Tetra Tech, Inc.

Database and GIS Solutions Developed During the Anthrax Emergency Cleanup Response on Capitol Hill, Washington D.C.

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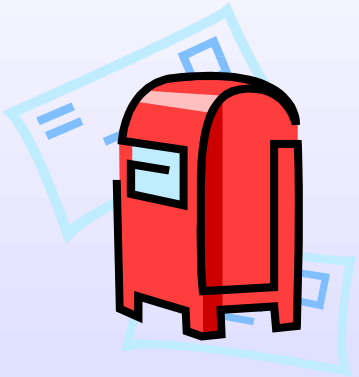
Outline

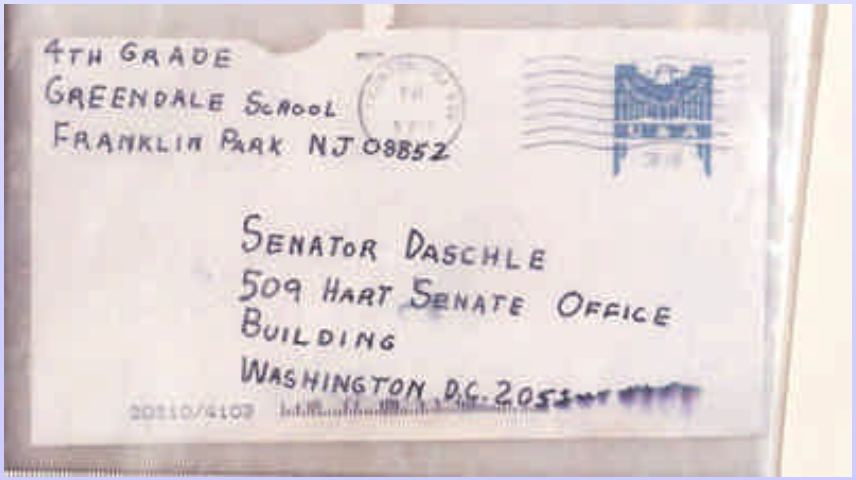
- Describe the situation
- State the problem
- Data migration
- Challenges and Implementation
- Summary

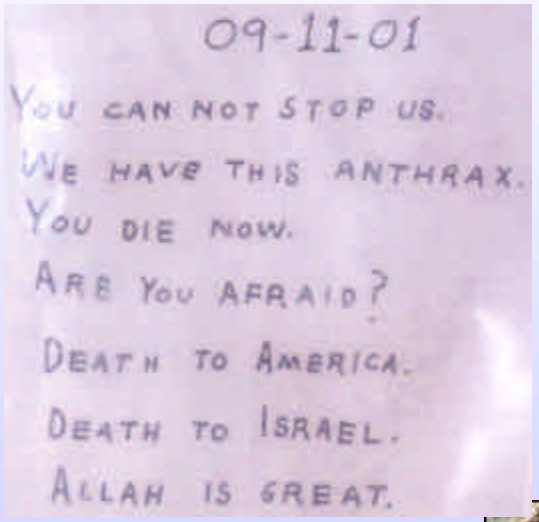
Describe the Situation

Anthrax Contamination on Capitol Hill

Anthrax-contaminated letter was opened in the Hart Senate Office Building on October 15, 2001

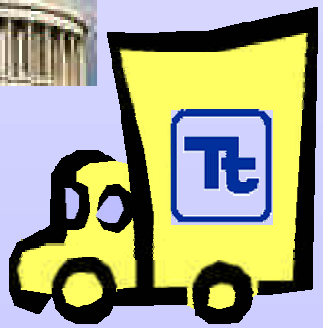






Mobilize to Washington, D.C.

Assist government agencies with evaluating the level of contamination and appropriate cleanup strategies.



Tasks

- Database
  - Track environmental samples and results
  - Delineate areas of contamination

- GIS
  - Identify precise locations of Anthrax contaminated areas
  - Characterize, isolate, remediate

- Data Review
  - Committee review of all maps and reports
  - Evaluate cleanup success
  - Final reports

State the Problem

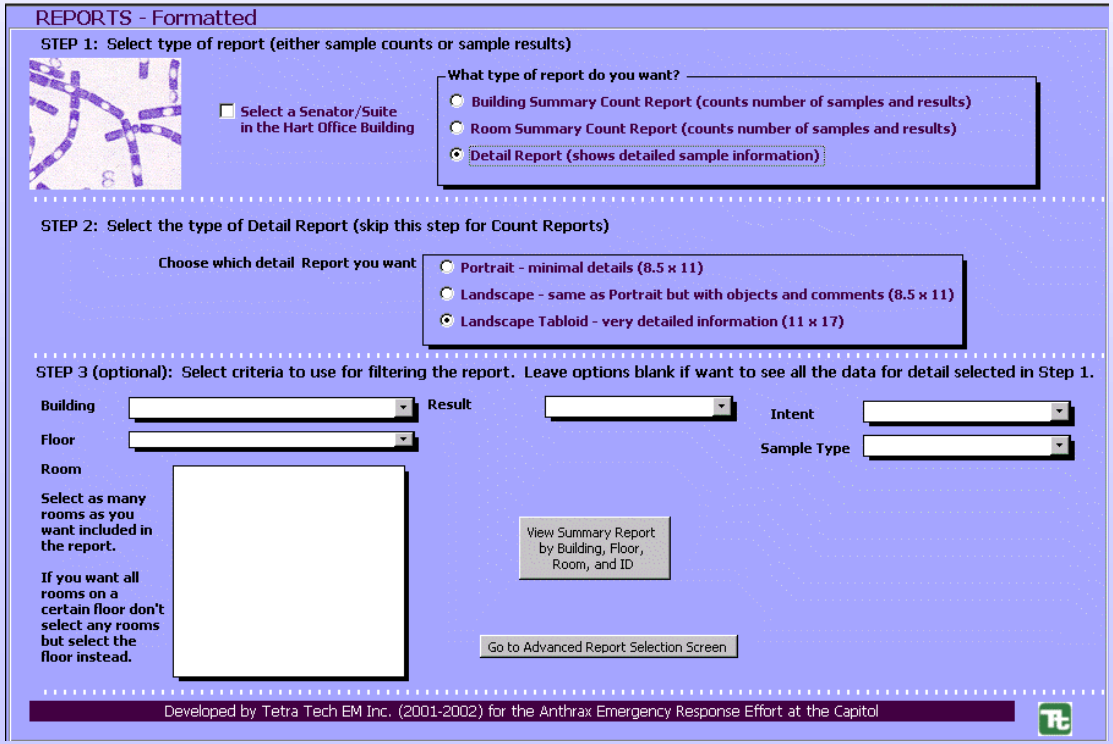
Issues

- Hundreds of biological samples collected daily
- Labs have quick turn-around time
- Quick integration of samples and results for immediate review

- Initial procedures lacked dynamic, updateable links between maps and databases
  - Microsoft VISIO
  - CAD maps
  - Multiple databases

Solution

- Develop procedures for quickly creating and maintaining accurate, reliable, updatable, dynamic, easy-to-use data reports and maps
  - ESRI ArcView 8
  - Master database with custom interface

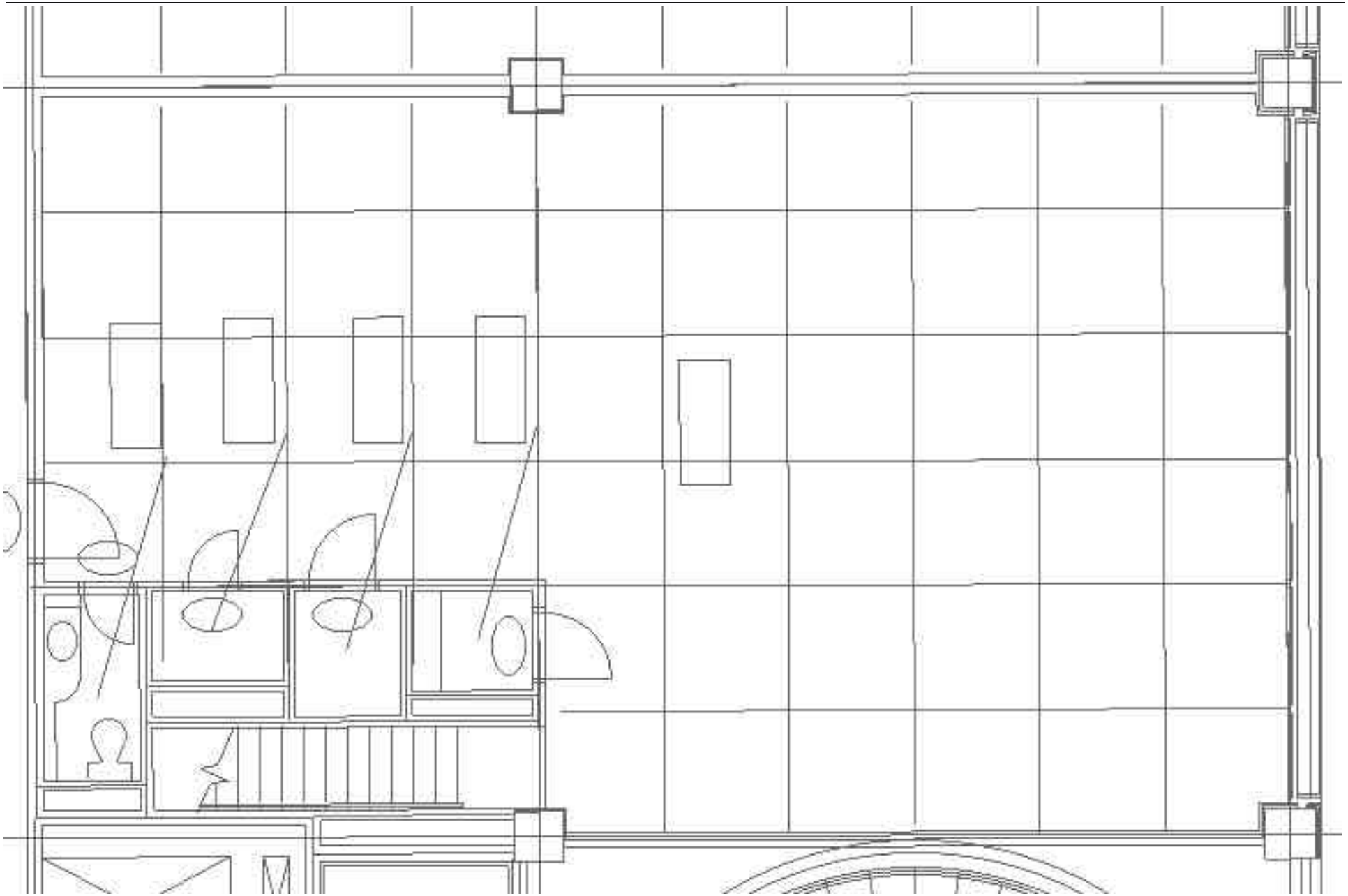


Data Migration

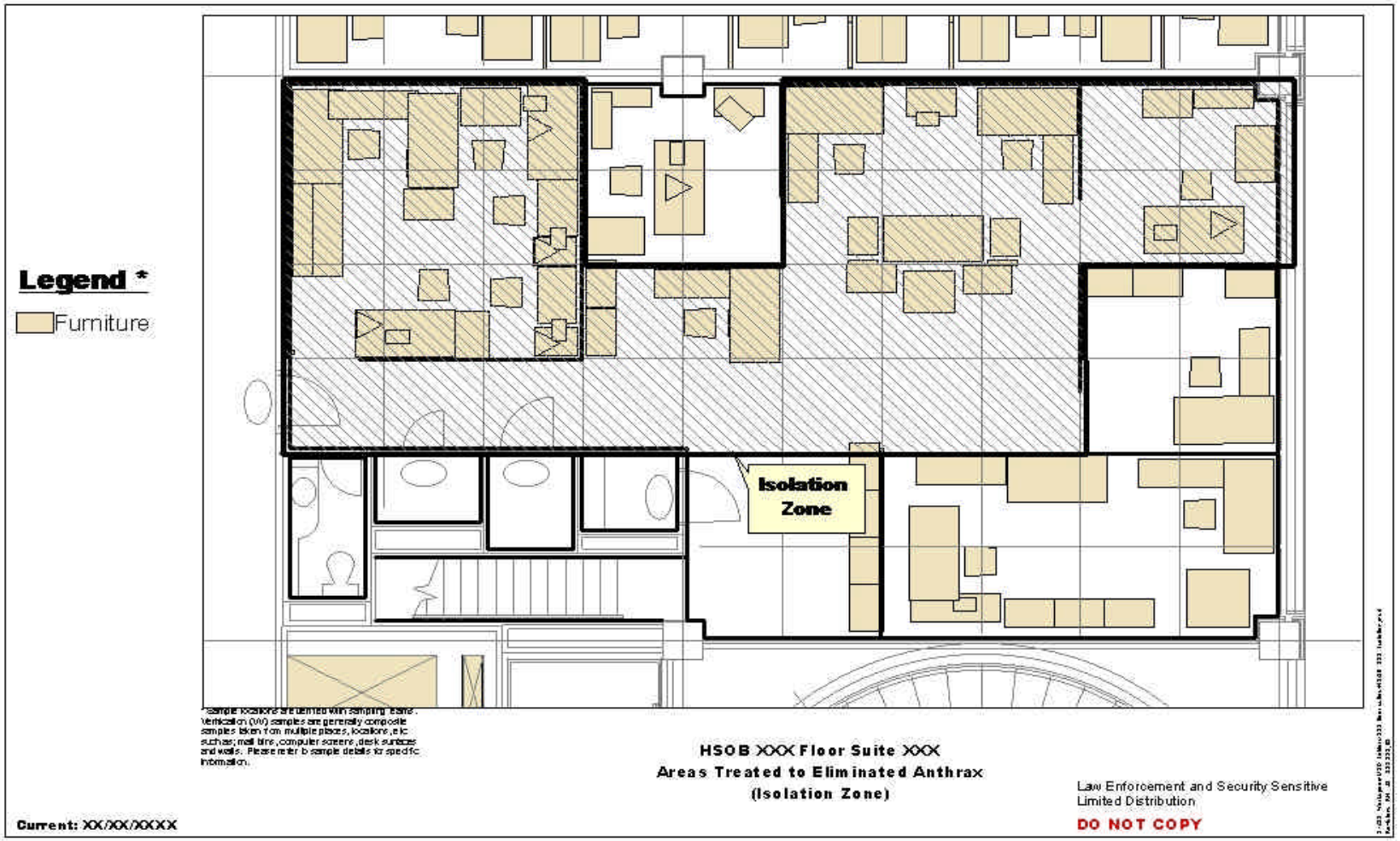
Basemaps

- Initial GIS Import
  - CAD files with detailed flow plans for each building
    - Bentley's MicroStation
    - Source: AOC
  - dBase format data
- Geodatabase
  - Dynamic adjustments to various features
    - Walls
    - Closets
    - Hallways
    - Furniture

Static basemap from MicroStation



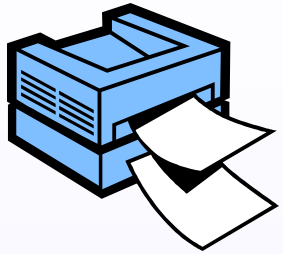
Dynamic Geodatabase created in ArcView

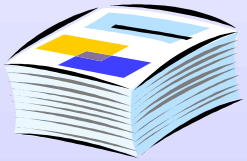


Quality Control Issues

- 5,000 samples with results imported during initial GIS import
  - Used COC forms and sampler's notes
  - Adjust geodatabase features
- 100 samples collected each day
  - Provide samplers with pre-printed COC forms and detailed maps
- Updates to database and GIS based on sampler's notations
- dBase exports

Sampling





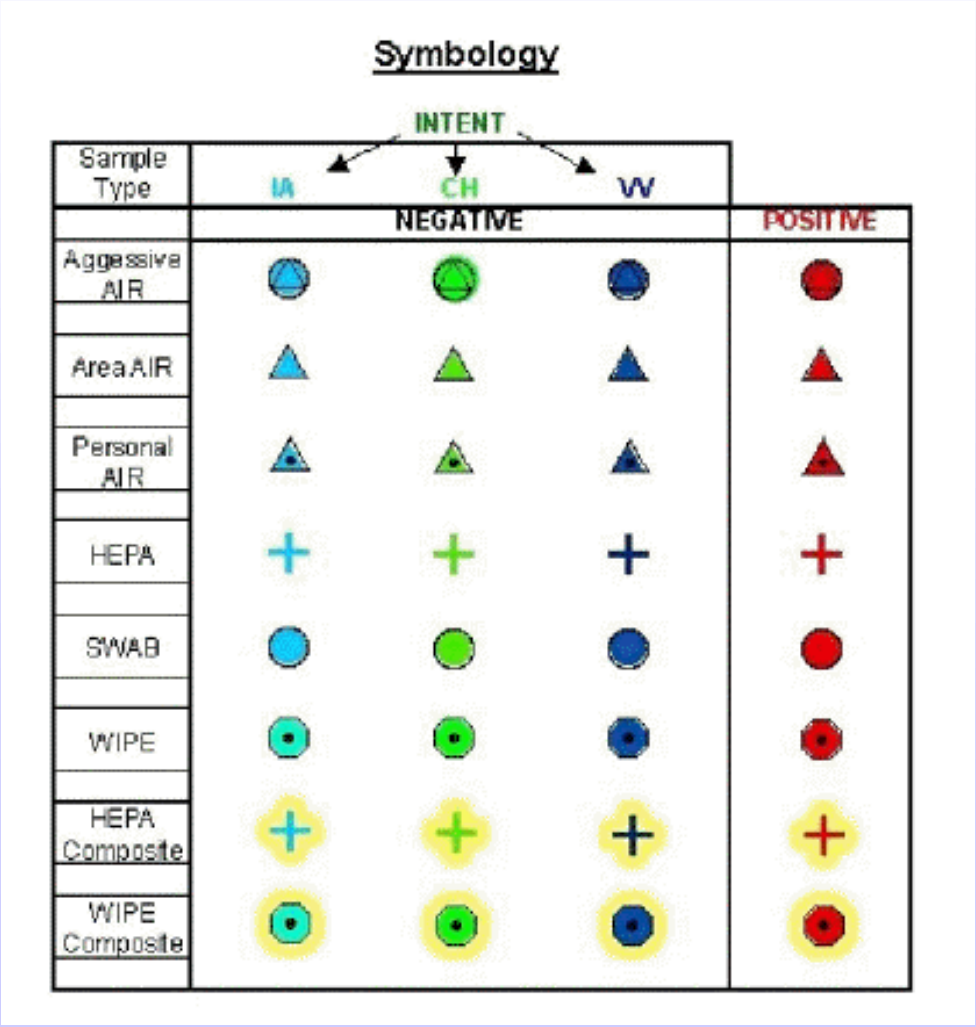
Challenges and Implementation

Samples

- Various sample types
  - Wipe
  - HEPA
  - Swab
  - Personal Air
  - Area Air

Symbology

- Maintain data integrity and consistency



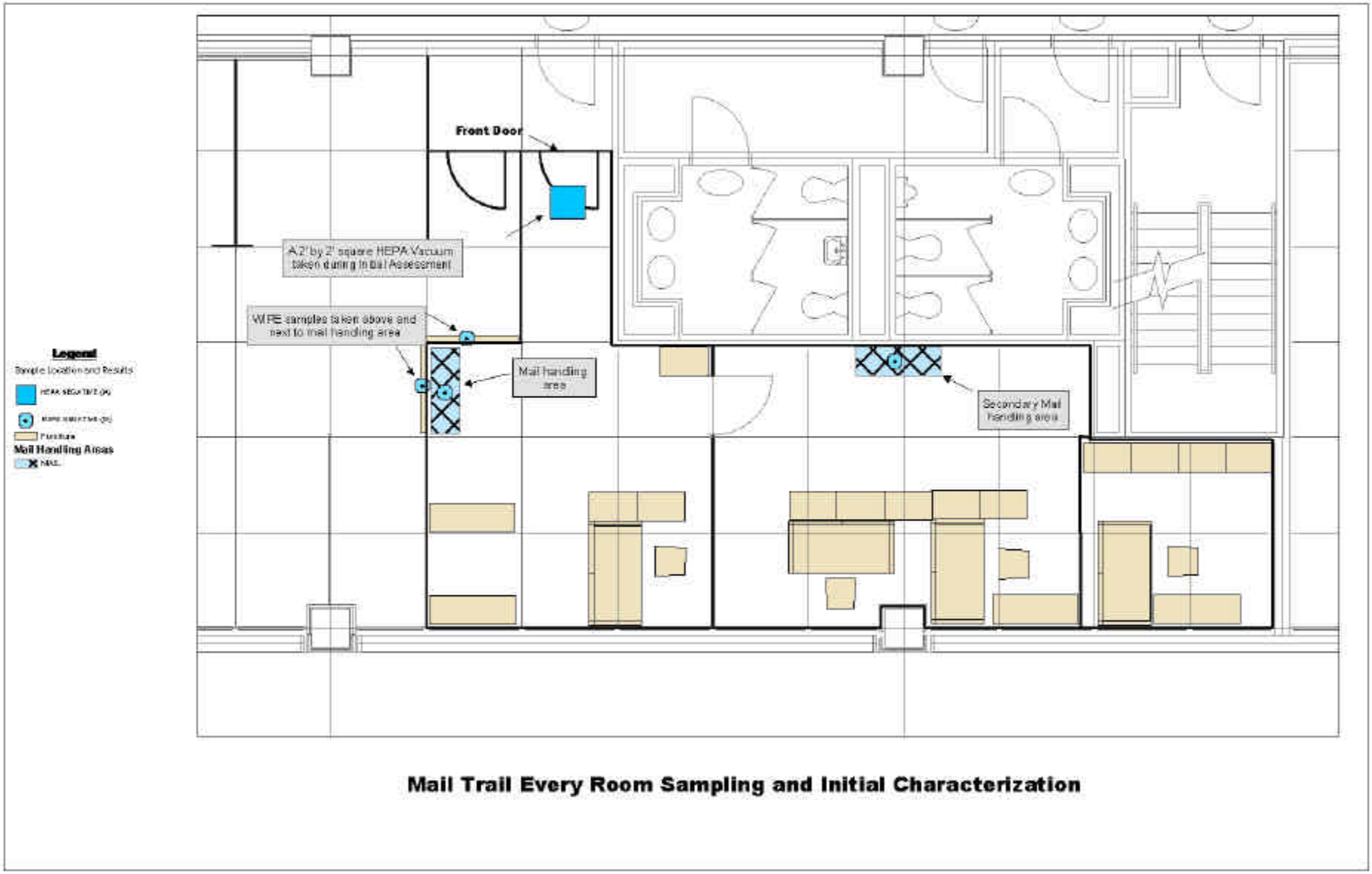
Sample Intents

Hundreds of maps and database reports produced for each intent

- Initial assessment (IA)
- Characterization (CH)
- Verification (VV)

Initial Assessement

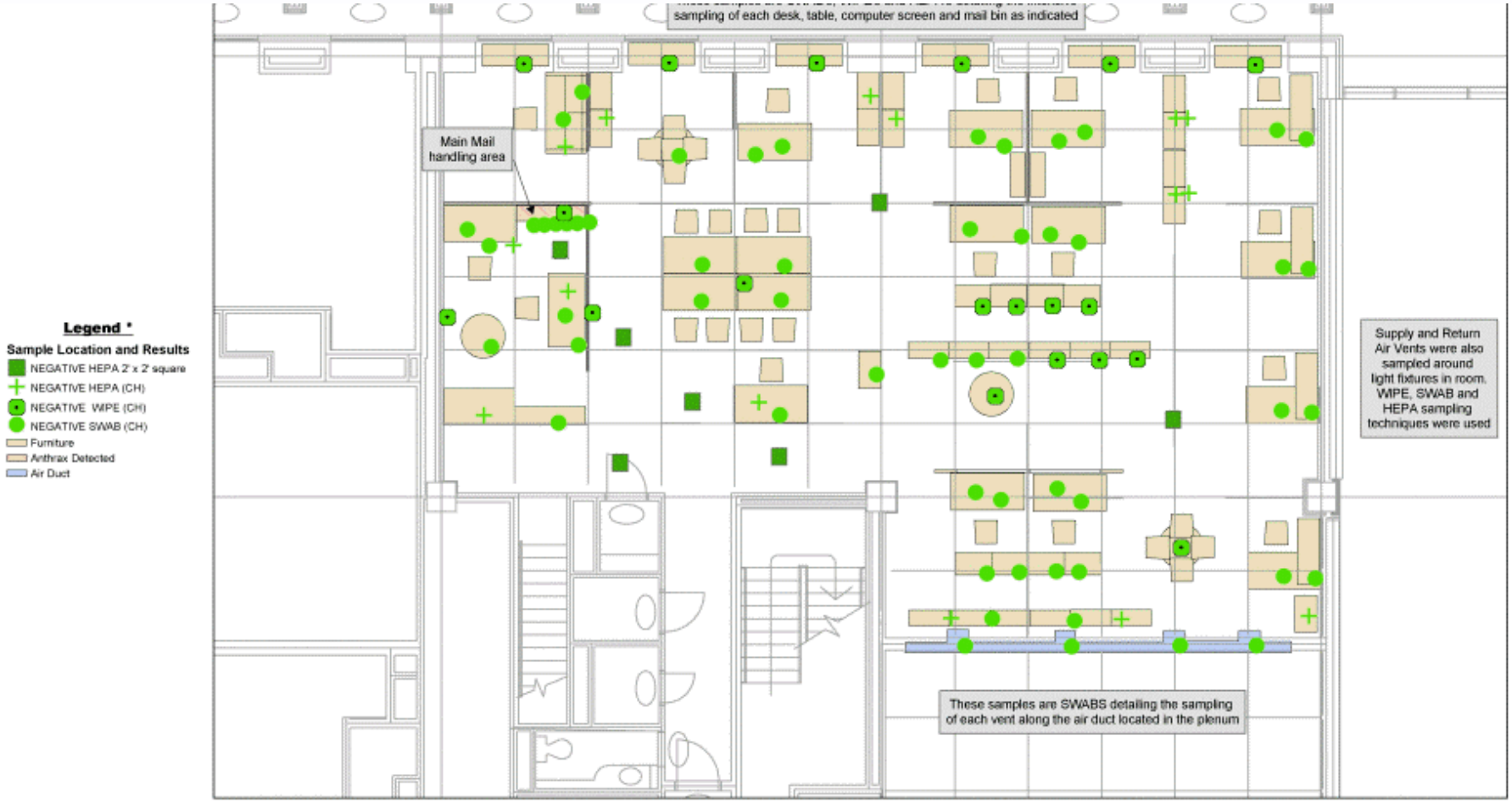
- Mail Trail (follow the mail)
- Wipe and HEPA collected at entrance of all mail handling areas



Mail Trail Every Room Sampling and Initial Characterization

Characterization

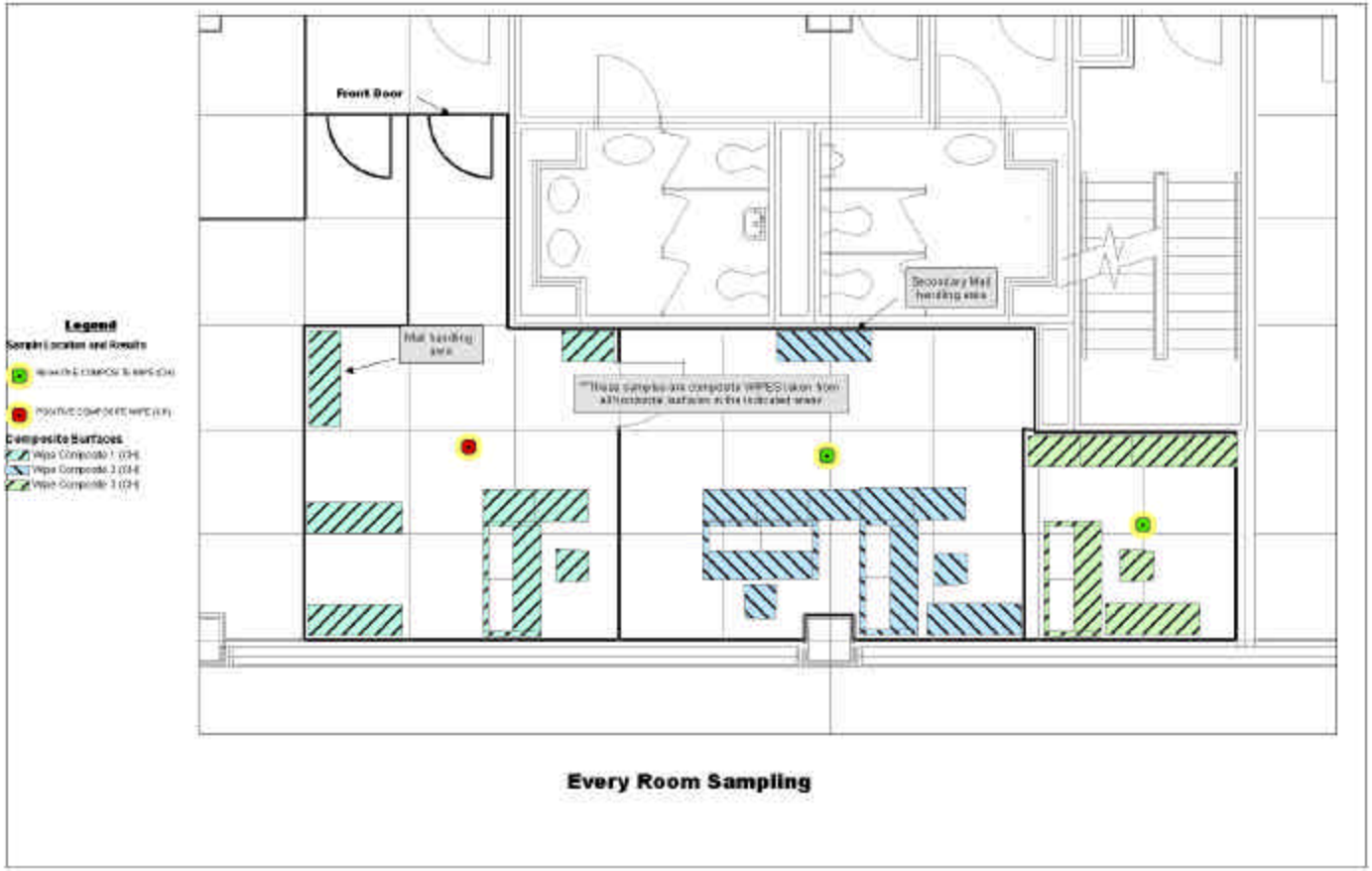
- All rooms and areas sampled
  - Had a positive hit during IA
  - Not previously sampled
- If positive, then additional sampling to enable in-depth characterization and delineation



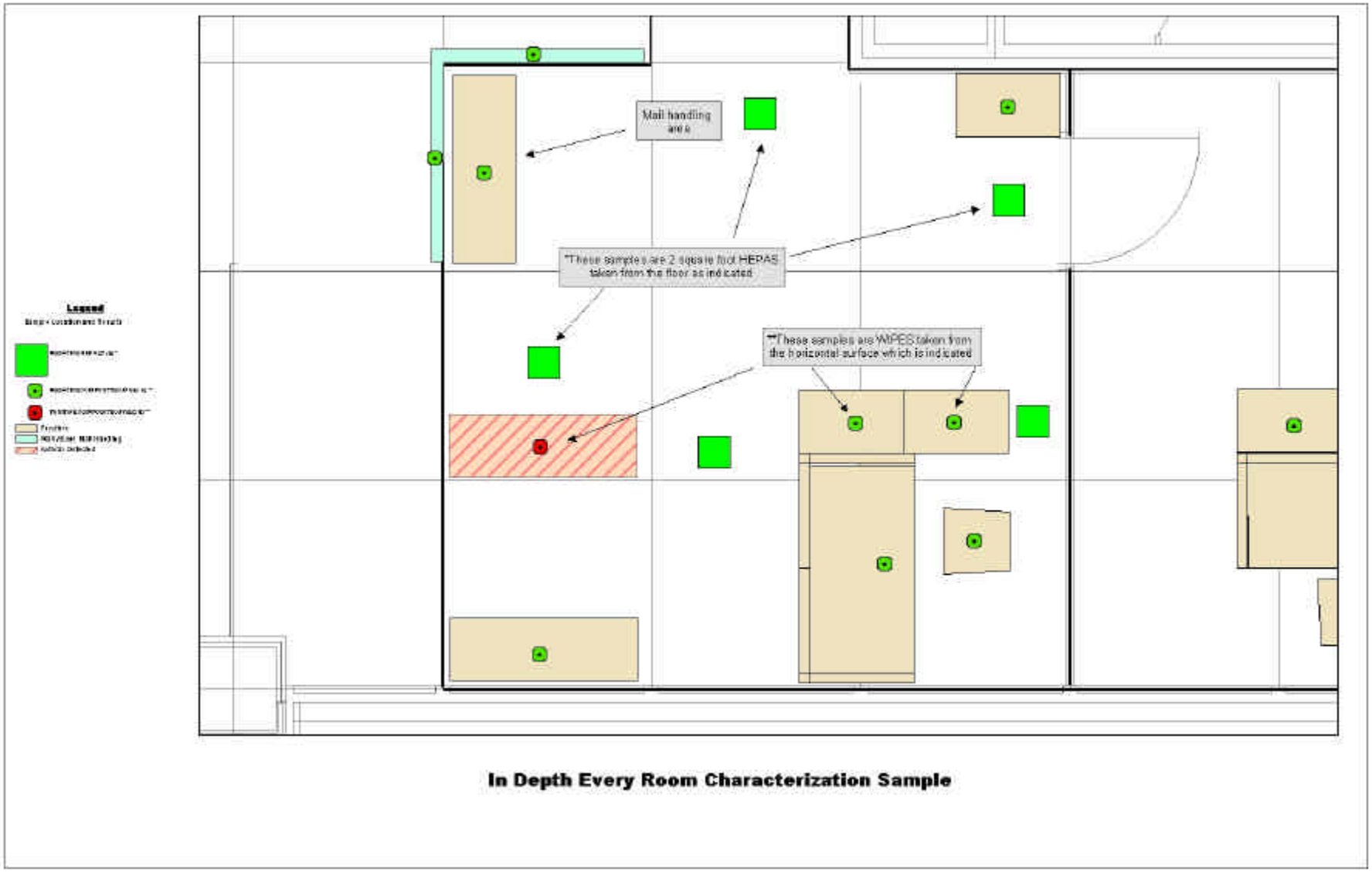
In Depth Characterization Sample Location Map

In-depth Characterization

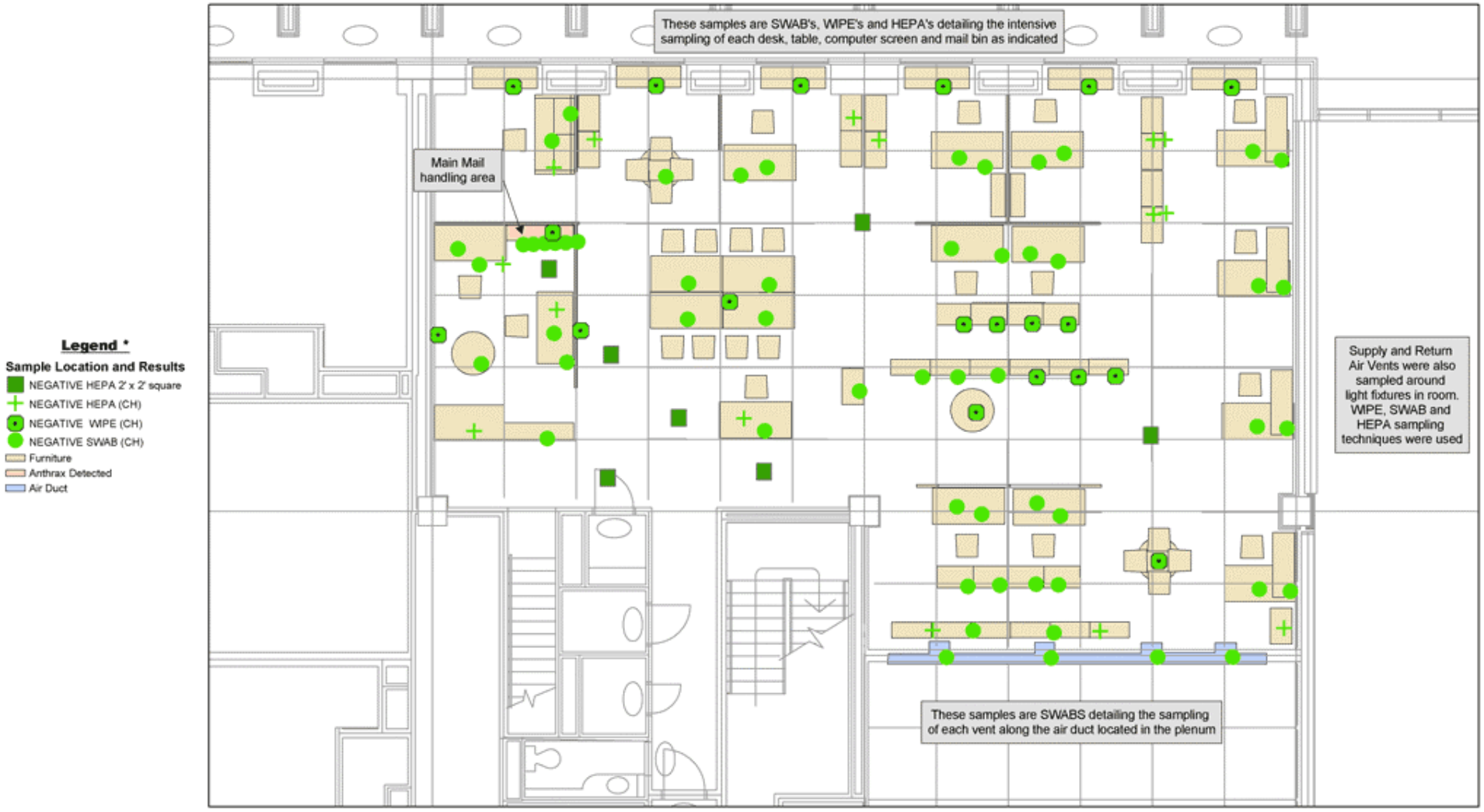
- Every Room sampling
  - Each room divided into areas
  - One composite sample from all horizontal surfaces in each area



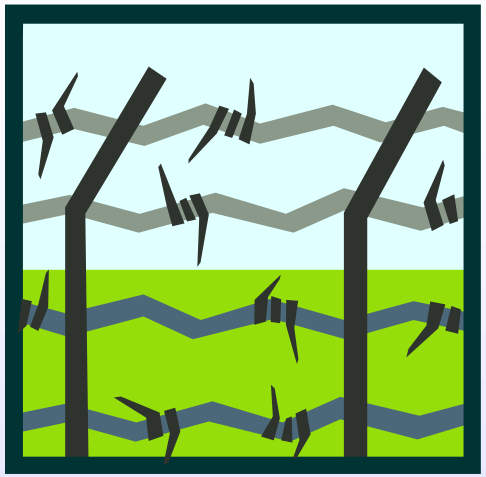
Every Room Sampling



In Depth Every Room Characterization Sample

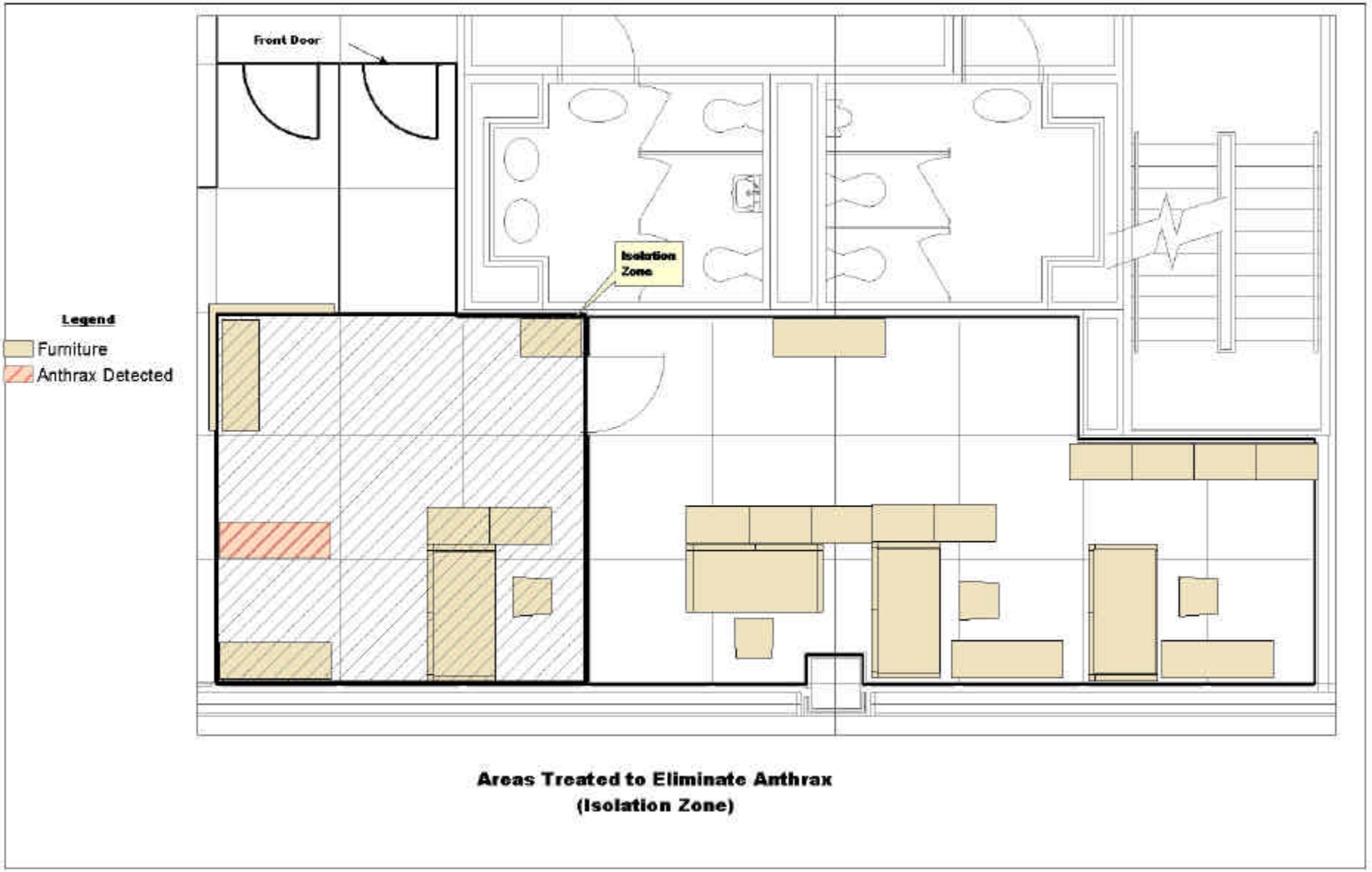

Legend *
Sample Location and Results
NEGATIVE HEPA 2' x 2' square
NEGATIVE HEPA (CH)
NEGATIVE WIPE (CH)
NEGATIVE SWAB (CH)
Furniture
Anthrax Detected
Air Duct
These samples are SWAB's, WIPE's and HEPA's detailing the intensive sampling of each desk, table, computer screen and mail bin as indicated
Main Mail handling area
Supply and Return Air Vents were also sampled around light fixtures in room. WIPE, SWAB and HEPA sampling techniques were used
These samples are SWABS detailing the sampling of each vent along the air duct located in the plenum

Verification

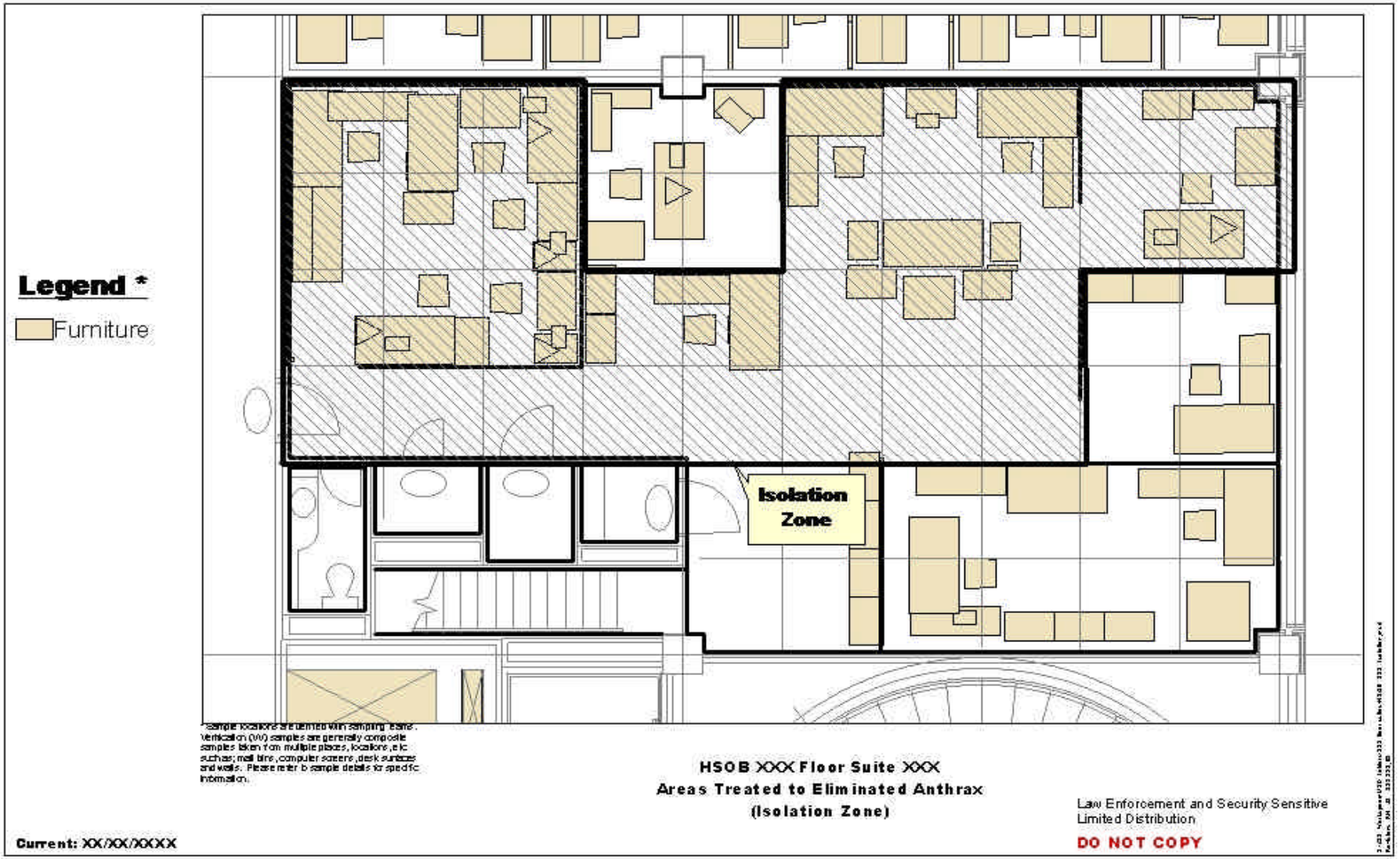


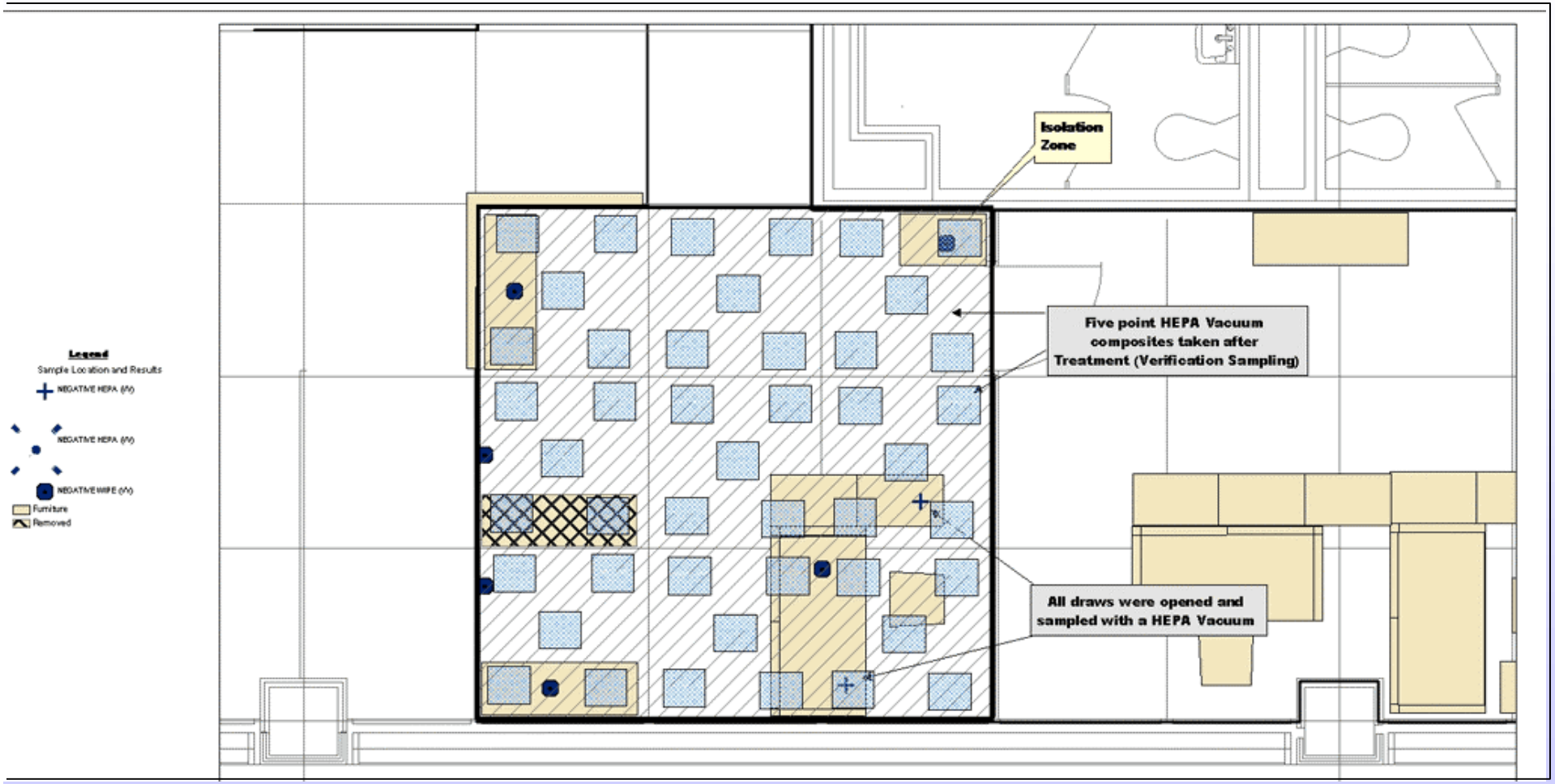
- Contaminated areas physically isolated and remediated

- Verification samples taken after remediation event to ascertain success or failure



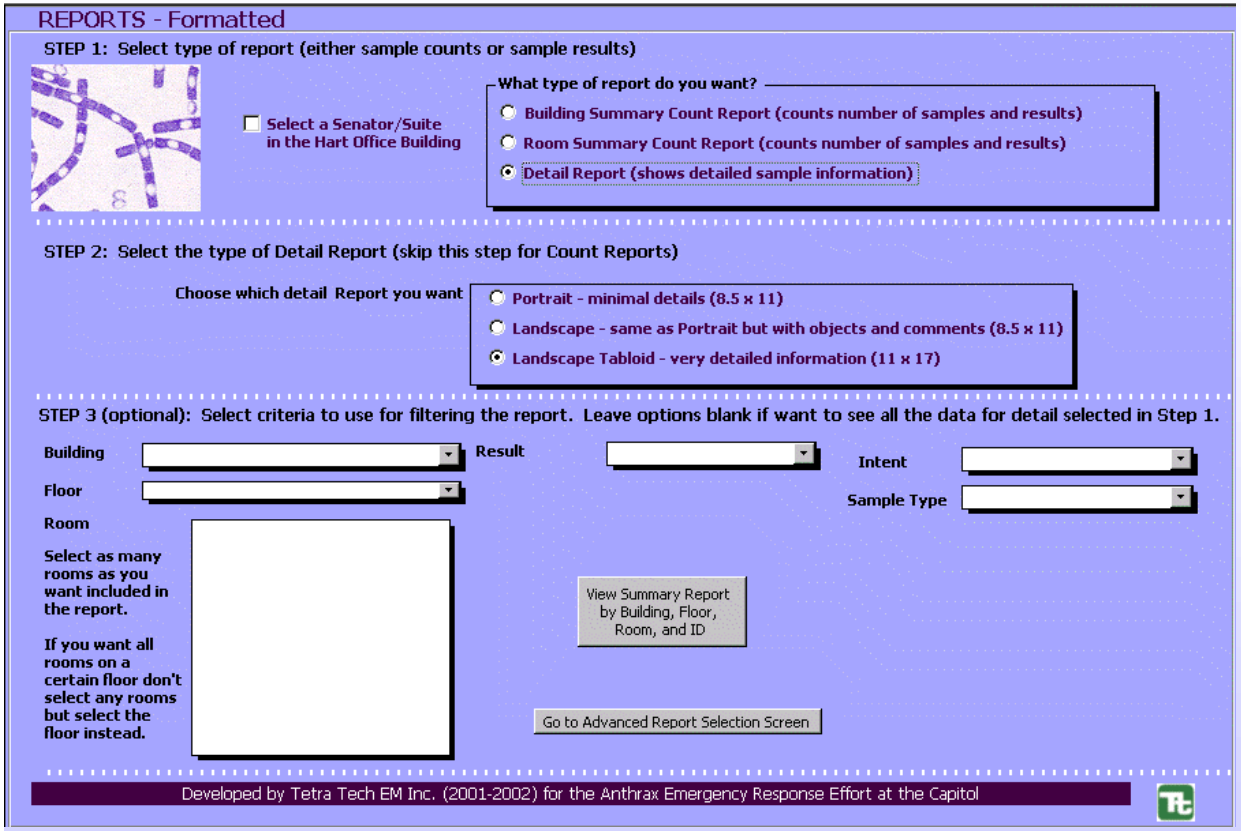
Isolation Zone


Legend *
Furniture
Isolation Zone
Sample locations are identified with sampling teams. Verification (VV) samples are generally composite samples taken from multiple places, locations, etc such as; mail bins, computer screens, desk surfaces and walls. Please refer to sample details for specific information.
HSOB XXX Floor Suite XXX
Areas Treated to Eliminated Anthrax
(Isolation Zone)
Law Enforcement and Security Sensitive
Limited Distribution
DO NOT COPY
Current: XX/XX/XXXX



Verification Samples

Custom Database



- Hundreds of custom queries and reports needed to support cleanup decisions
- Dynamically query sample data and results
- Easy-to-use, non-technical user interface developed
  - Allowed users to view and print a number of complex reports

Summary

Summary

- GIS and a single, master database greatly outperformed the original VISIO environment with multiple databases
- Rapid querying of results during constant flow of data
  - Tabular report
  - Graphic view
- QA/QC : cross referencing the analytical database with GIS ensured consistency between sample objects and locations
- Support of sampling and cleanup decisions
  - 100's of reports and more than 1,000 maps
- Facilitated the reopening of government buildings

Conclusions

- Database and GIS combination greatly shortened the time needed for data evaluations

Rapid, well-informed decisions could be made that protected human health and expedited the return to normalcy on Capitol Hill.