

Building site explosion in tunnel

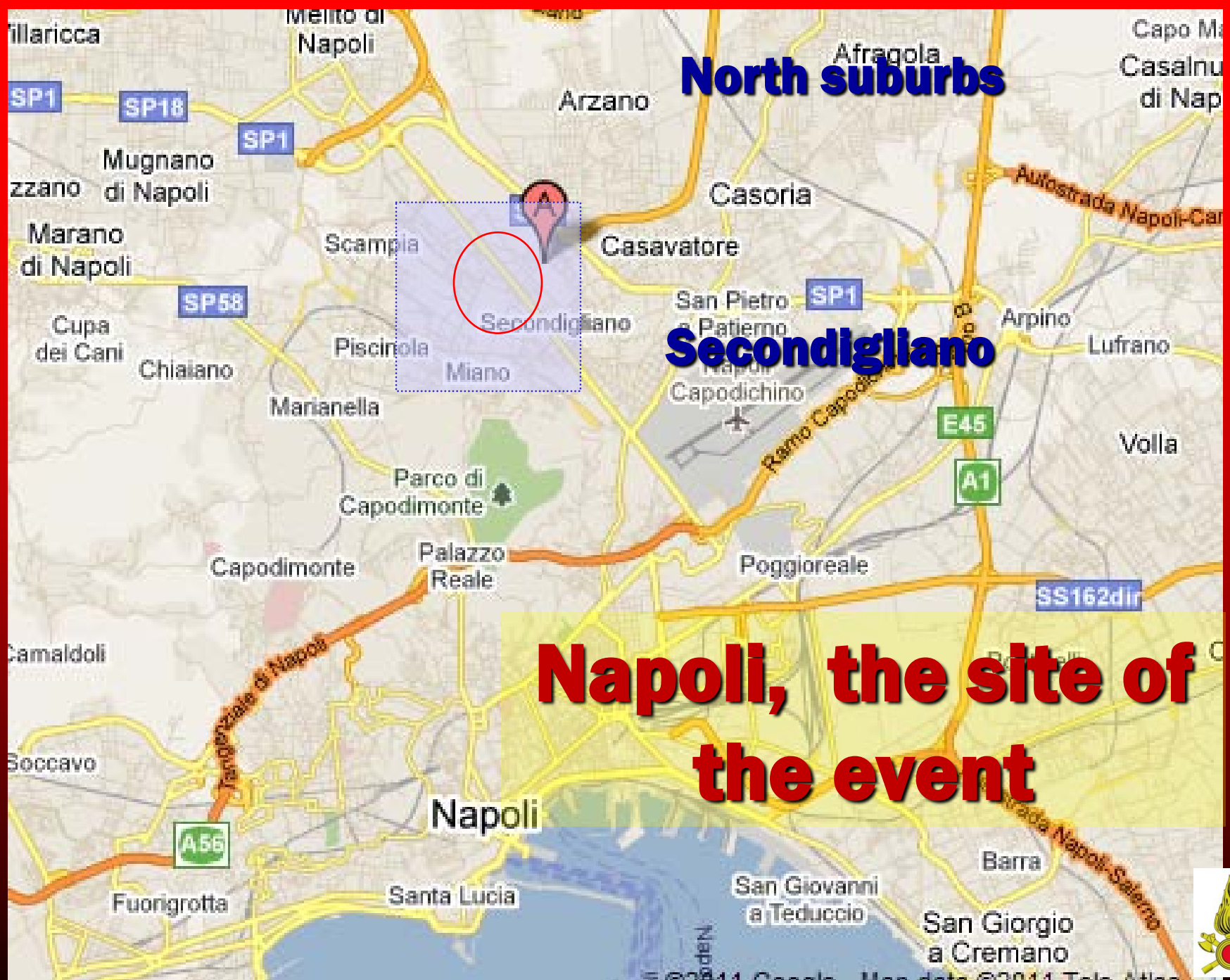
Rome, 3 rd march 2011

Rescue in Underground Facilities

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Secondigliano: fuga di gas, crolli, voragini, fiamme, mille sfollati. Due dispersi

Inferno a Napoli



**Naples,
January,
23rd 1996**

**What did it
happen?**



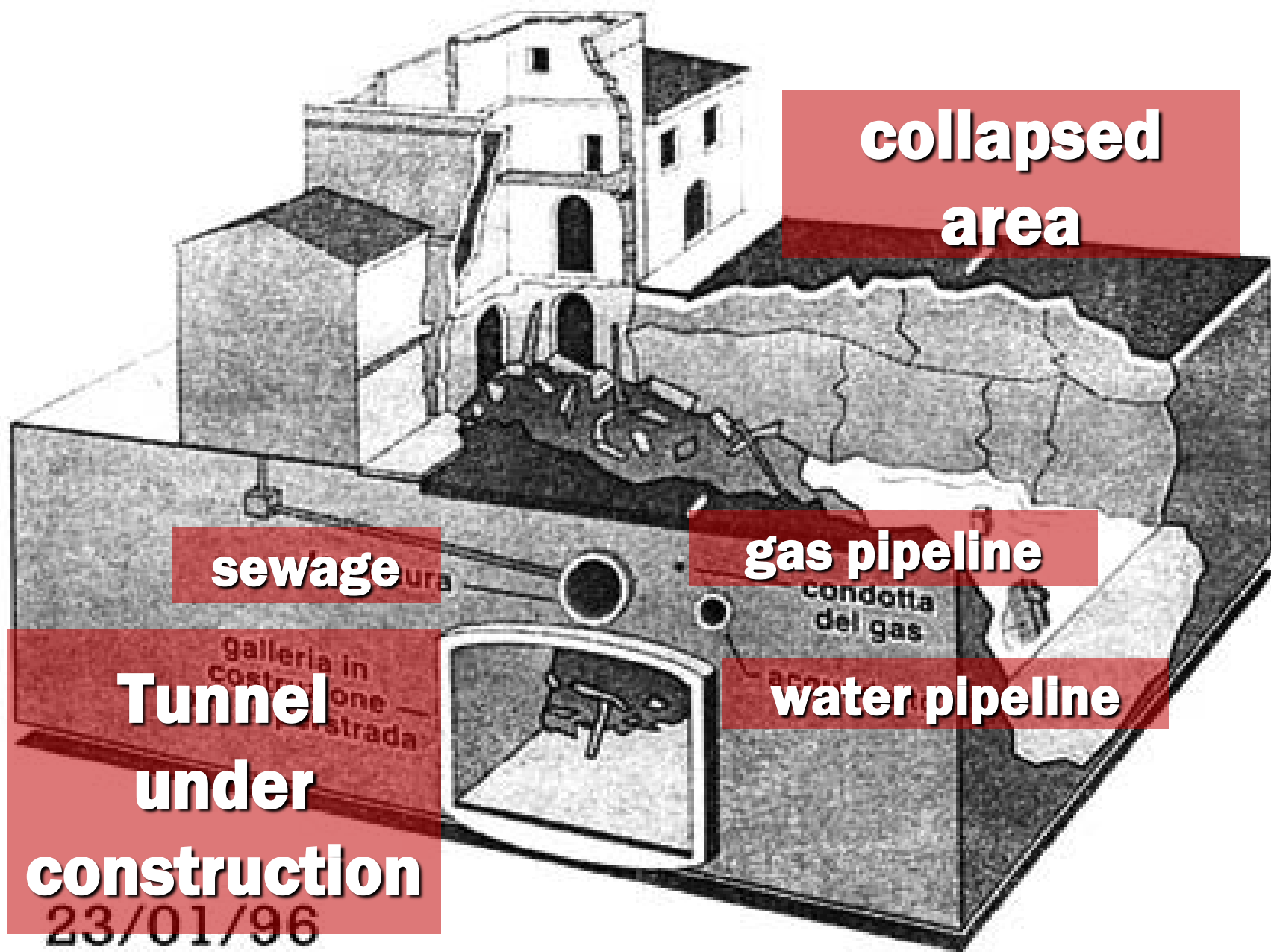
Naples, January, 23rd 1996

What did it happen?

People was upset by:

- a chasm of 20 metres in a street;**
- the boom of an explosion;**
- a fire, that lasted 7 hours ;**
- 6 deaths and 8 injured persons**





Type of excavation

-excavation of the tunnel with section in blind hole choked with pre-containment technique through the previous consolidation of the soil





**.. by means of an umbrella of columns
of soil treated with jet-injection to
counteract the immediate loosening
and distribute the forces on the final
coat of concrete.**



the fire during the night ...





... and the day after

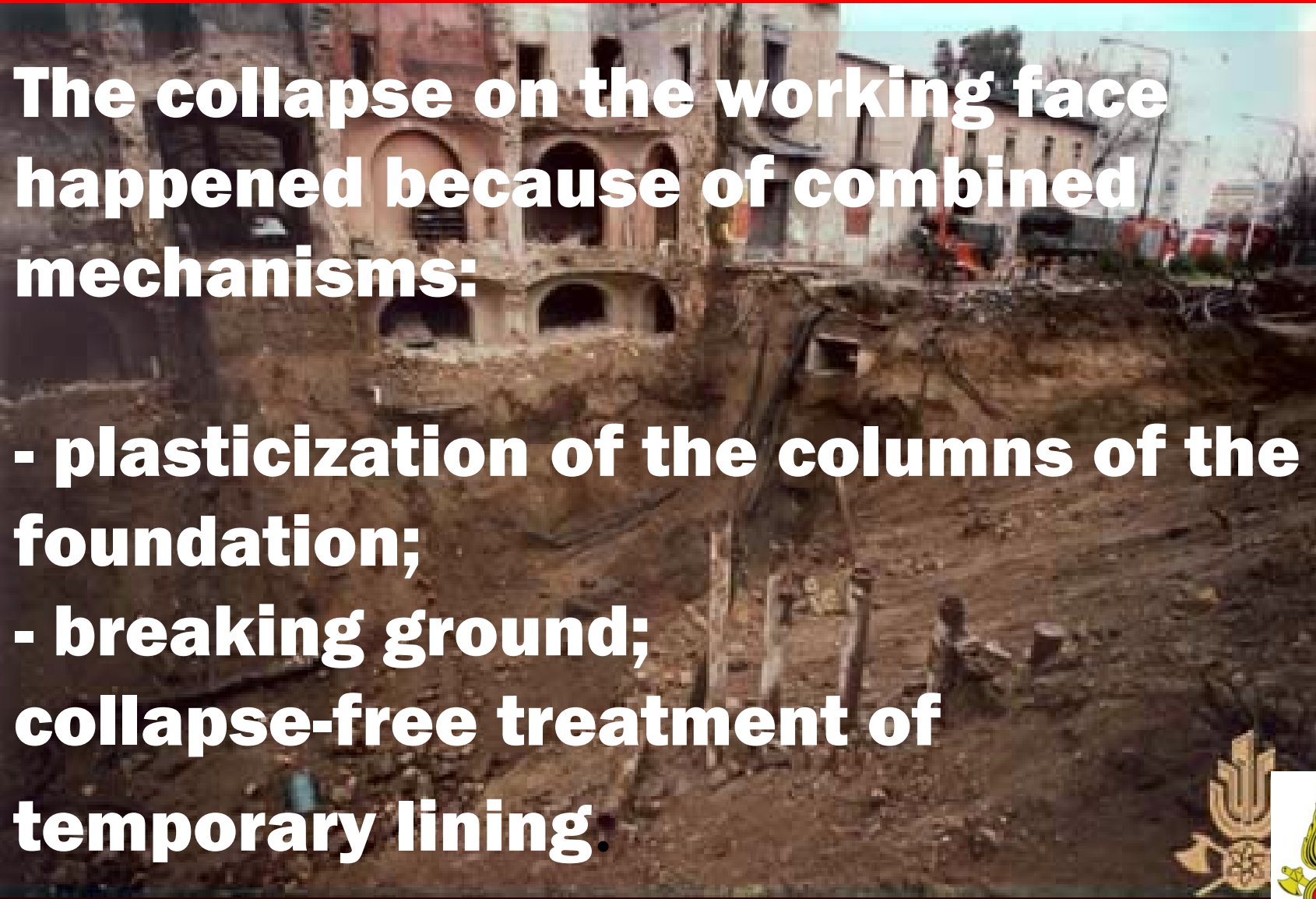




During the works, failures were detected on the surface along the axis of the tunnel for several centimetres

These ground deformation caused problems to the adjacent buildings





The collapse on the working face happened because of combined mechanisms:

- plasticization of the columns of the foundation;**
 - breaking ground;**
- collapse-free treatment of temporary lining.**



The intervention of firefighters.

- To extinguish fire, isolating the gas pipe**
- to extract the victims from the abyss**





- the research and the recover of the bodies of the workers in the tunnel

exhibits VORAGENESS
(non in scale)



ABSENZA
ARCO BOVESCO



A large yellow excavator with "HYDROMAC" written on its arm is working in a deep, narrow trench. Several workers in orange safety gear are visible around the machine. The trench walls are steep and show signs of excavation. The ground is covered in loose soil and debris.

- Securing the surrounding buildings

- Dugging the whole area of the gallery to bring to light the structures





**Dugging the whole area
of the gallery to bring to
light the structures**



For this event the President of the Italian Republic awarded the silver medal for civil merit to the standard of the Italian Firefighters.





The causes of the collapse:

- lack of planning;**
- poor execution**
- lack of control by the project manager of the construction site**





MINISTERO dell'INTERNO

**DIPARTIMENTO dei VIGILI del FUOCO
del SOCCORSO PUBBLICO e della DIFESA CIVILE**



Corpo Nazionale dei Vigili del Fuoco

Rome March 3, 2011 Istituto Superiore Antincendi

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