VI. TECHNICAL SERVICES BRANCH

A. MISSION AND RESPONSIBILITIES

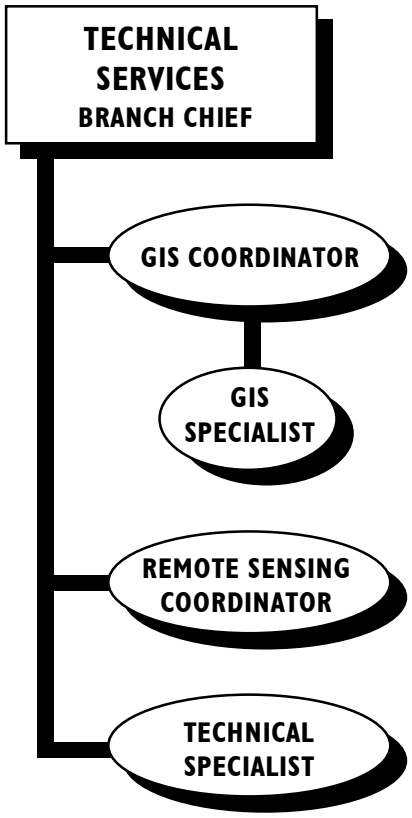
The mission of the Technical Services Branch is to support ERT planning and decision-making through the development and delivery of products and services. These products and services generally require a measure of technical expertise not otherwise available to the ERT. Primary responsibilities include, but are not limited to, the following:

1. Producing, or coordinating the development and generation of Geographic Information System (GIS) products.

2. Identifying requirements for, requesting, and coordinating necessary remote sensing support.

3. Providing subject matter expertise in areas of key scientific or other technical situational interest.

Figure VI-1
Technical Services Branch



B. ORGANIZATION

The Technical Services Branch consists of four designated functional positions (led by a branch chief) and one multifunctional position. As always, staffing of individual positions will be determined by the magnitude and scope of the disaster and evolving requirements of the Information and Planning Section and ERT. The four functional and one multifunctional branch positions are depicted in the organizational chart at left. Individual position descriptions are outlined in Appendix G.

C. INFORMATION FUNCTIONS

In addition to providing expertise in whatever technical or scientific area is needed to support ERT operations, the Technical Services Branch has been designated responsibility for managing two separate but complementary information functions: GIS Production and Remote Sensing Coordination. GIS involves the integration of graphic and tabular data to generate products that illuminate a situation in ways that raw data cannot. GIS products (usually maps) represent a distinct form of information. They combine different types of current and static information (typically, statistical and/or spatial data, such as remotely sensed damage assessment information and recent county population statistics) to yield a more operationally informative visual product. Products resulting

from the synthesis of information from both functions play an important decision-making role throughout the disaster response cycle. However, the need for detailed, accurate and timely damage assessment and situational impact information is never greater than immediately following a disaster. It is during this immediate post-disaster period that critical initial decisions need to be made on ***what*** federal response resources are required, ***where*** they should be deployed, ***how*** they should be transported or delivered, and ***when*** they should arrive. Since normal lines of communication are often impaired or inoperative, and ground assessments are usually incomplete or not yet available, other *remote* information collection strategies must be used. It is the fusion of these complementary functions (remotely sensed data with GIS-based display capabilities) that inevitably yields a consolidated picture far more useful than the sum of its parts.

D. GIS COORDINATION

A GIS is designed to work with data referenced by spatial or geographic coordinates. GIS is both a database system with specific capabilities for spatially referenced data, and a set of operations for working with the data (i.e., planning; observation and collection of data; storage and analysis of data; and use of the derived information in decision-making). Because GIS uses data referenced by spatial coordinates, the normal output product is a map displaying the information derived from combinations of databases. For example, GIS can be used to produce a map showing damaged areas overlaid with zip code boundaries or congressional districts. However, it is important to realize that the database can also be manipulated to produce lists; such as the total number of damaged structures in a community. GIS products support situation reporting; damage prediction, estimation, and assessment; resource management; information exchange; situation analyses; and operating center displays. GIS supports the following EEIs:

Figure VI-2 - GIS-Supported EEI

1 - 3 DAYS	4 - 10 DAYS	11 + DAYS	GIS-SUPPORTED ESSENTIAL ELEMENTS OF INFORMATION
Disaster Area EEI			
→			Boundaries of the Disaster Area
→			Access Points to the Disaster Area
→	→		Jurisdictional Boundaries
→	→	→	Social, Economic and Political Impacts
→	→	→	Historical and Demographic Information
Assessment EEI			
→			Predictive Modeling Impact Projections
→	→		Initial Needs and Damage Assessments
→	→	→	Status of Communications Systems
→	→	→	Status of Transportation Systems and Critical Transportation Facilities
→	→	→	Status of Operating Facilities
→	→	→	Status of Critical Facilities and Distribution Systems
→	→	→	Status of Energy Systems
Response and Recovery EEI			
→	→		Remote Sensing Activities

1. GIS Capabilities

GIS capabilities are basically divided into three general categories: *Predictive Modeling, Operational Mapping, and Reference Mapping.*

a. *Predictive Modeling*

(1) This GIS capability involves integrating known demographic and geographic characteristics with one or more predictable characteristics expected to be generated by a specific event. The product of this integration is a model predicting the effects of the event on the environment. For example, if a Category 4 hurricane is approaching a particular coastal area, a model might indicate that sustained winds of at 131 mph would severely damage 90 percent of the 37,500 mobile homes in the potential threat area.

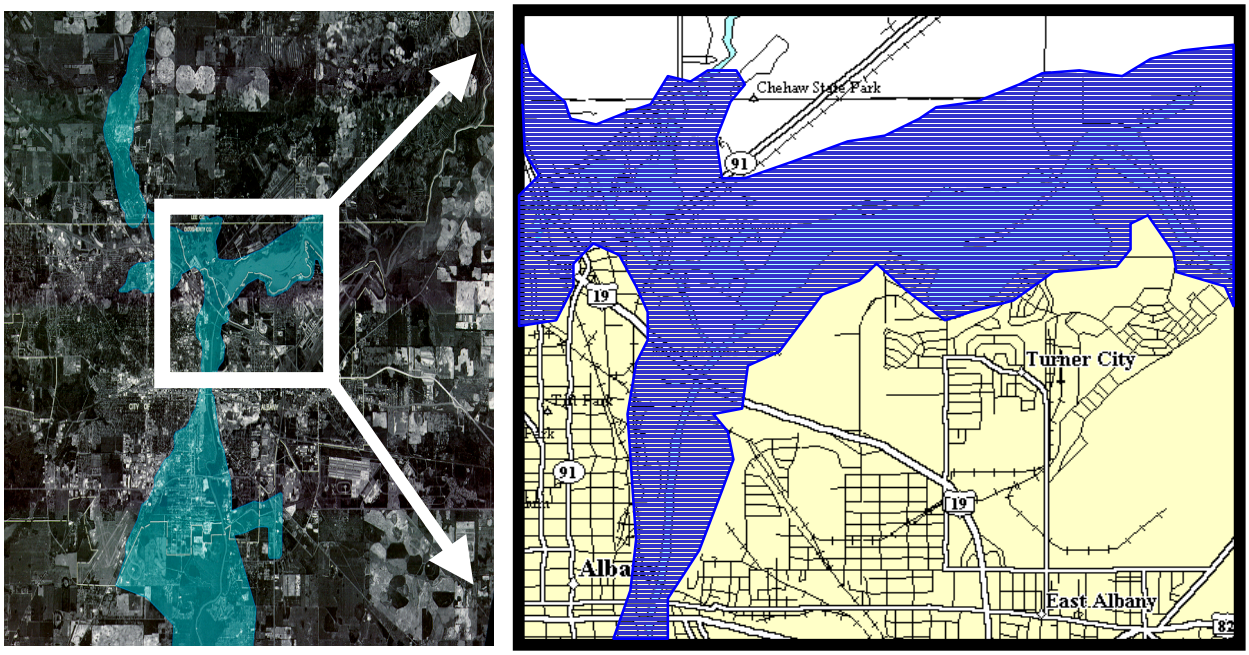
(2) The ability to predict and project consequences with reasonable accuracy allows decision-makers to initiate preparations for identifying and mobilizing those resources typically required to support the expected damage. The ability to prepare in advance of an actual event (or before actual damage assessments can be performed) can significantly reduce the time required to deliver critical resources to affected areas.

(3) Predictive modeling is normally used as a surrogate decision-making tool when actual situation and damage assessment information is not yet available. Because it has little utility in a field response environment, predictive modeling is generally accomplished at or through the EST and/or ROC. Although the Technical Services Branch Chief should be familiar with predictive modeling and its applications, there should generally be no requirement to establish a stand-alone capability. Predictive modeling requests or requirements generated at the field level should be forwarded to higher headquarters.

b. *Operational Mapping*

(1) This capability involves the development and production of maps that reflect real-time information, such as (but not limited to) damage assessment characterizations, evacuation data, and locations of responding elements and resources. This real-time information is often integrated with referential demographic or geographic information to produce a product that is more operationally useful. For example, imagery (satellite or aerial) derived damage assessment data might be combined with road overlays to identify potentially problematic lines of ground transportation, which could be of extreme interest to ERT elements planning field activities. In another example, translator requirements could be identified through a map reflecting the predominant language in each area scheduled to be serviced by a Community Relations Team or Disaster Recovery Center (DRC). Refer to Figure VI-3 for a depiction of a GIS product derived from imagery analysis. Note that the map product reveals details (streets, etc.) which cannot be seen on the actual image.

Figure VI-3 - Image and Imagery Derived GIS Product



(2) The ability to project operational impacts and status in a specific demographic or geographic context allows decision-makers at field and headquarters levels to visualize situations and plan or modify response actions accordingly.

c. *Reference Mapping*

This GIS capability involves the production of maps graphically reflecting referential statistics or information. The types of statistics and information include, but are not limited to: jurisdictional boundaries, congressional districts, population demographic breakdowns, locations of residential, commercial, industrial, and governmental facilities, income and economic information, infrastructure data, et al. The ability to accurately develop a visual demographic profile of a particular area by combining different types of information (e.g., congressional districts and number of people living in mobile homes) makes referential mapping an invaluable ERT tool.

2. Obtaining GIS Support from FEMA Headquarters

FEMA Headquarters GIS capability is accessed through the Information and Planning Section of the EST at FEMA Headquarters (if activated); or otherwise directly through the GIS Team at the Mapping and Analysis Center (MAC). Products can be provided via electronic mail, but may require specialized software and will require color printers or plotters. Products can also be faxed, but will invariably suffer a potentially significant loss of detail. Another option is overnight delivery and local reproduction. The best solution is to download GIS products directly from “www.gismaps.fema.gov”, or via the GIS pages on the NEMIS Intranet site.

3. Establishing a GIS Production Capability at the DFO

a. If a requirement or need exists to establish a stand-alone GIS production capability at the DFO, the GIS Team at FEMA Headquarters can provide the ERT with:

(1) A deployable FEMA standard desktop GIS hardware/software suite.
(2) GIS suite set-up (required) and tear-down support.
(3) Initial staffing to produce GIS products and analyses.
(4) Training for ERT personnel to assume the DFO production process.
(5) Results of disaster estimation models, e.g., wind/surge damage.
(6) Auxiliary map production assistance from Headquarters.
(7) High-end GIS analyses beyond desktop GIS system capabilities.
(8) Follow-up telephonic technical support.
(9) Databases maintained at FEMA HQ.

b. A GIS suite is deployed in its entirety. Individual components, if needed, will only be provided from the inventory of spare components. If the size of the disaster warrants more than the base configuration, the GIS Team can advise and assist the ERT in the procurement of additional DFO hardware. A standard deployable suite consists of the following components:

(1) Hardware:

- Pentium file server and two workstations
- RAID array for GIS data storage (6 GB)
- Black & White and Color (letter and E-size) printers
- 4mm tape backup unit (for daily backup)
- CD writer (for archiving final data sets)
- LAN hub and cabling to incorporate the GIS segment with the overall DFO LAN

(2) Software:

- MapInfo Professional
- Novell Netware
- Gear (CD-writer software)

(3) Expendable Supplies:

- Three boxes of plotter paper
- Seven 4mm backup tapes
- Five blank CDs
- Six ink cartridges of each color (cyan, yellow, magenta) for the color printers and plotter
- Nine black ink cartridges for the printers/plotter
- Seven 10 Base T Twisted Pair cables

(4) Data: A set of non-proprietary databases in MapInfo format is pre-loaded on the system. These include various boundary, facility, and resource files from the FEMA HQ database. In addition, the GIS Team also maintains licenses for the following proprietary MapInfo databases pre-loaded on each system (as well as on CDs shipped with the system):

- Census information at the block group level
- Street information with address matching capability
- Congressional district boundaries
- Zip code boundaries

(5) Other Data: FEMA Headquarters collects and maintains additional information that can be provided to the DFO, if requested. Headquarters staff can either pre-load or send this additional data with the deployable suite or provide the requested data, separately, at a later date. These data usually consist of:

- EQUIFAX business establishment data
- Additional resource and/or facilities data
- Flood zone data (Q3)

(6) Staffing Support.

(a) The GIS Team maintains standby contracts to provide initial staffing support if the ERT requires such support. The ERT is responsible for funding the contract personnel from the Disaster Fund allocation for the specific disaster being supported. The contract staff will ensure proper installation of the GIS software, and data, and provide initial production of GIS products and analyses. In addition, contract staff can train ERT personnel (FTEs, reservists, and local hires) to take over the GIS support. Contractor support is required to set up the GIS hardware suite and is also available, if requested, to integrate it with the overall DFO LAN if the ERT staff is not able to provide this service.

(b) The GIS Team can normally provide initial GIS contract-staffing support for a period of two to four weeks. The amount of support provided will be sized to operate one or two GIS workstations during the DFO workday, including extended duty hours and extended workweeks. The Information and Planning Section is responsible for making arrangements for assuming the GIS support function within this two to four-week period. This can be accomplished a number of ways: have the GIS contractor staff train ERT staff to take over this function, hire staff with the required GIS expertise, or make contractual arrangements with a local GIS firm, college, other government department or agency, etc. Under unusual circumstances, and on a case-by-case basis, the GIS Team can extend this support beyond four weeks. To avoid disruption in GIS support, the Information and Planning Section should provide the GIS Team with reasonable notice of any need to extend initial GIS support.

4. Requesting On-Site GIS Support at the DFO

The Information and Planning Section Chief, in consultation with the Technical Services Branch Chief, determines if on-site GIS support is or will be required to meet mission requirements. Confirmed requirements will be immediately conveyed to the ERT Information Technology Coordinator (ITC) who, in accordance with the revised ERT Structure and Operations Plan, is designated the single focal point for IT requirements supporting the response effort. The ITC will then follow the procedures outlined in *Procedures for Obtaining Geographic Information System (GIS) Support at the Disaster Field Office (DFO),* which can be accessed on the FEMA Public Bulletin Board, under GIS Info. The following form will be used to make the request, and the Information and Planning Section Chief or Technical Services Branch Chief should ensure that the submitted form accurately reflects the Section's needs.

Figure VI-4 - ERT GIS Support Request Format

ERT GIS SUPPORT REQUEST FORM

STATE:
DR #:
FCO NAME:
DFO LOCATION:
ITC NAME AND PHONE NUMBER:

I. GIS SUITE

STANDARD SUITE (See Appendix A)	**YES ____ NO ____**
ADDITIONAL SUITES (if available)	HOW MANY ?
DELIVERY TIME FRAME	DATE:

II. INITIAL TECHNICAL SUPPORT

HARDWARE SET-UP	**REQUIRED WITH SUITE**
START TIME*	DATE:

GIS PRODUCTION	**YES _____ NO _____**
TECHNICIANS PER SHIFT	HOW MANY ?
HOW LONG	TOTAL DAYS:
COVERAGE	HOURS PER DAY:
START TIME*	DATE:

TECHNICIAN TRAINING	**YES _____ NO _____**
TRAINEES	HOW MANY ?
HOW LONG	TOTAL DAYS:
START TIME*	DATE:

***START TIMES ARE DEPENDENT ON DELIVERY OF SUITE**

FCO APPROVAL: _____ DATE:_____

ITC APPROVAL: _____ DATE:_____

(WE ARE AWARE OF AND AGREE WITH THE SECURITY MEASURES OUTLINED IN THE *"PROCEDURES FOR OBTAINING GEOGRAPHIC INFORMATION SYSTEM (GIS) SUPPORT AT A DISASTER FIELD OFFICE (DFO)"*)

5. GIS Suite Redeployment Procedures

The deployable GIS suite is only intended to provide a temporary (approximately 90 days) GIS capability at the DFO. After that timeframe, or sooner, if the DFO closes or no longer needs the capability, Information and Planning Section staff should return the deployable suite to the DISC. If the Section Chief expects to need an on-site GIS capability beyond 90 days, ensure the ITC is notified so that action can be taken to procure a permanent replacement GIS suite. The ITC should initiate this procurement within the first 45 days to ensure meeting the 90 day timeframe for returning the deployable suite. Before returning the suite, the Information and Planning Section should archive two copies of the data directories on CD, keeping one copy and returning one with the suite. For additional information, refer to *Procedures for Obtaining Geographic Information System (GIS) Support at the Disaster Field Office (DFO).*

E. GIS PRODUCTS

The GIS Coordinator and Specialist(s) must be familiar with the GIS Production Catalog and prepared to develop and provide the full range of products available. These products include, but are not limited to, the following:

1. Model Output Maps

These products reflect predictive modeling information for a disaster area, allowing the recipient to project damages or impacts to that area (and population) prior to the availability of real assessment information. Typical products include maps depicting the number of homes (and associated population) expected to be damaged (and to what level) by winds, storm surge, flooding, or earthquake. Typically, these maps are not produced by an ERT except in response to secondary or follow-on events.

2. Introductory (Preliminary Detail) Maps

These products (maps or tables) are typically the easiest and quickest to generate, since they are based on source data that is readily accessible (e.g., basic demographic information, socioeconomic profiles, county lines, political subdivisions, etc.). These maps are primarily used for strategizing, rather than tactical response planning. Introductory Maps generally reflect the least amount of analysis.

3. Secondary (Intermediate Detail) Maps

These products (maps or tables) reflect significantly more detail than Introductory Maps, and therefore a greater measure of analysis. They typically include Introductory Map data fused with more specific site data (e.g., bridges, dams, sewage treatment plants, toxic release inventory sites, etc.) in the affected area. These maps may reflect initial assessment information (e.g., remotely sensed damage or impact data), but do not include detailed damage information, such as from inspection reports.

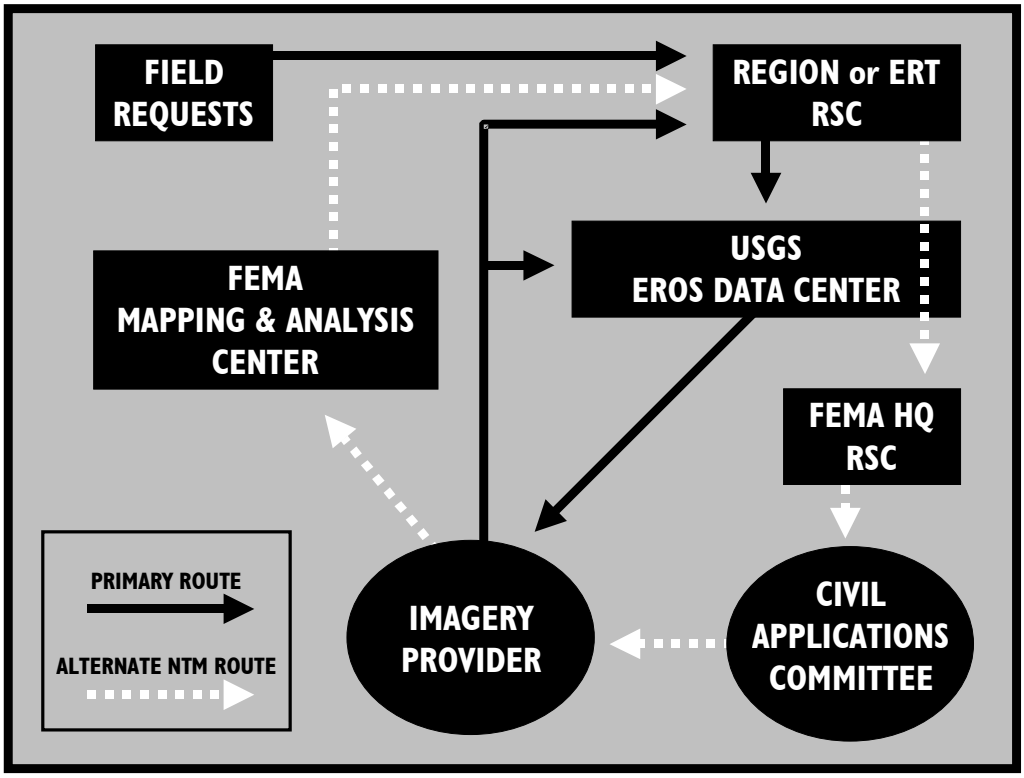
4. Tertiary (Maximum Detail) Maps

These products (maps or tables) contain the greatest level of detail. They typically combine information from Introductory and Secondary Maps with such information as actual locations of applicant homes/businesses, as well as other statistical information gathered from response sources such as the National Teleregistration Center (NTC) or National Processing Service Center (NPSC).

F. REMOTE SENSING COORDINATION

Remote sensing coordination involves the acquisition of visual or telemetric information about a specific area or environment using mechanical or electronic observation or collection methods, typically satellite imagery and/or aerial photography. Since each method possesses unique capabilities and limitations (in terms of both acquisition and application), it is the responsibility of the Technical Services Branch to determine what method best satisfies the informational demand.

Figure VI-5
Remote Sensing Request and Support Flow



1. Requesting and obtaining remotely sensed information should be among the first actions taken during the initial incident response. Data derived from remotely sensed imagery can be extremely useful in identifying key EEIs, such as affected area boundaries, types and severity of damage, and the status of transportation routes and key facilities. In addition, it can assist in the development of a response strategy by identifying potential operations sites, such as mobilization centers and staging areas.

Remote sensing can provide a unique tool for rapid, detailed and accurate data acquisition in support of situation assessment and follow-on planning. Remote sensing support activities are designed to be responsive to all levels of planning as well as to all levels of response. Products can be tailored to answer broad inquiries about an entire disaster area or to answer questions about specific locations, structures, geologic features, and more.

2. The Information and Planning Section is the central coordinating element for all remote sensing actions in any federal response to a declared disaster or emergency. To preclude duplication of effort, any Federal agency or department planning to use airborne or satellite assets (or planning to request such support) in response to a disaster or emergency must coordinate such requests through the ERT Information and Planning Section. Similarly, when a state government requires remote sensing support in excess of its own capabilities, the ERT Information and Planning Section will process the request in accordance with the procedures outlined in *Remote Sensing Standard Operating Procedures (SOP),* 9321.1-PR. In general, the Remote Sensing Coordinator at FEMA Headquarters will coordinate remote sensing support from National Technical Means (NTM) of reconnaissance. However, it is the responsibility of the ERT Information and Planning Section to coordinate any needed remote sensing support from aerial reconnaissance or non-NTM satellite sources. These responsibilities are depicted in Figures VI-5 (Remote Sensing Request and Support Flow). Please refer to the *Remote Sensing SOP* for more detailed guidance and instructions.

G. TECHNICAL EXPERTISE

Should a requirement arise for on-site expertise in a technical or scientific discipline or field that is not organizationally available to the ERT, the multifunctional position of Technical Expert will be used to acquire the necessary technical expert. Experts from numerous federal agencies can deploy to provide specialized technical support. The Technical Services Branch (or Information and Planning Section) Chief will coordinate the necessary mission assignment with the Operations Section, and attempt to fill the position from a local source. If qualified experts are locally unavailable, notify the EST Information and Planning Section. The Technical Specialist will report directly to the Technical Services Branch Chief, even if the position is detailed to support another ERT element. The following list reflects a variety of technical expertise disciplines and recommended tasking/acquisition sources. It does not, however, prevent the Information and Planning Section from seeking expertise in other technical areas.

1. Cartographer:	United States Geological Survey (USGS)	5. Meteorologist:	National Weather Service (NWS)
2. Ecologist:	Forest Service (FS)	6. Oceanographer:	National Oceanic and Atmospheric Administration (NOAA)
3. Hydrologist:	USGS	7. Seismologist:	USGS
4. Imagery Analyst:	National Imagery and Mapping Agency (NIMA)	8. Volcanologist:	USGS