch Library, 639 N. Hill Street, Los Angeles, CA 90012
- Von KleinSmid Center (VKC), University of Southern California, University Park Campus, Los Angeles, CA 90089
- Pasadena Central Library, 285 E. Walnut Street, Pasadena, CA 91101
- East Los Angeles Library, 4837 E. 3rd Street, Los Angeles, CA 90022
- Culver City Julian Dixon Library, 4975 Overland Avenue, Culver City, CA 90230
- Santa Monica Public Library, 601 Santa Monica Boulevard, Santa Monica, CA 90401
- Long Beach Public Library (Main Library), 101 Pacific Avenue, Long Beach, CA 90822

It will also be available on Metro's website at www.metro.net/projects/connector.

FOR FURTHER INFORMATION CONTACT: Ms. Mary Nguyen, Environmental Protection Specialist, Los Angeles Metropolitan Office, Federal Transit Administration, Region IX, 888 South Figueroa

Street, Suite 2170, Los Angeles, CA 90017, phone (213) 202-3950, email mary.nguyen@dot.gov; or Ms. Dolores Roybal Saltarelli, Project Manager, Los Angeles County Metropolitan Transportation Authority (Metro), One Gateway Plaza, MS 99-22-2, Los Angeles, CA 90012, phone (213) 922-3024, email roybald@metro.net.

CONTACT THE PROJECT TEAM OR OBTAIN FURTHER INFORMATION FROM:
Project hotline: (213) 922-7277
Project e-mail: regionalconnector@metro.net
Project website: metro.net/connector.

STATE OF CALIFORNIA
GOVERNOR'S OFFICE *of* PLANNING AND RESEARCH
STATE CLEARINGHOUSE AND PLANNING UNIT

EDMUND G. BROWN JR.
GOVERNOR

KEN ALEX
DIRECTOR

July 30, 2015

Dolores Roybal Saltarelli
Los Angeles County Metropolitan Transportation Authority
One Gateway Plaza, MS 99-22-2
Los Angeles, CA 90012-2952

Subject: Regional Connector Transit Corridor
SCH#: 2009031043

Dear Dolores Roybal Saltarelli:

The State Clearinghouse submitted the above named Revised/Supplemental EIS to selected state agencies for review. On the enclosed Document Details Report please note that the Clearinghouse has listed the state agencies that reviewed your document. The review period closed on July 29, 2015, and the comments from the responding agency (ies) is (are) enclosed. If this comment package is not in order, please notify the State Clearinghouse immediately. Please refer to the project's ten-digit State Clearinghouse number in future correspondence so that we may respond promptly.

Please note that Section 21104(c) of the California Public Resources Code states that:

> "A responsible or other public agency shall only make substantive comments regarding those activities involved in a project which are within an area of expertise of the agency or which are required to be carried out or approved by the agency. Those comments shall be supported by specific documentation."

These comments are forwarded for use in preparing your final environmental document. Should you need more information or clarification of the enclosed comments, we recommend that you contact the commenting agency directly.

This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act. Please contact the State Clearinghouse at (916) 445-0613 if you have any questions regarding the environmental review process.

Sincerely,

Scott Morgan

Scott Morgan
Director, State Clearinghouse

Enclosures
cc: Resources Agency

1400 10th Street P.O. Box 3044 Sacramento, California 95812-3044
(916) 445-0613 FAX (916) 323-3018 www.opr.ca.gov

Document Details Report
State Clearinghouse Data Base

SCH# **2009031043**
Project Title Regional Connector Transit Corridor
Lead Agency Los Angeles County

Type **SIS** Revised/Supplemental EIS

Description Metro and FTA have prepared a DSEIS for the Regional Connector Transit Corridor Project, a proposed underground light rail system that will connect the existing Metro Gold, Blue, and Expo Lines in downtown Los Angeles. FTA is serving as the federal lead agency for the purpose of NEPA environmental clearance. As directed by U.S. District Court Judge Kronstadt on May 29, 2014, the DSEIS has been prepared solely to provide additional detail on tunneling methods not selected along the Flower Street portion of the Project between 4th Street and the 7th Street/Metro Center Station. The tunneling methods discussed are Open Face Shield and Sequential Excavation Method (SEM).

Lead Agency Contact

Name Dolores Roybal Saltarelli
Agency Los Angeles County Metropolitan Transportation Authority
Phone 213 922 3024 ***Fax***
email
Address One Gateway Plaza, MS 99-22-2
City Los Angeles ***State*** CA ***Zip*** 90012-2952

Project Location

County Los Angeles
City Los Angeles, City of
Region
Lat / Long
Cross Streets Area bounded generally by US 101, 7th Street, Alameda Street and SR 110
Parcel No.
Township ***Range*** ***Section*** ***Base***

Proximity to:

Highways Hwy 110
Airports
Railways Metro Rail System
Waterways
Schools Various
Land Use Urban commercial/residential

Project Issues Aesthetic/Visual; Air Quality; Archaeologic-Historic; Geologic/Seismic; Noise; Toxic/Hazardous; Traffic/Circulation; Cumulative Effects; Other Issues

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Reviewing Agencies Resources Agency; Department of Fish and Wildlife, Region 5; Office of Historic Preservation; Department of Parks and Recreation; Department of Water Resources; Office of Emergency Services, California; Resources, Recycling and Recovery; California Highway Patrol; Caltrans, District 7; Air Resources Board, Transportation Projects; Regional Water Quality Control Board, Region 4; Department of Toxic Substances Control; Native American Heritage Commission; Public Utilities Commission

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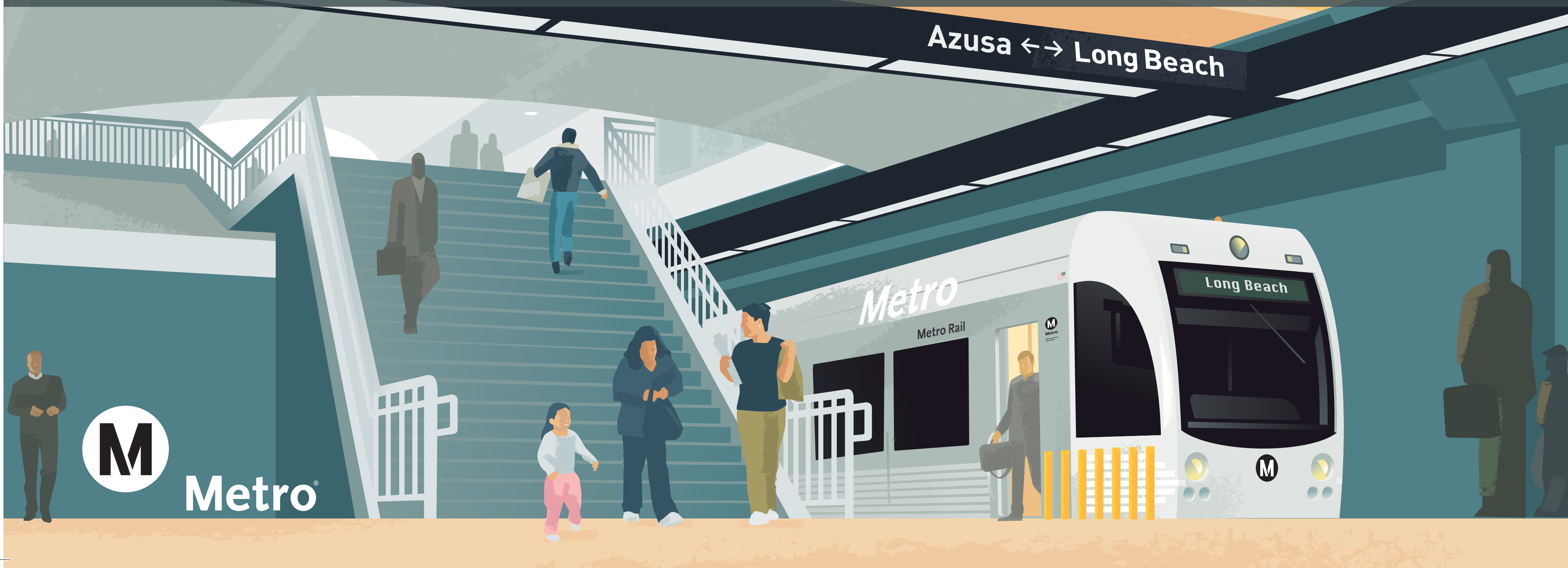
Date Received 06/12/2015 ***Start of Review*** 06/15/2015 ***End of Review*** 07/29/2015 metro.net/regionalconnector

Join us to provide your comments.

Acompáñenos y denos sus comentarios.

Regional Connector Public Hearings – June 30 & July 7, 2015

Conector Regional audiencias públicas – 30 de junio y 7 de julio de 2015



Metro®

Community public hearings are now set for the Regional Connector Transit Project.

The Draft Supplemental Environmental Impact Statement (SEIS) is intended to provide more information on the tunnel construction alternatives on Flower Street that were withdrawn from consideration.

The document is available for review by visiting *metro.net/regionalconnector*. The deadline for comments on the Draft SEIS is July 27, 2015.

Acompáñenos a una audiencia pública para el Conector Regional.

El Borrador SEIS intenta proporcionar información sobre alternativas para la construcción del túnel debajo de Flower Street que fueron retiradas de consideración.

Puede revisar el documento en metro.net/regionalconnector. *Se aceptarán comentarios para el Borrador SEIS hasta el 27 de julio de 2015.*

Metro
One Gateway Plaza
99-13-1
Los Angeles, CA 90012

MEETING DETAILS/*DETALLES PARA AUDIENCIAS*

Tuesday, June 30, 2015
12pm to 1:30pm
Los Angeles Central Library, Mark Taper Auditorium
630 W 5th Street, Los Angeles

Tuesday, July 7, 2015
6:30pm to 8pm
Japanese American National Museum
100 N Central Avenue, Los Angeles

All Metro meetings are held in ADA accessible facilities. ADA accommodations and translations available by calling 213.922.3012 at least 72 hours in advance.

Todas las reuniones de Metro se llevan a cabo en instalaciones accesibles de la ADA. Traducción en español, coreano y japonés estará disponible en ambas audiencias. Para otras adaptaciones de la ADA y traducciones llame al 213.922.7277 por lo menos 72 horas antes de la reunión.

323.466.3876

Español	Հայերէն	русский
한국어	Tiếng Việt	ภาษาไทย
中文	日本語	ខ្មែរ

Metro

宛先: 関係者各位様および関係各機関様

差出元: 連邦公共交通管理局 (FTA)およびロサンゼルス郡都市交通局 (Metro)

何故この広告か?

全国環境政策法 (NEPA) を順守するため、FTA とMetroは地域連絡交通回廊プロジェクトのための草案補足環境影響声明 (DSEIS) を作成しましたが、このプロジェクトとはカリフォルニア州ロサンゼルスのダウンタウンにある既存のメトロゴールド、ブルー、およびエクスポ線を結ぶという提案中の地下ライトレールのことです。FTA と Metro は、FTA の全国環境政策法 (NEPA) 実施手続き (23 CFR 771.130) に則って、地域連絡交通回廊プロジェクトのDSEISを作成しました。FTAは、 NEPA の環境認可を得るために、連邦政府の主導機関としての役目を果たしています。2014年5月29日連邦地裁のクロンスタッド判事の指示により 、DSEIS は4番通りと7番通り/メトロセンター駅の間でフラワー通りの一部である選ばれなかったトンネル方法に関する詳細の追加を提供するという目的に絞って作成されました。議論されたトンネル方法とは、開口型遮蔽法と順次掘削法 (SEM)です。

本広告は、DSEISが入手可能であることを市民の皆様にお知らせし、DSEIS中で評価を受けた2つのトンネル方法を記載し、地元優先代替案(LPA)としてそれらが選ばれなかった理由を説明し、かつ市民の皆様からのご意見やコメントをお願いするという公示の役目を果たします。

1319章に則って合併文書の発表を防ぐために、FTAが法的な基準あるいは実際性の配慮を決めない限り、FTAは公法 112-141、126 Stat. 405、1319(b)章に則って、単独の最終補足環境影響声明および決定記録文書を出すこともありえます。 この場合には、FTAは決定記録への補足の後に、最終補足環境影響声明を、必要となれば出すことになります。

何が計画中なのか?

ライトレール交通 (LRT)プロジェクトは、ロサンゼルス市内に限られます。つまり、北は連邦高速101号線、南は7番通り、東はアラメダ通り、西は州高速110号線に囲まれた区域です。提案中のライトレールのプロジェクトは、2マイル以内です。 3つの新駅 (2番通り/ホープ、 2番通り/ブロードウェイ、および1番通り/セントラル) ができることになります。地域連絡交通回廊プロジェクトは、パサデナへのメトロゴールド線、メトロゴールド線イーストサイド延長、メトロブルー線、メトロエクスポ線を含めて、現在運営中あるいは建設中のいくつかのライトレール線をつなぐ直接リンクを提供します。提案中のプロジェクトは、ロサンゼルスダウンタウンにおいてレールリンクを提供することになり、LRTによって東ロサンゼルスからサンタモニカへ、アズサからロングビーチへとスムーズに移動できることになります。当プロジェクトの実施により、LRT各線はロサンゼルスダウンタウンの軌道や駅を共有できます。

LPAは、認定済み2012年最終環境影響声明/環境影響報告 (Final EIS/EIR) および2012年6月29日に認定された決定記録 (ROD) において確認されたものとなっています。 LPA は4番通りの南から7番通り/メトロセンター駅のフラワー通り沿いに開削建築法で建設されます。既存の地上各線とつながるまでは全て地下で建設され、既存の地下7番通り/メトロセンター駅の北にあるLRTの後尾軌道からフラワー通り北の地下で横断します。3番通りでは、フラワー通りとセントラル通りの間の2番通りの地下を運行するために東に向きを換えはじめ、 2番通り/ホープおよび 2番通り/ブロードウェイの各駅で停車します。 セントラル通りでは、リトル東京のセントラル通りとアラメダ通りの間にある新駅(1番通り/セントラル)につながります。

DSEIS はフラワー通り沿いで選ばれなかったトンネル方法についての追加となる詳細を提供しますが、これは特に開口型遮蔽法とSEM法についての情報です。プロジェクト調整の残り部分には変更がなく、DSEISの検討の対象ではありません。

<u>EPBM/開口型遮蔽/SEM LPA プロフィール代替案 (代替案 A):</u> 代替案Aは、開口型遮蔽トンネル掘削法と順次掘削法(SEM) の双方を合併させて活用することにより、7番通り/メトロセンター駅への南をトンネル化することによって、開口型遮蔽建築方法を替えるものです。この代替案では、3番通りから4番通りの南には全般的にLPAの水平・垂直調整に従って2本のトンネルを掘るために地球圧力均衡掘削機 (EPBM) の活用を、4番通りから5番通りには開口型遮蔽トンネル掘削法の活用を、そして5番通りから既存の7番通り/メトロセンター駅の後尾軌道構造にはSEMトンネル建築法の活用を提案しています。

<u>EPBM/ SEM 軽調整代替案 (代替案 B):</u> 代替案 Bは、EPBM とSEM 建築手法の双方を合併させて使うことにより、7番通り/メトロセンター駅へと南をトンネル化することによって開削建築法を替えるものです。この代替案は、全般的にLPAの水平調整に従って2本のトンネルを掘るためにEPBMの活用を提案していますが、LPAより一層深い垂直調整を伴うものです。EPBM 法は、5番通りのちょうど南にあるトンネルに活用され、SEMトンネル建築手法は5番通り南から既存の7番通り/メトロセンター駅後尾軌道構造に活用されます。

入手可能な文書は?

Metro は本公示と共に45日間の一般コメント期間を設けました。この期間中に市民の皆様からのご意見やコメントを求めております。この期間は2015年6月12日に始まり、7月27日に終了します。ご意見やコメントの締め切りは2015年7月27日午後5時必着です。

DSEIS はMetroのウェブサイト <u>www.metro.net/projects/connector</u> からも入手できます。印刷された文書は、以下の場所でご覧いただくことができます。

Metro交通図書館
One Gateway Plaza, 15th floor
Los Angeles, CA 90012

ロサンゼルス中央図書館
630 W. 5th Street
Los Angeles, CA 90071

リトル東京分館
203 S. Los Angeles Street
Los Angeles, CA 90012

チャイナタウン分館
639 N. Hill Street
Los Angeles, CA 90012

ボン・クレインスミッドセンター (VKC)
University of Southern California
University Park Campus
Los Angeles, CA 90089

パサデナ中央図書館
285 E. Walnut Street
Pasadena, CA 91101

東ロサンゼルス図書館
4837 E. 3rd Street
Los Angeles, CA 90022

カルバー市ジュリアン・ディキソン図書館
4975 Overland Avenue
Culver City, CA 90230

サンタモニカ公立図書館
601 Santa Monica Blvd.
Santa Monica, CA 90401

ロングビーチ公立図書館 (主要図書館)
101 Pacific Avenue
Long Beach, CA 90822

公聴会は以下の場所で開催されます:

- 金融地区、2015年6月30日正午～午後1時半、場所 ロサンゼルス中央図書館Mark Taper Auditorium、住所 630 W. 5th Street, Los Angeles, CA 90071
- リトル東京、2015年7月7日、午後6時半～午後8時、場所Japanese American National Museum、住所 100 N. Central Ave, Los Angeles 90012.

公聴会で使用される建物は障害を持つ方々にもアクセス可能です。手話通訳、車椅子用の座席、別の方式による書類など特別の手配が必要な方々は、プロジェクトのホットライン電話 (213) 922-7277 あるいは電子メール <u>regionalconnector@metro.net</u> 宛までご連絡ください。

連絡先:

DSEISはフラワー通り沿いにおいて選ばれなかったトンネル方法の追加情報を提供します。 DSEISはこれらの代替案の環境への影響を、公共当局の決断権を有する人々や市民の皆様にお知らせするための情報開示文書です。公聴会での口頭コメントは法廷速記者により書き写されます。書面コメントは公聴会で提出することもできますし、プロジェクト電子メール<u>regionalconnector@metro.net</u> に送っていただくこともできます。その他の連絡方法には下記の2名宛にお願いします。

Ms. Dolores Roybal Saltarelliへのご連絡は、宛先Project Manager, Los Angeles County Metropolitan Transportation Authority (Metro), One Gateway Plaza, MS 99-22-2, Los Angeles, CA 90012、電話 (213) 922-3024、電子メール <u>roybald@metro.net</u>宛に、あるいはMs. Mary Nguyenへのご連絡は, 宛先Environmental Protection Specialist, Los Angeles Metropolitan Office, Federal Transit Administration, Region IX, 888 South Figueroa Street, Suite 2170, Los Angeles, CA 90017、電話 (213) 202-3950、電子メール <u>mary.nguyen@dot.gov</u> 宛にお願いします。

最終SEISにコメントが反映されるよう保証するためには、コメントは2015年7月27日午後5時までに必着の必要があります。DSEIS に関して、あるいはCDコピー要請に関しての詳しい情報については、上述のMs. Dolores Roybal Saltarelli あるいは Ms. Mary Nguyen 宛にご連絡ください。

CNS#2757805

단체들은 환자 발생
고 있다며 2차 메르
성서울병원에 대한 전
를 다시 해야 한다고
정부는 현재까지 발
병원에서 감염돼, 지
아니라고 못 박고 잇

하고 있다.

또 전국 모든 병원의 폐렴환자를 대상으로 문제 의료기관에 노출된 적이 있는지 전수조사를 실시하고, 건강보험공단의 접촉자 조회시스템과 건강보험심사평가원의 의약품 처방조제 지원 시스템(DUR)을 통해

도 1명 추가돼 4명이 됐다.

이날부터 역학조사에 들어간 세계보건기구(WHO)는 "한국의 메르스 발병 양상이 빠르게 진행되나 중동의 의료시설에서 발생한 것과 비슷할 것으로 보인다"고 의견을 밝혔다.

채지은기자 cje@hankookilbo.com

스 지역거점 의료기
중치료할 수 있도록
밝혔다.
총리 대행은 4가지
령을 주문했다. 행동요
침 호흡기 증상이 있
사용하고, 병문안을
방문을 자제할 것 ▲
오해를 갖지 말고 일
▲메르스 발생지역
피 등 근거 없는 행

동을 자제할 것 ▲자가 격리자는 본인은 물론 가족 이웃을 위해 잠복기가 지날 때까지 인내할 것 등이다.

정부는 이날 확진자와 의심환자, 그리고 메르스에 노출이 안 된 일반 국민을 따로 분류하는 '삼각 체계'로 환자 이동을 통한 병원 내 감염을 차단하겠다고 밝혔다. 음압병상을 갖춘 전국 16개 치료병원에서 중증 확진환자를 진료하고, 의심환자 진료는 32개 노출자진료병원에서 맡도록 했다. 일반국민은 안전병원과 응급실 선별진료소에서 진료를 받게 된다.

정부는 메르스 격리자 가운데 생계가 곤란한 가구에 월 110만원(4인가구 기준)의 긴급 생계비도 지원키로 했다. 소득이 최저생계비의 185% 이하(4인가구 기준 309만원 이하)이고 재산과 금융재산이 일정 기준 이하일 때 신청 가능하다.

채지은기자 cje@hankookilbo.com

6/11/15

明らかにし居住者で、く、全員が住という。か1人か複確認しない話した。た人と同じ在したこと滞在を求めと。2週間期間が終了離措置が解

16人、韓国約5200千人が自宅100人がる。(共同)

倉さん主演走る。」を界の巨匠、メッセージさんは私がで尊敬の対ぽっぽや」100の座らでほぼ埋に「君よ憤幸福の黄色計5作品が(共同)

있다.

구 원로의 애정 어린 충고를 받은 기자들이 꽤 있다. 잘못된 것을 바

는데 꾸짖 게 처음

brand-new reveals.

The expo is a favorite place for major players like Microsoft, Sony and Electronic Arts to surprise and stun visitors with new trailers, gameplay footage, hardware announcements and more. Gaming media and fans have whispered that mega-titles like *Mass Effect 4* and *Fallout 4*, or hardware such as a new Nintendo console, could be unveiled this week.

The confluence of entertainment and tech in Los Angeles makes holding a major expo in the urban core a smart choice for the ESA and the exhibitors, Wooden said.

Grand Central Market. The board is also working with the South Park Business Improvement District to distribute neighborhood maps to attendees, said BID Executive Director Jessica Lall.

"Figueroa can seem like a barrier with all the construction sites, with people not really knowing what's on the other side," she said. "We've been working with the tourism board and Convention Center so that people know that there's a neighborhood to explore along with all that's at L.A. Live."

South Park, along with other Downtown districts, needs to put its "best foot forward" for the thousands of visitors coming

40 million: The estimated economic impact, in dollars, with spending at hotels, restaurants, on parties and more.

50,000: Attendees at E3, the largest annual event hosted at the Convention Center.

27,000: The number of "room nights," or number of rooms multiplied by number of nights occupied, that E3 visitors book.

38 and **21**: The percentage of exhibitors who hailed from California and Los Angeles, respectively, at E3 2014.

7,000: International visitors at E3. About **20%** of them come from the Asia/Pacific region.

1,600: Products displayed at this year's E3. About **100** of those will be new products, according to the Electronic Software Association.

Racyorelli #2830.28

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STATE OF CALIFORNIA

I am a citizen of the United States and a resident of the county aforesaid; I am over the age of eighteen years, and not a party to or interested in the above-entitle matter. I am the principal clerk of the printer of La Opinión a newspaper of general circulation, printed and published daily in the city of Los Angeles, County of Los Angeles, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Los Angeles, State of California, under the date of July 28, 1969, Case Number: 950176; that the notice, of which the annexed is a printed copy, has been published in each regular and not in any supplement thereof on the following dates, to-wit:

June 12

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all in the year 20 15

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Dated at Los Angeles, California, this

12 day of June, 20 15

Rosa Berumen

A000003778883

Metro

Para: Todas las Personas y Agencias interesadas

De: Administración Federal de Transporte (FTA) y la Autoridad de Transporte Metropolitano de Los Ángeles (Metro)

¿Por qué este anuncio?
Para cumplir con la Ley Nacional de Política Ambiental (NEPA, por sus siglas en inglés), FTA y Metro han preparado una Declaración de Impacto Ambiental Proyecto Suplementario (DSEIS, por sus siglas en inglés) para el Proyecto de Corredor de Tránsito Conector Regional, un sistema de tren ligero subterráneo propuesto que conectará las Líneas Gold, Blue y Expo de Metro en el centro de Los Ángeles, California. FTA y Metro han preparado un DSEIS para el Proyecto de Corredor de Tránsito Conector Regional de conformidad con la implementación de procedimientos (título 23 de CFR 771.130) de la Ley Nacional de Política Ambiental (NEPA) de FTA. FTA está sirviendo como la agencia líder federal para el propósito de acreditación ambiental de NEPA. Como lo indica el Juez de la Corte de los EE. UU. Kronstadt el 29 de mayo de 2014, el DSEIS ha sido preparado solamente para proporcionar detalles sobre los métodos de construcción de túneles no seleccionados a lo largo de la parte de Flower Street del proyecto entre 4th Street y la 7th Street/Estación Central de Metro. Los métodos de tunelización discutidos son Protector Superficie Abierta y Método de Excavación Secuencial (SEM, por sus siglas en inglés).

Este anuncio sirve de aviso al público concerniente a la disponibilidad del DSEIS, para describir las dos alternativas de método de tunelización evaluadas en el DSEIS, para explicar por qué no fueron seleccionados como Alternativa Preferida Localmente (LPA, por sus siglas en inglés), y para invitar a la opinión pública y comentar.

La FTA puede emitir una sola Declaración de Impacto Ambiental Suplementario Final y documento de Registro de Decisión de conformidad con Pub. L. 112-141, 126 Declaración 405, Sección 1319(b) a menos que la FTA determine criterios legales o consideraciones de factibilidad que impida la emisión del documento combinado de conformidad con la Sección 1319. En ese caso, FTA emitiría una Declaración de Impacto Ambiental Suplementaria Final seguida por un suplemento para el Registro de Decisión, según sea necesario.

¿Qué está siendo planeado?
El proyecto de tránsito de tren ligero (LRT) se encuentra totalmente dentro de la Ciudad de Los Ángeles. Esto es en general rodeado por la Autopista 101 de los EE.UU en el norte, 7th Street en el sur, Alameda Street en el este, y la Ruta Estatal 110 en el oeste. La longitud del proyecto de tren ligero propuesto sería poco menos de dos millas. Tendría tres nuevas estaciones (2nd/Hope, 2nd/Broadway, y 1st/Central). El Proyecto de Corredor de Tránsito Conector Regional proporcionaría un enlace directo que conecta varias líneas de tren ligero en operación o en construcción, incluyendo la Línea Gold de a Pasadena, la Extensión del Lado Este de la Línea Gold de Metro, la Línea Blue de Metro, y la Línea Expo de Metro. El proyecto propuesto proporcionaría un enlace ferroviario a través del centro de Los Ángeles de tal manera que el servicio de LRT proporcionaría un paseo de una sede para viajar de East Los Ángeles a Santa Mónica, y de Azusa a Long Beach. Con la implementación del Proyecto, estas líneas de LRT compartirían pistas y estaciones en el centro de Los Ángeles.

La LPA permanece, como se identifica en la Declaración de Impacto Ambiental Final/Reporte de Impacto Ambiental 2012 (EIS/EIR Final) y el Registro de Decisión (ROD) certificado por FTA el 29 de junio de 2012. La LPA se construirá con construcción cortar y cubrir a lo largo de Flower Street desde el sur de 4th Street a la Estación 7th Street/Metro Center. Sería construido enteramente subterráneo hasta conectar con las líneas de grado por encima existentes, y atravesaría bajo Flower Street al norte de la parte trasera de carriles de LRT existentes ubicados al norte de la Estación 7th Street/ Metro Center subterránea existente. En 3rd Street, este comenzaría a girar al este para operar bajo la 2nd Street entre Flower Street y Central Avenue, sirviendo a las estaciones en 2nd/Hope y 2nd/Broadway. En Central Avenue, este conectaría a una nueva estación (1st/Central) ubicada entre Central Avenue y Alameda Street en Little Tokyo.

El DSEIS proporciona detalles adicionales sobre los métodos de tunelización no seleccionados a lo largo de Flower Street, específicamente Protector Superficie Abierta y tunelización de SEM. El resto de la alineación del proyecto no es cambiado, y no es considerado como parte del DSEIS.

Alternativa del Perfil de LPA EPBM/ Protector Superficie Abierta /SEM (Alternativa A): La Alternativa A sustituiría la construcción cortar y cubrir, por la tunelización al sur de la Estación 7th Street/Metro Center a través del uso de una combinación de las técnicas de construcción de la tuneladora del Protector Superficie Abierta y el método de excavación secuencial (SEM). Esta alternativa propone el uso de una máquina perforadora de balance a presión (EPBM) para perforar túneles gemelos generalmente siguiendo la alineación horizontal y vertical de la LPPA de 3rd Street al sur de 4th Street, con excavación del túnel Protector Superficie Abierta desde 4th Street a 5th Street, y construcción del túnel SEM de 5th Street a la estructura existente de la parte trasera de carriles de la Estación 7th Street/Metro Center.

Alternativa de Baja Alineación EPBM/ SEM (Alternativa B): La Alternativa B reemplazaría la construcción de corte y cubierta por la tunelización al sur de la Estación 7th Street/Metro Center a través del uso de una combinación de técnicas de construcción de EPBM y SEM. Esta alternativa propone el uro de EPBM para perforar túneles gemelos generalmente siguiendo la alineación horizontal de la LPA, pero con una alineación vertical más profunda que la de LPA. El método EPBM se utilizaría para construir un túnel justo al sur de 5th Street, con la construcción de túneles de SEM desde el sur de 5th Street a la la estructura existente de la parte trasera de carriles de la Estación 7th Street/Metro Center.

¿Qué está disponible?
Metro ha iniciado un período de comentarios públicos de 45 días con este aviso. Durante este tiempo estamos buscando la opinión del público. El periodo de revisión comienza el 12 de junio de 2015 y termina el 27 de julio de 2015. Los comentarios públicos deben ser recibidos antes de las 5pm del 27 de julio de 2015.

El DSEIS estará disponible en el sitio web de Metro en www.metro.net/projects/connector y los documentos impresos estarán disponibles para su consulta en las siguientes ubicaciones:

Biblioteca de Transportación Metro
One Gateway Plaza, 15vo piso
Los Ángeles, CA 90012

Biblioteca Central de Los Ángeles
630 W. 5th Street
Los Ángeles, CA 90071

Sucursal de la Biblioteca de Little Tokyo
203 S. Los Angeles Street
Los Ángeles, CA 90012

Sucursal de la Biblioteca de Chinatown
639 N. Hill Street
Los Ángeles, CA 90012

Von KleinSmid Center (VKC)
University of Southern California
University Park Campus
Los Ángeles, CA 90089

Biblioteca Central de Pasadena
285 E. Walnut Street
Pasadena, CA 91101

Biblioteca de East Los Ángeles
4837 E. 3rd Street
Los Ángeles, CA 90022

Biblioteca de Culver City Julian Dixon
4975 Overland Avenue
Culver City, CA 90230

Biblioteca Pública de Santa Mónica
601 Santa Monica Blvd.
Santa Mónica, CA 90401

Biblioteca Pública de Long Beach (Biblioteca Principal)
101 Pacific Avenue
Long Beach, CA 90822

Las Audiencias Públicas se llevarán a cabo en las siguientes ubicaciones:

- Distrito Financiero, 30 de junio de 2015 de 12:00pm a 1:30pm en la Biblioteca Central de Los Ángeles, Auditorio Mark Taper, 630 W. 5th Street, Los Ángeles, CA 90071
- Little Tokyo, 7 de julio de 2015 de 6:30pm a 8:00pm en el Museo Nacional Nipoamericano, 100 N. Central Ave, Los Ángeles 90012.

Los edificios destinados para las audiencias públicas son accesibles para personas con discapacidades. Cualquier individuo que requiera alojamiento especial, tal como un intérprete de lenguaje de señas, asientos accesibles o documentación en formatos alternativos, se les solicita llamar a la línea directa del proyecto al (213) 922-7277 o enviarnos un correo electrónico a regionalconnector@metro.net.

Dónde entra usted:

El DSEIS proporciona información adicional sobre los métodos de tunelización no seleccionados a lo largo de Flower Street. El DSEIS es un documento de información que informa a los tomadores de decisiones de la agencia pública y al público de los efectos ambientales de estas alternativas. Los comentarios orales formulados en las audiencias públicas serán transcritos por un reportero de la corte. Los comentarios escritos pueden ser presentados en las audiencias públicas, enviadas por correo electrónico al correo electrónico del proyecto a regionalconnector@metro.net, en enviarse a:

Sra. Dolores Roybal Saltarelli, Gerente del Proyecto, Autoridad de Transporte Metropolitano de Los Ángeles (Metro), One Gateway Plaza, MS 99-22-2, Los Ángeles, CA 90012, teléfono (213) 922-3024, correo electrónico roybald@metro.net; o Sra. Mary Nguyen, Especialista de Protección Ambiental, Oficina Metropolitana de Los Ángeles, Administración Federal de Transporte, Región IX, 888 South Figueroa Street, Suite 2170, Los Ángeles, CA 90017, teléfono (213) 202-3950, correo electrónico mary.nguyen@dot.gov.

Los comentarios deben ser recibidos antes de las 5pm del 27 de julio de 2015 para garantizar la incorporación en el SEIS Final. Para más información concerniente a este DSEIS o para solicitar una copia de CD, por favor póngase en contacto con la Sra. Ms. Dolores Roybal Saltarelli o la Sra. Mary Nguyen identificadas anteriormente.

109-4621910 CNS#2757804

Metro

Para: Todas las Personas y Agencias Interesadas

De: Administración Federal de Transporte (FTA) y la Autoridad de Transporte Metropolitano de Los Ángeles (Metro)

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El DSEIS proporciona detalles adicionales sobre los métodos de tunelización no seleccionados a lo largo de Flower Street, específicamente Protector Superficie Abierta y tunelización de SEM. El resto de la alineación del proyecto no es cambiado, y no es considerado como parte del DSEIS.

Alternativa del Perfil de LPA EPBM/ Protector Superficie Abierta /SEM (Alternativa A): La Alternativa A sustituiría la construcción cortar y cubrir, por la tunelización al sur de la Estación 7th Street/Metro Center a través del uso de una combinación de las técnicas de construcción de la tuneladora del Protector Superficie Abierta y el método de excavación secuencial (SEM). Esta alternativa propone el uso de una máquina perforadora de balance a presión (EPBM) para perforar túneles gemelos generalmente siguiendo la alineación horizontal y vertical de la LPPA de 3rd Street al sur de 4th Street, con excavación del túnel Protector Superficie Abierta desde 4th Street a 5th Street, y construcción del túnel SEM de 5th Street a la estructura existente de la parte trasera de carriles de la Estación 7th Street/Metro Center.

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¿Qué está disponible?
Metro ha iniciado un periodo de comentarios públicos de 45 días con este aviso. Durante este tiempo estamos buscando la opinión del público. El periodo de revisión comienza el 12 de junio de 2015 y termina el 27 de julio de 2015. Los comentarios públicos deben ser recibidos antes de las 5pm del 27 de julio de 2015.

El DSEIS estará disponible en el sitio web de Metro en www.metro.net/projects/connector y los documentos impresos estarán disponibles para su consulta en las siguientes ubicaciones:

Biblioteca de Transportación Metro
One Gateway Plaza, 15avo piso
Los Ángeles, CA 90012

Biblioteca Central de Los Ángeles
630 W. 5th Street
Los Ángeles, CA 90071

Sucursal de la Biblioteca de Little Tokyo
203 S. Los Ángeles Street
Los Ángeles, CA 90012

Sucursal de la Biblioteca de Chinatown
639 N. Hill Street
Los Ángeles, CA 90012

Von KleinSmid Center (VKC)
University of Southern California
University Park Campus
Los Ángeles, CA 90089

Biblioteca Central de Pasadena
285 E. Walnut Street
Pasadena, CA 91101

Biblioteca de East Los Ángeles
4837 E. 3rd Street
Los Ángeles, CA 90022

Biblioteca de Culver City Julian Dixon
4975 Overland Avenue
Culver City, CA 90230

Biblioteca Pública de Santa Mónica
601 Santa Monica Blvd.
Santa Mónica, CA 90401

Biblioteca Pública de Long Beach (Biblioteca Principal)
101 Pacific Avenue
Long Beach, CA 90822

Las Audiencias Públicas se llevarán a cabo en las siguientes ubicaciones:

- Distrito Financiero, 30 de junio de 2015 de 12:00pm a 1:30pm en la Biblioteca Central de Los Ángeles, Auditorio Mark Taper, 630 W. 5th Street, Los Ángeles, CA 90071
- Little Tokyo, 7 de julio de 2015 de 6:30pm a 8:00pm en el Museo Nacional Nipoamericano, 100 N. Central Ave, Los Ángeles 90012.

Los edificios destinados para las audiencias públicas son accesibles para personas con discapacidades. Cualquier individuo que requiera alojamiento especial, tal como un intérprete de lenguaje de señas, asientos accesibles o documentación en formatos alternativos, se les solicita llamar a la línea directa del proyecto al (213) 922-7277 o enviarnos un correo electrónico a regionalconnector@metro.net.

Dónde entra usted:

El DSEIS proporciona información adicional sobre los métodos de tunelización no seleccionados a lo largo de Flower Street. El DSEIS es un documento de información que informa a los tomadores de decisiones de la agencia pública y al público de los efectos ambientales de estas alternativas. Los comentarios orales formulados en las audiencias públicas serán transcritos por un reportero de la corte. Los comentarios escritos pueden ser presentados en las audiencias públicas, enviadas por correo electrónico al correo electrónico del proyecto a regionalconnector@metro.net, en enviarse a:

Sra. Dolores Roybal Saltarelli, Gerente del Proyecto, Autoridad de Transporte Metropolitano de Los Ángeles (Metro), One Gateway Plaza, MS 99-22-2, Los Ángeles, CA 90012, teléfono (213) 922-3024, correo electrónico roybald@metro.net; o Sra. Mary Nguyen, Especialista de Protección Ambiental, Oficina Metropolitana de Los Ángeles, Administración Federal de Transporte, Región IX, 888 South Figueroa Street, Suite 2170, Los Ángeles, CA 90017, teléfono (213) 202-3950, correo electrónico mary.nguyen@dot.gov.

Los comentarios deben ser recibidos antes de las 5pm del 27 de julio de 2015 para garantizar la incorporación en el SEIS Final. Para más información concerniente a este DSEIS o para solicitar una copia de CD, por favor póngase en contacto con la Sra. Ms. Dolores Roybal Saltarelli o la Sra. Mary Nguyen identificadas anteriormente.

CNS#2757804

Metro

To: All Interested Persons and Agencies

From: Federal Transit Administration (FTA) and the Los Angeles County Metropolitan Transportation Authority (Metro)

Why this ad?

To comply with the National Environmental Policy Act (NEPA), FTA and Metro have prepared a Draft Supplemental Environmental Impact Statement (DSEIS) for the Regional Connector Transit Corridor Project, a proposed underground light rail system that will connect the existing Metro Gold, Blue, and Expo Lines in downtown Los Angeles, California. FTA and Metro have prepared a DSEIS for the Regional Connector Transit Corridor Project pursuant to FTA National Environmental Policy Act (NEPA) implementation procedures (23 CFR 771.130). FTA is serving as the federal lead agency for the purpose of NEPA environmental clearance. As directed by U.S. District Court Judge Kronstadt on May 29, 2014, the DSEIS has been prepared solely to provide additional detail on tunneling methods not selected along the Flower Street portion of the Project between 4th Street and the 7th Street/Metro Center Station. The tunneling methods discussed are Open Face Shield and Sequential Excavation Method (SEM).

This ad serves as a notice to the public regarding the availability of the DSEIS, to describe the two tunneling method alternatives evaluated in the DSEIS, to explain why they were not selected as the Locally Preferred Alternative (LPA), and to invite public opinion and comment.

The FTA may issue a single Final Supplemental Environmental Impact Statement and Record of Decision document pursuant to Pub. L. 112-141, 126 Stat. 405, Section 1319(b) unless the FTA determines statutory criteria or practicability considerations preclude issuance of the combined document pursuant to Section 1319. In that case, FTA would issue a Final Supplemental Environmental Impact Statement followed by a supplement to the Record of Decision, as needed.

What is being planned?

The light rail transit (LRT) project lies entirely within the City of Los Angeles. It is generally bound by U.S. Highway 101 on the north, 7th Street on the south, Alameda Street on the east, and State Route 110 on the west. The length of the proposed light rail project would be just under two miles. It would have three new stations (2nd/Hope, 2nd/Broadway, and 1st/Central). The Regional Connector Transit Corridor Project would provide a direct link connecting several light rail lines in operation or in construction, including the Metro Gold Line to Pasadena, the Metro Gold Line Eastside Extension, the Metro Blue Line, and the Metro Expo Line. The proposed project would provide a rail link through downtown Los Angeles such that LRT service would provide a one-seat ride for travel from East Los Angeles to Santa Monica, and from Azusa to Long Beach. With implementation of the Project, these LRT lines would share tracks and stations in downtown Los Angeles.

The LPA remains as identified in the certified 2012 Final Environmental Impact Statement/Environmental Impact Report (Final EIS/EIR) and the Record of Decision (ROD) certified by FTA on June 29, 2012. The LPA will be constructed with cut and cover construction along Flower Street from south of 4th Street to the 7th Street/Metro Center Station. It would be constructed entirely underground until connecting with existing above grade lines, and would traverse under Flower Street north from existing LRT tail tracks located north of the existing underground 7th Street/Metro Center Station. At 3rd Street, it would begin to turn east to operate under 2nd Street between Flower Street and Central Avenue, serving stations at 2nd/Hope and 2nd/Broadway. At Central Avenue, it would connect to a new station (1st/Central) located between Central Avenue and Alameda Street in Little Tokyo.

The DSEIS provides additional detail on tunneling methods not selected along Flower Street, specifically Open Face Shield and SEM tunneling. The remainder of the project alignment is not changed and is not under consideration as part of the DSEIS.

EPBM/Open Face Shield/SEM LPA Profile Alternative (Alternative A): Alternative A would replace cut and cover construction, by tunneling south to the 7th Street/Metro Center Station through the use of a combination of Open Face Shield tunnel boring and sequential excavation method (SEM) construction techniques. This alternative proposes the use of an earth pressure balance boring machine (EPBM) to bore twin tunnels generally following the horizontal and vertical alignment of the LPA from 3rd Street to south of 4th Street, with Open Face Shield tunnel excavation from 4th Street to 5th Street, and SEM tunnel construction from 5th Street to the existing 7th Street/Metro Center Station tail tracks structure.

EPBM/ SEM Low Alignment Alternative (Alternative B): Alternative B would replace cut and cover construction by tunneling south to the 7th Street/Metro Center Station through the use of a combination of EPBM and SEM construction techniques. This alternative proposes the use of EPBM to bore twin tunnels generally following the horizontal alignment of the LPA, but with a deeper vertical alignment than the LPA. The EPBM method would be used to tunnel to just south of 5th Street, with SEM tunnel construction from south of 5th Street to the existing 7th Street/Metro Center Station tail tracks structure.

What's available?

Metro has initiated a 45-day public comment period with this notice. During this time we are seeking public input. The review period begins June 12, 2015 and ends on July 27, 2015. Public comments must be received by 5pm on July 27, 2015.

The DSEIS will be available on Metro's website at www.metro.net/projects/connector and hardcopy documents will be available for reference at the following locations:

Metro Transportation Library
One Gateway Plaza, 15th floor
Los Angeles, CA 90012

Los Angeles Central Library
630 W. 5th Street
Los Angeles, CA 90071

Little Tokyo Branch Library
203 S. Los Angeles Street
Los Angeles, CA 90012

Chinatown Branch Library
639 N. Hill Street
Los Angeles, CA 90012

Von KleinSmid Center (VKC)
University of Southern California
University Park Campus
Los Angeles, CA 90089

Pasadena Central Library
285 E. Walnut Street
Pasadena, CA 91101

East Los Angeles Library
4837 E. 3rd Street
Los Angeles, CA 90022

Culver City Julian Dixon Library
4975 Overland Avenue
Culver City, CA 90230

Santa Monica Public Library
601 Santa Monica Blvd.
Santa Monica, CA 90401

Long Beach Public Library (Main Library)
101 Pacific Avenue
Long Beach, CA 90822

Public Hearings will be held at the following locations:

- Financial District, June 30, 2015 from 12:00pm to 1:30pm at the Los Angeles Central Library, Mark Taper Auditorium, 630 W. 5th Street, Los Angeles, CA 90071
- Little Tokyo, July 7, 2015 from 6:30pm to 8:00pm at the Japanese American National Museum, 100 N. Central Ave, Los Angeles CA 90012.

The buildings used for public hearings are accessible to persons with disabilities. Any individual who requires special accommodation, such as a sign language interpreter, accessible seating or documentation in alternative formats, are requested to call the project hotline at (213) 922-7277 or email us at regionalconnector@metro.net.

Where you come in:

The DSEIS provides additional information on tunneling methods not selected along Flower Street. The DSEIS is a disclosure document that informs public agency decision makers and the public of the environmental effects of these alternatives. Oral comments made at the public hearings will be transcribed by

CLASSIFIEDS

To place a classified ad in the Downtown News please call 213-481-1448, or go to DowntownNews.com
Deadline for classified display and line ads are Thursday at 12pm.

Metro

To: All Interested Persons and Agencies

From: Federal Transit Administration (FTA) and the Los Angeles County Metropolitan Transportation Authority (Metro)

Why this ad?

To comply with the National Environmental Policy Act (NEPA), FTA and Metro have prepared a Draft Supplemental Environmental Impact Statement (DSEIS) for the Regional Connector Transit Corridor Project, a proposed underground light rail system that will connect the existing Metro Gold, Blue, and Expo Lines in downtown Los Angeles, California. FTA and Metro have prepared a DSEIS for the Regional Connector Transit Corridor Project pursuant to FTA National Environmental Policy Act (NEPA) implementation procedures (23 CFR 771.130). FTA is serving as the federal lead agency for the purpose of NEPA environmental clearance. As directed by U.S. District Court Judge Kronstadt on May 29, 2014, the DSEIS has been prepared solely to provide additional detail on tunneling methods not selected along the Flower Street portion of the Project between 4th Street and the 7th Street/Metro Center Station. The tunneling methods discussed are Open Face Shield and Sequential Excavation Method (SEM).

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What is being planned?

The light rail transit (LRT) project lies entirely within the City of Los Angeles. It is generally bound by U.S. Highway 101 on the north, 7th Street on the south, Alameda Street on the east, and State Route 110 on the west. The length of the proposed light rail project would be just under two miles. It would have three new stations (2nd/Hope, 2nd/Broadway, and 1st/Central). The Regional Connector Transit Corridor Project would provide a direct link connecting several light rail lines in operation or in construction, including the Metro Gold Line to Pasadena, the Metro Gold Line Eastside Extension, the Metro Blue Line, and the Metro Expo Line. The proposed project would provide a rail link through downtown Los Angeles such that LRT service would provide a one-seat ride for travel from East Los Angeles to Santa Monica, and from Azusa to Long Beach. With implementation of the Project, these LRT lines would share tracks and stations in downtown Los Angeles.

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The DSEIS provides additional detail on tunneling methods not selected along Flower Street, specifically Open Face Shield and SEM tunneling. The remainder of the project alignment is not changed and is not under consideration as part of the DSEIS.

EPBM/Open Face Shield/SEM LPA Profile Alternative (Alternative A): Alternative A would replace cut and cover construction, by tunneling south to the 7th Street/Metro Center Station through the use of a combination of Open Face Shield tunnel boring and sequential excavation method (SEM) construction techniques. This alternative proposes the use of an earth pressure balance boring machine (EPBM) to bore twin tunnels generally following the horizontal and vertical alignment of the LPA from 3rd Street to south of 4th Street, with Open Face Shield tunnel excavation from 4th Street to 5th Street, and SEM tunnel construction from 5th Street to the existing 7th Street/Metro Center Station tail tracks structure.

EPBM/ SEM Low Alignment Alternative (Alternative B): Alternative B would replace cut and cover construction by tunneling south to the 7th Street/Metro Center Station through the use of a combination of EPBM and SEM construction techniques. This alternative proposes the use of EPBM to bore twin tunnels generally following the horizontal alignment of the LPA, but with a deeper vertical alignment than the LPA. The EPBM method would be used to tunnel to just south of 5th Street, with SEM tunnel construction from south of 5th Street to the existing 7th Street/Metro Center Station tail tracks structure.

What's available?

Metro has initiated a 45-day public comment period with this notice. During this time we are seeking public input. The review period begins June 12, 2015 and ends on July 27, 2015. Public comments must be received by 5pm on July 27, 2015.

The DSEIS will be available on Metro's website at www.metro.net/projects/connector and hardcopy

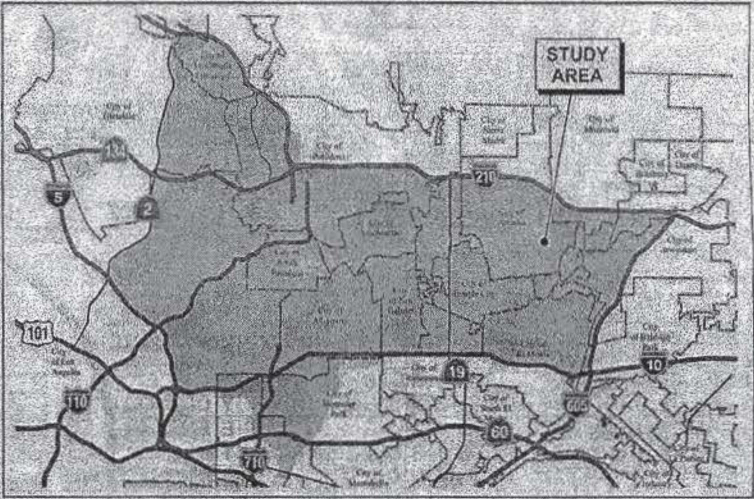
Caltrans

Metro

PUBLIC NOTICE

Draft Environmental Impact Report/
Environmental Impact Statement (EIR/EIS)
And Draft Section 4(f) De Minimis Finding
Available for the State Route 710 North Study

Announcement of Public Hearing



WHAT'S BEING PLANNED	California Department of Transportation (Caltrans), in cooperation with the Los Angeles County Metropolitan Transportation Authority (Metro), is proposing to find solutions to long standing traffic congestion and mobility constraints on State Route 710 (SR 710) in Los Angeles County, between State Route 2 (SR 2) and Interstates 5, 10, 210, and 605 (I-5, I-10, I-210, and I-605, respectively) in east/northeast Los Angeles and the western San Gabriel Valley. The study area for the SR 710 North Study is approximately 100 square miles and generally bounded by I-210 on the north, I-605 on the east, I-10 on the south, and I-5 and SR 2 on the west. The proposed alternatives for the project include: the Bus Rapid Transit (BRT) Alternative, the Freeway Tunnel Alternative, the Light Rail Transit (LRT) Alternative, the No Build Alternative, and the Transportation System Management/Transportation Demand Management (TSM/TDM) Alternative.
WHY THIS AD	Caltrans has studied the effects this project may have on the environment. Our studies show it may significantly affect the quality of the environment. The report that explains why it may have a significant effect on the environment is called an Environmental Impact Report/Statement (EIR/EIS). This notice is to tell you of the preparation of the Draft Environmental Impact Report/Statement and of its availability for public review and comment and to offer the opportunity for a public hearing. A fifth public hearing has been added to give you an additional opportunity to talk about certain design features of the project with members of the study team.
WHAT'S AVAILABLE	There are copies of the Draft EIR/EIS available at the following libraries:

Alhambra Civic Center Library- 101 S 1st St. Alhambra	El Sereno Library- 5226 Huntington Dr. South Los Angeles	City Terrace Library- 4025 E. City Terrace Dr. Los Angeles	Pasadena Central Library- 285 E. Walnut St. Pasadena
Bruggemeyer Library-	Malabar Library-	East LA Library	San Rafael Library-

Reg Conn.

PROOF OF PUBLICATION AFFIDAVIT
(2015.5 C.C.P.)

STATE OF CALIFORNIA,
County of Los Angeles,

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above-entitled matter. I am the principal clerk of the printer of the

Daily News

a newspaper of general circulation published 7 times weekly in the County of Los Angeles, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Los Angeles, State of California, under the date of May 26, 1983, Case Number Adjudication #C349217; that the notice, of which the annexed is a printed copy (set in type not smaller than nonpareil) has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, towit: June 12,

all in the year 2015

I certify (or declare) under penalty of perjury that the forgoing is true and correct.

Dated at Woodland Hills,

California, this 12th day of June, 2015

Signature

A000003801302

$1505

Proof of Publication of

CNS2757801

Metro

To: All Interested Persons and Agencies

From: Federal Transit Administration (FTA) and the Los Angeles County Metropolitan Transportation Authority (Metro)

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EPBM/ SEM Low Alignment Alternative (Alternative B): Alternative B would replace cut and cover construction by tunneling south to the 7th Street/Metro Center Station through the use of a combination of EPBM and SEM construction techniques. This alternative proposes the use of EPBM to bore twin tunnels generally following the horizontal alignment of the LPA, but with a deeper vertical alignment than the LPA. The EPBM method would be used to tunnel to just south of 5th Street, with SEM tunnel construction from south of 5th Street to the existing 7th Street/Metro Center Station tail tracks structure.

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Santa Monica Public Library
601 Santa Monica Blvd.
Santa Monica, CA 90401

Long Beach Public Library (Main Library)
101 Pacific Avenue
Long Beach, CA 90822

APPENDIX J

PUBLIC COMMENTS

Response to Comments on the Draft Supplemental EIS

Introduction

The Regional Connector Transit Corridor Project Draft SEIS was made available to identified stakeholders, agencies, and the general public for review and comment for a 45-day review period from June 12, 2015 through July 27, 2015. During the public review period, Metro held two public hearings to receive oral and written testimony on the Draft SEIS from the general public.

This Appendix J of the Final SEIS contains copies of all written comments and public hearing transcripts, and provide written responses to all comments received on the Draft SEIS. A total of 13 public and agency comment letters were received during the public review period, including written materials submitted at the two public hearings. Comments were also submitted in the form of oral testimony at those hearings. A total of 2 public testimonies were recorded at the public hearings. Overall, a total of 6 comments by individuals (not agencies) were received on the Regional Connector Transit Corridor Project Draft SEIS.

The format for the responses to comments presents each comment letter/hearing transcript, bracketed into separate comments, followed by corresponding responses to each individual comment of that comment letter/hearing transcript. The comment letters/hearing transcripts and responses are organized and grouped into the following categories based on the affiliation of the commenter as follows:

Letter/Speaker ID Prefix	Description
AF	Federal Agency
AL	Local Agency
AR	Regional Agency
AS	State Agency
PC	Public Comment
PHA	The first public hearing held on June 30, 2015
PHB	The second public hearing held on July 7, 2015

To assist the reader's review and use of the responses to comments, two indices that provide the commenter name, affiliation, and comment letter/speaker identification designator (e.g., PC1) for each comment letter are provided below. The first index lists all the comment letters by comment letter/speaker identification designator and the second lists all of the comment letters alphabetically by commenter's last name.

Index by Comment Letter/Speaker Identification

Comment Letter/Speaker	Affiliation	Last Name	First Name	Comment Page	Response Page
Federal Agencies					
AF1	U.S. Department of Homeland Security - FEMA	Blackburn	Gregor		
AF2	U.S. Environmental Protection Agency – Region IX	Dunning	Connell		
AF3	U.S. Department of Transportation – Federal Aviation Administration	De Leon	Benito		
AF4	U. S. Department of the Interior	Sanderson Port	Patricia		
Local Agencies					
AL1	City of Los Angeles – Department of Public Works	Gee	Curtis		
Regional Agencies					
AR1	South Coast Air Quality Management District	Radlein	Barbara		
State Agencies					
AS1	State of California – Department of Transportation, District 7	Watson	Dianna		
Public Comment					
PC1		Chang	Ike		
PC2		Meinert	Robert		
PC3		Sutton	Christopher		
PC4		Watson	Robert		
Public Hearings					
PHA1		Change	Ike		
PHB1		Sutton	Christopher		

Responses to Comments

Responses to Federal Agency Comment Letters

Comment Letter/Speaker	Affiliation	Last Name	First Name	Comment Page	Response Page
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AF3	U.S. Department of Transportation – Federal Aviation Administration	De Leon	Benito		
AF4	U. S. Department of the Interior	Sanderson Port	Patricia		

U.S. Department of Homeland Security
FEMA Region IX
1111 Broadway, Suite 1200
Oakland, CA. 94607-4052

FEMA

July 6, 2015

Dolores Roybal Saltarelli, Project Manager
Metro @ One Gateway Plaza, MS 99-22-2
Los Angeles, California 90012

Dear Ms. Saltarelli:

This is in response to your request for comments regarding the Los Angeles County Metropolitan Transportation Authority, Notice of Availability for the Regional Connector Transit Corridor Project Draft Supplemental Environmental Impact Statement.

Please review the current effective countywide Flood Insurance Rate Maps (FIRMs) for the County (Community Number 065043) of Los Angeles, Maps revised September 26, 2008. Please note that Los Angeles County, California is a participant in the National Flood Insurance Program (NFIP). The minimum, basic NFIP floodplain management building requirements are described in Vol. 44 Code of Federal Regulations (44 CFR), Sections 59 through 65.

A summary of these NFIP floodplain management building requirements are as follows:

- All buildings constructed within a riverine floodplain, (i.e., Flood Zones A, AO, AH, AE, and A1 through A30 as delineated on the FIRM), must be elevated so that the lowest floor is at or above the Base Flood Elevation level in accordance with the effective Flood Insurance Rate Map.

- If the area of construction is located within a Regulatory Floodway as delineated on the FIRM, any ***development*** must not increase base flood elevation levels. **The term *development* means any man-made change to improved or unimproved real estate, including but not limited to buildings, other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, and storage of equipment or materials.** A hydrologic and hydraulic analysis must be performed *prior* to the start of development, and must demonstrate that the development would not cause any rise in base flood levels. No rise is permitted within regulatory floodways. 1

- All buildings constructed within a coastal high hazard area, (any of the "V" Flood Zones as delineated on the FIRM), must be elevated on pilings and columns, so that the lowest horizontal structural member, (excluding the pilings and columns), is elevated to or above the base flood elevation level. In addition, the posts and pilings foundation and the structure attached thereto, is anchored to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all building components.

- Upon completion of any development that changes existing Special Flood Hazard Areas, the NFIP directs all participating communities to submit the appropriate hydrologic and hydraulic data to FEMA for a FIRM revision. In accordance with 44 CFR, Section 65.3, as soon as practicable, but not later than six months after such data becomes available, a community shall notify FEMA of the changes by submitting technical data for a flood map revision. To obtain copies of FEMA's Flood Map Revision Application Packages, please refer to the FEMA website at http://www.fema.gov/business/nfip/forms.shtm. 1 cont'd

Please Note:

Many NFIP participating communities have adopted floodplain management building requirements which are more restrictive than the minimum federal standards described in 44 CFR. Please contact the local community's floodplain manager for more information on local floodplain management building requirements. The Los Angeles County floodplain manager can be reached by calling George De La O, Senior Civil Engineer, at (626) 458-7155.

If you have any questions or concerns, please do not hesitate to call Michael Hornick of the Mitigation staff at (510) 627-7260.

Sincerely,

Gregor Blackburn, CFM, Branch Chief
Floodplain Management and Insurance Branch

cc:
George De La O, Senior Civil Engineer, Los Angeles County
Garret Tam Sing/Salomon Miranda, State of California, Department of Water Resources, Southern Region Office
Michael Hornick, NFIP Planner, DHS/FEMA Region IX
Alessandro Amaglio, Environmental Officer, DHS/FEMA Region IX

Responses to Comments

AF1

Responses to Comments from the U.S. Department of Homeland Security – FEMA, Blackburn, Gregor

Response to Comment AF1-1

As stated in Chapter 1, the Draft SEIS was prepared to address the Order of the United States District Court for the Central District of California in Today's IV, Inc. vs. Federal Transit Administration et al and 515/555 Flower Associates, LLC vs. Federal Transit Administration et al. The Judgment and Order for Partial Injunctive Relief by the Honorable John A. Kronstadt on May 28, 2014 and September 9, 2014, respectively, require that the FTA as the federal lead agency pursuant to NEPA, with Metro, explain why open-face tunneling alternatives were rejected on the Lower Flower Segment in downtown Los Angeles. The Draft SEIS is intended to provide more information on the tunnel construction alternatives on Flower Street that were withdrawn from consideration, specifically Open-Face Shield and Sequential Excavation Method (SEM) tunneling for the Flower Street portion of the Regional Connector project alignment between 4th Street and the 7th Street/Metro Center Station, as required by the Judgment.

The analysis and floodplain impacts of the locally preferred alternative may be found in the Final EIS/EIR Chapter 5.10 Water Resources, Section 4.10.3.5 Locally Preferred Alternative and 4.10.4.2 Final Mitigation Measures for the Locally Preferred Alternative.

As mentioned in the Draft SEIS, Chapter 4.5 Geotechnical, Subsurface, and Seismic Hazards, neither Alternative A nor B are within the 100-year flood hazard area; therefore they would not alter any existing flood zones.

AF2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

July 23, 2015

Ms. Mary Nguyen
Federal Transit Administration
Los Angeles Metropolitan Office
888 S. Figueroa Street, Suite 1850
Los Angeles, California 90017

Subject: Supplemental Draft Environmental Impact Statement for the Regional Connector Transit Corridor Project in Los Angeles, California (CEQ #20150162)

Dear Ms. Nguyen:

The Environmental Protection Agency (EPA) has reviewed the above-referenced document pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), and Section 309 of the Clean Air Act. We previously reviewed the Draft Environmental Impact Statement (DEIS) for the project and provided comments in an October 8, 2010 letter. We rated the DEIS as LO, *Lack of Objections*. This Supplemental Draft Environmental Impact Statement (SDEIS) is a limited-scope document that provides additional detail on tunneling methods not selected for construction. We are rating the SDEIS as LO, *Lack of Objections*, and have no additional comments on the project at this time. Please see the attached *Summary of EPA Rating Definitions* for a description of our rating system. 1

We appreciate the opportunity to review this SDEIS. If you have any questions, please contact Clifton Meek, the lead reviewer for this project, at 415-972-3370 or meek.clifton@epa.gov.

Sincerely,

For Connell Dunning, Transportation Team Supervisor
Environmental Review Section

Enclosures: Summary of EPA Rating Definitions

Cc via email: Dolores Roybal-Saltarelli, LA County Metropolitan Transportation Authority

SUMMARY OF EPA RATING DEFINITIONS*

This rating system was developed as a means to summarize the U.S. Environmental Protection Agency's (EPA) level of concern with a proposed action. The ratings are a combination of alphabetical categories for evaluation of the environmental impacts of the proposal and numerical categories for evaluation of the adequacy of the Environmental Impact Statement (EIS).

ENVIRONMENTAL IMPACT OF THE ACTION

"LO" (Lack of Objections)

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

"EC" (Environmental Concerns)

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

"EO" (Environmental Objections)

The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

"EU" (Environmentally Unsatisfactory)

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

ADEQUACY OF THE IMPACT STATEMENT

"Category 1" (Adequate)

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

"Category 2" (Insufficient Information)

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analysed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

"Category 3" (Inadequate)

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analysed in the draft EIS, which should be analysed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640, Policy and Procedures for the Review of Federal Actions Impacting the Environment.

Responses to Comments

AF2

Responses to Comments from the U.S. Environmental Protection Agency – Region IX, Dunning, Connell

Response to Comment AF2-1

Comment acknowledged.

Bryan Pennington

AF3

U.S. Department
of Transportation
Federal Aviation Administration

Office of the Associate Administrator
for Airports

800 Independence Ave., SW.
Washington, DC 20591

Receive

JUL 07 2015

Office of the CEO

JUN 29 2015

Mr. Phillip A. Washington
Chief Executive Officer
Los Angeles County Metropolitan
Transportation Authority
One Gateway Plaza
Los Angeles, CA 90012

Dear Mr. Washington:

Administrator Huerta has asked me to respond to your June 2 letter about your Regional Connector Transit Corridor project. Your letter requested comments from the Federal Aviation Administration on your Draft Supplemental Environmental Impact Statement (DSEIS) that evaluates two underground tunneling methods for the proposed project in downtown Los Angeles, California. Because this project is located underground in downtown Los Angeles, and does not appear to affect any airport or other aviation facilities, we have no comments on the DSEIS. 1

If you require further assistance, please contact David F. Cushing, Manager, Los Angeles Airports District Office, at (310) 725-3644.

I trust this information is helpful.

Sincerely,

Benito De Leon

Benito De Leon
Deputy Associate Administrator
for Airports

AF3

Responses to Comments

AF3
Responses to Comments from the U.S. Department of Transportation – Federal Aviation Administration, De Leon, Benito

Response to Comment AF3-1

Comment acknowledged.

AF4

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Pacific Southwest Region
333 Bush Street, Suite 515
San Francisco, CA 94104

IN REPLY REFER TO:
(ER 15/0337)

Filed Electronically

July 27, 2015

Ray Sukys
Director of Planning and Program Development
Federal Transit Administration, Region 9
201 Mission Main Street, Suite 1650
San Francisco, CA 94105-1839

Subject: Supplemental Draft Environmental Impact Statement (EIS) for the Regional Connector Transit Corridor, Los Angeles County, CA

Dear Mr. Sukys

The Department of the Interior has received and reviewed the subject document and has no comments to offer. 1

Thank you for the opportunity to review this project.

Sincerely,

Patricia Sanderson Port
Regional Environmental Officer

cc: OEPC-Staff Contact: Shawn Alam, 202-208-5465; shawn_alam@ios.doi.gov

Responses to Comments

AF4

Responses to Comments from the U.S. Department of the Interior, Sanderson Port, Patricia

Response to Comment AF4-1

Comment acknowledged.

Responses to Comments

Responses to Local Agency Comment Letters

Comment Letter/Speaker	Affiliation	Last Name	First Name	Comment Page	Response Page
Local Agencies					
AL1	City of Los Angeles – Department of Public Works	Gee	Curtis		

AL1

From: Curtis Gee [mailto:curtis.gee@lacity.org]
Sent: Monday, July 27, 2015 3:17 PM
To: Regional Connector
Cc: Curtis Tran; Buu Luu; Elliott Kim; Farid Baher; Maria Martin; Allen Wang; LAWRENCE Hsu; Benjamin Moore
Subject: Comments to Draft Supplemental Environmental Impact Statement for the Regional Connector Transit Corridor Project

Dear Ms. Dolores Roybal Saltarelli,

The City of Los Angeles, Department of Public Works, Bureau of Engineering, Metro Transit Division would like to comment on the Draft Supplemental Environmental Impact Statement for the Regional Connector Transit Corridor Project dated June 12, 2015. 1

For construction in the City of Los Angeles Public Right of Way, Metro shall submit construction plans to the City of Los Angeles for review and approval prior to construction. All construction must be in accordance to the City of Los Angeles' Standards and Specifications. 2

Thank you and have a good day.

Curtis Gee, PE, GE
Metro Transit Division | Civil Engineer
Bureau of Engineering | Department of Public Works
1149 South Broadway, Suite 810
Los Angeles, CA 90015
T: (213) 847-4782 | F: (213) 485-4838
ENGINEERING
CITY OF LOS ANGELES

Responses to Comments

AL1

Responses to Comments from the City of Los Angeles, Department of Public Works, Gee, Curtis

Response to Comment AL1-1

Comment acknowledged.

Response to Comment AL1-2

As stated in Chapter 1, the Draft SEIS was prepared to address the Order of the United States District Court for the Central District of California in Today's IV, Inc. vs. Federal Transit Administration et al and 515/555 Flower Associates, LLC vs. Federal Transit Administration et al. The Judgment and Order for Partial Injunctive Relief by the Honorable John A. Kronstadt on May 28, 2014 and September 9, 2014, respectively, require that the FTA as the federal lead agency pursuant to NEPA, with Metro, explain why open-face tunneling alternatives were rejected on the Lower Flower Segment in downtown Los Angeles. The SEIS is intended to provide more information on the tunnel construction alternatives on Flower Street that were withdrawn from consideration, specifically Open-Face Shield and Sequential Excavation Method (SEM) tunneling for the Flower Street portion of the Regional Connector project alignment between 4th Street and the 7th Street/Metro Center Station, as required by the Judgment.

The unchanged analysis for impacts of the locally preferred alternative may be found in the Final EIS/EIR. Refer to Chapter 4.18 Construction, Section 4.18.4.2 Final Mitigation Measures for the Locally Preferred Alternative, in addition to Chapter 8 Mitigation Monitoring and Reporting Program for information on permitting requirements with the City in addition to any ordinances.

As shown in Appendix L of the Draft SEIS the mitigation measure for the Locally Preferred Alternative would apply for Alternatives A and B.

Responses to Comments

Responses to Regional Agencies

Comment Letter/Speaker	Affiliation	Last Name	First Name	Comment Page	Response Page
Regional Agencies					
AR1	South Coast Air Quality Management District	Radlein	Barbara		

AR1

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

SENT VIA E-MAIL AND USPS: July 14, 2015
regionalconnector@metro.net
roybald@metro.net

Ms. Dolores Roybal Saltarelli
Los Angeles County Metropolitan Transportation Authority
1 Gateway Plaza, MS 99-22-2
Los Angeles, CA 90012

Draft Supplemental Environmental Impact Statement (DSEIS) for the Regional Connector Transit Corridor Project

The South Coast Air Quality Management District (SCAQMD) staff appreciates the opportunity to comment on the above-mentioned document. The DSEIS provides additional detail on tunneling methods not selected along Flower Street, specifically Open Face Shield and SEM tunneling. 1

Table 3-1 through 3-5 in Appendix C show that the Lead Agency relied upon a five-acre Localized Significance Threshold (LST) analysis site whereas section 4.2.2.1.1 Construction Impacts of the DSEIS states that a one-acre site was used in the analysis. SCAQMD staff recommends updating the LST and Air Quality analyses to reflect the correct site size. 2

Furthermore, Tables 2-4 and 2-5 in Appendix C calculate a maximum daily emission rate for only one phase of the project whereas the project description shows that the maximum daily emissions would occur when Phase 1 (EPBM Flower WB – 2015) overlaps with Phase 3 (Grouting on Flower – 2015). SCAQMD staff recommends updating the analysis to reconcile the differences contained within the DSEIS. In particular, Tables 3-4 and 3-5 in Appendix C should be updated to reflect with the maximum daily emissions of the overlapping phases. SCAQMD staff recommends updating LST analysis and Air Quality Analysis. 3

The SCAQMD staff is available to work with the Lead Agency to address these concerns and any other air quality questions that may arise. Please contact Jack Cheng, Air Quality Specialist at (909) 396-2448, if you have any questions regarding these comments. When complete, please transmit a copy of the Final EIS along with responses to these comments. Thank you. 4

Sincerely,

Barbara Radlein

Barbara Radlein
Program Supervisor
Planning, Rule Development & Area Sources

BR:JC
LAC150612-01
Control Number

Responses to Comments

AR1

Responses to Comments from the South Coast Air Quality Management District, Radlein, Barbara

Response to Comment AR1-1

Metro appreciates your participation and comment.

Response to Comment AR1-2

The LST values in Tables 3-1 through 3-5 of the appendix have been updated using the 1-acre values in the guidance and consistent with the discussion in Section 4.2 of the DSEIS. The updates do not change the impact determination and mitigation measures described would continue to apply.

Response to Comment AR1-3

The maximum daily emissions are shown for each phase in the appendix. However, the maximum daily emissions based on the overlapping construction schedules are shown in Tables 1-5 and 1-6 of the appendix. In addition, Tables 4.2-2 and 4.2-4 in the Air Quality Section indicate the total emissions associated with the overlap of those construction phases. Therefore, these estimates do not need to be updated.

The timing of Phases 1 and 3 would overlap. However, the construction activities would be relatively stationary during daily construction of boring and drilling. These activities would not occur in the same location and would be located approximately 300 feet (94 meters) apart for any given day. Because localized impacts were evaluated based on a receptor distance of 25 meters, construction activities occurring at the same time but at different locations were not evaluated concurrently. Moreover, because EPBM and grouting both involve stationary activities (boring and drilling), the evaluation of emissions from Phase 1 and Phase 3 individually was determined most appropriate for the estimate of potential localized impacts.

Response to Comment AR1-4

Comment noted. Metro will provide Final SEIS.

Responses to Comments

Responses to State Agencies

Comment Letter/Speaker	Affiliation	Last Name	First Name	Comment Page	Response Page
State Agencies					
AS1	State of California – Department of Transportation, District 7	Watson	Dianna		

STATE OF CALIFORNIA—CALIFORNIA STATE TRANSPORTATION AGENCY EDMUND G. BROWN Jr., Governor

DEPARTMENT OF TRANSPORTATION
DISTRICT 7-OFFICE OF TRANSPORTATION PLANNING
100 S. MAIN STREET, MS 16
LOS ANGELES, CA 90012
PHONE (213) 897-9140
FAX (213) 897-1337
www.dot.ca.gov

Serious drought.
Help save water!

July 28, 2015

Ms. Dolores Roybal Saltareli
Los Angeles County MTA
One Gateway Plaza, MS 99-22-2
Los Angeles, CA 90012-2952

RE: Regional Connector Transit Corridor Project
Vic. LA-110 and LA-101
SCH # 2009031043
Ref. IGR/CEQA No. 090324CS
Ref. IGR/CEQA No. 100923CS
IGR/CEQA No. 150636AL-DSEIS

Dear Ms. Saltareli:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the above referenced project. Metro and FTA have prepared a Draft Supplemental Environmental Impact Statement (DSEIS) for the Regional Connector Transit Corridor Project, a proposed underground light rail system that will connect the existing Metro Gold, Blue, and Expo Lines in downtown Los Angeles. 1

Storm water run-off is a sensitive issue for Los Angeles and Ventura counties. Please be mindful that projects should be designed to discharge clean run-off water. Additionally, discharge of storm water run-off is not permitted onto State highway facilities without a storm water management plan. 2

Transportation of heavy construction equipment and/or materials, which requires the use of oversized-transport vehicles on State highways, will require a transportation permit from Caltrans. It is recommended that large size truck trips be limited to off-peak commute periods and idle time not to exceed 10 minutes. 3

In addition, a truck/traffic construction management plan is needed for this project. Traffic Management Plans involving lane closures or street detours, which will impact the circulation system affecting traffic to and from freeway on/off-ramps should be coordinated with Caltrans. 4

If you have any questions, please feel free to contact Alan Lin the project coordinator at (213) 897-8391 and refer to IGR/CEQA No. 150636AL.

Sincerely,

Dianna Watson

DIANNA WATSON
Branch Chief
Community Planning & LD IGR Review

cc: Scott Morgan, State Clearinghouse

Responses to Comments

AS1

Responses to Comments from State of California – Department of Transportation, District 7, Watson, Dianna

Response to Comment AS1-1

Comment acknowledged.

Response to Comment AS1-2

As stated in Chapter 1, the Draft SEIS was prepared to address the Order of the United States District Court for the Central District of California in Today's IV, Inc. vs. Federal Transit Administration et al and 515/555 Flower Associates, LLC vs. Federal Transit Administration et al. The Judgment and Order for Partial Injunctive Relief by the Honorable John A. Kronstadt on May 28, 2014 and September 9, 2014, respectively, require that the FTA as the federal lead agency pursuant to NEPA, with Metro, explain why open-face tunneling alternatives were rejected on the Lower Flower Segment in downtown Los Angeles. The Draft SEIS is intended to provide more information on the tunnel construction alternatives on Flower Street that were withdrawn from consideration, specifically Open-Face Shield and Sequential Excavation Method (SEM) tunneling for the Flower Street portion of the Regional Connector project alignment between 4th Street and the 7th Street/Metro Center Station, as required by the Judgment.

Metro understands the sensitivity of the run-off issue for Los Angeles and Ventura Counties. The unchanged analysis for impacts of water run-off and discharge of the locally preferred alternative may be found in the Final EIS/EIR, Chapter 4.10 Water Resources, Section 4.10.3.5 Locally Preferred Alternative. Additionally, Chapter 8 Mitigation Monitoring and Reporting Program identifies the mitigation measures to be implemented as the Project relates to construction and water impacts.

As shown in Appendix L of the Draft SEIS the mitigation measure for the Locally Preferred Alternative would apply for Alternatives A and B.

Response to Comment AS1-3

Please see response to Comment AS1-2 above. The analysis for impacts of transportation during construction activities can be found in the Final EIS/EIR, Chapter 3 Transportation, Section 3.3.5 Locally Preferred Alternative. Additionally, Chapter 8 Mitigation Monitoring and Reporting Program identifies the mitigation measures to be implemented as the Project relates to construction impacts to traffic, transportation permits, and transport of construction equipment.

Response to Comment AS1-4

Please see response to Comment AS1-2 above. As indicated in Chapter 3, Transportation Impacts and Mitigation, of the Final EIS/EIR, a traffic management and construction mitigation has been developed for the Project to minimize impacts to traffic flow to street traffic and from freeway on/off ramps. TR-1, from the MMRP, would apply to Alternatives A and B.

Responses to Comments

Responses to Public Comment

Comment Letter/Speaker	Affiliation	Last Name	First Name	Comment Page	Response Page
Public Comment					
PC1		Chang	Ike		
PC2		Meinert	Robert		
PC3		Sutton	Christopher		
PC4		Watson	Robert		
PC5		Sutton	Christopher		

PC1

Metro

Regional Connector - Draft Supplemental Environmental Impact Statement (SEIS)
Public Hearing
Los Angeles Public Library – Central Library
Tuesday, June 30, 2015; 12:00 p.m. to 1:30 p.m.

Comment Card

Name: IKE I. CHANG

Affiliation (i.e. organization, resident, business):

Address: 223 S. CENTRAL AVE APT. #503 L.A., CA 90012

Phone: 213-617-8927

Email:

Comment Type: ☐ Written Comment ☐ Verbal and Written Comment

Comment:

보다 넓은 차원의 의견.
PURPLE LINE 이 SANTA MONICA 까지의 연결
PLAN 듣고 있습니다. 이 기회에 허락 하신다면
(계속 뒷등)

Please use the reverse side for additional comments. Comments may also be mailed to: Ms. Dolores Roybal Saltarelli, Project Manager, Metro, One Gateway Plaza, Los Angeles, CA 90012 or emailed to roybald@metro.net

---

Metro

Regional Connector - Draft Supplemental Environmental Impact Statement (SEIS)
Public Hearing
Los Angeles Public Library – Central Library
Tuesday, June 30, 2015; 12:00 p.m. to 1:30 p.m.

Ike Chang

Comment Card

Name: Ike I. Chang

Affiliation (i.e. organization, resident, business): 223 S. Central Ave., Apt #503 L.A., CA 90012

Address:

Phone: (213) 617-8927

Email:

Comment Type: ☒ Written Comment ☐ Verbal and Written Comment

Comment:

A more wider scope of opinion.
I am listening to the plan describing how the Purple line is getting connected
to Santa Monica. Is there more plans in the works for more metro lines? 1

Please use the reverse side for additional comments. Comments may also be mailed to: Ms. Dolores Roybal Saltarelli, Project Manager, Metro, One Gateway Plaza, Los Angeles, CA 90012 or emailed to roybald@metro.net

PC1

보다 더 많은 지하철의 건설 계획이 있으신지요
있으시다면 보다 널리 일반 시민에게 그 PLAN
들은 선전해 주실 것을 앙망합니다.
한국, 1973년에 미국와서 43년동안 살고
있는 ~~KORA~~ KOREAN AMERICAN으로서 느끼는 것!!
보다 더 많은 지하철이 필요하다고 느낍니다.
METROLINK는 MATRORAIL과 별개임을 압니다.
METRO RAIL을 보다 많이 계획하셔서
한국에서 처럼, 일반 시민이 보다 많은 도움이
되기를 기도합니다.

IKE CHANG
6-30-2015

Public Comments Continued:

Public Comments Continued:

If so, I hope and wish that you [illegible] advertise those plans to the general public. This is what I am feeling as a Korean American of 43 years, who came to U.S. in 1973. I feel that we need a lot more metro lines. I know that Metrolink is separate from Metro Rail. I hope that there will be more plans for metro rail and help the general public more like in Korea. 2

/signature – Ike Chang/
6/30/2015

Responses to Comments

PC1

Responses to Comments from Chang, Ike

Response to Comment PC1-1

Metro appreciates your comment. Metro is studying various transportation corridors as a way to expand its regional transit system. Metro's 2009 Long Range Transportation Plan (LRTP) serves as the long-term master plan for the transit system.

Response to Comment PC1-2

Thank you for your comment. It is noted that you support a more expanded Metro rail system and will continue to inform the public of the public participation process for the input on the environmental and planning process. In addition, Metro will continue to coordinate with other agencies, such as Metrolink.

Metro

Regional Connector - Draft Supplemental Environmental Impact Statement (SEIS) **PC2**
Public Hearing
~~Los Angeles Public Library – Central Library~~
~~Tuesday, June 30, 2015; 12:00 p.m. to 1:30 p.m.~~
7.7.15 JAPANESE MUSEUM
Comment Card

Name: ROBERT MEINERT

Affiliation (i.e. organization, resident, business): TRANSIT ADVOCATE (FORMER MEMBER)

Address:

Phone:

Email: eclecticexplorer@gmail.com

Comment Type: ☒ Written Comment ☐ Verbal and Written Comment

Comment: I SUPPORT THE FEIR PERTAINING TO TUNNELING ON FLOWER ST, HOWEVER IN LIGHT OF THE GENTLEMAN'S COMMENT WHO SPOKE ON TUNNELING DISRUPTIONS WITH THE CUT & COVER METHOD, I WOULD ENCOURAGE METRO TO BUILD THE BEST PROJECT POSSIBLE WITH THE FINANCIAL RESTRAINTS IN THE BUDGET. 1

Please use the reverse side for additional comments. Comments may also be mailed to: Ms. Dolores Roybal Saltarelli, Project Manager, Metro, One Gateway Plaza, Los Angeles, CA 90012 or emailed to roybald@metro.net

Responses to Comments

PC2

Responses to Comments from Meinert, Robert

Response to Comment PC2-1

Metro appreciated your comment and is dedicated to building the most feasible and cost effective alternative. Support for the construction methodology as identified in the Final EIS/EIR for the Project is noted.

PC3

Metro

Regional Connector - Draft Supplemental Environmental Impact Statement (SEIS)
Public Hearing

~~Los Angeles Public Library – Central Library~~ Japanese American National Museum
· Tuesday, ~~June 30, 2015; 12:00 p.m. to 1:30 p.m.~~ July 7, 2015, 6:30 p.m. to 8:00 pm.

Comment Card

Name: CHRISTOPHER SUTTON

Affiliation (i.e. organization, resident, business): WESTIN BONAVENTURE HOTEL

Address: 586 LA LOMA ROAD, PASADENA, CALIF. 91105

Phone: 626-683-2500

Email: christophersutton.law@gmail.com

Comment Type: ☐ Written Comment ☒ Verbal and Written Comment

Comment: The Supplemental EIS fails to analyze a lower alignment as directed by the Court's order. See attached alternative diagrams. Lower alignment allows TBM tunneling between 4th and 5th. Both Alt. A & B are not the lower alignment proposed by the Bonaventure Hotel, 1

Please use the reverse side for additional comments. Comments may also be mailed to: Ms. Dolores Roybal Saltarelli, Project Manager, Metro, One Gateway Plaza, Los Angeles, CA 90012 or emailed to roybald@metro.net

which is lower, as shown on the attached diagrams.

Responses to Comments

PC3

Responses to Comments from Sutton, Christopher

Response to Comment PC3-1

Thank you for your comment. Please see response to Comment PC5-4.

Robert Watson
4287664 - Legal Mail
29330 The Old Road
Castaic, Ca. 91384

Ms. Mary Nguyen
LA Metro Office
Federal Transit Admin. Region IX
888 S. Figueroa St., Ste. 2170
Los Angeles, Ca. 90017

Ms. Nguyen,

I am writing to request whatever information you can send me regarding the DSEIS for the Regional Connector Transit Corridor Project. I would like to know about the tunneling methods and any other information you can provide. If you are unable to help, a response with a referral of someone who can would be greatly appreciated.

Respectfully,

Responses to Comments

PC4

Responses to Comments from Watson, Robert

Response to Comment PC4-1

Metro appreciated your interest in the project and a copy of the DSEIS was provided to Mr. R Watson via U.S. Postal Mail.

PC5

THE SILVERSTEIN LAW FIRM
A Professional Corporation

215 NORTH MARENGO AVENUE, 3RD FLOOR
PASADENA, CALIFORNIA 91101-1504
PHONE: (626) 449-4200 FAX: (626) 449-4205
BRAD@ROBERTSILVERSTEINLAW.COM
WWW.ROBERTSILVERSTEINLAW.COM

July 27, 2015

VIA EMAIL AND U.S. MAIL

Ms. Dolores Roybal Saltarelli
Los Angeles Metropolitan Transit Authority
One Gateway Plaza, MS 99-22-2
Los Angeles, CA 90012
roybald@metro.net

Ms. Mary Nguyen
Federal Transit Administration
888 S. Figueroa Street, Suite 2170
Los Angeles, CA 90017
Mnguyen@dot.gov

Re: Draft Supplemental Environmental Impact Statement for the Regional Connector Transit Corridor Project

Dear Ms. Saltarelli and Ms. Nguyen:

I. INTRODUCTION

We represent Today's IV, Inc., owner of the Westin Bonaventure Hotel and Suites ("Bonaventure"), which occupies the block surrounded by 4th Street, 5th Street, Flower Street and Figueroa Street, and plaintiff in *Today's IV, Inc. v. Federal Transit Administration, et al.*; Case No. CV13-00378-JAK(PLAx). The Bonaventure, along with its guests, tenants, and employees will be directly and significantly impacted by Project construction, unless changes are made to the method of construction. It is on the Bonaventure's behalf that we are providing these comments on the Draft Supplemental Environmental Impact Statement ("DSEIS") for the Regional Connector Transit Corridor Project ("Project"). 1

As a preliminary matter, please ensure that notices of all hearings, actions and decisions related to the Project are timely provided to this office. All objections, including those regarding proper notice and due process, are expressly reserved. 2

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II. PROJECT DESCRIPTION.

We initially note that the Project against which the alternatives construction
methods are measured has changed in material ways since the initial approval of the 3
Projects in mid-2012. The Draft SEIS does not, however, reflect those changes.

In particular, the escalator/stair alternative entrance to the 2nd/Hope Station was
eliminated in May 2013 by MTA action in its instructions to its design-build bidders.
Only the all-elevator option remains. (**Exh. 1**)[1] The elimination of the escalator/stair
alternative entrance makes it far easier and more feasible to further lower the 2nd/Hope
Station, in part, because less excavation is necessary. The elevators will be installed
through vertical bores. Indeed, Alternative B already proposes a lower 2nd/Hope Station 4
than was approved in April 2012 and in the May 2013 all-elevator design change. An
alternative tunnel depth proposal was also provided to Metro by representatives of the
Bonaventure beginning in December 2013 and repeatedly thereafter. That Deep Tunnel
Alternative recognized this change – and a resulting lowering of the 2nd/Hope Station ---
to about 206 above sea level – would allow tunneling to 5th Street, and do so at a flatter
grade than either the Project alignment or the alternatives in the DSEIS. (**Exhs. 2, 3.**)[2]

The Draft SEIS fails to acknowledge this Deep Tunnel Alternative and fails to
analyze its merits as to lesser grades, shorter length, construction safety and duration, 5
lesser cost, and future operational speed, safety, maintenance, noise and vibration, cost,
and the lesser energy usage and lesser generation of Green House Gases.

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1 Exhibit 1 consists of a portion of the Regional Connector Transit Corridor Project Design Build [Proposer/Contractor] Questions and Answers and a July 24, 2015 article from Metro's blog on the updated design plans for the pedestrian bridge at the 2nd/Hope Station. The image of the surface portal that accompanies the blog post show no escalators or stairs, only elevators.

2 This Deep Tunnel Alternative proposal allowed for a flatter grade by lowering the
2nd/Hope Station to an elevation below that of Alternative B. The further lowering of the
2nd/Hope Station and the tunnels in the vicinity also has the additional benefit of
reducing noise and vibration impacts to Disney Hall, REDCAT Studios, and the Colburn 6
School. The DSEIS fails to mention acoustical testing at the Colburn School in April
2013 that indicated potentially significant noise and vibration impacts at a audible
disturbance level not previously identified. (See **Exh. 5.**)

The Project further changed in 2013 to give the contractor additional discretion to design and demonstrative the feasibility of alternative construction methods. (**Exh. 4.**) 7

III. ALTERNATIVES, GENERALLY.

The final judgment in the litigation **(Exh. 6)** requires FTA and MTA to prepare a supplemental analysis under the National Environmental Policy Act ("NEPA") that addresses the feasibility of open-face and SEM tunneling under Flower Street from 4th Street to the 7th Street/Metro Center station tail track near Wilshire Boulevard. The DSEIS, however, goes beyond the judgment to include an alternative (Alternative B) that includes earth-pressure tunneling, identified as EPBM in the DSEIS. This makes it incumbent upon FTA to analyze other tunneling alternatives that have already been determined to be potentially feasible, but for which analysis has yet to occur. In particular, this includes EPBM of one additional block from 4th to 5th Street, followed by cut-and-cover construction south ("C/C") to the 7th Street/Metro Center station. Metro previously determined this alternative to be potentially feasible in March 2012 (AR 20184) and provided a brief summary of the alternative in an April 25, 2012 draft tunneling study. (AR 84245.)[3] This one-block tunneling alternative would reduce the impacts of both the Project and DSEIS Alternatives A and B. With respect to the DSEIS alternatives, impacts would be reduced for reasons that include a drastic reduction or elimination of the need for grouting. It would also significantly reduce any Project delays because C/C south of 5th Street may occur simultaneously with tunneling. 8

This is also implicit from the DSEIS itself. Even from the limited alternatives that Metro and FTA have analyzed in the DSEIS, two conclusions can be reached:

(1) Between 4th and 5th Streets, EPBM is feasible, safer, less costly, and environmentally superior to C/C construction, and

(2) South of 5th Street, C/C less risky and is environmentally superior to SEM or open-face tunneling. 9

It is therefore incumbent upon Metro and FTA to analyze EPBM from 4th to 5th Street, followed south of 5th Street by cut-and-cover construction ("C/C") to the 7th Street/Metro Center station. The DSEIS fails to do so.

The Deep Tunnel Alternative presented by Bonaventure to MTA **(Exh. 3)** takes advantage of the existing design of the lower depth of the 2nd/Broadway Station located adjacent to the L.A. Times Building at around 200 feet above sea level ("asl"). This 10

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3 AR references are to the Administrative Record in the litigation and are incorporated herein by reference.

lower depth at that location is mandated by the need to tunnel safely under the existing Red Line subway tunnels at 2nd Street and Hill Street, which run perpendicular to the Project route under 2nd Street. The Deep Tunnel Alternative has the added construction benefits of keeping the EPBM fully within the Fernando Shale formation until 5th Street, reducing or eliminating otherwise required grouting from the surface, and shortening the overall length of tunneling by avoiding unnecessary inclines between 2nd/Broadway to 2nd/Hope and also between 2nd/Hope and 7th Street/Metro Center station. 10 cont'd

As proposed by MTA, the two tunnels will involve a greater linear distance: They would go up and down inclines on either side of a 2nd/Hope Station at the higher 260 feet asl when compared to the relatively level tunnels connected to a 2nd/Hope Stations at 206 feet asl proposed by Bonaventure. By shortening the tunnel and staying in the Fernando Shale less grouting is required and the safety of the construction crews is enhanced. By reducing the days of construction the cost of tunnel construction is also reduced. 11

Appendix A to the DSEIS claims that MTA's Low Alignment identified in the April 25, 2012 draft tunneling study was considered as Alternative B is the DSEIS. This is incorrect. Alternative B is EPBM **followed by SEM**. The MTA Low Alignment in the draft tunneling study was EPBM to STA 13+00 (5th and Flower Streets) **followed by C/C construction** to the 7th Street/Metro Center Station. (See AR 82422, 82425.) This error should be rectified by analysis of the corrected construction alternative provided for by the Low Alignment – EPBM to 5th Street **followed by C/C** to the 7th Street/Metro Center station. 12

IV. ALTERNATIVES CONSIDERED.

Both alternatives in the DSEIS claim to retain an option for a station at 4th Street/5th Street/Flower Street ("5th/Flower station"), essentially in front of the Bonaventure. It is clear from the record, however, that a potential future station is illusory, if not deceitful. The alternatives should be re-analyzed without the station. There is no funding analysis, no funding date, or any design of the hypothetical station, and MTA admits that any such station would require subsequent environmental review.

The 5th/Flower station was eliminated from the Project in October 2010 by vote of Metro's Board. (AR 15510.) Eighteen months later, and at the last minute, a design "not to preclude" a future station was added back when the Project was approved by Metro's Board on April 25, 2012. (AR 15677.) This was done, however, merely to allow Metro to claim any tunneling beyond 4th Street is infeasible and insulate it and FTA from having to analyze the environmental impacts of the additional tunneling, even though the possibility of a station ever being constructed is, at best, infinitesimally remote. In effect, Metro uses a potential 5th/Flower Station merely to set up straw men and avoid required analysis of feasible and reasonable alternatives. This is dishonest. 13

When the 5th/Flower Station was deleted no commitments to fund either a study or propose any mechanisms to fund a station at this location were made. (FTAR 35635.) Indeed, the FEIS notes that "[a] separate NEPA/CEQA process would be completed as necessary should a future separate Flower/5th/4th Street station project be undertaken." (AR 8163.) The station was not included in the preliminary design (DSEIS Appendix A, p. 3-4) and the 2012 FEIS notes that "no funding has been identified for such a station, and it is therefore not considered a reasonably foreseeable future phase of the Regional Connector." (AR 8149.) The 2012 FEIS also indicates that Project objectives are met without the station. (Id.) Appendix A to the DSEIS also indicates that any future station would have to be constructed using C/C (p. 4-23) – meaning Flower Street would have to be dug up **again** – making the possibility of a future station even more implausible. 13 cont'd

Discussion of operations in DSEIS Appendix A also belies any notion of a future 5th/Flower station. Page 5-6 of the DSEIS indicates that the desired operational speed necessary to meet Project objectives is 55 mph along Flower Street. The DSEIS, however, notes that the desired operation speed cannot be met with the 5th/Flower Station because of the closer station spacing. (Id.) This means that Project objectives cannot be met even by the Project with the inclusion of a 5th/Flower Station.

Metro designed the vertical alignment of Alternative B with a modified "sag" to, as the DSEIS states, "reduce the probability of the tunnel alignment encountering tie-backs located under Flower Street between 4th Street and impacting the 4th Street Bridge foundations." (p. 2-41.) This "sag," according to Metro, results in a 5.9% gradient on the south end and a 4.6% gradient on the north end of the "sag," resulting in an unacceptable reduction of the Flower Street segment's operational speed from 55 mph under the Project to 35 mph. (Id.) The "sag" with corresponding gradients, however, is also a straw man. It is an alternative purposely designed to fail. Changes to the Project in 2013 after Project approval made more level lower alignments feasible with a 2nd/Hope Station at about 206 feet asl. The "sag" is caused by the higher elevation of the 2nd/Hope Station. The tunnels must dip downward at a steeper angle to pass under the 4th Street bridge foundations, return to level, and then come up at a steeper angler. The "sag" is designed by Metro to create the unacceptable slopes and predestine the alternative to a low rating. 14

Bonaventure's Deep Tunnel Alternative proposal provided to Metro beginning in December 2013 (**Exh. 3**) has no such "sag." It shows the bottom of the tunnel below the 4th Street Bridge foundations at 213 feet asl. (**Exh. 2.**)[4] Metro's own diagrams show the 7th Street/Metro Center tail tracks at 240 feet asl, and the linear distance from 4th Street

4 The underlying graphics are taken from the 2012 Final EIS.

to the tail track as 1450 feet. (AR 17766.) The rise of 27 feet over 1450 feet results in a slope of less than 2% - substantially less than that claimed by Metro and well within design and operational criteria. Lowering the 2nd/Hope Station also reduces the slope between 2nd/Broadway and 2nd/Hope from 4.6% to 0.46%, allowing for increased operation speeds along that leg of the Project as well. 14 cont'd

Moreover, if failure to meet an operational speed of 55 mph on the Flower Street leg of the Project disqualifies an alternative, as MTA suggests it is, then both Alternatives A and B truly are improper straw men because the operational speed cannot be met with the hypothetical station.[5] The 5th/Flower Station must be deleted from not only the alternatives, but from the Project, and new analysis recirculated. 15

The purported 7 month increase in construction time Metro attributed to the Alternatives could be substantially shortened if C/C is used south of 5th Street instead of SEM after tunneling to 5th Street because the C/C could be undertaken concurrently. 16

V. NOISE.

The SDEIS claims that construction noise levels will be higher under Alternative B. There is however, no analysis provide in the DSEIS, so there is no substantial evidence to support the conclusion. There is also no analysis of the Project, so there is no substantial evidence to support any comparison. The only "analysis," of the LPA in the DSEIS (such as it is) is to list each individual piece of equipment used during a particular construction activity and provide the noise level associated with that piece of equipment. (AR 6386.) This is far from an adequate analysis and violates the very FTA protocols for quantitative noise assessment that the EIS purports to follow. (See AR 40625-40626.) FTA provides a laundry list of mitigation, but simply providing mitigation and reaching a conclusion as to the remaining impact does not give Metro or FTA license to forego the analysis. Without having given the public the opportunity to review the analysis of noise impacts, this section of the DSEIS, at the least, must be recirculated with that required information. 17

This omission is critical because Metro has changed the Project to significantly increase the possibility of nighttime construction, and has done so without analysis. This increase in the scope and intensity of nighttime construction includes water main relocation and pile and beam installation, and also includes the temporary removal of decking in order to remove and transport excavated soils that would otherwise be removed only through the TBM removal shaft. These nighttime construction activities do not appear in the 2012 FEIS or DSEIS; instead they only appear in a Settlement 18

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[5] This also means even the Project itself doesn't meet Project objectives.

Agreement dated June 30, 2015 between Metro and South Flower Street Associates, LLC, successor to 515/555 Flower Associates, LLC, for purposes of settling the CEQA and NEPA litigation. (**Exh. 7** [Sections 3.2 and 9.10, respectively].) 18 cont'd

The SDEIS is inconsistent in its conclusions, saying there will be no substantially adverse impact on page 4.4-7, but there will be adverse impact on page 4.4-8. Moreover, asserting that "As with the Project, potentially construction-related adverse effects would remain after implementation of these mitigation measures," is inconsistent with the FEIS, which notes, "[d]uring construction of the LPA, potential noise impacts to sensitive land uses would not be significant." (AR 6393.) 19

It is also clear the mitigation will not work and/or is not being followed by Metro. Mitigation Measure NV-13 provides as follows:

> "The construction mitigation plan shall prohibit noise levels generated during construction from exceeding the FTA construction noise criteria. This could include prohibiting simultaneous operation of major pieces of construction equipment if simultaneous operation exceeds FTA construction noise criteria. If a noise complaint is filed during project construction, noise monitoring shall be conducted in the vicinity of the area in question. Although it is not expected to do so with the application of appropriate BMPs, if monitored noise levels exceed FTA construction noise criteria, the contractor shall use all or a combination of the following measures (NV-14 through NV-17) to reduce construction noise levels below FTA construction noise criteria." 20

Project-related utility relocation has been on-going adjacent to Bonaventure for several months, based on the representations made by Metro's counsel to Judge Kronstadt that the specific utility work would be required regardless of whether tunneling or C/C was used. FTA's noise thresholds have been routinely exceeded.

Attached as **Exhibit 8** (63 pages) are Bonaventure's continuous email communications with Metro commencing in June 2014 through July 10, 2015, with the decibel readings of excessive noise levels, and Metro's repeated assurances that the matter would be addressed. Also included are several letters from Bonaventure's sound engineer, Marland Hale, setting forth the repeated violations of noise standards by Metro and its contractors. Many of the emails include attached photographs of the work which generated the excessive noise or the face of the noise meter, showing its readings. Metro and its contractors have been consistently unable to meet the noise limits established in the 2012 FEIR. Nothing in this 2015 DSEIS offers or analyzes new techniques of **20** measure to prevent excessive noise levels near the Bonaventure. It appears that the types cont'd of activities and construction contemplated by Metro along Flower between 4th and 5th Streets will exceed the noise limits and there is no method to reduce or mitigate this.

VI. CLIMATE CHANGE.

The DSEIS only addressed GHG emissions during construction because, according to the SDEIS, "operations and the associated climate change impacts would be nearly identical under the Project and the tunneling method alternatives." (p. 4.3-1.) **21** There is, however, no substantial evidence to support this conclusion, and a qualitative analysis suggests the contrary.

The Deep Tunnel Alternative provided to Metro beginning in December 2013 lowers the 2nd/Hope Station and provides a track profile grade that does not exceed 2% between 2nd/Broadway and the tail track at the 7th Street/Metro Center Station. (**Exh. 3**.) Metro's Project alignment, though, has profile grades as high as 4.6%. (Id.) More energy is necessary to move trains over the steeper grades, resulting in greater GHG emissions than for the Deep Tunnel Alternative. Metro assumes a project with greater inclines and fails to analyze the Deep Tunnel Alternative with inclines closer to level.

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The increase may be substantial on an annual basis: Each trains of about 100 tons in weight will climbing the steeper inclines over 300 times per day. GHG generation will be much more significant over the 100 year lifetime of the Project. The goals of GHG reduction in California are on a decades-long time line. The increase in GHG emissions due to steeper tunnel grades over the Project lifetime is especially greater when compared to the less than four year construction period provided for in the DSEIS. (p. 4.3-2.)[6] Yet the DSEIS fails to analyze the Deep Tunnel Alternative for GHG emission reductions over the lifetime of the Project.[7]

Moreover, EPBM to 5th Street, followed by C/C construction south of 5th Street to the tail track at the 7th Street/Metro Center Station reduces construction-related GHG impacts over the Alternatives by eliminating the need for grouting altogether. It also eliminated the need for hundreds of truck trips hauling away the excavation spoils and

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[6] While SCAQMD recommends use of a 30-year life of Project for the purpose of amortizing construction GHG emissions (p. 4.3-2), the actual life of the Project will be much longer. New York subways have been in operation for over 100 years.

[7] The increased energy use that may be associated with a deeper elevator shaft will be negligible because the elevators will be counterweighted.

returning fill soils between 4th and 5th, because with EPBM the earth and rock above the tunnel depth will remain in place and will not need to be re-filled. 23 cont'd

Metro's failure to analyze the Deep Tunneling Alternative in the DSEIS violates not only NEPA, but Metro's own Climate Action and Adaptation Plan, adopted in June 2012. The Plan "establishes a framework to identify the areas of greatest opportunity for Metro to reduce GHG emissions, based on estimates of cost and emissions impacts." (**Exh. 9** [p. 1].) The Deep Tunneling Alternative – which Metro has known of since at least December 2013 – is a reasonable alternative with the potential to reduce GHG emissions below that of the Project and the Alternatives. Because it provides an opportunity for Metro to reduce GHG emissions, the failure to analyze the Deep Tunneling Alternative is inconsistent with the Plan.[8] 24

VII. ENVIRONMENTAL JUSTICE.

The DSEIS suggests that Alternatives A and B create disproportionate adverse environmental justice impacts on Little Tokyo that are not created by the Project. This conclusion is based solely on the increased truck traffic necessary to remove spoils from the tunnel, but is not supported by substantial evidence. 25

First, the conclusion in the DSEIS is contradicted by the SEA, approved as part of the 2012 FEIS. According to the SEA, "[s]poils (excavated soil) would be removed within the Mangrove property, and trucks would be routed to the east and/or north to reach the freeway, and would not pass through Little Tokyo." (SEA p. 4.18.2-8.) Thus, the additional spoils removal will not result in a legally significant new adverse environmental justice impact. The Mangrove property is northeast of Little Tokyo and closer to the 101 Freeway, avoiding any truck trips through Little Tokyo. 26

Second, in making the assertion, FTA and Metro have impermissibly piecemealed tunneling along Lower Flower from the rest of the Project. Tunneling along 2nd Street will result in 35-70 truck trips per day for 24-48 months. (SEA p. 4.18.2-8.) While this does create a disproportionate impact (2012 FEIS, p. 4-421), the 2012 FEIS does not conclude that it is *significantly* adverse. (See 2012 FEIS, pp. 4-422, 424 ["congestion would increase slightly, though truck trips would be routed onto primarily industrial streets and existing truck routes whenever practicable"].) The additional spoils-related truck traffic generated by tunneling along Lower Flower for the additional amount of time estimated by Metro does not change that conclusion. 27

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[8] This inconsistency with a plan adopted for the purpose of avoiding or mitigating an environmental effect creates another potentially significant impact that has not been identified or analyzed.

To the extent there are additional impacts from the spoils-related truck traffic, they can be reduced substantially by an alternative that uses EPBM to 5th Street followed by C/C for the remainder of Lower Flower. That will reduce the duration of additional tunneling to less than one month. 27 cont'd

VIII. PROJECT COMPARISONS.

A. Operational Considerations

The SDEIS presents a false comparison of maximum operational speed along Flower Street. See Section IV, supra. The presence of a potential future 5th/Flower Station in the Project (p. 5-7) also limits the maximum speed to 35 mph. If Metro is using this section to now somehow claim the Project does not include a potential 5th/Flower Station (see p. 5-6), then Metro has lied to the public and lied to the Court, previously asserting the possibility of a potential future 5th/Flower Station had to be incorporated into the Project. Again, however, as noted in Section IV we believe the 5th/Flower Station is illusory, and it must be deleted from not only the alternatives, but from the Project, with the new analysis recirculated without it. 28

Metro has also chosen a design for Alternative B that is, in effect, a straw man designed to fail by creating unnecessary gradients of 5.9% and 4.6%. Again as noted in Section IV, an alternative depth design with a gradient of less than 2% is feasible and has already been provided to Metro. (See **Exhs. 2, 3.**)

B. Scheduling Impacts

Claiming an increase of an additional 29 months in scheduling impacts for the Alternatives is an improper post hoc rationalization. What Metro is saying is that going back and doing what it was legally required to do in the first place creates an unacceptable delay. This "hardship" is entirely of Metro's creating and cannot be used to unfavorably compare the Alternatives to the Project.[9] 29

This leaves only a relatively short 7 month increase in time for Alternative B. The purported 7 month construction time increase, however, could be substantially shortened if C/C is used instead of SEM after tunneling to 5th Street because the C/C construction can be undertaken concurrently.

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[9] Metro's claim is also a classic example of chutzpah, what federal courts define as "that quality enshrined in a man who, having killed his mother and father, throws himself on the mercy of the court because he is an orphan." Embury v. King, 361 F.3d 562, 566 n.22.

In fact, Metro has already discussed the Deep Tunnel Alternative with its design-build contractor, and Metro was informed that the Deep Tunnel Alternative could be constructed and constructed within the existing schedule. But only if a full analysis is performed on this feasible alternative will be time benefits be confirmed. Metro has chosen to omit the Deep Tunnel Alternative from the DSEIS in violation of NEPA. 30

C. Cost and Funding Considerations

Metro's claims here are improper, based on faulty and inaccurate assumptions. First, Metro may not incorporate pre-construction delay into any estimate. To do so is an improper and illegal post hoc rationalization. Any pre-construction delay is solely the result of Metro's failure to do what it was legally required to do in the first place. It may not rely on a hardship of its own making to now dismiss the alternatives. Cost and funding considerations must be revised accordingly. 31

Metro has failed to analyze the cost and funding considerations of the Deep Tunnel Alternative. The Full Funding Grant Agreement between Metro and FTA explicitly states that EPBM tunneling is roughly half the linear foot cost of C/C construction. (**Exh. 10** [excerpts].)This is obvious because spoils (soil and rock) from above the tunnel level remain in place and do have to be re-filled. An extra block of EPBM tunneling to 5th Street will likely reduce the Project cost. This is true not only because EPBM tunneling is cheaper than C/C construction, but also because the Deep Tunnel Alternative is shorter than Metro's straw man alternatives A and B. 32

The cost of delay is also purportedly based on sequential, rather than concurrent, construction. (p. 5-11.) However, that delay is substantially shortened or eliminated if C/C is used instead of SEM after tunneling to 5th Street because the C/C construction south of 5th Street can be undertaken concurrently with tunneling.

The increased cost is also, according the Metro, based on the underground constraints and increased risk on Lower Flower. Even Metro, however, acknowledges that the risk of using EPBM to 5th Street to be minimal, noting in the April 2102 draft Tunneling Study that "[s]ince the TBM tunneling will occur in the Fernando Formation the need for ground stabilization due to the tunneling operation for utilities along Flower Street is not anticipated. The EPB TBM drive beneath Flower Street provides a minimum of 10 ft clearance from the theoretical position of existing tie-backs, although most of the alignment provides much greater than 10 ft clearance." (AR 82425.) In other words, the risk of encountering tiebacks or alluvial soils from this construction alternative between 4th and 5th Streets is minimized, if not eliminated. 33

The lack of risk from tiebacks to any form of tunneling along Flower from 4th to 5th Streets is corroborated by tieback diagrams obtained from Metro through a Public Records Act request. They show the elevations of the Bonaventure's foundations and note the removal of the portion of anchor rods in the street right-of-way with 20 feet of existing grade. (**Exh. 11**.) 33 cont'd

Cost and funding considerations should take this into account and be revised accordingly. The Deep Tunnel Alternative avoids all tie-backs north of 5th Street, even those Metro plans to encounter and removed between 3rd and 4th behind the World Trade Center. Metro must study it.

This is equally applicable to construction and risk considerations. (p. 5-14.)

Because the DSEIS has not noted material changes the Project, such as the elimination of the escalator/stair entrance at the 2nd/Hope Station, is it reasonable to assume that cost and funding considerations also do not take this into consideration. Cost and funding considerations must be revised accordingly. 34

D. Purpose and Need.

The SDEIS claims that Alternative A and B do not perform as well as the Project, basing its assertion entirely on reduced operating speeds. (p. 5-14.) This, however, is false as it is based on the improper assumption that the Alternatives contain a 5th/Flower Station, but the Project does not. See Sections IV and VIII.A, supra. The Deep Tunnel Alternative would increase operating speeds by eliminating unnecessary inclines, but Metro chose not to analyze that alternative, even after having extension discussion about that alternative with its design-build contractor in 2014 and early 2015. 35

E. Environmental Considerations.

The conclusion that the two MTA Alternatives have greater environmental impacts than the Project rests almost entirely on the existence of grouting. (p. 5-15.) However, the Low ("sag") Alignment that Metro reviewed and found potentially feasible in approving the Project in April 2012 (AR 10) and the Deep Tunnel Alternative proposal provided to Metro beginning in December 2013 (**Exhs. 2, 3**) eliminates grouting by (1) using EPBM to 5th Street, and (2) using C/C construction south of 5th Street instead of other construction methods. This significantly reduces the impacts to a level less than that of Alternatives A and B (the latter of which Metro falsely claims is the Low Alignment reviewed in the April 2102 draft tunneling study), as well as that of the Project. Because the SDEIS should contain as reasonably complete a discussion of mitigation measures that could be implemented, the SDEIS must consider EPBM to 5th Street, with C/C south of 5th Street for the remainder of Lower Flower. 36

The SDEIS claims that any alternative will shift the majority of effects from handling spoils from Lower Flower to Little Tokyo. This is false. See Section VII, supra. 37

In unfavorably comparing the Alternatives to the Project with respect to transportation/circulation, the DSEIS fails to acknowledge that the alternatives will avoid the potential to temporarily shut down vehicular ingress/egress to the Bonaventure garage, something acknowledged in the 2012 Final EIS. (AR 8152.) Indeed, utility relocation, which Metro represented to the Court as a relatively minor activity that will be required regardless of whether C/C or tunneling is used, has already resulted in temporary losses of access to the Bonaventure's loading dock. (**Exh. 12**.) 38

Substantial evidence does not exist to support a conclusion that the Alternatives have a climate change impact greater than the Project. Construction impacts for Alternatives A and B may be greater, but operational impacts may be greater for the Project, which will occur for a far longer amount of time than construction. See Section VI, supra. The Deep Tunnel Alternative reduces GHG emissions over the lifetime of the Project and during construction. 39

Moreover, a Deep Tunnel Alternative alignment that lowers the 2nd/Hope Station and replaces SEM or open-face tunneling with C/C construction south of 5th Street will reduce operational energy use and eliminate grouting, thus resulting in less climate change impact than the Project. Id. 40

The basis for the greater impact of the two MTA Alternative with respect to visual quality and air quality is based almost entirely on the need for grouting. (p. 5-15.) A Deep Tunnel Alternative alignment that lowers the 2nd/Hope Station and replaces SEM or open-face tunneling with C/C construction south of 5th Street eliminates grouting. This alternative thus does not have greater visual or air quality impacts than the Project, and by reducing the need to remove much of the spoil between 4th and 5th will actually reduce air quality and noise impacts. 41

IX. METRIO'S INSTITUTIONAL BIAS

Metro is biased against analyzing changes in the project design that would significantly reduce environmental impacts. This bias means Metro will not even acknowledge alternatives such as the Deep Tunnel Alternative (**Exhibit 3**) provided to Metro and its design-build contractor commencing in December 2013. In October 2014, at a Project event held at the Little Tokyo office of the Project, Metro's design-build contractor acknowledged to representatives of Bonaventure in the presence of Metro employees the following when copies of Deep Tunnel Alternative were again distributed by Bonaventure: "We have spent a lot of time looking that this." Metro staff did not 42 contradict this statement by Michael Aparicio, Executive Vice President of Skanska Civil West, the lead construction partner in the consortium designing and building the Project. 42 cont'd

Metro has failed to include in the record or appendices of the 2015 DSEIS any of the emails or discussions between Metro and Skanska analyzing or even mentioning the Deep Tunnel Alternative provided to them by Bonaventure. This omission is willful. This omission is an attempt by Metro to conceal analysis and avoid considering a meaningful alternative to construct the Project. It appears that neither Skanska nor the other members of the design-build consortium were provided copies of the 2015 DSEIS or asked to comment on the alternatives, analysis and conclusions therein. 43

Metro remains pre-occupied with its errors in supervising the Red Line construction along Hollywood Boulevard in the early 1990's when a major cave in occurred. Metro attempted to blame the events on the contractor, Tutor-Saliba, but after over a decade of litigation the contractor was vindicated and Metro ordered to pay all withheld payments. Ironically, the Deep Tunnel Alternative keeps the construction fully within the safer Fernando Shale Formation for the block from 4th to 5th. Metro's "straw man" alternatives in the DSEIS are shallower and occur along the transition zone between the shale and the alluvium level, they very type of conditions where the Hollywood Boulevard disaster occurred. Metro is repeating its errors of the 1990's by not even considering the Deep Tunnel Alternative. Metro's bias against changing its mind is preventing a full and fair discussion of all feasible alternatives. 44

X. CONCLUSION.

It is clear from the SDEIS that the alternatives proffered by MTA are straw men, designed from the outset to fail. With minimal tweaking, a Deep Tunnel Alternative exists that is environmentally superior to the Project, will meet the purpose and need for the Project to the same extent the Project does, and does so with negligible construction delay. We ask the FTA and Metro to analyze that which Metro found potentially feasible over three years ago, EPBM to 5th Street and C/C construction from 5th Street to the 7th Street Metro Station, and do so in the SDEIS. 45

Very truly yours,

BRADLY S. TORGAN, AICP
FOR
THE SILVERSTEIN LAW FIRM

CHRISTOPHER SUTTON
FOR
LAW OFFICE OF CHRISTOPHER SUTTON

BST:jmr
Attachments

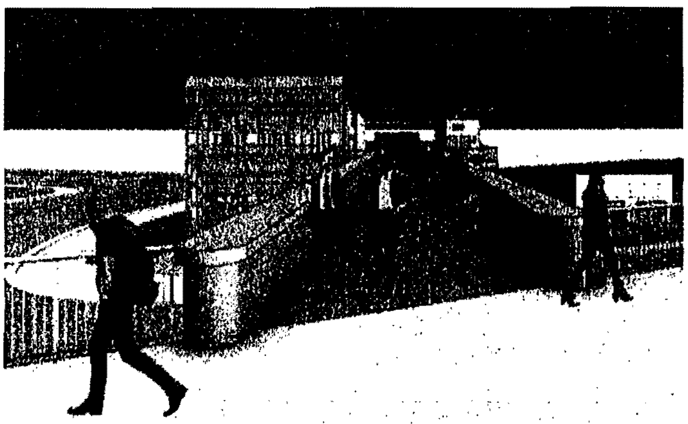
Exhibit 1

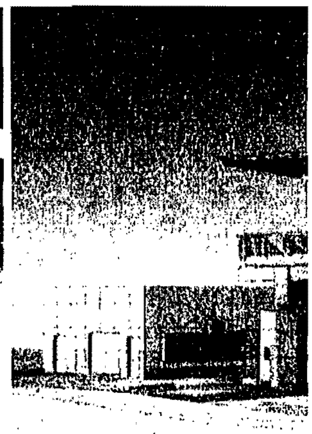
No.	Date of Question	Question	Answer	Answer Issued
1	1/23/2013	We hereby respectfully request a 12-week time extension to the submittal of the RFP for the Regional Connector Transit Corridor D/B Proposal.	LACMTA will revise the Request For Proposal extending the Proposal Due Date to June 18, 2013. This extension still allow LACMTA to work with its funding partners in a timely manner.	2/26/2013
2	1/30/2013	Please provide all of the electronic files for the project definition drawings. Please include any MicroStation files, InRoads or InRail files, AutoCAD files, Revet files,.dtm or photogrammetry files that are available.	The CADD Files for the Project Definition Drawings shall be provided only to LACMTA Pre-Qualified Firms/Teams listed in Exhibit A of the RFP Proposal Letter (Letter Invitation). Access to these documents is subject to the requirements provided in Article No. 5 of the Letter of Invitation Supplement (Construction). "5. NON-DISCLOSURE AGREEMENT FOR SECURITY SENSTIVE AND CONFIDENTIAL INFORMATION In connection with the development of a proposal for this RFP, LACMTA has determined that there are certain materials and information that should be provided to potential Proposers that are designated as Security Sensitive Information (SSI) and confidential information or are exempt from disclosure to the public or other unauthorized persons as provided under GEN 8 of LACMTA's Administrative Policies. The Project Definition Drawings (CADD Files) are the SSI and confidential information that LACMTA shall release to potential Proposers in CD/DVD.	2/11/2013
			The disclosure of above information shall be limited to LACMTA Pre-Qualified Firms/Teams only. As a condition to receiving access to the above-mentioned SSI and confidential information, potential Proposers must sign the NON-DISCLOSURE AGREEMENT FOR CONFIDENTIAL AND SECURITY SENSITIVE INFORMATION (EXHIBIT C) and must agree to safeguard and hold SSI and confidential information in strictest confidence in accordance with said agreement. Unsuccessful Proposers shall return to LACMTA all SSI and confidential information upon the award of the Contract." LACMTA will provide the SSI documents after receiving the completed and signed Non-Disclosure Agreement.	
3	1/31/2013	Is there a DVBE or a SDVOBE requirement?	No, there is no DVBE or SDVOBE requirement. LACMTA has established a "Disadvantaged Business Enterprise Anticipated Level of Participation (DALP) for this project in the percentage of: Design Twenty Percent (20%) of the Total Price for Final Design Construction Twenty Percent (20%) of the Total Price for Construction 1. Achieving the DALP percentage established for this contract is encouraged and is not a condition of award or issue responsiveness. However, it is the policy of LACMTA to provide the maximum opportunity for DBE firms to compete on its federally-assisted contracts. 2. DBE participation listed for this contract may be counted towards LACMTA's race neutral overall DBE goals.	2/11/2013
4	1/31/2013	Just following up to see if any Commissioning scope will be included in this bid to the general contractors.	The Contractor will be required to provide ongoing support to LACMTA during the testing and commissioning of the system, as noted in the Scope of Work and General and Technical Requirements.	2/11/2013

No.	Date of Question	Question	Answer	Answer Issued
375	5/22/2013	Alternate Design Proposal MCC/CIC Interface; 26 05 05: The specification 26-05-05 Page #8 calls for an alternate proposal to include for adding CIC cabinets to the MCC's (see below). There is no provision on the bid form for this alternate proposal (or option). From Section 26 05 05:	Requirements for Design of MCCs will be clarified by RFP Amendment. Only a base design will be required and the requested bid forms are not needed.	6/5/2013
		The Contractor shall submit an alternate design proposal with his bid for the "MCC/CIC Interface Redesign" to simplify the complexity of the wiring interface at the CIC. The alternate design proposal shall include the use of micro PLC I/O devices located in the MCC wiring bucket for each equipment, with the end result of a simplified single network wiring interface between MCC bucket micro I/O modules and the CIC PLC remote I/O real-tim control unit. Equipment safety interlocks required by the Metro Design Criteria and directive drawings shall be taken into consideration when redesigning this interface.		
		The CIC cabinet shall be of steel construction, indoor type. It can be part of a motor control center lineup and shall be provided with terminal blocks mounted on an interior panel within the cabinet. The SCADA/PLC remote I/O interface connections shall be made at these terminal blocks. The redesign of the CIC cabinet design will also need to be included in the alternate "MCC/CIC Interface Redesign" Proposal. These cabinets will also be used to terminate I/O of the communications and supervisory system circuits such as public address, fire protection, fire alarm, telephone, intrusion detection, and access control etc., Termination strips for these system equipment circuiting interfaces shall be provided at the top right hand corner of the CIC cabinet. Please provide direction and issuance of the Bid Form providing the proper method for offering the requested MCC/CIC Interface Redesign proposal.		
376	5/22/2013	The Alt-1 / Alt-2 drawing number format issued under Amendment#1 followed the following format: Alt-1 drawing = R3-E-101 Alt-2 drawing = R3-E-2101 (the addition of a s indicating Alt-2) That being the case there appears to be drawings missing for Alt-2. The missing drawings are: R3-E-2301; R3-E-2304; R3-E-2321; R3-E-2322; R3-E-2331; R3-E-2361 R3-S-2201; R3-S-2202; R3-S-2203; R3-S-2204	Changes to drawings are being issued by RFP Amendment. The escalator/ stair alternative entrance is being eliminated. Only the all-elevator station entrance design will be proposed.	6/5/2013
		In addition drawing R3-E-202 issued with Amendment #1 is for an Electrical Room Enlarged Plan, whereas it would be reasonable that R3-E-2202 would be issued if following the same numbering format as stated above would be for the East Station Single Line, so it appears the drawing numbers have gotten crossed. Please advise and provide any missing drawings		

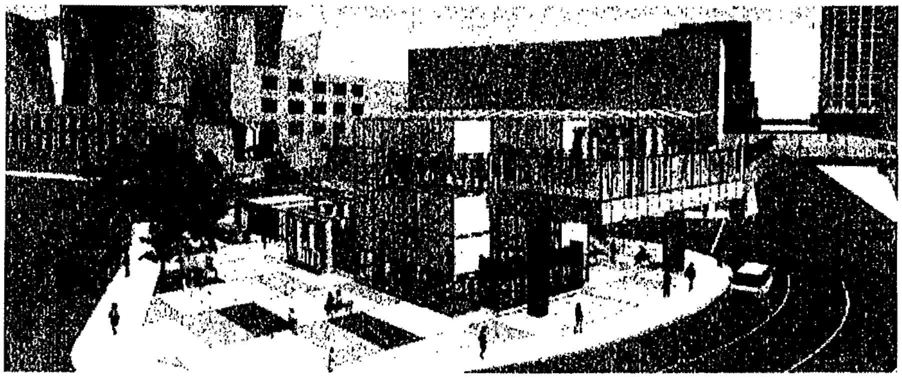
Updated design plans for pedestrian bridge at Regional Connector 2nd Place/Hope St Station

BY ANNA CHEN ON JULY 24, 2015 • (12 COMMENTS)





THE



If you've been following the Regional Connector project, you may remember that there were some public concerns about connecting the future 2nd/Hope Station to the many attractions along Grand Avenue. (And if you don't remember, here's a refresher (http://thesource.metro.net/2013/05/16/new-concept-developed-to-better-connect-the-regional-connector-to-grand-avenue-community-funding-however-will-be-needed/).)

The Regional Connector Community Leadership Council's 2nd/Hope Committee, made up of area residents and stakeholders, requested a pedestrian to help bring bring riders from the underground platform to Grand Avenue's street level. While I'm not always a fan of "sidewalks in the sky" (athough admittedly they tend to make cities look cool and futuristic), I'm a big fan of better connections for people who walk.

So here's Metro's updated design plans for the 2nd/Hope Station's pedestrian bridge. The committee found the design attractive and functional without competing with the extraordinary architecture of its neighbors — The Broad museum, MOCA, Walt Disney Concert Hall, etc. — while working well with Metro's modern system-wide station design.

"The committee feels the clean lines and pragmatic design of the bridge will safely connect transit users and area visitors to Upper Grand's rich entertainment, business, cultural and educational

There were a few concerns raised regarding the stainless steel cap to the bridge. Some commented that steel could easily be scratched. Others were worried that the flat design may tempt skateboarders to use it despite the clear danger of height. In addition, stainless steel can become hot to touch. (Take it from me, dedicated statue-hugger, you do not want to touch things made of stainless steel on a sunny day.)

Metro designers will consider alternatives in light of the comments, so there will be more design work to come before this station design is finalized.

THE

Is it really so hard to just have a secondary exit on the Reply sidewalk area next to the buildings instead of stranding exiting riders on the traffic island and then forcing them to take slow elevators to go over a sky bridge to cross a street? I know there isn't wide open areas off the island, but plenty of cities manage to fit extra exits on relatively narrow sidewalks without an issue.

You're supposed to be actively working on "last mile" issues and yet seem to have trouble dealing with the "last 50 foot issue"

★ (http://thesource.metro.net/2015/07/24/updated-design-plans-for-pedestrian-bridge-at-regional-connector-2nd-placehope-st-station/?like_comment=187938&_wpnonce=ed222c6c51)
Like

‹ Older Comments

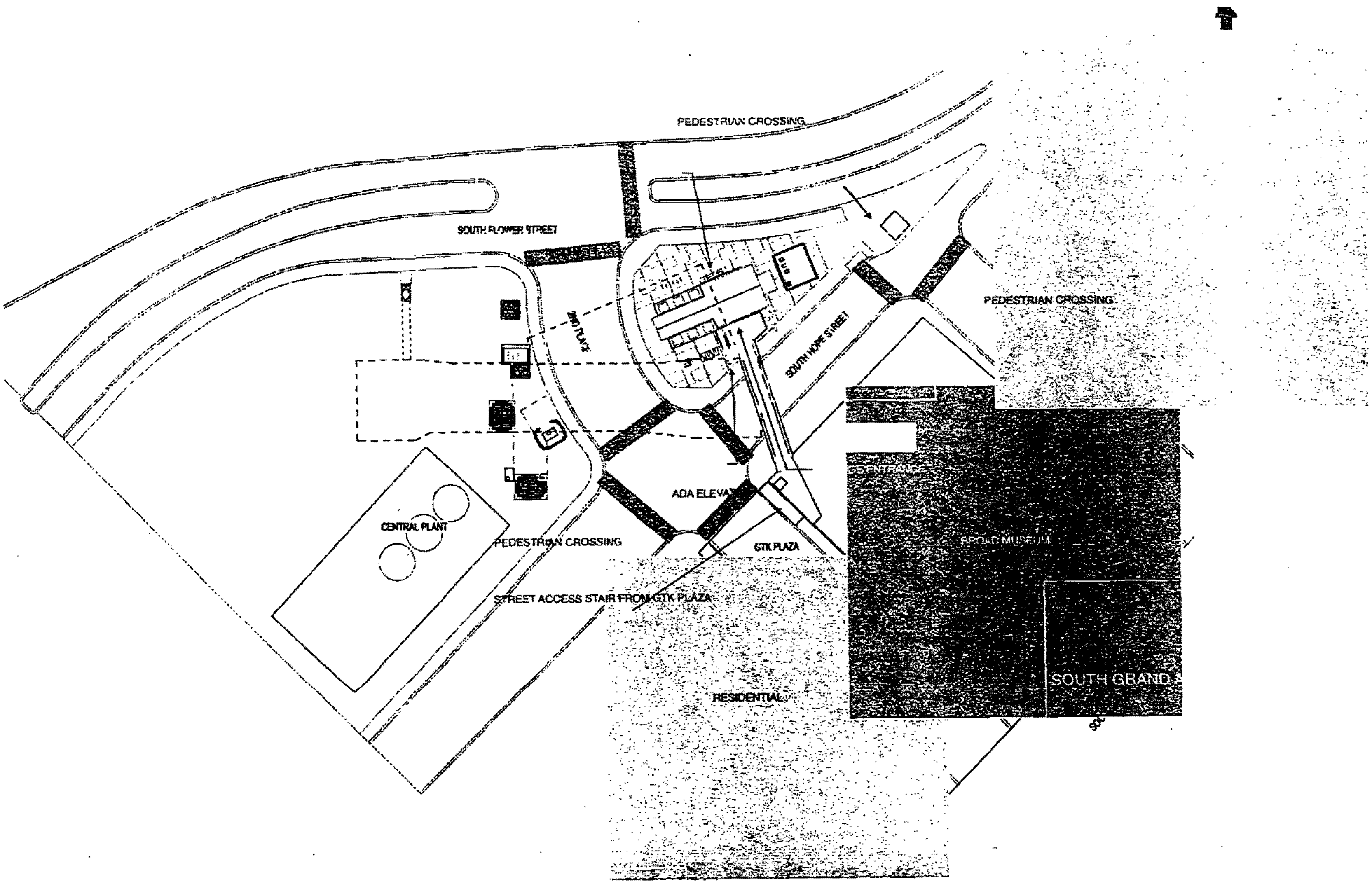
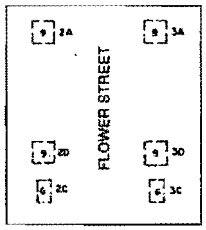

PEDESTRIAN CROSSING
SOUTH FLOWER STREET
2ND PLACE
SOUTH HOPE STREET
PEDESTRIAN CROSSING
ADA ELEVA
CENTRAL PLANT
PEDESTRIAN CROSSING
GTK PLAZA
STREET ACCESS STAIR FROM GTK PLAZA
RESIDENTIAL
BROAD MUSEUM
SOUTH GRAND

Exhibit 2

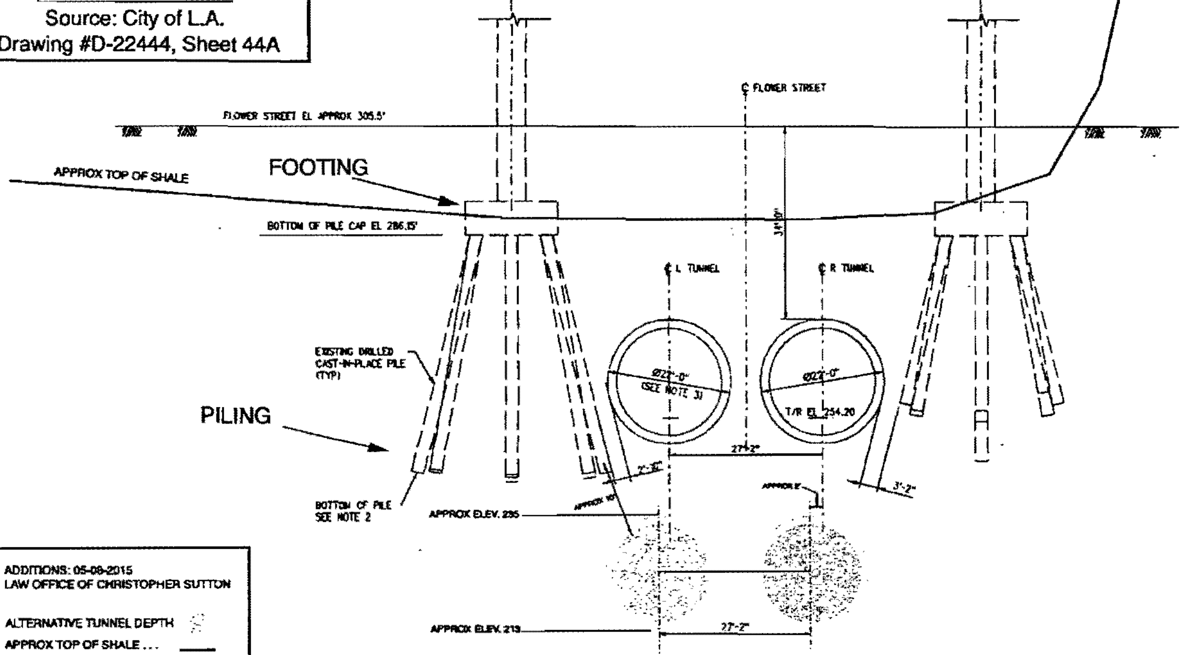
FOURTH STREET BRIDGE FOOTINGS: 2A & 3A



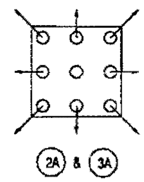
Source: City of L.A.
Drawing #D-22444, Sheet 44A

NOTES:

1. FOR GEOLOGICAL PROFILES ALONG TUNNEL ALIGNMENT SEE GEOLOGICAL PLAN AND PROFILE DRAWINGS.
2. THE PILE CAP AND PILE TIP DATA ARE EXTRACTED FROM AS-BUILT DRAWINGS OWNED BY THE CITY OF LOS ANGELES D-22444.
3. PILE AND PILE CAP INFORMATION TO BE VERIFIED IN FIELD BY THE CONTRACTOR.
4. AN OUTSIDE DIAMETER OF 22'-0" IS USED FOR CLEARANCE ANALYSIS OF TUNNELS AND FOUNDATIONS



SECTION- 4TH STREET BRIDGE (D / Y-304) Y-105
STA R 20+40



TYPICAL PILE INCLINATION PATTERN

PILE ORIENTATION		
PIER NO.	PILE DIA (IN)	AS-BUILT PILE TIP ELEVATION
2A	26	244.65
	26	243.15
	26	243.15
	26	244.15
	26 V	243.65
	26	244.15
	26	244.15
	26	242.15
	26	244.15
3A	26	255.55
	26	253.55
	26	254.65
	26	256.65
	26 V	246.15
	26	256.65
	26	254.65
	26	255.55
	26	258.65

10' 0 10' 20'

ADDITIONS: 05-08-2015
LAW OFFICE OF CHRISTOPHER SUTTON

ALTERNATIVE TUNNEL DEPTH
APPROX TOP OF SHALE . . .

SOURCE: CITY OF LOS ANGELES
DRAWING D-22444, SHEETS 2,3,7,9, 44A

BASIS FOR COST

REV	DATE	BY	APP	REC NO	EXPIRES	SEAL HOLDER	DESCRIPTION

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.

DESIGNED BY N. ALLAHVERDI
DRAWN BY J. DALVA
CHECKED BY V. NASRI
IN CHARGE P. ROY
DATE 2/3/2012

Metro
LOS ANGELES COUNTY
METROPOLITAN TRANSPORTATION AUTHORITY

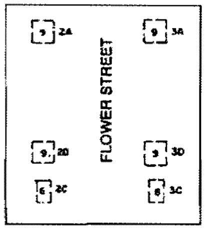
The Connector Partnership

REGIONAL CONNECTOR TRANSIT CORRIDOR
PRELIMINARY ENGINEERING
TUNNEL AND STATIONS - SECTIONS
BORED TUNNELS
SHEET 5 OF 9

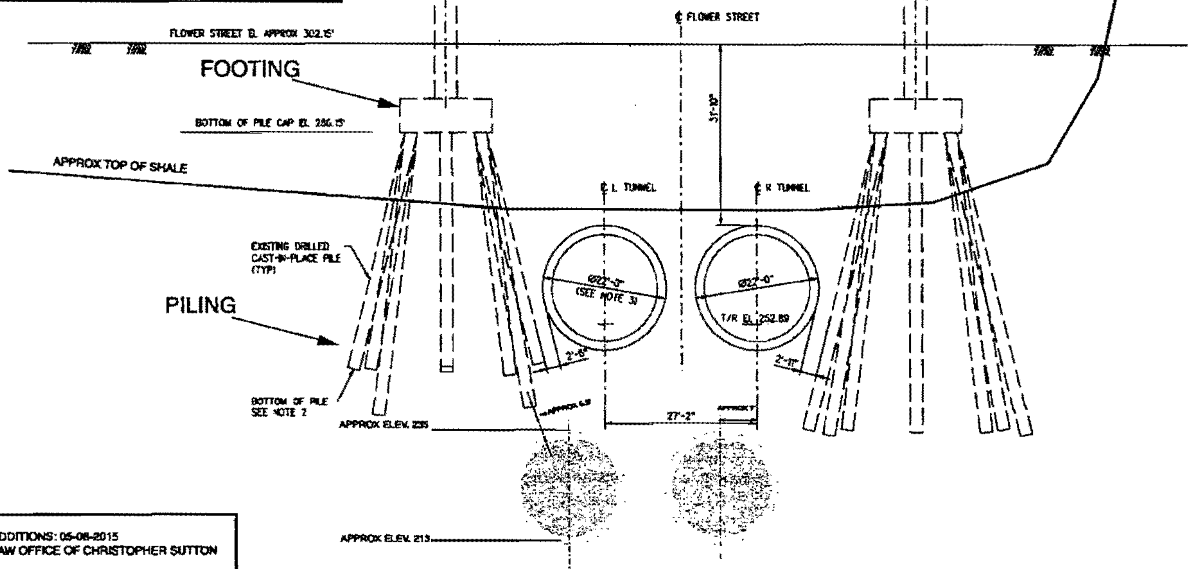
CONTRACT NO
DRAWING NO Y-304 REV 0
SCALE 1" = 10'
SHEET NO

FOURTH STREET BRIDGE FOOTINGS: 2D & 3D

FOOTING LOCATIONS



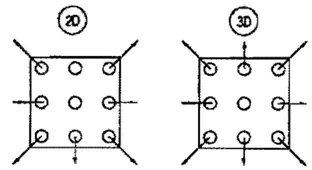
Source: City of L.A.
Drawing #D-22444, Sheet 44A



SECTION- 4TH STREET BRIDGE (B / Y-302) Y-104
STA R 19+47

NOTES:

1. FOR GEOLOGICAL PROFILES ALONG TUNNEL ALIGNMENT SEE GEOLOGICAL PLAN AND PROFILE DRAWINGS.
2. THE PILE CAP AND PILE TIP DATA ARE EXTRACTED FROM AS-BUILT DRAWINGS OWNED BY THE CITY OF LOS ANGELES D-224444.
3. PILE AND PILE CAP INFORMATION TO BE VERIFIED IN FIELD BY THE CONTRACTOR.
4. AN OUTSIDE DIAMETER OF 22'-0" IS USED FOR CLEARANCE ANALYSIS OF TUNNELS AND FOUNDATIONS.



TYPICAL PILE INCLINATION PATTERN

PILE ORIENTATION

PIER NO.	PILE DIA (IN)	AS-BUILT PILE TIP ELEVATION
2D	26	244.65
	26 V	244.15
	26	237.65
	26	244.65
	26 V	245.65
	26	245.65
	26	238.15
	26 V	245.15
	26	243.65
3D	26	232.65
	26	234.65
	26	233.65
	26	233.65
	26 V	233.15
	26	232.65
	26	233.65
	26	234.65
	26	233.15

10' 0 10' 20'

ADDITIONS: 05-08-2015
LAW OFFICE OF CHRISTOPHER SUTTON

ALTERNATIVE TUNNEL DEPTH
APPROX TOP OF SHALE . . .

SOURCE: CITY OF LOS ANGELES DRAWING D-22444, SHEETS 2,3,7,9, 44A

BASIS FOR COST

DESIGNED BY N. ALLAHVERDI
DRAWN BY J. DALVA
CHECKED BY V. HASRI
IN CHARGE P. ROY
DATE 2/3/2012

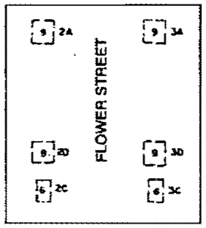
LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY
Metro
The Connector Partnership

REGIONAL CONNECTOR TRANSIT CORRIDOR
PRELIMINARY ENGINEERING
TUNNEL AND STATIONS - SECTIONS
BORED TUNNELS
SHEET 3 OF 9

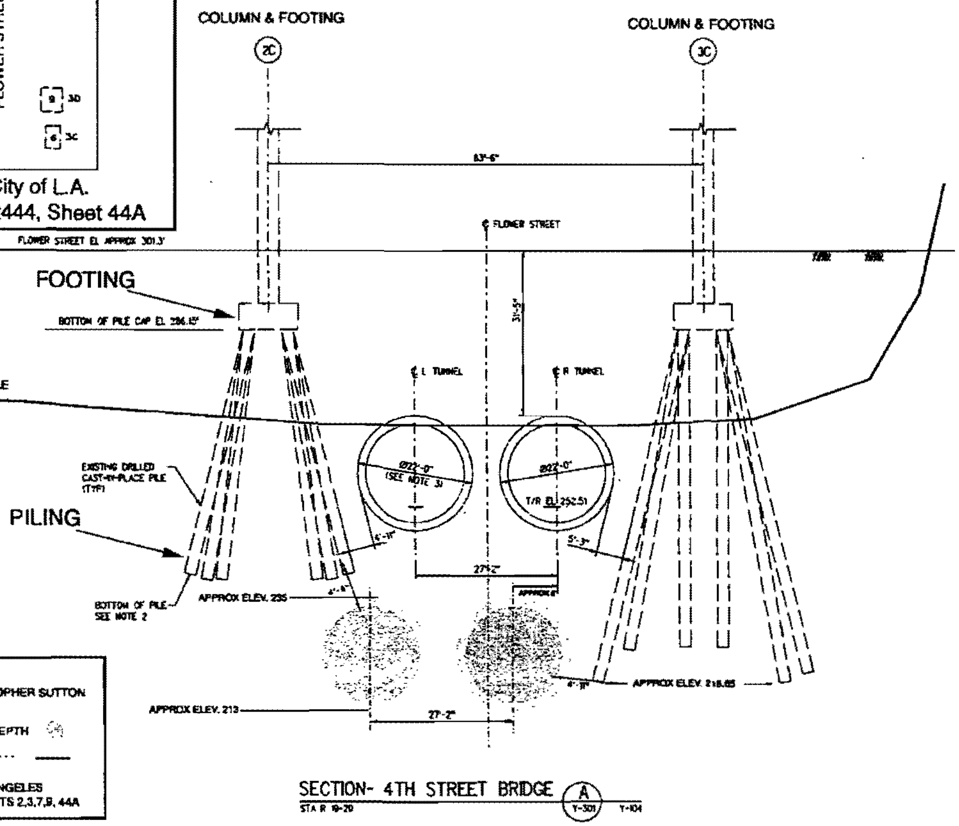
DRAWING NO Y-302 REV 0
SCALE 1" = 10'

FOURTH STREET BRIDGE FOOTINGS: 2C & 3C

FOOTING LOCATIONS



Source: City of L.A.
Drawing #D-22444, Sheet 44A



ADDITIONS: 05-08-2015
LAW OFFICE OF CHRISTOPHER SUTTON

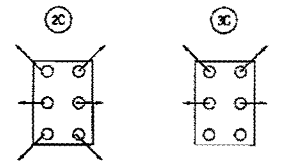
ALTERNATIVE TUNNEL DEPTH
APPROX TOP OF SHALE . . .

SOURCE: CITY OF LOS ANGELES
DRAWING D-22444, SHEETS 2,3,7,9, 44A

SECTION- 4TH STREET BRIDGE (A / Y-301) Y-104
STA R 19-20

NOTES:

1. FOR GEOLOGICAL PROFILES ALONG TUNNEL ALIGNMENT SEE GEOLOGICAL PLAN AND PROFILE DRAWINGS.
2. THE PILE CAP AND PILE TIP DATA ARE EXTRACTED FROM AS-BUILT DRAWINGS OWNED BY THE CITY OF LOS ANGELES D-22444.
3. PILE AND PILE CAP INFORMATION TO BE VERIFIED IN FIELD BY THE CONTRACTOR.
4. AN OUTSIDE DIAMETER OF 22'-0" IS USED FOR CLEARANCE ANALYSIS OF TUNNELS AND FOUNDATIONS.



TYPICAL PILE INCLINATION PATTERN

PILE ORIENTATION

PIER NO.	PILE DIA (IN)	AS-BUILT PILE TIP ELEVATION
2C	26	238.65
	26	234.65
	26	233.65
	26	231.65
	26	238.65
	26	235.65
3C	26	225.15
	26	218.65
	26	218.65
	26	220.65
	26 V	225.65
	26 V	225.65

BASIS FOR COST

REVIEWED BY N. ALLANVERDI
DRAWN BY J. DALVA
CHECKED BY V. NASRI
IN CHARGE P. ROY
DATE 2/3/2012

LOS ANGELES COUNTY
METROPOLITAN TRANSPORTATION AUTHORITY
Metro
The Connector Partnership

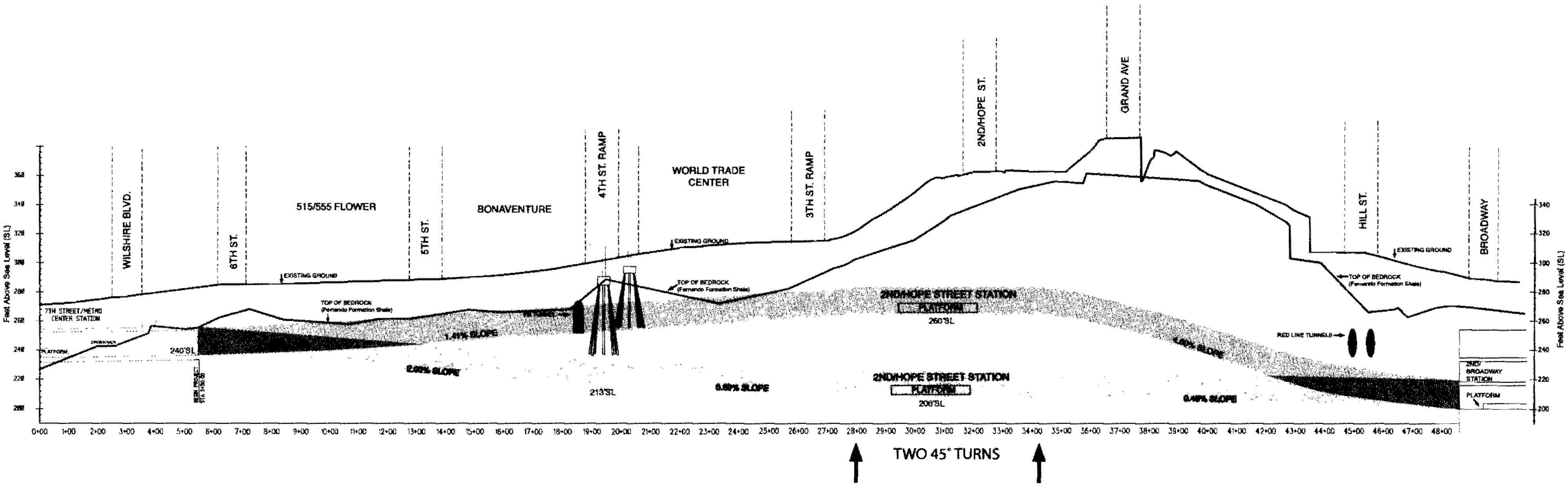
REGIONAL CONNECTOR TRANSIT CORRIDOR
PRELIMINARY ENGINEERING
TUNNEL AND STATIONS - SECTIONS
BORED TUNNELS
SHEET 2 OF 9

DRAWING NO Y-301 REV 0
SCALE 1" = 10'

AR00024562

Exhibit 3

Deep Tunnel Alternative



MTA ADOPTED TUNNEL DEPTH

ALTERNATIVE TUNNEL DEPTH

Note: Horizontal scale condensed 5:1.

Source Material – Alternative Tunneling Diagram

- Regional Connector Transit Corridor, Final Environmental Impact Statement/Environmental Impact Report Volume F-6, Appendix II: Conceptual Drawings for Build Alternatives Analyzed in the Draft EIS/EIR; FTAR 12648-12769 (12678-12680)
- Regional Connector Transit Corridor Basis for Cost, Volume 1, Preliminary Engineering Drawings, Los Angeles County Metropolitan Transportation Authority; FTAR 24271-24693 (24539-24556)
- Task No. 7.9.50 – Draft Evaluation of Tunnel Design & Construction on Flower Street; MSAR 17236-17253 (17250)
- Regional Connector Transit Corridor, Flower Street Proposed Construction, Draft Concept Design, Los Angeles County Metropolitan Transportation Authority PowerPoint Presentation; FTAR 20117-20134 (20120)
- Regional Connector, Final Conceptual Engineering Design Report: Appendix B: Sketches – Station Design and Architecture; Appendix C: Plate 1 – Underground Alternative – Geologic Profile; Plate 2 – Underground Alternative – Subsurface Obstructions, Los Angeles County Metropolitan Transportation Authority; FTAR 45815-45824 (45823)

Exhibit 4

PC5

No.	Date of Question	Question	Answer	Answer Issued
305	4/29/2013	Q & A # 34, Alternative Construction / Tunneling methods, Specification 31 71 19 - Excavation by Tunnel Boring Machine, 31 71 00 - Excavation by (SEM): Question No. 34, dated 2/5/2013, requested alternative construction/tunneling methods be encouraged to address stakeholder concerns and/or litigation. Metro response, dated 3/22/2013, replied that alternative construction/tunneling methods are permitted, even encouraged, as long as the methods conform in all respects to the requirements of the RFP and requirements for alternate proposals.	Metro's analysis of alternative construction/tunneling issues shows that tunneling and use of SEM in the Flower Street section of the Project presents issues of financial feasibility, technical and operational problems, including significant construction risk and worker and public safety concerns. In addition, the alternative proposal (AP) process set forth in IP-08 provides for Metro's review and decision on an AP following the proposal submittal, not before. We also refer to the answer given to question #263 above. Therefore, for these reasons, Metro will not "pre-approve" the alternatives described in the question. Nonetheless, a Proposer has the opportunity to submit a PAPS and/or AP addressing what the Proposer considers viable alternatives, and in so doing have the opportunity, and the obligation to demonstrate that its proposed AP satisfies the requirements for an acceptable AP, as required by IP-08.	5/10/2013
		The requirements of the RFP mandate using Earth Pressure Balance (EPB) TBM or Slurry TBA as a Contract requirement. TBM Tunneling must use a minimum face pressure between 10 psi and at-rest earth pressure. Additionally, the RFP requirements allow tunnel excavation by use of Sequential Excavation Method (SEM) although apparently limited to the mined crossover cavern adjacent to 2nd & Broadway Station.	IP-08 B. states: "Proposers submitting conforming proposals may submit written alternate proposals to this RFP as complete separate offers, if the alternate proposals offer technical improvements or modifications that are to the overall benefit of LACMTA. An alternate proposal must be equal to or better than the original requirements of the Contract Documents, as determined by LACMTA in its sole discretion. LACMTA reserves the right, at its sole discretion, to accept or reject any alternate proposal. An alternate proposal will not be considered by LACMTA if it would reduce quality,	
		The Flower Street Cut & Cover section runs form approximate station R5+47.83 to R19+02, 1,354 LF. The GBR Section 4.3, Flower Street Cut-and-Cover states subsurface excavations for some of the adjacent buildings along this section are known to have been supported by tie-back anchors. This is the primary reason for excavation by cut-and-cover construction methods for this section of the project.	performance or reliability; would only seek to relax LACMTA requirements; would change the definition of the Project as set forth in the environmental Record of Decision or require a supplemental EIR/EIS; or would have any negative impact on the Revenue Operations Date (ROD); or would add more than minimal risk to LACMTA or public and private properties as determined by LACMTA in its sole discretion.	
		The presence of tiebacks indicated within the path of a pressurized-face TBM would preclude the use of this type of alternative tunneling method in this reach. Will LACMTA approve tunneling the Flower Street reach using Sequential Excavation Method, SEM or a combination of SEM and Cut-and-Cover Methods? Please provide any other alternative construction/tunneling methods LACMTA would permit or encourage to address stakeholder concerns and/or litigation.	The decision to accept or reject an alternative proposal shall not be grounds for protest by any Proposer. Oral or telephonic proposals and/or modifications shall not be considered. Any alternative proposals accepted will be evaluated in accordance with the evaluation criteria in this RFP."	

Exhibit 5

PC5

Document
News
Articles

L.A. TIMES 5-17-2013 pg. A1 & A15

LA Times 5/17/13 pg A1-A15

Subway worries for the Phil

A test suggests a new line might be heard in Disney Hall

BY MIKE BOEHM

Nothing in the Los Angeles Philharmonic's repertoire calls for 135-ton trains. The orchestra aims to keep it that way when Metro light rail cars start rumbling through a subway tunnel near Walt Disney Concert Hall.

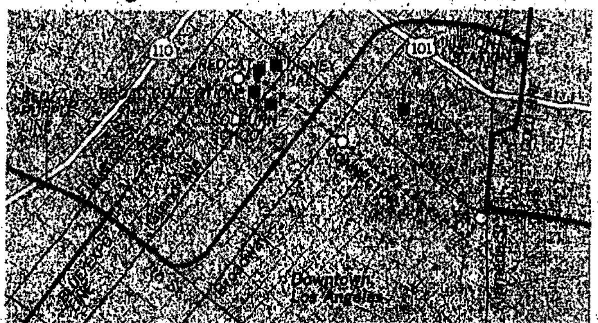
Experts who know the hall's acoustics are worried that the listening experience in the main auditorium could suffer when subway trains begin running 125 feet below the parking garage in 2020.

"It would be a disaster for Disney Hall," said its architect, Frank Gehry.

Noisy neighbor

Recent tests have raised concerns at downtown cultural venues about sound levels from a planned subway line.

Existing lines ---- Planned line ○ Planned stations



* Under construction

Source: Metropolitan Transportation Authority

BRADY MACDONALD Los Angeles Times

Subway planners have assured that noise won't be a problem, but a recent simulation conducted by the Los Angeles County Metropolitan Transportation Authority raised concerns.

The acoustic experiment was conducted April 23 in Thayer Hall, a below-ground performance and recording space at the Colburn School. The intimate venue, near 2nd Street and Grand Avenue, is closer than Disney Hall to the $1.37-billion subway's route, which will include a stretch beneath 2nd Street from Hope Street to Central Avenue.

"They played a solo piano piece through a loudspeaker

[See Subway sound, A15]

Performances already have one conductor

[**Subway sound,** from A1] and had subwoofers that simulated a passing train," said Fred Vogler, a recording engineer who oversees recording sessions and concert-taping for the Colburn School and the L.A. Philharmonic. "The test was several minutes long. Then they said, 'Is anybody troubled by the train sounds?' We said, 'Well, we heard them, if that's what you're asking.' It set off a lot of concerns."

Gehry heard about the test from Vogler, then passed along his concerns to Los Angeles County Board of Supervisors member Zev Yaroslavsky and others. He said projections of subway noise done nearly two years ago by Metro's noise abatement consultants, who predicted there would be no audible impact on Disney Hall, should be reviewed.

"The flag is up, and we should go over it and make sure," the architect said.

Art Leahy, Metro's chief executive, said that the simulation didn't represent the actual expected sonic impact of the trains. He said it was part of the process of determining just how exacting the noise abatement devices along the tracks must be to meet Metro's goal, which is no additional noise at all in performance spaces near the subway. In addition to noise-abatement consultants, Metro has hired an acoustics expert.

"We are not about to do anything which in any fashion, however slightly, impairs or damages ... Disney Hall or any other feature in that area," Leahy said. "They are critically important, and we are simply not going to build something that reduces the utility or benefit of those facilities. That's a blanket statement, no conditions or qualifiers on it."

The standard to be met isn't just preventing noise that an audience can hear, Leahy said, but the more stringent one of eliminating sounds that a recording microphone can pick up.

Yaroslavsky and Stephen Rountree, president of Disney Hall's landlord, the Music Center, said they will arrange a meeting in which cultural organizations adjacent to the subway route, which include the upcoming Broad Collection contemporary art museum and REDCAT, can receive an update from Metro project officials.

Rountree said the Music Center is retaining Disney Hall's acoustical designer, Yasuhisa Toyota, and its original noise abatement engineer, Charles M. Salter Associates, to go over Metro's noise projections, which raised no concerns when presented to cultural leaders in fall 2011.

"If new information has come up, we want to make sure it is reassessed and taken into account," Rountree said. "We'll bring in the engineers and go through the numbers one more time and make sure everyone is comfortable."

The sound simulation at Colburn was aimed at establishing the threshold at which subway noise ceases to be a problem, said Metro's Bryan Pennington, executive officer for the Regional Connector Transit Corridor Project, which will lay 1.9 miles of underground track to connect the Blue Line and Expo Line with the Gold Line.

The testing will help Metro set the maximum allowable decibel level for each performance space, which the subway's eventual design and construction contractors will have to satisfy.

Pennington said a June simulation at Thayer Hall will be at 36 decibels, down from 39 decibels in April.

GUSTAVO DUDAMEL ar
under 2nd Street — at leas

'We are not about to do anything which in any fashion, however slightly, impairs or damages ... Disney Hall.'

— ART LEAHY,
chief executive of Metro

Lowering a sound by 10 decibels makes it seem half as loud. He expects construction to begin at 2nd and Grand in two to three years. The project depends largely on federal funding that Metro hopes to land by the end of 2013.

The Environmental Impact Report, approved by the Metro board in January 2012, calls for common noise abatement features that reduce vibrations from passing trains, including rubber cushioning beneath the tracks, and rubberized fasteners to hold them in place. The result, it predicts, will be

LAWRENCE K. HO Los Angeles Times

ıd the Los Angeles Philharmonic won't be interrupted by noise from trains passing
ıt that's the goal. Metro is working to ensure the subway won't affect performances.

no audible impact on the nearby performance spaces.

The measured ambient noise level inside Disney Hall — the sound when nothing is happening — ranged from 24 to 28 decibels, according to the environmental report. It said Federal Transportation Authority noise standards call for a transit impact on concert halls of no more than 25 decibels— and that abatement measures will ensure that two passing trains project just 16 decibels into Disney Hall.

Pennington said that setting a speed limit lower than the 15 mph anticipated near Disney Hall also would reduce noise, but he doesn't expect that will be necessary.

Metro already has met the challenge of protecting recording studios in Hollywood from noise along its Red Line subway, he noted, even though the rail cars are heavier, and their vibrations bigger, than the ones that will run near Disney Hall.

Toyota, Disney Hall's acoustical designer, said that that the foundations of subway-adjacent performance halls he worked on in Tokyo and Shanghai have special features that reduce ground vibrations, but not Disney Hall. Widely acclaimed for its superior sound since opening in 2003, Gehry's space and Toyota's acoustics provided a platform for the Los Angeles Philharmonic to attract superstar conductor Gustavo Dudamel as its music director.

"We didn't assume a big vibration, such as from a subway, was going to come," Toyota said, and there's nothing further that can be done to the building now.

Deborah Borda, president of the philharmonic, said she isn't alarmed by the recent Colburn School noise simulation but thinks it's helpful that it has brought increased awareness.

"I think it's a good thing that there's a certain amount of uproar.... I have a comfort level with the [planning] process to this point, but the process is not completed," she said. "We all agree more analysis is required. [Disney Hall] is a treasure that has to be protected and maintained, and it will be."

Colburn School's president, Sel Kardan, issued a statement saying "we are working in a positive way" with Metro officials to keep its music facilities free from subway noise.

Yaroslavksy, a classical music buff, said the task now is "to determine whether the 2011 studies are valid or something slipped through the cracks. I'm not going to prejudge it or get hysterical about it. Obviously Metro will not build a line that is going to compromise Disney Hall."

Until reports of the Colburn School simulation began to circulate, "everybody was in sync" about the subway not being a noise threat, Yaroslavsky said. "If they're not in sync now, we'll get to the bottom of it. We want to find out what the facts are, and if the truth is that vibrations may compromise the acoustics of Disney Hall, Metro is going to have to adjust accordingly."

mike.boehm@latimes.com

Exhibit 6

PC5

UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

TODAY'S IV, INC., a California Corporation doing business as WESTIN BONAVENTURE HOTEL AND SUITES ;

Plaintiff,

vs.

FEDERAL TRANSIT ADMINISTRATION; PETER M. ROGOFF, in his official capacity as Administrator, Federal Transit Administration; LESLIE T. ROGERS, in his official capacity as Regional Administrator, Federal Transit Administration Region IX Office; UNITED STATES DEPARTMENT OF TRANSPORTATION; ANTHONY FOXX, in his official capacity as Secretary, United States Department of Transportation; LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY, a public entity; and ARTHUR T. LEAHY, in his official capacity as Chief Executive Officer of the Los Angeles County Metropolitan Transportation Authority,

Defendants.

Case No.: LA CV13-00378 JAK (PLAx)

Related Case Nos.:

LA CV13-00453 JAK (PLAx)
LA CV13-00396 JAK (PLAx)

JUDGMENT JS-6

Judge: Hon. John A. Kronstadt

PC5

On February 24, 2014, the Court heard cross-motions for summary judgment brought by Plaintiff Today's IV, Inc., d/b/a Westin Bonaventure Hotel in the above-captioned case (2:13-CV-00378-JAK-PLA), Plaintiff 515/555 Flower Associates, LLC in 2:13-CV-453-JAK-PLA (collectively, "Plaintiffs") and by Defendants in both cases: Federal Transit Administration ("FTA"), Peter M. Rogoff, Leslie T. Rogers, United States Department of Transportation, Anthony Foxx, Los Angeles County Metropolitan Transportation Authority, and Arthur T. Leahy (collectively, "Defendants"). After supplemental briefing, on May 29, 2014, the Court granted in part and denied in part those motions. On September 12, 2014, the Court GRANTED IN PART Plaintiffs' request for injunctive relief.

Accordingly, **FINAL JUDGMENT** is entered as follows:

1. In favor of Plaintiffs and against Defendants as to the following injunctive relief:
    a. The Court **REMANDS** the June 29, 2012 Regional Connector Record of Decision ("ROD") and **PARTIALLY VACATES** the ROD.
    b. The FTA shall prepare a supplemental analysis under the National Environmental Policy Act ("NEPA") that addresses the feasibility of Open-Face Shield and SEM tunneling alternatives.
    c. Unless and until FTA completes the Supplemental NEPA analysis, Defendants and their agents, contractors, subcontractors and representatives, are **ENJOINED** from commencing any cut and cover construction along the Lower Flower Segment of the Project.
    d. The Court shall retain jurisdiction to enforce the terms of this Injunction.
2. In favor of Defendants and against Plaintiffs as to all other relief sought by Plaintiffs.

IT IS SO ORDERED AND ADJUDGED.

Dated: October 24, 2014

John A. Kronstadt
United States District Judge

UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA
WESTERN DIVISION
312 North Spring Street, Room G-8
Los Angeles, CA 90012
Tel: (213) 894-3535

SOUTHERN DIVISION
411 West Fourth Street, Suite 1053
Santa Ana, CA 92701-4516
(714) 338-4750

EASTERN DIVISION
3470 Twelfth Street, Room 134
Riverside, CA 92501
(951) 328-4450

TERRY NAFISI
District Court Executive and
Clerk of Court

October 28, 2014

Federal Transit Administration
Attn: Remand Department
1200 New Jersey Avenue, SE
Washington, D.C. 20500

Re: Case Number: LA CV13-00378 JAK (PLAx)

Previously Superior Court Case No. N/A

Case Name: TODAY'S IV, INC v FEDERAL TRANSIT ADMINISTRATION, et al

Dear Sir / Madam:

Pursuant to this Court's ORDER OF REMAND issued on October 24, 2014, the above-referenced case is hereby remanded to your jurisdiction.

Attached is a certified copy of the ORDER OF REMAND and a copy of the docket sheet from this Court.

Please acknowledge receipt of the above by signing the enclosed copy of this letter and returning it to our office. Thank you for your cooperation.

Respectfully,

Clerk, U. S. District Court

Sharon Hall-Brown

By: Sharon Hall-Brown
Deputy Clerk 213-894-5883

☒ Western ☐ Eastern ☐ Southern Division

cc: Counsel of record

Receipt is acknowledged of the documents described herein.

Clerk, Superior Court

By: ______________________
Deputy Clerk

____
Date

Exhibit 7

PC5

SETTLEMENT AGREEMENT

This Settlement Agreement (this "**Agreement**") is made and entered into as of June 30, 2015 (the "**Effective Date**") by and between the Los Angeles County Metropolitan Transportation Authority ("**Metro**"), and FSP – South Flower Street Associates, LLC, a Delaware limited liability company ("**FSP**"). Metro and FSP are individually referred to herein as a "**Party**" and collectively as the "**Parties**."

RECITALS

A. On April 26, 2012, Metro's Board of Directors approved Metro's Regional Connector Transit Project ("**Regional Connector Project**") and certified the Environmental Impact Report ("**EIR**") for the Regional Connector Project under the California Environmental Quality Act ("**CEQA**"). The Regional Connector Project is a 1.9-mile subway line with three new underground stations to be built in downtown Los Angeles, California that would ultimately connect the Gold Line, on its eastern end, and the Blue and Expo Lines at the 7th Street/Metro Centre Station at its western end, in the financial district of downtown Los Angeles.

B. On June 29, 2012, the Federal Transit Administration ("**FTA**") issued its Record of Decision ("**ROD**") for the Regional Connector Project under the National Environmental Policy Act ("**NEPA**"), making, inter alia, the finding required by the Federal Transit Law (49 U.S.C. § 5324(b)) that the environmental record for the Regional Connector Project, including its Environmental Impact Statement ("**EIS**"), met the requirements of that law.

C. On May 25, 2012, 515/555 Flower Associates, LLC, a Delaware limited liability company ("**Flower Associates**"), filed a Petition for Writ of Mandate and Complaint for injunctive and declaratory relief under CEQA against Metro ("**CEQA Petition**") in the Los Angeles County Superior Court, as Los Angeles Superior Court Case No. BS137271 ("**CEQA Case**"). By the Petition, Flower Associates sought a writ of mandate ordering Metro to set aside its certification of the EIR and approval of the Regional Connector Project until a proper analysis of the Regional Connector Project's impacts, and of alternatives and mitigation measures to reduce or avoid the Regional Connector Project's impacts, had been prepared and certified.

D. On January 22, 2013, Flower Associates filed a Complaint for declaratory and injunctive relief under NEPA ("**NEPA Complaint**") against the FTA, the United States Department of Transportation, Metro and various individuals in their official capacities (collectively, "**Defendants**") in the United States District Court, Central District, Western Division, as Case No. 2:13-CV-00453-JAK-PLA ("**NEPA Case**"). By the Complaint, Flower Associates sought a declaratory judgment and an injunction requiring all Defendants to comply with NEPA, and prohibiting all construction and construction-related activity on the Regional Connector Project until such time as an EIS adequate under NEPA has been prepared.

E. On October 1, 2013, FSP purchased City National Plaza and the J-2 Garage (hereinafter defined) from Flower Associates. On October 1, 2013, FSP, through 515/555 Special Member, LLC, became the controlling member of Flower Associates for the CEQA Case and the NEPA Case.

F. The NEPA Case was heard by the Honorable John A. Kronstadt, Judge of the United States District Court, and determined by cross-motions for summary judgment that were heard on February 24, 2014. Final Judgment was entered on October 24, 2014 partially in favor of Flower Associates and partially in favor of the Defendants (the "**NEPA Judgment**"). The NEPA Judgment included an Injunction issued in favor of Flower Associates that (1) remanded and partially vacated the June 29, 2012 ROD; (2) ordered the FTA to prepare a supplemental analysis (the "**Supplemental Analysis**") under NEPA addressing the feasibility of open-face shield and sequential excavation method tunneling alternatives under South Flower Street south of 4th Street in the Financial District; and (3) enjoined Defendants and their agents, contractors, subcontractors and representatives from commencing any cut and cover construction along South Flower Street south of 4th Street unless and until the FTA completed the Supplemental Analysis. The NEPA Judgment also provided that the Court would retain jurisdiction to enforce the terms of the Injunction.

G. On December 18, 2014, the FTA, the United States Department of Transportation, and related individual Defendants filed a notice of appeal of the NEPA Judgment to the Ninth Circuit Court of Appeals ("**FTA NEPA Appeal**"). On December 19, 2014, Metro filed a notice of appeal of the NEPA Judgment to the Ninth Circuit Court of Appeals ("**Metro NEPA Appeal**"). The FTA NEPA Appeal and the Metro NEPA Appeal (collectively, "**NEPA Appeals**") are currently pending.

H. The CEQA Case was tried by the Honorable Judge Richard L. Fruin, Judge of the Superior Court, on May 14 and 15, 2014. The Judgment and final Statement of Decision were entered on November 10, 2014 in favor of Metro ("**CEQA Judgment**"). The CEQA Judgment rejected Flower Associates' claims that Metro had violated CEQA and the California Public Records Act. Flower Associates' Motion to Vacate the Judgment was heard and denied on December 11, 2014.

I. On December 30, 2014, Flower Associates appealed the CEQA Judgment to the California Court of Appeal, Second Appellate District as Case No. B261086 ("**Flower Associates CEQA Appeal**"). On January 2, 2015, Metro filed its cross-appeal in the CEQA Case on the trial court's denial of Metro's Motion for Judgment on the Pleadings ("**Metro CEQA Appeal**"). The Flower Associates CEQA Appeal and the Metro CEQA Appeal (collectively, "**CEQA Appeals**") are currently pending in Division 5 of the Second Appellate District.

J. Pursuant to the requirements of the Injunction included in the NEPA Judgment, FTA and Metro are required to prepare the Supplemental Analysis regarding the feasibility of tunneling alternatives under Flower Street south of 4th Street.

H. Metro desires to (i) provide contractual commitments to implement environmental protections to reduce the impact of the Regional Connector Project on the environment of the Flower Street Business District, (ii) dismiss the Metro NEPA Appeal and the Metro CEQA Appeal as to Flower Associates, and (iii) cause the dismissal of the FTA NEPA Appeal as to Flower Associates. In exchange, FSP desires to dismiss the Flower Associates CEQA Appeal.

NOW, THEREFORE, in consideration of the foregoing and the mutual covenants set forth below, and further good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties do hereby agree, as follows:

1. **Definitions**. The capitalized terms set forth below shall have the meanings indicated:

"**accessible**" or "**accessibility**" means (i) with respect to access to and egress from the CNP Garage, the full width of the driveways shall remain open to traffic at all times and the turning movement from the street onto the entrance ramp and from the exit ramp onto the street shall be possible to make safely at a reasonable speed (taking into account the ongoing construction activities in the area) and shall meet LADOT standards, and (ii) with respect to access to and from the J-2 Garage on Flower Street, the full width of the driveways shall remain open to traffic at all times and the turning movement from Flower Street to the entrance driveway and from the exit driveway onto Flower Street shall be possible to make safely at a reasonable speed (taking into account the ongoing construction activities in the area) and shall meet LADOT standards. In each case, the approach and entrance to the Garage shall be well-marked with signage clearly visible at appropriate distances.

"**Affected Businesses**" has the meaning set forth in Section 20.

"**AM Peak Period**" means 7:00 a.m. to 9:00 a.m. on weekdays other than national holidays.

"**Business Mitigation Assistance**" has the meaning set forth in Section 20.

"**City National Plaza**" or "**CNP**" means the City National Plaza and Towers located at 505-555 South, including the subterranean retail level located at 505 South Flower Street (known as Level B) and the "Jewel Box" building located at 525 South Flower Street.

"**CNP Garage**" means the subterranean garage located below CNP, which has a loading dock on 5th Street, an entrance on 5th Street, an exit on 6th Street and an entrance and exit on Flower Street.

"**CNP Plaza**" means the plaza located at CNP, which plaza fronts on Flower Street and includes restaurants, a bank branch, a fountain with artwork, tables and chairs, landscaping and, on Flower Street, a bus stop and vehicle loading area.

"**Contract Documents**" means Metro's C0980 Construction Contract Documents.

"**Construction Period**" means the entire period of construction of the Regional Connector on Flower Street from the beginning of the Utility Relocation Stage until the completion of the Street Restoration stage and cessation of all related work in the Flower Street Business District.

"**Cut/Cover Area**" means the area in Flower Street between the piles in which Metro shall excavate and construct the guideway structure as part of the Regional Connector Project. The Cut/Cover Area is depicted on Exhibit A attached hereto.

"**Daytime Period**" means weekdays between 7:00 a.m. and 9:00 p.m.

"**Daytime Work**" means work on the Regional Connector Project in the Flower Street Construction Area conducted during the Daytime Period.

"**Daytime Work Requirements**" means the following requirements, which must be met if Metro is to conduct Utility Relocation, Pile and Cap Beam Installation, Steady State or Final Paving work on Flower Street during the Daytime Period:

(i) Metro shall have provided written notice to Flower Associates of (a) such scheduled Utility Relocation, Pile and Cap Beam Installation and Final Paving work as part of a twenty-one day (21) "look ahead" projection for planning purposes, (b) the actual start of such Utility Relocation, Pile and Cap Beam Installation and Final Paving work at least seventy-two (72) hours in advance of the scheduled start (except when circumstances have arisen due to unforeseeable conditions beyond the control of Metro or the Design-Build Contractor where such advance notice may be impracticable),

(ii) Any work taking place during the Daytime Period shall occur only adjacent to the segments shown in pink and blue on Exhibit G attached hereto and no work shall occur adjacent to the segments shown in yellow on Exhibit G during the Daytime Period (other than in the intersections in accordance with this Agreement),

(iii) Pile and Cap Beam Installation and all related equipment, materials and supplies shall be located within the boundaries of K-rails on Flower Street,

(iv) the Flower Street entrance to and exit from the CNP Garage shall be open and accessible at all times during the Daytime Period,

(v) the Flower Street entrances and exits to the J-2 Garage shall be open and accessible at all times during the Daytime Period,

(vi) any Daytime Work that will close the intersections of 4th, 5th and 6th Streets with Flower Street, shall be prohibited during the Daytime Period,

(vii) when the Pile and Cap Beam Installation occurs on the east side of Flower Street between 5th Street and 6th Street, the three (3) western-most contiguous lanes of Flower Street shall remain open and accessible at all times and there shall be sufficient room for an additional left turn pocket permitting a turn onto 6th Street, and when Pile and Cap Beam Installation occurs on the east side of Flower Street between 4th Street and 5th Street, the three (3) western-most contiguous lanes shall remain open and accessible at all times and there shall be sufficient room for an additional right turn pocket permitting a turn onto 5th Street (provided, however, that FSP and Metro acknowledge that LADOT's approval of the lane configuration is required),

(viii) when the Pile and Cap Beam Installation or Water Main Relocation occurs on the west side of Flower Street between 5th Street and 6th Street, the three (3) eastern-most contiguous lanes of Flower Street shall remain open and accessible at all times and there shall be sufficient room for an additional left turn pocket permitting a turn onto 6th Street, and when such work occurs on the west side of Flower Street between 4th Street and 5th Street, the three (3) eastern-most contiguous lanes shall remain open and accessible at all times and there shall be sufficient room for an additional right turn pocket permitting a turn onto 5th Street (provided, however, that FSP and Metro acknowledge that LADOT's approval of the lane configuration is required),

(ix) the Pile and Cap Beam Installation may occur on only one (1) side of Flower Street at a time, taking into account the entire length of Flower Street from 4th Street to 6th Street,

(x) Metro shall provide suitable detours around the construction work with appropriate signage identifying the CNP entrances and the J-2 Garage entrances, and

(xi) the Design-Build Contractor shall post signs, provide flag persons as needed and take other reasonable steps to ensure accessibility is maintained safely and alternate routes to the CNP and J-2 Garage entrances are adequately marked and publicized.

"**Decking**" means the precast concrete decking that will be placed over the initial excavation of Flower Street as part of the Deck Installation stage.

"**Deck Installation**" means the construction stage during which the Decking is installed on the piles and cap beams.

"**Deck Removal**" means the removal of the Decking prior to the start of the Street Restoration stage.

"**5th Street Loading Dock**" means CNP's loading dock, access to which is located on 5th Street between Flower Street and Figueroa Street.

"**Final Paving**" means the last phase of the Street Restoration stage, in which the final paving surface is installed and striped.

"**Flower Street Business District**" means the area bounded by 7th Street on the south, Grand Avenue on the east, 3rd Street on the north and Figueroa Street on the west and shall include any real property or business that fronts on any of those streets.

"**Flower Street Construction Area**" means the area on Flower Street between 4th Street on the north and the southern-most end of the Cut/Cover Area south of 6th Street.

"**FSP**" means FSP – South Flower Street Associates, LLC, the entity that owns CNP.

"**General Requirements**" has the meaning set forth in Section 12.1.

"**Design-Build Contractor**" means Regional Connector Constructors (a joint venture between Skanska USA Civil West California District, Inc., and Traylor Bros. Inc.), the firm selected by Metro to design and build the Regional Connector Project.

"**Holiday Moratorium**" means the period from the Monday immediately before Thanksgiving through January 2, during which the Los Angeles Department of Public Works prohibits certain lane closures.

"**J-2 Garage**" means the J-2 Parking Garage located at 400 South Flower Street, which serves as a parking structure for CNP and which has entrances and exits on Flower Street, Hope Street and 4th Street.

"**LADOT**" means the Los Angeles Department of Transportation.

"**Night Period**" means the period on weekdays during which work can occur with a noise variance from the Los Angeles Police Commission (i.e., during the period beginning at 9:00 p.m. Monday through Friday, and ending at 7:00 a.m. on the following day).

"**Night Work**" means work on the Regional Connector Project in the Flower Street Construction Area conducted during the Night Period.

"**Night Work Requirements**" means the following requirements, which must be met if Metro is to conduct work in the Flower Street Construction Area during the Night Period:

(i) Metro shall have provided written notice to Flower Associates of (a) the scheduled Night Work as part of a twenty-one (21) day "look ahead" projection for planning purposes, (b) the actual start of Night Work at least seventy-two (72) hours in advance of the scheduled start (except when circumstances have arisen due to unforeseeable conditions beyond the control of Metro or the Design-Build Contractor where such advance notice may be impracticable),

(ii) the Flower Street entrance to and exit from the CNP Garage may be closed during the Night Period only if (a) access (x) to and from the 5th Street Loading Dock, (y) to the 5th Street entrance, and (z) to the 6th Street exit is open and accessible at all times (i.e., travel westbound on 5th Street to the CNP Garage entrance and the 5th Street Loading Dock and travel eastbound on 6th Street from the CNP Garage exit, in each case across Flower Street is open and accessible), and (b) the western-most lane on Flower Street provides dedicated accessibility to the Flower Street entrance and egress from the Flower Street exit until 11:00 p.m.,

(iv) the Flower Street entrance to and exit from the J-2 Garage may be closed after 8:00 p.m. only if the Hope Street entrance to and exit from the J-2 Garage are open and unimpeded; provided, however that unless a full block closure is required, Metro shall keep the eastern-most one (1) lane on Flower Street open for cars exiting from the J-2 Garage,

(v) no more than one (1) block on Flower Street may be fully closed at a time,

(vi) Metro shall provide suitable detours around the construction work with appropriate signage identifying the CNP entrances and the J-2 Garage entrances, and

(vii) the Design-Build Contractor shall post signs, provide flag persons as needed and take other reasonable steps to ensure accessibility is maintained safely and alternate routes to the CNP and J-2 Garage entrances are adequately marked and publicized.

"**Noise Control Plan**" has the meaning set forth in Section 12.1.

"**Noise Goals**" has the meaning set forth in Section 12.2.

"**Open Panel Work**" has the meaning set forth in Section 9.10.

"**Outreach and Notification Plan**" has the meaning set forth in Section 16.

"**Pile and Cap Beam Installation**" means the construction stage following the Utility Relocation Stage and during which piles and cap beams are installed in Flower Street in the Cut/Cover Area.

"**PM Peak Period**" means 4:00 p.m. to 7:00 p.m. on weekdays other than national holidays.

"**Regional Connector Project**" means the Regional Connector Transit Project.

"**Steady State**" means the construction stage following the completion of the Deck Installation and during which the guideway structure is constructed below the Decking on Flower Street, but excluding the TBM Removal.

"**Street Restoration**" means the construction stage following the completion of the Steady State and during which the Decking is removed, the Cut/Cover Area is backfilled and compacted, the initial temporary restoration is completed and Final Paving occurs.

"**TBM**" means the tunnel boring machine that will be used by the Design-Build Contractor to dig the tunnels for the Regional Connector Project.

"**TBM Recovery Pit Construction**" means the construction of the structure and excavation of the area to allow the TBM Removal.

"**TBM Removal**" means the removal of the TBM.

"**Traffic Management Plan**" shall have the meaning set forth in Section 5.1.

"**Utility Relocation Stage**" means the initial construction stage in which all utilities and laterals in the anticipated Cut/Cover Area are relocated, including, without limitation, the Water Main Relocation.

"**Water Main Relocation**" means the relocation of the twenty-four (24) inch water main under Flower Street, which is presently located between 5th and 6th Streets.

"**Weekend Period**" means the period beginning 9:00 p.m. on Friday and ending at 7:00 a.m. on Monday.

"**Weekend Work**" means work on the Regional Connector Project in the Flower Street Construction Area that occurs during the Weekend Period.

"**Weekend Work Requirements**" means the following requirements, which must be met if Metro is to conduct work on Flower Street during the Weekend Period:

(i) Metro shall have provided written notice to Flower Associates of (a) the scheduled Weekend Work as part of a twenty-one (21) day "look ahead" projection for planning purposes, (b) the actual start of Weekend Work at least seventy-two (72) hours in advance of the scheduled start (except when circumstances have arisen due to unforeseeable conditions beyond the control of Metro or the Design-Build Contractor where such advance notice may be impracticable),

(ii) the Weekend Work occurs only between Friday at 8:00 p.m. and Monday at 7:00 a.m., and Flower Street and adjacent streets cleaned and no materials or equipment stored or located outside of the K-rails after 7:00 a.m. on Monday,

(iii) the Flower Street entrance to and exit from the CNP Garage may be closed only if access (x) to and from the 5th Street Loading Dock, (y) to the 5th Street entrance, and (z) from the 6th Street exit is open and accessible (i.e, travel westbound on 5th Street to the entrance and the 5th Street Loading Dock and travel eastbound on 6th Street from the exit, in each case across Flower Street is open and accessible),

(iv) the Flower Street entrance to and exit from the J-2 Garage may be closed only if the Hope Street entrance to and exit from the J-2 Garage are open and unimpeded,

(v) Metro shall provide suitable detours around the construction work with appropriate signage identifying the CNP entrances and the J-2 Garage entrance, and

(vi) the Design-Build Contractor shall post signs, provide flag persons and take other reasonable steps to ensure accessibility is maintained safely and alternate routes to the CNP and J-2 Garage entrances are adequately marked and publicized.

"**West Segment CRO**" has the meaning set forth in Section 20.

"**Work Approvals**" shall have the meaning set forth in Section 3.1.

"**Work Stations**" means the four (4) areas in the approximate locations and with the approximate dimensions shown on Exhibit B attached hereto located along the east side of Flower Street through which the Design-Build Contractor will construct the guideway structure during the Steady State.

2. **Dismissal of the Litigation**. The Parties agree that the NEPA Appeals and the CEQA Appeals should all be dismissed in accordance with the following procedure:

2.1 Dismissal of the NEPA Appeals. Before the Effective Date, Metro shall have (A) filed with the United State Court of Appeals for the Ninth Circuit, a Stipulated Motion to Voluntarily Dismiss Appeal and Waiver of Costs in a form acceptable to A. Catherine Norian, Esq. of Gilchrist & Rutter, Professional Corporation ("**Gilchrist & Rutter**") duly executed by (1) counsel for Metro, and (2) counsel for Federal Transit Administration, Therese W. McMillan, Leslie T. Rogers, the United States Department of Transportation and Anthony

Foxx ("**Stipulated Motion**"), and (B) informed both the United States Court of Appeals for the Ninth Circuit and the United States District Court, Central District, Western Division that the NEPA Case has been settled, with all parties to bear their own costs. Metro shall provide a copy of the filed Stipulated Motion to Gilchrist & Rutter concurrently with its filing with the court. If necessary, Gilchrist & Rutter shall execute the Stipulated Motion on behalf of Flower Associates.

2.2 Dismissal of the CEQA Appeals. Concurrently with the delivery of fully executed original counterparts of this Agreement, Metro shall deliver to A. Catherine Norian, Esq. at Gilchrist & Rutter a Stipulation to Dismiss Appeal and Waiver of Costs (in accordance with Rule 8.244(c) of the California Rules of Court), duly executed by counsel for Metro ("**Stipulation to Dismiss**"). Upon its receipt of the duly executed Stipulation to Dismiss, Gilchrist & Rutter shall sign the Stipulation to Dismiss on behalf of Flower Associates, file the Stipulation to Dismiss and required associated documents, and inform both the California Court of Appeal, Second Appellate District and the Los Angeles County Superior Court that the CEQA Case has been settled, with all parties to bear their own costs.

2.3 Costs and Expenses. The Parties shall bear their own respective costs and expenses, including attorneys' fees and costs, incurred in connection with the CEQA Case (including the CEQA Appeals) and the NEPA Case (including the NEPA Appeals), subject to Metro's obligations pursuant to Section 22 of this Agreement.

2.4 Supplemental Analysis. FSP covenants and agrees that it shall not object to, challenge, or be a party to any litigation related to the Supplemental Analysis' compliance with the requirements of the NEPA Judgment, insofar as the Supplemental Analysis demonstrates and/or concludes that tunneling alternatives under Flower Street south of 4th Street in the Los Angeles Financial District are infeasible; provided, however, that nothing in this Agreement shall be construed as limiting and FSP expressly reserves all rights it has to object to, challenge and be a party to any litigation brought against or involving Metro related to the Supplemental Analysis on any other subject, including, without limitation, any recommendation or decision to tunnel under Flower Street south of 4th Street; and provided, further, however that nothing in this Agreement shall limit or have any effect upon FSP's rights to, and FSP reserves its rights to, comment on, object to, challenge and be a party to any litigation brought against or involving Metro and/or the Regional Connector Project related to any material change to the Regional Connector Project as approved on April 26, 2012, the EIS as approved by the ROD on June 29, 2012, or the EIR as certified on April 26, 2012, to the design and construction of the Regional Connector Project, whether under NEPA, CEQA or any other statutory or common law right or to enforce its rights under this Agreement.

3. **Metro Work Approvals**.

3.1 Metro and/or the Design-Build Contractor plan to request (i) noise variances from the Los Angeles Board of Police Commissioners to allow work on Flower Street past the hours for construction permitted under the Los Angeles Municipal Code (i.e., to permit work between 9:00 p.m. and 7:00 a.m. on weekdays, Saturdays between 6:00 p.m. and 8:00 am, and work on Sundays), (ii) approvals from the Bureau of Engineering to permit work on Flower Street during the AM Peak Period and the PM Peak Period during the Steady State, and (iii) approvals from the Board of Public Works to permit work on Flower Street during the period of the Holiday Moratorium (collectively, the "**Work Approvals**").

3.2 Metro agrees that it shall apply for and use its best effort to obtain the necessary Work Approvals to allow the Design-Build Contractor to perform (i) the Water Main Relocation as Night Work and/or Weekend Work, (ii) the Pile and Cap Beam Installation as Night Work and/or Weekend Work, (iii) the Deck Installation as Weekend Work only (i.e., so that no Deck Installation shall occur other than during the Weekend Period), (iv) the TBM Removal as Night Work and/or Weekend Work, and (v) the Deck Removal and Street Restoration as Weekend Work only (i.e., so that all Deck Removal and Street Restoration shall occur during the Weekend Period; provided however that Final Paving may occur on weekdays in accordance with the Daytime Work Requirements or the Night Work Requirements, as applicable). If Metro receives any of these Work Approvals, the Design-Build Contractor may work during such approved periods in order to minimize the duration of Daytime Work activities, but the Design-Build Contractor may nevertheless elect to work during the Daytime Period; provided, however that (i) such work shall be subject to the Daytime Work Requirements, and (ii) Deck Installation, Deck Removal, Street Restoration (other than Final Paving) and certain segments of Water Main Relocation and Pile and Cap Beam Installation shown in yellow on Exhibit G attached hereto shall occur as Weekend Work only). Metro acknowledges that the Board of Police Commissioners, the Bureau of Engineering and the Board of Public Works, as applicable, each has the authority to impose conditions of approval and other mitigation measures with respect to the work permitted pursuant to the Work Approvals. Metro shall accept and shall direct the Design-Build Contractor to comply with any and all of the conditions of approval and other mitigation measures imposed by the applicable authority in connection with the Work Approvals.

3.3 FSP agrees that it shall not oppose Metro's applications for the Work Approvals and, upon request by Metro, it shall work cooperatively with Metro and the Design-Build Contractor to assist Metro in obtaining the Work Approvals by (i) providing written confirmation to the Board of Police Commissioners, the Bureau of Engineering and the Board of Public Works, as applicable, of FSP's support for the Work Approvals, (ii) expressing its support for the Work Approvals to elected officials and/or their staff, (iii) expressing its support of the Work Approvals to other Flower Street stakeholders in connection with the efforts of Metro and the Design-Build Contractor to gain support for the Work Approvals.

3.4 Metro acknowledges and agrees that (i) there is no guarantee or other assurance that Metro will receive the Work Approvals even with FSP's support, (ii) none of Metro's obligations in this Agreement are conditioned on Metro receiving any or all of the Work Approvals, and (iii) none of Metro's obligations in this Agreement shall be excused if any or all of the Work Approvals are not obtained. Consistent with FSP's obligations in Section 3.3, nothing contained in this Agreement shall prohibit or limit FSP's right to provide comments to or otherwise communicate with the Board of Police Commissioners, Bureau of Engineering, the Board of Public Works or LADOT or any governmental officials, agencies or departments with respect to (i) work involving the Regional Connector Project, (ii) appropriate conditions and requirements of and restrictions with respect to the Work Approvals, and (iii) Metro's or the Design-Build Contractor's non-compliance with any conditions, restrictions or requirements of any Work Approvals or other matters involving construction in the Flower Street Construction Area.

4. **Access to CNP and the J-2 Garage**. Metro acknowledges that (i) FSP considers unimpeded vehicle and pedestrian access to CNP and the J-2 Garage to be of the utmost importance in minimizing impacts to CNP and the J-2 Garage during the construction of the Regional Connector Project in the Flower Street Construction Area, and (ii) FSP is particularly concerned about ensuring that access to and from CNP and the J-2 Garage for public safety vehicles, public transit buses, shuttle buses, passenger vehicles, and delivery vehicles is not compromised. For those reasons, Metro agrees that certain construction stages (i.e., Deck Installation, Deck Removal and Street Restoration (except for Final Paving) and certain segments of Water Main Relocation and Pile and Cap Beam Installation shown in yellow on Exhibit G attached hereto) must occur as Weekend Work only and that Metro will seek Work Approvals so that, if the Design-Build Contractor so elects, other stages (i.e., Utility Relocation and Pile and Cap Beam Installation) may occur as Night Work and/or Weekend Work. In addition, Metro agrees to satisfy the following standards regarding vehicle and pedestrian access to CNP and the J-2 Garage.

4.1 Vehicle Access. Vehicle access to City National Plaza and the J-2 Garage shall remain open and accessible at all entrances and exits at all times (including the 5th Street Loading Dock, and mid-block Flower Street passenger loading area (cut out); provided, however that during the Utility Relocation Stage, Pile and Cap Beam Installation, Deck Installation, Deck Removal, TBM Recovery Pit Construction and the Street Restoration, the entrances and exits on Flower Street for the CNP Garage and the J-2 Garage may be temporarily closed or impeded only if all of the following conditions are met:

(i) with respect to the Utility Relocation Stage, the TBM Recovery Pit Construction and the Pile and Cap Beam Installation stage, the work occurs as Night Work and/or Weekend Work and in full compliance with the Night Work Requirements and Weekend Work Requirements, as applicable; and

(ii) with respect to the Deck Installation, Deck Removal and Street Restoration (except for Final Paving) stages, the work shall occur as Weekend Work only and in full compliance with the Weekend Work Requirements.

Notwithstanding the foregoing, if, and only if, (A) Metro does not obtain or is unable to maintain the Work Approvals to perform the Utility Relocation Stage and/or Pile and Cap Beam Installation as Night Work and/or Weekend Work, and/or (B) the Design-Build Contractor elects to perform the Utility Relocation, Pile and Cap Beam Installation and/or Final Paving during the Daytime Period, then such work may be performed during the Daytime Period but only in strict compliance with all of the Daytime Work Requirements.

4.2 Intersections. Any Pile and Cap Beam Installation work that will be performed in the intersections of Flower Street and any of 4th, 5th or 6th Streets shall be performed as Weekend Work only (except for the TBM Removal conducted at the intersection of Flower Street and 4th Street in accordance with Section 10.3). Notwithstanding the foregong, any work performed in such intersections shall occur so that no more than one-quarter of the intersection is closed at any time (i.e., in the intersection, at least one-half of Flower Street and one-half of the cross street shall be open at all times).

4.3 Pedestrian Access to CNP and the J-2 Garage. Pedestrian access to and egress from all areas of CNP and the J-2 Garage shall remain open and accessible at all access points, including, without limitation, the sidewalks on Flower Street, the entrances and escalators to the retail Level B at CNP, the adjacent crosswalks, the restaurants located on the CNP Plaza, and the pedestrian entrances to the J-2 Garage. To the extent that alternate pedestrian routes are necessary and utilized to provide access to and egress from CNP and the J-2 Garage, such routes shall be designed to minimize inconvenience to CNP tenant employees and visitors. The sidewalks along both sides of Flower Street, 5th Street and 6th Street in Flower Street Business District shall remain open and passable at all times (except if due to unforeseeable circumstances beyond the control of Metro or the Design-Build Contractor or the requirements of LADOT), which shall include without limitation, (i) the width of the sidewalk on the west side of Flower Street shall not be reduced from its present width, and (ii) the width of the sidewalk on the east side of Flower Street shall not be less than eight (8) feet (except, subject to LADOT approval, for a narrower width due to the emergency exits adjacent to the Work Stations in front of the Central Library and Citicorp Plaza).

4.4 Crosswalks. With respect to crosswalks in the Flower Street Construction Area, (i) at least three of the four crosswalks at each of the intersections of Flower Street and 4th, 5th and 6th Streets shall remain open and passable at all times, and (ii) the mid-block crosswalk on Flower Street between 5th and 6th Streets (the "**Mid-Block Crosswalk**") shall remain open and passable at all times; provided, however, that (i) the crosswalks at the intersections of Flower Street and 4th, 5th and 6th Streets may be impeded during the Utility Installation, Pile and Cap Beam Installation, Deck Installation, Deck Removal or Street Restoration when the work in the intersections is performed in accordance with Section 4.2 above, and (ii) the Mid-Block Crosswalk may be closed during Daytime Work, Night Work and/or Weekend Work when such work occurs directly in the Mid-Block Crosswalk and, in each case, reasonably convenient alternate pedestrian access is provided.

5. **Transportation Impacts.** Metro acknowledges that minimizing traffic congestion in the Flower Street Business District and inconvenience to the tenant employees and visitors to CNP are of the utmost importance to FSP during the construction of the Regional Connector Project in the Flower Street Construction Area.

5.1 Traffic Management Plan. Metro and the Design-Build Contractor shall consult regularly and frequently with FSP so that FSP has meaningful input on the traffic management and construction mitigation plan for the Flower Street Business District (together with all amendments and supplements, the "**Traffic Management Plan**"). FSP shall receive the draft Traffic Management Plan for its review and comment at least fifteen (15) days before it is submitted to LADOT. FSP shall have a reasonable opportunity to provide written comments on the draft Traffic Management Plan and to meet with the Design-Build Contractor and any traffic engineer or consultant retained by Metro or the Design-Build Contractor during the preparation of the Traffic Management Plan. FSP may provide its recommendations regarding the effectiveness and feasibility of the Traffic Management Plan. Metro shall consider in good faith and respond to all of FSP's comments, concerns and recommendations regarding the Traffic

Management Plan and, where practical and feasible, shall incorporate FSP's proposals. The Traffic Management Plan shall comply with all of LADOT's requirements and shall include, without limitation, vehicle queuing, the location of construction staging/laydown areas, haul routes, hours of truck operations, lane/sidewalk/crosswalk/street closures, pedestrian pathways and detours, directional signage, public safety vehicle access and other matters at LADOT's discretion. The draft Traffic Management Plan shall include detailed drawings showing the location of work areas, the Work Stations, K-rails, traffic control measures, lane closures, the design of the Decking and paving at the interface with the entrance and exit ramps and driveways to the CNP Garage and the J-2 Garage. Prior to and during the Construction Period, Metro and the Design-Build Contractor shall consult with FSP and its consultants no less frequently than monthly at an agreed-upon regular date and time (and more frequently if requested by FSP) to discuss any issues regarding the Flower Street construction, including, without limitation, adjustments to the Traffic Management Plan. The monthly meetings shall include an update by the Design-Build Contractor on the Flower Street construction schedule. Trench plates shall be recessed and secured per LADOT drawings and requirements.

5.2 Haul Routes. As part of the development of the Traffic Management Plan described in Section 5.1 above, Metro shall consult with FSP regarding haul routes during all stages of the work. Metro shall consider in good faith FSP's requests and recommendations. Metro and FSP acknowledge that the haul routes will be subject to construction factors and LADOT approval through the Transportation Construction Traffic Management Committee.

5.3 Lane Closures. If the Utility Relocation Stage or the Pile and Cap Beam Installation take place during the Daytime Period, Metro shall comply with the lane closure restrictions set forth in the Daytime Work Requirements. During the Steady State, all of the travel lanes on Flower Street shall remain open, except for the area occupied by the Work Stations and as permitted pursuant to Section 9.10. During the Steady State, no travel lanes may be closed at any time on 4th, 5th and 6th Streets in the Flower Street Business District during the Daytime Period, except (i) for unforeseeable circumstances beyond the control of Metro and the Design-Build Contractor, and (ii) lanes on 5th and 6th Streets may be temporarily tapered at the intersection with Flower Street in order to accommodate temporary reductions in the width of the intersection or to accommodate turns around the Work Station located south of 5th Street. No staging or storing of materials, trucks or equipment shall take place on 4th, 5th and 6th Streets.

5.4 Bus Stop. Metro shall keep open to allow normal operations during CNP's regular business hours (7:00 a.m. to 7:00 p.m. on Monday through Friday) (i) the existing mid-block bus stop on Flower Street between 5th Street and 6th Street (except that the bus stops may be temporarily relocated during the period when Pile and Cap Beam Installation is occurring in front of the bus stop), and (ii) the mid-block passenger loading area (cut-out) on Flower Street (except that such loading area may be closed when the Pile and Cap Beam Installation and Water Main Relocation is occurring in front of such area).

5.5 Public Safety Vehicle Access. Metro acknowledges that (i) maintaining access to CNP and the J-2 Garage for fire trucks, police vehicles, ambulances and other public safety vehicles is of the utmost importance, and (ii) the frontage of CNP on Flower Street is used by public transit, buses, shuttle buses, private vehicles, and taxis and public safety vehicles. Accordingly, Metro shall at all times provide adequate street access to CNP and the J-2 Garage for public safety vehicles at all times during the Construction Period.

6. **Quality of Construction Barriers and Work Stations**. Metro shall work with FSP to provide aesthetically pleasing construction barriers and Work Station structures during the Steady State and for the CNP frontage between the CNP Flower Street driveways during the Water Main Relocation and Pile and Cap Beam Installation occurring in that area (the "**CNP Frontage Barrier**"). The Design-Build Contractor shall consult with FSP regarding the appearance of the Work Stations and the CNP Frontage Barrier. FSP shall be able to make alternative proposals and the Design-Build Contractor shall consider the FSP proposals in good faith. Upon FSP's request, the graphics on the Work Stations and the CNP Frontage Barrier will advertise that the restaurants and other businesses operating on the CNP Plaza and Level B are open during construction.

6.1 The Work Stations and CNP Frontage Barriers shall include aesthetically pleasing artwork, graphic designs and design features. The Design-Build Contractor shall consult with FSP and other stakeholders regarding the artwork, graphic designs and other design features. Metro and FSP agree that the general quality of the aesthetic appearance of the Work Stations and the CNP Frontage Barrier shall be substantially similar to the construction barriers and other structures utilized by the San Francisco MTA Central Subway project in the Union Square and Howard Street areas, which, for illustrative purposes, are shown in the photographs included in Exhibit C attached hereto; provided, however that the cost to Metro for the upgraded Work Stations and CNP Frontage Barrier shall not exceed One Million Two Hundred Thousand Dollars ($1,200,000.00) in the aggregate. The Work Stations and CNP Frontage Barrier shall incorporate noise suppression materials.

6.2 FSP acknowledges that the construction barriers, Work Stations and CNP Frontage Barrier will be subject to LADOT approval, which may require the use of K-rails for safety purposes. Any K-rails installed along Flower Street shall either be concealed or painted to provide an aesthetically pleasing appearance.

6.3 Unless required by LADOT or otherwise required for safety reasons, K-rails shall not be placed on the sidewalk along the CNP Flower Street frontage. If the use of K-rails on such sidewalk or in the public right-of-way is needed and approved by LADOT, FSP shall have the opportunity to review and comment on (i) the aesthetic appearance of the K-rails, (ii) maintaining access to the mid-block Flower Street passenger loading area (cut out), and mid-block Flower Street public bus stop, (iii) the means to anchor the K-rails, (iv) the plan to protect the granite pavers on the CNP Plaza from damage, and (v) the plans to restore any damaged granite pavers after the K-rails are removed.

7. **Weekend Only Work**. Notwithstanding anything to the contrary in this Agreement, the following work stages shall occur only as Weekend Work and only in strict compliance with the Weekend Work Requirements: (i) the Water Main Relocation and Pile and Cap Beam Installation in the segments shown in yellow on Exhibit G attached hereto (representing in part the areas in front of the Flower Street entrances and exits to the J-2 Garage and CNP Garage), (ii) Deck Installation, (iii) Deck Removal, and (iv) Street Restoration (except for Final Paving).

8. **Decking**.

8.1 Concrete Decking. Metro shall use precast concrete covers for the Decking along the entire length and width to cover the Cut/Cover Area. The Decking shall be positively attached to the cross beams and cap beams to eliminate noise and vibration. Any loose or unsecured Decking shall be re-secured within twenty-four (24) hours of notification from FSP.

8.2 Decking Height. Metro shall install Decking at a maximum height of no more than ten (10) inches above the existing surface of Flower Street. The Decking shall provide a flat surface across Flower Street; provided however, that (i) along the west side of Flower Street, concrete paving shall be installed to taper from the edge of the Decking down to the edge of the bottom of the gutter pan (i.e., preserving the existing curb and gutter (as shown on Drawing No. R2-SG-205), (ii) along the east side of Flower Street, the Decking shall meet the curb face no higher than the top of the existing curb face, and (iii) the Decking and paving shall satisfy LADOT standards and requirements.

8.3 Drainage. On both sides of Flower Street, the Decking shall be designed to provide adequate drainage at all times and shall (i) prevent ponding of water due to precipitation or other sources, and (ii) provide positive drainage to prevent any water flow into driveways, garages and private property.

8.4 Decking Slope. Metro shall install paving from the edge of the Decking at the appropriate and necessary slope to allow the vehicles traveling onto or off of the Decking to maintain a rate of speed consistent with LADOT standards (i.e., when traveling across Flower Street on 4th Street, 5th Street and 6th Street and when traveling down Flower Street). In addition, Metro shall install concrete paving from the edge of the Decking along the west side of Flower Street to allow vehicles to (i) travel in the curb lane, and (ii) enter and exit the CNP parking garage, in each case at a reasonable rate of speed consistent with LADOT standards.

9. **Construction Staging and Work Stations**.

9.1 No private property or sidewalk within the Flower Street Business District shall be used at any time for construction purposes for the Regional Connector Project, including without limitation, staging of trucks, equipment, workers or supplies, except for (i) the Work Stations, (ii) the construction easement for the tie back removal pit at 3rd Street, (iii) securing the CNP Frontage Barrier, if necessary, (iv) placing message boards or signage out of traffic lanes, if necessary, or (v) such easements or usage as may be necessary due to unforeseeable circumstances beyond the control of Metro and the Design-Build Contractor.

9.2 There shall be no vertical access to the work area below the Flower Street Construction Area except for (i) the vertical shaft located in the Work Station located south of 5th Street in front of the Central Library, (ii) the vertical shaft located in the Work Station located north of 5th Street in front of Citigroup Plaza, (iii) the access shaft that will be temporarily used for the TBM as shown on Exhibit D attached hereto, and (iv) as permitted in accordance with Section 9.10.

9.3 If, pursuant to the Supplemental Analysis, Metro determines that tunneling is not feasible on Flower Street between 4th Street and 6th Street, then (i) no tunneling shall occur under Flower Street south of 4th Street, and (ii) the cut and cover construction method shall not be utilized on Flower Street except between 4th Street on the north and the end of the tail track located approximately 100 feet south of 6th Street on the south.

9.4 The Work Stations shall not extend past the boundaries shown on Exhibit B attached hereto (Drawing No. R2-SG-200). Each Work Station shall have two fixed walls and gates. The minimum height of the Work Station walls shall be ten (10) feet. The walls of the Work Stations shall include sound-attenuating materials with an STC rating of 25 or more (determined under ASTM E90) and incorporate noise control curtains with an NRC rating of NRC 0.70 or greater (determined under ASTM C423). The Design-Build Contractor shall use reasonable efforts to minimize the use of all three (3) Work Stations simultaneously if, in the Design-Build Contractor's reasonable judgment, such minimized usage is feasible and will not materially and adversely affect the efficiency, schedule or cost of the construction. For example, if deliveries and loading/unloading during any period can be accomplished by using two (2) rather than all three (3) of the Work Stations without adversely affecting the construction, the Design-Build Contractor shall direct the deliveries and loading/unloading to occur at only two (2) Work Stations.

9.5 Metro and the Design-Build Contractor shall not store or stage materials and equipment in any areas in the Flower Street Business District other than the Work Stations (except for equipment and materials staged in accordance with clause (iii) of the definition of Daytime Work Requirements). Subject in all instances to Metro maintaining traffic lanes open in accordance with this Agreement, all deliveries of equipment, materials and supplies shall take place inside or immediately adjacent to the walls of the Work Stations; provided, however that Metro or the Design-Build Contractor shall not be responsible for any truck driver who fails to follow the appropriate directions regarding deliveries to the Work Stations.

9.6 In accordance with Metro's Green Construction Policy and the FEIS/FEIR, heavy trucks and equipment shall be prohibited from idling in excess of five minutes within the Flower Street Business District, provided however that the Design-Build Contractor shall use reasonable efforts to cause such trucks and equipment to turn off their engines immediately upon parking in the Flower Street Business District. There shall be no truck or equipment storage or parking in the Flower Street Business District except in the Work Stations. No equipment, materials or supplies shall be delivered to, loaded in or unloaded from the Work Stations during the AM Peak Period or the PM Peak Period.

9.7 Metro shall ensure that there is no construction worker parking on streets, in the Work Stations or in areas in Flower Street that are closed for construction. Except pursuant to parking contracts entered into by Metro or the Design-Build Contractor with individual property owners, construction workers shall not park during normal business hours in the parking structures or parking lots used by buildings in the Flower Street Business District.

9.8 Any street trees on Flower Street damaged or removed due to the construction shall be replaced during the final stage of the Street Restoration in accordance with terms of the permit issued by the City of Los Angeles Bureau of Street Services Department of Urban Forestry.

9.9 Following the completion of (i) each phase of the Utility Relocation stage, and (ii) each segment of the Pile and Cap Beam Installation, Metro shall provide reasonable sub-surface materials and compacting fill materials below the surface to prevent settling, remove surface deformities and repave the surface of the street, in each to satisfy the standards of LADOT and the Department of Public Works.

9.10 Metro desires that the Design-Build Contractor have the flexibility to remove panels of Decking in order to perform the following work outside of the Work Stations: (a) removal and transport of soil excavated below the Decking, and (b) pumping concrete into the forms for the guideway (the "**Open Panel Work**"). Metro intends that almost all of the Open Panel Work will occur during the Night Period or the Weekend Period. Accordingly, notwithstanding Sections 5.3 and 9.2, the Design-Build Contractor may temporarily remove panels of Decking to obtain vertical access to the work area below the Decking in order to perform the Open Panel Work during the Night Period or Weekend Period if all of the following conditions are met: (i) the Night Work Requirements and the Weekend Work Requirements, respectively, are satisfied, (ii) the Decking is replaced, all equipment and materials are removed from the area, the area is swept and cleaned and the lanes are reopened prior to 7:00 a.m. the following day in the case of Night Work and 7:00 a.m. on the following Monday in the case of Weekend Work, (iii) the work area around the Decking opening is located within the three (3) contiguous eastern-most lanes of Flower Street between 5th and 6th Streets, and (iv) the three (3) contiguous lanes along the western side of Flower Street remain open during such work. In addition, in the event that the Work Approvals necessary for such Open Panel Work are not available or extraordinary circumstances require the Open Panel Work to be performed during the Daytime Period, the Design-Build Contractor may temporarily remove panels of Decking in order to perform the Open Panel Work during the Daytime Period if all of the following conditions are met: (v) the Open Panel Work (including, without limitation, set up and removal of traffic control measures and equipment) does not occur during the AM Peak Period or the PM Peak Period, (w) the Daytime Work Requirements are satisfied, (x) the Decking is replaced, all equipment and materials are removed from the area, the area is swept and cleaned and the lanes are reopened promptly following the completion of the work, (y) the work area around the Decking opening is located within the three (3) contiguous eastern-most lanes of Flower Street between 5th and 6th Streets, and (z) the three (3) contiguous lanes along the western side of Flower Street remain open during such work. Notwithstanding the foregoing, in the event that extraordinary circumstances make it infeasible to comply with clauses (iii), (iv), (y) and (z) above, subject to LADOT approval, the Design-Build Contractor may utilize one (1) or more of the three (3) contiguous lanes along the western side of Flower Street for the Open Panel Work; provided, however that the Flower Street entrance to and exit from the CNP Garage and the J-2 Garage shall be open and accessible during such Open Panel Work.

10. **<u>Tunnel Boring Machine Removal</u>**.

10.1 <u>Location of TBM Removal</u>. If, pursuant to the Supplemental Analysis, Metro determines that tunneling is not feasible on Flower Street between 4th Street and 6th Street, the removal of the TBM (the "**TBM Removal**") shall occur at the location of the

TBM Removal shaft as shown on Exhibit D attached hereto (i.e., the retrieval window shall be located south of the intersection of 4th Street and Flower Street on the west side of Flower Street). Metro shall use a gantry crane system for the TBM Removal, which gantry crane shall be located in the position shown on Exhibit D attached hereto.

10.2 Time Period for TBM Removal. The actual removal of the TBM components from the removal shaft and the transportation of the TMP components (as opposed to the assembly or disassembly of the gantry crane, disassembly of the TBM and other work related to the TBM Removal) shall occur only during the Weekend Period or the Night Period in order to minimize impacts to traffic. Provided that Metro receives the noise variances to perform the TBM Removal work during the Night Period and the Weekend Period, the Design-Build Contractor shall use up to three (3) shifts per day and the TBM Removal process shall take no more than fifteen (15) calendar days (including assembly and disassembly of the gantry crane and as such period may change due to unforeseen conditions).

10.3 Traffic Management During TBM Removal. Prior to submitting the Traffic Management Plan for the TBM Removal to LADOT and other City of Los Angeles departments, Metro shall provide FSP with a copy of the draft Traffic Management Plan and an opportunity to provide Metro with comments on the Traffic Management Plan. Metro shall consider FSP's comments and recommendations in good faith. During all of the stages in the TBM Removal, Metro shall comply with the following minimum traffic conditions: (i) at least the two (2) eastern-most lanes of Flower Street shall remain open at all times on Flower Street adjacent to the J-2 Garage entrances and exits, (ii) two (2) lanes shall remain open eastbound on 4th Street, one of which shall allow a southbound right turn onto Flower Street and the second lane shall provide access to the entrance to the J-2 Garage; provided, however that Metro may implement a full block closure of Flower Street between 4th and 5th Streets for TBM Removal during the Night Period or the Weekend Period if it complies with the Night Work Requirements or the Weekend Work Requirements, respectively. Except when the TBM components are actually removed and transported, the lane closures on Flower Street shall be limited to the area for the gantry crane as shown on Exhibit D attached hereto.

11. **Lateral Stability; Ground Movement Monitoring; Ground Settlement.**

11.1 Lateral Stability. Metro shall continuously maintain full lateral stability of City National Plaza and the J-2 Garage, incorporating seismic safety considerations during the construction operations (for any method of tunnel construction). Metro shall design and construct excavation support in accordance with Metro Rail Design Criteria for temporary structures. The Metro Rail Design Criteria shall ensure sufficient lateral force resisting elements for seismic events and shall incorporate earthquake loading standards for the shoring design system. Metro shall make its completed excavation support design and structural drawings and calculations to available to FSP and FSP's consultant for their review. The drawings and calculations shall be made available to FSP at the earliest opportunity after their completion of so that FSP and its consultant have a meaningful opportunity for review. At FSP's request, Metro and the Design-Build Contractor shall meet to discuss the drawings and calculations.

11.2 Ground Movement Monitoring. Metro shall perform detailed photographic and video surveys of City National Plaza and the J-2 Garage (the "**Surveys**") prior to commencement of the Construction Period and at the end of the Construction Period.

11.2.1 FSP shall approve the timing and location of the photographic and video surveys through meetings and other communications with Metro. Copies of the results of all such Surveys shall be provided to FSP within thirty (30) days after completion of the Survey.

11.2.2 Metro shall develop a detailed ground movement monitoring plan for City National Plaza and the J-2 Garage. The Design-Build Contractor shall perform a baseline survey of monitoring points on the inside face of the parking garage along Flower Street prior to Pile and Cap Beam Installation. If Metro's ground movement monitoring devices indicate movement of the excavation supporting system in excess of the maximum levels set forth in Section 11.3 below, the Design-Build Contractor shall perform measurement and monitoring of the surface areas of City National Plaza and the J-2 Garage. Monitoring of vertical, horizontal and angular distortions shall include monitoring equipment capable of detecting deformation to an accuracy of least 0.05 inch. FSP shall have a reasonable opportunity to review the draft monitoring plan and provide Metro with comments and recommendations on the plan prior to its implementation. Metro shall consider FSP's comments and recommendations in good faith.

11.2.3 Metro shall determine the appropriately required ground movement monitoring devices, shall establish an appropriate frequency of monitoring (daily to monthly depending on the location and activity of construction activity within 100 feet and less frequently than monthly if warranted based on the stage of construction), and shall provide promptly the written reports to FSP. FSP shall be permitted to install its monitoring devices at its own expense so long as such devices do not interfere with the monitoring to be performed by Metro. Metro's ground settlement monitoring shall continue during construction until the end of the Construction Period. All monitoring performed by Metro shall be at Metro's sole cost and expense. Metro and the Design-Build Contractor shall meet with FSP and its consultant on a monthly basis to review the monitoring report and discuss the report's implications.

[continued on next page]

11.3 Ground Settlement. At such time as one of the monitoring instruments at the locations set forth in the table below shows ground settlement equal to or in excess of the applicable limit set forth in the column entitled "Design-Build Contractor Settlement Action Level", Metro shall cause the Design-Build Contractor to take immediate action to determine the cause of the ground settlement and develop and implement a plan to halt such ground movement. If one of the monitoring instruments at the locations shows ground settlement equal to or in excess of the applicable limit set forth in the column entitled "Maximum Settlement Value (Excavation Shutdown)", Metro shall immediately cause the Design-Build Contractor to cease the excavation or other operations until it has demonstrated to Metro's reasonable satisfaction that such measures have been implemented and improvements in the shoring structure have been completed that the ground settlement will cease.

Instrument	**Design-Build Contractor Settlement Action Level**	**Maximum Settlement Value (Excavation Shutdown)**
Surface monitoring points and Survey reflectors	0.35 inch	0.5 inch
Top of Shoring Wall Monitoring Points	0.35 inch	0.5 inch

12. **Noise**.

12.1 Noise Control Plan. Metro and the Design-Build Contractor shall consult regularly and frequently with FSP so that FSP has meaningful input in the development of a comprehensive noise mitigation plan (the "**Noise Control Plan**") for the Flower Street Construction Area. Metro and the Design-Build Contractor shall consider in good faith all of FSP's comments and concerns regarding the Noise Mitigation Plan. The Noise Control Plan shall be comprehensive, shall include a monitoring plan, shall take into account the noise characteristics of each construction stage and shall include noise attenuation measures designed to comply with the requirements of this Agreement, all applicable City of Los Angeles Municipal Code requirements for limiting construction noise, and the noise standards set forth in General Requirements 01 56 19 (Construction Noise and Vibration Control) of the Contract Documents (the "**General Requirements**"). The Noise Control Plan shall provide for Metro to (i) promptly provide to FSP weekly noise monitoring reports, and (ii) conduct meetings on an "as requested" basis with the Design-Build Contractor, Metro and FSP and their respective acoustic consultants to review the noise monitoring reports.

12.2 Noise Standards. Notwithstanding anything to the contrary herein, during all stages of construction in the Flower Street Construction Area other than Pile and Cap Beam Installation, Metro shall use its best efforts to satisfy the following noise goals (the "**Noise Goals**"): (i) during the Daytime Period, 80 dBA (measured and determined in accordance with the General Requirements, and (ii) during a daily 24 hour period, 80 dBA (based on a thirty (30) day average Ldn as measured and determined in accordance with the General Requirements). If the Noise Goals are exceeded, Metro, the Design-Build Contractor and FSP and its acoustic consultant shall promptly meet to discuss the noise reports and further mitigation measures as may be necessary to reduce the noise levels to satisfy the Noise Goals. FSP and its acoustic consultant shall have the opportunity to propose additional feasible noise mitigation measures and methods that it believes will assist Metro and the Design-Build Contractor in meeting the Noise Goals. Metro and the Design-Build Contractor shall consider such proposals in good faith. As used herein, "feasible" means measures that are capable of being accomplished with existing and customarily utilized technology and other noise control measures or techniques, including, without limitation, additional or more extensive sound blankets or noise attenuating barriers, noise mufflers or noise attenuation devices on equipment, or rescheduling noisier stages of the work, so long as such measures do not result in unreasonable increases in cost of the work or changes to the construction schedule or sequencing that would affect the project completion date. Notwithstanding the foregoing, Metro agrees to implement the additional methods and measures set forth on Exhibit E as may be needed in order to reduce noise levels. The inability to meet the Noise Goals, in and of itself, shall not be a default by Metro under this Agreement.

12.3 Monitoring. Metro shall on a regular basis monitor noise and vibration levels along the frontage of City National Plaza and the J-2 Garage along Flower Street during any construction activity, and promptly provide copies of written reports to FSP. Noise levels shall be monitored at the following specified locations along the property line of City National Plaza and the J-2 Garage: (a) 5th Street and Flower Street, (b) mid-block between 5th and 6th Streets, and (c) 6th Street and Flower Street, and (d) in front of the J-2 Garage on Flower Street. Noise monitoring shall take place at the same locations on a weekly basis throughout the Construction Period (which period may be adjusted with FSP's approval, not to be unreasonably withheld, depending on the construction stage). For avoidance of doubt, no pile drivers shall be used in the Flower Street Construction Area at any time during construction.

13. **Vibration**. Metro shall ensure that the construction in the Flower Street Construction Area complies with the ground borne vibration standards and other requirements set forth in the General Requirements and any other applicable City of Los Angeles Municipal Code requirements for limiting construction vibration. Metro shall install vibration monitors/sensors at City National Plaza and the J-2 Garage and shall provide monitoring on a regular basis which shall accurately detect vibration to an accuracy of at least 0.01 cycles/second. All monitoring performed by Metro shall be at Metro's sole cost and expense. Metro shall promptly provide to FSP copies of all of the vibration monitoring reports it receives, and shall conduct meetings on an as-needed basis depending on the construction stage, with the Design-Build Contractor, Metro and FSP and their respective consultants to review the vibration monitoring reports.

14. **Exhaust Fans**. The Design-Build Contractor shall install construction ventilation systems in a manner that will protect pedestrians from the exhaust and will mitigate noise from the ventilation system in accordance with this Agreement and General Requirement Section 01 56 19 (Construction Noise and Vibration Control) of the Contract Documents. Metro agrees that no exhaust fans or ducts shall be located (i) on the frontage of CNP (i.e., the west side of Flower Street between 5th and 6th Streets), or (ii) adjacent to the Flower Street pedestrian

entrance and exit of the J-2 Garage. FSP acknowledges that exhaust fans are required per Cal/OSHSA tunnel safety orders.

15. **Street and Sidewalk Cleaning**. Metro shall ensure that the Design-Build Contractor keeps all affected streets and sidewalks in the Flower Street Construction Area clean and free of dirt, asphalt or debris during all stages of construction. The Design-Build Contractor shall monitor on a regular basis all areas in the Flower Street Construction Area (including, without limitation, streets, sidewalks, areas in and around all Work Stations, staging sites, Work Stations, entrances to the CNP Garage and the J-2 Garage on Flower Street and haul routes) that are affected by the construction, work or haul activities and take prompt action to correct any deficiencies. The Design-Build Contractor shall comply with all street and sidewalk cleaning and monitoring requirements of this Agreement, the City of Los Angeles Department of Public Works, and any other agencies or departments with jurisdiction over the streets and sidewalks within the Flower Street Construction Area. The Design-Build Contractor shall sweep and/or wash the following areas, in each case, as needed (but not less frequently than once per shift) to keep such areas clean and free of dirt, asphalt or debris generated by its construction activities: (i) streets and adjacent sidewalks around and near any area that has significant volumes of construction vehicles carrying equipment, materials, debris and excavated soils, (ii) sidewalks near and pedestrian access points to CNP and the J-2 Garage, (iii) the areas around the Work Stations on Flower Street, (iv) haul routes, and (v) the areas around the vehicle entrances to and exits from the CNP Garage on Flower Street and Fifth Street and the J-2 Garage on Flower Street.

16. **Community Outreach and Advance Notification Process.** Metro acknowledges that the Flower Street Business District is an important center of economic activity for the City of Los Angeles, includes the Central Library, Maguire Gardens and plazas and other public amenities and is a sensitive area for property owners, businesses, tenants, commuters, visitors and other stakeholders. Metro and the Design-Build Contractor will be required to minimize any inconvenience to such parties and provide advance notification of construction activities and planned service interruptions in the Flower Street Business District. Metro shall develop and implement a community outreach and notification plan (the "**Outreach and Notification Plan**"), which shall include monthly meetings with FSP (or more frequently if the construction or other factors warrant) and bi-monthly public meetings to provide construction information to property owners, businesses, tenants and other stakeholders in the Flower Street Business District. FSP and Metro shall cooperate in the development of the Outreach and Notification Plan, which shall identify the events and benchmarks that shall require Metro to notify in advance FSP and other stakeholders. FSP may provide written comments on the draft Outreach and Notification Plan and to meet with Metro during the preparation of the Outreach and Notification Plan. FSP may provide its recommendations regarding the effectiveness and feasibility of the Outreach and Notification Plan. Metro shall consider in good faith and respond to all of FSP's comments, concerns and recommendations regarding the Outreach and Notification Plan.

The monthly meeting with FSP shall serve as an opportunity to review current activities and to discuss and coordinate upcoming work directly related to FSP and its adjacency. The bi-monthly public meeting shall also provide a "look ahead"of construction activities in an effort to provide advance notice of upcoming activities so the community is best positioned to plan around anticipated impacts. Through its outreach efforts and without limiting any other obligations of Metro under this Agreement, Metro shall notify FSP and other stakeholders of construction activities in the public right-of-way through a construction notice. The notice shall describe the activity, duration, location, work hours, and anticipated impacts to utility service, traffic lanes, sidewalks and crosswalks and shall provide approved detour routes when appropriate. The notice shall be distributed at least seventy-two (72) hours in advance of work starting via e-mail to FSP and Flower Street Business District property owners, businesses, tenants and other stakeholders. The construction notice shall also be available on the website established by Metro for the Regional Connector Project (www.metro.net/regionalconnector), Facebook (facebook.com/metroregionalconnector) and Twitter (twitter.com/metroconnector) feeds and will be updated frequently for the duration of construction of the Regional Connector Project in the Flower Street construction area. A Project Hotline (213-922-7277) shall be in place during construction to provide information on construction activities and to access Metro Construction Relations staff. Metro Construction Relations' staff shall be available twenty-four (24) hours a day, seven (7) days a week to assist with construction related project emergencies. Metro Construction Relations staff, through the Construction Impact Mitigation Program, shall be available to coordinate in advance with FSP any access needs, special events and plan temporary or intermittent impacts to day-to-day operations due to construction, as well as direct impacts, including but not limited to noise, vibration, dust and visibility. A dedicated West Segment Construction Relations Officer (the "**West Segment CRO**") will serve as a liaison to FSP and will work closely with FSP to schedule briefings as necessary in advance of construction activities to allow proper planning by FSP. The West Segment CRO shall work closely with FSP on a consistent basis to ensure proper coordination and to provide current information to FSP.

Information regarding construction in the Flower Street Business District and construction notifications may be provided in multiple formats including, mail, electronic mail, social media and on-street portable changeable message boards. Notifications shall conform to any applicable City of Los Angeles requirements and, whether delivered orally or in writing, shall include appropriate information concerning the construction and/or service interruptions and instructions on how to limit inconvenience caused.

Construction notices shall be provided to affected businesses and residents for all lane closures, driveway closures, sidewalk closures, and parking restrictions in accordance with the Outreach and Notification Plan. In addition, Metro shall also e-mail construction notices. The notices above are in addition to the notices required by this Agreement for Daytime Work, Night Work and Weekend Work. Metro shall also provide to FSP a monthly schedule of all proposed activities within the Flower Street Construction Area.

On-street changeable message signs related to lane closures and other traffic conditions shall be installed based on Traffic Control Plans and other documents. The message signs shall be installed prior to the beginning of each stage or major construction activity as required by LADOT. These requirements will be incorporated into Traffic Control Plans prepared by the Design-Build Contractor as they are submitted by Metro.

Metro shall designate a person from its Regional Connector Project construction management team (or the holder of a specified office or position) to act as the Metro liaison and representative to FSP for the Regional Connector Project. The Metro representative shall have the responsibility to manage and coordinate Metro's interaction with FSP concerning the Regional Connector Project. FSP shall designate a person from its property management team to act as FSP's liaison and representative to Metro for the Regional Connector Project. The FSP representative shall have the responsibility to manage and coordinate FSP's interaction with Metro concerning the Regional Connector Project. The FSP representative(s) and the Metro representative shall confer on a regular basis (at least weekly and more frequently if necessary) in order to coordinate their activities.

17. **Liability for Damage to FSP Property**. Metro shall be liable for and shall pay to FSP the cost of any damage of any kind whatsoever to CNP or the J-2 Garage, including, without limitation, the foundation, buildings, CNP Plaza, sidewalks, escalators, planters, trees, landscaping and any other physical property of FSP, in any way arising from or caused by the construction of the Regional Connector Project. Nothing in this Agreement shall limit in any way the rights of FSP or its tenants to recover from Metro or the Design-Build Contractor for any damage to CNP or the J-2 Garage, the cost to repair or replace any component of same or for other costs and expenses incurred by FSP or tenants due to damage to their physical property caused by the Regional Connector Project construction. Without limiting the foregoing, if any damage occurs to the granite pavers on the CNP Plaza, FSP shall be entitled to recover the costs and expenses to install new granite pavers of matching quality, size, thickness, texture shade of gray and appearance (including, without limitation, the cost, as reasonably determined by FSP, of any replacement pavers held by FSP in stock). If in FSP's reasonable judgment, the replacement pavers held by FSP in stock are not sufficient in number or sufficiently similar in quality, size, thickness, texture shade of gray and appearance, Metro shall reimburse FSP for the cost to replace all of the pavers along the entire Flower Street frontage for a width of up to thirty (30) feet from Flower Street with compatible replacement pavers in order to maintain a harmonious appearance; provided, however that prior to such reimbursement, Metro shall have a reasonable period of time and opportunity to locate and obtain granite pavers matching in quality, size, thickness, texture shade of gray and appearance. Metro shall maintain an administrative claims process throughout the term of this Agreement that may be initiated by filing a claim substantially in the form set forth in Exhibit F. Metro shall make copies of Exhibit F available upon request and on its website to any persons or businesses claiming damage caused by Metro. Claims by FSP for damage of any kind whatsoever to CNP or the J-2 Garage, including, without limitation, the granite pavers shall be handled through Metro's administrative claims process.

18. **Liability for Third Party Injuries**. Metro shall take all necessary and reasonable measures to protect against (i) accidents or injuries to or death of persons, or (ii) damage to the property of such persons, in each case occurring in, on or around the Flower Street Construction Area and the adjacent streets, sidewalks, ways, parking areas, curbs, ramps and (including, without limitation, any such areas on or around CNP or the J-2 Garage). Metro acknowledges and agrees that FSP's exercise of its rights under this Agreement, including, without limitation, its review of or commenting upon any plans or programs pursuant to this Agreement, shall not subject FSP to liability with respect to such Damages.

19. **Dispute Resolution**.

19.1 Pre-Arbitration Resolution. If a dispute, claim, disagreement or controversy (a "**Dispute**") arises in connection with this Agreement or the performance of obligations set forth herein, the Parties shall promptly attempt in good faith to resolve such Dispute by negotiation between officers of each Party who have authority to settle the controversy. Any Party may give the other Party written notice of any Dispute not resolved in the normal course of business. Within five (5) days after delivery of the notice, the receiving Party shall submit to the other Party a written response. The notice and response shall include with reasonable particularity a statement of each Party's position and a summary of its reasons supporting that position. Within five (5) days after delivery of the response, the officers of both Parties shall meet at a mutually acceptable time and place. Unless otherwise agreed in writing by the negotiating Parties, the above-described negotiation shall end at the close of the first meeting of officers described above ("**First Meeting**"). If the Parties agree to mediate the Dispute, such mediation shall be submitted to JAMS, or its successor, for mediation. If the Parties are unable to reach agreement or otherwise resolve the Dispute at the First Meeting (or if one of the Parties fails to comply with the requirements of this Section 19), either Party shall be entitled to initiate binding arbitration. All offers, promises, conduct and statements, whether oral or written, made in the course of the negotiation by any of the Parties, their agents, employees, experts and attorneys are confidential, privileged and inadmissible for any purpose, including impeachment, in arbitration or other proceeding involving the Parties; provided, however, that evidence that is otherwise admissible or discoverable shall not be rendered inadmissible or non-discoverable as a result of its use in the negotiation. All applicable statutes of limitation and defenses based upon the passage of time shall be tolled while the procedures specified in this Section 19 are pending and for fifteen (15) calendar days thereafter. The Parties shall take such action, if any, required to effectuate such tolling. Notwithstanding anything to the contrary in this Agreement, this Section 19 shall not limit FSP's right to utilize an Independent Compliance Monitor in accordance with Section 21 and FSP's right to utilize the Independent Compliance Monitor are separate and independent of the process set forth in this Section 19 and shall be implemented notwithstanding the dispute resolution proceedings set forth in this Section 19.

19.2 Arbitration. Any Dispute arising out of or relating to this Agreement or the breach, termination, enforcement, interpretation or validity thereof, including the determination of the scope or applicability of this agreement to arbitrate, shall be determined by arbitration in Los Angeles, California before one arbitrator. The arbitration shall be administered by JAMS pursuant to its Engineering and Construction Arbitration Rules and Procedures for Expedited Arbitration (the "**JAMS Rules**"). The arbitrator shall have the authority to grant all remedies at law or equity to the Parties. Judgment on the award by the arbitrator may be entered in any court having jurisdiction. This Section shall not preclude Parties from seeking provisional remedies in aid of or in lieu of arbitration from a court of appropriate jurisdiction.

19.3 Review of Award. The Parties may, within the time periods under California law, and upon the grounds specified in this Section 19.3, under California Code of Civil Procedure Sections 1286.2, 1286.6, and 1296 petition a reviewing court having proper jurisdiction to confirm, correct or vacate an arbitration award. The parties agree, in addition to the other grounds under California Code of Civil Procedure Section 1286.2, such reviewing court may pursuant to Code of Civil Procedure Section 1296, if applicable, vacate an arbitration award, or part thereof, if it determines either that the award, or part thereof, is not supported by substantial evidence or that it is not decided under or in accordance with California law. If the award, or part thereof, is vacated on the grounds set forth in the preceding sentence or in subdivision (a)(4) or (5) of Section 1286.2 of the Code of Civil Procedure or if the court determines that the award does not include a determination of all submitted questions necessary to determine the controversy, the court may order a rehearing before the original arbitrator or remand to the original arbitrator that portion of the dispute which the court concludes the arbitrator failed to determine.

20. **Business Mitigation Assistance**. Metro shall develop and implement a program business mitigation measures for the purpose of assisting those businesses (the "**Affected Businesses**") in the Flower Street Construction Area that may be financially affected by the construction of the Regional Connector Project in such area (the "**Business Mitigation Assistance**"). FSP and Metro shall cooperate in the development of the Business Mitigation Assistance program. Metro shall consult closely with FSP periodically during the course of the construction on Flower Street to develop, implement, and adjust as necessary the Business Mitigation Assistance program to serve the Affected Businesses. Metro shall provide FSP with a draft of its plan for the Business Mitigation Assistance and provide FSP with the opportunity to comment on the plan. FSP may provide its recommendations regarding the Business Mitigation Assistance program and Metro shall consider in good faith and respond to all of FSP's comments, concerns and recommendations regarding the Business Mitigation Assistance program. Metro agrees to devote at least Four Million Five Hundred Thousand Dollars ($4,500,000.00) (the "**Minimum Amount**") for the Business Mitigation Assistance over the course of the Construction Period, which shall include, but is not limited to, the following: (i) advertising of the Affected Businesses, including, but not limited to, local newspapers and on social media; (ii) parking validation and other incentives for the Affected Businesses; (iii) implementation of a program that focuses attention on the businesses in the Flower Street Construction Area; (iv) public outreach programs to benefit the Affected Businesses; (v) communications and outreach support; (vi) up to two (2) cameras or other surveillance equipment to publicly broadcast the progress of construction in the Flower Street Construction Area; (vii) public affairs representatives made available to Affected Business; (viii) placement of large, clearly visible signage indicating that the Affected Businesses are open during construction; and (ix) other urban design, mitigation, public outreach, and business assistance projects as mutually agreed upon by Metro and FSP. The Minimum Amount is based on the assumption that the Construction Period shall not exceed three (3) years. If the construction duration of three (3) years is exceeded, Metro shall expend at least an additional One Hundred Twenty Five Thousand Dollars ($125,000) per month on the Business Mitigation Assistance for each month that such any of such durations is exceeded.

21. **Independent Compliance Monitor**. During the Construction Period, Metro shall fund an Independent Compliance Monitor to ensure compliance with the conditions and required mitigation measures covered under this Agreement and all exhibits attached hereto. The Independent Compliance Monitor shall be utilized on an "as needed" basis at such time or times as FSP determines, in its sole and absolute discretion, that one or more incidents of non-compliance of a material nature have occurred. Prior to the utilization of the Independent Compliance Monitor, FSP shall give written notice to Metro of the occurrence of the incident or

incidents of non-compliance and its intention to utilize the Independent Compliance Monitor. For a period of five (5) days after delivery of the notice, a representative of Metro shall have the opportunity to meet with a representative of FSP and attempt to resolve the matter to FSP's satisfaction. If, at the end of the five (5) day period, FSP has not given written notice to Metro stating affirmatively that the matter has been resolved to FSP's satisfaction, the Independent Compliance Monitor shall commence its work. The Independent Compliance Monitor shall be an independent contractor, not otherwise employed by the Metro or FSP, and shall be selected jointly by Metro and FSP; provided, however that the independent compliance monitor employed by Metro in connection with the construction of the La Cienega station of the Westside Subway Extension project shall be eligible to serve as the Independent Compliance Monitor. The Independent Compliance Monitor shall have no pre-existing relationship with either Metro or FSP, unless (i) the Independent Compliance Monitor is utilized on another Metro project (including, without limitation, the La Cienega station of the Westside Subway Extension project), and (ii) this requirement is specifically waived by Metro (as to a contractor employed by FSP) and FSP (as to a contractor employed by Metro). Metro, FSP and the Independent Compliance Monitor shall enter into a three party contract to engage the services of the Independent Compliance Monitor. The Independent Compliance Monitor shall invoice Metro for its work and subject to Metro's verification and approval of the invoice and FSP's verification of the invoice, Metro shall pay the Independent Compliance Monitor. Metro's obligation to pay the Independent Compliance Monitor shall not exceed a maximum amount of One Hundred Eighty Thousand Dollars ($180,000) (the "**Maximum Amount**") in the aggregate for the entire Construction Period. At such time as the Maximum Amount has been paid by Metro to the Independent Compliance Monitor, Metro's obligations under this Section 21 shall terminate. The Maximum Amount is based on the assumption that the Construction Period shall not exceed three (3) years. If the construction duration of three (3) years is exceeded, the Maximum Amount will be increased by an additional Five Thousand Dollars ($5,000) per month for each month that such any of such durations is exceeded. The engagement of the Independent Compliance Monitor shall be for a term of one year, with said engagement to be automatically renewed annually unless either FSP or Metro objects to the renewal of the Independent Compliance Monitor's engagement. Nothing in this Article shall be construed to limit the ability of the Los Angeles City Attorney, any City department, bureau or other governmental authority to notify or inform Metro or the Independent Compliance Monitor of any alleged violations of laws, ordinances, statutes or regulations or to enforce same against Metro or the Design-Build Contractor.

The Independent Compliance Monitor shall be tasked with assessing whether Metro or the Design-Build Contractor is in compliance with the conditions and mitigations measures of this Agreement (including, without limitation, the exhibits attached hereto). When the Independent Compliance Monitor believes that Metro or the Design-Build Contractor has not complied with a condition or mitigation measure of this Agreement (or an exhibit attached hereto), the Independent Compliance Monitor shall provide documentation of its observations to both Metro and FSP within twenty-four (24) hours of its determination. Metro shall provide a response to the report within forty-eight (48) hours that shall include a description of the investigative and other actions taken to address the observations of the Independent Compliance Monitor.

22. **Compensation for FSP's Consultants Fees**. Metro acknowledges (i) that FSP has incurred substantial third-party consultants fees and costs in connection with obtaining this Agreement, and (ii) the additional mitigation measures and other protections included in this Agreement will protect the environment in the Flower Street Business District, which will benefit FSP and other property owners, tenants, employees, businesses and visitors in the Flower Street Business District. Accordingly, Metro agrees to pay FSP the amount of Eight Hundred Thousand ($800,000.00) as compensation for the consultant fees and costs FSP has incurred in connection with this Agreement and in consideration of FSP facilitating the public benefits obtained by this Agreement. The payment provided for in this Section 22 shall be made by Metro not more than thirty (30) days after its execution of this Agreement.

23. **Obligation to Perform MMRP and Contract Requirements**. Metro acknowledges and agrees that mitigation measures were adopted by Metro in connection with the certification of the EIR/EIS and that certain mitigation measures are applicable to the construction of the Regional Connector Project in the Cut/Cover Area (the "**EIR/EIS Mitigation Measures**"). In addition, the Contract Documents contain standards and requirements for the Design-Build Contractor to perform that are intended to reduce environmental impacts from the Regional Connector Project (the "**Contract Standards**"). Metro agrees that it shall perform and comply with and cause the Design-Build Contractor to perform and comply with the EIR/EIS Mitigation Measures and Contract Standards, as applicable. The EIR/EIS Mitigation Measures and the Contract Standards are in addition to and do not limit, derogate from, replace or override any of the covenants of Metro set forth in this Agreement. The obligations of Metro in the EIR/EIS Mitigation Measures, the Contract Standards and this Agreement are cumulative. Metro agrees that all of its obligations in this Agreement shall be performed at its sole cost and expense and FSP shall have no obligation to reimburse Metro for any of such obligations.

24. **Actions of the Design-Build Contractor**. The Parties acknowledge and agree that many of the obligations of Metro under this Agreement must or will be performed or carried out by the Design-Build Contractor. Whenever this Agreement provides that the Design-Build Contractor shall take or perform an action or refrain from taking or performing or such action, the intent of the Parties is that (i) Metro shall cause the Design-Build Contractor to do so, (ii) Metro shall be responsible for causing the Design-Build Contractor to perform as stated in this Agreement, and (iii) Metro shall be liable for the Design-Build Contractor's failure to do so as if Metro was directly responsible for performing as stated in this Agreement.

25. **Further Assurances**. The Parties agree to enter into, deliver, perform, construe, and take any action under any contract, agreement, or other instrument that the other Party reasonably determines to be necessary or desirable to further the purposes of this Agreement. This Section 255 shall survive the termination and expiration of this Agreement.

26. **Parties' Remedies**. Each Party shall have all rights and remedies available at law or in equity for the other Party's breach of this Agreement including, without limitation, an action for specific performance and/or injunctive relief. The remedies under this Agreement are cumulative and shall not exclude any other remedies to which any Party may be lawfully entitled.

27. **Severability**. Every provision of this Agreement is intended to be severable. In the event any term or provision hereof is declared to be illegal or invalid, for any reason whatsoever, by a court of competent jurisdiction, such illegality or invalidity shall not affect the balance of the terms and provisions hereof, which terms and provisions shall remain binding and enforceable.

28. **Entire Agreement**. This Agreement, together with the exhibits attached hereto, contains the sole and entire agreement and understanding to which the Parties and any and all prior discussions, negotiations, commitments or understandings related hereto, if any, are merged herein and superseded hereby. No representations, warranties, promises, covenants, undertakings, commitments, restrictions, or other obligations, verbal, written or otherwise, expressed or implied, other than those expressly contained herein have been made by any Party to the other.

29. **Amendments; Waiver**. This Agreement may be amended only by an agreement in writing signed by each Party hereto. No waiver of any provision or consent to any exception to the terms of this Agreement shall be effective unless in writing and signed by the Party to be bound, and then only for the specific purpose, extent, and instance so provided. Failure on the part of any Party to enforce any of its rights under this Agreement shall not be construed as a waiver of such rights, and a waiver by any Party of a default hereunder in any instance shall not be construed as constituting a continuing waiver or as a waiver in other instances.

30. **Attorneys' Fees**. In the event that any dispute between the Parties should result in litigation or arbitration, the prevailing Party in such litigation or arbitration shall be entitled to recover from the other Party all reasonable fees, costs, and expenses of enforcing any right of the prevailing Party, including, without limitation, reasonable attorneys' fees and expenses incurred in any appeal or in any post-judgment proceedings to collect or enforce the judgment.

31. **Notice**. Any notice, demand, or other communication of any kind, whatsoever, that any of the Parties may be required or may desire to give to or serve upon any of the other Parties shall be given in writing and (i) delivered in person (including express or courier service), or (ii) mailed by certified or registered mail, postage prepaid, return receipt requested, addressed as follows:

If to Metro:

Los Angeles County Metropolitan Transportation Authority
432 East Temple Street
Los Angeles, California 90012
Attention: Mr. Girish Roy

With a copy to:

Los Angeles County Metropolitan Transportation Authority
County Counsel
Transportation Division
One Gateway Plaza
Mail Stop: 99-24-20
Los Angeles, California 90012
Attention: Ronald W. Stamm, Esq.

If to FSP:

FSP – South Flower Street Associates, LLC
c/o CommonWealth Partners LLC
515 South Flower Street, Suite 3200
Los Angeles, California 90071
Attention: Mr. Travis Addison

With a copy to:

Paul Hastings LLP
515 South Flower Street, Suite 2500
Los Angeles, California 90071
Attention: Mitchell B. Menzer, Esq.

or to such other address or to such other person as any Party shall have last designated by such notice to the other Party. Each such notice, demand, or other communication, if addressed as aforesaid and delivered in person, shall be effective only when actually delivered to such addressee. Each such notice or communication, if addressed as aforesaid and transmitted via either certified or registered mail, shall be effective upon the date of delivery, whether or not accepted by addressee.

32. **Voluntary Agreement; Representation by Counsel**. This Agreement is executed voluntarily by each of the Parties hereto without any duress or undue influence on the part of, or on behalf of, any of them. The terms of this Agreement have been negotiated by the Parties, and the language of the Agreement shall not be interpreted under presumptions in favor of or against any particular Party. Each of the Parties hereto represents and warrants to each other Party that it has read and fully understands the provisions of this Agreement and has had the opportunity to discuss the same with legal counsel of its own choosing. Each of the Parties hereto further represents and warrants to each other Party that its officers or other representatives who sign this Agreement on its behalf are authorized to do so and to bind that Party, both by consent of that Party and under applicable law, and that they are executing this Agreement pursuant to that authority. The Parties, and each of them, acknowledge that each has been represented in the negotiations for and in the performance of this Agreement by counsel of its own choice; that the Parties have read this Agreement; that the Parties have had this Agreement, and each of its terms, fully explained by such counsel or have had such opportunity; and that each Party is fully aware of the contents of this Agreement and of its legal effect.

33. **Binding Effect**. This Agreement shall bind, and inure to the benefit of, the Parties' respective subsidiaries, parent, and affiliated corporations or partnerships, and their respective successors, assigns, representatives, and heirs.

34. **Assignment**. The rights and obligations of Metro under this Agreement shall not be assigned and any attempted assignment shall be void and of no effect. The rights and obligations of FSP under this Agreement shall not be assigned and any attempted assignment shall be void and of no effect; provided, however that FSP shall have the right to assign this Agreement and such rights and obligations to (i) any purchaser other transferee of CNP and/or the J-2 Garage or other successor-in-interest, and (ii) mortgagee or other lender as collateral for a loan secured by CNP and/or the J-2 Garage, in each case without the need to obtain the approval of Metro.

35. **Governing Law**. The validity, interpretation, effect, and enforcement of this Agreement, or any portion thereof, shall be governed by, and shall be construed and enforced in accordance with, the laws of the State of California.

36. **No Third-Party Beneficiaries**. Nothing in this Agreement is or shall be construed to be intended to benefit any third party, or create any third-party beneficiary and no third party or parties shall have any claim or right of action under this Agreement for any cause whatsoever.

37. **Authorization to Sign**. The persons executing this Agreement on behalf of Metro and FSP, respectively, each represent and warrant that he or she is duly authorized to execute same on behalf of its Party.

38. **Counterparts**. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original agreement, but all of which together shall constitute one agreement.

39. **Miscellaneous**. All powers, rights, or remedies of the Parties to this Agreement shall be cumulative with, and not exclusive of any powers, rights, or remedies otherwise available at law or in equity.

[Signature page follows]

IN WITNESS WHEREOF, the Parties have caused this Agreement to be duly executed by their duly authorized representatives as of the Effective Date.

"Metro"

The Los Angeles County Metropolitan Transportation Authority,
a public entity

By: ______________________________
Name: Phillip A. Washington
Title: Chief Executive Officer

Date: June 29, 2015

"FSP"

FSP – South Flower Street Associates, LLC,
a Delaware limited liability company

By: Fifth Street Properties, LLC,
a Delaware limited liability company,
Its Sole Member

By: CWP Capital Management, LLC,
a Delaware limited liability company,
Its Manager

By: ______________________________
Name: Michael W. Croft
Title: Chief Executive Officer and Chairman

Date: 6.30, 2015

EXHIBIT A

DEPICTION OF THE CUT/COVER AREA

[Attached]

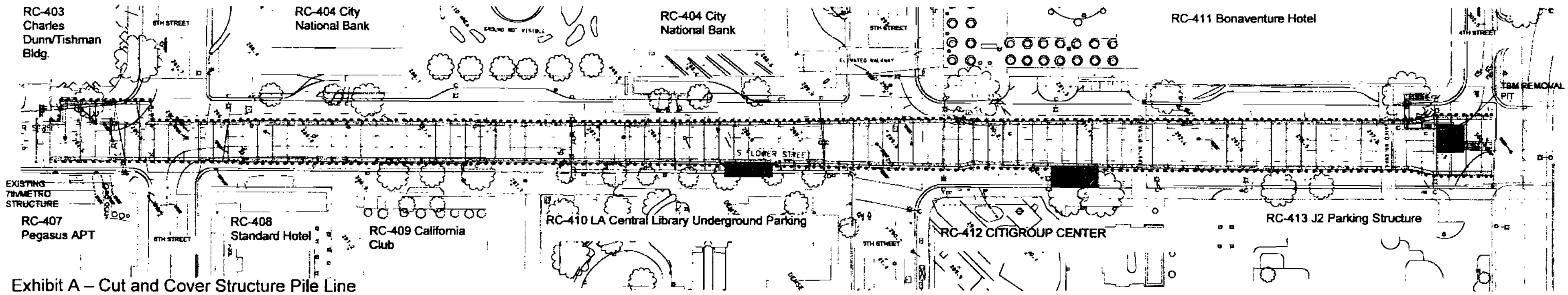


Exhibit A – Cut and Cover Structure Pile Line

EXHIBIT B

LOCATION AND DIMENSIONS OF THE WORK STATIONS

[Attached]

PC5

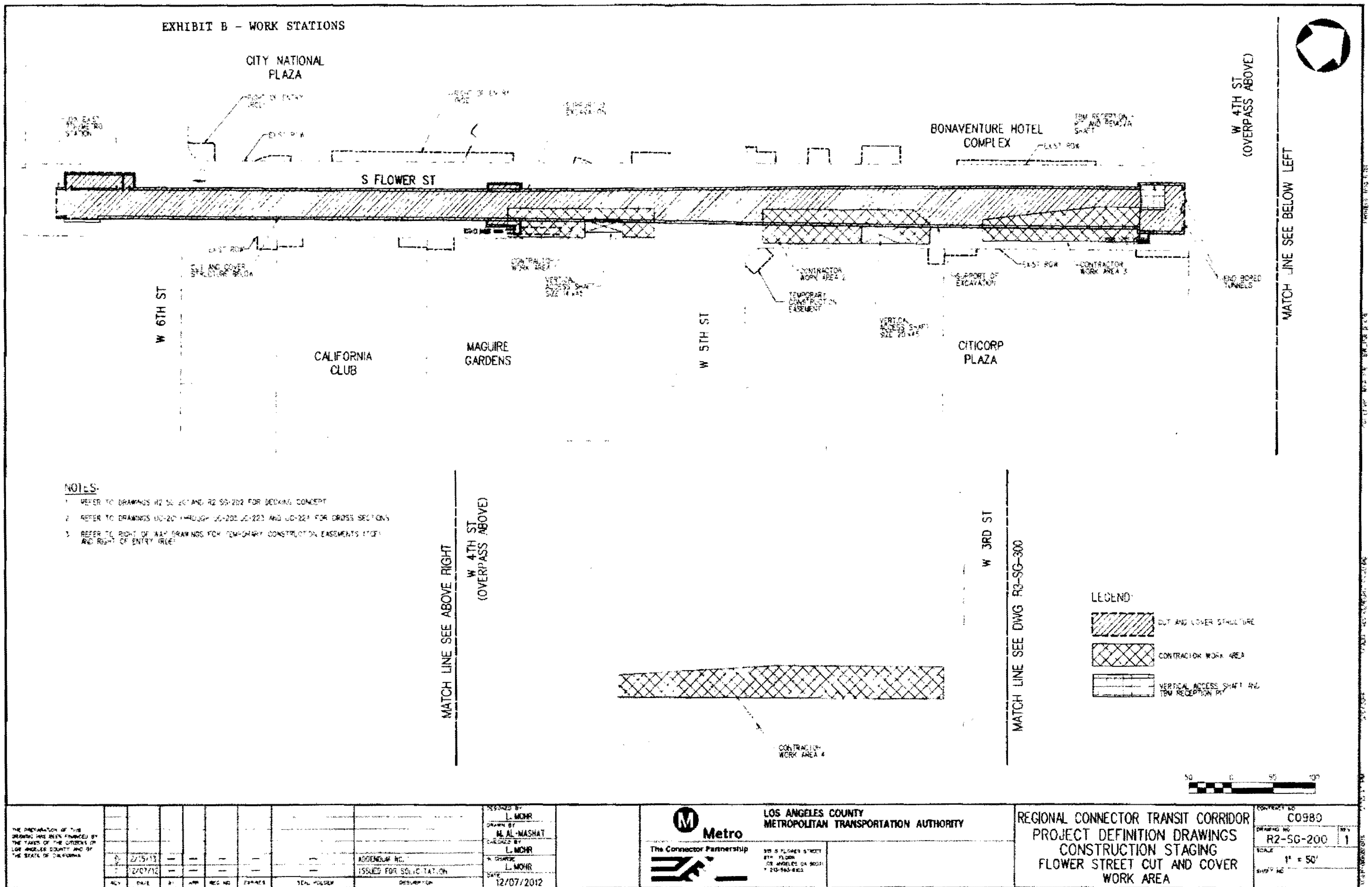


EXHIBIT B - WORK STATIONS
CITY NATIONAL PLAZA
BONAVENTURE HOTEL COMPLEX
S FLOWER ST
W 4TH ST (OVERPASS ABOVE)
MATCH LINE SEE BELOW LEFT
W 6TH ST
CALIFORNIA CLUB
MAGUIRE GARDENS
W 5TH ST
CITICORP PLAZA
NOTES:
MATCH LINE SEE ABOVE RIGHT
W 3RD ST
MATCH LINE SEE DWG R3-SG-300
LEGEND:
LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY
Metro
The Connector Partnership
L. MOHR
M. AL-MASHAT
ADDENDUM NO.
ISSUED FOR SOLICITATION
12/07/2012
REGIONAL CONNECTOR TRANSIT CORRIDOR
PROJECT DEFINITION DRAWINGS
CONSTRUCTION STAGING
FLOWER STREET CUT AND COVER
WORK AREA
C0980
R2-SG-200
1
1" = 50'

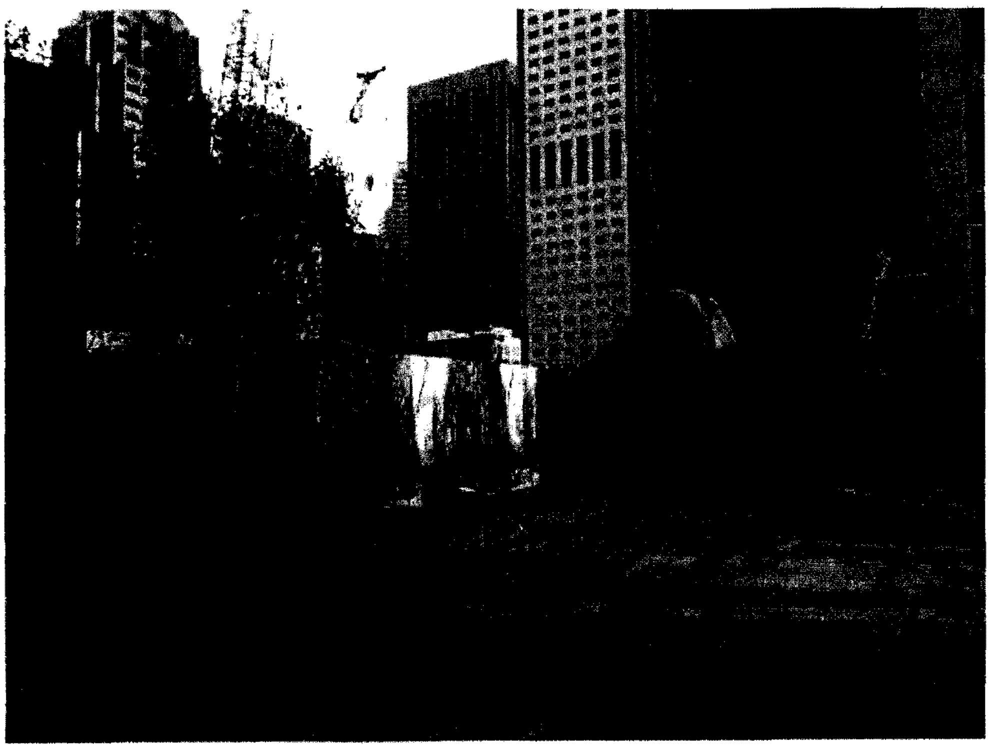
EXHIBIT C

EXAMPLES OF MINIMUM QUALITY FOR CONSTRUCTION BARRIERS AND WORK STATIONS

The TransBay Transit Center Fremont Street walkway.

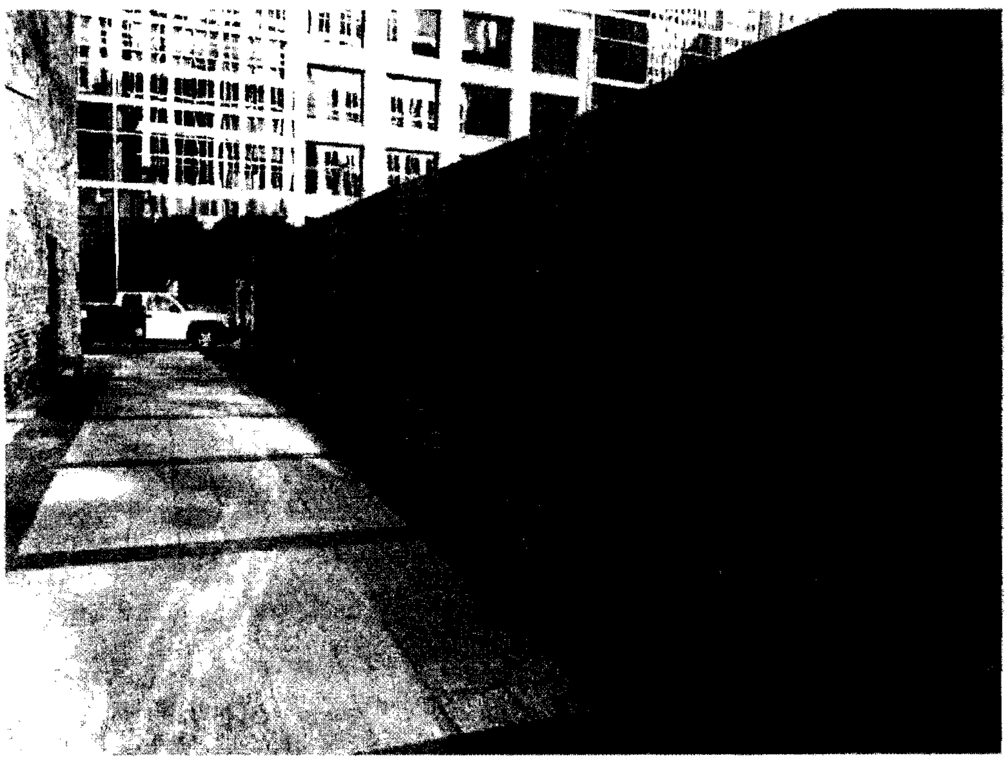
181 Fremont site near Howard

Plaza in front of 199 Fremont with 181 barricade.



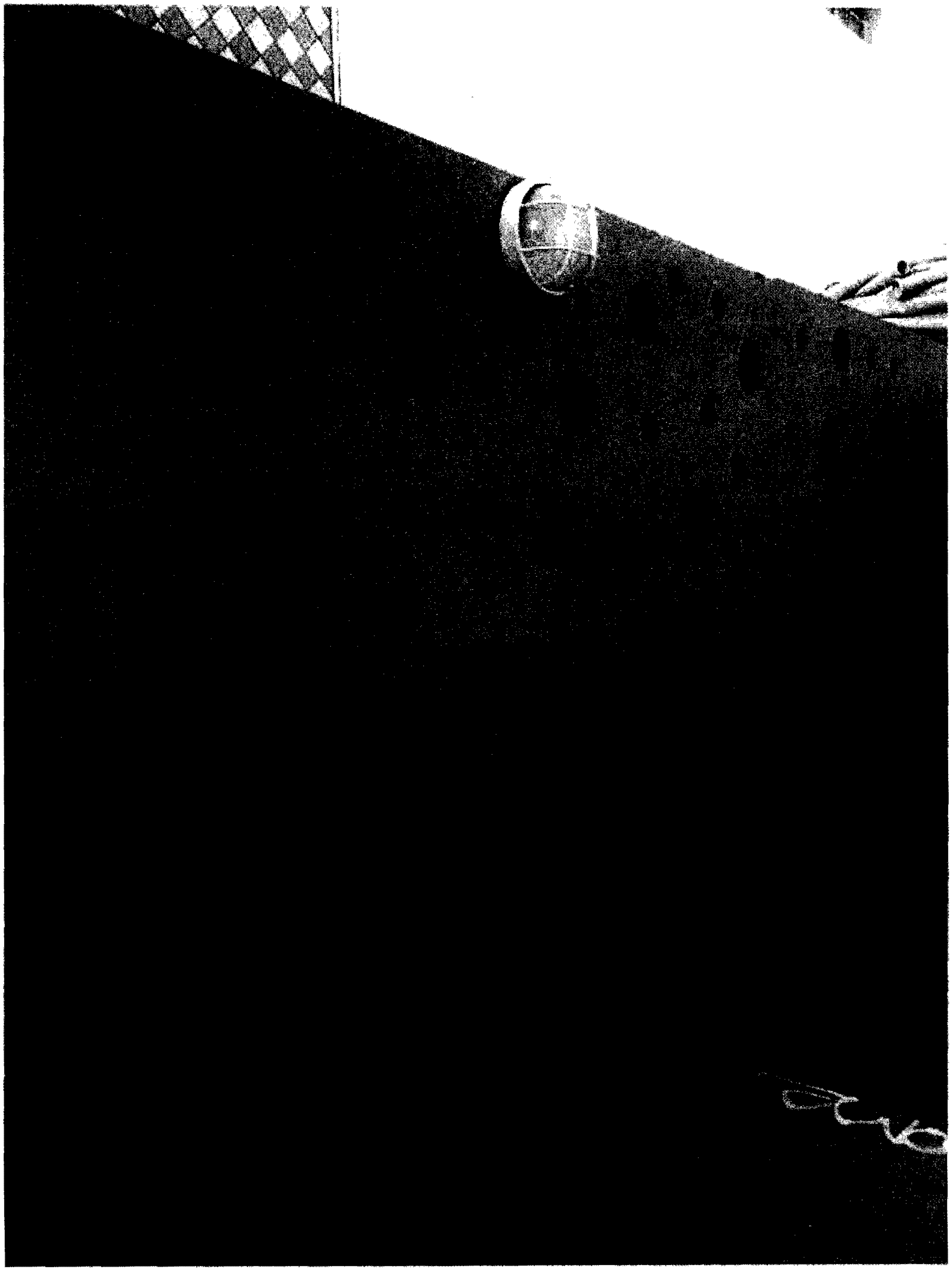
199 Fremont

Corridor between Towne Hall on Howard and 181 Fremont

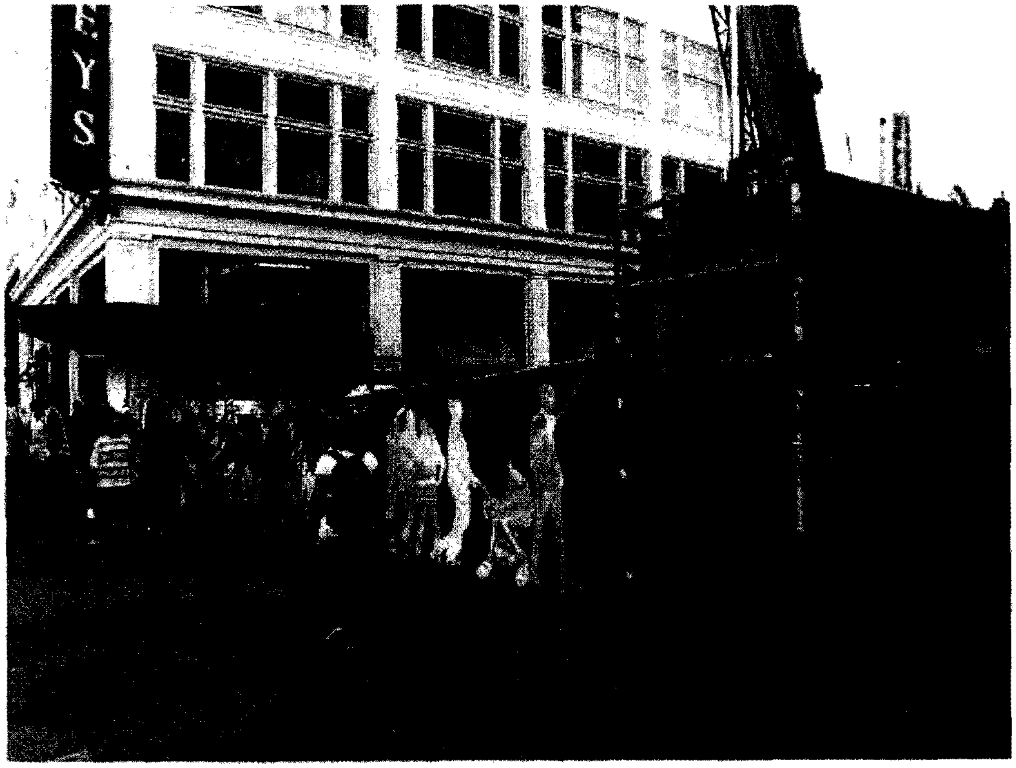


Union Sq. subway project.

Union Square



Union Square



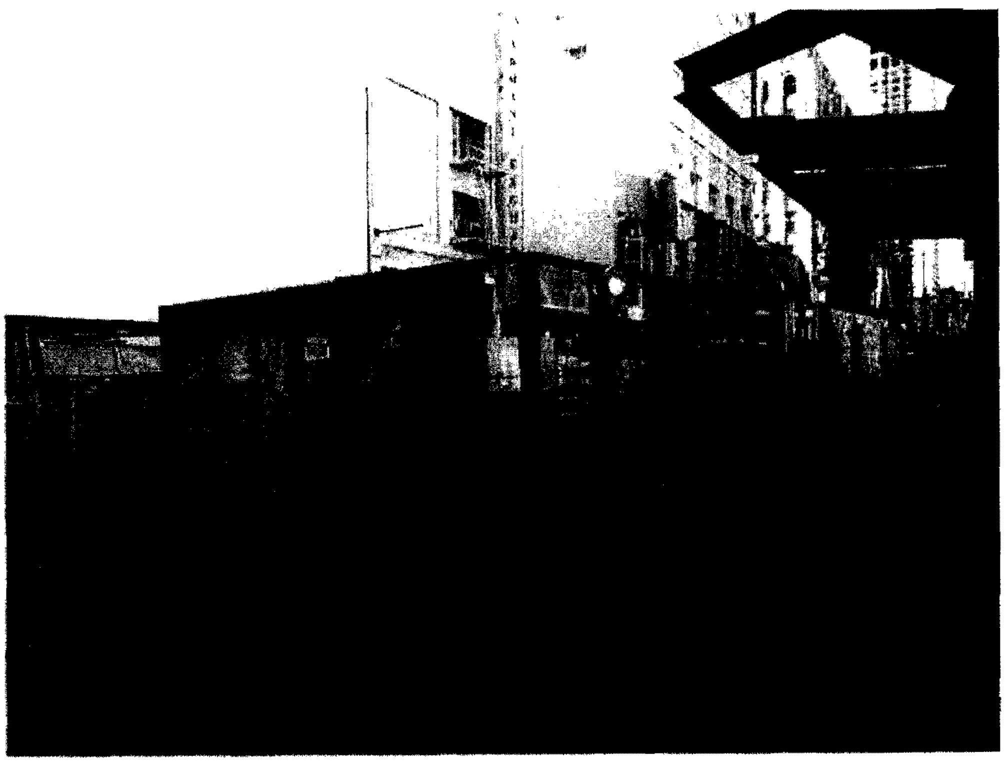


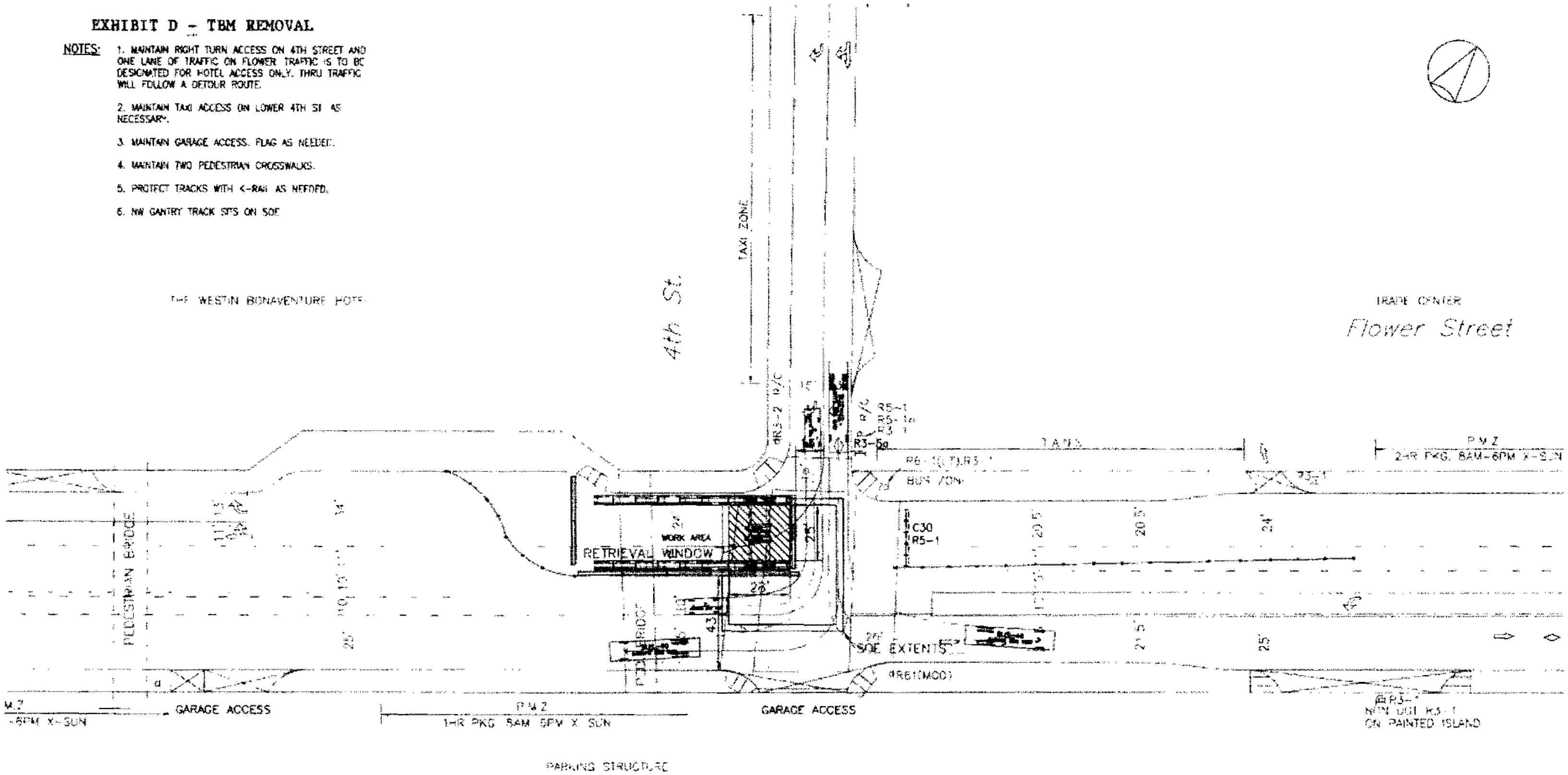
EXHIBIT D

LOCATION AND DIMENSIONS OF TBM REMOVAL

[Attached]

EXHIBIT D – TBM REMOVAL

NOTES:
1. MAINTAIN RIGHT TURN ACCESS ON 4TH STREET AND ONE LANE OF TRAFFIC ON FLOWER. TRAFFIC IS TO BE DESIGNATED FOR HOTEL ACCESS ONLY. THRU TRAFFIC WILL FOLLOW A DETOUR ROUTE.
2. MAINTAIN TAXI ACCESS ON LOWER 4TH ST. AS NECESSARY.
3. MAINTAIN GARAGE ACCESS. FLAG AS NEEDED.
4. MAINTAIN TWO PEDESTRIAN CROSSWALKS.
5. PROTECT TRACKS WITH K-RAIL AS NEEDED.
6. NW GANTRY TRACK SITS ON SOE



TRAFFIC SIGNS

1 FLOWER ST. TBM RETRIEVAL SHAFT – GANTRY OPTION – MOVE SHAFT 8' TO NW

SCALE:

DRAFT PRELIMINARY PLAN NOT FOR CONSTRUCTION

REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION
B	01.08.2015	AWK	-	-			REMOVED 5' OF EACH TRACK, OPENED RT LANE ON 4TH ST
A	01.08.2015	AWK	-	-	-		ORIGINAL

DESIGNED BY: -
DRAWN BY: A. KIRK
CHECKED BY: -
IN CHARGE:
DATE: 01.08.2015

Metro LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

REGIONAL CONNECTOR CONSTRUCTORS SKANSKA TRAYLOR

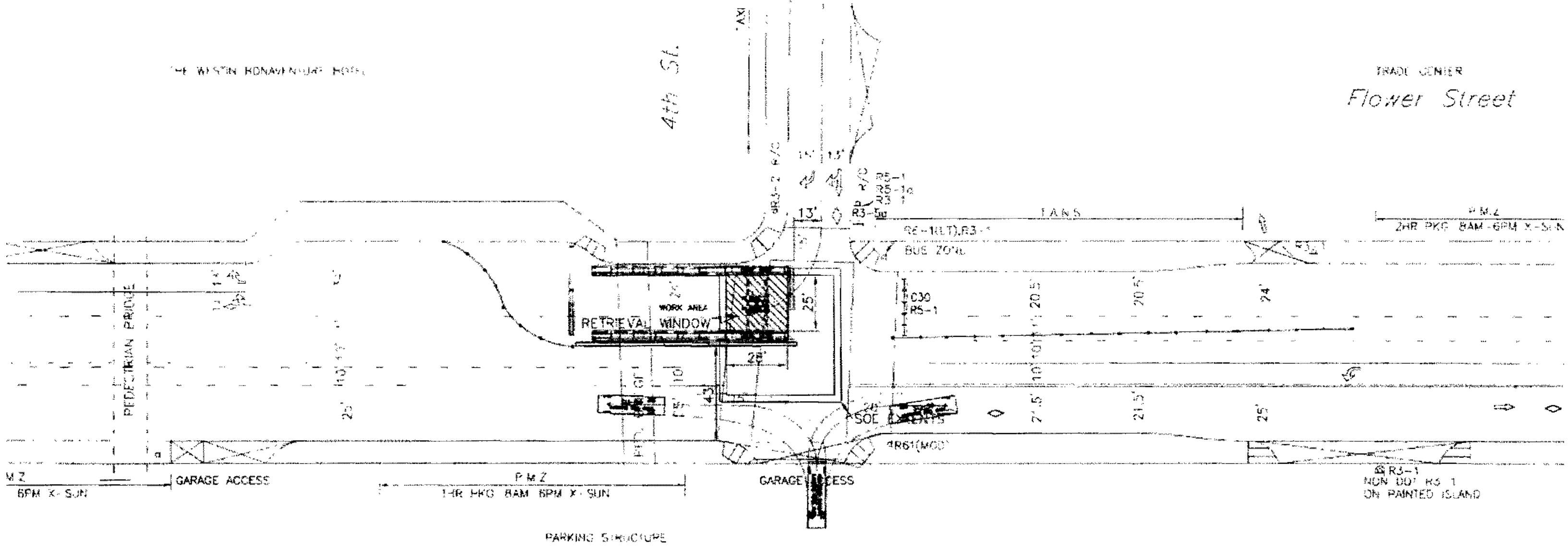
REGIONAL CONNECTOR
FLOWER STREET
TBM RETRIEVAL SHAFT

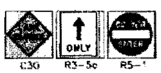
CONTRACT NO: C0980
DRAWING NO: 1402-0531 REV: B
SCALE: AS SHOWN
SHEET NO: 06

EXHIBIT D - TBM REMOVAL

NOTES:

1. MAINTAIN RIGHT TURN ACCESS ON 4TH STREET AND ONE LANE OF TRAFFIC ON FLOWER. TRAFFIC IS TO BE DESIGNATED FOR HOTEL ACCESS ONLY. THRU TRAFFIC WILL FOLLOW A DETOUR ROUTE
2. MAINTAIN TAXI ACCESS ON LOWER 4TH ST AS NECESSARY
3. MAINTAIN GARAGE ACCESS. FLAG AS NEEDED
4. MAINTAIN TWO PEDESTRIAN CROSSWALKS
5. PROTECT TRACKS WITH K-RAIL AS NEEDED
6. NW GANTRY TRACK SITS ON SOE





C30 R3-5c R5-1

TRAFFIC SIGNS

1 FLOWER ST. TBM RETRIEVAL SHAFT – GANTRY OPTION – MOVE SHAFT 8' TO NW

SCALE

DRAFT PRELIMINARY PLAN NOT FOR CONSTRUCTION

REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION
C	01.08.2015	ARH	-				ADJUSTED 5' OF EACH TRACK, OPENED RT LANE ON 4TH ST
A	01.06.2015	ARH	-	-	-		ORIGINAL

DRAWN BY A. KIRK

DATE 01.06.2015

Metro LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

REGIONAL CONNECTOR CONSTRUCTORS SKANSKA TRAYLOR

REGIONAL CONNECTOR
FLOWER STREET
TBM RETRIEVAL SHAFT

CONTRACT NO C0980

DRAWING NO 1402-0531 REV B

SCALE AS SHOWN

SHEET NO 06

EXHIBIT E

ADDITIONAL NOISE MITIGATION MEASURES

I. Additional Mitigation Measures. As part of the Noise Control Plan, Metro agrees that all of the following mitigation measures shall be implemented by Metro and the Design-Build Contractor as needed to meet the Noise Goals:

Source	Noise Control Measures
Backup alarms	Use of low impact alarms, which include manually-adjustable alarms, self-adjusting alarms and broadband alarms. Configure traffic pattern to minimize backing movement.
Slamming tailgates	No slamming tailgates Establish truck cleanout staging areas as needed. Use rubber gaskets or functional equivalent. Decrease speed of closure. Place plywood or dirt beds on all trucks.
Pavement breakers (jackhammers)	Fit with manufacturer approved exhaust muffler. Enclose pavement breaker activities with a noise barrier fence.
Vibratory rollers and packers	Avoid use in vibration sensitive areas.
Drilling for Piles	No impact pile driving will be used.
Prolonged idling of Equipment	No idling of heavy equipment. Locate equipment away from noise sensitive areas to the extent practicable.
Construction Operations Planning	Use modern equipment equipped with state of the art engine insulation and mufflers. Where a generator is necessary, it shall be equipped with the best available technology to minimize noise. Operate equipment at the lowest possible power levels. Provide noise muffling enclosures for fixed equipment. Provide noise awareness training to contractors/workers. Use solar, battery powered, or hybrid equipment whenever and wherever practical. All Work Stations shall be enclosed.

II. Path Mitigation Techniques.

- Use of temporary sound walls, noise barriers and sound control curtains or an equivalent form of solid object to either destroy part of the sound energy by absorption, or to redirect part of the energy by wave deflection.

- All jackhammers, pavement breakers, saw cutters and other noisy equipment used in the Flower Street Construction Area shall be enclosed with shields, acoustical barrier enclosures, or noise barriers.

- Enclose activities likely to create a noise disturbance and enclose stationary equipment.

- Employ sound blankets over a movable fence for all night work, including the use of state-of-the-art technology where necessary to achieve the Noise Goals.

III. Additional Measures.

Part 1 - Scheduling of Work

1.1 Schedule noisiest activities during permitted work hours during the appropriate periods. Examples of noisy activities include: (i) saw-cutting; (ii) pile-drilling; and (iii) jack-hammering.

Part 2 - Noise Control Measures

Equipment

2.1 Use low impact backup alarms on equipment. The backup alarms shall be white sound, broadband and multi-frequency type alarms. Acceptable manufacturers are Brigade, ECCO or approved equal. Ambient-sensitive self-adjusting backup alarms shall be strategically placed on vehicles to minimize engine noise interference.

2.2 Use modem equipment equipped with state of the art engine insulation and mufflers.

2.3 Where a generator is necessary, it shall be equipped with maximum noise muffling capability. Operate equipment at the lowest possible power levels.

2.4 Use solar-powered arrow boards.

2.5 Use nylon slings for lifting in lieu of chainfall.

Hauling/Staging

2.7 Configure traffic patterns to minimize backing movement.

2.8 Use approved haul routes only.

Work Areas

2.9 Enclose pavement breaker and sawcutting activities with a noise barrier fence. Noise barrier fence shall include materials with an STC rating of 25 or more (determined under ASTM E90) and incorporate noise control curtains with an NRC rating of NRC 0.70 or greater (determined under ASTM C423).

2.10 To minimize slamming tailgates use rubber gaskets or equivalent.

2.11 Place plywood or dirt on beds of trucks.

2.12 No slamming tailgates and decrease the speed of tailgate closures

2.13 No impact pile driving will be used.

2.14 Locate equipment away from noise sensitive areas to the extent practicable.

2.15 Use noise control signage in work zone that states "Noise Control Zone."

2.16 No idling of heavy equipment.

2.18 Use slurry backfill (which doesn't require vibratory equipment).

Staging Areas

2.19 Noise barrier fences at all staging areas/lay-down yards to have a wall assembly with an STC rating of 25 or more (determined under ASTM E90) and incorporate noise control curtains with an NRC rating of NRC 0.70 or greater (determined under ASTM C423).

EXHIBIT F

CLAIMS FORM

[Attached]

PC5

EXHIBIT F

Claim for Damages

Los Angeles County Metropolitan Transportation Authority
One Gateway Plaza, Mail Stop 99-3-1, Los Angeles, CA 90012-2952

Please type or print.

FOR OFFICE USE ONLY
Claim number & Reciept date

CLAIMANT INFORMATION

Last Name ______ First Name ______ Middle Name/Initial ______

Occupation ______ Social Security Number ______ Birth date ______

Street Address ______

City | State | Zip ______ Telephone Number ______

IF CLAIMANT IS A MINOR: PARENT OR GUARDIAN INFORMATION

Last Name ______ First Name ______ Middle Name/Initial ______

Street Address ______

City | State | Zip ______ Telephone Number ______

IF YOU HAVE AN ATTORNEY: ATTORNEY INFORMATION

Last Name ______ First Name ______ Middle Name/Initial ______ Telephone Number ______

Street Address ______ City | State | Zip ______

INCIDENT INFORMATION

Please indicate if you were a Metro bus or Metro rail passenger: ☐ Yes ☐ No

1. ☐ bus ☐ rail ☐ platform ☐ parking lot ☐ bus stop ☐ terminal ☐ other ______
2. Other than bus or rail car, vehicle description ______
3. Accident date ______ Time ______ Location ______
4. Direction ______ On which street ______ Cross-street ______
5. Speed ______ Weather ______ Bus or Rail Car # ______ Line # ______
6. Boarding point ______ Operator Name or Badge # ______

OWNER OF PRIVATE VEHICLE PLEASE COMPLETE THIS SECTION:

7. Name ______ Driver License # ______
   Address ______
   Telephone ______ Vehicle: Year ______ Make ______ Model ______
   Insured? ☐ Yes ☐ No Vehicle Lic. # ______ Injured? ☐ Yes ☐ No Insurance Tel. # ______
   Carrier ______ Policy # ______

CONTINUED

Claim for Damages

Los Angeles County Metropolitan Transportation Authority
One Gateway Plaza, Mail Stop 99-3-1, Los Angeles, CA 90012-2952

Please print or type.

OWNER OF PRIVATE VEHICLE PLEASE COMPLETE THIS SECTION (CONTINUED):

8. Describe what occurred (If necessary, you may add another page):

9. What property damage or bodily injury do you claim? Give full extent of damage or injury claimed:

10. The amount claimed if under $10,000 as of the date of presentation together with the basis of computation thereof. Attach medical bills and/or repair estimates.

11. Name(s) and address(es) of witness(es):

12. Name(s) and address(es) of doctor(s):

13. Dates of prior claims against the Los Angeles County Metropolitan Transportation Authority (METRO) or Southern California Rapid Transit District (RTD). If none, write "None".

Signature of Claimant

Date

Claims arising after January 1, 1988 must be filed within 6 months from the date of accident. For Law governing filing of claim and statute of limitations as to filing action see Chapter 201 Statutes 1987 (Sec 900 ET SEQ Government Code). For your protection California Law requires the following to appear on this form: Any person who knowingly presents a false or fraudulent claim for the payment of a loss is guilty of a crime and may be subject to fines and confinement in State Prison. Added by Stats. 1989, c. 1119, S 3.

Please mail your claim to:
Metro Board Secretary's Office – Legal Services
One Gateway Plaza, 99-3-1, Los Angeles, CA 90012-29952

Metro

EXHIBIT G

MAP SHOWING THE LOCATION OF PILE AND CAP BEAM INSTALLATION OCCURRING ON WEEKDAYS AND WEEKENDS

[Attached]

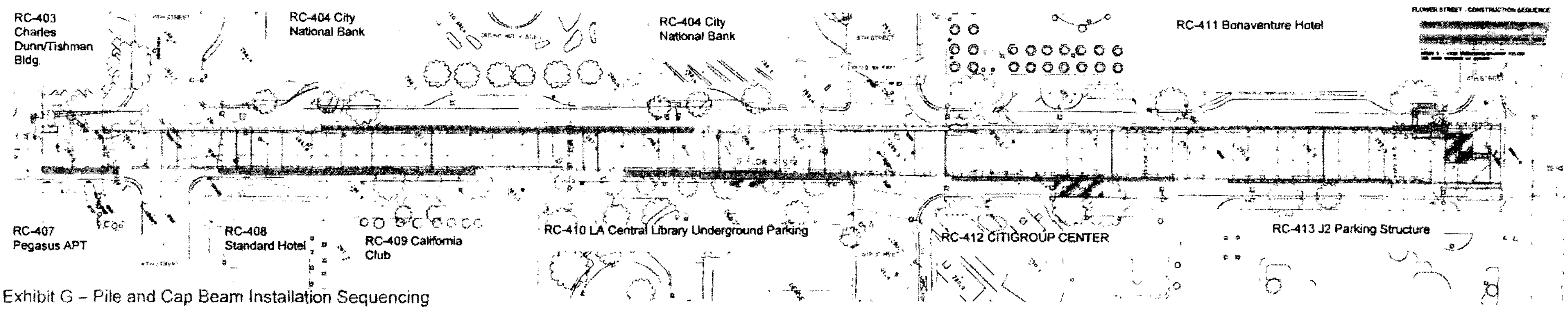


Exhibit G – Pile and Cap Beam Installation Sequencing

Exhibit 8

PC5

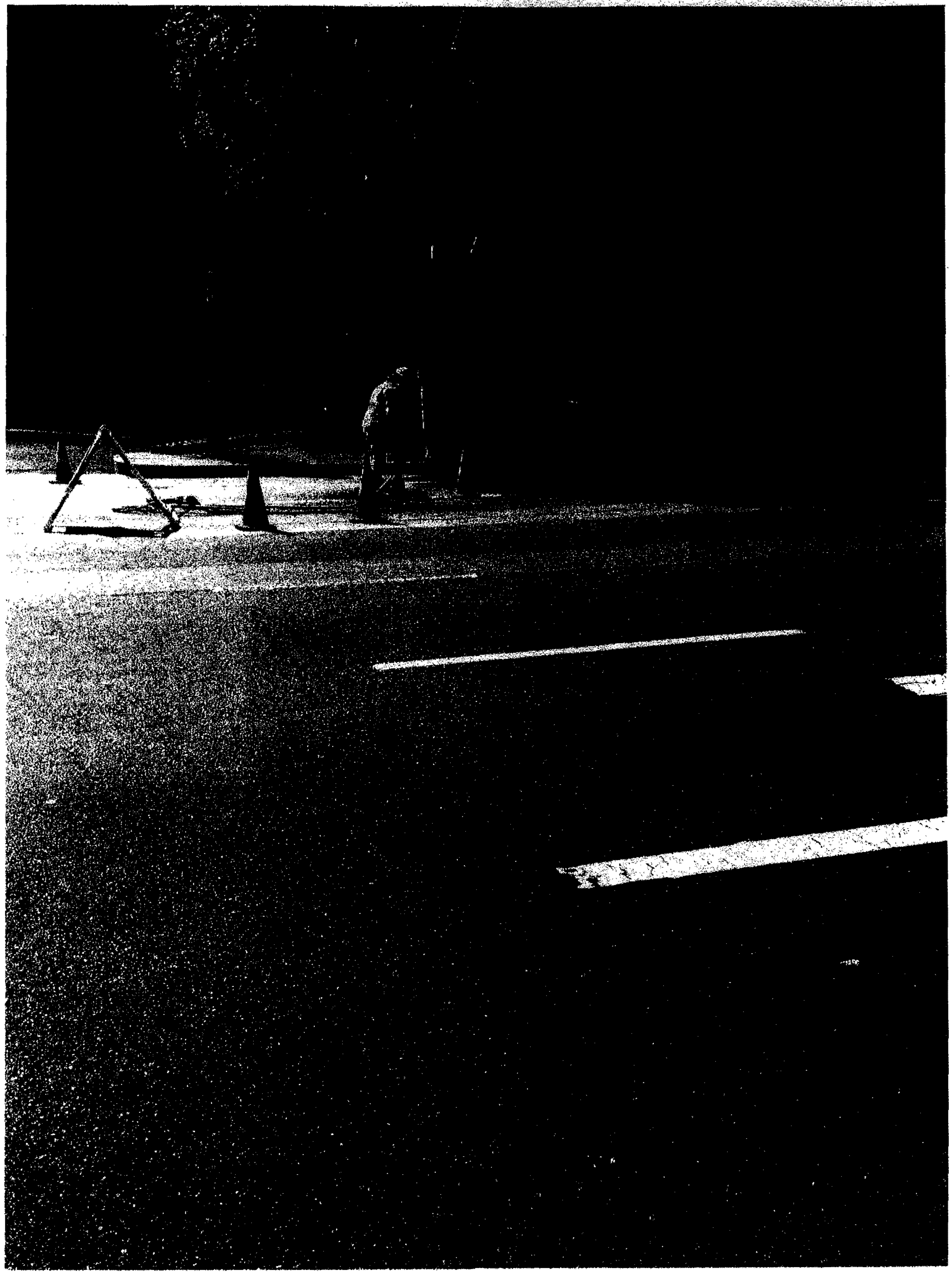
from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>
date: Thu, Jun 5, 2014 at 4:26 PM
subject: FW: Metro Construction 2-24-14 5th St between flower st and figueroa st

I was notified by MTA that utility relocation would be taking place on 2-24-14 on 5th st between flower st and Figueroa. On 2-24-14, I was located on the 5th st Westin Bonaventure property line between flower st and Figueroa St. I witnessed a worker on my opposite side of 5th st jackhammering without any type of noise screen causing noise at my location **exceeding 91dba consistent noise level** reading. Advanced Engineering Acoustics Company's technical director Marlund Hale also witnessed the jackhammering.

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

Please reach me at my new email address Patrick.serge@westinbonaventure.com

[PHOTO ATTACHED]



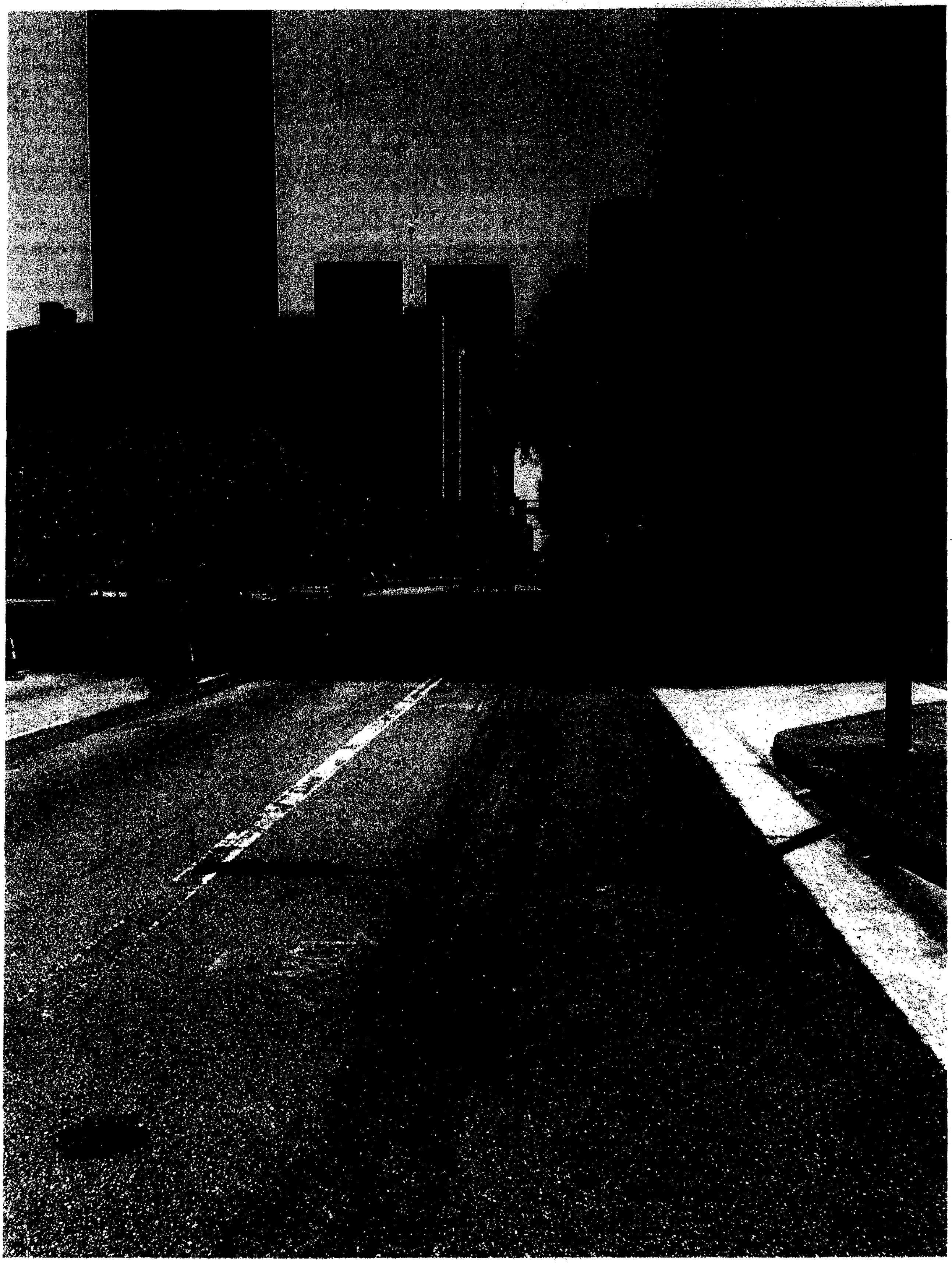
from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "Arroyo, Olga" <ARROYOO@metro.net>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>,
date: Mon, Jun 16, 2014 at 2:53 PM
subject: FW: Flower St/ Westin Bonaventure Parking Garage Entrance 6-16-2014

Olga, currently the Westin Bonaventure's parking garage exit on Flower St is barricaded right lane only to 5th st not allowing hotel guests to proceed straight down Flower St. There is no flagger assisting guests or vendors. This is unacceptable and a safety hazard as guests are trying to go straight from the right lane. We were not notified of this lane closure, stop this construction and remove barricades immediately.

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

[PHOTO ATTACHED]

PC5



PC5

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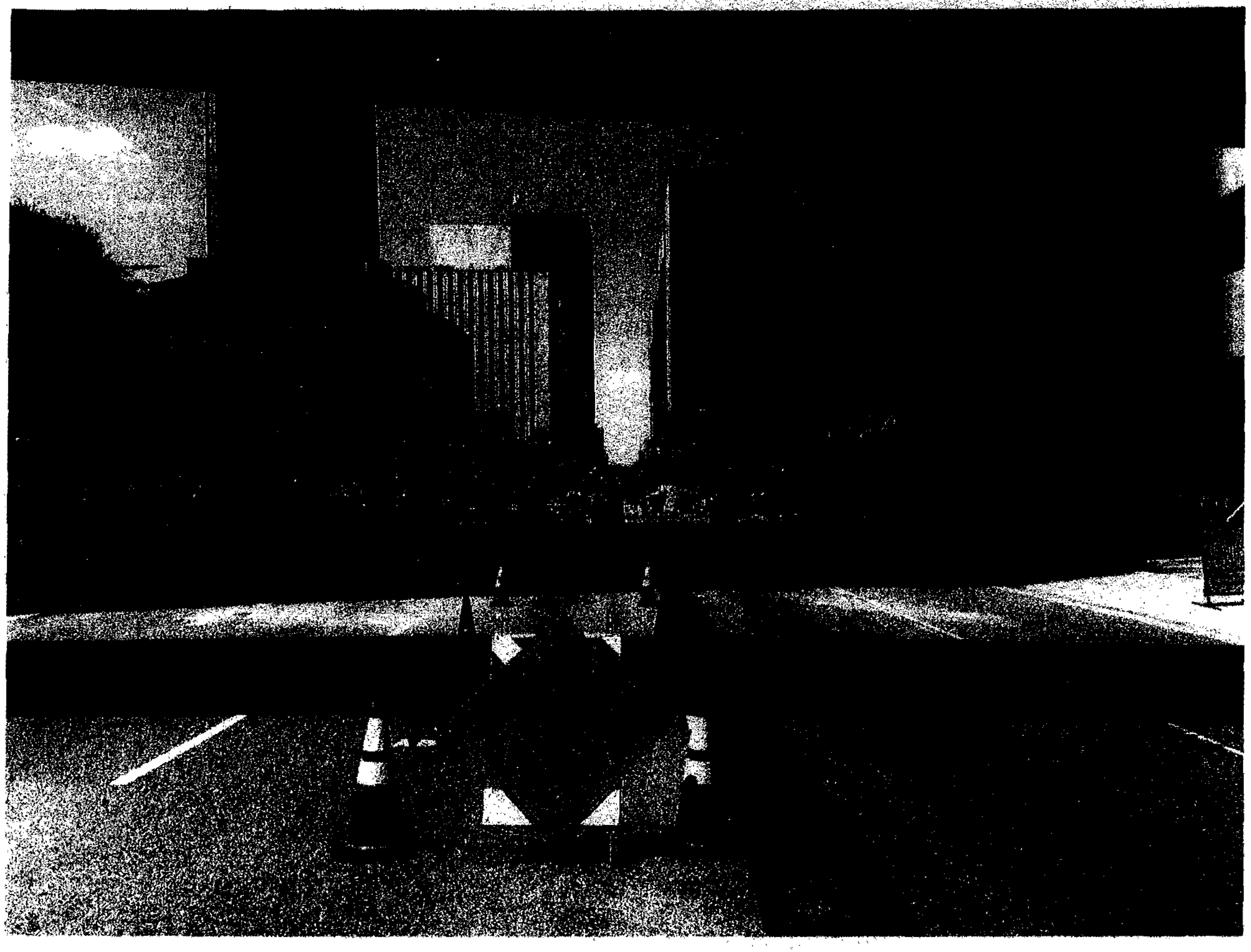
from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "Arroyo, Olga" <ARROYOO@metro.net>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>,
date: Tue, Jun 17, 2014 at 11:20 AM
subject: FW: Flower St/Westin Bonaventure Parking Garage Entrance 6-17-2014

Olga, currently the Westin Bonaventure's parking garage exit on Flower St is barricaded right lane only to 5th st with no flagger assistance. This is unacceptable and a safety hazard as guests are trying to go straight from the right lane as the bicyclist are doing in the picture attached. Stop this construction and remove barricades immediately.

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

[PHOTO ATTACHED]



PC5

from: Arroyo, Olga <ARROYOO@metro.net>
to: "Serge, Patrick" <Patrick.Serge@westinbonaventure.com>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>,
date: Thu, Jun 19, 2014 at 5:29 PM
subject: RE: Flower St/ Westin Bonaventure Parking Garage Entrance 6-16-2014

Good afternoon Pat,
My apologies for the delay in acknowledging your email, I was addressing your concern. A flagger was made available the following morning to assist with the daily operations of the Hotel during this phase of work.

Although full access was maintained at all times to the parking lot and the loading dock during the construction hours, I understand your concerns on behalf of your guests. For safety purposes I recommend you encourage guests exiting the Hotel to adhere to all traffic controls during implementation. The traffic control plan was laid out in accordance with LADOT approved plans. The potholing activity lasted only two days, so hopefully any inconvenience to your staff and guests was minimal.

As a result of your concern, we are in discussions with LADOT to identify options that may offer the flexibility for guests to exit the Hotel and continue southbound on Flower St. as you suggest. I'll keep you informed on this process as information becomes available.

Please note that no work is scheduled on Flower St. for the rest of the week.

Thank you.

Olga Arroyo
Construction Relations Manager
213-893-7115

PC5

---

from: Arroyo, Olga <ARROYOO@metro.net>
to: "Serge, Patrick" <Patrick.Serge@westinbonaventure.com>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, Christopher Sutton <christophersutton.law@gmail.com>
date: Thu, Jun 19, 2014 at 5:29 PM
subject: RE: Flower St/Westin Bonaventure Parking Garage Entrance 6-17-2014

Dear Pat,

Although full access was maintained at all times to the Hotel parking lot and the loading dock during the construction hours, I understand your concerns on behalf of your guests. For safety purposes I recommend you encourage guests exiting the Hotel to adhere to all traffic controls during construction. The traffic control plan was laid out in accordance with LADOT approved plans. The potholing activity lasted only two days, so hopefully any inconvenience to your staff and guests was minimal.

As a result of your concern, we are in discussions with LADOT to identify options that may offer the flexibility for guests to exit the Hotel and continue southbound on Flower St. as you suggest. I'll keep you informed on this process as information becomes available.

With regard to traffic from 4th St. heading south on Flower St., advanced warning signs are put in place to warn motorists and cyclists alike of construction ahead, including traffic lane restrictions.

Sincerely,
Olga Arroyo
Construction Relations Manager
213-893-7115

PC5

- -

from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "Arroyo, Olga" <ARROYOO@metro.net>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, Christopher Sutton <christophersutton.law@gmail.com>, "noisedoc@aol.com" <noisedoc@aol.com>
date: Thu, Jun 26, 2014 at 10:25 AM
subject: FW: Metro Construction 6/26/14

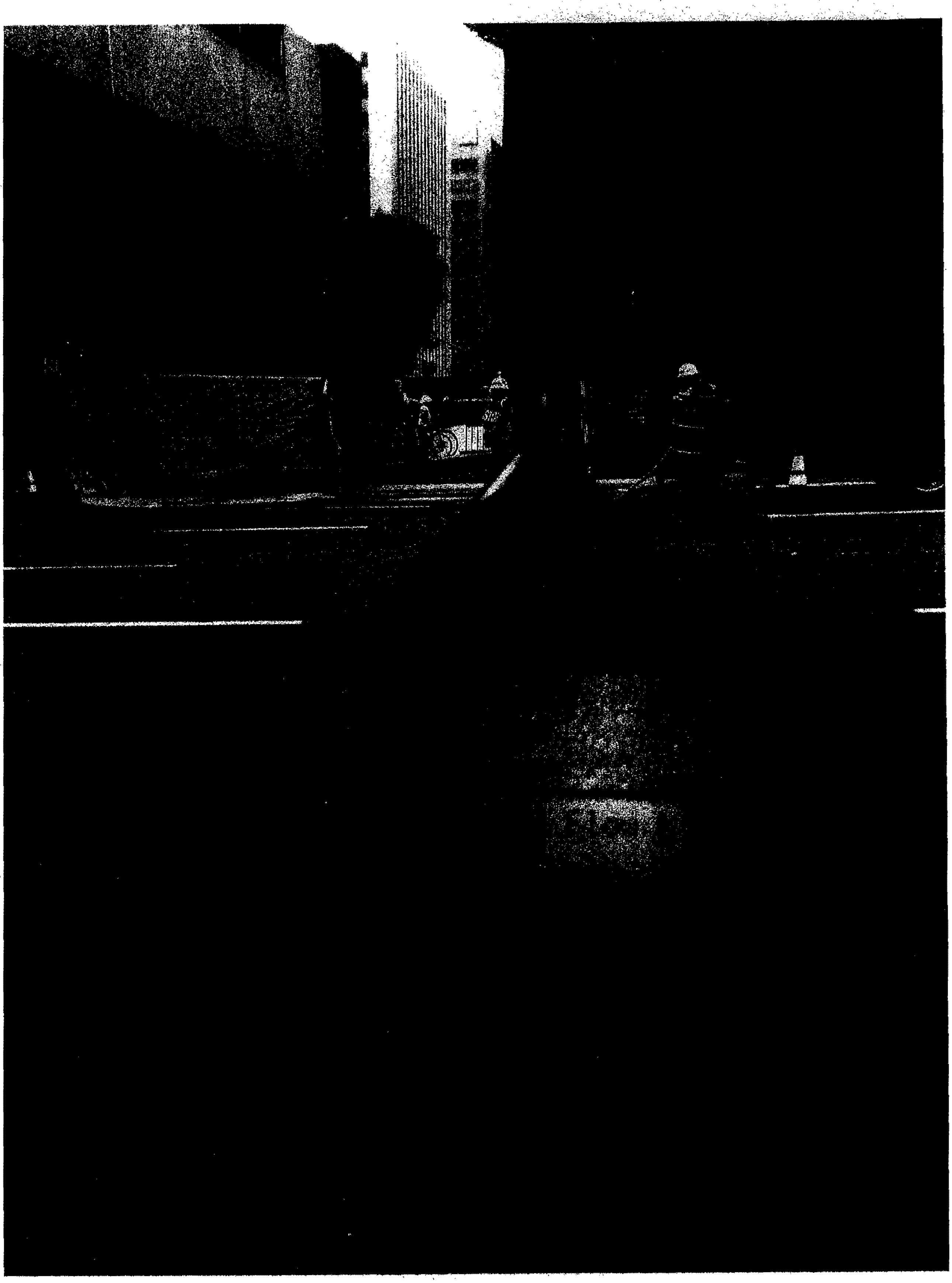
Sound level measurements were taken today 6/26/14 at 9a on 5thst between Flower St and Figueroa St at the MTA construction site, sound blankets were installed on the temporary street fencing. An 86-dBA reading was taken and witnessed by Advanced Engineering Acoustic Company's technical director Marlund Hale. This significantly exceeds Metro's noise thresholds.

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

[PHOTO ATTACHED[

- -

PC5



PC5

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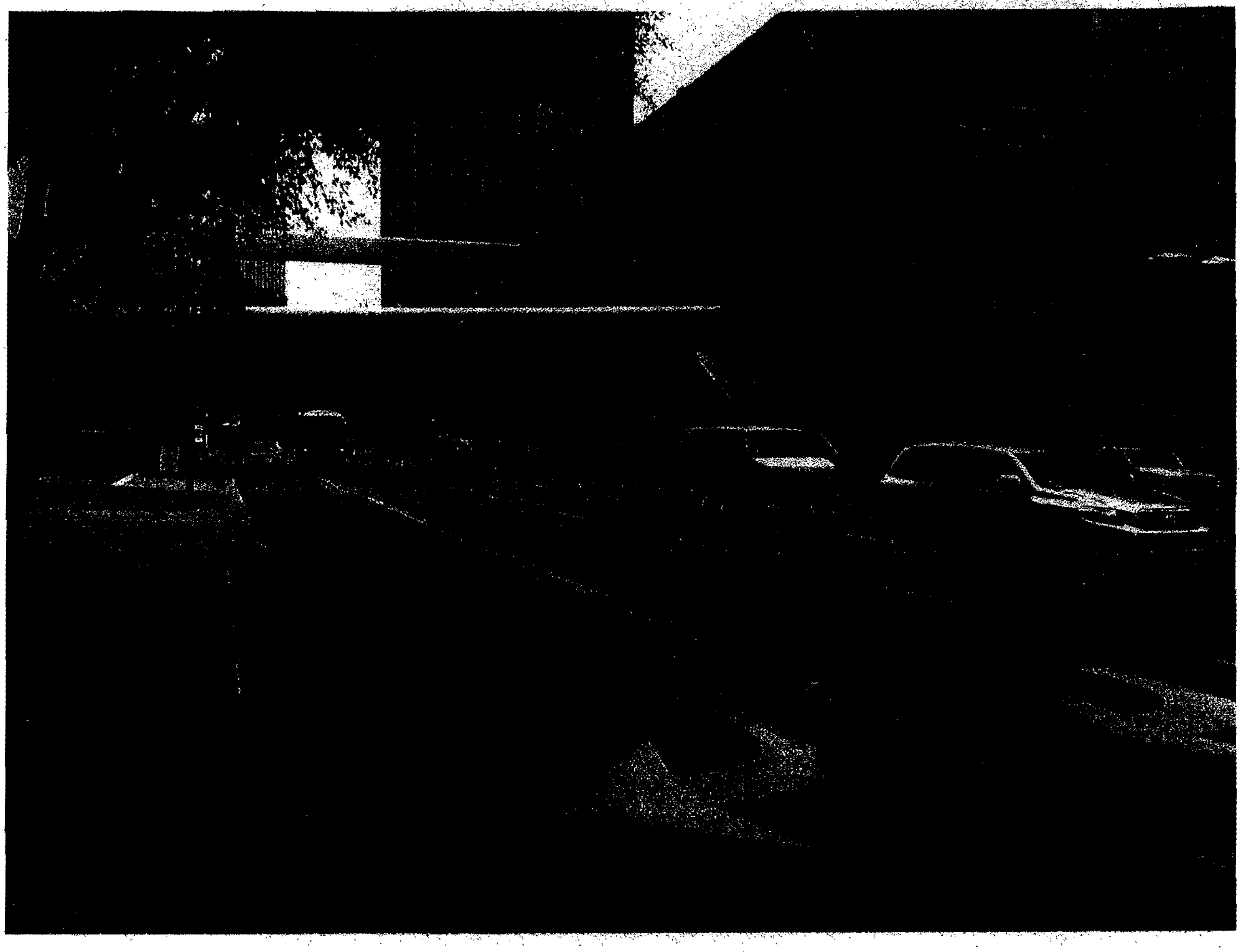
from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "Arroyo, Olga" <ARROYOO@metro.net>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, Christopher Sutton <christophersutton.law@gmail.com>
date: Thu, Jul 10, 2014 at 10:31 AM
subject: FW: Metro Construction 7-10-14 Flower St near 5th

Olga, at 10a today Metro coned off lanes on Flower St half way between 4th all the way to the 5th st intersection. As seen on the attached photo there is no flag person to assist with traffic allowing deliveries to the Bonaventure loading dock and a Metro SUV with a construction van are blocking our access with a bobtail truck/trailer, this is unacceptable

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

[PHOTO ATTACHED]



PC5

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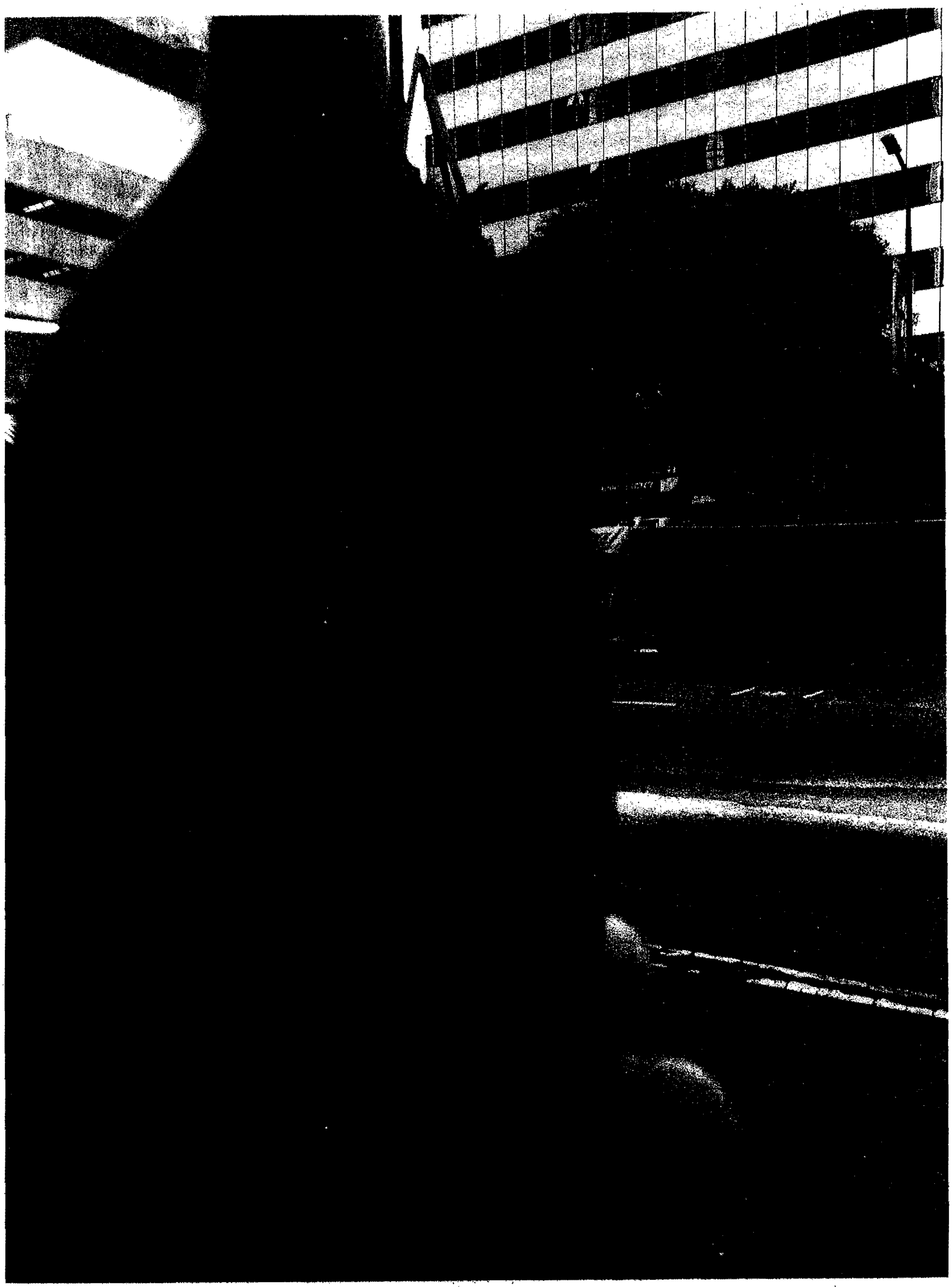
from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "Arroyo, Olga" <ARROYOO@metro.net>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, Christopher Sutton <christophersutton.law@gmail.com>
date: Mon, Jul 21, 2014 at 12:13 PM
subject: FW: Metro Construction 7-21-14

Sound level measurements were taken today 7-21-14 at 11a on Flower st near 5th st at the MTA construction site, sound blankets were overlapping an upright piece of fencing only. An 83-dBA reading was taken. This exceeds Metro's noise thresholds, stop work immediately.

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

[PHOTO ATTACHED]

PC5



- -

from: ``Czarcinski, Michael <Michael.Czarcinski@westinbonaventure.com>
to: `"Serge, Patrick" <Patrick.Serge@westinbonaventure.com>
cc: "Arroyo, Olga" <ARROYOO@metro.net>,
Christopher Sutton <christophersutton.law@gmail.com>,
"Richard M. Tefank" <richard.tefank@lapd.lacity.org>
date: Mon, Jul 21, 2014 at 12:58 PM
subject: Re: Metro Construction 7-21-14

Olga

This is constantly over 90 Dba this is ridiculous please shut down. The small barrier only blocks limited noise. Your staff has war plugs and our staff does not the have to communicate with guests.
Metro code states not to expose public to over 90 Dba

Please cease this work.

Michael Czarcinski
THE WESTIN BONAVENTURE

- -

PC5

---

from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "arroyoo@metro.net" <arroyoo@metro.net>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date: Tue, Aug 5, 2014 at 10:43 AM
subject: FW: Metro Construction 8-5-14

Sound level measurements were taken today 8-5-14 at 9:30a on Flower st between 4th and 5th st at the MTA construction site, sound blankets were overlapping an upright piece of fencing only. An 82.8-dBA reading was taken. This exceeds Metro's noise thresholds, stop work immediately.

PATRICK
SERGE
Director of Engineering

THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

[PHOTO ATTACHED]

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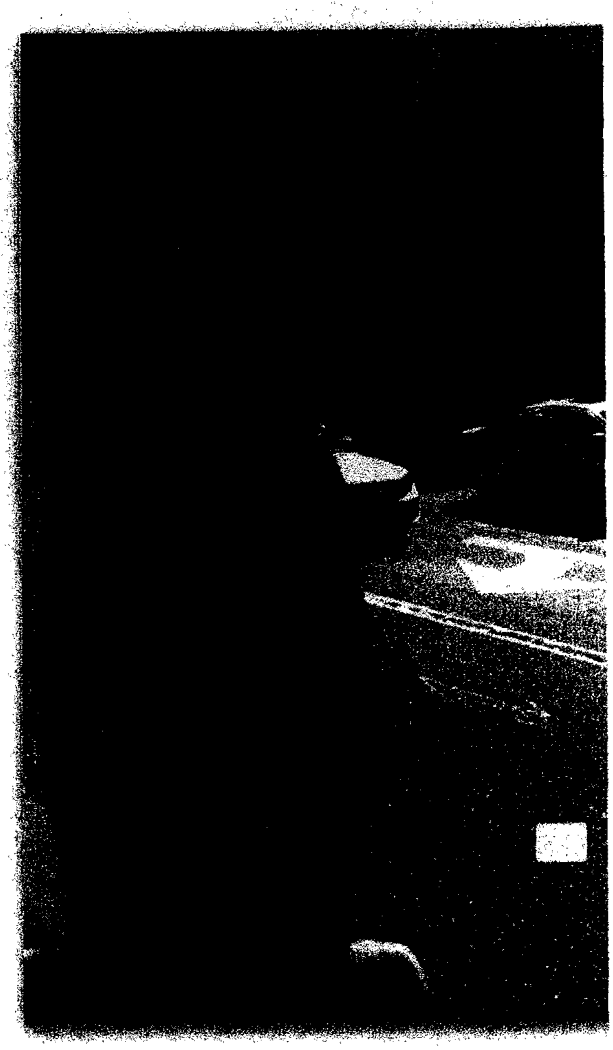
photo.JPG

Open with



---

from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "arroyoo@metro.net" <arroyoo@metro.net>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date: Wed, Aug 6, 2014 at 11:46 AM
subject: FW: Metro Construction 8-6-14

Sound level measurements were taken today 8-6-14 at 9:30a on Flower St from the Westin Bonaventure hotel entrance, the MTA construction site was in the street in front of the hotel entrance, sound blankets were overlapping an upright piece of fencing only. An 82.6 dBA reading was taken. This exceeds Metro's noise thresholds, stop work immediately.

PATRICK
SERGE
Director of Engineering

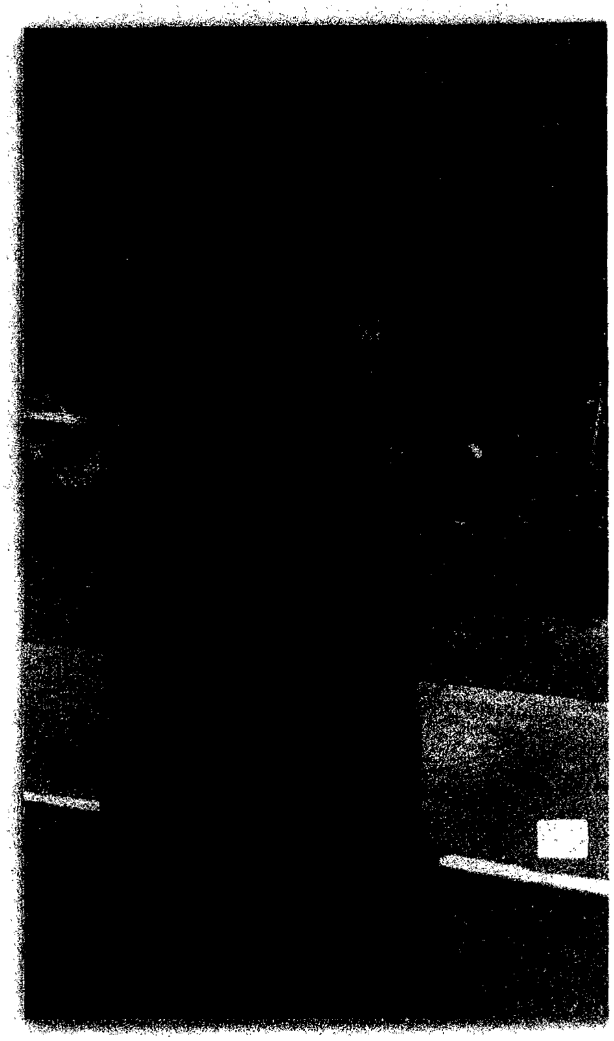
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

[PHOTO ATTACHED]

---

photo.JPG

Open with



---

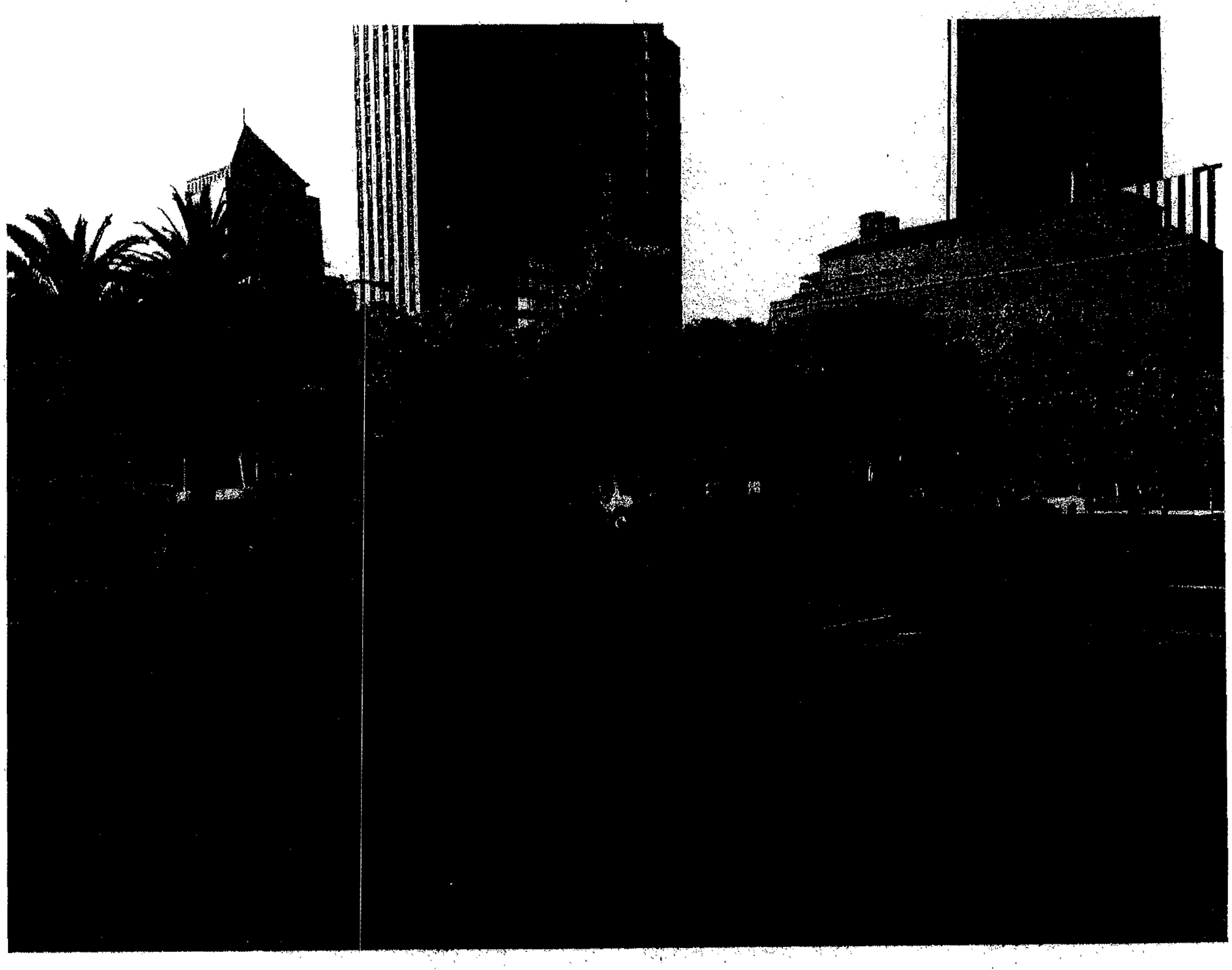
from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "arroyoo@metro.net" <arroyoo@metro.net>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date: Tue, Aug 26, 2014 at 10:18 AM
subject: FW: Metro Construction 8-26-14

Sound level measurements were taken today 8-26-14 at 9:30a on Flower st near the corner of 5th by Advanced Engineering Acoustics, sound blankets were overlapping an upright piece of fencing only, readings exceeding 80 dBA were taken. This exceeds Metro's noise thresholds, stop work immediately.

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

[PHOTO ATTACHED]

PC5



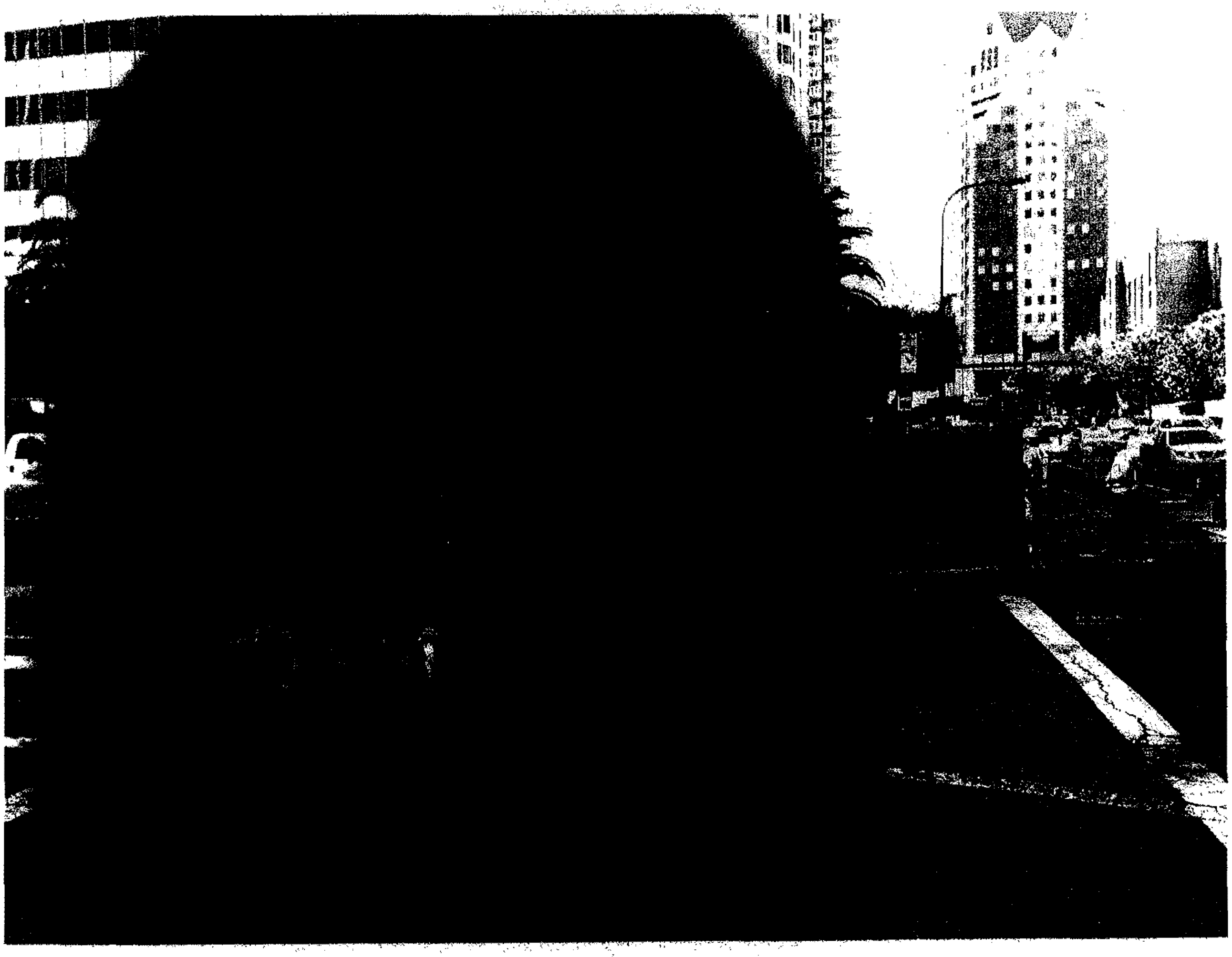
PC5

from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "arroyoo@metro.net" <arroyoo@metro.net>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date: Thu, Aug 28, 2014 at 12:09 PM
subject: FW: Metro Construction 8-28-14

Sound level measurements were taken today 8-28-14 at 10a on Flower St near 5th St, sound blankets were overlapping an upright piece of fencing only. An 81.3 dBA reading was taken. This exceeds Metro's noise thresholds, stop work immediately.

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

[PHOTO ATTACHED]



PC5

---

from:	Czarcinski, Michael <Michael.Czarcinski@westinbonaventure.com>
to:	"Serge, Patrick" <Patrick.Serge@westinbonaventure.com>
cc:	"Arroyo, Olga" <ARROYOO@metro.net>, Christopher Sutton <christophersutton.law@gmail.com>, "Richard M. Tefank" <richard.tefank@lapd.lacity.org>
date:	Mon, Jul 21, 2014 at 12:58 PM
subject:	Re: Metro Construction 7-21-14

Olga

This is constantly over 90 Dba this is ridiculous please shut down. The small barrier only blocks limited noise. Your staff has war plugs and our staff does not the have to communicate with guests.
Metro code states not to expose public to over 90 Dba

Please cease this work.

Michael Czarcinski
THE WESTIN BONAVENTURE

---

from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "arroyoo@metro.net" <arroyoo@metro.net>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date: Fri, Aug 29, 2014 at 10:30 AM
subject: Metro Construction 8-29-14

Sound level measurements were taken today 8-29-14 at 10:15a on Flower St near the corner of 5th st by Advanced Engineering Acoustics, sound blankets were overlapping an upright piece of fencing only, readings exceeding 80 dBA were taken. This exceeds Metro's noise thresholds, stop work immediately.

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

PC5

from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "arroyoo@metro.net" <arroyoo@metro.net>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>, "Kirin-Perez, Bonny" <Bonny.Kirin-Perez@westinbonaventure.com>
date: Mon, Sep 15, 2014 at 10:41 AM
subject: Metro Construction 9-15-14

Sound level measurements were taken today 9-15-14 at 9a on Flower St near the corner of 5th st by Advanced Engineering Acoustics, jackhammering was occurring, sound blankets were overlapping an upright piece of fencing only. Readings exceeding 85 dBA were taken. This exceeds Metro's noise thresholds, stop work immediately.

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

PC5

from: Kirin-Perez, Bonny <Bonny.Kirin-Perez@westinbonaventure.com>
to: "Serge, Patrick" <Patrick.Serge@westinbonaventure.com>, "arroyoo@metro.net" <arroyoo@metro.net>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date: Mon, Sep 15, 2014 at 10:50 AM
subject: RE: Metro Construction 9-15-14

Olga,

Per the attached Email, please contact your contractor and have them provide proper sound abatement as we are housing multiple international travelers who are currently sleeping. I would appreciate your immediate attention to this issue. Bonny

BONNY KIRIN-PEREZ
Director of Operations
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4718 F 213.612.4893 M 213.494-7297

From: Serge, Patrick
Sent: Monday, September 15, 2014 10:42 AM
To: arroyoo@metro.net
Cc: Czarcinski, Michael; christophersutton.law@gmail.com; Kirin-Perez, Bonny
Subject: Metro Construction 9-15-14

Sound level measurements were taken today 9-15-14 at 9a on Flower St near the corner of 5th st by Advanced Engineering Acoustics, jackhammering was occurring, sound blankets were overlapping an upright piece of fencing only. Readings exceeding 85 dBA were taken. This exceeds Metro's noise thresholds, stop work immediately.

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

PC5

---

from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "arroyoo@metro.net" <arroyoo@metro.net>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>, "Kirin-Perez, Bonny" <Bonny.Kirin-Perez@westinbonaventure.com>
date: Tue, Sep 16, 2014 at 11:14 AM
subject: RE: Metro Construction 9-16-14

Sound level measurements were taken today 9-16-14 at 11:00am on Flower St near the corner of 5th st by Advanced Engineering Acoustics, drilling was occurring, sound blankets were overlapping an upright piece of fencing only. Readings exceeding 85 dBA were taken. This exceeds Metro's noise thresholds, stop work immediately.

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

PC5

- -

from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "hongy@metro.net" <hongy@metro.net>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date: Mon, Nov 10, 2014 at 6:59 AM
subject: FW: Metro Construction 11-10-14

Metro Construction trucks staging on Flower St outside the Westin Bonaventure hotel entrance at 6:30a on 11-10-14, this is unacceptable

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

[PHOTO ATTACHED]

- -

- -

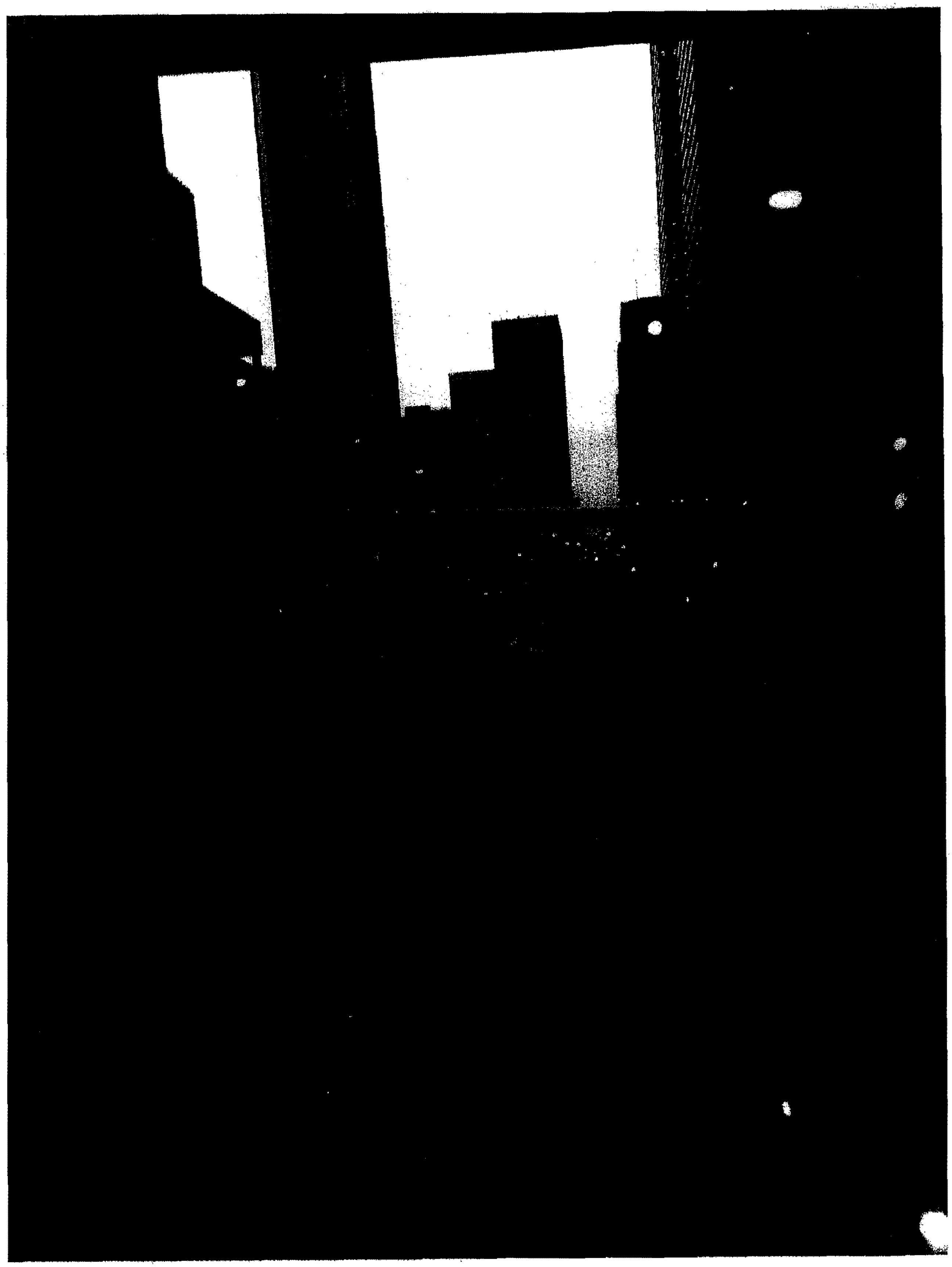
from: Hong, Yonah <HongY@metro.net>
to: "Serge, Patrick" <Patrick.Serge@westinbonaventure.com>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>, "Arroyo, Olga" <ARROYOO@metro.net>
date: Mon, Nov 10, 2014 at 9:25 AM
subject: RE: Metro Construction 11-10-14

Thank you, Patrick.
We have addressed this issue accordingly and have notified our contractor.

Best,

Yonah

- -



---

from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "hongy@metro.net" <hongy@metro.net>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date: Mon, Nov 10, 2014 at 6:59 AM
subject: FW: Metro Construction 11-10-14

Metro Construction trucks staging on Flower St outside the Westin Bonaventure hotel entrance at 6:30a on 11-10-14, this is unacceptable

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

[PHOTO ATTACHED]

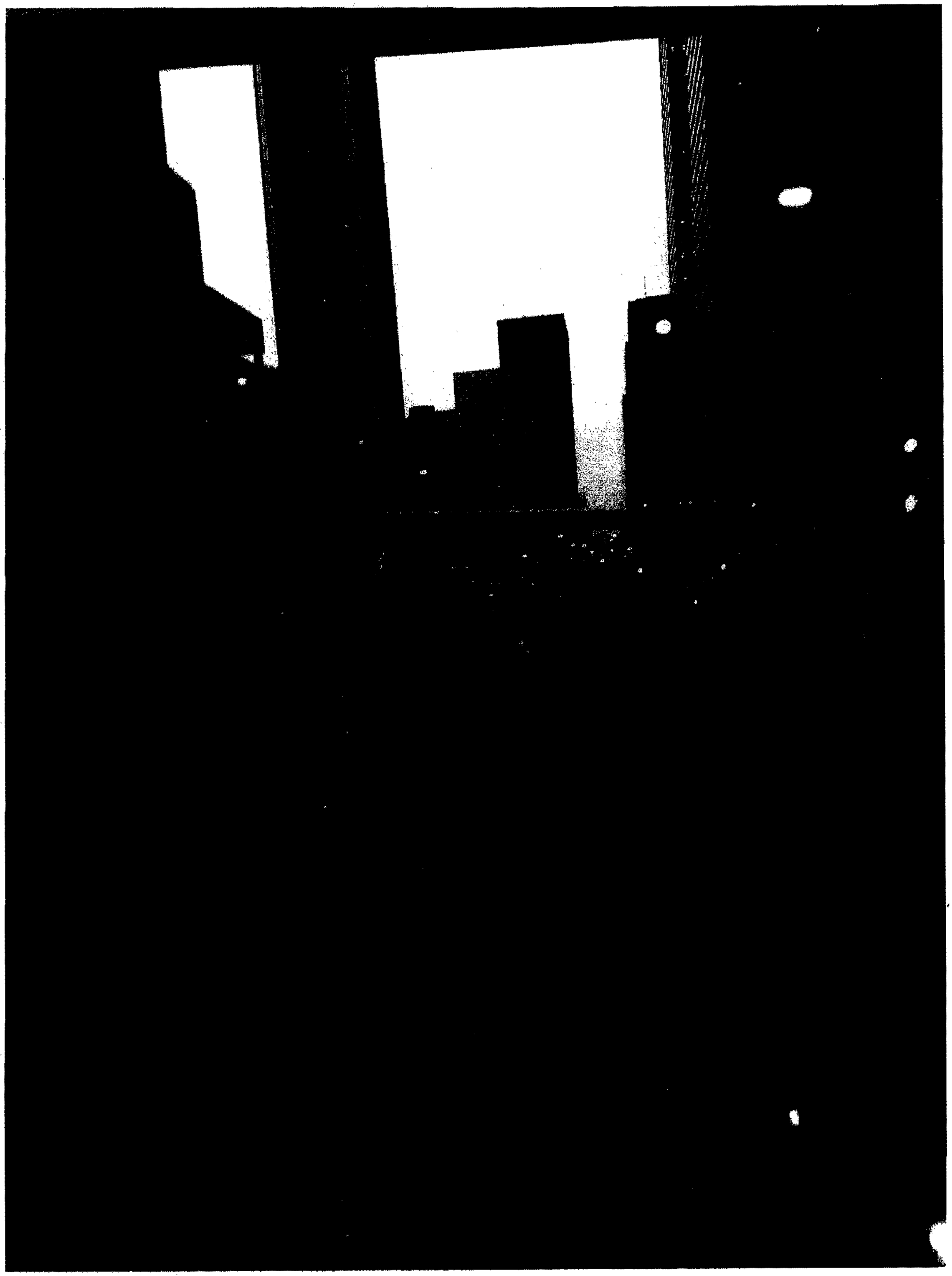
---

from: Hong, Yonah <HongY@metro.net>
to: "Serge, Patrick" <Patrick.Serge@westinbonaventure.com>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>, "Arroyo, Olga" <ARROYOO@metro.net>
date: Mon, Nov 10, 2014 at 9:25 AM
subject: RE: Metro Construction 11-10-14

Thank you, Patrick.
We have addressed this issue accordingly and have notified our contractor.

Best,

Yonah



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from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "hongy@metro.net" <hongy@metro.net>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date: Mon, Nov 10, 2014 at 9:35 AM
subject: FW: Metro Construction 11-10-14 9:15a No flag Person / Traffic Control

Yonah, currently there is no flag person located adjacent to our loading dock, this is unacceptable

PATRICK
SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

[PHOTO ATTACHED]

---

from: Hong, Yonah <HongY@metro.net>
to: "Serge, Patrick" <Patrick.Serge@westinbonaventure.com>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>, "Arroyo, Olga" <ARROYOO@metro.net>
date: Mon, Nov 10, 2014 at 9:58 AM
subject: RE: Metro Construction 11-10-14 9:15a No flag Person / Traffic Control

Hi Patrick,
We have a flagger in place adjacent to your loading dock. Please see the attached photo.

Thank you,
Yonah

[PHOTO ATTACHED]

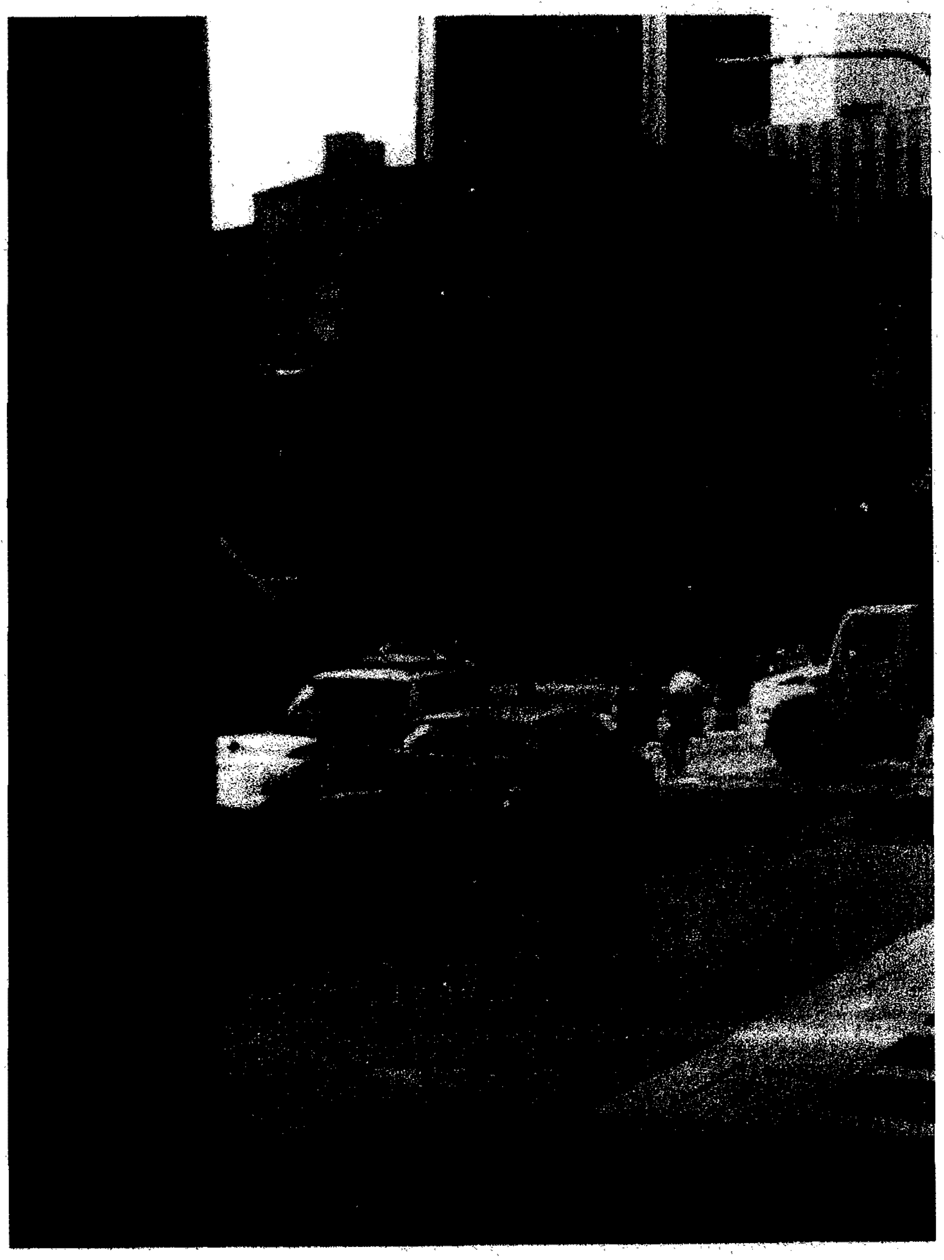
---

from: Czarcinski, Michael <Michael.Czarcinski@westinbonaventure.com>
to: "Hong, Yonah" <HongY@metro.net>
cc: "Serge, Patrick" <Patrick.Serge@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>, "Arroyo, Olga" <ARROYOO@metro.net>
date: Mon, Nov 10, 2014 at 10:48 AM
subject: Re: Metro Construction 11-10-14 9:15a No flag Person / Traffic Control

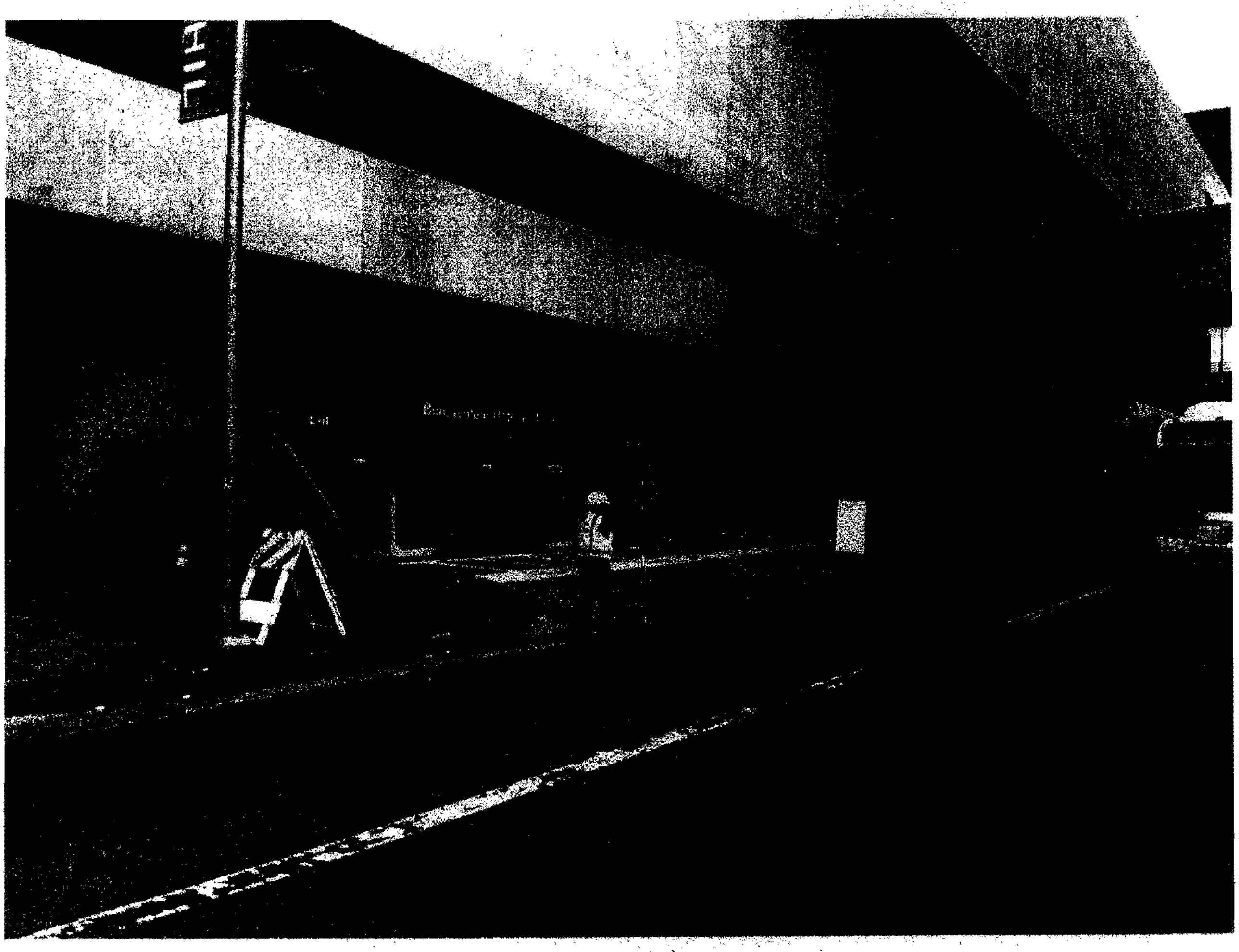
Yonah

FYI there was nobody out there for over a half an hour this morning I was watching the dock myself. Thanks Mike Czarcinski

Michael Czarcinski
THE WESTIN BONAVENTURE



PC5



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from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "arroyoo@metro.net" <arroyoo@metro.net>,
"hongy@metro.net" <hongy@metro.net>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>,
"Kirin-Perez, Bonny" <Bonny.Kirin-Perez@westinbonaventure.com>,
"christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date: Sat, Nov 22, 2014 at 3:19 PM
subject: Flower St between 4th and 5th Street Metro Construction 11-22-14

All barricades were removed on Flower Street today and street sweeping was not done, there are clouds of dust rolling into the air drifting towards the hotel as a car passes through the center of the street, clean the street ASAP as this is also a safety hazard to motorists.

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

---

from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "hongy@metro.net" <hongy@metro.net>,
"arroyoo@metro.net" <arroyoo@metro.net>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>,
"christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date: Thu, Dec 11, 2014 at 11:13 AM
subject: FW: Metro Construction 12-11-14

Yonah, sound level measurements were taken today 12-11-14 on flower st between 4th and 5th st, sound blankets were not used. Readings exceeding 83 dBA were taken. This exceeds Metro's noise thresholds, stop work immediately

PATRICK
SERGE
Director of Engineering

THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

[PHOTO ATTACHED]

---

from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "hongy@metro.net" <hongy@metro.net>,
"arroyoo@metro.net" <arroyoo@metro.net>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>,
"christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date: Thu, Dec 11, 2014 at 12:03 PM
subject: FW: Metro Construction 12-11-14

Yonah, sound level measurements were taken today 12/11/14 at 11:58a on flower st between 4th and 5th st, sound blankets were not used. Readings exceeding 86 were taken and continue to occur. This exceeds Metro's noise thresholds, stop work immediately.

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

[PHOTO ATTACHED]

PC5

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from:	Hong, Yonah <HongY@metro.net>
to:	"Serge, Patrick" <Patrick.Serge@westinbonaventure.com>, "Arroyo, Olga" <ARROYOO@metro.net>
cc:	"Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date:	Thu, Dec 11, 2014 at 12:15 PM
subject:	RE: Metro Construction 12-11-14

Thank you, Patrick. We will look into this.

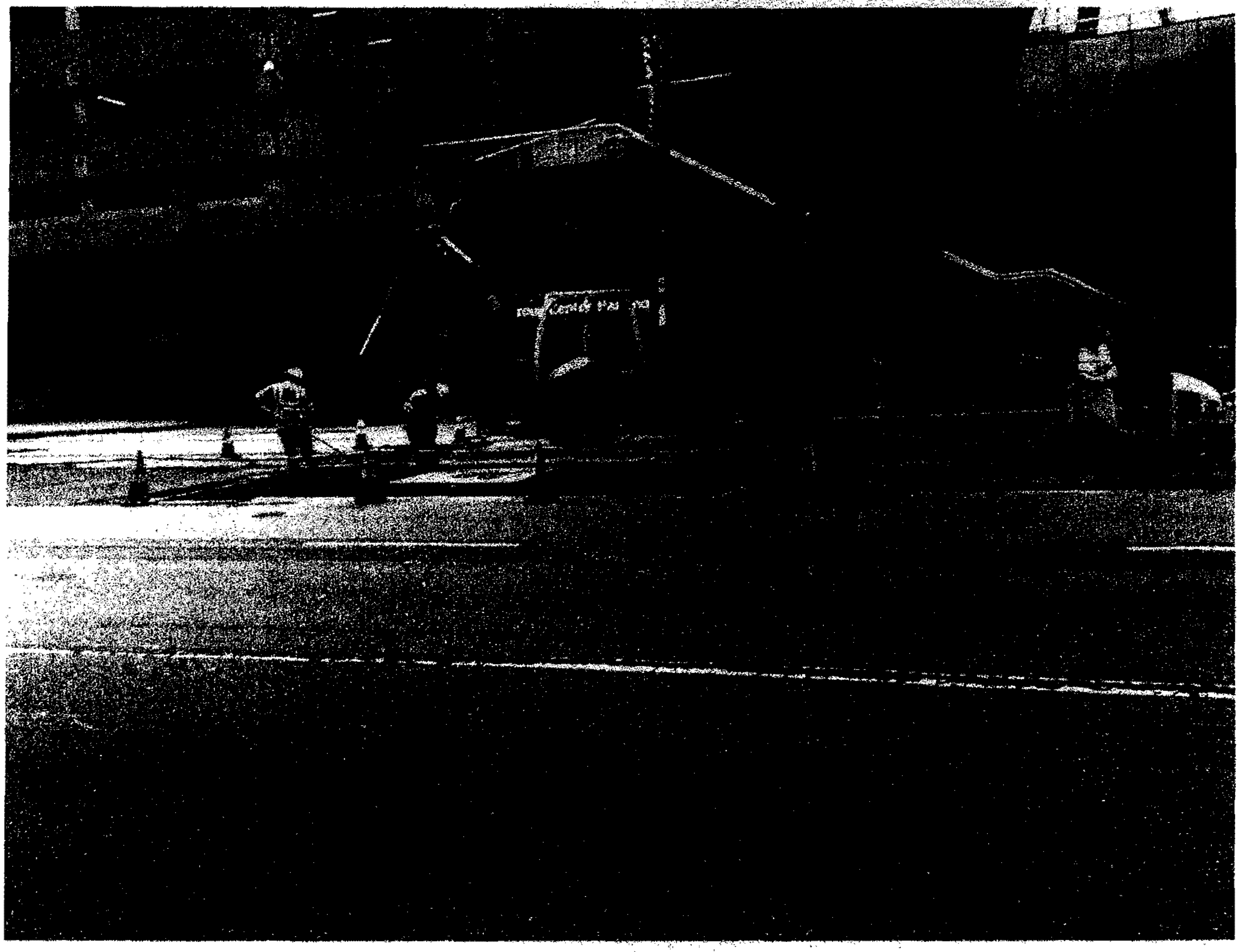
Best,

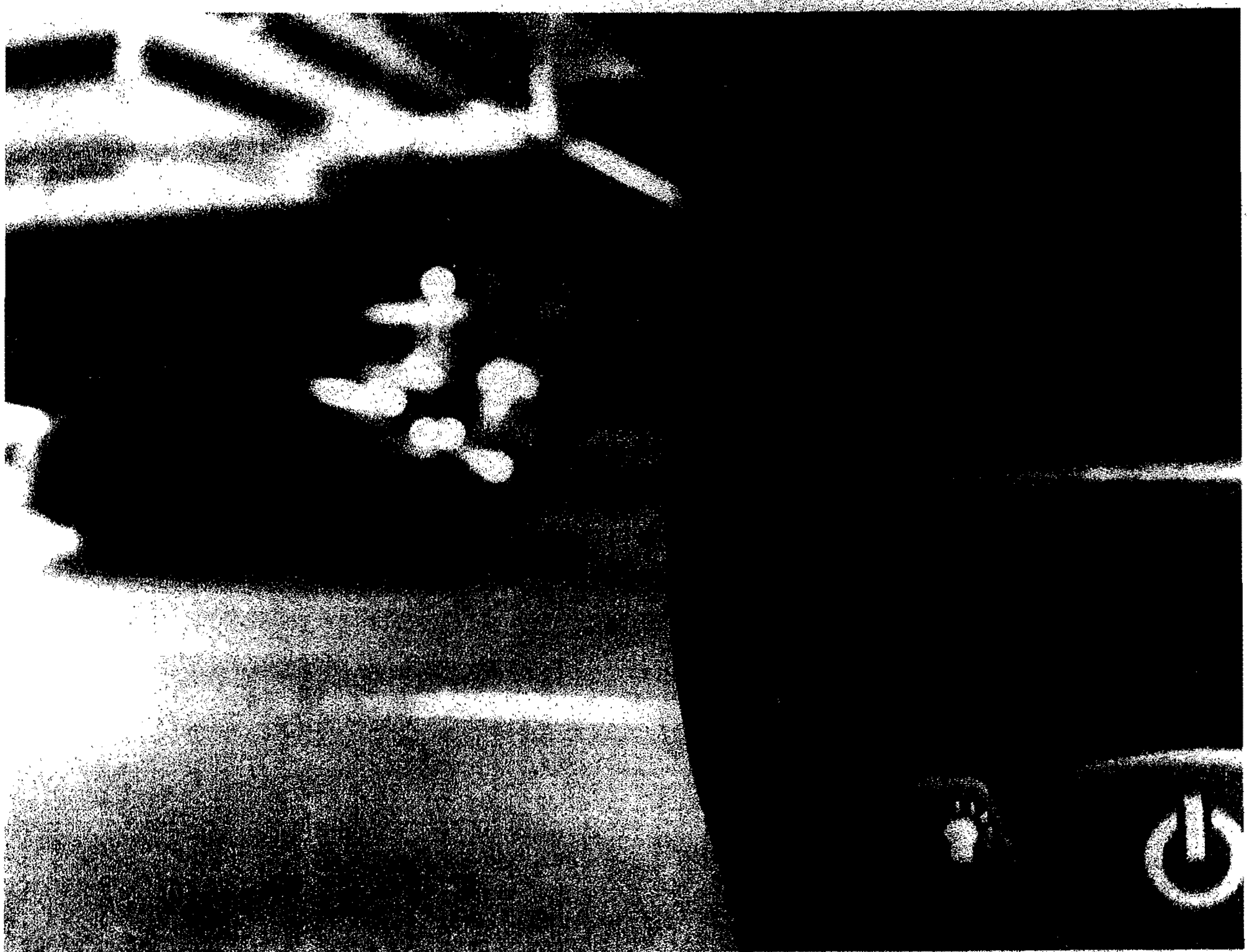
Yonah

---

from:	Hong, Yonah <HongY@metro.net>
to:	"Serge, Patrick" <Patrick.Serge@westinbonaventure.com>, "Arroyo, Olga" <ARROYOO@metro.net>
cc:	"Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date:	Thu, Dec 11, 2014 at 12:16 PM
subject:	RE: Metro Construction 12-11-14

Thank you, Patrick.





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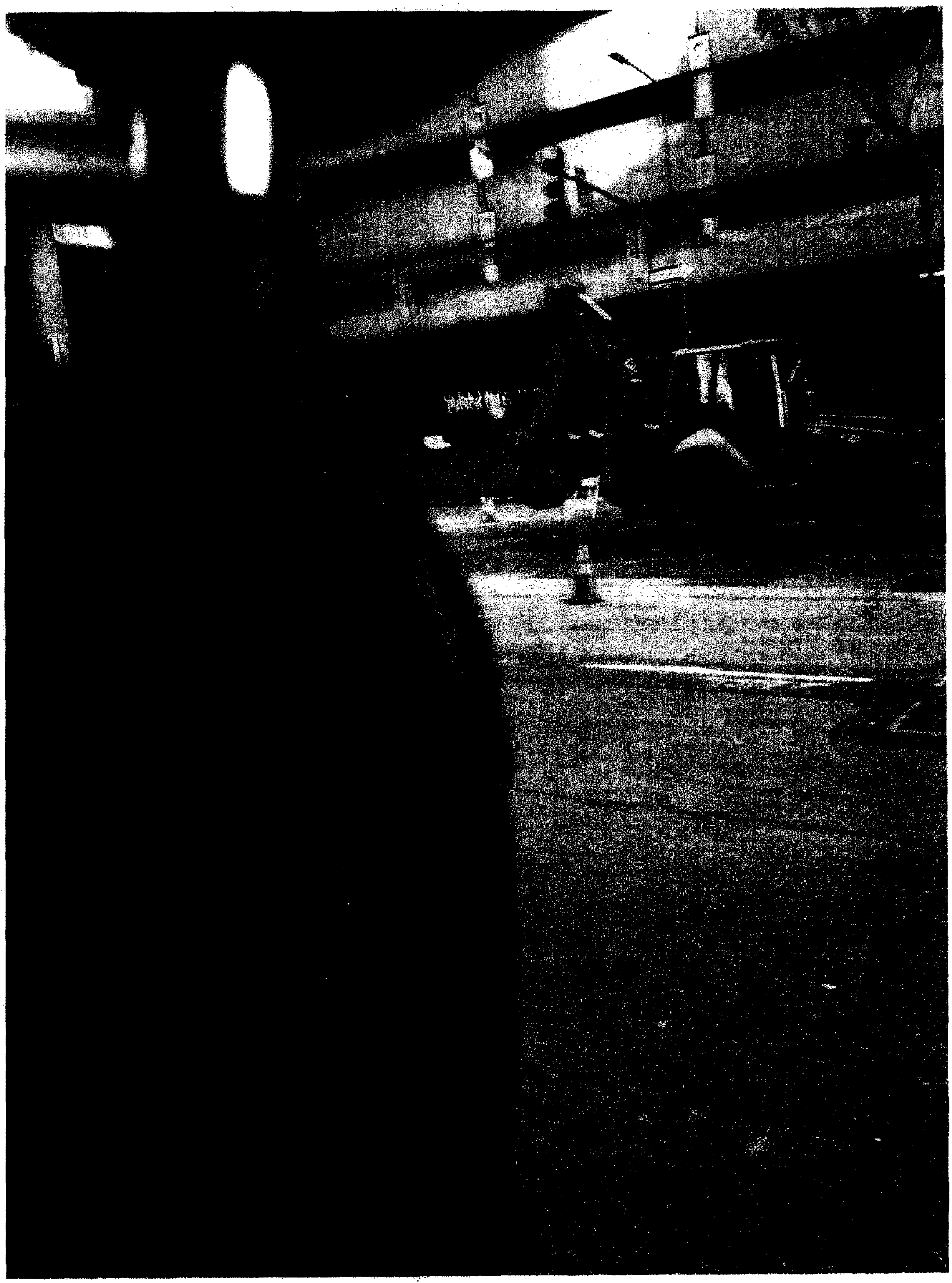
from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "hongy@metro.net" <hongy@metro.net>,
"arroyoo@metro.net" <arroyoo@metro.net>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>,
"christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date: Wed, Jan 7, 2015 at 9:11 AM
subject: FW: Metro Construction 1-7-15

Yonah/Olga, sound level measurements were taken today 1-7-15 at 8:25a on Flower St between 4th and 5th st, sound blankets were not used nor did you have a person measuring the sound levels. Readings of 83 were taken and continue to occur; this exceeds Metro's noise thresholds, stop work immediately.

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

[PHOTO ATTACHED]



PC5

- -

from:	Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to:	"arroyoo@metro.net" <arroyoo@metro.net>
cc:	"Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date:	Sat, Jan 17, 2015 at 9:49 AM
subject:	Metro Construction 1-17-15

Olga, sound level measurements were taken today 1-17-15 at 9a at the corner of 4th st and Flower where jackhammering was occurring, sound blankets were used. Readings exceeding 82 were taken. This exceeds Metro's noise thresholds, stop work immediately

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

- -

PC5

---

from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date: Tue, Mar 24, 2015 at 11:54 AM
subject: FW: Metro construction 4th and flower 3-21-15

My email response from Ayda was; "received", metro work continued Saturday.

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

From: Serge, Patrick
Sent: Saturday, March 21, 2015 1:59 PM
To: Metro Ayda Safaei
Cc: Kirin-Perez, Bonny
Subject: Fwd: Metro construction 4th and flower 3-21-15

You are consistently exceeding the sound limits, stop work now.

Patrick Serge
Director of Engineering
THE WESTIN BONAVENTURE

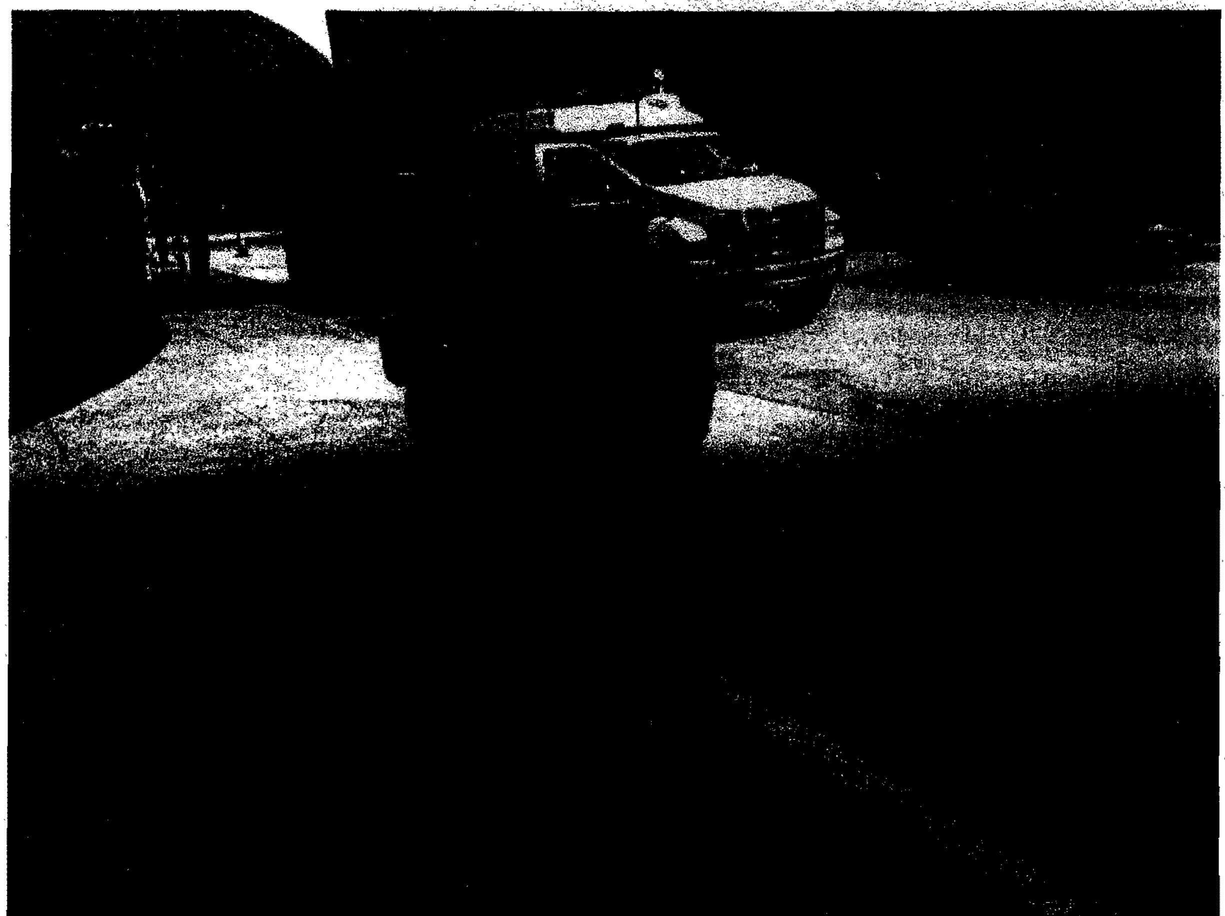
Begin forwarded message:

From: "Perez, Richard" <Richard.Perez@westinbonaventure.com>
To: "Serge, Patrick" <Patrick.Serge@westinbonaventure.com>
Subject: Construction Volume

Pat,
The attached photos were taken between 11:30am - 12:00pm. These photos were taken while standing next to the contractors sound tech, as well as, where our guests are waiting for cars/taxi cabs.

Thank you.

[PHOTO ATTACHED]



PC5

---

from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>
cc: "Kirin-Perez, Bonny" <Bonny.Kirin-Perez@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date: Thu, Mar 26, 2015 at 12:46 PM
subject: FW: Saturday Flower Street Noise Impacts Report

Noise report for 3-21-15

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

From: NOISEDOC@aol.com [mailto:NOISEDOC@aol.com]
Sent: Thursday, March 26, 2015 12:38 PM
To: Serge, Patrick
Subject: Saturday Flower Street Noise Impacts Report

Hi Pat,

I have attached the requested Saturday-only noise monitoring report for Flower Street.

Regards,
Marlund Hale

Advanced Engineering Acoustics
663 Bristol Avenue
Simi Valley, CA 93065-5402

805-583-8207
805-231-1242 cell
noisedoc@aol.com

Advanced Engineering Acoustics

663 Bristol Avenue
Simi Valley, California 93065-5402
(805) 583-8207 - Voice (805) 231-1242 - Cell (805) 522-6636 - Fax

March 26, 2015

Patrick Serge
Director of Engineering
Westin Bonaventure Hotel
444 Figueroa Street
Los Angeles, CA 90602

Subject: Flower Street Metro Project
Noise Impacts
Saturday, March 21, 2015

Dear Mr. Serge:

At your request, Advanced Engineering Acoustics (AEA) has been monitoring the Metro project demolition and utility relocation noise on hotel property along Flower Street.

On this past Saturday, March 21st, sustained interval noise of the subject Metro project at the Lobby Street entrance between 9:34 a.m. and 1:08 p.m. equaled or exceeded 80 dBA 552 times and equaled or exceeded 90 dBA (the project's <u>maximum</u> allowed public exposure noise limit) 16 times.

In addition, on Saturday, March 21st, sustained interval noise of the subject Metro project at the 5th Street and Flower Street site between 8:22 a.m. and 12:24 p.m. equaled or exceeded 80 dBA 102 times.

Sustained noise durations did not include instantaneous or very short-term noise events, such as would be associated with a single impact or passing emergency vehicles.

This concludes our report on the monitored Metro project noise impacts along Flower Street . If you have any questions regarding this report, please contact me at (805) 583-8207, or on my cell phone at (805) 231-1242.

Sincerely,

Marlund E Hale

Marlund E. Hale, Ph.D., INCE (Full Member)
Technical Director

From: NOISEDOC@aol.com [mailto:NOISEDOC@aol.com]
Sent: Wednesday, April 22, 2015 11:48 PM
To: Serge, Patrick
Subject: 4th Street Closure Memo and Map

Hi Pat,
I have attached my report summarizing the Saturday, April 18th Metro work noise at both 4th & Flower (paving with vibrator then saw cutting) and 5th & Flower (saw cutting). There were multiple noise exceedances at both locations.

Regards,
Marlund

Marlund E. Hale, Ph.D., INCE (full member)
Advanced Engineering Acoustics
663 Bristol Avenue
Simi Valley, CA 93065-5402

805-583-8207
805-231-1242 cell
noisedoc@aol.com

In a message dated 4/14/2015 2:34:27 P.M. Pacific Daylight Time, Patrick.Serge@westinbonaventure.com writes:

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

From: Lopez, Sonia
Sent: Tuesday, April 14, 2015 2:07 PM
To: Bonaventure Department Heads; Bonaventure Managers
Cc: Fu, Carmel
Subject: 4TH Street Closure Memo and Map

Good afternoon team,
Last week with meet with MTA and once again this weekend 4th Street will be closed. Attached you will find a map and memo for the street closure scheduled for Saturday, April 18,2015 from 8am -6pm.

Please ensure all staff are aware of 4th Street closure so that guest are guided into the hotel without any inconvenience.

This ongoing water work will continue to affect our guest. Tentatively they may have some partial closing on 4th from 4/16-4/17 followed by full closure on Saturday. Additionally more partial closures from 4/19-4/23 again followed by a full closure on Saturday 4/25. Feel free to contact me if you have any questions.

Thank you,

SONIA LOPEZ
Director of Guest Services & Westin Experience Specialist
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612- 4867 F 213.612.4800 C213.798.1645

- -

PC5

Advanced Engineering Acoustics

663 Bristol Avenue
Simi Valley, California 93065-5402
(805) 583-8207 - Voice (805) 231-1242 - Cell (805) 522-6636 - Fax

April 21, 2015

Patrick Serge
Director of Engineering
Westin Bonaventure Hotel
444 Figueroa Street
Los Angeles, CA 90602

Subject: Flower Street Metro Project
4th and 5th Street Metro Noise Monitoring
Saturday, April 18, 2015

Dear Mr. Serge:

At your request, Advanced Engineering Acoustics (AEA) has been monitoring the Metro project demolition and utility relocation noise on hotel property along Flower Street.

On this past Saturday, April 18th, street paving and saw cutting noise monitoring was conducted at the property lines of Flower Street and 4th Street from 9:00 a.m. until the crew ceased work at approximately 2:03 p.m. One other noise monitoring consultant for a Metro contractor was also at this street corner. There was also street saw cutting noise monitoring conducted at the stack on the corner of Flower Street and 5th Street. At that location the demolition crew set up two noise barriers to shield the hotel property from the pavement cutting noise. When work ceased at 5th and Flower, the noise blankets were brought to 4th and Flower. However, they did not set up the two noise barrier system like before.

Between 9:50 a.m. and 11:01 a.m. at 5th and Flower, intermittent interval noise of the Metro project equaled or exceeded 80 dBA eighty-one (81) times at the monitoring site. The demolition noise equaled or exceeded 90 dBA (the project's <u>maximum</u> allowed public exposure noise limit.) sixteen (16) times at 5th and Flower.

Between 9:08 a.m. and 10:28 a.m. (paving) and 11:18 a.m. and 2:03 p.m. (saw cutting) at 4th and Flower, intermittent interval noise of the Metro project equaled or exceeded 80 dBA two hundred twenty-one (221) times at the property line monitoring site. The Metro noise equaled or exceeded 90 dBA one (3) times at 4th and Flower..

Sustained noise durations did not include instantaneous or very short-term noise events, such as would be associated with a single impact or passing emergency vehicles.

This concludes our report on the monitored Metro project noise impacts at Flower Street and the 4th Street and 6th Street monitoring sites. If you have any questions regarding this report, please contact me at (805) 583-8207, or on my cell phone at (805) 231-1242.

Sincerely,

Marlund E. Hale

Marlund E. Hale, Ph.D., INCE (Full Member)
Technical Director

---

from:	Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to:	"arroyoo@metro.net" <arroyoo@metro.net>
cc:	"Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "Kirin-Perez, Bonny" <Bonny.Kirin-Perez@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date:	Thu, May 7, 2015 at 3:39 PM
subject:	FW: FW: Flower St Work

Olga, sound level measurements were taken on 4-25-15 on 4th and 5th /Flower where street construction was occurring, please read the attached report from Advanced Engineering Acoustics showing readings exceeding both 80 dBA and 90 dBA

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

From:	Safaei, Ayda [mailto:SafaeiA@metro.net]
Sent:	Wednesday, April 29, 2015 2:55 PM
To:	Kirin-Perez, Bonny
Cc:	Serge, Patrick; Czarcinski, Michael; Washington, Nwabudike; Arroyo, Olga; Hu, Kang
Subject:	RE: Flower St Work - Saturday, May 2

Hi Bonny,

I want to inform you that our design-build contractor would like to complete the remaining work on 4th St at the intersection of Flower and conduct more potholing at the intersection of 5th and Flower. Please note that this will be the same traffic plan that was implemented last Saturday. Please let me know if you have any questions.

Per my email yesterday, I've asked the contractor to provide the anticipated scope of work and street plans for the month of May.

Thank you,

Ayda Safaei

From: Safaei, Ayda
Sent: Tuesday, April 28, 2015 8:58 AM
To: 'Kirin-Perez, Bonny'
Subject: RE: Flower St Work Tomorrow

Hi Bonny,

Thank you for the email and feedback. We can assure you that the design-build contractor is not starting cut-and-cover construction, this is advanced utility work, and the street plans that were implemented are the same ones that I sent to you on Friday. The particular phase that you're referring is Phase 9 (see attached) which closed two lanes on Flower St to have a taper prior to the work area in the intersection of Flower/5th. I spoke to our inspector who was in the field on Flower St that day and have attached some photos showing that access to the Bonaventure Hotel was maintained. The boom truck (looks similar to a crane) was used to deliver metal plates needed to restore lanes of traffic after the potholing was complete.

Per your request, I will have RCC provide to you a copy of its street plan and work on Flower St for the month of May.

Thank you,

Ayda Safaei
Construction Relations Manager, Metro
Interim Manager, Regional Connector
Phone: (213) 949-1519
Email: safaeia@metro.net

For more information on the Regional Connector Transit Project:
Project Hotline: 213.922.7277
E-mail: RegionalConnector@metro.net
Website: Metro.net/regionalconnector
Twitter: @metroconnector
Facebook: Facebook.com/metroregionalconnector

From: Kirin-Perez, Bonny [mailto:Bonny.Kirin-Perez@westinbonaventure.com]
Sent: Saturday, April 25, 2015 7:00 PM
To: Safaei, Ayda
Subject: RE: Flower St Work Tomorrow

Ayda

After today's street issue with a crane blocking the access and a two lane closure on my side of the street, I am more than a little concerned that one, the contractor is actually starting construction, which they cannot do and two that the street plan is not correct. I see that they anticipate working in the street throughout may, I assume it is only for utility relocation, and I would like to have a copy of a correct street plan and work to take place, for the month of May. Can you assist with this? please let me know. Bonny

BONNY KIRIN-PEREZ
Director of Operations
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4718 F 213.612.4893 M 213.494-7297

From: Safaei, Ayda [mailto:SafaeiA@metro.net]
Sent: Friday, April 24, 2015 4:07 PM
To: Kirin-Perez, Bonny
Cc: Serge, Patrick; Czarcinski, Michael; Washington, Nwabudike
Subject: RE: Flower St Work Tomorrow

Hi Bonny,

We just spoke to the contractor and this is the revised schedule:

- 8am to 2:30pm – lane closure on 4th St
- 11am p 2:30pm – lane closures on Flower at intersection of 5th St

RCC will leave this area by 2:30pm in time for the events.

Thank you,

Ayda Safaei
Construction Relations Manager, Metro
Interim Manager, Regional Connector
Phone: (213) 949-1519
Email: safaeia@metro.net

From: Kirin-Perez, Bonny [mailto:Bonny.Kirin-Perez@westinbonaventure.com]
Sent: Friday, April 24, 2015 3:38 PM
To: Safaei, Ayda
Cc: Serge, Patrick; Czarcinski, Michael; Washington, Nwabudike
Subject: RE: Flower St Work Tomorrow

Ayda,

The traffic plan taking the flower street down to 12 ft. and turning right onto fifth will cause a huge traffic jam as the guest try and access Figueroa for valet parking, we need this work to stop at 3 pm otherwise every valet guest will be wrapped around the hotel, down to third and beyond. We have every VIP imaginable coming to the hotel and they are not going to get into their function on time and it and it is a safety issue for the hotel. If we have an emergency, vehicles will not be able to access the property and as you are aware this is not acceptable. Please call my office asap for us to discuss. Thank you Bonny

BONNY KIRIN-PEREZ
Director of Operations
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4718 F 213.612.4893 M 213.494-7297

From:	Safaei, Ayda [mailto:SafaeiA@metro.net]
Sent:	Friday, April 24, 2015 1:42 PM
To:	Kirin-Perez, Bonny
Cc:	Serge, Patrick; Czarcinski, Michael; Washington, Nwabudike
Subject:	Flower St Work Tomorrow

Hi Bonny,

Thanks for taking time to meet with us this morning.

Per our discussion, please see the attached notice and plans for work on Flower St tomorrow.

Please let me know if you have any questions.

Thank you,

Ayda Safaei
Construction Relations Manager, Metro
Interim Manager, Regional Connector
Phone: (213) 949-1519
Email: safaeia@metro.net
For more information on the Regional Connector Transit Project:
Project Hotline: 213.922.7277
E-mail: RegionalConnector@metro.net
Website: Metro.net/regionalconnector
Twitter: @metroconnector
Facebook: Facebook.com/metroregionalconnector

- -

from: Arroyo, Olga <ARROYOO@metro.net>
to: "Serge, Patrick" <Patrick.Serge@westinbonaventure.com>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "Kirin-Perez, Bonny" <Bonny.Kirin-Perez@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date: Thu, May 7, 2015 at 3:51 PM
subject: RE: FW: Flower St Work

Patrick, all,

Thank you for meeting with us this afternoon and for sending this information. Let me do some research on what transpired on this day, since this is before I returned to the office.

Best,

Olga N. Arroyo
Construction Relations Manager
Metro – Regional Connector
Office: 213-893-7115
Cell: 213-276-6213

- -

- -

From: Serge, Patrick [mailto:Patrick.Serge@westinbonaventure.com]
Sent: Thursday, May 07, 2015 3:40 PM
To: Arroyo, Olga
Cc: Czarcinski, Michael; Kirin-Perez, Bonny; christophersutton.law@gmail.com
Subject: FW: FW: Flower St Work

Olga, sound level measurements were taken on 4-25-15 on 4th and 5th /Flower where street construction was occurring, please read the attached report from Advanced Engineering Acoustics showing readings exceeding both 80 dBA and 90 dBA

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

[ATTACHMENT]

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- -

PC5

Advanced Engineering Acoustics

663 Bristol Avenue
Simi Valley, California 93065-5402
(805) 583-8207 - Voice (805) 231-1242 - Cell (805) 522-6636 - Fax

April 29, 2015

Patrick Serge
Director of Engineering
Westin Bonaventure Hotel
444 Figueroa Street
Los Angeles, CA 90602

Subject: Flower Street Metro Project
4th and 5th Street Metro Noise Monitoring
Saturday, April 25, 2015

Dear Mr. Serge:

At your request, Advanced Engineering Acoustics (AEA) has been monitoring the Metro project demolition and utility relocation noise on hotel property along Flower Street.

On this past Saturday, April 25th, street excavation with a vacuum truck and street paving noise monitoring was conducted at the NW corner of Flower Street and 5th Street from 9:00 a.m. until the crew ceased work there at approximately 2:30 p.m. They then relocated to the intersection of Flower and 4th Streets. Thereafter street excavation with the vacuum truck and street paving noise monitoring was conducted at the SW corner of Flower Street and 4th Street from 2:45 p.m. until a light rain prevented further monitoring. At both locations the demolition crew set up a single noise barrier perimeter around the work area. A noise monitoring consultant for a Metro contractor was also at each street corner.

Between 9:10 a.m. and 2:28 p.m. at the NW corner of 5th and Flower streets, nearly continuous interval noise of the Metro project equaled or exceeded 80 dBA seven hundred forty-six (746) times at the monitoring site. The demolition noise equaled or exceeded 90 dBA (the project's maximum allowed public exposure noise limit.) forty-six (46) times at 5th and Flower Streets NW corner.

At the SW corner of 4th and Flower Streets, noise of the Metro project did not exceeded 80 dBA nor 90 dBA, since the work site was on the NE side of the intersection.

Sustained noise durations did not include instantaneous or very short-term noise events, such as would be associated with a single impact or passing emergency vehicles.

This concludes our report on the monitored Metro project noise impacts at Flower Street and the 5th Street and 4th Street hotel property line monitoring sites. If you have any questions regarding this report, please contact me at (805) 583-8207, or on my cell phone at (805) 231-1242.

Sincerely,

Marlund E Hale

Marlund E. Hale, Ph.D., INCE (Full Member)
Technical Director

PC5

from: Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to: "arroyoo@metro.net" <arroyoo@metro.net>
cc: "Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "Kirin-Perez, Bonny" <Bonny.Kirin-Perez@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date: Tue, May 26, 2015 at 1:42 PM
subject: FW: Metro Construction Flower St near 5th st 5-26-15

Olga, sound level measurements were taken today 5-26-15 at the corner of Flower and 5th st where street sawcutting was occurring, sound blankets were used. Sound readings exceeding 86 dBA were taken. This exceeds Metro's noise thresholds, stop work immediately. You also advised Bonny Perez and I no vehicles would be parked in the middle of the Flower street between 4th and 5th st, this truck with a port-a-potty attached is parked unattended near the front of our garage entrance between the second and third lane, move it immediately.

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

[PHOTO ATTACHED]

PC5

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from:	Serge, Patrick <Patrick.Serge@westinbonaventure.com>
to:	"arroyoo@metro.net" <arroyoo@metro.net>
cc:	"Czarcinski, Michael" <Michael.Czarcinski@westinbonaventure.com>, "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>
date:	Fri, Jul 10, 2015 at 10:36 AM
subject:	FW: Metro Construction 7-10-15

Olga, sound level measurements were taken today 7-10-15 at 10a at the corner of 5th and Flower st where sawcutting was occurring, sound blankets were used. Readings exceeding 92Dba were taken. You did not have noise-recording personnel on site. This exceeds Metro's noise thresholds, stop work immediately.

PATRICK SERGE
Director of Engineering
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4773 F 213.612.4892 C 213.761.2049

[PHOTO ATTACHED]

Exhibit 9

PC5

Los Angeles County
Metropolitan Transportation Authority

Climate Action and Adaptation Plan

Metro

PC5

PC5

Table of Contents

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List of Abbreviations

APTA: American Public Transportation Association

BCF: billion cubic feet

BRT: bus rapid transit

CARB: California Air Resources Board

CCSM: Community Climate System Model

CH_4: methane

CNG: compressed natural gas

CNRM: Centre National de Recherches Météorologiques

CO_2: carbon dioxide

DJF: December, January, February

ECMP: Energy Conservation Management Plan

GFDL: Geophysical Fluid Dynamics Laboratory

GHE: gasoline hybrid electric

GHG: greenhouse gases

GWP: global warming potential

JJA: June, July, August

LACMTA: Los Angeles County Metropolitan Transportation Authority

LED: light emitting diode

LRTP: Long Range Transportation Plan

MAM: March, April, May

$MMTCO_2e$: million metric tons of carbon dioxide equivalents

MSIP: Metro Sustainability Implementation Plan

MT: metric tons

$MTCO_2e$: metric tons of carbon dioxide equivalents

N_2O: nitrous oxide

NCAR: National Center for Atmospheric Research

PCM: Parallel Climate Model

PMT: passenger miles traveled

PV: photovoltaic

ROW: right of way

SF_6: sulfur hexafluoride

SON: September, October, November

TIGGER: Transit Investments for Greenhouse Gas and Energy Reduction

TOD: transit oriented development

WESS: wayside energy storage substation

Executive Summary

Introduction

Metro is the principal provider of public transportation in Los Angeles County and also the County's transportation planner and coordinator, designer, builder, and operator. As a public transportation agency, Metro has a specific role in addressing climate. Well-planned and well-used public transportation reduces climate changing greenhouse gas (GHG) emissions by creating alternatives to driving and fostering communities that enable more walking and bicycling. Public transportation systems also consume fuel and electricity and thereby produce GHG emissions; however, most transit agencies, including Metro, prevent more emissions than they create. In spite of efforts to reduce GHG emissions, some degree of climate change is likely to occur over the next century, with impacts including rising sea levels, rising temperatures, and more extreme weather patterns. Metro is also responsible for protecting critical services and assets in the transportation system from these impacts. This Climate Action and Adaptation Plan ("the Plan") establishes the framework for Metro to both reduce GHG emissions and prepare for the impacts of climate change. Emissions from 2010 are used as a baseline in the Plan because at the time the Plan was prepared, 2010 emissions data was the most up to date and complete data set available.

Reducing Greenhouse Gas Emissions

This Plan establishes a framework to identify the areas of greatest opportunity for Metro to reduce GHG emissions and evaluates opportunities based on their costs and the volumes of emissions they reduce. Metro's influence on GHG emissions extends to all of the County's transportation systems. As a first step, the Plan focuses on prioritizing the most promising opportunities to reduce emissions from Metro's internal operations by the year 2020. The analysis on which the Plan is based consisted of four steps:

1. Inventory 2010 operational GHG emissions and forecast 2020 emissions.
2. Survey GHG reduction strategies that have been deployed or are under development at Metro or other transit agencies.
3. Quantify the costs and GHG reduction potential of the 11 strategies that appear to be most likely to offer cost effective reductions in GHG emissions by 2020.
4. Quantify the costs and GHG reduction potential of four potential packages of strategies.

Inventory and forecast

In 2010, Metro emitted 476,000 metric tons of carbon dioxide equivalents ($MTCO_2e$) from its operations, or roughly 1.04 $MTCO_2e$ per thousand passenger boardings. For comparison, these emissions account for roughly 1.9 percent of the GHG emissions from all road- and rail-based passenger transportation in Los Angeles County. Metro's transit service accounts for almost 90 percent of the agency's emissions; facilities and non-transit vehicles account for the remainder. Though Metro emits a substantial amount of GHG emissions, the agency displaces more emissions than it produces by offering alternatives to driving and fostering sustainable communities.

From 2010 to 2020, Metro's yearly GHG emissions will increase by seven percent, largely due to expanded bus service and new rail lines. However, annual passenger boardings are expected to increase at an even faster rate, growing by 12 percent, so emissions per passenger boarding will fall by 4.4 percent. An even greater portion of these emissions—95 percent—will come from transit as service expands and actions already underway at both Metro and the State increase the energy efficiency of the agency's buildings.

Strategy analysis

Metro surveyed both internal studies and studies conducted by other transit agencies for potential strategies to reduce emissions, and ranked each in terms of their potential for cost effective reductions in GHG emissions by 2020. Metro then analyzed the 11 highest-scoring measures that are focused on reducing operational emissions. Table ES1 summarizes the cumulative GHG reductions and cost-effectiveness of each measure.

Table ES1: Cumulative Reductions and Cost Effectiveness of Strategies to Reduce GHG Emissions

Strategy	Cumulative GHG Reductions (MT CO2e), 2012-2020	GHG Reduction Cost Effectiveness ($/MT)*
Use Biomethane in CNG Buses (well-to-wheels impacts)	528,555**	$174-379
On-board Railcar Braking Energy Storage	96,411	$180
Gasoline-Electric Hybrid Buses (tank-to-wheels impacts)	76,826	$4,922
Building Indoor Lighting Upgrades: LEDs	71,621	-$78
Building Indoor Lighting Upgrades: Efficient Metal Halides	46,226	-$117
Wayside Energy Storage Substation (WESS)	17,289	$2,774
Retrofit Lighting in Red Line Tunnel	5,783	-$73
Expand Use of Renewable Energy	4,467	$2,303
Municipal Recycled Water For Bus Washing	941	-$570
Extension of Bus Wash On-Site Reclamation	544	-$2,378
Low Water Sanitary Fixtures	424	-$907
Mobile Air Conditioning Replacement	353	$3,103

** Negative numbers indicate a net savings.*

*** Using biomethane in CNG buses reduces well-to-wheels emissions due to fuel production that are not accounted for in Metro's GHG inventory.*

NB: All costs represented are costs to Metro only, and do not include cost impacts to transportation users or other public agencies.

As transit vehicles and systems account for the majority of Metro's GHG emissions, many of the strategies in Table ES1 that deal with buses and rail systems produce correspondingly large reductions. However, these strategies also often involve large net costs for Metro, and are therefore generally not as cost effective as building energy and water strategies, which tend to save Metro money.

Metro is most likely to implement a package of strategies that reduce GHG emissions. To demonstrate the total impact that multiple strategies could have together, four potential packages of strategies were analyzed, as follows:

1. **Short-Term Cost Saving Strategies**—These are strategies that will provide net savings to Metro by 2020 and are ready for implementation in the near term using readily available methods. They include all strategies related to water and lighting.
2. **Short-Term and Mid-Term Strategies**—All strategies that are ready for implementation in the near term using available methods, as well as additional strategies that are appropriate for wider implementation pending the results of demonstration projects. They include all short-term strategies as well strategies related to rail and renewable energy.
3. **All Strategies with Tank-to-Wheels Benefits**—All strategies that would reduce GHG emissions that are currently counted as part of Metro's GHG inventory. This package excludes the use of biomethane in CNG buses.
4. **All Strategies with Well-to-Wheels Benefits**—All strategies that would reduce GHG emissions regardless of whether or not they are included in Metro's GHG inventory. This package includes the use of biomethane in CNG buses, but excludes gasoline-electric hybrid buses, which are not compatible with the biomethane strategy.

Table ES2 summarizes the GHG reductions potential and net cost to Metro for each package of strategies, between 2012 and 2020.

Table ES2: GHG Reductions and Cost Effectiveness of Packages of GHG Reduction Strategies

Package	Cumulative GHG Reductions (MT CO2e) 2012-2020	Net Cost (2012-2020)*	Reduction in Forecast GHG emissions in 2020	Reduction in GHG emissions per boarding from 2010 to 2020
1. Short-Term Cost Saving Strategies	66,616	-$8,121,116	0.6%	5.0%
2. Short-Term and Mid-Term Strategies	167,494	$67,443,140	4.3%	8.6%
3. All Strategies with Tank-to-Wheels Benefits	244,673	$446,719,774	7.4%	11.5%
4. All Strategies with Well-to-Wheels Benefits	696,402	$206,873,542	28.9%	32.1%

** Negative numbers indicate a net savings.*

NB: All costs represented are costs to Metro only, and do not include cost impacts to transportation users or other public agencies.

Recommendations

Based on this analysis, the Plan concludes that Metro could meet a goal of reducing internal GHG emissions by 0.6% in the year 2020 using cost effective strategies. This is equivalent to reducing the agency's GHG emissions per boarding by 5.0% from 2010 to 2020. As Table ES2 shows, Metro can meet this goal while saving money. Metro has multiple pathways to meeting this goal, including:

- Implement Short-Term Cost Saving Strategy Package – All lighting strategies in this package are underway or scheduled to begin shortly. To implement the remainder of this package, Metro would need to expand its current water saving strategies and ensure their proper operation.
- Partially Implement Short-Term and Mid-Term Strategy Package – It is likely that Metro will have two grant-funded WESS projects operational by 2020, and the agency is already planning to construct several new solar photovoltaic projects on facilities. Metro could attain the proposed goal by implementing the WESS projects on schedule, installing 0.5 MW of additional solar photovoltaic capacity, retrofitting the Red Line tunnel lighting, and completing facility lighting upgrades by 2020.

Adaptation

The adaptation component of the plan is a high-level screening analysis, designed to identify some of the most important Metro services and assets that are likely to be affected by climate impacts. The Plan outlines options for ensuring that these services and assets continue to function as the climate changes. This analysis consisted of four steps:

1. Identify the critical assets and services within the Metro system.
2. Examine local historical climate data and projections for future climate conditions.
3. Qualitatively assess the vulnerability of critical services and assets.
4. Identify potential adaptation strategies that can address these vulnerabilities.

Critical services and assets

This Plan used a simple and qualitative definition of criticality: critical services and assets are those that are essential to transporting Metro's customers. A critical service or asset would be extremely difficult or costly to replace or to substitute. Critical assets and services include:

- bus and rail fleets
- right-of-way on bus rapid transit (BRT) lines
- heavy rail tracks, stations, and energy infrastructure
- light rail tracks, stations, and energy infrastructure
- rail rehabilitation activities

In addition, the Plan identifies critical facilities. Transit facilities were ranked according to their ridership, connectivity to other parts of the transit network, and whether they are the site of current or planned joint development projects. To identify other types of facilities as critical, including maintenance facilities and administrative buildings, the Plan relied on expert opinions from Metro officials. Critical facilities include several key rail stations, the main bus maintenance facility, two important rail maintenance locations, and Metro's administrative headquarters. Transit projects that are planned for construction using Measure R funds are also considered critical due to the sizeable investments required to complete these projects.

Future climate conditions

Metro drew on historical data on temperature, rainfall and sea level rise, as well as climate models, to examine future climate conditions in Los Angeles County through the end of the century. Major findings include the following:

- Temperatures are projected to continue to rise, possibly in excess of 10°F, and the frequency of extremely hot days is expected to increase.
- There is some evidence of a recent increase in the frequency of events of heavy precipitation, but it is unclear if such a trend might continue into the future. Regardless, the region will continue to experience events of heavy rainfall in the future.
- Sea levels are expected to rise one foot by the mid-21st century and between 20 inches and five feet by the end of the century. However, the risk of impacts from sea level rise is low due to the inland location of most transit assets.

Vulnerabilities and adaptation options

Metro qualitatively assessed the vulnerability of critical services and assets to changing climate conditions in the region based on their exposure to impacts, their sensitivity to extreme heat and heavy rain, and their capacity to adapt to climate impacts through replacement, relocation, or retrofitting. Based on this analysis, the agency identified potential options for adapting each of the critical services and assets. Table ES3 summarizes the vulnerability of critical services and assets and outlines potential adaptation options.

Table ES3: Summary of Vulnerability Analysis and Potential Adaptation Options

Service/Asset	Climate Impact	Potential Adaptation Option
Rail Operations	Equipment malfunction (electrical systems; air conditioning systems) during periods of extreme heat	• Pre-emptive maintenance or inspection; weather/climate-related monitoring
	Railway buckling during periods of extreme heat	• More heat-resistant materials or designs, if available • Increased shading of railways
	Flooding of underground stations and tracks during heavy rainfall events	• Improved stormwater management systems • Infrastructure upgrades in stations (ventilation grates, entrances, seals) • Increased pumping capacity
	Flooding of at-grade railways and (Bus Rapid Transit right-of-ways[1]) during heavy rainfall events	• Upgraded stormwater management systems

[1] Although BRTs are part of Bus Operations, the right-of-ways are functionally more similar to a railway.

Bus Operations	Fleet breakdowns and maintenance during periods of extreme heat	• Pre-emptive maintenance or inspection; weather/climate-related monitoring
New Construction/ Measure R Projects	Exposing new infrastructure to episodes of extreme heat and heavy rainfall events	• Integration of climate considerations in siting and alternatives decisions
	Labor interruptions or delays during periods of extreme heat	• Modification of construction schedules, especially during summer months

Next steps

Next steps to evaluate and expand upon the GHG reduction strategies in the Plan include:

- Establish an interdepartmental working group to monitor the implementation of strategies and progress towards reduction goals. This group could also schedule regular check-ins on emerging technologies.
- Update the Plan with analyses of strategies that reduce emissions from regional transportation, such as strategies that promote transit use, carpooling, and bicycling.
- Update the Plan with new information every 5 years, or more often if significant changes in technology, policy, or legal requirements warrant more frequent updates.
- In future plan updates, include a section on local, state, and federal regulations that directly affect Metro's GHG emissions, such as new vehicle technology regulations.
- Use the annual Sustainability Report to document strategies selected for implementation and monitor progress.

Next steps as Metro moves toward evaluating specific options for adapting to climate change could include:

- Investigate climate vulnerabilities at a higher level of specificity.
- Explore the monetary and social costs of climate impacts and adaptation options.
- Develop a communications strategy for the adaptation component of the Plan and subsequent adaptation activities.
- Explore implementation of climate adaptation principles at the operations level through the FTA-funded Climate Adaptation Pilot Program.

PC5

1. Introduction to the Plan

As a public transportation agency, Metro has a specific role in addressing climate change at both global and local scales. Public transportation, when well planned and well used, reduces vehicle travel and congestion on roadways, and helps to create communities that enable more walking and bicycling. These impacts in turn reduce emissions of greenhouse gases (GHGs), which contribute to climate change. Even though public transportation agencies produce GHG emissions from their vehicles and facilities, most of them (Metro included) prevent more emissions than they create. Reducing GHG emissions means slowing the worldwide impacts of climate change, which include rising sea levels, rising temperatures, and more extreme weather patterns.

Metro and Los Angeles County will inevitably be affected by a changing climate. Extreme temperatures and higher risk of flooding bring operational and maintenance challenges to Metro's buses and trains. Some assets may have shorter lifespans than originally envisioned, or require structural reinforcements to protect them from long term damage. Preparing for these impacts now can mitigate damage to Metro's transportation systems in the future.

The American Public Transportation Association (APTA) has articulated the relationship of transit agencies to climate change in its *Recommended Practice for Quantifying Greenhouse Gas Emissions from Transit* ('the APTA Protocol'). APTA encourages transit agencies to take stock of the emissions that they produce as well as the emissions that they prevent. APTA also maintains a Sustainability Commitment, to which Metro is a signatory. Pledging to reduce GHG emissions is part of some signatories' commitments. Finally, APTA has released *Guidelines for Climate Action Planning*, in order to encourage transit agencies to work proactively to reduce GHG emissions and prepare for the effects of climate change.

This plan is presented in support of APTA's guidance, and in support of Metro's role as a steward of the environment and of Los Angeles County's transportation assets. Sustainability, including reducing GHG emissions, is one of Metro's core business goals. Fiscal responsibility is another one. Determining how best to protect and preserve Metro's assets from the impacts of climate change is a fiscally responsible action. Public transportation agencies can and must take action on climate change. This plan establishes the framework for the agency to take steps to both reduce GHG emissions and prepare for the impacts of climate change.

1.1. Plan Objectives

Metro has compiled this Climate Action and Adaptation Plan ("the Plan") to serve dual purposes:

1. **Create a framework to evaluate and prioritize areas of opportunity for Metro to reduce GHG emissions from operations.**

   Metro has many opportunities to reduce GHG emissions from its buses, trains, and facilities. There are also opportunities to reduce emissions generated by travel in private vehicles in Los Angeles County. Many of these are described in Metro's *Greenhouse Gas Emissions Cost Effectiveness Study*, which estimated the cost and emissions impacts of 17 current and potential future strategies to reduce emissions. All of the strategies involve some upfront cost, but some of them save money for Metro over time. All of the strategies have implications beyond GHG emissions. Some would require changes to the way that Metro operates and maintains its assets. Others would change the experience of Metro's riders.

This Plan establishes a framework to identify the areas of greatest opportunity for Metro to reduce GHG emissions, based on estimates of cost and emissions impacts. Strategies examined in this plan will in many cases require further analysis before they can be implemented. The Plan contains key steps to move each strategy toward implementation. As new opportunities to reduce GHG emissions inevitably arise and new information about strategies becomes available, this Plan can be updated to refine priorities and action steps for the agency to reduce GHG emissions.

Metro is the principal provider of public transportation in Los Angeles County and also the County's transportation planner and coordinator, designer, builder, and operator. As such Metro's influence on GHG emissions extends to all of the County's transportation systems. As a first step, the Plan focuses on identifying and prioritizing actions that would affect just Metro's internal operations. Strategies examined in detail are those that would reduce emissions created by Metro from its buses, trains, and facilities. Subsequent versions of this Plan should incorporate actions to reduce travel in private vehicles into the framework.

2. **Present an approach for responding to the likely impacts of climate change on Metro's system.**

   Adaptation options are based upon the ways in which climate conditions are anticipated to affect Metro's infrastructure and operations. In an effort to identify options for Metro, the Plan presents a combined analysis of Metro's major services and assets, the ways in which these assets and services are sensitive to climate, and information about expected future climate conditions.

   The adaptation options presented in the Plan, as well as the analysis that underlies the discussion of Metro's climate vulnerability, are based on a high-level perspective of Metro's infrastructure and operations. This analysis demonstrates a strong link between climate impacts and the ability of Metro to reliably provide service to its customers. In this context, the presentation of adaptations is intended to motivate and guide future research and consideration of potential climate impacts and adaptation strategies, and to provide some of the technical information that can support such activities.

1.2. How to Use this Plan

Mitigation

The strategies included in this Plan are Metro's most promising opportunities to reduce GHG emissions from operations by the year 2020. A horizon year of 2020 is used in order to focus on short-term and medium-term actions to reduce emissions. A baseline year of 2010 is used because it was the most recent GHG emissions data available during development of the Plan. 2020 is also the horizon year for California's GHG reduction goal. Metro's actions can contribute to the achievement of this goal.

Not all of the strategies in the Plan can or should be implemented. The Plan is not intended to identify the best investment for a given asset type. Instead the Plan identifies asset and investment types that should be investigated in further detail, given their potential to reduce emissions. Metro has conducted (and continues to conduct) a number of more detailed studies of opportunities to improve the sustainability of its operations through water conservation, energy conservation, and management of other resources. Some options analyzed in previous documents are included as strategies in the Plan. Those detailed studies are the appropriate medium for analyzing technical options in greater detail.

The information contained in this Plan should be used to support a balanced decision-making process to select strategies that improve the overall sustainability of the agency. Impacts on GHG emissions are only one of a number of factors that influence Metro's investment decisions. All of the strategies evaluated in this report have benefits in addition to GHG reduction, such as reducing transit operating costs, increasing transit ridership, improving mobility, reducing water use, and providing employee benefits. Some strategies involve significant costs. ***Decisions to support any individual strategy should be made based on a composite assessment of all these potential benefits and costs, rather than GHG impacts alone.***

Adaptation

The Plan's approach to considering climate change adaptation is also not intended to provide definitive recommendations. Rather, the Plan provides methodologies and analyses as technical inputs to future discussions of adaptation strategies.

It is clear that any decisions to implement adaptation measures will require significantly more specificity and technical detail than are provided in the Plan. Moreover, the choice to pursue any particular adaptation option will involve broad considerations of a variety of Metro management goals as well as more detailed information about costs and benefits.

In short, the Plan is intended as a first step to inform and facilitate Metro's longer-term commitment to bolstering its resilience to climate variability and climate change.

As a next step, Metro's FTA-funded Climate Adaptation Pilot Program uses principles outlined in the Plan and explores operational climate resiliency from the ground up as a counterpart to the Plan. Metro is taking a two part approach to integrating climate adaptation principles in the agency's processes: top-down planning in this Plan and bottom-up planning from Metro operations.

1.3. The Climate Action and Adaptation Plan in Context

This Plan is part of Metro's long-term Sustainability Program. The Sustainability Program was initiated with the 2008 *Metro Sustainability Implementation Plan (MSIP),* intended to demonstrate Metro's commitment to sustainability through fiscal responsibility, social equity, and environmental stewardship. Metro and Countywide GHG Emissions Management was one of four sustainability projects identified in the MSIP.

Since 2008, Metro has conducted a number of studies and planning efforts under the Sustainability Program. The agency has also issued several policies since 2008 that support the agency's sustainability agenda. A few of the agency's sustainability polices predate the MSIP.

Development and implementation of the Plan will be consistent with the "Plan-Do-Check-Act" model that was established through Metro's Environmental Management System (EMS). An EMS is a set of operational procedures that will ensure compliance with environmental regulations and facilitate environmental stewardship. Metro committed to the establishment and use of an EMS in the 2009 *Environmental Policy*. The EMS has been piloted in two Metro divisions and will soon be rolled out agency-wide. Through the EMS, Metro has been identifying environmental issues of significant concern, proactively addressing those issues, implementing specific solutions to issues as they are developed, and engaging Metro management to ensure continuous improvement. Thus, the EMS provides the structure for managing all environmental issues for Metro; the Climate Action and Adaptation Plan fits within this structure and provides more specific approaches to address climate change mitigation and adaptation.

The graphic below demonstrates the relationship of the Plan to the rest of Metro's Sustainability Program. The MSIP outlines several key goals for the Sustainability Program. Metro's annual Sustainability Report tracks the agency's progress on a number of sustainability indicators, including GHG emissions, energy used, and waste production. The Sustainability Report also documents successful actions and potential future actions.

Exhibit 10

PC5

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL TRANSIT ADMINISTRATION
WASHINGTON, D.C.

FULL FUNDING GRANT AGREEMENT

LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

REGIONAL CONNECTOR TRANSIT CORRIDOR PROJECT

CA-03-0825

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL TRANSIT ADMINISTRATION

FULL FUNDING GRANT AGREEMENT
(FTA FFGA-20, October 1, 2013)

On the date the authorized U.S. Department of Transportation, Federal Transit Administration (FTA) official signs this Full Funding Grant Agreement, the Government (FTA) has awarded Federal assistance in support of the Project described below. Upon Execution of this Full Funding Grant Agreement by the Grantee named below, the Grantee affirms this Award by the Government (FTA Award), and enters into this Full Funding Grant Agreement with FTA. The following documents are incorporated by reference and made part of this Full Funding Grant Agreement:

(1) "Federal Transit Administration Master Agreement," FTA MA(20), October 1, 2013, [http://www.fta.dot.gov/documents/20-Master.pdf];
(2) The Certifications and Assurances applicable to the Project that the Grantee has selected and provided to FTA, and
(3) Any Award notification containing special conditions or requirements, if issued.

FTA AWARD

The Government (FTA) hereby awards a Full Funding Grant as follows:

Project Number(s): CA-03-0825

Grantee: Los Angeles County Metropolitan Transportation Authority (LACMTA or Metro)

Citation of Statutes Authorizing the Project: 49 U.S.C. §§ 5309(b), 5309(d)

Estimated Net Project Cost: $1,402,932,490

Maximum FTA Amount Awarded [Including This Amendment]: $ 0

Amount of This FTA Award: $0

Maximum Federal New Starts Financial Contribution: $669,900,000

Maximum Percentage of FTA Participation: 52.3 percent

Maximum Percentage of New Starts Participation: 47.7 percent

TABLE OF CONTENTS

FULL FUNDING GRANT AGREEMENT TERMS AND CONDITIONS

ATTACHMENTS

Attachment 2

Los Angeles County Metropolitan Transportation Authority
Regional Connector Transit Corridor Project
Los Angeles, California

Project Description

Narrative Description:

The Regional Connector Transit Corridor Project (Project) consists of the design and construction of 1.9-mile light rail transit line in downtown Los Angeles, with three new underground stations and four new light rail vehicles. The Project will begin at the existing station at 7th/Metro Center and will provide connections via a new underground alignment to the existing Metro Blue, Expo, and Gold lines. The alignment will extend underground from the 7th Street/Metro Center Station following Flower Street, curving east under the 2nd Street roadway tunnel and 2nd Street, and continuing east under the intersection of 1st and Alameda Streets, surfacing to connect to the Metro Gold Line tracks within 1st Street at grade to the east, and north of Temple Street toward Union Station.

Project Description by Standard Cost Category:

The following provides a description of the Project by Standard Cost Categories. These Standard Cost Categories are the basis for the Baseline Cost Estimate and for the Baseline Schedule in Attachments 3 and 4, respectively.

SCC 10 – GUIDEWAY AND TRACK ELEMENTS

This SCC includes the guideway for the Project, which consists of both cut and cover sections and underground twin tunnels. SCC 10 includes the following subcategories.

10.03 Guideway: At-grade in Mixed Traffic

This SCC includes 0.06 route miles of guideway at both legs of the existing Metro Gold Line guideway where Regional Connector will be connecting to 1st Street and Alameda Street.

10.06 Guideway: Underground Cut and Cover

This subcategory includes approximately 0.49 route miles of cut and cover construction, consisting of the following sections: (1) on South Flower Street between 4th and 6th Streets; (2) the underground "Wye" junction beneath the intersection of 1st and Alameda Streets, that splits the Regional Connector trunk line, allowing connections to existing LRT Lines for the reconfigured North/South and East/West services; and (3) the underground guideway sections beneath 1st and Alameda Streets.

This subcategory also includes a special break into the existing 7th and Metro Center Station, installation of soldier piles, excavation support and disposal of soil, raised concrete decking, barrier setup, access shafts in the deck to build the work, waterproofing, muck storage hoppers, walkway concrete and concrete guideway structures, and traffic control and protection.

10.07 Guideway: Underground Tunnel

This subcategory includes the tunneling of approximately 1.16 route miles of the guideway. It includes the procurement, shipping, mobilization, set-up, and deployment of one Earth Pressure Boring Machine and trailing gear for the underground twin tunnel boring operations.

This subcategory also includes excavation; installation of concrete; waterproofing; lighting and ventilation, grouting preparation and permeation grouting, and instrumentation for building protection for tunneling operations. Other items include construction of crossovers and tunnel walkways.

10.08 Guideway: Retained Cut or Fill

This subcategory includes 0.09 route miles of retained cut on 1st Street and 0.1 route miles of retained cut on Alameda Street, including the "boat" structures – U-shaped transition structures – inserted between the cut and cover boxes of the tunnels and the elevated or at-grade alignment sections. Two boat structures are required: one for the transition to the existing Gold Line US 101 bridge overcrossing in the DWP Yard; and the other for the transition to the at-grade Gold Line tracks to East Los Angeles, within 1st Street, near Hewitt Street. This subcategory also includes installation of soldier piles, excavation (including excavation support), waterproofing, concrete structures, walkway concrete, and traffic control and protection.

10.09 Track: Direct Fixation

This subcategory includes 1.64 route miles of direct fixation track.

10.10 Track: Embedded

This subcategory includes 0.01 route miles of embedded track for connections to the existing Metro Gold Line at the tunnel portal on 1st Street.

10.11 Track: Ballasted

This subcategory includes 0.25 route miles ballasted track from Alameda Street towards Union Station.

10.12 Track: Special (Switches, Turnouts)

This subcategory includes the special track and equipment for the two (2) single crossovers at Alameda Street and Flower Street, and the double-crossover immediately east of the 2nd Street and Broadway Station.

10.13 Track: Vibration and Noise Dampening

This subcategory includes mitigation measures for eliminating or minimizing noise and vibration impacts including groundborne noise and groundborne vibration projected to be generated by operations of the constructed project. The potential sensitive land use locations include the Walt Disney Concert Hall, the Colburn School of Music, and the Hikari Lofts. The mitigation measures include the use of resiliently supported fasteners, isolated slab track, high compliance resilient fasteners, floating slab trackbed or other appropriate measures as needed to eliminate impacts and to reduce groundborne noise below FTA annoyance criteria.

Attachment 3

Los Angeles County Metropolitan Transportation Authority
Regional Connector Transit Corridor Project
Los Angeles, California

Baseline Cost Estimate

Table 1 – BCE by Standard Cost Category

Applicable Line Items Only	YOE Dollars Total
10 GUIDEWAY & TRACK ELEMENTS (1.9 miles)	**280,622,417**
10.03 Guideway: At-grade in mixed traffic	2,023,175
10.06 Guideway: Underground cut & cover	116,558,093
10.07 Guideway: Underground tunnel	131,295,004
10.08 Guideway: Retained cut or fill	10,555,947
10.09 Track: Direct fixation	9,817,387
10.10 Track: Embedded	76,556
10.11 Track: Ballasted	1,472,707
10.12 Track: Special (switches, turnouts)	5,069,845
10.13 Track: Vibration and noise dampening	3,753,703
20 STATIONS, STOPS, TERMINALS, INTERMODAL (3)	**354,268,073**
20.03 Underground station, stop, shelter, mall, terminal, platform	296,863,490
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.	31,821,845
20.07 Elevators, escalators	25,582,739
40 SITEWORK & SPECIAL CONDITIONS	**141,785,395**
40.01 Demolition, Clearing, Earthwork	12,214,689
40.02 Site Utilities, Utility Relocation	44,839,983
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments	10,318,458
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks	2,499,118
40.06 Pedestrian / bike access and accommodation, landscaping	5,553,353
40.07 Automobile, bus, van accessways including roads, parking lots	20,917,022
40.08 Temporary Facilities and other indirect costs during construction	45,442,772
50 SYSTEMS	**69,666,754**
50.01 Train control and signals	12,876,090
50.03 Traction power supply: substations	29,185,070
50.04 Traction power distribution: catenary and third rail	5,340,419
50.05 Communications	10,232,564
50.06 Fare collection system and equipment	9,664,025
50.07 Central Control	2,368,587
Construction Subtotal (10 - 50)	**846,342,640**
60 ROW, LAND, EXISTING IMPROVEMENTS	**115,889,205**
60.01 Purchase or lease of real estate	115,722,187
60.02 Relocation of existing households and businesses	167,018
70 VEHICLES (up to 4)	**16,275,350**
70.07 Spare parts	1,095,438

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80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	**261,455,309**
80.01 Preliminary Engineering	39,828,060
80.02 Final Design	69,607,793
80.03 Project Management for Design and Construction	70,039,553
80.04 Construction Administration & Management	41,857,057
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.	8,266,055
80.07 Surveys, Testing, Investigation, Inspection	4,133,026
80.08 Start up	27,723,765
Subtotal (10 - 80)	**1,239,962,503**
90 UNALLOCATED CONTINGENCY	**135,398,916**
Subtotal (10 - 90)	**1,375,361,419**
100 FINANCE CHARGES	**27,571,071**
Total Project Cost (10 - 100)	**1,402,932,490**

Exhibit 11

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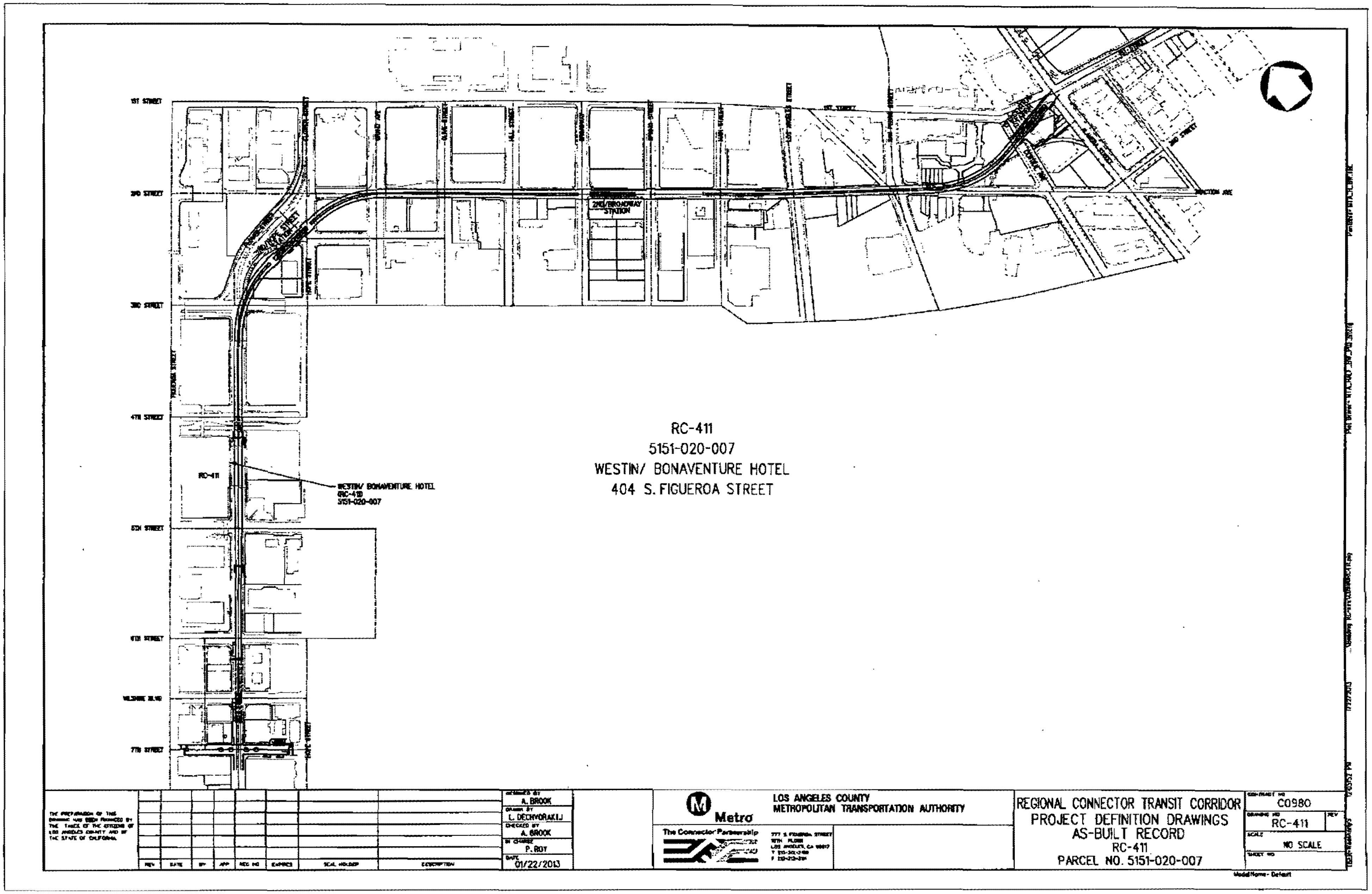

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2ND STREET
3RD STREET
4TH STREET
5TH STREET
6TH STREET
WILSHIRE BLVD
7TH STREET
FIGUEROA STREET
2ND/BROADWAY STATION
RC-411
WESTIN/ BONAVENTURE HOTEL (RC-411) 5151-020-007
A. BROOK
L. DECHVORAKIJ
A. BROOK
P. ROY
01/22/2013
LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY
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The Connector Partnership
REGIONAL CONNECTOR TRANSIT CORRIDOR
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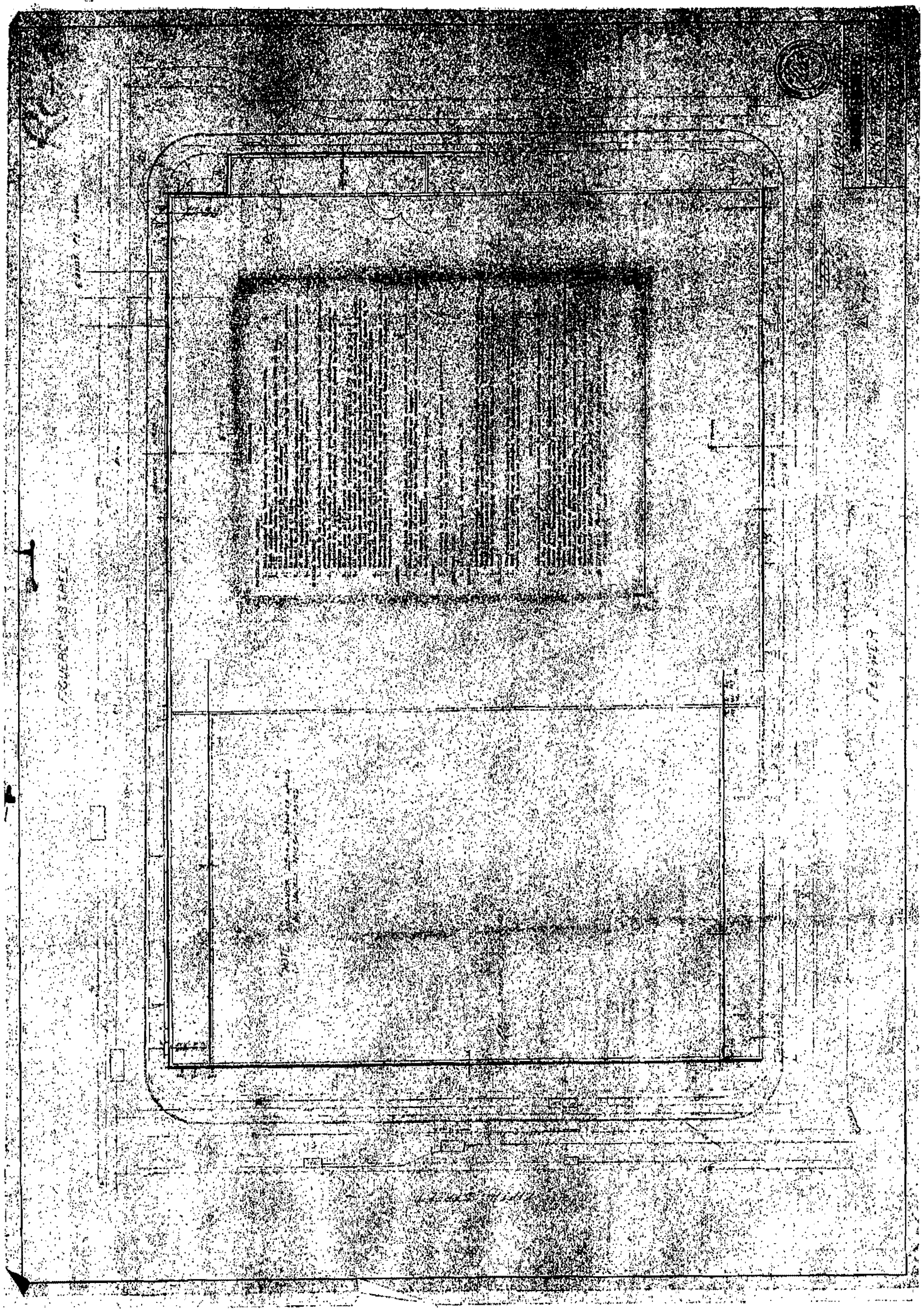

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LOADING AREA

E. TOWER

GENERAL NOTES

PROCEDURE FOR ERECTION

1. Drill soldier beam holes using care to prevent excessive caving.
2. Place soldier beams.
3. Fill soldier beam holes to bottom of footing elevation with 2500 psi conc. Fill remainder with 1½ sack sand slurry
4. Excavate to level of first anchor. Place lagging or wire mesh as excavation proceeds in maximum of 6' lifts.
5. Install drilled cast-in-place shoring anchors. Anchors to be tested under inspection of the Foundation Engineer before excavation proceeds.
6. Repeat steps 4 & 5 for remaining levels of anchors.

SHORING ANCHORS

1. Anchors to be drilled, cast-in-place tension piles. Precautions to be used to prevent excessive caving of holes.
2. Concrete to be 6 sack / yd pea gravel pump mix. Plasticment admixture to be added as required for temperature and pumping time. Concrete to be placed by pumping to the bottom of the shaft.
3. Shaft above slip plane to be filled with sand slurry.
4. Anchor rods to be Dywidag. Threadbars complying with ASTM A-[illegible] & A-322
5. All anchors to be tested to 150% of schedule design load and post tensioned to schedule design load under inspection of the Foundation Engineer. The deflection under the test load should not exceed 0.1 inch over a 15 minute period in order for the anchor to be approved; total deflection during the test load should not exceed 12 inches.
6. Foundation Engineer will inspect the installation of anchors.
7. Testing equipment to be calibrated by an approved testing laboratory, within last 30 days.
8. Representative anchors to be tested to 200% of schedule design load as directed by the Foundation Engineer.

LAGGING

1. Wood lagging to be installed in fill, overburden soils and areas of water seepage in the shale. Soil Engineer shall approve all areas not lagged.
2. 6 x 6 -10 / 10 wire mesh to be installed on the remainder of the shale. Shale to be sprayed with asphalt emulsion.
3. Lagging to be backfilled to provide full bearing.

WELDING

1. All welding to be electric arc using L.A. City approved electrodes.
2. All welders to be L.A. City certified.

STRUCTURAL STEEL

1. All structural steel to comply with ASTM A - 36.

REMOVAL

1. Remove that portion of anchor rods in the street right of way within 20ft. of existing grade. Rods shall not be removed or detensioned until the basement walls are complete and backfilled to within 3.0 ft. of the anchor elevation.
2. Remove soldier beams in the street right of way within 10 ft. of the existing grade.

INSPECTION

1. The Foundation Engineer shall inspect the installation of all shoring.
2. Work within the public way or affecting the lateral support of the public way shall be under inspection of the Bureau of Contract Administration.

SPECIAL NOTES

1. Rods shall remain extended and exposed to permit retensioning throughout the service life of the shoring.
2. Anchor rods shall not be welded or used for grounding welding equipment.
3. Berms shall be constructed or some other means provided to prevent storm water from entering excavations over top of shoring.
4. Where excessive caving occurs, as determined by the Foundation Engineer, adequate precautions shall be taken to prevent caving.
5. Excavation shall not be surcharged by heavy equipment or material storage within 10' of top of cut, except in loading areas.
6. Dewatering wells on city property shall be approved in advance by the City Engineer.
7. PROVIDE BARRICADES AROUND THE EXCAVATION
8. CONTROL POINTS SHALL BE ESTABLISHED BY A LICENSED SURVEYOR [illegible] AND [illegible] ST. STREET

TOWER

11.00 x 17.00 in

1. All structural steel to comply with ASTMA - 36.

REMOVAL

1. Remove that portion of anchor rods in the street right of way within 20ft. of existing grade. Rods shall not be removed or detensioned until the basement walls are complete and backfilled to within 3.0 ft. of the anchor elevation.
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5. Excavation shall not be surcharged by heavy equipment or material storage within 10' of top of cut, except in loading areas.
6. Dewatering wells on city property shall be approved in advance by the City Engineer.
7. PROVIDE BARRICADE AROUND THE EXCAVATION.
8. CONTROL POINTS SHALL BE ESTABLISHED BY A LICENSED SURVEYOR TO MONITOR ANY MOVEMENT OF 5TH STREET.

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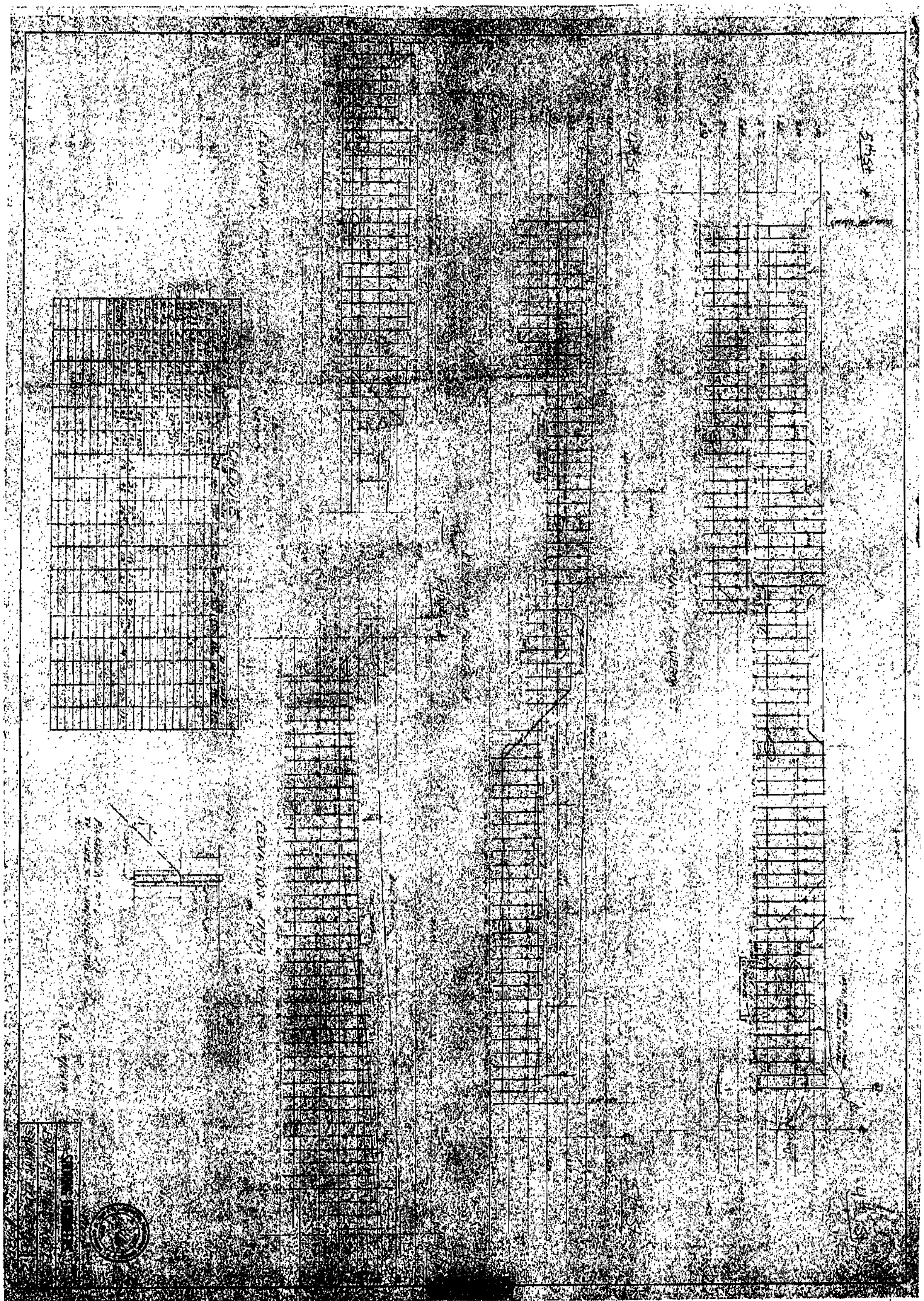

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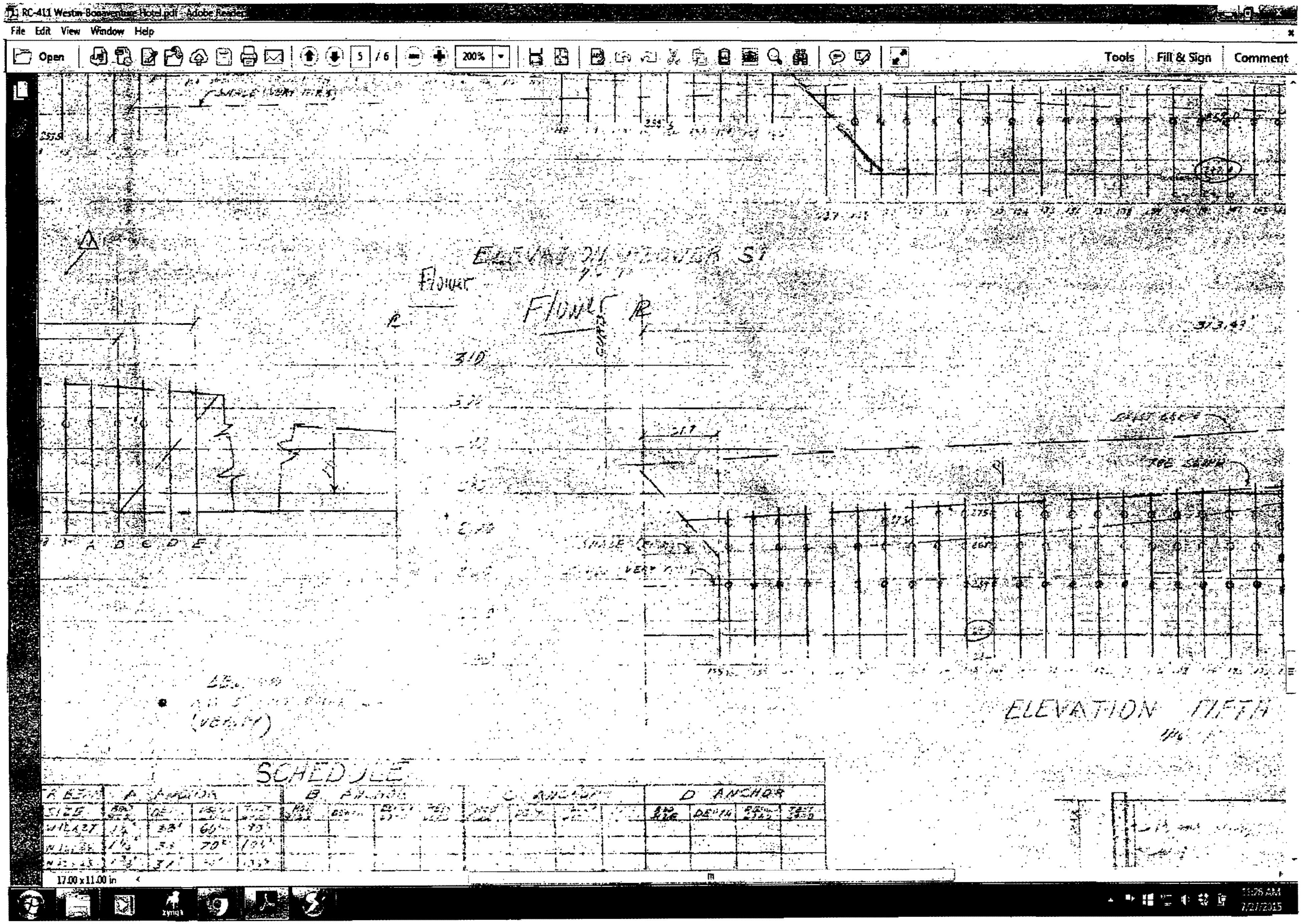

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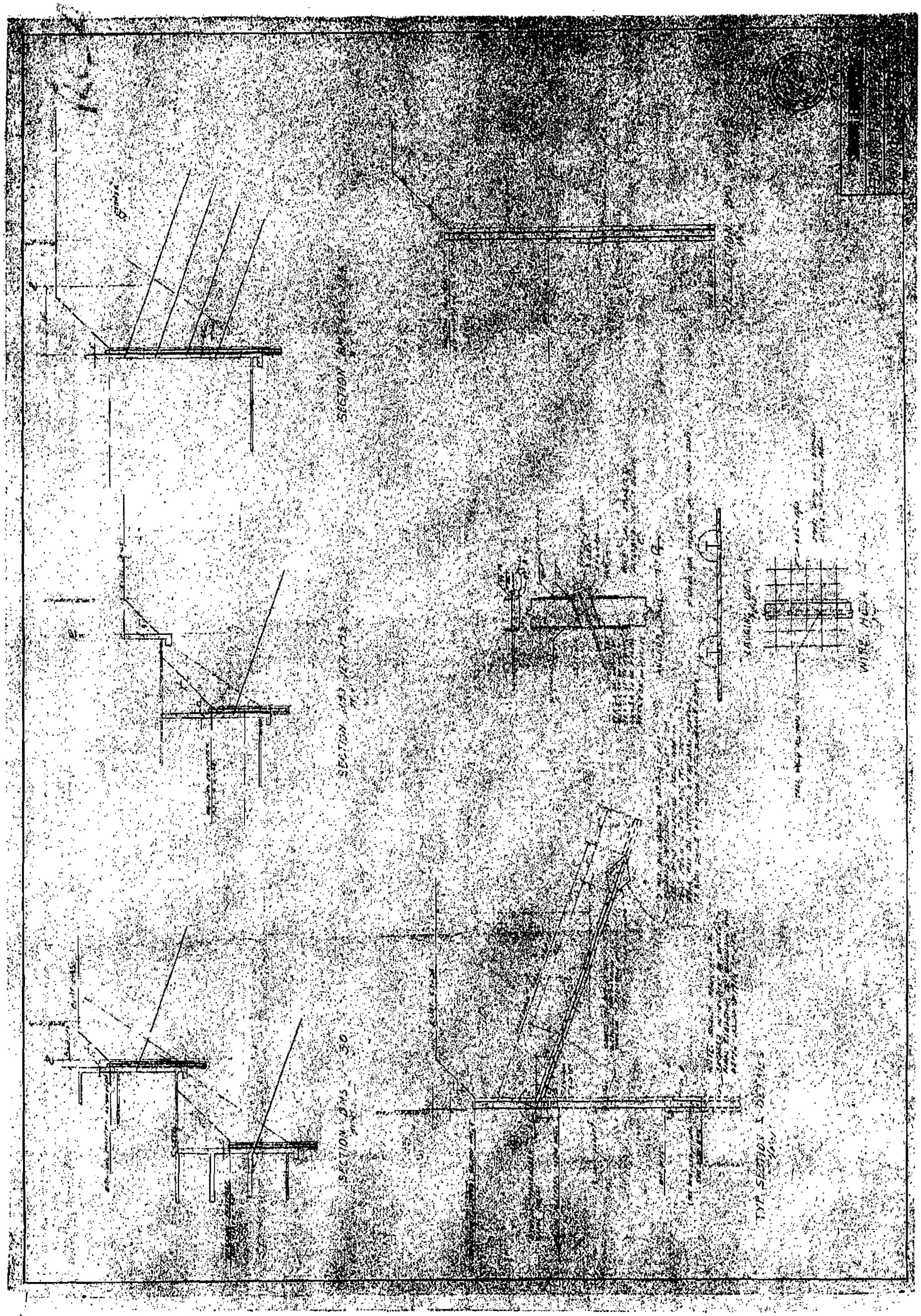

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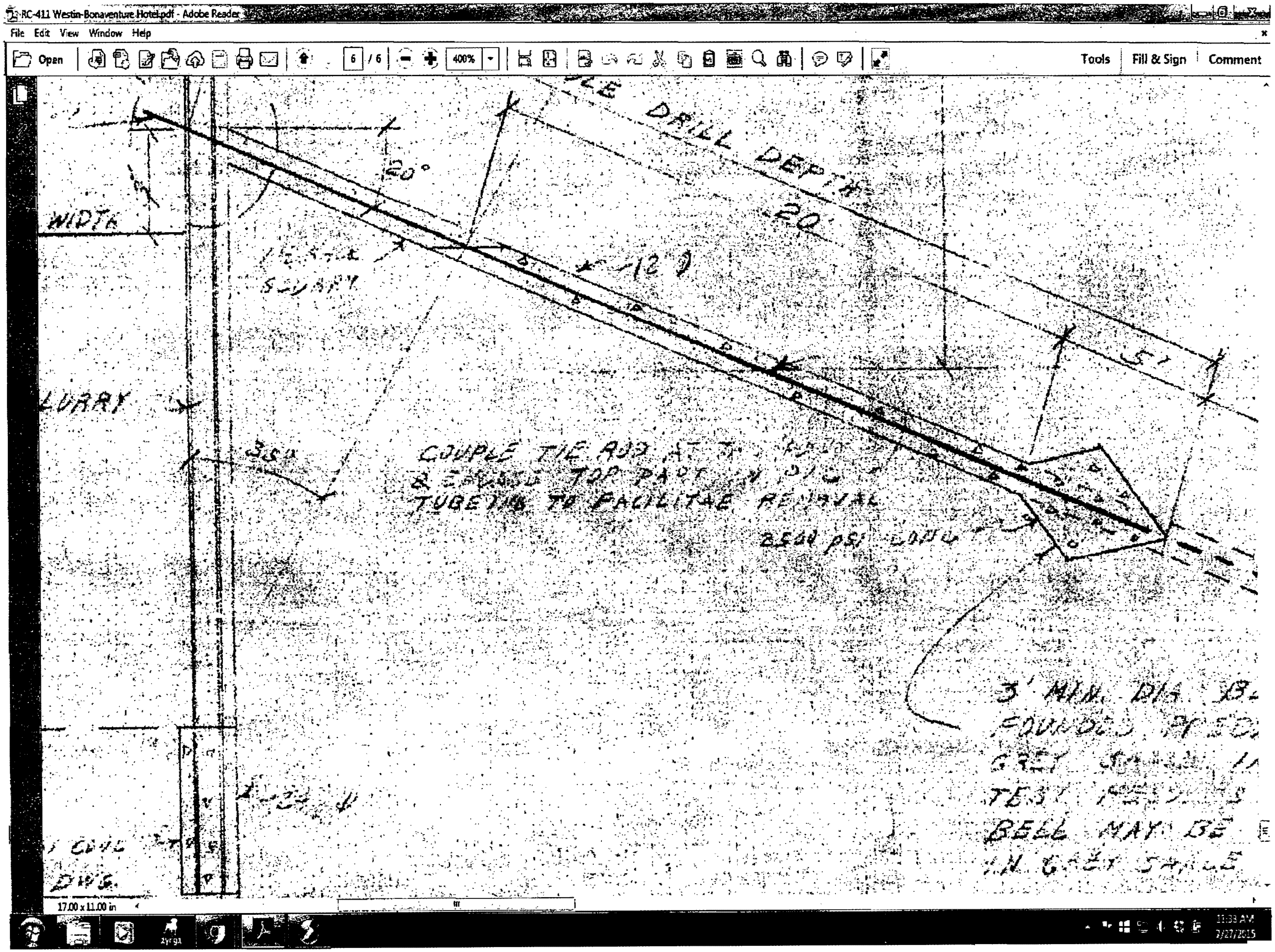
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7/27/2015

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Exhibit 12

---------- Forwarded message ----------
From: **Czarcinski, Michael** <Michael.Czarcinski@westinbonaventure.com>
Date: Thu, Jul 16, 2015 at 10:22 AM
Subject: FW: Flower St construction/ load-in
To: "christophersutton.law@gmail.com" <christophersutton.law@gmail.com>

We could not get this truck into garage because of MTA

MICHAEL
CZARCINSKI (char-chin-ski)
Managing Director

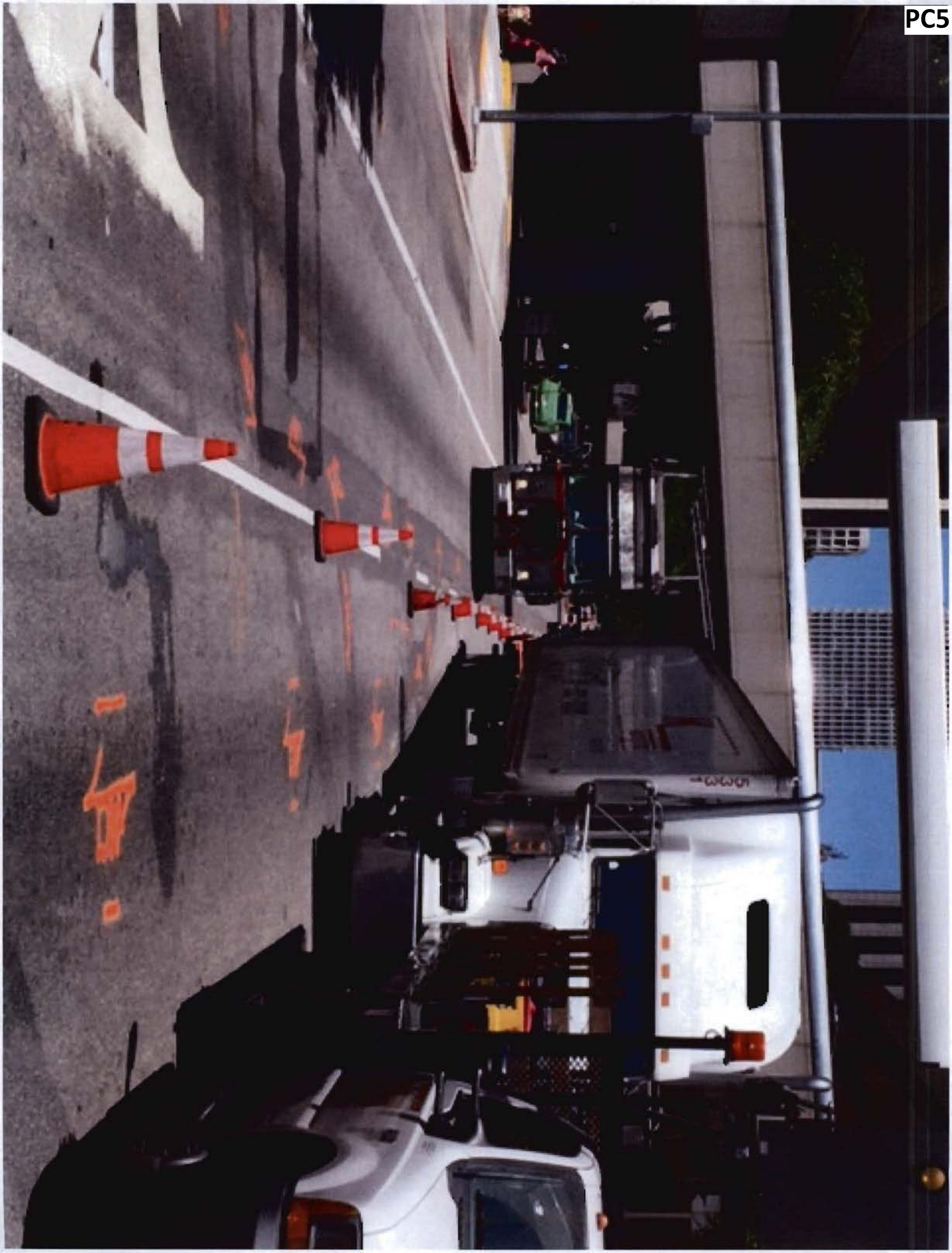
THE WESTIN BONAVENTURE
404 South Figueroa Street, Los Angeles, CA 90071
T 213.612.4880 F 213.612.4893 C 213.505.7728

WEBSITE | FACEBOOK | OFFERS | MEETINGS

-----Original Message-----
From: Long, Thomas
Sent: Wednesday, July 15, 2015 1:55 PM
To: Czarcinski, Michael
Subject: Flower St construction/ load-in

Mike,
Included are a few photos of the Flower St. Construction , and its impact on our loading dock load-in process.

PC5



PC5

PC5

Responses to Comments

PC5

Responses to Comments from Sutton, Christopher

Response to Comment PC5-1

As documented in the Final EIS/EIR and disclosed in the Draft SEIS, there would be temporary adverse effects associated with Project construction. Potential effects related to two method construction alternatives, Alternatives A and B, on Flower Street between 4th Street and the 7th Street/Metro Center Station are discussed in the SEIS in Chapter 3, Transportation and Circulation and Chapter 4, Affected Environment and Environmental Consequences. Chapter 5 of the Draft SEIS presents a summary of the consequences associated with the construction and operation of the two tunneling method alternatives.

- See Final EIS/EIR Chapter 4.18 Construction Impacts; Section 4.18.3.4 Locally Preferred Alternative for full analysis of construction impacts associated with the Project and mitigation measures identified.
- See Draft SEIS Section 2.1.2 Construction Methods of the Project; Section 2.1.3 Construction Staging for the Project for detailed descriptions of Project construction methods and construction staging areas associated with the tunneling alternatives which were not pursued.
- See Draft SEIS Chapter 3, 4 and 5 for discussion of potential environmental consequences of the two construction alternatives.

Response to Comment PC5-2

Metro will continue to provide timely notices.

Response to Comment PC5-3

As stated in Chapter 1, the Draft SEIS was prepared to address the Order of the United States District Court for the Central District of California in Today's IV, Inc. vs. Federal Transit Administration et al and 515/555 Flower Associates, LLC vs. Federal Transit Administration et al. The Judgment and Order for Partial Injunctive Relief by the Honorable John A. Kronstadt on May 28, 2014 and September 9, 2014, respectively, require that the FTA as the federal lead agency pursuant to NEPA, with Metro, prepare a supplemental analysis under the National Environmental Policy Act (NEPA) that addresses the feasibility of Open-Face Shield and SEM tunneling alternatives. The Draft SEIS is intended to provide more information on the tunnel construction alternatives on Flower Street that were withdrawn from consideration, specifically Open-Face Shield and Sequential Excavation Method (SEM) tunneling for the Flower Street portion of the Regional Connector project alignment between 4th Street and the 7th Street/Metro Center Station, as required by the Judgment.

The factual premise of this statement is false, there have been no material changes to the Project that are substantially different from what was presented and analyzed in the Final EIS/EIR that would require further analysis under 23 CFR § 771.129. The design refinements to the project were evaluated and they would not result in new or adverse impacts, and would not change the conclusions of the analysis for Alternative A and B.

- See Draft SEIS Section 1.2 Purpose and Scope of this Supplemental Environmental Document for purpose and limit of scope for this environmental analysis.

Response to Comment PC5-4

See response to Comment PC5-3, which responds to comments made in this comment.

The agencies reject the commenter's support of a deep tunnel alternative on several grounds. It fails to satisfy Metro policy decision, so it fails to meet the project's purpose and need. It may be physically possible, but it is not feasible as a matter of sound public policy because it would be impractical under the physical constraints; it would increase the burden on the Little Tokyo environmental justice community; it would cost more; and it would delay the schedule. The current project design is superior in all of these ways. Finally, NEPA does not require the agencies to analyze a deep tunnel alternative in detail because it is similar to other alternatives the environmental document is already analyzing.

First, as a policy Matter, Metro's Board has decided that the light rail project accommodate that future station. The commenter's suggested deep tunnel alternative could not accommodate that future station, so it does not meet the policy goals for this project.

Second, NEPA does not require analysis of an infinite number of alternatives in the environmental document. Under 40 CFR § 1505.1(e), NEPA requires evaluation of a reasonable range of alternatives and a brief discussion of alternatives which were eliminated from detailed study. As stated in Chapter 1 of the Draft SEIS, the Draft SEIS was prepared in response to the Judgment and Order for Partial Injunctive Relief by the Honorable John A. Kronstadt on May 28, 2014 and September 9, 2014. The SEIS is a limited-scope document that provides additional detail on tunneling methods not selected for construction along Flower Street, specifically Open-Face Shield and SEM tunneling for the Flower Street portion of the Regional Connector project alignment between 4th Street and the 7th Street/Metro Center Station.

Alternative B in the Draft SEIS includes deep tunneling and the analysis of Alternative B has benefits, risks, and costs similar to the suggested deep tunnel alternative. Alternative B provides a basis for evaluating the deep tunnel alternative. GHG analysis in Section 4.2.2.2 was conducted for Alternative B and a deep tunnel alternative which would have similar impacts as under Alternative B. Additional schedule delays, costs, environmental, and safety risks associated with Alternative B and the resulting increased depth of the 2nd/Hope Station have been identified and evaluated in the Draft SEIS. Minor shortening of the tunnel through increasing the 2nd/Hope Station depth 1) increases the amount and duration of excavation of materials handled at the Mangrove site 2) maintains impacts on Flower Street south of 5th Street 3) still has the potential for tieback interface and 4) still increases operations costs but reduces operational efficiencies on Flower Street south of 5th Street. Based on the potential impacts, safety risks, and issues associated with a deeper alternative are discussed above, it is not considered as a viable alternative.

Third, the commenter's deep tunnel alignment is not practicable. Increasing the depth of the 2nd/Hope Station as proposed by the commenter's deep tunnel alternative" would increase safety risks during construction and the amount of material required to be excavated to reach the depth of the station at 2nd and Hope. In addition, stations must meet Metro's Fire Life Safety Design Criteria requirements for emergency exiting of riders during unforeseen circumstances within the tunnels or at the station. In particular, riders must be able to exit the station adequately in case of emergency. A deeper station must be able to meet the emergency exit requirements. Meeting the Fire Life Safety Design Criteria requirements will be more challenging and is not certain with a significantly deeper station.

Fourth, a deeper alignment from 2nd/Hope results in an increased grade elevation from 5th Street to 7th Street Metro Center Stations resulting in reduced operating speeds, increased travel time and increased operational costs. For construction of Alternative A and B higher emissions result due to the use of grouting equipment, and for a longer duration. In addition, operationally, a qualitative assessment found that reduced emissions in some locations for Alternative B, the deeper alternative, would be more than offset by increased emissions associated with long term operational demands entering the 7th/Metro station and slower and less efficient transit operations. As presented in Chapter 5.0 Comparison of the Tunneling Method Alternatives versus the Project, Alternatives A and B, and therefore a deep tunnel alternative do not meet the purpose and need of the project.

Fifth, the suggested adjustment of the 2nd/Hope Station does not guarantee avoidance of tiebacks on Flower Street during construction while simultaneously rising at an acceptable grade to the 7th Street Metro Center Station to allow for safe and efficient operations.

Sixth, the deep tunnel alternative suggested by the commenter, still risks running into tiebacks. It is uncertain whether the depth of the tunnel would guarantee that the EPBM would not run into tiebacks closer to the 5th and Flower intersection. If an EPBM interfaces with a tieback, it would result in greater surface construction impacts associated with rectifying the situation than any of the alternatives identified in addition to significant delays and cost increases. The characteristics of the deeper alternative can be found in Section 2.3.2.2 analysis for Alternative B which states the following:

> *The deeper alignment proposed by Alternative B would have significant impacts on the future 5th/Flower and the 2nd/Hope stations:*

- *The modified sag provides for a flat spot at a one percent grade to accommodate a future 5th/Flower Station. The future station would have to be configured as a side platform since the narrow center-to-center spacing of the twin tunnels would preclude construction of a center platform. The depth of this alternative's tunnels would* *accommodate construction of a mezzanine. Construction of the future station side platforms would require demolition of a portion of each tunnel in order to provide an opening to connect with the two side platforms.* Transit service would be interrupted for a substantial length of time to permit this major construction work to take place. Deviations would be required from Metro rail design standards to accommodate the site-specific conditions.

- *Due to this alternative's greater depth, the 2nd/Hope Station would be shifted down by 32 feet from the Project station depth (96 feet) to 128 feet from TOR to the street surface. This station location would be deeper because the low point in Alternative B was shifted to the north to accommodate a future 5th/Flower Station. The greater station depth would have an increased risk to stability and safety of excavation shoring; this is an unprecedented depth for work of this nature in Los Angeles, which is not addressed by Metro Support of Excavation standards. Excavating at this depth would increase the difficulty in ventilating the excavation pit during construction, and increase the risk of exposure to hazardous gases. The greater depth would increase the amount of spoils (23,000 cubic yards) handled at the 2nd/Hope station site.*

As shown, a deeper alignment, as indicated by the commenter's deep tunnel alternative, from 2nd/Hope results in an increased grade elevation from 5th Street to 7th Street Metro Center Station resulting in reduced operating speeds, travel time and increased operational costs.

Furthermore, schedule impacts associated with change of project design and obtaining environmental clearance would be significant, even if performed in parallel. For the deeper alignment, per the Draft SEIS Alternative B, this would result in 7 months of schedule delay. Costs would also potentially increase as indicated in the Draft SEIS to potentially $403 million.

Finally due to the extended use of the EPBM, as indicated in the Draft SEIS, "The two tunneling method alternatives [EPBM to 5th Street] shift a majority of the effects resulting from the handling of excavation materials from the Flower street Segment, a high rise commercial district with wide streets, to Little Tokyo, a low to mid-rise mixed use district with visitor and cultural destinations, and identified as an environmental justice community."

- See Draft SEIS Section 1.2 Purpose and Scope of this Supplemental Environmental Document for purpose and need which indicates service levels that would not be met by a deeper tunnel alternative.
- See Draft SEIS Section 2.2 Development of Alternatives which presents the basis for identifying and evaluating the tunneling method alternatives in the SEIS.
- See Draft SEIS Section 2.2.1 Flower Street Existing Conditions; Section 2.3.1 Tunnel Construction Methods; Section 2.3.2 Description of Tunneling Method Alternatives for detailed description of existing conditions, constraints, construction methods per alternative, and associated impacts.
- See Draft SEIS Section 5.4 Construction and Risk Considerations, Section 5.5 Summary of Impacts of Alternatives versus the Project, Section 5.8 Cost and Funding Considerations for comparison of benefits, costs, and risk for a deep tunneling alternative

- See Draft SEIS Appendix A: Draft Flower Tunneling Method Alternatives Section 4.7 Transit Structure Configuration; Section 4.8 Underground Obstructions to Tunneling - Tiebacks; Section 5.0 Alternative Alignments and Tunneling Methods for detailed descriptions of existing conditions along Flower Street.

For all of these reasons, the commenter's suggested deep tunnel alignment would not meet Metro's policy goals; is infeasible as a matter of sound public policy, although it may be physically possible; and NEPA does not require the agencies to analyze it as an additional alternative because it is similar to other alternatives analyzed in detail in the environmental document.

Response to Comment PC5-5

See response to Comment PC5-4, which responds to comments made in this comment.

Response to Comment PC5-6

See response to Comment PC5-4 regarding the analysis of a deep tunnel alternative and the purpose and scope of the SEIS.

Noise and vibration impacts at the Colburn School were analyzed in the Final EIS/EIR. As stated in Section 4.7.3.5.1, Construction Noise and Vibration of the Final EIS/EIR:

> *As a school, the Colburn School was considered a Category 3 land use, in other words a land use with primarily daytime use. The analysis using the Category 3 land use classification determined that no significant impacts would occur at the Colburn School during construction. At the request of the Colburn School, additional noise analysis was undertaken, treating the school as a Category 1 land use. Given that the distance between the LRT tunnel and the Colburn School would be greater than the distance between the LRT tunnel and the Walt Disney Concert Hall and that GBV impacts would not occur at the Walt Disney Concert Hall during construction, operation of the TBM and delivery trains would not result in significant GBV impacts to the Colburn School even if the school is treated as a Category 1 land use. Although the Colburn School is properly considered as a Category 3 land use in this analysis, if the Colburn School were a Category 1 land use, a potentially significant GBN impact could occur at the Colburn School due to operation of the TBM and delivery trains during construction. Thus, in an abundance of caution, the mitigation identified in Section 4.7.4.2.1 below has been modified to ensure that GBN generated by the TBM and delivery trains would not impact the sensitive activity occurring at the Colburn School*.

Since approval of the Final EIS/EIR for the Project, Metro has been implementing its mitigations as identified in the Mitigation Monitoring and Reporting Program (MMRP). This includes but is not limited to activities such as construction schedule coordination with adjacent uses and monitoring, as well as continued development of design specifications in order to mitigate for impacts. The referenced April 2013 study was an in-progress study to determine the final specifications needed to mitigate for impacts in that location. Metro continues to work with the Colburn School on the results of the report, the construction schedule and the design and installment of the mitigation planned.

- See Final EIS/EIR Chapter 4.7 Noise and Vibration, Section 4.7.3.5.1 Construction Noise and Vibration; Section 4.7.4.2.1 Final Construction Mitigation Measures for the Locally Preferred Alternative for analysis pertaining to the Project, construction impacts, and mitigation measures.

Response to Comment PC5-7

See response to Comment PC5-3 regarding purpose and scope of this SEIS and court order.

Response to Comment PC5-8

See response to Comment PC5-3 regarding purpose and scope of the SEIS. See response to PC5-43 regarding alternatives.

Alternative A in the Draft SEIS includes the use of the EPBM to bore tunnels generally following the horizontal and vertical alignment of the Project from 3rd Street to south of 4th Street with open face shield tunnel excavation from 4th Street to 5th Street, and SEM tunnel construction from 5th Street to the existing 7th Street/Metro Center Station as required by the judgment. Alternative B proposes the use of EPBM to bore twin tunnels generally following the horizontal alignment of the LPA, but with a deeper vertical alignment than the Project. The EPBM method would be used to tunnel to just south of 5th Street, with SEM tunnel construction from south of 5th Street to the existing 7th Street/Metro Center Station. The Draft SEIS identifies EPBM use along Flower Street in Alternative B to reduce the risk of tunneling where appropriate along the alignment.

The environmental document examines the feasibility of Alternative A and B. Refer to Section 2.2.3.2 Earth Pressure Balance Tunnel Boring Method and Section 2.3.2.2 Alternative B – EPBM/SEM Low Alignment Alternative for explanation on tunnel depth and avoidance of tiebacks.

The commenter supports the use of an EPBM from 4th to 5th Street with cut and cover construction from 5th Street to 7th Street/Metro Center Station. To address comments on the Draft EIS/EIR to maximize the use of EPBM on Flower Street, Metro studied, analyzed, and extended the use of EPBM south on Flower Street from 3rd Street to 4th Street; thereby reducing the need for cut and cover between 3rd and 4th Streets. Per the Final EIS/EIR Chapter 9, Section 9.2.1.2 Comment Response Project Refinements, and Mitigation Measures Summary:

> *Refinements have been made to the LPA since publication of the Draft EIS/EIR specifically to address concerns regarding potential impacts of construction. These refinements would reduce the extent of cut and cover activities and associated street lane and sidewalk closures. Cut and cover would not occur on 2nd Street in Little Tokyo, and the tunnel under Flower Street between 3rd and 4th Streets would be excavated using a*

TBM instead of cut and cover. The TBM would be inserted at the property northeast of 1st and Alameda Streets, the Mangrove property (formerly known as the Nikkei Center), and transported underground to Central Avenue, where it would begin excavating westward. Thus, the main site of construction has been moved away from the heart of Little Tokyo reducing impacts from construction including routing truck traffic away from the community core.

The use of EPBM on Flower Street has been analyzed in the Final EIS/EIR for the Project along with the cut and cover construction method. As discussed in response to comment PC5-4, NEPA does not require analysis of an infinite number of alternatives, including combinations of multiple construction methods, in the environmental document. Cut and cover construction was analyzed in the Final EIS/EIR for all of Flower Street and selected for the section south of 4th Street. EPBM was analyzed in the Final EIS/EIR and selected for use from 1st and Central to 2nd and Hope Street with cut and cover at station areas.

Additional analysis was conducted to further extend the use of EPBM. Due to presence of tiebacks, the presence of the 4th Street bridge piers, the depth and location of the 7th Street Metro Center Station, the soils conditions on Flower Street from 4th Street to 7th Street, the disproportionate environmental impacts to an environmental justice community, the additional costs and the operational inefficiency for a primary regional core service, the EPBM was not selected for use south of 4th Street. Thus, the prior environmental analysis already considered that alternative and rejected it.

The agencies have weighed the commenter's support for the use of cut and cover south of 5th Street, as part of the deep tunnel alternative, but ultimately rejected that option. The use of cut and cover between 5th and 7th Street, has been analyzed in the Final EIS/EIR and is selected for the certain depth of the Project. This depth allows for the operation of trains to run efficiently and maintain Metro required travel times. Increased depth of this alignment, compared to the project, to accommodate the use of the EPBM would increase the length of time of cut and cover construction activities from 5th to Flower. It would also create grade of track and operational conditions that are similar to Alternative B. (See also response to comment PC5-4 for additional discussion).

- See Final EIS/EIR Section 4.18.2.5.1 Cut and Cover Construction for construction methods selected for the Project
- See Draft SEIS Section 2.2.1 Flower Street Existing Conditions; Section 2.3.1 Tunnel Construction Methods; Section 2.3.2 Description of Tunneling Method Alternatives for detailed description of existing conditions, constraints, construction methods per alternative, and associated impacts.
- See Draft SEIS Chapter 2.0 Alternatives Considered, Section 2.3.2.2 Alternative B for description on Alternative B configuration and associated construction method risks, need for grouting, and schedule impacts.

- See Draft SEIS Appendix A: Draft Flower Street Tunneling Method Alternatives Chapter 3.0 Development of Project Configuration which identify and evaluate the tunneling method alternatives in the SEIS.
- Chapter 5.0 of the Draft SEIS, Comparison of the Tunneling Method Alternatives versus the Project, provides a summary of the effectiveness of Alternatives A and B in meeting the purpose and need of the project.

Response to Comment PC5-9

The commenter supports the use of EPBM between 4th and 5th Streets. See response to Comment PC5-3 and Comment PC5-4 regarding the consideration of the deep tunnel alternative, use of the EPBM, and challenges associated with tunneling from the 2nd/Hope Station. See response to Comment PC5-8 regarding efforts to extend the use of EPBM on Flower Street.

Response to Comment PC5-10

See response to Comment PC5-4 regarding the deep tunnel alternative and constraints.

Response to Comment PC5-11

See response to Comment PC5-4 regarding 2nd/Hope Street Station.

The level tunnels result from a deeper station at 2nd/Hope, an already deep station for the Project in comparison to other underground stations in the Metro Rail system. Construction of a deeper station construction activity would result in increased time for excavating material, therefore increase construction activities at the surface related to construction and hauling, and increase safety impacts related to extreme depths of the station. This increase in depth and time would result in increased station construction costs. These costs and impacts would be tradeoffs between the perceived improvements in schedule, costs and impacts related to a deeper, but more level tunnel.

As indicated, the schedule impacts associated with change of project design and obtaining environmental clearance would be significant, even if performed in parallel. For the deeper alignment, per the Draft SEIS Alternative B, this would result in 7 months of schedule delay. Costs would also potentially increase as indicated in the Draft SEIS to potentially $403 million.

Due to the extended use of the EPBM, as indicated in the Draft SEIS, "The two tunneling method alternatives [EPBM to 5th Street] shift a majority of the effects resulting from the handling of excavation materials from the Flower Street Segment, a high rise commercial district with wide streets, to Little Tokyo, a low to mid-rise mixed use district with visitor and cultural destinations, and identified as an environmental justice community." Most importantly, the adjustment of the 2nd/Hope Station does not assist Metro in a guaranteed avoidance of tiebacks on Flower Street during construction while simultaneously rising at an acceptable grade to the 7th Street Metro Center Station to allow for safe and efficient operations. A deeper alignment from 2nd/Hope results in an increased grade elevation from 5th Street to 7th Street Metro Center Stations resulting in reduced operating speeds, travel time and increased operational costs.

- See Draft SEIS Section 2.3.1 Tunnel Construction Methods; Chapter 4.5 Geotechnical, Subsurface, and Seismic Hazards for existing conditions along Flower Street and tunneling methods.
- See Draft SEIS Appendix A: Draft Flower Tunneling Method Alternatives Section 4.1 Geologic Conditions for detailed descriptions of tunneling methods and construction techniques.

Response to Comment PC5-12

See response to comment PC5-8 regarding EPBM to 5th Street followed by cut and cover construction to 7th Street/Metro Center Station.

Comment references a draft tunneling report dated April 25, 2012, which has since been updated to reflect the Court direction received in May 2014. The Draft Tunnel Report, dated August 19, 2014, was included in Appendix A of the Draft SEIS. In the Draft Tunnel Report presented in Appendix A, the mapping of the alternatives is consistent as that presented in the Draft SEIS. The Final Tunnel Report is included in Appendix A and has had no updates since the Draft.

Response to Comment PC5-13

The Draft SEIS discusses environmental consequences associated with the construction and operation of the two tunneling method alternatives, Alternative A and B, and why they were withdrawn from consideration, including consideration of operational impacts.

Retaining the possibility of a 5th/Flower Station is not illusory. It is consistent with NEPA to identify and disclose the Metro Board's intention to include the 5th/Flower Station in the future if possible. The Metro Board approved the Project on Thursday April 26, 2012, with a Board directive to not preclude a future 5th/Flower Station. The clearly stated intention and policy decision was to build the station at this important location if funding can be identified in the future. This would be a separate project. The Metro Board committed to keeping the 5th/Flower Station for future consideration. Per meeting minutes for the April 26, 2012 Board meeting:

> *Item #74 APPROVED RECOMMENDATIONS A-D AS NEEDED:*
>
> *A. the Project Definition for the Regional Connector Transit Corridor, which is based on the Locally Preferred Alternative (LPA) of a 1.9 mile Light Rail project with three stations previously designated by the Board in October 2010 and which incorporates several design refinements, including:*
> *11. Preserve the opportunity to install a future station north of 5th and Flower Streets*

Should the 5th/Flower Station be implemented in the future, additional environmental evaluation in compliance with CEQA and NEPA as applicable, and an evaluation of cost and operational effects would be conducted.

- See Chapter 5.0 of the Draft SEIS, Comparison of the Tunneling Method Alternatives versus the Project, provides a summary of the effectiveness of Alternatives A and B in meeting the purpose and need of the project.
- See Draft SEIS Appendix A: Draft Flower Tunneling Method Alternatives Chapter 3.0 Development of Project Configuration; Chapter 4.7 Transit Structure Configuration; Section 4.7.1 Deferred 5th/Flower Street Station for identification and evaluation of the tunneling method alternatives in the Draft SEIS.

Response to Comment PC5-14

See response to Comment PC5-4 regarding the 2nd/Hope Street Station and deep tunnel alignment constraints.

See response to Comment PC5-8 regarding EPBM along Flower Street.

See response to Comment PC5-13 regarding the 5th/Flower Street Station and project refinements.

Response to Comment PC5-15

The SEIS discussed the 55 mph operational speed on the Flower Street as one of many factors considered in weighing the alternatives. The agencies sought to reach that speed because it would decrease the time between stations and make taking transit more attractive for riders. If the Metro Board later decides to build the 5th/Flower Street Station, it will have to decide whether the slower trips are worth the benefits of that station. It is not required for Metro to make those decisions at this time.

The Project provides a 55 mph operating speed in the Flower Street segment, meeting Metro's operating criteria, while Alternatives A and B would result in a speed reduction in this key LRT system segment to 35 mph. Reduction of the maximum operating speed in this key system link would decrease rail service headways, operational efficiency, and operating capacity for the entire Metro LRT system. Refer to Chapter 5, Section 5.6 for more detail regarding the comparison of alternatives.

Response to Comment PC5-16

See response to Comment PC5-8 regarding construction schedule.

Response to Comment PC5-17

See response to Comment PC5-3 regarding refinements to the Project and the purpose and scope of the Draft SEIS.

The Draft SEIS references the noise and vibration conditions and analytical information related to the Project and the entire project alignment in Chapter 4.7, Noise and Vibration of the Final EIS/EIR. This analysis applies the methodology consistent with the FTA Transit Noise and Vibration Impact Assessment (USDOT 2006). More information is available in Appendix S, Noise and Vibration Technical Memorandum, and Appendix 2, Updated Locally Preferred Alternative Noise and Vibration Analysis, of the Final EIS/EIR.

Noise and vibration effects during construction of Alternatives A and B were evaluated using the FTA's guidance manual. As done with the Project, sensitive receptors along Flower Street were identified and sites identified where noise measurements were conducted. Appendix F has been added to the SEIS to provide information on the detailed noise modeling assumptions, construction equipment, and results for the tunneling alternatives analyzed in the Draft SEIS. A reference to the Appendix has been added to Section 4.4 of the SEIS.

- See Final EIS/EIR Chapter 4.7 Noise and Vibration, Section 4.7.3.5.1 Construction Noise and Vibration; Section 4.7.4.2.1 Final Construction Mitigation Measures for the Locally Preferred Alternative for detailed analysis and associated technical calculations for noise and vibration analysis for the Project.
- See Draft SEIS Chapter 4.4 Noise and Vibration for analysis for Alternatives A and B.
- See Appendix B, Section 1.5 Noise and Vibration Regulatory Framework for thresholds of significance for methodology used in the Draft SEIS.
- See Appendix F, Noise and Vibration Prediction Model Outputs for detailed noise model results and spreadsheets for Alternatives A and B.

Response to Comment PC5-18

See response to Comment PC5-3 regarding refinements to the Project.

The Final EIS/EIR contemplates that construction would occur during the daytime *and* nighttime. As noted in Chapter 4 Noise and Vibration, Section 4.7.3 Environmental Impacts/Environmental Consequences the "analysis considered both daytime and nighttime construction activities using the procedures and criteria for a general noise assessment presented in Chapter 12 of the FTA guidance manual (USDOT 2006)". Additionally, mitigation measures identified in the Final EIS/EIR for the Project state:

> *NV-8 Nighttime construction activities that produce noticeable vibration shall be avoided near vibration-sensitive locations.*
>
> *NV-16 Higher performance mufflers shall be used on equipment used during nighttime hours as needed near sensitive land uses.*

The Settlement Agreement with Flower Associates does not increase the scope and intensity of nighttime construction activities on Flower St. Section 3.2 of the Agreement merely states that Metro will apply for and use its best efforts to obtain the necessary work approvals (i.e., nighttime and weekend variances) to allow the Contractor to perform the water main relocation as night work and/or weekend work, the pile and cap beam installation as night work and/or weekend work, the deck installation as weekend work, the TBM removal as night work and/or weekend work, and the deck removal and street restoration as weekend work (except final paving may occur on weekdays). If Metro receives any of these work approvals from the City, the Contractor *may* work during such approved periods to minimize the duration of daytime work activities, but the Contractor may nevertheless elect to work during the daytime period; provided. However that deck installation, deck removal, street restoration (other than final paving) and certain segments of water main relocation and pile and cap beam installation shall occur as weekend work only. Thus, the Final EIS/EIR contemplated work during the day and at night, and Section 3.2 of the Agreement does not change the considerations for day and nighttime work in the Final EIS/EIR nor does it assume that construction activities occur only at night.

With regard to the removal of deck panels, Section 9.10 of the Settlement Agreement preserves the Contractor's ability to temporarily remove panels at night to obtain vertical access to the work area below the decking assuming work approvals have been obtained from the City. The temporary removal of deck panels is consistent with the Final EIS/EIR description of construction staging areas along Flower St.

Contrary to the commenter's statement that the removal and transport of excavated soils would otherwise be through the TBM removal shaft, the Final EIS/EIR in Appendix K (see Figure 3-3 and Table 3-2) identified construction staging areas along Flower St. where soil will be excavated and transported. The TBM removal shaft is solely for the removal of the TBM, not excavated soil.

- See Final EIS/EIR Chapter 4.7 Noise and Vibration for noise analysis for the Project.
- See Final EIS/EIR Section 4.7.3.5.1 Construction Noise and Vibration for methodology and mitigations for the Project.

Response to Comment PC5-19

Text included a typo and is corrected in Section 4.4.3 Mitigation Measures. "As with the Project, there would be no potentially construction-related adverse effects after implementation of these mitigation measures for Alternatives A and B. However, the alternatives may have additional noise impacts along Flower Street beyond those identified for the Project due to the size and type of grouting and support equipment required for ground stabilization…."

- See Draft SEIS Section 4.4.3 Mitigation Measures for updated text.

Response to Comment PC5-20

Resolution of claims concerning noise impacts during construction of the Project is not related to the Draft SEIS analysis. Metro continues to implement the approved MMRP for noise and vibration mitigation. See response to comment PC5-3 regarding purpose and scope of the Draft SEIS.

Analysis for construction noise and vibration for the project can be found in Section 4.7.3.5.1 Construction Noise and Vibration. Additionally, Section 4.7.4 Mitigation Measures, NV-1 through NV-29, details the mitigations in place which Metro implements during the construction of the Project. Noise impact analysis for Alternatives A and B in the Draft SEIS can be found in Section 4.4 Noise and Vibration.

Metro continues to implement mitigation measures for noise during construction including during utility relocation activities per the MMRP as identified in the Final EIS/EIR. The commenter's letter includes documentation of complaints that Metro has received about noise during utility relocation and pre-construction activities such as surveys, geotechnical and utility investigations. For each complaint received, Metro recorded the complaint; field measurements and inspections were undertaken to establish noise levels present during the complaint and whether levels were a result of Metro activities. Where appropriate photos were taken showing mitigation in place properly applied (e.g. noise blankets). In every instance except for one on June 26, 2014, the findings documented that the complaint was during a time that Metro was not active at the complaint site, or that while Metro activities were occurring within the FTA criteria for construction noise. The June 26, 2014 incident, noted as out of compliance (over 85 dBA), had occurred in the very early stage of construction. Following this incident mitigation measures and procedures were refined based on lessons learned and no further out of compliance incidents occurred. Results of evaluation of each complaint were communicated back to each complainant except in instances where pending legal action precluded such notification. Complaints, noise levels present, and actions taken are summarized in the Log of Responses to Noise Complaints at 5th/Flower below.

- See SEIS Section 1.2 Purpose and Scope of this Supplemental Environmental Document for purpose and limit of scope for this environmental analysis.

- See Final EIS/EIR Chapter 4.7 Noise and Vibration, Section 4.7.3.5.1 Construction Noise and Vibration; Section 4.7.4.2.1 Final Construction Mitigation Measures for the Locally Preferred Alternative; Chapter 4.18 Construction, Section 4.18.4.2.6 Noise and Vibration; Chapter 8 Mitigation Monitoring and Reporting Program for all construction noise and vibration analysis for the Project as well as mitigation measures.

Response to Comment PC5-21

The regional reduction in GHG emissions due to traffic congestion relief is greater than the new emissions associated with construction activities and operation of the LRT trains and new facilities. The project would result in an overall reduction in GHG emissions in the region. The Project was also included in SCAG's 2008 Regional Transportation Plan as a strategic transit system expansion project. The RTP is intended to reduce Greenhouse gas emissions.

Based on a qualitative assessment, any difference in greenhouse gas emissions for Alternatives A and B compared to the project would be negligible. Section 4.2 of the SEIS has been updated to clarify the operational impact during operation. Reduced emissions in some locations for a deeper alternative would be offset by increased emissions associated with long term operational demands entering the 7th/Metro station and slower and less efficient transit operations. As stated in Section 1.2, there is no change in the location of the project or the project area studied, which remains as presented in the Final EIS/EIR.

- See Draft SEIS Chapter 4.3 Climate Change, Section 4.3.2 Environmental Consequences.

Log of Responses to Noise Complaints at 5th/Flower

DATE	SOURCE of COMPLAINT	COMPLAINT	MONITORED NOISE LEVEL				OBSERVATIONS
			FIXED		ATTENDED		
			(dBA 1-hr Leq)	(dBA 8-hr Leq)	(dBA 1-hr Leq)	dBA 8-hr Leq)	
24-Feb-14	Westin Bonaventure - Patrick Serge	jack hammering on 5th/no noise barriers & noise > 91 dBA	-	-	-	-	Metro was not active at the complaint site on 2/24/2014. Complaint was sent on 6/5/2014.
16-Jun-14	Westin Bonaventure - Patrick Serge	exit from garage is barricaded	N/A	N/A	N/A	N/A	Action was taken to mitigate the noise impact. Construction Relations emailed complainant on June 19, 2014 with action taken to address the concern. A flagger was provided to assist with daily operations of the Hotel during this phase of the work.
17-Jun-14	Westin Bonaventure - Patrick Serge	exit from garage is barricaded - no flagger	N/A	N/A	N/A	N/A	Action was takent to mitigate the noise impact. Construction activities were stopped at the complaint site. Construction Relations emailed complainant on June 19, 2014 acknowledging their concern and addressing questions in regards to improving access and installing advance warning signs.
26-Jun-14	Westin Bonaventure - Patrick Serge	at 9am - sound blankets but noise >86 dBA	-	-	87.5	89.2	Action was taken to mitigate the noise impact. Activities included sawcutting and grinding on 5th and on Flower. Sound blankets deployed on 6-ft panels on Flower and 5th. The contractor, ARCADIS, had a sound meter in front of City National Plaza. The construction activity of sawcutting from 8am to 9am with levels >90 dBA was recorded and the inspector was notified.
10-Jul-14	Westin Bonaventure - Patrick Serge	no flag person	N/A	N/A	N/A	N/A	Action was taken to mitigate the noise impact. A flagger was provided at the complaint site.
21-Jul-14	Westin Bonaventure - Patrick Serge	at 11am noise = sound blankets but noise = 83 dBA	84.7	74.6	82	78	Metro activies were occurring within the FTA criteria for construction noise. The activity of sawcutting started at 9am at 5th and Flower. The activity occurred north in front of complaint site. Sound blankets were deployed on 6-ft panels on both sides.The contractor, ARCADIS, attended monitoring. The activity of sawcutting continued from 10am to 13:00pm.
	Westin Bonaventure - Michael Czarcinski (complaint at 1pm)	noise > 90 dBA	72.2				Action was taken to mitigate the noise impact. Noise measurements were taken and recorded as the following: 1-hr Leq 7am - 3pm ranged from 71.7 dBA to 84.7 dBA [@11am]; Lmax 84.5 dBA to 95.2 dBA on fixed monitoring. Noise measurements of 70.8 dBA to 82.0 dBA [1-hour Leq] on attened monitoring and Lmax= 91.3 dBA from sawcutting activity.
5-Aug-14	Westin Bonaventure - Patrick Serge	at 9:30am, sound blankets but noise = 82.8 dBA	71.8	71.9	-	-	Metro activities where occurring within the FTA standards.

*Fixed = Represents at fixed point monitoring device
*Attended = Represents a hand held meter
*FTA criterion for construction noise is 85 dBA for commercial land uses (Transit Noise and Vibration Impact Assessment, FTA, May 2006)

Log of Responses to Noise Complaints at 5th/Flower

DATE	SOURCE of COMPLAINT	COMPLAINT	MONITORED NOISE LEVEL FIXED (dBA 1-hr Leq)	MONITORED NOISE LEVEL FIXED (dBA 8-hr Leq)	MONITORED NOISE LEVEL ATTENDED (dBA 1-hr Leq)	MONITORED NOISE LEVEL ATTENDED (dBA 8-hr Leq)	OBSERVATIONS
6-Aug-14	Westin Bonaventure - Patrick Serge	at 9:30am, sound blankets but noise = 82.6 dBA	71	73.7			Action was taken to mitigate the noise impact. The construction activity of sawcutting behind sound blankets was recored. The Metro inspector was notified of noise and moved trucks to mitigate. The Lmax = 86.0 dBA was recorded.
26-Aug-14	Westin Bonaventure - Patrick Serge	at 9:30am, sound blankets but noise >80 dBA	74.1	77.5	78.4	76.0	Action was taken to mitigate the noise impact. A drill and set pilings for shoring (auger drill and crane) were used at complaint site. A set 8 piles were completed. A drill motor higher than blankets on 6-foot panels which was directly across Flower from entrance was used. The noise level was Lmax = 86.3 dBA (fixed) and Lmax = 94.7 dBA (attended) due to auger drill construction equipment.
28-Aug-14	Westin Bonaventure - Patrick Serge	at 10am, sound blankets but noise = 81.3 dBA	73.8	74.9	74.8	75.3	Action was taken to mitigate the noise impact. The activity of hand-digging in trench was recorded on Flower street. Sound blankets were used. A clay spade was used to remove slurry. There was also tree cutting in front of California Club with a noise level of Lmax = 90.2 dBA (fixed) and Lmax = 86.9 dBA (attended).
29-Aug-14	Westin Bonaventure - Patrick Serge	at 10:15am, sound blankets but noise >80 dBA	81.6	77.4	77.4	77.8	Action was taken to mitigate the noise impact. The activity of potholing at Manhole 530 was conducted. The activity of saw cutting for I-beam pilings was recorded as well. A clay spade was used to remove asphalt and sound blankets were in place. The noise level of Lmax = 93.5 dBA (fixed) and Lmax = 102.1 dBA (attended) due to truck horn.
15-Sep-14	Westin Bonaventure - Patrick Serge	9am, jack hammmering with sound blankets; noise > 85 dBA	74.1	74.8	75.2	75.3	Action was taken to mitigate the noise impact. The acitivity of sawcutting asphalt for I-beams was conducted. The asphalt was removed using clay spade and a backhoe equipmnet used for excavation. Sound blankets were in place. The noise level of Lmax = 84.0 dBA (fixed) and Lmax = 86.9 dBA (attended) due to jackhammer equipment.
16-Sep-14	Westin Bonaventure - Patrick Serge	11am - drilling with sound blankets in place; noise >85 dBA	75.6	74.1	77.8/75.2	72.1	Action was taken to mitigate the noise impact. The activity of drilling and setting pilings with auger drill and crane was conducted and sound blankets were used. The noise level of Lmax = 91.2 dBA (fixed])and Lmax = 102.4 dBA (attended) due to 11:29am ambulance sirens.

*Fixed = Represents at fixed point monitoring device
*Attended = Represents a hand held meter
*FTA criterion for construction noise is 85 dBA for commercial land uses (Transit Noise and Vibration Impact Assessment, FTA, May 2006)

Log of Responses to Noise Complaints at 5th/Flower

DATE	SOURCE of COMPLAINT	COMPLAINT	MONITORED NOISE LEVEL FIXED (dBA 1-hr Leq)	MONITORED NOISE LEVEL FIXED (dBA 8-hr Leq)	MONITORED NOISE LEVEL ATTENDED (dBA 1-hr Leq)	MONITORED NOISE LEVEL ATTENDED (dBA 8-hr Leq)	OBSERVATIONS
10-Nov-14	Westin Bonaventure- Patrick Serge	6:30am- construction staging					Action was taken to mitigate the noise impact. Construction Relations emailed complainant on Nov. 10, 2014 with action taken to address the concern. Contractor was notified.
	Westin Bonaventure- Patrick Serge	9:15am-no flag person located adjacent to loading dock					Action was taken to mitigate the noise impact. Contruction Relations emailed complainant on Nov.10, 2014 and provided photo of flagger adjacent to the loading dock.
11-Dec-14	Westin Bonaventure - Patrick Serge	no sound blankets - noise >83 dBA	N/A		79.4	75.3	Action was taken to mitigate the noise impact. Construction Relations emailed complainant on Dec.11, 2014 acknowledging complaint and notifying him that it will be investigated. Activities/actions included; excavation and installation of shoring at 4th and Flower. Sound blankets were in place and used due to jackhammering and hand digging. The inspector directed the contractor, Pulice, to move and add blankets to address the complaint.
	Westin Bonaventure - Patrick Serge	at 11:58am, no sound blankets, noise greater than 86 dBA	N/A		73.2		Metro activities were occurring within the FTA criteria for construction noise. The activity of replating and cleanup was recorded at 11:58am.
7-Jan-15	Westin Bonaventure - Patrick Serge	at 8:25am, no sound blankets and noise = 83 dBA	71.0	70.4	74.3	75.5	Metro activities were occurring within the FTA criteria for construction noise. The contractor,ARCADIS, took photos of jack hammering activitiy and the sound blankets in place.
17-Jan-15	Westin Bonaventure - Patrick Serge	at 9am, noise >82 dBA while jack hammering; sound blankets in place	68.2/68.9	69.32	72.2/70.3	71.6	Metro activities were occurring within the FTA criteria for construction noise. The activity jack hammering at 8:57am with an Lmax attended = 83.8 dBA was recorded. The inspector took a picture at 9:15am of backhoe equipment behind sound blankets and recorded that activity was within compliance.
26-Mar-15	Westin Bonaventure - Patrick Serge	noise recorded on 3/21/2015; noise > 80 dBA and 90 dBA	66.6 - 70.1	68.4	N/A	N/A	Metro activities were occurring within the FTA criteria for construction noise.
18-Apr-15	Westin Bonaventure - Patrick Serge	Advanced Engineering Acoustics report citing noise from sawcutting and paving; noise > 80 dBA [transient >90 dBA]	-	-			Metro activities were occurring within the FTA criteria for construction noise. Double sound blankets were in place.

*Fixed = Represents at fixed point monitoring device
*Attended = Represents a hand held meter
*FTA criterion for construction noise is 85 dBA for commercial land uses (Transit Noise and Vibration Impact Assessment, FTA, May 2006)

Log of Responses to Noise Complaints at 5th/Flower

DATE	SOURCE of COMPLAINT	COMPLAINT	MONITORED NOISE LEVEL: FIXED (dBA 1-hr Leq)	MONITORED NOISE LEVEL: FIXED (dBA 8-hr Leq)	MONITORED NOISE LEVEL: ATTENDED (dBA 1-hr Leq)	MONITORED NOISE LEVEL: ATTENDED dBA 8-hr Leq)	OBSERVATIONS
25-Apr-15	Westin Bonaventure - Patrick Serge	Advanced Engineering Acoustics report citing noise >80 dBA and 90 dBA	-	-	73.7 - 84.8	79.4	Metro activities were occurring within the FTA criteria for construction noise. The noise level of Lmax from backhoe, sirens, skateboard, fire truck, vacuum truck, and whacker were recorded. The contractor, ARCADIS, observed two operations at corner of 5th and Flower including a backhoe, dump truck, vacuum truck, and cement trucks. Sound blankets were in place.
26-May-15	Westin Bonaventure - Patrick Serge	sawcutting with noise > 86 dBA	-	-	73.0-80.8	76.7	Metro activities were occurring within the FTA criteria for construction noise. The contractor, ARCADIS, observed work through intersection between 5th and Flower, which included saw cutting. Sound blankets were in place through intersection. The noise measurement of Lmax notes up to 104.3 dBA due to emergency vehicles.
10-Jul-15	Westin Bonaventure - Patrick Serge	sawcutting with noise > 92 dBA; no noise personnel on site	-	73.5	71.7-78.6	74.7	Metro activities were occurring within the FTA criteria for construction noise. Backhoe equipment on 5th Street, west of Flower, was recored. Sound blankets were in place on 5th Street. The noise level up to Lmax = 97.1 dBA was noted due to ambulance passing through.

*Fixed = Represents at fixed point monitoring device
*Attended = Represents a hand held meter
*FTA criterion for construction noise is 85 dBA for commercial land uses (Transit Noise and Vibration Impact Assessment, FTA, May 2006)

Response to Comment PC5-22

See response to Comment PC5-3 regarding the purpose and scope of the Draft SEIS.

See response to Comment PC5-21 regarding greenhouse gas analysis.

Alternative B in the Draft SEIS includes deep tunneling and the analysis of Alternative B has benefits and risks similar to the suggested deep tunnel alternative. See response to comment PC5-4 regarding the deep tunnel alternative.

Response to Comment PC5-23

See response to Comment PC5-8. See response to comment PC5-4 regarding the deep tunnel alternative.

Response to Comment PC5-24

See response to Comment PC5-23. See response to comment PC5-4 regarding the deep tunnel alternative.

Response to Comment PC5-25

As noted in Chapter 4.8 Environmental Justice of the Draft SEIS, both Alternative A and B would disproportionately impact Little Tokyo, an EJ community, as the duration and the intensity of construction impacts would be increased under Alternative A or B as compared to the Project. The longer construction activity duration and the increase in truck activity from the tunneling method alternatives would disproportionately impact Little Tokyo. There would be an increase in truck muck truck activity and construction traffic near Little Tokyo and trucking activities would be extended by 10 months under Alternative A and 8 months under Alternative B compared to the Project. Chapter 3.0 Transportation, Traffic Circulation for both Alternatives A and B details the change in excavation materials handling through the Mangrove site in Little Tokyo. Additionally, Chapter 5.0 Comparison of the Tunneling Method Alternatives versus the Project, Table 5.2-1 lists the shift in construction truck activity for Alternatives A and B.

An EJ analysis includes consultation with affected community regarding potential disproportionate adverse impacts. The Little Tokyo community worked at great length with FTA and Metro and the sensitivity of this fragile historic community is clearly recorded in the Final EIS/EIR in the EJ analysis and in the comments and responses. The community has been adversely impacted by construction projects in the past. The concerns about construction in their community, including disruption, congestion, and perception of construction inconvenience adversely impacting businesses are clearly expressed in the comments from LT community members on the Draft EIS/EIR (see FEIS/EIR volume F-2 and F-3). Metro has worked out a careful and specific mitigation program designed to address Little Tokyo construction impacts identified in the Final EIS/EIR. The community has indicated that any noticeable increase in construction impacts beyond those identified in the Final EIS/EIR would upset the careful balance worked out with the community and create adverse EJ impacts. As stated in SEIS Section 4.8.3 Mitigation Measures:

> *Little Tokyo would experience expanded traffic congestion and travel times due to an increase in truck activity handling a greater proportion of the tunneling excavation materials. Construction of both Alternatives A and B would have a longer duration than that of the Project, which would be disproportionately experienced in the Little Tokyo community (over the impacts of other communities) and would be considered disproportionately high and adverse to residents of Little Tokyo.*

As the Draft SEIS indicates the Alternative B, which is has similar impacts as the commenter's deep tunnel alternative would increase construction intensity and truck trips in Little Tokyo. It would create disproportionate adverse environmental justice impacts in Little Tokyo.

- See Chapter 4.17 Environmental Justice, Section 4.17.3.5 Locally Preferred Alternative for impacts associated with the Project and community coordination
- See Volume F-2 and F-3 of the Final EIS/EIR for extensive responses to Little Tokyo community, stakeholders, and residents
- See Draft SEIS Section 3.2 Environmental Consequences for discussion on traffic impacts for Alternatives A and B
- See Draft SEIS Chapter 4.8 Environmental Justice for analysis under environmental topic areas and associated EJ impacts

Response to Comment PC5-26

See response to Comment PC5-27 regarding impacts to Little Tokyo.

The commenter's preferred alternative would increase construction intensity at the Mangrove site which is in Little Tokyo. The routing of additional truck trips does not change the conclusion regarding Environmental Justice.

Response to Comment PC5-27

See response to Comment PC5-13 regarding cut and cover construction.

The analysis of tunneling along Lower Flower is not piecemealed from the rest of the Project. As stated in Section 4.0, the analysis of the construction methods in the Draft SEIS considered construction impacts along the focused Flower Street segment and Little Tokyo area. The Final EIS/EIR already analyzed the construction activity impacts on other portions of the Project Area, and those impacts would remain the same as analyzed in the Final EIS/EIR even if the agencies modified the Project by adopting Alternatives A or B. For some environmental resource areas, operational impacts are not changed from those identified in the Final EIS/EIR and are not discussed further.

The FEIS concluded that construction would have a disproportionate impact on the Little Tokyo community. The MMRP included extensive mitigations developed in consultation with the community in order to reduce the disproportionate impact. The Little Tokyo community does consider the Mangrove property to be within Little Tokyo and increased construction activity and duration of construction activities there associated with the commenter's preferred alternative would disproportionately impact Little Tokyo. See response to Comment PC5-25 regarding environmental justice impacts. The SEA concluded that, overall, tunneling through Little Tokyo and removing the spoils through the Mangrove property *reduced* impacts over the alternatives presented in the initial Draft EIS because the alternatives in the Draft EIS analyzed cut-and-cover construction down 2nd Street through Little Tokyo. Tunneling further down Flower Street south of 4th Street would require removing more and more spoils through the Mangrove property, and the additional impacts from removing those additional spoils risks tipping the impacts to a significant effect. Even using an EPBM to 5th Street, as the commenter suggests, would require removing additional spoils through the Mangrove property, and that would increase impacts on the fragile Little Tokyo environmental justice community.

Response to Comment PC5-28

See response Comment PC5-13 regarding environmental consequences associated with construction and operation of Alternatives A and B.

Response to Comment PC5-29

See response Comment PC5-3 regarding schedule impacts.

This SEIS is intended to analyze the feasibility of tunnel construction alternatives on Flower Street that were withdrawn from consideration earlier in the process because they were infeasible. Those tunnel construction alternatives have only become less feasible over time, and this analysis accounts for those changing circumstances. It would not be useful to provide a counter-factual analysis of how to implement those infeasible alternatives starting in the past. SEIS Chapter 5 Comparison of the Tunneling Method Alternatives versus the Project presents a summary of the consequences associated with the construction and operation of the two tunneling method alternatives, Alternatives A and B. As stated in Section 5.1, the information in Chapter 5 is provided to allow for informed decision-making. Impacts to the schedule is only one factor discussed. Information provided includes an overview of the construction descriptions of the two alternatives, and their resulting construction risk considerations, operational impacts, cost and schedule impacts, and environmental effects.

- See Chapter 5 Comparison of the Tunneling Method Alternatives versus the Project, Section 5.3 Effectiveness in Meeting the Purpose and Need; Section 5.4 Construction and Risk Considerations; 5.5 Summary of Impacts of Alternatives versus the Project; 5.6 Operational Considerations; 5.7 Schedule Impacts; 5.8 Cost and Funding Considerations; 5.9 Environmental Consequences for summary of impacts associated with Alternatives A and B as compared to the Project.

Response to Comment PC5-30

See response to Comment PC5-8 regarding environmental consequences associated with construction and operation a deep tunnel alternative.

Response to Comment PC5-31

See response to Comment PC5-29 regarding scope of SEIS and feasibility of evaluated alternatives.

Response to Comment PC5-32

A: See response to Comment PC5-4. Alternative B in the Draft SEIS includes deep tunneling and the analysis of Alternative B has benefits, risks, and costs similar to the suggested deep tunnel alternative. Alternative B in the Draft SEIS provides a basis for evaluating the deep tunnel alternative. Cost and funding considerations and analysis can be found in Chapter 5.0 Comparison of the Tunneling Method Alternatives versus the Project.

- See Chapter 5 Comparison of the Tunneling Method Alternatives versus the Project, Section 5.3 Effectiveness in Meeting the Purpose and Need; Section 5.4 Construction and Risk Considerations; 5.5 Summary of Impacts of Alternatives versus the Project; 5.6 Operational Considerations; 5.7 Schedule Impacts; 5.8 Cost and Funding Considerations; Section 5.9 Environmental Consequences for summary of impacts associated with Alternatives A and B as compared to the Project.

B: Commenter's support for cut and cover construction from 5th Street to 7th Street/Metro Center Station is noted. See response to Comment PC5-8.

Response to Comment PC5-33

Alternative B in the Draft SEIS includes deep tunneling and the analysis of Alternative B has benefits, risks, and costs similar to the suggested deep tunnel alternative. Alternative B in the Draft SEIS provides a basis for evaluating the deep tunnel alternative. As presented in the analysis for Alternative B, a deep tunnel alternative has many uncertainties including encountering tiebacks, and unstable soil conditions, among others. A comparison of risk can be found in Section 5.4 Construction and Risk Considerations, including physical operational challenges, significant underground constraints, and challenging geologic ground conditions. See response to comment PC5-4 regarding a deep tunnel alternative.

Comment references a draft tunneling report, which has since been updated to reflect the Court direction received in May 2014, and is presented in Appendix A of the SEIS.

- See Draft SEIS Section 2.2.1 Flower Street Existing Conditions; Section 2.3.1 Tunnel Construction Methods; Section 2.3.2 Description of Tunneling Method Alternatives for detailed description of existing conditions, constraints, construction methods per alternative, and associated impacts
- See Draft SEIS Appendix A: Draft Flower Street Tunneling Method Alternatives Chapter 3.0 Development of Project Configuration for identifying and evaluating the tunneling method alternatives in the SEIS
- See Draft SEIS Appendix A: Draft Flower Tunneling Method Alternatives Chapter 4.8 Underground Obstructions to Tunneling – Tiebacks for description of Flower Street tiebacks

Response to Comment PC5-34
See response to Comment PC5-3 regarding purpose and scope of this SEIS.

Response to Comment PC5-35
See response to Comment PC5-13 regarding the 5th/Flower Station.

See response to Comment PC5-4 regarding a deep tunnel alternative.

Response to Comment PC5-36
See Draft SEIS Chapter 5.0 Comparison of the Tunneling Method Alternatives versus the Project for discussion of potential adverse impacts, which are not limited to those associated with grouting.

See response to Comment PC5-4 regarding a deep tunnel alternative.

See response to comment PC5-8 regarding cut and cover construction south of 5th Street.

See response to comment PC5-14 regarding the sag and vertical alignment of Alternative B.

- See Draft SEIS Chapter 5.0 Comparison of the Tunneling Method Alternatives versus the Project for discussion of potential adverse impacts.

Response to Comment PC5-37
See response to Comment PC5-25 regarding impacts to Little Tokyo.

Response to Comment PC5-38
Under Alternatives A and B, there is risk of encountering tiebacks in front of the Bonaventure garages. If a tieback is encountered, it will have to be removed, resulting in unanticipated need for cut and cover construction activities at that location, as shown in Section 2.2.1.2 Flower Street Underground Context and Constraints. If using a deep bore alternative, the length of time of activities to remediate the situation with the use of cut and cover to reach those depths is greatly increased. Under Alternative A and B, there is a risk of sinkhole or other disruption, which would also affect access to the garages.

Metro continues to implement mitigation measures to address maintaining access to driveways for all properties along the along alignment during construction per the MMRP and as identified in Chapter 3.0 Transportation, Section 3.3 Mitigation Measures TR-1 through TR-13.

- See Final EIS/EIR Chapter 3.0, Section 3.3 Mitigation Measures for description of mitigation measures identified for the Project
- See Draft SEIS Section 2.2.1 Flower Street Existing Conditions; Section 2.3.1 Tunnel Construction Methods; Section 2.3.2 Description of Tunneling Method Alternatives for detailed description of existing conditions, constraints, construction methods per alternative, and associated impacts

Response to Comment PC5-39
See response to Comment PC5-21 regarding GHG emissions.

Response to Comment PC5-40

See response to Comment PC5-21 regarding cut and cover construction.

See response to Comment PC5-4 regarding a deep tunnel alternative.

See response to Comment PC5-13 regarding cut and cover construction.

Response to Comment PC5-41

See response to Comment PC5-4 regarding a deep tunnel alternative.

See response to Comment PC5-13 regarding cut and cover construction.

Response to Comment PC5-42

The agencies have weighed commenter's support for a deep tunnel alternative and rejected that alternative. Contrary to the comment, the environmental documents have sought to complete an objective, good faith inquiry into the environmental consequences of the Project and a reasonable range of alternatives. See response to comment PC5-4 regarding a deep tunnel alternative.

See response to comment PC5-3 regarding the purpose and scope of the SEIS.

Response to Comment PC5-43

As noted in Section 6.5 of the Draft SEIS, this SEIS was distributed for public review and comment. The Draft SEIS was publicly announced and provided to the public and interested parties. Refer to Chapter 6, Public and Agency Outreach for a summary of public notifications, public hearings, and announcements made pertaining to the Draft SEIS.

See response to comment PC5-4 regarding a deep tunnel alternative.

See response to comment PC5-3 regarding the purpose and scope of the SEIS.

- See Chapter 6.0 Public and Agency Outreach for description of outreach process including public hearings, noticing and coordination

Response to Comment PC5-44

Metro's decision not to tunnel on Flower St. between 4th and 5th Streets is based on its assessment of the feasibility and risks of tunneling on Flower St., as discussed in Chapter 5 Comparison of Tunneling Method Alternatives versus the Project. This decision was made based on a different location with different geotechnical characteristics than the situation Metro encountered on the Red Line in the 1990s. Metro analyzed that situation comprehensively, consulted experts, and learned from those experiences. Metro prefers to tunnel where it's safe, feasible, and consistent with its grade separation policy, as evidenced by its decision to use an EPBM on the Regional Connector, Westside Purple Line Extension and Crenshaw/LAX Projects. Metro is committed to public safety, ensuring safe conditions, and the health and safety of its workers.

- See Draft SEIS Section 1.2 Purpose and Scope of this Supplemental Environmental Document for purpose and need
- See Chapter 5 Comparison of the Tunneling Method Alternatives versus the Project, Section 5.3 Effectiveness in Meeting the Purpose and Need

Response to Comment PC5-45

See response to Comment PC5-8 regarding use of EPBM to 5th Street and cut and cover construction from 5th Street to 7th Street/Metro Center Station.

See response to Comment PC5-3 regarding the purpose and scope of the SEIS.

Responses to Comments

Responses to Public Hearing

Comment Letter/Speaker	Affiliation	Last Name	First Name	Comment Page	Response Page
Public Hearing					
PHA1		Chang	Ike		
PHB1		Sutton	Christopher		

IN RE: SEIS PURPOSE AND)
TUNNELING METHOD ALTERNATIVES)
)
_________________________________)

TRANSCRIPT OF PROCEEDINGS - PUBLIC HEARING

TUESDAY, JUNE 30, 2015

12:00 P.M.

REPORTED BY:

EDITH NAVAS, CSR 13797

IN RE: SEIS PURPOSE AND)
TUNNELING METHOD ALTERNATIVES)
)
________________________________)

TRANSCRIPT OF PROCEEDINGS, TAKEN ON BEHALF OF DAKOTA COMMUNICATIONS AT LOS ANGELES CENTRAL PUBLIC LIBRARY, 630 WEST 5TH STREET, MARK TAPER AUDITORIUM, LOS ANGELES, CALIFORNIA 90071, COMMENCING AT 12:00 P.M., TUESDAY, JUNE 30, 2015, BEFORE EDITH NAVAS, CSR 13797.

A P P E A R A N C E S

FOR DAKOTA COMMUNICATIONS:
MS. NICOLE CLARK REED
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SUITE 645
LOS ANGELES, CALIFORNIA 90064
(310) 815-8444

FOR LACMTA:
MS. DOLORES SALTARELLI
ONE GATEWAY PLAZA
MS-19-19-16
LOS ANGELES, CALIFORNIA 90012
(213) 922-3024

ALSO PRESENT:
VARIOUS INTERPRETERS
VARIOUS MEMBERS OF THE PUBLIC

I N D E X

LOS ANGELES, CALIFORNIA; TUESDAY, JUNE 30, 2015

12:00 P.M.

-0o0-

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PRESENTATION

(NOT TRANSCRIBED AS PER PRESENTER)

BY MS. SALTARELLI:

If you don't want to submit a comment now, you can submit it in writing as well as via web and e-mail directly. And with that, if there's any comment cards, I can take those.

So we'll be here until 1:30 P.M., so feel free to, you know, if you want to continue to look at the boards or if you want to provide written comment, you can give it to myself or anyone else that you see with the name tag, and then we'll be responding accordingly in the supplemental SEIS. Thank you.

MALE SPEAKER: [Speaking in Foreign Language].

INTERPRETER: Thank you for holding this public meeting. I wanted to make a comment, and I have a question. When I visited Seoul Korea, I was able to observe their massive Metro system, and I noticed that there's a lot of commercial stores at different stations. I want to know if you have any plans to have similar commercial stores or commercial business in the station space? 1

MS. SALTARELLI: [No transcribing necessary.] [One-on-one conversation].

MS. INTERPRETER: He had comments, so perhaps maybe we can help translate this for you. Maybe, you can ask Janet, and then she can just provide translation for this.

MS. CLARK-REED: Perfect. Thank you.

MS. INTERPRETER: The other meeting is the same content?

MS. CLARK-REED: Yes.

MALE SPEAKER: Very beautiful. I hope more train. I wanted to tell, but she has no time. And that is not today's subject. So I must keep it inside. 2

MS. CLARK-REED: But your comments are very important.

MS. INTERPRETER: I told him you organized the meeting and not with the Metro. If he wants, on the 7th again, can he come to you?

MS. CLARK-REED: Yes.

[Session Adjourned at 1:30 P.M.]

STATE OF CALIFORNIA)
) SS.
COUNTY OF LOS ANGELES)

I, EDITH NAVAS, a Certified Shorthand Reporter No. 13797 in the State of California, do hereby certify:

That the foregoing proceedings were taken before me at the time and place herein set forth; that a verbatim record of the proceedings was made by me using machine shorthand which was thereafter transcribed under my direction; further, that the foregoing is an accurate transcription thereof.

I further certify that I am neither financially interested in the action nor a relative or employee of any attorney of any of the parties.

IN WITNESS WHEREOF, I have hereunto subscribed my name this 14th day of July, 2015.

EDITH NAVAS
CSR No. 13797

Responses to Comments

PHA

Responses to Comments from Change, Ike

Response to Comment PHA-1

Comment is not a substantive comment related to the analysis in the Draft SEIS. At this time there are no plans for commercial spaces in the station space; however, Metro will take into consideration commercial development opportunities at station locations and opportunities for economic development around station area communities in the future.

Response to Comment PHA-2

Thank you for your comment. Support for additional trains on the Metro Rail system is noted.

IN RE: SEIS PURPOSE AND)
TUNNELING METHOD ALTERNATIVES)
)
________________________________)

TRANSCRIPT OF PROCEEDINGS - PUBLIC HEARING
TUESDAY, JULY 7, 2015
6:30 P.M.

REPORTED BY:
EDITH NAVAS, CSR 13797

IN RE: SEIS PURPOSE AND)
TUNNELING METHOD ALTERNATIVES)
)
__________________________________)

TRANSCRIPT OF PROCEEDINGS, TAKEN ON BEHALF OF DAKOTA COMMUNICATIONS AT JAPANESE AMERICAN NATIONAL MUSEUM 100 NORTH CENTRAL AVENUE, LOS ANGELES, CALIFORNIA 90012, COMMENCING AT 6:30 P.M., TUESDAY, JULY 7, 2015, BEFORE EDITH NAVAS, CSR 13797.

A P P E A R A N C E S

FOR DAKOTA COMMUNICATIONS:
MS. NICOLE CLARK REED
11845 WEST OLYMPIC BOULEVARD
SUITE 645
LOS ANGELES, CALIFORNIA 90064
(310) 815-8444

FOR LACMTA:
MS. DOLORES ROYBAL SALTARELLI
ONE GATEWAY PLAZA
MS-19-19-16
LOS ANGELES, CALIFORNIA 90012
(213) 922-3024

ALSO PRESENT:
CHRISTOPHER SUTTON, ESQ.
VARIOUS MEMBERS OF THE PUBLIC
VARIOUS INTERPRETERS

I N D E X

LOS ANGELES, CALIFORNIA; TUESDAY, JULY 7, 2015

6:30 P.M.

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PRESENTATION

(NOT TRANSCRIBED AS PER PRESENTER)

MS. SALTARELLI: That concludes my brief presentation. If anyone would like to give oral comment, please give me the comment card, and I apologize if I mispronounce your name.

Christopher Sutton, would you like to proceed at the mic?

MR. SUTTON: Thank you. My name is Christopher Sutton. I'm an attorney for the Westin Bonaventure Hotel, and one of the attorneys who obtained the court order from Judge John A. Kronstadt. His name was mispronounced earlier. And in that order, Judge Kronstadt joined construction of the subway on Flower Street until unless the supplemental environmental analysis element was done. 1

We also requested that the analysis include lower alignment that we had proposed, which is none of the alternatives that you have proposed. I want to give you a copy of some handouts I want to give you, and we'll be submitting our lengthy documents. 2

The subway project design changed after the environmental impact report was approved in April of 2012. 3

Let me say that again. The design of the subway was changed by MTA after the environmental analysis was approved, so that the changed project was never analyzed in any environmental document.

Among the changes were the elimination of stairs and escalators at the 2nd/Hope station. That is important because the elevation of the 2nd and Hope station was determined early before 2012 based upon the desire of MTA to have stairs and escalators down to the platform. In the June, excuse me -- June 2013 RFP Amendment sent to the bidders by MTA -- and I have copies if anybody wants them. Dated June 5th, 2013, MTA instructed the bidders that the stairs and escalators on 2nd and Hope station would be eliminated from the project.

What this meant was that the elevation of the 2nd/Hope was no longer fixed as it had been based upon the need to have escalators and stairs because the escalators and stairs were stationed needed to be closer to the surface. By elimination the escalators and stairs, let me quote what it says on the amendment -- the MTA document -- the memo -- Q and A memo to bidders dated 6/5/2013:

> "Changes to drawings are being issued by RFP Amendment. The escalator/stair alternative entrance is being eliminated. Only the all-elevator station entrance design will be proposed."

3 cont'd

And if you're in the lower elevation of the 2nd and Hope station, it has tremendous benefits to the project in a number of ways. 3 cont'd

It eliminates the slope at 4.6 degrees coming on to Bunker Hill from station behind the L.A. Times, and you can lower that slope to make it more gentle. It allows you to lower the tunnel under Flower Street to avoid the alluvion, at leas as far as 5th Street and continue using tunnel warren machine tunneling all the way to 5th Street and maybe past it. 4

The MTA submission for the federal government for its federal grant stated that TBM tunnel is roughly half the cost of cut-and-cover tunnel. And it makes sense because cut-and-cover tunnel means removing earth from 70 feet below ground surface, then building the tunnel, and then putting all that dirt back. Whereas TBM tunnelling just passes through the underground area without having to remove all the soils and -- 5

In addition by not having to go up a hill on 2nd and Hope station, and then coming down the hill on the 7th and Metro station, these trains that are going to operate for the next hundred years will save a huge amount of energy. Each one of these trains weighs several hundred tons, and you're going to have one of these every six -- or as early as three minutes, but let's say within six minutes a day approximately 6

20 hours a day for 100 years. 6 cont'd

And when you're pushing a train up a 4.6 degree slope and then down a slope and then up and down the other slope, you're using much more energy. In addition, having trains go up slopes and down slopes causes them to accelerate in brakes, which has wear and tear on the wheels and on the tracks. It causes more noise and vibration, which MTA's own test shows will be perceived by people attending concerts at Robey museum, the Colburn school, the Disney Concert Hall, an the Red Cat Studios. They will be able to hear those vibrations. 7

By lowering the slope under Bunker Hill and lowering 2nd and Hope station, the trains will operate more quietly. The trains will have less maintenance problems. And what's been identified when trains are on slopes the wheels can fail and cause derail, which results in potential injuries both to MTA drivers and to members of the public. To repair these tracks underground in the future will be a huge disruption to this regional connector. 8

So the alignment that we have proposed, the Bonaventure has proposed and has transmitted to MTA repeatedly for the last 18 months, and we have raised this issues before the final -- was approved in 2012. MTA has failed to analyze the lower alignment along 2nd Street; has failed to analyze a lower location of the 2nd and Hope 9 station. All Bonaventure wants is a better project. We are suing MTA to make the project better. In addition, by eliminating cut-and-cover construction between 4th and 5th in front of the Bonaventure's entrance -- to eliminate all the surface cost to our customers, our guests, our employees, and you save on time because it's actually quicker to build a subway using the TBM going through that area.

9 cont'd

Before the end of 2011, the draft TRI, in fact the final TRI, at the time was going to have a tunneling in at Flower and 3rd. And in then December of 2011-- and they said this because the machine is going to come down 2nd Street under Bunker Hill, and it's going to end at the 2nd and Hope stations. And we're going to pull it out of the ground, and they stated in public documents that the tunnel boring machine could not make a left-hand turn at 2nd and Flower. And suddenly on December of 2011, the MTA discovered that the tunnel boring machine could be designed to turn left at 2nd and Flower. Both pass the area where 2nd and Hope Street stations are and go down Flower street all the way to 4th.

10

So MTA has previously changed its mind regarding the state of the tunneling on Flower Street. They also said that there were tiebacks to the World Trade Center, which they would have to negotiate, which they say exist, which they may but in the Bonaventure's case in fact emphatically do not. There are no tiebacks with the Bonaventure. We provided the

11

drawings to MTA, and the drawings they are using show tiebacks going only to the sidewalk level, not out in the street. So even if those tiebacks were included in 1974, when the Bonaventure was built, they don't even come near to where the tunnel would be. 11 cont'd

So the tunneling at least one more block on Flower Street is cheaper; it's faster to build; it's safer to operate; it's quieter to operate; it's cheaper to operate and provides less environmental impacts to the Bonaventure and to the three concert venues that would be above this tunnel: Colburn, the Robey, the Disney Concert Hall and underneath Disney, the Red Cat studio.

So we would like to see the supplemental environmental statement analyze the alternatives -- the lower alternatives that Bonaventure has been proposing the last 18 months. As it has been proposed, we will dismiss our lawsuits if in fact MTA selects this alternative because it's better for all concerned. It gets the project done faster. 12

What MTA has done in the supplemental environmental impact instead is taking two alternatives that are straw man alternatives. They're both shallower, closer to the surface, require jet grouting, will require many of the things that would be eliminated by cut-and-cover but which do not analyze the lower alternative. 13

In addition, the lower alternative keeps the tunnel 14 boring machines within the bedrock longer. MTA has said we can't go lower because of the pilings below the 4th Street bridge footings. The diagrams that I've just handed in, and that we've been providing to MTA for the last 18 months show their own diagrams, and the diagrams from the city and Caltrans where the footings end, where the pilings end. And by simply lowering the tunnel, you can go beneath all those pilings. There's one set of pilings on the east side of 4th Street across from the Bonaventure, which is slightly -- the route could move about eight feet to the left without coming on to private property and avoid those as well as and go under -- through the other footings and pilings. **14** cont'd

The claim for tiebacks at the Bonaventure, which we believe is false, even assuming the MTA's claim is true, going lower goes past and beneath the location where MTA has stated the tiebacks are located. The reason the Bonaventure has been filing these lawsuits and litigating these for the past three years is because the project will be better and faster, cheaper and safer, not just for the people who build it, but for the people who ride on it and operate the trains. **15**

Earlier this year, 2015, MTA's bidder, Skanska's [phonetic] Partnership proposed to make a change in the Little Tokyo section of the subway, which Skanska believes was also safer to build; quicker to build; and cheaper to build. And MTA rejected those changes. Who knows why? **16**

There was no public discussion just a footnote in a monthly report that Skanska's proposed changes were rejected. I'm not here to fight for Little Tokyo or their rights. And the Japanese Village is also involved in a lawsuit and is appealing their decision, but it's an example of MTA rejecting suggestions from their own contractors on ways to improve the project.

When we met with the Skanska's executives they were noncommittal on our diagram, but they did say, we're looking at this alternative very seriously. So there were serious discussions between Skanska and MTA over our diagram alternative, and that was in last fall of 2014, and yet this supplemental environmental impact statement was released in June of 2015 -- has no discussion of the Bonaventure's alternatives lower alignment. Why? There's no explanation of that.

16 cont'd

Again, we'll be submitting a longer letter by the time of the comment period changes, but the Bonaventure has been trying to improve this project to make it quicker to build; cheaper to build; safer to build; to make it faster to operate; safer to operate; quieter to operate and have less impact on the businesses on south Flower Street. And for whatever reason, MTA has been resisting that process for the last three years.

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MS. SALTARELLI: Thank you, Mr. Sutton, for your comment.

If there's anyone else who would like to submit verbal comments, please give me a comment card. If not, feel free to leave your comment card at the desk. We will be here until 8:00 o'clock, and if after this evening, you would like to submit your comments, feel free to submit it either via mail, the website or via mail. Thank you very much.

[Session Adjourned at 8:00 P.M.]

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STATE OF CALIFORNIA)
) SS.
COUNTY OF LOS ANGELES)

I, EDITH NAVAS, a Certified Shorthand Reporter No. 13797 in the State of California, do hereby certify:

That the foregoing proceedings were taken before me at the time and place herein set forth; that a verbatim record of the proceedings was made by me using machine shorthand which was thereafter transcribed under my direction; further, that the foregoing is an accurate transcription thereof.

I further certify that I am neither financially interested in the action nor a relative or employee of any attorney of any of the parties.

IN WITNESS WHEREOF, I have hereunto subscribed my name this 15th day of July, 2015.

EDITH NAVAS
CSR No. 13797

Responses to Comments

PHB
Responses to Comments from Sutton, Christopher

Response to Comment PHB-1
Thank you for your comment. It is noted that commenter submitted written comments which are included in PC5 and responses to comments which are similar to those made at the public meeting are referred below and can be found in PC5. Refer to Chapter 1 for a discussion of the purpose and scope of the SEIS.

Response to Comment PHB-2
Commenter's support of lower alignment is noted. Please see response to comment PC5-4 which discusses the consideration of a lower alignment.

Response to Comment PHB-3
Please see response to comment PC5-3 and comment PC5-4 regarding alternatives identification process, purpose and scope of SEIS and alternatives analyzed in the SEIS.

Response to Comment PHB-4
Please see response to comment PC5-4 regarding slope and grade.

Response to Comment PHB-5
Commenter's support of TBM tunneling is noted. The commenter discusses the lower cost of TBM versus cut-and cover. The consideration of TBM is discussed in responses to Comment PC5.

Response to Comment PHB-6
Metro considered the potential energy savings associated with increasing the depth of the 2nd and Hope station; however the agency rejected the deep tunnel alternative on several grounds. A deeper station at 2nd and Hope is considered under Alternative B. Section 4.6 of the SEIS states that the analysis addresses energy usage during construction because operations of the Project and the evaluated alternatives would have nearly identical associated energy resource impacts. Please see responses to comment PC5-4 and PC5-11 regarding considerations for an increased depth of 2nd/Hope Station and increased grade.

Response to Comment PHB-7
Commenter's support of TBM tunneling is noted. Comment is not a substantive comment related to the analysis in the Draft SEIS. Noise and vibration impacts on the Walt Disney Concert Hall, museum, Red Cat Studios, and Colburn School were analyzed in Section 4.7 of the Final EIS/EIR. The FEIS states that with implementation of mitigation potential ground borne noise and vibration effects during construction and operation will not be adverse and would not

impact the sensitive activity occurring at the Colburn School or Walt Disney Concert Hall. As noted in the FEIS, mitigation for the Walt Disney Concert Hall has been modified to cover the Colburn School as well, in an abundance of caution.

Response to Comment PHB-8

Commenter's support of TBM tunneling is noted. Comment is not a substantive comment related to the analysis in the Draft SEIS.

Operation and operational impacts of Alternatives A and B would be the same as the Project. Alternative B includes consideration of a deeper station at 2nd/Hope. As with the Project, there would be no construction-related adverse effects after implementation of these mitigation measures for Alternatives A and B. However, the alternatives may have additional noise impacts along Flower Street beyond those identified for the Project due to the size and type of grouting and support equipment required for ground stabilization. See Response to Comment PHB7 regarding ground borne noise and vibration of the Project and a lower the 2nd/Hope Station.

Metro maintains and safely operates trains on the Metro Red Line which operates under similar conditions as the Project. Metro is committed to continuing maintenance and safe operations of the trains.

Response to Comment PHB-9

Please see response to comment PC5-3 regarding purpose and scope of SEIS and PC5-4 regarding range of alternatives.

Response to Comment PHB-10

Comment is not a substantive comment related to the analysis in the Draft SEIS. Refer to Appendix A of the Draft SEIS for the Flower Street Tunneling Method Alternatives Report for analysis pertaining to Alternatives A and B.

Response to Comment PHB-11

Please see response to comment PC5-4 regarding Flower and Appendix A, Flower Street Tunneling Method Alternatives, Section 4.8.4 Advance Tiebacks Removal to Mitigate Tunneling Hazard for constraints and tie-back discussion.

Response to Comment PHB-12

Please see response to comment PC5-3 for purpose and scope of this SEIS, PC5-4 for Flower Street conditions.

Response to Comment PHB-13

Please see response to comment PC5-3 for purpose and scope of this SEIS, PC5-4 for Flower Street conditions and constraints.

Response to Comment PHB-14

Please see response to comment PC5-4 and PC5-8 for underground conditions and constraints, PC5-11 for comparison of deep station in the Metro system.

Response to Comment PHB-15
Please see response to comment PC5-3 for purpose and scope of this SEIS, PC5-4 for NEPA range of alternatives, Flower Street underground conditions and constraints.

Response to Comment PHB-16
Please see response to comment PC5-3 regarding purpose and scope of this SEIS.

Response to Comment PHB-17
Commenter's support for a safe and reliable project are noted. Please see response to comment PC5-3 for purpose and scope of the SEIS.

APPENDIX K

SUPPLEMENTAL ROD

Supplemental Record of Decision
on the
Regional Connector Transit Corridor Project
in
Los Angeles County, California
by the
Federal Transit Administration

This Supplemental Record of Decision (ROD) supplements the ROD previously issued by the Federal Transit Administration (FTA) on June 29, 2012 (2012 ROD). The 2012 ROD has been supplemented in the section below titled "Supplemental Environmental Impact Statement" (SEIS) pertaining to the SEIS prepared in compliance with the Order of the United States District Court for the Central District of California in *Today's IV, Inc. vs. Federal Transit Administration et al* and *515/555 Flower Associates, LLC vs. Federal Transit Administration et al.* Except for the findings and decisions referenced in the "Supplemental Environmental Impact Statement" section below and the correction in the "Measures to Mitigate the Adverse Effects of the Project" section, the findings and determinations made in the 2012 ROD remain the same.

Decision

The Federal Transit Administration (FTA) has determined that the requirements of the National Environmental Policy Act of 1969 (NEPA) and related Federal environmental statutes, regulations, and executive orders have been satisfied for the Regional Connector Transit Corridor Project (the Project) located in Los Angeles County.

The Supplemental ROD applies to the fixed guideway transit alternative connecting the 7th Street/Metro Center Station to the Metro Gold Line, which was described as the Project (defined as the Locally Preferred Alternative (LPA) and refinements) and evaluated in the *Regional Connector Transit Corridor Project Final Environmental Impact Statement/ Environmental Impact Report* (Final EIS), dated January 2012 and construction method alternatives in the SEIS, dated December 2012. As the Project sponsor and potential recipient of FTA financial assistance for the Project, Los Angeles County Metropolitan Transportation Authority (LACMTA) served as a co-lead agency with FTA in conducting the environmental review process.

In light of the SEIS, the FTA has decided that while implementing Alternatives A and B may be technically possible, those construction method alternatives were considered infeasible as a matter of sound public policy. FTA has decided that Alternatives A and B will not be carried forward, and the LPA and construction method as identified in the Final EIS will remain the same and will be carried forward.

Any proposed change by LACMTA must be evaluated in accordance with 23 CFR § 771.130 and must be approved by FTA in writing before the agency requesting the change can proceed with the change.

Background

The Project will provide a 1.9 mile direct connection from the 7th Street/Metro Center Station to the Metro Gold Line tracks near 1st and Alameda Streets with three new below grade station locations. The alignment will extend north from the 7th Street/Metro Center Station under

Flower Street to 2nd Street. The tracks will continue north underneath Flower Street and veer northeast near the intersection of 3rd and Flower Streets to run east underneath 2nd Street. The tracks will then proceed east underneath the 2nd Street Tunnel and 2nd Street itself, and lead to a junction under the intersection of 1st and Alameda Streets. To the north and east of the junction, trains will rise to the surface through two new portals to connect to the Metro Gold Line heading north to Montclair and east towards I-605. The Project will include three new stations at 2nd/Hope Street, 2nd/Broadway, and 1st/Central Avenue.

Measures to Mitigate the Adverse Effects of the Project

Measures to mitigate the effects of the Project were considered during the Project's development in coordination with the interested agencies. All reasonable means to avoid and minimize the adverse effects of the Project have been adopted. These mitigation actions include, but are not limited to, all commitments for further consultation on specific issues. The mitigation commitments are described in the MMRP to ensure fulfillment of all environmental and related commitments in the Final EIS.

Due to a clerical error, some mitigation measures adopted by the LACMTA Board in April 2012 related to Little Tokyo were unintentionally left out of Attachment A to the 2012 ROD; the MMRP has been revised accordingly and is attached to this Supplemental ROD as Attachment A. Any change in such mitigation from the description in the Final EIS will require a review in accordance with 23 CFR § 771.130 and must be approved by FTA in writing.

Supplemental Environmental Impact Statement

A Supplemental Environmental Impact Statement was prepared in compliance with the Order of the United States District Court for the Central District of California in *Today's IV, Inc. vs. Federal Transit Administration et al* and *515/555 Flower Associates, LLC vs. Federal Transit Administration et al.* A single document consisting of the Final SEIS and Supplemental ROD was prepared consistent with23 USC 139(n)(2), as amended by Fixing America's Surface Transportation Act, Pub. L. 114-94. The Judgment and Order for Partial Injunctive Relief by the Honorable John A. Kronstadt on May 28, 2014 and September 9, 2014, respectively, require that the FTA and Metro "prepare a supplemental analysis under the National Environmental Policy Act ("NEPA") that addresses the feasibility of Open- Face Shield and SEM tunneling alternatives." Consistent with 23 CFR 771.130(f) and as required by the Judgment, the SEIS was a limited-scope document that provides additional detail on tunneling methods not originally selected for construction along Flower Street, but reconsidered here: specifically Open-Face Shield and SEM tunneling for the Flower Street portion of the Regional Connector project alignment between 4th Street and the 7th Street/Metro Center Station. The SEIS did not consider and this Supplemental ROD does not authorize any change in the location of the Project or the Project Area studied, which remains as presented in the Final EIS. The two alternatives in the SEIS included:

Alternative A is a combination of Earth Pressure Balance Tunnel Boring Machine (EPBM), Open-Face Shield, and SEM construction methods; and with similar horizontal and vertical alignment profiles to that of the Project.

Alternative B is a combination of EPBM and SEM construction methods with a similar horizontal alignment profile, but a lower vertical alignment profile than that of the Project.

The two alternatives have the horizontal and vertical alignment variations from that of the Project in order to address geologic conditions and other subsurface project constraints as described in Chapter 2 of the SEIS. Both alternatives would require small segments of cut and cover construction for shafts to allow for emergency exits, tunnel boring machine retrieval, and train control room ventilation. Both alternatives would require the use of grouting to stabilize Flower Street soil conditions to allow for tunnel construction.

Alternatives A and B would result in a higher safety risk, would cost more money, would take longer to construct, and would result in additional adverse environmental effects than the Project. The higher construction risks include increased risks of ground instability, loss, and settlement which could threaten public and worker safety. Even with the proposed methods to reduce construction risk associated with tunneling in the weak ground conditions under Flower Street, the tunneling method alternatives have a high risk of ground settlement problems. In addition, the speed reduction resulting from Alternatives A and B would have negative impacts on rail service headways, run times, and operations over the Project. While implementing Alternatives A and B may be technically possible, those alternatives were considered infeasible as a matter of sound public policy, and thus were withdrawn from further consideration.

FTA published the Notice of Availability (NOA) for the Draft SEIS in the *Federal Register* on June 12, 2015. The NOA also provided notice that the FTA may issue a single Final SEIS and Record of Decision document. The Draft SEIS was made available to stakeholders, agencies, and the general public for review and comment for a 45-day review period from June 12, 2015 through July 27, 2015. Two public hearings were held within the study area, one in the Financial District on June 30, 2015 at the Los Angeles Central Library and one in the Little Tokyo community on July 7, 2015 at the Japanese American National Museum.

Multi-lingual outreach and collateral materials were provided for Japanese and Spanish-speaking members of the public and stakeholders, including bilingual newspaper legal and display ads, translation at public hearings and project information materials. The Draft SEIS was placed in local libraries and other repository sites, and made available on the Metro website (http://www.metro.net/projects/connector). A transcript of the comments from the public hearings and written comments on the Draft SEIS and the responses to those comments are included as Appendix K of the Final SEIS and Supplemental ROD.

Leslie T. Rogers

DEC 16 2015

Leslie T. Rogers
Regional Administrator
Federal Transit Administration, Region IX

Date

Attachments:
Attachment A: Mitigation Monitoring and Reporting Program

Metro

MITIGATION MONITORING AND REPORTING PROGRAM FOR THE LOCALLY PREFERRED ALTERNATIVE

REGIONAL CONNECTOR TRANSIT CORRIDOR PROJECT

All mitigation measure herein shall be implemented and monitored by Metro. A mitigation measure field report (see attached form) for each mitigation measure shall be filed at least twice annually as needed. A summary of mitigation monitoring activities shall be provided to the Metro Board of Directors twice annually. Issues identified during monitoring shall be discussed with the Regional Connector Community Leadership Council (RCCLC) monthly.

*Due to a clerical error, some LACMTA Board adopted mitigation measures which are included in the MMRP and in the Project were unintentionally left out of the original ROD MMRP attachment; the Board adopted mitigations have been inserted into the MMRP below and marked to indicate so. Mitigation measures are TR-1, NV-21, NV-23

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Transportation Impacts						
Traffic circulation disruption would occur during construction.	TR-1: Prior to the initiation of localized construction activities, a traffic management and construction mitigation plan shall be devised. The closure schedules in the construction traffic plan shall be coordinated to minimize impacts to residences, businesses, special events, and traffic flow. During these times, traffic shall be re-routed to adjacent streets via clearly marked detours. The traffic management and construction mitigation plan shall identify, for instance, proposed closure schedules and detour routes; construction traffic routes, including haul truck route, and hours so as to avoid peak hours where feasible. It shall also account for the provisions below. Traffic flow shall be maintained, particularly during peak hours, to the degree feasible. Access to adjacent businesses shall be maintained via existing or temporary driveways at all times during business hours, and residences at all times. Traffic flow shall be maintained via existing or temporary driveways at all times during business hours, and residences at all times. Access to the Japanese Village Plaza parking garage located on Central Avenue shall be maintained from the existing entry and exit points on Central Avenue at all times. Access to the Japanese Village Plaza service alley shall be maintained from the existing entry and exit point on Second Street at all times*. Metro shall provide signage to indicate new ways to access businesses and community facilities affected by construction. Metro shall post advance notice signs prior to construction in areas where business access could be affected. Metro shall also notify Los Angeles Department of Transportation (LADOT) in advance of street closures, detours, or temporary lane reductions. Metro shall also inform advisory committees of known road closures during regularly scheduled meetings. If, for whatever reason, Metro is unable to maintain access to the Japanese Village Parking garage from the existing entry and exit points on Central Avenue at all times, Metro shall provide valet parking from vehicle pickup/drop-off points immediately adjacent to Japanese Village Plaza*.	Check design contract documents for compliance	Metro	Final Design	Traffic Control Plans	LADOT/Metro
		Monitor construction activities for compliance.	Metro	Construction	Traffic Control Plans	LADOT/Metro
	See also CN-1 through CN-3 and CN-5.					
Construction haul routes along project area streets would be needed.	TR-2: Haul routes for trucks shall be confirmed during the final design phase of the project. The routes shall be located to minimize noise, vibration, and other possible impacts to adjacent businesses and neighborhoods. Truck trips shall be primarily scheduled at times when they would be least disruptive to the community. Lighted or reflective signage shall direct truck drivers to the haul routes. If physical damage to the haul route roads occurs due to project-related traffic, the roads shall be restored to their pre-construction condition as quickly as is practicable. Haul routes shall be discussed with and approved by the City of Los Angeles through the Transportation Construction Traffic Management Committee (TCTMC).	Verify that community input into hauling schedule has occurred	Metro	Final Design	Haul Routes	LADOT/Metro
		Verify that TCTMC input into haul routes has occurred.	Metro, City of Los Angeles TCTMC	Final Design	Haul Routes	LADOT/Metro
		Check design contract documents for compliance.	Metro	Final Design	Haul Routes	LADOT/Metro
		Monitor construction activities for compliance.	Metro	Construction	Haul Routes	LADOT/Metro
		Verify whether roadway deterioration due to project traffic has occurred, and ensure that it is repaired.	Metro	Construction		Metro
Street parking would need to be temporarily removed during construction.	TR-3: To avoid impacts to neighborhood parking supplies, Metro shall require the contractor to designate areas for construction/contractor employee parking and shall not allow employees to park in other lots or unauthorized areas. Metro shall identify and implement measures to reduce the need for parking by construction workers, including carpool incentives, transit passes, or designated on-site or off-site parking. Metro shall direct construction workers not to park on the street.	Check design contract documents for compliance.	Metro	Final Design	Parking Plans	Metro
		Monitor construction activities for compliance.	Metro	Construction		Contractor/Metro
	See also DR-4 and DR-5.					
Re-routing of pedestrian and bicycle traffic would be needed during construction.	TR-4: Safe pedestrian detours with handrails, fences, k-rail, canopies, and walkways shall be provided as needed. When a crosswalk is closed due to construction activities, pedestrians shall be directed to nearby alternate crosswalks. Access shall be Americans with Disabilities Act (ADA) accessible at all times per existing Metro policy.	Check design contract documents for compliance.	Metro	Final Design	Pedestrian Access Plan	Contractor/Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	TR-5: Bicyclists shall be encouraged through signage to ride carefully in streets near construction activities, ride carefully on sidewalks (as City of Los Angeles municipal code permits), or choose nearby alternate routes around construction sites. Detours shall be provided as needed. Metro shall provide signage showing the alternate bicycle routes. Pedestrian and bicycle circulation, and travel lanes temporarily impacted during construction shall be restored to their permanent configurations at the conclusion of the construction period and prior to operations.	Check design contract documents for compliance.	Metro	Final Design	Bicycle Plans	LADOT/Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Permanent reductions in intersection performance on Flower Street from 4th to 6th Streets would occur.	TR-6: At the intersection of 4th and Flower Streets, Metro, in coordination with LADOT, shall permanently restripe the southbound Flower Street approach to provide one shared left-turn/through lane and two through lanes. Metro, in coordination with LADOT, shall also optimize the signal splits.	Verify that LADOT coordination has occurred.	Metro	Final Design	Design Drawings	LADOT/Metro
		Check design contract documents for compliance.	Metro	Final Design	Design Documents	LADOT/Metro
		Verify that the restriping has occurred after the street has been restored from cut and cover activities.	Metro	Construction		Metro
	TR-7: At the intersection of 5th and Flower Streets, Metro, in coordination with LADOT, shall permanently restripe the southbound Flower Street approach to provide three through lanes and one exclusive right-turn lane. Metro, in coordination with LADOT, shall also optimize the signal splits.	Verify that LADOT coordination has occurred.	Metro	Final Design	Design Drawings	LADOT/Metro
		Check design contract documents for compliance.	Metro	Final Design	Design Drawings	Metro
		Verify that restriping has occurred after the street has been restored from cut and cover activities.	Metro	Construction		Metro
	TR-8: At the intersection of 6th and Flower Streets, Metro, in coordination with LADOT, shall permanently restripe the eastbound 6th Street approach to provide three through lanes and two exclusive right-turn lanes. Metro, in coordination with LADOT, shall also optimize the signal splits.	Verify that LADOT coordination has occurred.	Metro	Final Design	Design Drawings	LADOT/Metro
		Check design contract documents for compliance.	Metro	Final Design	Design Drawings	Metro
		Verify that the restriping has occurred after the street has been restored from cut and cover activities.	Metro	Construction		Metro
Shuttle bus drop-off areas for City National Plaza could be affected by construction activities.	TR-9: Metro shall ensure that shuttle bus drop-off areas at City National Plaza are provided throughout construction.	Check design contract documents for compliance.	Metro	Final Design	Design Drawings	Metro
		Verify that the restriping has occurred after the street has been restored from cut and cover activities.	Metro	Construction		Metro
Connectivity with other transit lines and pedestrian systems would be needed.	TR-10: Metro shall design and implement linkages with the proposed streetcar project and Bringing Back Broadway project at the 2nd/Broadway station. The project shall also provide a knockout panel to the west side of Flower Street at 3rd Street to connect to the pedestrian system previously designed by the City of Los Angeles.	Check design contract documents for compliance.	Metro	Final Design	Design Drawings	Metro
	TR-11: Metro shall construct an enhanced pedestrian walkway along the east side of Flower Street between 4th and 7th Streets to better connect the Financial District to the improved transit services available at the existing 7th Street/Metro Center Station.	Check design contract documents for compliance.	Metro	Final Design	Design Drawings	Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Access to some bus stops would be restricted during construction.	TR-12: Metro shall maintain access to bus stops and provide adequate signage to guide bus users to accessible stops. Metro shall minimize temporary closures or relocations of bus stops and layover zones. Metro shall provide notices of closures and relocations on its website, smart phone apps, and other modes typically used to communicate service announcements. When closures of other bus operators' stops are needed, Metro shall work closely with the affected operators to provide notices.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Construction Notices	Metro
		Monitor construction activities and bus stop operation for compliance.	Metro	Construction		Metro
Some bus stops would need to be temporarily relocated due to street closures during construction, and buses may need to be re-routed around construction areas.	TR-13: As needed, Metro shall temporarily relocate bus stops to nearby alternative locations based on the re-routing of bus service, and provide adequate signage and notices at strategic locations indicating the relocated bus stops. Metro shall provide notices of relocations on its website, smart phone apps, and other modes typically used to communicate service announcements. Metro shall coordinate with municipal transit providers to temporarily relocate non-Metro bus stops. When bus re-routing is necessary, buses shall be re-routed to adjacent streets in a manner that minimizes inconvenience to bus passengers and to affected neighborhoods.	Check design contract documents for compliance.	Metro	Final Design	Construction Notices	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Displacement and Relocation Impacts						
Partial taking of parking and primary access to the Central Plant (APN 5151-014-032, 703 W. 3rd Street).	DR-1: For parcels in which parking is displaced by the project, Metro shall provide replacement parking elsewhere on the parcel or on a nearby parcel during construction.	Check design contract documents for compliance.	Metro	Final Design	Design Drawings	Metro
		Monitor construction activities and parking lot use to ensure that replacement parking is maintained.	Metro	Construction		Metro
	DR-2: In using parcel APN 5151014032 for construction staging, Metro shall maintain access to the Central Plant located on that parcel at all times during construction.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Drawings	LADOT/Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Some privately-owned parcels needed for construction staging currently contain buildings, but would be owned by Metro and may be vacant after construction.	DR-3: Upon completion of construction, property needed for construction but not required to maintain the physical infrastructure or necessary for access shall be included in the Metro Joint Development Program for possible development. Any development shall be environmentally and separately cleared from this project and shall undergo its own community input process. Until a development is approved, the remaining underutilized property may be used for public parking spaces or at the very least shall be graded and fenced to a higher standard that reflects the community's identity and character more than typical gravel and chain link. Per Metro's Joint Development Policy, the community shall be included in the development process.	Oversee Metro Joint Development Program and ensure compliance.	Metro	Post-Construction	Joint Development Documents	Metro
Public parking spaces would be lost in Little Tokyo during construction.	DR-4: Metro shall work with the City to develop a parking mitigation program to mitigate the loss of public parking spaces during construction. This would include, but is not limited to, restriping the existing street to allow for diagonal parking, reducing the number of restricted parking areas, phasing construction activities in a way that minimizes parking disruption, and increasing the time limits for on-street parking. Restriping would occur on portions of Temple Street, Alameda Street, 1st Street, 2nd Street, Central Avenue, San Pedro Street, Judge John Aiso Street, 3rd Street, and Traction Avenue. Such parking mitigation shall be implemented on a temporary, tiered basis pending findings of the annual parking analysis described in EJ-11.	Check design contract documents for compliance.	Metro, LADOT	Final Design	Parking Plans	LADOT/Metro
		Monitor construction activities for compliance.	Metro, LADOT	Construction		LADOT/Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	DR-5: Metro shall not hinder access to other public parking lots during construction.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		
	See also EJ-2 through EJ-9, EJ-11, and EF-1.					
Access to the Little Tokyo Library and other community destinations could be affected by construction.	DR-6: Metro shall maintain access to the Little Tokyo Library and other community facilities at all times during construction.	Check design contract documents for compliance.	Metro	Final Design	Construction Plans	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	DR-7: Metro shall develop a Construction Mitigation Program that includes protocol for community notification of construction activities, including traffic control measures, schedule of activities, and duration of operations, with written communications to the community translated into appropriate languages.	Ensure that an adequate Construction Mitigation Program has been developed.	Metro	Final Design	Community Outreach Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Displacement and relocation of businesses would be necessary.	DR-8: Metro shall provide relocation assistance and compensation as required by the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.	Verify qualifications of property appraiser.	Metro	Pre-Construction	Reacquisition Plans	Metro
		Ensure provision of relocation assistance and payment of affected owners just compensation not less than the appraised market value for their property.	Metro	Pre-Construction		Metro
A portion of the LADWP site on parcels 5173-007-901 and 5173-006-900 would need to be permanently acquired for right-of-way.	DR-9: Metro shall consult Los Angeles Department of Water and Power (LADWP) during the design phase to accommodate its operational needs during construction and operation of the project.	Check design contract documents for compliance and documentation of consultation with LADWP.	Metro, LADWP	Final Design		DWP/Metro
		Monitor construction activities for compliance.	Metro, LADWP	Construction		
Community and Neighborhood Impacts						
Disruption of traffic patterns during construction would affect access to residences and businesses, which could affect the economic vitality of some businesses.	CN-1: Accessible detours shall be provided whenever possible. Detours shall be compliant with the ADA. Signage shall be provided in those languages most commonly spoken in the immediate community. Signs shall mark detours in accordance with the Manual on Uniform Traffic Control Devices, and other applicable local and state requirements. Detours shall be designed to minimize cut-through traffic in adjacent residential areas.	Check design contract documents for compliance.	Metro	Final Design	Traffic Control Plans	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	CN-2: Early notification of traffic disruption shall be given to emergency service providers. Work plans and traffic control measures shall be coordinated with emergency responders to prevent impacts to emergency response times.	Verify that plans were developed in conjunction with emergency responders.	Metro, emergency service providers	Final Design	Traffic Control Plans	Metro
		Monitor construction activities for compliance.	Metro, emergency service providers	Construction		

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	CN-3: Traffic management and construction mitigation plans shall be developed in coordination with the community to minimize disruption and limit construction activities during special events. Worksite Traffic Control Plans shall be developed in conjunction with LADOT and surrounding communities to minimize impacts to traffic, businesses, residents, and other stakeholders. Crossing guards and other temporary traffic controls shall be provided in the vicinity of construction sites, haul routes, and other relevant sites as proposed in California DOT Traffic Manual, Section 10-07.3, Warrants for Adult Crossing Guards, and as appropriate to maintain traffic flow during construction.	Monitor Final Design process and check documents for compliance.	Metro, LADOT	Final Design	Traffic Control Plans	LADOT/Metro
		Monitor construction activities for compliance.	Metro, LADOT	Construction		LADOT/Metro
	CN-4: A 24-hour live hotline for community concerns regarding construction shall be provided, as well as a project office within the Little Tokyo community. Residents and businesses shall also be provided with comment/complaint forms during construction. A construction office shall also be placed within the community to provide in-person assistance and services. Metro shall negotiate with the Japanese American National Museum (JANM) to locate the office within the museum's historic building on 1st Street. The hotline and office shall enable Metro to maintain day-to-day contact with the community during construction and provide community members with all project details that may be relevant to the public.	Verify continuous operation of hotline and construction office.	Metro	Construction	Community Outreach Plan	Metro
	CN-5: A community outreach plan shall be developed and implemented to notify local communities and the general public of construction schedules and road and sidewalk detours. Metro shall coordinate with local communities during preparation of the traffic management plans to minimize potential construction impacts to community resources and special events. Construction activities shall be coordinated with special events.	Verify preparation of community outreach plan.	Metro	Final Design	Community Outreach Plan	Metro
		Verify preparation of traffic management plans in conjunction with community stakeholders.	Metro	Final Design	Traffic Management Plans	LADOT/Metro
		Check design contract documents for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	CN-6: Metro shall develop a construction mitigation plan with community input to directly address specific construction impacts in the project area. Metro shall establish and receive input from the RCCLC in developing the construction mitigation plan. The RCCLC shall consist of representatives from all parts of the alignment area. Metro shall work with the RCCLC in developing the outreach plan.	Establish RCCLC.	Metro, Community stakeholders	Preliminary Engineering	Community Outreach Plan	Metro
		Verify preparation of construction mitigation plan and outreach plan in conjunction with community stakeholders.	Metro	Final Design	Community Outreach Plan	Metro
		Check design contract documents for compliance.	Metro	Final Design	Design Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	See also DR-4 and DR-5.					
Construction sites could have a negative impact on the community if left unsecured.	CN-7: Barriers shall be erected and security personnel provided during construction to minimize trespassing and vandalism. Barriers shall be enhanced with culturally-relevant artwork, attractive design features, and advertisements for parking locations and businesses. Signage shall also identify that businesses are open during construction. Community input shall be sought in determining artwork and design features.	Verify incorporation of community input into artwork and design feature plans.	Metro	Final Design	Traffic Control Plans	Metro
		Check design contract documents for compliance.	Metro	Final Design	Design Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
The 1st/Central Avenue station should incorporate the Arts District's identity, in addition to Little Tokyo.	CN-8: Metro shall implement urban design improvements in the form of an "Arts District Path" linking the Arts District to the 1st/Central Avenue station. Metro shall invite Southern California Institute of Architecture and other local students to participate in the path's design. The path shall include sidewalk enhancements, design elements, way finding signage, and crosswalk improvements. The design of the station shall enhance pedestrian circulation.	Verify incorporation of Arts District input into art path design.	Metro	Preliminary Engineering, Final Design	Design Documents	Metro
	CN-9: Design of the 1st/Central Avenue station shall encourage connections and pedestrian travel to the Japanese Village Plaza (JVP), Los Angeles Hompa Hongwanji Temple, the JANM, and businesses south of 2nd Street.	Check design contract documents for compliance.	Metro	Final Design	Design Documents	Metro
Temporary intermittent utility disruption could occur as part of construction.	CN-10: Metro shall field verify (by potholing or other methods) the exact locations and depths of underground utilities and conduct condition checks prior to utility relocation.	Check design contract documents for compliance.	Metro	Final Design	Utility Plans	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	CN-11: Metro shall coordinate closely with utility providers to develop a service plan as needed to address planned and unplanned utility service interruptions. Should an unplanned outage occur as a result of construction activities, Metro shall contact the appropriate utility provider immediately to restore service. Metro shall also maintain access to utilities for providers' technicians. Metro shall provide protective measures such as pipe and conduit support systems, vibration and settlement monitoring, trench sheeting, and shoring during construction to avoid potential damage to utilities.	Verify that utility provider coordination has occurred.	Metro	Final Design	Utility Plans	Metro
		Check design contract documents for compliance.	Metro	Final Design	Design Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Visual and Aesthetic Impacts						
Prominent street-level features would be installed, including station entrances and tunnel portals. Visual character of the corridor could change slightly.	VA-1: Metro shall coordinate with the station area communities to obtain input on the urban design of the project within the community.	Verify that community input has been incorporated into urban design.	Metro	Preliminary Engineering	Design Documents	Metro
		Check preliminary engineering and design contract documents for compliance.	Metro	Preliminary Engineering and Final Design		Metro
	VA-2: Urban design measures shall be developed to integrate the light rail transit (LRT) facilities (stations, portals, entrances, etc.) into each community as appropriate. Designs might address elements such as materials and colors. This process has already begun with community urban design workshops, and Metro shall continue to involve communities in this process. Metro shall coordinate with the City of Los Angeles Department of Planning staff during the design process and regarding urban design elements.	Check preliminary engineering and Final Design drawings for compliance.	Metro	Preliminary Engineering and Final Design	Design Documents	Metro Community Outreach
Temporary visual impacts could occur during construction, but would be less than significant.	VA-3: Metro shall shield temporary lighting during construction to reduce spillover lighting.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Construction Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	VA-4: Metro shall locate stockpile areas (storage areas for construction equipment, supplies, and excavated soil) primarily in less visually sensitive locations, where they are not visible from the road or to businesses or residents.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	VA-5: Temporary construction sheds and barricades shall be located so as to avoid obscuring significant views of historic properties.	Compare design contract documents and construction specifications to Final EIS/EIR to determine compliance.	Metro	Final Design	Design Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Air Quality						
Construction emissions of VOC, NOX, CO, PM2.5, and dust would occur.	AQ-1: Contractors shall be required to adhere to South Coast Air Quality Management District (SCAQMD) standards for off-road engine emissions (refer to Section 4.5.1.1). Examples of how the contractors could ensure adherence include retrofitting off-road engines with add-on control devices such as catalytic oxidizers and diesel particulate filters where feasible.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	AQMD Regulations	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	AQ-2: Metro shall require contractors to use equipment that meets up-to-date specifications (equivalent to models manufactured from 2013 to 2017) for pollutant emissions during project construction.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	BMPs	AQMD/Metro
		Monitor construction activities for compliance.	Metro	Construction		AQMD/Metro
	AQ-3: Contractors shall be required to adhere to SCAQMD standards for dust emissions such as SCAQMD Rule 403. Examples of how the contractors could ensure adherence include applying water or a stabilizing agent to exposed surfaces in sufficient quantity to prevent generation of dust plumes.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	BMPs	AQMD/Metro
		Monitor construction activities for compliance.	Metro	Construction		AQMD/Metro
	AQ-4: Dirt from construction equipment shall not extend 25 feet or more from an active operation, and shall be removed at the conclusion of each workday (refer to Section 4.5.3.3). Street sweeping services shall be coordinated with construction activity to minimize impacts to surrounding businesses and residences.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	BMPs	AQMD/Metro
		Monitor construction activities for compliance.	Metro	Construction		AQMD/Metro
	AQ-5: Contractors shall be required to utilize at least one of the measures set forth in SCAQMD Rule 403 Section (d)(5) to remove bulk material from tires and vehicle undercarriages before vehicles exit the project site.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	BMPs	AQMD/Metro
		Monitor construction activities for compliance.	Metro	Construction		AQMD/Metro
	AQ-6: All haul trucks hauling soil, sand, and other loose materials shall maintain at least six inches of freeboard (not filling trucks all the way to the top) in accordance with California Vehicle Code 23114.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	BMPs	AQMD/Metro
		Monitor construction activities for compliance.	Metro	Construction		AQMD/Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	AQ-7: All haul trucks hauling soil, sand, and other loose materials shall be covered (e.g., with tarps or other enclosures that would reduce dust emissions) (refer to Section 4.5.1.1).	Check design contract documents and construction specifications for compliance.	Metro	Final Design	BMPs	AQMD/Metro
		Monitor construction activities for compliance.	Metro	Construction		AQMD/Metro
	AQ-8: Traffic speeds on unpaved roads shall be limited to 15 MPH.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Contract Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	AQ-9: To control fugitive dust, especially during high wind situations, Metro shall require the contractor to implement the following provisions, consistent with the requirements of SCAQMD Rule 403, as they apply to each of the construction activities identified below: When wind gusts exceed 25 MPH, in areas where earth-moving activities are occurring: (1A) Cease all active operations; or (2A) Apply water to soil not more than 15 minutes prior to moving such soil. Disturbed surface areas: (OB) On the last day of active operations prior to a weekend or holiday: apply water with a mixture of chemical stabilizer diluted with not less than 1/20 of the concentration required to maintain a stabilized surface for a period of six months; or (1B) Apply chemical stabilizers prior to wind event; or	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Contract Documents	Metro
	(2B) Apply water to all unstabilized disturbed areas three times per day. If there is evidence of wind driven fugitive dust, watering frequency is increased to a minimum of four times per day; or (3B) Establish a vegetative ground cover within 21 days after active operations have ceased. Ground cover must be sufficient density to expose less than 30 percent of unstabilized ground within 90 days of planting, and at all times thereafter; or (4B) Utilize any combination of control actions (1B), (2B), and (3B) such that, in total, these actions apply to all disturbed surface areas. Unpaved roads: (1C) Apply chemical stabilizers prior to wind event expected to exceed 25 MPH; or (2C) Apply water twice per hour during active operation; or (3C) Stop all vehicular traffic. Open storage piles: (1D) Apply water twice per hour; or (2D) Install temporary coverings. Paved road track-out: (1E) Cover all haul vehicles; or (2E) Comply with vehicle freeboard requirements of Section 23114 of the California Vehicle Code for both public and private roads. All categories: (1F) Any other control measures approved by the Executive Officer and the United States Environmental Protection Agency as equivalent to the methods specified may be used.	Monitor construction activities for compliance.	Metro	Construction	BMPs	AQMD/Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	AQ-10: Heavy equipment operations shall be suspended during second stage smog alerts as issued by SCAQMD.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	BMPs	AQMD/Metro
		Monitor construction activities for compliance.	Metro	Construction		AQMD/Metro
	AQ-11: On-site stockpiles of debris, dirt, or rusty materials shall be covered or watered at least two times per day.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	BMPs	AQMD/Metro
		Monitor construction activities for compliance.	Metro	Construction		AQMD/Metro
	AQ-12: Contractors shall utilize electricity supplied by LADWP rather than temporary diesel or gasoline generators, as feasible.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Construction Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	AQ-13: Heavy-duty trucks shall be prohibited from idling in excess of five minutes, both on- and off-site. Metro shall employ California Air Resources Board anti-idling requirements during construction. Metro shall require the contractor to regularly perform unscheduled inspections of construction equipment and activities to ensure minimization of associated air quality impacts.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	BMPs	AQMD/Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	AQ-14: Construction worker parking shall be configured to minimize traffic interference. This measure would minimize vehicle idling time, which would reduce emissions generated from construction vehicles.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Contract Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	AQ-15: Construction activity that affects traffic flow on the arterial system, including the transportation of excavated materials, shall be primarily limited to off-peak hours. This measure would minimize vehicle idling time, which would reduce emissions generated from construction vehicles.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Traffic Plans	LADOT/Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	AQ-16: Metro shall require ongoing maintenance and adherence to manufacturer's specifications for all construction equipment engines and vehicles.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Construction Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	AQ-17: Dedicated turn lanes for the movement of trucks and equipment to and from construction sites shall be provided where appropriate. This measure would minimize vehicle idling time, which would reduce emissions generated from construction vehicles.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Traffic Plans	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	AQ-18: Metro shall require on-site construction equipment to meet EPA Tier 2 or higher emission standards according to the January 1, 2012 to December 31, 2014 and post-January 15, 2015 criteria.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Construction Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	AQ-19: Metro shall maintain and clean all trucks and construction equipment as needed.	Monitor construction activities for compliance.	Metro	Construction		Contractor/ Metro
	AQ-20: Metro shall use low-sulfur fuel where possible.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Contract Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	AQ-21: The project and stations shall be designed and constructed in a manner consistent with Metro's sustainability policies (such as Metro's Energy and Sustainability Policy and Metro's Sustainability Implementation Plan).	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Construction-related lane closures and intersection improvements would result in increased emissions, particularly CO emissions, at the major points of delay.	AQ-22: Detour routes shall be designed to ensure that traffic does not idle for extended periods of time, thus reducing the potential for localized exceedence of federal CO/CO2 standards.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Traffic Control Plans	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Noise and Vibration						
Sensitive or historic buildings within 21 feet of construction may be susceptible to vibration damage.	NV-1: Mitigation Measure CR/B-2 shall also apply to sensitive, non-historic structures (Category I, II, III, IV buildings as defined in Table 4.7-4) located within 21 feet of vibration producing construction activity. However, design contract documents shall not require input or review by an architectural historian or historical architect under this mitigation measure.	Verify that an adequate survey of sensitive properties has been performed.	Metro	Preliminary Engineering	Noise and Vibration Control Plan	Contractor/ Metro
	See CR/B-2 and CR/B-4.					
	NV-2: A vibration monitoring plan shall be developed during final design to ensure appropriate measures are taken to avoid any damage to sensitive buildings (Category I, II, III, IV buildings as defined by FTA in Table 4.7-4) or historic buildings due to construction--induced vibration. This shall include pre-construction surveys of all buildings within 21 feet of vibration producing construction activity to confirm the building category (Category I, II, III, IV buildings as defined in Table 4.7-4), structural condition of the building, and to provide a baseline for monitoring of ground-borne vibration (GBV) and measuring the potential for GBV to cause damage where needed. Any damage caused by Metro's construction activities shall be repaired.	Verify that pre-construction surveys have been performed where needed.	Metro	Final Design	Noise and Vibration Control Plan	Contractor/ Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Moderate (but not significant) GBV could cause annoyance to sensitive land uses during construction.	NV-3: Distances greater than those provided in EIS/EIR Table 4.7-5 shall be maintained near vibration-sensitive locations to avoid potential construction-related vibration impacts.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-4: Less vibration-intensive construction equipment or techniques shall be used near vibration-sensitive locations.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Contractor/ Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-5: Heavily laden vehicles shall be routed away from vibration-sensitive locations.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-6: Earthmoving equipment shall be operated as far as possible from vibration-sensitive locations.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-7: Construction activities that produce vibration, such as demolition, excavation, earthmoving, and ground impacting shall be sequenced so that the vibration sources do not operate simultaneously.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-8: Nighttime construction activities that produce noticeable vibration shall be avoided near vibration-sensitive locations.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	City of LA/Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-9: Devices with the least impact shall be used to accomplish necessary tasks.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-10: Non-impact demolition and construction methods, such as saw or torch cutting and removal for off-site demolition, chemical splitting, and hydraulic jack splitting, shall be used instead of high impact methods near vibration-sensitive locations.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	NV-11: Building protection measures such as underpinning, soil grouting, or other forms of ground improvement shall be used where needed to prevent deterioration of building condition due to construction.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-12: Pavement breakers, vibratory rollers, and packers shall operate as far as possible from vibration-sensitive locations.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Noise may inadvertently exceed FTA significance criteria during construction.	NV-13: The construction mitigation plan shall prohibit noise levels generated during construction from exceeding the FTA construction noise criteria. This could include prohibiting simultaneous operation of major pieces of construction equipment if simultaneous operation exceeds FTA construction noise criteria. If a noise complaint is filed during project construction, noise monitoring shall be conducted in the vicinity of the area in question. Although it is not expected to do so with the application of appropriate BMPs, if monitored noise levels exceed FTA construction noise criteria, the contractor shall use all or a combination of the following measures (NV-14 through NV-17) to reduce construction noise levels below FTA construction noise criteria.	Monitor construction activities for compliance.	Metro	Construction	Noise Variance	City of LA/Metro
	NV-14: Temporary noise barriers around the construction sites and localized barriers around specific items of equipment or smaller areas shall be provided as needed.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-15: Alternative back-up alarms/warning procedures shall be used where feasible as needed.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-16: Higher performance mufflers shall be used on equipment used during nighttime hours as needed near sensitive land uses.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	NV-17: Portable noise sheds for smaller, noisy equipment, such as air compressors, dewatering pumps, and generators shall be provided as needed.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Noise and Vibration Control Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Significant ground-borne noise (GBN) impacts could occur during construction at Walt Disney Concert Hall, and the Broad Art Foundation Museum, which is currently under construction. Mitigation for the Walt Disney Concert Hall has been modified to cover the Colburn School as well, in an abundance of caution. Particular mitigation measures NV-19 and NV-21 to NV-23 apply to Japanese Village Plaza in Little Tokyo.	NV-18: Construction of the project, in the vicinity of the Walt Disney Concert Hall, shall be done in accordance with the Memorandum of Agreement (MOA) between FTA and the State Historic Preservation Officer (SHPO), which includes stipulations that outline the specific requirements for consultation and decision-making between the lead federal agency and consulting parties, specify the level of Historic American Building Survey/Historic American Engineering Record (HABS/HAER) recordation, and outline specific requirements for pre- and post-construction surveys, geotechnical investigations, building protection measures, and tunnel boring machine (TBM) specifications (for the Walt Disney Concert Hall only).	Confirm provisions of the MOA.	Metro	Preliminary Engineering	MOA	SHPO/Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	Tunnel Boring Machine:					
	NV-19: Maintenance and Operation: The construction contractor shall minimize vibration from jacking or pressing operations (if applicable, the action could be smoothed out to avoid a sharp push), and maintain machinery in good working order.	Monitor construction activities for compliance.	Metro	Construction	Noise and Vibration Control Plan	Metro
	NV-20: Coordination and Notification: There would be times when the Main Auditorium of the Walt Disney Concert Hall is vacant or not used for a noise-sensitive activity, thereby eliminating any noise impact from TBM. Similarly, there would be times at the Los Angeles Philharmonic Association Conference Room (and offices) of the Walt Disney Concert Hall and at the recording/performance halls of the Colburn School when activities are not particularly noise-sensitive. Metro shall coordinate closely with the Walt Disney Concert Hall, the Colburn School, and the Broad Art Foundation Museum, which is currently under construction, to ensure that the noise-generating parts of TBM operations shall be conducted to avoid noise-sensitive periods.	Monitor construction activities for compliance.	Metro	Construction	Noise and Vibration Control Plan	Metro
	Delivery Train:					
Significant GBN impacts could occur during construction at Japanese Village Plaza	NV-21: Speed: Delivery train speed shall be limited to 5 MPH in the vicinity of the Walt Disney Concert Hall, the Colburn School, and the Broad Art Foundation Museum, currently under construction, which would reduce the GBN to the lower range, or 5 dBA from the maximum range. At the Japanese Village Plaza, one of the following or similar mitigations shall be used: a resilient mat or limiting train speeds to 5 MPH*.	Monitor construction activities for compliance.	Metro	Construction	MOA	SHPO/Metro
	NV-22: Resilient Mat: A resilient system to support and fasten the delivery train tracks shall be used during construction, which would reduce GBN levels by at least 4 dBA. Such as system shall include a) resilient mat under the tracks and b) a resilient grommet or bushing under the heads of any track fasteners (assuming some kind of anchor or bolt system). The hardness of the resilient mat shall be in the 40 to 50 durometer range, and be about one to two inches thick, depending on how heavily loaded the cars would be. The contractor shall select the mat thickness so that the rail does not bottom out during a car pass-by.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		
	NV-23: Conveyor: The delivery train shall be replaced with a conveyor system to transport materials in the tunnel if GBN exceeds the FTA annoyance criteria at the Walt Disney Concert Hall, the Colburn School, or the Broad Art Foundation Museum, which is currently under construction. At the Japanese Village Plaza, one of the following or a similar method shall be used: a resilient mat, slower train speeds, or a conveyor system*.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		
	NV-24: Coordination and Notification: There would be times when the Main Auditorium and Choral Hall of the Walt Disney Concert Hall and the recording/performance halls of the Colburn School are vacant or not used for noise-sensitive activities, thereby eliminating any noise impact from the delivery train. Metro shall coordinate closely with the Walt Disney Concert Hall, the Colburn School, and the Broad Art Foundation Museum, which is currently under construction, to ensure that the delivery train pass-bys would be conducted to avoid noise-sensitive periods.	Monitor construction activities for compliance.	Metro	Construction	Design Documents	Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Significant GBN impacts and GBV could occur during construction at the Hikari Lofts, offices in JVP, and the Nakamura Tetsujiro Building.	NV-25: Metro shall provide advance notice and coordinate with the affected property owners regarding schedules for tunneling and other activities prior to the commencement of those activities.	Monitor construction activities for compliance.	Metro	Construction	Design Documents	Metro
	NV-26: Metro shall provide advanced notification and coordination by doing the following: • Metro shall establish a Construction Community Relation Program to inform and coordinate construction activities including notification to all occupants at the Hikari Lofts, the interior designer office at the JVP, and the Nakamura Tetsujiro Building about the schedule of tunneling activities at least one month prior to the start of the activities. • Metro shall monitor GBN and GBV levels in the in the building adjacent to TBM activity during its operation in that area. • During the few days the TBM will be operating in this area, should GBN or GBV measurements exceed FTA annoyance criteria for short-term impacts during construction, Metro shall offer to temporarily relocate affected residents.	Monitor construction activities for compliance.	Metro	Construction	Community Outreach Plan	Metro Community Relations
Significant GBN impacts could occur during operations at Walt Disney Concert Hall, Hikari Lofts, offices in JVP, the Nakamura Tetsujiro Building, and the Broad Art Foundation Museum, currently under construction. Mitigation for the Walt Disney Concert Hall has been modified to cover the Colburn School as well, in an abundance of caution.	NV-27: In the vicinity of the Walt Disney Concert Hall, the Japanese Village Plaza, and the Colburn School, Metro shall implement resiliently supported fasteners, isolated slab track, or other appropriate measures as needed to eliminate impacts and to reduce GBN below FTA annoyance criteria.	Verify that preliminary engineering studies have been completed.	Metro	Preliminary Engineering	Design Documents	Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
	NV-28: In the vicinity of the Hikari Lofts and Nakamura Tetsujiro Building, Metro shall conduct engineering studies during final design to verify initial estimates of GBN and shall implement high compliance resilient fasteners, floating slab trackbed, or other appropriate measures as needed to eliminate impacts and to reduce GBN below FTA annoyance criteria.	Verify that Final Design studies have been completed.	Metro	Preliminary Engineering	Engineering Study	Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design	Specifications	Metro
	NV-29: In the vicinity of the offices at JVP and the Broad Art Foundation Museum, currently under construction, Metro shall conduct engineering studies during final design to verify initial estimates of GBN and shall implement high compliance resilient fasteners or other appropriate measures as needed to eliminate impacts and reduce GBN below FTA annoyance criteria.	Verify that Final Design studies have been completed.	Metro	Preliminary Engineering	Engineering Study	Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design	Contract Documents	Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Ecosystems/Biological Resources						
Some trees in the project area would be removed or disturbed during construction.	EB-1: The construction contractor shall minimize disturbance to trees through avoidance or fencing.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Documents Landscape Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	EB-2: If disturbance is unavoidable, the construction contractor shall trim individual trees instead of removing them completely where feasible to reduce the scale of disturbance.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Landscape Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	EB-3: The construction contractor shall replant or replace disturbed or removed trees as soon as practicable.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Some tree removal and trimming may need to occur during the bird breeding season, from February 1 to August 31.	EB-4: The construction contractor shall schedule necessary tree removal and trimming activities that would affect bird nesting outside of the bird breeding season, which can extend from February 1 to August 31.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Landscape Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	EB-5: If it is not feasible to avoid tree removal and trimming related to construction during the breeding bird season from February 1 to August 31, breeding bird surveys shall be conducted as recommended by the California Department of Fish and Game. A qualified biologist shall conduct two biological surveys, one 15 days prior and a second 72 hours prior to construction activities that would remove or disturb suitable nesting habitat. The biologist would prepare survey reports documenting the presence or absence of active nests of any protected native bird (as identified in the Migratory Bird Treaty Act) in the habitat to be removed and any other such habitat within 300 feet of the construction work area (within 500 feet for raptors).	Verify qualifications of biologist.	Metro	Pre-Construction	Landscape Plan Bird Survey	Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	EB-6: If an active native bird species nest is located, construction within 300 feet of the nest (500 feet for raptor nests) shall be postponed or modified in consultation with the qualified biologist until the nest is vacated, juveniles have fledged, and there is no evidence of a second attempt at nesting.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Bird Survey	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
		Verify concurrence of qualified biologist.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Some of the trees that need to be removed may be native trees.	EB-7: After detailed engineering and design plans are prepared, a tree survey shall be conducted by a qualified arborist to identify native trees that could be affected by project construction. If construction of the project requires removal of any of the native trees located along the proposed alignment and stations for the approved project, the following mitigation measure shall be applied: A removal permit shall be obtained from the Los Angeles Board of Public Works in accordance with the City of Los Angeles Native Tree Protection Ordinance. Tree replacement shall comply with the ordinance and the terms of the removal permit. If construction would require pruning of any protected native tree, the pruning shall be performed in a manner that does not cause permanent damage or adversely affect the health of the trees.	Verify that permit has been obtained.	Metro	Final Design	Tree Survey	Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	See also EJ-30.					
Geotechnical/Subsurface/Seismic/Hazardous Materials						
Potential exists for ground movement associated with cut and cover construction and potential ground loss due to tunneling.	GT-1: While engineering designs are being finalized, but before any construction, a survey of structures within the anticipated zone of construction influence shall be conducted in order to establish baseline conditions. A geotechnical instrumentation and settlement monitoring plan and mitigation measures shall be developed and adhered to during construction to ensure appropriate measures are taken to address any construction-induced movement.	Verify that design criteria have been established.	Metro	Final Design	Structures Survey	Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Verify that additional geotechnical studies have been completed.	Metro	Final Design		Metro
	GT-1 (Continued): If assessments indicate the necessity to proactively protect nearby structures, additional support for the structures by underpinning or other ground improvement techniques shall be required prior to the underground construction. Metro shall require the construction contractor to limit movement to less than acceptable threshold values for vertical, horizontal, and angular deformation as a performance standard. These acceptable threshold values shall be established such that the risk of damage to buildings and utilities will be negligible to very slight. For buildings, these threshold values will be based on the relationship of building damage to angular distortion and horizontal strain consistent with Boscardin and Cording (1989) and qualitative factors including but not limited to the type of structure and its existing condition. For utility mains, these threshold values shall be those established by the utility owners. Additional data and survey information shall be gathered during final design for each building and utility main to enable assessment of the tolerance of potentially affected structures and utilities. Additional engineering and design level geotechnical studies shall be performed to define the nature of the soils and to refine the means of achieving each performance specification.	Monitor construction activities for compliance.	Metro	Construction	Structures Survey	Metro
	GT-2: Ground improvement such as grouting or other methods shall be required to fill voids where appropriate and offset potential settlement when excess material has been removed during excavation. The criteria for implementing grouting or ground improvement measures shall be based on the analysis described in mitigation measure GT-1.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Structures Survey	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	GT-3: The tunnel alignment shall be grouted in advance to provide adequate soil support and minimize settlement as geotechnical conditions require.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	GT-4: Settlement along the project alignment shall be monitored using a series of measuring devices above the route of the alignment. Leveling surveys shall be conducted prior to tunneling to monitor for possible ground movements.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Structures Survey	Metro
		Verify that adequate leveling surveys have been completed.	Metro	Pre-Construction		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	GT-5: Tunnel construction monitoring requirements shall be described and defined in design contract documents. Additional geotechnical provisions shall be included to the extent feasible, including use of an Earth Pressure Balance or Slurry TBM for tunnel construction to minimize ground loss. During tunnel construction, the soils encountered shall be monitored relative to anticipated soil conditions as described in a Geotechnical Baseline Report.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Contract	Metro
		Verify that an adequate Geotechnical Baseline Report has been prepared.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	See also CR/B-2.					
Contaminated soil or groundwater may be encountered during construction.	GT-6: Once a specific alignment is selected, and detailed engineering plans are being prepared a Contaminated Soil/Groundwater Management Plan shall be implemented during construction to establish procedures to follow if contamination is encountered in order to minimize associated risks to assure that applicable statutory and regulatory standards and requirements are satisfied. The plan shall be prepared during the final design phase of the project, and the construction contractor shall be held to the level of performance specified in the plan. The plan shall include procedures for the implementation of mitigation measures GT-7 through GT-11.	Verify that an adequate Contaminated Soil/Groundwater Management Plan has been prepared.	Metro	Final Design	Contaminated Soil / Ground Water Plan	DTSC/Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	GT-7: Appropriate regulatory agencies, identified in the Contaminated Soil/Groundwater Management Plan, shall be contacted if contaminated soil or groundwater is encountered.	Check construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	GT-8: Sampling and analysis of soil and/or groundwater known or suspected to be impacted by hazardous materials shall be conducted in accordance with the procedures detailed in the Contaminated Soil/Groundwater Management Plan.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	GT-9: Procedures for the legal and proper handling, storage, treatment, transport, and disposal of contaminated soil and/or groundwater shall be delineated and conducted in consultation with regulatory agencies and in accordance with established statutory and regulatory requirements as explained with specificity in the Contaminated Soil/Groundwater Management Plan.	Verify that consultation with appropriate regulatory agencies has occurred.	Metro, regulatory agencies	Final Design	Contaminated Soil / Ground Water Plan	DTSC/Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	GT-10: Dust control measures such as soil wetting, wind screens, etc. shall be implemented for contaminated soil.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Dust Control Plan	AQMD/Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	GT-11: Groundwater collection, treatment, and discharge shall be performed according to applicable standards and procedures (refer to Section 4.10.1).	Check design contract documents and construction specifications for compliance and consistency with Contaminated Soil/Groundwater Management Plan.	Metro	Final Design	RWQCB/ Regulations	RWQCB/Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	GT-12: Worker Health and Safety Plan shall be implemented prior to the start of construction activities. All workers shall be required to review the plan, receive training if necessary, and sign the plan prior to starting work. The plan shall identify properties of concern, the nature and extent of contaminants that could be encountered during excavation activities, appropriate health and environmental protection procedures and equipment, emergency response procedures including the most direct route to a hospital, contact information for the Site Safety Officer.	Verify that an adequate Contaminated Soil/Groundwater Management Plan has been prepared.	Metro	Final Design	Health and Safety Plan	Contractor/ Metro
		Verify that training has occurred and workers have signed the plan.	Metro	Pre-Construction		Contractor/ Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	GT-13: Impermeable grout and other appropriate measures shall be used where necessary to fill gaps between the tunnels and the surrounding earth to address the potential for creation of a preferential pathway and resulting spread of existing contaminated groundwater.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Hazardous Waste Soils/ Ground Water Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Subsurface gases associated with oilfields in the vicinity of the project area may be encountered during construction.	GT-14: Testing for subsurface gases particularly methane shall be conducted before and during construction along all portions of the underground alignment.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Hazardous Waste Soils/ Ground Water Plan	Metro
		Verify that adequate testing has occurred.	Metro	Final Design		Metro
	GT-15: Construction of the project shall be consistent with the City of Los Angeles Methane Mitigation Standards, established in accordance with City of Los Angeles Ordinance No. 175790 and No. 180619, which provide detailed installation procedures, design parameters, and test protocols for the methane gas mitigation system as well as methods to control methane intrusion emanating from geologic formations.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Hazardous Waste Soils/ Ground Water Plan	City / Metro
		Monitor construction activities for compliance.	Metro	Construction	Methane Mitigation	City / Metro
	GT-16: Specialized excavation methods shall be implemented to protect workers and the public from exposure to toxic gases and prevent explosions. For instance, pressurized closed-face TBMs and other equipment outfitted with ventilation systems would be used, as needed, to excavate the tunnels associated with the project, including Slurry Face Machines (SFMs) and Earth Pressure Balance Machines (EPBMs). During tunneling, the volume of gas (or water containing dissolved gas) released from the soil is confined to the excavated material chamber of the TBM because of the closed-face and gas-tight lining that is installed immediately behind the TBM. The project shall also be consistent with the City's Methane Mitigation Standards, which include provisions to protect workers and the public.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		City / Metro
		Monitor construction activities for compliance.	Metro	Construction		City / Metro
Asbestos and lead may be encountered during building demolition.	GT-17: Prior to building demolition, surveys of asbestos containing materials and lead-based paint shall be conducted. If necessary, destructive sampling shall be used. All asbestos containing materials and lead-based paint would be removed or otherwise abated prior to demolition in accordance with all applicable laws and regulations.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Lead and Asbestos Surveys	Metro
		Verify that adequate surveys have been completed.	Metro	Final Design		Metro
		Monitor construction activities for compliance and verify that any necessary abatement has been completed before demolition begins.	Metro	Construction		Metro
Potential exists for accidental release of construction-related hazardous materials.	GT-18: The construction contractor shall be required to implement best management practices (BMPs) for handling hazardous materials in compliance with existing regulations. These shall include requirements for proper use, storage, and disposal of chemical products and hazardous materials used in construction; spill control and countermeasures, including employee spill prevention/response training; vehicle fueling procedures to avoid overtopping construction equipment fuel tanks; procedures for routine maintenance of construction equipment, including the proper containment and removal of grease and oils; procedures for the proper disposal of discarded containers of fuels and other chemicals.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Hazardous Waste Management Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Potential exists for intrusion of subsurface gases into the underground portions of the alignment.	GT-19: Structures within methane zones and buffer zones shall be consistent with municipal code requirements for gas concentration/pressure testing on a specified frequency and, based on the results, appropriate mitigation measures or controls to be included in the design. These measures may include the use of gas-impermeable liners and venting to reduce or eliminate gas intrusion into stations and along the length of the underground segments.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
		Verify that gas concentration and pressure testing is performed according to specified frequency.	Metro	Operation		Metro
Potential exists for hazardous materials to be encountered during excavation and construction activities.	GT-20: Prior to the onset of demolition and construction, Metro shall develop and implement an Environmental Site Assessment program in accordance with appropriate laws and regulations (refer to Section 4.9.1) to assess the potential for hazardous materials that may be encountered during construction.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Environmental Site Assessment Report	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Potential exists for hazardous building materials to be encountered during demolitions.	GT-21: Prior to the onset of demolition and construction, Metro shall develop and implement plans for pre-demolition and demolition abatement of hazardous building materials (i.e., asbestos, lead-based paint, PCB-light ballasts) in accordance with appropriate laws and regulations such as the Toxic Substances Control Act (refer to Section 4.9.1).	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Hazardous Material / Lead and Asbestos Removal Plans	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Water Resources						
Potential exists for excess erosion to occur during construction.	WR-1: An erosion control plan shall be prepared prior to construction and shall specify procedures for implementing mitigation measures WR-2 through WR-5.	Verify that an adequate erosion control plan has been prepared.	Metro	Final Design		Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design	SWPPP/ SUSMPS	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	WR-2: Natural drainage, detention ponds, sediment ponds, or infiltration pits shall be used to allow runoff to collect and reduce or prevent erosion.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	SWPPP/ SUSMPS	City / Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	WR-3: Barriers shall be used to direct and slow the rate of runoff and to filter out large-sized sediments.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	SWPPP	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	WR-4: Down-drains or chutes shall be used to carry runoff from the top of a slope to the bottom.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	SWPPP	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	WR-5: Use of water for irrigation and dust control shall be controlled so as to avoid off-site runoff.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	SWPPP	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Impacts to water quality stemming from both construction and operation of the project could occur.	WR-6: Project design shall include properly designed and maintained biological oil and grease removal systems in new storm drain systems to treat water before it leaves project sites.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	SUSMPS	City / Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	WR-7: Hazardous materials shall be stored properly and in accordance with applicable law to prevent contact with precipitation and runoff.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Hazardous Material Management Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
		Monitor operations and maintenance for compliance.	Metro	Operation		Metro
	WR-8: Prior to the onset of demolition or construction an effective monitoring and cleanup program for spills and leaks of hazardous materials shall be developed and maintained.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Hazardous Material Management Plan	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
		Monitor operations and maintenance for compliance.	Metro	Operation		Metro
	WR-9: Equipment to be repaired or maintained shall be placed in covered areas on a pad of absorbent material to contain leaks, spills, or small discharges.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Hazardous Material Management Plan + SWPPP	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	WR-10: Periodic and consistent removal of landscape and construction debris shall be performed.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Contract Specifications	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
		Monitor operations and maintenance for compliance.	Metro	Operation		Metro
	WR-11: Any significant chemical residue on the project sites shall be removed through appropriate methods.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Hazardous Material Management Plan + SWPPP	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
		Monitor operations and maintenance for compliance.	Metro	Operation		Metro
	WR-12: Non-toxic alternatives for any necessary applications of herbicides or fertilizers shall be used.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
		Monitor operations and maintenance for compliance.	Metro	Operation		Metro
	WR-13: Detention basins shall be installed to remove suspended solids by settlement.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	SUSMPS	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	WR-14: Water quality or runoff shall be periodically monitored before discharge from project sites and into the storm drainage system.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	SWPPP	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Cultural Resources - Built Environment						
Construction-related direct and indirect adverse impacts to historical resources could occur.	CR/B-1: Documentation of historic properties and historical resources adversely affected by the project shall consist of the development of individual HABS/HAER submissions. The appropriate level of recordation shall be established in consultation with the California SHPO and formalized as a part of a Memorandum of Agreement as described in Section 4.12.1.4.5 of the Draft EIS/EIR and included in Appendix 3 of this Final EIS/EIR. The HABS/HAER documents shall be offered to the Library of Congress and the documents shall be prepared so that the original archival-quality documentation would be suitable for inclusion in the Library of Congress if the National Park Service accepts these materials. Archival copies of the documentation shall also be offered for donation to local repositories, including the Los Angeles Central Library and the Los Angeles Conservancy.	Verify that adequate HABS/HAER documents have been prepared.	Metro, SHPO	Preliminary Engineering	CRMMP / Historic Properties Inventory	SHPO / Metro
		Verify level of recordation established by SHPO and MOA has been met.	Metro, SHPO	Preliminary Engineering	CRMMP / SHPO MOA	SHPO / Metro
	CR/B-2: During preliminary engineering and final design of the project, a more detailed survey of historic properties and/or historical resources within 21 feet of vibration producing construction activity shall be conducted to confirm the building category, and to provide a baseline for monitoring of GBV and the potential for GBV to cause damage. The survey shall also be used to establish baseline, pre-construction conditions for historic properties and historical resources. During preliminary engineering and final design of the project, additional subsurface (geotechnical) investigations shall be undertaken to further evaluate soil, groundwater, seismic, and environmental conditions along the alignment. The analysis shall assist in the selection and development of appropriate support mechanisms for cut and cover construction areas and any sequential excavation method (mining) construction areas, in accordance with industry standards and the Building Code. The subsurface investigation shall also identify areas that could experience differential settlement as a result of using a TBM in close proximity to historic properties and/or historical resources. An architectural historian or historical architect who meets the Secretary of Interior's Professional Qualification Standards shall provide input and review of design contract documents prior to implementation of the mitigation measures.	Verify that an adequate survey of historic properties and/or historical resources has been performed.	Metro	Preliminary Engineering	CRMMP / Historic Properties Inventory	SHPO / Metro
		Verify that adequate subsurface investigations have occurred.	Metro	Preliminary Engineering		Metro
		Verify qualifications of architectural historian or historical architect, and ensure that review of design contract documents occurs prior to implementation of mitigation measures.	Metro	Final Design		Metro
	CR/B-3: The historic property and historical resource protection measures as well as the geotechnical and vibration monitoring program shall be reviewed by an architectural historian or historical architect who meets the Secretary of Interior's Professional Qualification Standards to ensure that the measures would adequately protect the properties/resources. A post-construction survey shall also be undertaken to ensure that adverse effects or significant impacts have not occurred to historic properties or historical resources.	Verify qualifications of architectural historian or historical architect, and ensure that review of protection measures has occurred.	Metro	Final Design	CRMMP	SHPO / Metro
		Verify that post-construction survey has occurred and no adverse effects or significant impacts would occur.	Metro	Post-Construction		Metro
	CR/B-4: For those historic properties and historical resources where adverse impacts are anticipated, a MOA has been developed to resolve those adverse effects consistent with 36 CFR 800. This agreement, developed by FTA and Metro in consultation with the California SHPO and other consulting parties shall resolve and/or avoid, minimize, or mitigate potential effects to historic properties and/or historical resources. The agreement includes stipulations that outline the specific requirements for consultation and decision-making between the lead federal agency and consulting parties, specify the level of HABS/HAER recordation, and outline specific requirements for pre- and post-construction surveys, geotechnical investigations, building protection measures, and TBM specifications. See Appendix 3 (MOA) of this Final EIS/EIR for specific requirements.	Confirm provisions of the MOA.	Metro, FTA, SHPO	Preliminary Engineering	CRMMP/ MOA	Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	CR/B-5: The S. Kamada Restaurant, Atomic Café, Señor Fish, and Coast Imports building (to be removed) shall be offered for a period of one year following certification of the Final EIS/EIR for the price of $1 to any party willing to move it off of the 1st/Central Avenue station site at their own expense. Should no parties come forward, Metro shall incorporate materials from the building into the project facilities. Metro shall explore keeping portions of the building intact for use in the 1st/Central Avenue station. Metro shall also offer to provide an exhibit commemorating the building at the JANM, the 1st/Central Avenue station site, or other suitable location. An individual HABS/HAER submission shall be developed.	Verify that the offer to sell is extended for one year.	Metro	Pre-Construction	Real Estate / Construction Specifications	Metro
		Verify that HABS/HAER submission is completed.	Metro	Pre-Construction		Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	CR/B-6: Facades of historic buildings adjacent to the construction areas shall be protected from accumulation of excessive dirt or shall be cleaned in an appropriate manner periodically while construction activities are occurring nearby.	Monitor construction activities for compliance.	Metro	Construction, Post-Construction		Metro
	See also GT-1 through GT-5.					
Significant GBN impacts could occur during construction and operations at Walt Disney Concert Hall.	See NV-18 through NV-24 and NV-27.					
Built environment mitigation measures included in the MOA between the SHPO, Metro, and FTA shall be implemented as part of this MMRP. The full text of the MOA is attached to this MMRP.	See attached MOA.					
Cultural Resources - Archaeology						
Unknown archaeological resources could be disturbed during construction.	CR/A-1: Construction personnel shall be trained on proper procedures by a qualified lead archaeologist.	Verify qualifications of lead archaeologist.	Metro	Pre-Construction	CRMMP	Metro
		Verify that training occurs.	Metro	Pre-Construction		Metro
	CR/A-2: An archaeological monitor shall be present during ground-disturbing activities. The archaeological monitor shall have authority to halt operations to examine potential resources and recover artifacts using professional archaeological methods.	Verify qualifications of archaeological monitor.	Metro	Pre-Construction	CRMMP	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	CR/A-3: A Native American cultural resources consultant from the Gabrielino/Tongva San Gabriel Band of Mission Indians and/or the Tongva Ancestral Territorial Tribal Nation shall be contacted to monitor ground-disturbing work if Native American cultural resources are discovered.	Identify a qualified Native American cultural resources consultant.	Metro, Gabrielino/Tongva San Gabriel Band of Mission Indians, and Tongva Ancestral Territorial Tribal Nation	Pre-Construction	CRMMP	Metro
		Monitor construction activities for compliance.	Metro	Pre-Construction		Metro
	CR/A-4: Work shall stop if human remains are found, and the Los Angeles County Coroner shall be notified immediately. If the remains are determined to be prehistoric, the Coroner shall notify the Native American Heritage Commission (NAHC), which will arrange for a Most Likely Descendent (MLD) to inspect the site within 48 hours and issue recommendations for scientific removal and nondestructive analysis.	Monitor construction activities for compliance.	Metro	Construction	CRMMP	Metro
		Identify MLD and ensure timely inspection occurs.	NAHC	Construction		Metro
	CR/A-5: If no cultural resources are discovered during construction monitoring, the archaeological monitor shall submit a brief letter to that effect. If previously unidentified cultural resources are discovered in the course of construction monitoring, a report shall be prepared following Archaeological Resource Management Report (OHP 1990) guidelines that documents field and analysis results and interprets the data within an appropriate research context.	Verify that a letter or report has been prepared as appropriate.	Metro	Post-Construction	CRMMP	Metro
Disturbance of the Los Angeles Zanja System (CA-LAN-887H and other unnumbered zanjas), and sites CA-LAN-3588, P-19-003338, and P-19-003339 could occur during construction.	CR/A-6: A proactive identification and documentation program that would facilitate preservation or mitigation in a cost-effective manner shall be undertaken. This shall include using documentary research to identify, as accurately as possible, the precise alignments of the zanjas within the area of potential effect. Where these alignments are expected to be affected by the proposed project, particularly where cut and cover or other near-surface construction techniques are planned in the vicinity of mapped zanja segments, full-time archaeological monitoring would be instituted to ensure documentation consistent with Section 4.12.2.4.2 of the Draft EIS/EIR.	Verify that the identification and documentation program has been prepared.	Metro	Final Design	CRMMP	Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Archaeological mitigation measures included in the MOA between the SHPO, Metro, and FTA shall be implemented as part of this MMRP. The full text of the MOA is attached to this MMRP.	See attached MOA.	Verify implementation of MOA mitigation measures.	Metro	Final Design, Construction	CRMMP	Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Cultural Resources - Paleontology						
Previously undiscovered paleontological resources may be disturbed during construction.	CR/P-1: A qualified paleontologist shall prepare a Paleontological Monitoring and Mitigation Plan for the proposed project and supervise monitoring of construction excavations within sensitive geologic sediments. The monitor shall have authority to temporarily divert grading away from exposed fossils to professionally and efficiently recover the fossil specimens and collect associated data.	Verify qualifications of paleontologist.	Metro	Final Design		Metro
		Verify that an adequate Paleontological Monitoring and Mitigation Plan has been prepared.	Metro	Final Design	CRMMP	Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro, Paleontological monitor	Construction		Metro
	CR/P-2: All project-related ground disturbances that could potentially affect the Puente Formation, Fernando Formation, and Quaternary older alluvium and terrace deposits would be monitored by a qualified paleontological monitor on a full-time basis (where feasible) because these geologic sediments are determined to have a high paleontological sensitivity. Very shallow surficial excavations (less than five feet) within Quaternary younger alluvium would be monitored on a part-time basis to ensure that underlying sensitive units are not adversely affected. Construction monitoring during any tunneling activity is not warranted as any potential fossil specimens present within sensitive geologic units would be crushed and destroyed by the nature of tunneling methodology.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	CRMMP	Metro
		Monitor construction activities for compliance.	Metro	Construction	CRMMP	Metro
	CR/P-3: At each fossil locality, field data forms shall be used to record pertinent geologic data, stratigraphic sections shall be measured, and appropriate sediment samples shall be collected and submitted for analysis.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	CRMMP	Metro
		Monitor construction activities for compliance.	Metro, Paleontological monitor	Construction		Metro
	CR/P-4: Due to the likelihood of the presence of microfossils, matrix samples shall be collected and tested within the Puente Formation and Fernando Formation. Testing for microfossils shall consist of screen-washing samples (approximately 30 pounds) to determine if significant fossils are present. Productive tests shall result in screen-washing of additional bulk matrix up to a maximum of 2,000 pounds per locality to ensure recovery of a scientifically significant sample.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro, Paleontological monitor	Construction		Metro
	CR/P-5: Recovered fossils shall be prepared to the point of curation, identified by qualified experts listed in a database to facilitate analysis, and reposited in a designated paleontological curation facility such as the Natural History Museum of Los Angeles County.	Verify that a suitable repository has been identified and recovered fossils are reposited appropriately.	Metro	Construction		Metro
	CR/P-6: The paleontologist shall prepare a final monitoring and mitigation report to be filed, at a minimum, with Metro and the identified repository.	Verify that an adequate report has been filed.	Metro	Post-Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Parklands and Other Community Facilities						
Restriction of access to public services could occur due to construction activities.	PC-1: Where feasible, temporary restriping of the roadway to maximize the vehicular capacity at locations affected by construction closures shall be performed. Metro shall provide notices of closures and relocations on its website, smart phone apps, and other modes typically used to communicate service announcements.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Documents	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	PC-2: Where feasible and necessary, temporary removal of on-street parking to maximize the vehicular capacity at locations affected by construction closures shall be performed. Where temporarily eliminated, parking spaces will be restored to their prior striped or signed condition at the conclusion of the construction period.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Traffic Control Plans	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	See also AQ-15, CN-1, CN-3, CN-5, CN-6, TR-4, TR-5, DR-6, and EJ-1.					
Economic and Fiscal Impacts						
Economic and fiscal impacts of business and parking displacement due to project acquisitions.	See DR-4 through DR-8.					
	EF-1: Metro shall develop measures to assist business owners significantly impacted by construction. These shall include temporary parking, marketing programs, and other measures developed jointly between Metro and affected businesses.	Oversee joint working group between Metro and affected business owners. Work individually with each business.	Metro, Joint working group	Preliminary Engineering, Final Design	Metro Community Outreach Plan	Metro
		Verify that all feasible, appropriate measures identified by the joint effort are implemented.	Metro, Joint working group	Construction		Metro
Safety and Security						
Safety and security concerns should be further minimized during operations through BMPs.	SS-1: Fire alarm protection shall be provided within station areas as required by applicable laws, regulations, and standards.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Verify that system is maintained in working order.	Metro	Operation		Metro
	SS-2: A minimum of two fire emergency routes shall be provided from each station as required by applicable laws, regulations, and standards.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Fire Life Safety Criteria	Metro
		Maintain exits in working order.	Metro	Operation		Metro
	SS-3: Adequate emergency ventilation and lighting shall be provided in each station in accordance with Metro Fire/Life Safety Standards and City of Los Angeles building codes.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Fire Life Safety Criteria	Metro
		Verify that system is maintained in working order.	Metro	Operation		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	SS-4: Communication systems between adjoining fire agencies shall be provided as required by applicable laws, regulations, and standards.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Fire Life Safety Criteria	Metro
		Verify that system is maintained in working order.	Metro	Operation		Metro
	SS-5: A methane detection system shall be provided in each station as required by applicable laws, regulations, and standards.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Fire Life Safety Criteria	Metro
		Verify that system is maintained in working order.	Metro	Operation		Metro
	SS-6: Building construction for underground stations shall not be less than Type I Construction as defined in the Uniform Building Code. All stations with more than two levels below-grade or where the lowest occupied level is more than 80 feet below-grade shall have protected level separation or other protection features to provide safe egress to exits.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Specifications	Metro
	SS-7: All proposed mitigation measures regarding safety and security shall be implemented in a manner conformant to Metro's Rail Transit Design Criteria and Standards and Fire/Life Safety Criteria. A combination of the following measures shall be implemented as indicated by the Threat and Vulnerability Assessment: closed-circuit television system, emergency push-button call system for patrons, intrusion detection system, dedicated security patrol protocols and procedures, and crime prevention through environmental design.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Fire Life Safety Criteria	Metro
	SS-8: Proposed station designs shall not include design elements that obstruct visibility or observation, nor provide discrete locations favorable to crime. Proposed stations shall be lighted to avoid shadows. Pedestrian pathways shall include clear sight lines whenever feasible. Project sidewalk widths and placements shall be appropriately designed to accommodate a wide variety of users. The following criteria shall be used when designing project sidewalks: sidewalk and pedestrian bridge widths shall be designed with the widest dimensions feasible (at least ten feet) in conformance with Metro's adopted land use and transportation policies; minimum sidewalk widths shall not be less than those allowed by the State of California Title 24 access requirements or the ADA design recommendations; where practicable, pedestrian movements and flows shall be favored over other transportation modes, such as automobile access; and stations shall be fully accessible as defined by ADA.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Specifications	Metro
	SS-9: An ADA accessible connection for the 2nd/Hope Street station to Upper Grand Avenue shall be provided. The future Broad Art Foundation Museum, currently under construction, is projected to include a plaza above General Thaddeus Kosciuszko Way connecting to Upper Grand Avenue. In order to provide access from the 2nd/Hope Street station to Upper Grand Avenue, an elevator from the station entrance to the plaza shall be built as part of this alternative if one is not already provided. If the plaza is not built, a pedestrian connection (such as a pedestrian bridge) shall be constructed. The connection shall reduce conflicts between pedestrians and vehicles.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Specifications	Metro
	SS-10: Adequate pedestrian queuing and refuge areas shall be provided at the proposed stations to facilitate pedestrian mobility. Adequately wide crosswalks shall be provided in the areas immediately around the proposed stations.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Specifications	Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	SS-11: All proposed stations shall be equipped with monitoring equipment, which shall primarily consist of video surveillance to monitor strategic areas of the stations and walkways and/or be monitored by Metro security personnel on a regular basis.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design Specifications	Metro
		Verify that system is maintained in working order.	Metro	Operation		
	SS-12: Metro shall implement a security plan for LRT operations to include both in-car and station surveillance by Metro security or other local jurisdiction security personnel. Metro shall coordinate and consult with the Los Angeles Fire Department, Los Angeles Police Department, and the Los Angeles County Sheriff Department as appropriate to develop safety and security plans for the proposed alignment and station areas.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Fire Life Safety Criteria	Metro
		Verify that system is maintained in working order.	Metro	Operation		Metro
	SS-13: Trains and/or platforms shall be equipped with safety features that reduce the potential for persons to contact the vehicle coupler and/or fall under the train.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Verify that features are maintained in working order.	Metro	Operation		Metro
	SS-14: Fire separations shall be provided and maintained in public occupancy areas as required by regulation.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Verify that features are maintained in working order.	Metro	Operation		Metro
Safety and security concerns should be further minimized during construction through BMPs.	SS-15: Metro shall protect public use of work areas involving sidewalks, entrances to buildings, lobbies, corridors, aisles, stairways, and vehicular roadways with appropriate guardrails, barricades, temporary fences, overhead protection, temporary partitions, shields, and adequate visibility. Metro shall keep sidewalks, entrances to buildings, lobbies, corridors, aisles, doors, or exits that remain in use by the public clear of obstructions. Metro shall post appropriate warnings, signs, and instructional safety signs. These requirements shall be included in the construction specifications.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Construction Specifications	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	SS-16: An education safety and outreach campaign shall be implemented during construction to address public safety awareness in the vicinity of the project. The campaign would target the diverse community in the project area to educate them on proper system use and benefits of LRT ridership.	Monitor construction activities for compliance.	Metro	Construction		Metro
	See also CN-1 through CN-3, TR-4, and DR-7.					

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Environmental Justice						
Temporary bus re-routing or stop closures may be needed in Little Tokyo during construction.	See TR-12 and TR-13.					
Disproportionate amounts of parking spaces would be temporarily removed in Little Tokyo during construction (i.e., more parking spaces would be removed in Little Tokyo than in other parts of the project area). This could impact the community, including businesses.	EJ-1: The temporary displacement of three bus loading spaces on Alameda Street for the JANM shall be replaced nearby for the duration of construction activities. Metro shall work with JANM to confirm locations of temporary loading spaces.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Traffic Control Plans	City / Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	EJ-2: Any unmet demand for parking spaces eliminated in Little Tokyo during construction shall be temporarily replaced within one block of the land uses that rely on those spaces, or through a combination of measures DR-4, and EJ-3 through EJ-9.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Traffic Control Plans	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	EJ-3: Metro shall provide two acres of land on the Mangrove property (northeast of 1st and Alameda Streets) for the purposes of providing alternative parking services during construction, which could include satellite parking served by shuttle buses, valet parking from vehicle pick-up/drop-off in the central business areas of Little Tokyo, and standard self-parking. The number of spaces provided would range from 200 standard spaces to approximately 300 spaces when supplemental parking services are operating. Any parking services shall be operated by a licensed/bonded parking company and shall be selected through a competitive request for proposal (RFP) process. Cost to park shall be comparable with current cost to park. The appropriate parking service provided will be determined with the participation of the Regional Connector Community Leadership Council (RCCLC) and/or other subcommittee. Through the RCCLC, LTCC, and other community groups it shall be assessed the feasibility of establishing a shuttle service connecting local parking lots and Little Tokyo/Arts District with destinations in downtown. This shall offset the temporary loss of parking available to patrons of Little Tokyo businesses, and other visitors, during construction.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Lease	Metro/Real Estate
		Monitor construction activities for compliance.	Metro, Parking Contractor	Construction		Metro
	EJ-4: Metro shall provide notices of traffic control plans and parking relocations on its website, smart phone apps, and other modes typically used to communicate service announcements.	Verify implementation of noticing procedures.	Metro	Construction	Community Outreach Plan	Metro Community Relations
	EJ-5: Metro shall support efforts to curb non-legitimate use of disabled parking spaces.	Verify agency support.	Metro	Construction, Operation		Metro
	EJ-6: Metro shall work with LADOT, owners of private parking lots, and businesses to develop an advanced parking reservation system at cooperative and suitable locations during construction.	Verify that agency and community coordination has occurred.	Metro, LADOT, Little Tokyo stakeholders	Final Design		LADOT / Metro
		Verify implementation and maintenance of system.	Metro	Construction		LADOT / Metro
	EJ-7: Metro shall work with LADOT to open city parking lots for short-term use on evenings and weekends during construction in the vicinity of Little Tokyo.	Verify that agency coordination has occurred.	Metro	Final Design		LADOT / Metro
		Verify parking lot adherence to extended hours.	Metro	Construction		LADOT / Metro
	EJ-8: Metro shall work with the City of Los Angeles to reduce impacts of government vehicles parking on 2nd Street during construction, such as identification of alternate parking areas.	Verify that agency coordination has occurred.	Metro	Final Design		LADOT / Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
	EJ-9: Metro shall work with the City of Los Angeles and the Little Tokyo Business Improvement District to facilitate creation of financial incentives such as parking validation programs to prioritize parking for Little Tokyo customers, residents, and businesses during construction.	Verify that agency coordination has occurred.	Metro	Final Design		LADOT / Metro
		Monitor implementation of any financial incentive parking programs.	Metro	Construction		Metro
	EJ-10: Metro shall identify which restaurants within Little Tokyo would be interested in establishing curbside pickup. Metro shall work with the City of Los Angeles to allow temporary curbside parking during construction, which would allow Metro to establish curbside pickup for Little Tokyo restaurants.	Verify that community and City of Los Angeles coordination has occurred.	Metro, LADOT, Little Tokyo stakeholders	Final Design	Community Outreach Plan	Metro
		Check design contract documents for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	EJ-11: Prior to construction, Metro shall conduct an annual parking needs assessment in Little Tokyo. Metro shall provide replacement parking for spaces lost as a result of the project as described in EJ-3 and to respond to the needs identified in the parking needs assessment. Metro shall work with Little Tokyo and surrounding communities to educate visitors and residents where parking is available during construction. Metro shall monitor parking, and the parking analysis shall be conducted on an annual basis throughout the duration of construction. This effort shall include new signage and other wayfinding features as appropriate.	Verify that an independent parking needs assessment has been performed.	Metro	Final Design	Parking Plan	Metro
		If demand exceeds supply, check design contract documents for permanent replacement parking provisions.	Metro	Final Design		Metro
		If demand exceeds supply, verify that replacement parking has been opened.	Metro	Pre-Construction		Metro
		If demand exceeds supply, verify that replacement parking is maintained.	Metro	Construction		Metro
		If supply exceeds demand, verify that meetings with the Little Tokyo community and surrounding communities have occurred.	Metro	Final Design		Metro
		If supply exceeds demand, verify that signage and any other appropriate way finding features have been placed and are maintained.	Metro	Pre-Construction, Construction		Metro
	See also DR-4 through DR-5.					
Disproportionate community and neighborhood impacts could occur in Little Tokyo during construction.	EJ-12: Metro shall provide assistance for businesses to maintain visibility during construction, including signage and advertisements.	Verify that signage and advertisements have been placed and are maintained.	Metro	Construction	Traffic Control Plans	Metro
	See also CN-1 through CN-7, DR-6, DR-7, TR-1, TR-2, TR-4, TR-5, EJ-2 through EJ-10, EJ-15, EJ-16, EJ-17, and EJ-19.					

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Disproportionate reductions of access to community facilities and businesses could occur in Little Tokyo during construction.	See TR-1 and EJ-1.					
Disproportionate property acquisitions and business relocations would occur in Little Tokyo.	EJ-13: Should parcels used for construction staging be proposed for redevelopment in the future, Metro is committed to involving the community in the redevelopment of construction staging areas following completion of construction activities. Metro shall do this through its established Joint Development Policy.	Verify that community input has been incorporated into redevelopment proposals.	Metro, Little Tokyo stakeholders	Construction, Post-Construction		Metro
	See also DR-8 and EJ-15.					
Disproportionate long-term displacement of commercial space could result in Little Tokyo.	EJ-14: Displaced commercial space in Little Tokyo shall be replaced with high quality commercial development opportunities consistent with Little Tokyo's community identity. This could include development at the 1st/Central Avenue station site. Depending on the type of new development, it would potentially create at least as many jobs as had been displaced.	Verify that opportunities for development of the 1st/Central Avenue station site and the Mangrove property are being actively sought.	Metro	Post-Construction		Metro / Joint Development
	EJ-15: Metro shall work with the Little Tokyo and Arts District communities and the Community Redevelopment Agency of the City of Los Angeles (CRA/LA) to create joint development opportunities for the 1st/Central Avenue station site.	Verify that input from CRA/LA and the Little Tokyo community has been received and incorporated into potential joint development opportunities.	Metro, CRA/LA, Little Tokyo stakeholders	Construction, Post-Construction		Metro / Joint Development
	See also EJ-13.					
Disproportionate visual alteration of the Little Tokyo neighborhood could occur due to removal of structures for the 1st/Central Avenue station.	See CN-7, EJ-14 and EJ-15.					
Disproportionate GBV impacts could occur in Little Tokyo during construction.	See NV-25 and NV-26.					

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Disproportionate economic and fiscal impacts to businesses in Little Tokyo could occur during construction.	EJ-16: Metro shall provide services to support affected Little Tokyo businesses and organizations during construction such as targeted advertising and marketing campaigns, Metro-sponsored coupons, incentives for construction worker patronage, and Metro-sponsored community events. Metro shall provide free technical support assistance (i.e., website development) to local businesses on strategies for business development that can minimize any adverse impacts of construction. This can include, but not be limited to, assistance with accounting or advertising. Metro shall work with the RCCLC including businesses, tenants, property owners, and government agencies with jurisdiction to make policy to resolve issues arising from adverse business issues during all phases of construction. The committee shall work to develop an implementation plan for these services and determine their content. The committee shall also be kept apprised of construction progress and upcoming transit, parking, or access changes. Metro shall provide maps showing existing and planned access during all phases of construction. Metro shall also provide directional signage to temporary parking facilities. An MOU agreement shall be developed to implement and compensate the process. The MOU will include but not be limited to provide the following: marketing and merchant support, technical and business assistance, Business Interruption Program to provide an expeditious standard for claims resolution and reimbursement, marketing services and branding campaign, merchant discounts and incentives/rewards program, signage (for business and access), and special event planning (including support). These activities shall be conducted in a manner consistent with the similar program developed for the Crenshaw Transit Corridor Project.	Verify that community input has been incorporated into implementation plan.	Metro, Little Tokyo stakeholders	Final Design	Community Outreach Plan	Metro / Community Relations
		Verify implementation of specified services and ongoing involvement of the RCCLC.	Metro	Construction		Metro / Community Relations
	EJ-17: Surface level construction activities shall be curtailed to the extent feasible during major Little Tokyo festivals and outdoor events to ensure that noise, air quality, traffic, and parking issues do not adversely affect these economically vital events. Metro shall request a list of events and festivities from the Little Tokyo community.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro / Community Relations
		Verify that community has provided a schedule of events.	Metro, Little Tokyo stakeholders	Final Design, Construction		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	See also CN-3 and EJ-2 through EJ-12.					
	EJ-18: Metro shall work with the Little Tokyo Business Association to help offset the neighborhood impacts associated with reduced revenue from the Business Improvement District funds during construction due to the removal of acquired businesses. Metro shall also offer the services described in EJ-16. Metro shall use Metro's existing claims process to address physical damage (utility interruption, for example).	Verify that community input has been incorporated into implementation plan.	Metro, Little Tokyo stakeholders	Final Design		Metro / Community Relations
		Verify implementation of specified services.	Metro	Construction		Metro
	EJ-19: Metro shall work with the Little Tokyo community businesses to minimize adverse impacts to business operations associated with utility relocation and protection of existing utilities. Metro shall offer the services described in TR-4, EJ-12, and CN-4.	Verify that community input has been incorporated into implementation plan.	Metro, Little Tokyo stakeholders	Final Design		Metro
		Verify implementation of specified services.	Metro	Construction		Metro

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Disproportionate adverse transportation impacts could occur in Little Tokyo during construction.	EJ-20: Metro shall provide advertising on its transit buses and other typical means of communication publicizing construction plans and alternatives to travel and park in Little Tokyo during the construction period. Metro shall also place these advertisements on construction site walls if the community desires.	Verify implementation of advertisement services.	Metro	Construction		Metro
	EJ-21: Metro shall avoid haul routes along 1st Street or along Alameda Street between 3rd Street and US 101 where possible. Haul routes shall be confirmed with the input of the community.	Verify that community input into haul routes has occurred.	Metro	Final Design	Haul Routes	Metro
		Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	See also EJ-1, EJ-2 through EJ-12, EJ-16, EJ-17, CN-3, and CN-7.					
Construction activities would be disproportionately centered in Little Tokyo, as would the associated safety and security needs.	EJ-22: Metro shall publish safety and security information at stations in Japanese, Korean, and Spanish. This includes both written and verbal announcements at stations.	Verify implementation and maintenance of signage and announcements.	Metro	Construction, Operation	Safety and Security Plans	Metro / Community Outreach
	EJ-23: Metro shall publish materials for the project's safety education campaign in Japanese, Korean, and Spanish.	Verify publication of materials.	Metro	Construction, Operation		Metro / Community Outreach
	EJ-24: Metro shall involve the Little Tokyo Public Safety Association in the development of safety and security plans.	Verify that input from Little Tokyo Public Safety Association has been incorporated.	Metro, Little Tokyo Public Safety Association	Final Design, Construction	Safety and Security Plans	Metro
		Monitor construction and operation for compliance.	Metro	Construction, Operation		Metro
	EJ-25: Metro shall monitor and ensure implementation of committed mitigation measures designed to address safety and security concerns.	Verify implementation and maintenance of measures.	Metro	Construction		Metro
	See also EJ-18.					
More operation noise may be audible in Little Tokyo than other parts of the alignment due to the portals and open-roof station.	EJ-26: Depending on the potential location and scope of the system's ventilation equipment, orient the exhaust away from downwind receptors to minimize noise from ventilation as well as underground train horns and related operational sounds.	Check design contract documents and construction specifications for compliance.	Metro	Final Design	Design	Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
Construction activities would be disproportionately centered in Little Tokyo, as would the associated air quality impacts.	EJ-27: Metro shall implement receptor-based mitigation where needed to reduce construction-related pollutant levels below significance thresholds. This could include installation of high efficiency particulate air filters on HVAC equipment at downwind receptors during construction activities.	Verify implementation of receptor-based mitigation measures.	Metro	Pre-Construction, Construction		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	See also AQ-1 through AQ-5, AQ-7, AQ-8, AQ-10, EJ-17, and EJ-26.					

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Land use impacts could occur in Little Tokyo.	EJ-28: Metro shall maximize opportunities to the extent feasible for enhancing access from existing land uses to the new station.	Verify implementation of program.	Metro	Final Design, Construction		Metro
	See also EJ-15 and EJ-26.					
Tunneling beneath existing buildings in Little Tokyo would introduce the potential risk of subsurface impacts.	EJ-29: Design of underground facilities shall avoid potential subsurface impacts to adjacent buildings.	Check preliminary engineering documents for compliance.	Metro	Preliminary Engineering	Design	Metro
	See also GT-1 through GT-5.					
Tree removal would occur in Little Tokyo.	EJ-30: New trees planted at station locations shall be regularly monitored by Metro to ensure healthy growth and development. Metro shall replace trees as close as possible to original locations.	Monitor trees.	Metro	Operation	Landscape Plan	Metro ECSD
	EJ-31: Metro shall provide the Little Tokyo and Arts District communities with opportunities for input into the development of landscape plans for the 1st/Central Avenue station throughout the preliminary engineering and final design processes.	Verify incorporation of Little Tokyo Community Council input into landscape plans.	Metro	Preliminary Engineering, Final Design	Landscape Plan	Metro ECSD
Foreign-language speakers would need to access project meetings and information.	EJ-32: Information shall be made available in Japanese and Korean, and flyers for project meetings shall indicate that there will be both Japanese and Korean translators present.	Verify provision of information in Japanese and Korean.	Metro	Ongoing		Metro Community Relations
TBM operations would be disproportionately concentrated in the vicinity of Little Tokyo.	EJ-33: Metro shall require the construction contractor to perform TBM operations for a period not extending beyond 48 months. This limit may need to be raised should circumstances arise that are beyond the control of Metro and the construction contractor. The community shall be notified if such a situation occurs.	Monitor construction activities for compliance.	Metro	Construction	Contract Documents	Metro
	EJ-34: Metro shall prepare a procedure for rapid shut-down of construction should maximum acceptable vibration thresholds be reached.	Check design contract documents and construction specifications for compliance.	Metro	Final Design		Metro
		Monitor construction activities for compliance.	Metro	Construction		Metro
	EJ-35: Metro shall prepare a cost-benefit analysis of using one versus two TBMs, and shall select the least impactful cost-effective solution.	Check preliminary engineering documents for compliance.	Metro	Preliminary Engineering		Metro
Construction Impacts						
Mitigation measures for construction-related impacts are discussed in the preceding sections.						

Impact	Mitigation Measure(s)	Monitoring Action(s)	Responsible Party	Project Phase	Deliverable	Enforcement Agency/Timing
Per Board Action (April 26,2012)						
74.A.1	Create an enhanced pedestrian walkway along the east side of Flower Street between 4th and 7th Streets.					
74.A.2	Relocate the Little Tokyo/Arts District underground station to minimize property required and eliminate the cut-and-cover segment on 2nd Street in Little Tokyo originally required for construction.					
74.A.3	Launch TBM from northeast corner of 1st and Alameda (Mangrove) instead of 2nd Street.					
74.A.4	Tunnel to Flower and 4th Streets in the Financial District to further reduce cut/cover in the area.					
74.A.5	Maintain access from Flower Street between 5th and 6th Streets to the West Lawn Garage.					
74.A.6	Any areas adjacent to the Maguire Gardens and Central Library impacted by construction will be returned to their original or improved state, with oversight by the Library Gardens Committee.					
74.A.7	The width and length of any construction worksite on Flower Street south of 4th Street will be minimized to the greatest extent feasible.					
74.A.8	South of 4th Street, construction decking shall be no higher than 10", if feasible, above the existing grade, and flush with existing curb on the east and west side of Flower Street with a maximum cross gradient of 3%.					
74.A.9	No construction worker parking on Flower and adjacent streets during construction. Consider obtaining temporary parking in the West Lawn Garage for construction workers.					
74.A.10	Enhancements to the pedestrian walkway along the east side of Flower Street between 4th and 7th Streets shall not permanently eliminate a southbound traffic land on Flower Street.					
74.A.11	Preserve the opportunity to install a future station north of 5th and Flower Streets.					
74.A.12	Restore Flower Street travel lanes after construction to the existing six lane condition from 4th to 6th Streets and the existing four lane condition from 6th to 7th Streets.					
74.A.13	Along Flower Street, accelerate the construction schedule to the greatest extent feasible, consistent with budgetary and other constraints.					
74.A.14	Minimize surface disruptions along Flower Street from truck trips, utility relocation, decking installation and removal, street restoration, or TBM removal, when feasible.					
74.A.15	Detailed surveys of Flower Street properties shall be performed prior to and at the end of construction.					
74.A.16	Shoring design for cut and cover construction along Flower Street will account for adjacent buildings.					
74.A.17	Noise and vibration levels will be monitored at Flower Street properties.					
74.A.18	If construction and/or operational ground-borne noise limits or ground-borne vibration limits are exceeded according to CEQA's significance thresholds, Metro will take action to reduce noise and vibration to less than significant levels at the property lines of sensitive uses.					
74.A.19	No pile drivers will be used along Flower Street during construction. If necessary, piles will be drilled or vibrated, but not driven.					
74.A.20	With property owners' consent, install and monitor deformation monitoring systems along Flower Street during construction.					
74.A.21	Reduced noise mufflers, air-inlet silencers, shrouds or sound walls will be used for generators, compressors, fans, exhaust systems and other inherently noisy construction equipment.					
74.A.22	Provide assistance for Flower Street businesses to maintain visibility during construction, including signage and advertisements.					
74.A.23	Ensure there is daily cleaning/washing during non-peak hours of Financial District streets affected by excavation and hauling.					
74.A.24	Provide protective measures, such as pipe and conduit support systems, vibration and settlement monitoring, trench sheeting, and shoring to avoid potential damage to utilities during construction.					
74.A.25	Maintain access to utilities for technicians, at all times during construction.					
74.A.26	Assign a full-time ombudsperson who is authorized to resolve complaints relative to the Project.					
74.C.1	Extend the use of a tunnel boring machine (TBM) under Flower Street to include the area between 4th and 5th Streets up to the intersection of 5th Street and Flower Street.					
74.C.2	On Flower Street between 5th and 6th Streets, where cut and cover is necessary, maintain four travel lanes between 6 AM and 8PM during weekdays during the "steady state". The steady state is defined as the period between the completion of the decking installation to the commencement of removal of decking.					
74.C.3	On Flower Street between 5th and 6th Streets, maintain no less than two travel lanes between 8pm and 6am, except for those times when further street restrictions are reqiured to facilitate decking installation and removal.					
74.C.4	Require that any public spaces, gardens, plaza, walkways, sidewalks, trees, street furniture, landscaping, hardscaping or pedestrian areas, including but not limited to the Library Gardens and the Citigroup Plaza, which are impacted, damaged or altered as a result of construction activity and/or staging, be reconstructed, replanted, repaired, and replaced like-for-like at the end of construction activity in that vicinity.					
74.C.5	Conduct various value engineering and cost methods determine if the aforementioned mitigation methods can be incorporated without an increase in the Life of Project 9 (LOP) Budget and report back in 60 days.					
74.C.6	Amend the LPA to include the design features if it can be completed within the current LOP budget. If staff determines that inclusion of these design features will exceed the LOP budget, the design features shall be included as proposal options during the construction procurement to allow proposers a process to include each feature and deterimine if it can be accomplished within the LOP budget.					
74.D.5	The designation of a Construction Relations Manager to serve as the point person for all community concerns regarding the project prior to construction. This person will be responsible for the entire project area and funded from the project budget.					
74.D.6	Reports will be made to the Board in June and August 2012 with the implementation strategy for the above activities, with quarterly reports to the Board thereafter, and throughout the duration of the construction period.					

LOS ANGELES COUNTY
METROPOLITAN TRANSPORTATION AUTHORITY

NOTICE OF AVAILABILITY
FOR THE
REGIONAL CONNECTOR TRANSIT CORRIDOR PROJECT
FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

The Federal Transit Administration (FTA) and the Los Angeles County Metropolitan Transportation Authority (Metro) have prepared a combined Final Supplemental Environmental Impact Statement (FSEIS) and Supplemental Record of Decision (ROD) for the Regional Connector Transit Corridor Project, a proposed underground light rail system that will connect the existing Metro Gold, Blue, and Expo Lines in downtown Los Angeles, California. This notice shall alert interested parties and Federal, State, tribal, regional, and local government agencies to the availability of the FSEIS and Supplemental ROD.

This Final Supplemental Environmental Impact Statement and Supplemental Record of Decision document has been prepared pursuant to Pub.L.114-94, 23 USC 139 (n)(2) as amended by the Fixing America's Surface Transportation Act. The Judgment and Order for Partial Injunctive Relief by the Honorable John A. Kronstadt on May 28, 2014 and September 9, 2014, respectively, require that the FTA as the federal lead agency pursuant to NEPA, with Metro, prepare a supplemental analysis under the National Environmental Policy Act (NEPA) to address the feasibility of Open Face Shield and Sequential Excavation Method (SEM) tunneling alternatives. Comments received during the public review period of the Draft SEIS are addressed in the FSEIS.

PROJECT BACKGROUND: The Regional Connector light rail transit (LRT) project lies entirely within the City of Los Angeles. It is generally bound by U.S. Highway 101 on the north, 7th Street on the south, Alameda Street on the east, and State Route 110 on the west. The length of the proposed light rail project would be just under two miles. It would have three new stations (2nd/Hope, 2nd/Broadway, and 1st/Central). The Regional Connector Transit Corridor Project would provide a direct link connecting several light rail lines in operation or in construction, including the Metro Gold Line to Pasadena, the Metro Gold Line Eastside Extension, the Metro Blue Line, and the Metro Expo Line. The proposed project would provide a rail link through downtown Los Angeles such that LRT service would provide a one-seat ride for travel from East Los Angeles to Santa Monica, and from Azusa to Long Beach. With implementation of the Project, these LRT lines would share tracks and stations in downtown Los Angeles.

The LPA remains as identified in the certified 2012 Final Environmental Impact Statement/Environmental Impact Report (Final EIS/EIR) and the Record of Decision (ROD) certified by FTA on June 29, 2012. The LPA will be constructed with cut and cover construction along Flower Street from south of 4th Street to the 7th Street/Metro Center Station. It will be constructed entirely underground until connecting with existing above grade lines, and would traverse under Flower Street north from existing LRT tail tracks located north of the existing underground 7th Street/Metro Center Station. At 3rd Street, it would turn east to operate under 2nd Street between Flower Street and Central Avenue serving stations at 2nd/Hope and 2nd/Broadway. At Central Avenue, it would connect to a new station (1st/Central) located between Central Avenue and Alameda Street in Little Tokyo.

ALTERNATIVES: The FSEIS provides additional detail on tunneling methods not selected along Flower Street, specifically Open Face Shield and SEM tunneling and additional detail regarding why these construction alternatives were not selected. The remainder of the project alignment is not changed and is not under consideration as part of the FSEIS.

EPBM/Open Face Shield/SEM LPA Profile Alternative (Alternative A): Alternative A would replace cut and cover construction by tunneling south to the 7th Street/Metro Center Station through the use of a combination of Open Face Shield tunnel boring and sequential excavation method (SEM) construction techniques. This alternative proposes the use of an earth pressure balance boring machine (EPBM) to bore twin tunnels generally following the horizontal and vertical alignment of the LPA from 3rd Street to south of 4th Street, with Open Face Shield tunnel excavation from 4th Street to 5th Street, and SEM tunnel construction from 5th Street to the existing 7th Street/Metro Center Station tail tracks structure.

EPBM/ SEM Low Alignment Alternative (Alternative B): Alternative B would replace cut and cover construction by tunneling south to the 7th Street/Metro Center Station through the use of a combination of EPBM and SEM construction techniques. This alternative proposes the use of EPBM to bore twin tunnels generally following the horizontal alignment of the LPA, but with a deeper vertical alignment than the LPA. The EPBM method would be used to tunnel to just south of 5th Street, with SEM tunnel construction from south of 5th Street to the 7th Street/Metro Center Station tail tracks structure.

DOCUMENT LOCATIONS: The FSEIS will be available for public review at the Metro Transportation Library at One Gateway Plaza, 15th floor, Los Angeles, CA 90012; and at the following public library locations:

- Los Angeles Central Library, 630 W. 5th Street, Los Angeles, CA 90071
- Little Tokyo Branch Library, 203 S. Los Angeles Street, Los Angeles, CA 90012
- Chinatown Branch Library, 639 N. Hill Street, Los Angeles, CA 90012
- Von KleinSmid Center (VKC), University of Southern California, University Park Campus, Los Angeles, CA 90089
- Pasadena Central Library, 285 E. Walnut Street, Pasadena, CA 91101
- East Los Angeles Library, 4837 E. 3rd Street, Los Angeles, CA 90022
- Santa Monica Public Library, 601 Santa Monica Boulevard, Santa Monica, CA 90401
- Long Beach Public Library (Main Library), 101 Pacific Avenue, Long Beach, CA 90822

It will also be available on Metro's website at www.metro.net/projects/connector.

FOR FURTHER INFORMATION CONTACT: Ms. Mary Nguyen, Environmental Protection Specialist, Los Angeles Metropolitan Office, Federal Transit Administration, Region IX, 888 South Figueroa Street, Suite 2170, Los Angeles, CA 90017, phone (213) 202-3960, email mary.nguyen@dot.gov; or Ms. Dolores Roybal Saltarelli, Project Manager, Los Angeles County Metropolitan Transportation Authority (Metro), One Gateway Plaza, MS 99-19-6, Los Angeles, CA 90012, phone (213) 922-3024, email roybald@metro.net.

CONTACT THE PROJECT TEAM OR OBTAIN FURTHER INFORMATION FROM:
Project hotline: (213) 922-7277
Project e-mail: regionalconnector@metro.net
Project website: metro.net/connector.