CENTERVIEWS
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Components of a Rail Risk Assessment

As undeveloped land near population centers becomes scarce, rail risk assessments are increasingly necessary as school districts find that the search for appropriate school sites is leading them to consider sites closer to industrial and commercial areas. Proximity to railroads entails special safety concerns for schools. According to the Federal Railroad Administration, in 2000, California had the highest number of pedestrian trespass fatalities in the nation and the second highest number of pedestrian trespass injuries (for more information, visit www.safetydata.fra.dot.gov/officeofsafety). Rail risk assessments can delineate the type and severity of risk when schools are located near rail lines.

The California Code of Regulations Title 5 Section 14010(d) requires the preparation of a safety study for any proposed school site located within 1,500 feet of a railroad track easement. This issue of CENTERVIEWS addresses the evolving nature of rail risk assessments and suggests a template for school districts. Below is a list of the components a rail risk study might contain.

We recommend that a rail risk assessment be prepared in three sequential steps. The analysis proceed to the next, more detailed and costly phase only when warranted by the conclusion or the questions raised during the prior phase.

PHASE I – DESCRIPTION AND INITIAL REVIEW

The first phase of a rail risk assessment is primarily descriptive. Information is collected concerning current rail operations, type of cargo, track conditions, existence of pipelines, access, and noise. Based on this initial review of the rail line, it may be determined that the railroad does not present a significant risk and nothing further is needed, or there may be recommendations that would make it acceptable. Finally, it may be necessary to conduct further research to make this determination, which would then require Phase II analysis.

Phase I – Description and Initial Review

I. PHYSICAL CHARACTERISTICS

- A. Existing configuration of roadways and rail line
- B. Distance to site
- C. Proximity to switching yards
- D. Existing track conditions
  - + Single or double
  - + Elevated or not
  - + Curved or straight
  - + Main line or spur
  - + Conditions of track
  - + Signage
  - + Existing warning arrangements
- E. Crossings
  - + Vehicular or pedestrian at-grade crossing
  - + Grade separation crossing
- F. Relationship of attendance area to tracks and school site

II. OPERATIONAL CHARACTERISTICS

- A. Current rail operations
- B. Type of rail traffic (passenger, freight or both)
- C. Frequency
- D. Speed of trains
- E. Schedule of rail traffic
- F. Type of cargo
  - + Hazardous
  - + Non-hazardous

III. HIGH PRESSURE HAZARDOUS LIQUIDOR GAS PIPELINES WITHIN RAILROAD RIGHT-OF-WAY

- A. Type of hazardous liquid or gas
- B. Type (materials) and diameter of pipeline
- C. Type of pipeline (transmission or distribution)
- D. Maximum allowable operating pounds per square inch (psi), average psi
- E. Date of construction
- F. Maintenance history and schedule
- G. Flow rate
- H. Classification (natural gas), e.g. 1, 2, 3 indicating maximum allowable operable pressure based on surrounding land uses
- I. Population Density
- J. Location of shutoff valves
- K. Topography

IV. NOISE

- A. Number of engines
- B. Number of cars
- C. Throttle setting
- D. Number of at-grade crossings (require horn blow)
- E. Type of tracks (bolted or welded)
- F. Intervening structures
- G. Other noise generating sources in vicinity

V. RECOMMENDATIONS

IS A PHASE II ANALYSIS NEEDED? IF YES, PROCEED...

PHASE II – RISK ANALYSIS

A risk analysis quantifies the likelihood of an incident that would result in fatality or injury. This analysis should include the individual annual risk to each student and the societal risk to the school and surrounding community. If Phase II indicates there would be a high probability of one death per million population as a result, then the rail risk assessment incorporates a Phase III analysis. **Risk is the change of fatality or injury.**

PHASE III – CONSEQUENCE ANALYSIS

A consequence analysis assumes a worst-case scenario involving a derailment and release of hazardous rail cargo or pipeline materials. A consequence analysis includes the calculation of hazard exclusion zones and "high consequence areas" with the population density, blast zone, and burn radii identified. The result of this analysis could be a contour map that identifies no build zones and areas of risk, both useful in site selection and school design.

Phase II – Risk Analysis

I. INDIVIDUAL ANNUAL RISK

A. Fatality Threshold:

+ $1x10^{-5}$ mortality (chance of 1 death per 100,000)

B. Injury Threshold:

+ $1x10^{-3}$ (1 chance in 1,000 of being injured)

II. SOCIETAL RISK

A. Fatality Threshold:

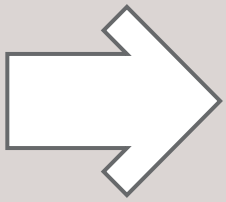
+ $2x10^{-6}$ (2 people in 1 million would perish)

B. Injury Threshold:

+ $70x10^{-6}$ (70 people in 1 million would be injured)

III. RECOMMENDATIONS

IS A PHASE III ANALYSIS NEEDED? IF YES, PROCEED...



Phase III – Consequence Analysis

I. IDENTIFY HAZARD EXCLUSION ZONES

+ Based on 1x10-6 mortality.
+ No buildzone.

II. IDENTIFY HIGH CONSEQUENCE AREAS

+ Area of risk, but less than 1x10-6 mortality.

III. RECOMMENDATIONS

+ Is the site appropriate for a school?
+ Are adequate setbacks provided?
+ What mitigation measures are required for safety, access, and noise?

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COMPONENTS OF A RAIL RISK ASSESSMENT