The Gateway Cities AQAP Project Update
Technical Roundtable
November 9, 2011
<table>
<thead>
<tr>
<th>Technical Tasks</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comm. Medical Needs Assessment</td>
<td>Completed</td>
</tr>
<tr>
<td>I-710 Near Roadway Modeling</td>
<td>Completed</td>
</tr>
<tr>
<td>I-710 Ultrafines</td>
<td>Completed</td>
</tr>
<tr>
<td>Air Quality Protocol</td>
<td>Completed</td>
</tr>
<tr>
<td>Compendium Update</td>
<td>Completed</td>
</tr>
<tr>
<td>Quantitative Air Quality Analysis</td>
<td>In Process</td>
</tr>
<tr>
<td>I-710 Construction Staging and Phasing Assessment</td>
<td>Completed</td>
</tr>
<tr>
<td>The I-710 Health Impact Assessment</td>
<td>Completed. Peer review underway</td>
</tr>
<tr>
<td>Health Risk Assessment</td>
<td>In Process</td>
</tr>
<tr>
<td>Develop Air Quality Strategies</td>
<td>Task starts in 2012</td>
</tr>
<tr>
<td>Analysis of New Air Quality Measures</td>
<td>Task starts in 2012</td>
</tr>
<tr>
<td>Early Action Support</td>
<td>In Process</td>
</tr>
<tr>
<td>Develop AQAP Report</td>
<td>Task start in April 2012</td>
</tr>
<tr>
<td>Public Outreach</td>
<td>In Process</td>
</tr>
</tbody>
</table>
## Remaining Tasks

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<th>Status</th>
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<tr>
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<td>The I-710 Health Impact Assessment</td>
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</table>
AQAP Toolkit Development Process

Compendium Update → Early Actions → AQAP Toolkit Development

AQ/HRA Protocol → Emission Inventory → AQ/HRA → AQ Strategies → Hot Spot Assessment

Sources:
- Traffic (includes I-710)
- Industry
- Rail
- Ports
- Powerplants etc.

Notes:
- CSP - I-710 Construction Staging and Phasing
- Ultra - Ultrafine Research
- CMIA - Community Medical Needs Assessment
- HIA - Health Impact Assessment
Nov-Dec 2011
- Peer Review Methodology

Jan-Mar 2012
- Early Action Projects
- HIA Peer Review

Apr-June 2012
- Develop and Prioritize High Priority Measures
- Define High Priority Air Quality Measures

July-Sep 2012
- Analysis of Impact of New Measures
- Meeting to review technical analyses
- Meeting to provide feedback on toolkit measures.

Oct-Dec 2012
- Development of Air Quality Action Plan
AQAP Task Updates
I-710 Health Impact Assessment

- HIA Work Product produced
- Transmitted to Caltrans for informational purposes only
- Additional roundtables ongoing to further review recommendations
- Peer review process under development.
Early Action Support

- Completed evaluation of status of Early Action Items
- Initiated Research on remaining Early Action Implementation.
- Conducted Workshop with PDs and PWs
- Initial Findings in January
Quantitative Air Quality Analysis

- Baseline emissions developed from AQMD data
- Currently updating with 3\textsuperscript{rd} party measures for years 2009, 2023, 2035
- Developed meteorological inputs for AQ modeling
Health Risk Assessment

- Methodology developed through HRA working group.
- Inventory and dispersion modeling underway.

- Develop HRA
- Develop AQ forecasts 2009, 2023, 2035
- Develop inputs into HRA modeling (Dec)
- Compare health impacts in 2008, 2023, 2035. (June)
- Evaluate effectiveness of new measures (Dec 2012)
- Include in Air Quality Analysis Report (Jan 2013)
Analysis of New Air Quality Measures

- Initial 3rd party measures identified as part of compendium update
- Underway: reviewing list and including new 3rd party measures in modeling
- Next steps: develop list of new measures, quantify in modeling, evaluate effectiveness
- New measures presented to committees in second half of 2012.
HIA Peer Review Process
The I-710 Health Impact Assessment Peer Review

- HIA work product completed on November 8.
- Methodology and scope of work underway
- Possible output: companion report of peer review comments and roundtable feedback (Feb).

Complete HIA Work Product

Develop Peer Review Methodology & Scope of Work

Choose Peer Review Coordinator (Nov)

Assemble Peer Review Panel (Nov)

Conduct peer review (Jan/Feb)

Submit peer review to Caltrans as a companion to the HIA (Feb)
Thank You

Questions or Comments?
The Gateway Cities Air Quality Action Plan
Technical Roundtable Meeting

November 9, 2011
I-710 Health Impact Assessment
Key Measures
Section 1: Mobility

- Adopt or advocate for policies to reduce automobile and truck usage including, for example, by increasing use of the lowest emission rail technologies to transport freight and continuing to promote land use policies in the Gateway Cities that encourage higher density and mixed use development.

- Reduce and enforce speeds on targeted roadways using traffic calming for safety and to encourage bicycling and walking. Incorporate a bicycle and pedestrian plan (e.g., complete streets) into the project.

- For any alternative selected, fully fund and if necessary strengthen enforcement of truck route regulations.

- In targeted areas, using physical engineered measures, reduce traffic speeds and volumes on streets with restaurants, stores, and services so that safety and walkability are improved. Examples include chicanes, lateral shifts, reduced lane width, pedestrian refuges, and narrower lane width.
Section 2: Air Quality

- All attempts should be made to move the goods movement infrastructure as close to the freeway as possible and to move sensitive uses away from the freeway and its associated traffic as well as away from the goods movement infrastructure.

- If cleaner trucks or zero emission trucks are adopted as a strategy, ensure that proper regulatory and enforcement actions maintain emissions reduction goals over time and that such efforts are fully funded.

- After the project is completed, regularly monitor air quality at sensitive receptors such as schools, community centers, libraries, and senior facilities. If air pollutant levels rise above what is considered harmful to human health and this is attributable to the I-710 project, commit to retrofit these facilities (e.g., providing upgrades to building thermal performance and ventilation systems) to keep indoor air pollutant levels below that which is considered harmful to human health.
Section 3: Noise

- Construct sound walls in all locations in the corridor that are adjacent to a residential area, school, or park. For these soundwalls, use greening and aesthetic principles found in the project’s Urban Design and Aesthetics Toolbox Report.
- For any alternative selected, fully fund and if necessary strengthen enforcement of truck route and parking regulations as well as idling regulations. For example, parking rules could prohibit trucks from parking adjacent to parks and other recreational facilities. Local jurisdictions could implement enforcement of the California Air Resources Board’s (CARB’s) idling regulations.
- After the project is completed, regularly monitor noise levels at schools, community centers, libraries, and senior facilities. If noise levels rise above what is considered harmful to human health and this is attributable to the I-710 project, commit to retrofitting these facilities (e.g., providing upgrades to windows and ventilation systems) to keep indoor noise below levels considered harmful by the WHO guidelines.
Section 4: Traffic Safety

- Conduct further traffic modeling to determine vehicle speeds and trips taken on arterials to better understand the relationship between freeway expansion and traffic collisions in neighborhoods.

- Supplement the intersection improvements outlined in the draft I-710 Corridor Project EIR/EIS with pedestrian-level improvements that increase their visibility and safety. Such improvements include, for example, clearly marked and protected crosswalks (e.g., with laddered crosswalks and pedestrian countdown signals).

- Starting with existing residential streets that are walkable/bikeable, expand the network of walkable/bikeable streets throughout the I-710 corridor to provide safe and pleasant streets that can be used for active transportation. This could include implementing “bicycle boulevards” (i.e., limited-access, low speed streets that have traffic calming features such as mid-block diverters with bicycle cut-outs) in local streets.
Section 5: Jobs & Economic Development

• Measure and track the proportion of local jobs in each industry that are filled by local residents. This data would allow policymakers to make informed decisions regarding strategies to enhance and stimulate local economies.

• Increase job-training opportunities for residents in the study area to better prepare the workforce for the employment opportunities in the region and reduce unemployment. Training should target jobs that pay a living wage and provide benefits such as health insurance.

• The green and sustainable technology jobs created locally (e.g., through Alternative 6B or projects at the ports) could be a strong source of employment, training opportunities, and improved health outcomes for residents in the study area. Opportunities in this relatively new industry should be encouraged to move into the I-710 Corridor Project study area regardless of the build alternative chosen, and government agencies and employers should be encouraged to train local workers in skills that will allow them to succeed in this field.
Section 5: Neighborhood Resources

- In order to at least partially offset any potential negative impacts on access to neighborhood resources, the I-710 Corridor Project could include additional improvements to existing neighborhood resources. For example, local jurisdictions could each be given funding as part of the project to invest in the neighborhood resources (e.g., libraries, schools, parks, community centers) that are likely to be impacted by the project.

- Increase direct government investment in community infrastructure and services to ensure that people have access to the goods and services they need to live healthy lives and to improve social cohesion in local communities. Such investment could help attract private investment.
State-of-Science on Ultrafine Particles Near Roadways
Technical and Advisory Roundtables

September 14 & 15, 2011

This AQAP study is not part of the I-710 Corridor Project studies, but upon completion, it will be submitted to Caltrans for review and consideration for use in preparing the I-710 Corridor Project EIR/EIS.
Outline

Objectives of the study

Literature review

Synthesis of the findings

Conclusions
Objectives

Perform a literature review on ultrafine particles with emphasis on latest understanding and findings on:

- Characteristics
- Measurements techniques
- Emissions and atmospheric processing
- Monitoring studies in LA basin
- Current and future regulation
Literature search also included other sources such as:

- 100 articles reviewed
- EPA website and published reports
- Publications of other state and local agencies (CARB, SCAQMD)
- Conference Proceedings

Informal staff interviews EPA, CARB and SCAQMD
Ultrafine Particles

General accepted definition: Particles less than 100 nm (0.1µm) in size

- Particles are not always spherical
- Diameter of a sphere with “equivalent” mobility
Ultrafine Particles

Smaller particles have higher probability of depositing in lower parts of the lung and entering bloodstream – linked to respiratory and cardiovascular diseases.

Particles are so small have little mass compared to larger particles – measure as number of particles per unit volume.
Ultrafine Particles: Characterization

Size is most distinguishing feature from other particles.

Also characterized by

- shape,
- structure,
- chemical composition
- toxicity
Ultrafine Particles: Ambient Concentrations

Urban environments contain elevated levels of ultrafine particles. Typical concentrations in various environments are as below in $10^3$ Particles/cm$^3$:
Development of **standardized measurement protocols** is the most essential next step towards regulatory application of particle sizing instruments.

Following are important parameters:

- Sampling frequency
- Detection limits and time-response standards
- Reproducibility of measurements
Ultrafine Particles: Emissions

Emissions depend upon vehicle type, vehicle age, fuel type and composition, control technologies, vehicle speed, engine load, and road conditions.

On a per mile basis heavy-duty diesel trucks emit significantly higher levels of ultrafine particles than light-duty gasoline vehicles.

Ultrafine emission factors are not well characterized for vehicles.
Ultrafine Particles: Ambient Processing

Three major processes that determine the size distribution:

• Nucleation
• Condensation and
• Coagulation

(Occur within 1 – 3 s from tailpipe, mostly within the roadway)
Ultrafine Particles: Near-Roadway Environment

Tailpipe - major sources of ultrafine particles in urban environment.

Particle number concentration are significantly elevated in near-roadway environments

Concentration drops exponentially in the downwind distance from the roadway

- Reaches background levels within 500m in clean environment
- Sooner in urban environment – typically 200-300 m
Ultrafine Particles: LA Region

Numerous studies have shown significantly elevated levels of UFP near LA freeways.

Sites near I-710 showed higher concentrations than I-405.

Most communities have at least typical urban “background” concentrations.

Winter concentrations are generally higher than those in summer (Huda, et al. 2010).
Ultrafine Particles: Exposure in LA region

Two major populations exposed to ultrafine particles in near-roadway environment:

**Residents in the vicinity of freeways:**
- Particles can penetrate efficiently into residences downwind near freeways – natural ventilation

**Commuters/drivers on the freeways:**
- UFP penetrate efficiently into vehicles Zhu et al. (2008) found
  - High (nearly full) penetration of UFP unless recirculation then about half.
Ultrafine Particles: Regulations

Currently no ambient standards for number concentration anywhere in the world.

EU recently adopted a tailpipe emissions standard for light duty diesel inclusion into Euro-5 (starting in Sept 2011 fully phased in Sept 2015) and Euro-6 standards.

• EPA reviewed testing protocol, but found not satisfactory for US due to the exclusion of volatile (gas-phase) material
Ultrafine Particles: Regulations

**EPA** - no immediate plans of regulation—continue with mass based std to reduce UFP, but continued priority research

**CARB** had planned regulations similar to that of EU for SULEV gasoline vehicles under upcoming LEV III standards
  - standardized testing procedures need to be developed
  - no plans heavy-duty diesel (DPF deemed best avail)

**Local agencies** lack the authority to set either tailpipe or ambient standards
  - Incentives for clean vehicles (zero emissions vehicles do not emit UFP
Ultrafine Particles: Regulations

SCAQMD taking steps to characterize the level of ultrafine particles in LA region

- MATES-IV study currently planning stage is underway with emphasis on UFP
  - Measure near freeways, arterials, intersections, warehouse areas, rail lines, rail yards and airports
  - Advisory group meetings start this fall start
  - Board approval Dec/Jan
  - Monitoring start June 2012 – continue for one-year
I-710 Near Roadway Monitored to Modeled Comparison Methodology
Technical and Advisory Roundtables
September 14 & 15, 2011

This AQAP study is not part of the I-710 Corridor Project studies, but upon completion, it will be submitted to Caltrans for review and consideration for use in preparing the I-710 Corridor Project EIR/EIS.
Outline for Presentation

Objectives of the analysis

Methodology
  • Data collection and modeling

Findings

Next Steps
Objective

Assess the representativeness of the I-710 EIR/EIS modeling near-roadway concentrations by:

- Comparing with the monitored data as used in air quality and exposure assessments
I-710 EIR/EIS Modeling Methodology

EIR/EIS of I-710 Corridor Project applied AERMOD

- Modeling domain encompassed 18 miles, divided into four met zones
- 2008 is the baseline year.
- Emissions based on average speeds and average weekday traffic volumes in 2008 (EMFAC2007)
I-710 EIR/EIS Near Roadway Modeling

- Three sets of receptor grids
  - 100m spacing within 500 m of I-710
  - 250 m spacing within 2,500 m of I-710
  - 500 m spacing within 5,000 m of I-710
- Considered appropriate scale for near-roadway modeling assessment for the I-710 EIR/EIS as requested by the CAC and the PC
Adjustment and Limitations for Comparisons to I-710 Modeling

- Emissions for 2009 not 2008
- Four freeway activity levels (6-9am, 10am-2pm, 3pm-7pm, 7pm-6am) – output from I-710 Traffic Demand Model
- Closest receptor to I-710 ~ 100-m
- To date only released results of NO\textsubscript{x} and CO
SCAQMD Primary Monitoring Dataset

Two intensive monitoring campaigns at sites near I-710

- February – March 2009 (~ 1-mo winter)
- July – August 2009 (~ 1-mo summer)

Three sites near I-710 in North Long Beach

- Nearest downwind of freeway (15-m)
- Further downwind of freeway (80-m)
- Upwind/background site (Del Amo)
Literature search was conducted to identify additional near-roadway monitoring datasets for comparison:

- Kozawa et al (2009) collected measurements using mobile platform in the summer of 2007 in the vicinity of I-710
- Arhami et al (2009) collected PM measurements in the summer of 2007 in communities surrounding I-710
- Moore et al (2009) measured ultrafine number concentrations at sites near I-710
Modeling Methodology

AERMOD – Air Dispersion Model (same as I-710 EIR/EIS)

• Key inputs: hourly emissions and local meteorology
• Model is only as good as inputs
Following adjustments to I-710 EIR/EIS modeling-setup for the comparison

- Hourly meteorological data for 2009 was obtained from SCAQMD and AERMOD input files were prepared
- Truck emissions were adjusted to 2009 levels based on monthly TEU activity relative to 2008
- Model receptors at SCAQMD at monitoring sites
Near-Roadway Concentrations Comparison Methodology

- SCAQMD monitoring data was adjusted to represent I-710 contribution by subtracting the urban background concentrations as observed at Del Amo

- Model predictions only compared for hours when the wind direction is within ± 45° of perpendicular line between the road and receptors. (i.e. only when the wind direction is such that monitoring sites are downwind of I-710)
Near-Roadway Concentrations Comparison Methodology

Separate comparison for two near-roadway monitoring sites (15m and 80m)
Separate comparison for both NO\textsubscript{x} and CO
  • Insights on inputs and model performance
  • Different source mix for NO\textsubscript{x} and CO
Graphical and statistical comparison
  • Scatter plots modeled vs. observed concentrations for: intra-day periods, winter/summer and two monitoring sites
  • Correlation coefficients – measure of scatter
Scatter Plots of Modeled versus Monitored CO (ppb) (paired in time and space)

- CO is generally under-predicted by the model.
- CO is primarily associated with gasoline vehicle emissions.

Under-predictions likely attributed to: hourly traffic volumes, fraction of HHDDT and cars.
NO\textsubscript{x} is generally over-predicted in the summer and underpredicted in winter.

Uncertainty in truck volumes and their speed profiles
Monitor to Model data is similar to other studies:

In an NCHRP study, two models HYROAD and CAL3QHC also had similar scatter for in comparison with monitored CO data.
Key Findings

• In general, model under-predicts CO and over-predicts NOx concentrations.

• Correlation is generally poor between data paired in time and space for predicted and observed concentrations.

• Discrepancies likely from uncertainties in traffic volumes and mix of vehicles and to a lesser degree meteorology.
Possible Next Steps

Present model comparison and discuss uncertainties in model

- On-site speed profile vs. average speed “driving cycle”
- Actual fleet mix (trucks/cars) vs. average weekday fleet
- Actual meteorology vs. N. Long Beach meteorology

Compare with similar type studies

Install permanent monitoring stations along the I-710 as an early action project (traffic volume, met and air quality)

Sensitivity studies on temporal traffic activity profile
Weight in Motion Hourly Profile versus Constant Volume with intra-day Periods
Health Impact Assessment Update & Noise Chapter Review – DRAFT

Technical Roundtable September 14, 2011, and Advisory Roundtable September 15, 2011

This document is a preliminary draft representing the opinions of Human Impact Partners, and does not represent the opinions (or endorsement) of Metro and the GCCOG. This AQAP study is not part of the I-710 Corridor Project studies, but upon completion, it will be submitted to Caltrans for review and consideration for use in preparing the I-710 Corridor Project EIR/EIS.
Noise: Pathways to Health

I-710 Corridor Project alternatives (including proposed mitigations)

Δ in vehicle noise due to technology

Δ in # of vehicles (by type) on freeways and arterials

Δ in vehicle speeds on freeways

Δ in vehicle speeds on arterials and local roads

Δ in noise due to Δ in use of goods movement facilities

Δ in proximity of sensitive uses to freeway/noise sources

Δ in noise/vibration levels near local roads and freeways

Δ in exposure (modeled/measured at different times of day/week) for sensitive receptors

Δ in environmental quality

N3, N4, N5, N6
Δ in health outcomes:
- Hypertension
- Annoyance
- Sleep disturbance
- Cardiovascular disease
- Education outcomes (reading, recall, recognition, and attention)
- Hearing loss

(see Neighborhood Resources)
Common Noise Levels
• **Decibel** (dB) = measure of sound intensity, computed based on the ratio of two sound levels [dB = 10 log (Power1 /Power0)]

• **A-weighted dB** (dBA) = takes into account the frequency range of the human ear

• **L_{eq}(hours)** = equivalent average continuous noise level integrated over a period of time
  - **L_{eq}[h]** = 1 hour period

• **L_d** = A-weighted daytime noise

• **L_n** = A-weighted nighttime noise

• **L_{dn}** = A-weighted day-night equivalent noise level over a 24 hour period with a 10 dB penalty given to noise during sleeping hours
The literature contains significant evidence on causal links between noise and the following conditions:

- Sleep disturbance
- Annoyance
- Speech interruption
- Learning & educational outcomes
- Stress
- Cardiovascular disease
Examples from the Public Health Literature

• Studies show an increase in the percentage of awakenings at night at noise levels of 55 – 60 dBA (WHO 1999 & Miedema 2002)

• Subjective reports of annoyance are the most widely studied impact of noise and the relationship has been quantified (Miedema 2001)

• Chronic road noise can affect cognitive performance of children including attention span, concentration and remembering, and reading ability (London Health Commission 2003 & Stansfeld 2005)

• There is a dose-response relationship between environmental noise from traffic and high blood pressure (Van Kempen 2002, Barregard 2009, & Babisch 2006)

• Increasing traffic noise, increases the risk of myocardial infarction at noise levels above 50 – 60 dBA (Selander 2009, Babisch 2005, 2006, 2008)
FHWA & Caltrans Policy

Federal (23 CFR 772) and state policy:

• Traffic noise prediction
• Traffic noise analysis
• Analysis of noise abatement
• Informing local officials

Simplest summary: keep noise levels below 67 dBA
<table>
<thead>
<tr>
<th>Activity Category</th>
<th>Activity Leq(h) (dBA)</th>
<th>Evaluation Location</th>
<th>Activity Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>57</td>
<td>Exterior</td>
<td>Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.</td>
</tr>
<tr>
<td>B*</td>
<td>67</td>
<td>Exterior</td>
<td>Residential</td>
</tr>
<tr>
<td>C*</td>
<td>67</td>
<td>Exterior</td>
<td>Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.</td>
</tr>
<tr>
<td>D</td>
<td>52</td>
<td>Interior</td>
<td>Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.</td>
</tr>
<tr>
<td>E*</td>
<td>72</td>
<td>Exterior</td>
<td>Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.</td>
</tr>
<tr>
<td>F</td>
<td>--</td>
<td>--</td>
<td>Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.</td>
</tr>
<tr>
<td>G</td>
<td>--</td>
<td>--</td>
<td>Undeveloped lands that are not permitted.</td>
</tr>
</tbody>
</table>

*The Leq(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.

*Includes undeveloped lands permitted for this activity category.
## World Health Organization Noise Guidelines

<table>
<thead>
<tr>
<th>Environment</th>
<th>Health effect</th>
<th>Sound level (dBA)</th>
<th>Time (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedrooms</td>
<td>Sleep disturbance</td>
<td>30</td>
<td>8</td>
</tr>
<tr>
<td>Inside dwellings</td>
<td>Speech intelligibility</td>
<td>35</td>
<td>16</td>
</tr>
<tr>
<td>School classrooms, indoors</td>
<td>Disturbance of communication</td>
<td>35</td>
<td>School hours</td>
</tr>
<tr>
<td>Outdoor living areas</td>
<td>Annoyance</td>
<td>50-55</td>
<td>16</td>
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<tr>
<td>Industrial, commercial and traffic areas</td>
<td>Hearing impairment</td>
<td>70</td>
<td>24</td>
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<tr>
<td>Music through earphones</td>
<td>Hearing impairment</td>
<td>85</td>
<td>1</td>
</tr>
<tr>
<td>Ceremonies and entertainment</td>
<td>Hearing impairment</td>
<td>100</td>
<td>4</td>
</tr>
</tbody>
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[http://www.who.int/docstore/peh/noise/guidelines2.html](http://www.who.int/docstore/peh/noise/guidelines2.html)
Existing Conditions

- Community concern regarding noise
- Caltrans noise measurements
- Other sources of noise
- Existing health conditions related to noise
Tier 2 Final Report:

“Excessive noise is a serious concern in the corridor. Noise has been shown to impact learning ability, skills development and quality of life. While not all noise can be eliminated, noise can be controlled through design and operational strategies, sound walls and retrofit of homes, schools and equipment. Noise must be controlled and we must find the means to do so.”

“Noise issues go beyond simply building more soundwalls. A comprehensive analysis of noise along the corridor must lead to a plan that recognizes the health impacts to our communities and seeks to resolve those impacts by providing appropriate relief. Future improvements must consider noise as a primary public health issue and find ways to mitigate those impacts.”

“Major infrastructure improvements must be conditioned on achieving a net decrease in noise impacts upon the affected communities.”
Caltrans Noise Measurements

- Existing conditions

<table>
<thead>
<tr>
<th>Noise Range (dBA) for single 10 min. measurement</th>
<th># of Sites</th>
</tr>
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<tbody>
<tr>
<td>40 - 50</td>
<td>13</td>
</tr>
<tr>
<td>50 - 60</td>
<td>43</td>
</tr>
<tr>
<td>60 - 70</td>
<td>46</td>
</tr>
<tr>
<td>70+</td>
<td>4</td>
</tr>
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</table>
Residential Areas & Noise
Potential major sources of noise besides freeway traffic noise:

- Truck traffic on arterial streets and local roads used to move between the freeway and other destinations described in this list;
- Intermodal facilities (the ICTF and the Hobart Railyard) where containers are moved between truck and rail;
- Transloading facilities where goods are moved from one container type to another;
- The Port of Long Beach;
- Warehouses and distribution centers;
- Container storage facilities; and
- Truck repair facilities.
Current Noise Estimates ($L_{dn}$)

- Based on 14 24-hour measurement sites that were available from Caltrans (only for southern portion of the freeway)
- Estimated based on physics (i.e., 3dB reduction with each doubling of distance from a line source)
- $L_{dn} = A$-weighted day-night equivalent noise level over a 24 hour period

Source: HIP
Existing Conditions Data

- Between 22,000 and 35,000 people would currently be expected to report being highly **annoyed** due to noise near the southern portion of the I-710 (calcs based on Miedema 2001)

- Between 5,000 and 7,500 people would be expected to report experiencing highly **disturbed sleep** due to noise near the southern portion of the I-710 (calcs based on Miedema 2001)

- **Cardiovascular disease** rates are not higher in the study area; because there are multiple factors that contribute to CVD and CVD may not be diagnosed consistently, we do not know how much noise is contributing to CVD in the study area

- Schools near the I-710 have fewer students who test as proficient in math and reading, potentially indicating **cognitive performance** issues. Noise measurements in schools are higher than WHO recommendations. We do not know how much noise contributes to lower proficiency in the schools because lower proficiency is caused by multiple factors.

Source: HIP
Impact Analysis

• Noise Emissions
• Noise Exposure
• Noise-related Health Outcomes
## Change in Noise Emissions (2035): Summary

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Freeway</th>
<th>Arterials</th>
<th>Other Goods Movement Infrastructure</th>
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</thead>
<tbody>
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<td>Alt 6B</td>
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<td>Alt 6C</td>
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</tbody>
</table>

Note: The number of ‘↑’ signs indicate the relative increase in noise from each source.

*Other goods movement infrastructure refers to warehouses, intermodal facilities and similar noise-producing that may be located near sensitive receptors.*

Source: HIP
Freeway Noise Exposure

- Early Action Report proposed possible soundwalls
- Caltrans has preliminarily identified possible additional soundwall locations next to all sensitive receptor sites
- Freight Corridor may be designed with soundwalls for receptors on same side of LA River; screenwall for opposite side
Freeway Noise Exposure

• No noise modeling data available yet from Caltrans

• Alternative 6:
  • High truck volumes & speeds
  • Freight Corridor further from residences on same side of LA river and closer to residences on opposite side;
  • Some areas with existing soundwalls, some with proposed soundwalls
  → HIA can’t predict changes in noise or compare to other alternatives (but modeling in process as part of EIR/EIS)
Impact Assessment Terms

**Impact** - refers to whether the alternative will improve health (+), harm health (-), or not impact health (~).

**Magnitude** – Reflects a qualitative judgment of the size of the anticipated change in health effect (e.g., the increase in the number of cases of disease, injury, adverse events (Negligible, Minor, Moderate Major))

Source: HIP
Impact Assessment Terms

**Severity** – Reflects the nature of the effect on function and life-expectancy and its permanence (High = intense/severe; Moderate; Low)

**Strength of Causal Evidence** – Refers to the strength of the research/evidence showing a causal relationship between noise and the health outcome (♦ = plausible but insufficient evidence; ♦♦ = likely but more evidence needed; ♦♦♦♦ causal relationship certain).

Causal effect means, the effect is likely to occur irrespective of the magnitude and severity

Source: HIP
Even if noise is reduced to 67 dBA by new soundwalls, the following health outcomes are anticipated:

Source: HIP
HIP Preliminary Recommendations

- Noise analysis
- Goods movement, transportation, and land use planning
- Noise mitigations through design
- Funding, enforcing and strengthening noise-related regulations
- Post build-out monitoring and mitigations

Note:
- Recommendations marked by this kind of bullet would have co-benefits for other health outcomes related to air quality, physical activity, traffic safety, etc.
• Noise analysis
  • Complete the noise modeling for the I-710 alternatives and use the results to quantitatively predict changes in annoyance and sleep disturbance and qualitatively assess changes in other health outcomes under the proposed alternatives.
  • In the final noise report, describe existing and future noise levels using multiple measures including separating daytime and nighttime noise.
• Goods movement, transportation, and land use planning
  ✦ All strategies for moving freight by other means, such as increasing on- and near-dock state-of-the-art rail, should be implemented.
  ✦ Planning departments should ensure that all local land use planning improves the separation of residential and other sensitive uses from the goods movement infrastructure. This is the best long term solution to noise issues in the community, but it will be most difficult to implement. For example:
    • Develop truck parking facilities and truck stops with services (e.g., restaurants, repair shops) near the freeway so that drivers do not need to drive further into the communities and near sensitive uses.
    • Pass city ordinances restricting potential land uses to reduce conflict between sensitive receptors and noise-producing facilities.
• Goods movement, transportation, and land use planning
  ✦ Use the Conditional Use Permit process to require goods movement related facilities to:
    • Post signage informing drivers of idling regulations and truck routes;
    • Require new facilities to locate loading docks and driveways as far away as possible from sensitive receptors; and
    • Use cargo handling equipment with noise mitigation technology.
  ✦ Starting with existing residential streets that are walkable/bikeable, expand the network of walkable/bikeable streets in low-noise areas throughout the I-710 corridor to provide quiet and pleasant streets that can be used for active transportation and for physical activity.
• Noise mitigations through design
  • Construct sound walls in all locations in the corridor that are adjacent to a residential area, school, or park. For these soundwalls, use greening and aesthetic principles found in the project’s Urban Design and Aesthetics Toolbox Report.
  • Use low-noise (e.g., rubberized) road surfaces, evaluating alternative materials with regards to their effects on air quality.
  ◇ Consider using variable tolling (e.g., congestion pricing) and/or changes to port gate hours to reduce variation of noise and peak noise periods.
  • Create and fund a program that provides private property owners funding and technical assistance to augment acoustical insulation in private residences.
• Funding, enforcing and strengthening noise-related regulations

✧ If Alternative 6C is adopted, use revenue from tolling to fund mitigations to noise impacts. Funds could be used, for example, for enforcement of truck routes, parking, idling regulations, and speed limits; installation of truck noise reduction technology; sound insulation at schools; and vegetative buffers between freeways and parks.

✧ For any alternative selected, fully fund and if necessary strengthen enforcement of truck route and parking regulations as well as idling regulations.

• Enforce and, if needed, strengthen regulations regarding truck noise (e.g., engine brake laws) and consider funding truck noise reduction programs.

✧ Enforce speed limits, considering photo-enforcement as a cost effective means to limit noise.
• Post build-out monitoring and mitigations
  
  • After the project is completed, regularly monitor noise levels at schools, community centers, libraries, and senior facilities and commit to retrofit these facilities (e.g., providing upgrades to windows and ventilation systems) to keep indoor noise below levels considered harmful by the World Health Organization standards.
  
  • After the project is completed, regularly monitor indoor noise levels in residences (daytime and nighttime) in close proximity to the freeway and near goods movement infrastructure (e.g., train yards and warehouses) and retrofit them to noise insulate either the residences (through windows and ventilation) or, if possible, noise producing equipment in goods movement facilities.
I-710 Construction Phasing and Staging Emissions
Technical and Advisory Roundtables

September 14 & 15, 2011

This AQAP study is not part of the I-710 Corridor Project studies, but upon completion, it will be submitted to Caltrans for review and consideration for use in preparing the I-710 Corridor Project EIR/EIS.
Objectives

Estimate emissions for a reasonable foreseeable concept of construction staging and phasing of the I-710 corridor improvements (2018 – 2034)
Key Assumptions

- Criteria and MSAT air pollutants
- Alternative 6 – 4 freight corridor and 10 general purpose lanes were evaluated.
- Daily and monthly emissions at location of activity
- GHG (on-site and tailpipe only – not life cycle)
- Construction fleet changes every year
- Freight corridor is constructed first
Key Assumptions cont.

- Freight corridor built first – funding available as one project
  - Start north and south segment at same time
- Average of 20 working days per month
- Construction phases are sequential within segment
- Construction schedule follows late finish
- LACMTA “Green” Construction Policy not included in analysis
- No onsite concrete or asphalt batch plants
Approach

1. Use construction data from GCCOG Construction Staging/Phasing concept report for each segment
   a. Area disturbed, project length and/or area, project duration, soil hauling, acres disturbed per day,
   b. duration of each stage and phase within segment

2. Input construction data into the enhanced Roadway Construction Emissions Model

3. Output daily emissions on a month by month basis for each of seven construction phases
4. Develop monthly emissions for each segment
5. Sum daily and monthly emissions across all segments over entire project time frame (2018-2034)
6. Also report peak daily emissions for each segment (2018-2034)
Methodology: Overview

- Based on GCCOGs concept report (April 2011) for information on:
  - Location (segment) and duration (phases) of construction activity
  - Type of construction activity (%roadways, %bridge)
- Enhanced version of Roadway Construction Emissions Model (originally developed for Sacramento AQMD)
  - OFFROAD emission factors extended to 2035
  - Now includes mobile source air toxic and all GHG’s
  - For EMFAC, uses South Coast air basin fleet
Methodology: Overview

- On-road Activity (e.g., watering trucks)
  - CARB EMFAC2007 model – South Coast Air Basin
- Off-road Activity
  - Current CARB OFFROAD2007 - statewide fleet
  - Update with new CARB model (August 2011)
    - Equipment population post recession and growth
    - Updated average load factors by equipment type
- MSAT speciated from VOC and PM via CARB speciation database
Methodology: Modifications to Inputs

Activity Data provided by GCCOG

• Data Organization
  – Segment → Subsegment → Multiple stages and Multiple phases
  – Model timeline and location provided on a stage/phase level

• Bridge and Roadway Data
  – Data combined both bridge and roadway construction data on Sub-Segment level
Methodology: Roadway Construction Emission Model Output

- Four outputs are given in mass per day.
  - By type of construction activity
    - Grubbing/land clearing
    - Grading/excavation
    - Drainage/utilities/sub-grade
    - Paving
  - Since inputs are by sub-segment, outputs from model apply to the entire sub-segment
    - Daily emissions applied to the stage-phases within each sub-segment.
### Allocation of emission factors by construction phase

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</table>

GLC = Grubbing/Land Clearing  
GEX = Grading/Excavation  
DUS = Drainage/Utilities/Sub-Grade  
Pav = Paving
Methodology: Roadway Construction Emission Model Output (continued)

- Apply either bridge or roadway daily emission factors to individual stage-phases.
- Allocation of daily emission factors to construction schedule.
- Daily emissions are multiplied by 20 for monthly emissions.
Peak NO\textsubscript{x} Emissions (lbs/day)

Peak NO\textsubscript{x} Daily Emissions for Any One Segment
Preliminary Findings cont.

Peak PM$_{10}$ Emissions (lbs/day)

Peak PM$_{10}$ Daily Emissions for Any One Segment

Most PM$_{10}$ generated from construction fugitive dust
Preliminary Findings cont.

Peak PM$_{2.5}$ Emissions (lbs/day)

Peak PM$_{2.5}$ Daily Emissions for Any One Segment

Most PM$_{2.5}$ generated from construction fugitive dust
Preliminary Findings cont.

- As shown in previous slides, PM$_{2.5}$ and PM$_{10}$ from diesel emissions (associated with construction equipment exhaust) do not exceed the AQMD thresholds of significance.

- Exceedances are generated primarily by fugitive dust from construction activities.
### Preliminary Findings cont.

<table>
<thead>
<tr>
<th>Segment</th>
<th>Total Months of Construction (per Segment)</th>
<th>Total Months the Emissions Threshold is Exceeded</th>
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<td>7</td>
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Note: Bold values indicate exceedances are due primarily from fugitive dust.
Conclusions

**NO\textsubscript{x}, PM\textsubscript{10} and PM\textsubscript{2.5}**

- Only segments 3-7 show exceedance of significance threshold, but only 10-20% of the construction period
- Analysis is developed for each segment and changes at the local scale (geometry, interchanges) will not impact the emission findings

**Robust analysis is useful for air quality modeling**

- Detailed info for specific times and locations
Next Steps

• Updating now with revised CARB OFFROAD model information
  • Update to equipment population and load factors
• Health risk of the toxics addressed in HRA
Recommendations

Emission reductions for PM$_{10}$ and PM$_{2.5}$ fugitive dust
- Smaller disturbance areas
- More frequent water (> 50% efficiency)
- Possible use of surfactants

Emission reductions for NO$_x$
- Detailed info for specific times and locations
- Newer equipment (lower emitting) 2019-2020 for segment 4 & 6
- Modify construction duration to manage emissions
I-710 Construction Phasing and Staging Emissions
Technical and Advisory Roundtables

October 12 & 13, 2011

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• On-road Activity (e.g., watering trucks)
  o CARB EMFAC2007 model – South Coast Air Basin

• Off-road Activity
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  o Updated average load factors by equipment type
Preliminary Findings

Peak NO\textsubscript{x} Emissions (lbs/day)

Peak NO\textsubscript{x} Daily Emissions for Any One Segment
Preliminary Findings cont.

Peak PM$_{10}$ Emissions (lbs/day)

Most PM$_{10}$ generated from construction fugitive dust

Peak PM$_{10}$ Daily Emissions for Any One Segment

- Construction Diesel Exhaust PM10
- Construction Fugitive Dust PM10
- PM10 Threshold
Most PM$_{2.5}$ generated from construction fugitive dust
Preliminary Findings cont.

• As shown in previous slides, PM$_{2.5}$ and PM$_{10}$ from diesel emissions (associated with construction equipment exhaust) do not exceed the AQMD thresholds of significance.

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**Robust analysis is useful for air quality and health risk assessment modeling**
- Detailed info for specific times and locations
Recommendations

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Emission reductions for NO$_x$
- Detailed info for specific times and locations
- Newer equipment (lower emitting) 2019-2020 for segment 4 & 6
- Modify construction duration to manage emissions
Construction Phasing and Staging Emissions Report Findings:

**Comment:** Concrete may pile up at the work site; if the concrete is not covered, it could produce a significant amount of dust. Do projections of the PM 10 & 2.5 emissions include fugitive dust from construction debris?

**Response:** Studies have shown fugitive dust can be reduced by 50% when watered every four (4) hours and up to 74% when watered every two (2) hours. Surfactants such as calcium chloride that when applied to fine dirt bonds with the soil and prevents it from becoming airborne when blown by the wind.
Revisions:

• In light of the recession in 2007-2009, CARB updated the OFFROAD2007 model emission factors to reflect a reduced rate of construction fleet turnover than original projected in 2007. These changes generally resulted in slightly lower emissions than by the same vehicles in the original OFFROAD2007 model.
Revisions:

  - Due to data limitations, CARB OFFROAD2011 outputs and data sets were updated for only certain types of equipment and pollutants and were only projected to 2029.
  - Since the update was limited to diesel fueled equipment, the OFFROAD2011 outputs exclude both CO and SOX, so these emission factors remained the same as in OFFROAD2007. Adjustments to these emission factors would have negligible impacts on emissions.
Health Impact Assessment Update & HIA Review – DRAFT

Topic: Air Quality

October 12, 2011 Technical Roundtable
October 13, 2011 Advisory Roundtable

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Air Quality: Pathways to Health

1. Air Quality Effects

- AQ1: Δ in vehicle emissions due to technology
  - CQ4, AQ3: Δ in public transit access and ridership
  - CQ1: Δ in # of vehicles (by type) on freeways and arterials
  - CQ1: Δ in # of vehicles (by type) on local roads
  - CQ2: Δ in vehicle speeds on freeways
  - CQ2: Δ in vehicle speeds on arterials and local roads
  - AQ2: Δ in air pollution due to Δ in use of goods movement facilities

- AQ1, AQ2, AQ12: Δ in air pollutants: (PM 2.5, PM 10, NO2, NOx, O3, SOx, Benzene, Diesel PM, Acrolein, other mobile air toxics, ultrafiners, green house gases, road dust)

- AQ12: Climate change (change in rainfall, sea-level rise, marine life)

- AQ13: Δ in heat related illness, water-, food-, vector-, or rodent-borne disease

- AQ4, AQ5, AQ6, AQ7, AQ8, AQ9: Δ in health outcomes:
  - AQ4: Δ in attendance at school or work
  - AQ4: Δ in education, employment, and incomes & associated health outcomes

- AQ1, AQ2, AQ10, AQ11: Δ in exposure to air pollutants

- Δ in environmental quality (see Neighborhood Resources)

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Scientific evidence in the public health literature firmly establishes the relationship between traffic-related air pollution and numerous negative health impacts. Traffic-related air pollutants known to impact health include:

- **Criteria air pollutants**: ozone, particulate matter (PM, including PM10, PM2.5, and ultrafines), carbon monoxide (CO), nitrogen dioxide (NO2), sulfur dioxide and lead;
- **Mobile Source Air Toxics (MSATs)**: while there are hundreds of MSATs, the six most commonly studied are benzene, 1,3-Butadine, formaldehyde, acrolein, acetaldehyde and diesel particulate matter (DPM);
- **Greenhouse gasses (GHGs)** such as carbon dioxide.
Air Quality Literature Review: Sources & Exposure

Sources

• It is well documented that traffic is a significant source of most of these air pollutants; proportion of each pollutant that comes from traffic is different and also varies with fuel/vehicle type

• Other sources include, for example, maritime vessels and point sources such as refineries and warehouses

Exposure

• Exposure is related to proximity to busy freeways and major arterials

• Research also suggests that low income and minority populations live in greater proximity to busy roadways and freeways, and thus are exposed to higher concentrations of air pollutants from vehicle emissions

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Air Quality Literature Review: Health Outcomes

- Health outcomes causally related to these pollutants include asthma and other respiratory diseases, cardiovascular disease, cancer, premature death, mortality, and preterm and low birth weight births.

- Furthermore, epidemiologic studies have consistently demonstrated that children and adults living in proximity to busy roadways have poorer health outcomes.

- Many studies supporting these findings have been conducted in Southern California and several have been specific to the I-710.
Existing Conditions Related to Air Quality

- Los Angeles air basin has the worst air quality in the nation
- Primary source of air pollution is traffic
- Air quality is the primary concern of the residents of the I-710 Corridor
Existing Conditions: Criteria Air Pollutants

At air monitoring stations in the I-710 Corridor:

• Current levels of PM$_{2.5}$ and PM$_{10}$ exceed various standards
• Current levels of Carbon Monoxide (CO) do not exceed standards
• Current levels of Nitrogen Dioxide (NO$_2$) at some stations exceed some standards

Ultrafines were not measured at air monitoring stations, but several studies have shown higher levels compared to regional background levels.

Note that current monitoring stations are not as close to the freeway as will be required by new standards.

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Existing Health

Disease rates for the study area and the county are similar; local rates have overlapping confidence intervals with County rates, so it is not clear if there are any true differences in these rates.

All existing health conditions listed here are multi-factorial in nature and air quality is only one of many components that influence disease levels; differences in health care and diagnosis are likely to influence reported rates.

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HIP analysis shows:

- Air quality will improve in 2035 due to cleaner fuels and more efficient technologies despite increases in traffic volumes in all I-710 Corridor Project Alternatives.

- Because of differences in the distribution of vehicles (i.e., whether they will use the I-710, other freeways, or the arterials) and differences in speeds (e.g., due to congestion), the alternatives impact different air pollutants by varying amounts.

We caution that our conclusions are based on preliminary data contained in an early version of the draft I-710 Corridor Project Draft AQ/HRA.
Pollutant Concentrations

- Ambient concentrations of CO decrease for all alternatives.
- Modeled CO concentrations are predicted to meet state and federal standards.
- Ambient NO$_X$ concentrations decrease for all alternatives.
- Modeled NO$_2$ concentrations are predicted to meet state and federal standards.
- Ambient concentrations of PM$_{2.5}$ (from exhaust) decrease, except for Alternative 6A.
- Further modeling of PM$_{2.5}$ is being conducted for the AQAP HRA. It is unclear whether 2035 PM$_{2.5}$ levels will be in violation of state or federal standards.
- Mobile Source Air Toxics levels decrease for all alternatives.

Source: I-710 Corridor Project Draft AQ/HRA

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Summary of Health Outcomes (2035)

Air Quality

General air quality will improve under any of the alternatives, resulting in a high likelihood that health of children, adults, and seniors throughout the corridor will improve.

Source: HIP

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