

Built Environment

Physical Environment

- ◆ Traffic/Transportation Systems
- ◆ Air
- ◆ Noise

Assessing Impacts to Transportation

- ◆ Traffic
- ◆ Transportation System
- ◆ Identify Source of Potential Impacts
 - Changes in Demographics
 - Changes in Access
 - Direct Changes Due to Project
 - Indirect/Attraction Related
- ◆ Determine Study Area
 - Neighboring counties
 - Traffic Surveys
- ◆ Determine Existing Conditions
 - State Data
 - County/Municipality Data
 - Traffic Survey
 - Mass Transit Provider

Transportation (cont.)

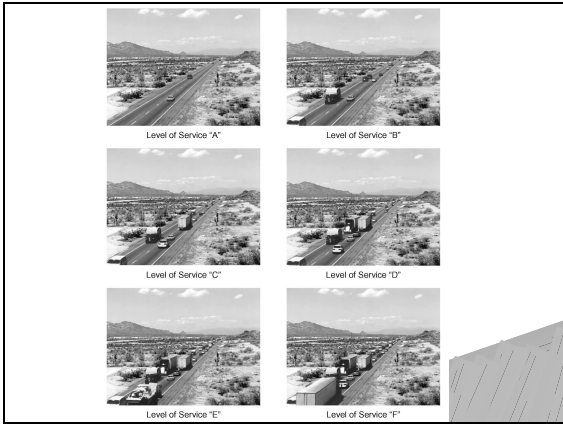
- ◆ Identify Standard
 - Level of Service
- ◆ Impact Prediction
 - Traffic Generation Tables
 - Traffic Flow Modeling
 - Highway Capacity Manual - ADT
- ◆ Assess Significance of Impacts
 - LOS
 - Lost of Parking
- ◆ Mitigation
 - Scheduling
 - Van/Car Pools

Level of Service

- ◆ Level of Service A
 - Free flow, with low volumes and high speeds.
- ◆ Level of Service B
 - Stable flow, operating speeds beginning to be restricted somewhat by traffic conditions. Reasonable ability to select speed and lane of operation.
- ◆ Level of Service C
 - Mostly stable flow, speeds and maneuverability are more closely constricted by the higher volumes.
- ◆ Level of Service D
 - Approaches unstable flow, tolerable operating speeds. Driving speed is considerably affected by changes in operating conditions.

Level of Service (continued)

- ◆ Level of Service
 - Operating speeds are lower than in Level D, with volume at or near the capacity of the highway.
- ◆ Level of Service F
 - Forced or breakdown flow. Stop and go patterns and waves set up in traffic stream. Highly unstable and unpredictable.



Assessing Impacts to Air Quality

- ◆ Identify Source of Potential Impacts
 - Transportation
 - Stationary - Fuel Combustion
 - Industrial Processes
 - Solid Waste Disposal (Burning/Dust)
- ◆ Determine Study Area
 - Local to Regional
- ◆ Determine Existing Conditions
 - EPA/State Monitoring Program
 - Meteorological Data (Airports/Weather Stations)
 - Emission Factors (AP-42 USEPA)
 - Field Testing - rarely
- ◆ Identify Standard
 - National Ambient Air Quality Standards
 - State Ambient Air Quality Standards
 - New Source Limitations

Air Quality (cont.)

- ◆ **Impact Prediction**
 - Emission Factors
 - Dispersion Modeling
- ◆ **Assess Significance of Impacts**
 - Depends on Attainment Status
 - Federal/State Standards
 - Sensitive Receptors
- ◆ **Mitigation**
 - Limit Burning
 - Limit Wind Erosion
 - Treat Unpaved Roads
 - Fugitive Dust Control
 - Reduce Emissions from Mobile Sources
 - Air Pollution Control of Point Sources

Clean Air Act

- ◆ 1970
 - EPA establishes National Ambient Air Quality Standards (NAAQS) for Criteria Pollutants
- ◆ 1990
 - Established “non-attainment” criteria
 - ◆ Ozone
 - ◆ Particulate Matter
 - ◆ Carbon Monoxide
 - Established requirements for “non-attainment” areas

Criteria Air Pollutants

Pollutant	Source	Standard
Sulfur Dioxide	Burning Fossil Fuel	0.03 ppm/annual 35 ppm/1 hr
Nitrogen Oxides	Burning Fossil Fuel	0.053 ppm annual
Carbon Monoxide	Motor vehicles	9 ppm/8 hr 35 ppm/1 hr
Ozone	NO _x + VOCs	0.08 ppm/8 hr
Particulate Matter	Industrial, burning wood	PM _{2.5} 15µg/m ³ ann. 65µg/m ³ 24 hr
Lead	Paint, smelters	1.5µg/m ³ 3month

Computer Based Dispersion Models

- ◆ Transportation
 - CALINE
 - HIWAY
- ◆ Industrial Sources
 - Industrial Source Complex – long-term
 - Fugitive Dust Model

Air Pollution Mitigation



Assessing Impacts to Noise Levels

- ◆ **Identify Source of Potential Impacts**
 - Transportation (Highways/Airports)
 - Stationary/Industrial Processes
 - Construction
 - Military Exercises
- ◆ **Determine Study Area**
 - Using within 1 mile of Activity
 - Air Traffic Patterns
- ◆ **Determine Existing Conditions**
 - Field Testing
- ◆ **Identify Standard**
 - Federal Highway Administration
 - EPA, DOT, HUD Goals
 - Local Noise Ordinances

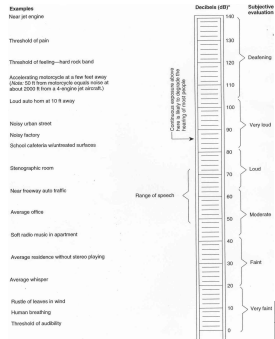
Noise (cont.)

- ◆ **Impact Prediction**
 - Construction Activity - Noise Ranges
 - Geometric Attenuation
 - ◆ Point Source - level decreases by 6 dBA for doubling of distance
 - ◆ Line Source - level decreases by 3 dBA for doubling of distance
 - Mathematical Modeling
 - ◆ Aircraft - INM
 - ◆ Helicopter - HNM
 - ◆ Motorized Vehicles - STAMINA
- ◆ **Assess Significance of Impacts**
 - Federal/Local Standards/Guidelines
 - Sensitive Receptors
 - 3 dBA increase Detectable
- ◆ **Mitigation**
 - Limit Time of Activities
 - Noise Barriers
 - Depress Grade of Highway
 - Building Designs
 - Flight Patterns

Noise Basics

- ◆ Define: unwanted sound
- ◆ Measured: microbars of sound pressure
- ◆ Human hearing: logarithmic
- ◆ Sound-pressure level (SPL)
 - SPL = $20 \log_{10}(P/P_0)$
- ◆ "A-weighted" frequencies
- ◆ Average Sound Levels
 - L_{dn} - Day/night Average
 - L_{eq} - Energy equivalent

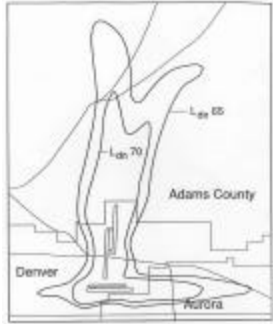
Common Sound Levels



Construction Noise Ranges

		Noise level at 50 ft, dBA					
		60	70	80	90	100	110
Equipment powered by internal combustion engines - generating	Compactors (rollers)						
	Front loaders						
	Backhoes						
	Tractors						
	Scrapers, graders						
	Pavers						
	Trucks						
	Concrete mixers						
	Concrete pumps						
	Cranes, movable						
Equipment powered by internal combustion engines - stationary	Cranes, derrick						
	Pumps						
	Generators						
	Compressors						
Impact equipment	Pneumatic wrenches						
	Jackhammers and rock drills						
	Impact pile drivers, peaks						
Other	Vibrator						
	Saws						

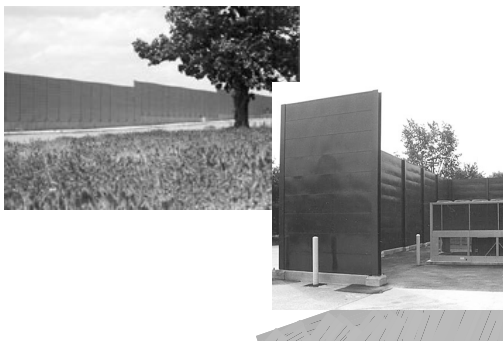
Aircraft Model Output



Highway Model

- ◆ STAMINA
 - Coordinates of highway
 - Coordinates of receptors
 - Traffic Data
 - ◆ Volume
 - ◆ Vehicle Mix
 - ◆ Speed
 - Ground Cover
 - Buildings

Noise Barriers



Noise Paths & Mitigation

