

Vapor Intrusion Mitigation Advisory (VIMA)

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Vapor Intrusion Mitigation Advisory (VIMA)

Soil Gas Advisory
(2002)

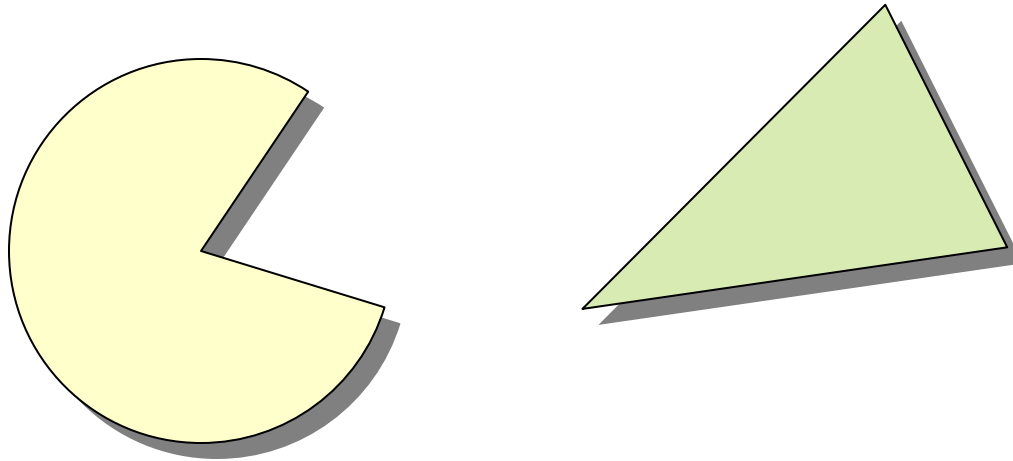
DTSC VI Guidance
(2005)

VIMA 2009



VIMA – Focus on Mitigation

- Mitigation complements remediation but does not replace it
- Remediation is “source removal”
- Mitigation eliminates the pathway



VIMA

- Framework of considerations and questions which should be addressed as part of a mitigation approach
- Case Specific Flexibility
- Not prescriptive

VIMA Overview

**Public
Participation
(Chapter 3)**

Risk-Based Decision Making (Chapter 2)

Evaluate Vapor Intrusion Approaches (Chapter 4)

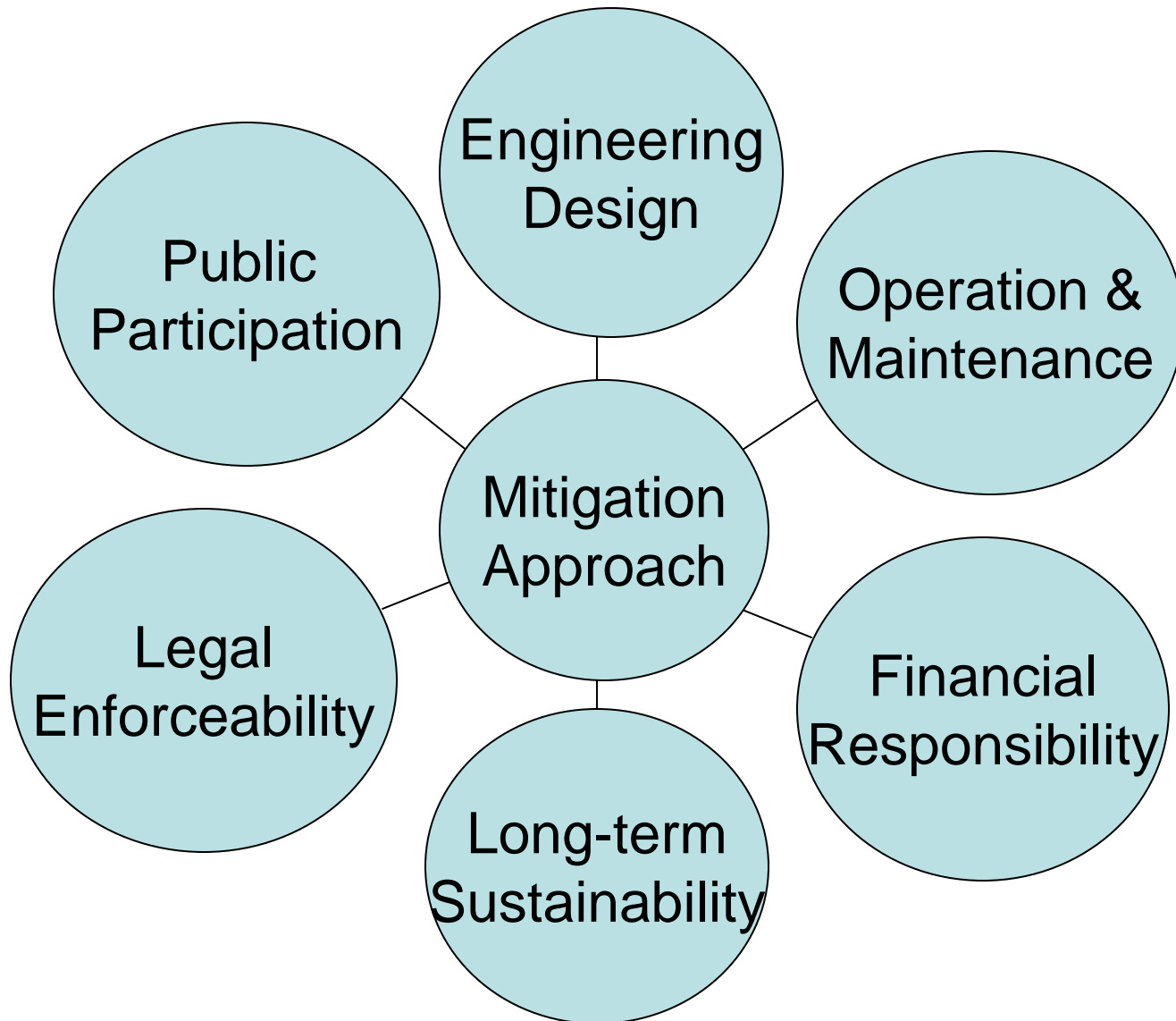
Select Vapor Intrusion Mitigation Method (Chapter 5)

**Vapor Intrusion Mitigation Design and Construction
(Chapter 6)**

Vapor Intrusion Mitigation Implementation (Chapter 7)

Closure (Chapter 7)

Mitigation Approach



Engineering Design

- Sub-slab depressurization system (SSD) is most likely choice
- Passive sub-slab venting (SSV) system
- Building pressurization/HVAC alteration for commercial buildings
- Podium-style buildings
- ‘Membrane only’ not acceptable
- Development Configuration

Vapor Intrusion Mitigation Approaches

Existing Buildings

```
graph TD; A[Existing Buildings] --> B[Residential Options]; A --> C[Commercial Options];
```

Residential Options

- Active SSD System
- Submembrane Depressurization
- Sub-slab Pressurization

Commercial Options

- Active SSD System
- Sub-slab Pressurization
- Building Pressurization

Vapor Intrusion Mitigation Approaches

Future Buildings

```
graph TD; A[Future Buildings] --> B[Residential Options]; A --> C[Commercial Options];
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Residential Options

- Active SSD System
- Passive SSV System
- Submembrane Depressurization
- Sub-slab Pressurization
- Podium Building

Commercial Options

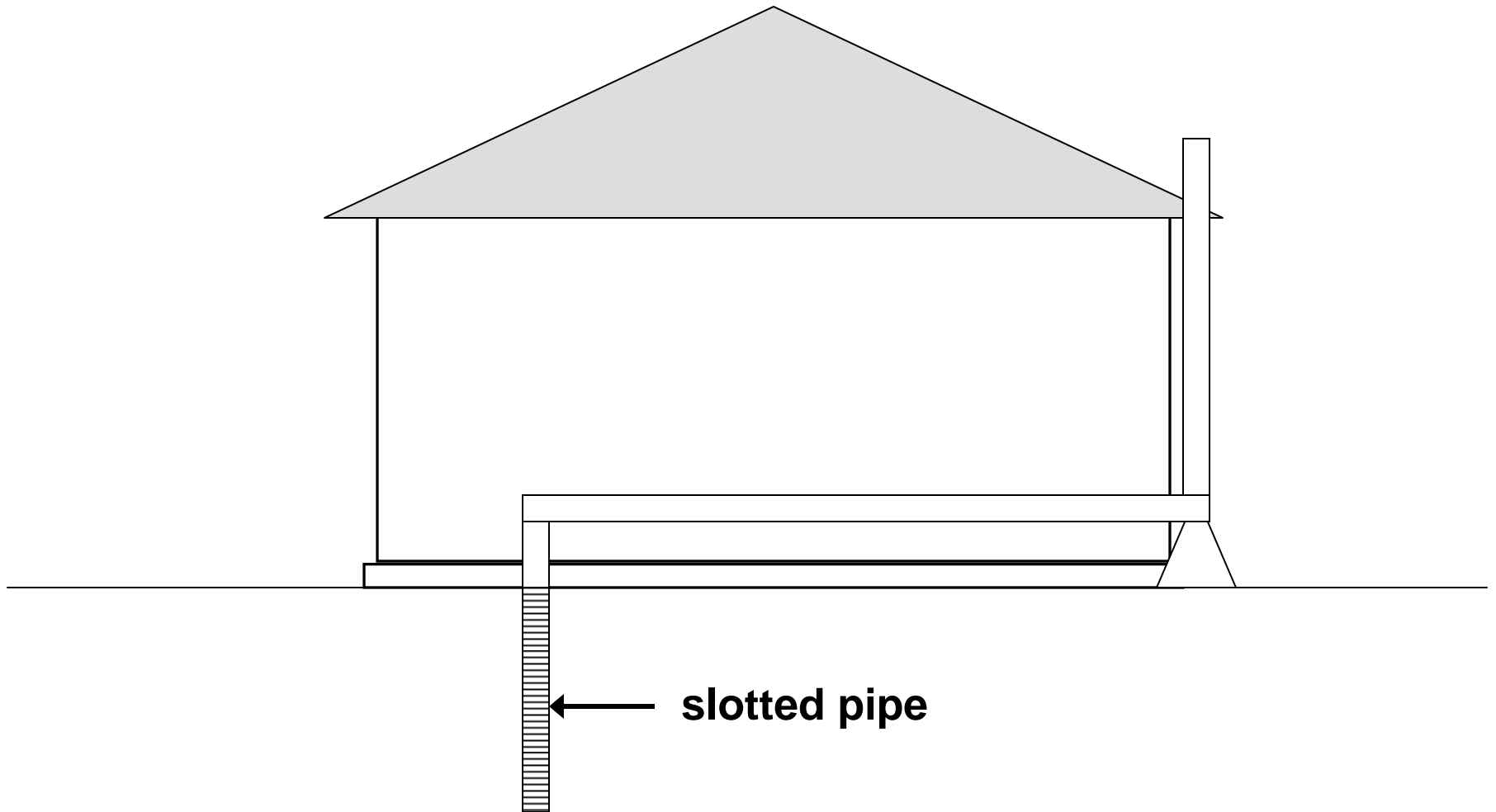
- Active SSD System
- Passive SSV System
- Sub-slab Pressurization
- Building Pressurization
- Podium Building





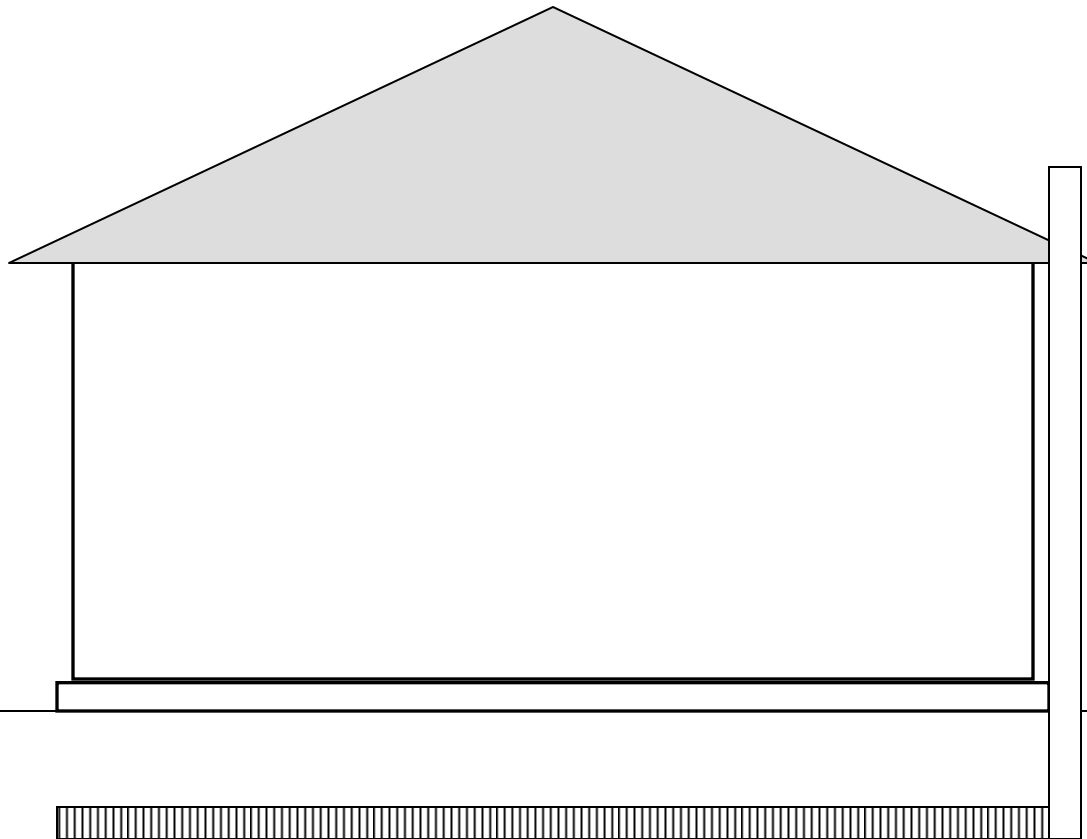
ENGINEERING CONTROLS

Passive Sub slab Venting of an Existing Building



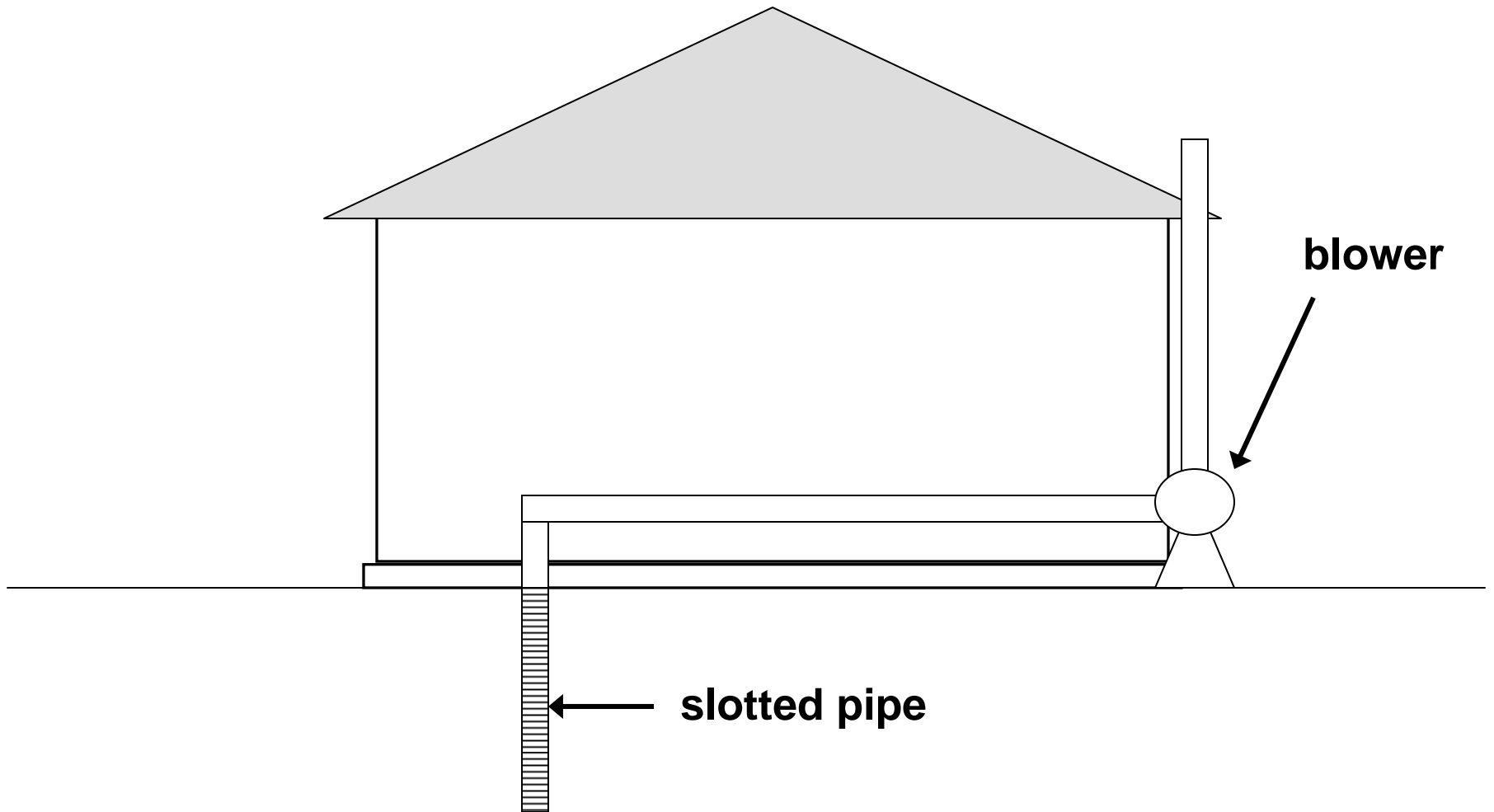
ENGINEERING CONTROLS

Passive Sub slab Venting of a Existing Building



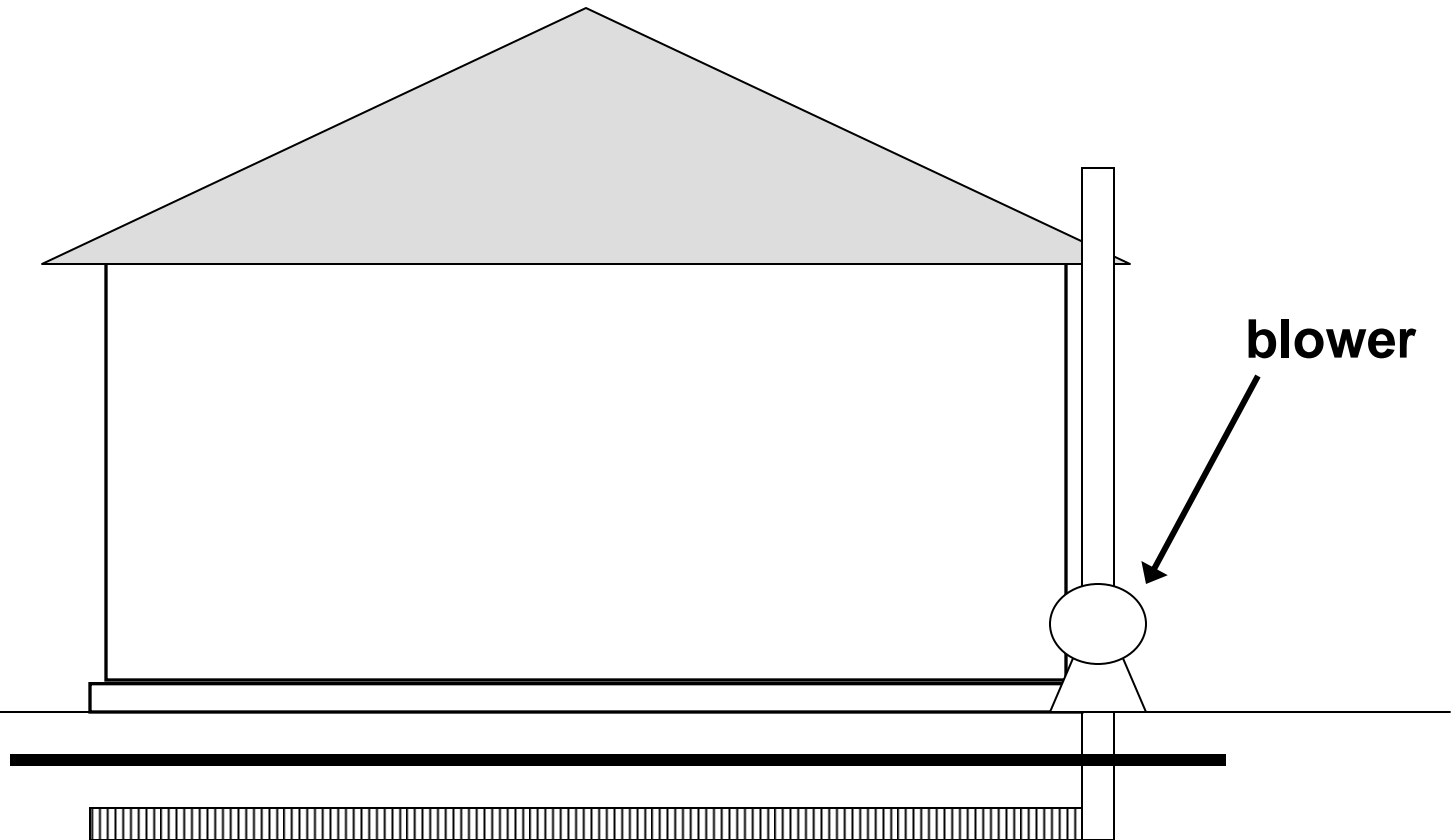
ENGINEERING CONTROLS

Active Sub slab Venting of an Existing Building



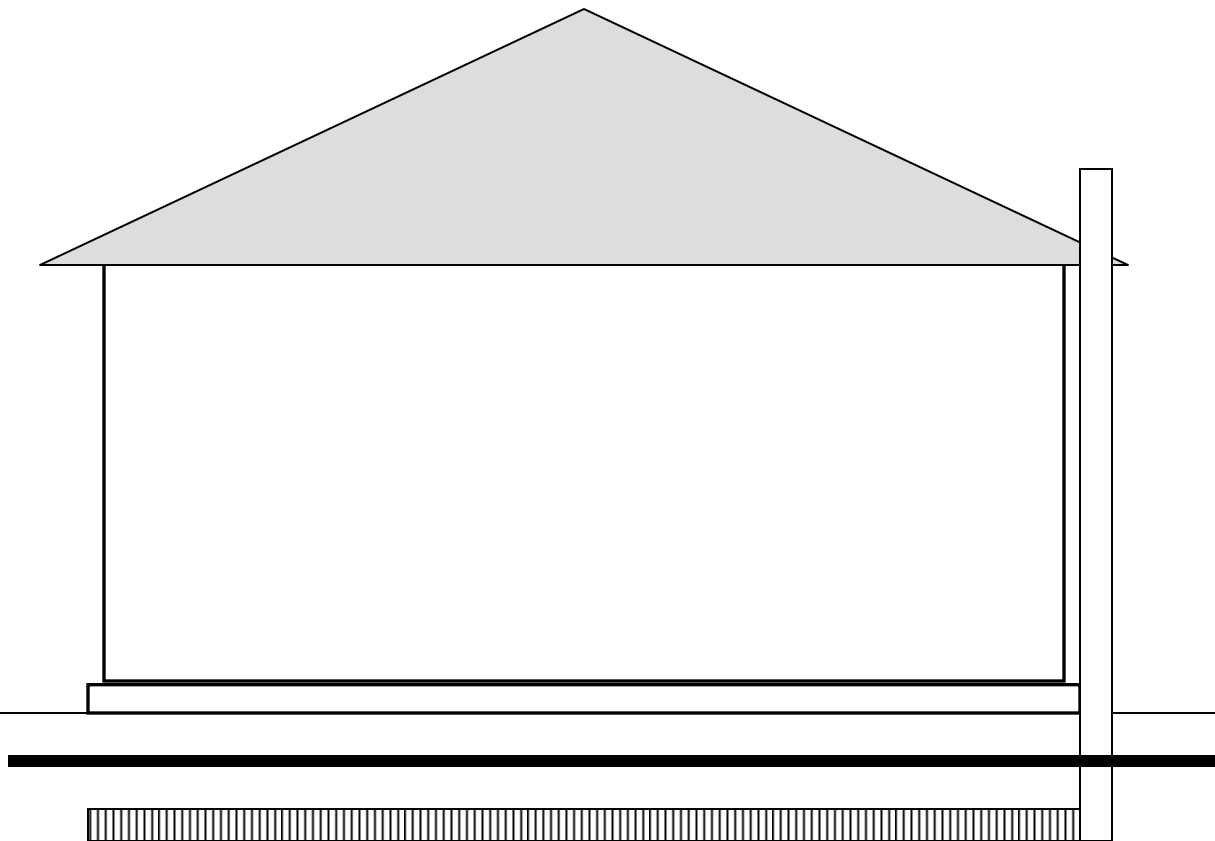
ENGINEERING CONTROLS

Active Sub slab Venting of a Future Building with Membrane



ENGINEERING CONTROLS

Passive Sub slab Venting of a Future Building with Membrane



Evaluation of Vapor Intrusion Mitigation Approaches

- Screening Alternatives
 - No single mitigation approach can be used at every site
 - Reflect site-specific conditions
 - Based on experience, SSD will work for most scenarios
 - Existing vs future buildings

Detailed Analysis of Alternatives

- Threshold Criteria
 - Overall protection of human health and the environment
 - Current vs future exposure
 - Compliance with federal/state/local requirements

Detailed Analysis of Alternatives

- Balancing Criteria
 - Long-term effectiveness and permanence
 - Short-term effectiveness
 - Implementability
 - Cost
 - Effective concurrent remediation in reduction of toxicity, mobility or volume through cleanup of source contamination

Detailed Analysis of Alternatives

- **Modifying Criteria**
 - State and local agency acceptance
 - Community acceptance
- **Additional Considerations**
 - Specific community concerns
 - Environmental Justice (EJ) issues
 - Ambient air quality
 - Local land use zoning

Mitigation System Design Considerations

- Overall building design
- Monitoring devices/alarms
- Back drafting / short circuiting
- Integrate mitigation and remediation systems
- Safety and environmental hazards

Design Documents

- Project background
- Site conditions summary & Conceptual Site Model (CSM)
- Existing building design report
- Mitigation goals and objectives
 - Performance and contingency measures
- Construction methods
- Design calculations and drawings

Design Documents

- Conceptual drawings
- Vapor intrusion mitigation approach
- Implementation mechanisms
 - Land Use Covenants (LUCs), deed restrictions
- Financial responsibility
- Supporting documents
 - Health & Safety Plan, O&M Plan, Public Participation Plan, soil management plan (including dust control)

VI Mitigation Implementation

- Operation and Maintenance Plan
 - Performance goals
 - Eliminate indoor air pathway
 - Acceptable indoor air levels
 - Performance measures
 - Collect subsurface vapor and/or indoor air samples
 - Pressure data (negative pressure)
 - Contingency plan

VI Mitigation Implementation

- Operation and Maintenance Plan
 - Monitoring
 - Approach, methods, and frequency
 - Inspections
 - Responsibility, frequency, access
 - Reporting
 - Responsibility, content, frequency
 - Costs
 - Operational, maintenance, regulatory oversight

Financial Responsibility

- Responsible Party
- Home Owners Association or Mello-Roos / Zone of Benefit mechanisms?
- Long-term costs
- Cost increase over time
- Financial stability
- Protection for building owner / tenant
- DTSC cost reimbursement

Legal Enforceability

- Institutional control mechanisms
- Legal agreements
- Access agreements
- Long term ability to track
- Enforcement of noncompliance

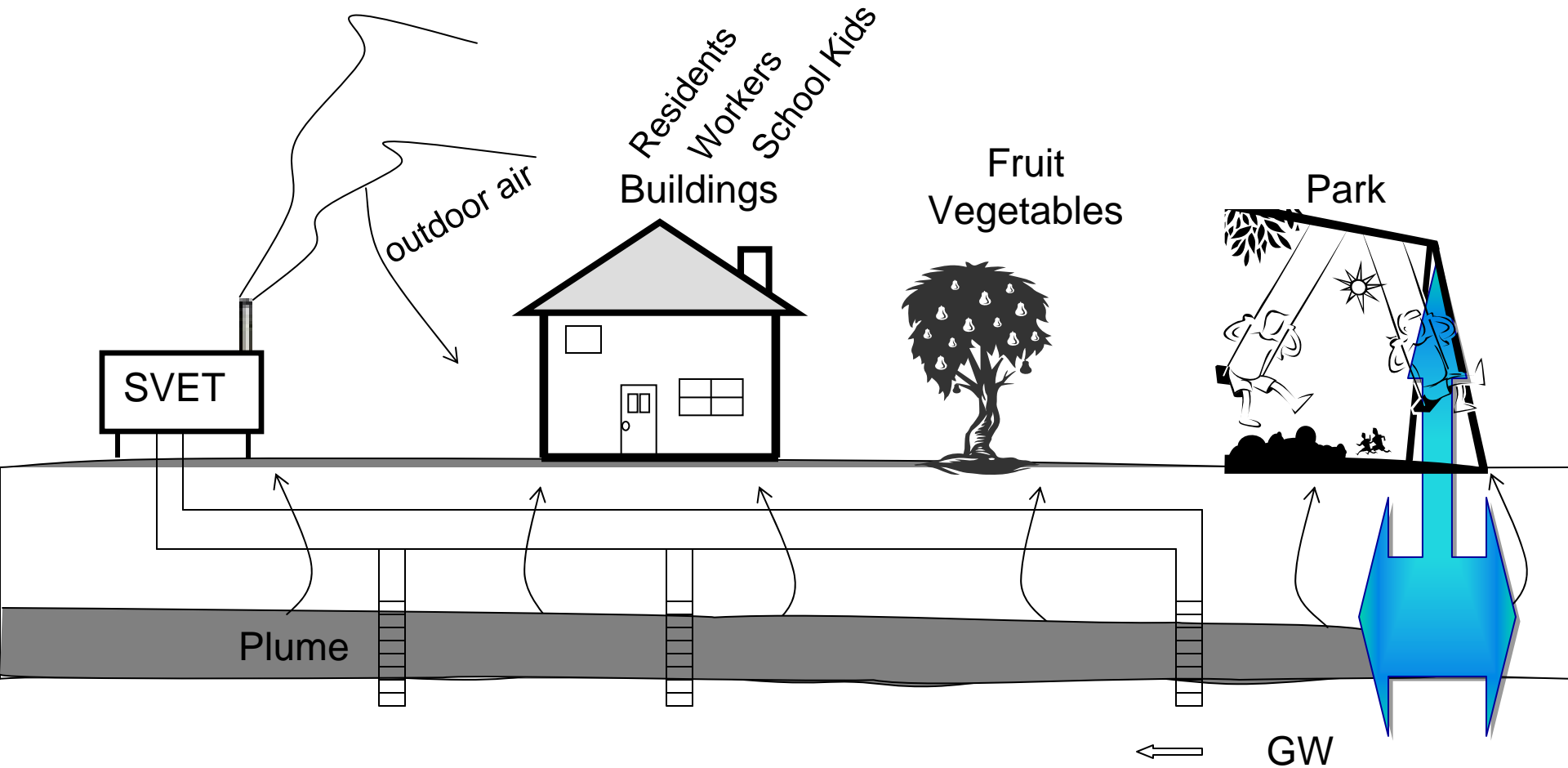
Long-term Sustainability

- Interim Measure
- Contingency planning
- Limited track record
- Five year reviews
- Closure

Public Participation & Outreach Critical to the Process

- Public concern is ALL potential vapor exposure; not just buildings
- Cumulative effects of all community environmental impacts
- Balancing all stakeholder needs and cost while maximizing public health protection

Vapor Intrusion – Public Perspective



Lessons Learned

- Involve the community at beginning
- Investigate VI pathway early
- Reliance on minimum public participation requirements causes unnecessary delays & public distrust
- Establish interim measures as soon as possible

Public Participation Strategy

- Connect with local community leaders; city/county agencies; community advocates; church leaders; potential developers
- Develop a community profile
 - Community needs, goals, & desires
 - Current & future land use
 - Other environmental concerns
 - Determine language needs

Public Participation Strategy

- Provide information / publications
 - Early & often
 - Full disclosure to potential buyers
- Hold public information meetings which focus on individual exchange
- Door to door contact; walk the neighborhood; let the community know who you are; ask community members about their concerns

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Public Participation Strategy

- Establish a working relationship with community leaders, elected officials, local agencies, potential developers
- Establish regular contact
 - Regular updates via e-mail
 - Frequent fact sheets & work notices
- Establish one primary point of contact
- Form Community Advisory Committee

Public Participation Strategy

- Provide easy access to information
- Information repositories for completed documents
- Online web access to completed documents (e.g. Calif Envirostor <http://www.envirostor.dtsc.ca.gov/public/>)
- Require all documents received include an electronic file copy (pdf file format)

Public Participation Strategy

- Utilize the CEQA process fully
 - Public feels the process is for their benefit
 - Facilitates decision making process
 - Identifies all potential & cumulative impacts for public review & comment
 - Public hearing required
 - Review of alternatives
- DTSC Vapor Intrusion Public Participation Strategy – proposed 2009



Regulatory Contacts (DTSC)

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US EPA Indoor Air Vapor Intrusion Mitigation Approaches

www.clu-in.org/download/char/600r08115.pdf