Purpose of High-Cube Warehouse Truck Trip Study

- Warehouses and distribution centers attract a number of heavy duty diesel trucks on a daily basis.
- AQMD is a commenting agency on air quality issues under CEQA.
- Warehouse projects may not have a tenant at time of CEQA approval, therefore CEQA requires a reasonable worst case analysis.
- AQMD staff has developed a recommendation for trip rates based on existing data, however more data is needed to enhance current assumptions to assess air quality impacts.
Role of the Technical Working Group

- Review relevant materials related to trip rates used for warehouse development
- Provide technical feedback on proposed study methodology
- Review progress of study, and provide feedback regarding study results
- Review and comment on the use of study results
- Total study period approximately 6 months
Relationship Between Truck Trips and Air Quality

- Most heavy duty trucks are diesel
- Exposure to Diesel Particulate Matter (DPM) can cause adverse health effects
  - DPM designated as a carcinogen by state
  - DPM also causes non-carcinogenic health impacts

**Local Impacts**
- Some warehouse / distribution centers are located in or near residential neighborhoods

**Regional Impacts**
- Trucks travel long distances in the basin and emit NOx and PM
Background

- First AQMD warehouse study in 2002 investigated proliferation of warehouses in Mira Loma and Fontana
- Air quality and health impacts from warehouse/distribution centers due to diesel trucks
- Warehouse projects continue to increase in numbers and size
- Projections indicate more warehouses
  - SCAG projects additional 412 million square feet of warehousing in Riverside and San Bernardino in next 25 years
  - Ports of Los Angeles and Long Beach forecast tripling of containers in next 25 years
  - New projects being developed now, including Moreno Valley NOP for 40 million square feet of warehousing
Air Quality Analysis – CEQA

- AQMD staff recommends new warehouse projects evaluate potential air quality impacts for:
  - Criteria Pollutants
    - Regional impacts (entire truck trip length)
    - Localized impacts (truck travel onsite and to closest freeway)
  - Health Risks
    - Diesel exhaust
- AQMD has adopted maximum *daily* regional and local thresholds recommended for use by other lead agencies
  - Staff recommends an analysis that captures potential unless enforceable conditions limit project activities to what was analyzed in EIR
Terminology

- High-Cube Warehouse
  - Used for the storage of manufactured goods prior to their distribution locally or regionally.
  - Commonly larger than 100,000 square feet
  - Typically 24-30 feet tall
  - Contain many dock doors for loading/unloading trucks
  - Can facilitate many different types of operations
High Cube Warehouse
Terminology

- Overall Warehouse Trip Rate vs. Truck Trip Rate

Example:
- 1.44 trips/1,000 ft.² \times 20\% \text{ trucks} = 0.29 \text{ truck trips/1,000 ft.}²

*Overall warehouse trip rate includes truck and passenger car trip rate
Trip Rate Background

- Institute of Transportation Engineers (ITE) Trip Generation Manual is the most commonly cited reference to determine trip rates for most land uses.
- ITE 7th Edition (2003) did not have a daily overall trip rate for high-cube warehouses due to lack of data.
  - 4.96 trips per 1,000 ft.² of building space for all warehouses.
    - Includes all truck trips and employee trips.
    - No data on truck% vs. car%.
Trip Rate Background

- ITE Manual provides overall trip rate data for high-cube warehouses
- Uses an average rate
- Does not represent "reasonable worst case" recommended for air quality analysis

<table>
<thead>
<tr>
<th>Year</th>
<th>Study</th>
<th>Average Trip Rate (trips/TSF)</th>
<th>Used in ITE 8th Edition?</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>ITE 7th Edition (All Warehouses)</td>
<td>4.96</td>
<td>Yes</td>
</tr>
<tr>
<td>2003</td>
<td>Fontana</td>
<td>4.81</td>
<td>No</td>
</tr>
<tr>
<td>2005</td>
<td>NAIOP San Bernardino/Riverside</td>
<td>1.1</td>
<td>Yes</td>
</tr>
<tr>
<td>2006</td>
<td>Manalapan, New Jersey</td>
<td>Data unavailable</td>
<td>Yes</td>
</tr>
<tr>
<td>2007</td>
<td>Tampa, Florida</td>
<td>Data unavailable</td>
<td>Yes</td>
</tr>
<tr>
<td>2007</td>
<td>Fresno</td>
<td>0.66</td>
<td>Yes</td>
</tr>
<tr>
<td>2008</td>
<td>NAIOP Inland Empire</td>
<td>1.11</td>
<td>Yes</td>
</tr>
<tr>
<td>2008</td>
<td>Jacksonville, Florida #1</td>
<td>1.83</td>
<td>Yes</td>
</tr>
<tr>
<td>2008</td>
<td>Jacksonville, Florida #2</td>
<td>2.57</td>
<td>Yes</td>
</tr>
<tr>
<td>2008</td>
<td>Visalia</td>
<td>1.26</td>
<td>No</td>
</tr>
<tr>
<td>2008</td>
<td>ITE 8th Edition (High-Cube Warehouses)</td>
<td>1.44</td>
<td></td>
</tr>
</tbody>
</table>

Studies collected in 2010
Trip Rate Background

  - 1.44 trips per 1,000 ft.²
  - Daily truck trip rate = 0.64 (44%)
- Truck Trip percentage most commonly obtained from Fontana Truck Trip Study
  - High-Cube Warehouse
    Truck percentage = 20.4%

\[
\text{1.44 trips/1,000 ft}^2 \times 20.4\% \text{ Trucks} = 0.29 \text{ Trip/1,000 ft}^2
\]
Variability in Trip Rates

- Guidance varies for each jurisdiction

<table>
<thead>
<tr>
<th>Recent Projects with CEQA Approval</th>
<th>Building Size (ft.²)</th>
<th>Overall Trip Rate</th>
<th>Truck %</th>
<th>Truck Trip Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banning Business Gateway</td>
<td>787,000</td>
<td>1.44</td>
<td>20%</td>
<td>0.29</td>
</tr>
<tr>
<td>South Perris Industrial</td>
<td>7,400,000</td>
<td>1.61</td>
<td>20%</td>
<td>0.33</td>
</tr>
<tr>
<td>Rialto Commerce Center</td>
<td>3,475,000</td>
<td>1.44</td>
<td>29%</td>
<td>0.41</td>
</tr>
<tr>
<td>Rados Distribution Center</td>
<td>1,191,000</td>
<td>1.1</td>
<td>53%</td>
<td>0.59</td>
</tr>
<tr>
<td>Palm Industrial</td>
<td>678,275</td>
<td>1.91</td>
<td>47%</td>
<td>0.90</td>
</tr>
<tr>
<td>West Ridge Commerce Center</td>
<td>937,260</td>
<td>1.69</td>
<td>54%</td>
<td>0.91</td>
</tr>
<tr>
<td>Mira Loma Commerce Center</td>
<td>782,398</td>
<td>4.96</td>
<td>20%</td>
<td>1.01</td>
</tr>
</tbody>
</table>
Rialto Commerce Center

- 3.6 million ft² warehouse project in southern Rialto adjacent to homes
- Project approved in 2011
- Project used ITE overall trip rate of 1.44
  - Truck trip rate of 0.41
- City and County of Riverside brought CEQA lawsuit over concerns about underestimation of truck traffic
- Lawsuit recently settled with Rialto agreeing to pay City and County of Riverside $3.5 million
Lack of correlation between building size, and trips or trip rate
Overall Trip Rate vs. Building Size

- Lack of correlation between building size, and trips or trip rate
Current AQMD Staff Trip Rate Recommendation

- AQMD Staff current recommendation:
  - For general plans or other projects with >10 warehouses, AQMD staff currently recommends the ITE average rate (1.44)
    - Projects with many warehouses likely to have diversity of warehouse types more similar to ITE average as a whole
    - Alternatively can use project specific data with substantial evidence
AQMD Staff Rationale and Basis

- Overall trip rate of 2.57 trips/1,000 ft$^2$ provides:
  - Reasonable worst-case assumption sufficient for CEQA
  - Consistency with AQMD regional and localized thresholds based on peak daily activity
  - Default that can be replaced if project has enforceable throughput limit

- Truck trip percentage of 40% represents:
  - Average percentage from all available studies and is consistent with ITE ratio

- Investigation peer reviewed by traffic consultant
Oblique aerial photograph showing an example of a facility evaluated in the NAIOP San Bernardino County Truck Study. The truck trip rate for this facility was 1.13/TSF
Aerial photograph showing an example of two facilities evaluated in the NAIOP Riverside County Truck Study. Photo date may not coincide with timing of trip counts.
Potential Methods for Warehouse Trip Study

Two potential methods to supplement existing studies

1. ITE-like study using traffic counts enhanced with follow-up business surveys
   - 100 location-days of trip counts with sampling tubes on the street adjacent to warehouses
   - 50 warehouses for 2 days each, 25 warehouses for 4 days each, etc.
   - Business surveys would be sent out with significant fraction of businesses receiving phone call follow up
   - BENEFIT: Data from study can be sent directly to ITE for consideration for inclusion in next edition
Potential Methods for Warehouse Trip Study

2. Develop model that determines truck trips based on specifics of each development based on operational profile

- Develop model/spreadsheet tool based on business surveys
- Calibrate model with trip counts
- Substantially less trip counts than other approach
- Potential model parameters include:
  - Number of dock doors, floor area of operations, type of operations, availability of rail service, seasonality, others?

  • BENEFIT: Method is more similar to other goods movement land uses such as port berths, airports, rail yards, quarries, waste transfer stations, etc. Also, method provides better correlation between operations and trucking, rather than building size.
Questions for the Group

- Truck Count/Business Survey vs. Model Development vs. Other?

- What types of warehouse operations should be explicitly classified?
  - Cross-dock, Transload, Storage, Manufacturing/Assembly, More?

- Other Feedback?
**Freight Trip Generation Study**

Information you provide here will be kept confidential and will be used for planning purposes only.

### ESTABLISHMENT INFORMATION

- **Name:**
- **Address:**
- **City:**
- **State:**
- **ZIP:**

### CONTACT INFORMATION FOR THE PERSON COMPLETING THE SURVEY

- **Name:**
- **Position:**
- **Phone number:**
- **E-mail:**

### BUSINESS ACTIVITY (percent of business dedicated to this operation)

- **Nature of business:**
- **Other (please specify):**

### TYPE OF ESTABLISHMENT

- Is this the headquarters of the firm? **YES** [ ] **NO** [ ]

### NUMBER OF PEOPLE TYPICALLY EMPLOYED AT THIS ADDRESS

- **Full time**
- **Part time**

### SITE AND GROSS FLOOR AREA

- **Is your establishment the only one at this site?** **NO** [ ] **YES** [ ]
- **Total site area**
- **Establishment Floor Area**
- **# of Dock Doors**

### NUMBER OF VEHICLES TYPICALLY OPERATED FROM THIS ADDRESS BY TYPE

- **Notes:** (1) Include leased vehicles. See the diagram of vehicle types in the next question.
- **2 or 4 axle single-trailer trucks:**
- **2 axle single unit trucks:**

### TRIPS RELATED TO GOODS AND SUPPLIES

**Typical number of delivery trips with this address as origin or destination by vehicle type**

<table>
<thead>
<tr>
<th>Description</th>
<th>Example</th>
<th>Made from this address (delivers to customers)</th>
<th>Received at this address (delivers to establishment)</th>
<th>Time unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cars</td>
<td><img src="image1.png" alt="Example" /></td>
<td><img src="image2.png" alt="Example" /></td>
<td><img src="image3.png" alt="Example" /></td>
<td><img src="image4.png" alt="Example" /></td>
</tr>
<tr>
<td>Small pickups/vans</td>
<td><img src="image5.png" alt="Example" /></td>
<td><img src="image6.png" alt="Example" /></td>
<td><img src="image7.png" alt="Example" /></td>
<td><img src="image8.png" alt="Example" /></td>
</tr>
<tr>
<td>2 axle single unit trucks</td>
<td><img src="image9.png" alt="Example" /></td>
<td><img src="image10.png" alt="Example" /></td>
<td><img src="image11.png" alt="Example" /></td>
<td><img src="image12.png" alt="Example" /></td>
</tr>
<tr>
<td>Large trucks</td>
<td><img src="image13.png" alt="Example" /></td>
<td><img src="image14.png" alt="Example" /></td>
<td><img src="image15.png" alt="Example" /></td>
<td><img src="image16.png" alt="Example" /></td>
</tr>
</tbody>
</table>

### TYPE OF CARGO PRODUCED AND RECEIVED BY THE ESTABLISHMENT

<table>
<thead>
<tr>
<th>Type of cargo produced</th>
<th>Quantity</th>
<th>Unit (e.g., tons, lbs)</th>
<th>Type of cargo received</th>
<th>Quantity</th>
<th>Unit (e.g., tons, lbs)</th>
</tr>
</thead>
</table>

### TRIPS RELATED TO SERVICES

**Typical number of service trips with this address as origin or destination by vehicle type**

<table>
<thead>
<tr>
<th>Description</th>
<th>Example</th>
<th>Leaving this address</th>
<th>Received at this address</th>
<th>Time unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cars</td>
<td><img src="image17.png" alt="Example" /></td>
<td><img src="image18.png" alt="Example" /></td>
<td><img src="image19.png" alt="Example" /></td>
<td><img src="image20.png" alt="Example" /></td>
</tr>
<tr>
<td>Small pickups/vans</td>
<td><img src="image21.png" alt="Example" /></td>
<td><img src="image22.png" alt="Example" /></td>
<td><img src="image23.png" alt="Example" /></td>
<td><img src="image24.png" alt="Example" /></td>
</tr>
<tr>
<td>2 axle single unit trucks</td>
<td><img src="image25.png" alt="Example" /></td>
<td><img src="image26.png" alt="Example" /></td>
<td><img src="image27.png" alt="Example" /></td>
<td><img src="image28.png" alt="Example" /></td>
</tr>
</tbody>
</table>

If you would like more information about the survey, please contact Mr. xxxxx (xxx@xxx.xxx) at his/her e-mail address or call xxx-xxxx-xxxx.