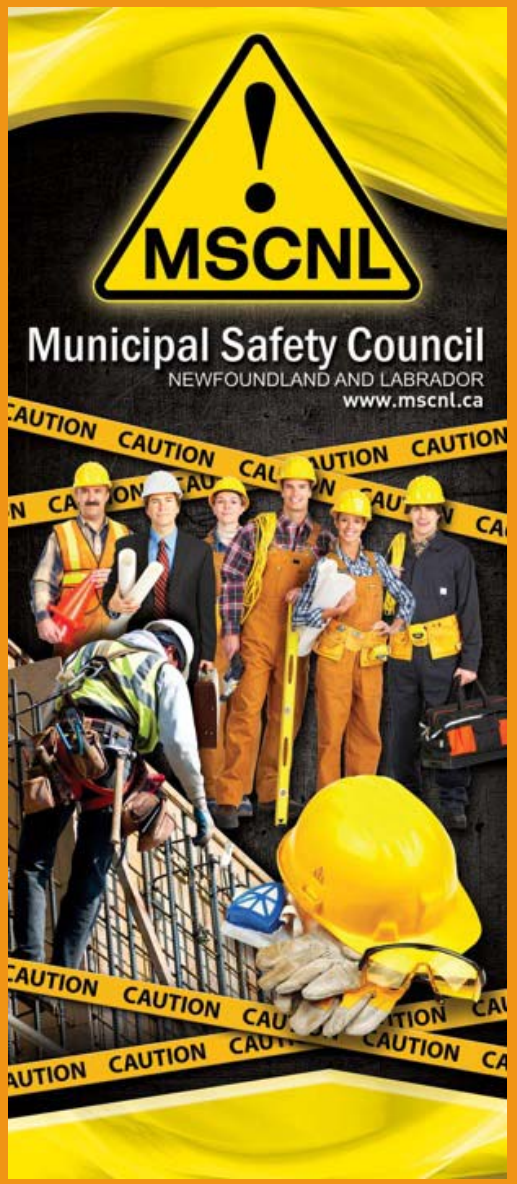
MUNICIPAL TRENCHING & EXCAVATION SAFETY



Municipal Safety Council NL
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Agenda

- Trench vs Excavation
- OHS Legislation
- Hazards
- Types of Soil
- Causes of Trench Collapse
- Control Measures

What is a Trench?

Trench:

- A hole where the depth is greater than the width and narrow compared to its length

What is an Excavation?

Excavation:

A hole left in the ground as a result of removing material

Cavity formed by cutting, digging or scooping

Occupational Health and Safety (OHS) Legislation

OHS Act and Regulations

- intended to protect health and safety of workers
- outlines legal duties of workplace parties
- minimum standard

Administered by OHS Division, Department of Government Services

OHS Act

Act(4) - Employer's general duty

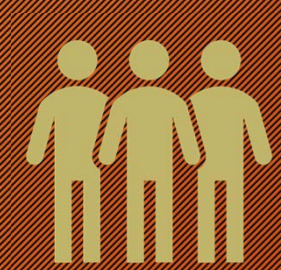
- An employer shall ensure, where it is reasonably practical, the health, safety and welfare of his or her workers

OHS Act

Act(5) – Specific duties of employers

- provide safe equipment, systems and tools
- provide information, instruction, training, supervision and facilities
- ensure everyone is aware of hazards
- ensure no one else is exposed to hazards
- provide operating instruction for PPE and devices
- cooperate with OHS Committee/Worker Health and Safety Representative

OHS Act



Act(6) – Workers general duty

protect his or her own health and safety and that of workers and other persons at or near the workplace

OHS Act

Act(7) – Specific duties of workers

- a worker shall
  - protect his/her safety
  - protect safety of other workers
  - protect safety of other people nearby
- use all safety equipment and devices
- consult and cooperate with OHS Committee

OHS Regulations

- **Reg. (14) – General duties of employers**
- inspect all buildings, structures, excavation, machinery and equipment
- ensure PPE and protective devices are used
- ensure safe work procedures are followed
- ensure that SWP's promote the safe interaction of workers & their work environment

OHS Act

Act (5.1) – General duties of Supervisor

- A supervisor shall ensure, where it is reasonably practicable, the health, safety and welfare of all workers under his or her supervision.

OHS Act

Act	Act (5.2) – Specific Duties of a Supervisor
Advise	advise workers under his or her supervision of the health or safety hazards that may be met by them in the workplace;
Provide	provide proper written or oral instructions regarding precautions to be taken for the protection of all workers under his or her supervision; and

OHS Act

Act (5.2) – Specific Duties of a Supervisor

ensure that a worker under his or her supervision uses or wears protective equipment, devices or other apparel that this Act, the regulations or the worker's employer requires to be used or worn.

OHS Regulations

Reg.(406)- Pre excavation requirements

locate underground services

secure/remove material within 1.83m of edge of excavation;

OHS Regulations

If excavations is greater than1.22m deep:

- Slides must be sloped/shored or trench box
- Other effective means
- Consider added loads
  - Machinery/equipment
  - Adjacent excavations
  - Vibration from nearby equipment/traffic
  - Adjacent foundations
    - Work done in small sections and building shored or braced

OHS Regulations

Reg.(407) – Excavation or access

- in excavations 1.22m or greater in depth, a ladder be provided in the **immediate area**
- the ladder must extend at least 0.91m (3 rungs) above the top of the excavation.

OHS Regulations

Reg. (410) - Excavation safety

excavations shall be guarded by effective railings or barriers to prevent workers from falling in to excavations

accumulation of water in an excavation must be prevented/removed

OHS Regulations

- a ladder, ramp or other acceptable means must be available for entry and exit
- faces must be scaled of loose rock
- excavated material must be at least 1.2m away from edge of excavation

OOPS

Hazard vs Risk

Hazard

- Any situation or action that has potential for harm or an adverse effect

Risk

- Chance or probability that a person will be harmed if exposed to a hazard

Hazards

- Cave in
- Fall into trench
- Trip over equipment/materials
- Material falling onto worker
- Underground services – dial before you dig
- Overhead services
- Heavy equipment
- Traffic
- Adjacent structures: trees/poles
- Atmosphere: gases/oxygen

Types of Soil

- Soil types may pose a potential hazard.
- Four different types of soil.

Type 1

“Hardpan”

- consolidated clay and some glacial tills.
- walls of excavation may lose shiny appearance after several days
- hard to drive a pick into.

Type 2

"Silty Clay"

less dense tills

walls may crack if left exposed to air longer than several hours

easy to drive a pick into

Type 2

Type 3

Previously excavated material

will not stand vertically and sides of excavation will cave in to a natural slope of 1-1 depending on moisture

easily excavated with a backhoe

Type 3

Type 4

High moisture content

must be supported and contained to be excavated to any significant depth

sensitive to vibration

easily excavated with a backhoe

Type 4

Common Causes of Trench Collapse

Moisture

Inadequate scaling

Inadequate benching/sloping

Materials/Equipment/Vibration

Moisture

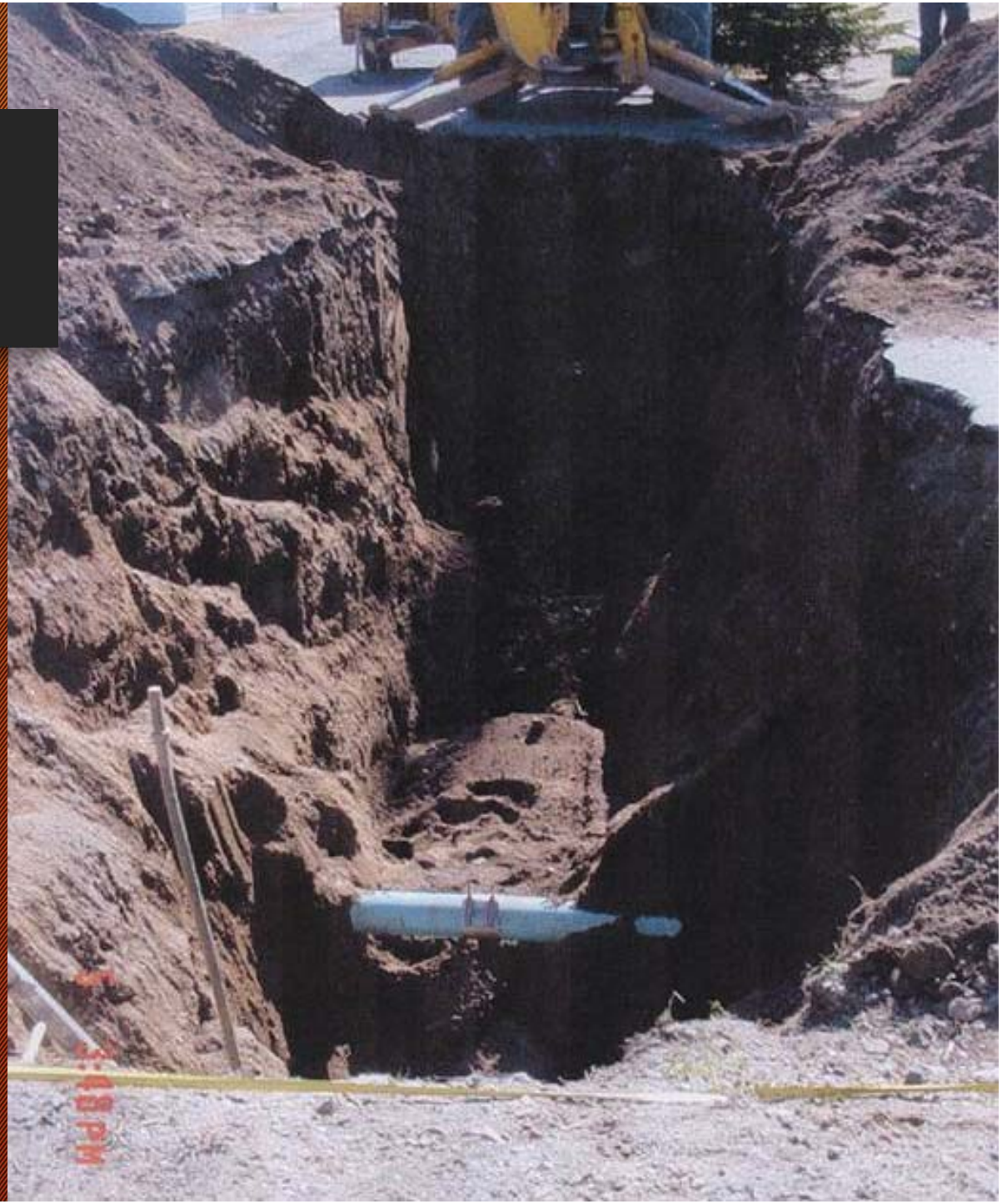
Moisture

- Water gets behind face of excavation;
  - freeze/thaw causes ground to lose soil cohesiveness,
  - expansion/contraction
- Excavations left open to the air will contribute to a loss of moisture promoting cracking and loss of strength
  - Freeze/thaw

Inadequate Scaling

Inadequate scaling

- Scaling: Removal of loose material from the sides of a trench
- Overhanging material



Inadequate Benching/Sloping

Inadequate benching/sloping

- Weight of material adds strain to compactness

Materials/Equipment/Vibration

- Materials/Equipment on side of excavation
  - Weight of materials and equipment adds strain to compactness
  - Vibration from equipment can cause soil to lose cohesiveness leading to a collapse

How Much Does Soil Weigh

- 1m3 dirt =
  - 1.2 Tonne – 1.7 Tonne
  - 1200 kg – 1700 kg
  - 2645 lbs – 3747 lbs.

weight of water + rock = > 5000 lbs!!

HOW FAST CAN YOU RUN?

Soil falling only 10 feet will be moving at 25 ft/s. That's the same as: 17 mph or 7.62 m/s.

Human (running): 12 – 15 mph (short sprint)

Human (walking): 3.1 mph

The worlds fastest man ran 100 m in 9.72 sec – that's 33.75 ft/s or 10.29 m/s

The average human can only jump 5 – 8 inches and most ditches are >36 inches

YOU CANNOT OUTRUN A COLLAPSING DITCH OR JUMP OUT OF IT IN TIME!!!!

Sloping

Trench Box

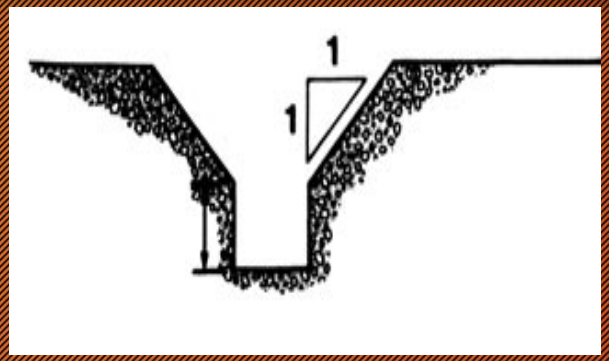
Shoring

Control Measures

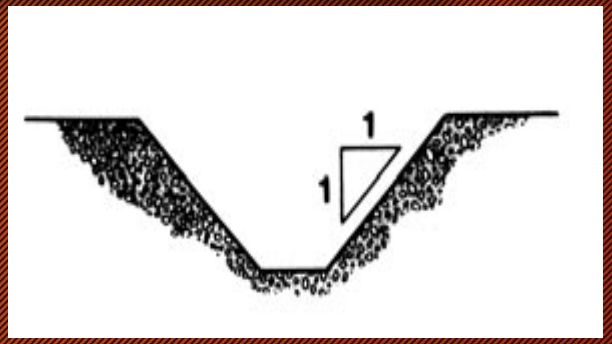
Sloping

Type	Type 1 soil • Slope 1-1 within 4 feet from bottom
Type	Type 2 soil • Slope 1-1 within 4 feet from bottom
Type	Type 3 soil • Slope 1-1 all the way to the bottom
Type	Type 4 soil • Slope 1-3 all the way to bottom

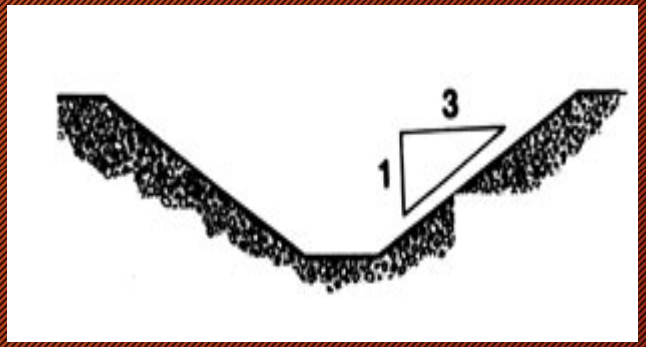
Sloping



Type 1 & 2 soil



Type 3 soil



Type 4 soil

Trench Box

- Must be certified by professional engineer
- Must be inspected before every use
- Must be cut back at top if used to top of trench
- Must go all the way to the bottom of excavation.
- Must protect employee not the excavation

Trench Box

Shoring

Bracing for trench walls which provide additional support

Must be certified by a professional engineer

Shoring

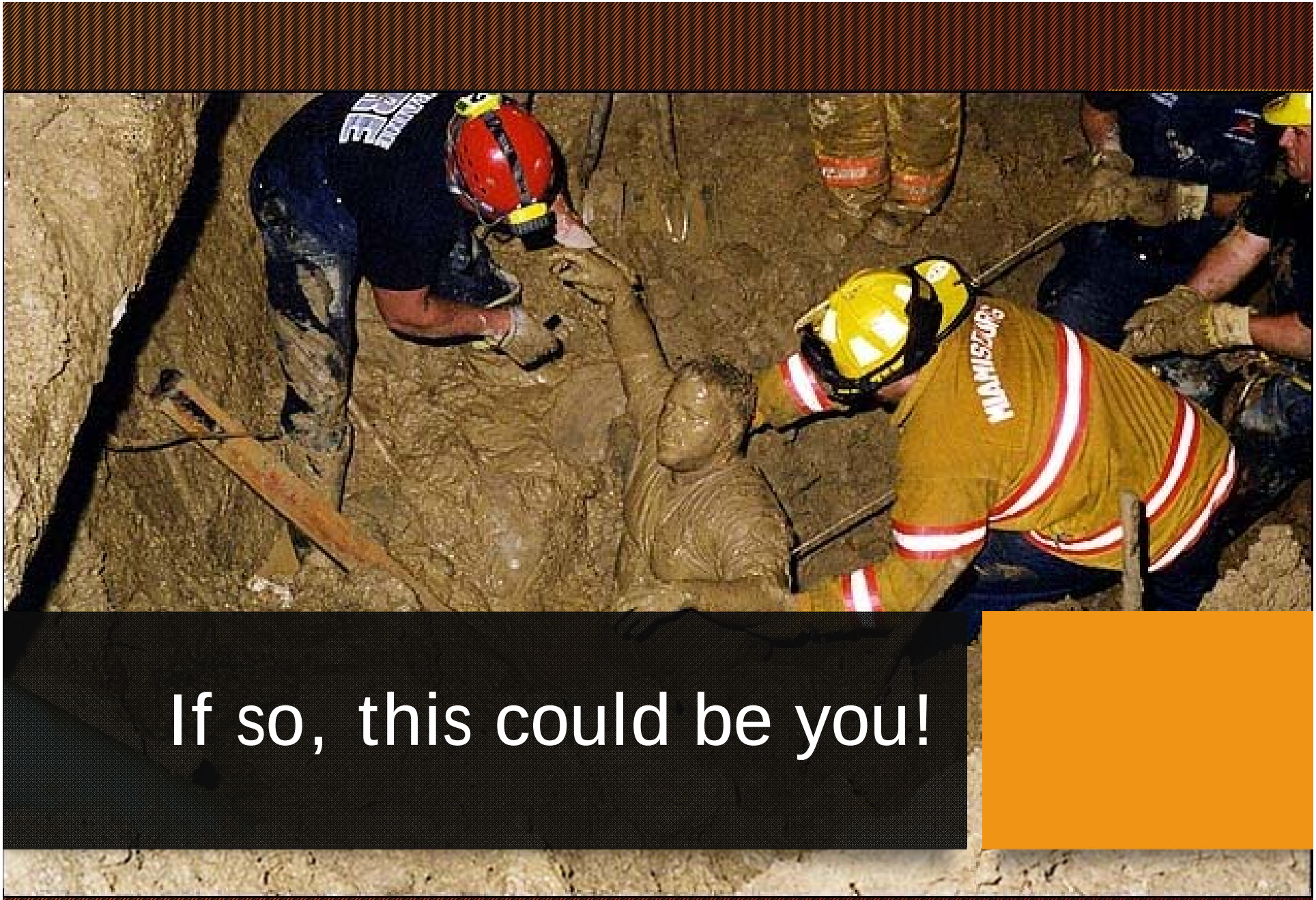
Emergency Response!

If you become trapped in a collapsed ditch, use your hardhat to create an air pocket.

If you see someone become trapped:

Call 911 immediately	Note the last known location of the victim	If you must dig, dig by hand only


Would This Be You?


If so, this could be you!

Remember!

Question & Answers


Thank You