Geophysical Research Abstracts
Vol. 19, EGU2017-18438, 2017
EGU General Assembly 2017

Earthquake Risk Reduction to Istanbul Natural Gas Distribution Network

Can Zulfikar (1), Cagatay Kariptas (2), Hikmet Biyikoglu (3), and Cevat Ozarpa (3)

(1) Gebze Technical University, Engineering Faculty, Civil Engineering Department, Turkey (aczulfikar@gtu.edu.tr), (2) GRM Communication and Information, (3) IGDAS (Istanbul Gas Distribution Industry and Trade Incorporated Company)

Earthquake Risk Reduction to Istanbul Natural Gas Distribution Network

Istanbul Natural Gas Distribution Corporation (IGDAS) is one of the end users of the Istanbul Earthquake Early Warning (EEW) signal. IGDAS, the primary natural gas provider in Istanbul, operates an extensive system 9,867km of gas lines with 750 district regulators and 474,000 service boxes. The natural gas comes to Istanbul city borders with 70bar in 30inch diameter steel pipeline. The gas pressure is reduced to 20bar in RMS stations and distributed to district regulators inside the city. 110 of 750 district regulators are instrumented with strong motion accelerometers in order to cut gas flow during an earthquake event in the case of ground motion parameters exceeds the certain threshold levels. Also, state of-the-art protection systems automatically cut natural gas flow when breaks in the gas pipelines are detected. IGDAS uses a sophisticated SCADA (supervisory control and data acquisition) system to monitor the state-of-health of its pipeline network. This system provides real-time information about quantities related to pipeline monitoring, including input-output pressure, drawing information, positions of station and RTU (remote terminal unit) gates, slum shut mechanism status at 750 district regulator sites.
IGDAS Real-time Earthquake Risk Reduction algorithm follows 4 stages as below:
1) Real-time ground motion data transmitted from 110 IGDAS and 110 KOERI (Kandilli Observatory and Earthquake Research Institute) acceleration stations to the IGDAS Scada Center and KOERI data center.
2) During an earthquake event EEW information is sent from IGDAS Scada Center to the IGDAS stations.
3) Automatic Shut-Off is applied at IGDAS district regulators, and calculated parameters are sent from stations to the IGDAS Scada Center and KOERI.
4) Integrated building and gas pipeline damage maps are prepared immediately after the earthquake event.

The today's technology allows to rapidly estimate the expected level of shaking when an earthquake starts to occur. However, in Istanbul case for a potential Marmara Sea Earthquake, the time is very limited even to estimate the level of shaking. The robust threshold based EEW system is only algorithm for such a near source event to activate automatic shut-off mechanism in the critical infrastructures before the damaging waves arrive. This safety measure even with a few seconds of early warning time will help to mitigate potential damages and secondary hazards.