Wavelets - *The Walls Come a Tumblin' Down – The Houston Club Implosion*

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A rapid and effective method of building demolition can be via implosion. Houston has witnessed several prominent implosion events recently (Macy's, MD Anderson's HMB, Prudential). The 18-story Houston Club building at 811 Rusk was one of the city's landmarks and met its finale via 500 lbs of explosives on October 19th, 2014, at approximately 7:00 am ***(Figure 1)***. Many Houstonians watched (and felt) the series of explosions. In less than a minute, the six-decade old building collapsed and became history. Skanska USA plans to build a new 35-story LEED Platinum-rated building, called the Capitol Tower, in its stead.

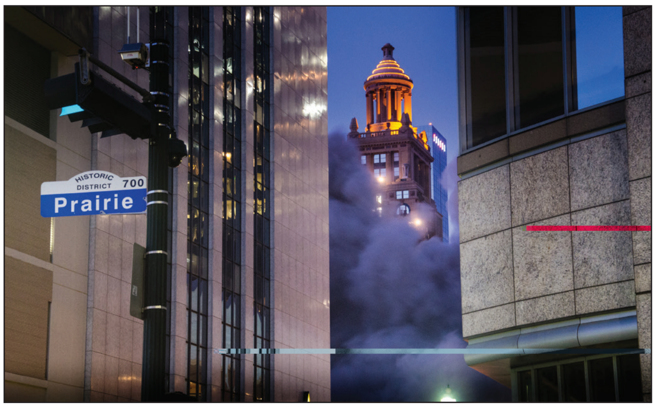

Figure 1: Dust and debris from the Houston Club building's collapse during the October 2014 implosion (taken from Prairie St. by J. Wang).

A building implosion (actually a series of internal explosions that weaken the structure which then collapses under gravity) is a carefully controlled demolition procedure accomplished by strategically placing explosives and timing their detonation to collapse the building onto itself. This can rapidly and safely demolish the building and minimize damage to its immediate surroundings. The Houston Club brought its own challenges as the building was about 382 feet tall and the nearest structure was only 80 feet away, and all this in a city center crammed with infrastructure.

Recording the implosion

A geophysical crew from the Allied Geophysical Lab (AGL) at the University of Houston was interested in recording the vibrations emanating from the implosion event. The goal of the recording was to analyze the seismic magnitude of the event, its wave types, and the underlying ground properties of the city center. We used Geospace Seismic Recorder (GSR) nodes with three-component geophones. The recording was challenging with safety, access, and planting constraints. Fortunately, at the intersection of Main and Walker

Figure 2: Autonomous seismic nodes (Geospace GSRs) awaiting deployment (left) along Main St. in downtown Houston and then planted (right) for the implosion.

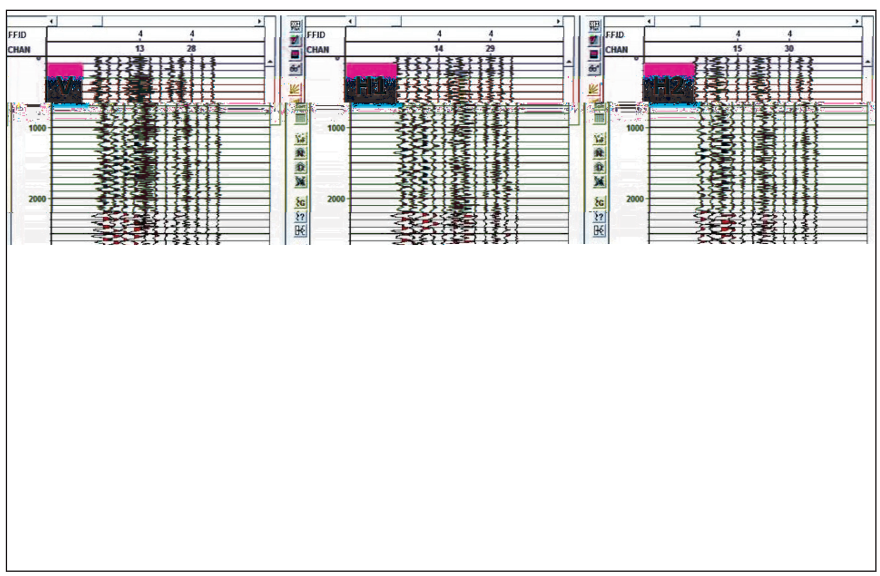

Figure 3: Seismic shot gathers from the implosion event - vertical component (left), horizontal 1 (middle), and horizontal 2 (right). The dashed rectangular represents the implosion event time window.

Wavelets continued on page 19.

Wavelets continued from page 18.

Street, there was an 80 m long roadside vegetation area which allowed us to deploy our 12 GSR units 6 m apart in a SW-NE direction, radially from the building. Each GSR unit is comprised of a battery, electronics, 8 GB of memory storage, and a 10 Hz multicomponent geophone ***(Figure 2).***

The GSR nodes continuously recorded vibrations in a time window around the period of the implosion.

Seismic shot gathers, from a time window around the event, for the 12 stations and three components are shown in ***Figure 3***.

From the shot gathers, we can see the implosion events were recorded on all three components. Since the explosives and collapse sequence, as well as near-surface environment are complicated, the seismic signature is also a complex mix. Yet, the two major arrivals are observable. The velocity of these two events (interpreted as ground roll) across our array was around 230 m/s at about 15 Hz.

We are currently analyzing the data to determine the magnitude of the event in addition to further characterizing the near-surface properties and urban demolitions in general.