Business Plan for Developing a Statewide Addressing Program for Connecticut

Developed for the:

Connecticut Geospatial Information Systems Council (CGISC)

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Prepared by:

The Addressing Subcommittee of the Data Inventory and Assessment Working Group of the Connecticut Geospatial Information Systems Council

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1. EXECUTIVE SUMMARY

The Connecticut Geospatial Information Systems Council's (CGISC) strategic planning process for an Enterprise Geographic Information System (GIS) identified the need to develop the following core statewide framework data layers:

- Orthophotos
- Street Centerlines
- Cadastral/Parcels
- Address Points

The Address Points Framework Data Layer necessitates the following strategic goals for this addressing program by the CGISC Data Inventory and Assessment Working Group's Addressing Subcommittee:

- **Develop a Statewide Addressing Guideline** that assists Connecticut's municipal and tribal government addressing authorities with street naming and address assignment.

- **Develop a Statewide Geospatial Address Point Layer** for Connecticut that will meet the data needs of all levels of government (federal, state, regional, local and tribal) and other major users of addresses, like USPS and utilities, be kept accurate and current and compliment the other statewide data layers.

Statewide Addressing Guideline

Street naming and address assignment is done by an address authority in each Connecticut municipality and tribal government. However, there are currently no statewide standards or guidelines in place to assist them with this task. The result has been a patchwork of different addressing rules across Connecticut, causing addressing inconsistencies and anomalies. Having a statewide Addressing Guideline that is based on current addressing best practices will help to standardize addressing across Connecticut and mitigate these inconsistencies and anomalies.

Funding will be required to successfully implement an Addressing Guideline. Based on the CGISC strategic and business plans, the estimated cost to create the Addressing Guideline is $50,000.

Statewide Geospatial Address Point Layer

An address point is defined as a discrete geographic location that identifies a specific point for a particular address. The geospatial address point layer is one of the most important geographically-based data layers currently being created in the United States due to the number of entities with a need for accurate address data.

Having a statewide geospatial address point layer that includes all physical addresses and significant points of interest and based on a cooperative effort between all level of government

will allow Connecticut to improves its address locating ability for such programs as 9-1-1, emergency management/homeland security, health and human services, voter registration, property taxes, and Census tabulation. Figure 1 below give examples of address point types.

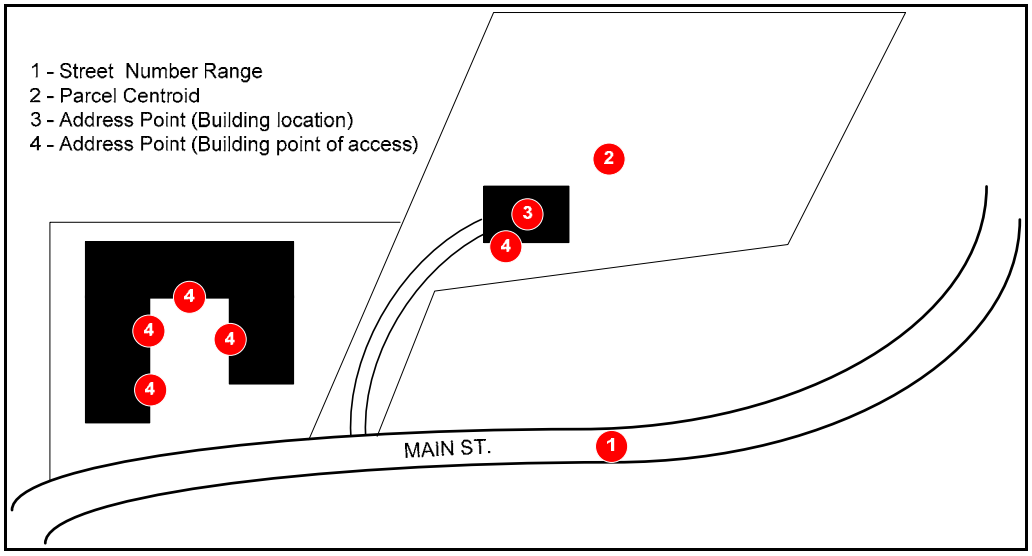


Figure 1: Address point types

A street number range based address point (type #1) is created from extrapolating its location from an address range along a section of road. A parcel centroid based address point (type #2) is created by using the center or centroid of the addresses tax parcel. A building location based address point (type #3) is created by using the center or centroid of the addresses building. A building point of access based address point (type #4) is created from the location of the primary point of access for the addresses building. The four types of address points increase in spatial accuracy from address ranges (least accurate) to building points of entrance (most accurate).

There is currently no geospatial address point layer available that contains all known addresses for the State of Connecticut. The absence of a comprehensive address layer has resulted in duplication of effort, incompatible data formats and approximated address locating. A survey conducted for the CGISC's 2007 Strategic Plan found that 76% of all survey respondents said they need address points to do their work.

Approximately 70-75% of Connecticut municipalities have some kind of geospatial mapping capability that includes digital parcels, road centerlines and address points. Without a statewide coordinating agency, all these towns have developed their own data standard and approach for geospatial data management. This addressing program will provide much needed guidance to these existing efforts and support a comprehensive statewide program.

Funding will be required to successfully implement a geospatial address point layer. Based on the requirements defined in the 2007 CGISC Business plan, the estimated cost to successfully create a statewide geospatial address point layer will be $1.8 million based on a phased three-year process. Furthermore, the estimated yearly maintenance cost for the address point is approximately $340,000/year. This estimate is based on a cost of $2000 per town (169 towns x $2000).

2. PROGRAM GOALS

The Connecticut Geospatial Information Systems Council's (CGISC) strategic planning process for an Enterprise Geographic Information System (GIS) identified the need to develop the following core statewide framework data layers:

- Orthophotos
- Street Centerlines
- Cadastral/Parcels
- Address Points

The Address Points Framework Data Layer necessitates the following strategic goals for this addressing program by the CGISC Data Inventory and Assessment Working Group's Addressing Subcommittee:

- **Develop a Statewide Addressing Guideline** that assists Connecticut's municipal and tribal government addressing authorities with street naming and address assignment.

- **Develop a Statewide Geospatial Address Point Layer** for Connecticut that will meet the data needs of all levels of government (federal, state, regional, local and tribal) and other major users of addresses, like USPS and utilities, be kept accurate and current and compliment the other statewide data layers.

2.1 Goal 1 – Statewide Addressing Guideline

The objective of this goal is to develop a statewide Addressing Guideline that will assist Connecticut's municipal and tribal government addressing authorities with street naming and address assignment within their jurisdictions in order to create a more standardized approach to addressing within Connecticut.

2.1.1. Current Status

Street naming and address assigning is done by an address authority in each Connecticut municipality and tribal government. However, there are currently no statewide standards or guidelines in place to assist them with this task. The result has been a patchwork of different addressing rules across Connecticut, causing addressing inconsistencies and anomalies. Having inconsistencies and anomalies with addressing can lead to problems with locating these addresses, which can have serious ramifications with location critical services like 9-1-1 emergency response. Connecticut's 9-1-1 system currently uses street centerlines with address ranges to geocode 9-1-1 wireline calls. Street centerlines with address ranges work well to give an approximate location when addressing is done logically, but will not work well when addressing does not follow any logical rules. For example, if the addresses on a segment of road are numbered out of order, the chance of an accurate geocoded is diminished. This uncertain address location could waste precious time and slow down an emergency response. Having a

statewide Addressing Guideline that is based on current addressing best practices will help to avoid future street name and address assignment issues and could be used by a municipality to guide their efforts in correcting past issues.

Throughout the United States, numerous municipal, county and state governments, along with national entities like the United States Postal Service (USPS) and the National Emergency Number Association (NENA), a group dedicated to the advancement of 9-1-1, have created standards and guidelines for street naming and address assignment (see appendix A for a list of street name and address assignment standard examples). A few of the more well known rules from these standards and guidelines include:

- No duplicate street names should exist within a jurisdiction.
- Even and odd numbered addresses associated with a particular street should be on opposite sides of that street.
- Address numbers should run from low to high and not be out of order.

These entities have recognized how important it is to document exactly how street naming and address assignment should be done within their jurisdictions in order to insure that this important process is done in a consistent and uniform manner.

2.1.2. Requirements

The following summarizes the requirements for the development of a statewide Addressing Guideline:

- **Comprehensive to Connecticut's addressing needs –** Because the Addressing Guideline will affect established addressing systems, care must be taken to identify all known addressing situations applicable to Connecticut and include addressing rules for each situation.

- **Living document –** Realizing that an addressing rule can be overlooked or could change the guideline must be adaptable to new ideas.

- **Straight forward and easy to use –** The guideline must be organized in a straight forward and easy to use format to reduce the chances of misinterpreting its contents.

- **Templates and forms –** The guideline should also include any templates or documents that can help address authorities with their addressing duties.

- **Incorporate current Connecticut best practices –** The guideline must not reinvent the wheel for addressing in Connecticut but must incorporate current best practices done in Connecticut along with current national best practices.

- **Cooperative effort** – All levels of government (federal, state, regional, and local) and other major users of addresses, like USPS and utilities, will benefit from this guideline and should be involved in its development and/or maintenance.

2.1.3. Recommended Approach

It is recommended that a new Addressing Guideline be created. The recommended approach is detailed in Section 4, Implementation Plan.

2.1.4. Anticipated Funding Requirements

Funding will be required to successfully implement an Addressing Guideline. Based on the CGISC strategic and business plans, the estimated cost to create the Addressing Guideline is $50,000. This estimate is based on the following activities:

- Researching and creating the Addressing Guideline
- Education and outreach to Addressing stakeholders
- Publication and distribution

These activities are further broken out in detail in Section 4, Implementation Plan.

2.2 Goal 2 – Statewide Geospatial Address Point Layer

An address point is defined as a discrete geographic location that identifies a specific point for a particular address. Examples of address points include geocoded point based on an interpolated address range, parcel centroids, building centroid and building point of entry (see Appendix B for example of different address points).

The geospatial address point layer is one of the most important geographically-based data layers currently being created in the United States due to the number of entities with a need for accurate address data.

The objective of this goal is to develop a digital geospatial address point layer that:

- Shows the most accurate spatial location of each address in Connecticut (approximately 1.8 million). For occupied structures, like single family houses, apartments, condos & individual commercial stores, this will be the primary entrance/exit.
- Includes interest points such as parks and athletic fields that don't have an assigned address but significant enough to warrant a defined location.
- Creates a standard that can be used by all addressing stakeholders in Connecticut.
- Meets the data and currency needs of all levels of government (federal, state, regional, local and tribal) and other major users of addresses, like USPS and utilities.

- Is maintained and made accessible in a timely manner.

2.2.1 Current Status

There is currently no geospatial address point layer available that contains all known addresses for the State of Connecticut. The absence of comprehensive address layer has resulted in the following issues:

- **Duplication of effort** – Address data users like municipalities, state government, federal government, utilities, and private entities are forced to create and manage their own address layers. This has resulted in a wasteful duplication of effort and resources.

- **Incompatible data formats –** Most current address layers are not based on a common standardized format, making comparison problematic.

- **Approximate address location –** Many current address layers have their address point locations based on geocoded estimated locations along a street centerline address range. This sort of geocoding will give an approximate location for an address, but it cannot precisely identify the location of the address associated with it.

As part of the CGISC's 2007 Strategic Plan, an on-line survey was done on behalf of the CGISC asking Connecticut's GIS stakeholders about their GIS data needs. Forty-eight percent of all local government respondents said they have address point data, this being a mix of geocoded street addresses, access point, structure, and parcel centroid address points (see Appendix C for a map of Connecticut municipalities with a verified geospatial address point layer). An additional 28% of respondents said they wanted the address point data, but there is no known source and 76% of all respondents said they "need this layer [address points] to do their work."

Approximately 70-75% of Connecticut municipalities have some kind of geospatial mapping capability that includes digital parcels, road centerlines and address points. Without a statewide coordinating agency, all these towns have developed their own data standard and approach for geospatial data management. This addressing program will provide much needed guidance to these existing efforts and support a comprehensive statewide program.

2.2.2 Requirements

The following summarizes the current requirements for the development of a statewide geospatial address point layer:

- **Physical addresses –** The geospatial address point layer must include all physical addresses that have been assigned within Connecticut. This will include street addresses (ex. 50 Main Street) and place name/landmark addresses (ex. 8 State House Square). The layer will not include non-geographic mailing address like P.O. boxes and rural routes. Please note that the geospatial address point layer will not contain any personal information like names of owners or occupants.

- **Points of Interest –** Well known points of interest, such as parks, athletic fields, villages, commuter parking lots, highway rest stops and other locations that are deemed helpful for location purposes, will be included in this layer.

- **Cooperative effort –** All levels of government (federal, state, regional, and local) and other major users of addresses, like USPS and utilities, will benefit from this geospatial address point layer and should be involved in its development and/or maintenance.

- **Maintain quarterly –** Consensus was reached by the stakeholder community that this address point data layer should be updated (at a minimum) on a quarterly basis. It was felt that municipalities are the best source of modifications to this layer and the collection of the changes should be done at a local level and consolidated at a state level.

- **Use established geographic data standards –** The attribute data for the address points should be based on already established standards like the proposed FGDC address standard.

- **State level standards –** The database standards used for this geospatial address point layer will be state level standards. Municipalities or other address data providers can adopt these standards for their own business needs if they choose.

- **Metadata** – Layer will include FGDC metadata and will also include feature level metadata that includes collection method (digitized from orthophoto, geocoded address range, parcel/building centroid, GPS collected), data source, date created, and address status (proposed, potential, active, retired)

- **Orthophoto base –** At a minimum the addresses layer should use the most current statewide orthophoto flight available as a base for determining its spatial accuracy. If a municipality or group of municipalities has an orthophoto flight that meets or exceeds the statewide flight, this orthophoto flight will be used instead for that area.

- **SSDI/NSDI –** Must support the Connecticut State Spatial Data Infrastructure (SSDI) and thereby support the National Spatial Data Infrastructure (NSDI). See Appendix E & F for more information on SSDI and NSDI.

- **Phased development within other statewide data layers –** Creating a statewide geospatial address point layer should be completed as a phased development within the development of the statewide street centerline and parcel layers currently being developed by the CGISC's Transportation (street centerline) and Cadastral (parcel) subcommittees. By coordinating the development of these layers, completeness and accuracy will be built over time and the process will be more cost-effective.

- **Maintainable collection/update process –** A process for receiving new and updated address information and quality checking procedures needs to be developed to insure that these addresses can be incorporated into the layer as fast as possible, even if their

absolute location is uncertain. For example, new addresses can be geocoded using street centerlines or parcel centroids until the structure location is known. At its core, this collection/update process will need to be digitally based, but flexible to allow other methods of collection. The collection/update process must also have processes established to import data that does not follow the statewide database standard.

- **Point type code –** Because the address points within this layer will not all be the same type (ex. some will be structure based, some will be parcel based, etc.), it will be necessary to develop an address point coding system based on the level of accuracy for each point. For example, the codes could be:

    - Level 1 – Geocoded/Address matched point (from street centerline address range)
    - Level 2 – Parcel centroid/location
    - Level 3 – Building centroid/location
    - Level 4 – Building point-of-entry

- **Basis for updating street centerline address ranges –** The geospatial address point layer will be used to keep the address ranges for the statewide street centerline layer updated.

2.2.3 Recommended Approach

From the results of this study it is recommended that a new statewide address point program be created to support the broad needs of the State of Connecticut's stakeholder community. The recommended approach is detailed in Section 4, Implementation Plan.

2.2.4 Anticipated Funding Requirements

Funding will be required to successfully implement a geospatial address point layer. Based on the requirements defined in the 2007 CGISC Business plan, the estimated cost to successfully create a statewide geospatial address point layer will be $1.8 million. This is based on the following activities:

- Year One – Development of address point data model standard, education and outreach and performing pilot address point project, $250,000

- Year Two – Creation of parcel centroid address points (based on parcels collected from statewide parcel layer program) = $775,000

- Year Three – Creation of entry/exit way and structure based address points = $775,000

Furthermore, the estimated yearly maintenance cost for the address point is approximately $340,000/year. This estimate is based on a cost of $2000 per town (169 towns x $2000).

These activities are further broken out in detail in Section 4, Implementation Plan.

3. POTENTIAL BENEFICIARIES AND INITIATIVES

Having an address point program that helps to standardize addressing and improves address location throughout Connecticut will benefit many, if not all, current or planned programs and initiatives within Connecticut that utilize GIS technology and have a need for locating addresses. Several of these important programs and initiatives are detailed below:

3.1. Public Safety

- **9-1-1 call location/emergency response** – There were approximately 2.3 million 9-1-1 calls for 2007 in Connecticut, with around 852,000 of these calls being from wireline phones (State of Connecticut 2008). These wireline calls are currently located by geocoding the phone number address to a street centerline with the 9-1-1 mapping software. Adding address points to this geocoding process will allow for these 9-1-1 calls to be located more accurately. Address points can also allow for dispatching emergency responders to the exact location of any address in Connecticut, including the closest address for a wireless call. Address points are the next evolutionary step in refining 9-1-1 call location and continue the integration of GIS into public safety planning and operations.

- **Emergency Management/Homeland Security –** Emergency Management/Homeland Security GIS applications rely on data sets like orthophotos, street centerlines, parcel boundaries, traffic capacity, flood zone and census demographic data. The inclusion of address point data into these applications further enhances their capability. Much like 9-1-1, using spatially accurate address points as the primary means of address location, instead of street centerline address ranges, will improve evacuation planning/routing, telephone based emergency notification (i.e. calling all telephone numbers within a defined range of an incident), disaster planning and recovery/relief (knowing the location of addresses after the destruction of buildings and landmarks) and critical infrastructure.

- **Law Enforcement –** Address data plays an integral role in Connecticut's law enforcement community. Having a spatially accurate geospatial address point layer will help law enforcement respond to calls, verify offender addresses and further improve their ability to map, query, analyze and report crime data for patterns and trends. The City of Hartford Police Department, for example, has begun implementing a national criminal tracking system that uses their address point data as its base. Hartford exports their most serious crime data from the previous day (geocoded address points) to an application that links and correlates the spatial location of those incidents to the movement of any GPS tracked offender with a reported crime history within the country. The system will notify police and corrections officials when an offender is detected at or near a crime scene. Having spatially accurate address points to use for the initial data crime data is extremely important for this application to work effectively for Hartford. For an application like this to be expanded statewide, Connecticut will need a statewide geospatial address point layer.

3.2. Municipal Applications

- **Municipal Personal Property Assessments –** All Municipalities across the State are required to assess and collect taxes on personal property, in accordance with Section 12-71 of the Connecticut General Statutes (CGS), subject to the provisions of Sections 12-41, 12-43 and 12-59 of the CGS. Having an accurate geospatial address point layer to indicate where this property is physically located is crucial to the accuracy of the information.

- **School Bus Routing –** The total cost of operating a school bus including the cost of the bus, the driver's salary and benefits, and the cost of fuel and insurance has been estimated to be $250K per year. Address points can be used in conjunction with a street centerline road network and GIS to perform pupil school assignment and bus routing analysis to better plan school bus routes and reduce the number of buses needed for any individual school district. Building and deploying an application at a state level that can be used by all communities could save millions of dollars on an annual basis for Connecticut tax payers.

- **Municipal Services –** Municipal services, like health inspections, restaurant inspections, business licenses, property complaints, building permits, and 3-1-1 (non emergency government services), would benefit from an address point program because these services get down to the address point level for reporting. The City of Hartford, for example, has been very successful in using their address point data to improve the locational accuracy of the services mentioned above within Hartford.

3.3. Regional Planning Applications

- **Traffic Modeling –** Many of Connecticut's Regional Planning Organizations (RPOs) perform detailed traffic modeling that is based on residential and business location information to forecast future traffic capacity. Having a geospatial address point layer will allow the RPOs to further refine the locations of residential and business locations to further enhance their modeling projections.

- **Regional Planning/Community Development –** Connecticut's RPOs perform a variety of regional planning activities for their constituent towns. These planning activities usually involve a strong element of GIS which an address point program would surely compliment. For example, the Capitol Region Council of Governments (CRCOG), the RPO for the Hartford region, could use the geospatial address point layer to assist with locating brownfield sites that CRCOG has been asked to review for the MetroHartford Brownfield Assessment Program. The geospatial address point layer can also be used to better locate properties for subdivision referrals that come from an RPO member town that require review and comment by the RPO and regional planning commission.

- **RPO GIS Implementation –** Nearly all of Connecticut's RPOs have implemented or are planning to implement a regional GIS for their areas. Many of these RPOs funded their GIS through Statewide Performance Grants ($2+ million of $9 million in 2008 grants went for GIS related activities). Having Regional GIS programs throughout Connecticut will allow small municipalities without the resources to fund a GIS program the ability to have GIS capability available to them. Regional GIS programs can also be a funnel for municipal data, making it easier for data, like address points, to be collected at the statewide level.

3.4. State Applications

- **Statewide Enterprise GIS Initiative –** An address point program will be an integral component to the Statewide Enterprise GIS initiative. This initiative includes the creation of other vital data layers like orthophotos, street centerlines, land parcels and critical infrastructure. The geospatial address point layer will compliment these data layers by providing information for and getting information from them. For example, a new address point could be an indicator of a new road or a new parcel subdivision could be an indicator of new addresses.

- **Health and Human Services –** Connecticut's health and human service agencies, like the Department of Developmental Services, Department of Public Health and the Department of Social Services, have each made a strong commitment to incorporate GIS into their business operations. These agencies GIS programs would benefit from a spatially accurate geospatial address point layer.

    - Department of Developmental Services (DDS) – Uses street centerlines with address ranges to locate facilities used by their clients. Facilities include group homes, apartments, day programs, and employment locations. These geocoded locations, however, cannot be used for spatial analyses, like floodplain determination and distances between group homes (mandated to do so). As a result, DDS must spend time and resources doing site visits to do these analyses. A geospatial address point layer that already had the group home's address located would save DDS considerable time and effort.

    - Department of Public Health (DPH) – Like DDS, DPH uses street centerlines with address ranges for their geocoding. This level of accuracy is sufficient for some of their spatial analyses, like dead crow sightings for West Nile Virus, as long as the geocoded point is placed near its correct location. Spatial analyses that directly involve people, however, like the location of patients with cancer and other diseases, the tracking of medical benefits and the location of births and deaths, needs more accurately located address data since geocoding errors would potentially bias the results of these analyses. DPH needs to eliminate as much error as possible and having the actual location of the address by using a geospatial address point layer would be ideal and make their analyses more robust.

- Department of Social Services (DSS) – The majority of the data used by DSS's Program Divisions is address based but is not spatially located. Their Aging Services Division, for example, operates several programs for elderly individuals including 13 Elderly Nutrition Projects which operate 200 Senior Community Cafes. By using the geospatial address point layer, DSS could pinpoint the addresses of these locations, which would provide a reliable resource for their clients. For emergency situations, DSS could use the geospatial address point layer to help locate their clients, some of Connecticut's most vulnerable populations, as well as the locations of agencies/programs that serve their clients (nursing homes, day care centers, etc.). The geospatial address point layer could also be used in conjunction with the statewide street centerline road network to help DSS direct their clients to locations where they could receive any needed services, like electronic benefit cards to purchase goods, normally provided by DSS.

- **Help America Vote Act of 2002 (HAVA) –** One of the requirements of HAVA is each state "shall implement,…, a single, uniform, official, centralized, interactive computerized statewide voter registration list defined, maintained, and administered at the State level that contains the name and registration information of every legally registered voter in the State…" (42 USC § 15483). A centralized voter registration system linked to the geospatial address point layer will allow registrars of voters to effectively monitor their official registry list, to keep track of those electors who may have moved in or out of their municipalities or are deceased, to more effectively prevent voter fraud and duplicate registration and to assign voting precincts.

- **Streamlined Sales Tax Project (SSTP) –** As Internet sales rapidly increase, states like Connecticut will continue to lose substantial amounts of state sales tax revenue from such sales. It is estimated that Connecticut lost $280 million in FY 2004, $360 million in FY 2005 and $430 million in FY 2006 due to untaxed sales through Internet and mail order transactions. The SSTP is an effort created in 2000 by state governments, with input from local governments and the private sector, to simplify and modernize sales and use tax collection and administration. The primary goal of the SSTP is to permit states that have simplified their tax system to require out-of state retailers to collect tax on purchases sent to those states, even when the retailers do not have physical presence there. Sales tax would be collected at the location of the service leading to an increased tax base that includes on-line merchant and service providers. In order for this initiative to be successful, the program needs data about business locations. A statewide geospatial address point layer would fulfill this need for Connecticut since it would accurately locate all business addresses within Connecticut with their complete address.

3.5. National Applications

- **United States Postal Service (USPS) Address Management –** The USPS currently has an initiative to standardize their address collection process. The USPS is looking to reach out to addressing authorities across the country to assist them with developing addressing and data process flow/exchange standards. In return, the USPS will provide relevant postal data back to the addressing authority (ZIP+4, geographical reference, municipality data and carrier route information. The USPS believes that this data exchange will benefit such things as 9-1-1, emergency services, utilities, insurance and tax information.

- **United State Census Bureau Local Update of Census Addresses (LUCA) Program** – The LUCA program is authorized by the Census Address List Improvement Act of 1994 (Public Law 103-430) and has been used to update the Master Address File used to mail out the census questionnaires for the 2000 and 2010 census. For these two censuses, the Census Bureau had to reach out to individual towns and the state to complete the updating process for Connecticut. Having a complete and accurate geospatial address point layer for all of Connecticut will allow the next LUCA program cycle (around 2017) to be done much more efficiently since one uniform up-to-date set of address information will be sent to the Census Bureau, saving considerable amounts of time and effort for all levels of government (municipal, state, federal).

- **National States Geographic Information Council (NSGIC) Addresses for the Nation –** One of the current top initiatives with the NSGIC is the development of "Nation-wide, publicly available address data, complete with geographic coordinates that is supported by all stakeholders." The stakeholders include:

    - Local governments: assign and update addresses.
    - County/9-1-1 authorities: Address verification, regional database maintenance and distribution.
    - States: Regional database aggregation, data backup, technical assistance, filling black spots in data, and providing grants.
    - Federal government: Discrepancy notification, major user (Census, DHS, USPS). Long-term goal would also be to share federal address data with states and locals.
    - Private sector: Provide assistance with database implementation, technical assistance and new products and services creation.

  NSGIC's next steps include the completion of a strategic vision white paper and continuing their involvement with the Federal Geographic Data Committee's (FGDC) draft addressing standard, which includes getting states to adopt the standard.

- **FGDC Cooperative Agreements Programs (CAP) Grants –** The FGDC CAP grant program's goal "…is to encourage resource sharing projects through the use of technology, networking, and more efficient inter-organizational coordination." (Federal Geographic Data Committee. 2008**)** In 2008, the CAP grant program gave out $1.6 million in grants to various GIS-related projects throughout the United States, many of these projects involving standards creation and building structure datasets (closely related to address points). The Address Point Program is a perfect example of the type of program that could receive funding through a CAP grant. Connecticut has a track record

with the CAP grant program. The state received a CAP grant in 2006 to help fund the creation of the CGISC strategic and business plans.

3.6. Private Applications

- **Utilities and Call Before You Dig –** In addition to the coordination between the phone company and public safety for 9-1-1 address information, all utilities can benefit from standardized addresses. Shared, consistent addressing information will improve coordination between utilities, municipalities, and the general public with regard to permits, service availability questions, road closures, utility mark outs, utility hookups, service calls and billing.

  In Connecticut, whenever mechanical equipment is used to perform any type of excavation, the contractor must go through Call Before You Dig (www.cbyd.com) for the location of where the work will take place. The various utilities then must evaluate this request and mark any utilities in the area. This information gets passed to the utilities via an address to determine if they have utilities in that area and if so they can send a crew to the proposed excavation area for markouts. Consistent address information will facilitate the coordination this process requires.

- **Package Delivery** – Package delivery companies like DHL, FedEx and UPS need to know exactly where to deliver their packages. Having a geospatial address point layer could benefit these companies through more efficient delivery of packages and a reduction in fuel usage and vehicle emissions.

- **Service/Repair** – Companies that need to locate addresses for service/repair calls would benefit from an accurate geospatial address point layer.

- **Internet/Digital Mapping** – Internet companies, like Google, MapQuest and Zillow (real estate), could include address point data on their online mapping sites for enhanced address location and routing/navigation. Address point data could also be used on personal navigation devices (GPS) to enhance their vehicle routing capabilities.

4. IMPLEMENTATION PLAN

This implementation plan presents a practical set of objectives that can be accomplished within the next few years in order to achieve the overall goals of Connecticut's Address Point Program.

4.1. Program Management

4.1.1. Organization and Oversight

The various tasks of this program will be coordinated by the Data Inventory and Assessment Working Group's Addressing Subcommittee. The overall program will be managed by the Connecticut Geospatial Information Systems Council through the Data Inventory and Assessment Working Group.

4.1.2. Authority

In order for this initiative to succeed, official authority must be extended to the Addressing Subcommittee in order to coordinate the activities of the various Addressing Authorities in the State of Connecticut.

4.1.3. Data Stewardship

The Connecticut Department of Public Safety, Office of Statewide Emergency Telecommunications, shall be recognized as data steward for the Connecticut's statewide geospatial address point layer acting on recommendations of all stakeholders and statewide needs.

4.1.4. Coordination

Due to number of potential data addressing updaters (could be as many as 200 different entities), keeping layer updated and maintained will require an organized set of policies and procedures as well as open channels of communication and data exchange. A web-based application that could be used to provide address updates would be an excellent means to keep the geospatial address point layer current.

The Addressing Program is closely related to other initiatives of the Data Inventory and Assessment Working Group subcommittees such as Transportation, Cadastral, Geographic Names and Places, and Administrative and Political Boundaries. The creation and maintenance of these data layers needs to be coordinated to help ensure completeness of each layer and reduce duplication of effort.

Coordination will also be critical with the initiatives of surrounding States, commercial data providers, vendors, utility companies, regional planning agencies as well as other State agencies such as the DEP, DMV, Public Safety, Secretary of State, OPM, etc.

4.1.5. Education and Outreach

Since the State of Connecticut has numerous Addressing Authorities, a large constituency for addressing data, and a significant quantity of legacy data, it is critical that the user community be educated on the purpose of this effort and be assured it is a long-term commitment by the State of Connecticut. A significant public education and outreach effort will be required for this program to gain a foothold and ultimately succeed. It will also be necessary to work with the CGISC Training and Education Working Group to coordinate this education and outreach with the other data initiatives, like the statewide parcel layer, to ensure a common message be presented to our stakeholders.

4.1.6. Funding

The success of this program is dependent on adequate funding to develop, implement, maintain, and support the Addressing Program efforts. Without a plan for initial funding or annual support for this program, it is unlikely to succeed. This funding should be coordinated with the funding of the other Data Inventory and Assessment Working Group initiatives and should also include financial assistance to municipalities for creation and maintenance of their address data.

4.1.7. Security and Liability

Once this data is developed statewide, it will be a powerful resource that could potentially be misused either intentionally or inadvertently. It is important that the State of Connecticut be clear about the security aspect of this data as well as the ramifications of errors in this data.

4.2. Goals and Objectives

4.2.1. Goal: Create a Statewide Addressing Guideline

4.2.1.1. Research Existing Standards and Guidelines

Determine what types of street name and address assignment standards are being used now by Connecticut municipalities and conduct further research into other addressing standards and guidelines throughout the United States. (Emphasis will be placed on standards and guidelines from the Northeastern United States due to similar forms of addressing.) The combination of the best standards currently used inside and outside of Connecticut will be the basis for a Connecticut street name and address assignment guideline.

4.2.1.2. Develop Draft Guideline

Create a clear and easy to use street name and address assignment guideline document that can be used on a consistent basis throughout Connecticut. The guideline should include all necessary rules, standards and best practices needed to standardize address assignment in Connecticut.

4.2.1.3. Educate and Solicit Feedback from Stakeholders

Distribute Addressing Guideline to addressing stakeholders, like municipal address authorities, the USPS and the public for their feedback. Incorporate feedback into final Addressing Guideline.

4.2.1.4. Develop Policy for Updating Guideline

Develop a plan for stewardship and revising the Addressing Guideline. The plan needs to decide who will "own" the guideline to insure its continued existence and use. The plan also needs to establish policies and procedures for how the guideline can be updated and modified. This plan can either be incorporated in to the street name and address assignment guideline or be a separate document.

4.2.1.5. Official State Adoption of Guideline

Develop a plan to implement the street name and address assignment guideline throughout Connecticut. Implementation will require state level adoption of guideline and municipal adoption by individual addressing authorities. Coordination with CGSIC Training and Education Working Group to leverage their outreach expertise will be a good first step to insuring successful implementation of this guideline.

4.2.1.6. Publish and Disseminate Guideline

Develop a plan for distribution of Addressing Guideline. Primary means include paper copies and website download.

4.2.2. Goal: Create a Statewide Geospatial Address Point Layer

4.2.2.1. Develop Draft Address Point Standard

The Address Point Standard includes the development of a database structure, identification of domain fields and values, table relationships, and feature-level metadata requirements. These need to be specified for the address point feature which identifies all addressable locations and for the interest point feature which identifies commonly known non-addressable locations such as athletic fields, beaches, parks, etc. One of the key areas this standard must specify is the proposed, active, inactive, and retired status of addresses and interest points.

4.2.2.2. Solicit Feedback from Stakeholders

Distribute Address Point Standard to addressing stakeholders and public for their feedback. Incorporate feedback into final Address Point Standard.

4.2.2.3. Publish and Disseminate Address Point Standard

Develop a plan for distribution of Address Point Standard.

4.2.2.4. Data Development, Support, and Maintenance

Once a standard has been agreed upon, data will need to be developed, QA checked, consolidated at the State level, and be regularly maintained. The maintenance of this data at the State level requires a network of data providers that submit information in a common format and structure on a regular basis, a rigorous set of QA procedures, and feedback loop to the data providers for error resolution. See Figure 2 for an overview of the address update process.

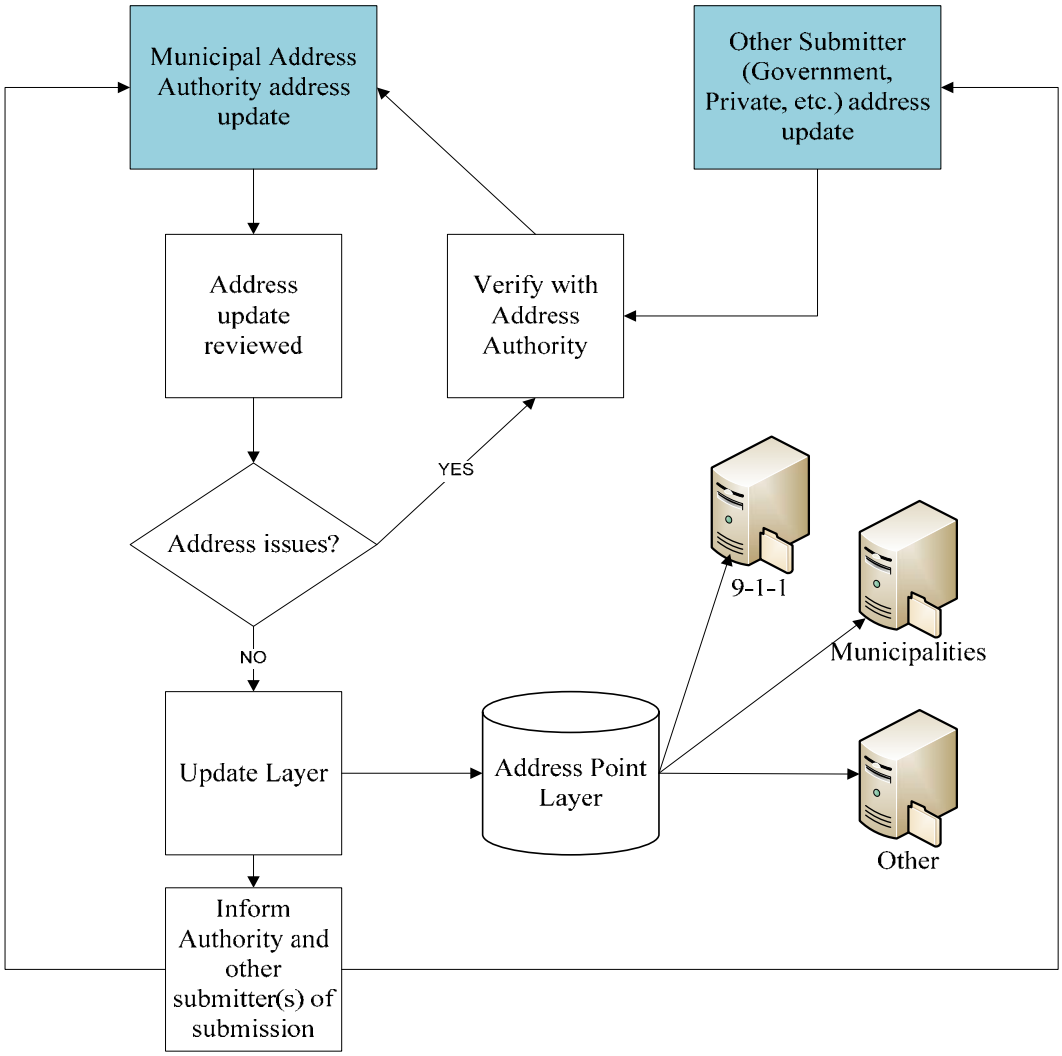


Figure 2: Address update process

4.2.2.5. Conduct Pilot Project and Report Findings

The objectives of conducting an Addressing Pilot Project are to:

- Validate the Addressing Guideline recommended procedures
- Validate the proposed Addressing standard database structure
- Assess the approach and estimate the effort in developing address points
    - Assess different types of areas (rural, suburban, low density mixed residential/commercial, high density residential/commercial)
    - Evaluate the effort required from multiple starting points (established GIS, limited GIS, no GIS)
- Assess the effort to convert or capture landmarks in the address points data and create an interest points layer
- Validate approach and procedures for QA checking, error reporting, and correction methods
- Required interface with other data and standards (road centerlines, parcels)
- Methods of consolidating the data from multiple sources (local, regional, state)
- Evaluate potential methods for data updates (web, GIS data transmittal, hardcopy)
- Methods of capturing addressing issues at the local level and tracking resolution
- Evaluate security aspects and test procedures for limited access
- Test of IT infrastructure necessary to implement the entire program

The results of the Addressing Pilot Project should be well documented and the lessons learned incorporated into the overall Addressing Program plan, phasing approach, and funding estimates.

4.2.2.6. Conduct Full Build out of Geospatial Address Point Layer

Phase one of this step will be to populate the geospatial address point layer with whatever address point data is available, including place name/landmark addresses, for each municipality in Connecticut. For most of Connecticut's municipalities, this will be address points derived from parcels.

Phase two will be to move all structure based addresses to the addresses primary entry/exit from the structure. This will be accomplished either by using orthophotos or GPS equipment.

4.2.2.7. Maintain Geospatial Address Point Layer

Using the established maintenance procedures, begin the process of keeping the geospatial address point layer up to date.

4.3. Next Steps

The next step necessary to begin executing this business plan will be to work with the CGISC and its Finance Working Group to identify potential sources of funding for implementation of the Addressing Guideline and addresses layer. The preliminary steps to the business plan (Addressing Guideline, database standard and the pilot addresses layer) will require a small portion of the overall funding needs of the address program, in the range of $200,000 to

$300,000. Once the preliminary steps are completed funding will be required to complete full build out of the addresses layer and continued maintenance of the layer.

APPENDIX A

Examples of Street Name and Address Assignment Guidelines/Standards used within the United States

National Level

American Planning Association: *Street-Naming and Property-Numbering Systems*

United States Postal Service: http://pe.usps.gov/text/pub28/welcome.htm

National Emergency Number Association: *Addressing Systems, A Training Guide for 9-1-1*

State Level

State of Georgia: http://gis.state.ga.us/Coordination/GISCC/Meetings/102004-addressguide_draft.pdf

State of Kansas: http://www.kansasgis.org/docs/uploaded/2address.pdf

State of Maine Emergency Services Communication Bureau:
http://www.maine911.com/communities/publications/AddressingGuidebook.pdf
http://www.maine911.com/communities/publications/AOManualMaster5rev.pdf

State of New Hampshire Bureau of Emergency Communications:
http://www.nh.gov/safety/divisions/emergservices/nh911/documents/addressingstandards.pdf

State of New York (in progress)

State of Pennsylvania:
http://www.pacounties.org/pamagic/lib/pamagic/DataStandards_Part_II_Best_Practices_05-22-02.doc

State of Rhode Island

State of Vermont

State of West Virginia: http://www.addressingwv.org/handbooks/wvsamb_handbook_1stEd.pdf

County Level

Bonner County, Idaho:
http://www.co.bonner.id.us/publicworks/Documents/TITLE13BONNERADDRESSORDINANCE_000.pdf

Boundary County, Idaho: http://www.boundarycountyid.org/legals/addressingord.htm

Cassis County, Idaho: http://www.cassiacounty.org/zoning-development/publications/StreetAddressSystemOrdinanceamended3.pdf

Chester County, Pennsylvania: http://www.pacounties.org/gis/lib/gis/Chester_County_2.doc

Clark County, Nevada: http://www.accessclarkcounty.com/depts/comprehensive_planning/title30/Documents/AppendixA.pdf

Clay County, Minnesota: http://www.co.clay.mn.us/Depts/GIS/GISAddSt.pdf

Coconino County, Arizona: http://www.coconino.az.gov/uploadedFiles/GIS/Standard_Addressing/COCONINOCOUNTYADDRESSINGORDINANCE_rev_8_dec2-formed.pdf

Jackson County, Michigan: http://www.co.jackson.mi.us/Documents/Ordinances/AddressOrd.pdf

La Plata County, Colorado: http://co.laplata.co.us/addr/addresspolicy.pdf

Lawrence County, Pennsylvania: http://www.co.lawrence.pa.us/emergency/StreetNamingPolicy.html

Livingston County, Michigan: http://co.livingston.mi.us/GIS/PDF/addresingPolicy0705.pdf

Prince Georges County, Virginia: http://www.princegeorgeva.org/index.aspx?page=455

Sandoval County, New Mexico: http://www.sandovalcounty.com/addressingordinance.pdf

Yuma County, Arizona: http://www.co.yuma.az.us/admin/PDF/ORD-StNaming_Addressing13-01rev%202001.pdf

Municipal Level

Town of Camp Verde, Arizona: http://www.cvaz.org/planning/docs/Section121.htm

City of Casa Grande, Arizona: www.ci.casa-grande.az.us/c/document_library/get_file?folderId=6735&name=DLFE-356.pdf

City of Gresham, Oregon: http://www.ci.gresham.or.us/departments/planningServices/dp/code/appendix/appendix13.pdf

Town of Huntington Beach, California: http://www.ci.huntington-beach.ca.us/files/users/fire/409.pdf

City of Lacy, Washington: http://www.ci.lacey.wa.us/lmc/title_12/chapter_12-04.htm

City of Loveland, Colorado:
http://www.ci.loveland.co.us/publicworks/DevEng/Docs/Ch13%20RevDraft01-17-07.pdf

City of River Falls, Wisconsin: http://www.rfcity.org/eng/Information/addressing.htm

City of Snoqualmie, Washington:
http://srch.mrsc.org:8080/code/template.htm;jsessionid=F54D3520DE2B459749A954E0603C55FD?view=main

City of Troy, Michigan: http://www.ci.troy.mi.us/CodeAndCharter/Code/CH002.pdf

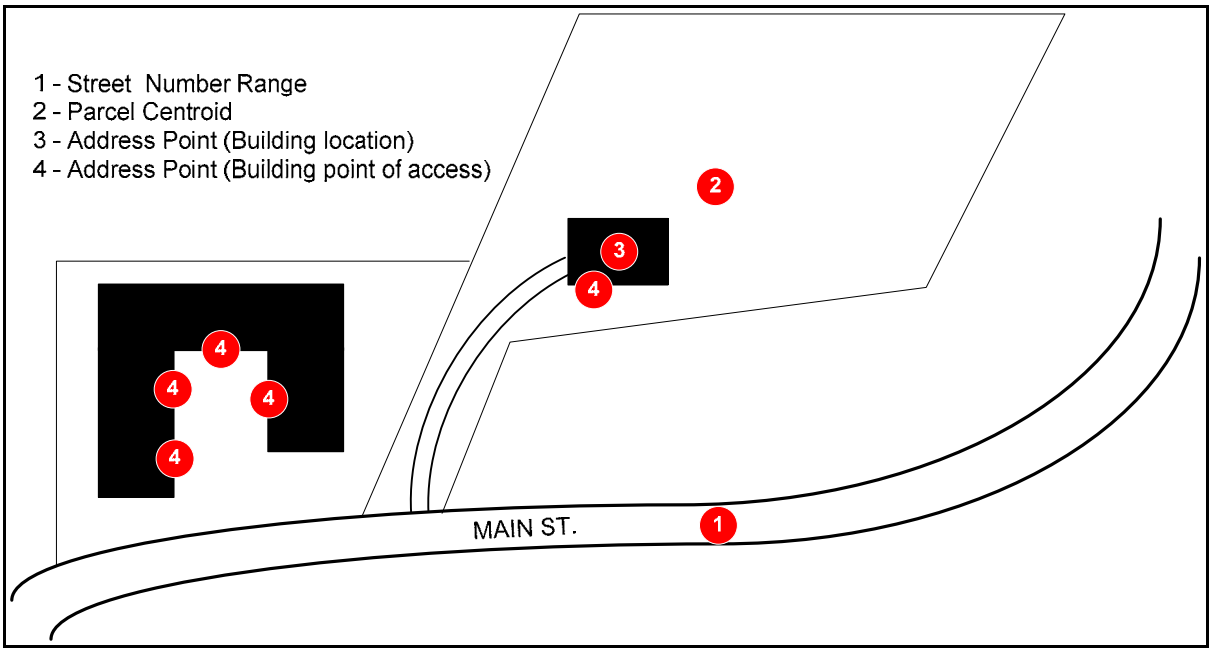
City of Vallejo, California: http://www.wheaton.il.us/custom/citycode/13201028.HTM

Town of Wheaton, Illinois: http://www.wheaton.il.us/custom/citycode/13201028.HTM

Town of Wilmington, Vermont:
http://www.wilmingtonvermont.us/vertical/Sites/%7BE2DA69A7-840E-4CF1-AC59-A0278D51236E%7D/uploads/%7B6EF666F3-5DB2-43CF-BDF0-5F9A26393B11%7D.PDF

APPENDIX B

Address Point Types



Street Number Range

Street number range is the most common form of geocoding. Geocoding is the process of converting an address to a spatial location. Commercial vendors such as TeleAtlas and Navteq publish street centerline data with the range of a street numbers for each segment or block. Often this data has reliability and accuracy issues. Generally, this type of geocoding works in an urban environment where addresses are evenly spaced throughout a city block. In more rural areas, positional accuracy between a calculated address location and the actual location of a driveway could be significantly different causing confusion and lost time in an emergency response situation. An example of a location determined from street number address range geocoding is represented by point number "1" in the previous figure.

Parcel Centroid

Calculating an address location at the center, or centroid, of a parcel is the next level of positional accuracy, particularly in rural settings (Point number "2" in previous figure). A centroid is created for each parcel that has an address and its center is used to position the spatial location. Many Connecticut municipalities use parcel centroids as a low-cost substitute for a physical structure address point since they are easy to create from an existing digital parcel dataset. Parcel centroids are also perfectly suited for undeveloped parcels that are given an address by a municipality. A parcel centroid based address point, however, can still not be reliably used to locate driveways or buildings on the parcel, particularly on large or irregularly

shaped parcels. Address points based solely on parcel centroids also only contain parcel addresses and not specific building addresses, like commercial and residential condominium units, that also may reside within the parcel.

Address Point (Driveway entrance, Building location, Building point of access)

Creating address points by either physically visiting the site with GPS equipment, or detailed orthophoto analysis can be time consuming and expensive, but is the most accurate of the three geocoding methods. The point where a driveway meets the road (point number “3”), the entry point or centroid of a building (point number “4”), and/or the building point of access (point number “5”) can be precisely mapped and made available for geocoding purposes. This data is a key data layer for many applications from emergency response to accident locations.

APPENDIX C

Known Address Point Datasets for Connecticut as of June 30, 2008

Statewide

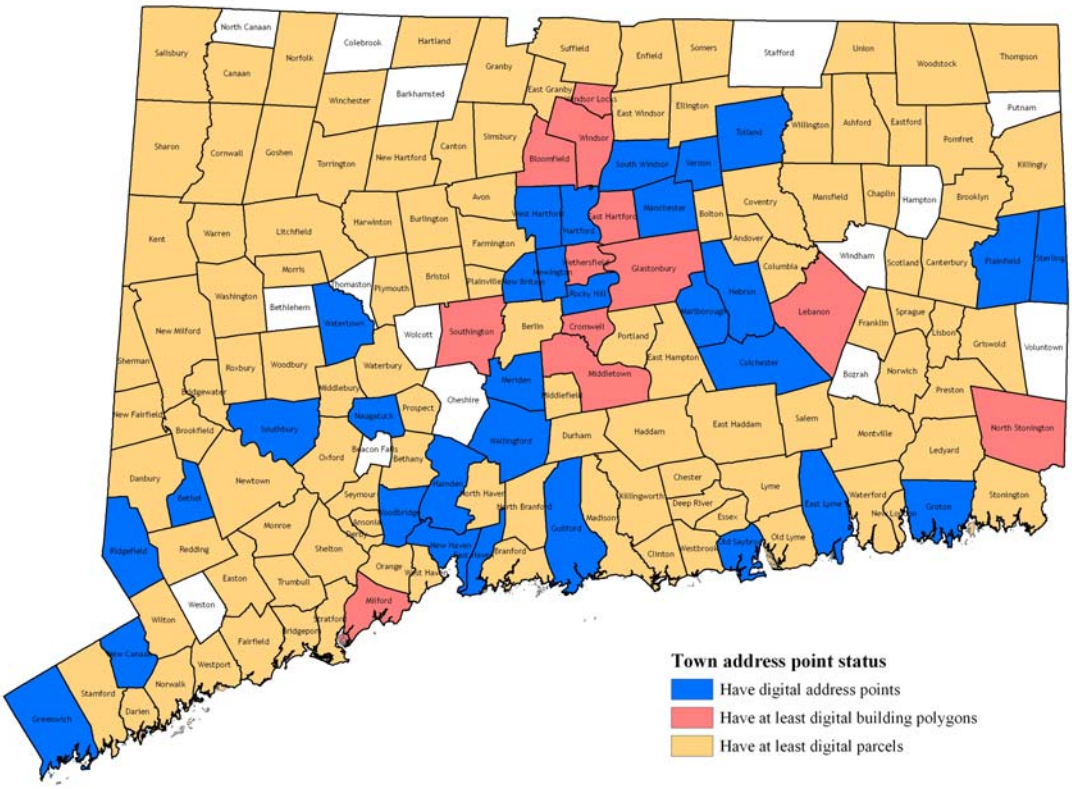
United States Census Bureau Master Address File (MAF) – Can only be used for Census.

Private data companies Tele Atlas, NAVTEQ, and Group 1 – Can provide less expensive parcel centroid based address points for state but unsure of completeness of datasets

AT&T – Has discrete point locations for each building or structure in the state, but no address data is currently attached to these points. In addition, past licensing practices may limit the usefulness of this data. Data may become more accessible as their business model continues to be modified.

Municipal Level

The following map shows towns that currently have a verified geospatial address point layer or have a verified digital building or parcel polygon layer that can be used for creating address points.



Other Data Stewards

AGRC

Northwest Conservation District

South Central Council of Governments

Southeastern Connecticut Council of Governments

US Department of Agriculture, FSA

United Way of Connecticut

Windham Regional Council of Governments

APPENDIX D

Examples of Street Address Data Standards within the United States

National Level

Federal Geographic Data Committee (FGDC) *Street Address Data Standard*, v 2.0 (working draft): http://www.fgdc.gov/standards/projects/FGDC-standards-projects/street-address/index_html

State Level

TBD

County Level

TBD

Municipal Level

Town of East Hampton, CT Address Ordinance

APPENDIX E

National Spatial Data Infrastructure Framework (NSDI)

The National Spatial Data Infrastructure (NSDI) is a means to assemble geographic data nationwide to serve a variety of users. GIS users of many different disciplines have a recurring need for a few themes of data. The framework is a collaborative community based effort in which these commonly needed data themes are developed, maintained, and integrated by public and private organizations within a geographic area. The framework is one of the key building blocks and forms the data backbone of the NSDI. The framework concept was developed by representatives of county, regional, state, federal, and other organizations under the auspices of the Federal Geographic Data Committee (FGDC). Local, regional, State and Federal government organizations, and private companies see the framework as a way to share resources, improve communications, and increase efficiency.

The NSDI provides an environment within which organizations and technology interact to foster activities for using, managing, and producing geographic data.

The Framework forms the data backbone of the NSDI. It has three aspects: data, procedures, and technology for building and using the data, and institutional relationships and business practices that support the environment. The framework is designed to facilitate the production and use of geographic data, reduce costs and improve service and decision making.

Geographic data are essential to many operations, yet they are expensive and time consuming to produce. Many organizations need the same basic geographic data for their applications and spend precious resources duplicating existing data sets. Others go without data because they cannot afford the production costs. Furthermore, when an application or problem covers more than one jurisdiction, it is often difficult to find and combine existing data. The framework meets these needs by providing a reliable, standardized source for commonly needed and used geographic data themes.

The initial NSDI framework includes the following seven core geographic data themes: Geodetic Control, Ortho Imagery, Elevation, Transportation, Hydrography, Governmental Units, and Cadastral Information.

These seven themes of geographic data are those produced and used by most organizations, are required by a majority or users, form a critical foundation for the NSDI, and have widespread usefulness. A cooperative approach to producing and sharing these common data will benefit most organizations that use geographic data.

APPENDIX F

State Spatial Data Infrastructure Framework (SSDI)

The goal of the Connecticut SSDI is to improve everyone's operations, reduce costs, and facilitate new analyses and joint decision making by providing a readily available set of basic digital geographic data. The infrastructure consists of commonly needed, used, and produced data brought into a common standard and made widely accessible. It is comprised of the initial seven NSDI themes and adds the following new themes critical to Connecticut's geospatial interests and business needs: Addressing, Census and Demographics, Critical Infrastructure and Key Resources, Geographic Names and Places, and Land Used and Land Cover.

The following are the guiding principles for building the infrastructure:

- The infrastructure should be a preferred data source. It should represent the best available data for an area – the most current, complete, and accurate data.
- The infrastructure should be widely used and useful. Users must be able to easily integrate framework data with their own and provide feedback and corrections to framework data.
- Access to infrastructure data should be at the lowest possible cost without restrictions on use and dissemination. The infrastructure is a public resource.
- Duplication of efforts should be minimized. Sharing the development and maintenance of framework data reduces the costs of individual users' data production.
- The infrastructure should be based on cooperation. It is built through the combined efforts of many participants who work together on its design and development and contribute data to it.

REFERENCES

Federal Geographic Data Committee. 2008. 2008 Cooperative Agreements Program (CAP) Project Information. Reston, Virginia. Federal Geographic Data Committee. http://www.fgdc.gov/grants/documents/FactsheetCAP2008Projects062008.pdf (accessed July 17, 2008).

Help America Vote Act, 42 USC § 15483 (2002).

State of Connecticut Department of Public Safety, Division of Fire, Emergency and Building Services, Office of Statewide Emergency Telecommunications, 2008. 2007 Annual Report to the General Assembly: Enhanced 9-1-1 Emergency Telephone Service, State of Connecticut. http://www.ct.gov/dps/lib/dps/2007_annual_report_-_complete.pdf (accessed August 21, 2008).