One-Year Post-Hurricane Matthew Field Study in Lumberton, North Carolina Housing/Household Recovery Survey

U.S. Department of Commerce
National Institute of Standards and Technology
Generic Clearance for Community Resilience Data Collections
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For each proposed request using this generic clearance, NIST will submit the actual instrument and related documents (letters, emails to respondents, scripts, etc.), as well as proposed statistical methods to be employed to OMB along with responses to the following questions:

1. Explain who will be surveyed and why the group is appropriate to survey.

The Center of Excellence (CoE) field studies team in conjunction with NIST researchers will conduct another round of data collection as part of the field study in Lumberton, North Carolina, which experienced major flooding damage due to Hurricane Matthew in early October 2016. The purpose of this field study is to explore the interconnectivity between structural damage (buildings, roads, bridges, power, water) and social-economic impacts to the community. The information collected in this household survey instrument will augment findings from December 2016. The data from this collection will contribute to the housing recovery modeling in the IN-CORE community resilience modeling environment, as well as to NIST research on community resilience.

The new household survey instrument is written to assess housing recovery, dislocation, work and school impacts for households in Lumberton, NC following Hurricane Matthew (October 2016). From the initial household survey conducted in December 2016, we are aware that the structural damage from Hurricane Matthew was significant in its impact to the population in terms of leading to dislocation and associated social and economic impacts. Approximately one year from the initial collection, the team aims to collect information on the recovery of these housing units and the associated households.

We will be surveying randomly sampled households that were part of the initial sample in Lumberton, NC with a goal of 400 structures. For household surveys conducted in December 2016, we conducted a cluster sample of households within the most heavily impacted school attendance zones. The sampling strategy is outlined in Response 3.

2. Explain how the survey was developed including consultation with interested parties, pretesting, and responses to suggestions for improvement.

The survey instrument was developed by the NIST funded Resilience Center of Excellence in collaboration with NIST researchers. Several of the foundational questions on household dislocation and associated social and economic impacts were drawn from the initial survey instrument used in Year 1. The new sections of the survey draw from existing survey instruments focused on housing recovery and disaster impacts to children and families. Additionally, the survey draws from the rich experience of the CoE and NIST researchers in the area of disaster studies.

During development, the survey instrument underwent several rounds of review by researchers on both the CoE team and at NIST, specifically in the Community Resilience Group of NIST's Engineering Laboratory (EL). Finally, the survey instruments were reviewed by the broader, interdisciplinary team that participated in the first data collection effort in Lumberton, NC. This iterative collaboration created a relatively brief and thorough instrument. Interviewer guidance has been added throughout the revision process in order to support the proper elicitation of responses when in the field.

3. Explain how the survey will be conducted, how customers will be sampled if fewer than all customers will be surveyed, expected response rate, and actions your agency plans to take to improve the response rate.

The survey will be conducted by an interviewer as a face-to-face survey for up to 400 households. A consent script will be used. Each survey should require no more than 10 minutes. The surveying will likely take place across several long weekends in order to maximize the response rate by surveying at times when householders are more likely to be present. Surveyors will receive training prior to being in the field.

For household surveys conducted in December 2016, we conducted a cluster sample of households within the most heavily impacted school attendance zones. The sampling strategy is outlined below:

> 1) Develop a baseline assessment of the population of individuals/household in our focus areas prior to the flooding. This will be done using Census block data from the 2010 Decennial Census of Population and Housing, as well as Census block-group data from the American Community Survey 2014 5-year estimates.
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> 2) Select a representative sample of households for the focus areas (i.e., the school attendance zones for the focus schools within Lumberton). Using existing data to help inform the sample selection, the goal will be to obtain variability and representativeness with respect to damage (flood heights and structural damage), socio-demographic characteristics (race/ethnicity, income, and tenure), and housing types (single attached, multi-attached townhouses, duplexes, and other multi-family structures), to the greatest extent possible.

3) Based the above factors and the purposes and goals of the fieldwork, we will apply a two stage cluster sample in which our penultimate sampling units are census blocks and our primary sample units are again housing units/households.

> *Stage 1*: We will identify all census block that are 1) within the attendance zones of our target schools and 2) are within the 100 and 500-year flood plains.
> If possible, we will utilize actual inundation maps as opposed to flood plains. At present, given available data, we utilize a 100m buffer zone around the 100/500 year flood plains as a conservative estimates of the extent of flooding experienced in Lumberton.
> Based on the criteria above, we will identify blocks falling into the target and buffer zones.
> We will gather data on all block groups for Lumberton these will include the boundary files for block groups and census data on number of individuals, household, race and ethnicity, housing units, housing types, etc.
>
> *Stage 2*: Based on these data our penultimate sampling units (blocks) will be selected utilizing a probability proportion to size random sampling procedure. This process will be evaluated to insure we are generating a good representative sample of the area – if we need to we can adjust this sampling strategy (introducing disproportionate sampling options) to better insure representativeness with respect to racial/ethnic and damage criteria.

4) Once the blocks have been selected, the data from these blocks combined with Google mapping data, and parcel data will be used to estimate the numbers of structures and, most importantly, housing units on the block along with the potential location, distribution among the housing structures on the block.

5) The primary sampling will be based on a random selection of a fixed sample size of housing units for all blocks – this will insure that we have a nice random sample of our primary sampling units for the study.

> Note 1: since it is possible that housing units may be located in a single multi-family structure, there may be fewer structures to do assessments on than there will be housing units.
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> Note 2: it may be conceivable that we try to sample within all blocks – if the number of blocks potentially in the flooded area is relatively small – in which case we will use a simple random sampling technique.

6) Final sample determination will be based on advanced team's actual observation and verification of the numbers of structures and housing units in each block. A critical element of this procedure will be the assignment of numbers to each housing unit in the block. Again, since there may be multiple housing units in each structure, we want to assure that we are getting accurate counts AND the appropriate assignment of numeric

values to each housing unit within the structure. This will better ensure that we are not introducing potential bias in to our final sample.

7) Finally, the sample will be spatially and temporally ordered so as to make the field work as efficient, logical, and safe as possible. The primary sample units are housing units/households located in various forms of housing structures (single family, single family attached, duplexes, multi-family structures of various forms).

The expected response rate is 60%. It should be noted that responding to any or all the survey is considered as a survey response. Although resources (staff, time, and funds) will be limiting factors, several actions can be taken to improve the outcomes of the field study data collection. The team will take the following actions to ensure a higher response rate:

- Training surveyors for maximum efficiency in the field,
- Concentrating surveying on weekends and evenings,
- Making repeat visits to households,
- Arranging scheduled follow up times for households not available for surveying during initial visit (if willing to participate),
- And, adjusting the field work plan and team composition based upon daily evaluation of results.

Burden estimate: (assumes 100% response rate)
400 households x 10 minutes = 67 hours

4. Describe how the results of the survey will be analyzed and used to generalize the results to the entire customer population.

It is expected that the findings of this survey will inform the understanding of the CoE field studies team in conjunction with NIST researchers in terms of housing recovery and best practices and circumstances for recovery.

The data will be analyzed as a case study in the specific context of Lumberton, NC and the existing social, economic, and built infrastructure elements to the community. Statistical analysis will be used to determine trends and correlations in the data, as well as relationships between factors that contributed to housing recovery, dislocation, work and school impacts. There are six main survey sections in the household survey tool. The sections are:

1) Establish eligibility
2) Housing damage
3) Financial assistance for housing recovery
4) Dislocation and work impacts
5) School recovery impacts
6) Household demographics

Analyzing these types of data singularly and in conjunction is expected to extend understanding of housing recovery alone and in relation to the recovery of the community, more broadly. Of particular interest to NIST researchers are the dependencies between housing recovery and household recovery along with the interconnections of housing, business, and school recovery following a hazard event.

Research on housing and household recovery to date has been limited by a lack of over time data following a single event in a community as well as an absence of cases that collect the same data across events and communities. Several factors that impact the timeline associated with the recovery of housing and households have been identified in prior research. In this field study, these factors are expected to be quantified for a model of housing recovery. The data from this collection will contribute to the housing recovery modeling in the IN-CORE community resilience modeling environment.

The data will also be used to inform conceptual and quantitative modeling of the community as a system, including interdependencies between housing, business, and school recovery, the timing of aspects of community recovery, and the resources available versus those needed. Furthermore, it is expected that administering the survey tool will provide useful information on best practices for field research on housing recovery following a natural disaster. The survey tool itself is one that has been designed to be applicable for field studies in other communities for a range of hazard events.