

Shelby County Hazard Mitigation Plan



2021 Update

Prepared By:

Shelby County Hazard Mitigation Committee
Shelby County Emergency Management Agency

Assistance Provided By:

Tennessee Emergency Management Agency
as part of the Tennessee Mitigation Initiative

Executive Summary

Over the past two decades, hazard mitigation has gained increased national attention due to the large number of natural disasters that have occurred throughout the U.S. and the rapid rise in costs associated with those disaster recoveries. It has become apparent that money spent mitigating potential impacts of a disaster event can result in substantial savings of life and property. With these benefit cost ratios being extremely advantageous, the Disaster Mitigation Act of 2000 was developed as U.S. Federal legislation that reinforces the importance of pre-disaster mitigation planning by calling for local governments to develop mitigation plans (*44 CFR 201*).

The purpose of a local hazard mitigation plan is to identify the community's notable risks and specific vulnerabilities, and then to create/implement corresponding mitigation projects to address those areas of concern. This methodology helps reduce human, environmental, and economical costs from natural and man-made hazards through the creation of long-term mitigation initiatives.

The advantages of developing a local hazard mitigation plan are numerous including improved post-disaster decision making, education on mitigation approaches, an organizational method for prioritizing mitigation projects, etc. It has been noted that communities who successfully complete and maintain a mitigation plan receive larger amounts of Federal and State funding to be used on mitigation projects, and receive these funds faster, than communities who do not have a plan. Such funding sources that the plan caters to are Pre-Disaster Mitigation, Flood Mitigation Assistance, Severe Repetitive Loss, and Hazard Mitigation Grant Programs.

The 2021 update of the Shelby County Hazard Mitigation Plan was created to act as a well-thought-out guide to be used by, and for, the people of Shelby County. For this plan to be successful, each jurisdiction/district within the county participated in the drafting and preparation of the plan update. These participating jurisdictions/districts include:

- Shelby County (Unincorporated)
- City of Memphis (County Seat)
- Town of Arlington
- City of Bartlett
- Town of Collierville
- City of Germantown

- City of Lakeland
- City of Millington
- Shelby County Schools
- Arlington Community Schools
- Bartlett City Schools
- Collierville Schools
- Lakeland School System
- Millington Municipal Schools

In reference to federal code title *44 CFR 201*, an updated hazard mitigation plan is required to be submitted to both TEMA (State) and FEMA (Federal) for review every five-years to be reapproved. When the plan is deemed “approval pending adoption” by FEMA (*44 CFR 201.6(c)5*), each of the participating jurisdictions will adopt the plan through a local resolution.

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Section 1: Planning Process

Planning Process Update

The previous Shelby County Hazard Mitigation Plan was approved by FEMA on April 14th, 2016. Per federal requirements stated in *44 CFR 201*, all local hazard mitigation plans are required to go through a FEMA update review every 5 years to remain eligible for hazard mitigation grants. This update methodology was developed to assure that local governments are continuing to re-evaluate their risks and to regularly implement mitigation projects that can reduce community vulnerabilities.

The plan's five-year update process began in a meeting (via WebEX) on August 26th, 2020 (See [Appendix 1](#) for WebEx chat log/attendance sheet). At this meeting Shelby County Emergency Management Agency stated that they would continue the role of leading staff and interested persons in updating their mitigation plan. The tasks to be undertaken by Shelby County Emergency Management Agency consisted of continuing to get agencies and the public involved in the county's mitigation efforts and performing the written plan's required 5-year update.

Prior to this meeting Shelby County began reorganizing the county-wide hazard mitigation committee. Realizing that a successful mitigation committee includes a number of representatives, specialists, and individuals who can give valuable/unique insights that local emergency management staff may not have considered; invites to be a part of this plan update included open invitation to elected officials, county and city staff, representatives of the jurisdictions, representatives of all school districts, neighboring counties, local businesses, state agencies, private organizations, academia, non-profits, and other noticeable persons. In addition to public advertisements, adjacent counties were invited to participate via announcements at the West Tennessee Regional Emergency Management Quarterly Director's Meetings. Despite notices to representatives from adjacent counties, none were present at either meeting. Additionally, there was no public input as no members of the public were in attendance.

The Shelby County Hazard Mitigation Committee for the plan update consists of the following members:

Member	Title	Agency	Representation
Shannon Towery (Committee Chairperson)	Planning Coordinator	Shelby County Emergency Management and Homeland Security	Shelby County
James Harvill	Chief	Arlington Fire Department	Arlington
Jeremy Yow	Supervisor- Student Services and HR	Arlington Community Schools	Arlington Community Schools
Miracle Roberts	Chief Financial Officer	Arlington Community Schools	Arlington Community Schools
Tim Ruff	Director of Operations	Arlington Community Schools	Arlington Community Schools
Eric Leppanen	Captain	Bartlett Police Department	Bartlett
Jeff Cox	Chief	Bartlett Police Department	Bartlett
Rick McClanahan	City Engineer	Bartlett	Bartlett
Steve Sones	Assistant Chief	Bartlett Police Department	Bartlett
Terry Wiggins	Chief	Bartlett Fire	Bartlett
Gary Rikard	Security Manager	Bartlett City Schools	Bartlett City Schools
John Fox	Public Works Manager	Collierville	Collierville
Tommy Kelley	Chief of Operations	Collierville Fire Department	Collierville
Nancy Kelley	Safe Schools Director	Collierville Schools	Collierville Schools
Robin Berzins	Tennessee FEMA Integration Team	Federal Emergency Management Agency	Federal Emergency Management Agency
John Selberg	Fire Chief / Emergency Manager	Germantown Fire Department	Germantown
Dennis Wolf	Fire Management Consultant	Lakeland	Lakeland
Shane Horn	City Manager	Lakeland	Lakeland School System
Brandon Carpenter	Planning	Memphis Office of Emergency Management	Memphis
Christopher Favaloro	Operations Officer	Office of Emergency Management	Memphis
Evan Boulanger	Senior Design Engineer	Memphis	Memphis

Greg Waymon	Planning	Memphis Fire & Office of Emergency Management	Memphis
Jonathan Haley	Grants Coordinator	Memphis Fire Department	Memphis
Lopa Naik	Senior Design Engineer	Memphis	Memphis
Manny Belen	City Engineer	Memphis	Memphis
Patrina Chambers	Director of Grants and Procurement	Memphis Area Transit Authority	Memphis
Robert Rehkopf	Consultant	Memphis	Memphis
Gary Graves	Public Safety Director	Millington	Millington
Philip Leblanc	Director of Operations and Transportation	Millington Municipal Schools	Millington Municipal Schools
Angela Brown	Grant Manager	Shelby County Emergency Management and Homeland Security	Shelby County
Angela Hill	Administrator	Shelby County Parks and Neighborhood	Shelby County
Benjamin Hamilton	Asset Management Engineer	Memphis Light, Gas, and Water	Shelby County
Brenda Jones	Director	Shelby County Emergency Management and Homeland Security	Shelby County
Chris Masin	Senior Engineer	Shelby County Roads, Bridges, and Engineering	Shelby County
Cliff Norville	Director	Shelby County Public Works	Shelby County
Daniel Hochstein	Lead Project Engineer	Memphis Light, Gas, and Water	Shelby County
Erin Stirgus	Project Engineer	Memphis Light, Gas, and Water	Shelby County
George Boyington	Intergovernmental Affairs & Special Projects Manager	Shelby County Assessor of Property	Shelby County
Glen Kneeland	Deputy Chief	Shelby County Fire	Shelby County
Jared Darby	Senior Manager	Shelby County Office of Resilience and Sustainability	Shelby County
Madelyn Lukens	Project Engineer	Memphis Light, Gas, and Water	Shelby County

Misty Haley	Emergency Operations Manager	Shelby County Emergency Management and Homeland Security	Shelby County
Oussama Terrab	Crisis Management	Memphis Light, Gas, and Water	Shelby County
Rick Stieg	GIS Administrator	Shelby County	Shelby County
Ryan Groves	Regulatory Compliance Coordinator	Memphis Light, Gas, and Water	Shelby County
Steve Fort	Emergency Response Coordinator	Shelby County Health Department	Shelby County
Jimmy Tuggers	Emergency Management	Shelby County Schools	Shelby County Schools
LaTonya McGowan	Emergency Management Specialist	Shelby County Schools	Shelby County Schools
Quentin Reed	Special Project Assistant	Shelby County Schools	Shelby County Schools
Brent Phillips	Planner	Tennessee Emergency Management Agency	Tennessee
Jane Waldrop	Regional Director	Tennessee Emergency Management Agency	Tennessee
Mack Green	District Coordinator	Tennessee Emergency Management Agency	Tennessee
Brian Waldron	Director	Center for Applied Earth Science and Engineering (CAESER)	University of Memphis
Gary Patterson	Director of Education and Outreach	Center for Earthquake Research and Information (CERI)	University of Memphis

The Shelby County Hazard Mitigation Committee continues to be the county's lead in all mitigation efforts and in the development of the county's mitigation plan. The committee member's efforts in the plan update were broken down into five stages: 1) analysis of the original plan (*the plan as it stood prior to the updates*), 2) updating of the plan, 3) public participation, 4) review of the final updated plan, and 5) adoption of the plan.

Stage 1: During the analysis of the plan, Shelby County Emergency Management Agency reviewed the original county plan and made notes on what sections would require the main updates. Shelby County Emergency Management Agency suggested that the two core areas for needed updates were in the risk/vulnerability assessment and in the restructuring of the county's listed hazard mitigation projects, as well as re-evaluating the plan's hazards, re-assessing their risks, re-calculating each jurisdiction's vulnerable areas, and re-establishing the county's mitigation goals.

Stage 2: From there the committee started making the updates to the plan. A large amount of this effort took place at the second Shelby County Hazard Mitigation Committee meeting that was held on September 20th, 2020. Tasks included developing and prioritizing projects for the new plan and concluding any remaining business. TEMA personnel were present at this meeting to answer mitigation planning and grant questions. [Appendix 2](#) provides a copy of the meeting's attendance sheet.

Stage 3: To encourage public involvement, the Shelby County Hazard Mitigation Committee meetings were given public notice. [Appendix 3](#) presents a copy of the public notices.

Stage 4: Next the committee evaluated the written updates of the plan against FEMA's crosswalk requirements via email correspondence. This also included having the jurisdictions review the drafts that specifically addressed aspects of their jurisdiction before the plan is sent to FEMA for review.

Stage 5: Upon receiving the "Approval Pending Adoption" designation from FEMA's review, the public will be given a chance to comment on the final draft of the update plan prior to its adoption by each local jurisdiction. This opportunity will take place at a local board meeting for each jurisdiction before the updated plan adoption decision takes place. The opportunity for final public comment will therefore be documented through the receipt of a signed adoption resolution.

Review of Existing Information

A preliminary review of existing plans, reports, and information was conducted during the initial phase of creating the Shelby County Hazard Mitigation Plan. The primary purpose of reviewing this information was to identifying local hazards, recognizing local risks, and understanding different local vulnerabilities. The following list of sources identifies some of the existing studies that were reviewed:

- State of Tennessee Hazard Mitigation Plan
- Tennessee Emergency Management Plan (TEMP)
- U.S. Census Bureau
- FEMA Mitigation “How to” Guides
- NOAA National Climatic Data Center (NCDC) storm reports
- Shelby County BEOP
- County & Jurisdictional Schools Emergency Plans
- Shelby County Highway Department Plan
- County & Jurisdictional Public Works Development Plans
- County & Jurisdictional Fire Department 5 Year Plans
- Jurisdictional Plans, SOP’s, & SOG’s

These sources helped to develop the plan’s hazard, risk, and vulnerability assessment sections that in return led to the establishment of meaningful mitigation actions.

Updates within the Plan

It is important to note that this countywide plan was a minor revision of the previous Shelby County Hazard Mitigation Plan. Shelby County reviewed and analyzed each section of the original plan and made updates in the following ways:

Section 1: Planning Process

Shelby County updated the original plan’s description of the planning process to include the new or no longer participating committee members, the most recent countywide mitigation meetings that took place for the plan’s update, and the latest opportunity for the public to get involved. Shelby County also compiled a new list of existing documents that they reviewed in updating their sections in the plan.

Section 2: County Profile

Shelby County created a new development trends section in this plan update.

Section 3: Risk Assessment

Shelby County kept all of their listed natural hazards from the original hazard mitigation plan. As part of the plan update, Shelby County updated their previous occurrence hazard listings to cover all occurrences for flood and tornado events, the most recent twenty years for all other hazards. The committee then re-evaluated each hazard’s extent, probability, and potential impacts.

Section 4: Mitigation Strategy

Shelby County has brainstormed some new mitigation projects that were added to the list, used a new chart method to profile project details, and developed a system to describe where their previous plan's projects are in terms of being implemented. Projects were then prioritized based on specific criteria.

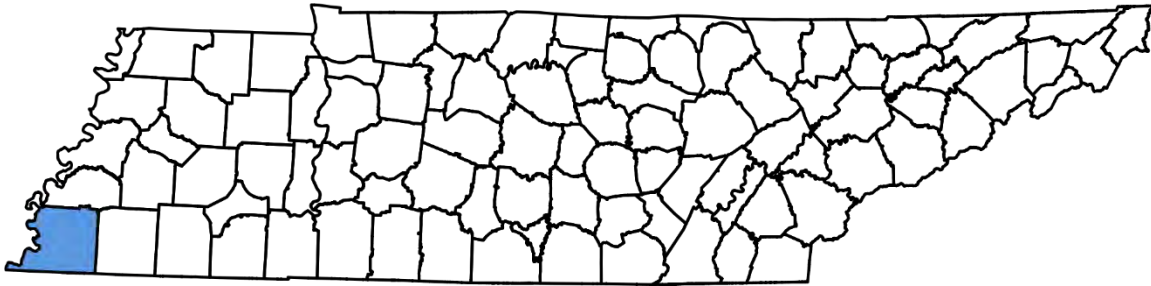
Section 5: Plan Maintenance

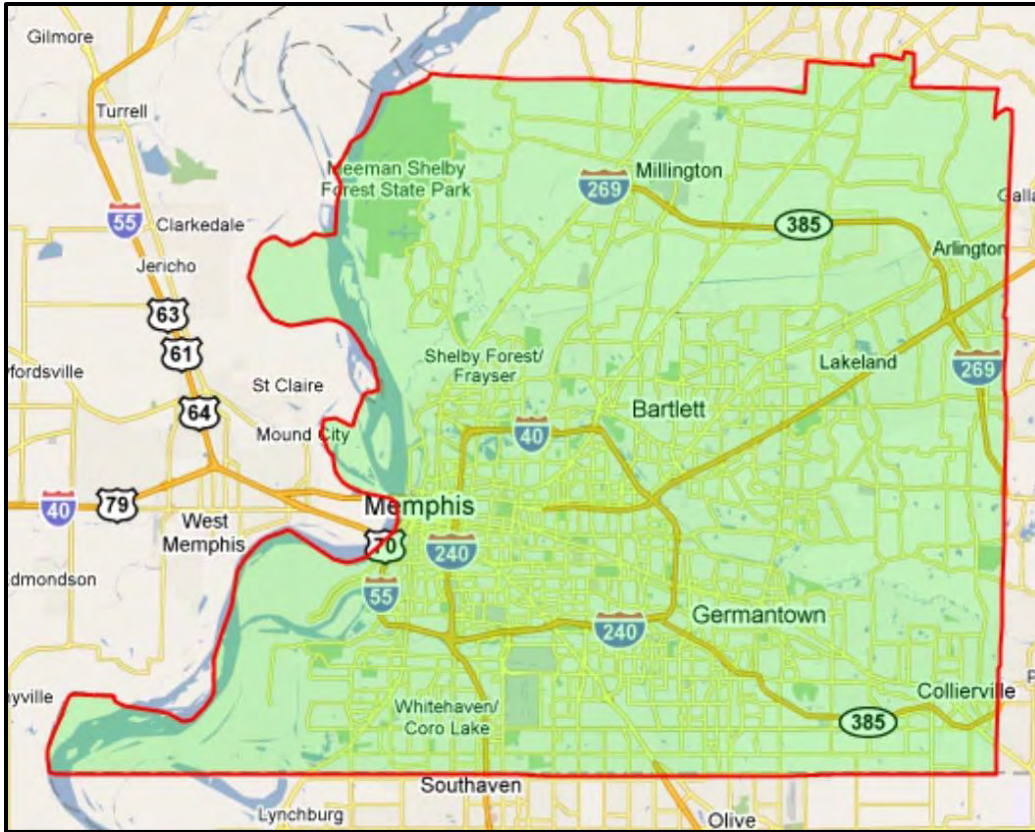
Shelby County updated how they would work with the other jurisdictions in monitoring, evaluating, and updating the plan; provided an updated list of mechanisms they could incorporate mitigation within; stated that now the Shelby County BEOP has mitigation concepts incorporated into it; and updated how all the jurisdictions would keep the public involved in updating processes.

Section 2: County Profile

Development Trends

Shelby County and its jurisdictions can be found in the south-western portion of West Tennessee. It is bordered by the Mississippi River and Arkansas to the west, Tipton County to the north, Fayette County to the east, and Mississippi to the south. Shelby County has a population of 927,644 (2010 census), and is second in county population only to Davidson County (Metro Nashville) in Tennessee. The county has a total area of 785 square miles, of which 763 square miles is land and 22 square miles is water. Memphis is the county seat.





The incorporated jurisdictions have populations as follows (2010 census):

Jurisdiction	Population
Memphis	646,889
Arlington	11,517
Bartlett	54,613
Collierville	43,965
Germantown	38,844
Lakeland	12,430
Millington	10,176

Shelby County has many noteworthy attributes. It is home to the major hub for Federal Express (FedEx), among other major global corporations. The International Port of Memphis is the second largest inland port on the shallow draft portion of the Mississippi River, and the 5th largest inland port in the United States overall. Memphis is a frequent travel destination and is known as the "Home of the Blues". Surrounding the metropolitan areas of the county is a vibrant agricultural industry, supplying cotton, corn, and soybeans, among others.

Due to current land use trends, the Shelby County and jurisdictional officials predict significant growth in all areas. Significant projected growth includes the following:

Projected County/Jurisdictional Growth	
Industrial	• South Memphis- XPO Logistics is expanding local industrial operations in South Memphis adding new operating space, processing areas and over 300 distribution jobs • Memphis Airport Area- DHL Express expanding two industrial warehouse expansions, adding 250 jobs • South Memphis- Airport Area- Siemens Healthineers Industrial Products is launching a \$70M factory expansion • Memphis, South- Blues City Brewery, LLC expansion of manufacturing capabilities and machinery processing at primary distillery located at 5151 E Raines Road. • Memphis, Riverside - Hyosung Heavy Industries Corporation is developing new construction and site improvements in the City of Memphis at 2865 Riverport Road, to produce electrical power equipment and industrial machinery • Memphis, Riverside- The Pallet Factory Inc, expanding existing 46,508 square foot manufacturing facility, in addition to adding a 40,000 sq ft facility. The Pallet Factory makes pine and hardwood pallets and refurbishes existing pallets to customer specifications. • Memphis, Frayser- Penn A Kem LLC., renovation of existing structures and construction of new structures. Penn A Kem is a chemical manufacturing company for agrichemical and pharmaceutical markets. • Memphis- Airport Area, United Parcel Service Inc., is expanding current operating space with the construction of a new combined air and ground sorting facility • Memphis, Riverside- Carvana Distribution Center new facility will create more than 450 jobs with a new regional distribution center • PeroxyChem, a global leader in peroxygen chemistries, plans to construct a new peracetic acid production facility in Memphis, Tennessee. PeroxyChem won a competitive Memphis City contract, and has begun construction at the Maynard C. Stiles Wastewater Treatment Plant. • Memphis, South- Cummins, Inc. will investing \$6.7 million to expand its current parts and distribution center in Memphis, Tennessee. The expansion will create 70 new jobs for Shelby County. The site designs, manufactures, distributes, and services diesel and natural gas engines and related technologies, including fuel systems, controls, air handling, filtration, emission solutions and electrical power generation systems. • Memphis- Airport Area, United Parcel Service Inc., construction of new combined air and ground sort facility

	• Memphis, Airport Area The modernization project will consolidate airline operations as well as retail. The facility will see reconfigurations to the concourse and runways, giving more aircraft clearance. Facility will also be seismically retrofitted. • The new Amazon processing facility will contain more than 1 million sq ft of operating space and create 500 full-time jobs, It will handle larger bulk items and package sorting2
Commercial	• Downtown, Riverside – Memphis The \$60M makeover of the 30-acre Tom Lee Park will feature 5 new buildings; an open-air rec area and more than 250,000 square feet of open lawn space. • East Memphis - Poplar Plaza at Park Ave- project launched to develop a \$56M redevelopment and expansion of mixed use, and commercial properties • Germantown- Expedient, a leading provider of data center colocation, cloud computing and managed hosting services, opened its newest top-tier data. The new facility will be connected to the company's 10 other data centers, by its 10Gbps fiber optic network. The data center is 35,000 square feet with 7,500 square feet of raised floor production • Memphis- Airport Area, United Parcel Service Inc., construction of new combined air and ground sort facility • Memphis- Downtown- Autozone launches a \$12M Operations Expansion at the downtown site. • Memphis Downtown- FedEx Logistics moving national headquarters to former Gibson Guitar building in Downtown Memphis- The FedEx Logistics Operation began moving operations in April 2020, to expand to the 154,000 sq ft vacant Gibson Guitar Factory. • Memphis- Downtown, Loews Hotels developing a \$240 million Downtown Memphis project with retail space and apartments • Memphis- Raleigh-Fraser – 68,000sq ft Amazon Sorting Facility groundbreaking, adding to the current Amazon network centered in Shelby County. • Memphis, Airport - Mimeo, an online content management service, distribution network, and printing company, invested \$16 million to expand its facility operations, establishing its U.S. headquarters in Memphis, Tennessee, creating 300 jobs in Shelby County. The company's Memphis facility is located adjacent to FedEx's Global Hub • Memphis, Downtown- the ServiceMaster Corporate Headquarters relocated to downtown Memphis, bringing 2300 jobs • Memphis/Germantown- Renovation of existing structures and new construction at two properties at 1100 Ridgeway Loop and 889 Ridge Lake Boulevard. The Memphis facility will expand, providing service for the Private Capital Group, Equity Capital Markets, Fixed Income Markets, and maintaining daily operations

	• Memphis, Downtown/Medical District- UTHSC College of Dentistry is expanding with a 68,000 sq. ft. facility designed to provide special needs clinic • Memphis, Midtown- New headquarters for DEVCON (cybersecurity software), Green Mountain Technology (shipping/technology), and Indigo Ag (agricultural technology) have launched operations • Memphis, Raleigh-The closed Raleigh Springs Mall site was converted to into a \$28 million civic center the end of June 2019, creating civic and commercial space to include a library, rec park, and police precinct. • Memphis/Germantown- Carrefour Redevelopment is a multiphase commercial property development which will include retail space, multi-story office building and hotel space • St. Jude Children's Research Hospital announced a new construction project, a \$13.4 million laboratory and support facility • Memphis, Airport Area- FedEx launched a \$1 billion renovation and expansion of the FedEx hub • Memphis, University Areas- The University of Memphis Research Foundation has funded a research park, established on main University of Memphis campus in 2018. The 10,000-square-foot facility serves as research and technology facility for cybersecurity testing, robotics, smart biomaterials, additive manufacturing, and bioengineering. • Memphis- Raleigh Town Center District ("District") is a 211.5-acre area focused around the intersection of Austin Peay Highway at Yale Road is \$91 million commercial property, mixed use and retail zoned along the Austin Peay Highway. • Power & Tel is expanding a \$25 million headquarters on the border of Shelby and Fayette County to consolidate regional operations to one facility, while expanding operational capabilities. • Memphis Cook Convention Center is currently under renovations, expanding the existing facility instead of constructing a new one. The facility will undergo a \$175 Million investment
Residential	• Shelby County is seeing expanded residential project developments, with over 5000 new apartment units planned or in current development. Projects include: • Downtown Memphis - A local apartment developer has his sights set on the long-vacant building at 2701 Union Ave. Extended • Unincorporated Shelby County, near Germantown The 398-unit project will eventually cost about \$40 million in vertical construction. • Memphis- Cooper Young District 17,000-square-foot brewery and taproom is expected to open at 435 Madison Ave. in 2020

	• Memphis- Getwell \$17M worth of improvements to an apartment complex off of Getwell • Memphis, Medical District- Medical District apartments, Tower Park, a 128-unit apartment high-rise, undergoes \$18M overhaul • Collierville- \$270 million Farms at Bailey Station is now fully financed and under construction in Collierville. • Lakeland- The Lake District Project with Museum Lofts and the Lakeland Commons projects has broken ground • Memphis- Midtown- University Park Apartments is a new development with 80 apartment units and a retail restaurant space at 3637 Park Avenue • Memphis- Raleigh Town Center District ("District") is a 211.5-acre area focused around the intersection of Austin Peay Highway at Yale Road is \$91 million commercial property, mixed use and retail zoned along the Austin Peay Highway • Memphis- Binghampton- Grubb Management is developing and constructing a new residential development of approximately 350 apartment units at the intersection of Broad Avenue and Bingham Street. • Shelby County- Unincorporated, Shelby Farms- Velo at Shelby Farms Parkside at Shelby Farms with 267 Units, 63 Garages on Approximately 23 Acres, Opening 2021 • The Dwell at Shelby Farms is developing 715 apartments, 102 single-family houses and 162 senior-living units on undeveloped land now zoned heavy industrial • Parkside at Shelby Farms comprises approximately 59 acres facing Shelby Farms Park, Parkside at Shelby Farms Park is a 60+ acre development which will include 33,000 square feet of commercial space, 1,700 structured parking spaces, and 1,400 apartments, along with a mixture of garden homes, offices, and support services. The development will also include a 130-room boutique hotel at the corner of Mullins Station and Whitten Road • Memphis, East Park Area-New Project constructing approximately 240 apartment units at the intersection of Poplar Avenue and Highland to be marketed as Poplar Plaza
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Projected School/District Growth	
School	- Arlington Community Schools: new bus lot, new administration building, new middle school gym addition, new indoor practice facility - Bartlett High School located at 5688 Woodlawn St is undergoing major improvement and expansion - Collierville Elementary School addition to building, projection 2021 - Construction of the Lakeland Preparatory School high school addition (capacity for 1100 additional students) is underway, and the school is scheduled to open in August, 2022 - Shelby County Schools: Future school construction at Frayser Community, Kingsbury Area, Orange Mound Community, Raleigh Craigmont Community, Cordova, Southeast, and Hickory Hill Community; Kingsbury ES/ MS/ HS- Major School Renovations

As is often the case, development has led to some flooding problems and will be monitored by county and jurisdictional agencies, which will require careful planning to reduce the risk moving forward.

Jurisdictional & School District Capabilities

The following chart indicates the legal and regulatory adherence of each of the jurisdictions within Shelby County:

Jurisdictional Tools, Plans, & Capabilities	Shelby County	Memphis	Arlington	Bartlett	Collierville	Germantown	Lakeland	Millington
Building Codes	Y	Y	Y	Y	Y	Y	N	Y
Zoning	Y	Y	Y	Y	Y	Y	Y	Y
Emergency Response Plan	Y	Y	Y	Y	Y	Y	Y	Y
National Flood Insurance Program Participant	Y	Y	Y	Y	Y	Y	Y	Y
Post-Disaster Recovery Plan	Y	Y	Y	Y	Y	Y	Y	Y
Law Enforcement	Y	Y	N	Y	Y	Y	N	Y
Full Time Fire Services	Y	Y	Y	Y	Y	Y	N	Y

Jurisdictional Tools, Plans, & Capabilities	Shelby County	Memphis	Arlington	Bartlett	Collierville	Germantown	Lakeland	Millington
Grant Writer	Y	Y	Y	N	N	Y	N	N
Public Information Officer	Y	Y	Y	Y	Y	Y	N	Y

School District Tools, Plans, & Capabilities	Arlington Community Schools	Bartlett City Schools	Collierville Schools	Lakeland School System	Millington Municipal Schools	Shelby County Schools
Emergency Response Plan	Y	Y	Y	Y	Y	Y
Post-Disaster Recovery Plan	Y	Y	Y	Y	Y	Y
Law Enforcement/SRO	Y	Y	Y	Y	Y	Y
Grant Writer	N	Y	Y	N	Y	Y
Public Information Officer	Y	Y	N	N	Y	Y
Capital Improvement Funding	N	Y	Y	Y	Y	Y
Bond Funding	N	Y	Y	Y	N	N
Private Contributions	N	Y	Y	Y	N	Y
State/Federal Funding	Y	Y	Y	Y	Y	Y
Emergency Notification System	Y	N	Y	Y	Y	Y

Expanding & Improving Mitigation Programs

All jurisdictions have been active in the past in pursuing mitigation projects. All involved see the opportunity in BRIC state funding minimums, as well as multiple HMGP funding streams from several disasters within the state. Challenges to expanding mitigation programs include funding of the local match, buy-in from elected officials, public support for additional funding for districts, and keeping all stakeholders involved in the planning process between 5-year mitigation plan updates.

Section 3: Risk Assessment

Hazard Identification

To begin to assess Shelby County's risk to natural hazards and identify the community's areas of highest vulnerability, the mitigation committee had to identify which hazards have or could impact the county. This hazard identification process began with researching previous hazard events that have occurred in Shelby County by going through newspaper articles, Shelby County Emergency Management Agency records, and recalling personal experiences. From there Emergency Management staff also analyzed hazard events that could occur in the county by reviewing scientific studies and the State of Tennessee Hazard Mitigation Plan. The following hazards have been identified as hazards of concern by the Shelby County mitigation committee within the update process.

Flooding

Flooding events occur when excess water from rivers and other bodies of water overflow onto riverbanks and adjacent floodplains. In addition, lower lying regions can collect water from rainfall and poorly drained land can accumulate rainfall through ponding on the surface. Floods in Shelby County are usually caused by rainfall, but may also be caused by snowmelt and man-made incidents. The below charts explain common ways flooding occurs and common factors that contribute toward the severity of floods.

Common Ways Flooding Occurs	
Methods	Description
Overland Flow	
(a) Infiltration	-Excess overland flow occurs when the rain is falling more rapidly that it infiltrates into the soil.
(b) Saturation	-Excess overland flow occurs when soil spaces are so full of water that no more rain can be absorbed.
Throughflow	-Rainwater which has infiltrated into unsaturated soil can move horizontally to the river channel. This process is slower than overland flow but faster than base flow.
Baseflow	-Rainwater which has percolated to the aquifer can seep into the river channel. This is the slowest process.

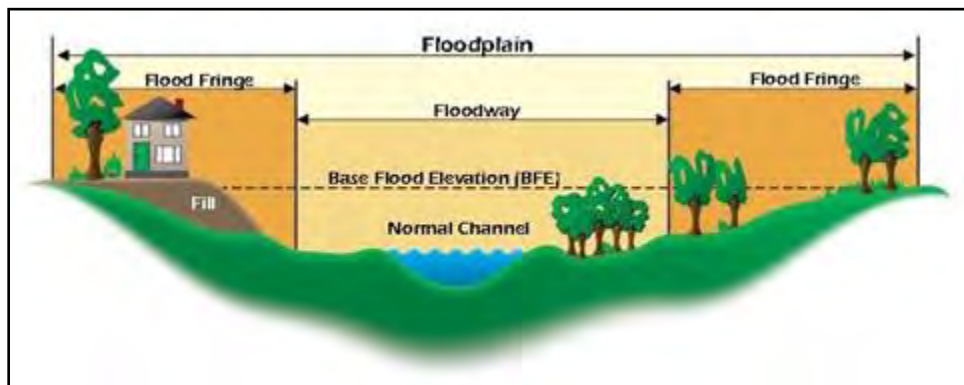
Source: The Field Studies Council

Common Causes of Flooding	
Factor	Effect on Flooding
Geology	Impermeable rocks are saturated more quickly than porous and pervious rocks. Saturation excess overland flow is more common. Sandy soils have larger pore spaces than clay soils. Infiltration is most rapid in sandy soils.
Relief	Water reaches the channel more rapidly in a steeper basin as water is travelling more quickly downhill.
Vegetation	Vegetation intercepts a large proportion of rainfall. Where trees are deciduous, discharge is higher in a forested basin in winter as there is less interception.
Meteorological Factors	Where rain is falling faster than the infiltration rate, there is infiltration-excess overland flow. This is common after a summer storm. Snow does not reach the channel but is stored on the ground surface. As snow melts, the meltwater will reach the channel quickly as infiltration is impeded if the ground is still frozen.
Catchment Shape	It takes less time for water to reach the channel in a circular basin as all extremities are roughly equidistant from the channel.
Land Use	Surface runoff is higher in urban areas because there are more urban surfaces (concrete & tarmac) and sewers take water rapidly to rivers. There is less interception and evapotranspiration and more surface runoff in a deforested catchment.
Catchment Size	Water reaches the channel more rapidly in a smaller basin as water has a shorter distance to travel.
Antecedent Conditions	The level of discharge before the storm is called the antecedent discharge. Even a small amount of rain can lead to flooding.

Source: The Field Studies Council

In Shelby County some areas are more flood-prone than others. One of the ways of identifying these flood-prone areas is through determining the county's 100- and 500-year floodplains. 100-year floods are calculated to be the level of flood water expected to be equaled or exceeded every 100 years on average, meaning a flood that has a 1% chance of being equaled or exceeded in magnitude in any single year. A 500-year floodplain has a 0.2% chance. A 100-year floodplain would include the areas adjoining a stream, river, or watercourse that would be covered by water in the event of a 100-year flood (see diagram below).

Characteristics of a Floodplain



Source: FEMA

Detailed Flood Insurance Rate Maps (FIRMs) are also included in [Appendix 5](#), which shows where FEMA has placed the 500-year floodplain for each jurisdiction.

Shelby County historically has had many flood events in the past. Based on NOAA NCDC data, the following charts provide a list of flood events occurring in Shelby County from January 1950 to present and a list of floods with descriptions of their impacts imposed on the community.

Flood Events in Shelby County: January 1950–Present

Location	Date	Type	Deaths	Injuries	Property Damage
MEMPHIS	7/24/1996	Flash Flood	0	0	5.00K
MEMPHIS	10/27/1996	Flash Flood	0	0	20.00K
SHELBY (ZONE)	3/1/1997	Flood	1	0	100.00K
MEMPHIS	9/23/1997	Flood	0	0	40.00K
MEMPHIS	7/29/1998	Flood	0	0	1.00K
MEMPHIS	8/8/1998	Flash Flood	0	0	1.00K
MEMPHIS	4/3/1999	Flood	0	0	1.00K
MILLINGTON	5/5/1999	Flood	0	0	1.00K
GERMANTOWN	5/5/1999	Flood	0	0	1.00K
MEMPHIS	7/30/2001	Flash Flood	0	6	25.00K
MEMPHIS	8/12/2001	Flash Flood	0	0	1.000M
MEMPHIS	11/24/2001	Flash Flood	0	0	1.00K
SHELBY (ZONE)	11/28/2001	Flood	0	0	1.000M
SHELBY (ZONE)	12/12/2001	Flood	0	0	1.00K
MEMPHIS	3/17/2002	Flash Flood	0	0	1.00K
MEMPHIS	4/30/2002	Flash Flood	0	0	0.50K
FRAYSER	5/25/2002	Flash Flood	0	0	1.00K
BARTLETT	5/28/2002	Flash Flood	0	0	1.00K
MEMPHIS	6/13/2002	Flash Flood	0	0	1.00K
MEMPHIS	7/14/2002	Flash Flood	0	0	2.00K
BARTLETT	9/19/2002	Flash Flood	0	0	1.00K
MEMPHIS	9/20/2002	Flash Flood	0	0	100.00K
COUNTYWIDE	10/10/2002	Flash Flood	0	0	20.00K
MEMPHIS	11/10/2002	Flash Flood	0	0	1.00K
MEMPHIS	12/18/2002	Flash Flood	0	0	5.00K
MILLINGTON	12/19/2002	Flood	0	0	0.50K
MEMPHIS	4/20/2003	Flash Flood	0	0	5.00K
MILLINGTON	5/16/2003	Flash Flood	0	0	1.00K
MEMPHIS	5/17/2003	Flash Flood	0	0	5.00K
MEMPHIS	6/16/2003	Flash Flood	0	0	1.00K
MEMPHIS	2/5/2004	Flash Flood	0	0	1.00K
MEMPHIS	3/20/2004	Flash Flood	0	0	5.00K
MEMPHIS	6/14/2004	Flash Flood	0	0	5.00K
FRAYSER	10/18/2004	Flash Flood	0	0	1.00K

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MEMPHIS	10/19/2004	Flash Flood	0	0	1.00K
MEMPHIS	7/15/2005	Flash Flood	0	0	1.00K
MEMPHIS	7/17/2005	Flash Flood	0	0	1.00K
MEMPHIS	7/19/2005	Flash Flood	0	0	1.00K
MEMPHIS	11/15/2005	Flash Flood	0	0	1.00K
MEMPHIS	5/30/2006	Flash Flood	0	0	0.01K
CORDOVA	6/18/2006	Flash Flood	0	0	0.01K
GERMANTOWN	2/24/2007	Flash Flood	0	0	0.00K
GERMANTOWN	6/25/2007	Flash Flood	0	0	1.00K
ARLINGTON	7/6/2007	Flash Flood	0	0	0.00K
MEMPHIS	7/26/2007	Flash Flood	0	0	0.00K
BARTLETT	8/18/2007	Flash Flood	0	0	0.00K
FRAYSER	10/8/2007	Flash Flood	0	0	0.00K
BARTLETT	11/21/2007	Flash Flood	0	0	0.00K
ELLEDALE	11/21/2007	Flash Flood	0	0	0.00K
MEMPHIS	1/8/2008	Flash Flood	0	0	0.00K
RALEIGH	1/8/2008	Flash Flood	0	0	0.00K
CORDOVA	1/8/2008	Flash Flood	0	0	0.00K
SPRING LAKE	1/10/2008	Flash Flood	0	0	0.00K
GERMANTOWN	1/10/2008	Flash Flood	0	0	0.00K
WHITE STATION	3/3/2008	Flash Flood	0	0	0.00K
MEMPHIS	3/3/2008	Flash Flood	0	0	0.00K
BARTLETT	3/15/2008	Flash Flood	0	0	0.00K
BENJESTOWN	3/31/2008	Flash Flood	1	0	0.00K
PISGAH HGTS	3/31/2008	Flash Flood	1	0	0.00K
MEMPHIS	3/31/2008	Flash Flood	0	0	0.00K
COLLIERVILLE ARPK	4/1/2008	Flood	1	0	10.00K
COLLIERVILLE ARPK	4/4/2008	Flash Flood	0	0	0.00K
LENOW	4/11/2008	Flash Flood	0	0	0.00K
WHITE STATION	5/10/2008	Flash Flood	0	0	0.00K
GERMANTOWN	5/10/2008	Flash Flood	0	0	0.00K
PISGAH HGTS	7/31/2008	Flash Flood	0	0	0.00K
AULON	8/25/2008	Flash Flood	0	0	20.00K
NATIONAL CEMETERY	8/25/2008	Flash Flood	0	0	0.00K
SHELBY CENTER	8/25/2008	Flash Flood	0	0	0.00K
MEMPHIS	12/27/2008	Flash Flood	0	0	0.00K
AULON	5/2/2009	Flash Flood	0	0	0.00K
SHELBY FARMS	6/12/2009	Flash Flood	0	0	0.00K
MILLINGTON	7/5/2009	Flash Flood	1	0	20.00K
BERCLAIR	7/16/2009	Flash Flood	0	0	0.00K
RALEIGH	7/21/2009	Flash Flood	0	0	0.00K
WHITE STATION	7/26/2009	Flash Flood	0	0	0.00K
COLLIERVILLE	7/30/2009	Flash Flood	0	0	500.00K

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ARLINGTON	7/30/2009	Flash Flood	0	0	0.00K
COLLIERVILLE	8/1/2009	Flash Flood	0	0	0.00K
AULON	8/18/2009	Flash Flood	0	0	0.00K
GERMANTOWN	8/18/2009	Flash Flood	0	0	0.00K
MEMPHIS	9/16/2009	Flash Flood	0	0	0.00K
WEST JCT	9/18/2009	Flash Flood	0	0	40.00K
CORDOVA	9/20/2009	Flash Flood	0	0	0.00K
ARLINGTON	12/8/2009	Flash Flood	0	0	0.00K
SHELBY FARMS	4/7/2010	Flash Flood	0	0	0.00K
AULON	4/24/2010	Flash Flood	0	0	0.00K
(MEM)MEMPHIS INTL AR	4/24/2010	Flash Flood	0	0	0.00K
SHELBY CENTER	4/24/2010	Flash Flood	0	0	0.00K
GERMANTOWN	4/24/2010	Flash Flood	0	0	0.00K
ARLINGTON MUNI ARPT	4/24/2010	Flash Flood	0	0	0.00K
KERRVILLE	5/1/2010	Flash Flood	1	0	28.900M
PISGAH HGTS	5/1/2010	Flash Flood	0	0	150.00K
ARLINGTON	5/1/2010	Flood	0	0	50.000M
EAST JCT	5/14/2010	Flash Flood	0	0	0.00K
LENOW	5/16/2010	Flash Flood	0	0	0.00K
WOODSTOCK	5/24/2010	Flash Flood	0	0	0.00K
CORDOVA	5/24/2010	Flash Flood	0	0	0.00K
LUCY	5/24/2010	Flash Flood	0	0	0.00K
SHELBY CENTER	5/24/2010	Flash Flood	0	0	0.00K
BARTLETT	6/3/2010	Flash Flood	0	0	0.00K
BAILEY	6/16/2010	Flash Flood	0	0	0.00K
BAILEY	6/17/2010	Flash Flood	0	0	0.00K
MILLINGTON	6/18/2010	Flash Flood	0	0	0.00K
COLLIERVILLE ARPK	6/26/2010	Flash Flood	0	0	0.00K
(MEM)MEMPHIS INTL AR	7/12/2010	Flash Flood	0	0	20.00K
WHITEHAVEN	7/29/2010	Flash Flood	0	0	0.00K
GERMANTOWN	8/9/2010	Flash Flood	0	0	0.00K
BUNTYN	8/10/2010	Flash Flood	0	0	0.00K
WHITEHAVEN	8/13/2010	Flash Flood	0	0	0.00K
LENOW	2/24/2011	Flash Flood	0	0	0.00K
ARLINGTON	4/26/2011	Flash Flood	0	0	20.00K
SHELBY FARMS	4/27/2011	Flood	0	0	150.00K
DARWIN	5/1/2011	Flood	0	0	2.000B
LUCY	5/1/2011	Flash Flood	0	0	0.00K
MALLORY	5/2/2011	Flash Flood	0	0	0.00K
SHELBY FARMS	7/21/2011	Flash Flood	0	0	0.00K
CORDOVA	3/16/2012	Flash Flood	0	0	50.00K
GERMANTOWN	6/11/2012	Flash Flood	0	0	0.00K

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FOREST HILL	7/10/2012	Flash Flood	0	0	0.00K
MEMPHIS	9/2/2012	Flash Flood	0	0	0.00K
CORDOVA	1/30/2013	Flash Flood	0	0	100.00K
MALLORY	5/21/2013	Flash Flood	0	0	30.00K
ELLENDAL	7/18/2013	Flash Flood	0	0	250.00K
RUGBY	2/4/2014	Flash Flood	0	0	0.00K
FOREST HILL	6/6/2014	Flash Flood	0	0	0.00K
EADS	6/29/2014	Flash Flood	0	0	50.000M
MILLINGTON	9/11/2014	Flash Flood	0	0	1.100M
ARLINGTON	2/21/2015	Flood	0	0	0.00K
MADGE	4/13/2015	Flash Flood	0	0	0.00K
SHELBY FARMS	7/3/2015	Flash Flood	0	0	15.00K
MEMPHIS	7/23/2015	Flash Flood	0	0	500.00K
(MEM)MEMPHIS INTL AR	8/5/2015	Flash Flood	0	0	0.00K
SHELBY FARMS	8/5/2015	Flash Flood	0	0	0.00K
FELTS	11/17/2015	Flash Flood	0	0	25.00K
SHELBY CENTER	2/2/2016	Flash Flood	0	0	0.00K
MEMPHIS	2/2/2016	Flash Flood	0	0	0.00K
DARWIN	3/9/2016	Flash Flood	0	0	0.00K
EAST ACRES	3/11/2016	Flood	0	0	0.00K
WEST JCT	3/13/2016	Flash Flood	0	0	0.00K
BERCLAIR	4/29/2016	Flash Flood	0	0	0.00K
WHITE STATION	5/25/2016	Flash Flood	0	0	0.00K
ARLINGTON	6/3/2016	Flash Flood	0	0	1.500M
GERMANTOWN	6/27/2016	Flash Flood	0	0	0.00K
GERMANTOWN	7/14/2017	Flash Flood	0	0	0.00K
BERCLAIR	7/14/2017	Flash Flood	0	0	0.00K
MEMPHIS	8/11/2017	Flash Flood	0	0	1.00K
FOREST HILL	8/11/2017	Flash Flood	0	0	1.00K
MEMPHIS	8/31/2017	Flash Flood	0	0	0.00K
PISGAH	8/31/2017	Flash Flood	0	0	0.00K
EAST ACRES	3/1/2018	Flood	0	0	0.00K
ROSEMARK	3/1/2018	Flood	0	0	0.00K
SPRING LAKE	6/24/2018	Flash Flood	0	0	0.00K
GERMANTOWN	8/29/2018	Flash Flood	0	0	0.00K
RALEIGH	2/23/2019	Flash Flood	0	0	0.00K
FOREST HILL	6/7/2019	Flash Flood	0	0	0.50K
FOREST HILL	6/7/2019	Flash Flood	0	0	15.00K
FOREST HILL	6/7/2019	Flash Flood	0	0	1.500M
FOREST HILL	6/7/2019	Flash Flood	0	0	150.00K
GERMANTOWN	8/20/2019	Flash Flood	0	0	0.00K

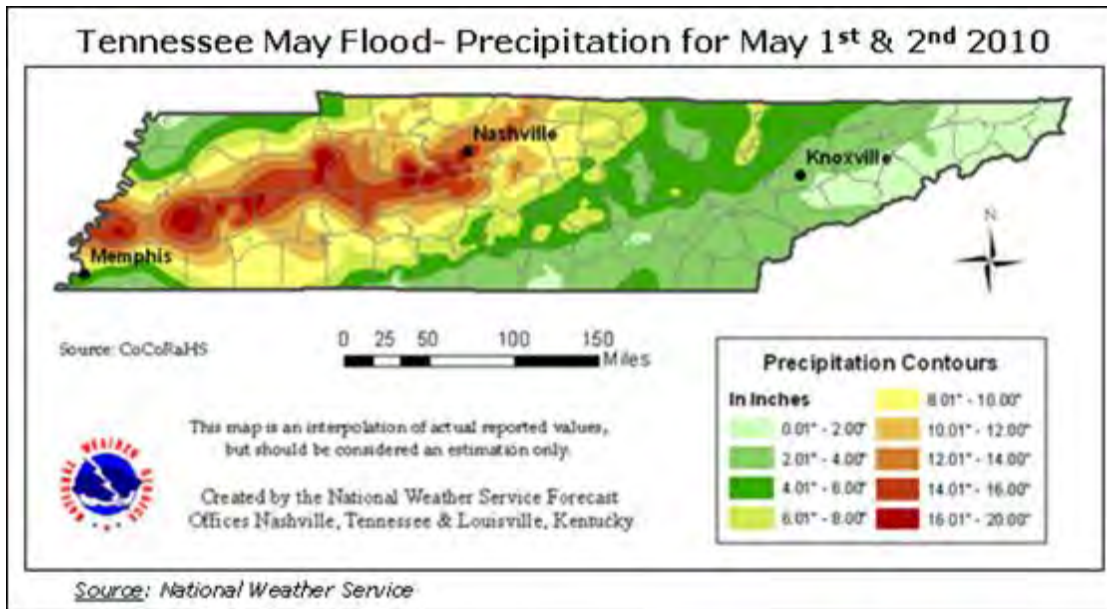
The above list represents all listed incidents from the NCDC site for a given time period. If a jurisdiction or district is not listed, there is not a recorded incident of this nature with the NCDC.

Small localized flood events are likely to occur approximately 6-7 times per year (over the last 25 years) in Shelby County. The severity of flooding that may occur in the county is measured by depth of inundation. The following occurred during the May 1st & 2nd, 2010 flood event (DR-1909), which led to up to 16" of precipitation in many areas of Shelby County. The impacts from this (or other) significant flooding events for each applicant are listed below:

Location	Extent
Shelby County	• 1 fatality when vehicle became stranded in a flooded roadway • 576 homes received some kind of flood damage, of which 77 were completely destroyed • 8 businesses were damaged • 403 mobile homes were completely destroyed • Several other buildings (including apartment complexes) were damaged • The flash flooding event transitioned into a flood event where rivers rose rapidly spilling over their banks • Inundation over roadways in the northern end of the county exceeded 5' in some areas
Memphis	• Water covered some streets with water inundation as high as vehicle wheel wells
Arlington	• No significant flooding from May, 2010 event • Arlington experienced flash flooding in 2016, with up to 1-2' of water in several homes
Bartlett	• Widespread flooding, with inundation up to 4'
Collierville	• Johnson Park flooded in 3' of water • Several homes flooded with several inches • Collierville-Arlington road was closed due to 6" of floodwater
Germantown	• Greenway along the Wolf River, as well as the associated out-buildings, experienced as much as 2' of inundation • Businesses built over a former landfill experienced flammable gas in their

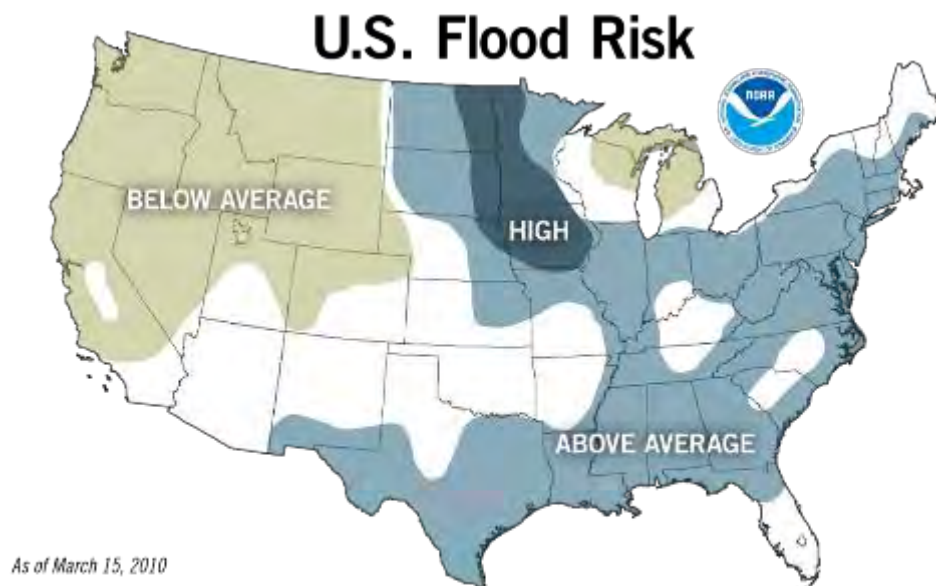
	building due to such a fast water table rise
Lakeland	• Steward Road flooding approximately 1' • Salem Road under 1' in areas near Brunswick Road • Ivy Creek Lane had 3-4' of flood water • Homes flood in Ivy Creek and on Stewart Road
Millington	• Levee holding back water from Big Creek was topped • 200-300 homes in base housing at Naval Support Activity Millington were flooded • Numerous people had to be rescued • 4-5' of water covered the navy base • Some locations were covered by as much as 8 feet of water • All roads were closed
Shelby County Schools	• Six schools sustained considerable flood damage in 2011 from up to 12" of flood water in school buildings
Arlington Community Schools	• Roof drains at Arlington Elementary are tied to the city drain system. The system periodically gets overwhelmed, and leads to several inches of flood water in classrooms
Bartlett City Schools	• Flood is low risk/no noted damage
Collierville Schools	• Flood is low risk/no noted damage
Lakeland School System	• No flooding incidents since the inception of the school district. Flood is rated as a moderate risk due to the impact on bus routes.
Millington Municipal Schools	• Millington High School experienced 3+" of inundation in flooding during 2016

Precipitation Map – May 1st & 2nd, 2010

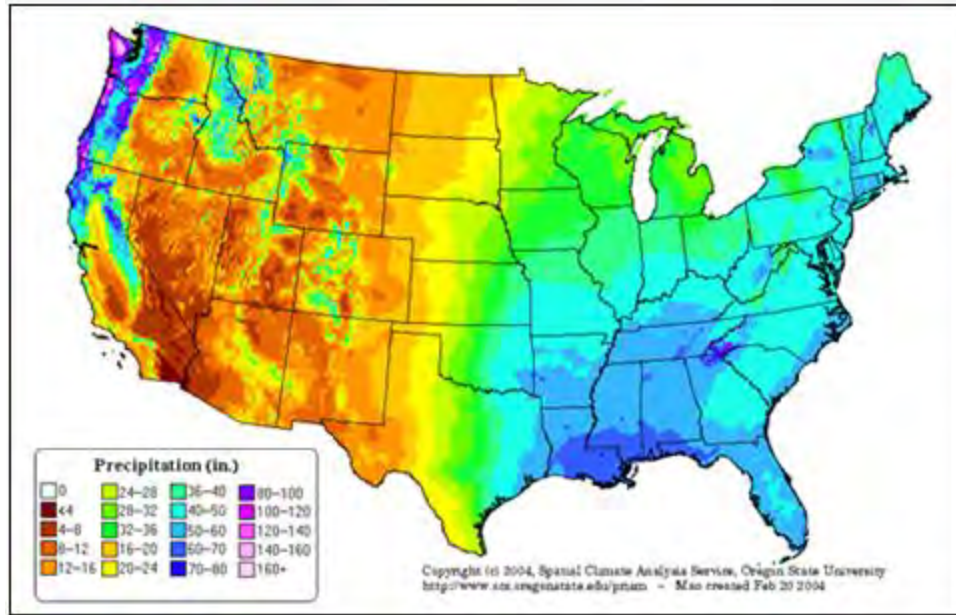


According to a NOAA Flood Risk Map (see map below), the majority of Tennessee was located in an "above average" risk of flooding zone during spring 2010. This proposed vulnerability is coupled with the fact that on average Tennessee usually acquires over 50-60 inches of rainfall a year (see following map).

U.S. Flood Risk (2010)



Average Annual Precipitation per Year (1971-2000)



Source: Spatial Climate Analysis Service, Oregon State University

Shelby County uses a ranking system to determine each jurisdiction's vulnerability to flooding events. This system is based off simple arithmetic which analyzes potential impacts to determine vulnerabilities and then analyzes the probability of a flood event occurring to calculate a flood risk ranking for each jurisdiction.

Flooding

Jurisdiction / Applicant	Human	Impacts Property	Business	Vulnerability $H+P+B=\#$; $\#/3=V$
Shelby County	2	4	3	3.0
Memphis	3	3	3	3.0
Arlington	2	4	2	2.7
Bartlett	2	4	2	2.7
Collierville	1	1	1	1.0
Germantown	1	5	2	2.7
Lakeland	3	4	1	2.7
Millington	4	5	2	3.7
Arlington Community Schools	1	2	1	1.3
Bartlett City Schools	1	2	1	1.3
Collierville Schools	1	1	1	1.0
Lakeland School System	3	4	1	2.7
Millington Municipal Schools	4	5	2	3.7
Shelby County Schools	4	5	4	4.3

Jurisdiction / Applicant	Vulnerability	Probability	Risk $V+P=R$	
Shelby County	3.0	3	6.0	Medium
Memphis	3.0	3	6.0	Medium
Arlington	2.7	3	5.7	Medium
Bartlett	2.7	2	4.7	Moderate
Collierville	1.0	3	4.0	Moderate
Germantown	2.7	2	4.7	Moderate
Lakeland	2.7	2	4.7	Moderate
Millington	3.7	2	5.7	Medium
Arlington Community Schools	1.3	2	3.3	Low
Bartlett City Schools	1.3	2	3.3	Low
Collierville Schools	1.0	1	2.0	Low
Lakeland School System	2.7	2	4.7	Moderate
Millington Municipal Schools	3.7	2	5.7	Medium
Shelby County Schools	4.3	4	8.3	High
			Risk	
			Low	2-3.6
			Moderate	3.7-5.2
			Medium	5.3-6.8
			High	6.9-8.4
			Severe	8.5-10

Human	
<i>Risk of Injuries and Death from the Hazard</i>	
1	Death very unlikely, injuries are unlikely
2	Death unlikely, injuries are minimal
3	Death unlikely, injuries may be substantial
4	Death possible, injuries may be substantial
5	Deaths probable, injuries will likely be substantial

Property	
<i>Amount of Residential Property Damage Associated from Hazard</i>	
1	Less than \$500 in damages
2	\$500-\$10,000 in damages
3	\$10,000-\$500,000 in damages
4	\$500,000-\$2,000,000 in damages
5	More than \$2,000,000 in damages

Business	
<i>Amount of Business Damage Associated from the Hazard</i>	
1	Less than 3 businesses closed for only a day
2	More than 3 businesses closed for a week
3	More than 3 businesses closed for a few months
4	More than 3 businesses closed indefinitely or relocated
5	A top-10 local employer closed indefinitely

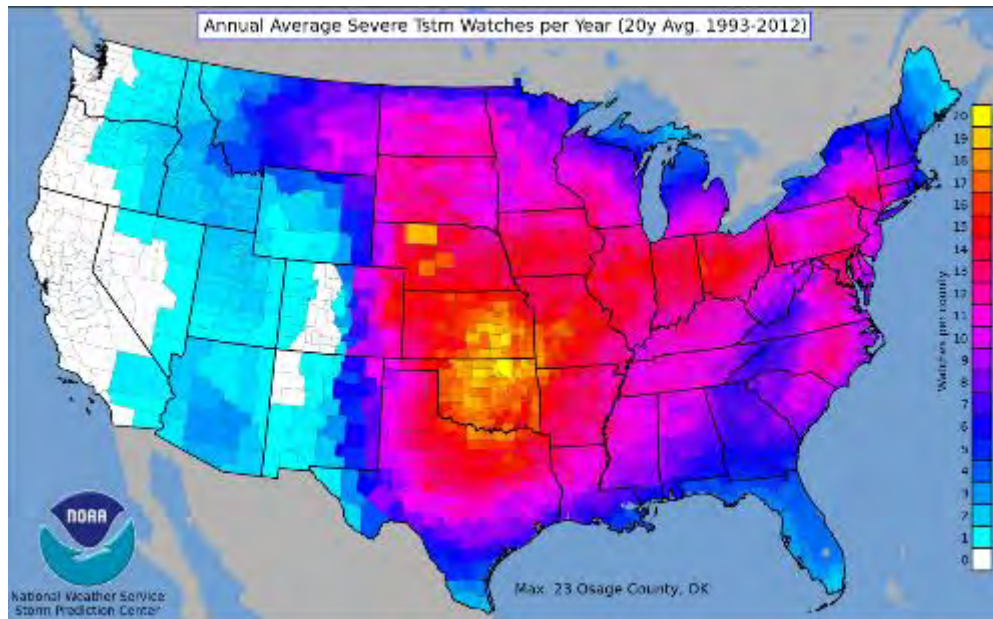
Probability	
<i>Amount of Residential Property Damage Associated from Hazard</i>	
1	Less than once every 10 years
2	About once every 5-10 years
3	About once every 2-5 years
4	About once a year
5	More than once a year

For further information about flooding hazards in Shelby County, see the HAZUS vulnerability study in [Appendix 5](#).

Severe Weather

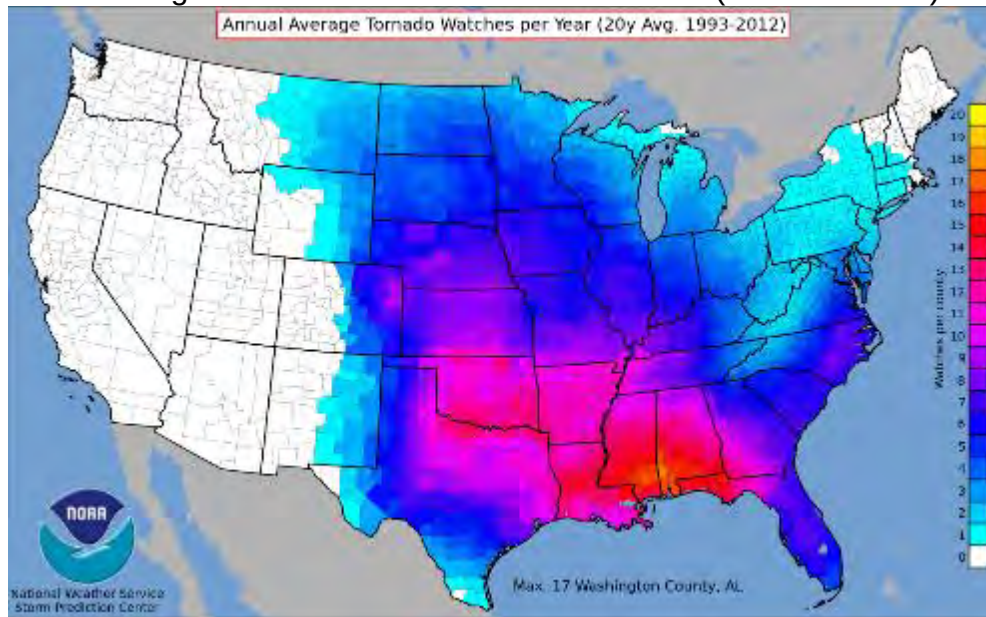
According to the National Weather Service, to consider a storm severe it must encompass one of three traits: produce winds greater than 58 miles per hour (50.4 knots), produce hail $\frac{3}{4}$ of an inch or greater in diameter, or produce tornadoes. On average, a typical county in Tennessee has about 10 severe storm watches per year (see map below).

Average Severe Storm Watches Per Year (1993-2012)



Source: NOAA/NWS Storm Prediction Center

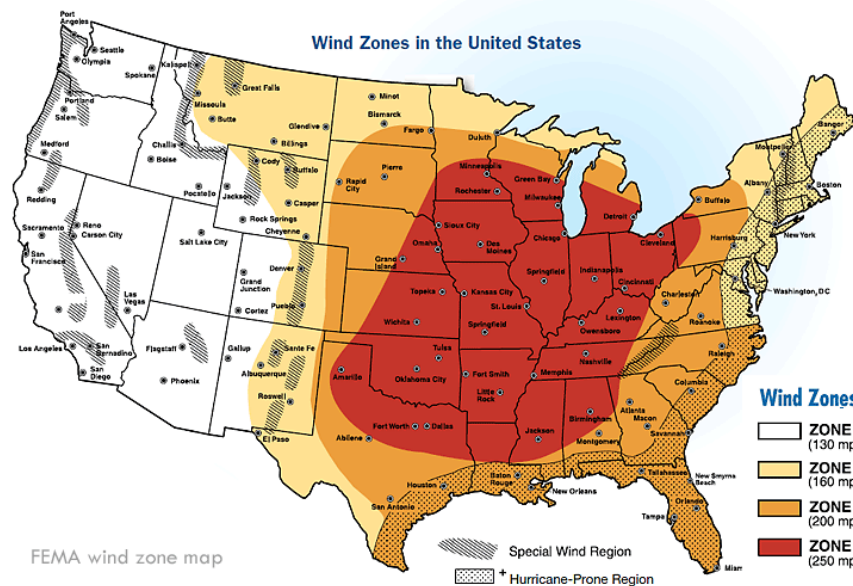
Average Tornado Watches Per Year (1993-2012)



Source: NOAA/NWS Storm Prediction Center

A tornado is a violently rotating column of air that extends from a thunderstorm, etc. down to the ground, and can reach wind speeds of 40 mph to 250 mph and higher. Tornadoes paths, lengths, and widths can vary greatly. In Shelby County, all jurisdictions are vulnerable to tornado threats. The following map places much of Tennessee in the highest wind zone (see following map).

Wind Zones in the United States



Source: FEMA

Shelby County historically has had several tornado events in the past. Based on NOAA NCDC data, the following chart provides a list of tornado events occurring in Shelby County from January 1950 to present.

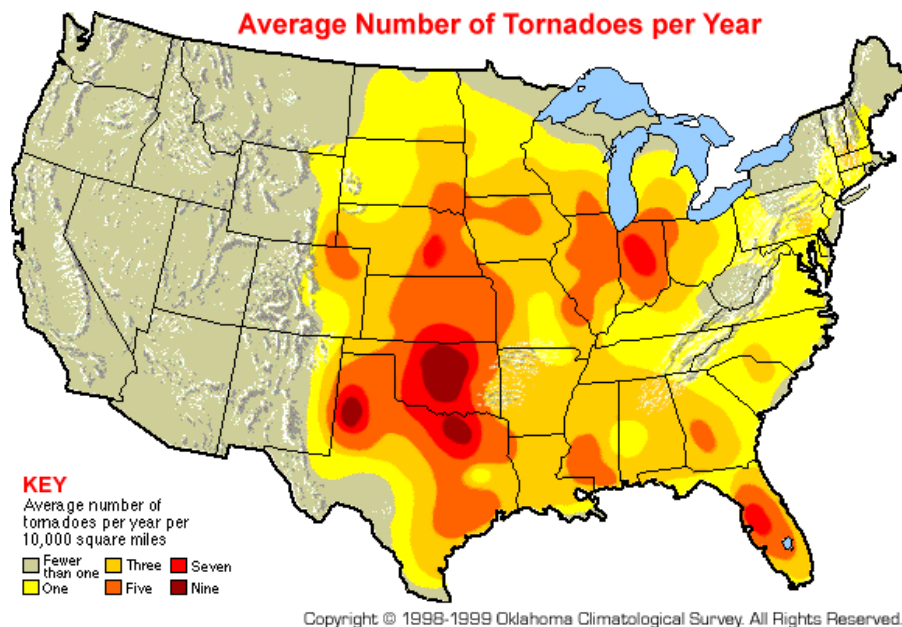
Tornado Events in Shelby County: January 1950–Present

Location	Date	Magnitude	Deaths	Injuries	Property Damage
SHELBY CO.	10/28/1955	F2	0	0	250.00K
SHELBY CO.	7/21/1956	F1	0	0	2.50K
SHELBY CO.	3/4/1964	F2	0	3	25.00K
SHELBY CO.	7/11/1964	F1	0	0	250.00K
SHELBY CO.	5/16/1966	F1	0	0	25.00K
SHELBY CO.	4/23/1967	F1	0	2	250.00K
SHELBY CO.	4/23/1967	F1	0	0	25.00K
SHELBY CO.	5/14/1967	F1	0	0	2.500M
SHELBY CO.	7/5/1967	F1	0	0	25.00K
SHELBY CO.	4/3/1968	F3	0	4	2.500M
SHELBY CO.	5/15/1968	F1	0	0	0.00K
SHELBY CO.	5/16/1968	F1	0	0	25.00K
SHELBY CO.	5/16/1968	F1	0	0	0.00K
SHELBY CO.	5/25/1968	F1	0	0	0.00K
SHELBY CO.	9/17/1968	F2	0	0	2.50K
SHELBY CO.	6/24/1969	F1	0	0	25.00K
SHELBY CO.	4/1/1970	F1	0	0	25.00K
SHELBY CO.	4/19/1970	F2	0	0	250.00K
SHELBY CO.	4/24/1970	F3	0	5	2.500M
SHELBY CO.	4/24/1970	F3	0	13	2.500M
SHELBY CO.	4/24/1970	F3	0	3	2.500M
SHELBY CO.	6/19/1970	F1	0	1	2.50K
SHELBY CO.	4/21/1972	F1	0	0	0.00K
SHELBY CO.	4/19/1973	F1	0	0	25.00K
SHELBY CO.	5/11/1973	F1	0	0	25.00K
SHELBY CO.	5/22/1973	F1	0	0	2.50K
SHELBY CO.	5/27/1973	F2	0	0	25.00K
SHELBY CO.	8/29/1978	F2	0	26	2.500M
SHELBY CO.	3/22/1979	F2	0	3	25.00K
SHELBY CO.	12/25/1982	F2	0	0	250.00K

SHELBY CO.	11/23/1983	F1	0	0	250.00K
SHELBY CO.	4/21/1984	F3	0	3	2.500M
SHELBY CO.	12/14/1987	F3	0	21	2.500M
SHELBY CO.	5/22/1988	F0	0	0	2.50K
SHELBY CO.	6/4/1989	F2	0	0	250.00K
SHELBY CO.	6/4/1989	F1	0	0	25.00K
SHELBY CO.	11/7/1989	F0	0	0	25.00K
SHELBY CO.	3/27/1991	F1	0	0	0.25K
SHELBY CO.	11/19/1991	F1	0	0	2.500M
SHELBY CO.	3/18/1992	F0	0	0	25.00K
Memphis	6/9/1994	F0	0	0	5.00K
Memphis	6/9/1994	F1	0	0	500.00K
SHELBY AND FAYETTE CO.	11/27/1994	F3	3	25	50.000M
SHELBY CO.	5/15/1995	F0	0	0	5.00K
CORDOVA	1/22/1999	F1	0	0	300.00K
FISHERVILLE	4/22/2004	F0	0	0	25.00K
CORDOVA	6/17/2006	F1	0	0	100.00K
BOLTON	2/5/2008	EF2	0	1	1.000M
WHITEHAVEN	2/5/2008	EF2	3	13	100.000M
EADS	2/5/2008	EF0	0	0	25.00K
BARTLETT	6/12/2009	EF1	0	0	25.00K
SHELBY CENTER	7/30/2009	EF1	0	0	250.00K
LUCY	5/1/2010	EF1	0	0	10.00K
ROSEMARK	4/28/2014	EF0	0	0	25.00K
(MEM)MEMPHIS INTL AR	10/21/2019	EF1	0	0	1.500M

The above list represents all listed incidents from the NCDC site for a given time period. If a jurisdiction or district is not listed, there is not a recorded incident of this nature.

Average Number of Tornadoes Per Year



Source: Oklahoma Climatological Survey

Tornadoes occur approximately once every six years in Shelby County over the time period of records being kept. The severity of tornadoes that may occur in the county is measured using the Fujita/Enhanced Fujita Scale for tornadoes (see chart below). Based on historical events, it is possible for the extent of a tornado to reach an F3 magnitude, as demonstrated on November 27th, 1994. This tornado resulted in 3 deaths, 25 injuries, and \$50 million (\$90.5 million when adjusted for inflation) in property damage.

Fujita Scale/Enhanced Fujita Scale for Tornadoes

Fujita / Enhanced Fujita Scale for Tornadoes				
F-Scale	Fastest Quarter Mile Wind Speed	Typical Impacts	Enhanced Scale: 3 Sec Wind Gust Speed	Enhanced F-Scale
F0	40-72 MPH	Some damage to chimney; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.	65-85 MPH	EF0
F1	73-112 MPH	Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.	86-110 MPH	EF1
F2	113-157 MPH	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.	111-135 MPH	EF2
F3	158-206 MPH	Roof and some walls torn off well-constructed homes; trains overturned; most trees in forest uprooted.	136-165 MPH	EF3

F4	207-260 MPH	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.	166-200 MPH	EF4
F5	261-318 MPH	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel reinforced concrete structures badly damaged.	Over 200 MPH	EF5

Source: NOAA National Weather Service; The Tornado Project

Severe storm winds most commonly occur as straight-line winds; a downburst of wind created by an area of significantly rain-cooled air that spreads out in all directions after hitting the ground. All jurisdictions are vulnerable to receiving damage from these severe storm winds.

The following chart provides severe storm wind event information for Shelby County from January 2000 to present.

Wind Events in Shelby County: January 2000 – Present

Location	Date	Type	Extent	Deaths	Injuries	Property Damage
MEMPHIS	7/20/2000	Thunderstorm Wind	55 kts. M	0	0	0.00K
MILLINGTON	9/14/2000	Thunderstorm Wind		0	0	5.00K
SHELBY (ZONE)	11/24/2000	High Wind	34 kts. E	0	0	1.00K
MEMPHIS	2/24/2001	Thunderstorm Wind		0	0	5.00K
MEMPHIS	2/24/2001	Thunderstorm Wind		0	0	5.00K
MEMPHIS	4/15/2001	Thunderstorm Wind		0	0	10.00K
MILLINGTON	5/11/2001	Thunderstorm Wind		0	2	1.00K
MEMPHIS	5/20/2001	Thunderstorm Wind		0	0	5.00K
MEMPHIS	5/23/2001	Thunderstorm Wind	75 kts. E	0	0	50.00K
WHITEHAVEN	6/4/2001	Thunderstorm Wind		0	0	5.00K
MEMPHIS	7/5/2001	Thunderstorm Wind		0	0	10.00K
BARTLETT	7/10/2001	Thunderstorm Wind		0	0	5.00K
BARTLETT	7/21/2001	Thunderstorm Wind		0	0	10.00K

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MEMPHIS	7/30/2001	Thunderstorm Wind		0	0	1.00K
MEMPHIS	10/24/2001	Thunderstorm Wind		0	0	10.00K
COLLIERVILLE	11/24/2001	Thunderstorm Wind		0	0	100.00K
COLLIERVILLE	11/26/2001	Thunderstorm Wind		0	0	10.00K
MEMPHIS	11/29/2001	Thunderstorm Wind		0	0	5.00K
MEMPHIS	11/29/2001	Thunderstorm Wind		0	0	5.00K
COUNTYWIDE	1/31/2002	Thunderstorm Wind		0	0	10.00K
ARLINGTON	7/2/2002	Thunderstorm Wind		0	0	10.00K
MEMPHIS	7/10/2002	Thunderstorm Wind		0	0	10.00K
(MEM)MEMPHIS INTL AR	8/13/2002	Thunderstorm Wind	51 kts. M	0	0	1.00K
FRAYSER	8/24/2002	Thunderstorm Wind		0	0	5.00K
MEMPHIS	9/19/2002	Thunderstorm Wind		0	0	5.00K
SHELBY (ZONE)	9/26/2002	High Wind	35 kts. E	0	0	10.00K
SHELBY (ZONE)	10/4/2002	High Wind		0	0	5.00K
MEMPHIS	11/10/2002	Thunderstorm Wind	55 kts. E	0	0	10.00K
ARLINGTON	11/10/2002	Thunderstorm Wind		0	0	5.00K
MEMPHIS	12/18/2002	Thunderstorm Wind		0	0	5.00K
ARLINGTON	12/18/2002	Thunderstorm Wind		0	0	5.00K
MEMPHIS	4/20/2003	Thunderstorm Wind	65 kts. EG	0	0	75.00K
MEMPHIS	5/1/2003	Thunderstorm Wind	50 kts. EG	0	0	1.00K
MEMPHIS	5/6/2003	Thunderstorm Wind	55 kts. EG	0	0	1.00K
MEMPHIS	5/11/2003	Thunderstorm Wind	50 kts. EG	0	0	1.00K
MILLINGTON	5/16/2003	Thunderstorm Wind	65 kts. EG	0	0	15.00K
MILLINGTON	5/16/2003	Thunderstorm Wind	50 kts. EG	0	0	5.00K

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MILLINGTON	5/16/2003	Thunderstorm Wind	55 kts. EG	0	0	10.00K
COUNTYWIDE	7/22/2003	Thunderstorm Wind	95 kts. EG	1	3	40.000M
MEMPHIS	8/3/2003	Thunderstorm Wind	50 kts. EG	0	0	5.00K
ARLINGTON	8/22/2003	Thunderstorm Wind	50 kts. EG	0	0	5.00K
MEMPHIS	8/22/2003	Thunderstorm Wind	50 kts. EG	0	0	1.00K
MEMPHIS	4/22/2004	Thunderstorm Wind	60 kts. EG	0	0	15.00K
COUNTYWIDE	5/30/2004	Thunderstorm Wind	55 kts. EG	0	0	20.00K
MILLINGTON	7/4/2004	Thunderstorm Wind	60 kts. EG	0	0	5.00K
ARLINGTON	7/4/2004	Thunderstorm Wind	50 kts. EG	0	0	15.00K
MEMPHIS	7/16/2004	Thunderstorm Wind	50 kts. EG	0	0	5.00K
EADS	10/18/2004	Thunderstorm Wind	60 kts. EG	0	0	10.00K
BARTLETT	1/13/2005	Thunderstorm Wind	50 kts. EG	0	0	10.00K
MEMPHIS	4/22/2005	Thunderstorm Wind	60 kts. EG	0	0	900.00K
GERMANTOWN	4/22/2005	Thunderstorm Wind	50 kts. EG	0	0	15.00K
MEMPHIS	7/19/2005	Thunderstorm Wind	50 kts. EG	0	0	5.00K
ARLINGTON	8/6/2005	Thunderstorm Wind	50 kts. EG	0	0	5.00K
MEMPHIS	9/25/2005	Thunderstorm Wind	50 kts. EG	0	0	1.00K
MEMPHIS	11/15/2005	Thunderstorm Wind	55 kts. EG	0	0	10.00K
GERMANTOWN	4/7/2006	Thunderstorm Wind	50 kts. EG	0	0	5.00K
BARTLETT	5/31/2006	Thunderstorm Wind	50 kts. EG	0	0	3.00K
GERMANTOWN	6/17/2006	Thunderstorm Wind	50 kts. EG	0	0	2.00K
WHITEHAVEN	6/17/2006	Thunderstorm Wind	50 kts. EG	0	0	2.00K
CORDOVA	6/17/2006	Thunderstorm Wind	55 kts. MG	0	0	2.00K

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BARTLETT	4/3/2007	Thunderstorm Wind	50 kts. EG	0	0	2.00K
WEST JCT	5/3/2007	Thunderstorm Wind	50 kts. EG	0	0	2.00K
MEMPHIS	5/15/2007	Thunderstorm Wind	52 kts. EG	0	0	4.00K
COLLIERVILLE	6/25/2007	Thunderstorm Wind	50 kts. EG	0	0	2.00K
GERMANTOWN	6/25/2007	Thunderstorm Wind	50 kts. EG	0	0	2.00K
BARTLETT	6/30/2007	Thunderstorm Wind	50 kts. EG	0	0	2.00K
BARTLETT	6/30/2007	Thunderstorm Wind	50 kts. EG	0	0	2.00K
FRAYSER	7/26/2007	Thunderstorm Wind	50 kts. EG	0	0	3.00K
BARTLETT	8/18/2007	Thunderstorm Wind	50 kts. EG	0	0	2.00K
MEMPHIS	8/18/2007	Thunderstorm Wind	50 kts. EG	0	0	6.00K
BARTLETT	8/18/2007	Thunderstorm Wind	50 kts. EG	0	0	4.00K
ROSEMARK	11/14/2007	Thunderstorm Wind	50 kts. EG	0	0	20.00K
MEMPHIS	1/8/2008	Thunderstorm Wind	50 kts. EG	0	0	10.00K
BARTLETT	1/8/2008	Thunderstorm Wind	50 kts. EG	0	0	5.00K
SHELBY (ZONE)	1/29/2008	High Wind	51 kts. MG	0	0	40.00K
(MEM)MEMPHIS INTL AR	2/5/2008	Thunderstorm Wind	73 kts. MG	0	0	500.00K
CORDOVA	2/5/2008	Thunderstorm Wind	50 kts. EG	0	0	2.00K
RUGBY	4/10/2008	Thunderstorm Wind	50 kts. EG	0	0	2.00K
BARTLETT	4/25/2008	Thunderstorm Wind	50 kts. EG	0	0	2.00K
MILLINGTON	5/10/2008	Thunderstorm Wind	52 kts. EG	0	0	0.00K
WHITEHAVEN	5/10/2008	Thunderstorm Wind	52 kts. EG	0	1	15.00K
MEMPHIS	5/24/2008	Thunderstorm Wind	50 kts. EG	0	0	2.00K
SHELBY (ZONE)	6/1/2008	Strong Wind	40 kts. EG	0	0	10.00K

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SHELBY (ZONE)	2/11/2009	Strong Wind	44 kts. EG	0	0	10.00K
MEMPHIS	6/11/2009	Thunderstorm Wind	50 kts. EG	0	0	5.00K
NONCONNAH	6/12/2009	Thunderstorm Wind	50 kts. EG	0	0	0.00K
NORTH	6/12/2009	Thunderstorm Wind	52 kts. EG	0	1	0.00K
BINGHAMTON	6/12/2009	Thunderstorm Wind	50 kts. EG	0	0	0.00K
GERMANTOWN	6/12/2009	Thunderstorm Wind	61 kts. EG	0	0	0.00K
BARTLETT	6/12/2009	Thunderstorm Wind	61 kts. EG	0	0	0.00K
CORDOVA	6/12/2009	Thunderstorm Wind	50 kts. EG	0	0	0.00K
MILLINGTON	6/12/2009	Thunderstorm Wind	50 kts. EG	0	0	0.00K
ARLINGTON	6/12/2009	Thunderstorm Wind	61 kts. EG	0	0	0.00K
EAST JCT	6/14/2009	Thunderstorm Wind	39 kts. EG	0	1	0.00K
AULON	7/26/2009	Thunderstorm Wind	50 kts. EG	0	0	0.00K
PISGAH HGTS	7/30/2009	Thunderstorm Wind	50 kts. EG	0	0	10.00K
MEMPHIS	7/30/2009	Thunderstorm Wind	50 kts. EG	0	0	0.00K
CORDOVA	3/11/2010	Thunderstorm Wind	50 kts. EG	0	0	0.00K
ARLINGTON	4/7/2010	Thunderstorm Wind	50 kts. EG	0	0	0.00K
MEMPHIS	4/24/2010	Thunderstorm Wind	50 kts. EG	0	0	0.00K
RALEIGH	4/24/2010	Thunderstorm Wind	50 kts. EG	0	0	0.00K
ELLENDAL	4/24/2010	Thunderstorm Wind	50 kts. EG	0	0	2.00K
EADS	5/1/2010	Thunderstorm Wind	50 kts. EG	0	0	0.00K
RAINES	5/2/2010	Thunderstorm Wind	50 kts. EG	0	0	0.00K
CORDOVA	5/2/2010	Thunderstorm Wind	52 kts. EG	0	0	0.00K
FOREST HILL	6/16/2010	Thunderstorm Wind	50 kts. EG	0	0	0.00K

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LENOW	6/18/2010	Thunderstorm Wind	50 kts. EG	0	0	0.00K
PISGAH	6/18/2010	Thunderstorm Wind	50 kts. EG	0	0	0.00K
COLLIERVILLE ARPK	6/18/2010	Thunderstorm Wind	50 kts. EG	0	0	0.00K
OAKVILLE	7/26/2010	Thunderstorm Wind	50 kts. EG	0	0	0.00K
OAKVILLE	8/3/2010	Thunderstorm Wind	50 kts. EG	0	0	0.00K
EAST ACRES	8/21/2010	Thunderstorm Wind	50 kts. EG	0	0	0.00K
SHELBY (ZONE)	10/26/2010	Strong Wind	48 kts. EG	0	0	10.00K
SHELBY (ZONE)	2/1/2011	High Wind	50 kts. EG	0	0	3.00K
BENJESTOWN	2/24/2011	Thunderstorm Wind	83 kts. EG	0	0	0.00K
GERMANTOWN	2/24/2011	Thunderstorm Wind	50 kts. EG	0	0	0.00K
GERMANTOWN	4/4/2011	Thunderstorm Wind	50 kts. EG	0	0	0.00K
(MEM)MEMPHIS INTL AR	4/4/2011	Thunderstorm Wind	56 kts. MG	0	0	0.00K
FRAYSER	4/19/2011	Thunderstorm Wind	65 kts. EG	0	0	2.470M
GERMANTOWN	4/19/2011	Thunderstorm Wind	61 kts. EG	0	0	0.00K
SHELBY CENTER	4/25/2011	Thunderstorm Wind	50 kts. EG	0	0	0.00K
GERMANTOWN	4/25/2011	Thunderstorm Wind	52 kts. EG	0	0	1.00K
COLLIERVILLE	4/26/2011	Thunderstorm Wind	50 kts. EG	0	0	0.00K
SHELBY FARMS	5/25/2011	Thunderstorm Wind	50 kts. EG	0	0	0.00K
SHELBY CENTER	6/13/2011	Thunderstorm Wind	52 kts. MG	0	0	0.00K
GERMANTOWN	6/13/2011	Thunderstorm Wind	61 kts. EG	0	0	0.00K
(MEM)MEMPHIS INTL AR	6/16/2011	Thunderstorm Wind	63 kts. MG	0	0	0.00K
(NQA)NAS MEMPHIS MIL	6/16/2011	Thunderstorm Wind	50 kts. EG	0	0	0.00K
CORDOVA	6/16/2011	Thunderstorm Wind	52 kts. MG	0	0	0.00K

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ELLENDALE	6/16/2011	Thunderstorm Wind	56 kts. EG	0	0	0.00K
FRAYSER	6/28/2011	Thunderstorm Wind	50 kts. EG	0	0	0.00K
MEMPHIS	6/28/2011	Thunderstorm Wind	50 kts. EG	0	0	0.00K
BRUNSWICK	8/20/2011	Thunderstorm Wind	61 kts. EG	0	0	0.00K
WHITEHAVEN	1/22/2012	Thunderstorm Wind	91 kts. EG	0	0	75.00K
SHELBY FARMS	1/22/2012	Thunderstorm Wind	56 kts. EG	0	0	0.00K
RAMSEY	5/31/2012	Thunderstorm Wind	50 kts. EG	0	1	0.00K
ARLINGTON	6/3/2012	Thunderstorm Wind	50 kts. EG	0	0	0.00K
EGYPT	6/11/2012	Thunderstorm Wind	50 kts. EG	0	0	0.00K
MEMPHIS	8/13/2012	Thunderstorm Wind	50 kts. EG	0	0	0.00K
MEMPHIS	8/31/2012	Thunderstorm Wind	50 kts. EG	0	0	45.00K
MADGE	9/1/2012	Thunderstorm Wind	50 kts. EG	0	0	10.00K
COLLIERVILLE	9/5/2012	Thunderstorm Wind	50 kts. EG	0	0	0.00K
WOODSTOCK	9/7/2012	Thunderstorm Wind	50 kts. EG	0	0	0.00K
MEMPHIS	10/5/2012	Thunderstorm Wind	50 kts. EG	0	0	0.00K
MILLINGTON	10/17/2012	Thunderstorm Wind	70 kts. EG	0	0	25.00K
MEMPHIS	12/20/2012	Thunderstorm Wind	50 kts. EG	0	0	0.00K
FOREST HILL	12/20/2012	Thunderstorm Wind	50 kts. EG	0	0	0.00K
(MEM)MEMPHIS INTL AR	1/29/2013	Thunderstorm Wind	53 kts. MG	0	0	0.00K
CORDOVA	6/19/2013	Thunderstorm Wind	50 kts. EG	0	0	0.00K
EAST JCT	6/27/2013	Thunderstorm Wind	50 kts. EG	0	0	0.00K
RALEIGH	6/28/2013	Thunderstorm Wind	50 kts. EG	0	0	0.00K
CORDOVA	7/18/2013	Thunderstorm Wind	50 kts. EG	0	0	0.00K

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SHELBY CENTER	9/10/2013	Thunderstorm Wind	50 kts. EG	0	0	0.00K
MILLINGTON	6/5/2014	Thunderstorm Wind	61 kts. EG	0	0	0.00K
EAST JCT	7/14/2014	Thunderstorm Wind	50 kts. EG	0	0	5.00K
FOREST HILL	7/14/2014	Thunderstorm Wind	50 kts. EG	0	0	0.00K
BARTLETT	7/14/2014	Thunderstorm Wind	50 kts. EG	0	0	0.00K
(MEM)MEMPHIS INTL AR	10/2/2014	Thunderstorm Wind	53 kts. MG	0	0	0.00K
AULON	10/2/2014	Thunderstorm Wind	50 kts. EG	0	0	0.00K
MILLINGTON	4/19/2015	Thunderstorm Wind	50 kts. EG	0	0	10.00K
ARLINGTON	6/8/2015	Thunderstorm Wind	50 kts. EG	0	0	0.00K
BUNTYN	6/8/2015	Thunderstorm Wind	50 kts. EG	0	0	0.00K
ROSEMARK	6/26/2015	Thunderstorm Wind	50 kts. EG	0	0	0.00K
MILLINGTON	7/14/2015	Thunderstorm Wind	61 kts. EG	0	0	20.00K
BARTLETT	7/14/2015	Thunderstorm Wind	52 kts. EG	0	0	0.00K
FRAYSER	7/14/2015	Thunderstorm Wind	56 kts. EG	0	0	0.00K
GERMANTOWN	7/14/2015	Thunderstorm Wind	56 kts. MG	0	0	0.00K
SPRING LAKE	8/5/2015	Thunderstorm Wind	50 kts. EG	0	0	0.00K
WHITE STATION	8/5/2015	Thunderstorm Wind	61 kts. EG	0	0	0.00K
SHELBY (ZONE)	11/17/2015	Strong Wind	41 kts. MG	0	0	25.00K
SHELBY (ZONE)	12/13/2015	Strong Wind	39 kts. MG	0	0	1.00K
KERRVILLE	3/31/2016	Thunderstorm Wind	50 kts. EG	0	0	0.00K
SHELBY (ZONE)	4/30/2016	Strong Wind	47 kts. MG	0	0	50.00K
GERMANTOWN	6/15/2016	Thunderstorm Wind	50 kts. EG	0	0	0.00K
OAKVILLE	7/15/2016	Thunderstorm Wind	50 kts. EG	0	0	20.00K

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(MEM)MEMPHIS INTL AR	7/20/2016	Thunderstorm Wind	57 kts. MG	0	0	5.00K
BERCLAIR	7/20/2016	Thunderstorm Wind	50 kts. EG	0	0	5.00K
GOODMAN	7/29/2016	Thunderstorm Wind	50 kts. EG	0	0	20.00K
SHELBY (ZONE)	11/28/2016	Strong Wind	46 kts. EG	0	0	20.00K
MILLINGTON	12/17/2016	Thunderstorm Wind	50 kts. EG	0	0	0.00K
RALEIGH	3/9/2017	Thunderstorm Wind	75 kts. EG	0	0	30.00K
RALEIGH	3/9/2017	Thunderstorm Wind	78 kts. EG	0	0	150.00K
AULON	3/9/2017	Thunderstorm Wind	50 kts. EG	0	0	0.00K
SHELBY (ZONE)	3/29/2017	High Wind	51 kts. MG	0	0	0.00K
SHELBY (ZONE)	3/29/2017	High Wind	50 kts. EG	0	0	60.00K
SHELBY (ZONE)	4/2/2017	Strong Wind	43 kts. EG	0	0	20.00K
MEMPHIS	4/30/2017	Thunderstorm Wind	50 kts. EG	0	0	15.00K
WHITE STATION	4/30/2017	Thunderstorm Wind	50 kts. EG	0	0	0.00K
WHITE STATION	4/30/2017	Thunderstorm Wind	50 kts. EG	0	0	50.00K
ELLENDAL	4/30/2017	Thunderstorm Wind	50 kts. EG	0	0	100.00K
ELLENDAL	4/30/2017	Thunderstorm Wind	50 kts. EG	0	0	0.00K
ELLENDAL	4/30/2017	Thunderstorm Wind	50 kts. EG	0	0	20.00K
ELLENDAL	4/30/2017	Thunderstorm Wind	50 kts. EG	0	0	0.00K
BARTLETT	4/30/2017	Thunderstorm Wind	50 kts. EG	0	0	0.00K
SHELBY (ZONE)	5/5/2017	Strong Wind	40 kts. MG	0	0	2.00K
SHELBY (ZONE)	5/5/2017	Strong Wind	40 kts. MG	0	0	10.00K
SHELBY (ZONE)	5/5/2017	Strong Wind	40 kts. MG	0	0	2.00K
WEST UNION	5/27/2017	Thunderstorm Wind	70 kts. EG	0	0	50.00K

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MEMPHIS DEWITT SPAIN	5/27/2017	Thunderstorm Wind	70 kts. EG	0	0	20.00K
FRAYSER	5/27/2017	Thunderstorm Wind	70 kts. EG	0	0	100.00K
NORTH	5/27/2017	Thunderstorm Wind	65 kts. EG	0	0	5.00K
BERCLAIR	5/27/2017	Thunderstorm Wind	70 kts. EG	0	0	9.000M
BINGHAMTON	5/27/2017	Thunderstorm Wind	70 kts. EG	0	0	200.00K
MEMPHIS	5/27/2017	Thunderstorm Wind	60 kts. MG	0	0	0.00K
CORDOVA	5/27/2017	Thunderstorm Wind	65 kts. EG	0	0	100.00K
SHELBY FARMS	5/27/2017	Thunderstorm Wind	65 kts. EG	0	0	50.00K
(MEM)MEMPHIS INTL AR	5/27/2017	Thunderstorm Wind	53 kts. MG	0	0	0.00K
MEMPHIS	6/18/2017	Thunderstorm Wind	50 kts. EG	0	0	2.00K
MEMPHIS	6/18/2017	Thunderstorm Wind	50 kts. EG	0	0	80.00K
GERMANTOWN	6/18/2017	Thunderstorm Wind	50 kts. EG	0	0	10.00K
BARTLETT	6/23/2017	Thunderstorm Wind	50 kts. EG	0	0	2.00K
BENJESTOWN	7/8/2017	Thunderstorm Wind	50 kts. EG	0	0	1.00K
CORONA	8/11/2017	Thunderstorm Wind	50 kts. EG	0	0	0.00K
MALLORY	8/11/2017	Thunderstorm Wind	50 kts. EG	0	0	0.00K
ELLENDALE	8/11/2017	Thunderstorm Wind	50 kts. EG	0	0	0.00K
PIPER	8/11/2017	Thunderstorm Wind	50 kts. EG	0	0	50.00K
SHELBY (ZONE)	8/31/2017	Strong Wind	39 kts. EG	0	0	15.00K
LENOW	5/19/2018	Thunderstorm Wind	52 kts. EG	0	0	0.00K
LENOW	6/12/2018	Thunderstorm Wind	50 kts. EG	0	0	0.50K
ST PAUL	6/21/2018	Thunderstorm Wind	50 kts. EG	0	0	3.00K
SLOANVILLE	6/21/2018	Thunderstorm Wind	50 kts. EG	0	0	3.00K

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KERRVILLE	6/21/2018	Thunderstorm Wind	50 kts. EG	0	0	3.00K
ARLINGTON	6/21/2018	Thunderstorm Wind	50 kts. EG	0	0	3.00K
PERSEY	6/23/2018	Thunderstorm Wind	56 kts. EG	0	0	3.00K
(MEM)MEMPHIS INTL AR	6/23/2018	Thunderstorm Wind	56 kts. MG	0	0	0.00K
GERMANTOWN	6/23/2018	Thunderstorm Wind	55 kts. EG	0	0	5.00K
BAILEY	6/23/2018	Thunderstorm Wind	55 kts. EG	0	0	5.00K
RUGBY	6/24/2018	Thunderstorm Wind	50 kts. EG	0	0	3.00K
BERCLAIR	7/5/2018	Thunderstorm Wind	50 kts. EG	0	0	0.50K
AULON	7/5/2018	Thunderstorm Wind	50 kts. EG	0	0	10.00K
WHITE STATION	7/5/2018	Thunderstorm Wind	50 kts. EG	0	0	10.00K
MEMPHIS	7/5/2018	Thunderstorm Wind	50 kts. EG	0	0	20.00K
LEEWOOD	7/15/2018	Thunderstorm Wind	50 kts. EG	0	0	5.00K
SHELBY FARMS	7/15/2018	Thunderstorm Wind	50 kts. EG	0	0	2.00K
FRAYSER	7/15/2018	Thunderstorm Wind	55 kts. EG	0	0	15.00K
BINGHAMTON	7/15/2018	Thunderstorm Wind	55 kts. EG	0	0	30.00K
WHITE STATION	7/15/2018	Thunderstorm Wind	50 kts. EG	0	0	0.50K
SHELBY (ZONE)	3/9/2019	Strong Wind	45 kts. EG	0	0	25.00K
SHELBY (ZONE)	3/14/2019	Strong Wind	46 kts. EG	0	0	1.00K
SHELBY (ZONE)	3/14/2019	Strong Wind	40 kts. EG	0	0	50.00K
CORDOVA	4/6/2019	Thunderstorm Wind	50 kts. EG	0	0	2.00K
MALLORY	5/18/2019	Thunderstorm Wind	51 kts. MG	0	0	3.00K
AULON	5/18/2019	Thunderstorm Wind	45 kts. EG	0	0	1.00K
RALEIGH	5/18/2019	Thunderstorm Wind	50 kts. EG	0	0	5.00K

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NATIONAL CEMETERY	5/18/2019	Thunderstorm Wind	45 kts. EG	0	0	0.50K
RUGBY	5/18/2019	Thunderstorm Wind	50 kts. EG	0	0	0.50K
(MEM)MEMPHIS INTL AR	6/19/2019	Thunderstorm Wind	58 kts. EG	0	0	0.00K
GRIFFIN CORNER	6/19/2019	Thunderstorm Wind	50 kts. EG	0	0	0.50K
FOREST HILL	6/23/2019	Thunderstorm Wind	50 kts. EG	0	0	15.00K
WHITE STATION	7/15/2019	Thunderstorm Wind	50 kts. EG	0	0	1.00K
(MEM)MEMPHIS INTL AR	8/13/2019	Thunderstorm Wind	50 kts. EG	0	0	10.00K
(MEM)MEMPHIS INTL AR	8/13/2019	Thunderstorm Wind	50 kts. MG	0	0	0.00K
WEST JCT	8/13/2019	Thunderstorm Wind	50 kts. MG	0	0	0.00K
FELTS	10/21/2019	Thunderstorm Wind	50 kts. EG	0	0	0.00K
GERMANTOWN	10/21/2019	Thunderstorm Wind	50 kts. EG	0	0	50.00K
NEW SOUTH MEMPHIS	1/11/2020	Thunderstorm Wind	60 kts. EG	0	0	15.00K
MEMPHIS	1/11/2020	Thunderstorm Wind	50 kts. EG	0	0	2.00K
BINGHAMTON	1/11/2020	Thunderstorm Wind	60 kts. EG	0	0	50.00K
BINGHAMTON	1/11/2020	Thunderstorm Wind	60 kts. EG	0	0	50.00K
MILLINGTON	1/11/2020	Thunderstorm Wind	56 kts. EG	0	0	2.00K
SHELBY CENTER	3/28/2020	Thunderstorm Wind	50 kts. EG	0	0	10.00K
BERCLAIR	4/12/2020	Thunderstorm Wind	50 kts. EG	0	0	0.00K
BARTLETT	4/28/2020	Thunderstorm Wind	50 kts. EG	0	0	0.00K

Historically, severe storm wind events occur approximately 13 times per year in Shelby County. The severity of severe storm winds is commonly measured by wind speed (knots or mph). The strongest severe storm wind event within Shelby County in recent years was recorded July 22nd, 2003 (*DR-1482-TN*). Dubbed “Hurricane Elvis” by locals, the event was a strong derecho that yielded winds up to 108 mph. Per the NCDC, impacts were as follows:

- Numerous trees, power lines and power poles were blown down.
- Some of the trees fell on houses producing some major damage.
- At least 20 buildings collapsed.
- Numerous homes and buildings were damaged and a few were destroyed. Among the damaged buildings was the Gibson Guitar Factory in downtown Memphis.
- One person was killed when a tree fell on his house crushing him.
- Over 300,000 homes in the county were without electricity. Most were without power for anywhere from 2 days to 2 weeks.
- Several people were killed due to post storm related issues such as carbon monoxide poisoning from improperly using generators.
- Property damage exceeded \$40 million.

The above list represents all listed incidents from the NCDC site for a given time period. If a jurisdiction or district is not listed, there is not a recorded incident of this nature.

Hail is the frozen form of precipitation, falling as small spheres of solid ice. Even though the risk from hail is relatively low, all jurisdictions have the possibility of hail causing some window and roof damage.

TORRO Hail Index

TORRO Hail Index			
Scale	Max Diameter	Comparisons	Typical Impacts
H0	5-9 MM	Pea	No damage.
H1	10-15 MM	Mothball	Slight general damage to plants, crops.
H2	16-20 MM	Marble	Significant damage to fruit, crops, vegetation.
H3	21-30 MM	Walnut	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored.
H4	31-40 MM	Pigeon's Egg	Widespread glass damage, vehicle bodywork damage.
H5	41-50 MM	Golf Ball	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries.
H6	51-60 MM	Hen's Egg	Bodywork of grounded aircraft dented, brick walls pitted.
H7	61-75 MM	Tennis Ball	Severe roof damage, risk of serious injuries.
H8	76-90 MM	Soft Ball	Severe damage to aircraft bodywork.
H9	91-100 MM	Grapefruit	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open.

Source: The Tornado & Storm Research Organization

The following chart provides hail event information for Shelby County.

Hail Events in Shelby County: January 2000 – Present

Location	Date	Extent	Deaths	Injuries	Property Damage
FRAYSER	2/13/2000	0.88 in.	0	0	0.05K
MEMPHIS	2/13/2000	0.75 in.	0	0	0.01K
WHITEHAVEN	2/18/2000	0.75 in.	0	0	0.01K
MEMPHIS	2/18/2000	0.88 in.	0	0	0.06K
CORDOVA	7/29/2000	0.75 in.	0	0	0.01K

CORDOVA	8/4/2000	0.75 in.	0	0	0.01K
MEMPHIS	2/24/2001	1.00 in.	0	0	0.10K
RALEIGH	3/3/2001	1.75 in.	0	0	0.75K
BARTLETT	3/29/2002	1.00 in.	0	0	0.22K
MILLINGTON	3/30/2002	0.88 in.	0	0	0.05K
MEMPHIS	4/24/2002	0.75 in.	0	0	0.01K
MILLINGTON	4/30/2002	0.75 in.	0	0	0.01K
MEMPHIS	4/30/2002	0.88 in.	0	0	0.10K
CORDOVA	5/25/2002	0.75 in.	0	0	0.01K
BARTLETT	5/28/2002	0.75 in.	0	0	0.50K
RALEIGH	5/28/2002	0.75 in.	0	0	0.01K
MEMPHIS	11/10/2002	0.75 in.	0	0	0.01K
BARTLETT	4/6/2003	0.75 in.	0	0	0.01K
GERMANTOWN	4/20/2003	1.00 in.	0	0	0.15K
COLLIERVILLE	4/20/2003	0.75 in.	0	0	0.01K
MEMPHIS	5/3/2003	0.75 in.	0	0	0.01K
MEMPHIS	5/16/2003	1.75 in.	0	0	1.15K
CORDOVA	5/16/2003	1.00 in.	0	0	0.11K
FRAYSER	8/27/2003	0.75 in.	0	0	0.01K
CORDOVA	10/7/2003	1.00 in.	0	0	0.15K
MILLINGTON	3/20/2004	1.00 in.	0	0	0.15K
MEMPHIS	4/23/2004	1.00 in.	0	0	0.20K
MEMPHIS	7/14/2004	1.00 in.	0	0	0.10K
GERMANTOWN	7/14/2004	0.75 in.	0	0	0.01K
CORDOVA	8/28/2004	0.75 in.	0	0	0.01K
ARLINGTON	9/12/2004	0.75 in.	0	0	0.01K
MEMPHIS	10/18/2004	1.50 in.	0	0	0.50K
MILLINGTON	2/21/2005	0.75 in.	0	0	0.01K
BARTLETT	2/21/2005	0.75 in.	0	0	0.01K
MEMPHIS	3/22/2005	1.00 in.	0	0	0.16K
MILLINGTON	4/6/2005	0.75 in.	0	0	0.01K
GERMANTOWN	7/19/2005	0.88 in.	0	0	0.05K
MEMPHIS	11/15/2005	1.75 in.	0	0	1.62K
MEMPHIS	11/15/2005	1.00 in.	0	0	0.11K
MEMPHIS	4/2/2006	1.75 in.	0	0	12.00K
MEMPHIS	4/2/2006	1.75 in.	0	0	15.00K
MEMPHIS	4/2/2006	1.00 in.	0	0	5.00K
WHITEHAVEN	4/7/2006	0.88 in.	0	0	4.00K
CORDOVA	4/7/2006	1.75 in.	0	0	15.00K
GERMANTOWN	4/7/2006	1.75 in.	0	0	11.00K
BARTLETT	4/7/2006	1.00 in.	0	0	7.50K
GERMANTOWN	4/7/2006	2.75 in.	0	0	75.00K
BARTLETT	4/20/2006	1.00 in.	0	0	6.00K
FRAYSER	4/25/2006	0.88 in.	0	0	2.50K
BARTLETT	4/25/2006	0.88 in.	0	0	2.50K
GERMANTOWN	5/4/2006	0.75 in.	0	0	1.00K

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MEMPHIS	5/9/2006	0.88 in.	0	0	2.50K
ELLEDALE	5/31/2006	1.00 in.	0	0	5.00K
BARTLETT	6/17/2006	1.00 in.	0	0	5.00K
MILLINGTON	4/3/2007	1.75 in.	0	0	2.00K
GERMANTOWN	4/3/2007	0.75 in.	0	0	1.00K
COLLIERVILLE	4/13/2007	0.75 in.	0	0	1.00K
GERMANTOWN	4/13/2007	0.75 in.	0	0	1.00K
MEMPHIS	5/15/2007	0.75 in.	0	0	1.00K
MILLINGTON	6/26/2007	0.75 in.	0	0	1.00K
BARTLETT	6/30/2007	0.75 in.	0	0	1.00K
COLLIERVILLE	11/14/2007	0.75 in.	0	0	1.00K
MEMPHIS	1/8/2008	0.75 in.	0	0	1.00K
BARTLETT	1/8/2008	1.00 in.	0	0	2.00K
GILDFIELD	2/5/2008	0.75 in.	0	0	1.00K
SHELBY FARMS	3/14/2008	0.75 in.	0	0	1.00K
COLLIERVILLE	3/14/2008	1.75 in.	0	0	5.00K
BARTLETT	3/14/2008	1.00 in.	0	0	2.00K
ELLEDALE	3/14/2008	0.75 in.	0	0	1.50K
LENOW	3/14/2008	0.88 in.	0	0	1.50K
GILES TOWN	3/15/2008	0.88 in.	0	0	1.50K
SPRING LAKE	3/15/2008	0.88 in.	0	0	1.50K
WHITEHAVEN	4/4/2008	0.88 in.	0	0	1.50K
CAPLEVILLE	4/22/2008	0.88 in.	0	0	1.50K
GERMANTOWN	5/2/2008	1.00 in.	0	0	2.00K
CAPLEVILLE	5/10/2008	1.00 in.	0	0	2.00K
(MEM)MEMPHIS INTL AR	5/22/2008	0.88 in.	0	0	1.50K
COLLIERVILLE ARPK	5/22/2008	0.75 in.	0	0	1.00K
OAKVILLE	2/17/2009	0.75 in.	0	0	0.00K
OAKVILLE	2/17/2009	1.00 in.	0	0	0.00K
AULON	2/17/2009	1.00 in.	0	0	0.00K
OVERTON	6/12/2009	1.00 in.	0	0	0.00K
FOREST HILL	6/12/2009	0.88 in.	0	0	0.00K
ARLINGTON MUNI ARPT	6/12/2009	1.75 in.	0	0	0.00K
GRIFFIN CORNER	3/25/2010	0.88 in.	0	0	0.00K
CAPLEVILLE	3/25/2010	0.75 in.	0	0	0.00K
GERMANTOWN	4/24/2010	1.25 in.	0	0	0.00K
CORDOVA	4/24/2010	1.75 in.	0	0	0.00K
GERMANTOWN	4/24/2010	1.75 in.	0	0	0.00K
PIPER	4/24/2010	1.75 in.	0	0	0.00K
ARLINGTON	4/24/2010	1.75 in.	0	0	0.00K
MILLINGTON	5/1/2010	1.75 in.	0	0	0.00K
OAKVILLE	5/14/2010	0.88 in.	0	0	0.00K
OAKVILLE	5/14/2010	0.88 in.	0	0	0.00K
WHITE STATION	5/14/2010	1.75 in.	0	0	0.00K

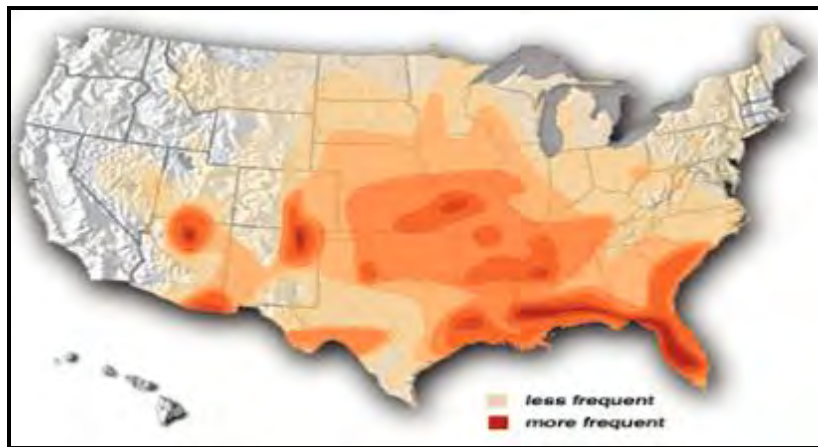
ARLINGTON MUNI ARPT	5/14/2010	1.00 in.	0	0	0.00K
ARLINGTON	5/14/2010	1.75 in.	0	0	0.00K
CORDOVA	5/14/2010	0.75 in.	0	0	0.00K
CORDOVA	5/14/2010	1.00 in.	0	0	0.00K
ARLINGTON MUNI ARPT	5/14/2010	1.25 in.	0	0	0.00K
CORDOVA	5/24/2010	1.75 in.	0	0	0.00K
CORDOVA	5/24/2010	1.00 in.	0	0	0.00K
SHELBY CENTER	5/24/2010	0.88 in.	0	0	0.00K
CORDOVA	5/24/2010	0.88 in.	0	0	0.00K
COLLIERVILLE ARPK	5/24/2010	0.75 in.	0	0	0.00K
COLLIERVILLE	5/24/2010	1.00 in.	0	0	0.00K
MILLINGTON	10/12/2010	0.88 in.	0	0	0.00K
LENOW	3/4/2011	0.75 in.	0	0	0.00K
(NQA)NAS MEMPHIS MIL	3/26/2011	0.75 in.	0	0	0.00K
ARLINGTON	4/20/2011	1.25 in.	0	0	0.00K
MILLINGTON	4/20/2011	0.75 in.	0	0	0.00K
PISGAH	4/25/2011	0.75 in.	0	0	0.00K
CAPLEVILLE	4/26/2011	1.00 in.	0	0	0.00K
BARTLETT	4/26/2011	1.00 in.	0	0	0.00K
ARLINGTON MUNI ARPT	4/26/2011	1.75 in.	0	0	0.00K
MILLINGTON	4/26/2011	1.00 in.	0	0	0.00K
MEMPHIS	4/27/2011	1.75 in.	0	0	0.00K
MILLINGTON	4/27/2011	0.75 in.	0	0	0.00K
MILLINGTON	5/1/2011	0.88 in.	0	0	0.00K
ARLINGTON MUNI ARPT	5/1/2011	1.75 in.	0	0	0.00K
CAPLEVILLE	5/22/2011	0.88 in.	0	0	0.00K
FOREST HILL	5/22/2011	1.00 in.	0	0	0.00K
COLLIERVILLE	5/22/2011	1.00 in.	0	0	0.00K
MADGE	5/25/2011	1.00 in.	0	0	0.00K
BRUNSWICK	5/25/2011	1.00 in.	0	0	0.00K
CORDOVA	6/16/2011	2.25 in.	0	0	0.00K
BARTLETT	6/16/2011	0.88 in.	0	0	0.00K
MEMPHIS	8/18/2011	1.00 in.	0	0	0.00K
COLLIERVILLE	8/20/2011	1.00 in.	0	0	0.00K
FRAYSER	9/25/2011	1.25 in.	0	0	0.00K
MILLINGTON	9/25/2011	1.75 in.	0	0	0.00K
BOLTON	9/25/2011	1.00 in.	0	0	0.00K
BOLTON	2/1/2012	0.88 in.	0	0	0.00K
MADGE	3/31/2012	1.00 in.	0	0	0.00K
BERCLAIR	4/5/2012	0.75 in.	0	0	0.00K
NATIONAL CEMETERY	5/6/2012	0.75 in.	0	0	0.00K

SHELBY CENTER	6/11/2012	1.75 in.	0	0	0.00K
WHITEHAVEN	7/7/2012	1.00 in.	0	0	0.00K
SHELBY FARMS	9/5/2012	1.00 in.	0	0	0.00K
MILLINGTON	10/17/2012	1.00 in.	0	0	0.00K
BARTLETT	11/3/2012	1.75 in.	0	0	0.00K
NEW SOUTH MEMPHIS	11/3/2012	1.00 in.	0	0	0.00K
COLLIERVILLE	5/21/2013	1.00 in.	0	0	0.00K
COLLIERVILLE ARPK	12/21/2013	1.00 in.	0	0	0.00K
MILLINGTON	4/28/2014	1.75 in.	0	0	0.00K
CORDOVA	4/28/2014	0.75 in.	0	0	0.00K
SHELBY FARMS	10/2/2014	1.75 in.	0	0	0.00K
FRAYSER	10/7/2014	1.00 in.	0	0	0.00K
BRUNSWICK	4/1/2015	1.00 in.	0	0	0.00K
ARLINGTON	4/1/2015	1.00 in.	0	0	0.00K
LENOW	6/29/2015	1.00 in.	0	0	0.00K
RAINES	6/29/2015	1.00 in.	0	0	0.00K
BARTLETT	12/23/2015	1.00 in.	0	0	0.00K
MILLINGTON	3/31/2016	0.88 in.	0	0	0.00K
BRUNSWICK	5/2/2016	0.75 in.	0	0	0.00K
GERMANTOWN	7/15/2016	0.88 in.	0	0	0.00K
ROSEMARK	7/15/2016	1.00 in.	0	0	0.00K
LENOW	12/28/2016	0.88 in.	0	0	0.00K
ARLINGTON MUNI ARPT	12/28/2016	1.00 in.	0	0	0.00K
BARTLETT	3/1/2017	1.00 in.	0	0	0.00K
SHELBY CENTER	3/1/2017	0.88 in.	0	0	0.00K
MEMPHIS	6/1/2017	0.88 in.	0	0	0.00K
FISHERVILLE	7/4/2017	1.00 in.	0	0	0.00K
BRUNSWICK	5/19/2018	1.00 in.	0	0	0.00K
HOLLADAY	5/19/2018	1.00 in.	0	0	0.00K
BARTLETT	5/20/2018	1.00 in.	0	0	0.00K
CORDOVA	7/19/2018	1.00 in.	0	0	0.00K
BRUNSWICK	5/15/2019	1.00 in.	0	0	0.00K
SHELBY CENTER	5/15/2019	0.75 in.	0	0	0.00K
LENOW	5/15/2019	1.00 in.	0	0	0.00K

Shelby County experiences 8 to 9 hail events annually. As illustrated on April 7th, 2006, hail can be as large as 2.75" (H7), or roughly the size of a tennis ball. Per the NCDC, this incident resulted in extensive damage to several vehicles. The above list represents all listed incidents from the NCDC site for a given time period. If a jurisdiction or district is not listed, there is not a recorded incident of this nature.

Lightning is an enormous electrical discharge that is caused by an imbalance between positive and negative charges. During a storm, colliding particles of rain, ice, or snow increase this imbalance and often negatively charge the lower reaches of storm clouds. Objects on the ground, like steeples, trees, and the Earth itself, become positively charged—creating an imbalance that nature seeks to remedy by passing current between the two charges. Lightning events may affect the entire area of Shelby County any time of the year, though they are more numerous in spring and summer.

Lightning Probability Incidence Map:
Annual Frequency of Cloud-to-Ground Lightning



The following chart provides lightning event information for Shelby County. Per the NCDC, lightning strikes occur approximately once every six to seven years in Shelby County, yet are often not captured in NCDC data. During the first meeting, several participants indicated that number is much higher. The severity of damages depends on what the lightning strikes, as illustrated on March 31st, 2007. In this incident, a lightning strike caused a fire at a house on Shea Road. The fire caused substantial damage to the home. Four firefighters were treated for heat exhaustion and two other firefighters were treated for other injuries. The fire took 4 to 5 hours to put out.

Recorded Lightning Impacts in Shelby County:
January 2000 – Present

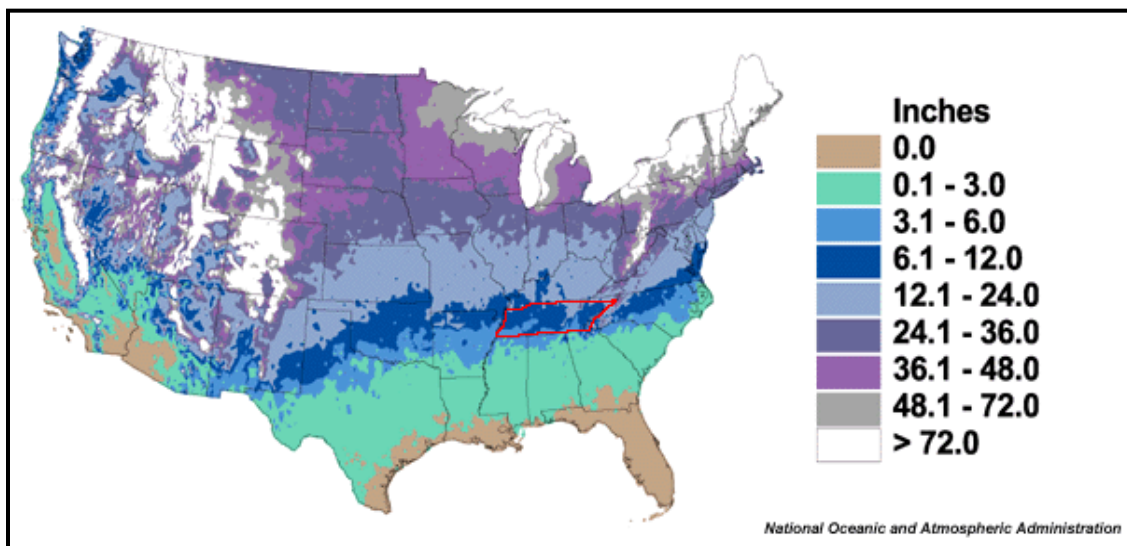
Location	Date	Deaths	Injuries	Property Damage
MEMPHIS	11/10/2002	0	1	0.00K
ARLINGTON	5/30/2004	0	0	1.00K
ARLINGTON	9/12/2004	1	0	0.00K
BARTLETT	4/25/2006	0	0	150.00K
COLLIERVILLE	3/31/2007	0	0	500.00K

BARTLETT	6/28/2007	0	0	145.00K
GERMANTOWN	7/26/2009	0	0	50.00K
WHITE STATION	7/26/2009	0	0	25.00K
SHELBY CENTER	7/26/2009	0	0	25.00K
NORTH	8/5/2009	0	0	50.00K
SHELBY FARMS	4/24/2010	0	0	5.00K
FOREST HILL	8/9/2010	0	1	0.00K
MILLINGTON	10/12/2010	0	0	30.00K
OAKVILLE	4/6/2016	0	2	0.00K
BRUNSWICK	6/30/2017	0	0	0.00K
LENOW	6/1/2018	0	0	200.00K
FOREST HILL	4/12/2020	0	0	35.00K
OAKVILLE	4/28/2020	0	0	10.00K

The above list represents all listed incidents from the NCDC site for a given time period. If a jurisdiction or district is not listed, there is not a recorded incident of this nature.

A freeze occurs when temperatures are below 32 degrees Fahrenheit for a period of time. These temperatures can damage agricultural crops, burst water pipes, and create layers of "black ice." Winter storms are events that can range from a few hours of moderate snow to blizzard-like circumstances that can affect driving conditions and impact communications, electricity, and other services. In Shelby County, all jurisdictions are vulnerable to freezes and moderate winter storms in varying degrees, but not to the severity level seen in much of the northern U.S. Mean snowfall per year is from 3-6" annually

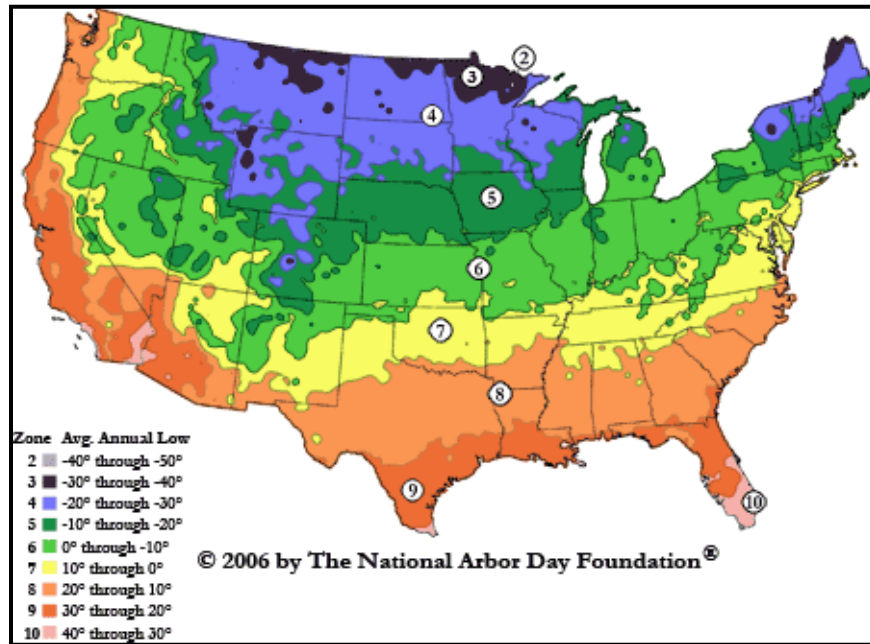
Average Mean Snowfall Per Year



Source: NOAA

Shelby County can experience temperatures between 15 to 5 degrees Fahrenheit, thus causing multiple freeze conditions during the winter months (see the following map for other average lows).

Average Annual Low Temperatures



Source: NOAA

The following chart provides winter storm event information for Shelby County. Based on previous occurrences, Shelby County experiences winter weather one to two times per year. Winter weather can occasionally be severe, as illustrated in the ice storm on February 11th, 1994. Per multiple members of the hazard mitigation committee, up to 2" of ice fell over Shelby County. Nearly the entire county was impassable for two days. Power outages lasted in some areas for up to two weeks.

Winter Events in Shelby County: January 2000 – Present

Jurisdiction	Date	Type	Deaths	Injuries	Property Damage
SHELBY (ZONE)	1/27/2000	Heavy Snow	0	0	0.00K
SHELBY (ZONE)	12/13/2000	Winter Storm	0	0	20.00K
SHELBY (ZONE)	2/5/2002	Winter Storm	0	0	0.00K
SHELBY (ZONE)	2/6/2003	Heavy Snow	0	0	1.00K
SHELBY (ZONE)	2/25/2003	Heavy Snow	0	0	1.00K
SHELBY (ZONE)	12/22/2004	Winter Storm	0	0	1.00K
SHELBY (ZONE)	2/10/2006	Winter Storm	0	0	1.00K
SHELBY (ZONE)	2/18/2006	Winter Storm	0	0	1.00K
SHELBY (ZONE)	2/1/2007	Winter Weather	0	0	0.00K
SHELBY (ZONE)	1/25/2008	Winter Weather	0	0	0.00K

SHELBY (ZONE)	3/7/2008	Winter Storm	0	0	0.00K
SHELBY (ZONE)	1/5/2009	Winter Weather	0	0	0.00K
SHELBY (ZONE)	2/28/2009	Winter Storm	0	0	0.00K
SHELBY (ZONE)	3/1/2009	Winter Storm	0	0	0.00K
SHELBY (ZONE)	1/29/2010	Winter Storm	0	0	0.00K
SHELBY (ZONE)	2/8/2010	Winter Storm	0	0	0.00K
SHELBY (ZONE)	2/15/2010	Winter Weather	0	0	0.00K
SHELBY (ZONE)	12/15/2010	Winter Weather	0	0	0.00K
SHELBY (ZONE)	1/9/2011	Winter Storm	0	0	0.00K
SHELBY (ZONE)	1/20/2011	Winter Weather	0	0	0.00K
SHELBY (ZONE)	1/25/2011	Winter Weather	0	0	0.00K
SHELBY (ZONE)	2/7/2011	Winter Weather	0	0	0.00K
SHELBY (ZONE)	2/9/2011	Winter Storm	0	0	0.00K
SHELBY (ZONE)	11/28/2011	Winter Weather	0	0	0.00K
SHELBY (ZONE)	12/7/2011	Winter Weather	0	0	0.00K
SHELBY (ZONE)	12/25/2012	Winter Weather	0	0	0.00K
SHELBY (ZONE)	1/15/2013	Winter Weather	0	0	0.00K
SHELBY (ZONE)	12/5/2013	Winter Storm	0	0	0.00K
SHELBY (ZONE)	12/7/2013	Winter Weather	0	0	0.00K
SHELBY (ZONE)	2/2/2014	Winter Storm	0	0	0.00K
SHELBY (ZONE)	2/4/2014	Winter Storm	0	0	0.00K
SHELBY (ZONE)	3/2/2014	Winter Storm	0	0	0.00K
SHELBY (ZONE)	11/13/2014	Winter Weather	0	0	0.00K
SHELBY (ZONE)	2/16/2015	Winter Storm	0	0	0.00K
SHELBY (ZONE)	2/20/2015	Winter Storm	0	0	0.00K
SHELBY (ZONE)	2/25/2015	Winter Weather	0	0	0.00K
SHELBY (ZONE)	3/4/2015	Winter Storm	0	0	0.00K
SHELBY (ZONE)	1/20/2016	Winter Weather	0	0	0.00K
SHELBY (ZONE)	1/22/2016	Winter Storm	0	0	0.00K
SHELBY (ZONE)	1/6/2017	Winter Weather	0	0	0.00K
SHELBY (ZONE)	1/12/2018	Winter Storm	0	0	0.00K
SHELBY (ZONE)	1/15/2018	Winter Storm	0	0	0.00K
SHELBY (ZONE)	11/14/2018	Winter Weather	0	0	0.00K
SHELBY (ZONE)	12/8/2018	Winter Weather	0	0	0.00K

The above list represents all listed incidents from the NCDC site for a given time period. If a jurisdiction or district is not listed, there is not a recorded incident of this nature.

Throughout the county all buildings and infrastructure are vulnerable to tornadoes and severe storm impacts. Shelby County's building stock can be broken down into the following percentage categories: 74% residential, 18% commercial, 4% industrial, <1% agricultural, 2% religious, <1% governmental, and 1% educational. In the county, manufactured homes, electrical lines, and older barns are some of the most vulnerable features. Many of these structures wouldn't receive

direct impacts from winter storms but they could receive indirect impacts such as downed electrical lines that cut off electricity to the structures, frozen pipelines that crack, destroyed agriculture crops, and customers not being able to access travels to the structures due to ice covered roads. In the county, road traveling conditions, electrical lines, and agricultural functions are some of the most vulnerable features.

Shelby County uses a ranking system to determine each jurisdiction's vulnerability to freezes/winter storm events. This system is based off simple arithmetic which analyzes potential impacts to determine vulnerabilities and then analyzes the probability of a freeze/winter storm event occurring to calculate a risk ranking for each jurisdiction.

In evaluating the risk of winter storms, jurisdictions viewed incidents that impacted day-to-day business as opposed to all incidents indicated by the NCDC. Additionally, Shelby County Schools views the threat as impacting the ability to transport school children as opposed to a direct threat to infrastructure.

Severe Weather

Jurisdiction / Applicant	Impacts			Vulnerability $H+P+B=\#$; $\#/3=V$
	<i>Human</i>	<i>Property</i>	<i>Business</i>	
Shelby County	3	3	2	2.7
Memphis	4	4	4	4.0
Arlington	3	2	3	2.7
Bartlett	4	5	3	4.0
Collierville	4	4	3	3.7
Germantown	1	5	2	2.7
Lakeland	4	4	3	3.7
Millington	4	4	2	3.3
Arlington Community Schools	2	3	2	2.3
Bartlett City Schools	4	4	3	3.7
Collierville Schools	3	4	4	3.7
Lakeland School System	4	4	3	3.7
Millington Municipal Schools	4	4	2	3.3
Shelby County Schools	4	5	4	4.3

Jurisdiction / Applicant	Vulnerability	Probability	Risk $V+P=R$	
Shelby County	2.7	5	7.7	High
Memphis	4.0	4	8.0	High
Arlington	2.7	2	4.7	Moderate
Bartlett	4.0	3	7.0	High
Collierville	3.7	2	5.7	Medium
Germantown	2.7	2	4.7	Moderate
Lakeland	3.7	2	5.7	Medium
Millington	3.3	5	8.3	High
Arlington Community Schools	2.3	4	6.3	Medium
Bartlett City Schools	3.7	3	6.7	Medium
Collierville Schools	3.7	5	8.7	Severe
Lakeland School System	3.7	2	5.7	Medium
Millington Municipal Schools	3.3	5	8.3	High
Shelby County Schools	4.3	4	8.3	High
			Risk	
			Low	2-3.6
			Moderate	3.7-5.2
			Medium	5.3-6.8
			High	6.9-8.4
			Severe	8.5-10

Human	
<i>Risk of Injuries and Death from the Hazard</i>	
1	Death very unlikely, injuries are unlikely
2	Death unlikely, injuries are minimal
3	Death unlikely, injuries may be substantial
4	Death possible, injuries may be substantial
5	Deaths probable, injuries will likely be substantial

Property	
<i>Amount of Residential Property Damage Associated from Hazard</i>	
1	Less than \$500 in damages
2	\$500-\$10,000 in damages
3	\$10,000-\$500,000 in damages
4	\$500,000-\$2,000,000 in damages
5	More than \$2,000,000 in damages

Business	
<i>Amount of Business Damage Associated from the Hazard</i>	
1	Less than 3 businesses closed for only a day
2	More than 3 businesses closed for a week
3	More than 3 businesses closed for a few months
4	More than 3 businesses closed indefinitely or relocated
5	A top-10 local employer closed indefinitely

Probability	
<i>Amount of Residential Property Damage Associated from Hazard</i>	
1	Less than once every 10 years
2	About once every 5-10 years
3	About once every 2-5 years
4	About once a year
5	More than once a year

Extreme Temperatures

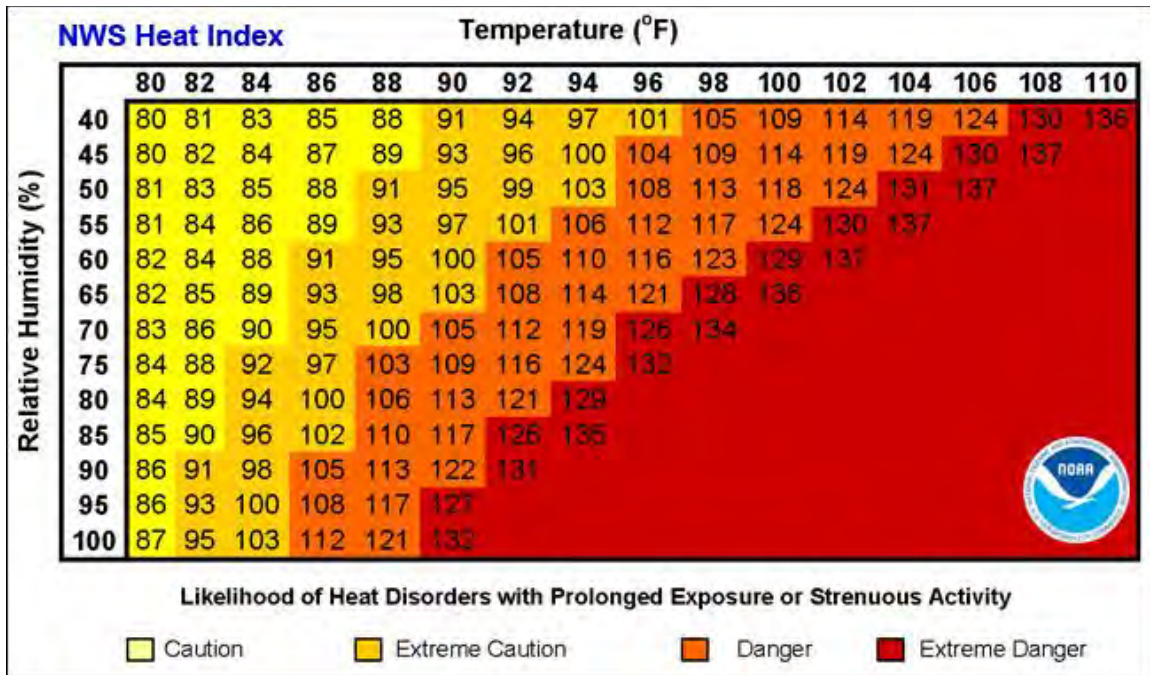
An extreme temperature event occurs when the temperature is exceptionally hotter or colder than the geographic norm and persists long enough to affect the life of the community.

Extreme heat is defined as temperatures which hover 10 degrees or more above the average high temperature for a region and last for several weeks, and though the event may not be as notable as other hazards, its effects can have devastating consequences. While it is hard to quantify the exact total number of deaths that are advanced by heat wave weather, in a normal year, about 175 Americans succumb to the demands of summer heat.

The term "Heat Index" was created by the NWS to measure apparent temperature of the air as it increases with the relative humidity. This was done to help the public understand that a lower temperature with a high relative humidity can be just as dangerous as a hotter, dryer day. The Heat Index can be used to determine what effects the temperature and humidity can have on the population. It is important to know that the Heat Index (HI) values are devised for shady, light wind conditions. Exposure to full sunshine can increase HI values by up to 15 degrees. Also, strong winds, particularly with very hot, dry, air can be extremely hazardous to individuals.

Extreme heat is not a hazard that responds to the traditional mitigation measures of building codes or land use restrictions. Heat is the number 1 weather related killer in the United States, resulting in roughly 175 fatalities each year. In fact, on average, excessive heat claims more lives each year than floods, lightning, tornadoes and hurricanes combined.

National Weather Service Heat Index Chart



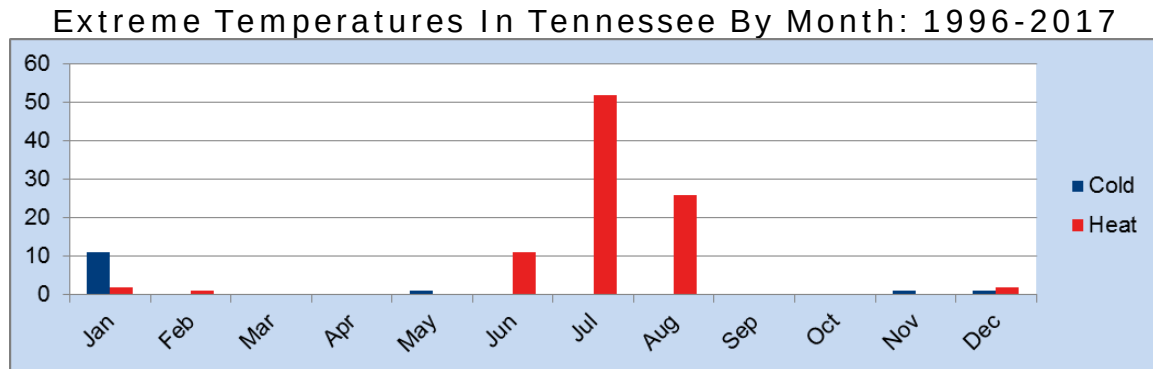
Source: National Weather Service

While not as clearly defined as extreme heat, extreme cold can be just as problematic and deadly for a jurisdiction that encounters this hazard. Extreme cold conditions typically accompany winter storm events but may occur on beautiful, sunny days as well. Exposure to cold can cause frostbite or hypothermia and become life-threatening. Infants and elderly people are most susceptible.

The term wind chill, much like the term heat index is not the actual temperature but rather how wind and cold feel on exposed skin. As the wind increases, heat is carried away from the body at an accelerated rate, driving down the body temperature.

What constitutes extreme cold varies in different parts of the country. In the southern United States, near freezing temperatures are considered extreme cold. Freezing temperatures can cause severe damage to citrus fruit crops and other vegetation. Pipes may freeze and burst in homes that are poorly insulated or without heat. Most people judge extreme cold by the problems it causes rather than just by a temperature or a wind chill factor. In the northern areas of the country, extreme cold means temperatures well below zero.

Extreme cold events are typically associated with the winter months while extreme heat is associated with the summer months. Please see the chart below depicting the seasonal differences in extreme heat and extreme cold.



Source: NOAA

The speed of onset of extreme temperatures, both hot and cold, is fairly slow and predictable from short and long term weather forecasts. The scale of measurement for this hazard is temperature and departure from normal temperature.

Public information campaigns are designed to remind citizens to hydrate and avoid direct exposure to the elements during the time of temperature extremes. Typical medical problems caused by extreme temperatures include the following:

- Heatstroke is a life threatening condition that requires immediate medical attention. It exists when the body's core temperature rises above 105 degrees F as a result of environmental temperatures. Patients may be delirious, stuporous, or comatose. The death-to-care ratio in reported cases in the U.S. averages about 15%.
- Heat exhaustion is much less severe than heatstroke. The body temperature may be normal or slightly elevated. A person suffering from heat exhaustion may complain of dizziness, weakness, or fatigue. The primary cause of heat exhaustion is fluid and electrolyte imbalance. The normalization of fluids will typically alleviate the situation.
- Heat syncope is typically associated with exercise by people who are not acclimated to exercise. The symptom is a sudden loss of consciousness. Consciousness returns promptly when the person lies down. The cause is primarily associated with circulatory instability because of heat. The condition typically causes little or no harm to the individual.
- Heat cramps are typically a problem for individuals who exercise outdoors but are unaccustomed to heat. Similar to heat exhaustion,

it is thought to be a result of a mild imbalance of fluids and electrolytes.

- Frostbite is one of the many problems caused by exposure to extreme cold. It is damage to body tissue caused by extreme cold. A wind chill of -20 degrees Fahrenheit (F) will cause frostbite in just 30 minutes. Frostbite causes a loss of feeling and a white or pale appearance in extremities, such as fingers, toes, ear lobes or the tip of the nose.
- Hypothermia is a condition brought on when the body temperature drops to less than 95 degrees Fahrenheit (F). Hypothermia is deadly and for those who survive, there are likely to be lasting kidney, liver and pancreas problems. Warning signs include uncontrollable shivering, memory loss, disorientation, incoherence, slurred speech, drowsiness and apparent exhaustion. Immediate critical care is essential to save the victim's life.

Shelby County typically experiences 2 to 3 extreme temperature events per year (2010 to present). As illustrated on August 1st, 2010, heat index measurements can exceed 115 degrees, which led to 7 deaths and 1 injury.

Extreme Temperature in Shelby County: January 2000–Present

Jurisdiction	Date	Type	Deaths	Injuries	Property Damage
SHELBY (ZONE)	12/16/2000	Extreme Cold/wind Chill	1	0	0.00K
SHELBY (ZONE)	1/2/2010	Cold/wind Chill	3	0	0.00K
SHELBY (ZONE)	8/1/2010	Excessive Heat	7	1	0.00K
SHELBY (ZONE)	8/10/2010	Excessive Heat	4	0	0.00K
SHELBY (ZONE)	8/21/2010	Excessive Heat	0	0	0.00K
SHELBY (ZONE)	12/13/2010	Cold/wind Chill	0	0	0.00K
SHELBY (ZONE)	7/10/2011	Excessive Heat	1	0	0.00K
SHELBY (ZONE)	8/3/2011	Excessive Heat	1	0	0.00K
SHELBY (ZONE)	8/7/2011	Excessive Heat	2	0	0.00K
SHELBY (ZONE)	7/19/2012	Excessive Heat	0	0	0.00K
SHELBY (ZONE)	2/17/2015	Cold/wind Chill	3	0	0.00K
SHELBY (ZONE)	7/28/2015	Excessive Heat	2	0	0.00K
SHELBY (ZONE)	6/16/2016	Excessive Heat	0	0	0.00K
SHELBY (ZONE)	7/22/2016	Excessive Heat	0	0	0.00K
SHELBY (ZONE)	8/4/2016	Excessive Heat	0	0	0.00K
SHELBY (ZONE)	8/5/2016	Excessive Heat	1	0	0.00K
SHELBY (ZONE)	7/21/2017	Excessive Heat	0	0	0.00K
SHELBY (ZONE)	7/26/2017	Excessive Heat	0	0	0.00K
SHELBY (ZONE)	7/20/2018	Excessive Heat	0	0	0.00K
SHELBY (ZONE)	7/17/2019	Excessive Heat	0	0	0.00K
SHELBY (ZONE)	8/12/2019	Excessive Heat	0	0	0.00K

Extreme Temperatures

Jurisdiction/Applicant	Impacts			Vulnerability <i>H+P+B=#; #/3=V</i>
	<i>Human</i>	<i>Property</i>	<i>Business</i>	
Shelby County	4	2	2	2.7
Memphis	4	3	1	2.7
Arlington	2	1	1	1.3
Bartlett	4	1	1	2.0
Collierville	4	3	2	3.0
Germantown	1	5	2	2.7
Lakeland	3	3	1	2.3
Millington	2	1	1	1.3
Arlington Community Schools	1	1	1	1.0
Bartlett City Schools	1	2	1	1.3
Collierville Schools	2	2	1	1.7
Lakeland School System	3	3	1	2.3
Millington Municipal Schools	2	1	1	1.3
Shelby County Schools	4	4	2	3.3

Jurisdiction / Applicant	Vulnerability	Probability	Risk $V+P=R$	
Shelby County	2.7	5	7.7	High
Memphis	2.7	5	7.7	High
Arlington	2.3	1	3.3	Low
Bartlett	2.0	5	7.0	High
Collierville	3.0	4	7.0	High
Germantown	2.7	2	4.7	Moderate
Lakeland	2.3	4	6.3	Medium
Millington	1.3	5	6.3	Medium
Arlington Community Schools	1.0	1	2.0	Low
Bartlett City Schools	1.3	1	2.3	Low
Collierville Schools	1.7	4	5.7	Medium
Lakeland School System	2.3	4	6.3	Medium
Millington Municipal Schools	1.3	5	6.3	Medium
Shelby County Schools	3.3	3	6.3	Medium
			Risk	
			Low	2-3.6
			Moderate	3.7-5.2
			Medium	5.3-6.8
			High	6.9-8.4
			Severe	8.5-10

Human	
<i>Risk of Injuries and Death from the Hazard</i>	
1	Death very unlikely, injuries are unlikely
2	Death unlikely, injuries are minimal
3	Death unlikely, injuries may be substantial
4	Death possible, injuries may be substantial
5	Deaths probable, injuries will likely be substantial

Property	
<i>Amount of Residential Property Damage Associated from Hazard</i>	
1	Less than \$500 in damages
2	\$500-\$10,000 in damages
3	\$10,000-\$500,000 in damages
4	\$500,000-\$2,000,000 in damages
5	More than \$2,000,000 in damages

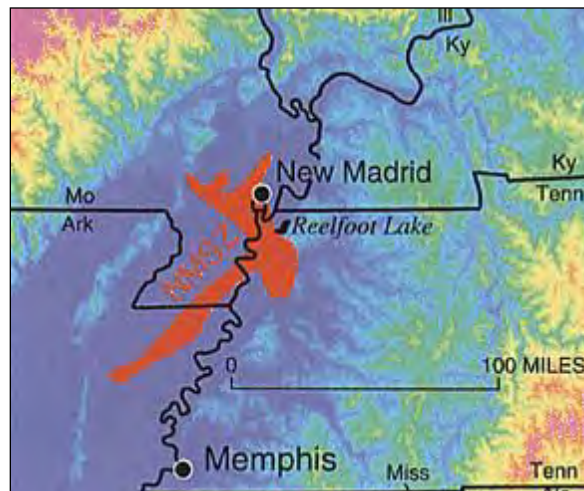
Business	
<i>Amount of Business Damage Associated from the Hazard</i>	
1	Less than 3 businesses closed for only a day
2	More than 3 businesses closed for a week
3	More than 3 businesses closed for a few months
4	More than 3 businesses closed indefinitely or relocated
5	A top-10 local employer closed indefinitely

Probability	
<i>Amount of Residential Property Damage Associated from Hazard</i>	
1	Less than once every 10 years
2	About once every 5-10 years
3	About once every 2-5 years
4	About once a year
5	More than once a year

Earthquakes

Shelby County is in close proximity to the major intraplate (within a tectonic plate) seismic zone known as the New Madrid Seismic Zone. The New Madrid Seismic Zone (NMSZ) is an approximately 120-mile long fault system that stretches across five states including Western Tennessee.

New Madrid Seismic Zone



Historically, the zone is known for producing four of the largest North American earthquakes in recorded history, all in which would have had been felt in Shelby County. This includes the noted three-month period between December 1811 and February 1812 that had quakes reaching

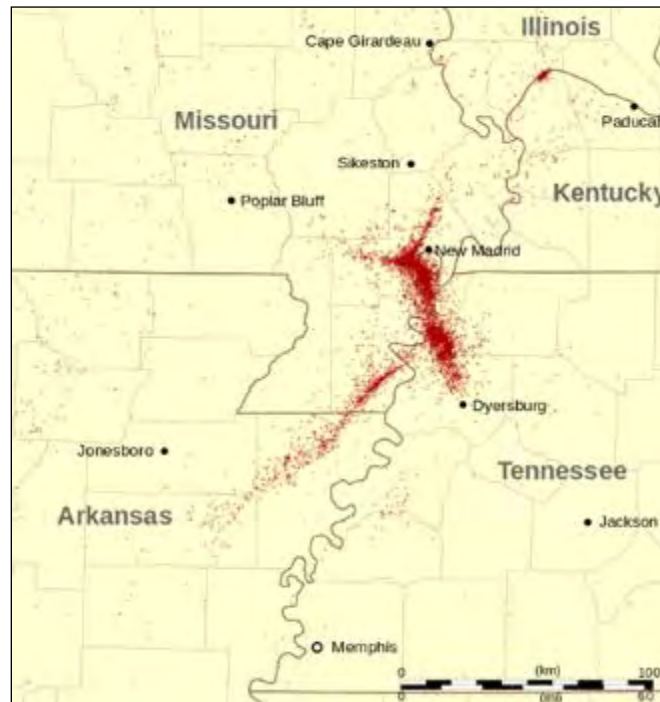
Richter Scale magnitudes into the 7.0 through 7.6 ranges, which created Reelfoot Lake in Lake County, Tennessee.

Richter Scale for Earthquakes		
Magnitudes	Description	Typical Impacts
< 2.0	Micro	Not felt.
2.0-2.9	Slight	Generally not felt, but recorded.
3.0-3.9	Minor	Often felt, but rarely causes damage.
4.0-4.9	Light	Noticeable shaking of indoor items, rattling noises. Significant damage likely.
5.0-5.9	Moderate	Can cause major damage to poorly constructed building over small regions. At most slight damage to well-designed buildings.
6.0-6.9	Strong	Can be destructive in areas up to about 100 miles across populated areas.
7.0-7.9	Major	Can cause serious damage over larger areas.
8.0-8.9	Great	Can cause serious damage in areas several hundred miles across.
9.0-9.9	Epic	Devastating in areas several thousand miles across.

Source: USGS

Since the 1812 earthquakes, the largest recorded quakes from this zone were the October 1895, 6.6 magnitude quake (epicenter Charleston, MO) and the November 1968, 5.5 magnitude quake (epicenter in Dale, IL). From the time when seismic measurement instruments were installed in and around the zone in the 1970's, more than 4,000 small earthquakes have been recorded, with the vast majority being too small to be felt.

NMSZ Earthquakes Recorded Since 1974

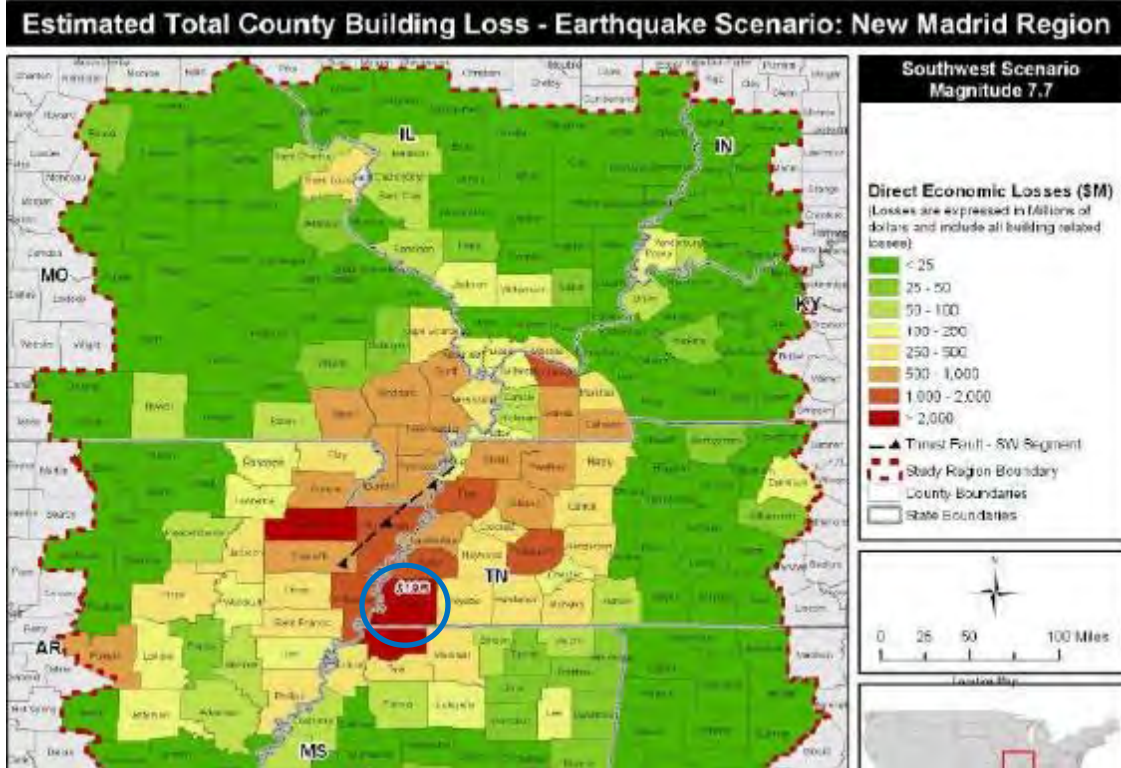


Source: USGS

According to a FEMA report filed in 2008, a serious earthquake in the NMSZ could result in the highest economic loss due to a natural disaster in U.S. history, causing widespread and catastrophic damage across a

seven-state radius with most of the worst impacts taking place in Western Tennessee (includes Shelby County). Based on this report, a 7.7 magnitude quake in the NMSZ would result in thousands of fatalities, hundreds-of-millions of dollars in damages to structures, and total disruption of vital infrastructure in Western Tennessee.

Estimated Building Losses – Catastrophic Earthquake Scenario



Source: USGS

Shelby County sits in what FEMA/TEMA considers the 20-county New Madrid Impact Zone. Statistical earthquake vulnerability studies from FEMA show that out of these 20 counties that Shelby County will receive moderate to severe impacts because of its close proximity to the NMSZ. As indicated in the above map, building damage will exceed \$2 billion in a catastrophic earthquake event.

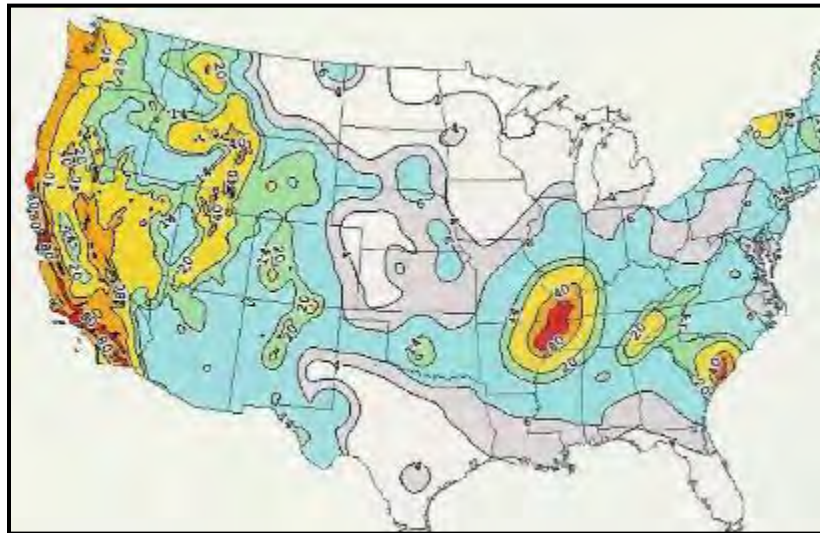
Furthermore, according to the 2007 Mid-American Earthquake (MAE) Center Study, Shelby County will experience the following in a catastrophic earthquake scenario:

- 2,225 fatalities
- 34,605 casualties
- 161,189 displaced residents, of which 45,466 will require shelter
- >14,310 thousand tons of debris
- >84% of households without power on day 1

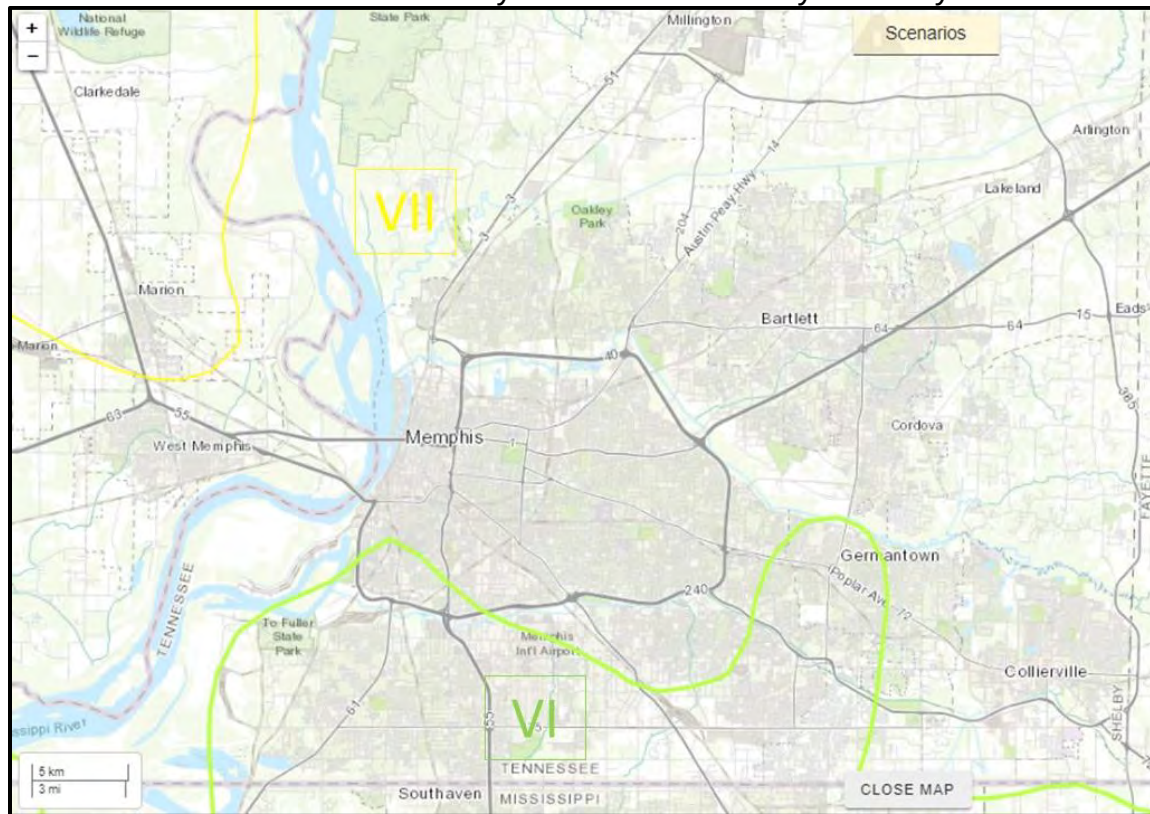
- >131,000 residences with moderate or greater damage
- >42,900 residences completely destroyed
- <1% police station functionality on day 1
- <1% fire station functionality on day 1
- 4.4% hospital functionality on day 1
- <1% school functionality on day 1
- >94% of households without potable water
- 45% communications functionality on day 1
- >24% of bridges with moderate or greater damage

Throughout the county many buildings and the majority of infrastructure networks could be vulnerable to earthquake impacts. Shelby County's building stock can be broken down into the following percentage categories: 74% residential, 18% commercial, 4% industrial, <1% agricultural, 2% religious, <1% governmental, and 1% educational. Throughout the county all buildings and infrastructure are vulnerable to earthquake impacts.

National Seismic Hazard Map
Ground Motions with a 2 % Chance of Occurring in 50 Years



Mercali Intensity Zones In Shelby County



Source: USGS

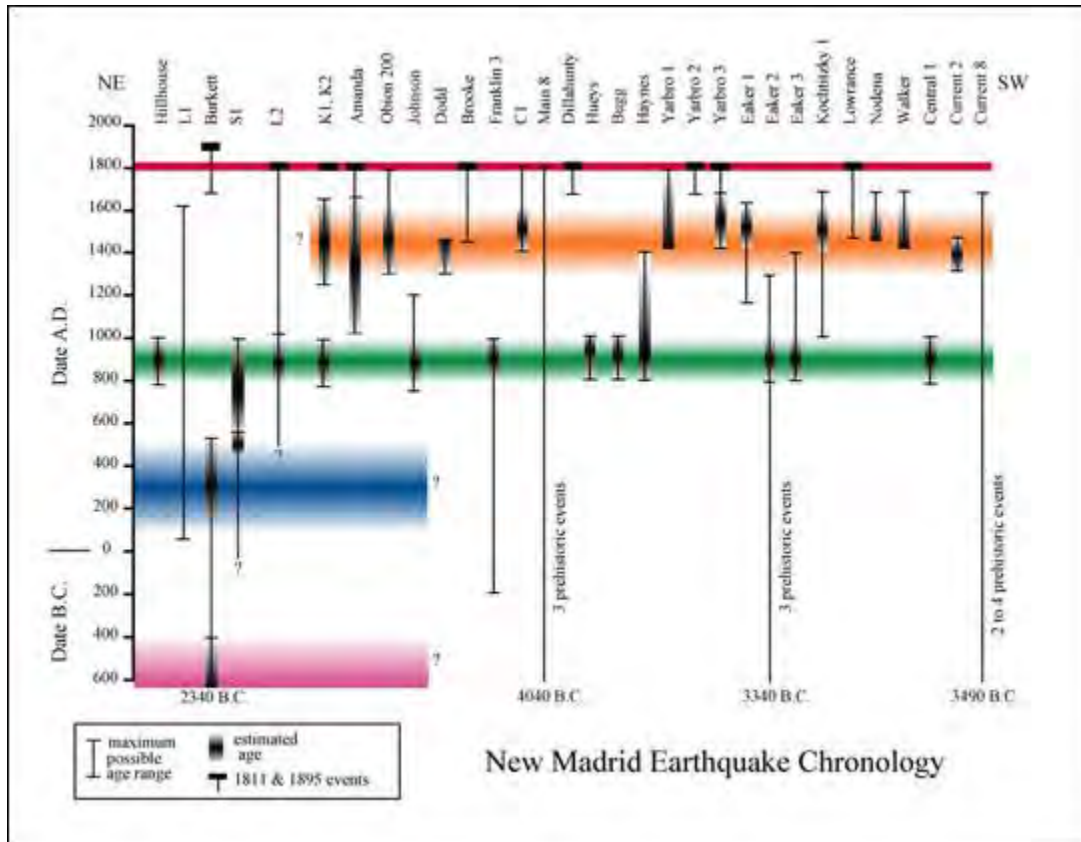
As indicated in the above maps, all of Shelby County's jurisdictions and districts sit within intensity zones VII (very strong) to VI (strong) of the Modified Mercali Intensity Scale due to its proximity to the New Madrid Seismic Zone.

The following is an abbreviated description of the levels of Modified Mercalli intensity.

Intensity	Shaking	Description/Damage
I	Not felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone, many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all; many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted on foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

The current lack of apparent land movement along the NMSZ has long puzzled scientists. Currently, GPS measurements show that the NMSZ faults are moving no more than 0.0079 inches a year. In contrast the San Andreas Fault in California moves up to 1.5 inches a year. This has led some researchers to believe that the fault may be “shutting down” while others say it is a “sleeping giant.” These differing views have made it difficult for public policy makers to decide on if, how, and how much to prepare for and spend on mitigating a potential large-scale earthquake.

New Madrid Seismic Zone Earthquake Liquefaction Chronology



Source: USGS

Over the past decade, paleoseismic studies have begun to unravel the earthquake history of the New Madrid seismic zone. Studies focusing on earthquake-induced liquefaction features utilized archaeology and radiocarbon dating to estimate the ages of liquefaction features, and thus, the timing of the earthquakes that caused them. In this way, sand blows across the New Madrid region were found to have formed during earthquakes about 1450 A.D., 900 A.D., 300 A.D., and 2350 B.C.

In addition, the size and spatial distributions of historic and sand blows that formed about 1450 A.D. and 900 A.D. were determined to be strikingly similar to each other, suggesting that the prehistoric earthquakes had similar locations and magnitudes to the 1811-1812 earthquakes. Furthermore, sand blows attributed to the 1450 A.D., 900 A.D., and 2350 B.C. earthquakes are composed of multiple, fining upward layers similar in thickness to those that formed in 1811-1812. These observations support the interpretation that the prehistoric events were similar in location and magnitude to the 1811-1812 earthquakes, and also suggest that they too were earthquake sequences. Paleoseismic studies

concluded that the New Madrid seismic zone generated magnitude 7 to 8 earthquakes about every 500 years during the past 1,200 years.

Shelby County uses a ranking system to determine each jurisdiction's vulnerability to a large NMSZ earthquake. This system is based off simple arithmetic which analyzes potential impacts to determine vulnerabilities and then analyzes the probability of an earthquake event occurring to calculate a risk ranking for each jurisdiction.

Earthquake

Jurisdiction / Applicant	Impacts			Vulnerability <i>H+P+B=#; #/3=V</i>
	<i>Human</i>	<i>Property</i>	<i>Business</i>	
Shelby County	5	4	4	4.3
Memphis	5	5	3	4.3
Arlington	3	3	3	3.0
Bartlett	5	5	3	4.3
Collierville	5	5	4	4.7
Germantown	5	5	4	4.7
Lakeland	4	5	2	3.7
Millington	5	3	3	3.7
Arlington Community Schools	4	4	4	4.0
Bartlett City Schools	4	4	3	3.7
Collierville Schools	2	2	1	1.7
Lakeland School System	4	5	2	3.7
Millington Municipal Schools	5	5	3	4.3
Shelby County Schools	4	5	4	4.3

Jurisdiction / Applicant	Vulnerability	Probability	Risk $V+P=R$	
Shelby County	4.3	1	5.3	Medium
Memphis	4.3	2	6.3	Medium
Arlington	3.0	1	4.0	Moderate
Bartlett	4.3	1	5.3	Medium
Collierville	4.7	1	5.7	Medium
Germantown	4.7	1	5.7	Medium
Lakeland	3.7	1	4.7	Moderate
Millington	3.7	1	4.7	Moderate
Arlington Community Schools	4.0	1	5.0	Moderate
Bartlett City Schools	3.7	1	4.7	Moderate
Collierville Schools	1.7	2	3.7	Moderate
Lakeland School System	3.7	1	4.7	Moderate
Millington Municipal Schools	4.3	1	5.3	Medium
Shelby County Schools	4.3	2	6.3	Medium
			Risk	
			Low	2-3.6
			Moderate	3.7-5.2
			Medium	5.3-6.8
			High	6.9-8.4
			Severe	8.5-10

Human	
<i>Risk of Injuries and Death from the Hazard</i>	
1	Death very unlikely, injuries are unlikely
2	Death unlikely, injuries are minimal
3	Death unlikely, injuries may be substantial
4	Death possible, injuries may be substantial
5	Deaths probable, injuries will likely be substantial

Property	
<i>Amount of Residential Property Damage Associated from Hazard</i>	
1	Less than \$500 in damages
2	\$500-\$10,000 in damages
3	\$10,000-\$500,000 in damages
4	\$500,000-\$2,000,000 in damages
5	More than \$2,000,000 in damages

Business	
<i>Amount of Business Damage Associated from the Hazard</i>	
1	Less than 3 businesses closed for only a day
2	More than 3 businesses closed for a week
3	More than 3 businesses closed for a few months
4	More than 3 businesses closed indefinitely or relocated
5	A top-10 local employer closed indefinitely

Probability	
<i>Amount of Residential Property Damage Associated from Hazard</i>	
1	Less than once every 10 years
2	About once every 5-10 years
3	About once every 2-5 years
4	About once a year
5	More than once a year

Shelby County Declared Disasters 2011 – 2020

Year	Disaster Recovery Number(s)	Hazard(s)
2011	DR-1974-TN	Tennessee Severe Storms, Tornadoes, Straight-line Winds, And Associated Flooding
	DR-1978-TN	Tennessee Severe Storms, Flooding, Tornadoes, And Straight-line Winds
	DR-1979-TN	Tennessee Severe Storms, Tornadoes, Straight-line Winds, And Flooding
	EM-3321-TN	Tennessee Flooding
2012		
2013		
2014	DR-4171-TN	Severe Winter Storm
2015		
2016		
2017	DR-4320-TN	Tennessee Severe Storms, Straight-line Winds, And Flooding
2018		
2019		
2020	DR-4514-TN	Pandemic

Section 4: Mitigation Strategy

Mitigation Goals

The purpose for developing a set of goals is to clearly state the community's overall vision for hazard mitigation and to provide a path towards building a safer, more resilient community. The Shelby County Hazard Mitigation Committee identified the following goals to be the forefront in the overall development of this plan update. All actions/projects recommended as mitigation efforts for the Hazard Mitigation Plan must first meet or further at least one of these goals. The goals are provided in a ranked order where the first goal is paramount. There have been no changes to the goals and priorities from the previous plan.

Mitigation Goals

Goal 1: Protect the lives and health of citizens from the effects of natural and man-made hazards.

Goal 2: Minimize future loss from all hazardous incidents by reducing the vulnerability of public and private property.

Goal 3: Encourage public and commitment to hazard mitigation, by communication mitigation benefits.

Goal 4: Strive to protect business and industry by reducing their economic vulnerability.

Goal 5: Acquire vulnerable properties to prevent future losses.

Identification and Prioritization of Mitigation Projects

Shelby County has developed a comprehensive range of mitigation projects. These projects were solicited and identified by the different entities that make up the Shelby County Hazard Mitigation Committee. Once the proposed projects attained a sponsoring agency and the details of the projects were discussed by the committee, the committee then proceeded to prioritize the mitigation projects.

The prioritization process was important since most mitigation projects represent a large investment of financial and personal resources. By evaluating each project's degree of feasibility and the level of costs versus

benefits, Shelby County was able to determine when and which projects should be implemented based on available funding and time.

For the plan update, the Shelby County Hazard Mitigation Committee used the SAFE-T method to prioritize these projects. This approach was adopted from the successful methodology used by other counties in FEMA Region 4. This rating system uses five variables to evaluate the overall feasibility and appropriateness: Societal, Addministrative, Financial, Environmental, and Technical. A focus on this methodology emphasizes the use of a cost-benefit review to maximize benefits.

Project Prioritization Method: SAFE-T			
Variable		Value	Description
S	Societal: The public must support the overall implementation strategy and specified mitigation actions. The projects will be evaluated in terms of community acceptance and societal	1	Low community priority, few societal benefits
		2	Moderate community acceptance / priority
		3	High community acceptance / priority
A	Administrative: The projects will be evaluated for anticipated staffing and maintenance requirements to determine if the jurisdiction has the personnel and administrative capabilities necessary to implement the project or whether outside help will be needed.	1	High staffing, outside needed
		2	Some staffing, help may be needed
		3	Low staffing, no outside help needed
F	Financial: The projects will be evaluated on their general cost-effectiveness and whether additional outside funding will be required	1	Somewhat cost-effective
		2	Moderately cost-effective
		3	Very cost-effective
E	Environmental: The projects will be evaluated for any immediate or long-term environmental impacts caused by their construction or operation	1	Many environmental impacts, possibly long term
		2	Some environmental impacts, some possibly long term
		3	Few, if any, environmental impacts
T	Technical: the projects will be evaluated on their ability to reduce losses in the long-term, whether there are secondary impacts, and whether the proposed project solves the associated problem or if additional components are necessary.	1	Other actions are needed or short-term fix
		2	Other actions may be needed for long-term fix
		3	Other actions not needed, long-term fix

Committee members ranked the projects as a group by determining the value for each variable and then by adding the variables rates up for a project sum value. All the project rankings can be seen on the Shelby County Hazard Mitigation Project List.

Shelby County Project List

The following Project List provides an overview of all projects decided on by the Shelby County Hazard Mitigation Committee. This includes potential funding sources, implementation timeframes, the project's responsible agency, and other information. This list is to remain active

and updated. Additionally, any hazard determined to be “low” by a jurisdiction was determined by the committee to not necessitate a corresponding project.

Shelby County Project List

Shelby County																
Project Number	Priority Score	Jurisdiction Priority Rank (High, Medium, Low)	Action /Project	Hazard Mitigated				Addresses New or Existing Buildings/ Infrastructure	Estimated Cost	Responsible Agency	Funding Sources				Population Affected	Timeframe
				Flood	Severe Storm	Extreme Temperature	Earthquake				HMGP	BRIC	FMA	Local		
SC1	15	H	Automate Circuits to modernize the grid and reduce outage time	X	X	X	X	Both	\$15,000,000	MLGW		X	X	X	50,000	1-4 Years
SC2	15	H	Leak Mitigation due to Seismic Shifts- Cast Iron				X	Existing	\$3,000,000	MLGW		X		X	24,300	1 Years
SC3	15	H	Increased monitoring and reaction time using Supervisory Control and Data Acquisition (SCADA) Communication of Gas System & Regulator Stations	X	X	X	X	Existing	\$1,125,000	MLGW		X	X	X	937,200	5 Years

SC4	15	L	Seismic Hazard Mitigation to Regulator & Gate Stations				X	Existing	\$300,000	MLGW		X		X	937,200	5 Years
SC5	15	H	Seismic Mitigation of Transmission Line				X	New & Existing	\$13,500,000	MLGW		X		X	937,200	10 Years
SC6	15	H	Seismic Mitigation of Service Taps				X	Existing	\$21,500,000	MLGW		X		X	937,200	5 Years
SC7	15	H	Convert all External Sirens to Solar Power Source	X	X			Existing	\$100,000	Shelby County Government	X	X	X	X	900,000	2 years
SC8	15	H	Property Protection Regulation - Perform comprehensive review of subdivision regulations and developer fee structure to discourage/provide incentive for development that increases/decreases storm water runoff and flooding potential	x				New	\$300,000	Shelby County Government	x	x			10,000	3 years
SC9	15	H	Education and Training - Develop and distribute educational materials to high risk residents, as well as, conduct informational meetings	x	x	x	x	Both	\$15,000	Shelby County Government	x	x			100,000	1 year

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SC10	14	M	Flood Mitigation for Below grade Regulator stations	X				Existing	\$3,000,000	MLGW		X	X	X	937,200	10 Years
SC11	14	L	Seismic Mitigation of Pipe on Bridges				X	Existing	\$5,000,000	MLGW		X		X	937,200	10 Years
SC12	14	H	Hardening of Distribution System in High Risk Neighborhoods - Glenview	X	X	X	X	Existing	\$8,333,333	MLGW		X	X	X	2,929	4 Years
SC13	14	H	Hardening of Distribution System in High Risk Neighborhoods - Orange Mound	X	X	X	X	Existing	\$8,333,333	MLGW		X	X	X	14,586	4 Years
SC14	14	H	Hardening of Distribution System in High Risk Neighborhoods - Whitehaven	X	X	X	X	Existing	\$8,333,333	MLGW		X	X	X	36,998	4 Years
SC15	14	H	Community Safe Rooms	X	X	X		New	\$2,000,000	Shelby County Government					200,000	2 years
SC16	14	H	Raise and Seal Sewer Manholes - Elevate and flood proof sewer manholes that are located in low lying flood plains and ditches	x				Existing	\$250,000	Shelby County Government	x	x			100,000	1 year
SC17	14	H	Advance Acquisition and Land Banking - Purchase and reserve properties within the	x				Both	\$1,000,000	Shelby County Government	x	x			100,000	2 years

Section 4: Mitigation Strategy

			Floodway and other developable land that would impact downstream development													
SC18	14	H	Flood Protection - Flood proof high-risk and repeat structures	x				Existing	\$1,000,000	Shelby County Government	x	x			100,000	2 years
SC19	13	H	Interstate Streetlight Retrofit	X	X	X	X	Both	\$3,500,000	MLGW		X	X	X	1,000,000	5 Years
SC20	13	H	Dams and Reservoirs - Purchase agricultural and vacant properties in flood zones and construct levees to store flood waters	x				Existing	\$300,000	Shelby County Government	x	x	x		10,000	2-3 Years
SC21	12	M	Backup Emergency Power Generation Projects (New and Upgrades) for Water Pumping/Treatment Facilities		X		X	Existing	\$5,000,000	MLGW		X		x	775,000	2-5 Years
SC22	12	M	Improve Reliability and Capacity of Water Supply in North Shelby County		X		X	New	\$75,000,000	MLGW		X		X	125,750	5-10 Years
SC23	12	H	Install New Water Wells to Increase Raw Water Availability to Pumping Stations		X		X	Existing	\$50,000,000	MLGW		X		X	775,000	2-10 Years

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SC24	12	H	Water Station Control System Upgrades		X		X	Existing	\$10,000,000	MLGW		X		X	775,000	2-10 Years
SC25	12	H	Upgraded Seismic performance level for new building to replace the current Transformer, Fabrication Shops and the Heavy Equipment Repair Facility				X	New	\$1,350,000	MLGW, Facilities Dept.		X		X	450,000	1-5 Years
SC26	12	M	Seismic Retrofit of non-structural components for an existing building to house the Builder Services Department and all existing Electric, Gas and Water Meter Shops.				X	Existing	\$150,000	MLGW, Facilities Dept.		X		X	200,000	1-5 Years
SC27	12	H	Seismic Retrofit of Non-structural elements - South Service Center				X	Existing	\$150,000	MLGW, Facilities Dept.		X		X	200,000	1-5 Years
SC28	12	H	Seismic Retrofit of Non-structural elements - Brunswick Service Centers				X	Existing	\$150,000	MLGW, Facilities Dept.		X		X	200,000	1-5 Years
SC29	12	H	Seismic Retrofit of Non-structural elements - Hickory Hill Service Center				X	Existing	\$150,000	MLGW, Facilities Dept.		X		X	200,000	1-5 Years
SC30	12	H	Seismic Retrofit of Non-structural elements - North Services Center				X	Existing	\$150,000	MLGW, Facilities Dept.		X		X	500,000	1-5 Years

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SC31	12	H	Seismic Retrofit of Non-structural elements - Electric & System operations				X	Existing	\$150,000	MLGW, Facilities Dept.		X		X	200,000	1-5 Years
SC32	12	H	Seismic Retrofit of Non-structural elements - Administration Building				X	Existing	\$150,000	MLGW, Facilities Dept.		X		X	200,000	1-5 Years
SC33	12	H	Seismic Mitigation at LNG Plant				X	Existing	\$120,000	MLGW		X		X	937,200	10 Years
SC34	12	H	Earthquake vulnerability assessment for Shelby County buildings and critical elements of infrastructure				x	Both	\$275,000	University of Memphis Center for Earthquake Research and Information (CERI)	x	x			900,000	2-3 Years
SC35	12	H	Raise Roadbed Elevations - Elevate roadways that frequently are crossed by flood waters.	x				Existing	\$4,000,000	Shelby County Government	x	x			100,000	3 year
SC36	12	H	Stream Restoration - Purchase property and redirect channelized streams to restore them with USCOE projects meandering and flood stage protection	x				Both	\$1,000,000	Shelby County Government	x	x			100,000	2 years
SC37	12	H	Storm Drain System Management - Clean culverts and remove debris from the storm	x				Existing	\$300,000	Shelby County Government	x	x			100,000	3 years

			water collection system													
SC38	12	H	Streambank Protection - Install weirs inside channels to prevent future bank erosion and scour from head-cutting	x				Both	\$1,000,000	Shelby County Government	x	x			100,000	2 years
SC39	12	H	Porous Pavement - Design and install porous pavement systems for County buildings and projects	x				Existing	\$1,000,000	Shelby County Government	x	x			100,000	2 years
SC40	12	H	Storm Water Basin - Design and install a regional storm water detention basin	x				Both	\$1,000,000	Shelby County Government	x	x			100,000	2 years
SC41	12	H	Mapping Hazards - Produce highly accurate storm drainage system information	x				Both	\$500,000	Shelby County Government	x	x			100,000	2 years
SC42	12	H	Mapping Hazards - Identify and graph areas with high liquefaction/damage potential				x	Both	\$500,000	Shelby County Government	x	x			100,000	2 years
SC43	12	M	Small Business Audits - Perform structural inspections of heavy impact/high risk businesses in Shelby County	x	x		x	New	\$20,000	Shelby County Government	x	x			100,000	1 year

SC44	12	New	Big Creek Basin Stabilization	x				Existing		Shelby County Government	x	x				2 years
SC45	12	M	Traffic Lights/Traffic Control	x	x	x	x	Both	\$300,000	Shelby County Government	x	x			500,000	2 years
SC46	12	M	Community Awareness Program	x	x	x	x	Both	\$100,000	Shelby County Government	x	x			1,000,000	1 year
SC47	12	New	Stationary Generators	x	x	x	x	Existing		Shelby County Government	x	x				
SC48	12	H	Tree Limb Removal Program		x			Existing	\$300,000	Shelby County Government	x	x			50,000	1 year
SC49	12	H	Seismic Retrofit Bridges - Upgrade at-risk structures				x	Both	\$2,500,000	Shelby County Government	x	x			800,000	2 years
SC50	12	H	Seismic Retrofit Fire station - Upgrade at-risk buildings and install emergency generators				x	Both	\$2,000,000	Shelby County Government	x	x			100,000	2 years
SC51	12	H	Emergency Portable Generator - Purchase an emergency portable generator to operate sewer lift stations during extended power outages	x	x			Both	\$20,000	Shelby County Government	x	x			100,000	1 year

SC52	12	H	Bonus and Incentive Zoning - Install a system allowing developers to exceed limitations of current regulations, such as density or building height, in return for specific concessions	x				New	\$20,000	Shelby County Government	x	x			100,000	1 year
SC53	12	H	Education and Training - Train code enforcement, law enforcement, disaster responders and citizens in earthquake response. Develop a community awareness program	x	x		x	Both	\$15,000	Shelby County Government	x	x			100,000	1 year
SC54	12	H	Home Inspection Program - Complete hazard susceptibility checklists to offer personalized vulnerability assessments	x	x		x	Existing	\$100,000	Shelby County Government	x	x			1,000,000	1 year
SC55	12	H	Community Awareness Program - Develop real estate disclosure information and educate homebuyers and the general public of hazard risks	x		x	x	Both	\$100,000	Shelby County Government	x	x			1,000,000	1 year
SC56	12	H	Education and Training - Generate awareness of hazards, mitigation steps and disaster response for	x	x	x	x	Both	\$100,000	Shelby County Government	x	x			1,000,000	1 year

			Shelby County employee													
SC57	12	H	Traffic Lights and other Traffic Controls - Protect traffic lights and other traffic controls. Install resilient street signs for navigation in an emergency	x	x	x	x	Both	\$300,000	Shelby County Government	x	x			500,000	2 years
SC58	12	H	Vegetation - Identify locations for and install dense vegetative strips or buffers or reestablishment of removed vegetation	x				Existing	\$100,000	Shelby County Government	x	x			1,000,000	1 year
SC59	12	H	Wind Proofing - Modify at-risk structures to be able to withstand high winds and tornados		x			Existing	\$300,000	Shelby County Government	x	x			500,000	2 years
SC60	12	H	Tie-Down Program - Mandate and retrofit propane tank tie-downs and mobile homes		x			Both	\$100,000	Shelby County Government	x	x			1,000	2 years
SC61	12	H	Protect water supply - Install shut-off valves and emergency connector hoses where water meters connect		x		x	Existing	\$100,000	Shelby County Government	x	x			1,000,000	1 year

SC62	12	H	Utility Line Relocation - Bury electric, telephone and cable lines and/or reinforce the connections on existing utility lines		x			Both	\$3,000,000	Shelby County Government	x	x			50,000	3 years
SC63	12	H	Tree Limb Removal Program - Develop and enact project to clear tree limbs in the right-of-way and threatening utility lines	x	x			Existing	\$300,000	Shelby County Government	x	x			50,000	1 year
SC64	11	H	Variable Frequency Drive Motor & Transformer Upgrades. Include backup motor control and environmentally stable enclosures.		X	X	X	Existing	\$20,000,000	MLGW		X		X	775,000	2-5 Years
SC65	11	H	Sheahan Wash Water Recovery Basin Upgrade				X	Existing	\$8,000,000	MLGW		X		X	650,000	4-7 Years
SC66	11	M	Seismic Upgrades to Water Facilities		X		X	Existing	\$30,000,000	MLGW		X		X	775,000	5-10 Years
SC67	11	H	Add/Upgrade Water Distribution Facilities for better seismic and storm resilience		X		X	Both	\$50,000,000	MLGW		X		X	775,000	2-15 Years
SC68	11	H	Add/Upgrade Water Production Facilities for better seismic and storm resilience		X		X	Both	\$70,000,000	MLGW		X		X	775,000	2-15 Years

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SC69	11	M	Upgrade/Repair Network Vaults	X	X	X	X	Both	\$2,500,000	MLGW		X	X	X	3,000	5 Years
SC70	11	M	Update/Replace Network Protectors	X	X	X	X	Both	\$6,500,000	MLGW		X	X	X	3,000	5 Years
SC71	11	H	Seismic retrofits distribution transformers and switch gear.				X	Existing	\$60,000,000	MLGW		X		X	937,200	Annual
SC72	11	H	Location 3- 6235 Haley Road	x	x	x		Existing	\$100,000	Shelby County Government	x	x	x	x	900,000	2 years
SC73	11	H	Location 4Election Commission 980 Nixon Drive	x	X	x	X	Existing	\$100,000	Shelby County Government	x	x	x	x	900,000	2 years
SC74	11	H	Big Creek CN Bridge Damn Blowout Mitigation	x			X	Existing	\$7,000,000	Shelby County Government		X	X	X	100,000	2 years
SC75	11	H	Damage Assessment Software	X	X	X	X	Existing	\$60,000	Shelby County Government	X	X	X	X	900,000	1 year
SC76	11	H	Mass Communication/ Notification System	X	X	X	X	New	\$1,000,000	Shelby County Government	X		X	X	900,000	2 years
SC77	11	H	Stream Restoration	x				Existing	\$1,000,000	Shelby County Government	x	x			100,000	2 years

SC78	11	H	Purchase Streambank Easements - Purchase easements on high flow at risk streambeds to allow the County the rights to clear and maintain debris which causes flooding	x				Both	\$1,000,000	Shelby County Government	x	x			100,000	2 years
SC79	11	H	Drainage system upgrade - Design and install larger or parallel drainage pipe in locations that bottleneck and cause upstream flooding	x				Both	\$150,000	Shelby County Government	x	x			100,000	5 years
SC80	11	H	Green Infrastructure - Install regional green infrastructure projects in locations with large flow generators or conveyances			x		Both	\$1,000,000	Shelby County Government	x	x			100,000	2 years
SC81	11	H	Community Safe Rooms - Build shelter areas at key locations throughout Shelby County to allow residents a place to go in freezing, high-heat and high-wind situations			x	x	Existing	\$3,000,000	Shelby County Government	x	x			50,000	2 years
SC82	11	H	Dredge Behind Levee of Dam #5 - Remove siltation deposits to increase capacity and clear wooded area to improve flow	x				Both	\$500,000	Shelby County Government	x	x			50,000	1 year

SC83	10	H	Seismic retrofits of highly vulnerable electrical substation equipment and control buildings.				X	Existing	\$9,700,000	MLGW		X		X	937,166	Annual
SC84	10	H	Seismic retrofits of highly vulnerable electrical substation equipment and control buildings.				X	Existing	\$9,700,000	MLGW		X		X	937,200	Annual
SC85	10	M	Location 2-140 Adams Ave #106, Memphis, TN 38103	x	x	x		Existing	\$100,000	Shelby County Government	x	x	x	x	900,000	2 years
SC86	10	H	Widening of Big Creek Floodplain - Design and construct overflow floodplain areas for the Big Creek Drainage canal between Singleton Parkway and Highway 51	x				Both	\$50,000,000	Shelby County Government	x	x			50,000	3 years
SC87	9	M	Stationary Generators at critical infrastructure locations, tasked with performing essential functions	X	X	X	X	Existing	\$100,000	Shelby County Government	X	X	X	X	900,000	2 years
SC88	9	M	Location 1- Generator 584 Adams Ave, Memphis, TN 38103	x	x	x		Existing	\$100,000	Shelby County Government	x	x	x	x	900,000	2 years
SC89	9	M	Stationary Generators at critical infrastructure locations, tasked with performing essential	x	x	x		Existing	\$100,000.00	Shelby County Government	x	x	x	x	900,000	2 years

			functions Location 1-Generator 584 Adams Ave, Memphis, TN 38103													
SC90	10	M	Stationary Generators at critical infrastructure locations, tasked with performing essential functions Location 2-140 Adams Ave #106, Memphis, TN 38103	x	x	x		Existing	\$100,000.00	Shelby County Government	x	x	x	x	900,000	2 years
SC91	11	H	Stationary Generators at critical infrastructure locations, tasked with performing essential functions Location 3-6235 Haley Road	x	x	x		Existing	100,000.00	Shelby County Government	x	x	x	x	900,000	2 years
SC92	11	H	Stationary Generators at critical infrastructure locations, tasked with performing essential functions Location 4Election Commission 980 Nixon Drive	x	X	x	X	Existing	100,000.00	Shelby County Government	x	x	x	x	900,000	2 years
SC93	11	H	Big Creek CN Bridge Damn Blowout Mitigation	x			X	Existing	7,000,000.00	Shelby County Government		X	X	X	100,000	2 years
SC94	15	H	Convert all External Sirens to Solar Power Source	X	X			Existing	100,000.00	Shelby County Government	X	X	X	X	900000	2 years

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SC95	14	H	Community Safe Rooms	X	X	X		New	2,000,000.00	Shelby County Government					200000	2 years
SC96	11	H	Damage Assessment Software	X	X	X	X	Existing	\$60,000	Shelby County Government	X	X	X	X	900000	1 year
SC97	11	H	Mass Communication/ Notification System	X	X	X	X	New	1,000,000	Shelby County Government	X		X		900000	2 years
SC98	13	H	Basin study of Long Creek area from East Holmes Road to Nonconnah Creek	X				Existing	250,000	Shelby County Government - Roads and Bridges	X	X	X	X	5000	1-2 years
SC99	13	H	North Shelby County- Loosehatchie River Basin	X				Existing	450,000	Shelby County Government - Public Works	X	X	X	X	50,000	1 year

Memphis																
Project Number	Priority Score	Jurisdiction Priority Rank (High, Medium, Low)	Action /Project	Hazard Mitigated				Addresses New or Existing Buildings/ Infrastructure	Estimated Cost	Responsible Agency	Funding Sources				Population Affected	Timeframe
				Flood	Severe Storm	Extreme Temperature	Earthquake				HMGP	BRIC	FMA	Local		
ME1	15	H	Stormwater Program Manager	x				New	\$20,000,000	City of Memphis	x	x	x	x	685,000	1-5 Years
ME2	15	H	Memphis Fire Stations Uninterruptible Power Supply		x		x	Existing	\$2,300,000	City of Memphis	x	x	x	x	685,000	1-5 Years
ME3	15	H	Revise emergency response routes incorporating bridges which have been replaced or retrofitted since the previous routes established in 1991	x	x		x	Both	\$5,000	City of Memphis	x	x			600,000	1-5 Years
Me4	14	H	Implementation of Stormwater Program Manager/Drainage Master Plan(s) Recommendation(s)	x				Both	\$20,000,000	City of Memphis	x	x	x	x	1,000,000	1-5 Years

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ME5	14	H	Acquisition and Demolition or Relocation of Flood Prone Structures	x				Existing	\$2,000,000	City of Memphis	x	x	x	x	2,000	1-5 Years
ME6	14	H	Outdoor Warning Siren Upgrade	x	x	x		Both	\$650,000	City of Memphis	x	x	x	x	1,000,000	3-5 Years
ME7	14	H	Designated shelter/ warming/ cooling center	x	x	x	x	Both	\$650,000	City of Memphis	x	x	x	x	685,000	2-4 Years
ME8	14	H	Mitigation Planning	x	x	x	x	Existing	\$650,000	City of Memphis	x	x	x	x	300,000	1-2 Years
ME9	14	H	Scour/Flood Prevention of Existing Bridges/Structures	x				Existing	\$10,000,000	City of Memphis	x	x	x	x	685,000	1-3 Years
ME10	14	H	Create New Hazmat Plan Reviewing All Projects For Cost/Benefit Analysis And Update Hazmat Plan		x		x	Existing	\$2,000,000	City of Memphis	x	x		x	1,200,000	1-5 Years
ME11	13	H	Develop Multijurisdictional Comprehensive Earthquake Hazard Management Plan				x	Existing	\$1,700,000	City of Memphis	x			x	1,000,000	1-3 Years
ME12	13	H	Flood Control Improvements utilizing local detention systems	x				Existing	\$2,000,000	City of Memphis	x	x	x	x	685,000	<1-3 Years

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ME13	13	H	Reduce or eliminate erosion due to flooding	x				Existing	\$750,00.00	City of Memphis	x	x	x	x	685,000	1-4 Years
ME14	13	M	Reflective Warning System(s)	x	x	x	x	New	\$2,000,000	City of Memphis	x	x	x	x	685,000	1-5 Years
ME15	13	L	Memphis Fire Stations 30 and 36 Structural Retrofits		x		x	Existing	\$1,500,000	City of Memphis	x	x	x	x	685,000	1-5 Years
ME16	13	H	Buyouts 2 Property Buyouts 2 Houses Contracted To Buyout (Honeybrook, Princeton)	x				Existing	\$500,000	City of Memphis	x	x	x		20	2 years
ME17	13	H	Bartlett Road and Shelby Oaks over Fletcher Creek, Construction Only	x				Existing	\$1,800,000	City of Memphis	x	x			90,000	1-5 Years
ME18	13	H	Apply For Buyout Program For 7 Units Along Barr Av. Nonconnah Floodplain	x				Existing	\$500,000	City of Memphis	x	x			50	1-5 Years
ME19	13	H	N Watkins Over N. Cypress Creek Scheduled To Be Replaced In Next 5-10 Years	x				Existing	\$1,000,000	City of Memphis	x	x			120,000	1-5 Years
ME20	12	H	Flood Control Rehabilitation and Improvements for local drainageway conveyance systems	x				Existing	\$2,500,000	City of Memphis	x	x	x	x	685,000	2-4 Years

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ME21	12	L	Increase Drain Maintenance Inspections	x	x			Existing	\$1,000,000	City of Memphis	x	x	x	x	685,000	1-5 Years
ME22	12	M	Major Flood Control Pumping Station(s) upgrade	x				Existing	\$500,000	City of Memphis	x	x	x	x	685,000	1-5 Years
ME23	12	L	Mississippi River Floodgate Upgrade	x			x	Existing	\$1,000,000	City of Memphis	x	x	x	x	1,000,000	1-5 Years
ME24	12	M	McKellar Lake Facilities	x				Existing	\$5,500,000	City of Memphis	x	x	x	x	685,000	1-5 Years
ME25	12	H	MFD- Public Safety (PS) Communications Center Resiliency Project		x		x	New	\$2,500,000	City of Memphis	x	x	x	x	685,000	1-5 Years
ME26	12	L	MFD- PS Maritime Division Operations Center Flood & Storm Precautions	x	x		x	Existing	\$1,900,000	City of Memphis	x	x	x	x	685,000	1-5 Years
ME27	12	M	Audubon Park basin	x				Existing	\$100,000	City of Memphis	x	x	x	x	20,000	2-4 Years
ME28	12	M	South Cypress Creek flood control	x				Existing	\$500,000	City of Memphis	x	x	x		25,000	2-4 Years
ME29	12	M	Black Bayou flood control	x				Existing	\$750,000	City of Memphis	x	x	x		35,000	2-4 Years

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ME30	12	M	Huling Basin flood control	x				Existing	\$5,000,000	City of Memphis	x	x	x		40,000	1-3 years
ME31	12	M	Fontaine Basin flood control	x				Existing	\$2,500,000	City of Memphis	x	x	x		45,000	1-3 years
ME32	12	M	Fletcher Creek Basin flood control	x				Existing	\$5,000,000	City of Memphis	x	x	x		90,000	0-2 years
ME33	12	M	Massey Basin flood control	x				Existing	\$1,500,000	City of Memphis	x	x			30,000	1-5 Years
ME34	12	M	Sophia Bayou flood control	x				Existing	\$1,000,000	City of Memphis	x	x			30,000	1-5 Years
ME35	12	M	Gayoso Bayou Basin flood control	x				Existing	\$300,000	City of Memphis	x	x			70,000	1-5 Years
ME36	12	M	White Station Basin flood control	x				Existing	\$5,000,000	City of Memphis	x	x			45,000	1-5 Years
ME37	12	H	Promote Public Awareness And Education Programs Focusing On The Ability To Plan And Respond To A Catastrophic Earthquake.				x	Both	\$7,500,000	City of Memphis	x	x			1,200,000	1-5 Years

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ME38	12	M	Royster Bayou Basin flood control	x				Existing	\$100,000	City of Memphis	x	x			20,000	1-5 Years
ME39	12	M	Quince Road flood control	x				Existing	\$120,000	City of Memphis	x	x			30,000	1-5 Years
ME40	12	M	Harrison Creek flood control	x				Existing	\$5,000,000	City of Memphis	x	x			45,000	1-5 Years
ME41	11	H	Seismic retro fit of City owned or operated buildings/structures/b ridges				x	Existing	\$20,000,000	City of Memphis	x	x	x	x	6,000	2-5 Years
ME42	11	L	Bellevue Solid Waste Transfer Facility				x	Existing	\$9,000,000	City of Memphis	x	x	x	x	325,000	1-5 Years
ME43	11	M	Memphis Fire Training Center and USAR Warehouse Flood Mitigation	x				Existing	\$3,000,000	City of Memphis	x	x	x	x	685,000	1-5 Years
ME44	11	H	Sam Cooper Bridges from Holmes Road to I-40, Design & Construction				x	Existing	\$800,000	City of Memphis	x	x			150,000	1-5 Years
ME45	11	H	Seismically Retrofit 3 Water Treatment Plants				x	Existing	\$2,000,000	City of Memphis	x	x			300,000	1-5 Years
ME46	11	L	Drainage Manual Revisions					Existing		City of Memphis	x	x			900,000	1-5 Years

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ME47	10	L	Drainage Manual Revisions	x				Existing	\$1,000,000	City of Memphis	x	x	x	x	685,000	1-5 Years
ME48	10	L	Re-establish Roadway surface for proper drainage conveyance	x				Existing	\$5,000,000	City of Memphis	x	x	x	x	685,000	1-5 Years
ME49	10	H	Memphis Area Transit Authority (MATA)				x	New	\$65,022,899	City of Memphis	x	x	x	x	1,000,000	1-5 Years
ME50	8	M	Multi-Purpose Facility (Coliseum)	x	x	x	x	Existing	\$500,000	City of Memphis	x	x	x	x	1,000,000	1-5 Years

Arlington																
Project Number	Priority Score	Jurisdiction Priority Rank (High, Medium, Low)	Action /Project	Hazard Mitigated				Addresses New or Existing Buildings/ Infrastructure	Estimated Cost	Responsible Agency	Funding Sources				Population Affected	Timeframe
				Flood	Severe Storm	Extreme Temperature	Earthquake				HMGP	BRIC	FMA	Local		
AR1	12	Low	Develop CERT Program	x	x	x	x	Both	\$2,500	Fire Chief				x	13,000	Annual
AR2	11	High	Drainage Improvements Quintard Street to Depot Square	x	x			Existing	\$80,000	Dir. Of Public Works	x	x	x	x	250 homes	2 yr
AR3	11	High	Drainage Improvements Walker Street to Depot Square	x	x			Existing	\$50,000	Dir. Of Public Works	x	x	x	x	250 homes	2 yr
AR4	11	High	Drainage Improvements Chester Street to Walker Street	x				Existing	\$45,000	Dir. Of Public Works	x	x	x	x	250 homes	2 yr
AR5	11	High	Drainage Improvements Campbell Street to Brown Street	x	x			Existing	\$100,000	Dir. Of Public Works	x	x	x	x	250 homes	2 yr

AR6	11	Moderate	Equipment for Right of Way cleaning; Gradall	x	x		x	Both	\$265,000	Dir. Of Public Works	x	x		x	13,000	10 yr
AR7	11	High	Increase culvert Size on Highway 70. Possible State project	x				Existing	\$240,000	Dir. Of Public Works	x	x	x	x	250 homes	2 yr
AR8	11	High	Drainage Improvement on Airline Road near Otto Lane. Provide regional draining structure	x	x			Existing	\$30,000	Dir. Of Public Works	x	x	x	x	250 homes	2 yr
AR9	11	High	Drainage Improvements west of Airline Road in the Industrial Park	x	x			Existing	\$3,000,000	Dir. Of Public Works	x	x	x	x	250 homes	2 yr
AR10	10	Moderate	Provide increase in water service to Mary Alice subdivision		x		x	Existing	\$180,000	Dir. Of Public Works	x	x	x	x	25 homes	2 yr
AR11	9	High	Retrofit Town Hall for Earthquake					Existing	\$75,000	Town Administrator	x	x		x	50	5 yr
AR12	9	High	Retrofit Fire Station 1 for Earthquake				x	Existing	\$75,000	Fire Chief	x	x		x	50	5 yr
AR13	9	Moderate	Removal of unsafe buildings		x		x	Existing	\$350,000	Town Administrator	x	x		x	150	Annual

Bartlett																
Project Number	Priority Score	Jurisdiction Priority Rank (High, Medium, Low)	Action /Project	Hazard Mitigated				Addresses New or Existing Buildings/ Infrastructure	Estimated Cost	Responsible Agency	Funding Sources				Population Affected	Timeframe
				Flood	Severe Storm	Extreme Temperature	Earthquake				HMGP	BRIC	FMA	Local		
BA1	15	H	Backup generator for water plants	X	X		X	Existing	\$300,000	City of Bartlett	x	x			60,000	3 years
BA2	15	H	Backup generator for High Service Pumps	X	X		X	Existing	\$100,000	City of Bartlett	x	x			10,000	3 years
BA3	15	H	Backup generator for Solid Waste Complex and Fuel Pumps 5250 Shelter Run Lane	X	X		X	Existing	\$150,000	City of Bartlett	x	x			60,000	3 years
BA4	15	M	Repetitive Loss Home Buyout	X				Existing	\$500,000	City of Bartlett	X		X		20	5 years
BA5	15	L	Clear Row to prevent down trees in ice storm		X	X		Existing	\$500,000	City of Bartlett				X	5,000	5 years

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BA6	13	M	Backup generator for City Hall Annex 6382 Stage Rd.	X	X		X	Existing	\$100,000	City of Bartlett	x	x			60,000	3 years
BA7	13	M	Backup generator for Public Works General Maintenance Building 3587 Altruria Road	X	X		X	Existing	\$150,000	City of Bartlett	x	x			60,000	3 years
BA8	13	M	Mobile Command Center	X	X	X	X	New	\$400,000	City of Bartlett	x	x			60,000	2 years
BA9	13	M	Bartlett Boulevard Detention Basin construction	X				New	\$500,000	City of Bartlett	X		x		20,000	5 years
BA10	12	M	Civil Defense Sirens: upgrade, replace or new install		X			Both	\$100,000	City of Bartlett	x	x			30,000	3 years
BA11	12	H	Retrofit Wells and Water Plant				X	Existing	\$100,000	City of Bartlett	X	x			60,000	5 years
BA12	12	H	Training/Storage Building at Fire Training Facility for Training and safe storage of Disaster Preparedness equipment	X	X		X	Existing	\$500,000	City of Bartlett	X	x			60,000	3 years
BA13	12	H	Mitigate Flooding of Sub Bus etc.	X				Existing	\$1,000,000	City of Bartlett	X		x		10,000	5 years

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BA14	12	M	Fiske Detention Basin	X				Existing	\$250,000	City of Bartlett	X		x		500	5 years
BA15	12	L	Yale Road and Bypass Channel construction	X				New	\$250,000	City of Bartlett	X		x		25,000	5 years
BA16	11	M	Backup generator for Animal Shelter, 5220 Shelter Run Lane	X	X		X	Existing	\$125,000	City of Bartlett	x	x			15,000	3 years
BA17	11	M	Easthill Detention Basin	X				New	\$400,000	City of Bartlett	x		x		2,000	2 years
BA18	10	M	Prosperity Point Drainage Project	X				New	\$500,000	City of Bartlett	x		x		20	2 years
BA19	10	H	Public Building Seismic Study				X	Existing	\$100,000	City of Bartlett	x	x			60,000	5 years
BA20	10	M	Seismic Retrofit of Fire Stations				X	Existing	\$300,000 Each @ 5 Stations	City of Bartlett	X	x			60,000	5 years
BA21	10	L	Reduce Heat Island Effect/Green Roof			X		Existing	\$500,000	City of Bartlett	X				5,000	5 years

Collierville																
Project Number	Priority Score	Jurisdiction Priority Rank (High, Medium, Low)	Action /Project	Hazard Mitigated				Addresses New or Existing Buildings/ Infrastructure	Estimated Cost	Responsible Agency	Funding Sources				Population Affected	Timeframe
				Flood	Severe Storm	Extreme Temperature	Earthquake				HMGP	BRIC	FMA	Local		
CO1	14	H	Downtown Drainage Basin	x				New	\$550,000	Collierville Division of Engineering	x	x	x		Over 450 Homes and businesses	1-2 years
CO2	13	M	Replacement emergency generator for Fire House #2	x	x	x	x	Existing	\$75,000	Collierville Fire Department	x	x			1 fire house continuation of services	3-5 Years
CO3	11	M	Review The Options To Raise Finished Floor Elevations In The Flood Plain	x				Existing	\$500,000	Collierville Division of Engineering	x			x	200	3-5 Years
CO4	11	M	Review Ways To Retrofit Existing Structures/Infrastructure For Greater Resistance		x		x	Both	\$1,000,000	Collierville Division of Engineering	x	x		x	5,000	3-5 Years

Germantown																
Project Number	Priority Score	Jurisdiction Priority Rank (High, Medium, Low)	Action /Project	Hazard Mitigated				Addresses New or Existing Buildings/ Infrastructure	Estimated Cost	Responsible Agency	Funding Sources				Population Affected	Timeframe
				Flood	Severe Storm	Extreme Temperature	Earthquake				HMGP	BRIC	FMA	Local		
GE1	15	H	English Meadows drainage improvement (phase 1)	x	x			Existing	\$900,000	Germantow n City Hall	x			x	87	2 Years
GE2	15	H	Miller Farms Area drainage improvements (phase 1)	x	x			Existing	\$3,000,000	Germantow n City Hall	x			x	200	2 Years
GE3	15	H	Wildwood Farms detention basin	x	x			Existing	\$1,000,000	Germantow n City Hall	x		x	x	100	3 years
GE4	15	H	Stout road drainage and widening improvments	x	x			Existing	\$700,000	Germantow n City Hall	x		x	x	41,000	4 Years
GE5	15	H	Miller Farms Area drainage improvements (phase 2)	x	x			Existing	\$3,000,000	Germantow n City Hall	x		x	x	200	4 Years

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GE6	15	H	Miller Farms Area drainage improvements (phase 3)	x	x			Existing	\$3,000,000	Germantown City Hall	x		x	x	200	4 Years
GE7	15	H	McVay Bridge update				x	Both	\$3,000,000	Germantown City Hall	x			x	100,000	4 Years
GE8	14	M	Fire station 2 & 3 retrofits				x	Both	\$1,000,000	Germantown City Hall	x				41,000	4 Years
GE9	14	M	Crestwyn area drainage improvements	x	x			Both	\$750,000	Germantown City Hall	x				15	3 years
GE10	11	L	Community safe room (Riverdale elementary)		x	x		New	\$900,000	Germantown City Hall	x				41,000	2 Years
GE11	10	L	Add more green space and tree space to existing parking lots			x		Existing	\$600,000	Germantown City Hall	x				41,000	4 Years
GE12	9	L	Add green roof to public building			x		New	\$1,000,000	Germantown City Hall	x				41,000	2 Years

Lakeland																
Project Number	Priority Score	Jurisdiction Priority Rank (High, Medium, Low)	Action /Project	Hazard Mitigated				Addresses New or Existing Buildings/ Infrastructure	Estimated Cost	Responsible Agency	Funding Sources				Population Affected	Timeframe
				Flood	Severe Storm	Extreme Temperature	Earthquake				HMGP	BRIC	FMA	Local		
LA1	13	H	Backup generator at city hall	X	X	X	X	Both	\$23,000	Lakeland City Hall	X	X			12,605	1-3 years
LA2	13	H	Install backup generator for one lift station	X	X		X	Both	\$23,000	Lakeland City Hall	X	X			12,605	1-3 years
LA3	13	H	Seismic evaluation and earthquake retrofit of city hall, if required				X	Both	\$300,000	Lakeland City Hall	X	X			12,605	1-3 years
LA4	13	H	Seismic evaluation and earthquake retrofit of fire station, if required				X	Both	\$300,000	Lakeland City Hall	X	X			12,605	1-3 years
LA5	13	H	Backup generator at fire station	X	X	X	X	Both	\$23,000	Lakeland City Hall	X	X			12,605	1-3 years

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LA6	13	H	Install backup generator for Monroe LS#3	X	X		X	Both	\$23,000	Lakeland City Hall	X	X			12,605	1-3 years
LA7	13	H	Rocky Branch Creek Regional Detention Facility, 9599 Blue Spruce Drive	X				Both	\$600,000	Lakeland City Hall			X		12,605	1-3 years
LA8	13	H	Tornado Siren Upgrades and Additions		X			Both	\$10,000	Lakeland City Hall			X	X	12,606	1-3 years
LA9	12	H	Maintain sewer right of way and access road	X	X	X		Both	\$10,000	Lakeland City Hall				X	12,605	Annually
LA10	12	H	Provide reinforced hallways in public buildings for tornados		X		X	Both	\$100,000	Lakeland City Hall	X	X			12,605	1-3 years
LA11	12	H	Anchor bookcases and filing cabinets to walls in public buildings for earthquake mitigation				X	Both	\$5,000	Lakeland City Hall	X	X			12,605	1-3 years
LA12	11	H	Clear stream crossing of tress/debris	X	X			Both	\$25,000	Lakeland City Hall				X	12,605	Annually
LA13	11	M	Channel improvements	x				Existing	\$100,000	Lakeland City Hall	x	x	x		12,605	2-3 Years

Millington																
Project Number	Priority Score	Jurisdiction Priority Rank (High, Medium, Low)	Action / Project	Hazard Mitigated				Addresses New or Existing Buildings / Infrastructure	Estimated Cost	Responsible Agency	Funding Sources				Population Affected	Timeframe
				Flood	Severe Storm	Extreme Temperature	Earthquake				HMGP	BRIC	FMA	Local		
MI1	15	H	Stabilization of Big Creek to prevent failure of CN Railroad and Raleigh-Millington bridges. Stabilization to prevent failure of levee control system	x				Existing	\$8,500,000	City of Millington	x	x	x		47,000	24 months
MI2	15	H	Big Creek Resiliency Project	x				Existing	\$40,000,000	City of Millington and Shelby County	x		x	x	47,000	36 months
MI3	13	H	Royster Creek bank and Shelby Rd. bridge stabilization	x				Existing	\$8,000,000	City of Millington	x		x	x	47,000	24 months
MI4	12	M	Generator for Emergency Operations Center	x	x	x	x	Existing	\$70,000	City of Millington	x		x	x	12,000	2 months

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MI5	13	H	Community Safe Room	x	x	x	x	New	\$1,000,000	City of Millington	x		x	x	12,000	12 months
MI6	13	H	Navy Rd. drainage improvements	x				Existing	\$750,000	City of Millington	x		x	x	47,000	24-36 months
MI7	14	H	Newport Channel improvements	x				Existing	\$250,000	City of Millington	x		x	x	1,500	12-18 months
MI8	12	H	Sanitary System Repairs	x				Existing	\$50,000	City of Millington	x		x	x	12,000	12-18 months
MI9	10	H	Public Works facility relocation	x	x	x	x	Existing	\$2,500,000	City of Millington	x		x	x	12,000	24 months
MI10	12	H	Emergency Flood Relief Pumping Station	x				Existing	\$500,000	City of Millington	x		x	x	10,200	2-3 Years
MI11	11	L	Local Underground Detention	x				Existing	\$225,000	City of Millington	x		x	x	500	2-3 Years
MI12	13	H	Emergency Operations Center (EOC)	x	x	x	x	Existing	\$75,000	City of Millington	x			x	10,200	2-3 Years
MI13	10	M	Emergency Warning Devices	x	x	x	x	Existing	\$50,000	City of Millington	x			x	3,000	2-3 Years

MI14	10	L	Water Plant Seismic Retrofit				x	New	\$200,000	City of Millington	x			x	10,200	2-3 Years
MI15	11	H	Regional Detention Pond	x				New	\$500,000	City of Millington	x		x	x	3,500	2-3 Years

Arlington Community Schools																
Project Number	Priority Score	Jurisdiction Priority Rank (High, Medium, Low)	Action /Project	Hazard Mitigated				Addresses New or Existing Buildings/ Infrastructure	Estimated Cost	Responsible Agency	Funding Sources				Population Affected	Timeframe
				Flood	Severe Storm	Extreme Temperature	Earthquake				HMGP	BRIC	FMA	Local		
AS1	10	H	Safe Space with generator near Arlington Middle		x	x		Existing	\$1,600,000	School Superintend ent	x	x		x	1,500	5 yr
AS2	10	H	Safe Space with generator near Donelson Elementary		x	x		Existing	\$1,600,000	School Superintend ent	x	x		x	1,500	5 yr
AS3	10	H	Bi-Directional Amplifier for Arlington Elementary School	x	x	x	x	New	\$125,000	School Superintend ent	x			x	1,000	4 yr
AS4	10	H	Bi-Directional Amplifier for Arlington Middle School	x	x	x	x	New	\$125,000	School Superintend ent	x			x	1,000	4 yr
AS5	10	H	Bi-Directional Amplifier for Donelson Elementary School	x	x	x	x	New	\$125,000	School Superintend ent	x			x	1,000	4 yr

AS6	10	H	Bi-Directional Amplifier for Arlington Highy School	x	x	x	x	New	\$125,000	School Superintend ent	x			x	1,500	4 yr
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Bartlett City Schools																
Project Number	Priority Score	Jurisdiction Priority Rank (High, Medium, Low)	Action /Project	Hazard Mitigated				Addresses New or Existing Buildings/ Infrastructure	Estimated Cost	Responsible Agency	Funding Sources				Population Affected	Timeframe
				Flood	Severe Storm	Extreme Temperature	Earthquake				HMGP	BRIC	FMA	Local		
BS1	12	M	Generator @ Oak Elementary and Update Sprinkler System		x	x	x	E	\$130,000	Bartlett Schools		x			1,000	1-3yrs
BS2	12	M	Generator @ Bartlett Elementary		x	x	x	E	\$50,000	Bartlett Schools		x			1,000	1-3 yrs
BS3	12	M	Generator @ Ellendale Elementary and Update Sprinkler System		x	x	x	E	\$130,000	Bartlett Schools		x			850	3-5 yrs
BS4	12	M	Update sprinkler system @ Altruria Elementary		x	x	x	E	\$80,000	Bartlett Schools		x			1,000	3-5 yrs

Collierville Schools																
Project Number	Priority Score	Jurisdiction Priority Rank (High, Medium, Low)	Action /Project	Hazard Mitigated				Addresses New or Existing Buildings/ Infrastructure	Estimated Cost	Responsible Agency	Funding Sources				Population Affected	Timeframe
				Flood	Severe Storm	Extreme Temperature	Earthquake				HMGP	BRIC	FMA	Local		
CS1	15	High	Communication for staff, students, and stakeholders in emergency situations in all buildings through 2 way radio systems.	X	X	X	X	Both	\$65,000	Collierville Schools				x	10,000	2 years

Lakeland School System																
Project Number	Priority Score	Jurisdiction Priority Rank (High, Medium, Low)	Action /Project	Hazard Mitigated				Addresses New or Existing Buildings/ Infrastructure	Estimated Cost	Responsible Agency	Funding Sources				Population Affected	Timeframe
				Flood	Severe Storm	Extreme Temperature	Earthquake				HMGP	BRIC	FMA	Local		
LS1	13	High	Backup generatory at Lakeland Elementary School	X	X	X	X	Both	\$23,000	Lakeland Municipal Schools	X	X			1,900	1-3 years
LS2	13	High	Backup generator at Lakeland Preparatory School	X	X	X	X	Both	\$23,000	Lakeland Municipal Schools	X	X			1,900	1-3 years
LS3	12	High	Tornado proof safe room at Lakeland Elementary School		X			Both	\$5,000,000	Lakeland Municipal Schools	x	x			1,900	1-3 years
LS4	12	High	Tornado proof safe room at Lakeland Preparatory School		X			Both	\$5,000,000	Lakeland Municipal Schools	x	x			1,900	1-3 years

Millington Municipal Schools																
Project Number	Priority Score	Jurisdiction Priority Rank (High, Medium, Low)	Action /Project	Hazard Mitigated				Addresses New or Existing Buildings/ Infrastructure	Estimated Cost	Responsible Agency	Funding Sources				Population Affected	Timeframe
				Flood	Severe Storm	Extreme Temperature	Earthquake				HMGP	BRIC	FMA	Local		
MS1	14	High	E.A. Harrold Elementary School drainage project to prevent building from flooding in heavy rains	x				Existing	\$850,000	Millington municipal schools	x		x	x	1,500	24-36 months
MS2	12	High	Millington Central High School Stadium Press Box Project , structural upgrade project				x	Existing	\$250,000	Millington municipal schools	x		x	x	2,600	24-36 months
MS3	13	High	Millington Elementary School severe storm tornado shelter project		x	x		Existing	\$700,000	Millington municipal schools	x		x	x	1,000	24-36 months
MS4	13	High	Millington middle school severe storm tornado project		x	x		Existing	\$700,000	Millington municipal schools	x		x	x	1,000	24-36 months

Shelby County Schools																
Project Number	Priority Score	Jurisdiction Priority Rank (High, Medium, Low)	Action /Project	Hazard Mitigated				Addresses New or Existing Buildings/ Infrastructure	Estimated Cost	Responsible Agency	Funding Sources				Population Affected	Timeframe
				Flood	Severe Storm	Extreme Temperature	Earthquake				HMGP	BRIC	FMA	Local		
SS1	13	Low	Cummings K-8 Gym/ Safe Building		X	X	X	Existing	\$3.5 Million	Shelby County Schools		X		X	627	2 years
SS2	13	Low	Kingsbury HS Gym/ Safe Building		X	X	X	Existing	\$4.5 Million	Shelby County Schools		X		X	1,457	5 years
SS3	13	Low	Grahamwood ES Gym/ Safe Building		X	X	X	Existing	\$3.5 Million	Shelby County Schools		X		X	1,095	5 years
SS4	13	Low	Downtown ES Classroom Addition		X	X	X	Existing	\$3.3 Million	Shelby County Schools		X		X	665	5 years
SS5	13	Low	Richland ES Gym/ Safe Building		X	X	X	Existing	\$3.5 Million	Shelby County Schools		X		X	906	5 years

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SS6	13	Low	Delano ES Gym/ Safe Building		X	X	X	Existing	\$3.5 Million	Shelby County Schools		X		X	341	5 years
SS7	12	Low	Germantown ES Classroom Addition		X	X	X	Existing	\$4.0 Million	Shelby County Schools		X		X	748	2 years
SS8	12	Low	Willow Oaks ES Classroom Addition		X	X	X	Existing	\$3.5 Million	Shelby County Schools		X		X	799	5 years
SS9	12	Low	Brownsville Road ES Classroom Addition		X	X	X	Existing	\$3.3 Million	Shelby County Schools		X		X	653	5 years
SS10	12	Low	La Rose ES Classroom Addition		X	X	X	Existing	\$3.3 Million	Shelby County Schools		X		X	412	5 years
SS11	12	Low	Grandview Heights MS Classroom Addition		X	X	X	Existing	\$3.3 Million	Shelby County Schools		X		X	547	5 years
SS12	12	Low	Lucie Campbell ES Classroom Addition		X	X	X	Existing	\$3.3 Million	Shelby County Schools		X		X	675	5 years
SS13	12	Low	Snowden K-8 Classroom Addition		X	X	X	Existing	\$3.3 Million	Shelby County Schools		X		X	1,482	5 years
SS14	12	Low	White Station HS Classroom Addition		X	X	X	Existing	\$3.3 Million	Shelby County Schools		X		X	2,305	5 years

SS15	12	Low	Whitehaven ES Classroom Addition		X	X	X	Existing	\$3.3 Million	Shelby County Schools		X		X	559	5 years
SS16	12	Low	Ross ES Classroom Addition		X	X	X	Existing	\$3.3 Million	Shelby County Schools		X		X	869	5 years
SS17	12	Low	Shelby Oaks ES Classroom Addition		X	X	X	Existing	\$3.3 Million	Shelby County Schools		X		X	1,024	5 Years
SS18	12	Low	Macon Hall ES Classroom Addition		X	X	X	Existing	\$3.3 Million	Shelby County Schools		X		X	1,269	5 Years

Project List Update

The following chart shows the status of each approach/project from the previous plan:

Action / Project	Project Status
Dispatch Relocation	Complete
Public Works Emergency Response Building	Complete
Emergency Operations Center (EOC)	Carried Forward
Replace Generators	Carried Forward
800 Mgz Radio System	Complete - system upgraded county wide
Emergency Warning Devices	Carried Forward
Public Works Relocation	Carried Forward
Safe Rooms	Carried Forward
Update EOP	Complete
"Create New EOP RFP for Basic Plan"	Complete
"Create New Hazmat Plan	Ongoing
Reviewing All Projects For Cost/Benefit Analysis And Update Hazmat Plan By Mid-2014	Ongoing
"	Ongoing
Update Crisis Mgmt Plan	Complete
Purchase Substantial Damage Estimator & Command Pro Incident Mgmt Software	Complete
Update Hazmat Plan	Carried Forward
Sam Cooper Bridges from Holmes Road to I-40, Design & Construction	Carried Forward
Fire Station retrofit	Carried Forward
Bridge Upgrade	Carried Forward-remove
Develop Multijurisdictional Comprehensive Earthquake Hazard Management Plan	Carried Forward
Fire Station Retrofits	Complete
Bridge Upgrade	Delete
Water Plant Seismic Retrofit	Carried Forward
75,000 and 500,000 Gallon Water Tank Upgrades	Complete
Consider adopting IBC 2003 Code with more strict seismic criteria. All public buildings would be designed accordingly.	Complete
Revise emergency response routes incorporating bridges which have been replaced or retrofitted since the previous routes established in 1991	Carried Forward
Promote Public Awareness And Education Programs Focusing On The Ability To Plan And Respond To A Catastrophic Earthquake.	Carried Forward
Seismically Retrofit 3 Water Treatment Plants	Carried Forward
Amend Zoning Ordinance To Reflect High Levels Of Seismic Standards	Complete
Seismic Retrofit Bridges - Upgrade at-risk structures	Carried Forward
Seismic Retrofit Fire station - Upgrade at-risk buildings and install emergency generators	Carried Forward
Emergency Portable Generator - Purchase an emergency portable generator to operate sewer lift stations during extended power outages	Carried Forward

Section 4: Mitigation Strategy

Bonus and Incentive Zoning - Install a system allowing developers to exceed limitations of current regulations, such as density or building height, in return for specific concessions	Carried Forward
Small Business Audits - Perform structural inspections of heavy impact/high risk businesses in Shelby County	Carried Forward
Mapping Hazards - Identify and graph areas with high liquefaction/damage potential	Pending
Dams and Reservoirs - Retrofit dam and levee structures on Mary's creek	Complete
Education and Training - Train code enforcement, law enforcement, disaster responders and citizens in earthquake response. Develop a community awareness program	Carried Forward
"Earthquake Vulnerability Assessment for Shelby County Buildings and Critical Elements of Infrastructure"	Carried Forward
Review Ways To Retrofit Existing Structures/Infrastructure For Greater Resistance	Carried Forward
Emergency Flood Relief Pumping Station	Ongoing
Stream Restoration	Ongoing
English Meadows Drainage Improvements (Phase II)	Complete
Lateral J (Queen Oaks Ditch)	Complete
Channel Improvements - Hayes Road	Complete
Dams and Reservoirs	Complete
Miller Farms Area Drainage Improvements (Phase II)	Delete
Alcorn Village (Concrete Channel)	Complete
Channel Improvements	Carried Forward
Culvert Replacement - Highway 70	Complete
Regional Detention Pond	Carried Forward
Downtown Drainage Basin	Ongoing
Shady Creek Weir	Complete
Crestwyn Area Drainage Improvements	Carried Forward
Wildwood Farms Detention Basin	Complete
Alcorn Village (Detention Area)	Complete
Massey Basin	Carried Forward
Detention Ponds (Davies area/Harrington Creek)	Complete
Royster Bayou Basin	Carried Forward
Sanitary Sewer System Repairs	Carried Forward
South Rex Road	Complete
Massey Basin	Ongoing
Bank Stabilization and Channel Improvements	Carried Forward
Audubon Park Basin	Ongoing
Quince Road	Carried Forward
South Cypress Creek	Ongoing
Sophia Bayou	Ongoing
Newport Channel Improvements	Complete
Gayoso Bayou Basin	Ongoing
Black Bayou	Ongoing
Huling Basin	Ongoing
Fontaine Basin	Ongoing
Harrison Creek	Carried Forward
White Station Basin	Ongoing
Re-establish Roadway Surface Drainage	Carried Forward
Fletcher Creek Basin	Ongoing
Increase Drain Maintenance Inspections	Carried Forward
Navy Road Drainage Improvements	Ongoing
Local Underground Detention	Ongoing
Upper Newport Channel Improvements	Ongoing
Drainage Manual Revisions	Carried Forward

Bartlett Blvd Rd Slope Failure	Complete
Alleviate Yard & Road Flooding On Cedar Rd.	Complete
Prevent Outbuilding Flooding On Elmore Park @ 2600 Block.	Complete
Prevent Garage Flooding Oak Forrest Dr	Scrap
Prevent Yard Flooding Broadway @ 3200 Block	Complete
Prevent House Flooding On Coral Hill Cove	Ongoing
Replacement Of Shady Creek Weir	Complete
2 Property Buyouts, 2 Houses Contracted To buyout (Honeybrook, Princeton)	Ongoing
Apply For Buyout Program For 7 Units Along Barr Av. Nonconnah Floodplain	Carried Forward
Big Creek Basin Stabilization	Carried Forward
"Buyout & Demo Kerrville-Rosemark Property"	
"	Complete
Build Regional Detention Basin @ Woodland Hills	Complete
Review The Options To Raise Finished Floor Elevations In The Flood Plain	Ongoing
Widening of Big Creek Floodplain - Design and construct overflow floodplain areas for the Big Creek Drainage canal between Singleton Parkway and Highway 51	Ongoing
Dredge Behind Levee of Dam #5 - Remove siltation deposits to increase capacity and clear wooded area to improve flow	Ongoing
Dams and Reservoirs - Purchase agricultural and vacant properties in flood zones and construct levees to store flood waters	Ongoing
Raise and Seal Sewer Manholes - Elevate and flood proof sewer manholes that are located in low lying flood plains and ditches	Ongoing
Raise Roadbed Elevations - Elevate roadways that frequently are crossed by flood waters.	Ongoing
Stream Restoration - Purchase property and redirect channelized streams to restore them with USCOE projects meandering and flood stage protection	Ongoing
Purchase Streambank Easements - Purchase easements on high flow at risk streambeds to allow the County the rights to clear and maintain debris which causes flooding	Ongoing
Storm Drain System Management - Clean culverts and remove debris from the storm water collection system	Ongoing
Streambank Protection - Install weirs inside channels to prevent future bank erosion and scour from head-cutting	Ongoing
Drainage system upgrade - Design and install larger or parallel drainage pipe in locations that bottleneck and cause upstream flooding	Ongoing
Advance Acquisition and Land Banking - Purchase and reserve properties within the Floodway and other developable land that would impact downstream development	Ongoing
Flood Protection - Flood proof high-risk and repeat structures	Ongoing
Property Protection Regulation - Perform comprehensive review of subdivision regulations and developer fee structure to discourage/provide incentive for development that increases/decreases storm water runoff and flooding potential	Ongoing
Green Infrastructure - Install regional green infrastructure projects in locations with large flow generators or conveyances	Ongoing
Porous Pavement - Design and install porous pavement systems for County buildings and projects	Ongoing
Storm Water Basin - Design and install a regional storm water detention basin	Ongoing

Section 4: Mitigation Strategy

Mapping Hazards - Produce highly accurate storm drainage system information	Ongoing
Education and Training - Develop and distribute educational materials to high risk residents, as well as, conduct informational meetings	Ongoing
Airways Bridge over Nonconnah Creek, Construction Only	Completed
Bartlett Road and Shelby Oaks over Fletcher Creek, Construction Only	Ongoing
Raleigh-Millington Bridge over Loosahatchie, Construction Only	Complete
N Watkins Over N. Cypress Creek Scheduled To Be Replaced In Next 5-10 Years	Carried Forward
Home Inspection Program - Complete hazard susceptibility checklists to offer personalized vulnerability assessments	Carried Forward
Community Awareness Program - Develop real estate disclosure information and educate homebuyers and the general public of hazard risks	Carried Forward
Education and Training - Generate awareness of hazards, mitigation steps and disaster response for Shelby County employee	Carried Forward
Traffic Lights and other Traffic Controls - Protect traffic lights and other traffic controls. Install resilient street signs for navigation in an emergency	Carried Forward
Vegetation - Identify locations for and install dense vegetative strips or buffers or reestablishment of removed vegetation	Carried Forward
Wind Proofing - Modify at-risk structures to be able to withstand high winds and tornados	Carried Forward
Tie-Down Program - Mandate and retrofit propane tank tie-downs and mobile homes	Carried Forward
Protect water supply - Install shut-off valves and emergency connector hoses where water meters connect	Carried Forward
Utility Line Relocation - Bury electric, telephone and cable lines and/or reinforce the connections on existing utility lines	Carried Forward
Tree Limb Removal Program - Develop and enact project to clear tree limbs in the right-of-way and threatening utility lines	Carried Forward
Additional Sirens (Davies/Wolfchase Farms)	Complete
3 Community Safe Rooms	1 Complete-
Traffic Lights/Traffic Control	Carried Forward
Community Awareness Program	Carried Forward
Stationary Generators	Carried Forward
Convert All Sirens To Solar Power	Complete
New Sirens Lambuth Campus	Complete
Community Safe Rooms - Build shelter areas at key locations throughout Shelby County to allow residents a place to go in freezing, high-heat and high-wind situations	Carried Forward
Electrical Backup Generator @ City Hall	Carried Forward
Sewage Lift Station Backup Generator	Carried Forward
Community Safe Room (Riverdale Elementary-7931 Miller Farms Road)	Carried Forward
Community Safe Room	Complete
Tree Limb Removal Program	Carried Forward
Community Safe Room	Ongoing
E.A. Harrold Elementary School drainage project to prevent building from flooding in heavy rains	Carried Forward

The following definitions apply to the status as listed in the above chart:

- Completed-All work on the project complete
- Carried Forward-Project was not funded from the previous plan, and has been added to the new project list
- Deleted-Project has been deemed unqualified, unnecessary, or infeasible

National Flood Insurance Program Compliance

The National Flood Insurance Program (NFIP) is a pre-disaster flood hazard mitigation and insurance protection program which has reduced the increasing cost of disasters. The intent of the program is to: require new and substantially improved structures be designed and constructed to minimize or eliminate future flood damage; provide floodplain residents and business owners with financial insurance assistance in the form of insurance after floods; and it transfers most of the cost of private property flood losses from the taxpayers to floodplain property owners through flood insurance premiums. Participation in the NFIP is based on an agreement between communities and FEMA.

Currently, all jurisdictions except are NFIP participants. FEMA has listed these jurisdictions to have a current effective map date as of 2/2013. Below are three charts that give an overview of NFIP policy and loss data for Shelby County. This data represents the most recent data available to the State of Tennessee regarding NFIP policy and loss data.

NFIP Policy Data for Shelby County			
Jurisdiction	Policies In-Force	Insurance In-Force Whole \$	Written Premium In-Force
Shelby County	508	\$148,04,000	\$310,607
Memphis	1,264	\$386,061,600	\$910,260
Arlington	81	\$26,907,400	\$48,466
Bartlett	234	\$67,168,300	\$132,784
Collierville	387	\$126,568,000	\$212,142
Germantown	654	\$209,588,000	\$357,539
Lakeland	56	\$17,321,000	\$30,452
Millington	129	\$31,729,600	\$81,783

Policies In-force: number of NFIP flood insurance policies

Insurance In-force whole \$: value of building and contents insured by the NFIP

Written Premium In-force: total premiums paid for NFIP insurance policies

NFIP Loss Data for Shelby County		
Jurisdiction	Total Claims	Total Payments
Shelby County	166	\$5,001,589
Memphis	515	\$9,513,520
Arlington	9	\$367,060
Bartlett	75	\$1,446,234
Collierville	33	\$766,347
Germantown	62	\$1,836,103
Lakeland	10	\$320,553
Millington	79	\$3,401,255

Total Losses: number of flood insurance claims filled by policyholders

Closed Losses: number of flood insurance claims paid to policyholders

CWOP Losses: claims that were "closed without payment"

Total Payments: total dollars paid to policyholders

Repetitive Loss/Severe Repetitive Loss Properties				
Location	Dwelling Type	Flood Zone	Total Losses	Total Payout
ARLINGTON	OTHR-NONRES	X	2	\$106,455
BARTLETT	SINGLE FMLY	AE	2	\$78,917
MEMPHIS	SINGLE FMLY	EMG	3	\$18,191
BARTLETT	2-4 FAMILY	EMG	2	\$7,439
BARTLETT	SINGLE FMLY	X	2	\$22,031
BARTLETT	SINGLE FMLY	X	2	\$22,350
MEMPHIS	2-4 FAMILY	X	3	\$92,230
BARTLETT	SINGLE FMLY	AE	2	\$69,096
BARTLETT	SINGLE FMLY	X	2	\$137,813
BARTLETT	SINGLE FMLY	A	3	\$12,133
BARTLETT	SINGLE FMLY	AE	3	\$72,266
COLLIERVILLE	SINGLE FMLY	AE	3	\$23,746
COLLIERVILLE	2-4 FAMILY	A02	2	\$11,921
COLLIERVILLE	2-4 FAMILY	A02	2	\$12,012
GERMANTOWN	SINGLE FMLY	A04	3	\$10,433
GERMANTOWN	SINGLE FMLY	X	2	\$56,997
GERMANTOWN	SINGLE FMLY	X	2	\$23,933
GERMANTOWN	SINGLE FMLY	B	4	\$140,203
BARTLETT	SINGLE FMLY	EMG	2	\$7,174
MEMPHIS	SINGLE FMLY	X	2	\$27,684
MEMPHIS	SINGLE FMLY	AE	3	\$33,485
MEMPHIS	SINGLE FMLY	X	5	\$104,262
MEMPHIS	SINGLE FMLY	EMG	3	\$44,764
MEMPHIS	SINGLE FMLY	X	3	\$96,007
MEMPHIS	SINGLE FMLY	EMG	2	\$12,335
MEMPHIS	OTHER RESID	X	2	\$239,716
MEMPHIS	OTHER RESID	X	2	\$223,723
MEMPHIS	OTHER RESID	X	2	\$336,638
MILLINGTON	SINGLE FMLY	A	3	\$135,883

MEMPHIS	OTHR-NONRES	X	2	\$358,947
MEMPHIS	SINGLE FMLY	EMG	2	\$2,974
MEMPHIS	SINGLE FMLY	EMG	3	\$14,519
MEMPHIS	SINGLE FMLY	X	3	\$27,391
MEMPHIS	SINGLE FMLY	X	3	\$137,743
MEMPHIS	OTHR-NONRES	X	2	\$92,144
MEMPHIS	2-4 FAMILY	A	2	\$10,094
MEMPHIS	OTHR-NONRES	A	4	\$6,227
MEMPHIS	SINGLE FMLY	EMG	2	\$4,852
MEMPHIS	SINGLE FMLY	EMG	3	\$13,872
MEMPHIS	OTHR-NONRES	EMG	3	\$10,622
MEMPHIS	SINGLE FMLY	X	6	\$105,083
MEMPHIS	SINGLE FMLY	X	2	\$142,111
MEMPHIS	SINGLE FMLY	AE	3	\$10,515
MEMPHIS	SINGLE FMLY	EMG	3	\$7,120
MEMPHIS	SINGLE FMLY	X	4	\$68,154
MEMPHIS	SINGLE FMLY	EMG	2	\$8,769
MEMPHIS	SINGLE FMLY	X	2	\$35,994
MEMPHIS	SINGLE FMLY	X	2	\$11,041
MEMPHIS	SINGLE FMLY	X	2	\$27,283
MEMPHIS	OTHER RESID	X	2	\$203,706
MEMPHIS	SINGLE FMLY	X	3	\$11,780
MEMPHIS	SINGLE FMLY	X	2	\$57,852
MEMPHIS	OTHR-NONRES	AE	3	\$590,359
MEMPHIS	SINGLE FMLY	X	2	\$88,432
MEMPHIS	SINGLE FMLY	X	2	\$103,420
MEMPHIS	SINGLE FMLY	X	2	\$12,358
MEMPHIS	2-4 FAMILY	A	2	\$8,221
MEMPHIS	2-4 FAMILY	A	3	\$10,160
MEMPHIS	2-4 FAMILY	A	3	\$10,452
MEMPHIS	2-4 FAMILY	A	3	\$10,245
MEMPHIS	2-4 FAMILY	A	4	\$12,584
MEMPHIS	2-4 FAMILY	A	4	\$12,049
MEMPHIS	2-4 FAMILY	A	6	\$14,662
MEMPHIS	2-4 FAMILY	A	4	\$12,754
MEMPHIS	2-4 FAMILY	A	4	\$12,408
MEMPHIS	2-4 FAMILY	A	3	\$11,036
MEMPHIS	SINGLE FMLY	EMG	3	\$24,328
MEMPHIS	SINGLE FMLY	C	2	\$64,074
MEMPHIS	SINGLE FMLY	EMG	5	\$18,162
MEMPHIS	SINGLE FMLY	X	2	\$23,564
CORDOVA	OTHR-NONRES	X	2	\$634,551
MEMPHIS	SINGLE FMLY	X	2	\$5,057
MEMPHIS	OTHR-NONRES	X	2	\$32,853
MEMPHIS	SINGLE FMLY	A	3	\$9,873
MEMPHIS	2-4 FAMILY	A	5	\$13,476

NASHVILLE	SINGLE FMLY	A	2	\$4,861
MILLINGTON	SINGLE FMLY	X	2	\$11,065
MILLINGTON	SINGLE FMLY	X	2	\$18,499
MILLINGTON	SINGLE FMLY	X	3	\$66,566
MEMPHIS	ASSMD CONDO	C	6	\$237,453
MEMPHIS	SINGLE FMLY	X	2	\$6,112
MEMPHIS	SINGLE FMLY	X	2	\$29,185
GERMANTOWN	SINGLE FMLY	X	2	\$9,818
MEMPHIS	SINGLE FMLY	X	5	\$62,955
MILLINGTON	SINGLE FMLY	X	5	\$302,482
MILLINGTON	SINGLE FMLY	X	2	\$247,630
ARLINGTON	SINGLE FMLY	C	3	\$155,442
MILLINGTON	SINGLE FMLY	AE	2	\$54,678
MILLINGTON	SINGLE FMLY	AE	3	\$9,908
MILLINGTON	SINGLE FMLY	X	5	\$175,937
MILLINGTON	SINGLE FMLY	B	4	\$104,767

To continue compliance with the NFIP, the jurisdictions have identified, analyzed, and prioritized three mitigation strategies to stay active with the program.

1. Continue to evaluate improved standards that are proven to reduce flood damage.
2. Maintaining supplies of FEMA/NFIP materials to help homeowners evaluate measures to reduce damage.
3. Maintaining a map of areas that flood frequently and prioritizing those areas for inspection immediately following heavy rains or flooding event.
4. Develop GIS system that will assist in flooding preparedness.

Section 5: Plan Maintenance

Monitoring, Evaluating, and Updating

The Shelby County Hazard Mitigation Committee is designated to monitor and evaluate the mitigation plan. This committee is chaired by Shelby County Emergency Management Agency who leads the monitoring, evaluating, and updating process.

Monitoring of the previous mitigation plan, progress and projects occurred informally over the life-cycle of the previous plan.

Monitoring activities will involve Shelby County Emergency Management Agency setting up a committee meeting to be held on a quarterly basis in conjunction with the Local Emergency Planning Committee meetings. Shelby County Emergency Management Agency will prepare a brief annual report of the meeting's findings by addressing mitigation progress and shortfalls within the county.

The plan is to be evaluated annually and after any significant disaster causing human, infrastructure, and property losses. Following each annual informal evaluation of the plan by emergency management staff, any proposed revisions or recommendations will be brought before the Mitigation Committee to be incorporated into the plan. Potential updates to the plan will address changes to the hazard assessment, the repetitive loss list, the committee membership list, and the project priority list.

The plan will be formally updated every five-years in accordance to 44 CFR 201.6(d)3, which states that the plan shall be reviewed, revised, and resubmitted for approval within five-years to continue eligibility for hazard mitigation grant funding. For the five-year update, Shelby County Emergency Management Agency will notify the jurisdictional governments and the Shelby County Hazard Mitigation Committee approximately one year prior to the plan's expiration date. The review of the plan will include updating the planning process, the County profile, the hazard profiles, the risk assessment, the vulnerability assessment, the mitigation strategies, and the plan maintenance descriptions.

The five-year plan update will also include soliciting other interested persons/agencies to join the Mitigation Committee and a review of what has been accomplished in the past 5 years. The Shelby County Hazard Mitigation Committee's goal is to have at least 5 meetings within this time span; dates, public notices, and objectives for these meetings will be determined by Shelby County Emergency Management Agency.

Five months prior to the plan's expiration date, Shelby County Emergency Management Agency will submit the revised plan to the Tennessee Emergency Management Agency for preliminary review. Upon approval by the state, TEMA will submit the updated plan to FEMA for review.

Once Shelby County has attained the designation of the plan's approval pending adoption, each jurisdiction will adopt the plan through a resolution within a year.

Incorporation into Planning Cycle

In the previous planning cycle, Shelby County and its jurisdictions/school districts did not have a systematic process for incorporating mitigation into other planning mechanisms, and instead left it up to individual entities and agencies to review and incorporate as necessary.

By incorporating the Shelby County Hazard Mitigation Plan into the planning cycle, information contained in the mitigation plan can help fill-in missing gaps in existing documents, can contribute to already existing mitigation-based projects, and can create a strengthen stance of mitigation implementation and awareness within the county and its jurisdictions.

Some of the mechanisms that the Shelby County Hazard Mitigation Plan could be incorporated into include:

- Shelby County BEOP
- Shelby County Schools Emergency Plans
- Shelby County Highway Department Plan
- County & Jurisdictional Public Works Development Plans
- County & Jurisdictional Fire Department 5 Year Plans
- Jurisdictional Plans, SOP's, & SOG's

The process of incorporating the hazard mitigation plan into other plans will begin during the other plan's update cycles. All jurisdictions will first review the plans side-by-side to make applicable notes on how mitigation concepts and actions can be incorporated into the other plans. These recommendations will be submitted to the lead agencies of the other planning mechanisms for them to place relevant information within the documents.

Continued Public Participation

The Shelby County Mitigation Committee will strive to involve the public in future mitigation activities. This will be accomplished by continuing to post Mitigation Committee Meeting dates in the local newspaper, by attempting to have a public mitigation meeting once a year, by providing public access to copies of the Shelby County Hazard Mitigation Plan in the local emergency management office, and by soliciting other interested persons to participate in the mitigation planning process. By implementing these methods, the public will have an opportunity to comment on the plan during the update drafting stage and prior to plan approval.

Appendix 1

Attendance Sheet – Committee Meeting #1

August 26, 2020	from Shannon Towery to everyone:	9:33 AM testing chat- hello
August 26, 2020	from Shannon Towery to everyone:	9:44 AM are you angry at the keyboard?
August 26, 2020	from Brandon Carpenter to everyone:	9:55 AM Brandon Carpenter
August 26, 2020	from Greg Waymon to everyone:	9:56 AM Greg Waymon, Planning, Memphis Fire Office of Emergency Management
August 26, 2020	from Shannon Towery to everyone:	9:56 AM Shannon Towery- Shelby County Emergency Management and Homeland Sec,, Planning Coordinator
August 26, 2020	from Brandon Carpenter to everyone:	9:56 AM Brandon Carpenter, Planning, Memphis Office of Emergency Management
August 26, 2020	from Brent Phillips to everyone:	9:56 AM When you type in your name, please also include your official title and department/jurisdiction/district. Thank you!
August 26, 2020 Fire Deputy Chief	from Glen F. Kneeland to everyone:	9:56 AM Glen Kneeland-Shelby County
August 26, 2020 Director	from Jane Waldrop to everyone:	9:57 AM Jane Waldrop TEMA West Regional
August 26, 2020 Emergency Management	from LaTonya McGowan to everyone:	9:58 AM LaTonya McGowan , Specialist, Shelby County Schools
August 26, 2020 Special Project Assistant	from Quentin Reed to everyone:	9:59 AM SCS Emergency Management -
August 26, 2020 memphis	from Robert Rehkopf to everyone:	9:59 AM Robert Rehkopf consultant City of
August 26, 2020 Consultant, Lakeland	from Dennis Wolf to everyone:	10:01 AM Dennis Wolf, Fire Management
August 26, 2020 Works Director	from Cliff Norville to everyone:	10:01 AM Cliff Norville, Shelby County Public
August 26, 2020	from Gary Graves (privately):	10:01 AM Gary Graves; City of Millington
August 26, 2020 of Germantown	from tbierdz to everyone:	10:01 AM Tim Bierdz - Stormwater Engineer City
August 26, 2020 City of Millington	from Gary Graves to everyone:	10:02 AM Gary Graves; Public Safety Director;
August 26, 2020	from Nancy Kelley (privately):	10:02 AM Nancy Kelley, Collierville Schools
August 26, 2020 Schools Emergency Management	from Jimmy Tuggers to everyone:	10:05 AM Jimmy Tuggers- Shelby County
August 26, 2020 ask questions	from Cliff Norville to everyone:	10:09 AM I am unable to unmute my mic to
August 26, 2020	from Robert Rehkopf to everyone:	10:15 AM I lost audio.

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August 26, 2020 from laTonya McGowan to everyone: 10:16 AM Will this powerpoint be emailed to participants

August 26, 2020 from Brent Phillips to everyone: 10:16 AM Yes.

August 26, 2020 from Gary Rikard to everyone: 10:16 AM Gary Rikard/Security Manager/Bartlett City Schools

August 26, 2020 from Cliff Norville to everyone: 10:17 AM FYI...the slides are approximately 30 seconds behind your speech.

August 26, 2020 from Robert Rehkopf to everyone: 10:22 AM How much allowed to TN, audio was off

August 26, 2020 from chris.masin to everyone: 10:24 AM Is the decicson of what projects get funded for a BRIC done by the state or national?

August 26, 2020 from Robert Rehkopf to everyone: 10:28 AM no audio again

August 26, 2020 from Shelby County - EOC to everyone: 10:31 AM Misty Haley Emergency Operations Manager Shelby County EMHS

August 26, 2020 from James Harvill to everyone: 10:40 AM James Harvill-Fire Chief Arlington Fire Department

August 26, 2020 from Robert Rehkopf to everyone: 10:42 AM Freeboard requirement for essential structures and land protected by levees?

August 26, 2020 from tkelley (privately): 10:47 AM Chief of Operations Collierville Fire Department / Emergency Mgt. Coordinator

August 26, 2020 from Jared.Darby to everyone: 10:48 AM Shannon, I would like that earthquake study please

August 26, 2020 from Shannon Towery to everyone: 10:48 AM Will do

August 26, 2020 from Nancy Kelley (privately): 10:56 AM Brent, can you say that one more time for the schools and sorry - maybe the last part...owning versus something

August 26, 2020 from Nancy Kelley (privately): 10:58 AM gotcha

August 26, 2020 from Brandon Carpenter to everyone: 10:58 AM Mr. Rehkopf, can you please contact me at 901-208-0386, Thanks.

August 26, 2020 from Robert Rehkopf to everyone: 10:59 AM Yes

August 26, 2020 from James Harvill to everyone: 11:00 AM I will need to get with our planning department to get more exacting information for the Growth Trends portion of the form.

August 26, 2020 from Jared.Darby to everyone: 11:01 AM Jared Darby

August 26, 2020 from Quentin Reed to everyone: 11:02 AM Quentin Reed, SCS Emergency Management - Special Project Assistant

August 26, 2020 from Jared.Darby to everyone: 11:02 AM Jared Darby, Senior Manager, Shelby County, Office of Resilience and Sustainability

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August 26, 2020 from Rick.Stieg to everyone: 11:02 AM Rick Stieg, GIS Administrator

August 26, 2020 from Gary Patterson to everyone: 11:02 AM Gary Patterson,

August 26, 2020 from Manny Belen to everyone: 11:02 AM Manny Belen, City Engineer - City of Memphis

August 26, 2020 from Gary Patterson to everyone: 11:02 AM Gary Patterson

August 26, 2020 from tkelley (privately): 11:02 AM Brent, Sorry I forgot my name, Tommy Kelley Collierville Fire Department Chief of Operations / Emergency Mgt. Coordinator for Collierville

August 26, 2020 from Robin Berzins to everyone: 11:02 AM Robin Berzins, FEMA R-IV, TN FIT

August 26, 2020 from John Fox to everyone: 11:02 AM John Fox, Public Works Manager, Town of Collierville

August 26, 2020 from chris.masin to everyone: 11:02 AM Chriss Masin, Senior Engineer, Shelby County Roads, Bridges and Engineering

August 26, 2020 from Gary Patterson (privately): 11:03 AM Gary Patterson University of Memphis, CERI

August 26, 2020 from Terry Wiggins to everyone: 11:03 AM Rick McClanahan City Engineer City of Bartlett

August 26, 2020 from John Selberg to everyone: 11:03 AM John Selberg, City of Germantown, Fire Chief/Emergency Manager

August 26, 2020 from Steve Fort to everyone: 11:03 AM Steve Fort, Emergency Response Coordinator, Manager - Public Health Emergency Preparedness - Shelby County Health Department

August 26, 2020 from Terry Wiggins to everyone: 11:04 AM Terry Wiggins, City of Bartlett Fire Chief

August 26, 2020 from philip leblanc (privately): 11:06 AM Philip Leblanc, Millington Municipal Schools, Director of Operations and Transportation , pleblanc@millingtonschools.org

August 26, 2020 from Shannon Towery (privately): 11:09 AM Had a question from Roads/Bridges for Shelby Co. They do not need to complete a separate questionnaire?

August 26, 2020 from Shannon Towery (privately): 11:10 AM gotcha. ty

August 26, 2020 from Mack Green to everyone: 11:23 AM Mack Green, TEMA District Coordinator

August 26, 2020 from James Harvill to everyone: 11:25 AM You may have already mentioned this but could I get a copy of this Power Point for a reference?

August 26, 2020 from Gary Patterson to everyone: 11:26 AM You can download the referenced MAE Center EQ study by googling "Impact of Earthquakes on the Central USA"

August 26, 2020 from James Harvill to everyone: 11:39 AM Works for me

August 26, 2020 from Rick.Stieg to everyone: 11:40 AM Rick Stieg GIS Administrator Shelby County

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August 26, 2020 from Gary Patterson to everyone: 11:40 AM September 30 at 10 AM is ok with me

August 26, 2020 from Robert Rehkopf to everyone: 11:40 AM works for me

August 26, 2020 from Brandon Carpenter to everyone: 11:40 AM Sounds Good

August 26, 2020 from Dennis Wolf to everyone: 11:40 AM Dennis from Lakeland will not be available

August 26, 2020 from Gary Graves to everyone: 11:40 AM Millington OK

August 26, 2020 from tbierdz to everyone: 11:40 AM that works for me

August 26, 2020 from laTonya McGowan to everyone: 11:40 AM works for me

August 26, 2020 from Jimmy Tuggers to everyone: 11:41 AM Jimmy Tuggers-Emergency management Advisor-Shelby County Schools

August 26, 2020 from Terry Wiggins to everyone: 11:42 AM Date good with Bartlett

August 26, 2020 from Robert Rehkopf to everyone: 11:43 AM Brent, thanks I'm sure well talk during the week.

August 26, 2020 from Gary Patterson (privately): 11:43 AM Great job Brent....talk soon

August 26, 2020 from George Boyington to everyone: 11:44 AM George Boyington Intergovernmental Affairs & Special Projects Manager Shelby County Assessor of Property

August 26, 2020 from Angela Hill to everyone: 11:45 AM Angela Hill, Adminstrator Parks and Neighborhood- Shelby County TN Govt

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Appendix 2

Attendance Sheet – Committee Meeting #2

September 30, 2020	9:49 AM	from Shannon Towery to everyone: Shannon Towery Shelby County Emergency Management and Homeland Security Office, Planning Coordinator
September 30, 2020	9:51 AM	from Robin Berzins (privately): Good morning, Brent.
September 30, 2020	9:51 AM	from Gary Rikard to everyone: Gary Rikard
September 30, 2020	9:52 AM	from Rick.Stieg to everyone: richard stieg shelby county ITS, Regis Administrator
September 30, 2020	9:52 AM	from Brandon Carpenter to everyone: Brandon Carpenter, Emergency Operations Officer, City of Memphis Office of Emergency Management
September 30, 2020	9:52 AM	from Gary Rikard to everyone: Gary Rikard, Bartlett Schools, Security Manager
September 30, 2020	9:53 AM	from Robin Berzins to everyone: Robin Berzins, FEMA Integration Team TN, Mitigation Spc
September 30, 2020	9:56 AM	from James Harvill to everyone: James Harvill- Town of Arlington- Fire Chief
September 30, 2020	9:56 AM	from Gary Graves to everyone: Gary Graves: City of Millington; Public Safety Director
September 30, 2020	9:57 AM	from LaTonya McGowan to everyone: LaTonya McGowan Shelby County Schools - Emergency Management Specialist
September 30, 2020	9:58 AM	from Misty Haley to everyone: Misty Haley, Emergency Operations Manager, Shelby County Emergency Management Homeland Security Agency
September 30, 2020	10:01 AM	from Shane Horn to everyone: Shane Horn
September 30, 2020	10:01 AM	from Evan Boulanger to everyone: Evan Boulanger--Senior Design Engineer
September 30, 2020	10:01 AM	from Evan Boulanger to everyone: Mark McGuire--Senior Design Engineer
September 30, 2020	10:01 AM	from Ryan (privately): Ryan Groves, MLGW Regulatory Compliance Coordinator
September 30, 2020	10:01 AM	from Evan Boulanger to everyone: Lopa Naik--Senior Design Engineer
September 30, 2020	10:01 AM	from Evan Boulanger to everyone: All of us are from the City of Memphis
September 30, 2020	10:01 AM	from Greg Waymon (privately): Greg Waymon - Memphis OEM, Lieutenant - Planning
September 30, 2020	10:01 AM	from Jeremy Yow to everyone: Jeremy Yow Supervisor-Student Services and HR for Arlington Community Schools Arlington, TN
September 30, 2020	10:01 AM	from Chris Favaloro Memphis OEM to everyone: Christopher Favaloro Memphis OEM Operations Officer

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September 30, 2020 10:02 AM from Oussama Terrab to everyone: Oussama Terrab (901-412-3506) - Memphis Light Gas & Water - Crisis Management / Shelby County

September 30, 2020 10:02 AM from Jeff Cox, et. al. (privately): Jeff Cox, City of Bartlett Chief of Police

September 30, 2020 10:02 AM from chris.masin to everyone: chris masin, Senior Engineer, Shelby County Govt.

September 30, 2020 10:02 AM from brenda.jones@shelbycountyttn.gov (privately): Brenda Jones - Director - Shelby County Emergency Management & Homeland Security Agency

September 30, 2020 10:02 AM from Benjamin Hamilton to everyone: Ben Hamilton - Memphis Light, Gas & Water; Asset Management Engineer

September 30, 2020 10:02 AM from Shane Horn to everyone: Shane Horn - City Manager- City of Lakeland

September 30, 2020 10:02 AM from Daniel Hochstein to everyone: Daniel Hochstein - Memphis Light, Gas and Water - Lead Project Engineer

September 30, 2020 10:03 AM from philip leblanc (privately): Philip Leblanc Millington Municipal Schools, operations and transportation.

September 30, 2020 10:04 AM from Jonathan Haley to everyone: Jonathan Haley CoM MFD- Administrative Lieutenant

September 30, 2020 10:04 AM from Robert Rehkopf to everyone: RRobert Rehkopf Consultant City of Memphis

September 30, 2020 10:11 AM from Jeremy Yow to everyone: Tim Ruff Director of Operations Arlington Community Schools

September 30, 2020 10:18 AM from Madelyn to everyone: Madelyn Lukens Project Engineer at Memphis Light, Gas and Water

September 30, 2020 10:32 AM from tkelley (privately): Tommy Kelley, Chief of Operations, Collierville Fire Department, Town of Collierville

September 30, 2020 10:34 AM from Jeff Cox, et. al. (privately): Is this presentation available, or can it be emailed to us?

September 30, 2020 10:40 AM from Erin Stirgus to everyone: Erin Stirgus

September 30, 2020 10:40 AM from Erin Stirgus to everyone: Erin Stirgus, MLGW, Project Engineer

September 30, 2020 10:41 AM from Miracle Roberts to everyone: Miracle Roberts, Chief Financial Officer, Arlington Community Schools

September 30, 2020 10:41 AM from Brian to everyone: Brian Waldron - University of Memphis CAESER supporting UASI

September 30, 2020 10:41 AM from Jane Waldrop to everyone: Jane Waldrop, Regional Director TEMA West

September 30, 2020 10:42 AM from Terry Wiggins to everyone: Terry Wiggins, City of Bartlett

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Fire Chief

September 30, 2020	10:43 AM	from Patrina Chambers to everyone: Patrina Chambers Memphis Area Transit Authority (MATA) Director of Grants and Procurement
September 30, 2020	10:46 AM	from Robert Rehkopf to everyone: Sorry, Done
September 30, 2020 Bartlett Police	11:00 AM	from Jeff Cox, et. al. (privately): Steve Sones, Assistant Chief
September 30, 2020 Bartlett Police Department	11:00 AM	from Jeff Cox, et. al. (privately): Eric Leppanen, Captain
September 30, 2020	11:03 AM	from Shannon Towery to everyone: my contact-shannon.towery@shelbycountyttn.gov or 901-222-6716
September 30, 2020	11:10 AM	from Brent Phillips to everyone: Project List Deadline: Oct 16th
September 30, 2020	11:11 AM	from Angela Brown to everyone: Angela Brown, Grant Manager, Shelby County Emergency Management and Homeland Security
September 30, 2020	11:12 AM	from John Selberg to everyone: John Selberg, Fire Chief/Emergency Manager, City of Germantown
September 30, 2020	11:16 AM	from Brian (privately): Thank soooo much, Brent!!

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Appendix 3

Public Notice/Meeting Minutes/Letters



Record Details - Google Chrome
 memphisdailynews.com/Search/Details/ViewNotice.aspx?id=Mpd77722&date=9/25/2020

THE Daily News
 EST. MEMPHIS 1886

Miscellaneous Notice [Print](#)

Shelby County Hazard Mitigation Committee Meeting

There will be a virtual meeting of the Shelby County Hazard Mitigation Committee on September 30, 2020 at 10:00 a.m. to discuss and review the Shelby County Hazard Mitigation Plan. The meeting will address pending revisions to the 2021-2025 Shelby County Hazard Mitigation Plan. This meeting is open to the public.
 September 30, 2020 at 10:00 a.m.
 Registration URL: <https://tngov.webex.com/tngov/j.php?MTID=mf1cb61d0b8dbd6671271b8eac6db49cb>
 To join by phone +1-415-655-0003
 Meeting number (access code): 171 575 0900

Sept. 25, 2020 Mpd77722

COVID-19 DIRECTIVES Coronavirus Disease 2019 (COVID-19) [Click Here](#) Report COVID-19 Concerns [Click Here](#)

SHELBY COUNTY
 TENNESSEE
 MAYOR LEE HARRIS

I'm looking for...

Calendar
 View all calendars is the HOW DO I use Select a Calendar LIVE/VISIT a specific calendar BUSINESS GOVERNMENT
 Select the arrows on either side of the current month to change the month.

List Week Month Find a Facility Notify Me Subscribe to iCalendar

Search calendar by:
 Start date End date Search Show Past Events Select a Calendar

Event Details [Return to Previous](#)

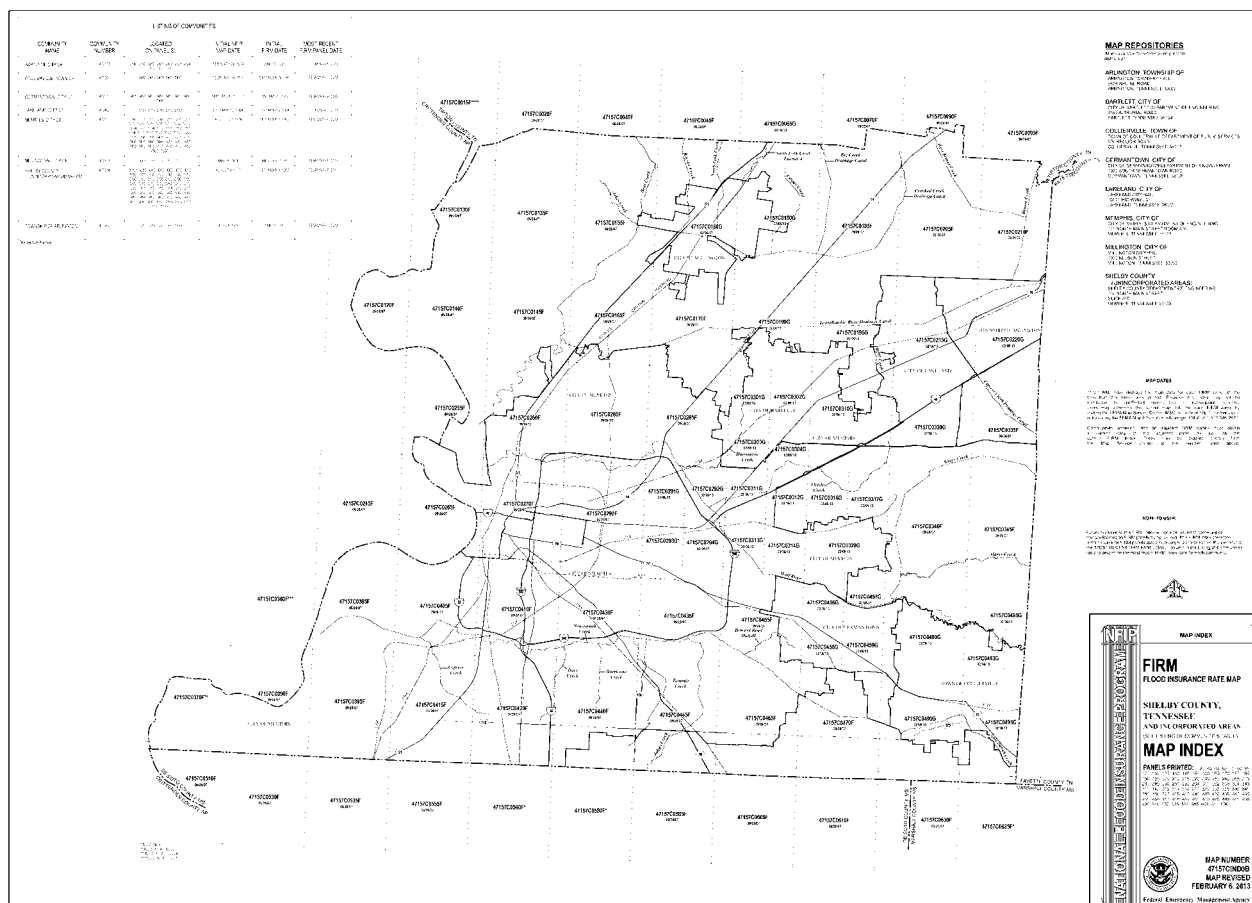
Shelby County Hazard Mitigation Committee Meeting
Wednesday, September 30, 2020
 To discuss and review the Shelby County Hazard Mitigation Plan. The meeting will address pending revisions to the 2021-2025 Shelby County Hazard Mitigation Plan. This meeting is open to the public. To join by phone +1-415-655-0003 Meeting number (access code): 171 575 0900

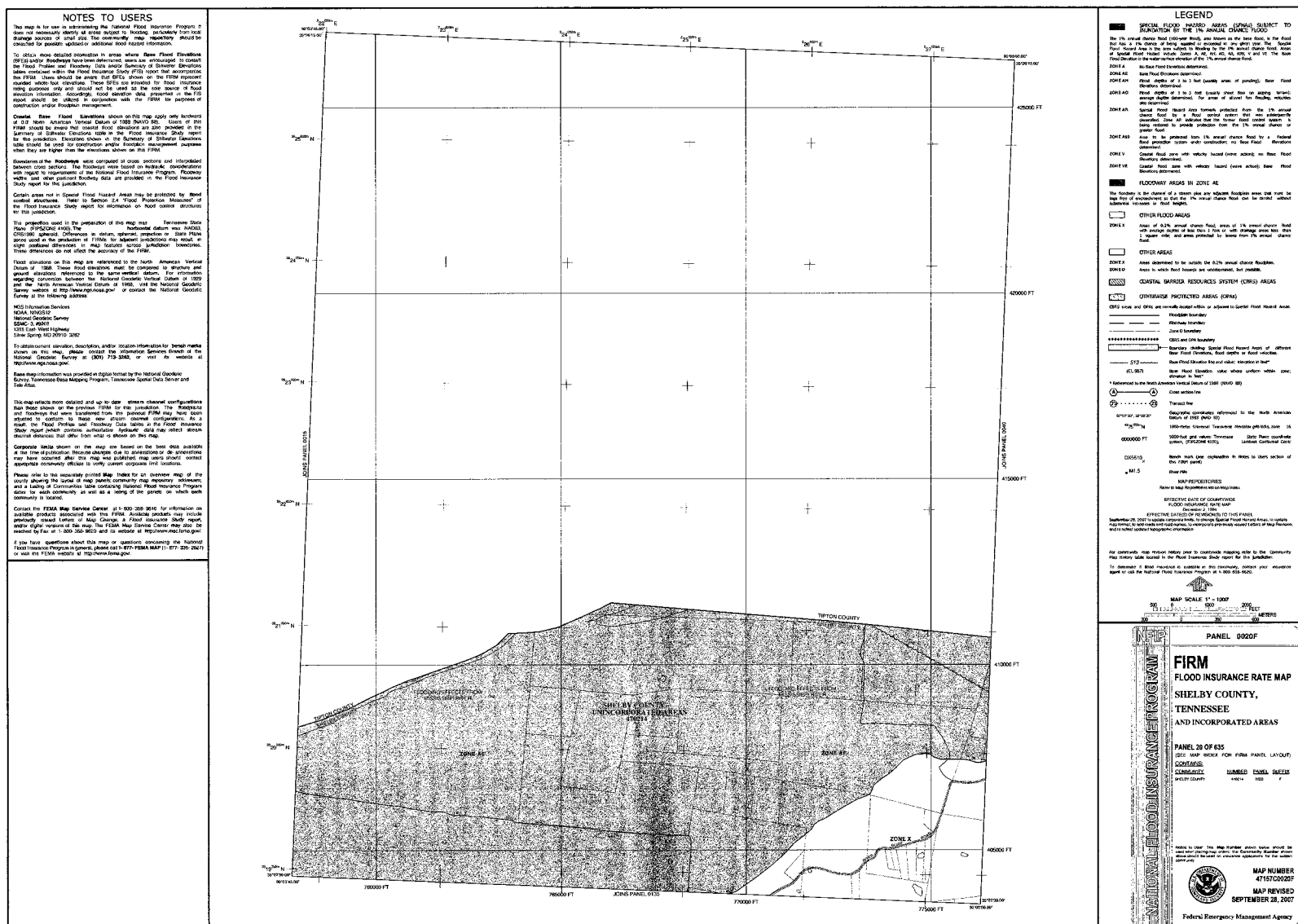
Date: September 30, 2020
Time: 10:00 AM
Location: There will be a virtual meeting
Link: [Registration URL](https://tngov.webex.com/tngov/j.php?MTID=mf1cb61d0b8dbd6671271b8eac6db49cb)

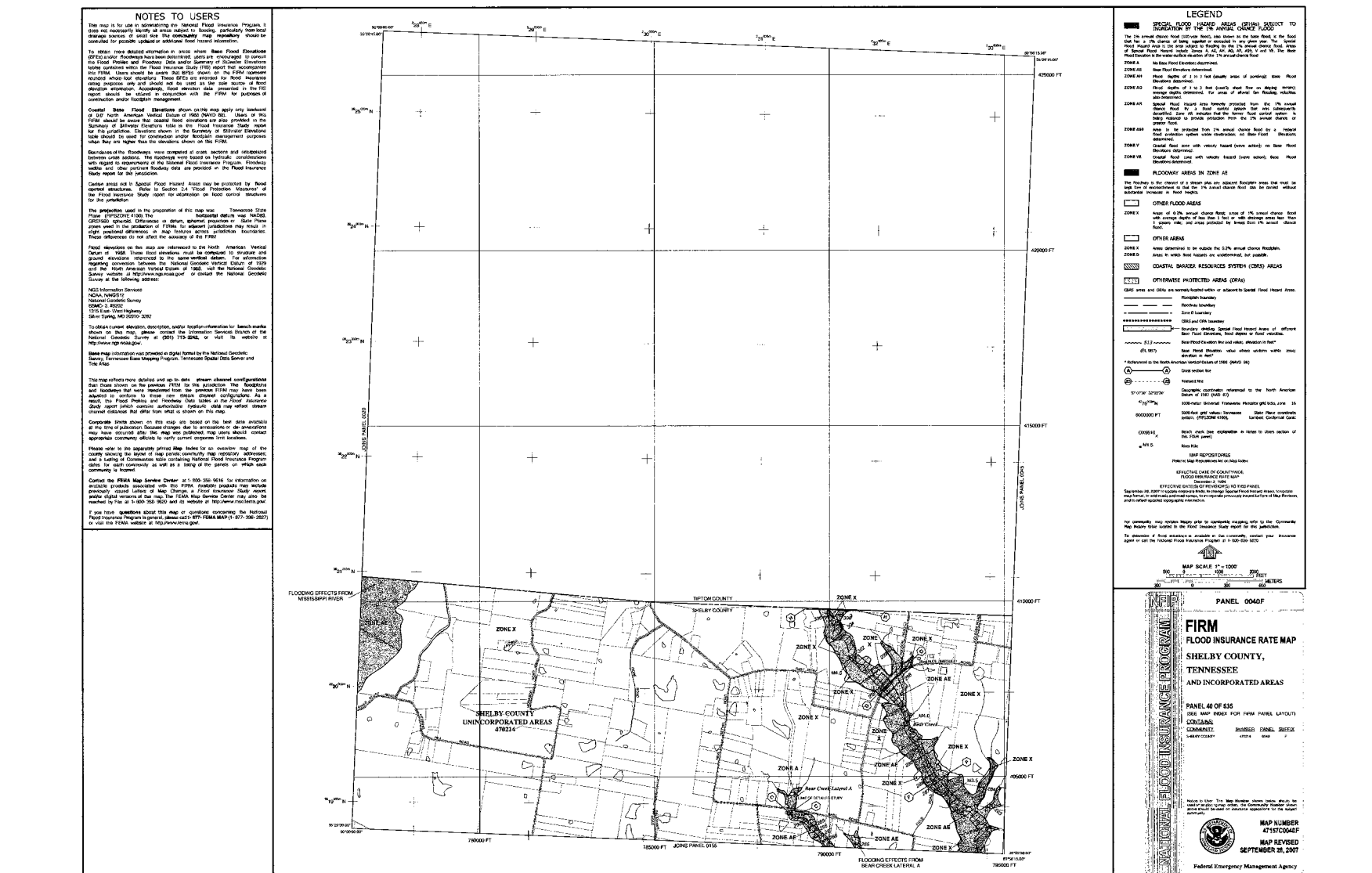
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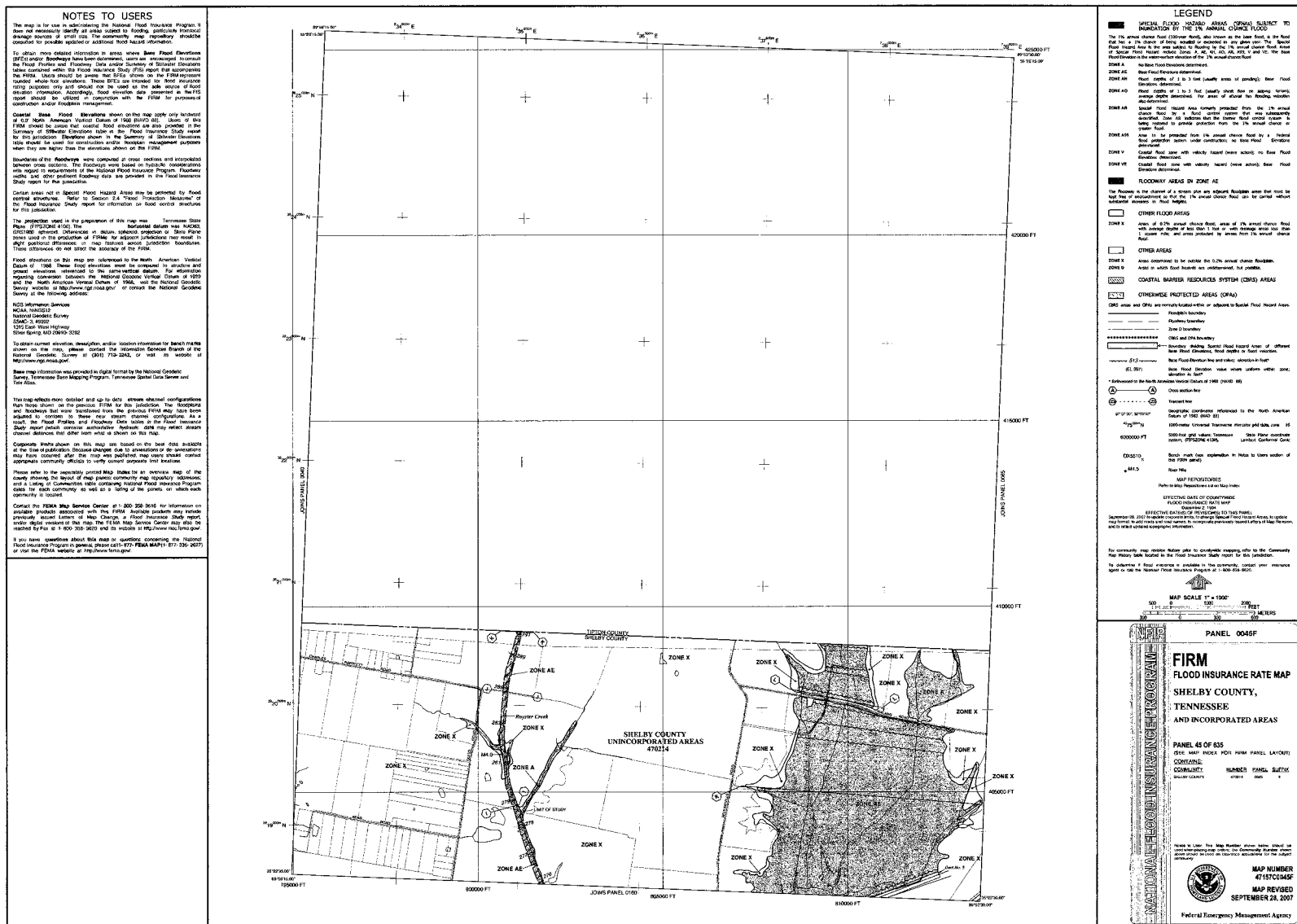
Appendix 4

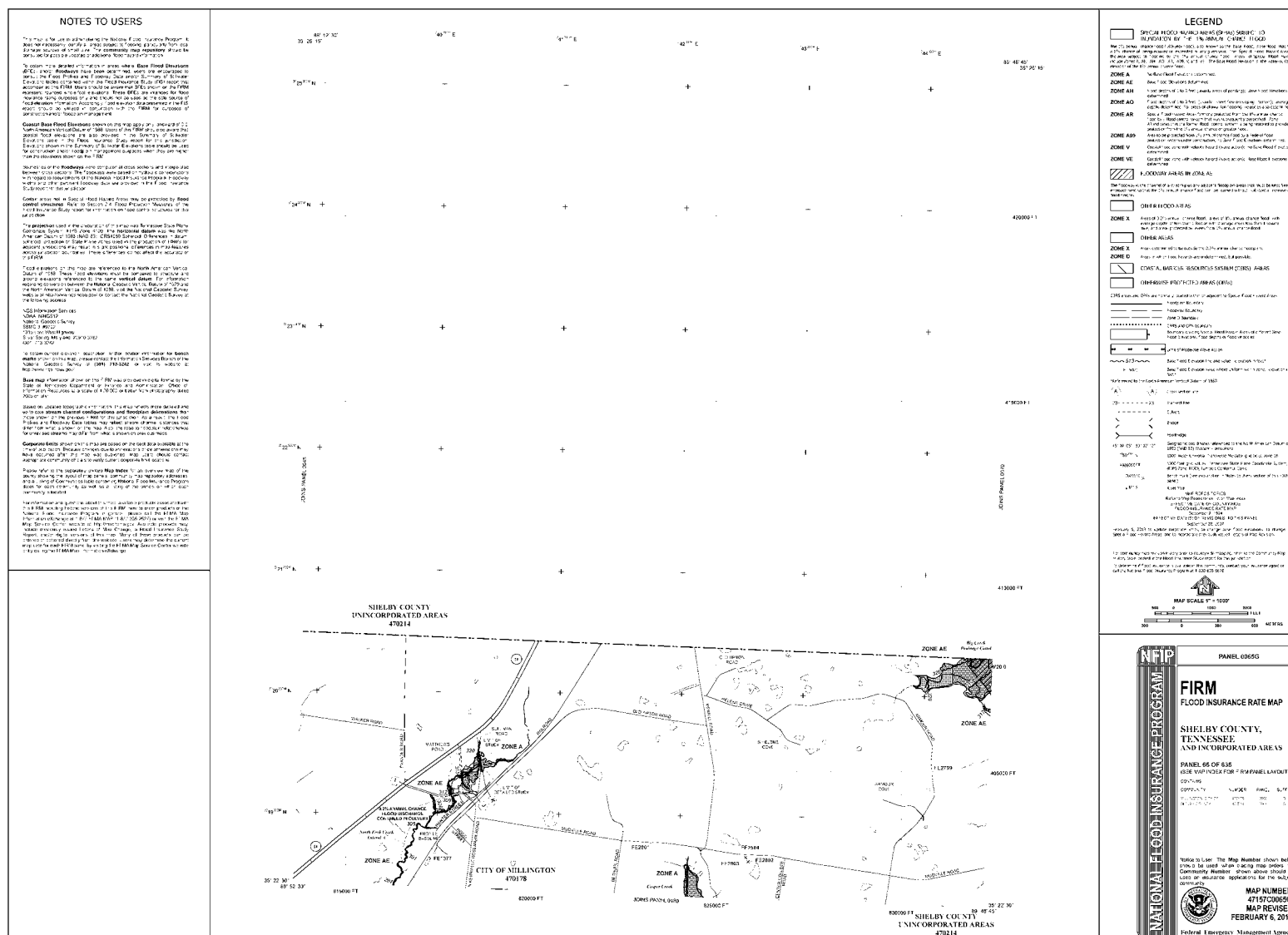
Flood Insurance Rate Maps for Shelby County

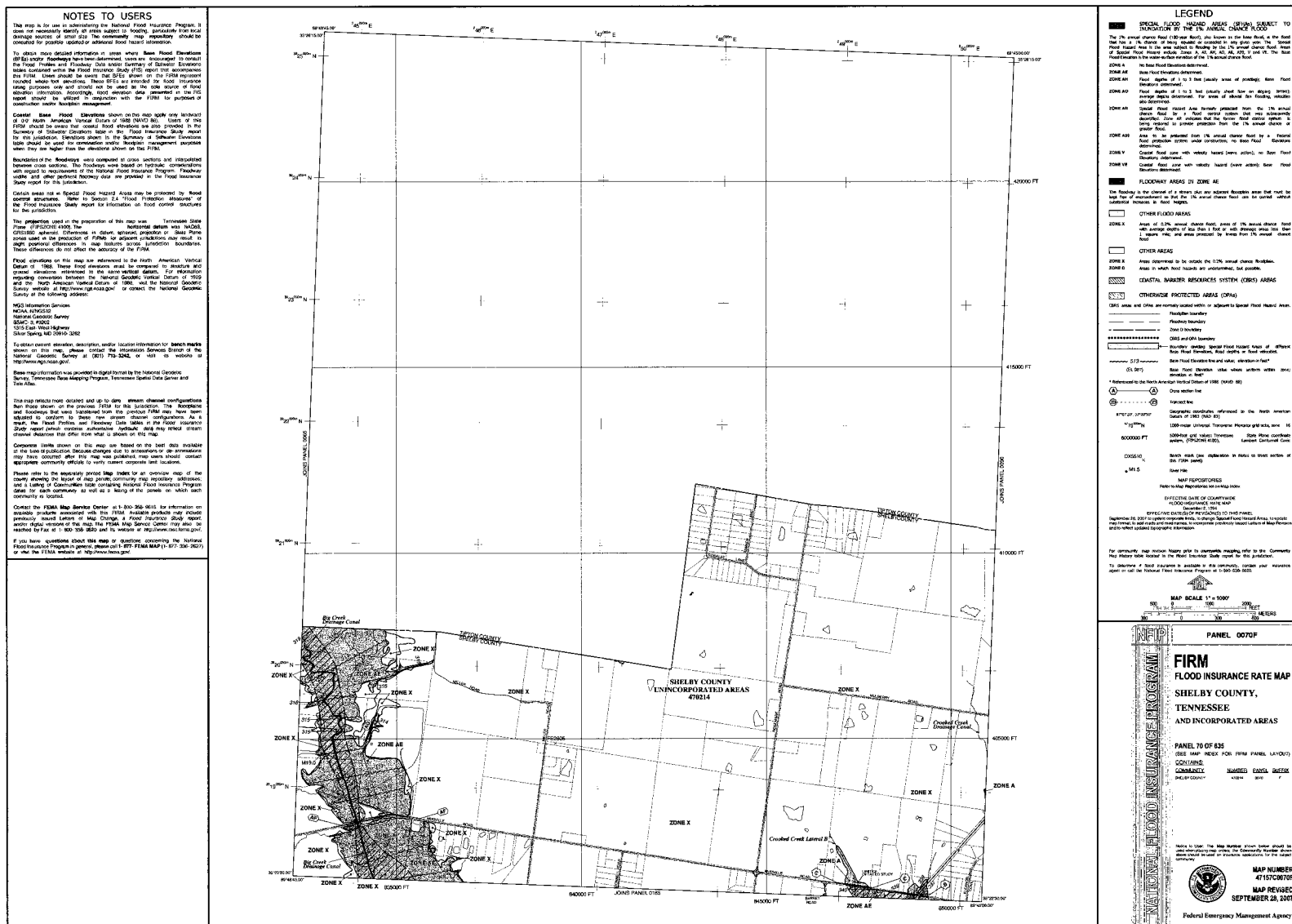


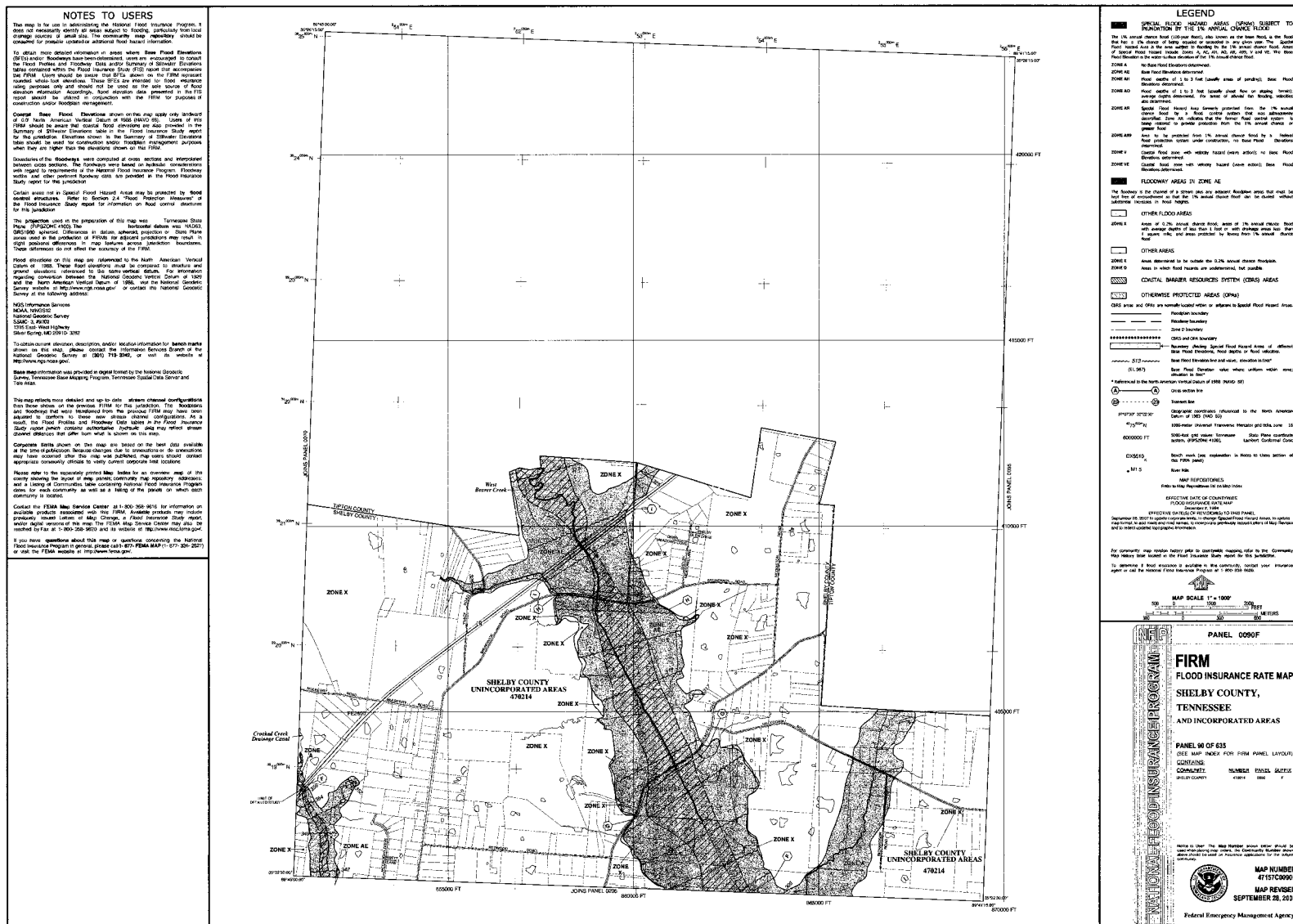




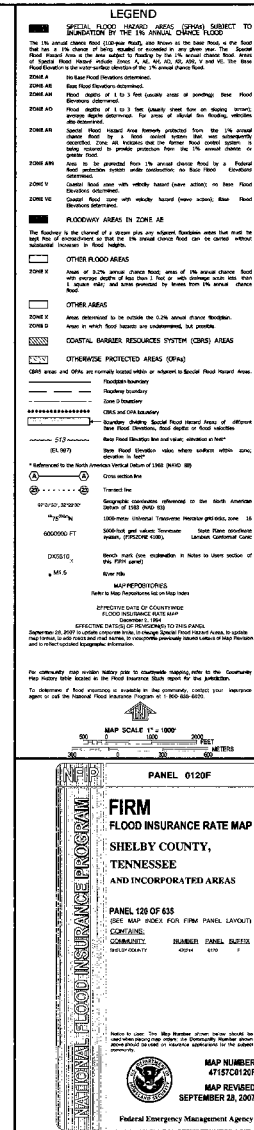
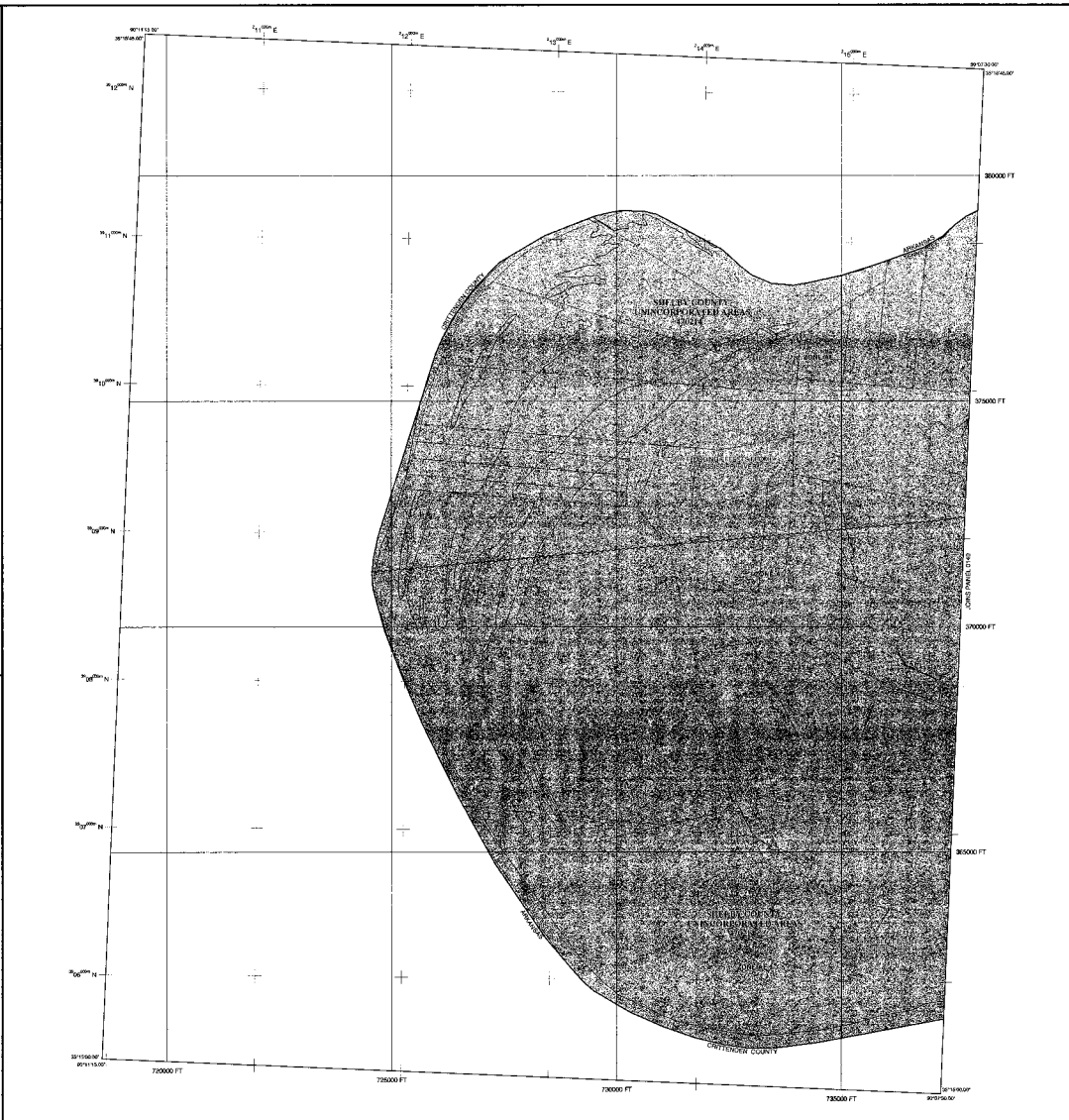


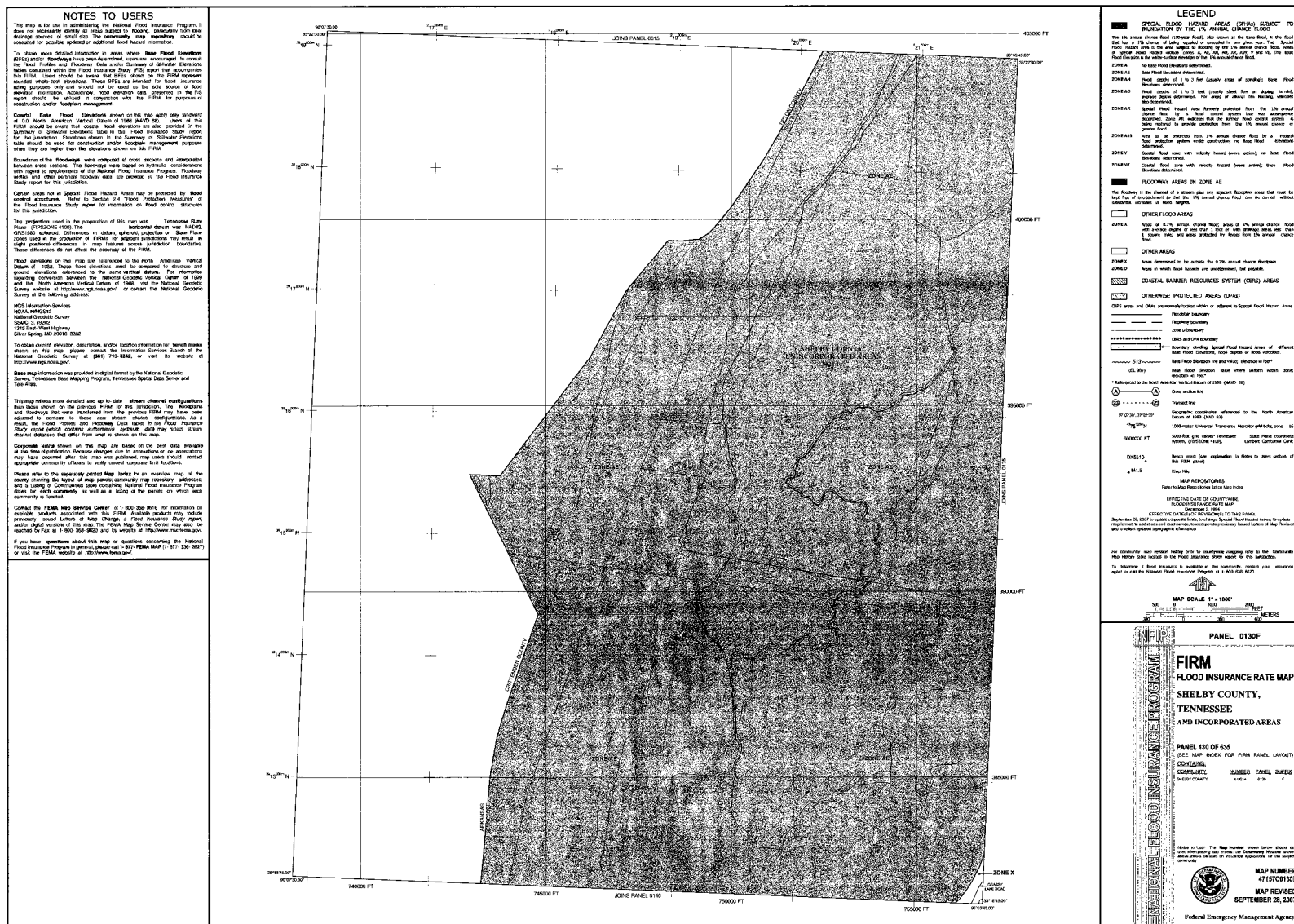


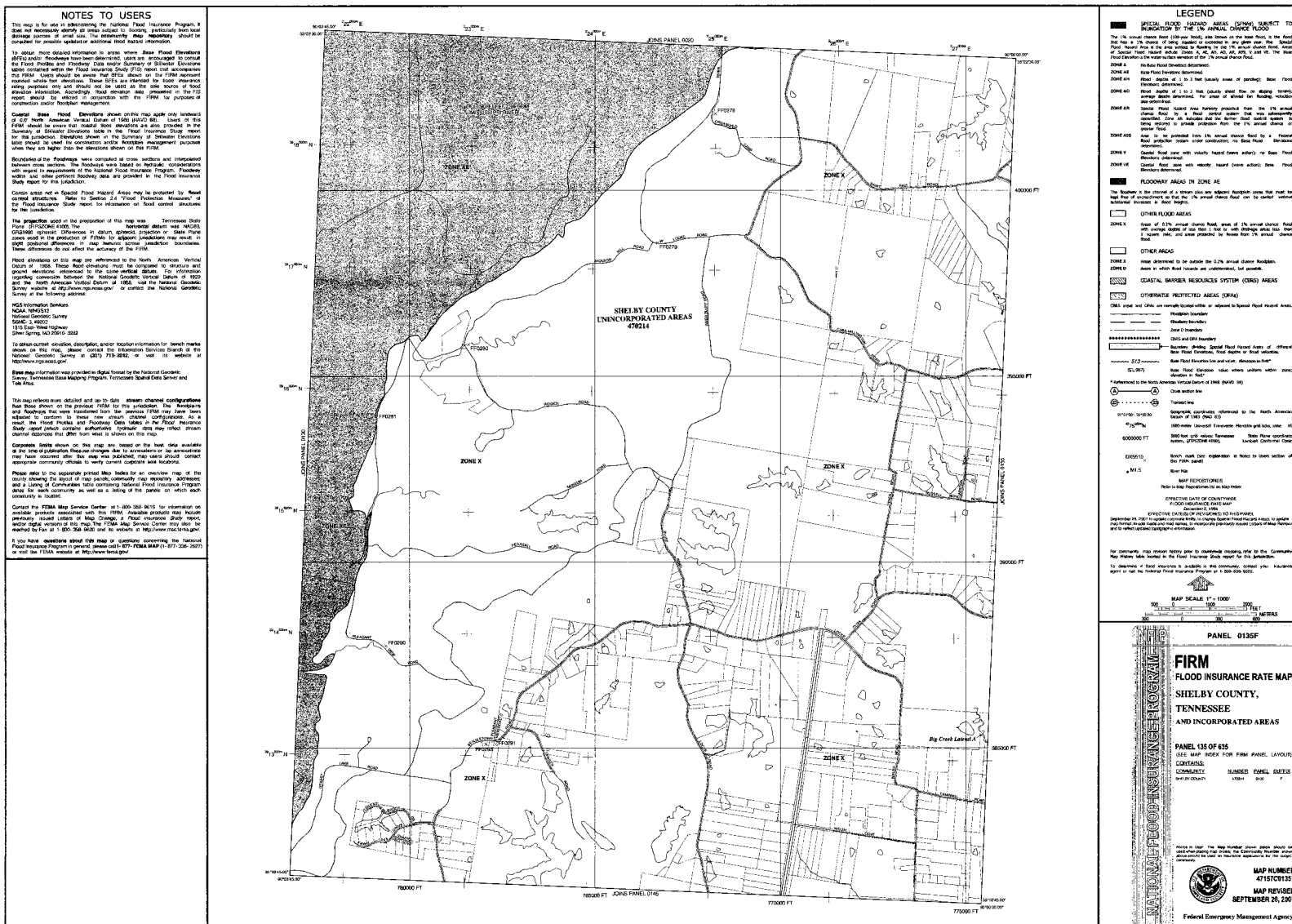


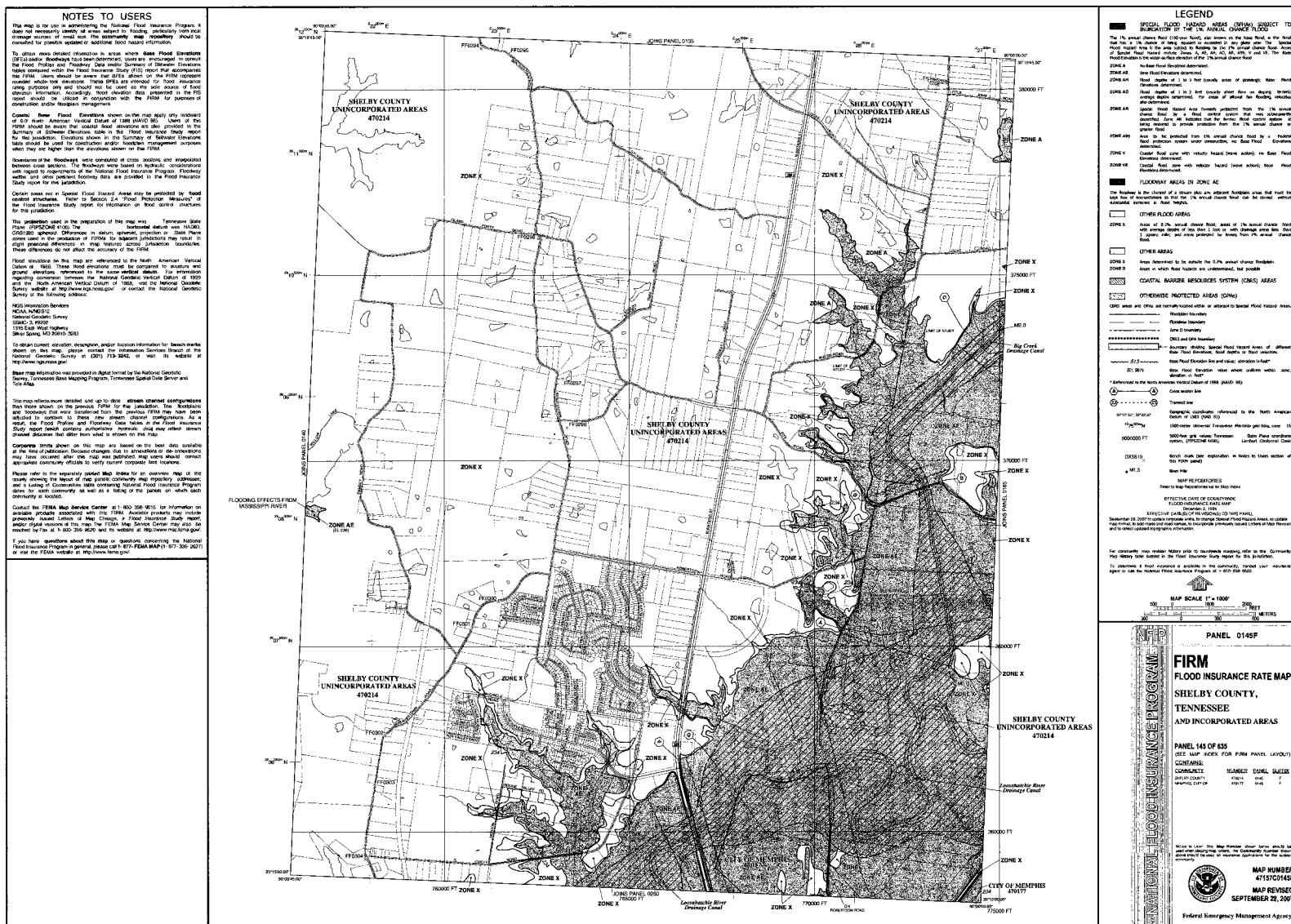


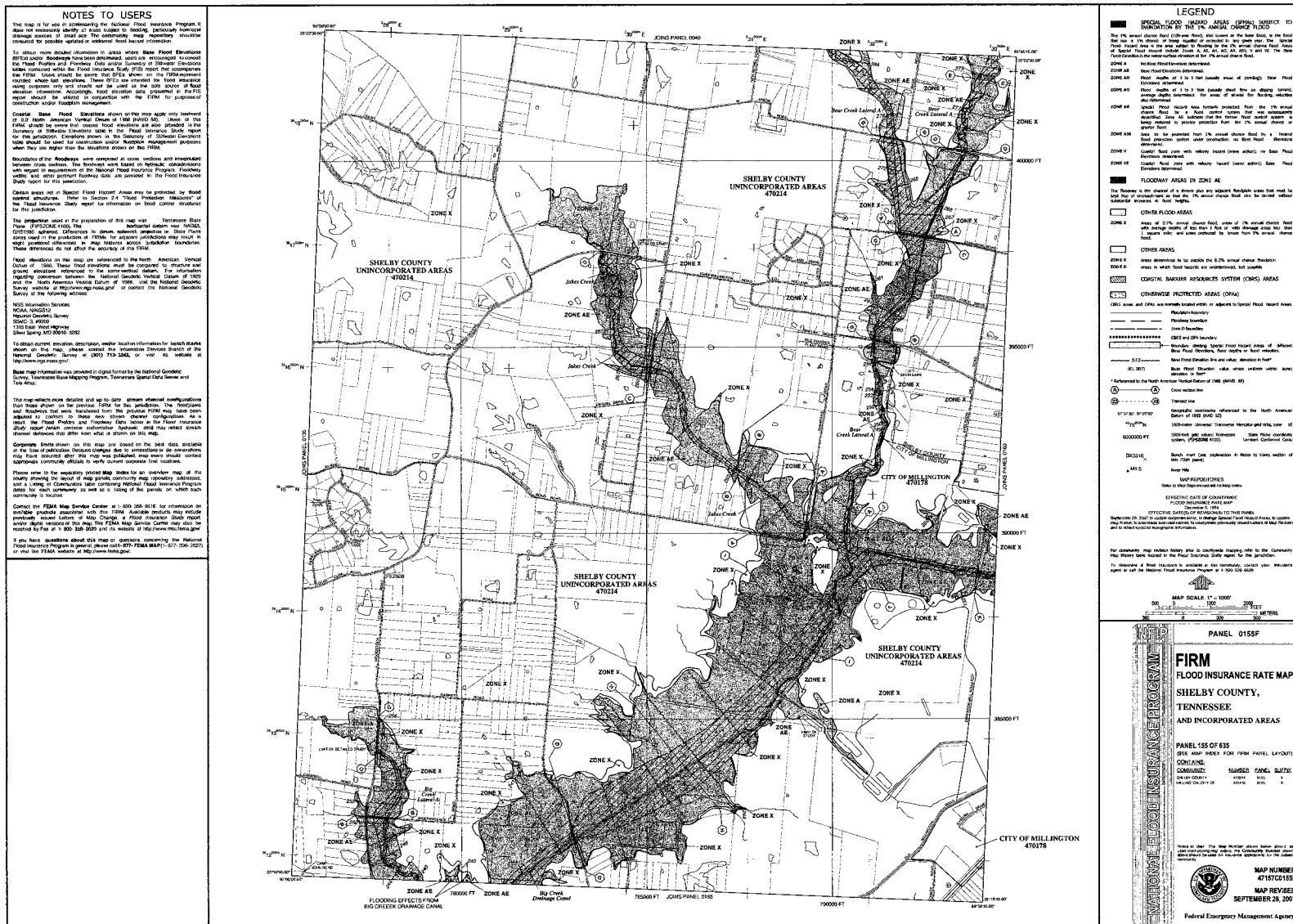


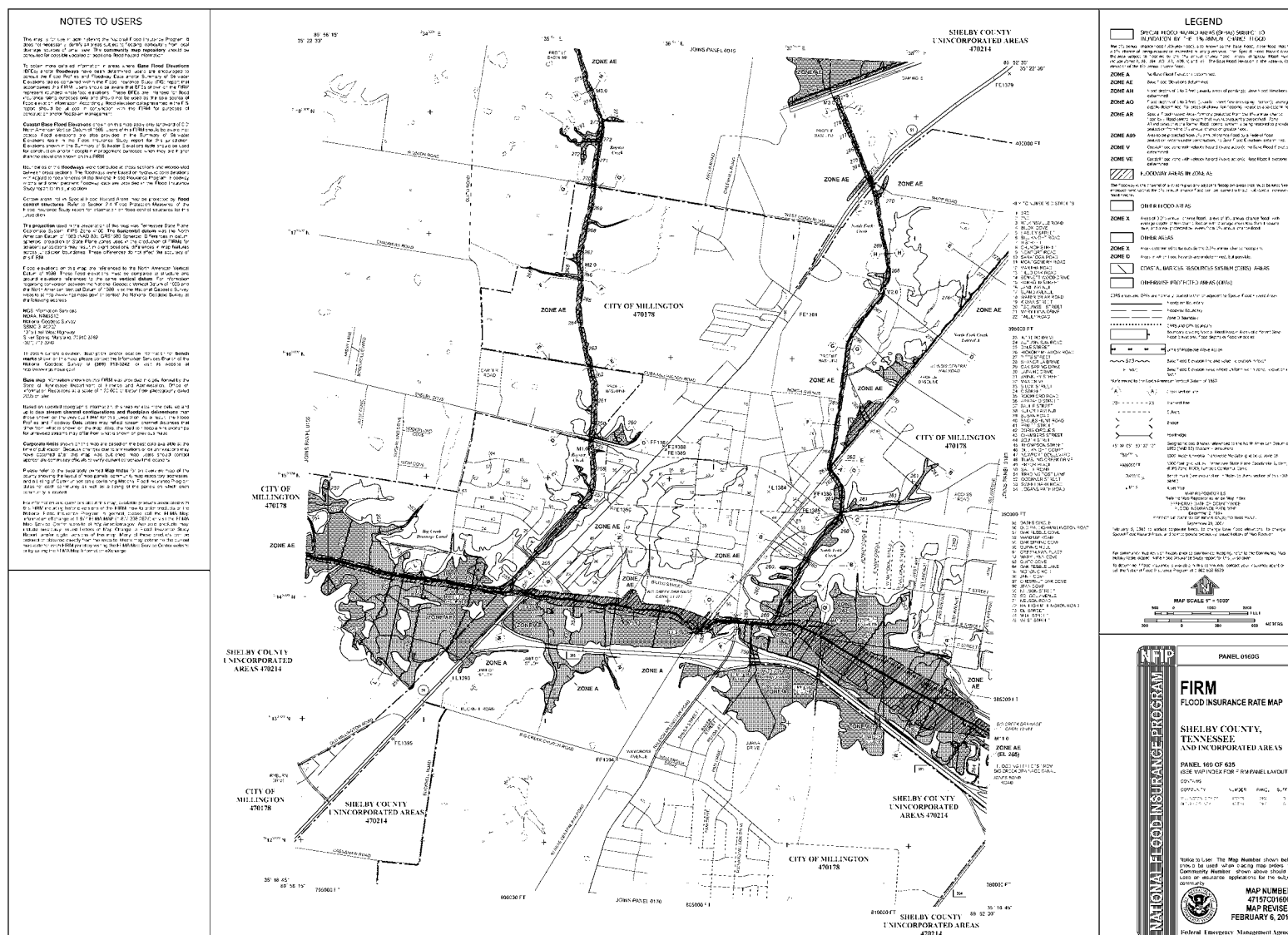


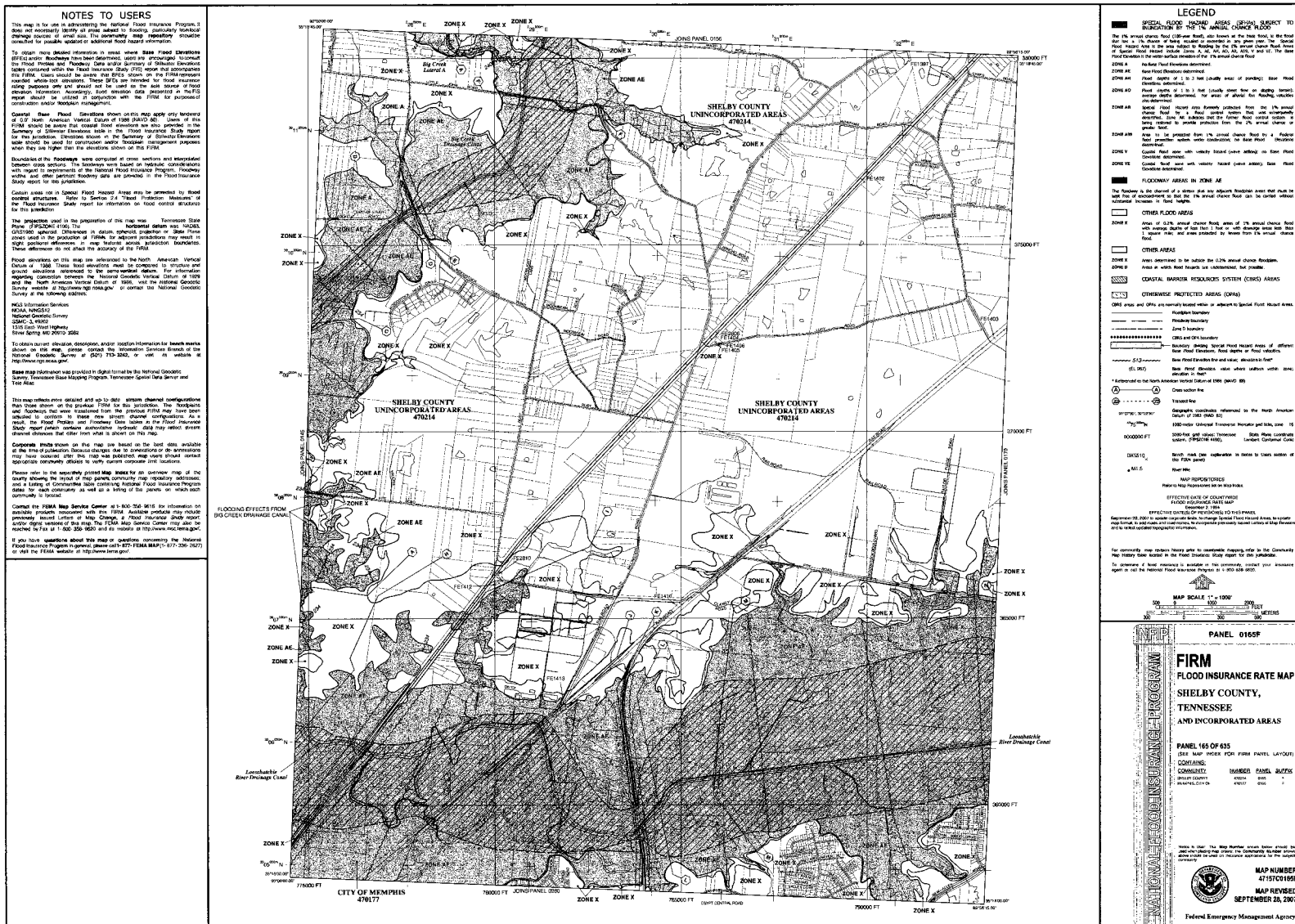


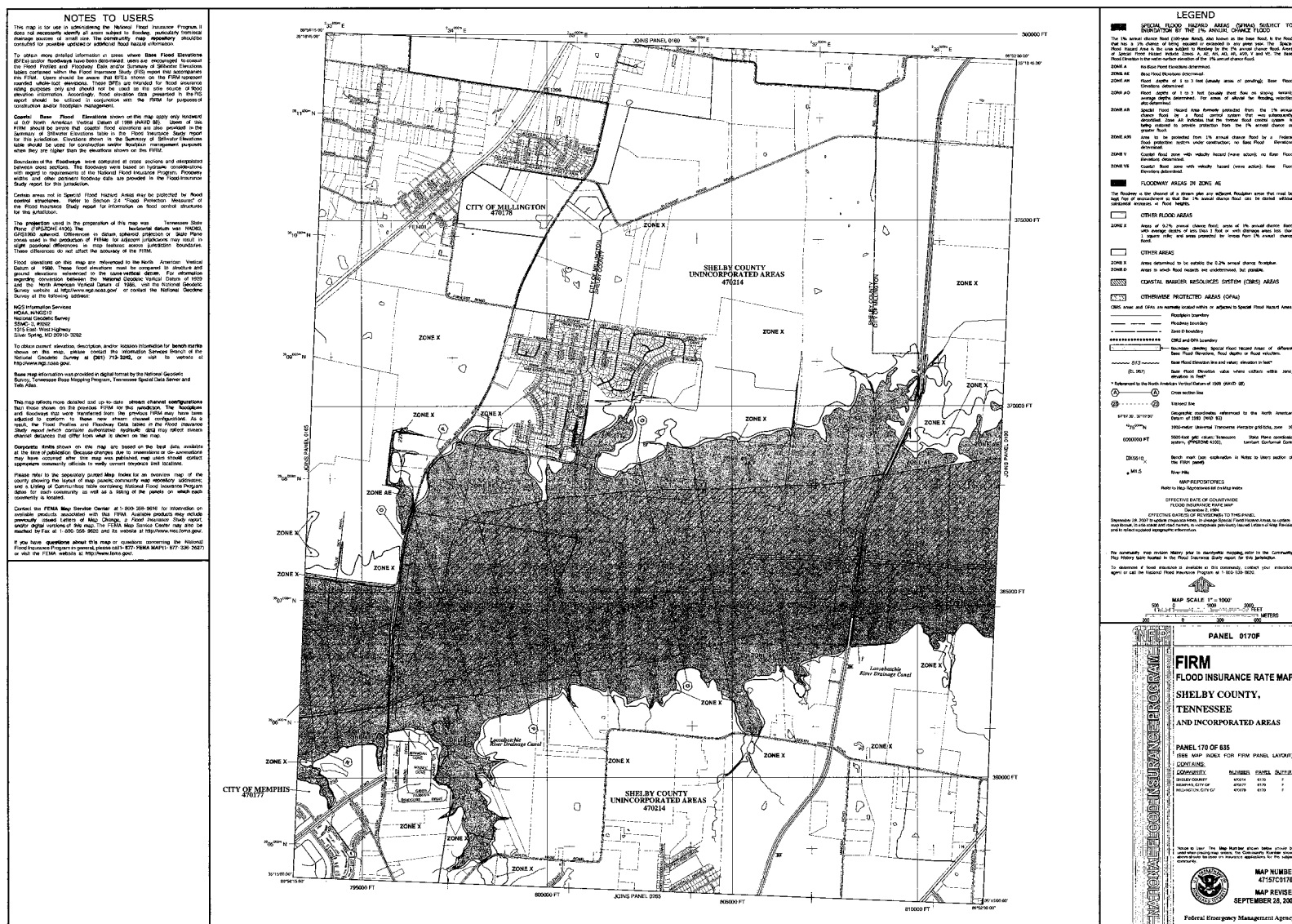


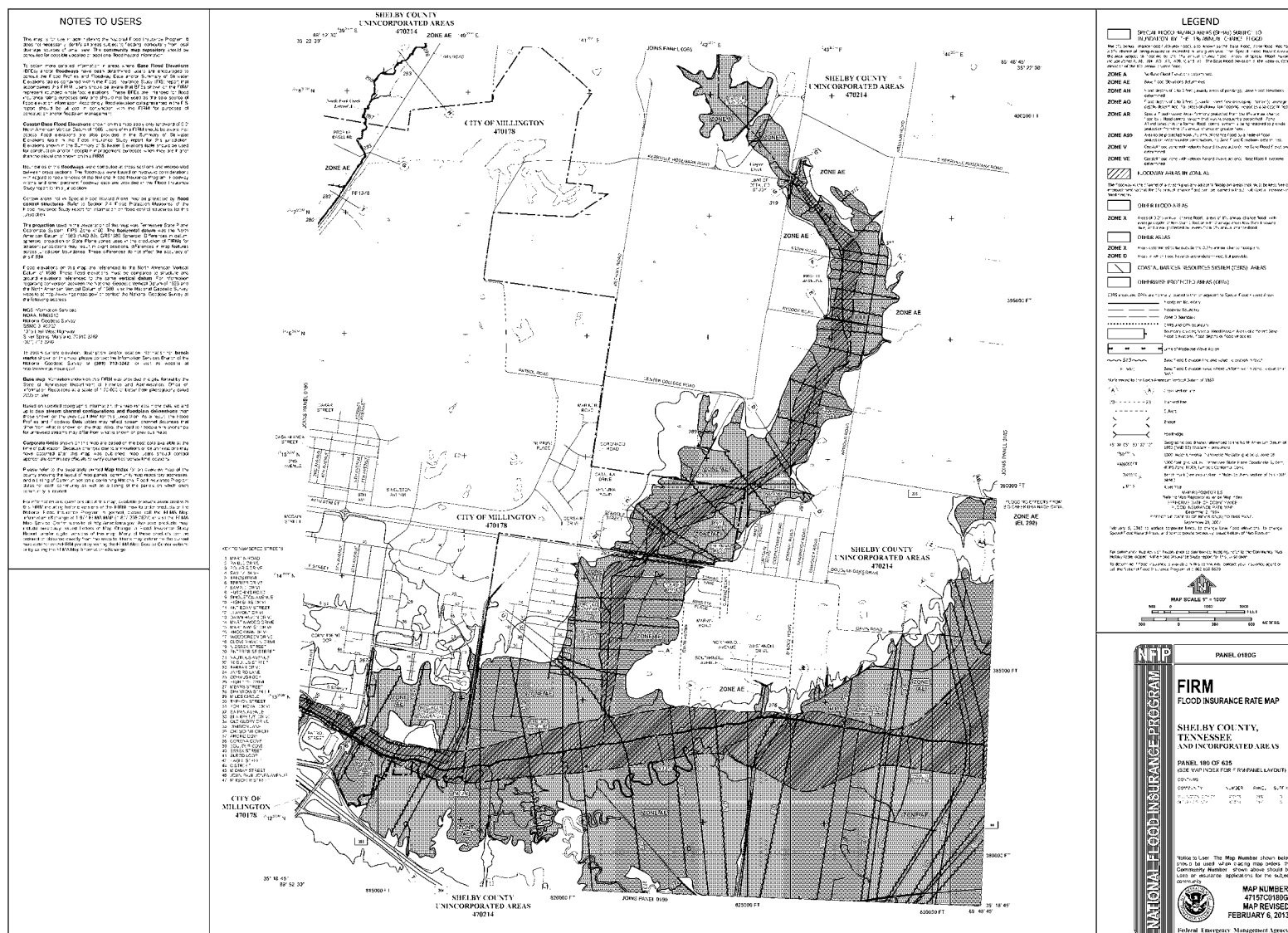


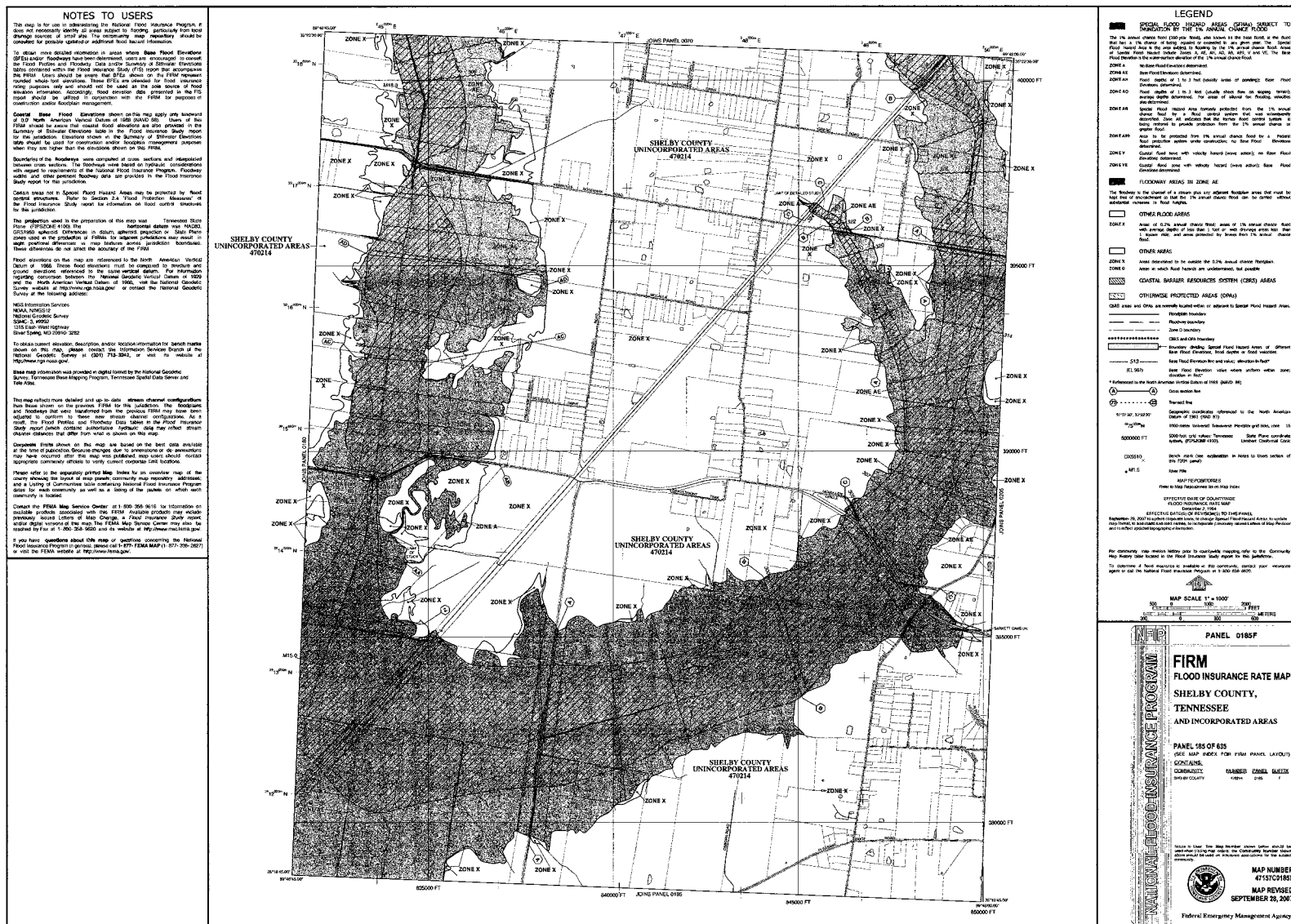




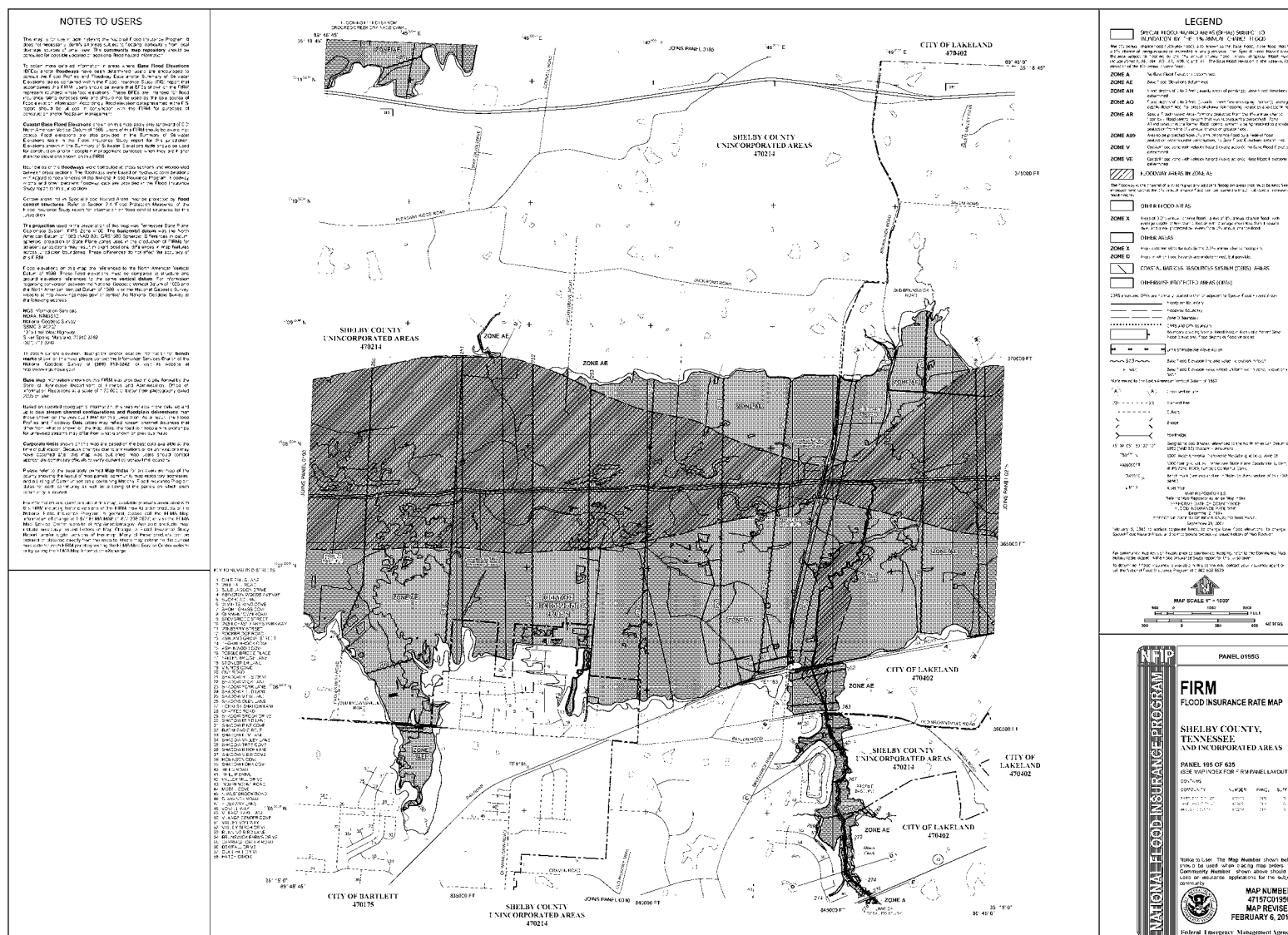


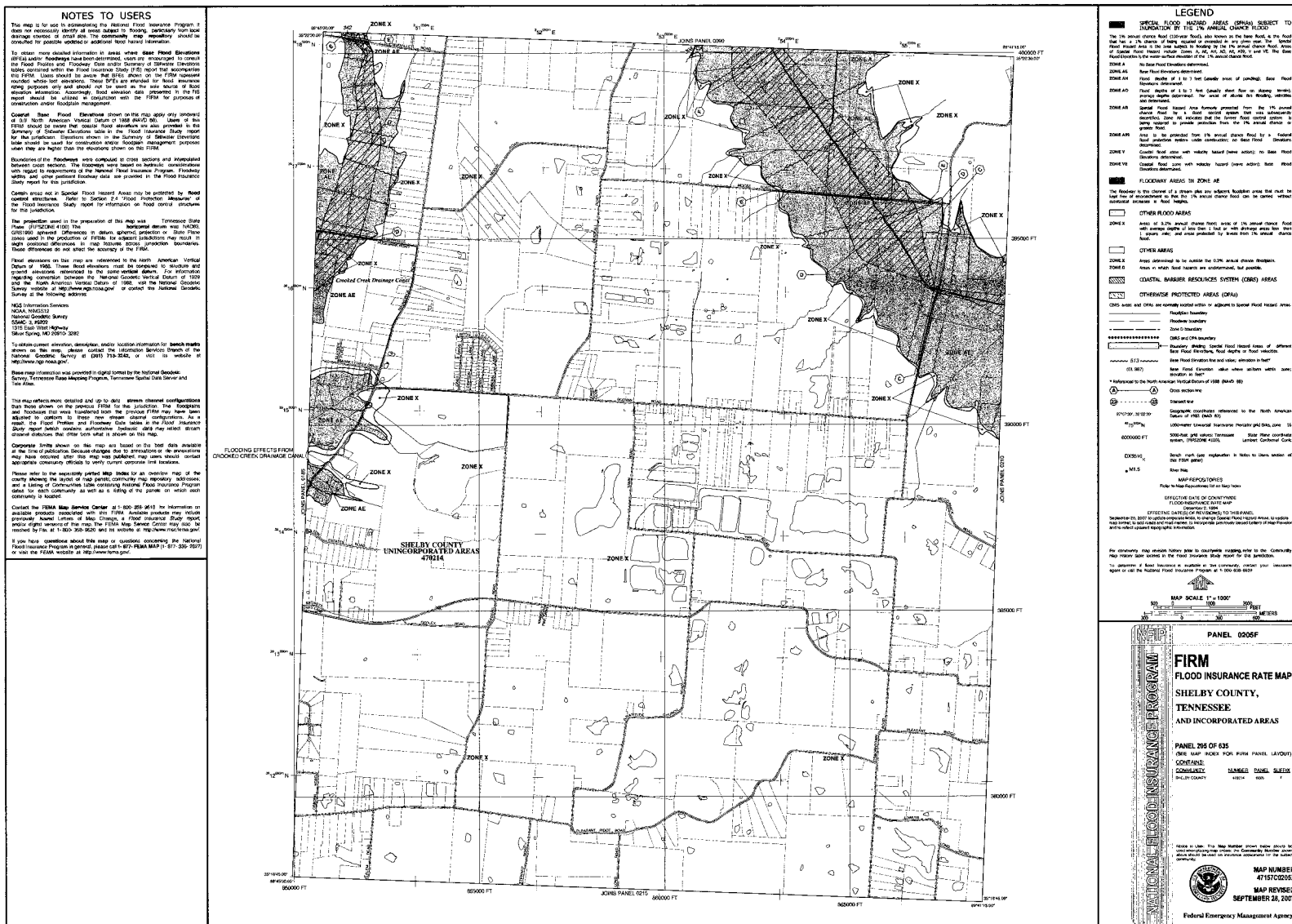


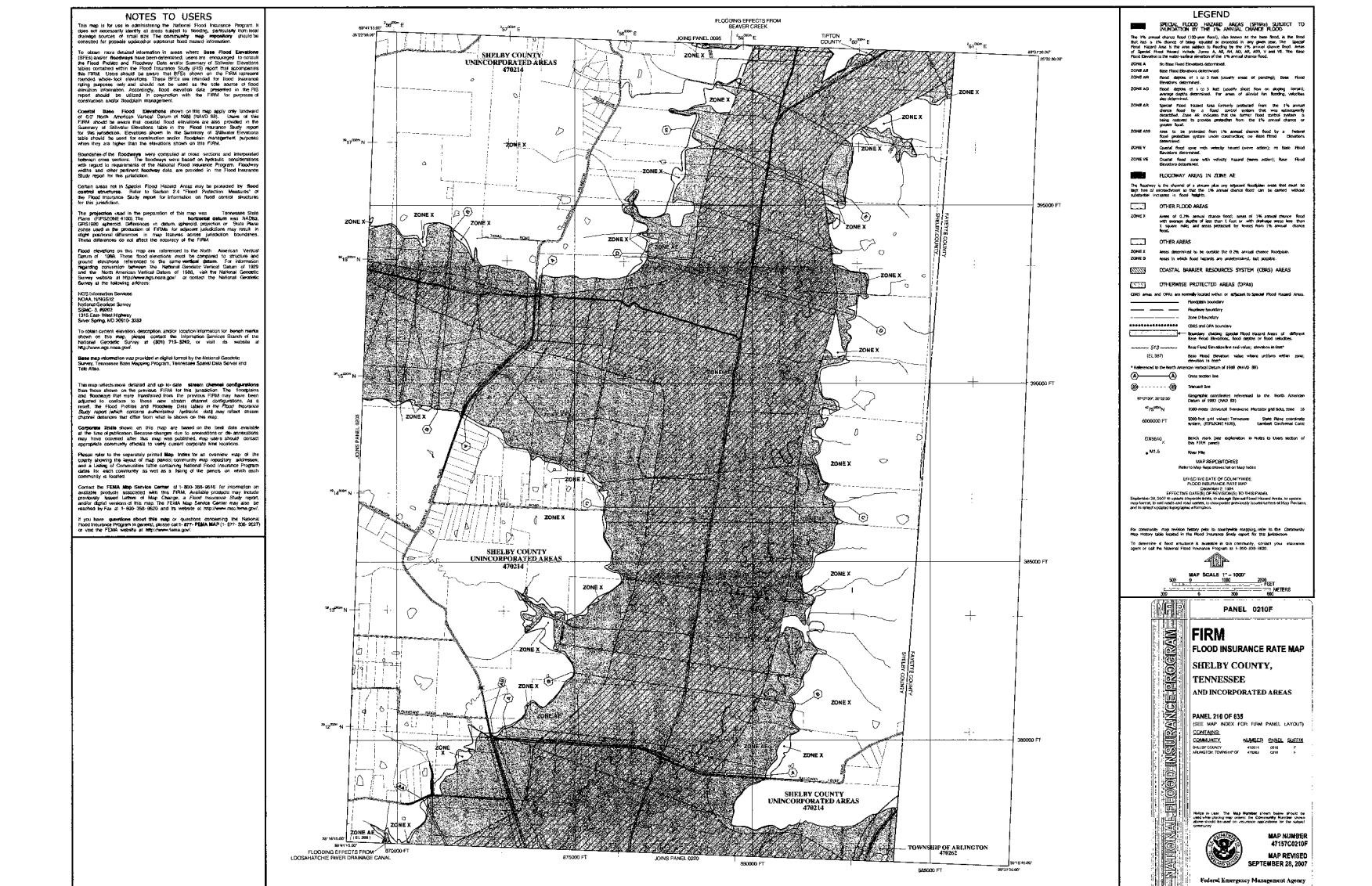


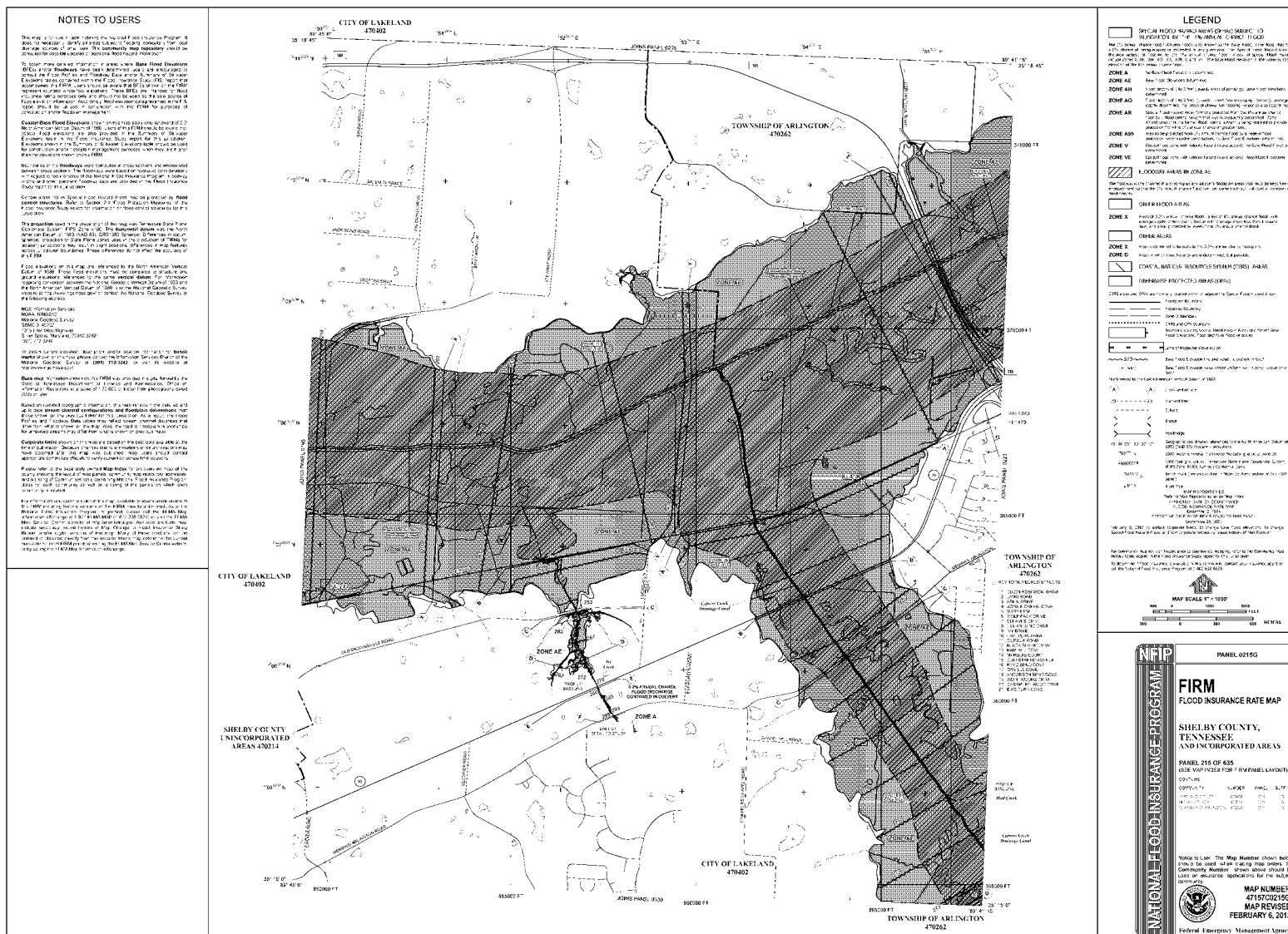


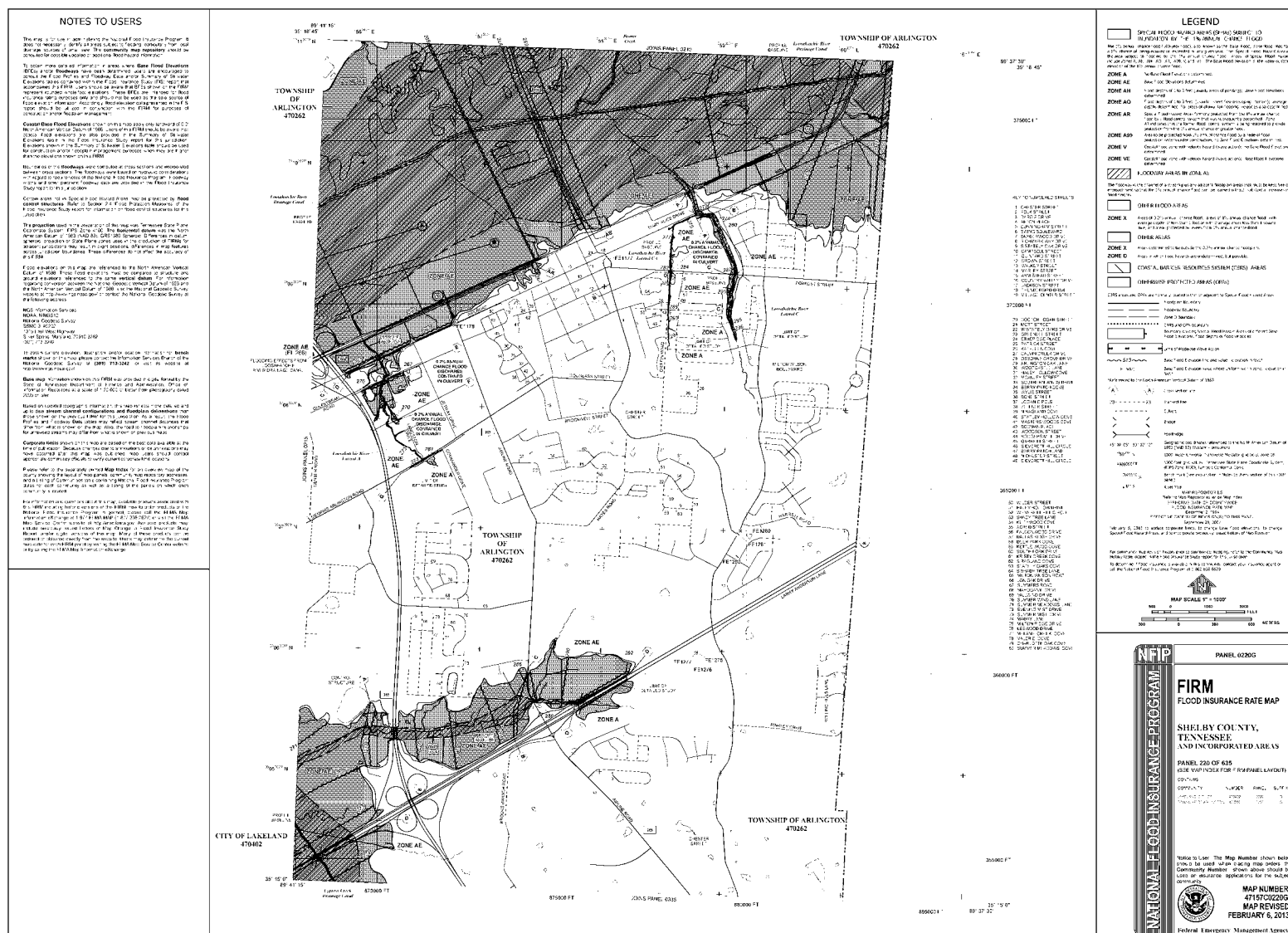


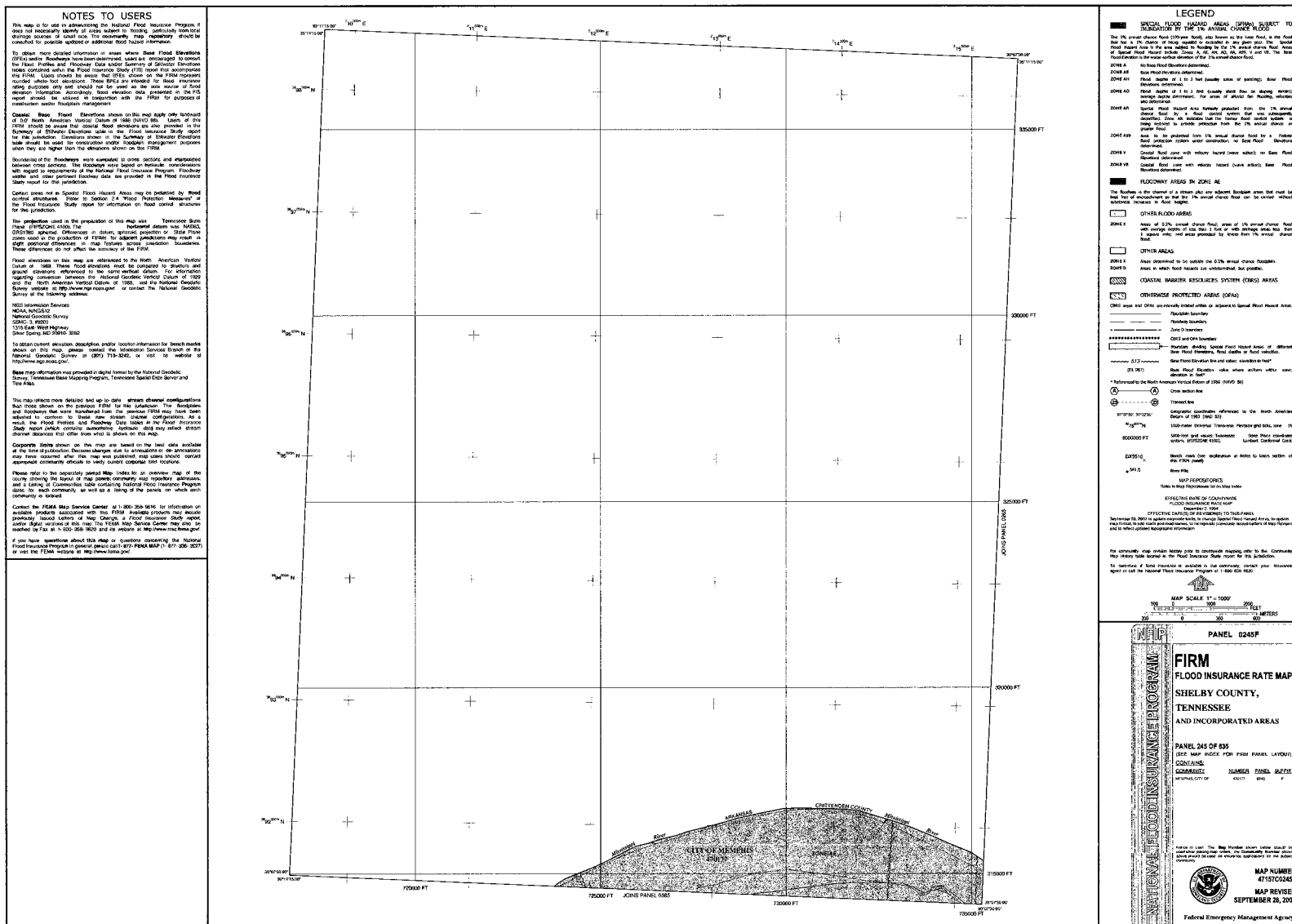


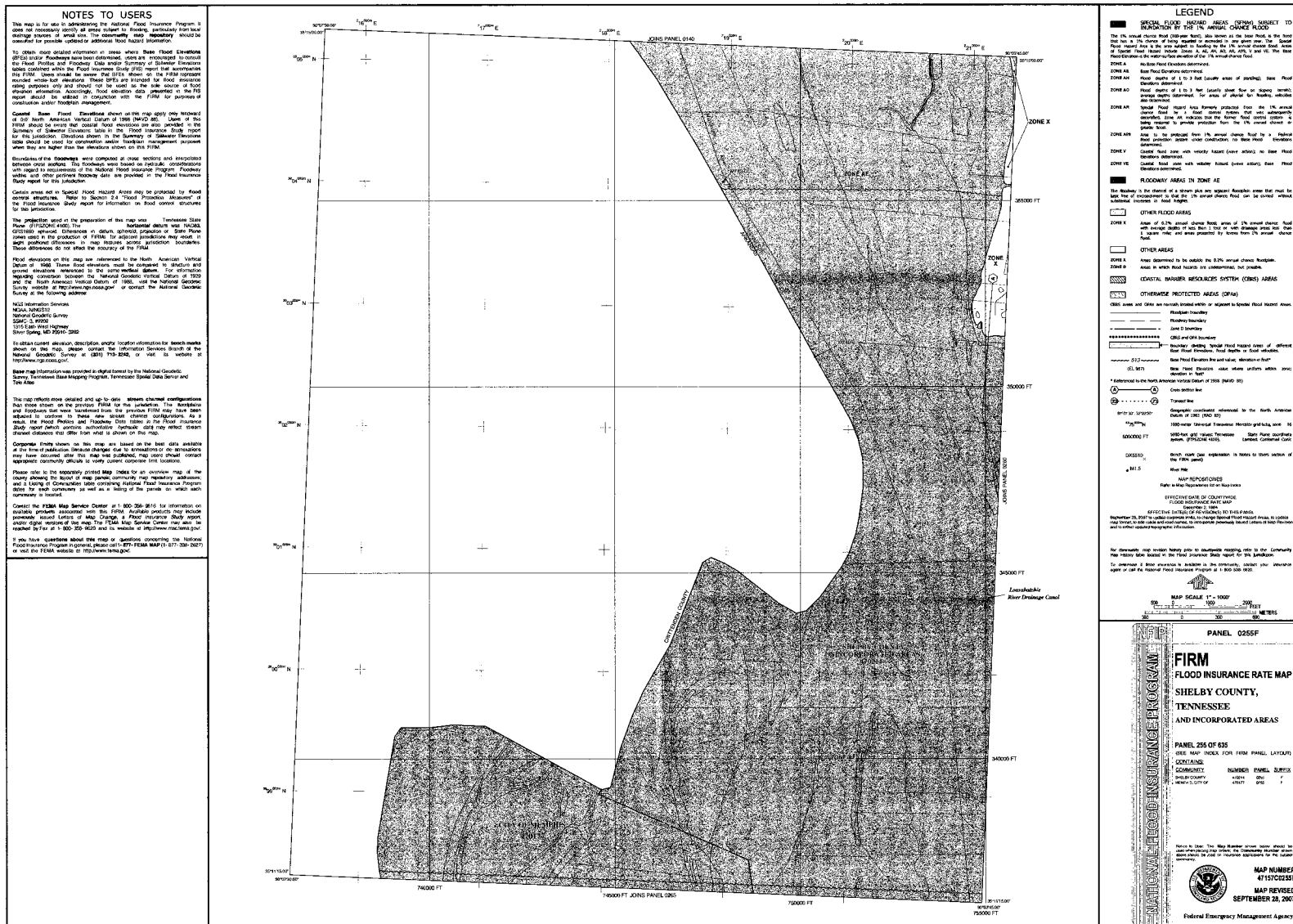


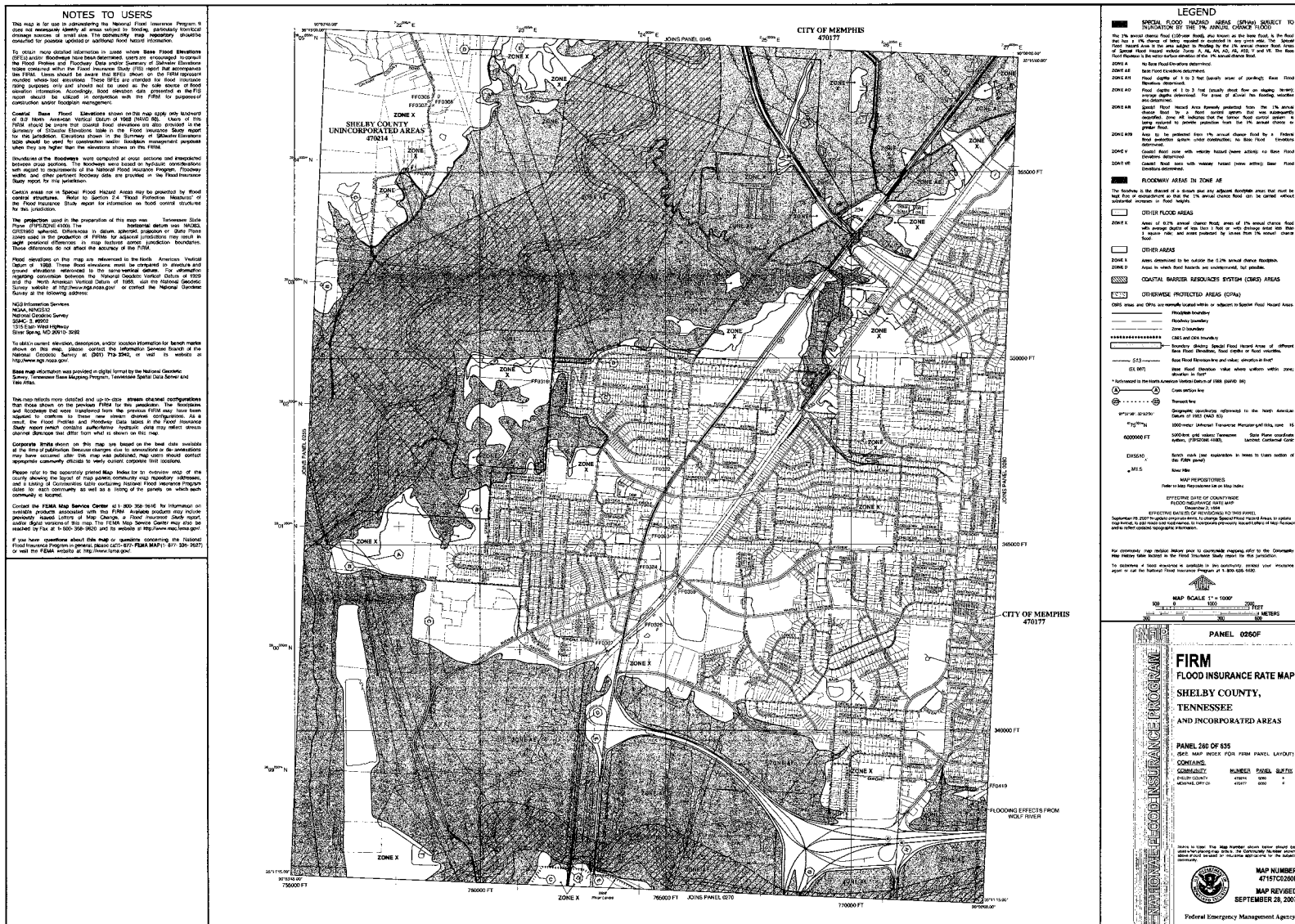


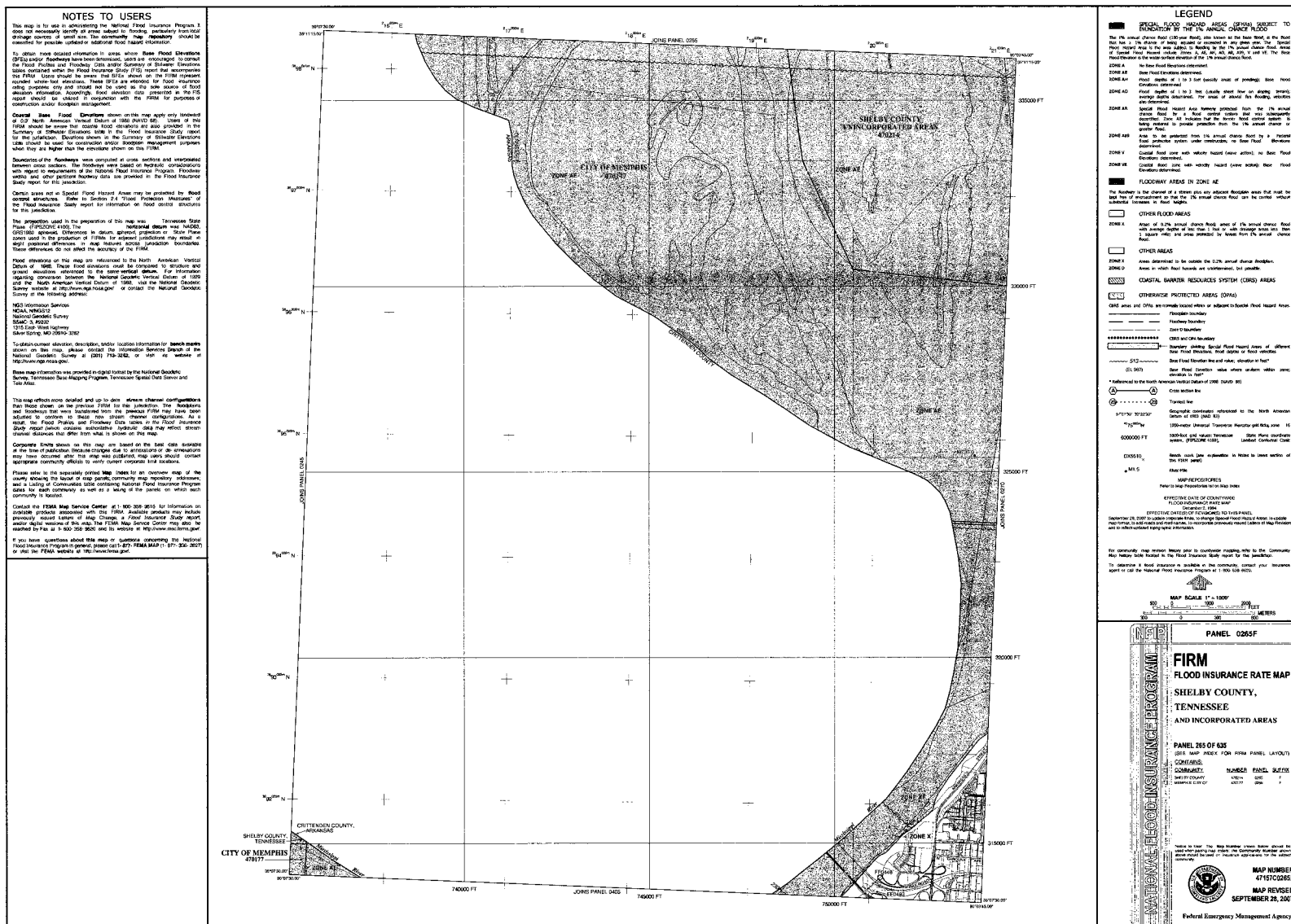




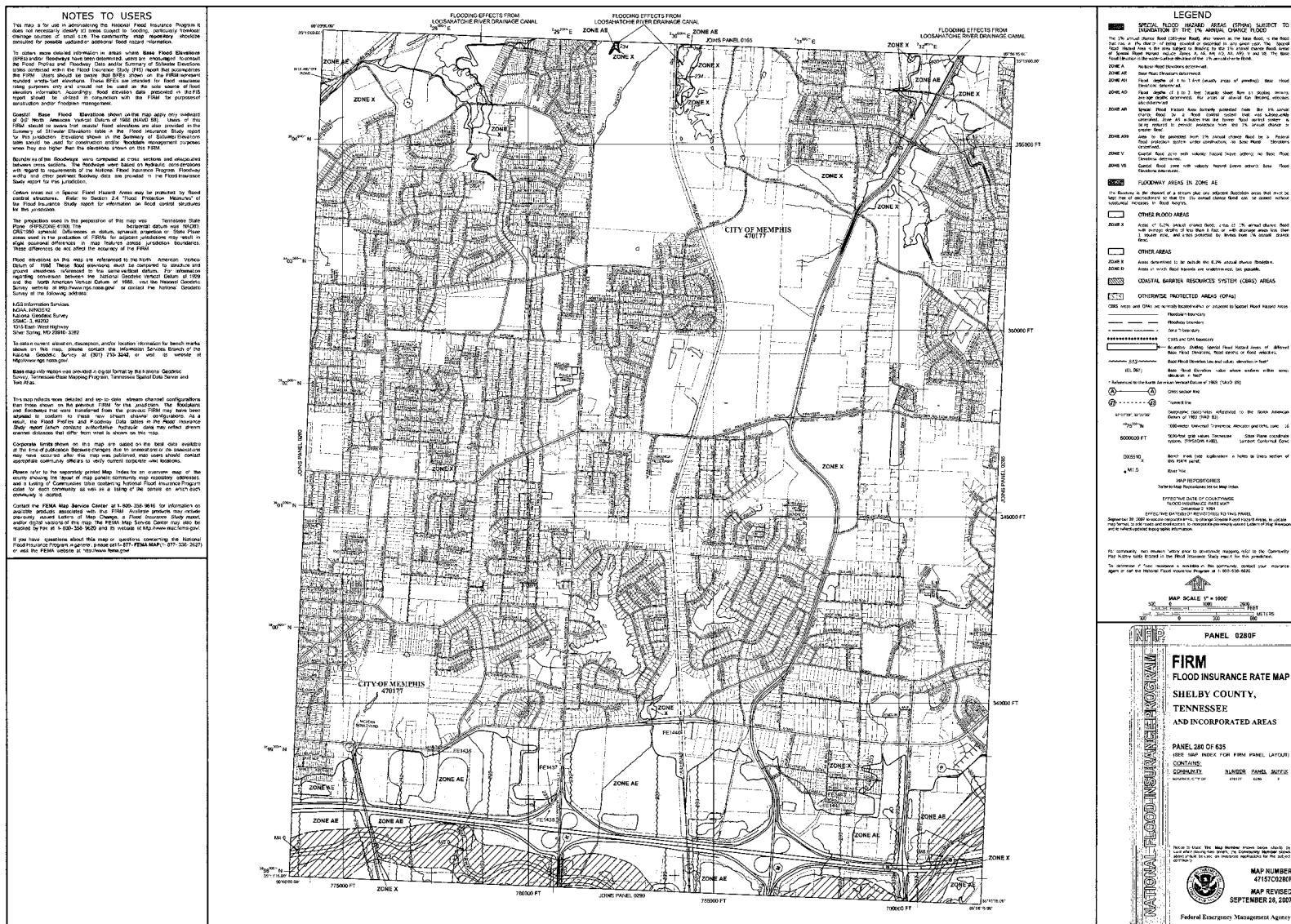




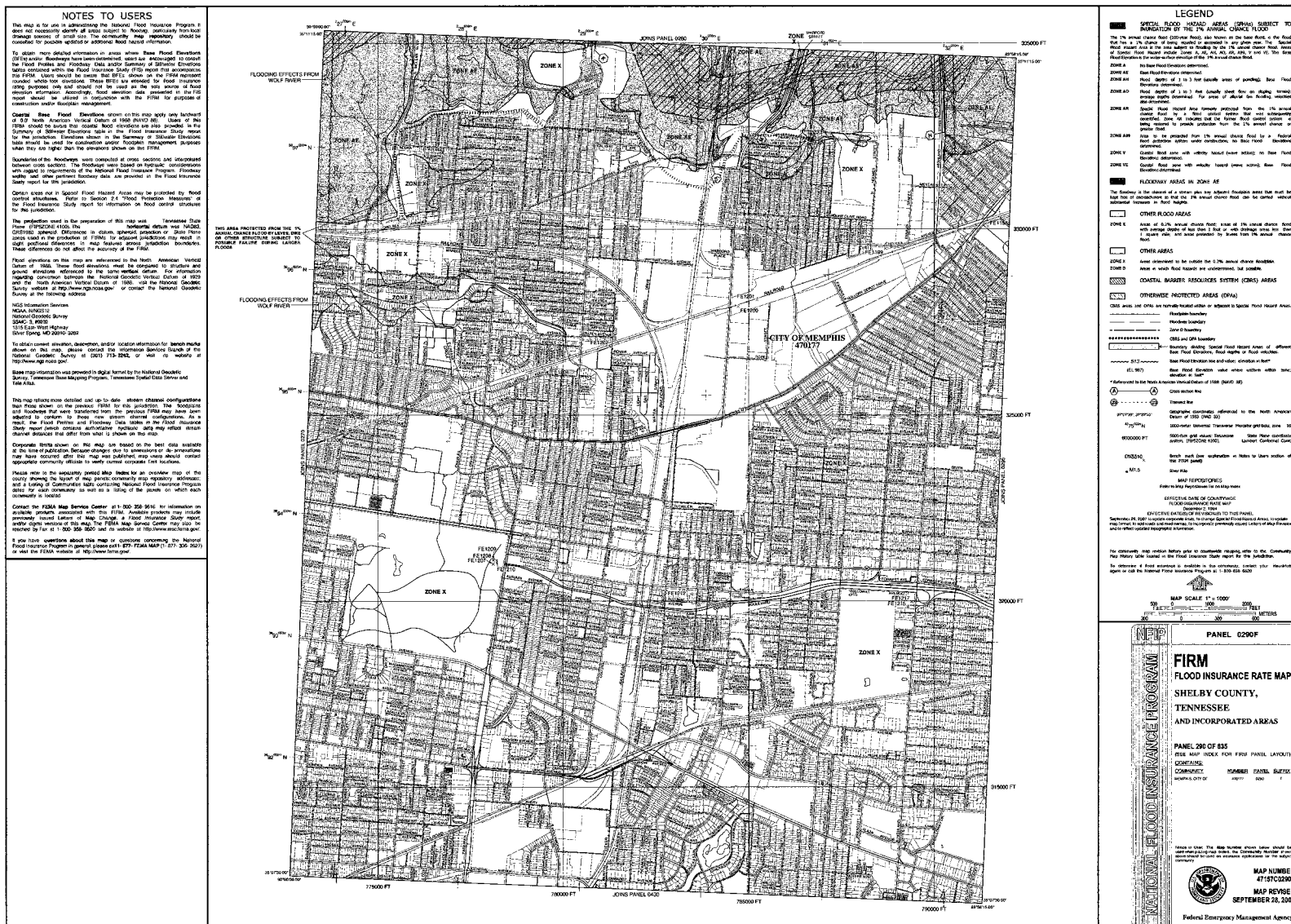


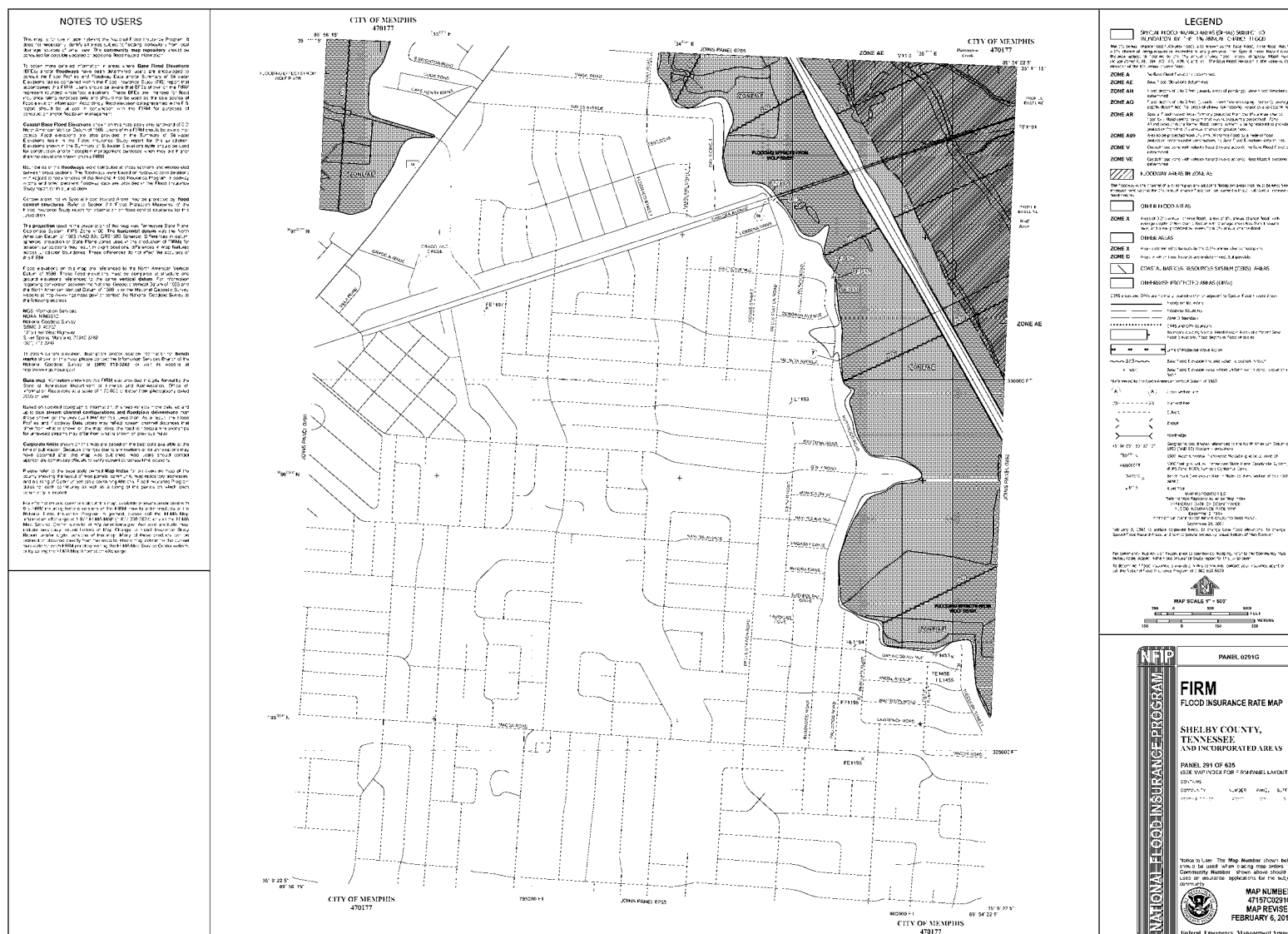


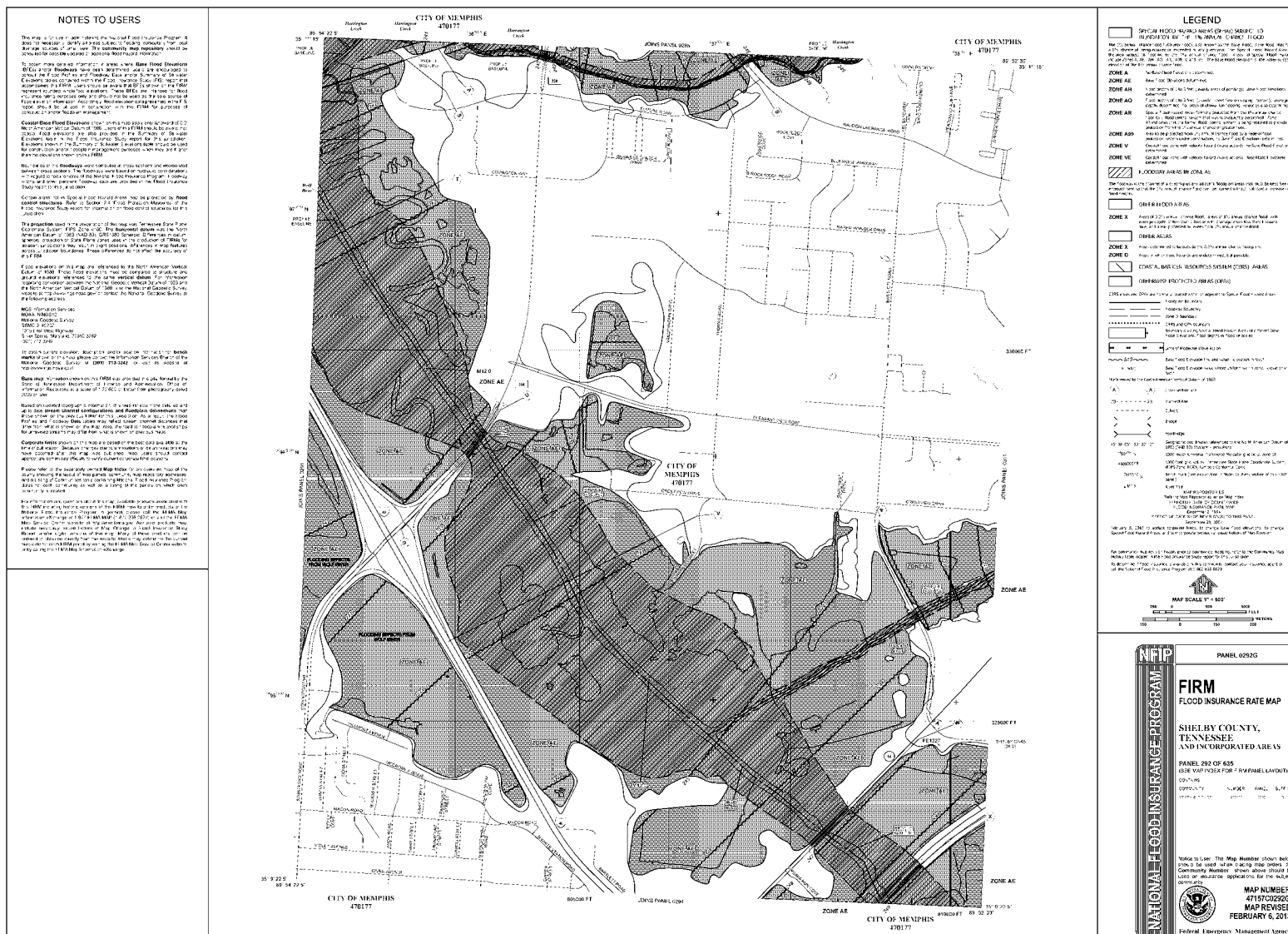


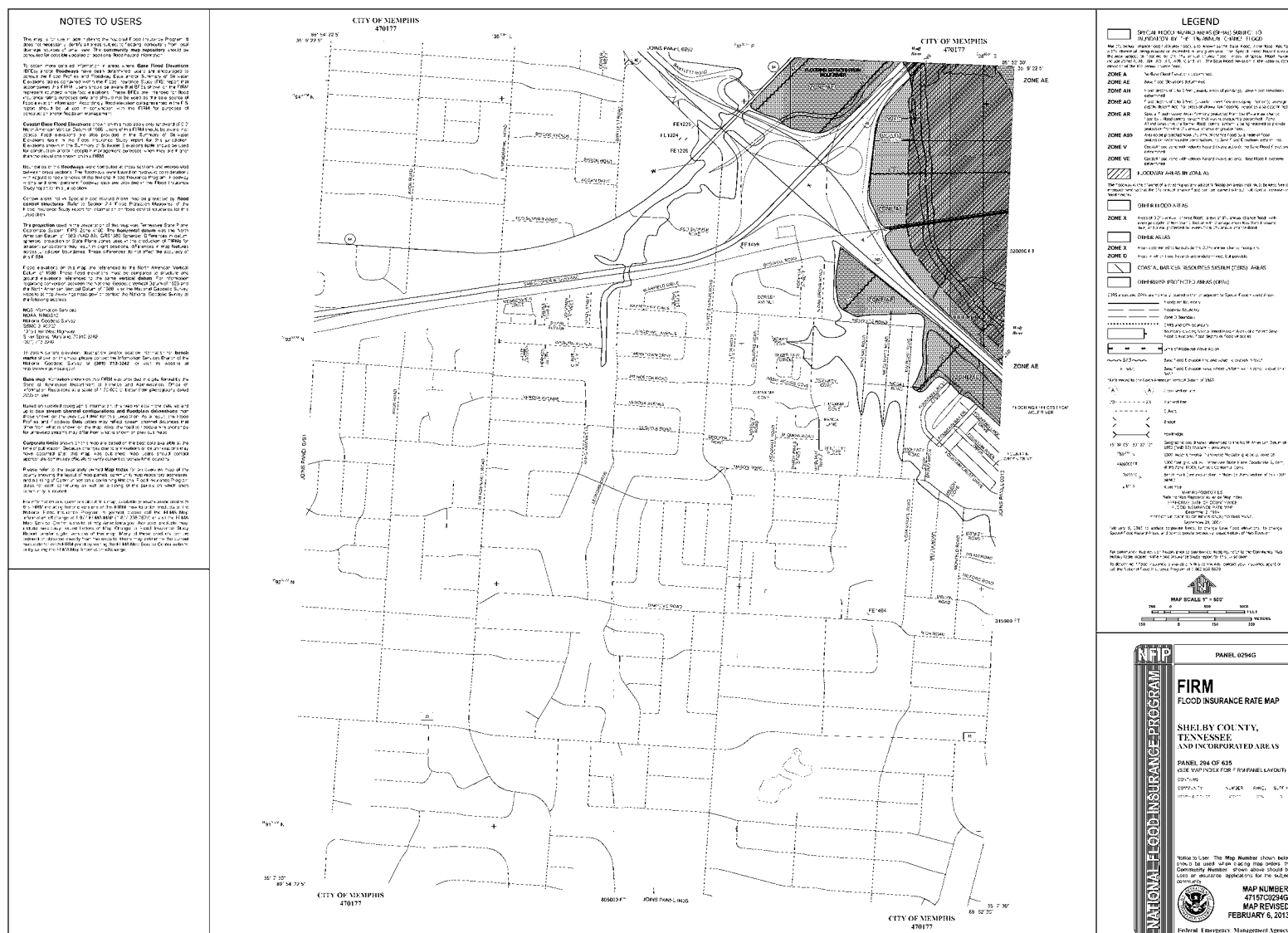


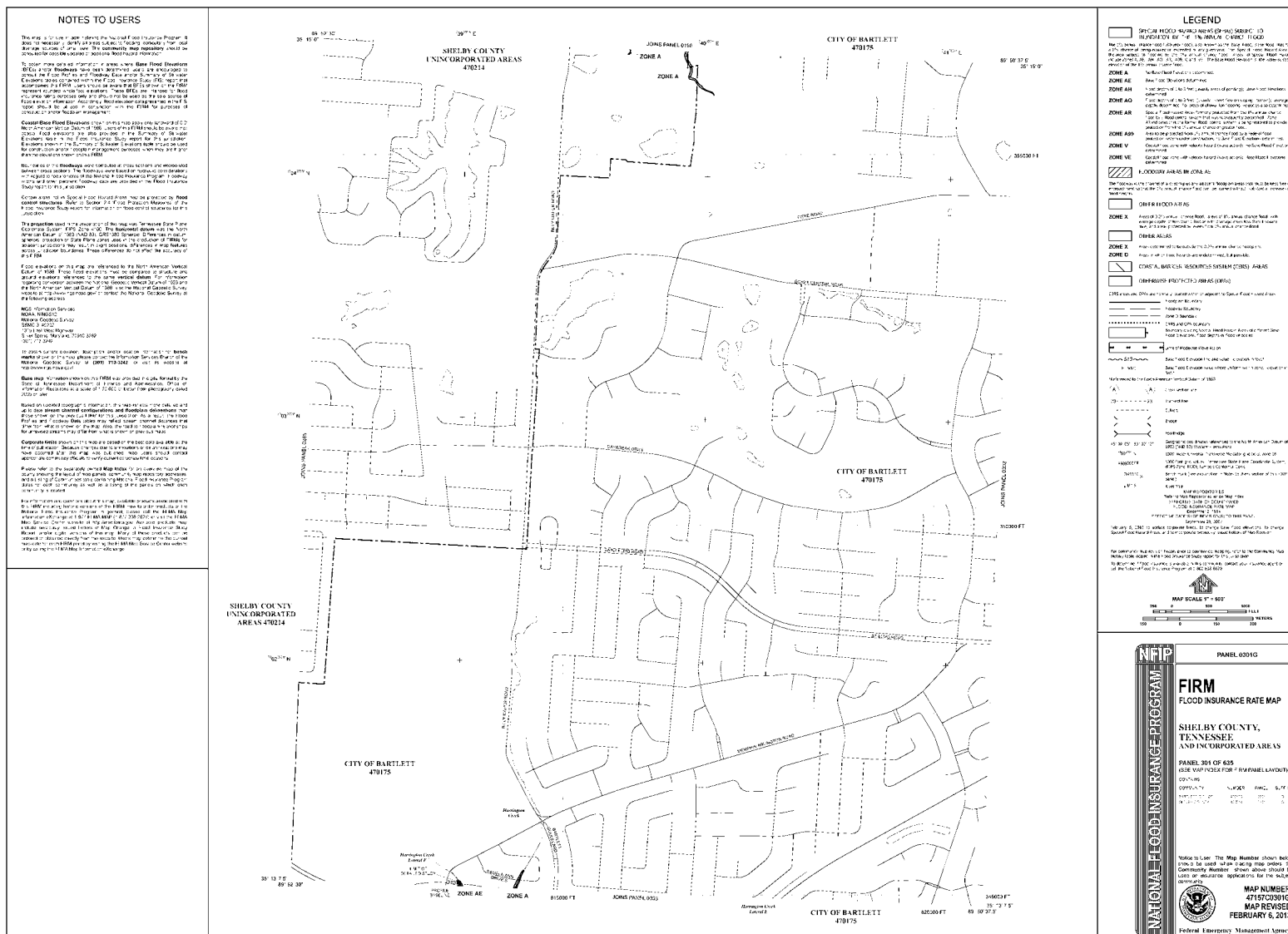


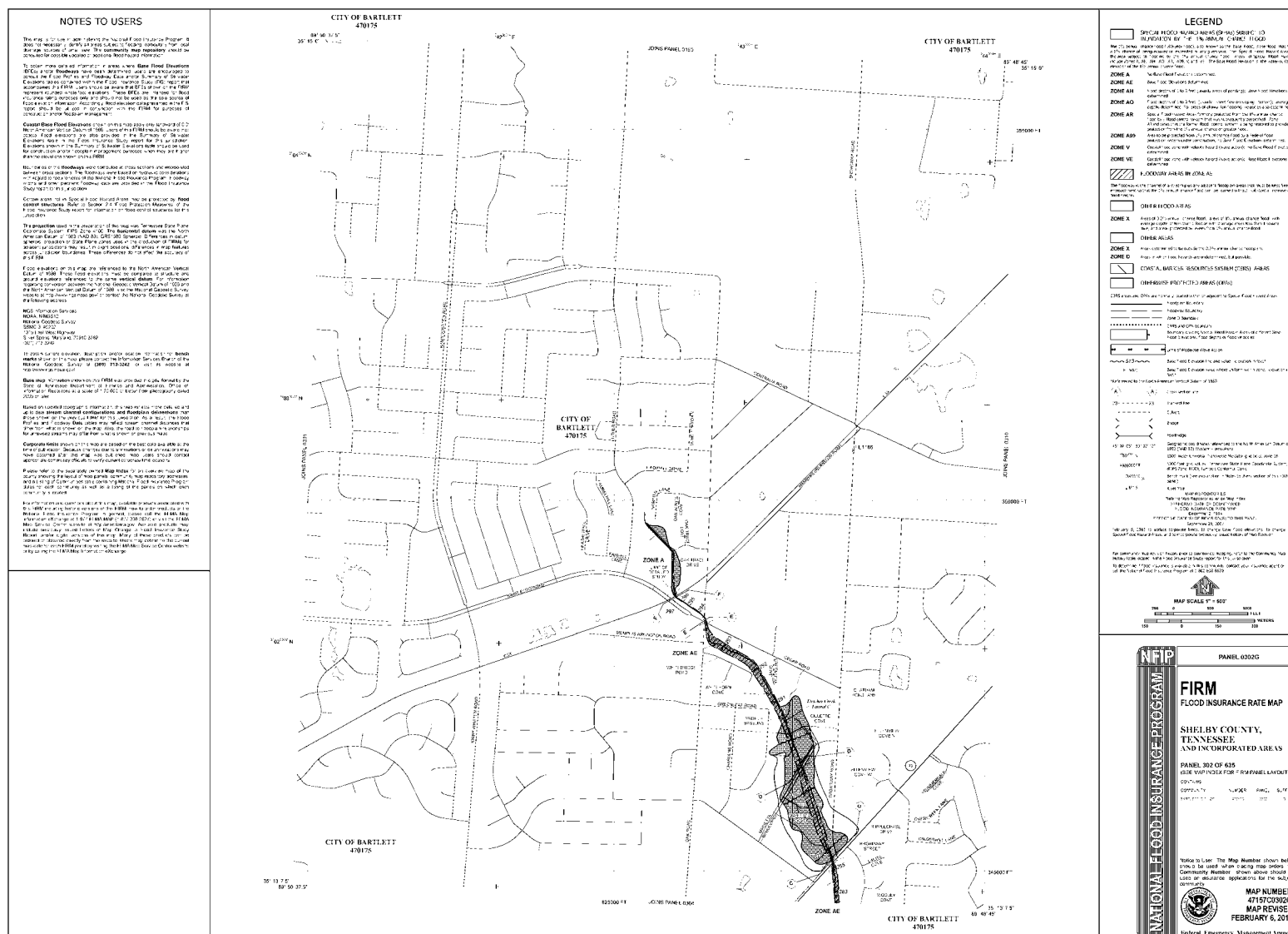


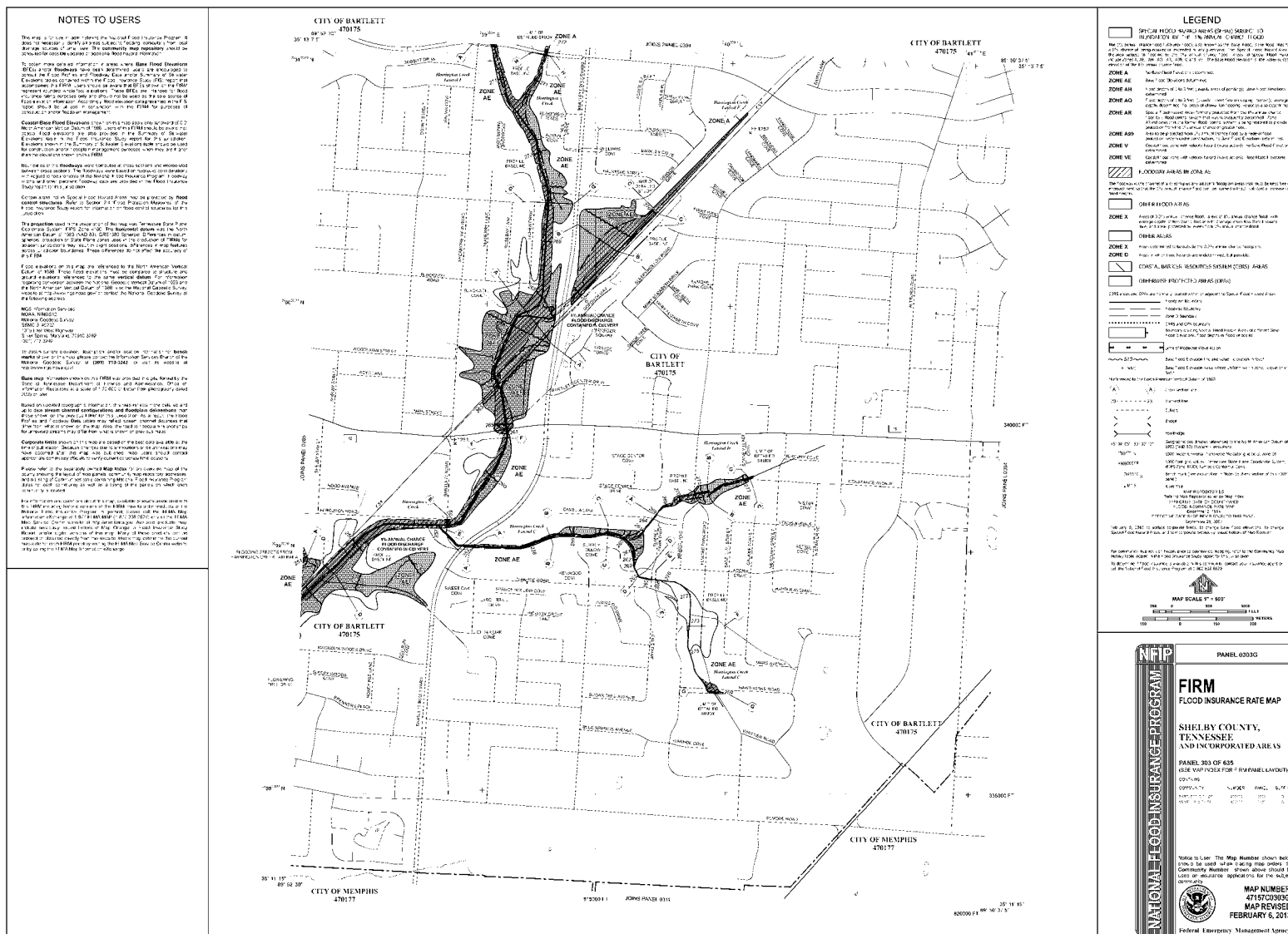


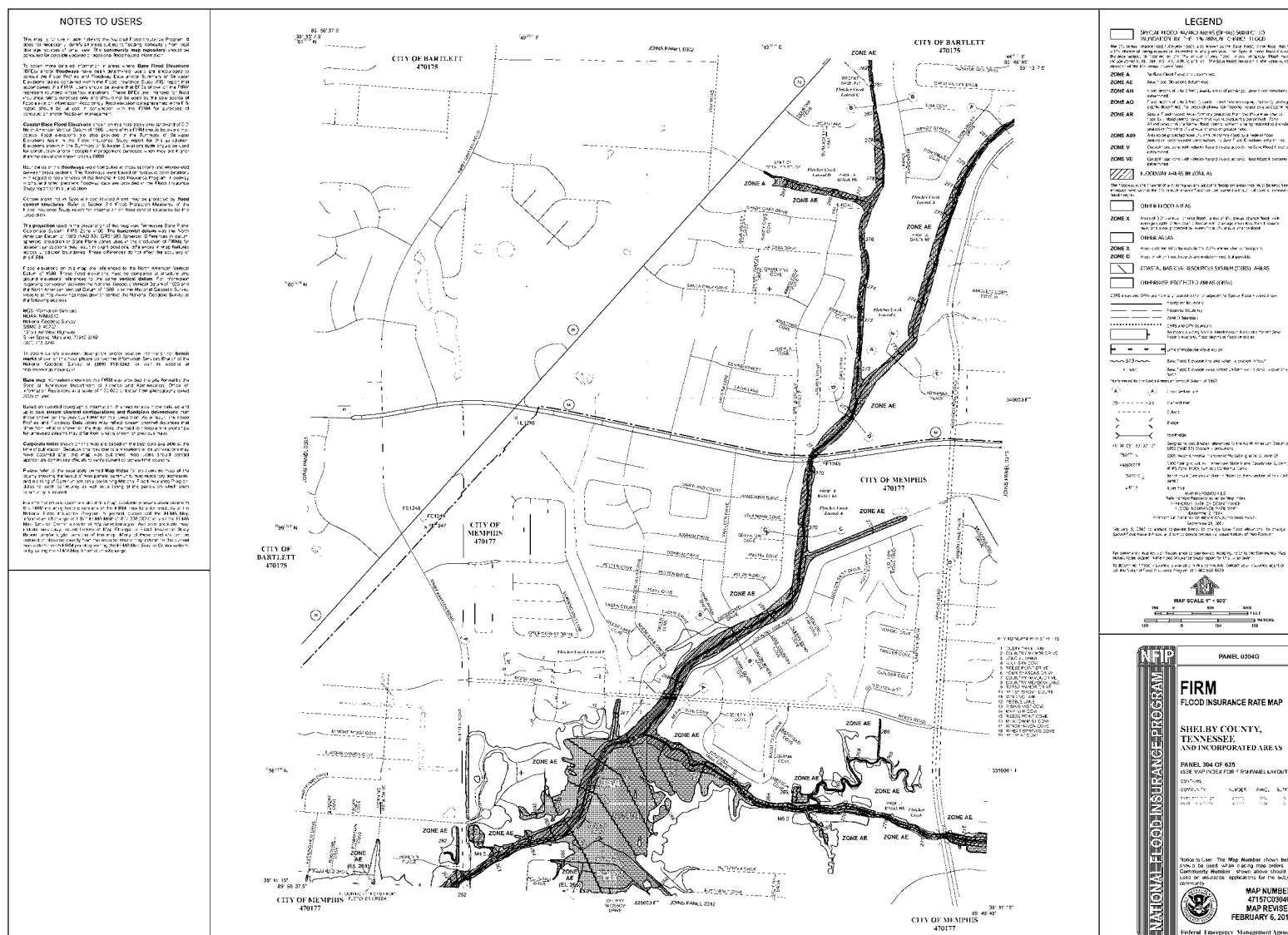


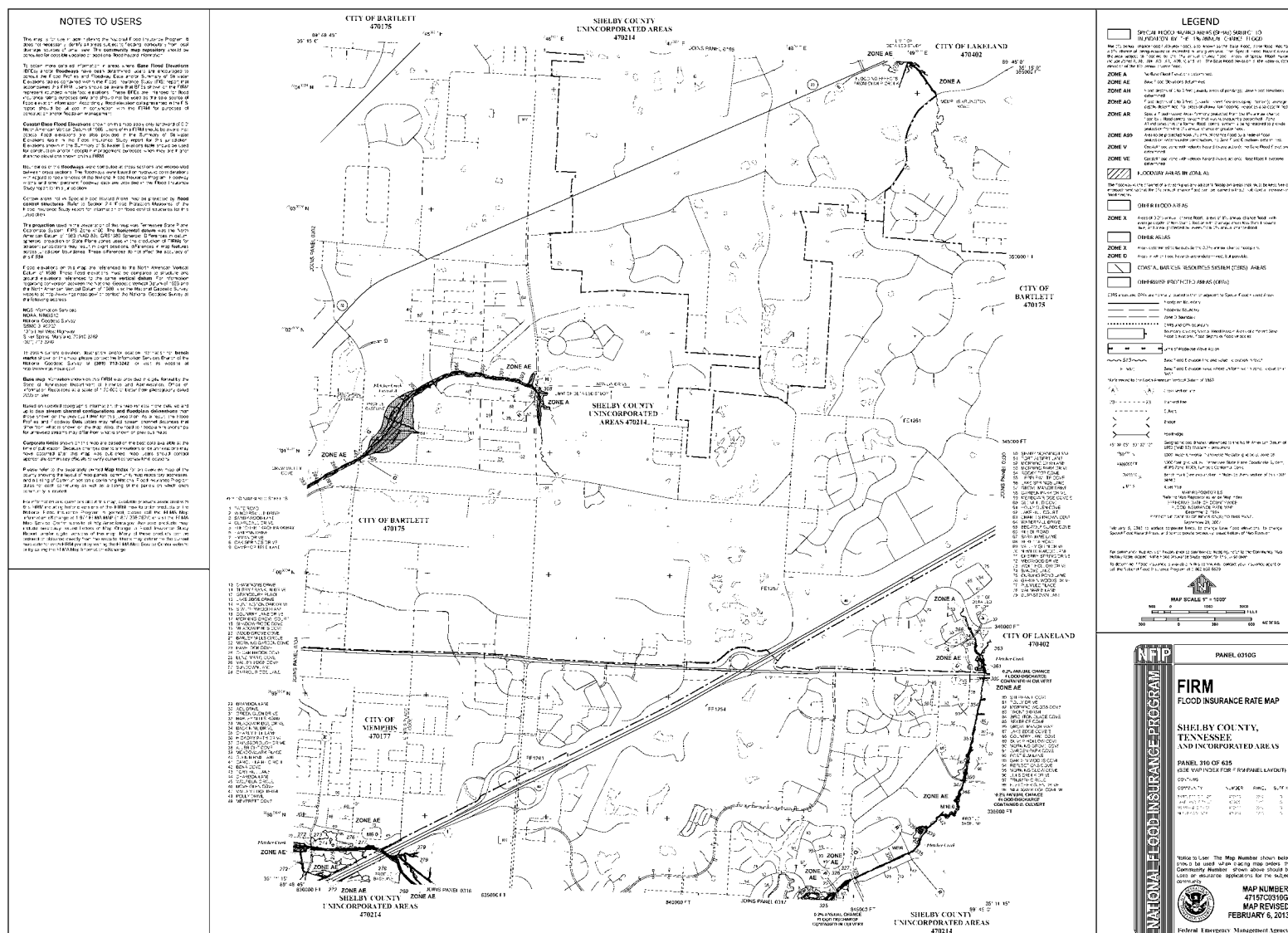


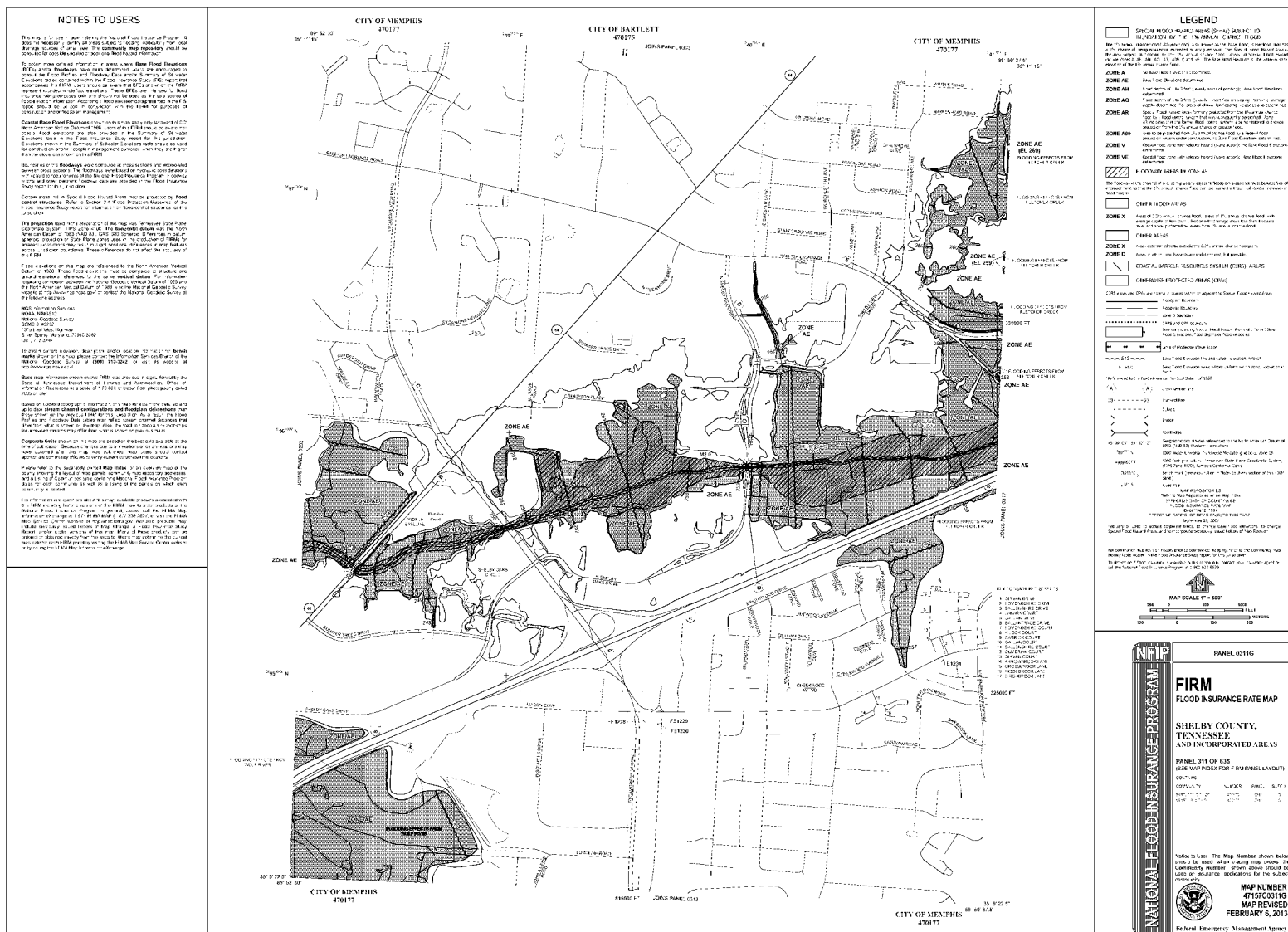






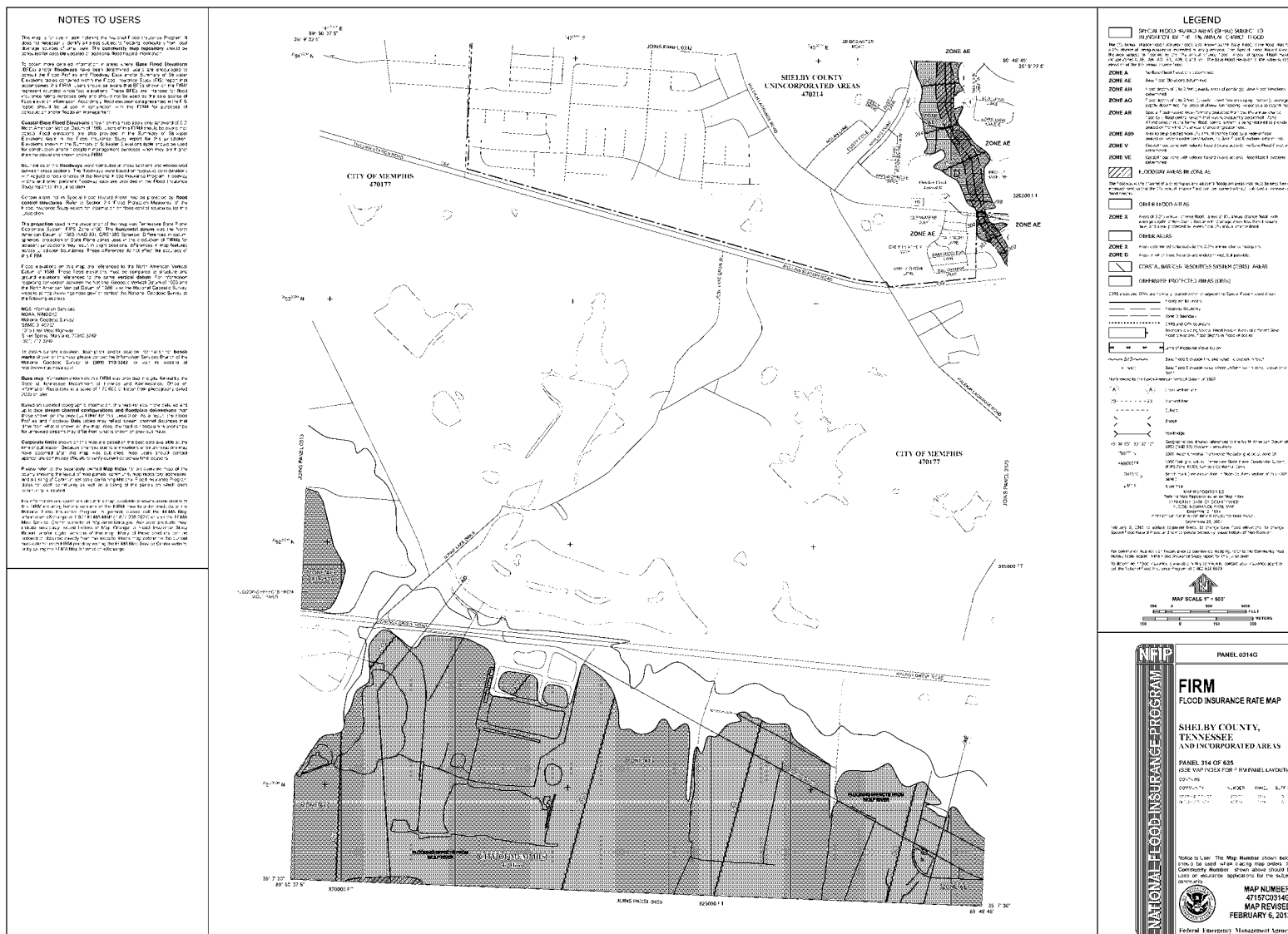


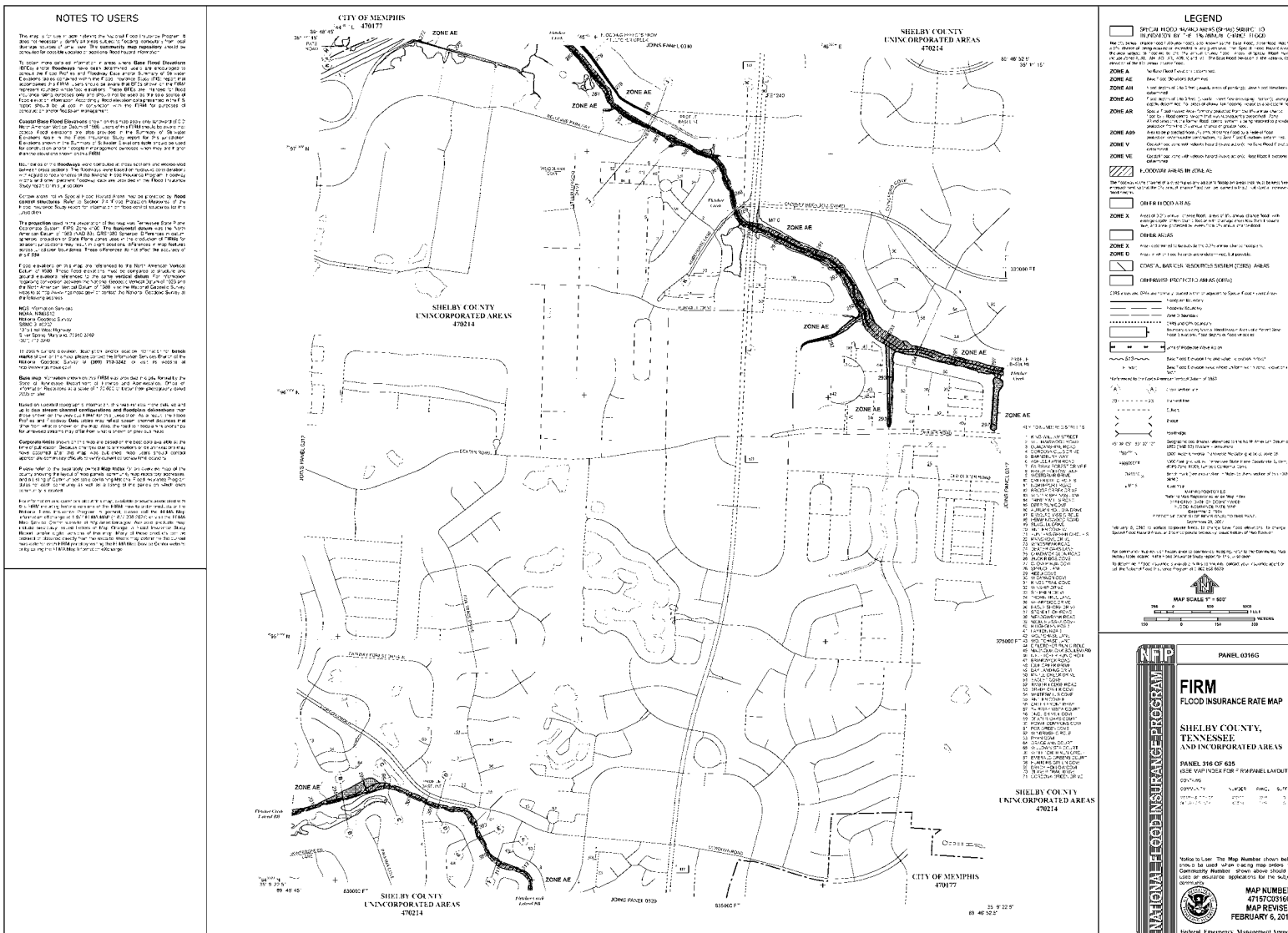


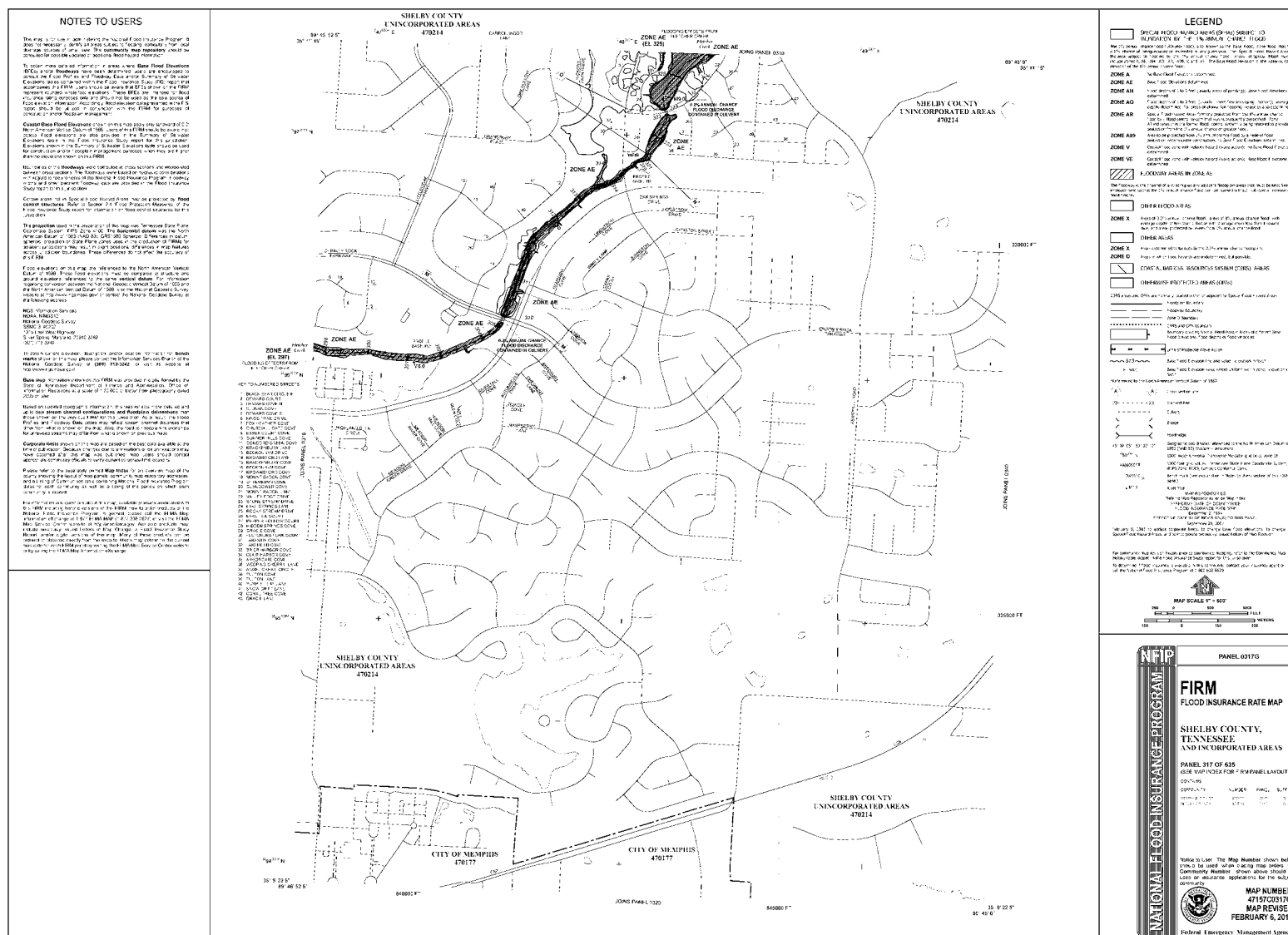


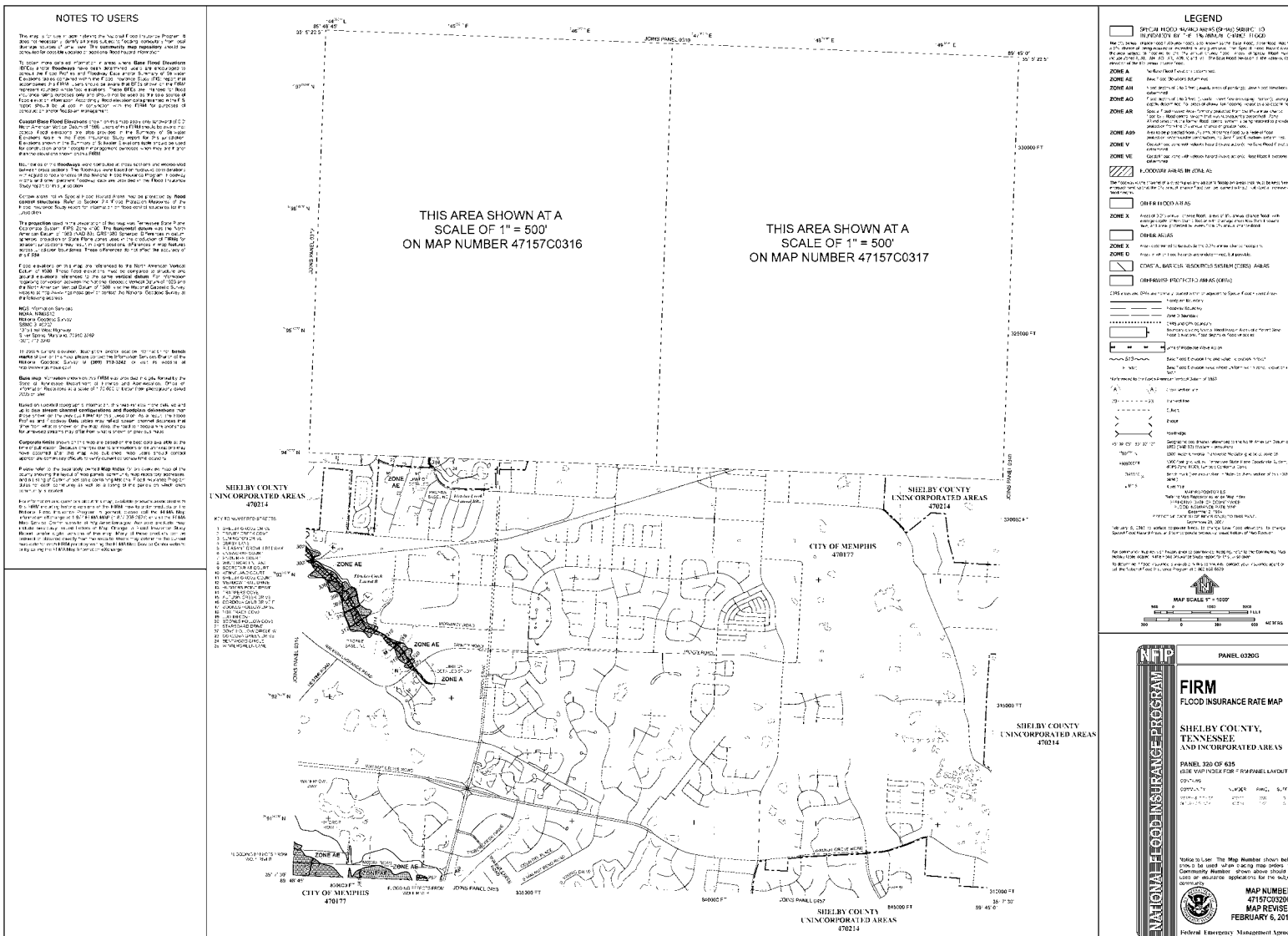


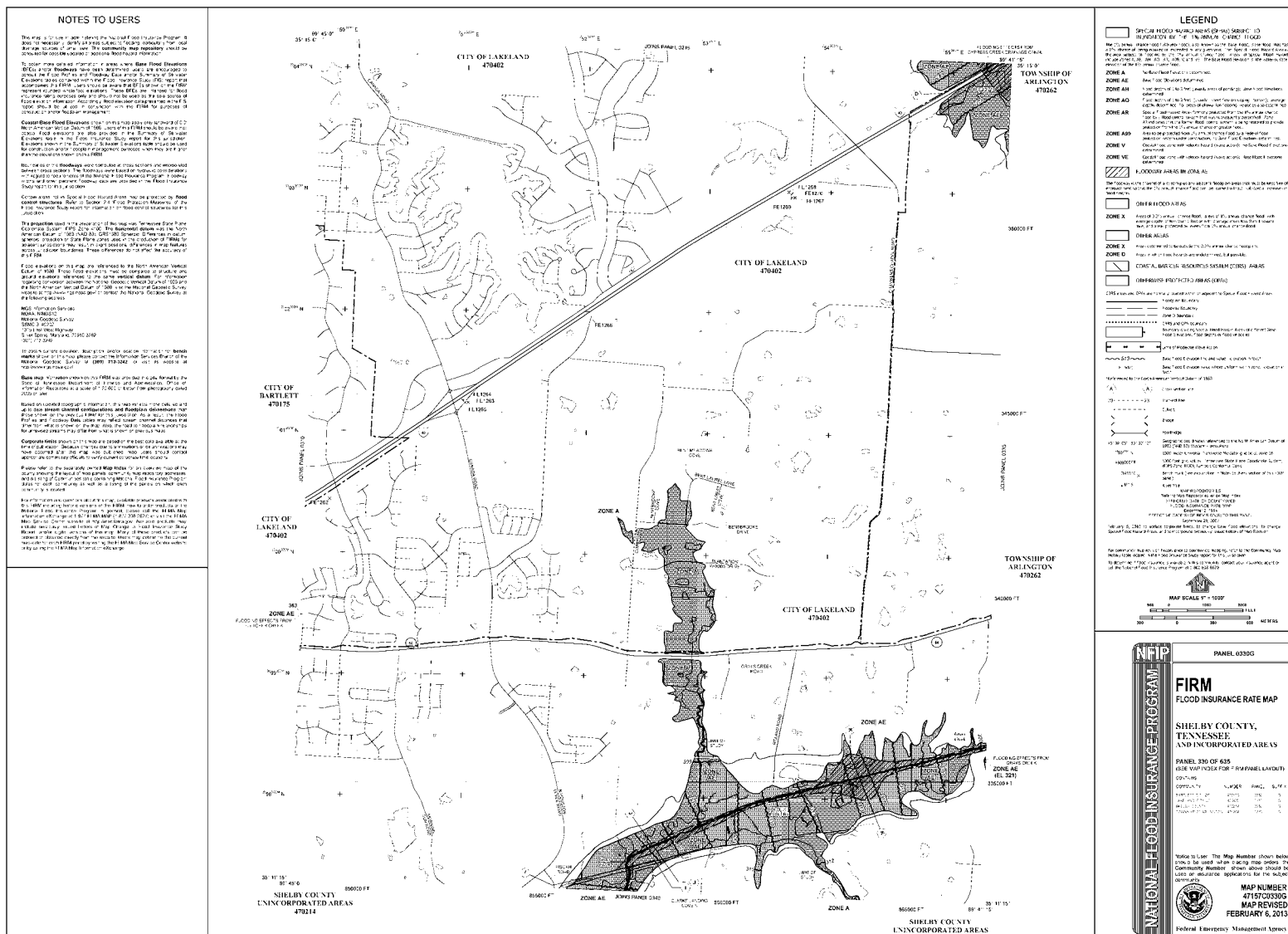


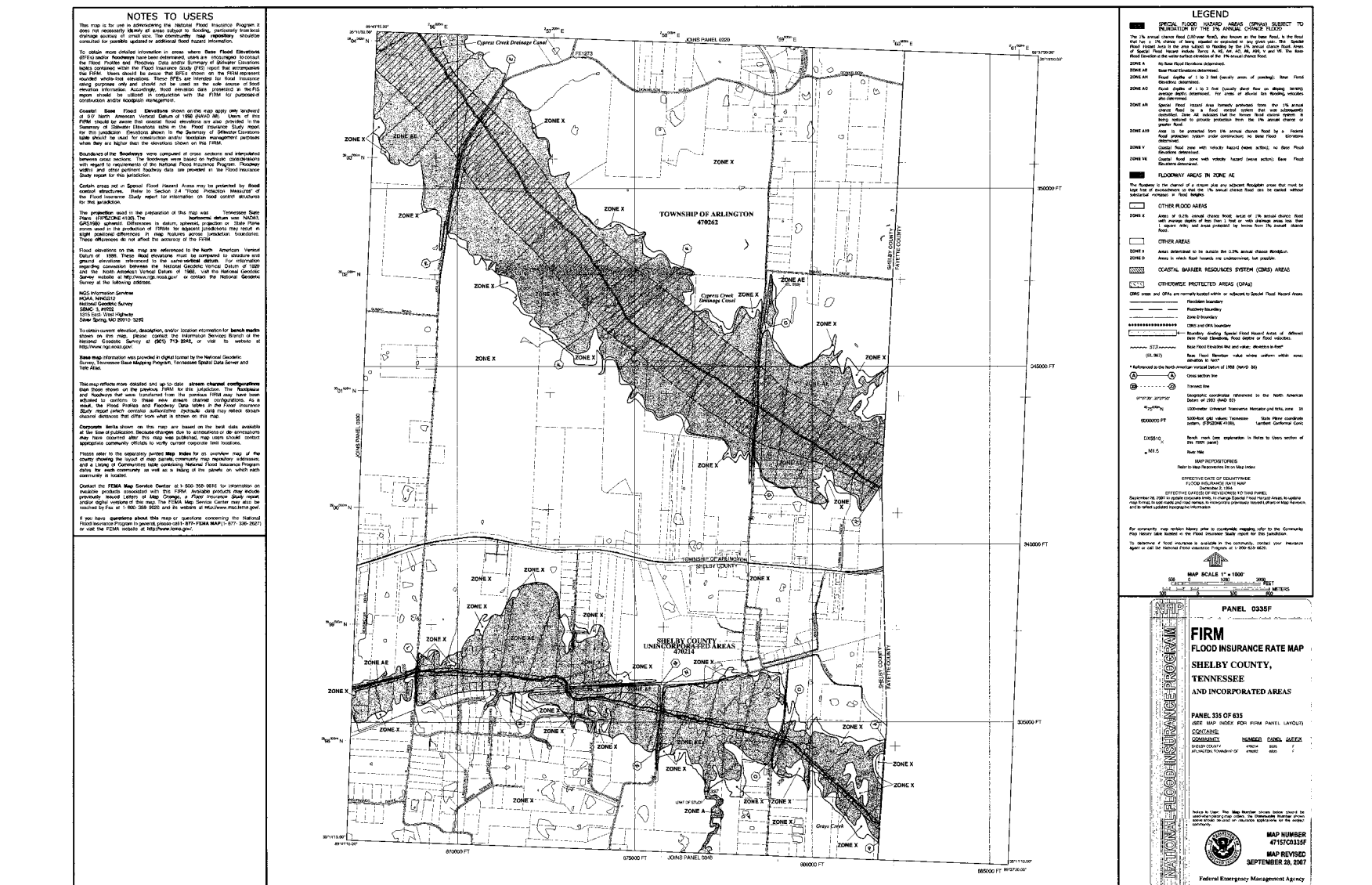


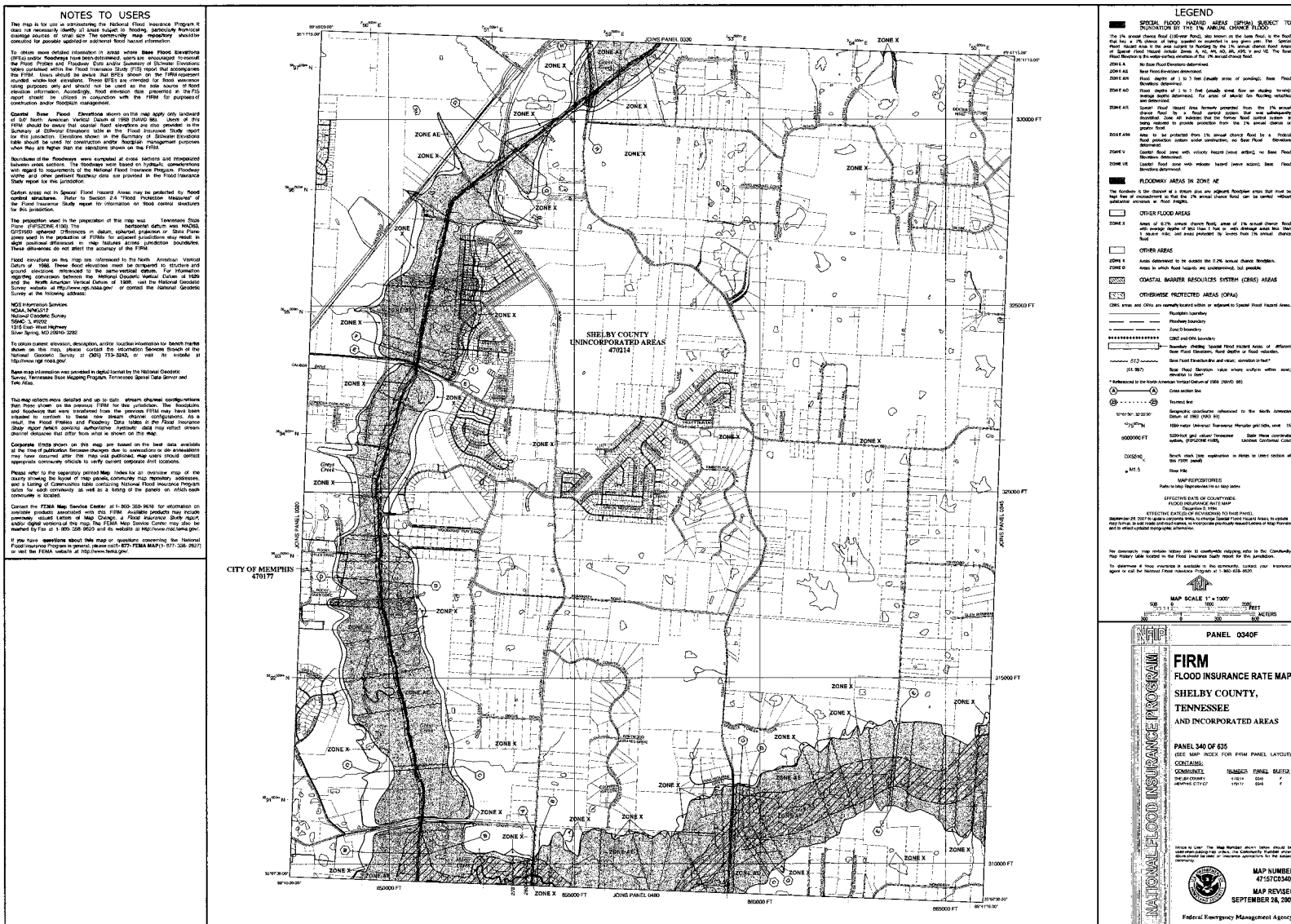


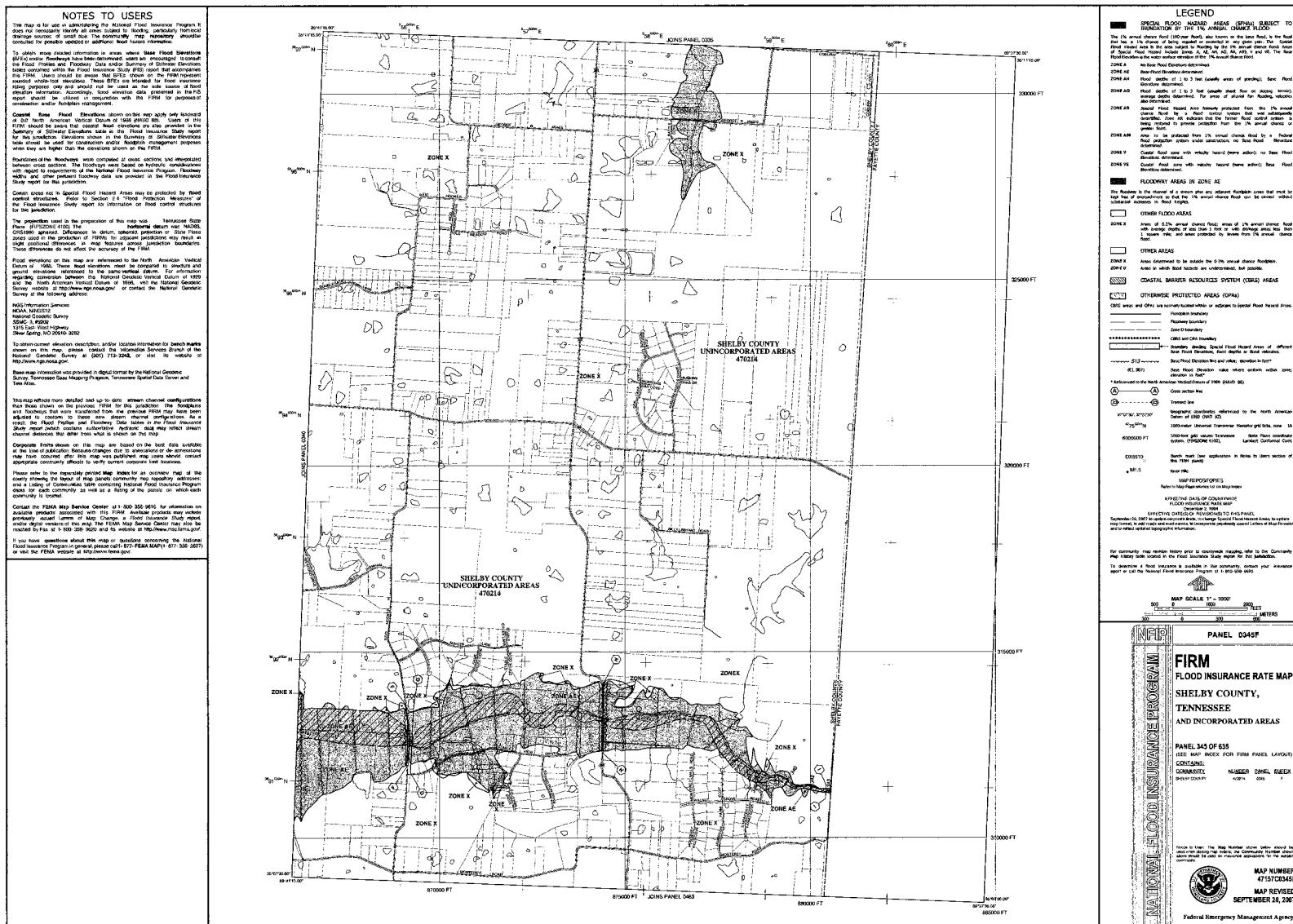


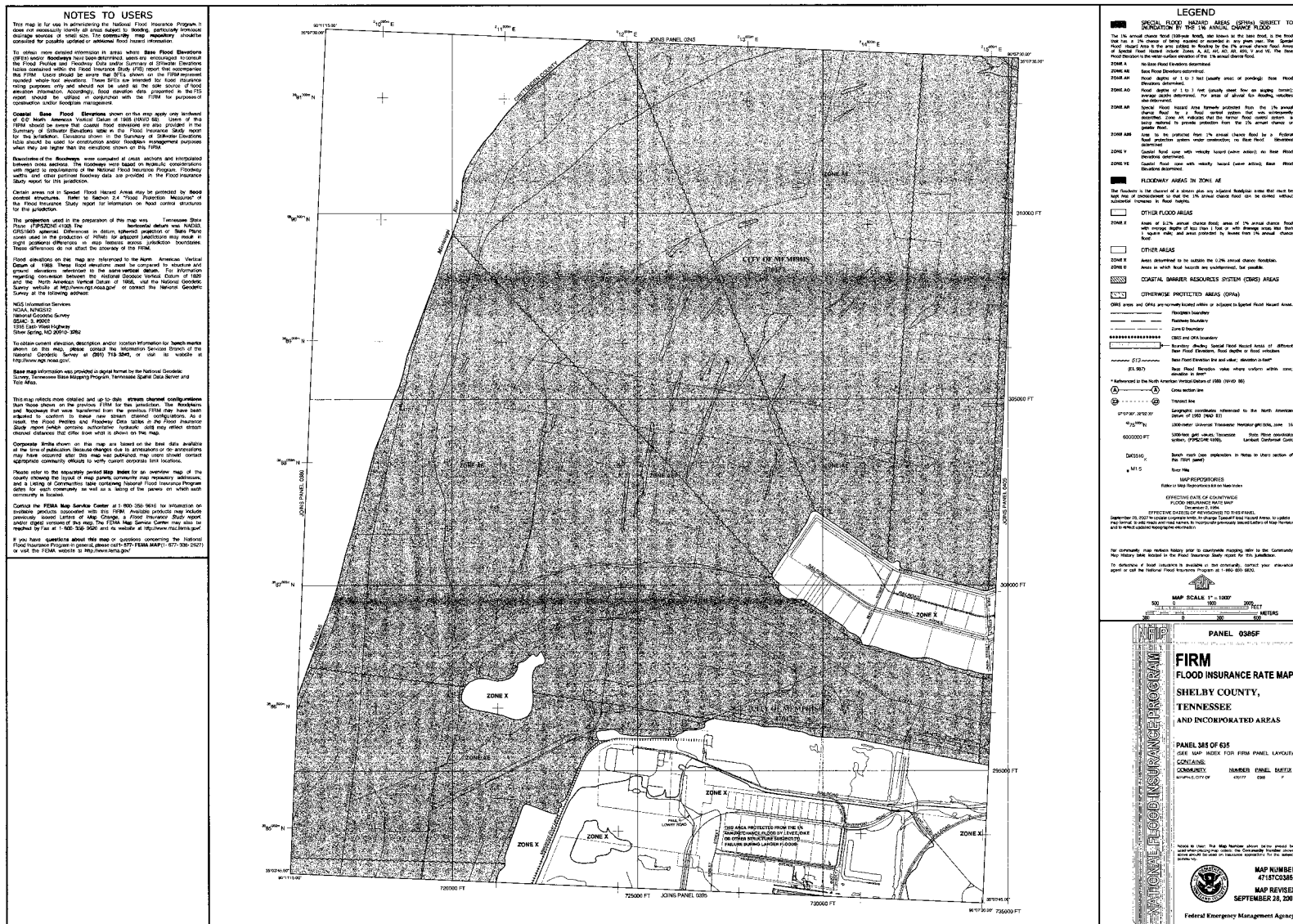


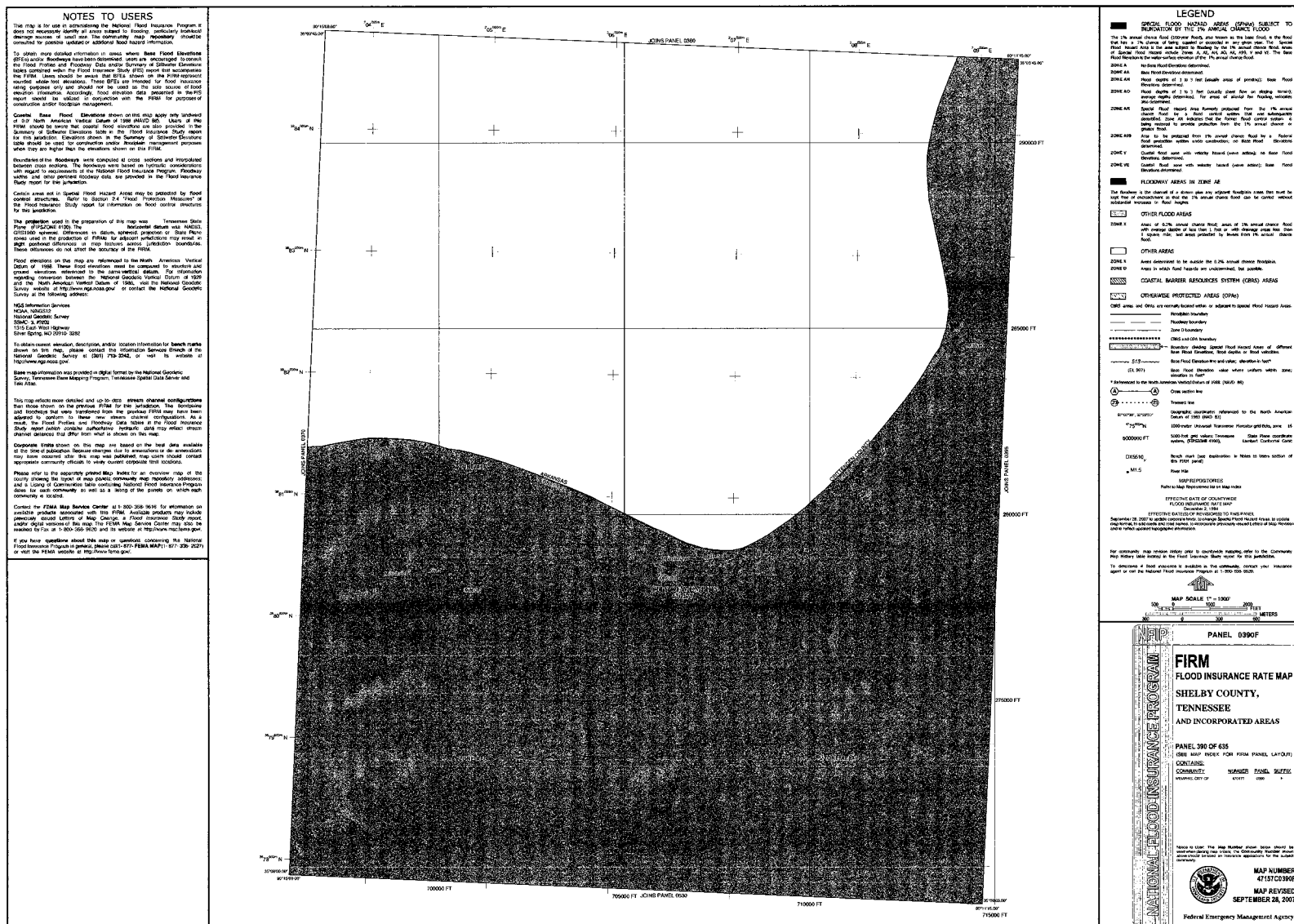


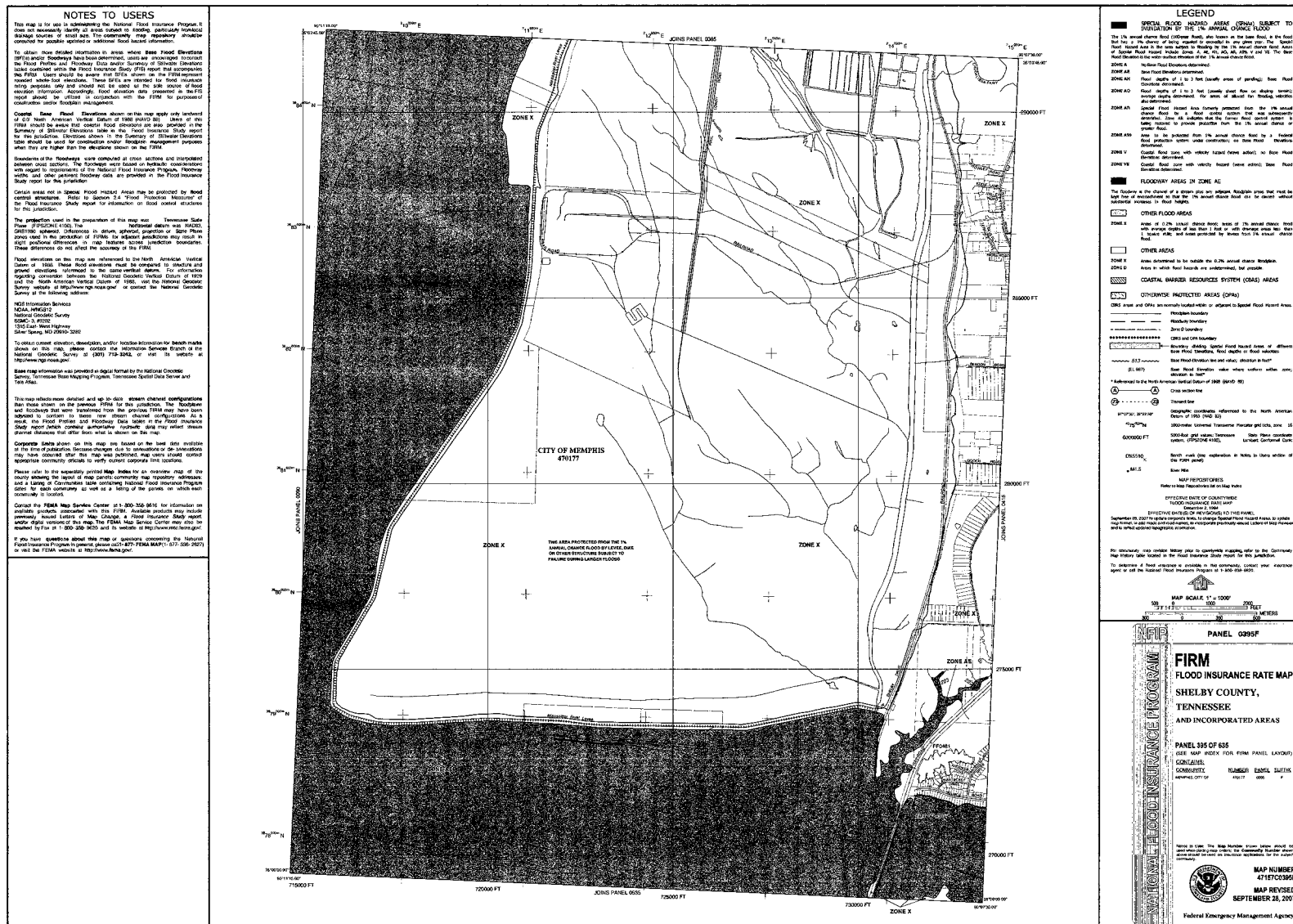


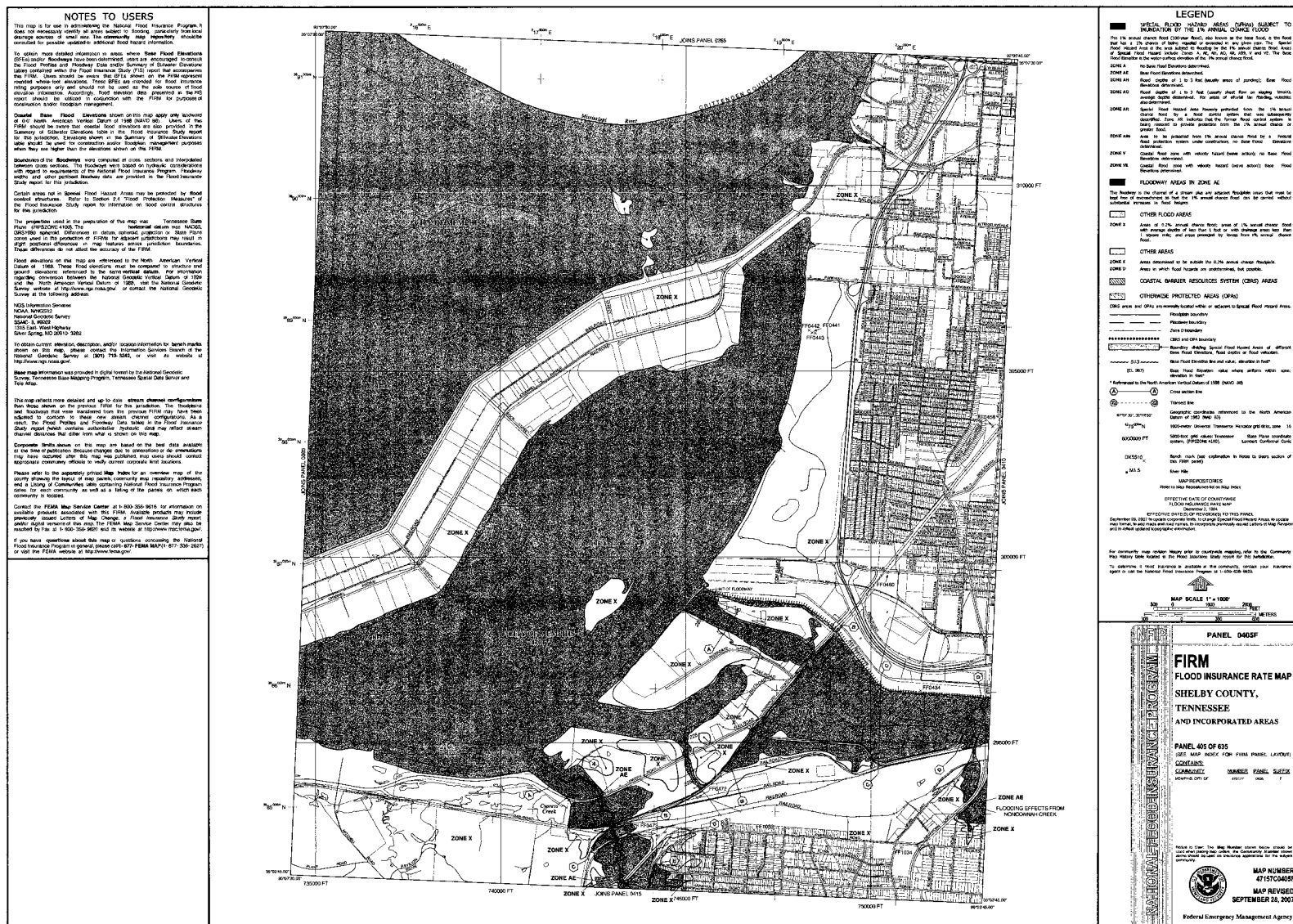


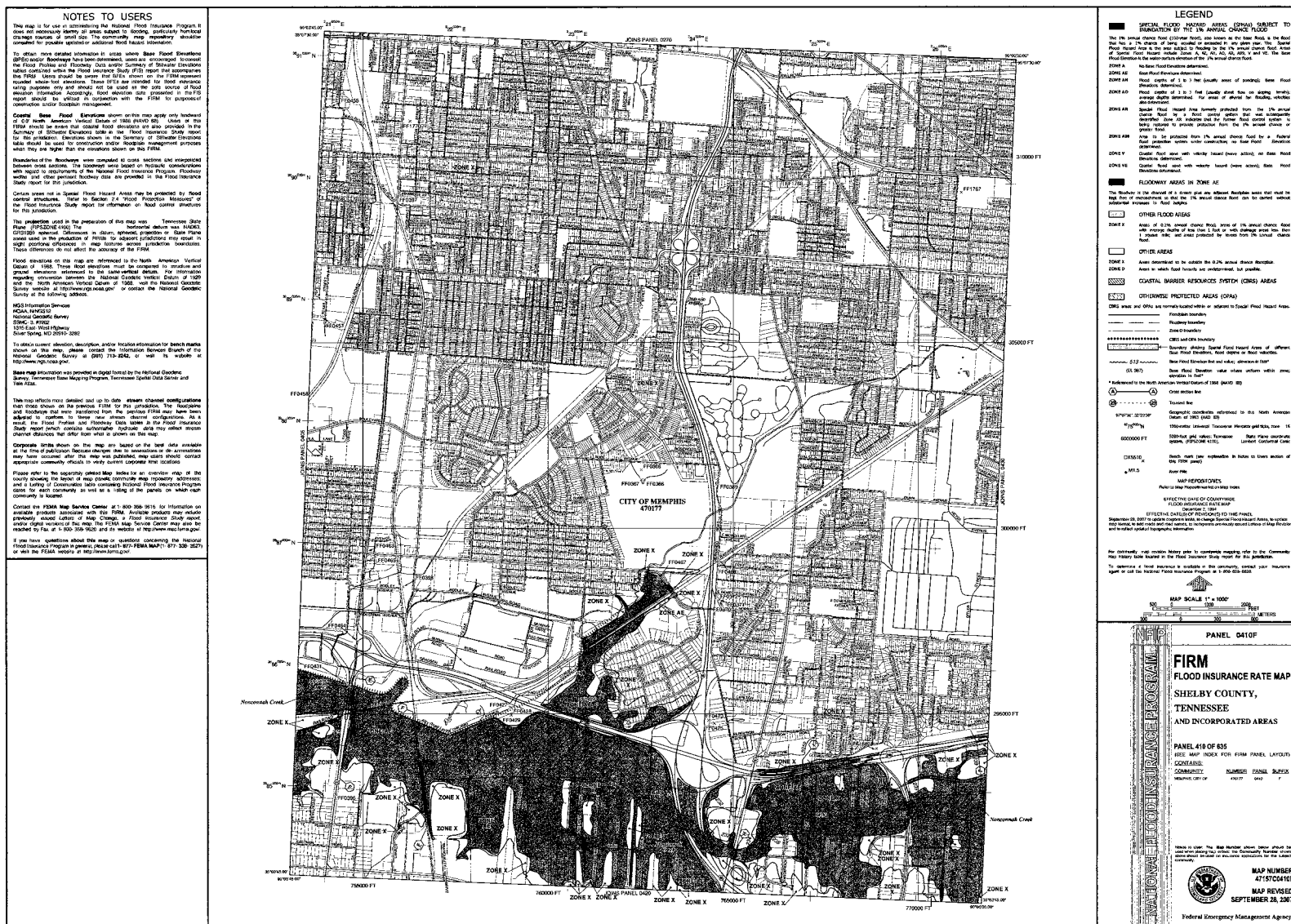


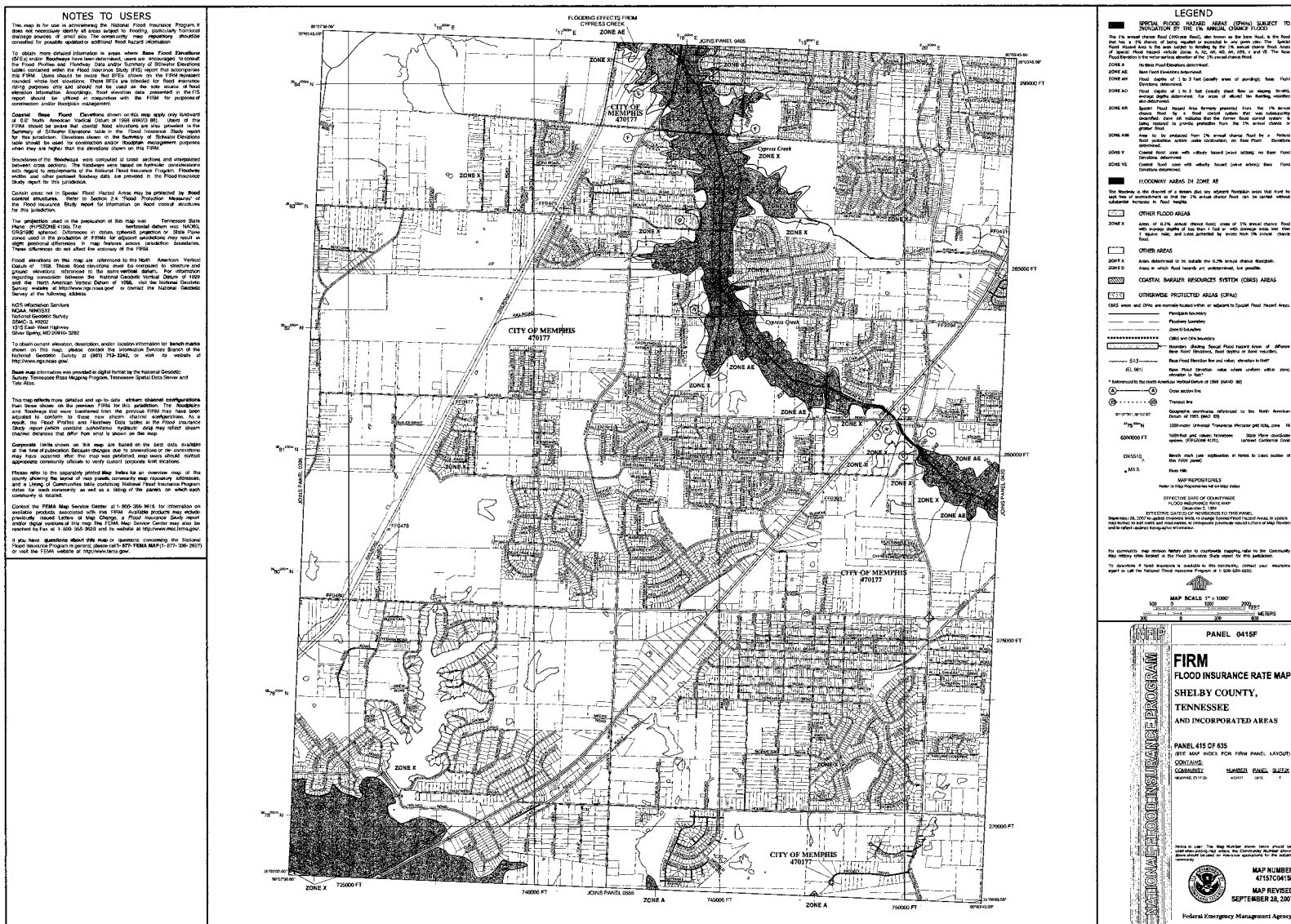


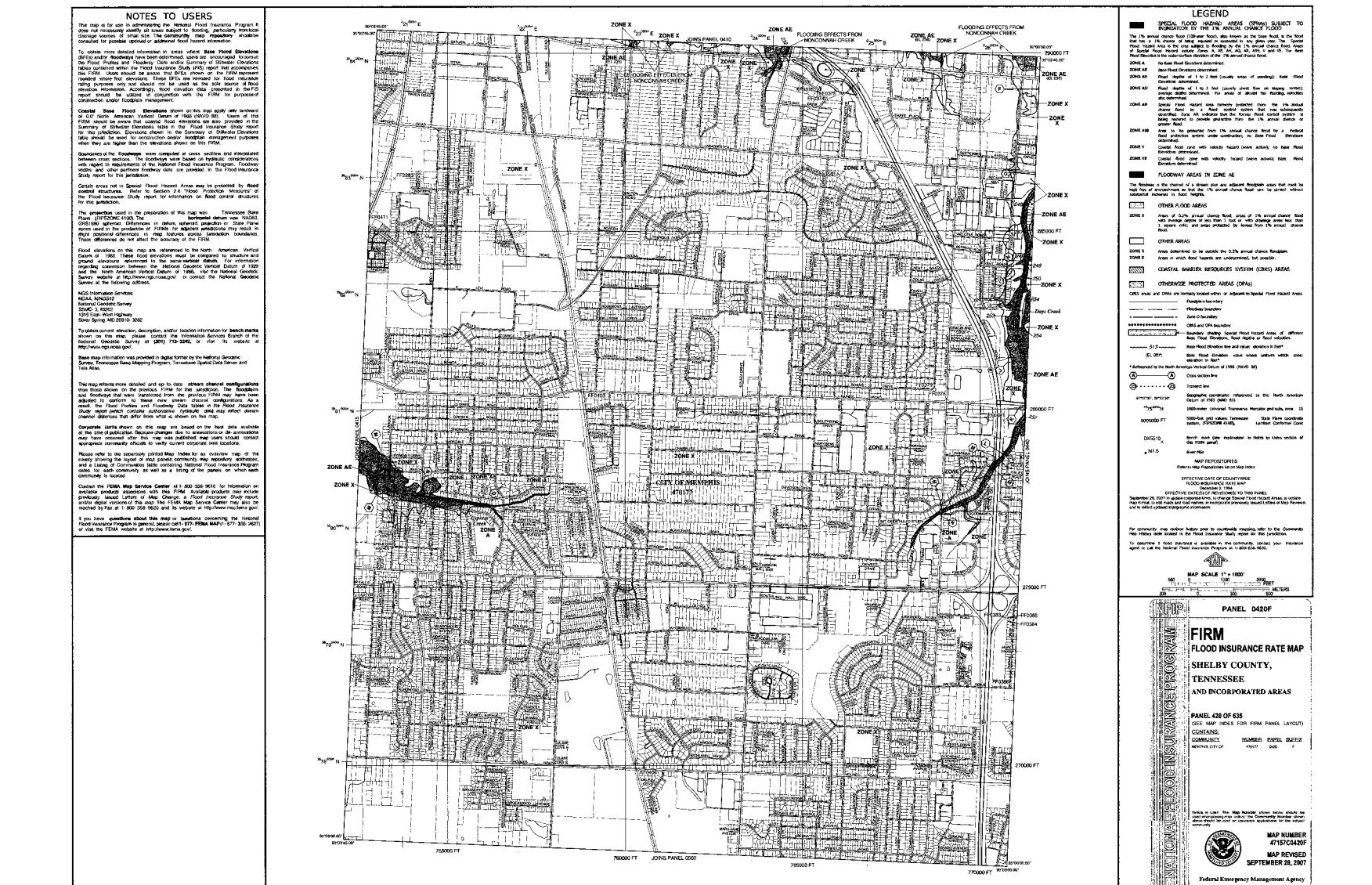


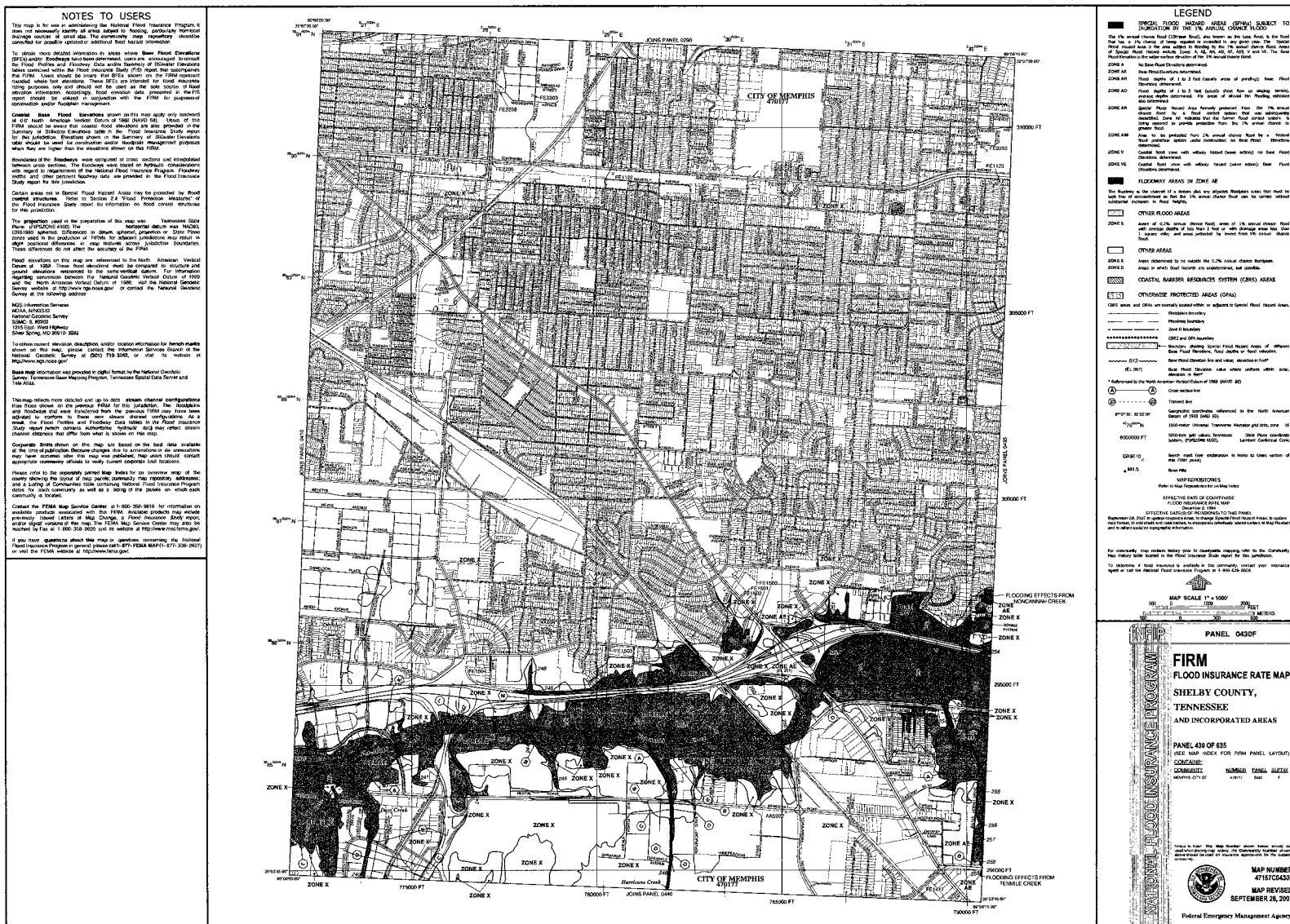


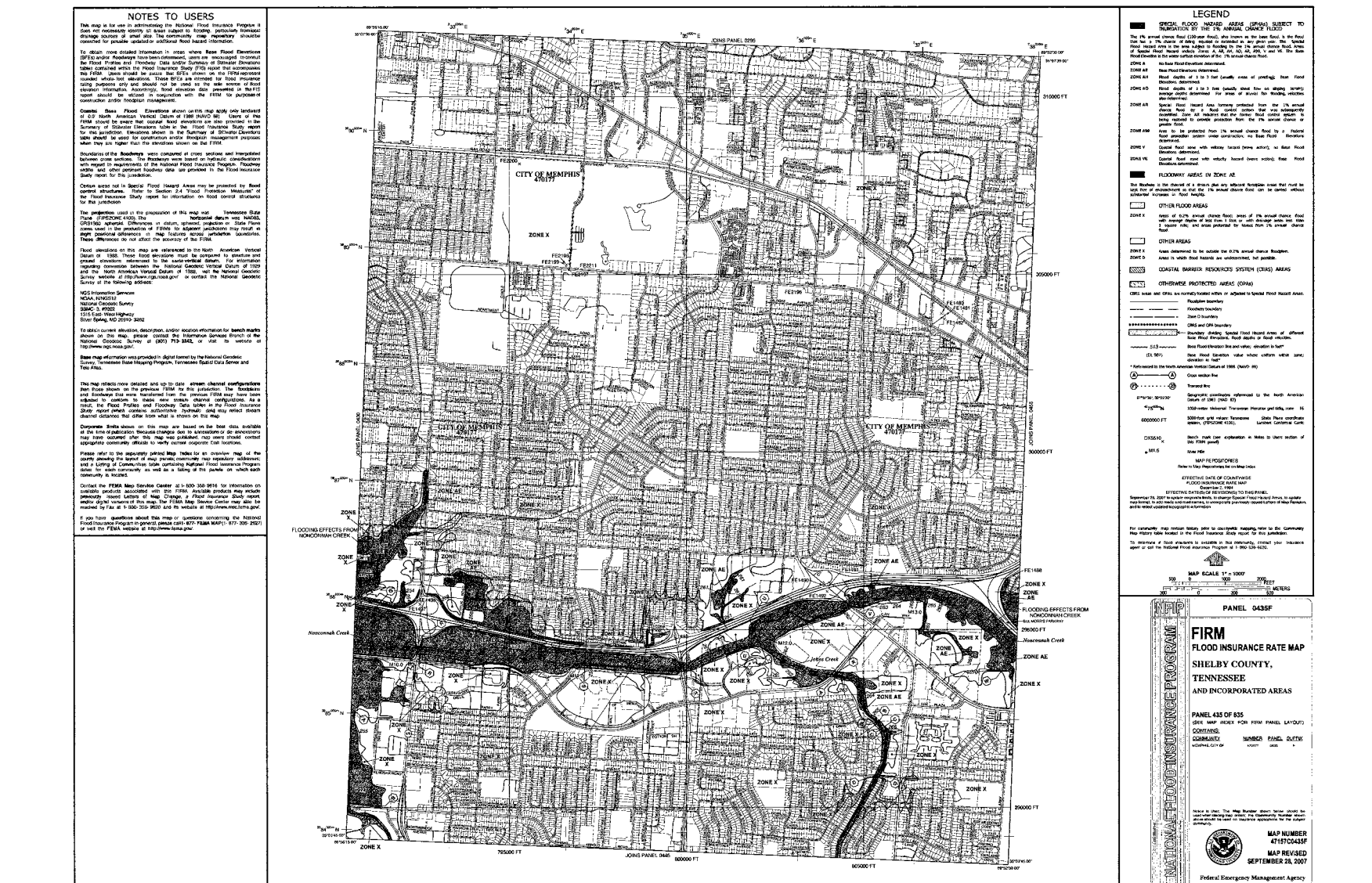


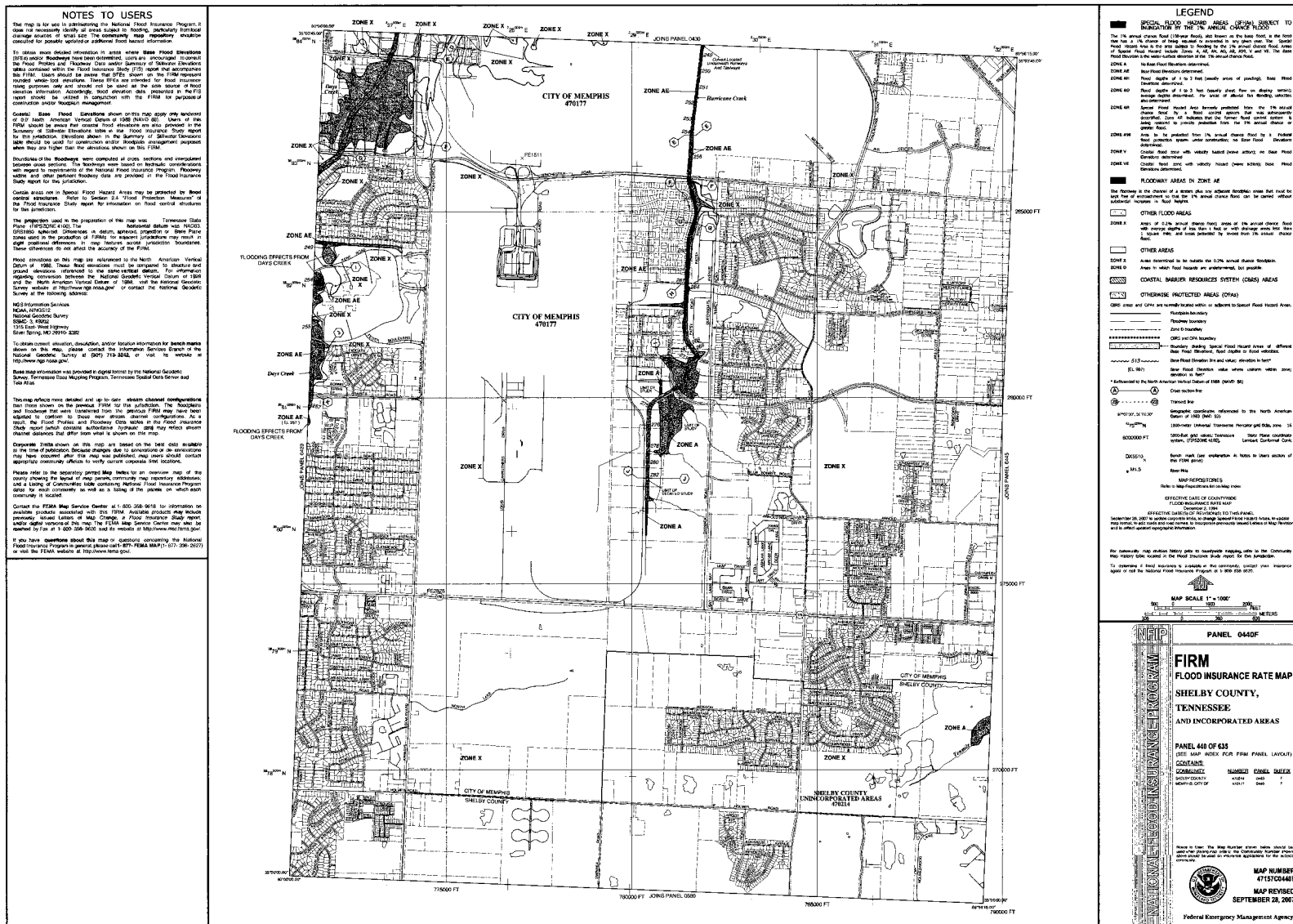


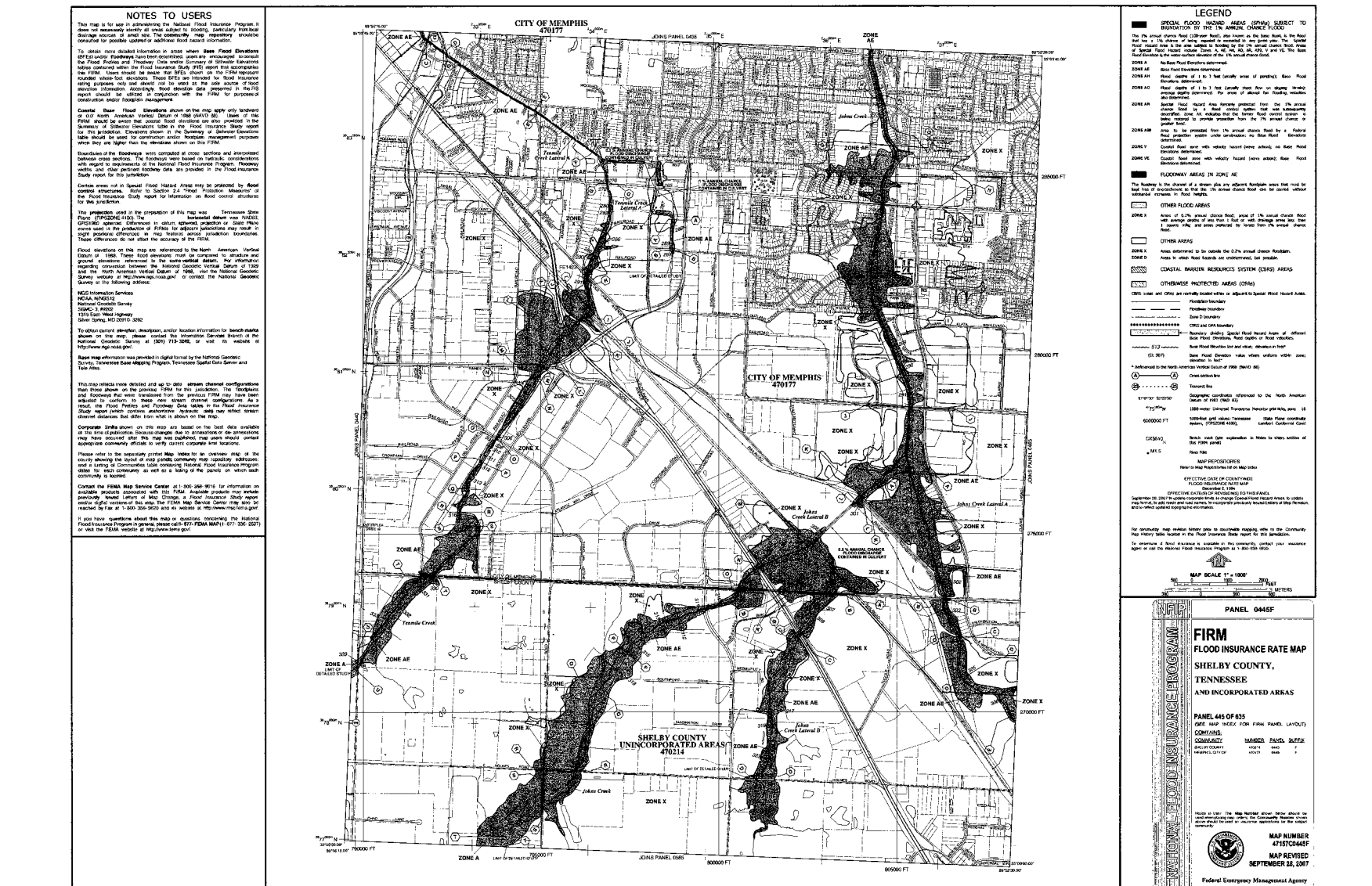


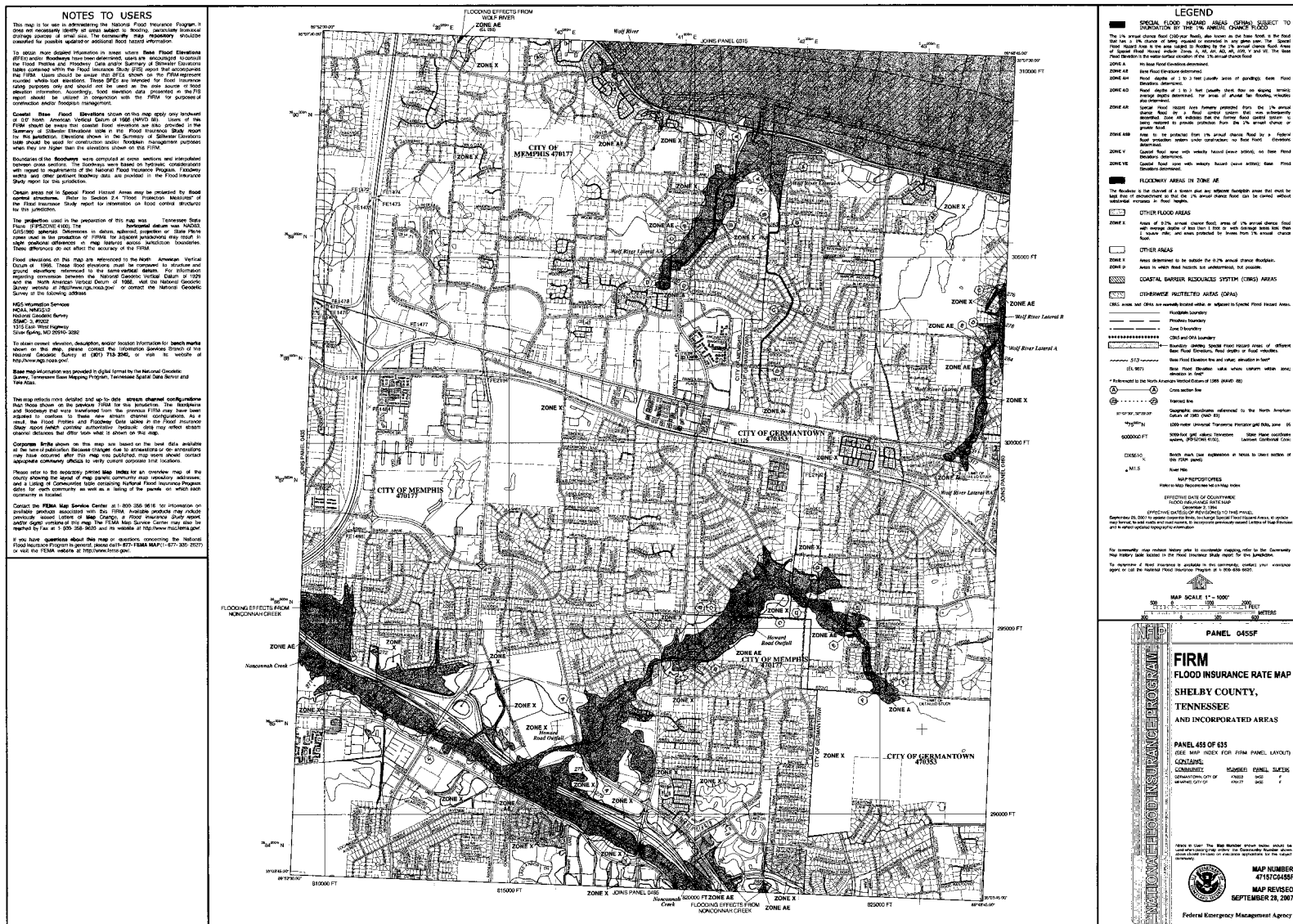


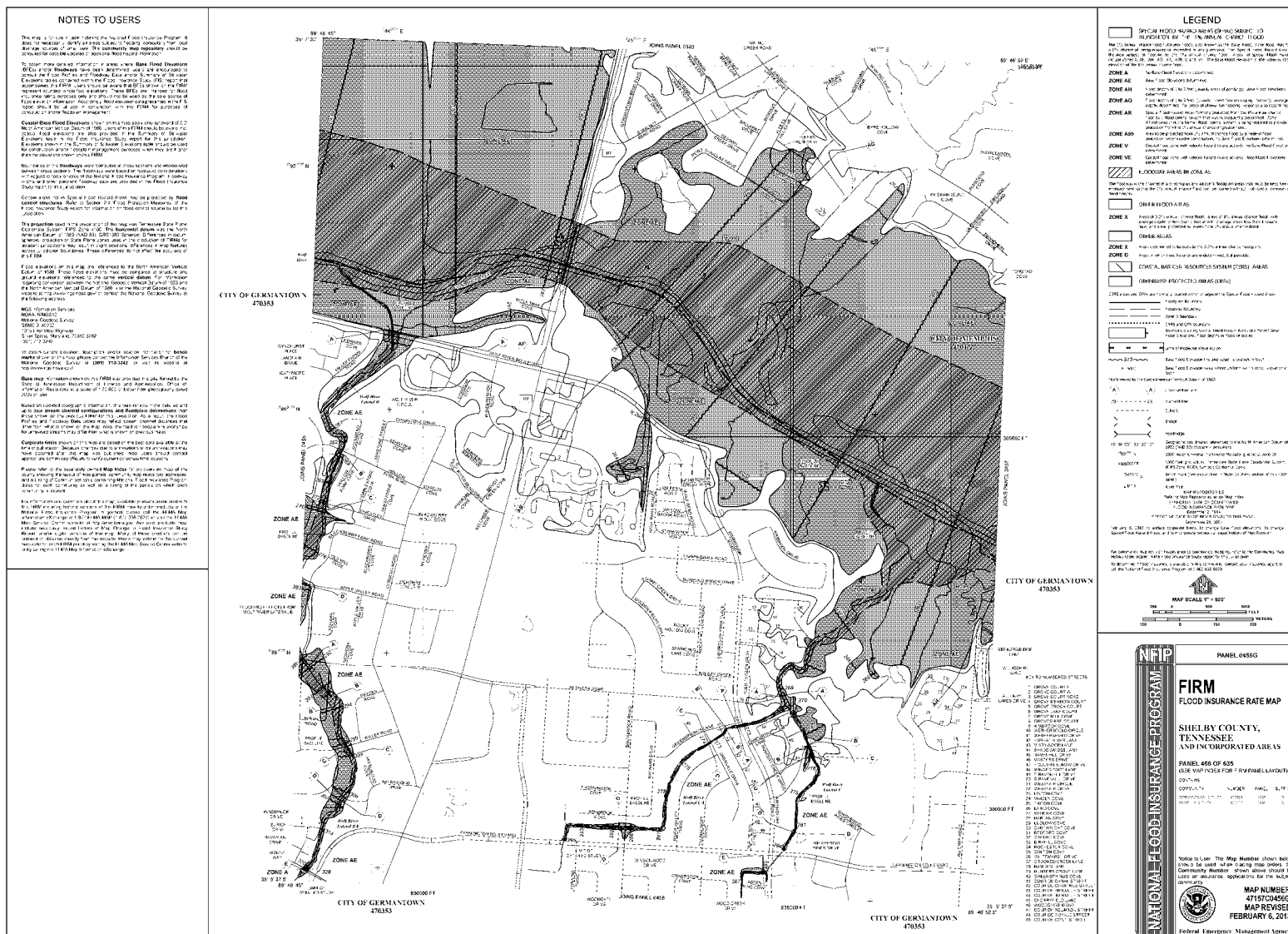


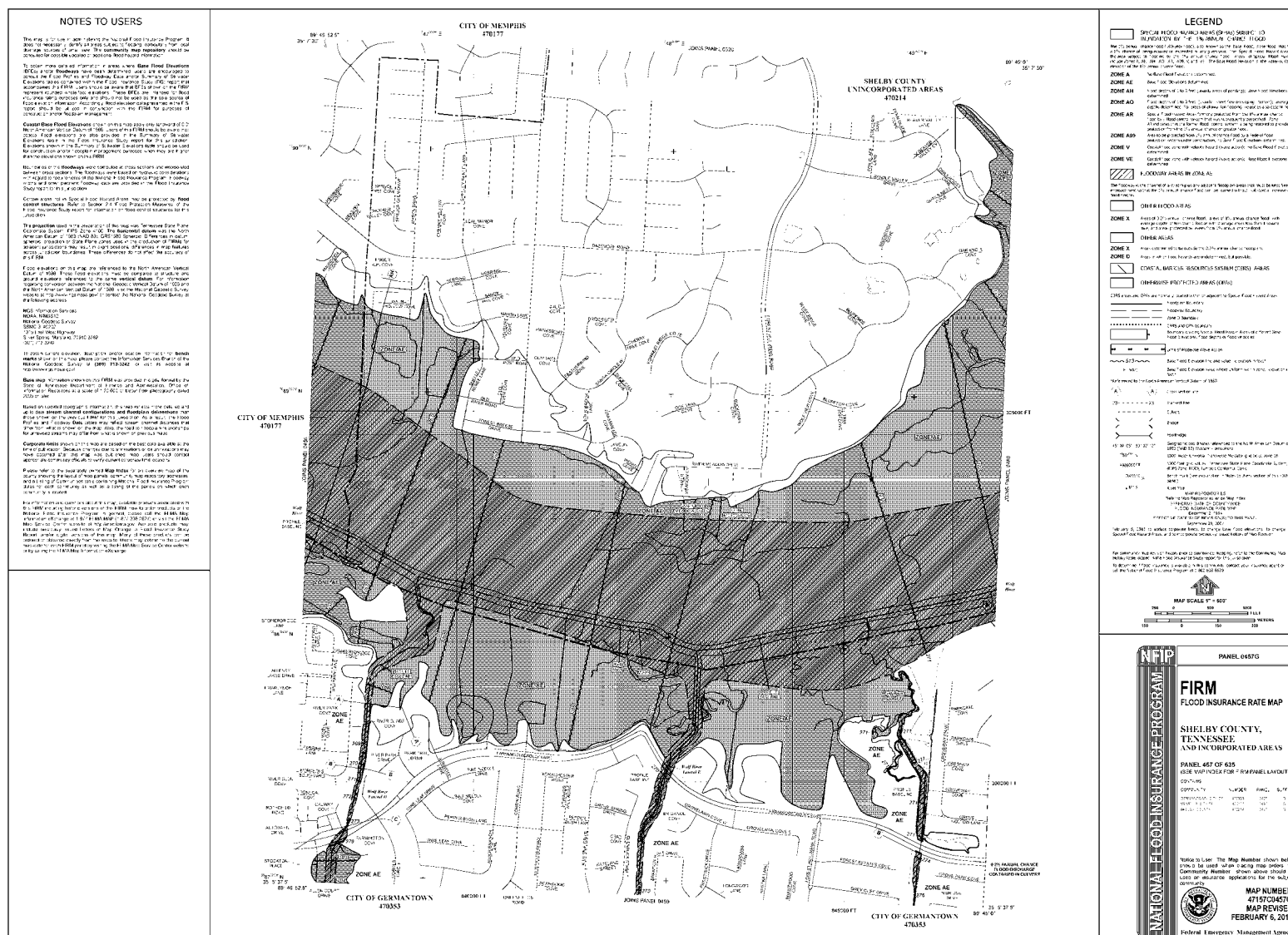


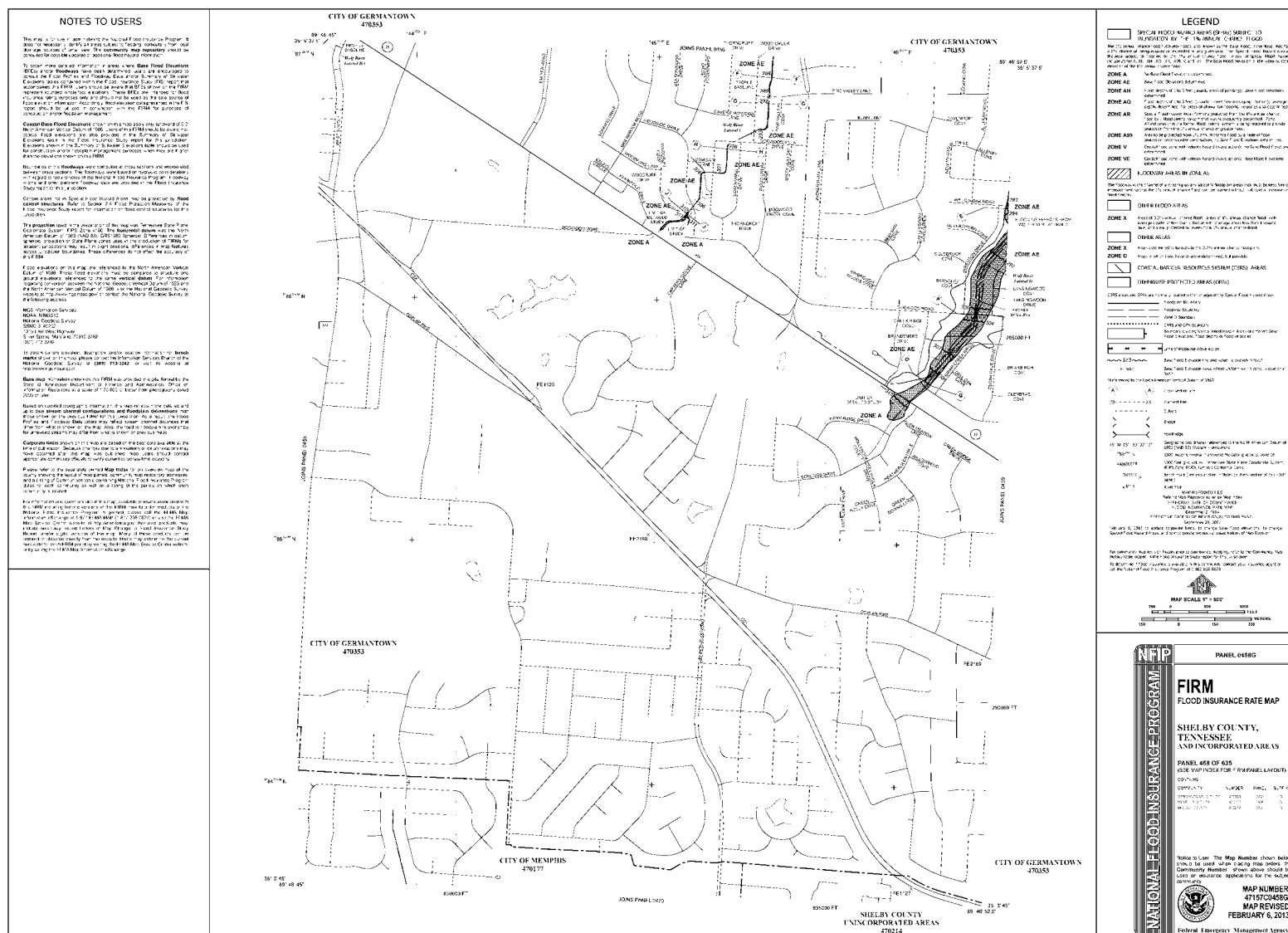


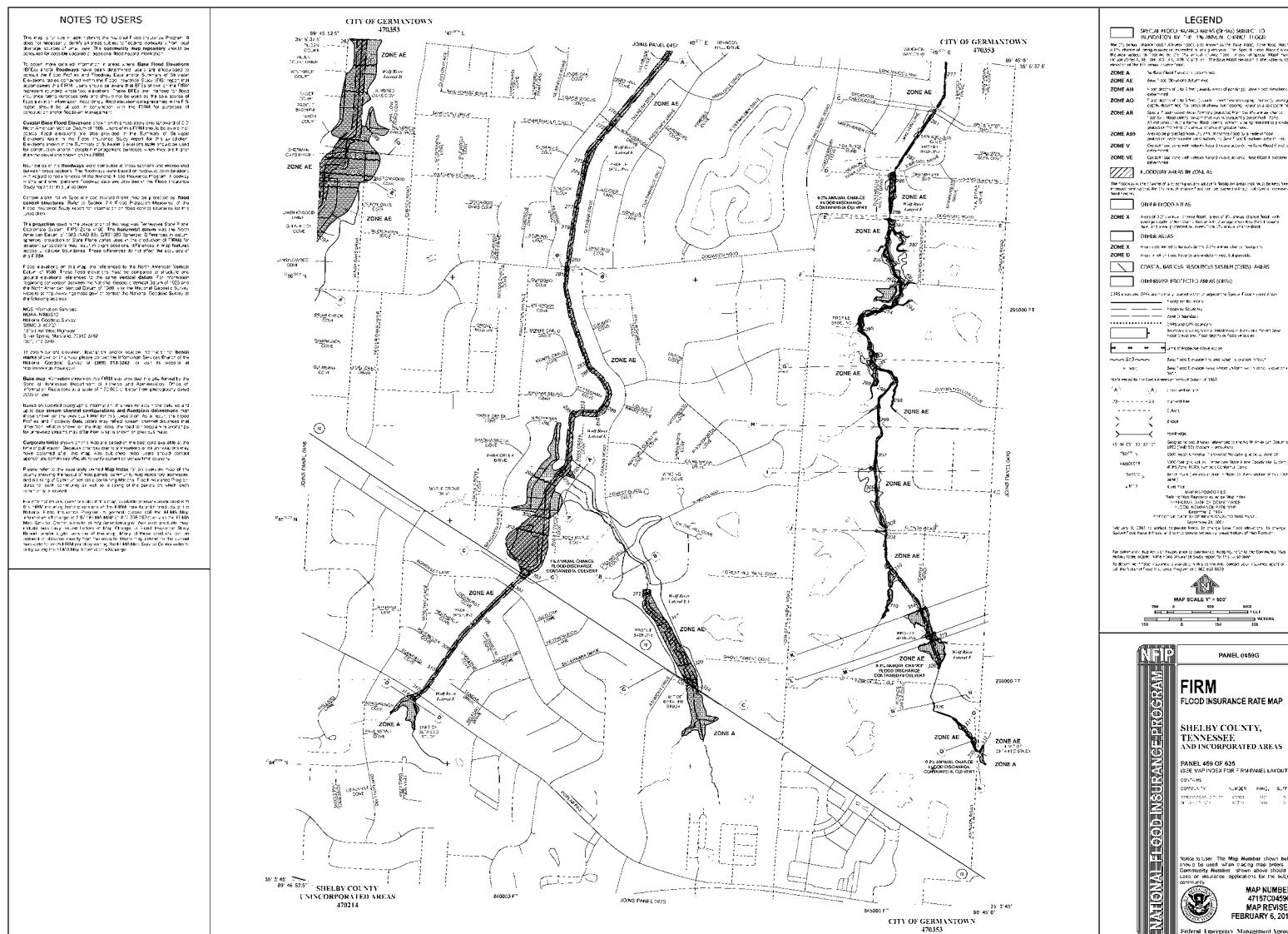


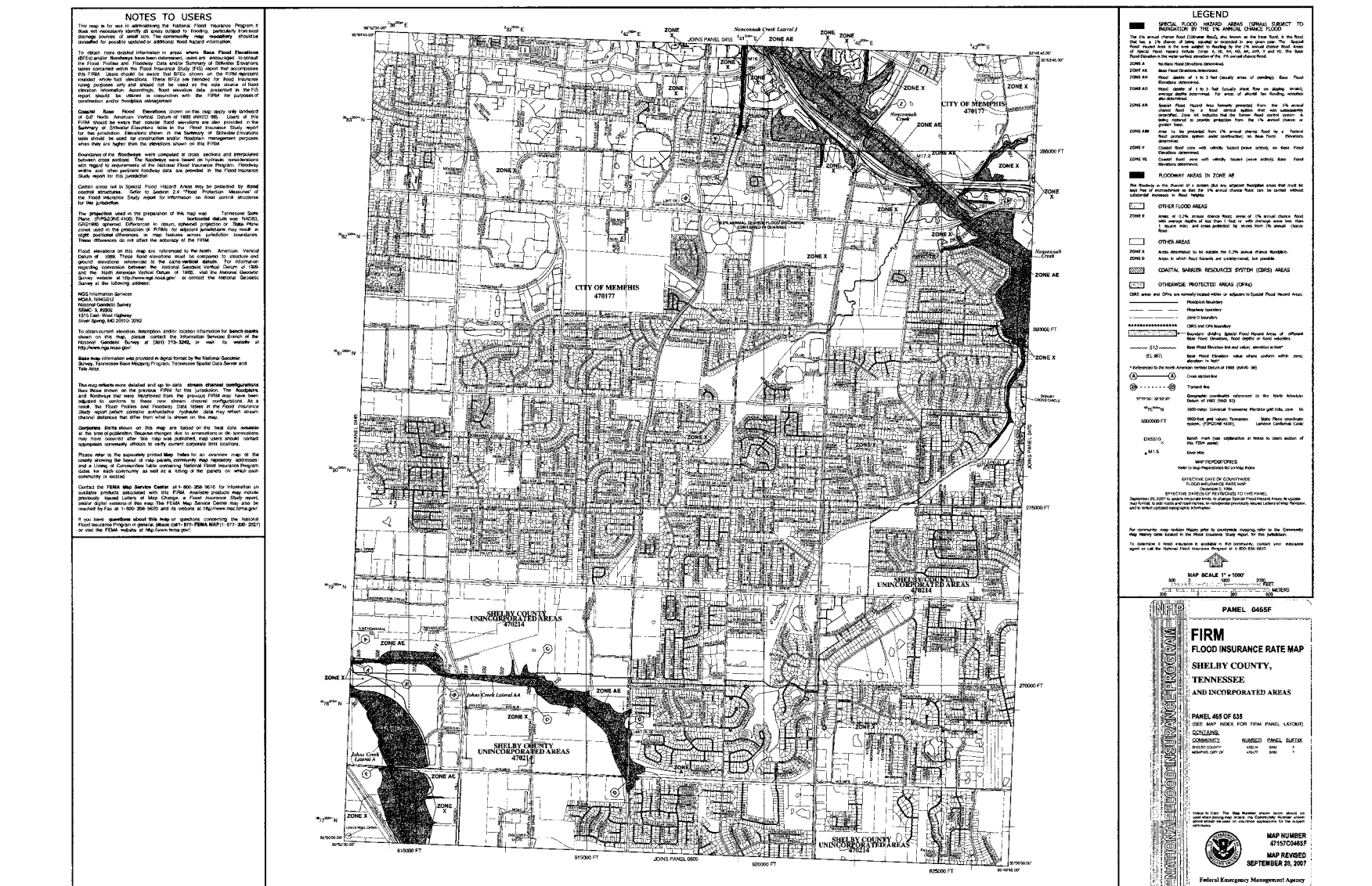


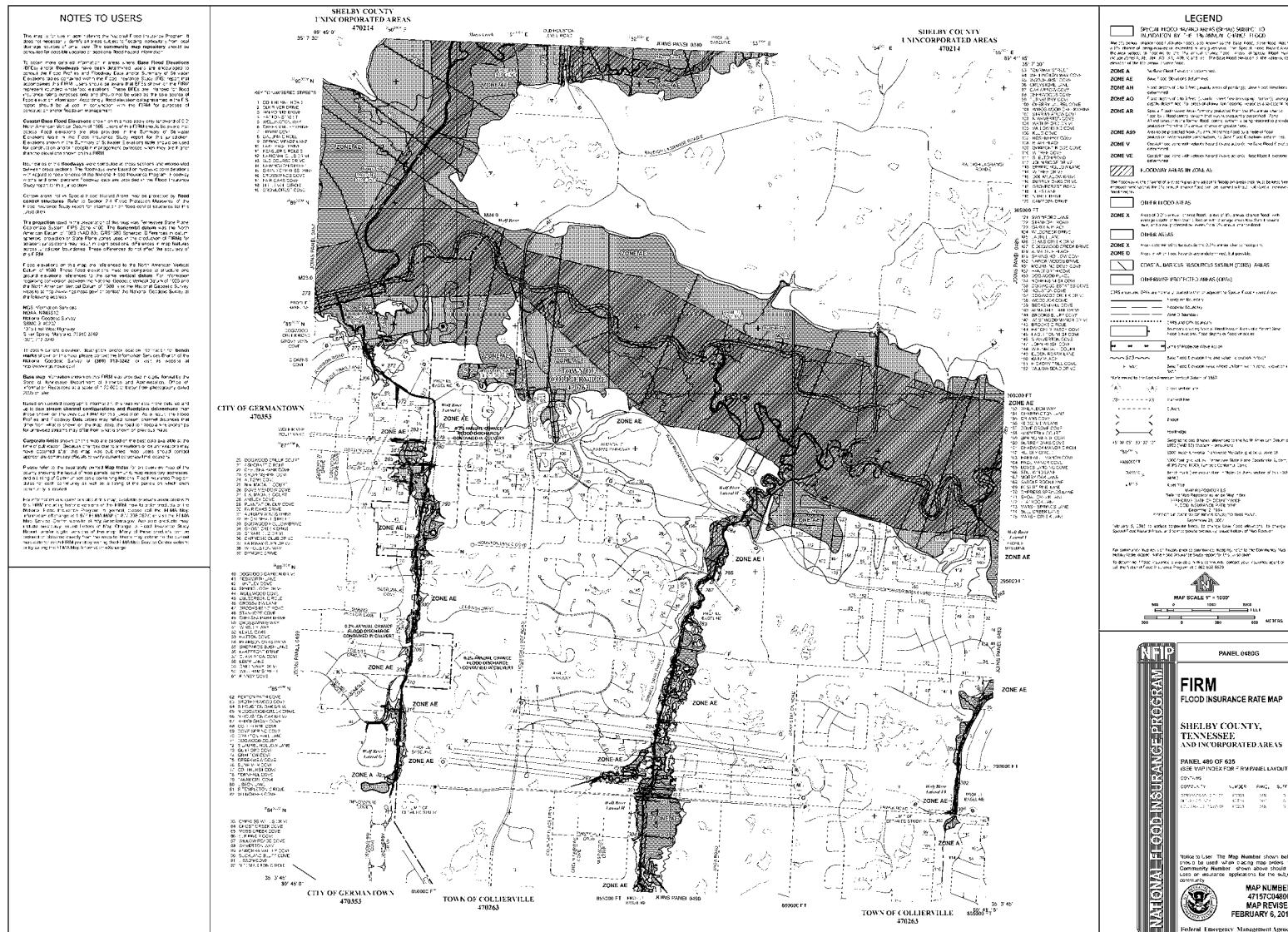


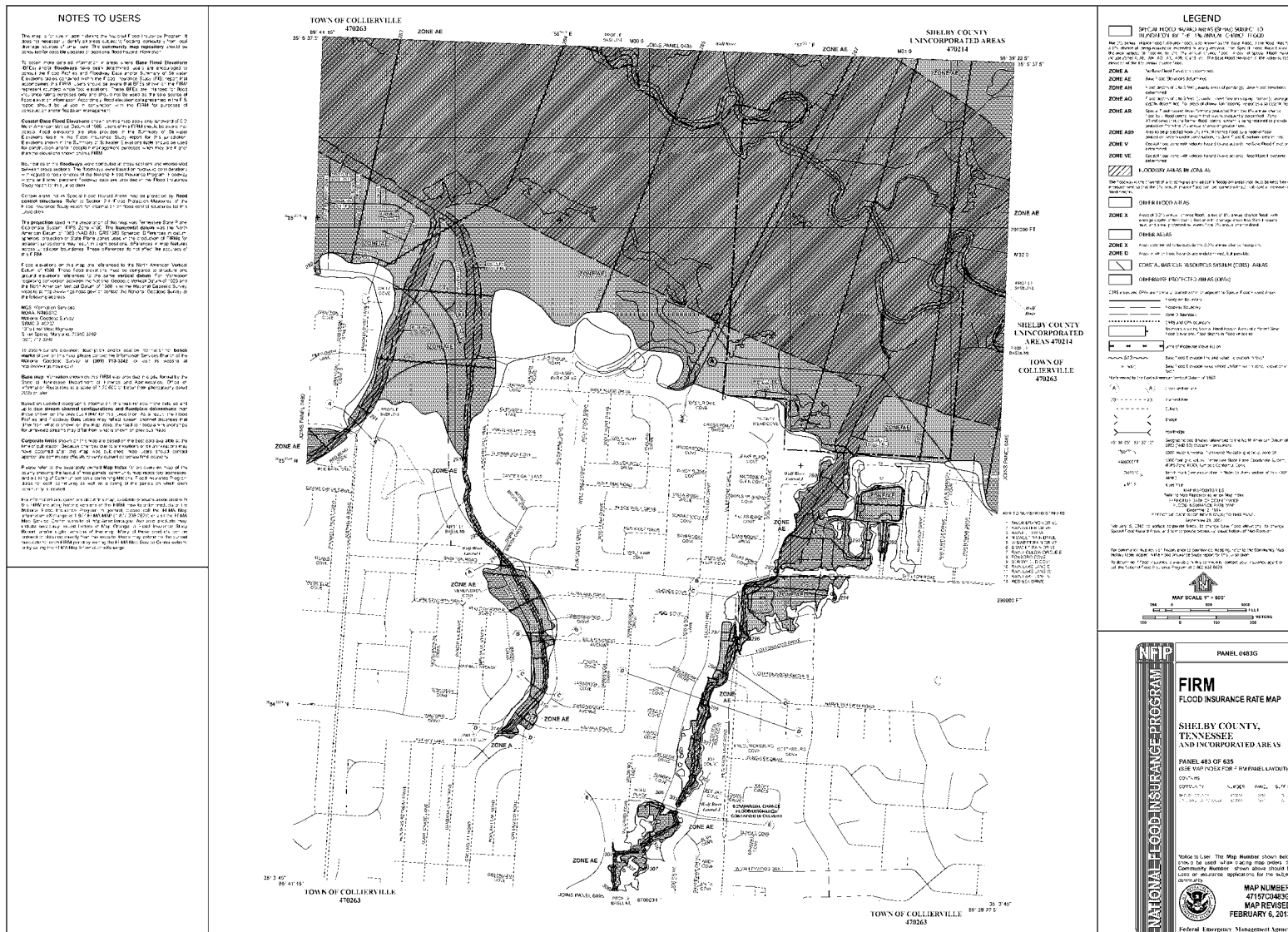


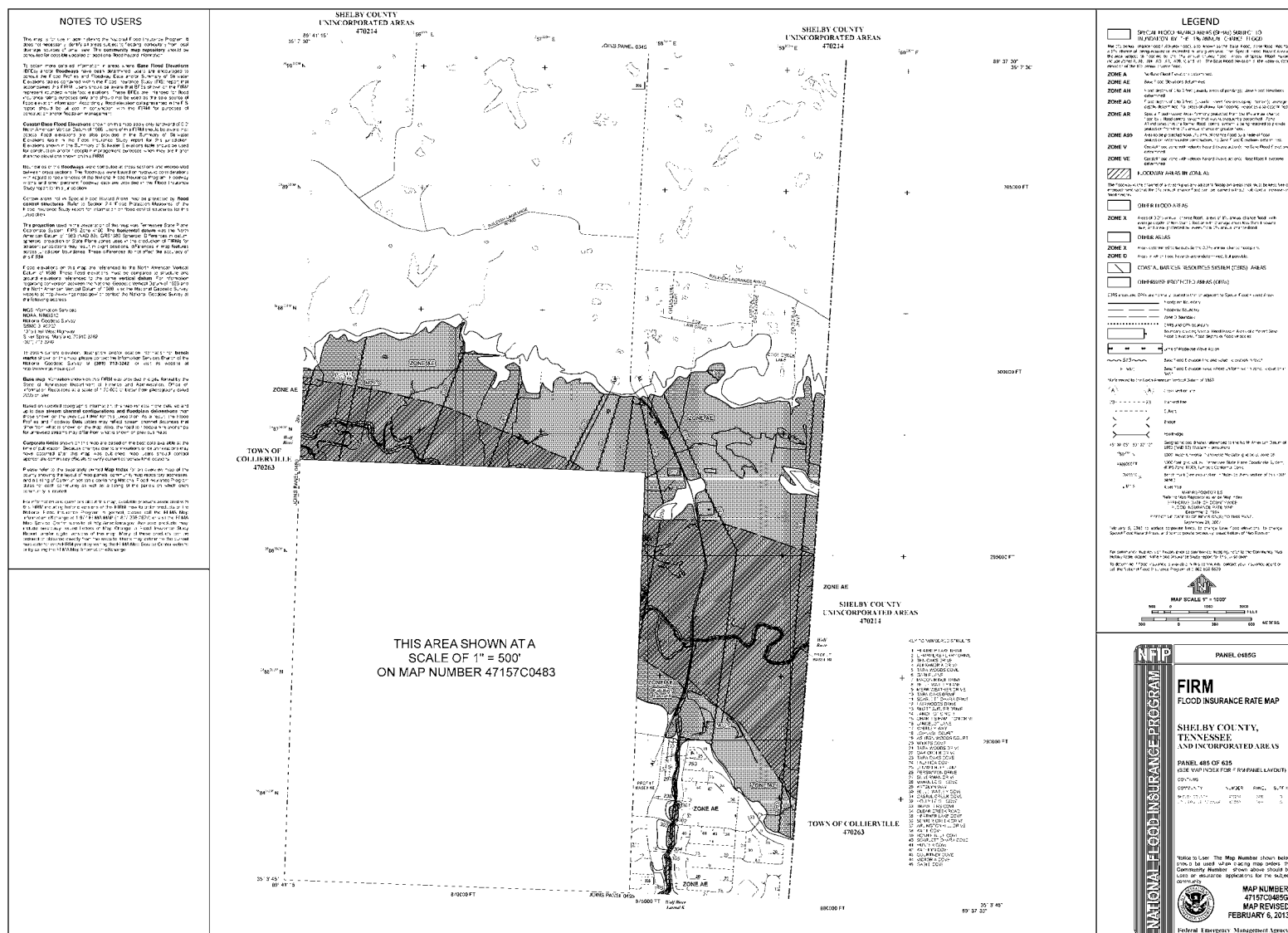


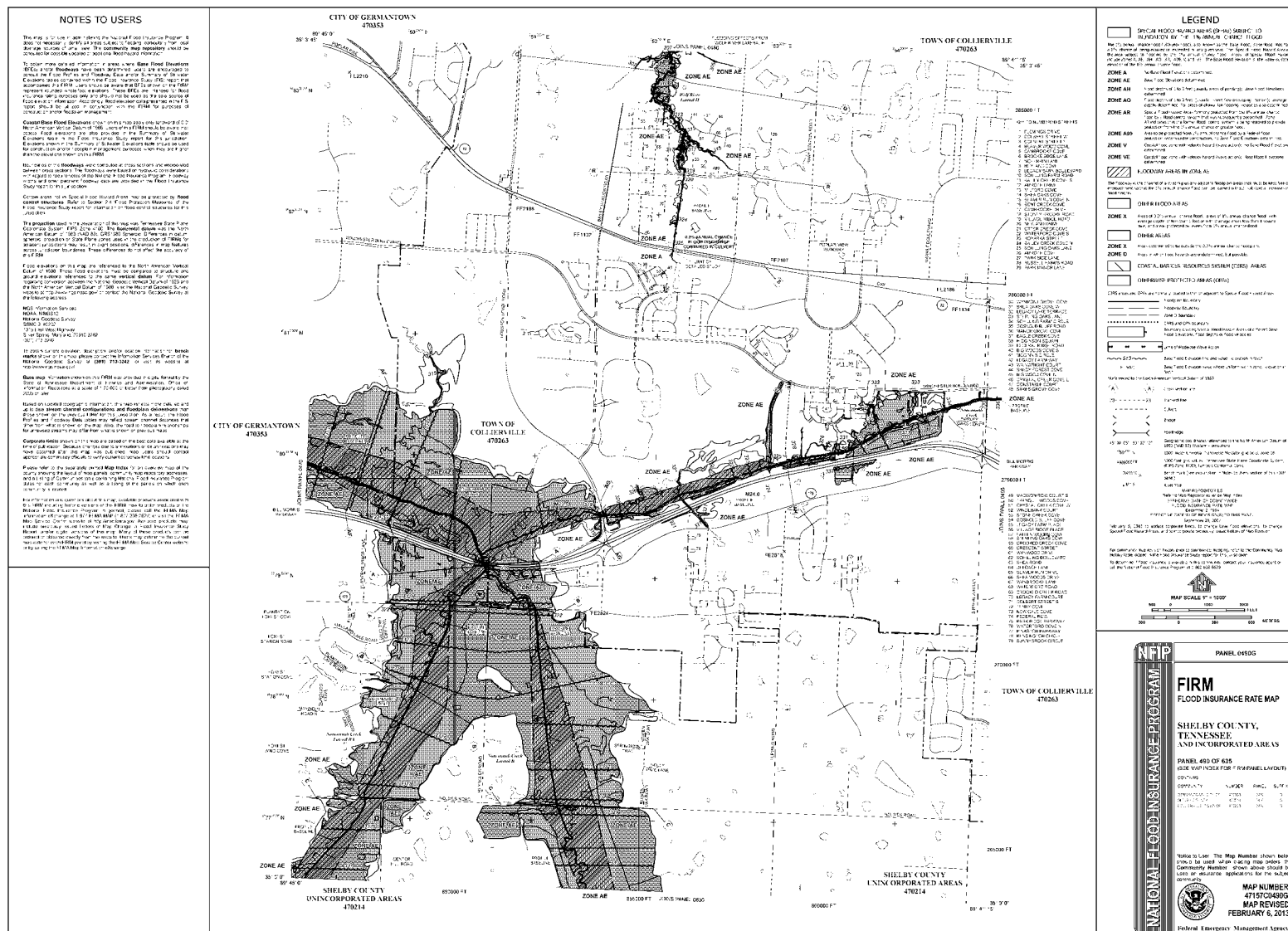


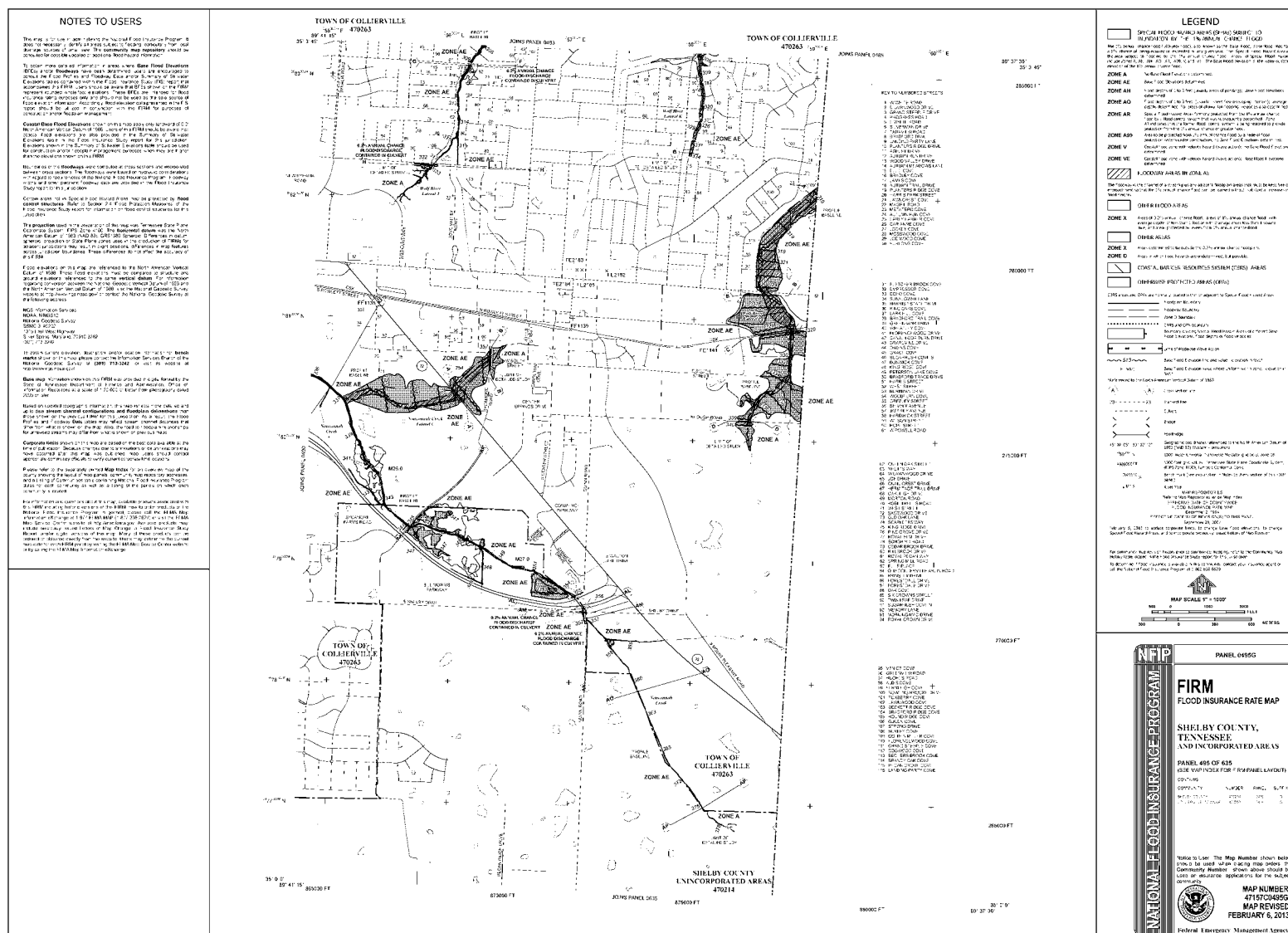


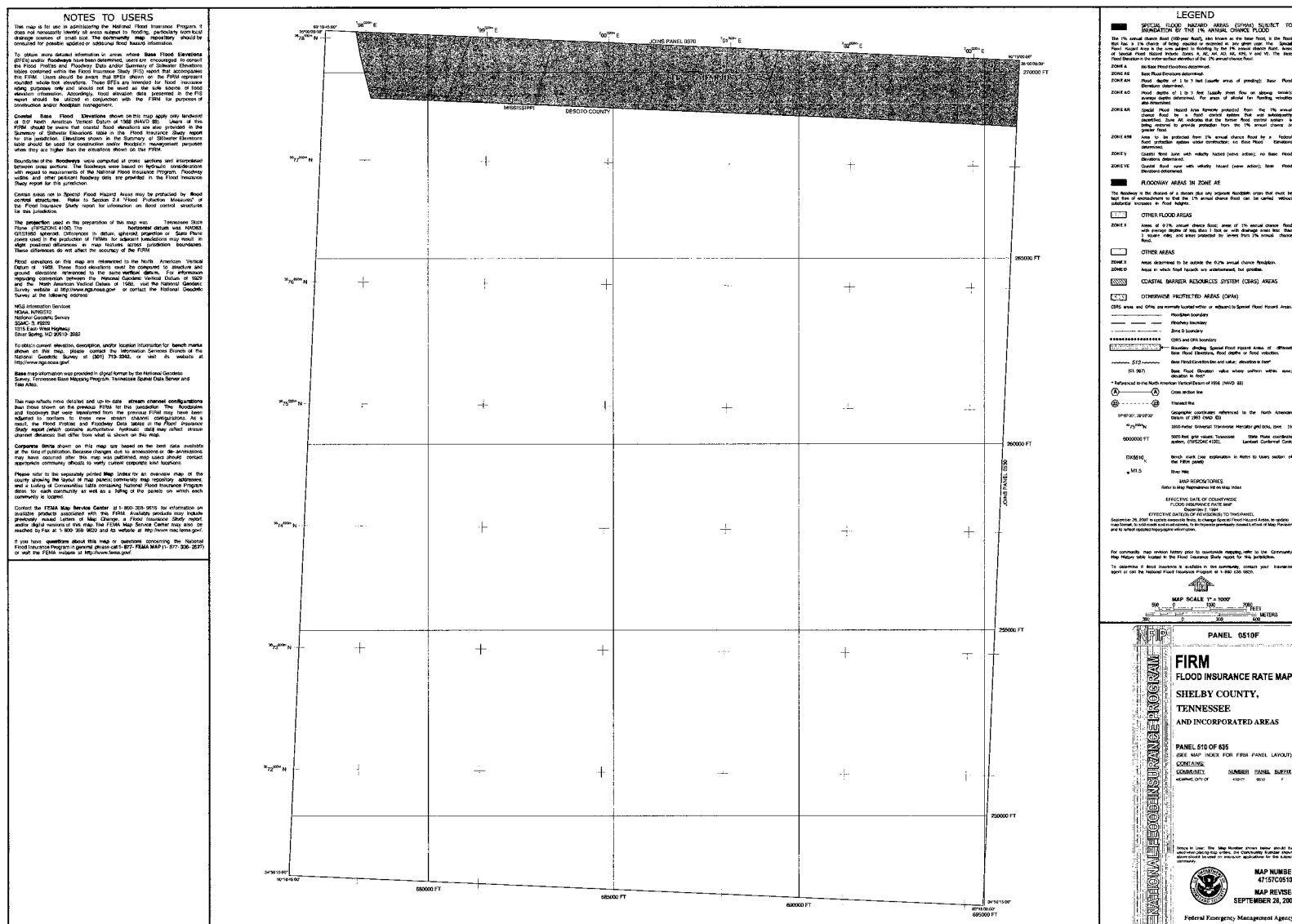


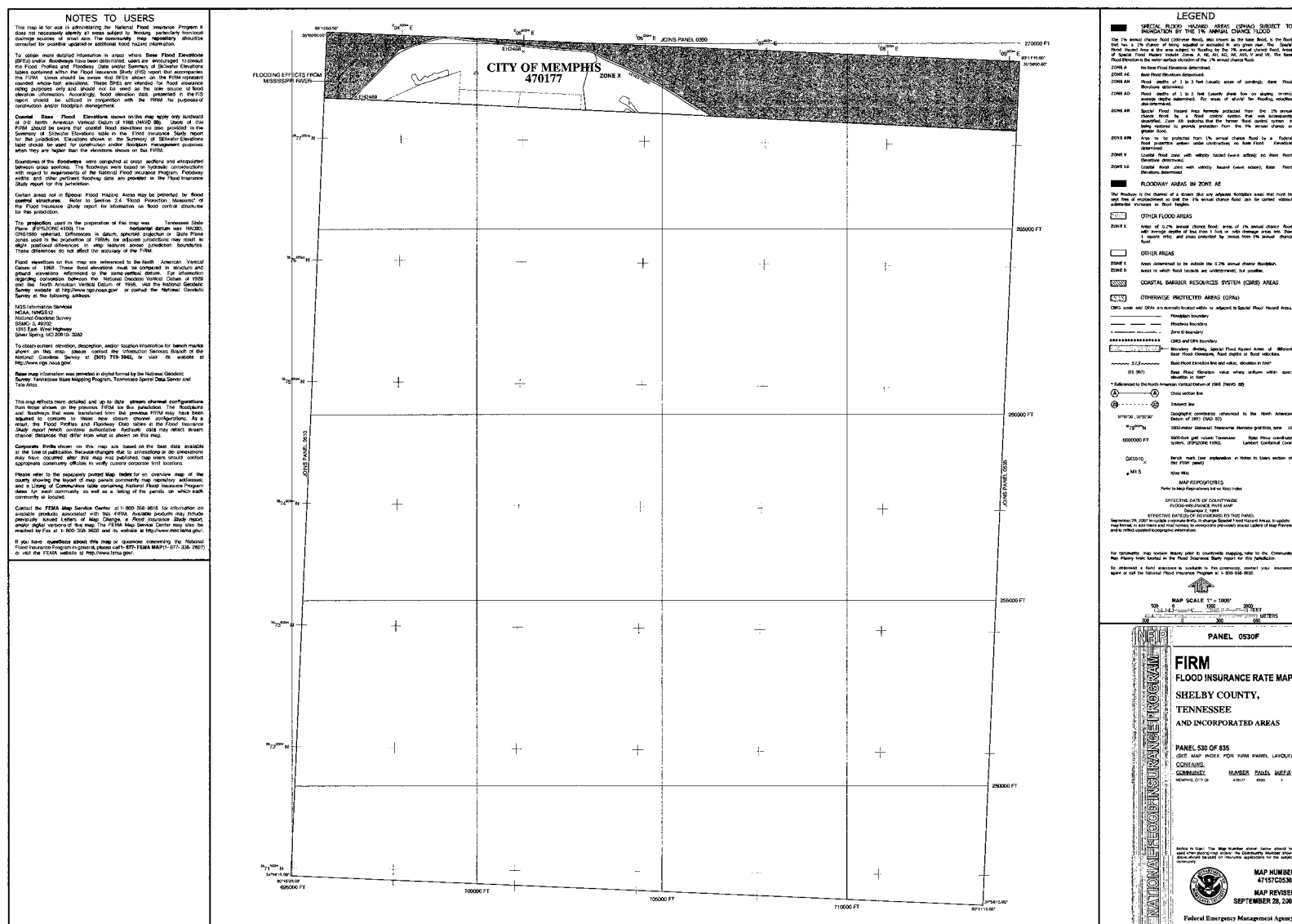


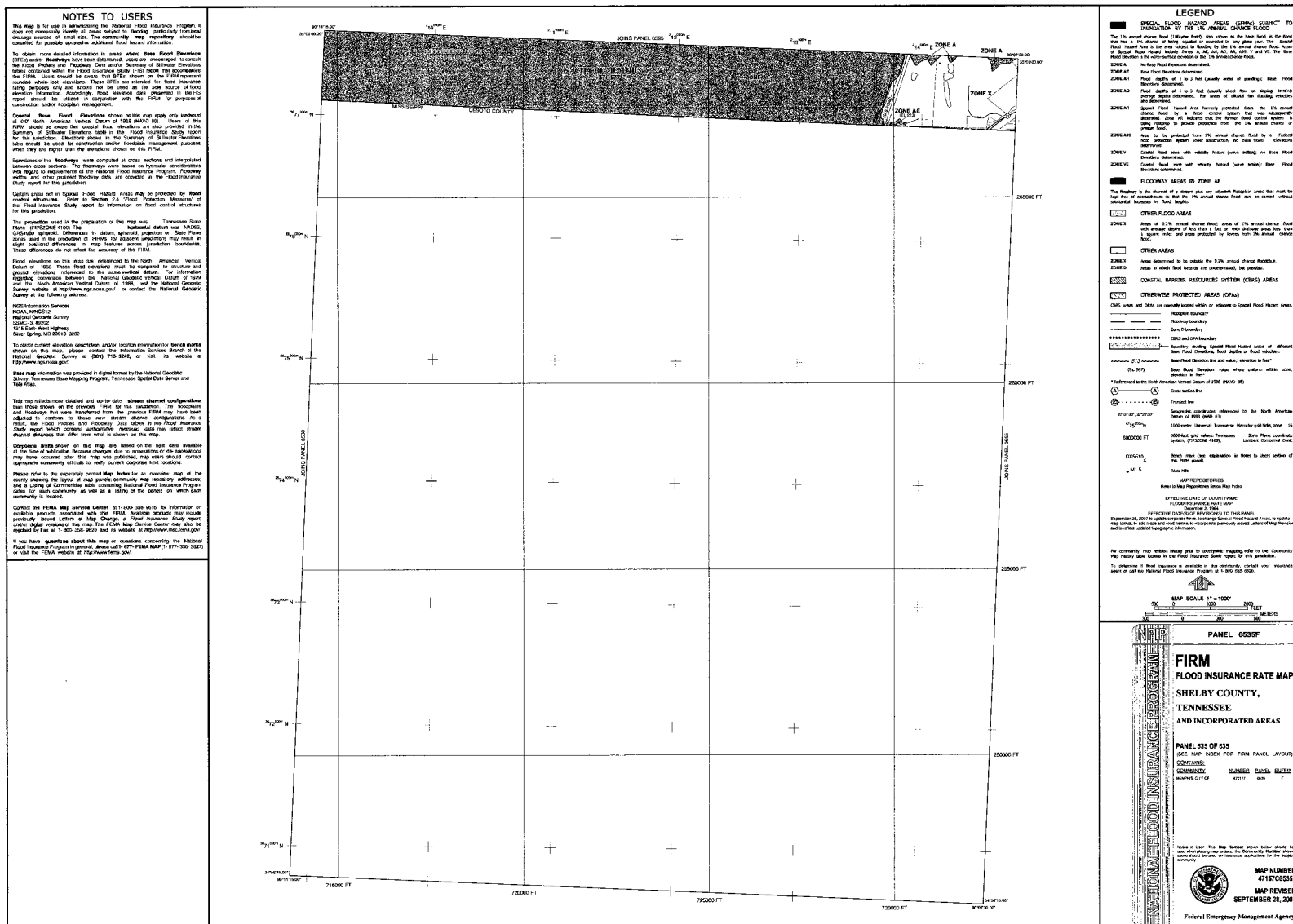


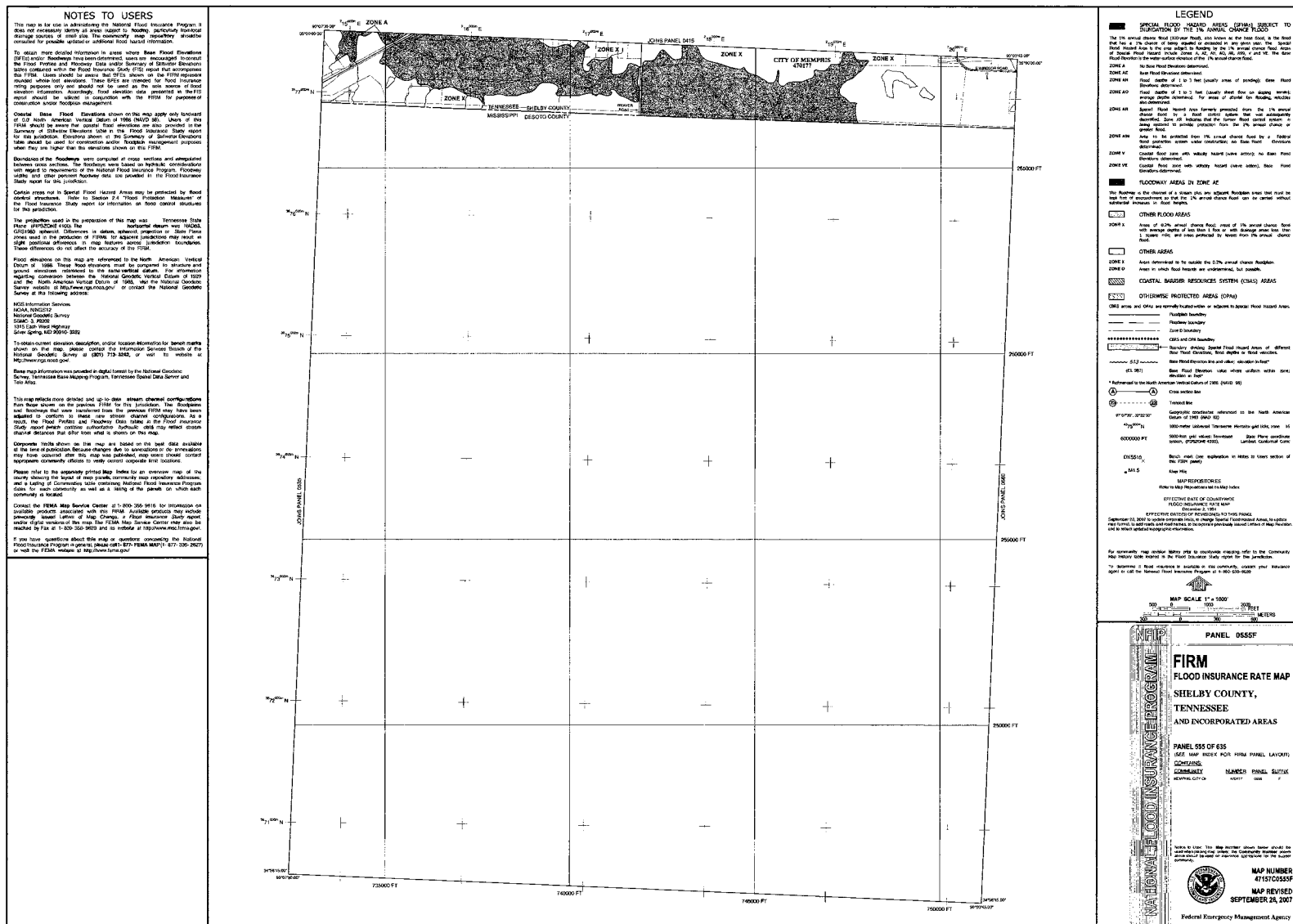




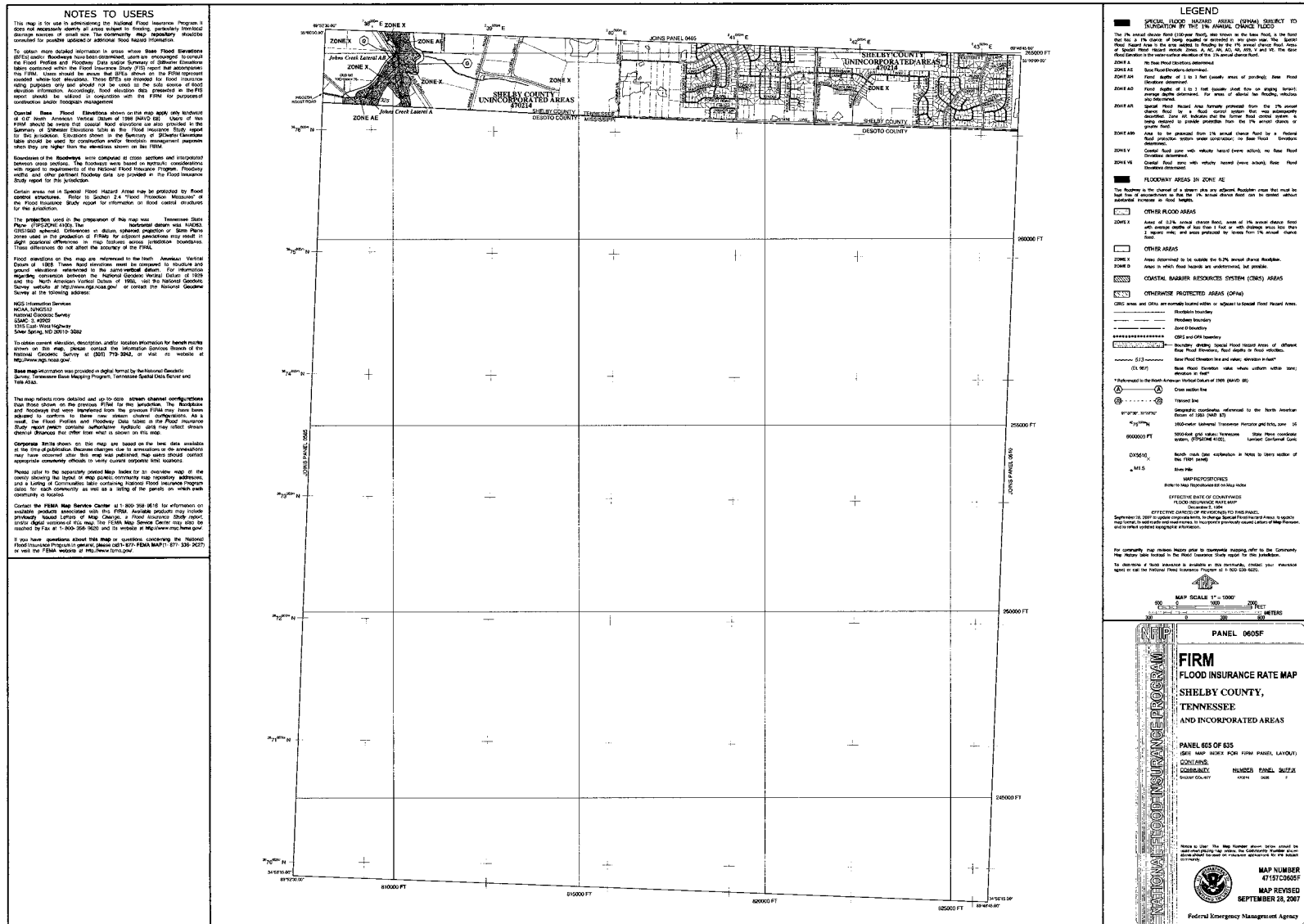


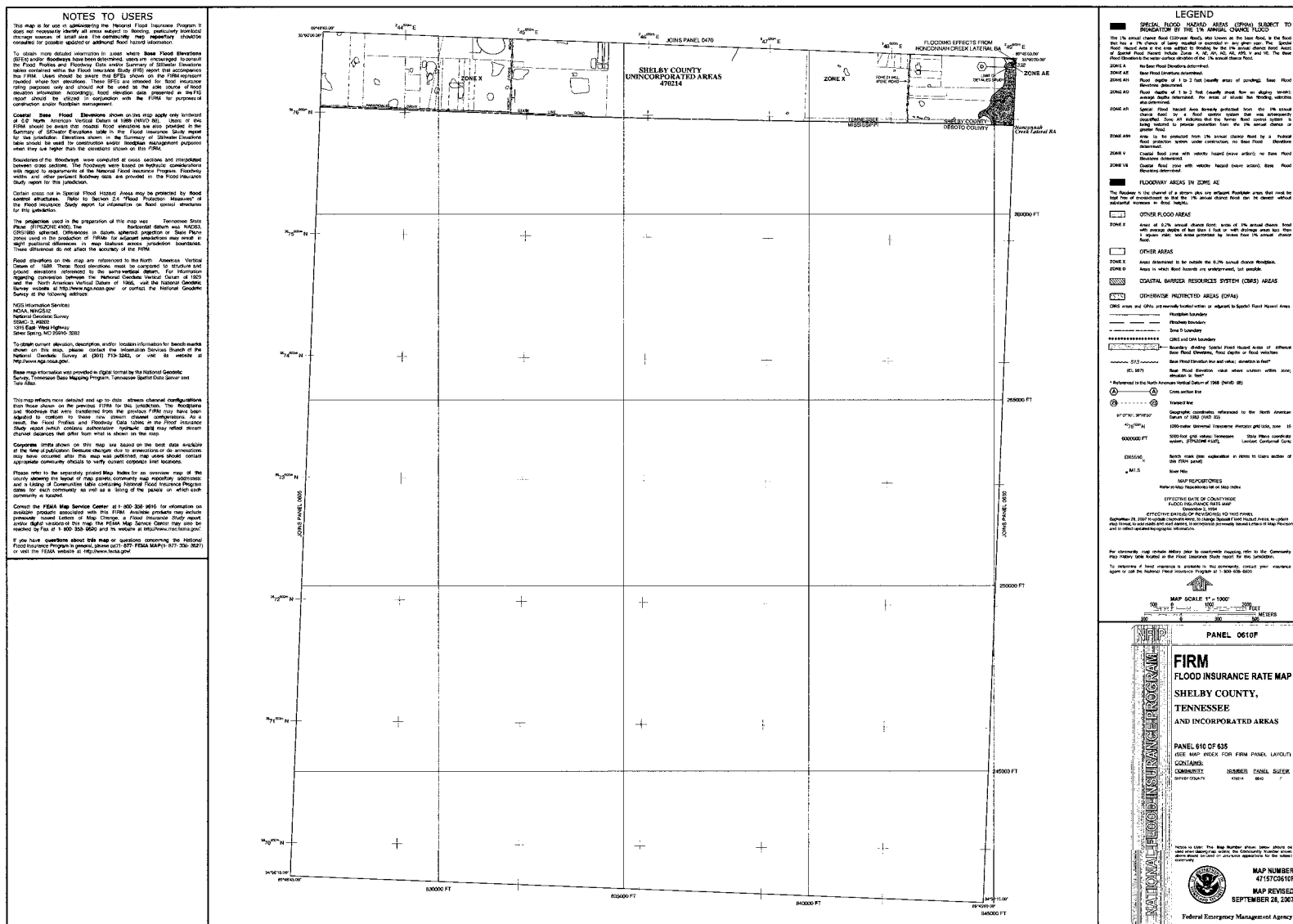


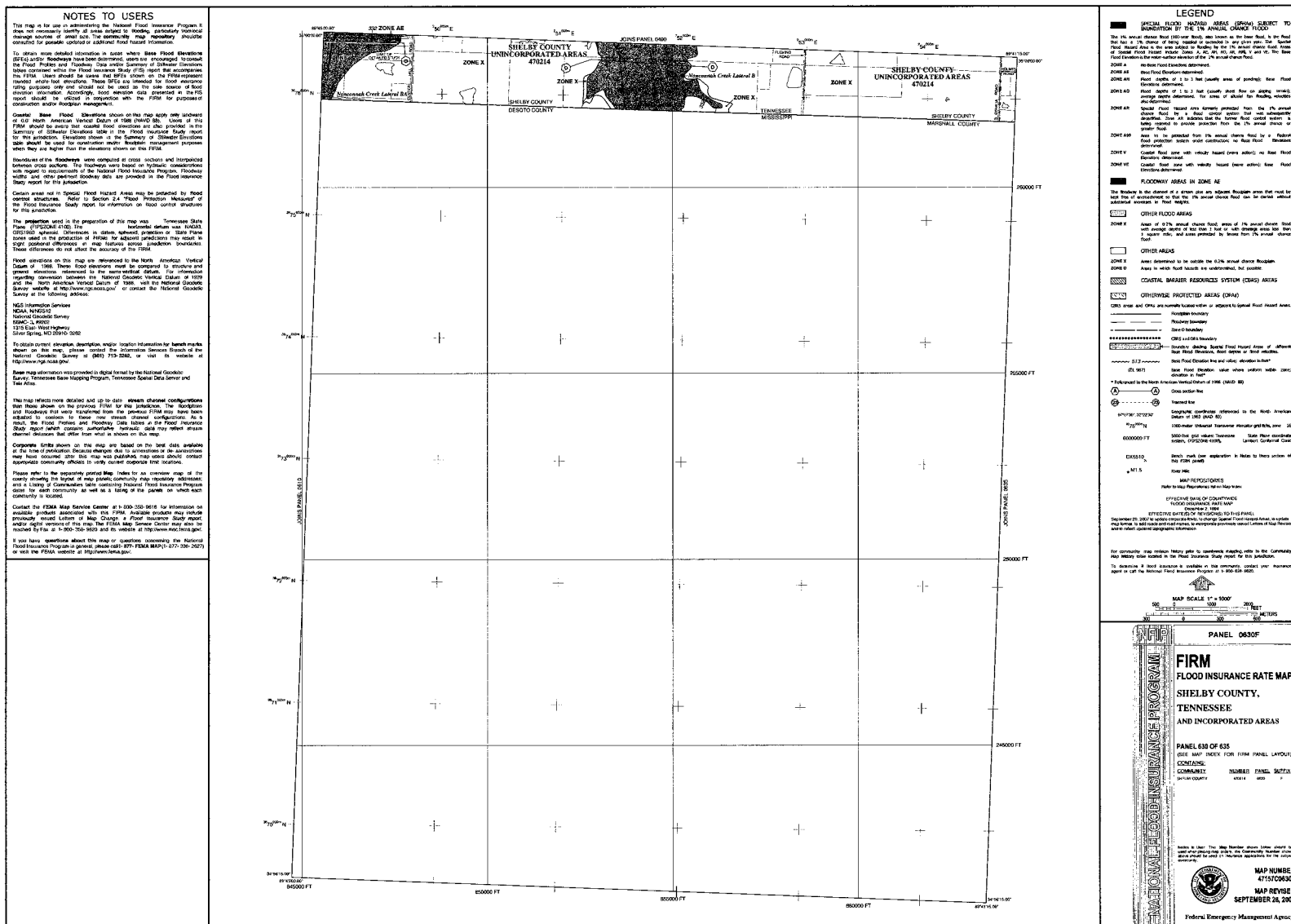












Appendix 5

HAZUS: 500-year Flood Study



Disclaimer:

This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific flood. These results can be improved by using enhanced inventory data and flood hazard information.



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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Tennessee

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is approximately 785 square miles and contains 17,275 census blocks. The region contains over 351 thousand households and has a total population of 927,644 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 335,912 buildings in the region with a total building replacement value (excluding contents) of 109,057 million dollars. Approximately 91.43% of the buildings (and 73.49% of the building value) are associated with residential housing.



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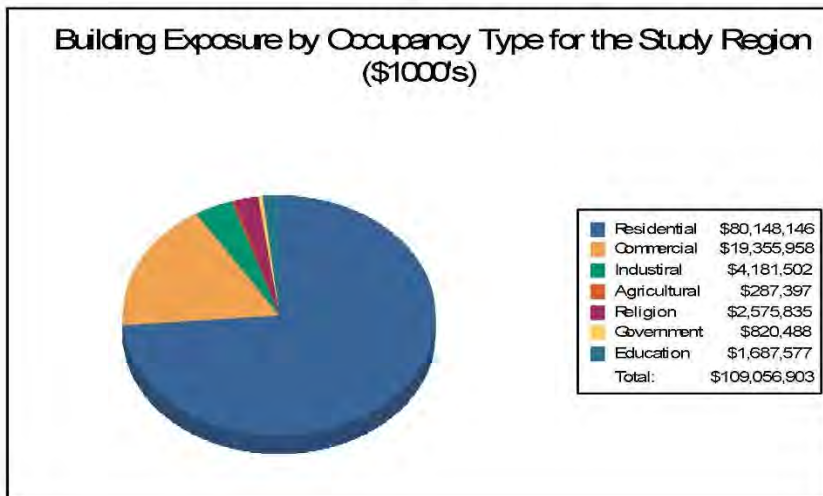
Building Inventory

General Building Stock

Hazus estimates that there are 335,912 buildings in the region which have an aggregate total replacement value of 109,057 million dollars. Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure (\$1000)	Percent of Total
Residential	80,148,146	73.5%
Commercial	19,355,958	17.7%
Industrial	4,181,502	3.8%
Agricultural	287,397	0.3%
Religion	2,575,835	2.4%
Government	820,488	0.8%
Education	1,687,577	1.5%
Total	109,056,903	100%



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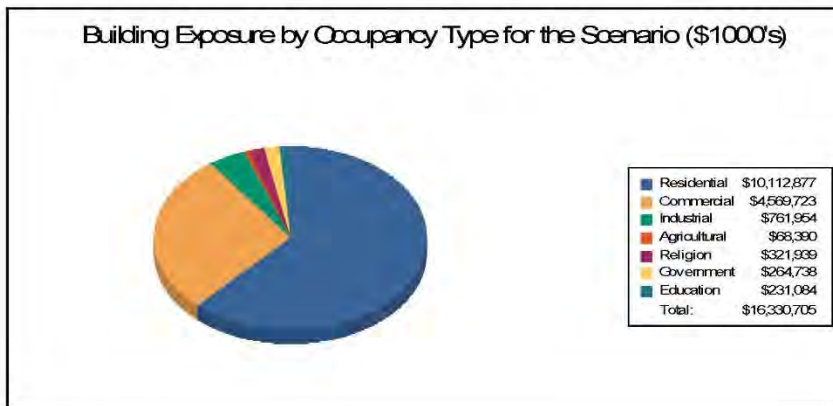
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Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure (\$1000)	Percent of Total
Residential	10,112,877	61.9%
Commercial	4,569,723	28.0%
Industrial	761,954	4.7%
Agricultural	68,390	0.4%
Religion	321,939	2.0%
Government	264,738	1.6%
Education	231,084	1.4%
Total	16,330,705	100%



Essential Facility Inventory

For essential facilities, there are 12 hospitals in the region with a total bed capacity of 4,163 beds. There are 339 schools, 11 fire stations, 36 police stations and 2 emergency operation centers.



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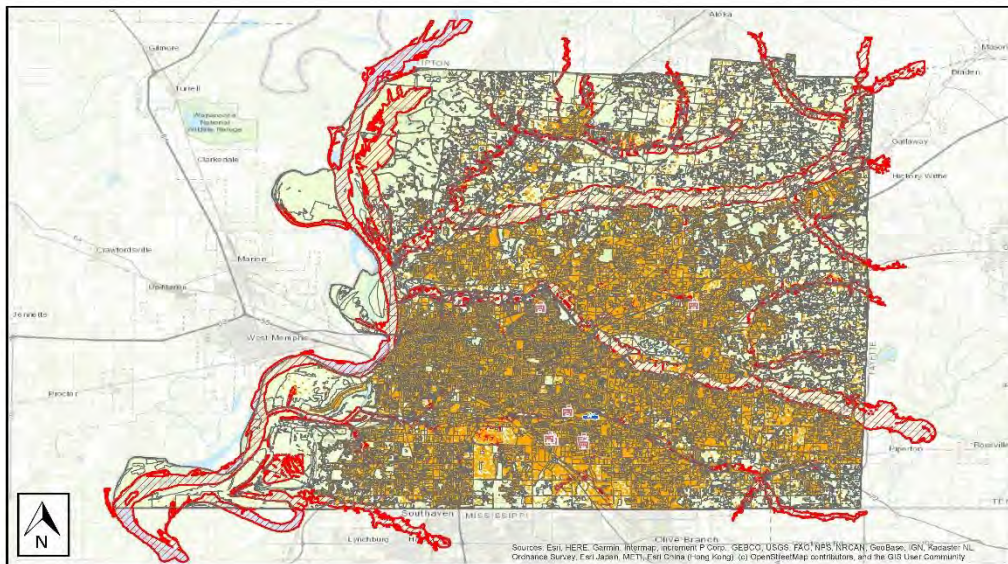
Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	Shelby_County
Scenario Name:	Shelby_County_50yr_Flood
Return Period Analyzed:	500
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



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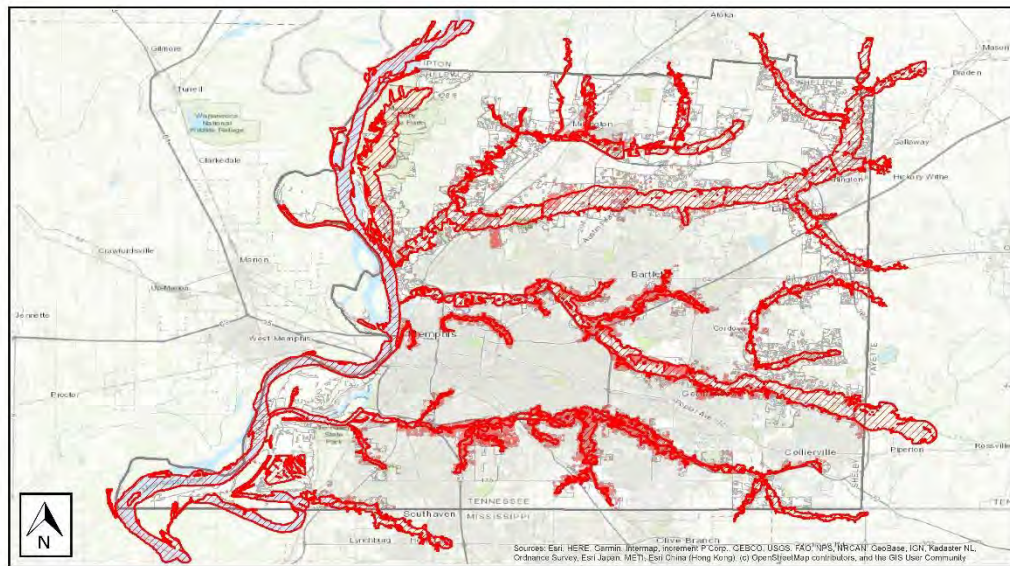


Building Damage

General Building Stock Damage

Hazus estimates that about 4,217 buildings will be at least moderately damaged. This is over 59% of the total number of buildings in the scenario. There are an estimated 504 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = \$300K) Overview Map



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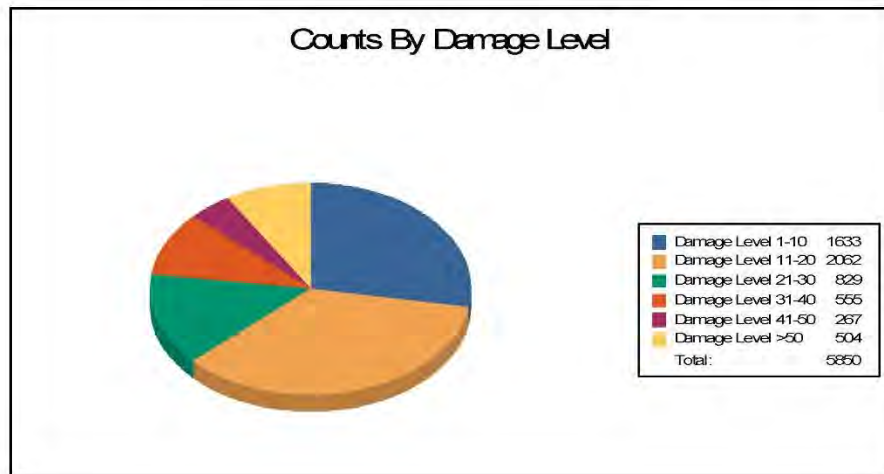


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Table 3: Expected Building Damage by Occupancy

Occupancy	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0	1	100	0	0	0	0	0	0	0	0
Commercial	42	42	56	57	1	1	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	10	59	6	35	1	6	0	0	0	0	0	0
Industrial	0	0	2	100	0	0	0	0	0	0	0	0
Religion	0	0	2	100	0	0	0	0	0	0	0	0
Residential	1,581	28	1,995	35	827	14	555	10	267	5	504	9
Total	1,633		2,062		829		555		267		504	



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Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	6	50	6	50	0	0	0	0	0	0	0	0
Manuf/Housing	1	3	2	6	1	3	0	0	1	3	27	84
Masonry	140	32	188	43	47	11	33	7	13	3	20	5
Steel	12	41	17	59	0	0	0	0	0	0	0	0
Wood	1,496	28	1,881	35	790	15	530	10	254	5	463	9



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Essential Facility Damage

Before the flood analyzed in this scenario, the region had 4,163 hospital beds available for use. On the day of the scenario flood event, the model estimates that 4,163 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	2	1	0	1
Fire Stations	11	0	0	0
Hospitals	12	0	0	0
Police Stations	36	1	0	1
Schools	339	8	0	8

If this report displays all zeros or is blank, two possibilities can explain this.

- (1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
- (2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.



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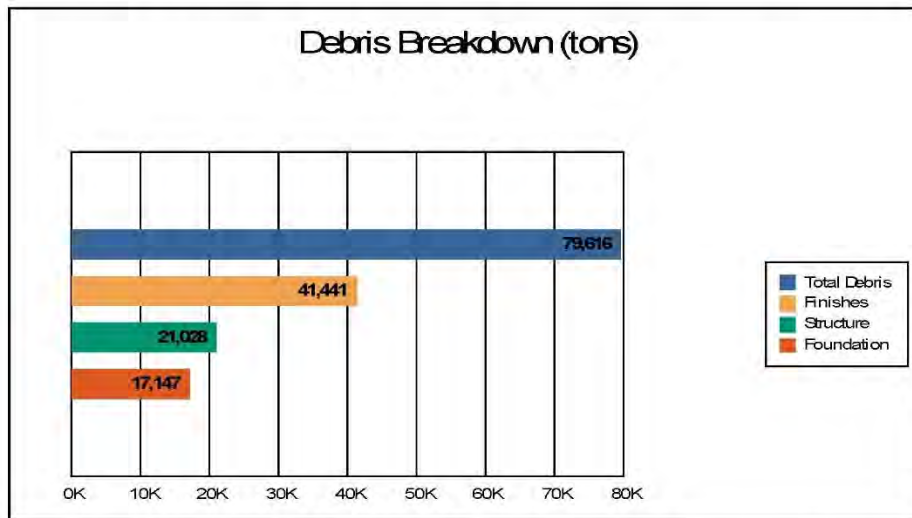
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Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.



The model estimates that a total of 79,616 tons of debris will be generated. Of the total amount, Finishes comprises 52% of the total, Structure comprises 26% of the total, and Foundation comprises 22%. If the debris tonnage is converted into an estimated number of truckloads, it will require 3185 truckloads (@25 tons/truck) to remove the debris generated by the flood.



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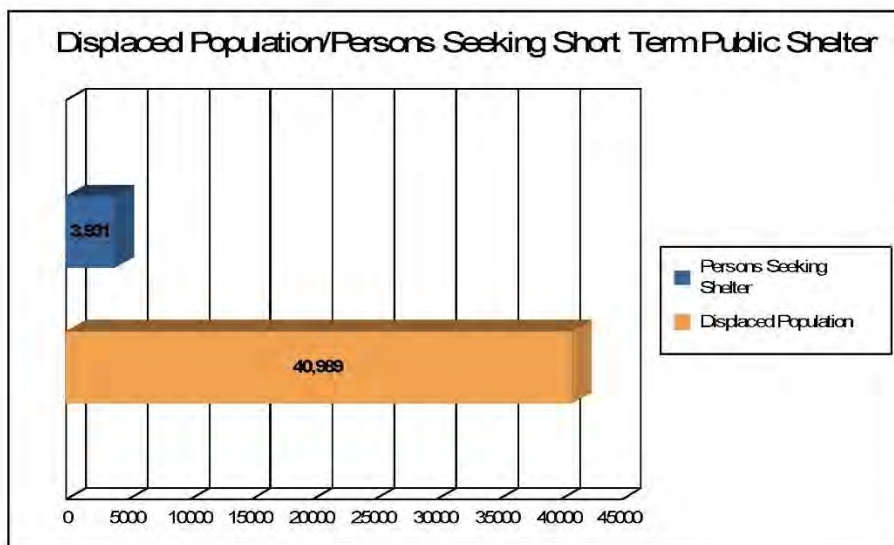
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Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 13,663 households (or 40,989 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 3,931 people (out of a total population of 927,644) will seek temporary shelter in public shelters.



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Economic Loss

The total economic loss estimated for the flood is 4,222.68 million dollars, which represents 25.86 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 1,957.77 million dollars. 54% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 27.36% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.



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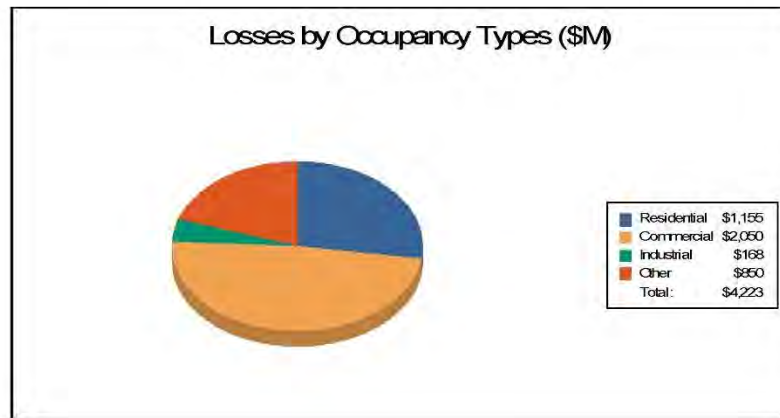
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Table 6: Building-Related Economic Loss Estimates
(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	522.73	227.24	45.36	31.24	826.57
	Content	296.09	558.32	94.07	146.55	1,095.02
	Inventory	0.00	18.34	16.32	1.52	36.18
	Subtotal	818.82	803.91	155.75	179.30	1,957.77
Business Interruption						
	Income	12.02	453.94	3.01	54.13	523.10
	Relocation	188.78	157.38	3.41	32.65	382.22
	Rental Income	107.48	100.30	0.58	4.90	213.26
	Wage	28.29	533.98	5.21	578.85	1,146.33
	Subtotal	336.57	1,245.59	12.21	670.53	2,264.90
ALL	Total	1,155.39	2,049.50	167.96	849.83	4,222.68



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Appendix A: County Listing for the Region

- Tennessee
 - Shelby



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Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Tennessee				
Shelby	927,644	80,148,146	28,908,757	109,056,903
Total	927,644	80,148,146	28,908,757	109,056,903
Total Study Region	927,644	80,148,146	28,908,757	109,056,903



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Appendix 6

Ongoing Performance Tasks

1. The EMA will continue to educate the public on preparedness and safety.
2. The EMA will continue to participate in formal campaigns such as CUSEC's Earthquake Awareness Week.
3. The EMA will continue to coordinate activities for severe weather awareness week.
4. The EMA will continue to encourage residents to buy flood and earthquake insurance.
5. The utility companies have adopted a program to maintain right of ways. This Ongoing program will continue to keep power lines free of ground growth and tree limbs that could cause power outages during severe storms.
6. EMA will continue to monitor any flooding conditions that may arise within the county.
7. The EMA will continue working with all agencies to review and update the BEOP and other response plans.
8. The EMA will continue working with those agencies that will provide shelter during times of emergencies.
9. The mitigation committee working with the local media will provide periodic releases dealing with personal disaster plans for the general public; such as maintaining emergency supplies, family contacts, evacuation plans, shelter locations, etc.

Appendix 7

Ordinances

U.S. Department of Homeland Security
Region 4
3005 Chamblee Tucker Road
Atlanta, GA 30341

May 3, 2022



Mr. Doug Worden
State Hazard Mitigation Officer
Tennessee Emergency Management Agency
3041 Sidco Drive
Nashville, TN 37204

Reference: Shelby County Hazard Mitigation Plan

Dear Mr. Worden:

This is a follow-up to our previous correspondence of January 20, 2022, in which we approved the Shelby County Hazard Mitigation Plan and all participating jurisdictions that originally submitted adoption resolutions. We have recently received and approved additional resolution(s) for inclusion.

Enclosed is the status of all participating jurisdictions. Approved jurisdictions are eligible applicants through the State for the following mitigation grant programs administered by the Federal Emergency Management Agency (FEMA):

- Hazard Mitigation Grant Program (HMGP)
- Flood Mitigation Assistance (FMA)
- Building Resilient Infrastructure and Communities (BRIC)

Please note that all funding requests will be evaluated individually according to the program's specific eligibility requirements.

If you or any plan participant need assistance, please do not hesitate to contact Robin Berzins, of my staff, at (678) 822-8516.

Sincerely,

A handwritten signature in blue ink that reads "Kristen M. Martinenza". The signature is fluid and cursive, with the first name "Kristen" and last name "Martinenza" clearly visible.

Kristen Martinenza, P.E., CFM
Branch Chief, Risk Analysis Branch
FEMA Region 4

Enclosure

Enclosure: Plan Participant Status List

Attached is the list of participating jurisdictions in the referenced hazard mitigation plan.

Jurisdiction Name	Jurisdiction Status	Date Approved by FEMA
1) Arlington Community School District	Approved	1/20/22
2) Arlington town	Approved	1/20/22
3) Bartlett city	Approved	1/20/22
4) Bartlett City School District	Approved	1/20/22
5) Collierville School District	Approved	1/20/22
6) Collierville town	Approved	1/20/22
7) Germantown city	Approved	1/20/22
8) Lakeland city	Approved	1/20/22
9) Lakeland School System District	Approved	1/20/22
10) Memphis city	Approved	1/20/22
11) Millington city	Approved	1/20/22
12) Millington Municipal School District	APA	
13) Shelby County	Approved	1/20/22
14) Shelby County School District	Approved	5/3/22