2020 Census Detailed Operational Plan for the Address Canvassing Operation

A New Design for the 21st Century

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1 Introduction

This document, the *2020 Census Detailed Operational Plan for the Address Canvassing Operation*, serves as a guide for the Address Canvassing operational activities and the supporting systems for the 2020 Census. It compliments the U.S. Census Bureau's *2020 Census Operational Plan*, which documents the initial baseline version of the 2020 Census Operational design and covers all operations required to execute the 2020 Census, starting with pre-census address and geographic feature updates, and ending once census data products are disseminated and coverage and quality are measured. It describes what will be done during the 2020 Census and, at a high level, how the work will be conducted.

This document baselines the overall 2020 Census address list development process and provides specific details for the Address Canvassing operation. It will be updated over time to reflect changes in strategies that result from 2020 Census planning, research, and testing activities.

1.1 Program Overview

The Address Canvassing program implements methods to improve and refine the United States Census Bureau's address list in advance of the 2020 Census enumeration. The Census Bureau needs the address and physical location of each living quarter in the United States and Puerto Rico to conduct and tabulate the census. An accurate list ensures that residents will be invited to participate in the census and that the census counts residents in the correct location.

For the 2010 Census, the Address Canvassing operation mobilized thousands of field workers to canvass almost every street in the United States and Puerto Rico to update the Census Bureau's address list and map data. This method of In-Field updating is expensive and research has shown that it is not necessary in all areas of the country. In keeping with a more efficient design for the 2020 Census, the Census Bureau has reengineered the Address Canvassing program. Address Canvassing now includes a suite of operations conducted both in the field and in the office that will update the address list and map data for the 2020 Census enumeration.

1.2 Purpose

This document describes the objectives and procedures for all aspects of the Address Canvassing program, including a description of the major tasks involved in the implementation, the overall program workflow, and the overall resources needed to support the effort.

1.3 Audience

The intended audience for this Detailed Operational Plan includes both internal and external 2020 Census stakeholders. The content of this plan is appropriate for business, technical, governance, oversight, and project management stakeholders.

2 Background

2.1 The MAF/TIGER System

The Master Address File (MAF)/Topologically Integrated Geographic Encoding and Referencing (TIGER) System (software applications and databases) serves as the national repository for all of the spatial, geographic, and residential address data needed for census and survey data collection, data tabulation, data dissemination, geocoding services, and map production. The MAF/TIGER System supports the Census Bureau's census and survey programs. The MAF contains all known living quarters and serves as the base of the census frame, to deliver questionnaires and postcards and to facilitate in-person data collection. The goal is to have each address in the MAF linked to a geographic location in TIGER, the Census Bureau's mapped spatial database. This linkage also ensures that the census data are processed and tabulated in the correct geographic location.

The Census Bureau established the first MAF/TIGER System to support the Census 2000 enumeration. Prior to 1970, the census was conducted in an all-in-one operation where enumerators were responsible for listing addresses and conducting interviews at the same time. Beginning in 1970, each decennial census has used some form of canvassing to validate and update the Census Bureau address list prior to mailing census questionnaires. For the 1970, 1980, and 1990 censuses, the Census Bureau began with a commercially purchased address list for available metropolitan areas, and then conducted canvassing operations to improve the list. For Census 2000, the objective was to build and maintain a permanent housing unit address list for future use. The 1990 Address Control File was the initial base for the MAF. The United States Postal Service (USPS) Delivery Sequence File (DSF) provided regular updates to the MAF in city-style address areas. Census 2000 frame operations, including the Local Update of Census Addresses (LUCA), Block Canvassing, and Address Listing were the first decennial census operations to update the MAF. Census 2000 enumeration operations supplied additional updates to the MAF.

After Census 2000, the advent of the American Community Survey (ACS), an ongoing census survey to collect community information, strengthened the need for MAF/TIGER System updates throughout the decade. Between 2000 and 2010, the Census Bureau continued to use the USPS's DSF to update the MAF at least twice a year. In addition, the ACS established the Community Address Updating System (CAUS), a program that provides field verified address updates to the MAF particularly in areas where the DSF is deficient. These updates continued through 2009, when the decennial census conducted a large-scale In-Field Address Canvassing operation to update the MAF/TIGER System.

Post-2010 Census, the USPS's DSF and CAUS continued to update the MAF/TIGER System along with other special census and current survey programs. However, the Census Bureau determined that there was a need for a more concerted, larger-scale effort for MAF validation and updates in order to support census surveys and the 2020 Census. This prompted the initiation of the Geographic Support System Initiative (GSS-I), a continuous plan to provide the most current, accurate, and complete address, feature, and boundary data. The GSS-I and the

Address Canvassing operation will work together to update the MAF/TIGER System and establish the 2020 Census address list. This document describes these programs in more detail.

2.2 Decennial Census Address Frame Operations

The MAF/TIGER System provides the base for the census address list and maps. DSF updates to the MAF continue throughout the census life cycle. The Census Bureau also conducts several operations to validate and update the census address list. Some of these operations focus solely on updating the address list prior to enumeration. Other operations are conducted at the time of enumeration with the intent to update the address list and enumerate households. These operations are described below.

The Local Update of Census Addresses (LUCA) program provides an opportunity for designated representatives of local, state, and tribal governments to review addresses contained in the Census Bureau's MAF/TIGER System. The Census Address List Improvement Act of 1994 (Public Law 103-430) makes the LUCA program possible and mandatory. Governments that choose to participate appoint liaisons to work with the Census Bureau. Liaisons review and provide updates to the census address list. To protect Title 13 requirements, all local government LUCA liaisons are required to sign a confidentiality agreement and abide by the Census Bureau's security guidelines. The Census Bureau validates the LUCA updates in the Address Canvassing operation.

The Address Canvassing operation assures a complete and accurate address list for the decennial census, prior to enumeration. Historically, Address Canvassing field staff, referred to as listers, traversed almost every block in the nation to compare what they observed on the ground to the contents of the Census Bureau's address list. Listers verified or corrected addresses that were on the list; added new addresses to the list; and deleted addresses that no longer existed. Listers also collected map spot locations for each structure and added new streets. The Census Bureau considered this In-Field method the best way to establish a complete address list, but it was also very expensive. For the 2020 Census, the Census Bureau will implement a Reengineered Address Canvassing that includes In-Office as well as In-Field methods in order to reduce these costs. This document describes this new Address Canvassing methodology.

For the 2010 Census, the Census Bureau conducted the Group Quarters Validation (GQV) operation after the Address Canvassing operation, and prior to enumeration. The purpose of the GQV operation was to improve the group quarters[1] (GQ) frame. Field staff visited a specific address to determine if it was GQ, housing unit, transitory location[2], non-residential, or

[1] Group Quarters are places where people live or stay, in a group living arrangement, which is owned or managed by an entity or organization providing housing and/or services for the residents. This is not a typical household-type living arrangement. These services may include custodial or medical care as well as other types of assistance, and residency is commonly restricted to those receiving these services. People living in group quarters are usually not related to each other. Group quarters include such places as college residence halls, residential treatment centers, skilled nursing facilities, group homes, military barracks, correctional facilities, and workers' dormitories.

[2] Transitory Locations are recreational vehicle parks, campgrounds, hotels, motels, marinas, racetracks, circuses, and carnivals.

nonexistent. If the address was a GQ, the lister conducted an in-person interview with the GQ contact person to determine the type of GQ and collect additional information to plan for enumeration. In support of a more efficient census design strategy, the 2020 Census will not conduct a separate operation to validate GQ information. Instead, the 2020 Census will validate GQ information during the Address Canvassing operation.

Once the initial address list operations are complete, the census conducts the enumeration operations. For the 2010 Census, there were two operations where the field staff updated the address list using In-Field Address Canvassing methods at the time of enumeration. In general, the operations were conducted in areas where we expected problems with getting the mail to the actual physical location of the address. In the 2010 Update/Leave operation, the field worker updated the address list and left a census questionnaire at the door for the resident of the household to complete and mail back to the Census Bureau. In the 2010 Update/Enumerate operation, the field worker updated the address list and conducted an in-person interview to enumerate members of the household.

For the 2010 Census, the Census Bureau also conducted Address Canvassing in Update/Leave areas and Update Enumerate areas (with the exception of very remote areas of Maine and Alaska), meaning we visited areas twice to update the address list. This strategy was deemed necessary in order to provide timely feedback to the 2010 Census LUCA participants. The feedback was needed prior to the start of the census enumeration. The Update/Leave and Update Enumerate operations were conducted too late to provide that LUCA feedback. For the 2020 Census, the Census Bureau will not conduct In-Field Address Canvassing in these types of areas and will rely primarily on In-Office Address Canvassing results to provide feedback to LUCA participants.

2.3 Reengineering Address Canvassing

The purpose of the Address Canvassing operation is to:

- Deliver a complete and accurate list and spatial database for enumeration and tabulation
- Determine the type and address characteristics for each living quarter

For the 2010 Census, the full In-Field Address Canvassing operation required 148,889 listers at a cost of $443,591,299. Additional costs were incurred for field infrastructure and information technology infrastructure support. The Census Bureau has determined that while there will be a full Address Canvassing of the nation for the 2020 Census, a full In-Field Address Canvassing of the nation is no longer necessary. Advancements in technology have enabled continual address and spatial updates to occur throughout the decade as part of an In-Office Address Canvassing effort.

The availability of up-to-date high quality, high-resolution aerial and street-level imagery, now provides a viable and effective tool to help reduce field work for many parts of the United States. More efficient and effective uses of land use and land cover data and various sources of address information reviewed in the office can provide a substitute for field work, especially in areas that

have been relatively stable residentially. An In-Field Address Canvassing now will only be needed in some areas of the country as determined by In-Office Address Canvassing.

The goal of reengineering Address Canvassing is to deliver a complete and accurate address and spatial frame to 2020 Census enumeration and tabulation operations. To support this effort, the Census Bureau is developing innovative methodologies for updating the MAF/TIGER System throughout the decade. These design changes have the potential to avoid costs up to an estimated $900 million. The sections below present the high-level design for the reengineered Address Canvassing and the design decisions that are yet to be made. Please refer to the *2020 Census Operational Plan* for a complete inventory of design decisions for all 2020 Census operations.

2.3.1 High Level Design

The scope of the Address Canvassing operation for the 2020 Census includes four major components as shown in Figure 1. Although each component is presented in a separate box, the success of the Address Canvassing operation relies on the success and integration of all four components as well as the GSS-I that provides local government and third party data to update the MAF.

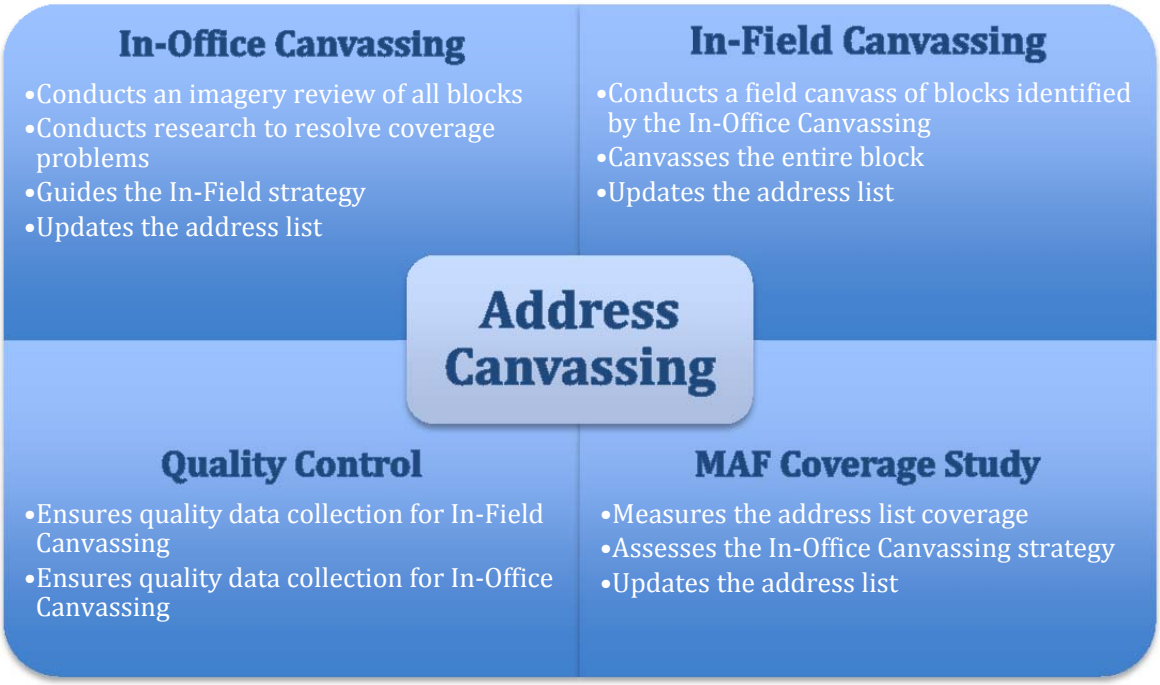


Figure 1: Components of the Address Canvassing Operation

In-Office Address Canvassing

In-Office Address Canvassing is the process of using empirical geographic evidence (e.g., imagery, comparison of the Census Bureau's address list to partner-provided lists) to assess the current address list. This process will remove geographic areas from the In-Field Address Canvassing workload based on the availability of administrative record and third party datasets (e.g., military lands, national forests) and/or the method of enumeration planned for the 2020 Census (e.g., Update Enumerate). In addition, this process will detect and identify change from high quality administrative and third party data sources to reduce the In-Field Address Canvassing workload.

In-Field Address Canvassing

In-Field Address Canvassing is the process of having field staff visit specific geographic areas to identify every place where people could live or stay. Field staff then compare what they see on the ground to the existing census address list and verify, correct, or add the address and location information.

Quality Control

The Quality Control (QC) program is responsible for devising a plan to ensure quality of the In-Field Address Canvassing, In-Office Address Canvassing, and MAF Coverage Study (MAFCS) work. For the QC of In-Field Address Canvassing and MAFCS work, this means ensuring proper execution of duties by field staff. The QC strategies currently reflected in this document represent a traditional but expensive approach that is heavily reliant on additional field work. The Census Bureau will research strategies for eliminating the additional field work to the extent possible and will update this document with the revised strategies.

MAF Coverage Study

The MAF Coverage Study is an ongoing field activity that measures the coverage of the census address list, validates In-Office Address Canvassing processes, and updates the MAF on a continuous basis.

2.3.2 Design Decisions Made to Date

Early Census Bureau research and planning activities have resulted in the design decisions listed below.

- ✓ The Address Canvassing operation consists of:
  - In-Office Address Canvassing;
  - In-Field Address Canvassing;
  - Quality Control; and
  - the MAF Coverage Study.

- ✓ Administrative records and third-party data sources will be used to validate addresses within each block.
- ✓ GQs will be identified and classified during Address Canvassing.
- ✓ Geographic areas (e.g., living quarters and features) which are included in downstream field operations (e.g., Update Enumerate and Remote Alaska) will no longer be canvassed in the field.
- ✓ At most twenty-five percent of the living quarters will be canvassed in the field.
    - Target as of September, 2015; continued study through additional testing
- ✓ Production Address Canvassing began September 2015.
- ✓ Address Canvassing will encompass training for both production and quality control processes for In-Office work.
- ✓ Address Canvassing will utilize automated training for both production and quality processes for In-Field work.
- ✓ Address Canvassing updates the Census Bureau's address list using a dependent canvass (from ground to list).
- ✓ In-Field Address Canvassing validates and collects coordinates for every structure with a living quarter.
- ✓ The MAF Coverage Study will be conducted annually, throughout the decade.
- ✓ In-Office Address Canvassing creates the universe for In-Field Address Canvassing.
- ✓ In-Office Address Canvassing will review public lands.
- ✓ Geographic areas designated for In-Office Address Canvassing can move to the In-Field Address Canvassing universe and vice versa.
- ✓ In-Field Address Canvassing can identify additional in-field work.
- ✓ Statistical modeling to identify areas for In-Field Address Canvassing work will not be used in Address Canvassing.
- ✓ Imagery will be available on the data collection application that will be used during In-Field Address Canvassing.
- ✓ Address Canvassing will validate LUCA submissions.

2.3.4 Design Decisions to be Made

Although the Census Bureau has determined the high-level design for the Address Canvassing operation, there are options that require testing in order to determine cost and quality trade-offs and to ensure appropriate integration with other census operations. Below is a list of outstanding decisions that are yet to be made and the timeline for making them.

1. How will Quality Control be handled?
   - Approach: Research in 2016 MAF Coverage Study and Address Canvassing Test
   - Decision by: January 2017

2. What are the business processes for handling Transitory Locations during Address Canvassing?
   - Approach: Research in the Address Canvassing Test
   - Decision by: January 2017

3. Will the Census Bureau be able to meet the 25 percent In-Field Address Canvassing goal without sacrificing quality?
   - Approach: Research in the 2016 MAF Coverage Study and the Address Canvassing Test
   - Decision by: January 2017

As the Census Bureau makes the decisions documented above, this document will be updated to reflect any changes in the design.

3 Business Architecture

The Address Canvassing operation design, planning, implementation and monitoring activities are coordinated efforts among many Census Bureau areas. The Decennial Census Management Division (DCMD) leads the overall Address Canvassing effort with key support from the Geography Division (GEO), the Decennial Information Technology Division (DITD), the Decennial Statistical Studies Division (DSSD), the Field Division (FLD), and the National Processing Center (NPC). Personnel from these areas lead teams for each of the Address Canvassing component parts and meet regularly to discuss and report the status of major activities. Figure 2 presents a high-level work breakdown structure and indication of which division serves as the subject matter expert for a particular Address Canvassing component.

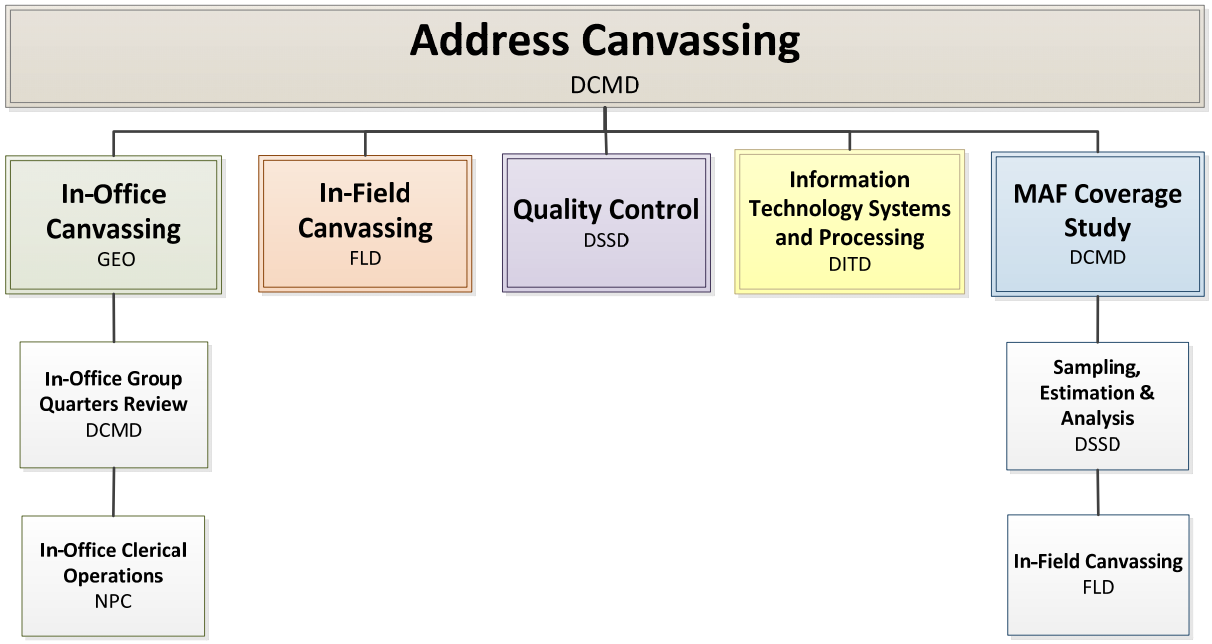


Figure 2: Address Canvassing Business Structure

3.1 Decennial Census Management Division

DCMD serves as the centralized management office responsible for planning, implementation, and evaluation of the 2020 Census Program. This includes the overall responsibility for the budget, schedule, and scope at both the program and project levels, and monitoring readiness of all internally and externally provided systems needed by the decennial census. For the Address Canvassing operation, DCMD tasks include:

- Managing the budget, schedule and scope of the overall program
- Serving as the subject matter expert for the In-Office GQ Review processes that support the In-Office Address Canvassing
- Serving as the subject matter expert for the MAF Coverage Study
- Documenting business processes
- Participating actively in inter-divisional working groups

3.2 Decennial Statistical Studies Division

DSSD coordinates, develops, and implements mathematical statistical techniques in the design and conduct of the ACS and the decennial census. The scope includes research and testing of methods for alternate sample design and selection, data collection, processing, quality control, the use of administrative records, questionnaire content, estimation, imputation, and variance estimation. For the Address Canvassing operation, DSSD tasks include:

- Serving as the subject matter expert for all Quality Control components
- Serving as the subject matter expert for sampling, estimation and analysis in support of the MAF Coverage Study
- Participating actively in inter-divisional working groups
- Reporting operational status updates (e.g., budget and schedule) to DCMD
- Documenting all business processes
- Determining and documenting the requirements for all the census address list content
- Determining and documenting the requirements for updates to the census address list

3.3 Decennial Information Technology Division

DITD is a centralized office that conducts most of the Information Technology (IT) related functions for the ACS and the decennial census. This includes application development and operations, infrastructure coordination, Quality Assurance and Independent Validation & Verification, data dissemination, and Systems Engineering and Integration activities (e.g., configuration management, requirements management support, and IT Directorate Liaison). For the Address Canvassing operation, DITD tasks include:

- Developing systems and software to conduct the In-Office Address Canvassing
- Developing systems and software to update the MAF/TIGER System as updates are received from In-Office Address Canvassing, In-Field Address Canvassing and the MAF Coverage Study
- Creating address and spatial products to support all Address Canvassing operational components
- Documenting business processes
- Reporting operational status updates (e.g., budget and schedule) to DCMD
- Participating actively in inter-divisional working groups

3.4 Geography Division

GEO plans, coordinates, and administers all geographic and cartographic activities needed to facilitate the Census Bureau's statistical programs throughout the United States and its territories. It also manages the Census Bureau's programs to continuously update the addresses, features, boundaries, and geographic entities in its nationwide, automated geographic support system. For the Address Canvassing operation, GEO tasks include:

- Serving as the subject matter expert for planning, implementing and monitoring the In-Office Address Canvassing processes
- Documenting business processes
- Reporting operational status updates (e.g., budget and schedule) to DCMD
- Managing the ongoing update of the MAF/TIGER System
- Participating actively in inter-divisional working groups

3.5 Field Division

FLD plans, organizes, coordinates, and carries out the Census Bureau's field data collection program for surveys, special censuses, and the decennial census. FLD's Headquarters component has a unique and pivotal role with the regional offices and other Census Bureau divisions and offices. For the Address Canvassing operation, FLD's Headquarters staff tasks include:

- Serving as the technical area lead for the In-Field Address Canvassing (including the collection of data for housing units, GQs, and transitory locations)
- Providing direction and leadership to Regional Directors as they carry out field data collection operations
- Formulating data collection and supporting activity budgets
- Developing policies and procedures that impact regional staff

- Participating actively in inter-divisional working groups
- Reporting operational status updates (e.g., budget and schedule) to DCMD
- Creating training materials for use by regional staff
- Overseeing the implementation of In-Field Address Canvassing, including production listing and QC
- Monitoring data collection production standards and budget compliance

3.6 National Processing Center

NPC is the Census Bureau's primary center for collecting and capturing data for surveys and censuses. Overall, services provided include mail processing, data capture, statistical operations, geographic operations, and call center support. The center has a flexible labor force, with the ability to rapidly expand and contract in size, from 1,700 to more than 5,000 employees. The NPC staff will support the In-Office Address Canvassing activities for the 2020 Census. For the Address Canvassing operation, NPC tasks include:

- Recruiting and hiring staff to conduct In-Office Address Canvassing data collection
- Managing the daily data collection processes for In-Office Address Canvassing
- Participating actively in inter-divisional working groups
- Reporting operational status updates (e.g., budget and schedule) to DCMD and GEO

3.7 Other Supporting Census Bureau Areas

In addition to the areas described above, the Address Canvassing operation relies on the support of other areas of the Census Bureau to conduct production activities, develop systems and applications, and provide governance. As roles are defined, future versions of this document will include descriptions of information technology supporting divisions and governance groups.

4 2020 Census Address List Development

Although the Address Canvassing operation is a key address list development activity leading into the 2020 Census enumeration, it does not work alone to assure a complete and accurate list. The 2020 Census address list development started soon after the Census Bureau finalized the 2010 Census count of living quarters. The Census Bureau retains the 2010 Census addresses in the MAF and they are subject to continuous updates from the Delivery Sequence File (DSF) as well as new sources, to support the 2020 Census. In contrast to the previous decade, the 2020 Census will not wait until just prior to enumeration to supplement the address list where necessary. For example, the Geographic Support System Initiative (GSS-I) program started work to improve the address frame in Fiscal Year (FY) 2011. The GSS-I and the DSF, in conjunction with the Address Canvassing operation will keep the frame updated throughout the decade.

This section describes:

- Address list updating activities that have been completed to date and how the results inform us about the quality of the current MAF
- Address list updating activities that are planned and how those activities integrate with the Address Canvassing operation

4.1 The Early Years (2010-2014)

4.1.1 The 2010 Census Address List

There were 131.7 million housing units in the final 2010 Census count. The addresses for these units established the base for the 2020 Census address list. The 2010 Census address list will represent the vast majority of the 2020 Census address list in most areas of the United States and Puerto Rico. In the previous decade, the Census Bureau observed that approximately 77 percent of the final 2010 address list was comprised of addresses from Census 2000.

For the 2010 Census, 96.7 percent of the addresses included in the final address list were city-style (house number, street name) and 3.3 percent were non-city-style (for example, rural route, post office box, or general delivery). For the Census 2000 and the 2010 Census, the principal sources of address data in city-style areas were the DSF and Census Bureau field activities, including address listing for the Decennial Census and the ACS. For the 2020 Census it is expected that this DSF updating trend, along with ongoing field updates, will continue.

4.1.2 United States Postal Service File Updates

The USPS is the authoritative source for mail delivery addresses and postal codes in the United States and Puerto Rico. The USPS shares its address list, the DSF, with the Census Bureau in accordance with Public Law 103-430, the Census Address List Improvement Act of 1994. The Census Bureau used the USPS data to create the initial MAF for Census 2000 and continues to use the data to update the MAF periodically. The USPS typically provides the data to the Census Bureau twice a year, in the spring and the fall.

The DSF is the list of all addresses (and some related data) maintained by the USPS for the purpose of mail delivery. The Census Bureau also uses the Locatable Address Conversion Service (LACS) file from the USPS, which identifies known address conversions. These conversions can represent city-style to city-style address conversions as well as rural route to city-style conversions. GEO processes the DSF and LACS along with other data from the USPS through a project collectively known as the "DSF Refresh." The DSF Refresh includes the following general steps:

- Match the new DSF file to the MAF to update existing MAF addresses with DSF source information and add new, unmatched DSF addresses to the MAF
- Process the USPS Zone Improvement Plan (ZIP) Code file to update existing ZIP Codes for all addresses on the MAF[3], even those addresses that did not originate from the DSF
- Process the LACS file to account for address conversions
- Attempt to assign DSF addresses to a census block (i.e., run the geocoding process)

The last step is critical for inclusion in the census. The block provides a physical location (geographic area) for census workers to visit during in-field enumeration activities. If the DSF address matches an existing MAF address that already has a census block assignment then the DSF address is geocoded. For those DSF addresses that have no matches to an existing MAF address, GEO compares the address number to address ranges in TIGER in an attempt to assign the address to a census block code. In some cases, the street feature or house number range may not exist in TIGER and the DSF address remains on the MAF without a census block. The Census Bureau refers to these addresses as ungeocoded addresses.

The DSF adds approximately half a million addresses to the MAF every six months. The adds are predominantly attributed to the spreading of urban developments on undeveloped land near a city or its suburbs. The Census Bureau does not use all records on the DSF to update the MAF. Specifically, the update excludes non-city style addresses including Post Office Box addresses and rural routes. The inability to link these types of addresses to a physical geographic area is the reason for the exclusion.

DSF Stability Index

The DSF Stability Index provides an indicator of the stability of addresses in the DSF over a specified duration. The DSF Stability Index is calculated by tracing the presence of addresses in the DSF at the end of the period through each preceding DSF for the time period. Index values range from zero to one; an index value of one indicates that each address in the final DSF for the time period appears in each preceding DSF. The higher the index value the greater the stability of addresses in the DSF. Figure 5 shows the DSF Stability Index for addresses on the DSF between 2010 and 2015, by census tract.

[3] In TIGER, address ranges and their associated ZIP Codes are assigned to each street feature segment.

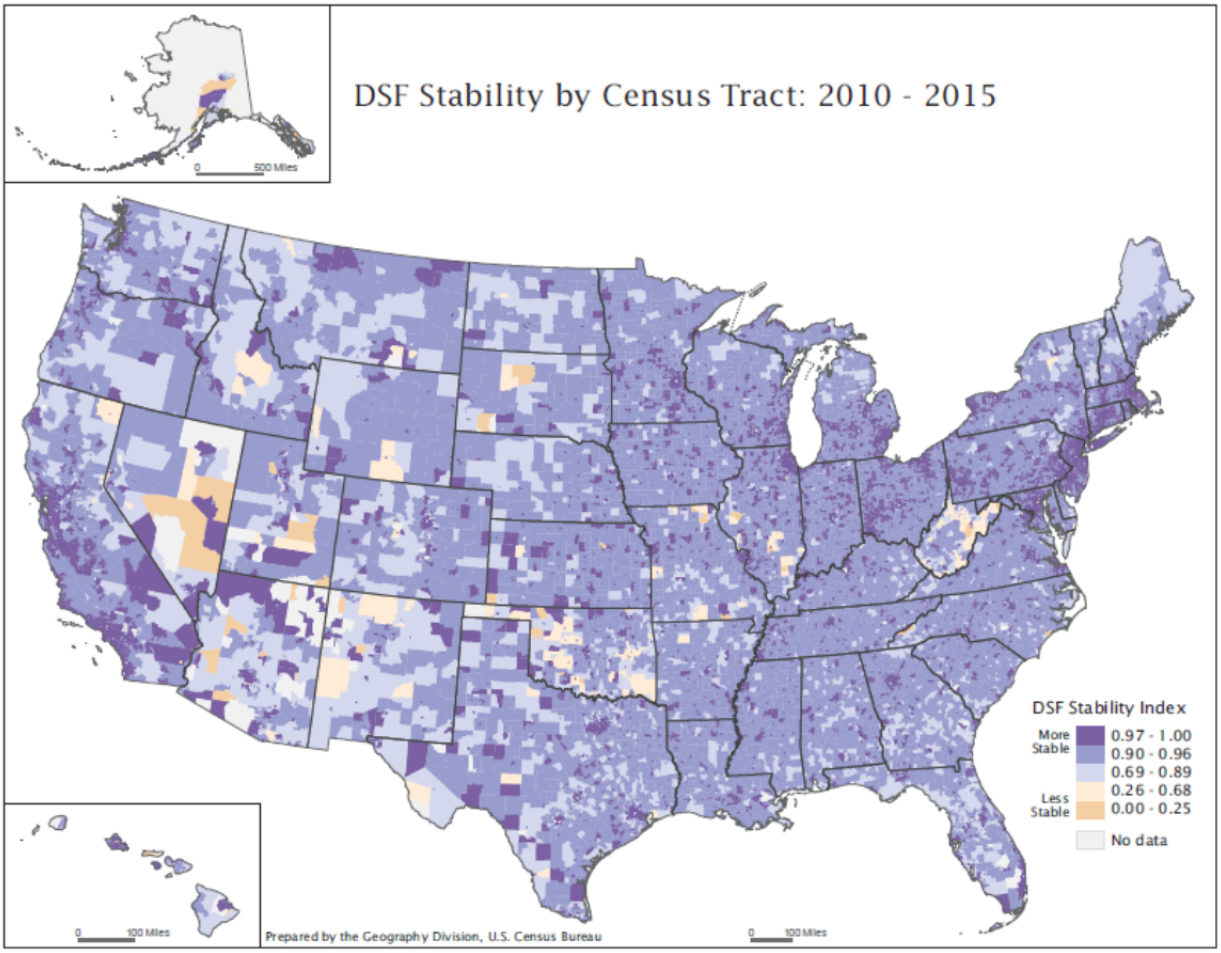


Figure 3: DSF Stability by Census Tract

Census tracts with the highest levels of stability tend to be located in urban and suburban areas. The DSF Stability Index provides one measure of stability and will be used with other measures of stability, coverage, and quality in decision-making for the Address Canvassing operation.

4.1.3 American Community Survey

The ACS conducts field visits every month to interview residents in households that did not respond to the survey. During that visit, field representatives (FRs) confirm the address information and block location (geocode) of each address. The ACS program collects and reviews these updates and sends them to GEO twice a year to update the MAF. This process occurs for housing units and GQs separately. The Census Bureau refers to these updates as the ACS Time of Interview (TOI) MAF updates. The ACS TOI corrects existing housing unit and GQ addresses but does not add new addresses during the interview. However, GQs are added as a result of ongoing office research activities that ACS conducts in support of a quality GQ frame. These updates from both ACS TOI and In-Office research will continue throughout the decade.

4.1.4 The Geographic Support System Initiative

The GSS-I is an integrated program of improved address coverage, continual spatial feature updates, and enhanced quality assessment and measurement. Its activities contribute to the MAF/TIGER System improvement. GSS-I research and analysis results support the combination of In-Field and In-Office Address Canvassing methods as outlined in this document. The Census Bureau, with tribal, federal, state, and local governments, as well as third party data providers and all users of MAF/TIGER data are major participants in the program. The GSS-I began in FY 2011 and has a 10-year lifecycle.

The GSS-I developed Quality Indicators (QIs) in 2012. QIs measure the quality of MAF/TIGER System address and road data by census block and census tract, and contribute to an overall assessment of MAF/TIGER System data quality. QIs allow the comparison of census blocks and census tracts based on their quality evaluation. GEO uses the evaluation to identify geographic areas on which to focus partnership activities.

In 2012, the GSS-I Partnership Program prioritized outreach to partners based on characteristics of the MAF addresses for their area, taking into account varying sizes and locations across the country. The objective was to determine whether the GSS-I could obtain files from partners in sparsely populated rural areas to confirm that the MAF had sufficient and accurate coverage in areas with low QIs. The GSS-I Partnership Program solicited tribal, state, and local governments within these parameters to submit address and road data.

Address Source Evaluation Operation

Once GEO receives partner data, a geographer examines each partner file, inventories the contents, and determines whether the file complies with data content guidelines for addresses and roads. Prior to using the partner-provided data, GEO conducts a series of automated checks and analytic reviews. This process includes matching partner addresses to the MAF, interactively reviewing non-matches to avoid duplication in the MAF, and validating that new addresses represent structures that actually exist on the ground. GEO refers to this entire process for reviewing and updating the MAF with partner data as the Address Source Evaluation (ASE) operation.

Address Canvassing Recommendation

The GSS-I Partnership Program results, as documented in the *Geography Division Address Canvassing Recommendation* report, offers the following conclusions about the availability and utility of partner data:

- The Census Bureau is more likely to acquire partner address and road data in urban and suburban areas, many of which are likely to show growth. This supports the notion that partner data can be used to both validate and supplement the MAF/TIGER System data in these areas.
- The Census Bureau is less likely to acquire and successfully process partner data for sparsely-populated rural areas containing non-city-style addresses. Planning is underway

to use alternative methods to supplement the address list in these areas with third-party data and possibly addresses from administrative records.

- Partner data adds and modifies roads at highly variable rates. In some areas, GEO made only few updates to roads in the MAF/TIGER System because the roads were already current and of high quality. In other areas, such as new housing subdivisions, adding roads made it possible to geocode the new housing units.
- Matching partner-provided address data to the MAF/TIGER System reduced the number of ungeocoded addresses. Historically, ungeocoded addresses are not included in the census frame because, without a census block location, the enumeration data associated with the address cannot be tabulated to the correct jurisdiction and census block. When ungeocoded addresses are resolved, the coverage for that area improves and there is less need to conduct in-field address canvassing.

GSS-I Results to Date

Figure 4 depicts the areas for which GSS-I partners have provided files by the type of data provider. Areas in grey represent areas where the GSS-I has a local partner, but that partner was unable to provide data. Areas in white represent areas where the GSS-I does not currently have partnership coverage as of April of 2015.

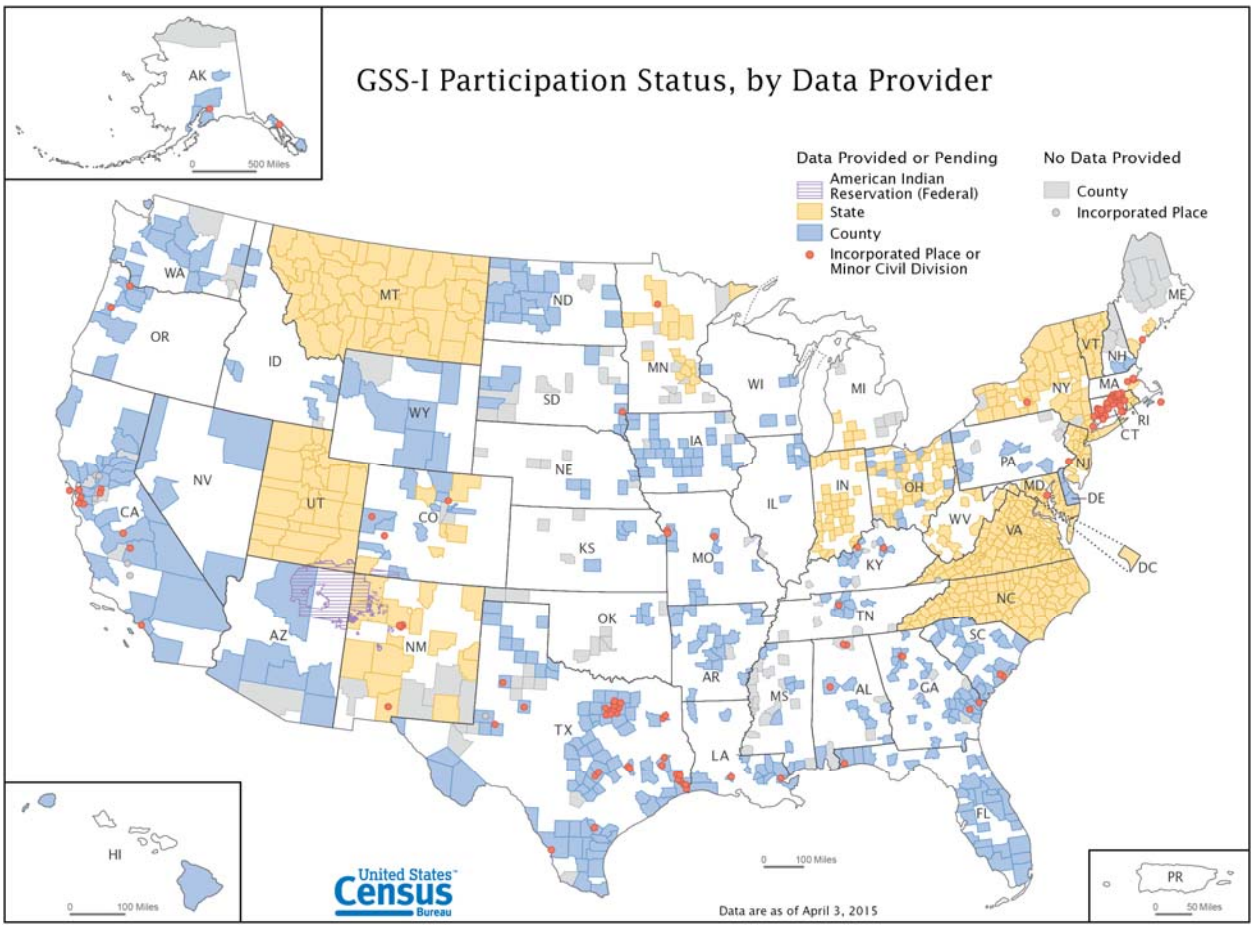
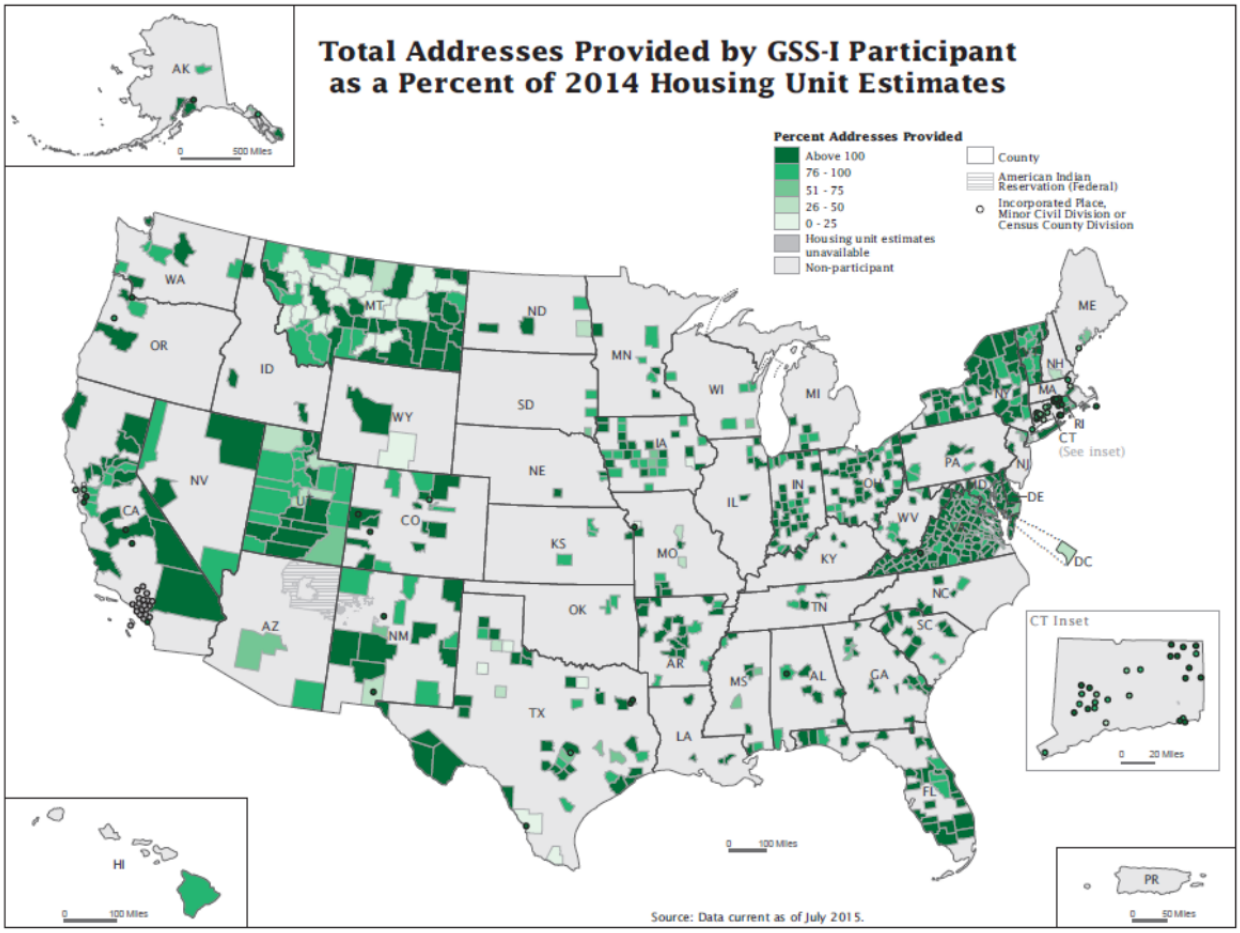


Figure 4: GSS-I Participation Status, by Data Provider

A total of 1,010 partners have provided files as of April 2015.[4] As of July 2015, the GSS-I has been successful at evaluating and incorporating current, high-quality address and road data from 776 of the 1,010 partner provided files. The GSS-I systems have processed approximately 53.7 million addresses from these files. See Figure 11 in Appendix C for a geographic representation of partner provided addresses. These addresses represent approximately 99.2 percent of the housing units[5] in the participating areas. Figure 5 below presents the partner provided addresses as a percentage of the July 2014 County Housing Unit Estimates for States from the Census Bureau's Population Estimates.

[4] The GSS-I started work to identify more partners in October of 2016 (as described in *Section 4.2.1*). Once those partners are identified and new files are provided, the map will be updated to reflect coverage.

[5] As determined by the Census Bureau Population Estimates data, County Housing Unit Estimates for States, July 2014.



Source Data: County Housing Unit Estimates for States (Census Bureau Population Estimates, July 2014)

Figure 5: GSS-I Provided Addresses as a Percent of 2014 Housing Unit Estimates

Table 1 presents the results of the ASE operation for these partner provided addresses.

Table 1: Results of the Address Source Evaluation for Partner Provided Files

MAF Update Category	Number	Percent of Total
Total Addresses Provided	**53,713,656**	**100.00**
Matched to the MAF	42,149,393	78.5
Added to the MAF	139,344	0.3
Rejected	11,416,429	21.2

Results as of July 2015

The vast majority of partner provided addresses, that is approximately 42.1 million (or 78.5 percent), matched to an existing MAF address record. See Figure 12 and Figure 13 in Appendix C for a geographic representation of match results.

Some of the matched address records were previously ungeocoded (i.e., did not have a census block code). The total number of previously ungeocoded records in the MAF/TIGER System that obtained a block geocode because of the partner provided update amounts to 597,375 or approximately 1.1 percent of the partner provided addresses.

Another 0.3 percent of the partner provided addresses were unmatched, but geocoded, and added to the MAF as a new address record. The remaining 21.2 percent (11.4 million) unmatched addresses were rejected and not updated on the MAF. Major reasons for rejection include:

- Records in the partner file were identified as duplicates
- Records in the partner file did not have a complete city-style address
- Records in the partner file were missing information needed for the MAF/TIGER System, such as unit type

4.2 Mid-Decade and Beyond (2015-2020)

4.2.1 Continued Geographic Support Systems Initiative Work

Moving forward into Fiscal Years 2016 and 2017, the goal of the GSS-I program is to collect and process local partner data and third party data for the remainder of the nation. It is possible that many areas do not have local data to share and will not have any in that time frame. These partners will be cataloged in the GSS-I Workflow Control System (GWCS) so that the GSS-I can work with them to obtain data in the future. The GSS-I will work to supplement data in these areas with usable third party data.

The GSS-I will not only work to acquire and process files from new partners, the program will acquire new files from existing partners when needed. The acquisition needs are determined by the following factors:

- Living quarters growth identified by In-Office Address Canvassing processes (see *Section 6*)
- An agreement with state providers to provide data on a regular cycle

The GSS-I will also research the availability of usable third party data in areas where local files are not available. At the end of Fiscal Year 2015, the Census Bureau purchased address data from five vendors and national street centerline spatial data from one vendor for 2020 Census work. The GSS-I will conduct an initial evaluation of these data and determine how these data will be used to validate or update the MAF/TIGER database. In this initial evaluation, the GSS-I will:

- Extract, transform and load each third party data file into the appropriate format for processing
- Match the incoming third party data to the MAF/TIGER System data

- Attempt to geocode the incoming data

All of these activities will continue in the years leading up to the 2020 Census to support In-Office Address Canvassing and overall frame development.

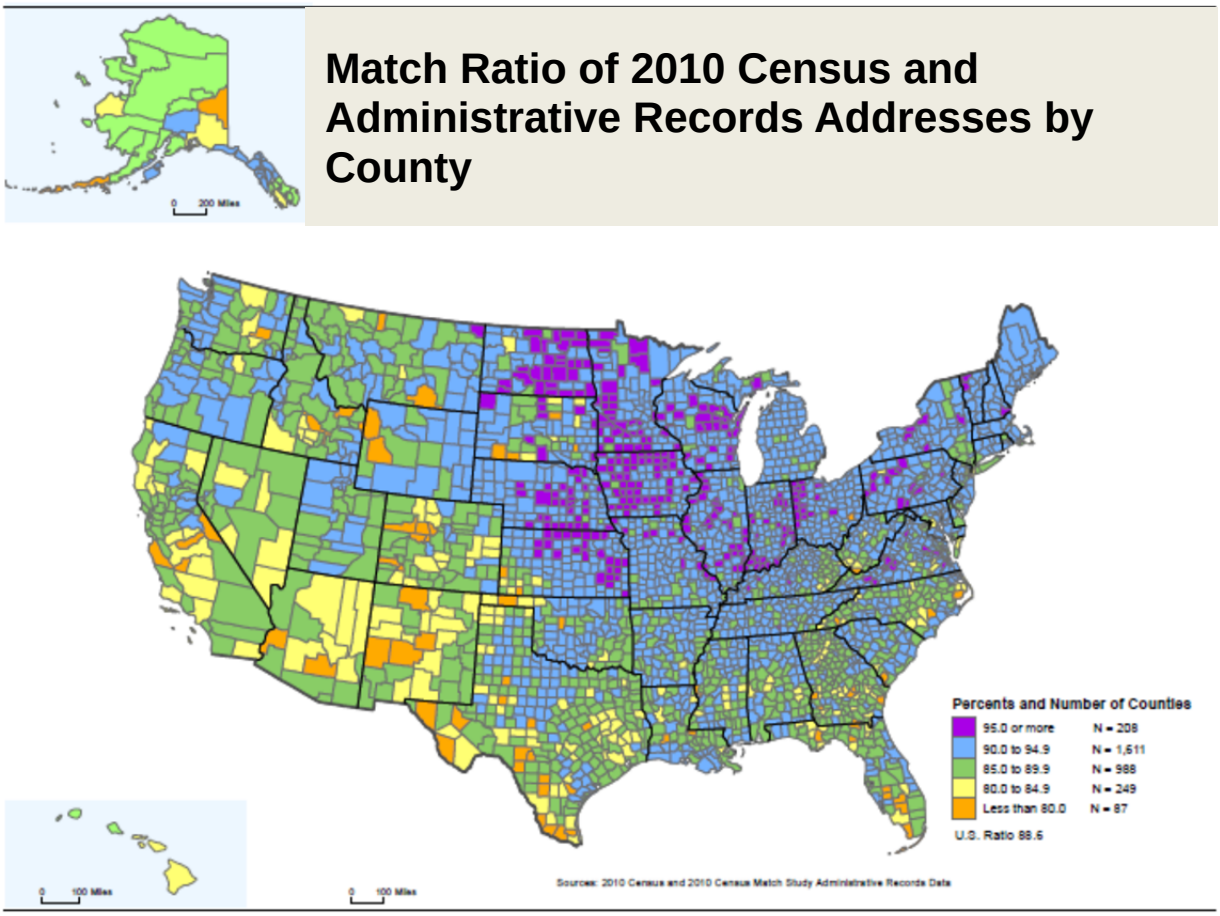
4.2.2 Federal Administrative and Third Party Data Files

Administrative records and third party data will be used to validate and update addresses in the MAF/TIGER System. In addition to the third party address and street centerline data the Census Bureau acquired for the 2020 Census (see *Section 4.2.1*), the Census Bureau will continue to acquire administrative records and third party data through efforts that are coordinated through the Center for Administrative Records Research and Applications (CARRA). These data are used not only to validate addresses already in the MAF/TIGER System, but also to validate addresses from yet another source (e.g., census respondents) before the data are applied to the MAF\TIGER System.

CARRA has created an administrative records composite file from the following federal data sources:

- Housing and Urban Development (HUD) Public and Indian Housing Center Database
- HUD Tenant Rental Assistance Certification System Database
- Indian Health Service Patient Registration File
- Selective Service System Registration File
- Centers for Medicare and Medicaid Services, Medicare Enrollment Database

In addition to these federal files, CARRA has acquired several third party data files. As a first validation exercise, this composite was matched to the final 2010 Census address list. Results, as shown in Figure 6 indicate high match rates in urban areas. The overall match ratio was 92.6 percent and the majority of counties had a match ratio of 85.0 percent or higher.



Source: Linking Administrative Records at the U.S. Census Bureau Presentation (CARRA, June 2015)

Figure 6: Match Ratio of 2010 Census and Administrative Records Addresses

4.2.3 Group Quarters Administrative Records Partnerships

The Address Canvassing operation for the 2020 Census will collect data for GQs to support GQ enumeration activities. In addition to the traditional address and location information, these enumeration activities require information about the type of GQ and contact information for GQ management. The In-Field Address Canvassing will collect these additional data when possible. However, the U.S. Census Bureau is implementing new and improved methods to update the GQ frame. The Census Bureau will work to collect and validate GQ data through administrative records as well as other In-Office Address Canvassing processes (as described in *Section 6.7*) for the 2020 Census.

To collect electronic GQ administrative record data (internal records maintained by GQ administrators on a daily basis), the Census Bureau plans to engage:

- Federal-State Cooperative Population Estimate partners to obtain their GQ administrative records (Stateside and Puerto Rico)

- The NPC to conduct research into Service-Based Enumeration[6] (SBE) locations (Stateside and Puerto Rico)
- The Military (all branches) to obtain one national-level file from the Defense Manpower Data Center (DMDC) that includes geocoded information for all living quarters on military installations (Stateside and Puerto Rico)

In Fiscal Year 2016, a Group Quarters Electronic Transfer Capability Survey (GQETCS) will be fielded to Stateside GQ umbrella organizations such as the Department of Education, the Salvation Army, the National Coalition for the Homeless, and state-level adult and juvenile correctional facilities. These organizations assisted the Census Bureau during the 2010 Census by identifying group quarter facilities under their jurisdiction.

The GQETCS will inform the Census Bureau about the availability of GQ electronic administrative records. It will also assess whether GQ administrators and/or each primary GQ contact under their jurisdiction have the capability to send these records directly to the Census Bureau by electronic means. The information gleaned from the GQETCS will help design the Group Quarters Electronic Transfer Test (GQETT), which will be conducted for approximately 280,000 GQs (Stateside and Puerto Rico). The timing for the GQETT is yet to be determined. The GQETT will test the electronic transfer of address information and client-level administrative record data files. The Census Bureau will assess the quality and coverage of those files. Information gleaned from the GQETT and the GQETCS will drive decisions for the enumeration of GQs for the 2020 Census.

4.2.4 Expanded Postal Service Updates and Services

The Census Bureau will broaden the scope of USPS related updates prior to the 2020 Census. The goals are to expand the universe of deliverable addresses into Puerto Rico and assess the mailability of all addresses in the MAF/TIGER System.

Mailability Confirmation

The mailability of an address is a key factor in determining how to approach the census enumeration for that address. Ideally, the Census Bureau would like to be able to notify most respondents of their response options by mail. To support that effort, the Census Bureau will employ methods to assess and improve the mailability of addresses in the MAF/TIGER System. The Census Bureau will use USPS's Coding Accuracy Support System (CASS) service to evaluate the quality of the address-matching software in order to improve the accuracy of ZIP+4, carrier route, and five-digit coding. The service also adds missing address information, such as ZIP codes, to ensure the address is complete. It will also perform delivery point validation to verify whether or not an address is deliverable.

[6] SBE is an operation designed to enumerate people at facilities where they might receive services, such as shelters, soup kitchens, healthcare facilities, and other selected locations. This operation targets the types of services that primarily serve people who have no usual residence.

Postal Check

The Census Bureau will work with the USPS to implement a casing check in order to assess the deliverability of addresses. The Census Bureau will receive the USPS feedback and resolve problem addresses as appropriate. The results of both the mailability confirmation and the postal casing check will help inform strategies for contacting respondents at the time of census enumeration.

Puerto Rico DSF Updates

Although the DSF includes all of the USPS's deliverable addresses in Puerto Rico, the Census Bureau did not include these addresses in the MAF/TIGER System in the past. This was primarily due to limitations in matching Puerto Rico style addresses to each other. The GSS-I research included the identification of methods to standardize Puerto Rico style addresses and to improve the address matching beyond identification of only exact text strings. This allowed the MAF/TIGER System update process to closely resemble the Stateside method and include regular DSF updates in Puerto Rico. These updates may enable the 2020 Census to employ a mailout self-response strategy in some areas of Puerto Rico for the first time. The first of these updates are scheduled to start in Fiscal Year 2016.

4.2.5 Ungeocoded Resolution Operation

The Ungeocoded Resolution operation is an in-office process to assign a census block code to addresses on the MAF that do not already have one (i.e., ungeocoded addresses). As described in *Section 4.1.2*, the DSF and some other sources introduce ungeocoded addresses to the MAF/TIGER System. Although the DSF is the primary source of ungeocoded addresses, there are also a small number of ungeocoded addresses in the MAF/TIGER System from current survey and census updates.

The automated geocoding process that is part of the DSF Refresh (as described in *Section 4.1.2*) attempts to assign census block codes to new addresses by either matching the new address to an address in the MAF/TIGER System with an existing location coordinate or by matching it to an address range in TIGER. This automated process is not able to assign block codes to all addresses, some reasons for this include:

- The street feature has not been created in TIGER
- The street feature is missing all or part of the address range in TIGER
- All or part of the street feature information (e.g., street name spelling, ZIP code) in TIGER may be inconsistent with how the address is represented on the MAF

In some instances, updates from the ASE, as described in *Section 4.1.4*, will resolve ungeocoded records. The Ungeocoded Resolution operation will investigate the records that were not resolved from the automated process (and ASE) and attempt to assign block codes by reviewing local source data available in-house as well as online.

Ungeocoded Addresses on the MAF

As of the spring of 2015, there are approximately 2.2 million ungeocoded residential addresses in the MAF/TIGER System. The universe of ungeocoded addresses has increased at a rate of 12.9 percent between the Fall of 2014 and the Spring of 2015. In general, ungeocoded addresses tend to represent new housing development attributed to population growth away from central urban areas into low-density residential developments (i.e., urban sprawl). Figure 7 shows a map of the 2.2 million ungeocoded residential DSF addresses (as of Spring 2015) by county.

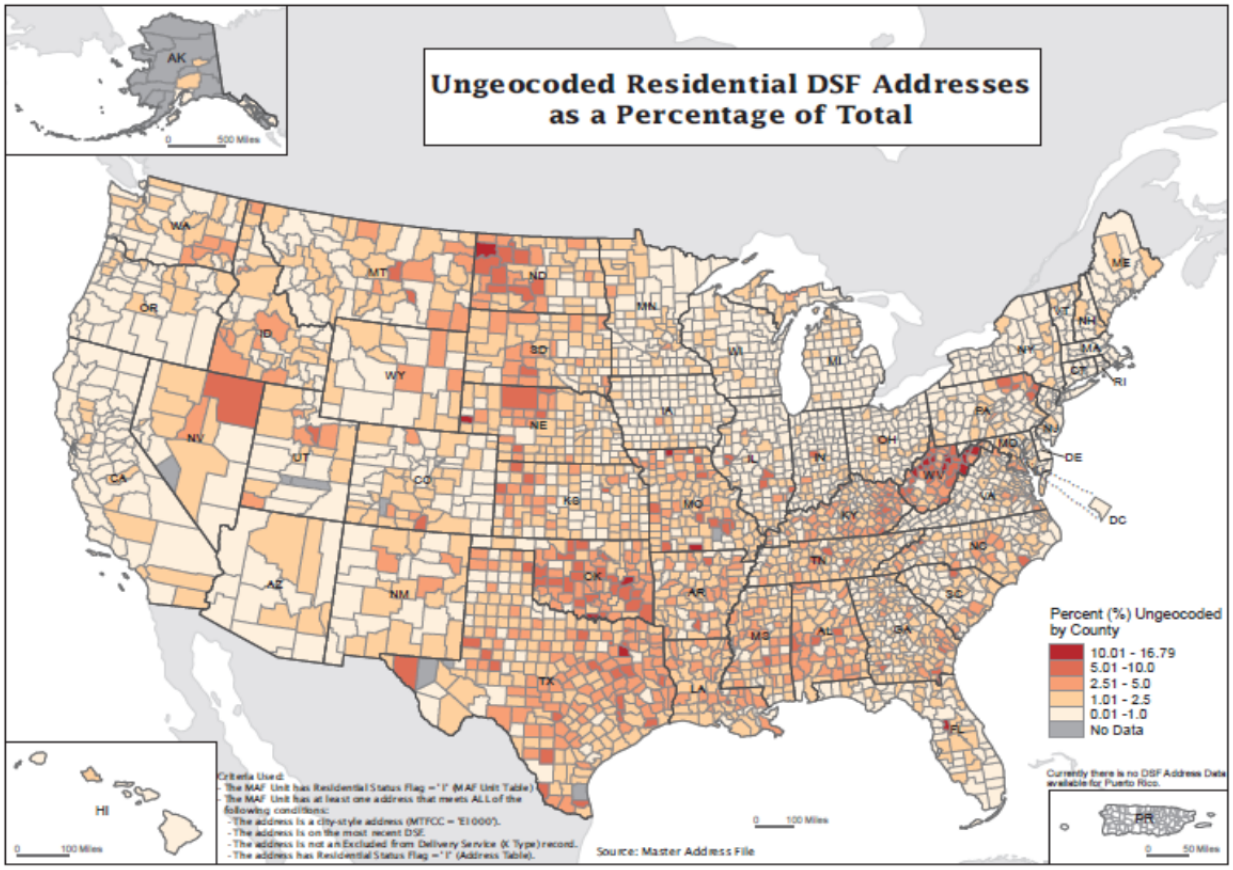


Figure 7: Ungeocoded Addresses by County

Ungeocoded Resolution Process

The Ungeocoded Resolution operation will attempt to resolve the 2.2 million census eligible ungeocoded addresses in the office. Analysts will conduct research using available online sources to identify the location of the address. Initially, the operation will prioritize counties that have completed GSS-I updates.[7] The Ungeocoded Resolution will work closely with the In-

[7] GSS-I updates are likely to reduce the number of ungeocoded records in the MAF/TIGER System, thus creating smaller clerical workloads in the Ungeocoded Resolution operation.

Office Address Canvassing operation to resolve coverage issues found in specific geographic areas.

The operation will first create work units for each five digit ZIP Code within a state and county. The work units are divided into ZIP+4 clusters for assignment to analysts. Analysts review the work unit in the Geographic Acquis-based Topological Real-time Editing System (GATRES), as adapted for this process. The analysts conduct research to determine the geographic location of each address in their work unit and use GATRES to record any resolutions by making one of the following TIGER updates:

- Adding a new road feature and address range
- Adding an address range to an existing road feature
- Adding or correcting a ZIP Code associated with an address range
- Correcting or adding a name on a road feature

Analysts may also edit the address in GATRES by:

- Changing the feature name or ZIP Code
- Adding an associated map spot (i.e., coordinate location) or linking to an existing map spot
- Linking an ungeocoded address to another existing MAF address if they are duplicates

The GATRES output is an Address Update File (ADDUP) that is used to update the MAF.

4.2.6 MAF Unduplication

In addition to efforts to add new or missing addresses to the MAF, the Census Bureau will attempt to identify duplicate MAF addresses. There is known duplication in the MAF introduced by 2010 Census field data collection software limitations and processing requirements, however these duplicate addresses are not currently linked. Linkages would ensure that only one instance of the address is included on the census address list. Address list overcoverage at the time of enumeration can cause confusion and will be more costly to resolve.

The Census Bureau will conduct an automated match with clerical follow-up in order to identify and resolve duplicates in the MAF. Enhanced software will identify potential unlinked duplicate city-style addresses in the MAF using exact and equivocated address matching methods. The process will not only identify duplicate pairs but also clusters of addresses that appear duplicative based on address information. Census staff will clerically review the matching results to ensure that the addresses identified as duplicates do indeed reflect the same structure on the ground. The staff will confirm that the automated process of identifying duplicates was effective and they will identify common characteristics of duplicate pairs (or clusters) and categorize them accordingly. The clerical review staff will then use the categorical information

to inform an automated resolution strategy. That is, categories of the duplicate pairs (or clusters) that are valid will be linked via software specifically designed for the task.

The clerical review staff described here may ultimately be the same staff conducting the In-Office Address Canvassing work. When the Census Bureau determines the business process model for integrating this work and the resources available to do the work, this document will be updated to reflect current plans.

4.2.7 Local Updates of Census Addresses

The LUCA program provides, by law, the opportunity for tribal, state, and local governments to review and comment on the Census Bureau's address list to ensure an accurate and complete enumeration of their communities. The general process is as follows:

- The Census Bureau invites governments to participate in the program.
- The participating governments designate a LUCA liaison to review the portion of the census address list covering their area of jurisdiction. The LUCA liaison is subject to the same confidentiality requirements as census workers.
- The Census Bureau provides the LUCA liaison an address list from the MAF/TIGER System, corresponding maps, and address tallies.
- The LUCA liaison provides comments on the address list and maps (including coordinate locations of living quarters).
- The Census Bureau verifies these updates during the Address Canvassing operation, and provides feedback to the participants about the results.
- Public Law 103-430 allows the LUCA participants to appeal the Census Bureau address determinations provided during the feedback phase. The appeals adjudication occurs prior to Census Day to ensure that the housing unit is included in the enumeration phase. An agency independent of the Census Bureau reviews and decides on all appeals.

For the 2010 Census, the LUCA address updates were validated in the field during the Address Canvassing operation. As only a portion of the Address Canvassing universe is going to the field for the 2020 Census, a large part of LUCA verification will be part of the In-Office Address Canvassing operation. Specific details for how the LUCA program will interact with the In-Office Address Canvassing operation will be provided in future versions of this document.

4.2.9 Address Canvassing Updates

As previously mentioned, the Address Canvassing operation has four component parts that all work together to assure an accurate census list for census enumeration. Detailed descriptions of all of the components are provided in the sections listed below. Note that the QC components are not presented within one unique section, but are instead presented within each of the production operations that they support.

- In-Office Address Canvassing (*Section 6*)
- MAF Coverage Study (*Section 7*)
- In-Field Address Canvassing (*Section 8*)
- Quality Control (*Sections 6.5.4, 6.6.4, 7.8 and 8.7*)

Once the Address Canvassing operation is complete in the Fall of 2019, the Census Bureau will create the initial address list for the 2020 Census. That list will be used to mail out invitations, which inform respondents of their census response options. This list will also be the dependent list for the census enumeration operations.

4.2.10 Enumeration Updates

Geographic areas included in the census enumeration operations conducted in the field may be reviewed during the In-Office Address Canvassing; however, they will not be visited during the In-Field Address Canvassing. These operations include Update Enumerate and Remote Alaska.

Update Enumerate

The 2020 Census Update Enumerate operation combines the methodologies of 2010 Census Update/Leave, 2010 Census Update/Enumerate and 2010 Remote Update/Enumerate operations (refer to *Section 2.2* for more information), including the geographic scope of the operations. The UE enumerators will canvass the geographic area, update the address list and map, and attempt to conduct an interview for each housing unit.

Remote Alaska

Remote Alaska (RA) areas primarily consist of Alaska native villages in sparsely populated areas of Alaska. These areas have unique challenges associated with the accessibility to communities where the population ranges from several hundred people to just a few people. Communities are widely scattered and rarely linked by roads. Most are accessible only by small engine airplane, snowmobile, four-wheel-drive vehicles, dogsled, or some combination thereof. This operation occurs earlier than other enumeration operations due to seasonal availability of the population, who disperse when warmer weather arrives.

The enumerators canvass the geographic areas, update the address list and census maps, and add residential units that are not on their list. Enumerators also conduct interviews with a knowledgeable respondent to determine the Census Day status for every housing unit and to enumerate everyone at the address.

5 Address Canvassing Universe and Workload Estimates

5.1 Block Universe

Census Bureau address listing work is traditionally conducted and managed within the confines of a census block. Blocks define specific geographic areas bounded by features. Data collection may occur within a tabulation block or a collection block.

Census blocks are statistical areas bounded by visible features, such as streets, roads, streams, and railroad tracks, and by nonvisible boundaries, such as selected property lines and city, township, school district, and county. Generally, census blocks are small in areas. For example, a block in a city is bounded on all sides by streets. Blocks in suburban and rural areas may be large, irregular, and bounded by a variety of features, such as roads, streams, and transmission lines. In remote areas, census blocks may encompass hundreds of square miles. Census blocks nest within all other tabulated census geographic entities and are the basis for all tabulated data.

In general, the types of blocks as described above are referred to as tabulation blocks. For the purposes of field data collection, the census has historically worked within the confines of collection blocks. Collection blocks are similar to tabulation blocks, but they are bounded by only visible features to the extent possible. This allows field workers to easily observe their boundaries while conducting work.

The Census Bureau is exploring the use of a new type of collection geography for the 2020 Census known as the Basic Collection Unit (BCU). The BCU replaces both the collection block and assignment area geographies that operations used for the 2010 Census. In short, where collection operations used blocks and assignment areas for the 2010 Census, they will use the BCU for the 2020 Census. The BCU will serve as the fundamental unit of work assignment for all 2020 Census operations when appropriate. The Census Bureau will test the use of the BCU for the first time in the Address Canvassing Test.

The current block universe for each component of Address Canvassing is as follows:

- In-Office Address Canvassing: Currently conducts work within the confines of the 2010 Census tabulation block (work will be translated to BCU in Fiscal Year 2016)
- MAF Coverage Study: Currently conducts work within the confines of the 2010 Census tabulation block
- In-Field Address Canvassing for the 2020 Census: Will conduct work within the confines of the BCU

For the remainder of this document both of these types of collection units (tabulation block or BCU) are simply referred to as blocks.

5.2 Address Universe

The initial address universe for all Address Canvassing operations is supplied by the MAF. The address list does not include the complete list of addresses from the MAF. Instead, the addresses represent a subset of the MAF that satisfy specific requirements. The requirements are referred to as the address filter. In general, the census excludes the following types of addresses from the address list:

- Ungeocoded addresses
- Duplicate addresses
- Non-residential addresses
- Addresses that do not contain sufficient information for location on the ground

The Census Bureau intends to keep the address universe for all listing operations consistent, allowing for the inclusion of any new validated records over time. However, the In-Office Address Canvassing universe requires a complete inventory of all structures, commercial and residential, in order to accurately compare MAF data to local files. Therefore, the non-residential address exclusion criteria does not hold for that operation.

5.3 Workload Estimates

Current workload estimates for each of the Address Canvassing component operations are included below.

5.3.1 In-Office Address Canvassing Workload

The first In-Office Address Canvassing sub-operation, Interactive Review (IR), which conducts imagery review to identify coverage problems, includes all tabulation blocks (approximately 11 million).

The second sub-operation, Active Block Resolution (ABR), which attempts to resolve the coverage problems identified in IR, includes an estimated 1.7 million blocks. This number represents 21 percent of blocks with population and housing and five percent of blocks without population in housing that were not identified as stable in the IR work performed as part of the 2015 Address Validation Test.[8]

A subset of blocks will re-enter any of the processes above for re-work.

[8] Address Validation Test Results are only for blocks with population and housing. The five percent estimate for zero population and housing blocks represents expert opinion. Early results of the In-Office Address Canvassing production operation will help refine estimates in starts in September of 2015, these estimates will be revised.

5.3.2 In-Field Address Canvassing Workload

The In-Office Address Canvassing results will determine the In-Field Address Canvassing workload. The current estimate is that approximately 25 percent of addresses in non-UE areas will be included in the In-Field Address Canvassing workload. This estimate is based on a conservative approach to identifying blocks that could be managed in the office or through field enumeration operations. Blocks that meet the following criteria would be excluded from In-Field Address Canvassing:

- Blocks where the census will conduct listing at the time of enumeration (i.e., RA and UE areas)
- Blocks where 100 percent of the addresses are on the USPS's DSF
- Blocks where there are currently have zero population or housing in the MAF
- Blocks that have not experienced any changes in the MAF inventory of addresses between 2010 and 2014

The weighted results of the 2015 Address Validation Test also provide In-Field Address Canvassing workload estimates in the same range. In that test, 21 percent of blocks that were not identified as stable in the IR included approximately 25 percent of the addresses. In-Office Address Canvassing work would resolve some portion of these addresses, thus In-Field Address Canvassing would not be required for all.

The Census Bureau expects that the In-Office Address Canvassing process and other continuous MAF update processes (i.e., GSS-I activities and the MAFCS) will resolve the coverage problems in some subset of these blocks, thus reducing the In-Field Address Canvassing workload even more. The Census Bureau will continue to develop rules for In-Field Address Canvassing workload eligibility and monitor In-Office Address Canvassing activities in order to refine the In-Field Address Canvassing workload estimates each year.

The map presented in Figure 8 represents a national view of areas the Census Bureau currently anticipates would be excluded (in orange) or eligible (in yellow) for the In-Field Address Canvassing.

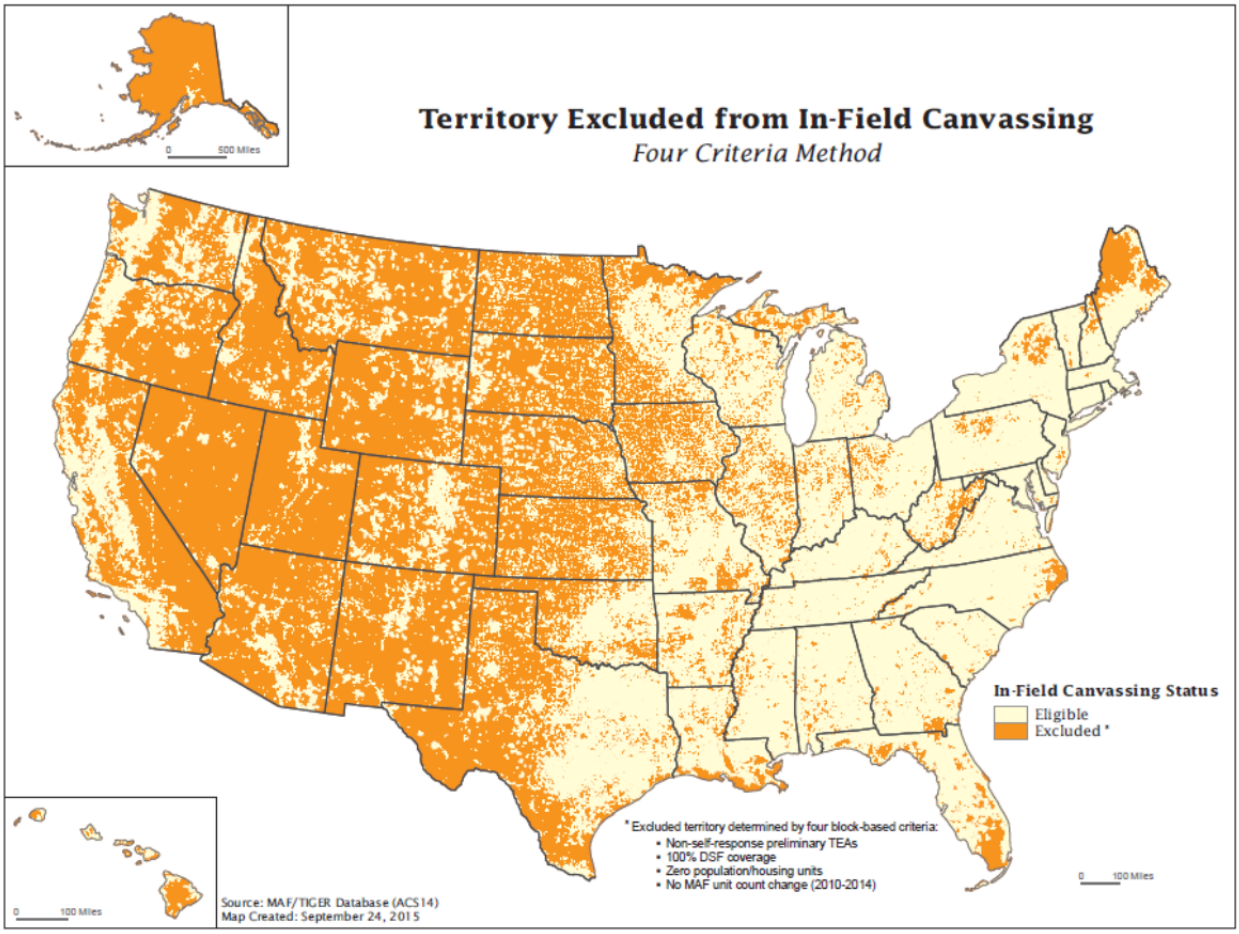


Figure 8: National Map of Territory Excluded from In-Field Canvassing

As can be seen from the national level map, the majority of the land area in the Midwestern United States would be excluded from In-Field Address Canvassing. Looking at the national level map at this scale makes it appear that much of the states in the Eastern United States would include significant In-Field Address Canvassing workload, however, a closer view of individual states reveals more of a patchwork. The map of Virginia is provided as an example in Figure 9. As can be seen in that map, significant Virginia territory would be excluded from the In-Field Address Canvassing workload.

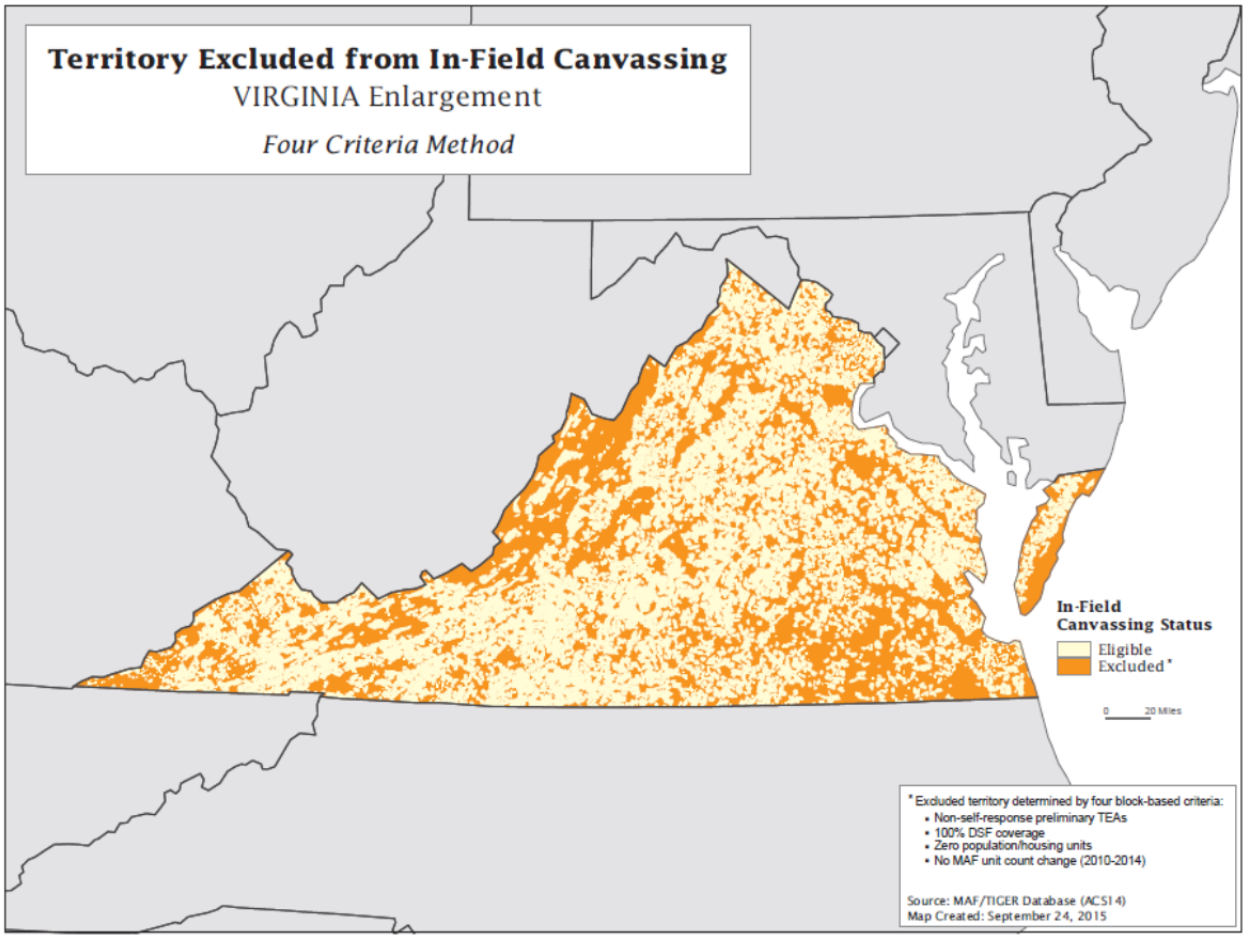


Figure 9: Virginia Map of Territory Excluded from In-Field Canvassing

5.3.3 MAF Coverage Study Workload

At this time, the MAFCS is expected to have a consistent, national level, block workload to support the creation of coverage estimates. The MAFCS will work with the Community Address Updating System (CAUS) program to select blocks for field work.

- The MAFCS and CAUS will canvass approximately 20,000 blocks each year
- The address workload will vary based on the block sample, but is approximately one million addresses in 2016

6 In-Office Address Canvassing

6.1 Overview

The In-Office Address Canvassing operation is a continuous process of monitoring the residential and nonresidential landscape to measure, assess, and ensure the completeness and accuracy of the MAF and associated attributes and geospatial data. In-Office Address Canvassing encompasses several activities occurring over the years leading up to In-Field Address Canvassing in the August of 2019.

The In-Office Address Canvassing is not a single, discrete event occurring at a specific time. In the grand view, the work of the GSS-I to update the MAF/TIGER System with partner data are part of the In-Office work to update the frame. However, this section only describes the activities developed beyond that, which work to methodically canvass the nation through In-Office methods. These additional processes will integrate with the GSS-I efforts to provide complete address coverage for the majority of the country.

The ultimate goals of the In-Office Address Canvassing operation are to:

- Identify geographic areas that are stable and do not require address or geospatial updates
- Update the living quarters (housing units and GQs) in geographic areas through In-Office Address Canvassing processes
- Identify geographic areas that will require In-Field Address Canvassing prior to the census enumeration

The In-Office Address Canvassing operation has several sub-components that work together to identify and resolve areas that require updates. These activities primarily represent a clerical review of the MAF/TIGER System data in comparison with data from outside sources. A high-level overview of the work processes follows:

- The Block Tracking Database (BTD) is created to manage the work. Blocks within the BTD are prioritized for In-Office Address Canvassing work.
- The Interactive Review (IR) staff assesses those blocks using imagery to identify potential coverage concerns. Blocks that require further review are labeled “active.” Blocks that do not require further review are labeled “passive.”

- The Active Block Resolution (ABR) staff attempts to resolve active blocks from the IR. The ABR staff may either resolve the issues by updating the MAF/TIGER System with information from local government and third party data or they may determine that the block (or some portion of the block) requires an In-Field Address Canvassing visit.[9]
- In-Office GQ Review processes and staff will review all GQs on the MAF and any potential GQs added by ABR staff to collect and/or confirm the GQ information.[9]
- Change monitoring processes continuously assess the status of all blocks and may trigger a block to reenter any of the previous In-Office Address Canvassing processes.

The sections below provide more details for all of these processes. Please refer to the In-Office Address Canvassing business process models in Appendix D for additional details of the processing flow.

6.2 Data Inputs

The external data inputs required for all phases of In-Office Address Canvassing are predominantly acquired through the GSS-I or other corporate efforts. Some of these data are included in the Block, Assessment, Research, and Classification Application (BARCA), an application that enables In-Office Address Canvassing staff to review the geographic landscape through imagery. Other data inputs are generated as part of normal GEO processing to prepare for census work.

Imagery

Geospatial imagery is a valuable reference for identifying, digitizing, and confirming the existence of geographic features. The comparison of two images from two different points in time is a useful way to identify changes in the landscape. There are various types and quality of geospatial imagery available, typically acquired from sources such as satellites, spacecraft, and aircraft. The Census Bureau will acquire imagery and provide it as a service to the In-Office Address Canvassing operation as well as other census operations. Two vintages of imagery will be acquired:

- A baseline vintage to serve as the base for comparison
- Current vintage (updated regularly)

[9] The Census Bureau is working towards eliminating this multi-step approach to conducting In-Office Address Canvassing work (i.e., the flow from the Interactive Review staff to Active Block Resolution staff and a separate GQ review staff). As procedures are refined, it may be the case that one staff person is trained to conduct all necessary work to both identify and resolve issues.

Parcel Data

Most of the land area throughout the United States and Puerto Rico is divided into parcels. Data for these small geographic units provide a detailed depiction of boundaries between individual properties, and often provide information relating to the address associated with the parcel, location and types of structures on the parcel, ownership, and land use. In some jurisdictions, parcel records may also provide information about the way in which the parcel is zoned, providing insight into allowable future uses. These data are valuable as a source of address information as well as for assessing whether land is zoned for residential, commercial, or other types of uses. This information is critical when assessing the potential for residential development on parcels that currently are undeveloped and/or used for other, non-residential purposes (such as agriculture).

Parcel data are available from local governments and third party data sources. GEO acquires parcel files for the Boundary, Quality Assessment and Reconciliation Project (BQARP), a Geographic Partnerships Program to assess, analyze, and improve the spatial quality of legal and administrative boundaries within the MAF/TIGER System. These data, as well as parcel data acquired from other sources, are made available to the In-Office Address Canvassing staff in the Block Assessment, Review and Classification Application (BARCA).

Local Data Sources

As described in *Section 4.1.4*, the GSS-I continues to contact local partners to acquire local address and spatial data. These partner-provided files are critical for In-Office Address Canvassing work. In addition to those data files already in-house, the In-Office Address Canvassing will identify areas for which the MAF/TIGER System would benefit from local data and request those files through the GSS-I.

In the absence of partner provided files, In-Office Address Canvassing staff will search for online sources such as local Geographic Information Systems (GIS), property tax data, third party data files, or data in web-based mapping and street level imagery applications. The In-Office staff will assess and document the availability of local sources for each geographic area prior to the start of the IR. GEO staff and systems maintain this information and use it to prioritize the In-Office work.

Third Party Data Sources

As described in *Section 4.2.1*, the 2020 Census has acquired third party data files from national vendors. These data, in addition to third party data acquired by the Center for Administrative Records Research and Applications will be made available as a resource for the In-Office Address Canvassing clerks. These data will supplement the local and online data sources.

Type of Enumeration Area Delineation

The type of enumeration area (TEA) represents how the Census Bureau makes contact with households in a given geographic area. In-Office Address Canvassing will prioritize self-response areas of the country over areas where the census plans for an in-field visit at the time of enumeration (i.e., the Update Enumerate and Remote Alaska operations). In early In-Office Address Canvassing work, the TEA delineation represents the best approximation based on the current thinking. The definitions will become more refined as the 2020 Census approaches. The In-Office Address Canvassing may receive several iterations of TEA areas and will need to adjust as necessary. Please refer to the *Geographic Programs: 2020 Collection Geography Detailed Business Proposal* for more information about the TEA delineation process.

Special Land Use Areas

The term "Special Land Use Areas" refers to a variety of geographic areas, such as national parks and national forests, military installations, and federal government-owned grazing lands, that often are sparsely populated, have large amounts of unpopulated land area, and are managed by other federal agencies from whom the Census Bureau can obtain information about resident population, housing, and GQs. In addition, this category also includes a variety of areas that local officials have defined as unique census tracts for analytical and mapping purposes. Examples of such areas include international airports, large municipal and state parks, large commercial, industrial, and governmental complexes, college campuses, state hospital grounds, and prisons. In many instances, census tracts defined for these areas have remained stable for multiple decades, and In-Office Address Canvassing staff can compare decennial census data with information in the MAF and other data sources to determine whether the status as well as population, housing, and GQs, have changed.

Public lands such as state parks are often sparsely populated and do not require significant address updates due to housing growth. Military lands do contain a significant housing unit and group quarter inventory, however, the 2020 Census will collaborate with federal partners (as described in *Section 4.2.3*) to accurately capture addresses in these areas. Given these activities, the In-Office Address Canvassing will not prioritize these areas for review. For more information about special land use areas, please refer to the *Geographic Programs: 2020 Collection Geography Detailed Business Proposal.*

BCU Delineation

The Basic Collection Unit (BCU) is new unit of geography designed for field data collection in the 2020 Census. The BCU replaces both the collection block and assignment area geographies that operations used for the 2010 Census. For the start of the In-Office Address Canvassing, work is conducted within the confines of a 2010 Census tabulation block. Once BCUs are defined, the tabulation block work will be translated to BCU. For more information about BCU delineation, please refer to the *Geographic Programs: 2020 Census Collection Geography Detailed Business Proposal.*

MAF/TIGER System Data

In order to compare the MAF/TIGER System data to other sources, the In-Office Address Canvassing requires extracts of that data. The MAF/TIGER System provides TIGER data to the BARCA, where it will overlay imagery.

Addresses deemed valid for the operation will be extracted from the MAF (as described in *Section 5.2*). These data yields counts and address inputs for all phases of the In-Office Address Canvassing. These data inputs occur twice a year, subsequent to DSF updates to the MAF. As the 2020 Census approaches, In-Office Address Canvassing staff may obtain these inputs more frequently to ensure staff are reviewing the most up-to-date information.

6.3 Systems

In addition to the MAF/TIGER System, the In-Office Address Canvassing operation uses the systems described in this section to complete the work.

6.3.1 BARCA

The BARCA is an interactive review tool that allows analysts to assess and classify blocks by comparing housing units in 2009 imagery and current imagery, along with TIGER reference layers, MAF data and parcel boundary data. The BARCA incorporates the Census Bureau's TIGERWeb application, as a web-mapping service, to display TIGER features and reference layers. It also displays MAF data. In-Office Address Canvassing staff conducting both the IR and the ABR use the BARCA to conduct and status their work.

6.3.2 GATRES

The Geographic Acquis-based Topological Real-time Editing System (GATRES) is a Census Bureau system used to interactively update information in the MAF/TIGER System. GATRES allows concurrent access to the MAF/TIGER System by multiple simultaneous interactive users and is accessible from multiple sites, including the Census Regional Offices and NPC. For the In-Office Address Canvassing, GEO will enhance GATRES to enable the ABR staff to provide address updates for a particular block.

6.3.3 MAF Browser

The MAF Browser is a software tool that allows a user to easily search the complex MAF database, and return filtered results in a web browser. The ABR staff will use the MAF browser to research specific addresses as they compare information from local files to the MAF.

6.4 Universe Creation

GEO establishes the universe for the In-Office Address Canvassing work by first creating the Block Tracking Database (BTD), a file of all blocks in the United States and Puerto Rico. GEO then identifies blocks that are eligible for review in the IR and ABR workload.

Block Tracking Database

The BTD is a complete inventory of all blocks (approximately 11 million tabulation blocks) in TIGER. The BTD contains the associated MAF/TIGER System summary information that is required to inform and manage the In-Office Address Canvassing workload and In-Field Address Canvassing workload.[10] Each block in the BTD has a provisional canvass status that allows the 2020 Census to make final decisions regarding the universe for In-Field Address Canvassing at any given time. The BTD is an input to the BARCA system. It also retains block trigger data and block level outputs from the IR and ABR processes.

Identify Blocks Permanently without Population and Housing

Specific portions of the nation are permanently without population and living quarters due to either the physical characteristics of the area or legal and administrative restrictions. For example, territorial waters in the Atlantic, Pacific, and Arctic Oceans, Gulf of Mexico, Bering Sea, and inland water in the Great Lakes are defined as separate census blocks in the MAF/TIGER System, consisting entirely of water, and lacking any population and living quarters. Other examples include land areas in which residential and commercial uses are excluded, such as national parks, wilderness areas and other environmentally sensitive areas, portions of military bases used for training purposes (i.e., bombing ranges). This category of areas also includes highway medians, traffic islands, and other small areas that, for various reasons, met the criteria to be defined as separate census blocks, but are either too small to contain a house or living quarters or are areas in which living quarters are not permitted (for example, an interstate highway median).

Many of the areas in this category have lacked population and living quarters for decades and can be identified, assessed, and managed through use and comparison of decennial census data, the MAF, and other administrative data sources. As such, they will be placed in a lower priority for imagery review.

6.5 Interactive Review

The In-Office Address Canvassing starts with the Interactive Review (IR), which is an imagery-based review to assess changes between the current imagery and the baseline vintage of imagery and to assess the extent to which the number of units in the MAF is consistent with the number of units visible in the current imagery. The IR production work started in September of 2015.

[10] As of FY15, all Address Canvassing teams are working within the constraints of approximately 11 million 2010 Census tabulation blocks. Once the BCU is defined, all work will be translated from tabulation block to BCU.

6.5.1 Staff

The IR component of the In-Office Address Canvassing is conducted by clerical staff located at NPC. NPC clerks will review all blocks in the IR workload. After NPC reviews each eligible block once, they will continue IR work with blocks that are triggered for re-review via the change monitoring process. Table 2 below shows the NPC staffing estimates by Fiscal Year.

Table 2: NPC Interactive Review Staff by Fiscal Year

Role	2016	2017	2018	2019 - 2020
Clerks	~120	~120	~120	TBD
Lead Clerks	8	8	8	"
Supervisors	4	4	4	"
Technicians	4	4	4	"

In September of 2015, the IR work started with the lead clerks and supervisors. Staff conducted production work in order to gain experience before 30 clerks were hired in October of 2015. After this staff of 30 clerks gained experience, and the systems and procedures were refined, NPC hired an additional 30 clerks in December of 2015. The staff is expected to reach a total of approximately 120 clerks by February of 2016. Clerks are organized in units of 30 and each unit will have a mix of experience levels, with some clerks having started in October of 2015 and some later.

The bulk of the IR production and QC work will occur in Fiscal Years 2016 through 2018. In the Spring of 2018, all the blocks in the IR universe are expected to have completed at least one IR inspection. NPC work will then focus on the re-review work.[11]

Headquarters will also have staff on hand to manage overall operations, provide technical guidance, and conduct adjudication work for QC when necessary.

6.5.2 Managing the IR Work

The BARCA system, supported by the BTD, is the mechanism for assigning work to the NPC staff. Each IR work assignment contains multiple blocks grouped within census tabulation tract, referred to as a block cluster.

Prioritize Work Assignments

The block cluster assignments are queued in the BARCA in priority order influenced by some of the following factors:

- Availability of parcel boundary data

[11] As the ABR procedures are defined, some of that work will move to NPC staff as well. NPC staff that are working on ABR in the Spring of 2018 would also work on LUCA address validation activities.

The BARCA displays parcel boundary data from local governments or third party data vendors when available. In most instances, this information is helpful to understanding property boundaries, residential/commercial zones, and sometimes addressing. Given its usefulness, areas known to have these data available are prioritized over others.

- Ungeocoded Records

  The process to interactively geocode USPS addresses, known as the Ungeocoded Resolution operation described in *Section 4.2.5*, occurs concurrently with the In-Office Address Canvassing work. However, not all Ungeocoded Resolution work for a particular area may be complete prior to the IR for an area. Blocks with a high number of ungeocoded records in its associated ZIP Code Tabulation Area (ZCTA) are prioritized for work. This prioritization allows the downstream Ungeocoded Resolution and ABR work to focus efforts in particular blocks.

- TEA and Address Characteristic Type Code (ACT)

  TEAs and the Address Characteristic Type (ACT), which is an input to TEA delineation, can indicate areas that have a higher percentage of city-style addressing. These areas are ideal for In-Office work because staff are more likely to be able to determine whether the address from a local source matches a particular address on the list. Thus, resolving more issues in the office. To ensure a complete In-Office canvass of these types of areas and eliminate them from In-Field Address Canvassing, they are prioritized over areas with lower percentages of city-style addressing.

- Assignments released from a "hold" status

  During the initial IR pass, a clerk may determine that more information (e.g. better imagery or parcel boundary data) is needed to make a conclusion. In those instances, the assignment is placed on hold awaiting more data. Once that data are available, these assignments have higher priority.

- MAFCS estimates and related DSSD analysis

  The Fiscal Year 2016 MAFCS estimates will be available in March of 2017. The lowest level of geography available is the state level. However, the estimates in combination with other DSSD analysis that helps narrow the characteristics of areas with coverage concerns will inform the IR work prioritization.

Although the information listed above informs the assignment prioritization, the specific order of criteria are yet to be determined. In addition, in the early IR stages, research needs may drive prioritization over all other criteria (e.g., prioritizing Address Canvassing Test areas).

Assign the Work

The BARCA queues the work assignments per the prioritization criteria. Clerks are automatically assigned the next available block from the prioritized queue. Once the clerk completes an assignment, they select a new one from the top of the queue.

There are two types of work assignments, production and QC. The QC clerk's activity is the same as the production clerk. However, the BARCA must ensure that QC clerk is different from the production clerk. Once the block is complete through production and QC, the BARCA compares the results from both clerks. A Census Bureau Headquarters geographer will conduct the adjudication if the results do not match. In the future, the adjudication work may be performed by NPC technical staff and/or geographers.

Production Reports

As the IR clerks complete their work assignments, the BARCA tracks the amount of time spent on a particular assignment. This information, in combination with the number of completed assignments and other paradata will help determine production and completion rates. These rates populate daily production reports for NPC and Headquarters management.

6.5.3 Performing the IR Work

Once the IR clerk selects their block cluster assignment from the top of the queue, they will work each block within the cluster, in sequence, one at a time. The details of the work process are provided below.

Block Information

The clerk selects and opens one of the assigned blocks for work. Clerks will have the following information for each block at their disposal:

- Baseline imagery (at the start of the operation, the baseline is 2009 imagery)
- Current imagery (less than one year old)
- Map Spot locations for each census address (when available)
- The number of addresses in the block
- The housing unit type make-up of the block (e.g. single family, multi-unit, and trailer information)
- TIGER road features
- Public lands data
- A grid pattern overlay to help focus work (in large blocks only)
- Parcel boundary data (where available)

The clerk conducts all of the activities described below for each block in the assignment, but not necessarily in the same order. The clerk first uses a tool to swipe between the old and current images and looks for changes that will indicate how they proceed through the following activities.

Imagery Comparison *(baseline compared to current imagery)*

By comparing the baseline block image and current block image, a clerk identifies any changes in the housing inventory and records observed differences in BARCA. Pins assigned by the clerk to the current image indicate areas of growth or decline. The clerk includes whether the growth indicated by the pin is past or present growth (change in the number of rooftops), future growth (signs of construction) or both. Pin colors indicate the level of magnitude of the growth or decline on a three-point scale.

Built Out or Future Growth Status *(current imagery)*

By assessing the current image and spatial parcel boundary data, the clerk determines if the entire land area of the block is built out. The built-out status can represent either of the following:

- Built out: The block land area is completely covered by structures and there is no space to build additional structures.
- Non-developable: The block is completely non-residential land use and is unlikely to change (e.g., a public park).

The clerk also reviews the current imagery and determines if there are signs of possible future residential growth (for example, cleared land area). A block can either be built out or have signs of future growth, not both. However, a block could be neither status; that is, the block is not built out, but there is no indication of future growth.

Missing or Misaligned Feature Review *(current imagery compared to TIGER)*

By comparing the MAF/TIGER System road and block boundary features against the current imagery, the clerk identifies and records the appearance of any missing road features or misaligned road and boundary features. Any such case is recorded by dropping a "Missing Feature" or "Misaligned Feature/Boundary" pin on the map to identify the location of the discrepancy in BARCA.

Imagery to MAF Coverage Review *(current imagery compared MAF)*

By assessing the current imagery, the clerk determines the approximate number of units, both residential and nonresidential. The clerk then compares the determined number of units in imagery to the count of units in the MAF. To complete this activity, BARCA presents valid MAF residential and nonresidential unit counts as well as their associated map spots. The clerk identifies whether the MAF has more addresses than the imagery (overcoverage) or the imagery has more addresses than the MAF (undercoverage) and drops the respective pin on the map. The pin colors indicate the magnitude of the coverage difference on a three-point scale.

Special Procedure for Large Blocks

In large (physical area) blocks, staff will be required to use a grid to assist in their work, moving methodically throughout the block grid square by grid square.

Complete Block Work

When the IR clerk completes a block, they will mark it as done and then review the next block in their assignment. A block may have multiple areas of growth and/or decline. The BARCA aggregates the information for growth and decline separately to determine and assign an overall block status. Updates for blocks with coverage issues occurs in the ABR phase as described in *Section 6.6*.

6.5.4 Quality Control

The IR QC procedure involves checking the quality of each clerk's work at a high rate to start and then adjusting the QC sample based on their individual work and acceptable error thresholds. When a clerk finishes the IR activities for a block, the BARCA determines whether a particular block requires a QC inspection per the business rules. Another clerk conducts the QC inspection and then an expert adjudicates the two results if they do not match.

Inspection Rate Business Rules

A clerk's first set of completed blocks are tagged for QC inspection at a rate of 100 percent. This 100 percent inspection lasts for the first 500 blocks, called the baseline.[12] Once the clerk establishes a baseline, the error rate for the blocks in the clerk's baseline group is compared to the targeted error rate, currently five percent. If the clerk's error rate is lower than the targeted level, future inspections are conducted based on a sample of the clerk's work. If the clerk's error rate is too high, the clerk receives feedback and the 100 percent inspection resumes. After each subsequent inspection, the clerk's error rates are compared again and the inspection sample rate is reset when necessary. The BARCA system will implement these business rules and select blocks for inspection, as appropriate.

The targeted error rate was set with considerations for both cost and quality given an expected production error in rate. The initial production error rate was thought to be about 7.5 percent, based on expert opinion. We expect the final error will be near 5 percent and the anticipated workload for QC review will be approximately one third of the production blocks.[13] As production work starts and is monitored, the real error in rate will be known, and QC business rules can be adjusted with considerations for both cost and quality.

[12] The initial baseline was set at 500 for the start of IR production work in September of 2015. Staff will continue to assess and monitor the production results to determine if adjustments to this baseline value are necessary.

[13] This QC workload is in addition to the blocks included in the initial baseline review.

Inspection

If it is the first IR work for the block, the Quality Control business rules described above determine if the block should be tagged for inspection. If the block is tagged for inspection, it is assigned to a different clerk (at the same skill level) to perform the IR activities again. There is no information on the case to indicate to the second clerk that the first clerk also worked the block. The review is independent. If the block is not tagged for inspection, a second clerk does not work the block. IR activities are complete for the block and the final block outcome is determined by the first clerk's review.

Adjudication

Once the inspection clerk has completed the second IR for the block, an automated match compares the results of the first and second reviews. If the results match, IR is complete and the status of the block is determined. If there is a critical difference in the results from the two independent procedures, the result is referred to an expert (e.g., a subject matter expert or geographer). The expert determines the correct results and assigns error codes to one clerk's block or both.

The expert then provides feedback that supervisors or procedure designers can use to promote continuous improvement. If the expert review calls any prior uninspected block into question, they can identify and submit that block, belatedly, to inspection. The Interactive Review is complete for the block at this stage and the status of the block is determined.

6.5.5 Outputs

The results of the IR determine the block status that is stored in the BTD. Clerks may assign one or more pins[14] to a block indicating that more In-Office Address Canvassing work is required in the block. The BARCA aggregates the outcomes assigned by the clerk for each block. Considering only the imagery review and the imagery to MAF coverage review, there are four possible summary level outcomes:

Table 3: Interactive Review Summary Level Outcomes

Imagery Review	State of the MAF
No change	Consistent with imagery
No change	Inconsistent with imagery
Change	Consistent with imagery
Change	Inconsistent with imagery

This information, in combination with the outcomes from the misaligned feature and built out or future growth review, determines the subsequent activities required for the block. The BARCA assigns each block a status of either passive, active, or on hold as described below.

[14] Pins are visual indications (icons) that the clerk placed on the map in the general location of the detected problem.

Passive Blocks

A passive block has no indication of coverage concerns (or potential future coverage concerns) from any activities in the IR. That is, the imagery review indicated either no change or change, but the MAF/TIGER System is consistent with imagery and the block has no signs of future growth. Hence, no reason exists for further In-Office or In-Field Address Canvassing work. GEO processes will continuously monitor the block for trigger events (e.g., housing unit estimates indicate growth) that indicate it may need to reenter the IR. See *Section 6.8* for a description of the change monitoring processes.

Active Blocks

An active block has some indication of coverage differences identified during any phase of the IR. That is, the IR staff set one or more pins during their review to indicate that the MAF/TIGER System data are inconsistent with imagery. Therefore, the block requires further assessment to either fix the coverage concerns with a MAF/TIGER System update or assign the block to the In-Field Address Canvassing. These subsequent activities are part of the ABR described in *Section 6.6*.

On Hold Blocks

In some instances, the IR clerk may observe ongoing and future growth in imagery. In those cases, the block will be placed on hold awaiting new imagery that would account for all growth. If the imagery becomes available before a cutoff date, the block reenters IR. If the imagery does not become available before the cutoff date, the block enters the ABR to determine if In-Field Address Canvassing is required.

6.6 Active Block Resolution

The Active Block Resolution (ABR) receives the active blocks identified during the Interactive Review (IR). ABR staff attempt to resolve coverage concerns identified during IR and verify every MAF unit the active block by virtually canvassing the entire block. During the virtual canvass, ABR staff will compare what is found in imagery to MAF/TIGER System data and external data sources to attempt to resolve pins identified in IR and complete a ground to book canvass. As staff canvass the block they will make updates within the GATRES software to resolve pins, and take action on each address in the block. If the ABR staff cannot resolve the problem in the office, they will indicate that the block is unresolved, or partially resolved in the BARCA and the block becomes a candidate for In-Field Address Canvassing.

The ABR staff conducts a variety of activities in order to virtually canvass the active block so that the In-Office Address Canvassing actions mirror those performed during the In-Field Address Canvassing. These activities include are described in detail in the sections below.

6.6.1 Staff

For Fiscal Year 2016, ABR will be performed in two stages. Starting in March of 2016 Census Bureau Headquarters geographers and some contractors will begin ABR production. After this initial phase, clerical production will commence at the NPC in the Summer of 2016.

The initial stage of production will be performed at HQ to enable the ABR design team to work in a more agile fashion when challenges with the workflow, system, or procedures arise. During this first iteration of the ABR, staff will work to refine and standardize the ABR process so that non-Headquarters personnel can conduct all or part of the steps in the future. This will enable any major issues to be worked out prior to launching the ABR into clerical production at the NPC. This initial phase will also provide some more refined production estimates that will be used to confirm the number of clerical staff required at the NPC for Fiscal Year 2016 and beyond.

Starting in the Summer of 2016 and beyond, the expectation is that skilled NPC clerks will complete a significant portion of the review. The NPC clerks working ABR will not be clerks at the same skill level as those currently working the Interactive Review.

Table 4: Estimated Active Block Resolution Staff

Role	Fiscal Year 2016	Fiscal Years 2017-2019
Initial Stage Headquarters Production Estimates		**TBD**
Geographers	5	"
Geographic Contract Staff	20	"
NPC Production Estimates		
Clerks	~200	"
Lead Clerks	~14	"
Supervisors	~7	"
Technicians	~7	"

Note that the NPC estimates shown in the table above assume it will take 20 minutes to complete a block in ABR. As previously stated, more accurate ABR estimates will be available once the initial stage of ABR has begun and will inform future staffing estimates.

6.6.2 Managing the ABR Work

The BARCA system, supported by the BTD, is the mechanism for assigning work to the ABR staff. Each ABR work assignment is one block. The blocks are clustered within a specified higher-level geography such as state and county.

Create Business Rules for ABR versus In-Field Address Canvassing Eligibility

The current plan for ABR is to review all active blocks from the IR process. After ABR has commenced and the Census Bureau refines In-Office Address Canvassing procedures with actual production rates, it may be determined that some active blocks can be flagged for In-Field Address Canvassing without an additional review. The Census Bureau may also determine that there should be a time threshold set for resolving blocks in the office. As the Census Bureau learns more about these activities during the Address Canvassing Test, the business rules will be refined and included in this description.

Prioritize Work Assignments

The block assignments are queued in the BARCA in priority order, influenced by some of the following factors (in no particular order):

- IR Outcomes

  The nature of some of the IR active block outcomes is such that there will be varying level's of complexity in the blocks sent to ABR and as s result the amount of time required to perform the ABR will vary. This information can be used to prioritize more difficult assignments, or to identify assignments that can be finished quickly.

- Availability of local GIS or third party data

  The ABR staff is reliant on the availability of local source data in order to accurately resolve the coverage concern and update the MAF. The BTD and BARCA systems are integrated with information from the GSS-I Workflow Information Control System to provide ABR staff information of interest as it relates to the block including:

  1. Details about local GIS data acquired through GSS-I or other third party data
  2. GSS-I local file processing status
  3. Identification of where a local file is not on-hand

  ABR work assignments are prioritized within this category based on the order above. Blocks in category three will prompt communication to the GSS-I program which initiates an attempt to acquire local partner files for the area. Note that this process is currently envisioned as an automated determination; however, it may not be implemented in the initial stages of ABR production.

- Blocks Released from a "Hold" status

  Some blocks may have received a "Hold" status during the first ABR review. In those cases, an automated system will detect when the event that the block is being held for (e.g., a file acquisition or MAF update process) occurs. The block will then return to the ABR workload and will be assigned to the original ABR staff if they are available.

- The 2020 Census LUCA Operation

  Once the 2020 Census LUCA operation commences, processes will identify local government address submissions that require validation. This work will be coordinated with In-Office Address Canvassing, and where appropriate, integrated with the ABR work.

Assign the Work

ABR staff selects their own assignment within BARCA from a specified higher-level geography such as county or state. Where possible ABR staff will work all of the blocks nominated for ABR within a county. Limiting the focus of one person's review to specific geography enables them to resolve problems that persist across blocks in an area and build expertise in the available source files for the area.

Production Reports

As the ABR staff completes each work assignment, they record the amount of time spent on a particular assignment. This information, in combination with the number of completed assignments will help determine production and completion rates. These rates populate daily production reports for Headquarters management.

6.6.3 Performing the ABR Work

Once the ABR staff member selects their block assignment from the BARCA assignment queue, they conduct a series of tasks as described below to complete their work. A block may have a single issue or multiple issues identified within it, as identified by pins assigned by the IR clerk. However all blocks in ABR will be virtually canvassed, regardless of the number of pins identified in IR. Possible issues eligible for ABR include:

- Growth seen in imagery
- Decline seen in imagery
- Undercoverage based on the comparison of the census address list count with imagery
- Overcoverage based on comparison of the census address list count with imagery
- Missing road feature
- Misaligned road or boundary feature

The BARCA displays each issue, as identified by the IR clerk, with a unique pin within the BARCA. The ABR staff will canvass the entire block systematically by choosing a starting point and then working systematically to canvass the block as they would if they were in the field. While performing the virtual canvass the ABR staff will work each issue, or pin, at a time within the block and assign a resolution status code for each in the BARCA.

Resources

In addition to the information retained in the BARCA, the ABR staff use to the following systems and data to conduct ABR:

Applications and Systems:

- GATRES: The primary application used to access and update live TIGER and record address updates
- MAF Browser: Used to access live MAF and conduct research
- BARCA: Used to review the pins place within the IR, and to control assignments
- BTD: Reflects the overall result of ABR
- GSS-I Workflow Control System (GWCS): Used to review availability and status of GSS-I partner file acquisition and processing.

Data and/or Information used in ABR

- The list of valid census addresses contained in the MAF for the block: Used as the baseline for the block, the list that will be added to, deleted from and/or corrected during the "virtual" canvass.
- Where available, GSS-I partner data: Used as a resource to identify and validate addresses being added or corrected within the ABR.
- Local GIS resources for the area available online: Used as a resource to identify and validate addresses being added or corrected within the ABR.
- The list of ungeocoded records for the area (assigned via the block's ZIP Code information): Used to identify addresses that appear to be missing from the block due to a lack of geocode. As part of ABR, staff will attempt to geocode ungeocoded issues to address coverage concerns.
- Web-based mapping utilities with street level imagery to conduct research (for example Google, Zillow etc.): Used as a resource to identify and validate addresses being added or corrected within the ABR.
- Where available, the address lists from the Census Bureau's commercial address list acquisition: Used as a resource to identify and validate addresses being added or corrected within the ABR.

Assess the Overall Results of the IR

First, the ABR staff needs to ensure that the Interactive Review information is still valid. In some cases ABR staff may find that the IR result is now inaccurate because recent MAF/TIGER System updates have already resolved the issues, or in rare circumstances there was a error made in IR. In this case, they assign the appropriate resolve status to all issue pins in the block.

Gather Data Sources and Conduct Research

After reviewing the overall block status, the ABR staff gathers all available data for the block and conducts a review of that data to determine if each pin in the BARCA is resolvable with the information. The first data source to investigate is the existing data on the MAF, as accessed through the MAF Browser and the ungeocoded address list. The staff will then look to their list of local data sources and also search for any new, online sources. If data exists that will immediately resolve any of the pins, the staff will record these sources in their reference list and then proceed to make the necessary updates.

Virtually Canvass the Block to Update/Validate Address List and Maps

The ABR staff use a methodical approach to assess each pin in the block while systematically evaluating each address in the block in a "virtual" canvass of the block. Some pins will require updates to the MAF/TIGER System. If the ABR staff determines updates are required, they use the GATRES tool to enter the appropriate information. Activities within GATRES to resolve issues include reshaping features, adding or moving map spots, and updating the address list. The feature updates are to live TIGER, meaning that the ABR staff updates the source file directly via the GATRES tool. The address updates are collected in GATRES, but the MAF update happens later.

The ABR staff will validate all of the addresses in the block. These address updates include:

- Confirming that the address data that appear in imagery are also in the MAF
- Updating existing MAF addresses to assure that they reflect what exists in the source data, as appropriate
- Adding addresses that appear to be included in imagery but are missing in the MAF, as confirmed by local sources
- Indicating when existing MAF addresses no longer represent housing units, as confirmed by local sources
- Deleting addresses that appear in the active block inventory that appear to be duplicates of other addresses in the active block
- Deleting addresses that do not appear to belong in the active block, and their specific location cannot be confirmed by local data sources to be within the active block
- Adding new, suspected GQ addresses for input into the In-Office GQ Review process
- Adding road features and reshaping misaligned roads where they impact housing units

- Adding address ranges and/or road features to resolve ungeocoded addresses and/or updating geocodes for ungeocoded or misgeocoded MAF addresses thereby including them in the inventory of addresses for the active block

As part of the ABR process, ABR staff will resolve ungeocoded records by a method similar to the Ungeocoded Resolution, as described in *Section 4.2.5*. The ABR staff will also assign a verification status to the ungeocoded address. A feature correction alone would enable the address to geocode during the next DSF Refresh (see *Section 4.1.2* for more information); however, the additional verification ensures that the record receives an In-Office Address Canvassing source in the MAF. This process is still in development and this section of the document will be updated to reflect the final details once they are determined. It may be that the ABR staff indicates the need for the Ungeocoded Resolution operation to occur in particular areas. The Ungeocoded Resolution analysts would then complete the task.

Assign Resolution Status

Once the ABR staff completes work with a particular pin/issue they will assign one of the following resolution statuses:

- Fully Resolved
- Partially Resolved
- Unresolved

The BARCA uses this information to determine the final overall block status.

Document Actions Taken to Resolve

If a pin/issue is marked as "Fully Resolved" or "Partially Resolved," the ABR staff will document the process that resolved the issue (or part of the issue) in the BARCA.

Document Data Sources Used to Resolve Issues

If a pin/issue is marked as "Fully Resolved" or "Partially Resolved," the ABR staff will document the sources used to resolve the pin in the BARCA. The BARCA will contain a pick list of common types of sources; however, the staff will also be able to input other sources in a free-form text box. The ABR staff will also update the list of sources used for resolution so that other staff can benefit.

Recommend Next Steps

If a pin/issue is marked as "Partially Resolved" or "Unresolved," the ABR staff will recommend the next step and record the information in the BARCA. Recommendations may include the following:

- Hold for the next DSF Refresh
- Hold for a GSS-I file or third party data acquisition
- Hold for new imagery

After reviewing the results of the ABR work, Headquarters staff may also make recommendations that identify blocks for field work, through either In-Field Address Canvassing or Update Enumerate.

6.6.4 Quality Control

The ABR work is subject to a QC process, currently envisioned as a dependent review of the original ABR staff member's work. This review is conducted by staff with equal or more advanced skills to that of the original reviewer. Due to the complex nature of the ABR work, the QC design is not yet fully determined. This document will be updated with more details once they are determined.

6.6.5 Outputs

6.6.5.1 Block Status

Until the staff determines the status, blocks within the ABR workload are assigned an interim status of "Unresolved - Under Review." The Block Tracking Database (BTD) will aggregate the issue-level resolution codes to calculate a block-level status. Criteria will determine which statuses are recommended for In-Field Address Canvassing or further rounds of In-Office Address Canvassing.

In-Field Address Canvassing Blocks

Blocks that contain partially resolved or unresolved issues are recommended for In-Field Address Canvassing. Blocks in the "Unresolved - Under Review" state may also be recommended for In-Field Address Canvassing. As the In-Field Address Canvassing recommendation cut-off date approaches, the volume of these under review blocks should be small. Also, once the ABR business rules as described in *Section 6.6.2* are determined, some blocks will receive an In-Field Address Canvassing recommendation status without an ABR review.

Hold Blocks

The ABR staff may assign a hold status to a block to wait for more data or processes to run. When the In-Field Address Canvassing recommendation cut-off date approaches, all of these blocks will be released from their hold status so that ABR staff can conduct an assessment of In-Field Address Canvassing needs.

Passive Blocks

If all issues within the block have been marked as "Fully Resolved," the block will become a passive block and is not likely to be recommended for In-Field Address Canvassing. These blocks will remain subject to change monitoring.

6.6.5.2 Data for MAF Update

If the ABR staff submitted address updates during their resolution work, the GATRES tool will create an Address Update File (ADDUP) that contains the changed address information as well as the added information. The MAF Update operation receives these ADDUPs and processes them as described in *Section 9*. Note that if the ABR staff identifies any suspected GQ addresses, they are added to the MAF with a flag that allows the address to enter the In-Office GQ Reveiw process as described in *Section 6.7*.

6.7 In-Office Group Quarters (GQ) Review

The In-Office GQ Review process will assist with frame development for GQ operations through receipt of GQ addresses on electronic administrative record files from various stakeholders. GQ administrative records are matched to the MAF, which will result in the validation of existing MAF GQ addresses or the addition of GQ addresses.

Additionally, the In-Office GQ Review process will validate or collect GQ information, such as the type of GQ (college dorm, group home, shelter etc.), GQ facility name, contact name at the GQ facility, telephone number, and maximum number of people that could live or stay in the GQ.

6.7.1 Inputs

GQ Administrative Records Data

The GQ administrative data gained through CARRA acquisition efforts (see *Section 4.2.2*) and the GQ partnerships (see *Section 4.2.3*) will form a composite that will be compared to the universe of GQs currently on the MAF.

MAF Data

The GQ frame currently on the MAF is predominantly comprised of 2010 Census and updates from the ACS TOI (see *Section 4.1.3*). The MAF also contains a universe of suspected GQs, or unknown structures. These addresses may be GQs, but are unconfirmed. The In-Office ABR work will add these types of unknown structures to the MAF if they can confirm the address is missing from the list and have some indication that it may be a GQ. Both GQs and unknown structures will establish the initial GQ address extract to be validated in the In-Office GQ Review process.

6.7.2 High Level Process

The goals of the process steps outlined below are to confirm that the current MAF GQs are still GQs; to validate the unknown structures identified in ABR and those currently on the MAF; and to obtain sufficient contact information if needed to validate the unmatched records and unknown structures as a GQ, housing unit, non-residential, or transitory location.

Note that the process steps outlined below are on a continuous cycle, each step will occur more than once prior to the start of the 2020 Census.[15]

Assess the GQ Administrative Records Composite

The address records received from GQ umbrella organizations will be reviewed by CARRA to ensure they meet the Census Bureau's standards for acceptable address information, prior to being forwarded to GEO. Unacceptable records, not meeting the Census Bureau's address standards, will need to be standardized before forwarding to GEO.

Conduct MAF match to GQ Administrative Records

All standardized address information forwarded to GEO will be matched to existing GQ address records on the MAF, and geocoded if necessary. Standardized and matched records are considered validated.

Conduct Internet Search

Any remaining unmatched GQ address records and unknown structures will require Internet research and/or telephone calls (by NPC staff) to obtain relevant contact information.

Review Process (employ 2010 GQV Questionnaire)

Once adequate contact information is obtained, NPC staff will contact a knowledgeable source and ask a series of questions from the 2010 GQV Questionnaire to validate unmatched records and unknown structures as a GQ, housing unit, transitory location, or non-residential. These address records will be geocoded if necessary.

If the structure type is determined to be a GQ, NPC staff will collect the GQ type (e.g., college dorm, group home, shelter, etc.), facility name, primary contact name of the GQ, telephone number, and maximum number of people that could live or stay in the GQ.

Update MAF

Address records validated as a GQ, housing unit, transitory location, or non-residential will be forwarded to GEO to update the MAF.

[15] Details of the number of occurrences past the 2016 collection activity are yet to be determined.

Determine Need for In-Field Address Canvassing and Update the BTD

Any remaining unvalidated records or unknown structures that lacked sufficient contact information during Internet research efforts will be summarized at the block level and the information will be forwarded to the BTD. This information will influence the overall In-Field Address Canvassing recommendation. In some cases it may prompt a full canvass of the block. In others, it may be that one (or several) GQ addresses need to be located and confirmed but the entire block does not require canvassing (i.e., a Locate Address assignment).

6.8 Change Monitoring (Triggers)

Blocks in the passive status are subject to continuous monitoring and may be triggered for a re-review in IR and/or ABR. Some triggers are identified on a regular cycle, for instance twice a year, after each benchmark of the MAF/TIGER System. Other triggers are identified on an irregular cycle, based on special events. Trigger types include:

- New living quarters are assigned to the block in the MAF
- The block contains areas nominated for update by Census Bureau Field Representatives (FRs) or Headquarters staff
- New feature updates have changed the geographic information such that the block is no longer completely water, a public land, military or Update Enumerate area
- Population estimate changes, as determined by the Census Bureau's Population Division
- Land value changes
- The block has LUCA updates that require validation
- A GSS-I change detection partner has identified areas of change in the block

6.9 In-Field Address Canvassing Decision

The In-Office Address Canvassing work must complete in time to create the workload for the In-Field Address Canvassing operation that starts in August of 2019. To meet that goal, the Census Bureau will set a cut-off date for the In-Office Address Canvassing operation and establish a decision process to determine the final In-Field Address Canvassing blocks.

6.9.1 Cut-Off Date

The cut-off date represents the day when all In-Office Address Canvassing work must stop in order to allow time for final In-Field Address Canvassing determinations. All active blocks within the BTD will have a recommended interim status for In-Field Address Canvassing work at the completion of the IR. That status is updated as a result of the ABR work. As the cut-off date approaches, blocks on hold will enter an abbreviated IR or ABR review to determine a quick, final In-Field Address Canvassing determination.

The official cut-off date has not yet been determined, however it will be based on the following factors:

- The amount of time needed for Field Infrastructure preparation
- The amount of time needed to process final address updates from the ABR

6.9.2 Decision Tree

The In-Field Address Canvassing decision is based on the information from all In-Office Address Canvassing work as well as other outside factors that may influence the inclusion of areas in the In-Field Address Canvassing. The In-Office Address Canvassing recommendations for In-Field Address Canvassing will undergo internal stakeholder review. Stakeholders, including FLD, GEO, and DCMD, will use a decision tree (to be determined) to identify the final In-Field Address Canvassing workload.

7 MAF Coverage Study

7.1 Overview

The MAF Coverage Study (MAFCS) is an ongoing Address Canvassing operation designed to meet the following objectives:

- Produce MAF coverage estimates at national and sub-national levels
- Provide continuous updates to the MAF for current surveys and the 2020 Census
- Evaluate the In-Office Address Canvassing results

The MAFCS leverages existing Census Bureau programs and systems to achieve these objectives. The Community Address Updating System (CAUS) program, a program that supports the address list updating needs for the ACS, recently selected up to 1,500 blocks to canvass each year. CAUS and the MAFCS now combine to select approximately 20,000 blocks each year. This collaborative effort starts in October of 2015 and continues through September of 2019.

The Demographic Area Address Listing (DAAL) operation is the primary field operation that the Census Bureau conducts to list blocks during non-decennial years. The DAAL operation includes assignments for both current surveys and decennial operations. Types of assignments traditionally include:

- CAUS, and now the MAFCS updates
- National Health Interview Survey (NHIS) listings
- GQ frame updates for current surveys

Field Representatives (FRs) will canvass assigned blocks looking for every place where people could live or stay. They collect the address data using the Listing and Mapping Instrument (LiMA). In general, this listing activity is the same as the traditional In-Field Address Canvassing for the 2020 Census.

The MAFCS will produce yearly MAF coverage estimates for the United States. Coverage estimates for Puerto Rico will be included in the second year of implementation. In the first year, the design allows for the delivery of coverage estimates in January of 2017. The 2016 estimates will be based on a probabilistic sample of 18,500 blocks canvassed in the six-month period between April and September of 2016. The remaining 1,500 blocks were selected to meet specific CAUS criteria and to supply a consistent workload prior to April of 2016 while Field staff also prepared for the increased workload in April by recruiting and hiring new FRs.[16] In

[16] These 1,500 blocks will not be included in the final Fiscal Year 2016 MAF Coverage Study estimates since they were not selected using probabilistic sampling methods.

subsequent years, the 20,000 sample blocks will be evenly distributed across a 12-month period. This strategy allows for a consistent field workload, thus eliminating the need for irregular cycles of hiring and training.

The coverage estimates are vital for understanding the quality of the MAF and monitoring how that quality is changing as the Census Bureau continuously updates the MAF. These estimates will provide a measure of comparison as the census strives to achieve quality goals that meet or exceed those in 2010. In addition, the related analysis will determine the characteristics of the areas that have the most quality concerns. That information will help guide the In-Office Address Canvassing efforts.

The sections that follow describe the overall MAFCS business process, including:

- Sample selection and input file creation
- Systems used in production
- Process for managing the field workload
- Performing the field data collection
- Quality Control
- Final Outputs

Please refer to the business process models for the MAFCS in Appendix D for a visual flow of the process.

7.2 Sample Selection and Input File Creation

The MAFCS sample design assures that the collected data are sufficient for meeting all stated objectives. The primary objective is to produce MAF coverage estimates; however, the sample must also support address updates needed for current surveys and the analysis of In-Office Address Canvassing processes. The sample also allows for coverage estimate breakouts for geographic areas such as urban versus rural and states. DSSD and GEO work together to select the sample and create the Sample Control Input File (SCIF), which enables the field control systems to identify and process field assignments.

7.2.1 Sample Selection Inputs

Inputs from other components of the Address Canvassing program will inform the MAFCS sample selection. A description of each input data source and associated activities is below.

Block Nominations

During the DAAL data collection, FRs may identify blocks in areas they believe need canvassing to improve the address list. These areas may represent situations such as new construction, address conversions, or situations where the Census Bureau address and map data appear inconsistent with what they observe on the ground. In these instances, the FRs may "nominate" the block for future listing in the LiMA. Headquarters personnel are also able to nominate blocks for listing if they observe oddities in the course of reviewing data.

GEO will receive this block nomination data periodically. In most cases, the nominations will first be reviewed in the In-Office Address Canvassing operation, where geographers either locate source files to update the information in the office or they confirm the need for In-Field Address Canvassing. See *Section 6* for more information on In-Office Address Canvassing.

Geographic Exclusion Areas

The MAFCS will not include blocks in areas of the country where the Census Bureau is certain no living quarters can exist. The MAFCS exclusion list has some overlap with the In-Office Address Canvassing exclusion list as described in *Section 6.4* but the overlap is not complete. GEO provides a list of the following types of blocks to ensure DSSD does not select them for the MAFCS sample:

- Water blocks
- Public land blocks (e.g. national parks)
- Road median blocks (starting in Fiscal Year 2017)
- Remote Alaska

In-Office Address Canvassing Results

GEO sends the final In-Office Address Canvassing assessments for each block to DSSD. The final block assessment includes the following high-level outcomes:

- The Interactive Review identified the block as a passive block, indicating that it does not currently need updating
- The Interactive Review identified the block as an active block and either
    - the block was placed on hold during ABR
    - the ABR resolved all issues with the block

    - the ABR identified the block for In-Field Address Canvassing
    - the block has not yet entered the ABR
- The block has not yet completed all phases In-Office Address Canvassing

Field Winter Exclusion Areas

FLD sends a list of winter exclusion areas to DSSD. These are areas known to be inaccessible during the winter months. DSSD will ensure that sample blocks in these areas are assigned for data collection in some other season.

GSS-I Partner and Third Party Data Areas

GEO sends an indication of whether or not the block is in an area that has been updated with a GSS-I partner provided file (as described in *Section 4.1.4*) or a third party data file (as described in *Section 4.2.1*). These data are used to assess whether the coverage in these updated areas is better than areas that have not already been updated with a local partner or third party data file.

Block Characteristics

In preparation for sample selection, DSSD must create a block level file for the nation that summarizes characteristics for the block such as:

- Number of living quarters in the block
- The percentage of non-city-style addresses
- The percentage of addresses from the DSF

DSSD uses these data to partition the block universe and select an appropriate sample of blocks that will allow for weighted analysis of the In-Office Address Canvassing results.

7.2.2 Selecting the Sample

For Fiscal Year 2016 MAFCS work, DSSD and GEO selected the sample in two parts. First, they selected a smaller sample of 1,500 blocks slated for data collection between October of 2015 and March of 2016. These blocks primarily represent areas that meet traditional CAUS criteria. These blocks are not included in the first year's coverage estimates since they are not selected using probabilistic sampling methods.

The second, larger sample of 18,500 blocks were selected using probabilistic sampling methods. The sample universe was approximately 11.2 million tabulation blocks, excluding Puerto Rico, Remote Alaska, special land use areas, water blocks, and the 1,500 CAUS blocks. The sample was first stratified by the measure of size (number of eligible living quarters), states, and cities with greater than two million in population. Blocks were clustered geographically within tract in order to minimize field costs. All blocks within a cluster had the same probability of selection (i.e., blocks were not clustered across different strata). Differential sampling rates were assigned to each strata, the design allowing for oversampling of large blocks. DSSD also used the data inputs, as described in *Section 7.2.1* to guide and finalize the sample selection.

The field data collection for these 18,500 blocks occurs between April and September of 2016. Starting in Fiscal Year 2016, a sample of 20,000 MAFCS blocks are selected for the entire year at one point in time.

MAFCS sample blocks are divided into three (FY 2016) or six (FY 2017) two-month assignment periods. The assignment period is the amount of time allotted for the field data collection. The sample blocks are also clustered geographically within assignment period to allow for more efficient field data collection.

Once the sample selection is final, DSSD sends a list of the sample blocks with their expected living quarters count to FLD for review. FLD uses this information to determine the optimal work allocation while considering DSSD's suggested geographic clustering. FLD also identifies any "red flags" for the data collection (e.g., the block is in an area that is not reachable by the current field staff). FLD approves the workload and sends the information back to DSSD. DSSD then sends the sample block and assignment period information to GEO who creates the SCIF.

7.3 Address and Spatial Data Inputs

The MAFCS data collection is a dependent address listing activity. That is, FRs will provide updates to the existing address list and maps instead of creating new ones. The address list does not include the complete list of addresses from the MAF. Instead, the addresses are a subset of the addresses on the MAF that meet specific requirements as described in *Section 5.2*. The MAF/TIGER System extracts the valid addresses and create a national extract of the MAF.

The associated extract from TIGER, which contains the street features, block boundaries, and geographic entities, is also created. Geographic Reference Files (GRFs) provide additional information such as names for geographic areas, and the relationships between the lowest geographic area, block, and higher levels such as county, state and Regional Office (RO). The MAF/TIGER System makes all of these data available to the DAAL data collection systems twice a year, in April and October.

7.4 Field Staff

The Census Bureau FLD ROs in Atlanta, Chicago, Denver, Los Angeles, New York and Philadelphia manage the DAAL operation. The DAAL staff in the RO usually includes RO supervisors, clerks, survey statisticians and geographers. The RO staff performs tasks such as:

- Making listing assignments to FRs
- Monitoring progress to ensure deadlines are met
- Closing out the listing as scheduled
- Ensuring RO staff follow security policies and procedures

- Hiring and training FRs

FRs can and do work on other census field operations such as interviewing for ACS and other census surveys. They are responsible for organizing all assigned work and planning their day efficiently. FRs report to Field Supervisors (FSs).

7.4.1 Field Staff Recruiting and Hiring

The DAAL FRs receive constant work from either DAAL alone or a combination of DAAL and other current surveys. FLD recruiting and hiring efforts occur in response to attrition or changes in workloads. The introduction of the MAFCS workload to DAAL in the Spring of 2016 (with a consolidated six-month data collection period) required a significant hiring effort in the winter. FLD started recruiting in December of 2015 to hire approximately 220 additional FRs. As the MAFCS workload becomes steady in subsequent years, the hiring and recruiting efforts will settle into low levels. An overview of the recruiting and hiring process is provided below.

Recruiting

For DAAL, recruiting only takes place when ROs determine that additional staff is needed to support the anticipated workload. First, the RO locates physical space to test recruits in the geographic area. The RO may either contact people already in a queue waiting to be tested, contact local partners, place an advertisement, or a combination of all of these to get a list of people to invite to the session. Applicants that complete the test at the session become part of the applicant pool.

Hiring

In areas where it is determined that DAAL FRs are needed, the current staff that do not already work DAAL are considered first. If there are no current staff available, then a new hire is requested on a selection certificate in that geography. If there is a sufficient applicant pool, applicants are interviewed and a selection is made. If there is an insufficient applicant pool, recruiting sessions take place.

Post-Selection

If the selected applicant is a brand new hire, the applicant takes their Census Bureau security training and the laptop request process begins. Prior to taking the FR classroom training as described in *Section 7.4.2*, RO staff administers the Oath of Non-Disclosure and the FR signs a sworn affidavit. The FR then receives their laptop and pre-classroom training.

7.4.2 Field Staff Training

Starting in September of 2015, the classroom training includes a Web-Based Training (WBT) component for the Mobile Case Management (MCM) and LiMA. The automated, interactive training for FRs was developed with a “Tell Me, Show Me, and Let Me Try” theme. The instructor first explains a topic to the classroom and then shows them how the process would work via the WBT, which simulates MCM and LiMA actions. FRs follow along in the WBT

with the instructor. FRs then individually complete a series of interactive WBT exercises in the classroom.

The training sessions last for three days. On the last day, FRs complete field exercises that include canvassing a real block near the training site. RO staff observe these exercises and provide feedback to the FRs.

7.4.3 Field Staff Technical Support

The Census Bureau's Technical Assistance Center (TAC) is the central point of contact for automation support for all RO staff and FRs. The TAC provides support for all major field data collection operations for current surveys, Special Censuses and Computer Assisted Telephone Interviewing (CATI). RO and field staff receive support for all data collection applications and laptop issues, including transmissions. FRs do not contact TAC; they coordinate assistance through the FS and the RO automation staff. If the laptop issues cannot be resolved, the RO staff may direct FRs to receive assistance directly from TAC.

7.5 Systems

The MAFCS leverages existing Census Bureau systems designed for all corporate listing activities. Descriptions of the current systems are in the sections that follow. Please note that as the Census Bureau implements components of the Census Enterprise Data Collection and Processing (CEDCaP) model, the systems listed here will change.[17]

7.5.1 Master Control System

The Master Control System (MCS) is the central entry and exit point to the Application Development and Services Division's (ADSD) systems for other users. That is, input that ADSD receives from sponsoring divisions (e.g., Sample Control Input Files) and output from ADSD back to those divisions (e.g., Sample Control Output Files) come into and go out from the MCS. The exceptions to this process are address and spatial input files for the LiMA. Those are processed directly through communications with the MAF/TIGER System and the systems that support the LiMA. The MCS Operations Staff use menu-driven functions in the MCS to set up and monitor the surveys.

7.5.2 Regional Office Survey Control System

The Regional Office Survey Control System (ROSCO) is the Census Bureau control system used for most census surveys as well as DAAL. ROSCO provides the ability to:

- Maintain a current list of field staff
- Create and release work assignments

[17] Once the Unified Tracking System has been tested and implemented for DAAL, it will be included here.

- Reassign work
- Monitor progress with daily reports at the appropriate supervisor level
- Review and evaluate completed work
- Report technical problems to the TAC
- Close out assignments
- Send staffing reports to headquarters

7.5.3 Mobile Case Management

Mobile Case Management (MCM) provides mobile device-level survey case management and dashboards. MCM also manages data transmissions and other applications on the mobile device. FRs use MCM to view assignment information about blocks. MCM enables FRs to:

- Receive block assignments
- Launch the LiMA in order to work a block assignment
- Transmit completed block assignments

7.5.4 Listing and Mapping Application

The LiMA, a CEDCaP system, is a single, scalable, automated corporate instrument that enables FRs to capture and provide accurate listing and mapping updates to the MAF/TIGER System. LiMA will display an address record for each known living quarter in the assigned block. LiMA will also display a map of the blocks in the surrounding area to orient the FR and allow for the collection of a MAF structure point (MSP), or "map spot." For the MAFCS, the LiMA operates on a laptop in a Windows software environment.

7.5.5 Sampling Matching, Review Coding System

The Sampling, Matching, Reviewing and Coding System (SMaRCS) is used to create QC sample and provide reports after the QC is complete.

7.6 Managing the Field Data Collection

The yearly block sample is divided into field assignment periods representing two months of field work. At the start of the assignment period, ROSCO receives the sample block information via MCS. RO staff use ROSCO to assign the work to each FR based on the geographic location.

Assign Work to Field Workers *(Production or QC)*

The FS reviews assignments made to field staff in their area. For the production listing, the FS reviews the assignments to determine proximity of the block(s) to the personal residence of the FR and ensure the assignments are made in the most cost efficient manner. QC work will be conducted by FSs. The production and QC work is never conducted by the same person for a particular assignment. FRs receive their work assignments through MCM on their laptop.

Reporting and Assignment Closeout

DAAL progress reports are updated in the control systems each time the field staff transmit their completed assignments. The reports list the total number of blocks in the region's workload, the number of blocks completed and the percentage of blocks completed. Once all blocks are complete at the end of the assignment period, the RO performs a close out and all data are sent to either SMaRCS for QC or GEO for the MAF/TIGER System update.

7.7 Performing the Field Data Collection

To perform the field data collection, FRs canvass assigned blocks with their laptops, equipped with MCM and LiMA, in hand. The LiMA displays the Census Bureau's existing address list and maps. In addition, the laptop is equipped with a Global Positioning System (GPS), which enables the LiMA to display a "you are here" indicator (YAHI) so FRs can determine their location on the ground and collect accurate location coordinates for living quarters. The FR compares what is actually on the ground in the real world to the LiMA address list and maps and updates when necessary. This method is known as "ground to list." Please refer to the "Conduct In-Field Work" business process model in Appendix D for a visual flow of the overall process. The details for that process follow.

Receive Device and Worker Assignment

Prior to training, each FR receives a laptop, which they use to complete all work assignments. The FR must safeguard the laptop and its information in compliance with Census Bureau security policies. The FR performs a data transmission in the MCM in order to receive their individual work assignments (blocks). MCM downloads all of the address and spatial data required for the LiMA for each assignment.

Locate and Travel to Assignment

Each FR reviews their work assignments for DAAL and other surveys in MCM and determines the best order for performing the work, as well as the best route of travel. MCM displays a map of the assigned blocks and their associated geographic center pinpoint locations to aid the FR with this activity. However, the FR does not use the MCM to navigate to a block. Instead, the FR will use their local knowledge as well as a commercial navigation device to travel to their block assignment.

Once in the block, the FR selects the option to work the block in MCM, which launches the LiMA for the block. The FR uses the "You are Here" Indicator (YAHI) in the LiMA to help determine their location on the ground. The FR chooses an intersection to begin their canvassing

activities in the block. From the starting point, they travel the block in a clockwise direction, always turning to the right at each intersection. The FR stops at each structure they encounter on their right hand side only. At multi-unit structures, the FR attempts to find a manager, property owner, or some other knowledgeable source to obtain the update information for all living quarters in the structure. If need be, the FR will walk through the entire structure, canvassing at each level to confirm every unit in the structure.

FRs complete the activities that follow for each structure.

Compare Ground to Address List

At each structure they encounter on the ground, the FR identifies the location address based on visual observation or by talking to a knowledgeable person. FRs then look for the same address in the LiMA address list for the block.

Update/Verify the Address List

As the FR compares what they see on the ground to the address list, they verify or update the address and location information in the LiMA. In general, FRs complete the following tasks:

- If the address is on the address list, they will confirm the existing information and provide updates as necessary
- If the address is not on the address list, they will add it
- If addresses remain on the list that they did not encounter during their ground canvass, they will either
    - move the address to an adjacent block in the fringe area that is within 150 feet of the block they are canvassing (e.g., the address is across the street), or
    - identify the address as a delete/does not exist in the block
- They will also collect location coordinates for existing living quarters, and update the maps as necessary by adding or updating street names

The following paragraphs provide more details for the work completed during this Update/Verify phase.

Collect Address Status and Structure Type *(Update/Verify the Address List)*

The FR first assigns an address status code, which identifies the address as a housing unit, a GQ, does not exist or some other status. Please refer to Appendix E for a complete listing of address status codes.

FRs also collect a structure type for each living quarter. The structure type indicates the type of building in which the living quarter is located. Structure types are as follows:

- Single Family Home
- Multi-Unit Structure

- Trailer/Mobile Home
- Boat, Tent, etc.

The address status and structure type helps the LiMA determine the subsequent actions an FR must perform to validate the address.

Collect Address Information *(Update/Verify the Address List)*

For each living quarter, the FR reviews the location address information and updates as necessary. Each living quarter should have either a city-style address (house number and street name) or a location/physical description such as two-story ranch house with two-car garage. The LiMA provides standardized descriptions for structure characteristics that the FR may choose from to fill the location/physical description field. A location/physical description is only required when the FR cannot determine the house number and street name for the structure.

The FR also confirms or updates the mailing address in cases where the address on the list is not a USPS address[18]. The LiMA prompts the user to take this action when appropriate. To collect the mailing address, the FR must make contact with a knowledgeable person. If the FR makes contact, they collect either a city-style mailing address or a Rural Route style mailing address.

Collect GQ Information

If the FR encounters a GQ address on the ground, they will attempt to make contact with a manager or some other knowledgeable person to collect specific GQ information. This information includes:

- The GQ type (see Appendix F for a complete listing)
- Facility name
- Contact information for the manager or other knowledgeable person (includes name, title, phone number, email address, website and office location)
- Number of units (e.g., number of beds)

The FR attempts to collect this information the first time they encounter the address. They will not make return visits to the block to find a knowledgeable person. If they are unable to make contact with someone the first time, they will look for contact information posted on or near the building. Otherwise, they will fill in the information to the best of their ability by observation only.

[18] The identification of a non-USPS addresses is not made obvious to the FR. The LiMA uses the information provided by the MAF/TIGER System to guide the data collection path for the user.

Collect a Map Spot *(Update/Verify the Address List)*

A map spot indicates the general location of the living quarters on the ground. The FR must collect or verify the map spot for every structure that contains at least one living quarter. The FR stands at the primary entrance for the structure to collect the map spot. This is the preferred location, however in cases where the GPS is not available; they may choose to stand at a secondary entrance, driveway, or pathway leading to the structure.

The FR collects the map spot in the LiMA by tapping or clicking on the map within the relative location of the structure or within the YAHI when GPS is available. When the FR collects the map spot, two sets of geographical coordinates are collected:

- The manual (or relative) coordinates where the FR tapped the screen
- The GPS coordinates based on where the FR is standing

During the map spot collection, the LiMA conducts a long strand test. That is, the LiMA compares the manual coordinate location to the GPS coordinates or some other location information available through Wi-Fi and the cellular network when GPS is not available. If the distance between the two data points is outside of an acceptable range, the LiMA warns the FR that they appear to be standing too far away from the location they want to map spot. The FR is not stopped from collecting coordinates at this location, as there may be a good reason to do so.

Collecting or verifying a map spot is the final step in working or adding a particular address.

Resolve Unworked Addresses on the List *(Update/Verify the Address List)*

When the FR has travelled the entire block and arrived back at their starting point, they will resolve any addresses left on their list that they did not previously locate on the ground. The LiMA enables the FR to filter their address list based on a worked versus unworked status. The unworked addresses may have been missed during their canvass, or they may duplicate another address on their list, or the address may not exist in the block.

Nominate Blocks

As the FR is travelling to or within their assigned block, they may observe situations where they believe the address list and maps in the surrounding area requires updating. In those situations, the FR may nominate (suggest) blocks for future listing work[19]. The FR accomplishes this by accessing the nominate block functionality available in the LiMA. The FR selects their assigned block or any block in the fringe area and supplies a reason for the nomination. Possible reasons include:

- There are new roads or the existing roads are not drawn correctly
- There is a new addressing system (e.g., emergency 911 or other conversions)

[19] This functionality is not currently available in the LiMA, however, the Census Bureau plans to have it in place by the Spring of 2016, in time for the FY 2016 MAFCS work.

- The housing development has changed due to demolitions or new construction
- The area was affected by a natural disaster
- Other (the FR provides a write-in response)

Mark Assignment as Complete

Once the FR has completed canvassing their assigned block, they indicate that all work is done by selecting the block complete button in the LiMA. The LiMA then conducts a series of checks to confirm all addresses in the block have been worked (all addresses have an address status and map spot when necessary). If not, the LiMA displays an error message and the FR resolves the unworked addresses and then submits the block as complete again. If the check passes, the LiMA marks the block complete and the FR exists the LiMA.

Submit Results

The FR transmits their completed assignments in MCM. FRs may transmit at any time but should always transmit once they have finished work for the day. They transmit their work at the end of the day, even if they have not completed any block assignments. The SMaRCS receives only the completed blocks and determines the QC sample as described in *Section 7.8*.

7.8 Quality Control

The basic purpose of Quality Control (QC) is to ensure the quality of the collected data. To achieve this goal, the following activities are implemented:

- Deter field staff from falsifying data
- Identify field staff in need of additional training to correct behavior
- Identify field work that was erroneous and must be reworked

The QC will not be in place for the Fiscal Year 2016 MAFCS. The LiMA and SMaRCs development is underway and will complete in time for the start of the Fiscal Year 2017 MAFCS.

The QC design DAAL uses an acceptance sampling methodology based on the Average Outgoing Quality Limit (AOQL). This method focuses on rectifying errors and in the end, assures that the error rate for the output data are lower than a specified AOQL value. The AOQL for all DAAL operations, including the MAFCS is ten percent. To meet this goal, the QC is structured as a dependent field listing of a sample of the original FR's work. Field Supervisors conduct the QC field listing. They review and correct the listing work as necessary with guidance from the LiMA (via SMaRCS) as to the amount of review work required. At the completion of the QC, the original FR who completed the production listing receives feedback. Sections *7.8.1* and *7.8.2* provide more details for the QC assignment and listing processes.

Note that the QC design presented here is dependent on field work. The Address Canvassing QC team will conduct research on alternative designs to answer the design decision *Question 1*

presented in *Section 2.3.2*. Some items to research include using external sources to confirm data collected in the field, and collecting and analyzing paradata to help develop models, which can focus the QC sample on the known problem areas. For more details on the QC program, please refer to the *Address Canvassing Quality Control Detailed Business Proposal* (U.S. Census Bureau, 2015).

7.8.1 Assign the QC Work

Business Rules

The rules for determining the sample of QC review units is guided by two factors:

- The number of units required to measure the error in production FR's based on their total number of completed units
- The proportion of deletes in the sample block

Census operations have traditionally required a 100 percent check of all deletes; however, research results have shown that the delete status was rarely reverted to a valid status in QC. Therefore, the methodology has changed so that only a sample of deletes is included in the QC. Also, as the QC plan changes based on research activities, these business rules will include criteria for comparisons to other source data which will further reduce the QC sample.

Send Results for QC Sampling via SMaRCS

Once the FRs complete their production listings for MAFCS, along with listings for their other DAAL work, the SMaRCS recieves all of these completed listings.

Sample and Determine Need for In-Field QC Work

The completed production work is batched for each FR on a monthly basis in preparation for the sample selection. SMaRCS then determines the amount of sample units that are required for review based on the business rules described above. SMaRCS will identify:

- The sample unit where the QC FR should start their listing
- The remaining number of sample cases required, which are selected during the QC listing from the ground, in sequence (*i.e.*, specific units are not pre-identified)
- The specific sample of production FR deletes required for review during the QC listing

SMaRCS then sends that information to the In-Field workload management systems and the work is assigned to a QC FR.

In the future, it may be the case that the QC design will allow for confirmation without field work. If so, SMaRCS will determine the need for field work per those business rules. If no further work is necessary, this information is conveyed back to the appropriate systems and the production listing results are sent to GEO. If further work is necessary, the listings are sent to workload management and assigned for QC work.

7.8.2 Perform Field Data Collection QC

Locate and Travel to Assignment

QC FRs receive QC assignments on their laptop via MCM. They will then locate and travel to the assignment to confirm the work of the original production FR. They will first locate the start unit identified in the LiMA.

Compare Ground to List** and **Update/Verify Address List

The QC FR then proceeds to perform the same tasks as the production FR as described in *Section 7.7*. The only difference is that the QC FR's address list and map reference data reflects the updates provided by the production FR.

At each address, the QC FR proceeds to conducts each of the following activities

- Compares what is on the ground to the work of the production FR
- Updates and/or verifies the information in the address list
- Collects GQ information when appropriate

The QC FR completes these tasks for each address on the ground until the QC sample is complete, as guided by the LiMA. The QC FR will also work each delete record on the address list that is part of the QC sample. They may work these deletes while they are working on their sample from the ground or they work these deletes after their ground sample work is complete.

QC Sample Pass/Fail** and **Assignment Completion

As the QC FR completes their work, the LiMA keeps track of any corrections made and tallies the errors. If the production FR work passes, that is it did not exceed the number of allowable errors, then the QC assignment is complete. If the production work did not pass, then the QC FR begins a full recanvass of the production FR's work. They will again update and/or verify the address list and maps and collect GQ information as required, continuing this process until they rework all addresses/features in the assigned blocks.

Submit Results

The completed work is then submitted back to Headquarters. If QC work is not required, then the data are prepared and sent to the MAF/TIGER System. If QC is required, the production and QC results are adjudicated (via automated business rules) to identify the appropriate action for MAF update. For instance, if the production lister corrected the address information and the QC lister verified that information, the final action for MAF update is a correction action. Systems then send the final results to the MAF/TIGER System.

7.9 Final Outputs

The MAF/TIGER System will receive the results of the MAFCS, as passed through QC. Those results contain updates for addresses on the MAF and features in TIGER. Once those results are processed through the MAF/TIGER System, as described in *Section 9*, update transaction files are created and delivered to DSSD for analysis.

7.9.1 Data for MAF/TIGER Updates

The LiMA and MCM outputs are used to generate the following files for the MAF/TIGER System.

Address Update File

The ADDUP contains all of the original MAF units for the block as well as any units added during the field work. The address information on each record reflects the final corrected or verified version. Each record also has the final address status, which determines what MAF updates are required.

Structure Update File

The Structure Update File contains all of the MSP (or map spot) information collected during the field work. This includes the latitude and longitude coordinates both the manual and GPS locations. The coordinate information on the Structure Update File is linked to the address information on the ADDUP through an identification number that is retained on both files. Addresses at the same coordinate location are assigned the same identification number.

Feature Update File

The Feature Updates Table contains information for all road features that were updated during the field work. Currently the only outputs for this table are road name changes.

Block Nomination File

The Block Nomination File contains the blocks that FRs may have nominated for future field work, indicating an address or feature coverage problem. This file is one of the inputs to the In-Office Address Canvassing operation.

7.9.2 Data for Analysis

The MAFCS requires results files in order to produce the MAF coverage estimates as well as to report on the overall results of the production and QC listings. To support this effort, DSSD receives output data from the LiMA as well as transaction files from the MAF/TIGER System.

MAF Update Transaction File

The MAF Update Transaction File is an address level file that contains the results of the MAF Update process. The file provides:

- The final action applied to the MAF for each address record that existed prior to the field work.
- The new MAF identification number[20] (MAFID) for the addresses added during the field work.
- The duplicate linkages, as identified during the field work or during the match to the MAF.

Production and QC Analysis Files

The production and QC analysis files contain the raw data from both the production and QC listing as well as any paradata.

7.10 Estimation and Analysis

The outcomes from the field data collection are the basis for the final MAF coverage estimates. The current plan is to produce estimates of adds, deletes, verifies, and coverage for the following domains:

- The United States
- Puerto Rico (starting in 2017)
- 50 States and the District of Columbia
- Cities with greater than two million in population: New York, New York; Chicago, Illinois; Los Angeles, California; and Houston, Texas
- Metropolitan areas
- In-Office Address Canvassing Results
- American Indian Reservations
- GSS-I Partner areas
- Types of enumeration areas

Specific details of the estimation and analysis work will be provided in the next version of this document.

[20] The MAFID represents a nine digit numeric identifier that uniquely distinguishes one unit on the MAF from all others.

8 In-Field Address Canvassing

8.1 Overview

In-Field Address Canvassing is the process of having field staff visit specific geographic areas to identify every place where people could live or stay. Field staff compare what they see on the ground to the existing census address list and either verify or correct the address and location information. For the most part the details for how to conduct the In-Field Address Canvassing work are the same as what is described in the MAFCS section of this document. However, there are specific details unique to the In-Field Address Canvassing that will be conducted in August of 2019. Those differences are explained in the sections that follow. Differences at a high level include:

- Listers canvass using collection geography (BCUs) instead of tabulation blocks (to be tested in the Address Canvassing Test)
- Listers may use smaller platform mobile devices, such as smart phones (to be tested in the Address Canvassing Test)

Please refer to the In-Field Address Canvassing business process models in Appendix D for a visual flow of the process.

8.2 Data Inputs

In addition to the address and spatial data inputs described in *Section 7.3*, the In-Field Address Canvassing requires the workload to be created as part of the In-Office Address Canvassing processes.

Block and Other Field Area Delineation

The In-Field Address Canvassing will collect data within the confines of a BCU, the same collection geography as the In-Office Address Canvassing operation. In addition to BCU, the field data collection will require higher level geography that can be used to organize and manage the field work within census office areas. This information will be provided to data collection systems via a GRF.

In-Field Workload

The In-Field workload is determined by the recommendation from the In-Office Address Canvassing and the final stakeholder decision-making process. Once the final universe of In-Field blocks is identified, FLD will use the information to recruit and hire field staff in advance of the production start date. The MAF/TIGER System will create assignment files that are provided to the In-Field data collection control systems. Current workload estimates are presented in *Section 5.3*.

8.3 Field Staff

8.3.1 Office Structure

Area Census Offices (ACOs) will serve as the management offices for all 2020 Census field data collection. The ACOs will open on a rolling basis from May through October of 2019. ACOs needed for the In-Field Address Canvassing operation will open first, between May and June of 2019.

8.3.2 Roles and Responsibilities

The overall concept for field staff roles and responsibilities is shown in Figure 10 below. Note that the Enumerator, a field worker that conducts census interviewing, equates to a lister for Address Canvassing.

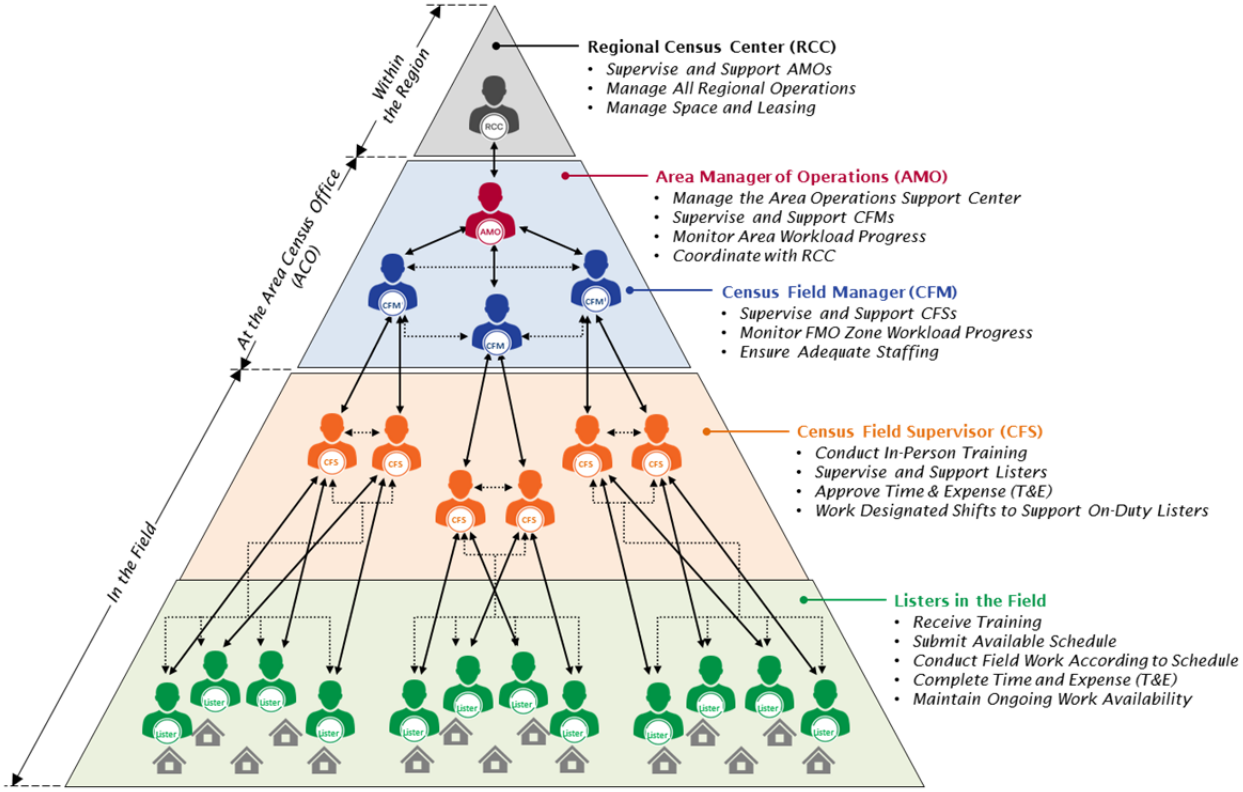


Figure 10: Field Staff Roles and Responsibilities

Area Manager of Operations

The Area Manager of Operations (AMO) is responsible for the completion of workload within the geographic boundary of the ACO. They will use the operational control systems to monitor overall workload progress and performance of the Census Field Managers.

Census Field Manager

The Census Field Manager (CFM) is responsible for managing the field operation by monitoring daily progress and moving resources, as needed, in order to complete the assigned workload.

Census Field Supervisor

The Census Field Supervisor (CFS) works in the field to monitor progress and performance of assigned listers and provide support to listers who work during the same shifts.

Lister

The lister conducts the data collection work by traveling to the assigned block and collecting the address and map spot location for every structure where people could live or stay.

8.3.3 Field Staff Recruiting and Onboarding Process

Recruiting

The ACO will recruit staff to work as CFMs, CFSs, listers, and local office clerks. The recruiting process will utilize an online job application and online skills assessment. The Decennial Personnel and Payroll System (DAPPS) will receive job application and skills assessment data and will produce reports that can be used to monitor recruiting. In addition, recruiting will be monitored by the field operations management staff through an interface between DAPPS and the operational control system.

Onboarding

Onboarding (including background checks for employment suitability), payroll processing, and other personnel processing will be facilitated though the use of the DAPPS and the Census Hiring Check (CHEC). A vendor will also assist in the onboarding process for new employees by providing fingerprinting and other related services. The ACO operations and administrative staff will be responsible for execution of these activities.

Further details of the field staff recruiting and onboarding process will be described in the *Field Infrastructure Detailed Operational Plan* to be released in September of 2016.

8.3.4 Training

Automated training will be used to prepare all staff for their roles in the operation. Staff will train by automated means and complete independent study modules prior to a maximum of two days of face-to-face meetings to receive needed materials and ensure readiness for the field. This will limit classroom time but still provide ready-to-work listers. The electronic training modules

developed for the DAAL program will serve as the initial baseline for automated training materials and will be updated in preparation for the Address Canvassing Test and In-Field Address Canvassing.

8.3.5 Technical Support

The Decennial Service Center supports all 2020 Census field operations and handles all service requests initiated by field staff. Services include:

- Password resets
- Resolution of software and hardware issues
- Security incident management
- Communications to and from field offices to address such things as outages software releases

8.4 Systems

8.4.1 Unified Tracking System

The Unified Tracking System (UTS) provides cost, progress, and quality business intelligence reporting to stakeholders using paradata collected from various data collection modes. UTS is an existing application used by Field ROs and Headquarters survey managers. The UTS will require changes to existing interfaces, the addition of new reports, or changes to existing reports to support the Address Canvassing operation. The UTS Project Team will work with Address Canvassing stakeholders to determine progress and reporting requirements for all Address Canvassing components.

8.4.2 Operational Control System

An operational control system will be used to manage the In-Field Address Canvassing work. The control system will provide the capabilities to:

- Create crews of listers
- Make assignments
- Generate reports, both daily and near real-time

8.4.3 LiMA and MCM

The LiMA, as described in *Section 7.5.4*, is enhanced for the In-Field Address Canvassing to accommodate locate address assignments and imagery. MCM controls assignments at the device level by launching the LiMA for the selected assignment, tracking the status of the assignments and allowing for completed work to be transmitted.

8.5 Managing the In-Field Address Canvassing

Assignments

Assignments will be provided to the listers from the operational control system. These assignments will exist on their mobile device in the MCM. They will use applications on the device to update the address list and maps within each assignment, as well as to submit time and expenses.

Monitoring and Reporting

CFSs will have progress and status information available to them within the operational control system, by use of a tablet device, for their assigned listers. The CFSs will provide support to listers and will use the mobile device to approve lister timesheets and capture lister interaction data (e.g., Lister John Doe called to report his car is broken down and he is not working today).

Workload progress within the operational control system will be monitored by the CFMs. They will use dashboard summaries and key performance indicators to understand areas of concern and move resources as needed. CFMs will use information provided by the operational control system and local knowledge to make decisions on when to onboard/off-board listers/CFSs as field work progresses. Their work in conjunction with other CFMs in their assigned areas will ensure completion of all work for their entire area.

8.6 Performing the In-Field Address Canvassing

To perform the In-Field Address Canvassing work, listers canvass assigned blocks with their mobile devices in hand. The data collection occurs within the LiMA. The 2020 Census In-Field Address Canvassing will use full block canvassing methods and locate address assignments to collect specific GQ information.

For the most part, the In-Field Canvass is comprised of the same general steps outlined for the MAF Coverage Study field data collection in *Section 7.7*. At a high level:

1. The lister receives assignments in MCM from the operational control system and prepares for work.
2. The lister locates and travels to an assignment and compares what is on the ground to the LiMA address list.
3. If a map update is required, the lister updates the LiMA map as required (updates street names, adds streets, collects map spots, adds addresses, deletes addresses, and so on). If it is a GQ address, they also collect GQ information including the GQ type.
4. The lister marks the assignment as complete, submits the results and does the next assignment until no more assignments exist.

Locate Address Assignment

Some assignments require that the lister only work a subset of the addresses on the current list for the block. These addresses are typically GQs that were not validated during the In-Office Address Canvassing and require validation in the field. This method may also potentially be used to resolve difficult multi-unit situations identified during the In-Office Address Canvassing. The lister will open the block and the address, or set of addresses, that require review are specified for the lister in the LiMA. The lister will attempt to locate the specified addresses and update as appropriate.

Imagery

Aerial imagery will be available as a layer in the LiMA map view to assist listers with their work. Listers will toggle the information on and off as needed comparing what they see on the ground to the image, in order to orient themselves and identify living quarters missing from the list.

8.7 Quality Control

By leveraging technology, the Census Bureau hopes to improve the impact QC has on deterring field falsification, speed up the feedback loop when listers are not correctly implementing the procedures, and ultimately reduce the need for rework.

Prior to implementing QC for the In-Field Address Canvassing, the Census Bureau will research:

- Using Administrative Records – Compare the completed production listings to administrative records data to distinguish assignments that are likely to have been completed correctly and do not require further field review.
- Modeling Assignments – Use statistical models to gauge the probability that an assignment requires further field review. For example, a block that has many small multi-unit structures may be more likely to contain errors and therefore should be checked, while a block that is entirely single family units may be likely to have fewer errors.
- Using In-Office Methods – Identify blocks from the completed production listings that require QC and send to review by in-office staff. In-office staff will use methods similar to those used during the In-Office Address Canvassing to review and validate the production results. This work will occur during the same time frame as the production listing to still allow for QC In-Field Address Canvassing when necessary.

In addition to these types of possible enhancements, the QC process will work as described in *Section 7.8*. The batched unit for the QC sample selection may be determined by a combination of a specific lister's work for a specific time frame and/or the geographic area of the assignments.

The overall process at a high level:

1. The SMaRCS will sample and determine the need for In-Field QC work
2. The QC lister receives the assignment in MCM from the operational control system and prepares for work
3. The QC lister locates and travels to an assignment and compares what is on the ground to the LiMA address list. They will begin canvassing at the starting address indicated in the LiMA.
4. The QC lister will validate or update the address list as needed until they complete their QC sample. They will also work the sample of deletes identified in the LiMA. In cases where the QC sample fails, the QC lister will rework all blocks in a pre-determined geographic area (if they were assigned in the production listing).
5. The QC lister marks the assignment as complete, submits the results and does the next assignment until no more assignments exist.

8.8 Final Output

The final outputs sent to the MAF/TIGER System are the Address Update File (ADDUP), Structure File, and Feature Update File as described in *Section 7.9.1*.

LiMA and MCM systems will also create data files for Address Canvassing assessments.

9 MAF Updates

A detailed process description will be included in the next version of this document. At a high level, MAF update steps include:

- Data files are received from the field operation or customer
- The file is converted to an ADDUP, if not already provided in that format
- Pre-processing steps are run to identify data errors on the ADDUP and reject records prior to updating the MAF
- Records are matched to the MAF (via the MAFID and/or address) and assigned a transaction case number that identifies the type of MAF update (or reject) that will occur
- The MAF is updated according to the transaction case
- Results, including rejects, are made available to GEO staff and customers

10 Quality Metrics and Stakeholder Communications

The Address Canvassing teams are currently discussing quality goals and plans for external stakeholder communications. As those plans are defined, this document will be updated.

11 Milestones

Date	Activity
August 2015	Release Address Validation Test Results
September 2015	Begin In-Office Address Canvassing (Interactive Review) for the 2020 Census
December 2015	Release Address Canvassing Detailed Operational Plan
March 2016	Begin In-Office Address Canvassing (Active Block Resolution) for the 2020 Census
April 2016	Begin MAF Coverage Study (Field Data Collection)
September 2016	Begin Address Canvassing Test (In-Field Address Canvassing)
September 2017	Begin In-Field Address Canvassing for the 2018 End-to-End Test
August 2019	Begin In-Field Address Canvassing for the 2020 Census

13 References

Address List Operations Implementation Team, “2010 Census Address Canvassing Operational Assessment,” U.S. Census Bureau, January 12, 2012.

Field Division, U.S. Census Bureau (2015), “Demographic Area Address Listing (DAAL) Field Representative Manual (11-832),” June, 2015.

U.S. Census Bureau (2015), “2020 Census Operational Plan,” October 6, 2015.

U.S. Census Bureau (2015), “2020 In-Field Address Canvassing Detailed Business Proposal,” July, 2015.

U.S. Census Bureau (2015), “2020 In-Field Address Canvassing Detailed Business Proposal,” July, 2015.

U.S. Census Bureau (2015), “2020 In-Office Address Canvassing Detailed Business Proposal,” July, 2015.

U.S. Census Bureau (2015), "Geographic Programs: 2020 Collection Geography Detailed Business Proposal,” June, 2015.

U.S. Census Bureau (2014), “Geography Division Address Canvassing Recommendation,” Version 1.0, Washington, D.C., September 30, 2014.

O’Hara, Amy (2015), “Linking Administrative Records at the U.S. Census Bureau,” Presentation, June 25, 2015.

15 Document Logs

15.1 Sensitivity Assessment

This table specifies whether the document contains any administratively restricted information.

Verification of Document Content
This document does not contain any: • Title 5, Title 13, or Title 26 protected information; • Procurement information; • Budgetary information; and/or, • Personally identifiable information.

15.2 Review and Approvals

This 2020 Census Detailed Operational Plan document has been reviewed and approved for use. This table documents the necessary approvals leading up to the point of baselining.

Document Review and Approval Tier: Detailed Operational Plan		
Name	**Area Represented**	**Date**
Lisa M. Blumerman	Associate Director for Decennial Census Programs	
Shirin A. Ahmed	Assistant Associate Director for Decennial Census Programs	
Deirdre D. Bishop	Chief, Decennial Census Management Division	
K. Evan Moffett	Assistant Division Chief for Geographic Operations, Decennial Census Management Division	
Kim Higginbotham	Deputy Chief, Decennial Communications Coordination Office	

15.3 Version History

Version	Date	Description
V 1.0	12/31/2015	Original baseline

17 Appendices

Appendix A: Acronyms

Acronym	Meaning
ABR	Active Block Resolution
ACS	American Community Survey
ACO	Area Census Office
ACOM	Area Census Office Manager
ADSD	Application Development and Services Division
ASE	Address Source Evaluation
BARCA	Block [or BCU] Assessment, Research and Classification Application
BCU	Basic Collection Unit
BLM	Bureau of Land Management
BTD	Block [or BCU] Tracking Database
BQARP	Boundary, Quality Assessment and Reconciliation Project
CARRA	Center for Administrative Records Research and Applications
CASS	Coding Accuracy Support System
CAUS	Community Address Update System
CCM	Census Coverage Measurement
CEDCaP	Census Enterprise Data Collection and Processing
CFM	Census Field Manager
CFS	Census Field Supervisor
CPS	Current Population Survey
CUF	Census Unedited File
DAAPS	Decennial Personnel and Payroll System
DAAL	Demographic Area Address Listing
DCMD	Decennial Census Management Division
DITD	Decennial Information Technology Division
DOD	Department of Defense
DSF	Delivery Sequence File
DSSD	Decennial Statistical Studies Division

Acronym	Meaning
FR	Field Representative
FS	Field Supervisor
FY	Fiscal Year
GATRES	Geographic Acquis-based Topological Real-time Editing system
GEO	Geography Division
GIS	Geographic Information System
GQ	Group Quarter
GQV	Group Quarters Validation
GRF	Geographic Reference File
GSS-I	Geographic Support System Initiative
GWCS	GSS-I Workflow Control System
HU	Housing Unit
IR	Interactive Review
IT	Information Technology
LACS	Locatable Address Conversion System
LiMA	Listing and Mapping Application
LUCA	Local Update of Census Addresses
MAF	Master Address File
MAFCS	Master Address File Coverage Study
MAFID	Master Address File Identification Number
MCM	Mobile Case Management
MCS	Master Control System
MSP	MAF structure point
NHIS	National Health Interview Survey
NPC	National Processing Center
OCS	Operational Control System
PBC	Partial Block Canvassing
QC	Quality Control
QI	Quality Indicators

Acronym	Meaning
ROSCO	Regional Office Survey Control System
SBE	Service-Based Enumeration
SCIF	Sample Control Input File
SIPP	Survey of Income and Program
SMaRCS	Sampling, Matching, Review and Coding System (for QC)
TAC	Technical Assistance Center
TEA	Type of Enumeration Area
TIGER	Topologically Integrated Geographic Encoding and Referencing System
TOI	Time of Interview
USPS	United States Postal Service
UTS	Unified Tracking System
YAHI	You are Here Indicator
ZCTA	ZIP Code Tabulation Area
ZIP	Zone Improvement Plan

Appendix B: Glossary

Term	Meaning
Active Block Resolution (ABR)	The ABR is a phase of the In-Office Address Canvassing operation where Census Bureau staff research blocks that have identified growth, decline, undercoverage, or overcoverage as identified by the Interactive Review phase of the In-Office Address Canvassing. The ABR will attempt to resolve these issues and update the MAF/TIGER System as appropriate. Otherwise, ABR will identify the block as a candidate for In-Field Address Canvassing or Update/Enumerate.
Block	A geographic area bounded on all sides by visible features such as roads, railroad tracks, and rivers or by invisible features, such as a county line, city limits, or a property line.
Basic Collection Unit	The BCU is a proposed new unit of geography, designed for field data collection in the 2020 Census. It serves as the smallest unit of collection geography for all 2020 Census listing-based operations. BCU would serve as the fundamental unit of work assignment for 2020 Census operations.
City-Style Address	An address that consists of a house number and street or road name, for example, 101 Main Street.
Community Address Update System (CAUS)	A system to improve the Address Frame used for ACS sampling where less of (or no) coverage from USPS DSF exists
Demographic Area Address Listing	A listing operation conducted to update the Census Bureau's address lists and maps.
Geocode	A code used to identify a specific geographic entity
Geocoding	The assignment of an address, structure, key geographic location, or business name to a location that is identified by one or more geographic codes
Group Quarters	Group Quarters are places where people live or stay, in a group living arrangement, which is owned or managed by an entity or organization providing housing and/or services for the residents. This is not a typical household-type living arrangement. These services may include custodial or medical care as well as other types of assistance, and residency is commonly restricted to those receiving these services. People living in group quarters are usually not related to each other.
Group Quarters Facility Name	The name of the larger facility in which a group quarter may be found. For example, the name of a college or university.

Term	Meaning
Housing Unit	A house, an apartment, a mobile home or trailer, a group of rooms, or a single room occupied as a separate living quarters. A housing unit must have direct access from the outside or through a common hall.
Interactive Review	The Interactive Review is the first phase of the In-Office Address Canvassing operation where Census Bureau staff compare two vintages of imagery (2009 and current) as well as MAF counts to identify areas of growth, decline, MAF undercoverage, or MAF overcoverage.
Lister	A Census Bureau field representative who travels along streets and roads to look for living quarters and updates the census address list.
Living Quarters	A place where persons either live or stay or could live or stay, and are classified as either a housing unit or group quarter. Living quarters may be occupied or vacant.
Location Address	An address used to find a living quarter on the ground.
Location/Physical Description	A short description of the location and physical characteristics of the structure that tend not to change such as building material (e.g., brick, stone), housing style, garages, porches, and so on used to help others find the structure.
Mailing Address	The address to which the United States Postal Service delivers mail.
Map spot	A symbol on the map representing the location of a structure that contains one or more living quarters.
Nonresponse Followup	A census operation that serves two purposes: • Determines the housing unit status for nonresponding addresses • Enumerates housing units for which a 2020 Census response was not received
Overcoverage	Overcoverage occurs in address frames when the frame contains more than enough records. This primarily results from two situations: there are records in the address frame that do not exist; or duplicate or multiple records in the frame target the same living quarter.
Paradata	Data that describes the way the raw data was collected. For example, the amount of time a lister spent entering the address information in the data collection instrument.
Quality Control	Quality Control is the set of activities that evaluates the quality of results based off quality requirements and identifies ways to eliminate the causes of unsatisfactory results.
Service-Based Enumeration (SBE)	An operation designed to enumerate people at facilities where they might receive services, such as shelters, soup kitchens, healthcare facilities, and other selected locations. This operation targets the types of services that primarily serve people who have no usual residence.

Term	Meaning
Tract	A small, relatively permanent statistical subdivision of a county for the purpose of presenting data. Census tracts nest within counties, and their boundaries normally follow visible features, but may follow legal geography boundaries and other non-visible features in some instances. Census tracts ideally contain about 4,000 people and 1,600 housing units.
Transitory Location	Transitory Locations are recreational vehicle parks, campgrounds, hotels, motels, marinas, racetracks, circuses, and carnivals.
Undercoverage	Undercoverage in the address frame occurs when an address is not represented (i.e. missing) on the frame. Undercoverage is the most serious type of coverage error because it can be difficult to detect and even more difficult to solve.
Wi-Fi	A local area wireless computer networking technology that allows electronic devices to network.
You are Here Indicator	A symbol on the map used to indicate where you are on the ground. The location is determined by a GPS imbedded in the mobile device.

Appendix C: GSS-I Results for Partner Provided Addresses

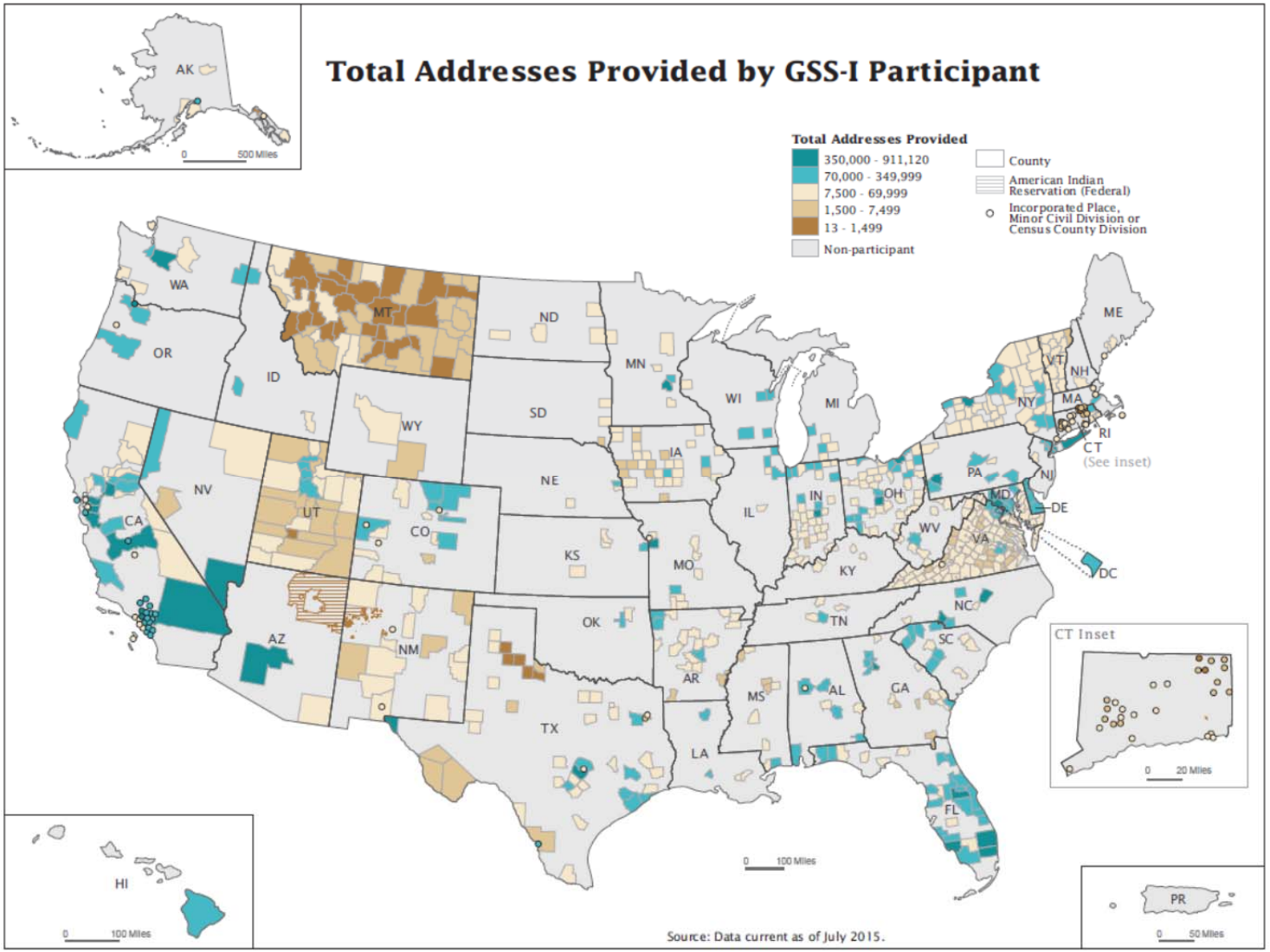


Figure 11: Total Addresses Provided by GSS-I Participant

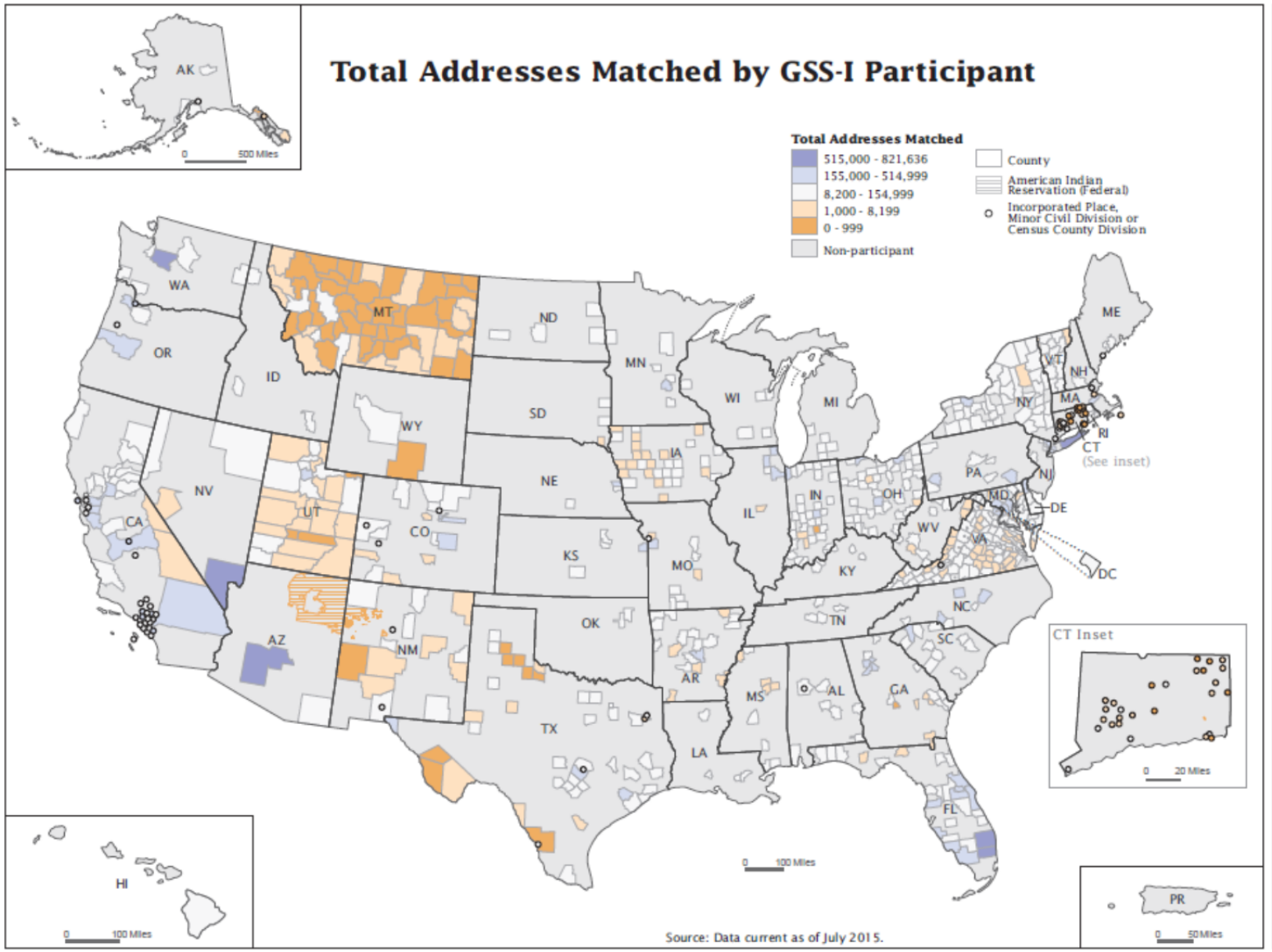


Figure 12: Total GSS-I Participant Addresses Matched to the MAF

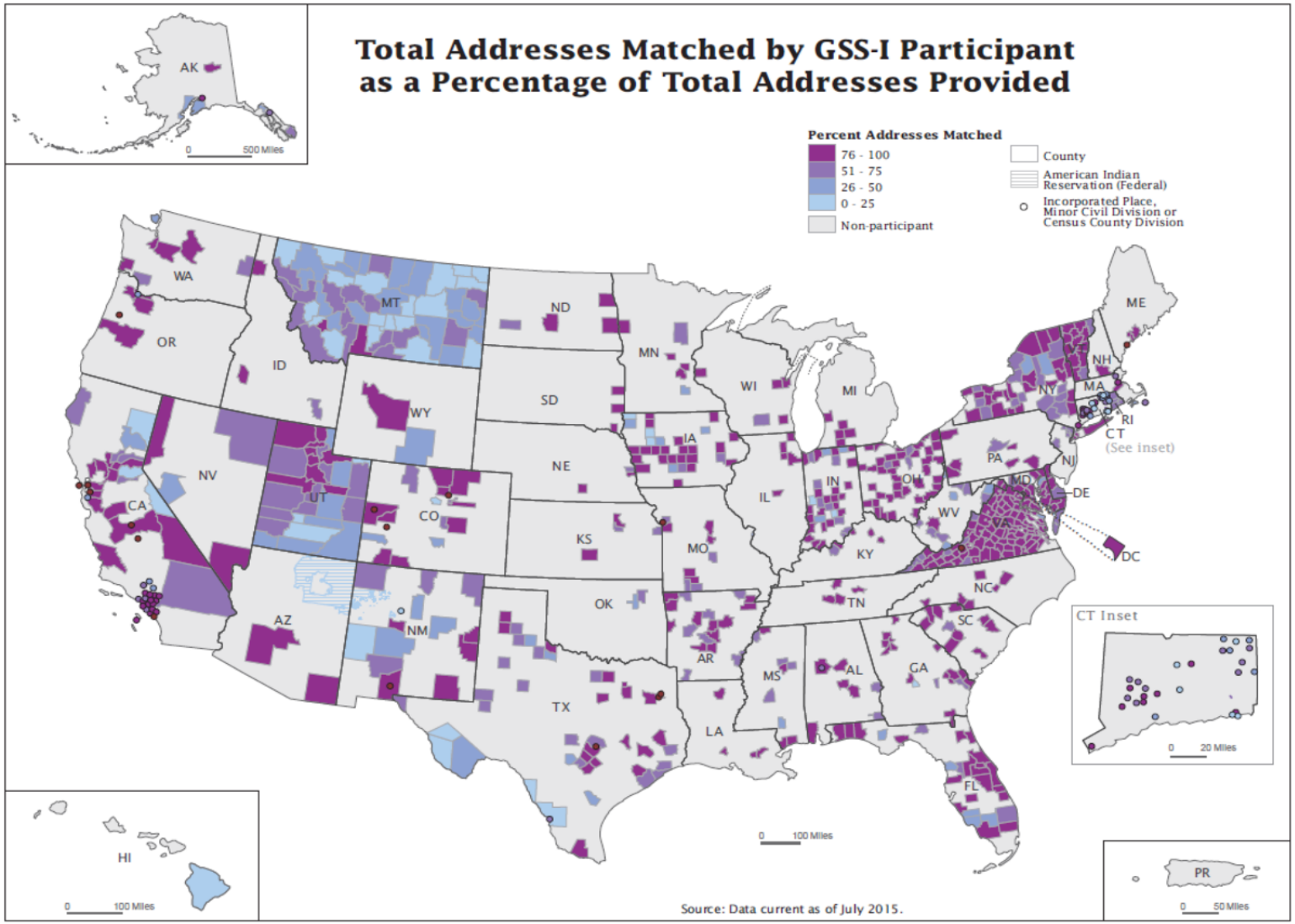


Figure 13: Percentage of GSS-I Participant Addresses Matched to the MAF

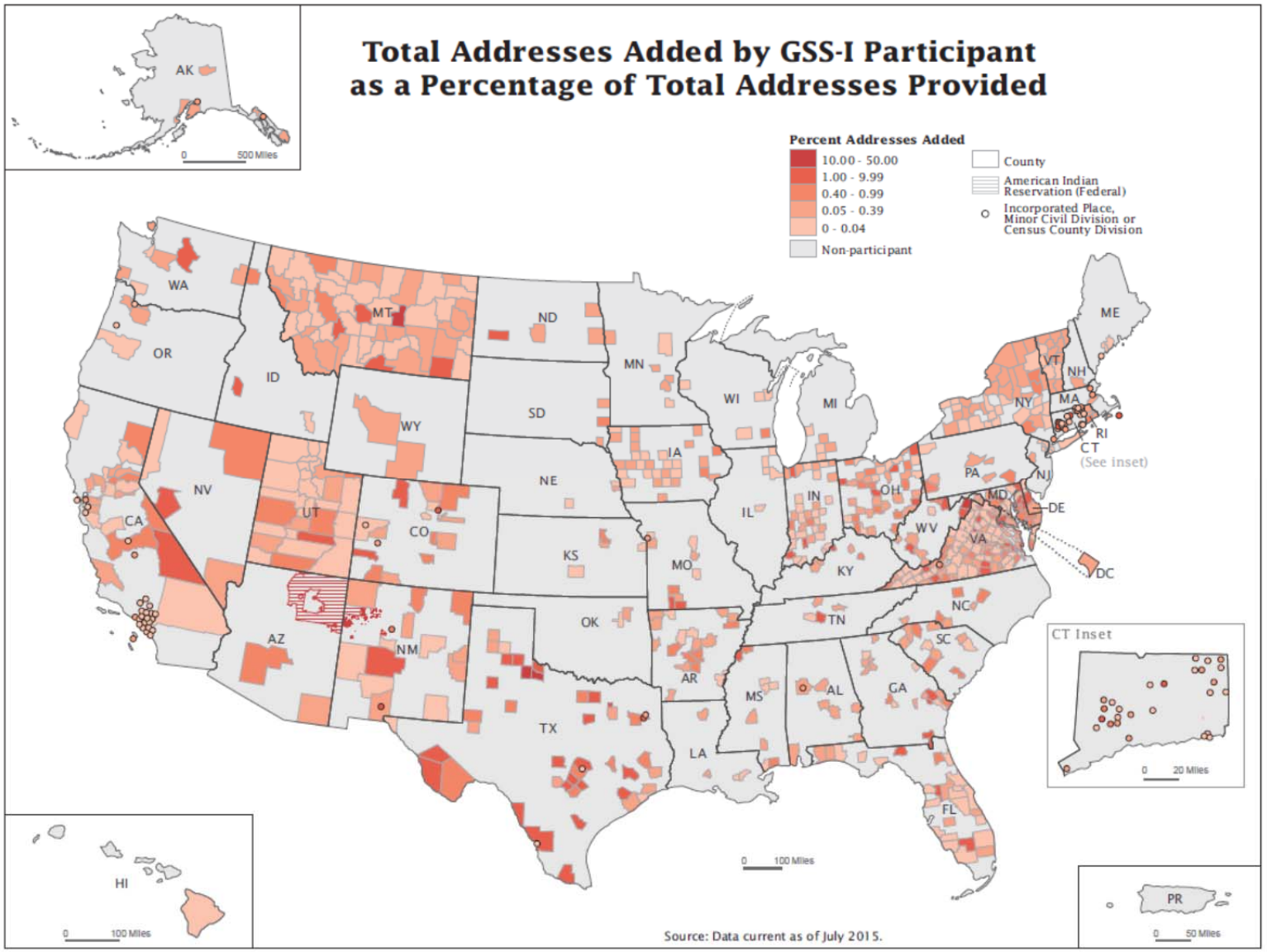


Figure 14: Total Addresses Added by GSS-I Participant

Appendix D: Business Process Models

The Address Canvassing Operation Business Process Models in this appendix are version 5.0 and were last revised on December 18th, 2015. The documents will be updated as these documents evolve and are re-baselined. The models presented here have undergone significant change and will be updated in the next version of this document.

2020 (ADC) Address Canvassing

Version: 5.0

Revision Date: December 18, 2015

United States Census Bureau

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30 Conduct In-Field Canvassing. . . . 9
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90 Conduct Master Address File Coverage Study (MAFCS). . . . 11

Facilitation & Analysis: Lena Oleynikova, Zachary Schwartz

Model Preparation: Alex Fischoff

Subject Matter Experts: Shawn Hanks, Karen Owens

Major Revision Change History

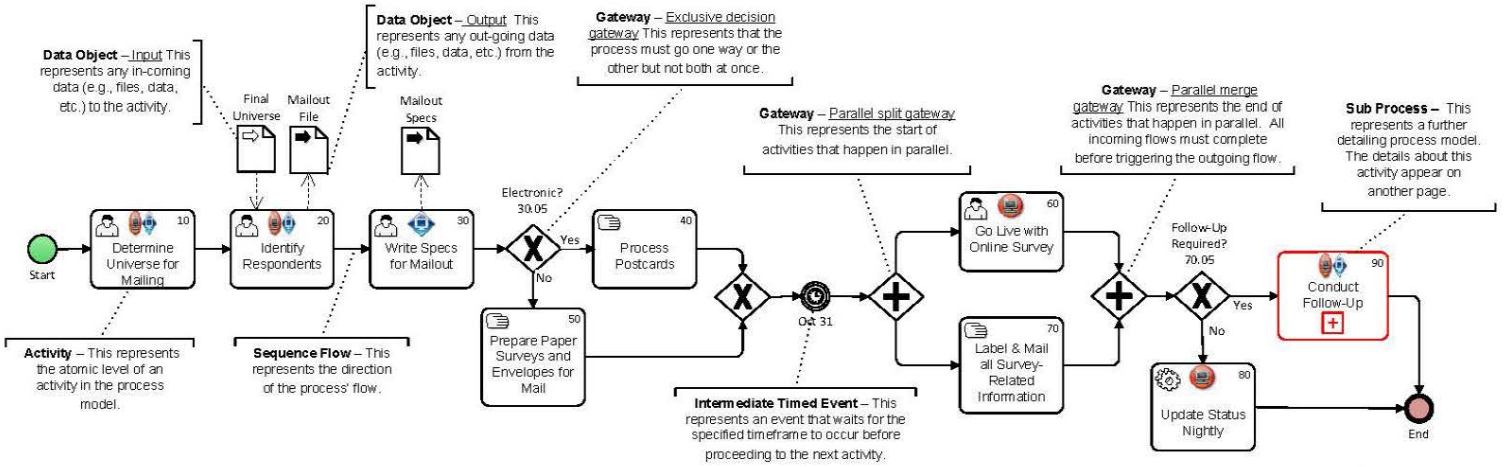
Date	Description	Author	Version #	Page #'s
12/31/2015	Baseline 1.0	Rosalyn Thomas	1.0	All
04/24/2015	Baseline 2.0	Rosalyn Thomas	2.0	All
08/14/2015	Baseline 3.0 (Added QC & other updates)	Rosalyn Thomas	3.0	All
11/20/2015	Baseline 4.0	Alex Fischoff	4.0	All
12/18/2015	Baseline 5.0	Alex Fischoff	5.0	All

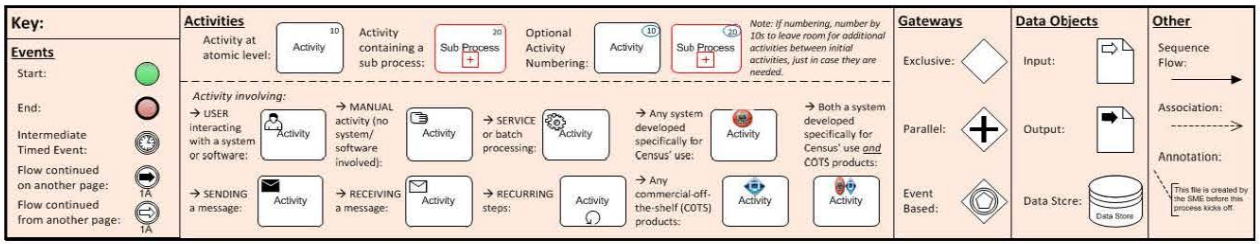
Reading and Understanding the Model

Example Activity Model

BPM Purpose

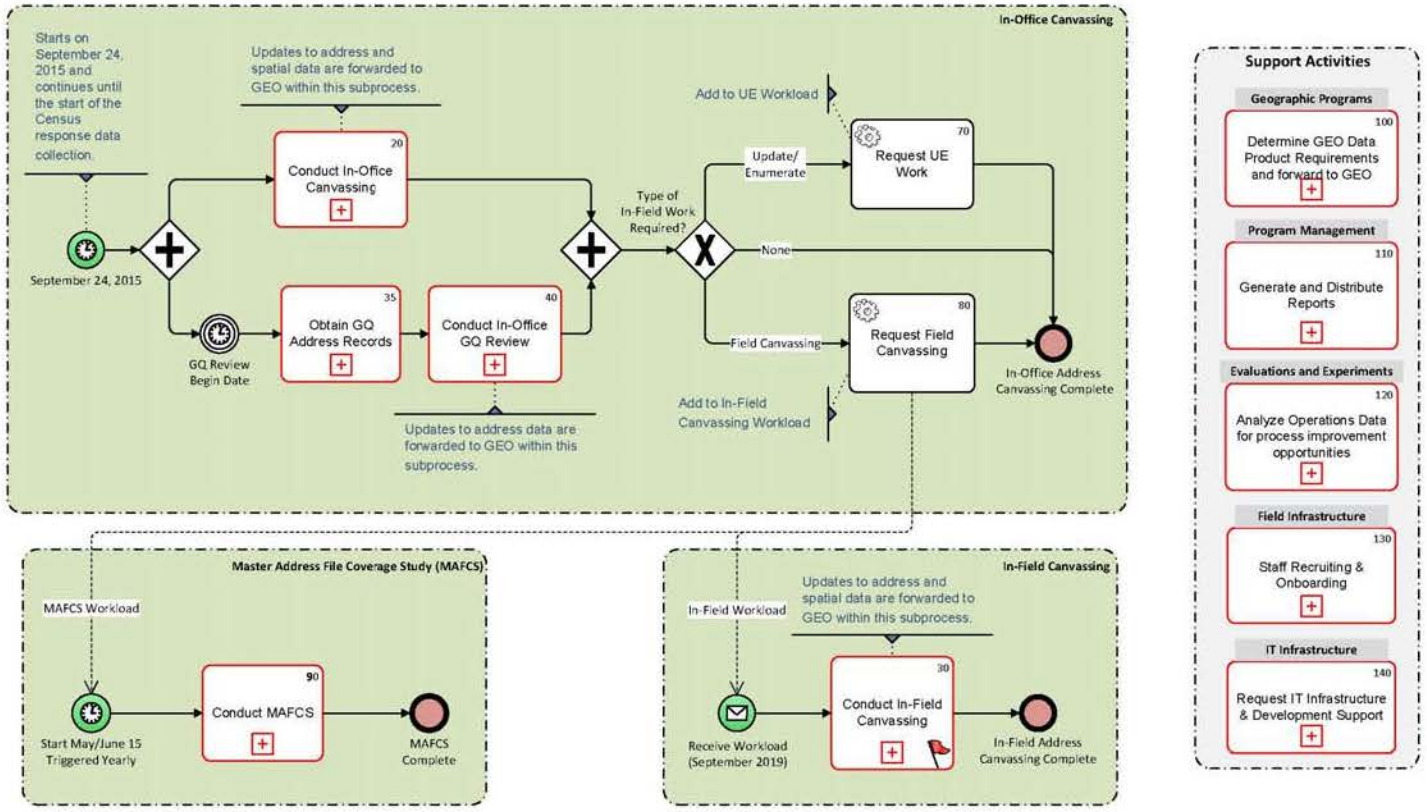
- Describe Census Operations business processes – activities, resources and key milestones
- Provide the details necessary for non-subject matter experts to understand the business process
- Contribute to the requirements development process
- Facilitate the linkage of business processes to IT capabilities
- Capture Operations inputs and outputs





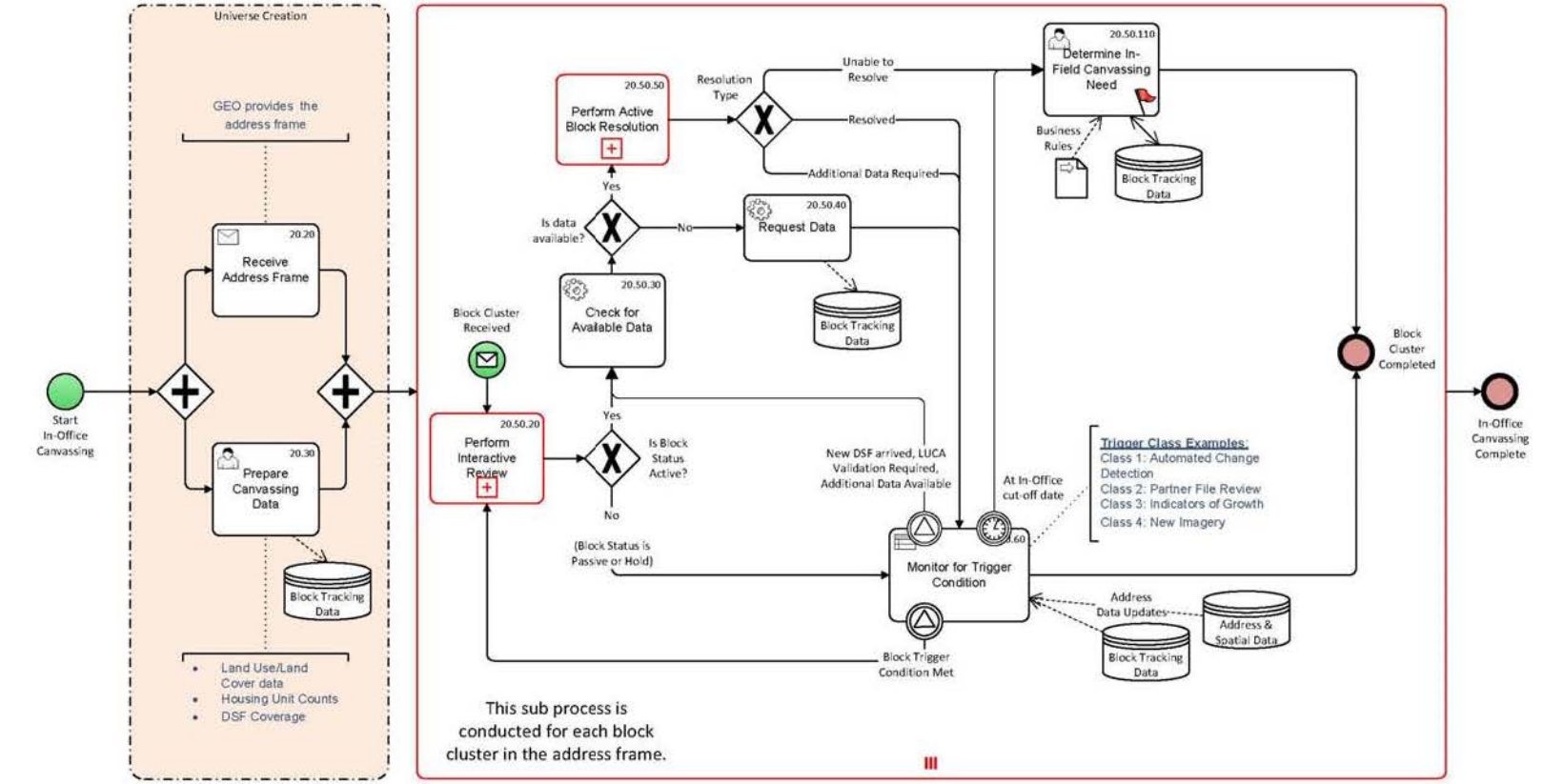
2020 (ADC) Address Canvassing

Purpose: To improve and refine the Census Bureau's address list in advance of the Census enumeration.



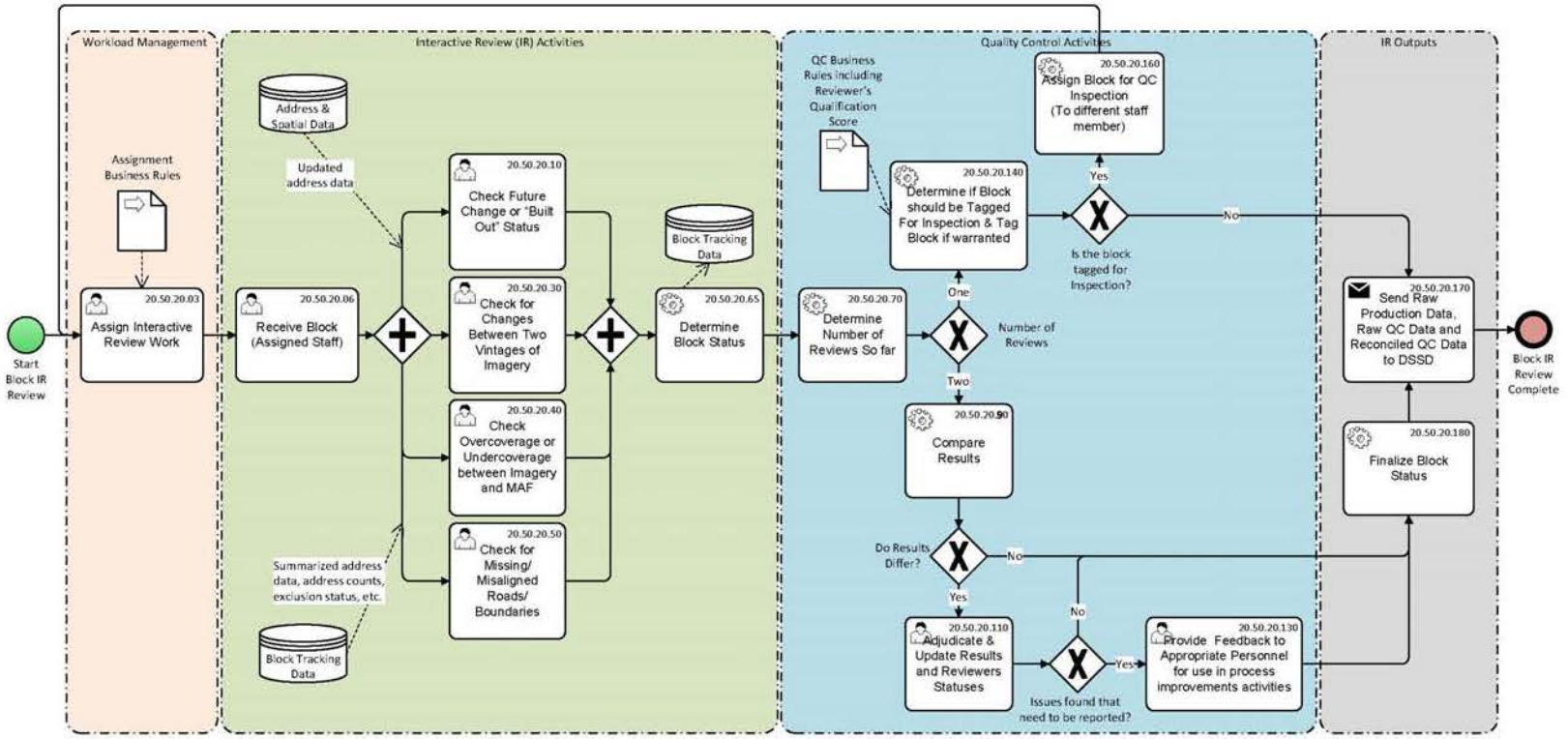
20 Conduct In-Office Canvassing

Purpose: To use empirical geographic evidence to assess and update the current address list.



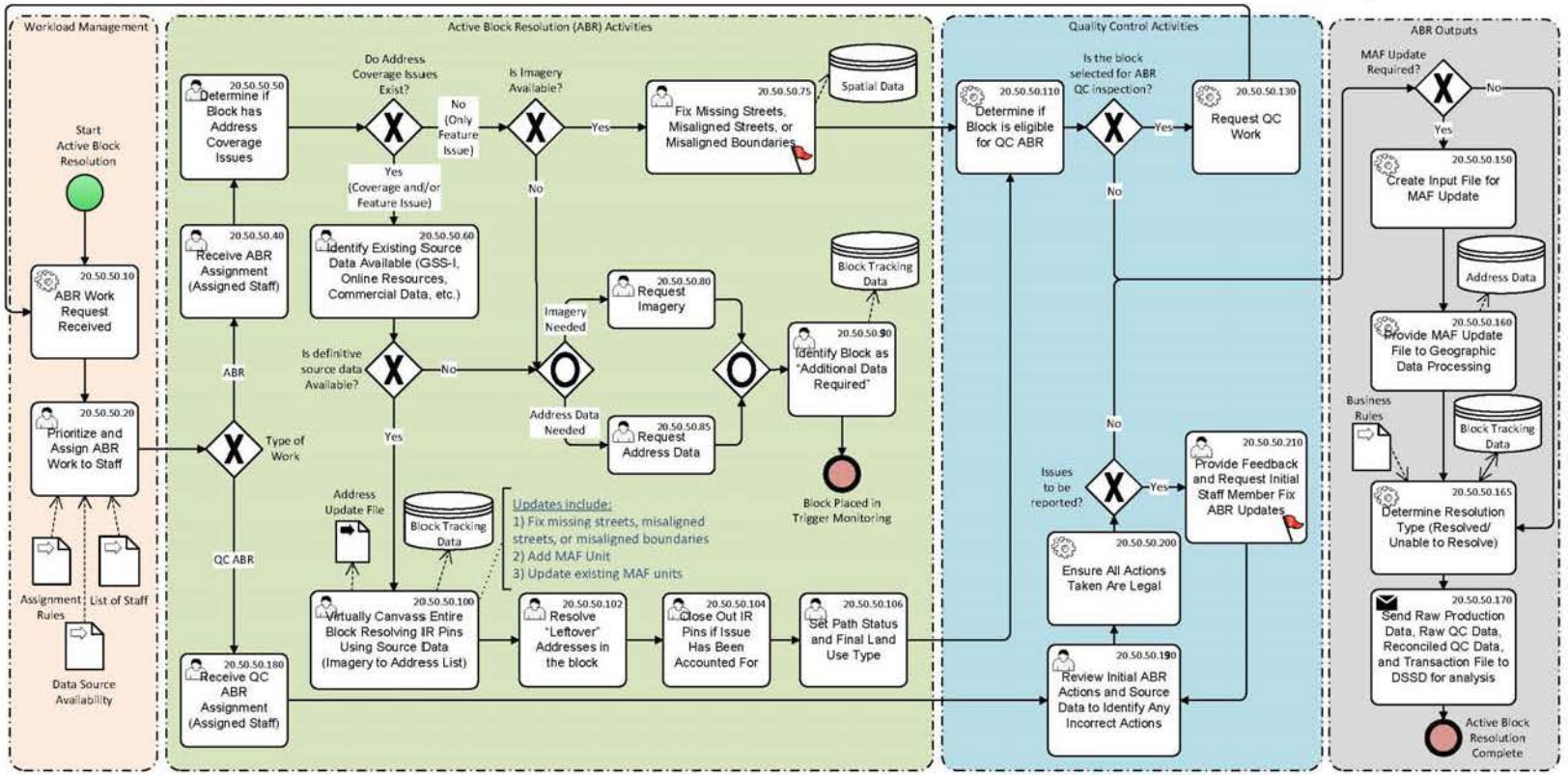
20.50.20 Perform Interactive Review

Purpose: To assess changes between current imagery and the baseline vintage of imagery to determine if imagery is consistent with the MAF.



20.50.50 Perform Active Block Resolution

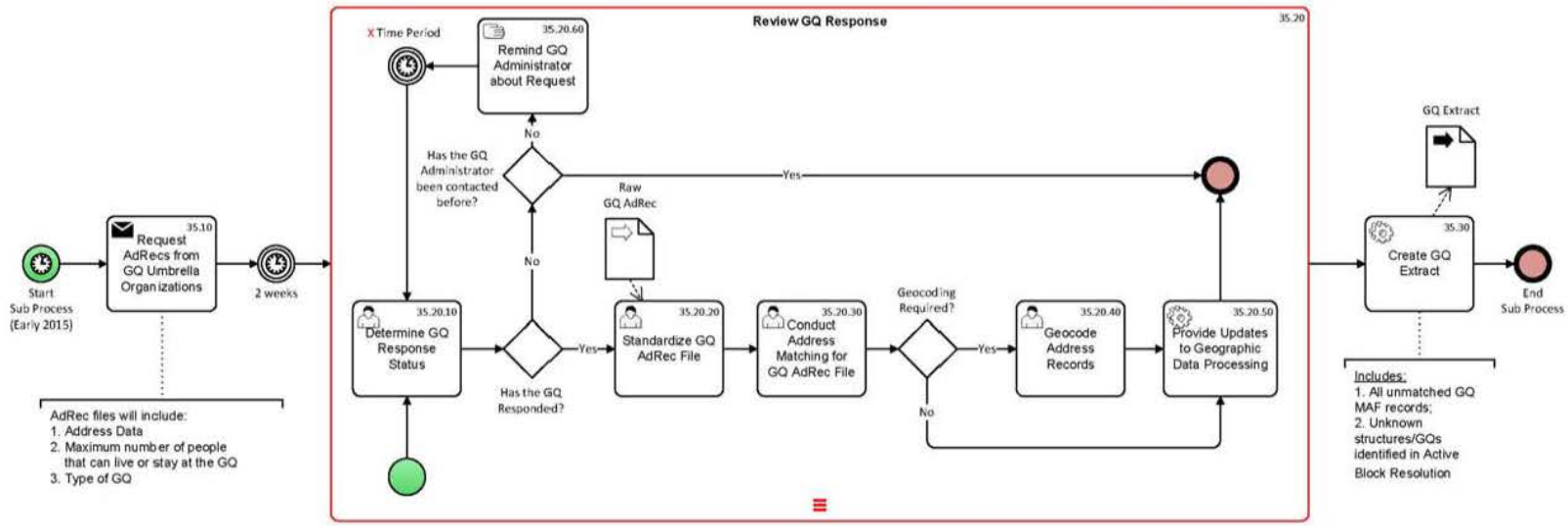
Purpose: To attempt to resolve coverage issues identified in IR using MAF/TIGER and external data sources when available.



NOTE: The ABR QC design has not yet been fully determined.

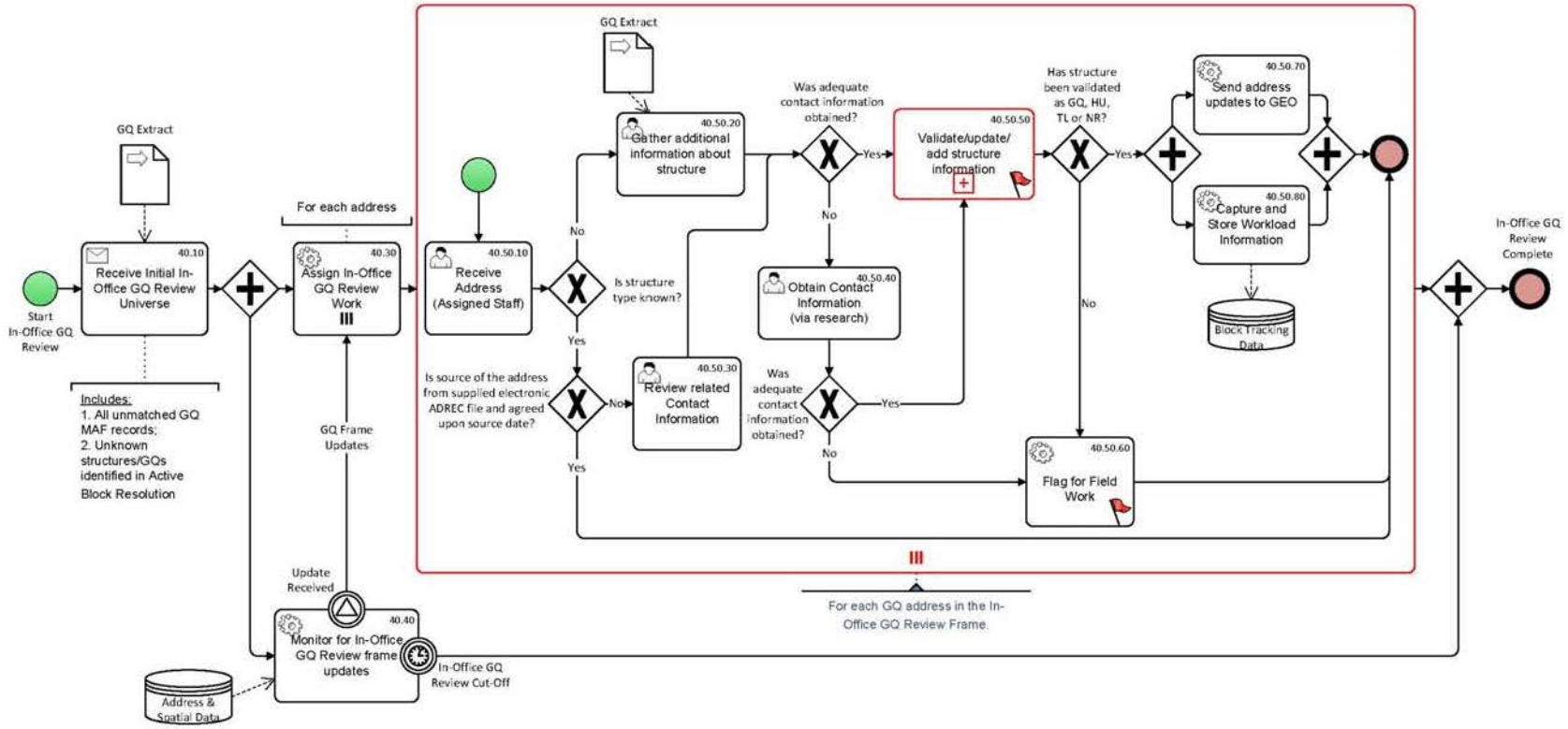
35 Obtain GQ Address Records (AdRecs)

Purpose: To receive Address Records from GQ umbrella organizations to validate MAF GQ records.



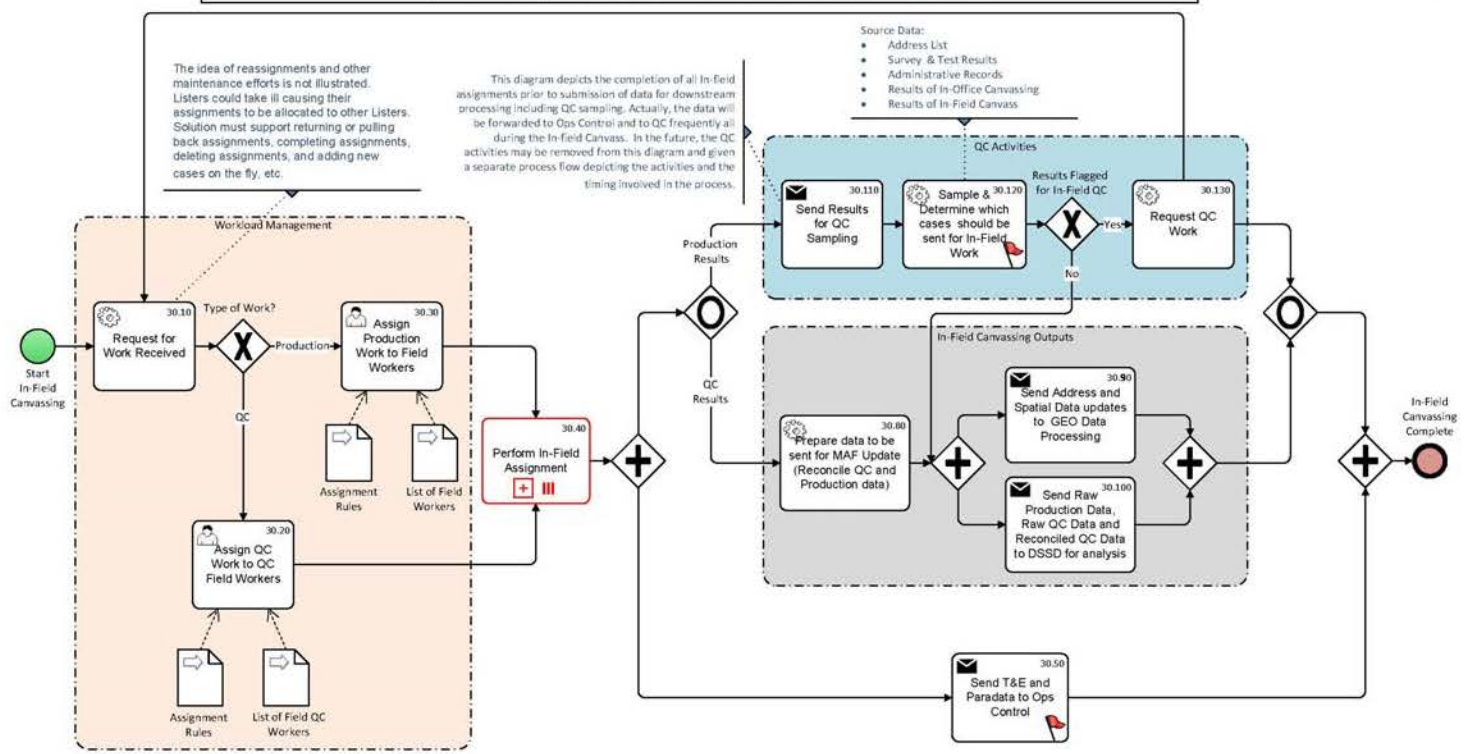
40 Conduct In-Office GQ Review

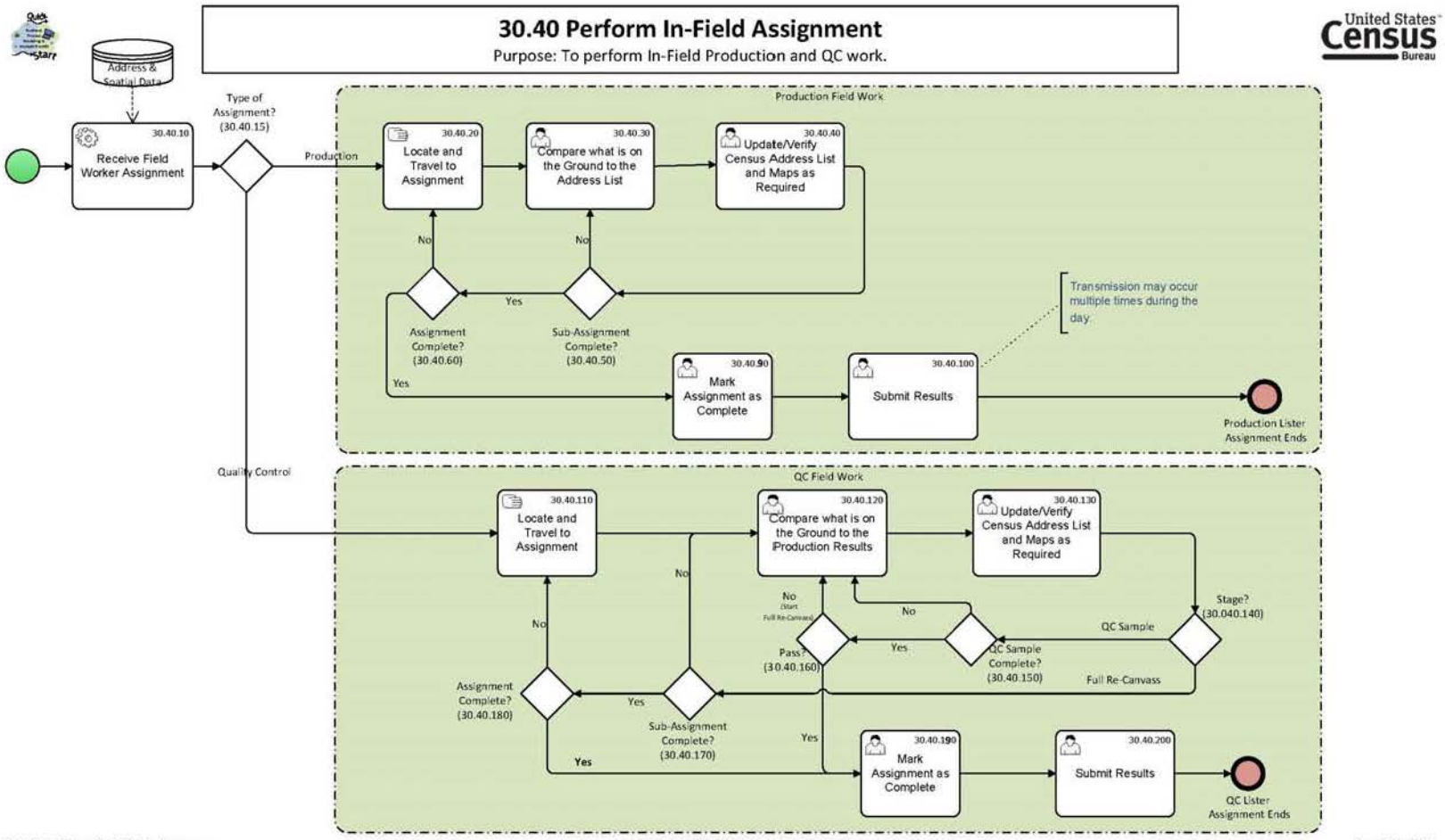
Purpose: To perform in-office review for all GQ addresses within the GQ extract.



30 Conduct In-Field Canvassing

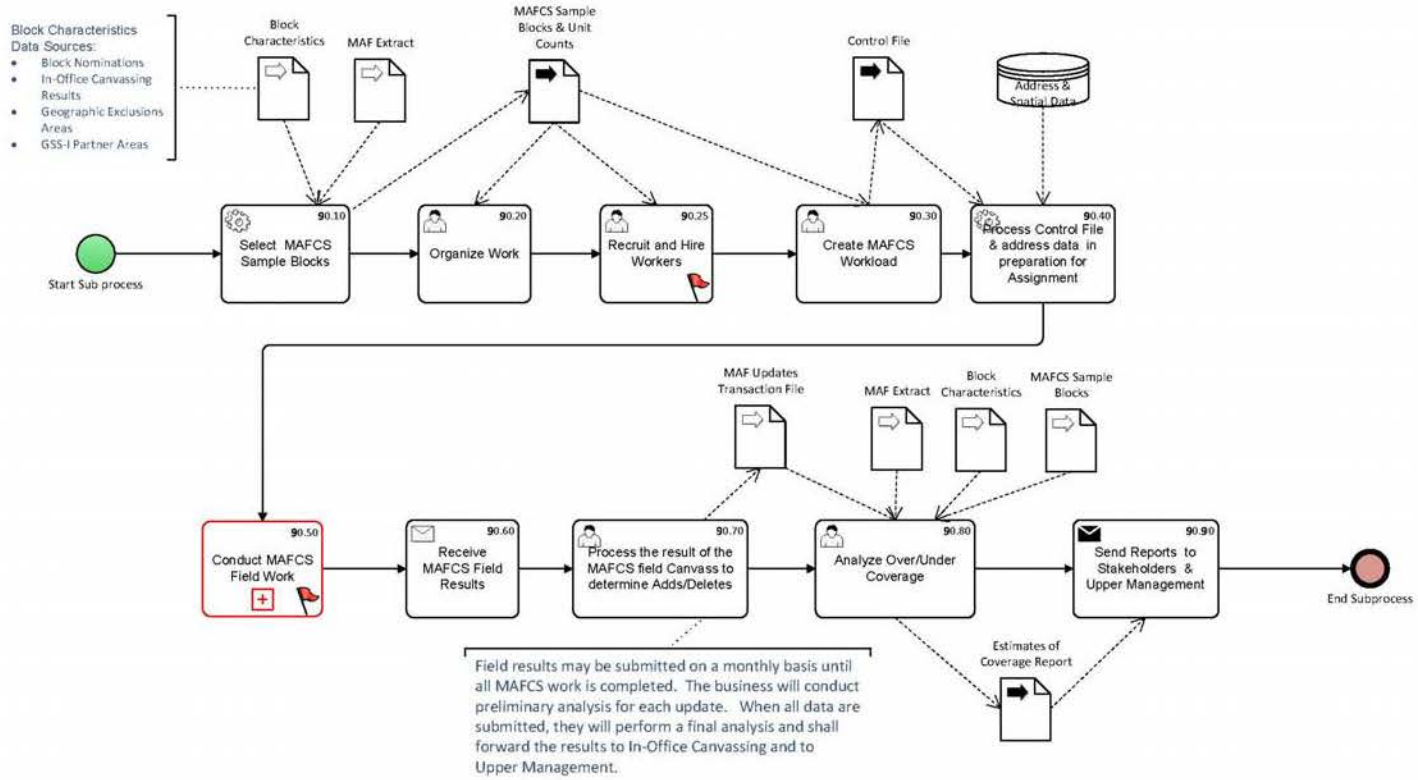
Purpose: To manage the workload of Field Workers including QC Field Workers.




30.40 Perform In-Field Assignment
Purpose: To perform In-Field Production and QC work.
United States Census Bureau
Address & Spatial Data
Type of Assignment? (30.40.15)
30.40.10
Receive Field Worker Assignment
Production
Production Field Work
30.40.20
Locate and Travel to Assignment
30.40.30
Compare what is on the Ground to the Address List
30.40.40
Update/Verify Census Address List and Maps as Required
No
No
Yes
Assignment Complete? (30.40.60)
Sub-Assignment Complete? (30.40.50)
Yes
Transmission may occur multiple times during the day.
30.40.90
Mark Assignment as Complete
30.40.100
Submit Results
Production Lister Assignment Ends
Quality Control
QC Field Work
30.40.110
Locate and Travel to Assignment
30.40.120
Compare what is on the Ground to the Production Results
30.40.130
Update/Verify Census Address List and Maps as Required
No
No
No (Start Full Re-Canvass)
Pass? (30.40.160)
Yes
No
QC Sample Complete? (30.40.150)
QC Sample
Stage? (30.040.140)
Full Re-Canvass
Assignment Complete? (30.40.180)
Yes
Sub-Assignment Complete? (30.40.170)
Yes
Yes
30.40.190
Mark Assignment as Complete
30.40.200
Submit Results
QC Lister Assignment Ends

90 Conduct Master Address File Coverage Study (MAFCS)

Purpose: To determine over/under coverage for a given MAF Coverage area. This process includes the creation of the In-Field workload, canvassing of sample blocks, and the analysis of collected data. The analysis results are used to determine statistically the over/under coverage stats for the entire Master Address Frame.



Appendix E: In-Field Address Canvassing Status Codes

Status	Meaning
Housing Unit	The living quarters is a house, an apartment, a mobile home or trailer
Uninhabitable Housing Unit	The housing unit is either vacant, open to the elements, condemned, or burned out, and because of these conditions is unfit for habitation
Group Quarters	The living quarters is a residence where people share common facilities or receive authorized care or custody
Uninhabitable Group Quarters	The group quarters is vacant, open to the elements, condemned, or burned out, and because of these conditions is unfit for habitation
Empty Trailer Pad/Mobile Home Site	The location is an empty trailer pad or mobile home site in a trailer park or mobile home community
Under Construction	The address is undergoing construction
Nonresidential	The address is solely used for business purposes
Duplicate	The address describes the same living quarters as another address on the list
Does Not Exist	The address on the list cannot be located in the block or in a nearby fringe area
Exists in the Fringe	The address is not located in the block, but it is in an adjacent block within the fringe area
Unable to Work	The address cannot be confirmed because access to the block or parts of the block is limited due to a dangerous situation, or natural or manmade barriers

Appendix F: 2020 Census Group Quarters Type Codes

Group Quarters	
A group quarters is a place where people live or stay in a group living arrangement that is owned or managed by an entity or organization providing housing and/or services for the residents. This is not a typical household-type living arrangement. These services may include custodial or medical care as well as other types of assistance, and residency is commonly restricted to those receiving these services. People living in group quarters are usually not related to each other. Group quarters include such places as college residence halls, residential treatment centers, skilled nursing facilities, group homes, military barracks, correctional facilities, and workers' dormitories.	
101	**Federal Detention Centers** Stand alone, generally multi-level, federally operated correctional facilities that provide "short-term" confinement or custody of adults pending adjudication or sentencing. These facilities may hold pretrial detainees, holdovers, sentenced offenders, and Immigration and Customs Enforcement (ICE) inmates, formerly called Immigration and Naturalization Service (INS) inmates. These facilities include: Metropolitan Correctional Centers (MCCs), Metropolitan Detention Centers (MDCs), Federal Detention Centers (FDCs), Bureau of Indian Affairs Detention Centers, ICE Service Processing Centers, and ICE contract detention facilities.
102 **103**	**Federal Prisons** **State Prisons** Adult correctional facilities where people convicted of crimes serve their sentences. Common names include: prison, penitentiary, correctional institution, federal or state correctional facility, and conservation camp. The prisons are classified by two types of control: (1) "federal" (operated by or for the Bureau of Prisons of the Department of Justice) and (2) "state." Residents who are forensic patients or criminally insane are classified on the basis of where they resided at the time of enumeration. Patients in hospitals (units, wings, or floors) operated by or for federal or correctional authorities are counted in the prison population. Other forensic patients will be enumerated in psychiatric hospital units and floors for long-term non-acute patients. This category may include privately operated correctional facilities.
104	**Local Jails and Other Municipal Confinement Facilities** Correctional facilities operated by or for counties, cities, and American Indian and Alaska Native tribal governments. These facilities hold adults detained pending adjudication and/or people committed after adjudication. This category also includes work farms and camps used to hold people awaiting trial or serving time on relatively short sentences. Residents who are forensic patients or criminally insane are classified on the basis of where they resided at the time of enumeration. Patients in hospitals (units, wings, or floors) operated by or for local correctional authorities are counted in the jail population. Other forensic patients will be enumerated in psychiatric hospital units and floors for long-term non-acute patients. This category may include privately operated correctional facilities.

105	**Correctional Residential Facilities** These are community-based facilities operated for correctional purposes. The facility residents may be allowed extensive contact with the community, such as for employment or attending school, but are obligated to occupy the premises at night. Examples are halfway houses, restitution centers, and prerelease, work release, and study centers.
106	**Military Disciplinary Barracks and Jails** Correctional facilities managed by the military to hold those awaiting trial or convicted of crimes.
201	**Group Homes for Juveniles (non-correctional)** Includes community-based group living arrangements for youth in residential settings that are able to accommodate three or more clients of a service provider. The group home provides room and board and services, including behavioral, psychological, or social programs. Generally, clients are not related to the caregiver or to each other. Examples are maternity homes for unwed mothers, orphanages, and homes for abused and neglected children in need of services. Group homes for juveniles do not include residential treatment centers for juveniles or group homes operated by or for correctional authorities.
202	**Residential Treatment Centers for Juveniles (non-correctional)** Includes facilities that primarily serve youth that provide services on-site in a highly structured live-in environment for the treatment of drug/alcohol abuse, mental illness, and emotional/behavioral disorders. These facilities are staffed 24-hours a day. The focus of a residential treatment center is on the treatment program. Residential treatment centers for juveniles do not include facilities operated by or for correctional authorities.
203	**Correctional Facilities Intended for Juveniles** Includes specialized facilities that provide strict confinement for its residents and detain juveniles awaiting adjudication, commitment or placement, and/or those being held for diagnosis or classification. Also included are correctional facilities where residents are permitted contact with the community, for purposes such as attending school or holding a job. Examples are residential training schools and farms, reception and diagnostic centers, group homes operated by or for correctional authorities, detention centers, and boot camps for juvenile delinquents.
301	**Nursing Facilities/Skilled-Nursing Facilities** Includes facilities licensed to provide medical care with seven day, twenty-four hour coverage for people requiring long-term non-acute care. People in these facilities require nursing care, regardless of age. Either of these types of facilities may be referred to as nursing homes.
401	**Mental (Psychiatric) Hospitals and Psychiatric Units in Other Hospitals** Includes psychiatric hospitals, units and floors for long-term non-acute care patients. The primary function of the hospital, unit, or floor is to provide diagnostic and treatment services for long-term non-acute patients who have psychiatric-related illness. All patients are enumerated in this category.

402	**Hospitals with Patients Who Have No Usual Home Elsewhere** Includes hospitals if they have any patients who have no exit or disposition plan, or who are known as "boarder patients" or "boarder babies." All hospitals are eligible for inclusion in this category except psychiatric hospitals, units, wings or floors operated by federal, state or local correctional authorities. Patients in hospitals operated by these correctional authorities will be counted in the prison or jail population. Psychiatric units and hospice units in hospitals are also excluded. Only patients with no usual home elsewhere are enumerated in this category.
403	**In-Patient Hospice Facilities** Includes in-patient hospice facilities (both free-standing and units in hospitals) that provide palliative, comfort, and supportive care for the terminally ill patient and their families. Only patients with no usual home elsewhere are tabulated in this category.
404	**Military Treatment Facilities with Assigned Patients** These facilities include military hospitals and medical centers with active duty patients assigned to the facility. Only these patients are enumerated in this category.
405	**Residential Schools for People with Disabilities** Includes schools that provide the teaching of skills for daily living, education programs, and care for students with disabilities in a live-in environment**.** Examples are residential schools for the physically or developmentally disabled.
501*	**College/University Student Housing** Includes residence halls and dormitories, which house college and university students in a group living arrangement. These facilities are owned, leased, or managed either by a college, university, or seminary, or by a private entity or organization. Fraternity and sorority housing recognized by the college or university are included as college student housing. Students attending the U.S. Naval Academy, the U.S. Military Academy (West Point), the U.S. Coast Guard Academy, and the U.S. Air Force Academy are counted in military group quarters.
601 **602**	**Military Quarters** **Military Ships** These facilities include military personnel living in barracks (including “open” barrack transient quarters) and dormitories and military ships. Patients assigned to Military Treatment Facilities and people being held in military disciplinary barracks and jails are not enumerated in this category. Patients in Military Treatment Facilities with no usual home elsewhere are not enumerated in this category.

701*	**Emergency and Transitional Shelters (with Sleeping Facilities) for People Experiencing Homelessness** Facilities where people experiencing homelessness stay overnight. These include: 1) Shelters that operate on a first-come, first-serve basis where people must leave in the morning and have no guaranteed bed for the next night; 2) Shelters where people know that they have a bed for a specified period of time (even if they leave the building every day); and 3) Shelters that provide temporary shelter during extremely cold weather (such as churches). This category does not include shelters that operate only in the event of a natural disaster. Examples are emergency and transitional shelters; missions; hotels and motels used to shelter people experiencing homelessness; shelters for children who are runaways, neglected or experiencing homelessness; and similar places known to have people experiencing homelessness.
703	**Domestic Violence Shelters** Includes community-based homes, shelters or crisis centers that provide housing for people who have sought shelter from household violence and my have been physically abused.
702 **704** **706**	**Soup Kitchens** **Regularly Scheduled Mobile Food Vans** **Targeted Non-Sheltered Outdoor Locations** Includes soup kitchens that offer meals organized as food service lines or bag or box lunches for people experiencing homelessness; street locations where mobile food vans regularly stop to provide food to people experiencing homelessness; and targeted non-sheltered outdoor locations where people experiencing homelessness live without paying to stay. Targeted non-sheltered outdoor locations must have a specific location description; for example, "the Brooklyn Bridge at the corner of Bristol Drive" or "the 700 block of Taylor Street behind the old warehouse."
801*	**Group Homes Intended for Adults** Group homes are community-based group living arrangements in residential settings that are able to accommodate three or more clients of a service provider. The group home provides room and board and services, including behavioral, psychological, or social programs. Generally, clients are not related to the caregiver or to each other. Group homes do not include residential treatment centers or facilities operated by or for correctional authorities.
802*	**Residential Treatment Centers for Adults** Residential facilities that provide treatment on-site in a highly structured live-in environment for the treatment of drug/alcohol abuse, mental illness, and emotional/behavioral disorders. They are staffed 24-hours a day. The focus of a residential treatment center is on the treatment program. Residential treatment centers do not include facilities operated by or for correctional authorities.
900	**Maritime/Merchant Vessels** Includes U.S. owned and operated flag vessels used for commercial or noncombatant government related purposes at U.S. ports, upon the sea, or on the Great Lakes.

901*	**Workers' Group Living Quarters and Job Corps Centers** Includes facilities such as dormitories, bunkhouses, and similar types of group living arrangements for agricultural and non-agricultural workers. This category also includes facilities that provide a full-time, year-round residential program offering a vocational training and employment program that helps young people 16-to-24 years old learn a trade, earn a high school diploma or GED and get help finding a job. Examples are group living quarters at migratory farm worker camps, construction workers' camps, Job Corps centers and vocational training facilities.
902*	**Religious Group Quarters** These are living quarters owned or operated by religious organizations that are intended to house their members in a group living situation. This category includes such places as convents, monasteries, and abbeys. Living quarters for students living or staying in seminaries are classified as college student housing not religious group quarters.
903	**Living Quarters for Victims of Natural Disasters** These are temporary group living arrangements established as a result of natural disasters.
999	**Vacants** The facility is not in use.

*Staff residing at this type of Group Quarters are counted in the same GQ as the other residents. These codes are 501, 701, 702, 801, 802, 901, and 902.