KATRINA DEATH TOLL

# Failed walls caused deaths

•FLOODWALLS, FROM 1A

neighboring St. Bernard Parish, where Katrina's storm surge poured over levees and flooded neighborhoods.

The role of the 17th Street and London Avenue canal floodwalls in the destruction of New Orleans has been hotly debated in the four months since the storm. Engineers who are investigating their collapse think that floodwaters generated by Katrina never rose high enough to pour over the walls, and they blame flawed design, construction or maintenance for the walls' failure and the flooding that followed.

Louisiana authorities are investigating whether laws were broken during construction of the floodwalls, but until now there's been no attempt to quantify how much their failure may have contributed to New Orleans' death toll.

Louisiana State University hurricane expert Ivor Van Heerden said there was no doubt that vast areas of the city would have remained dry, and residents relatively safe, had the walls of the 17th Street and London Avenue Canals not collapsed.

"A big yes," Van Heerden replied to an e-mail question asking whether the majority of the city would have stayed largely dry had those floodwalls held.

Peter Nicholson, an associate professor of civil and environmental engineering at the University of Hawaii, said some flooding in central New Orleans came from breaches on the west side of the Industrial Canal, but that those breaches were above sea level and the flooding stopped as Katrina's surge died down Aug. 29.

"The big difference is with 17th Street and London, the breaches opened gaps that were below sea level and continued to drain Lake Pontchartrain until they were closed," Nicholson said.

### EFFORTS CONFOUNDED

This confounded rescue efforts and left thousands stranded in darkened hospitals, attics, on freeway overpasses or in the foul refuges of the Superdome and the convention center.

Dr. Frank Minyard, the Orleans Parish coroner, has estimated that 20 percent of Katrina's victims drowned. Scores more died awaiting rescue, trapped by floodwaters in attics, on highway overpasses and in medical facilities. The causes of death for many will never be known because their bodies were too badly decomposed by the time they were recovered.

Said Robert Bea, a professor of civil and environmental engineering at the University of California at Berkeley, "Had we not lost the integrity at 17th Street and the integrity on London, we would have had water in there and maybe some soggy carpets, but certainly not the water level that ultimately led to the catastrophe. That is directly attributable to those two sets of failures." Bea is a member of a team of engineers who studied the levee system under the auspices of the National Science Foundation.

Months after Katrina's landfall, experts still are debating how the tragedy might have been avoided. Local officials ordered an evacuation of New Orleans, but perhaps not soon enough. Tens of thousands of residents ignored the evacuation order. Federal help came slowly.

Debate also continues over what part Louisiana's fractured system for governing the levees played in the flooding. In addition to the two canals whose floodwalls collapsed, engineers reported poor maintenance and construction practices at scores of places throughout the vast levee system.

Louisiana officials still are tabulating the death toll, which stands at nearly 1,100 statewide. Dr. Louis Cataldie, the state medical examiner, said a precise total might never be known.

The Louisiana Department of Health and Hospitals, in response to a request from Knight Ridder released a list of nearly 600 locations where at least 874 bodies had been recovered in Orleans and St. Bernard parishes, the two areas in Louisiana that Katrina hit the hardest.

Louisiana health officials say the list is incomplete, and a review of the data showed some inaccuracies.

But the addresses provided the first comprehensive view of where Katrina's New Orleans victims were found and allowed a systematic look at the dead for the first time.

The addresses showed that far more dead were recovered in western and central New Orleans than in the city's eastern neighborhoods, even though the Lower Ninth Ward, New Orleans East and St. Bernard Parish received the storm's harshest battering.

Van Heerden, the LSU hurricane expert, said the flooding in the eastern areas began when an 18-foot storm surge from Lake Borgne destroyed much of the earthen levee system that had protected St. Bernard Parish shortly before the storm made landfall at 6:10 a.m. Most of the parish's 123 victims drowned in their homes, said Dr. Bryan Bertucci, the parish coroner.

By 6:30 a.m., water as high as 17 feet surged into a convergence of two channels east of New Orleans, engineers believe. It overwhelmed the levees, added to the flooding in St. Bernard Parish and began to flood the Lower Ninth Ward.

Just before 7 a.m., water poured over the top of the Industrial Canal, separating the Lower Ninth and New Orleans East from the rest of the city. The water eroded the back side of the levee, scouring out trenches that undermined the walls.

About 7:45 a.m., walls protecting the Lower Ninth were "explosively breached," and a head of water almost 20 feet high mowed down houses in its path, Van Heerden said.

But Van Heerden's re-creation of the storm's flooding indicates that as the storm's eye moved north to the south shore of Lake Pontchartrain, the surge that had buried St. Bernard Parish leveled off.

Most of central and western New Orleans remained dry — until the 17th Street and London Avenue canals' floodwalls collapsed.

Van Heerden, the deputy director of LSU's Hurricane Center, places the collapse of the 17th Street Canal wall at about 10:30 a.m., though others have reported it hours earlier. The breach would expand to 455 feet.

At the London Avenue Canal, the 11-inch-thick concrete floodwalls bowed and then breached on both sides, at about 9:30 and 10:30 a.m. The two breaches measured 425 and 720 feet, according to the Army Corps of Engineers.

In central New Orleans, the water rose at different times, speeds and heights, depending on the neighborhood and often the street. Water didn't reach some areas until the next day. It leveled off two days later.

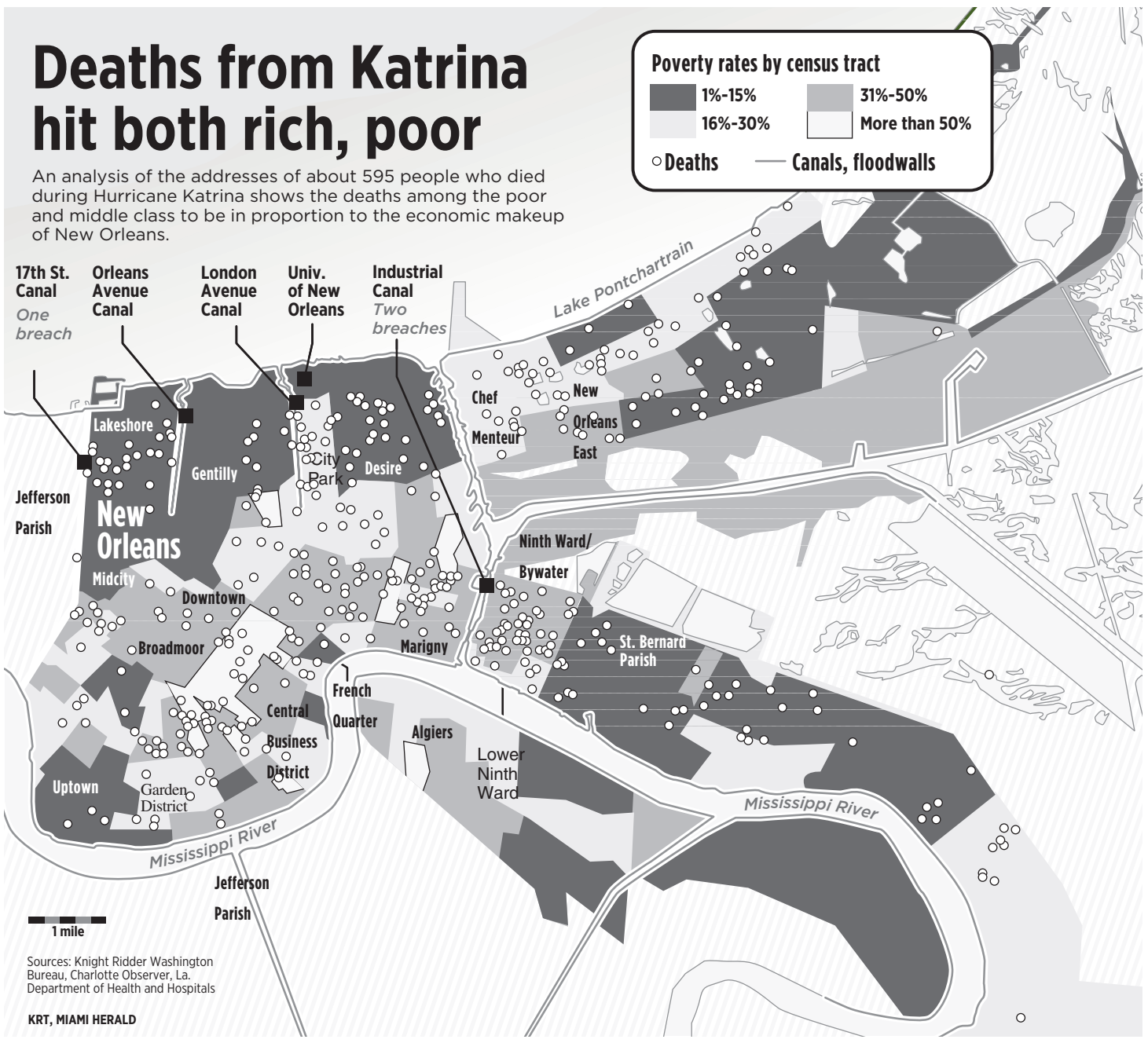
### HOME INUNDATED

New Orleans police Sgt. Forrest Austin's mother, Winona Austin, 82, might have lived through the storm if water from the London Avenue Canal hadn't inundated her home in the Gentilly neighborhood.

"I got a guilty feeling because I didn't grab her by the arm and drag her out," he said. His mother's body wasn't recovered until three weeks after Katrina.

Arthur Batieste Jr., 78, a retired truck mechanic, rode out the storm with others at Second Mount Bethel Baptist Church. Then he went back to his home on Toledano Street, west of the Superdome. Water from the 17th Street Canal reached there early the day after the storm, rising eventually to nine feet. Batieste's body was found two weeks later outside his house.

*Simerman of the Contra Costa Times and Ott of The Philadelphia Inquirer reported from New Orleans; Mellnik of The Charlotte Observer reported from Charlotte, N.C.*



NADER KHOURI/ CONTRA COSTA TIMES/KRT

**'GUILTY FEELING':** Winona K. Austin, 82, above left, died in the Lakeview area of New Orleans as a result of Hurricane Katrina. Her son, New Orleans police Sgt. Forrest Austin, above, says he feels guilty because he didn't force his mother to leave.

HURRICANE STATISTICS

# Data analyses show storm assumptions in error

**After-the-fact data showed mistakes were made in widely reported assumptions about the victims of Hurricane Katrina.**

BY JOHN SIMERMAN, DWIGHT OTT AND TED MELLNIK
Knight Ridder News Service

NEW ORLEANS — Four months after Hurricane Katrina, analyses of data suggest that some widely reported assumptions about the storm's victims were incorrect.

For example, a comparison of locations where 874 bodies were recovered with U.S. Census tract data indicates that the victims weren't disproportionately poor. Another database, compiled by Knight Ridder of 486 Katrina victims from Orleans and St. Bernard parishes, suggests they also weren't disproportionately African American.

Both sets of data are incomplete; Louisiana state officials have released no comprehensive list of the dead. Still, they provide the most comprehensive information available to date about who paid the ultimate price in the storm.

The one group that was disproportionately affected by the storm appears to have been older adults. People 60 and older account for only about 15 percent of the population in the New Orleans area, but the Knight Ridder database found that 74 percent of the dead were 60 or older. Nearly half were older than 75. Many of those were at nursing homes and hospitals, where nearly 20 percent of the victims were recovered.

Lack of transportation was assumed to be a key reason that many people stayed behind and died, but at many addresses where the dead were found, their cars remained in their driveways, flood-ruined symbols of fatal miscalculation.

The addresses where bodies were recovered were compiled by Louisiana state officials and released earlier this month. Knight Ridder charted the locations on a map of Orleans and St. Bernard parishes, then compared them with census data on income in those neighborhoods. The analysis excluded 216 bodies that were recovered from hospitals and nursing homes, as well as 63 recovered at collection points where people had dropped off bodies in the days after the storm; those victims probably came from locations other than the census tracts where they were found.

The comparison showed that 42 percent of the bodies found in Orleans and St. Bernard parishes were recovered in neighborhoods with poverty rates higher than 30 percent. That's only slightly higher than the 39 percent of residents who lived in such neighborhoods, according to the census data.

Similarly, 31 percent of the bodies turned up in areas with poverty rates below 15 percent, where 30 percent of the population lived.

The median household income in neighborhoods where Katrina victims were recovered was about $27,000 a year, just under the $29,000 median for the overall area.

One-fourth of Katrina deaths fell in census tracts with median incomes above $35,300. One-fourth of the area's pre-storm population lived in tracts with median incomes above $37,000.

About 67 percent of the mapped deaths fell in the central and western portion of New Orleans, an area thought to have flooded primarily because of the failure of man-made structures.

The separate Knight Ridder database of 486 Katrina victims was compiled from official information released by state and federal authorities and interviews with survivors of the dead. It cataloged deaths according to location, race, age, name and cause of death.

In that database, African Americans outnumbered whites 51 percent to 44 percent. In the area overall, African Americans outnumber whites 61 percent to 36 percent.

In Orleans Parish, 62 percent of known Katrina victims were African American, compared with 66 percent for the total parish population. In St. Bernard Parish, 92 percent of the identified victims were white. Census figures show that 88 percent of parish residents identified themselves as white.

Among hurricane victims on the Knight Ridder list, men outnumbered women 51 percent to 49 percent, about the same as in the overall area before the storm.

*Simerman of the Contra Costa Times and Ott of The Philadelphia Inquirer reported from New Orleans; Mellnik of The Charlotte Observer reported from Charlotte, N.C.*