Assessing Street Conditions through Volunteer Spatial Mapping

Lakeview

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REGIONAL PLANNING COMMISSION
FOR THE PARISHES OF
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WhoData.org

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Abstract

In September 2011 volunteers from the *Lakeview Civic Improvement Association* (LCIA) began taking inventory of street conditions in the Lakeview area of New Orleans, LA. The Lakeview area is a collection of neighborhoods located in Orleans Parish. After establishing a protocol that was developed in cooperation with the Regional Planning Commission, WhoData.org and LCIA, volunteers evaluated streets conditions block-by-block and collected primary data to be analyzed and incorporated within a geographic information system (GIS). The primary data included identifying nine street conditions: street type, rolling bumps, uneven plates, broken curb, missing pavement, water leak, raised manhole covers, potholes, and clogged/broken storm drains.

The goal of this project was to improve community data collection techniques, enhance mapping and visualization of volunteer collected data, and provide a functional map for LCIA to convey street maintenance priorities to the City of New Orleans. This report summarizes the collection efforts and is provided as a case study model for local and national communities. By using a bottom up neighborhood planning model, improvements to public participation using GIS was achieved. Through a standardized means of data collection, and improved mapping techniques, community organizations can coordinate with governmental offices and other development organizations to target specific infrastructure changes that improve their neighborhood and contribute to the city's revitalization efforts.

Acknowledgements

We would like to thank the following people and organizations for their assistance:

- Rita LeGrand and Henry “Freddy” Yoder Jr., Lakeview Civic Improvement Association (LCIA) and LCIA volunteers

- Lynn Dupont and Meredith Soniat, Regional Planning Commission (RPC)

- Dr. Michelle Thompson, WhoData.org

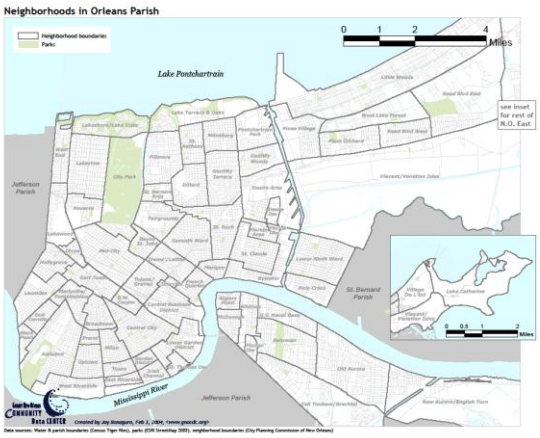
- University of New Orleans, Department of Planning and Urban Studies

Purpose

The goal of this paper is to provide an example of how to develop new ways to improve volunteer data collection methods and public participatory geographic information systems (PPGIS) mapping techniques. Using the Lakeview Civic Improvement Association (LCIA) street maintenance survey as a case study, methods of identifying street maintenance conditions and substandard streets were established. The study included an analysis of primary data collected by LCIA volunteers which was then integrated with city spatial data to analyze patterns and provide citizen-identified repair priorities using GIS. This comprehensive street condition survey was used to create a street repair ranking map.

The LCIA street condition data was collected during the fall of 2011 in preparation for a vote by Lakeview residents to create the Lakeview Street Maintenance District (LSMD). Houses within LSMD would fall privy to a $150/year fee which would be used for the minor repairs of streets and alleys. It was approximated that this annual fee would generate $1,000,000 per year. Although the creation of LSMD was not approved, the residents of Lakeview continue their dedication to public participation and seek solutions to improve neighborhood conditions. With the information collected from the survey a street priority map was created. This map provides the LCIA with a visual representation of street maintenance severity issues by block. LCIA is now using this data to inform and coordinate infrastructure plans with City of New Orleans Department of Public Works and the New Orleans Sewerage and Water Board. These data and maps are intended to continue aiding LCIA in their efforts to improve the quality of life for residents in the Lakeview area.

Lakeview at a Glance



The Lakeview area planning district is located in the northwest corner of Orleans parish and is named for its proximity to Lake Pontchartrain.

The City Planning Commission defines the boundaries of Lakeview (District 5) as these streets: Robert E. Lee Boulevard, Orleans Avenue, Florida Boulevard, Canal Boulevard and I-610 and Pontchartrain Boulevard (Greater New Orleans Community Data Center, 2012). For the purposes of this study, Lakeview will be defined the boundaries used by the LCIA. The Lakeview survey area is approximately 1,795 acres and includes a population of 11,199 people (U.S. Census 2010).

Lakeview, as described on the Lakeview Civic Improvement Association, is referred to as the section of the city bounded by Lakeshore Drive, Orleans Avenue, City Park Avenue and Jefferson Parish line (LCIA). . Figure 2 provides a general overview of the Lakeview Area of New Orleans. In 2005 during hurricane Katrina a 450 foot wide breach along the east side of the 17th Canal adjacent to the 6900 block of Bellaire Drive sent water flooding into the Lakeview area (Boyd, 2010). As can be seen on the next page in Figure 2 the water levels exceeded 10ft in some areas devastating both homes and the physical infrastructure of the area. Water degraded the infrastructure further through remaining within the leveed area for over 21 days. Lakeview residents have worked diligently to rebuild the physical infrastructure in their community which has seen a return of 20,521 people (U.S. Census 2010/RPC). Since the 2005 flood, the LCIA and neighborhood residents have completed two public infrastructure assessments. These assessments have supported public and private reinvestments to aid in the 68% return rate shown in Table 1 (U.S. Census, 2000 & 2010). Residents and businesses continue to rebuild this area with a mix of residential, recreational and commercial uses.

Table 1: 2000 to 2010 Return Rate for Lakeview Area and Orleans Parish

2010	Population Return	Household Return
Lake Area	68.0%	63.3%
Orleans Parish	70.9%	75.5%

Source Citation: Analysis of data from U.S. Census by Regional Planning Commission

Figure 2: Lakeview Area of New Orleans

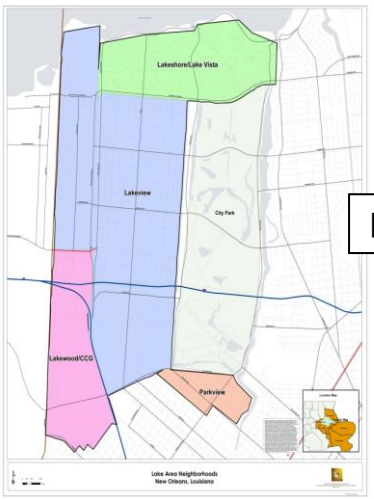


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Figure 3: Katrina Flood Levels in the Lakeview Area of New Orleans- Map by RPC

Figure 3 below outlines the Lakeview survey area in green and portrays the 2010 U.S. Census population dot density by race and with choropleth population density at the block level. It also shows occupied housing density by block color with the darker blocks showing higher occupancy. This map provides a quick snapshot of post-storm resettlement by Census block in the Lakeview area as compared to Metairie (which did not flood), the area located just to the west of Lakeview on the map.

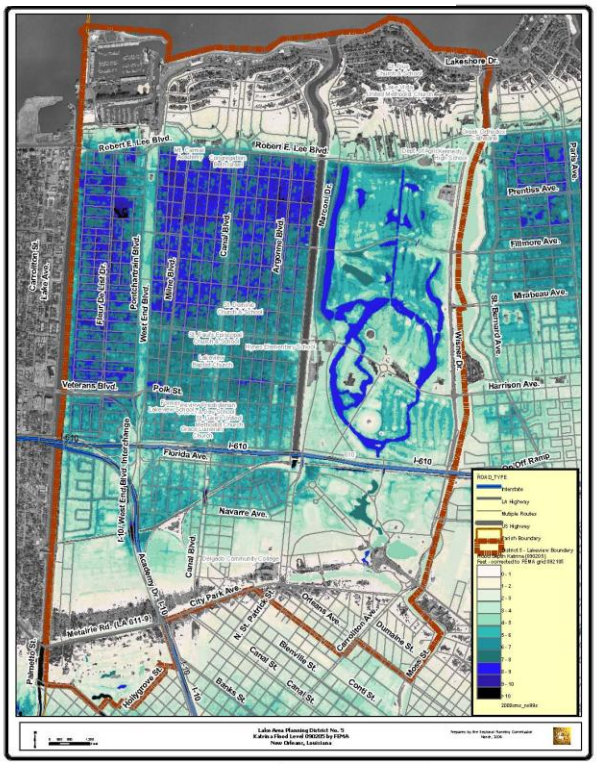
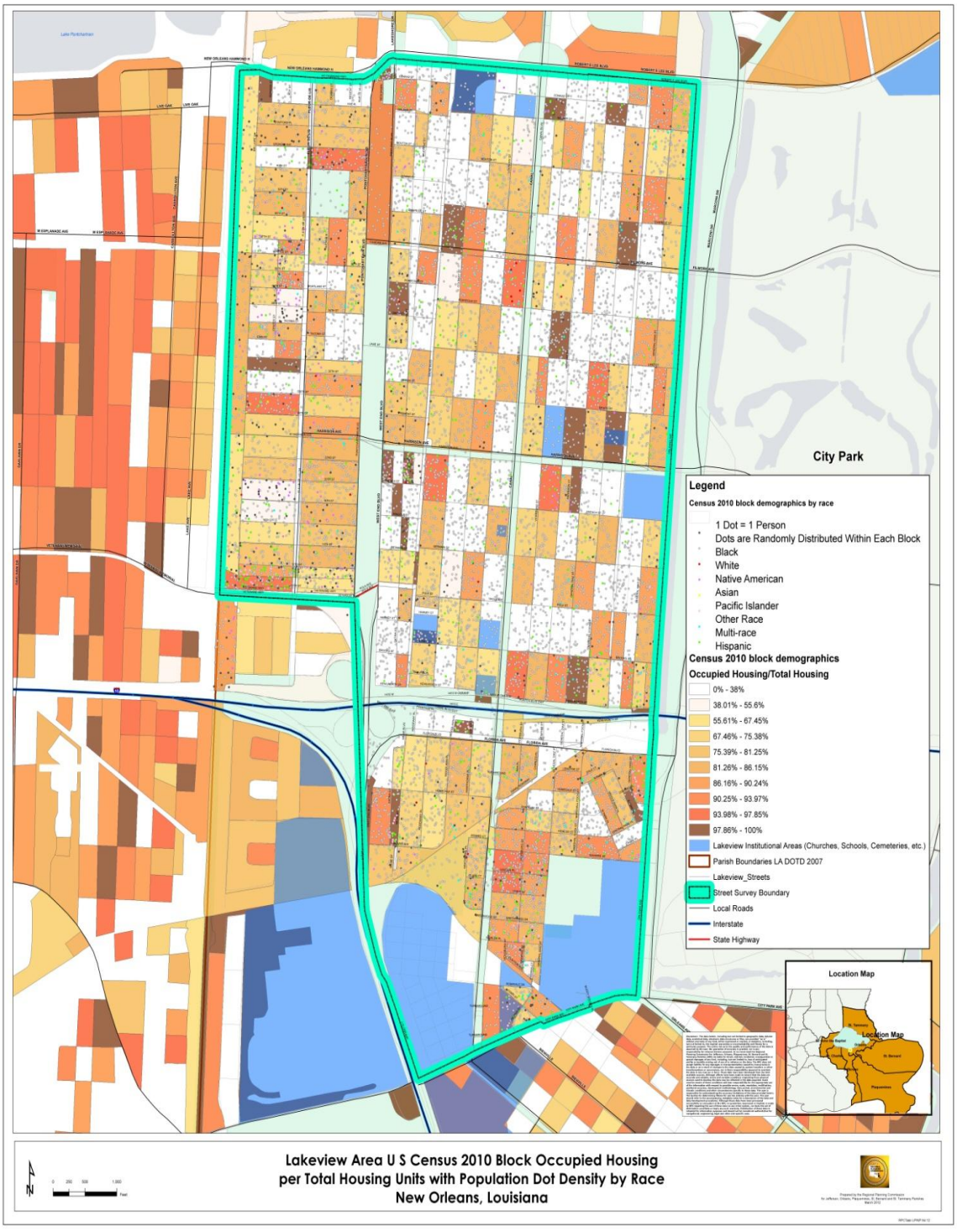


Figure 4: U.S. Census Lakeview Area Demographics



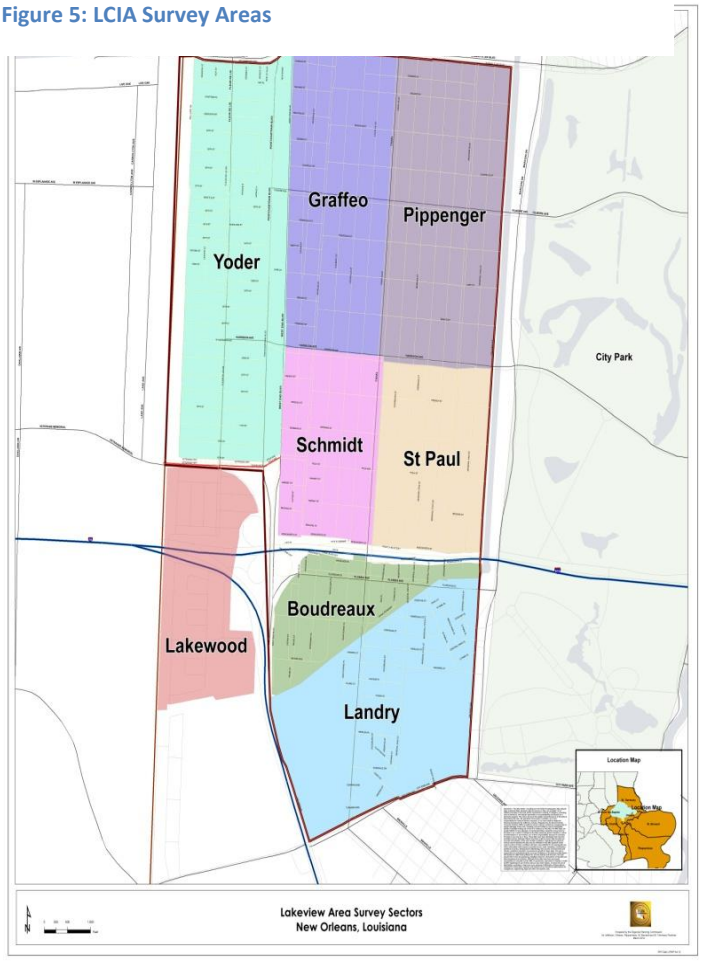
Methodology

Methodology Overview:

- Transfer block level data using street segment ID and provide an associated unique neighborhood ID
- Provide spread sheets for each survey group with block descriptions paired with street segment ID collected data by survey group
- Use unique neighborhood identifier to join street conditions data back to city's GIS street layer

This section includes a summary of methodology used to establish and deploy an inaugural community-led street condition survey. Additional comments have been provided to enhance what was learned from this pilot. Specific ways to optimize a similar study in other neighborhoods should focus on: volunteer training, data entry, management, integration, mapping and analysis. The LCIA survey area only includes neighborhoods shown in Figure 4. Sub-areas were created in order to make the data collection easier to manage by the volunteer teams. The LCIA has been actively mapping the Lakeview neighborhood recovery since 2005. A partnership was formed between the LCIA, University of New Orleans Department of Urban and Regional Planning, Whodata.org and Regional Planning Commission to collect block-by-block street condition information and compile detailed maps to prioritize public infrastructure needs in the community. Each sub-area was assigned a team leader and three or four volunteers to collect street condition information for every street in their area. This PPGIS initiative is an extension of previous blight mapping efforts conducted in other New Orleans neighborhoods by WhoData.org since 2011. However, this methodology is a customized version of previous volunteered geographic mapping projects and the culmination of over 20 years of community-university-municipality public participation geographic information systems project experience that have been successfully deployed by Dr. Michelle Thompson. Therefore the methodology for data

Figure 5: LCIA Survey Areas



collection by LCIA and the protocol established by the RPC and WhoData (using State and Federal guides for data integration)minimized data discrepancies.

Initial LCIA Street Maintenance Survey

LCIA volunteers began collecting data in September 2011. Typically, before any data is collected a pilot study is conducted to help reduce errors in data processing and to increase data reliability. However, due to a voter referendum the initial street maintenance survey took place a few weeks prior to the start of the mapping exercise and there was no opportunity to conduct a pilot study. Data gathering methods were determined and carried out by the volunteers. Without a predetermined data gathering technique, transferring information from the LCIA to a GIS database proved to be both time and labor intensive. Even with these difficulties, Rita LeGrand was able to guide the Lakeview volunteers to input the survey data into Excel spreadsheets so all of the collected data could be used in the mapping process. During the data integration process, if there were discrepancies in the data or missing information, additional site visits were conducted to resolve the data conflict.

Identifying Street Conditions

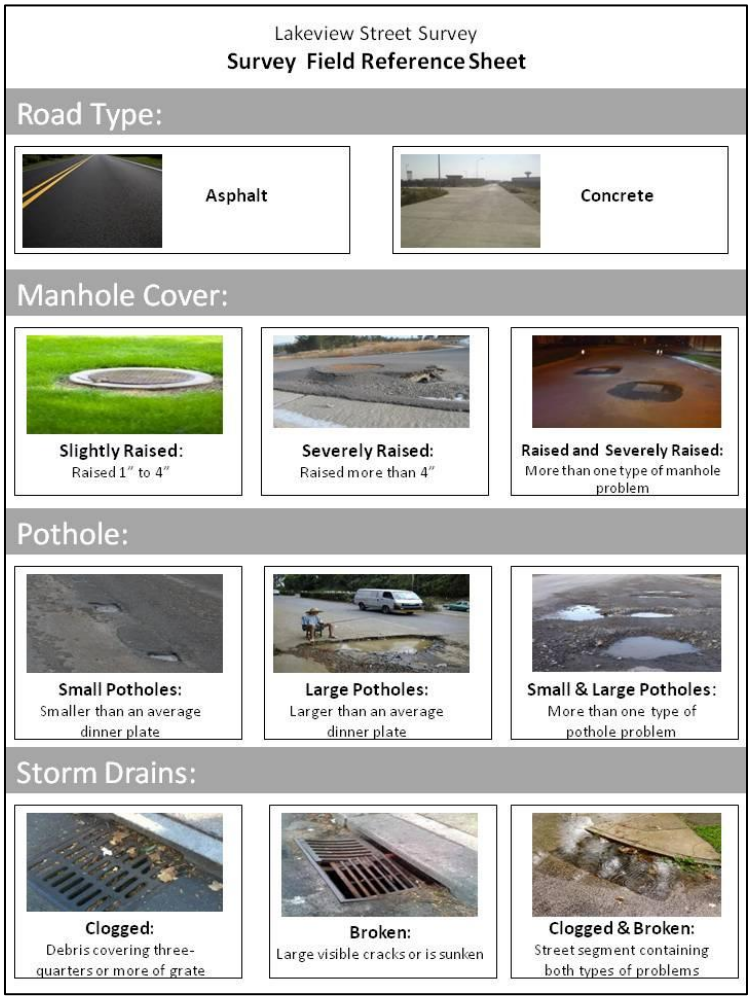
The LCIA survey defined nine categories to identify street conditions throughout Lakeview. In working to collect consistent field data, a predetermined street condition ranking was provided for each category by the LCIA Infrastructure Committee. The categories and rating system are explained in the following table (Table 2). Sample photographs of these conditions are shown on page 17 of this report.

Table 2: Street Condition Categories Created by LCIA Infrastructure Committee

Category	Description	Input Abbreviation
Street Type	Asphalt, Pavement, Combination	ASP, PV, or A_P
Missing Pavement	Missing Pavement “Yes” or “No”	M
Water Leaks	Water Leaks “Yes” or “No”	L
Uneven Plates	Uneven Plates “Yes” or “No”	UP
Raised Manholes	Severely Raised, Slightly Raised, or Both	SV, SL, or SV_SL
Storm Drains	Broken, Clogged, or Both	B, C, or B_C
Potholes	Large, Small, or Both	LP, SP, LP_SP

Broken Curbs	Broken Curb “Yes” or “No”	BC
Rolling Bumps	Rolling Bumps “Yes” or “No”	RB

Figure 6: Volunteer Field Reference



Assigning Values to Street Conditions

The data was then segmented into two categories. Potholes, Storm Drains, Manhole Covers were grouped into a category (Tables 3, 4, 5) which allowed volunteers to assign an acronym to the level of disrepair for the street maintenance issue. Table 6 summarizes the five street conditions that volunteers used in their evaluation if a certain condition existed or did not. . Upon completion of the LCIA street condition survey, Martin Salmon (WhoData GIS Program Associate) created an Excel spreadsheet and assigned values to the collected data. Values were assigned in the following manner based upon severity as determined by the neighborhood infrastructure group and outlined in their original survey form. Assigning these weighted values

allowed the neighborhood to visualize the worst street sections as ranked through the cumulative condition methodology. The LCIA Infrastructure Team evaluated these rankings prior to use in the final mapping and analysis.

Level of Disrepair: Three conditions (Potholes, Storm Drains, Manhole Covers) received a text input in the table and then were assigned a value of 1, 2, or 3 based on the severity of disrepair.

Potholes **Large Pothole:** a hole larger than an average dinner plate in circumference.
Small Pothole: anything smaller than an average dinner plate.
Large and Small Potholes: street segment containing more than one type of Pothole problem.

Manhole Covers **Raised:** raised one to four inches.
Severely Raised: raised more than four inches.
Raised and Severely Raised: a street segment containing more than one type of Manhole Problem.

Storm Drains **Clogged:** debris covering three-quarters or more of the grate.
Broken: any drain that has large visible cracks or is sunken.
Clogged and Broken: a street segment containing both types of Storm Drain problems.

Table 3: Pothole Ranking

Potholes	Ranking
Small Potholes	1
Large Potholes	2
Large and Small Potholes	3

Table 4: Storm Drain Ranking

Storm Drains	Ranking
Clogged	1
Broken	2
Clogged and Broken	3

Table 5: Manhole Cover Ranking

Manhole Covers	Ranking
Raised	1
Severely Raised	2
Raised and Severely Raised	3

Additional Categories: Five categories (Water Leaks, Uneven Plates, Rolling Bumps, Broken Curbs, Missing Pavement) were ranked 1 if the condition existed and 0 if the condition did not.

Table 6: Additional Street Condition Ranking

Category	If "Yes"	If "No"
Water Leaks	1	0

Uneven Plates	1	0
Rolling Bumps	1	0
Broken Curbs	1	0
Missing Pavement	1	0

Formatting the Data

It was determined that the block level data collected by the LCIA would be transferred using a unique identifier found in the city's street layer called an "ID." This preserved the original city ID (geopin) while pairing data with a unique ID for this effort. This also allowed datasets created that paired the collected data with each street segment ID.

Training Volunteers

In an effort to aid the transfer of data a training via Power Point was given to volunteers to demonstrate how they can find street segment IDs in relation to street blocks when transferring data to an Excel spreadsheet. Volunteers were trained as to how to match each street block with its corresponding street unique neighborhood ID so it could be joined to the city's street layer. As previously stated, this training took place after the survey. In an ideal situation the training would come first as part of the initial field survey training.

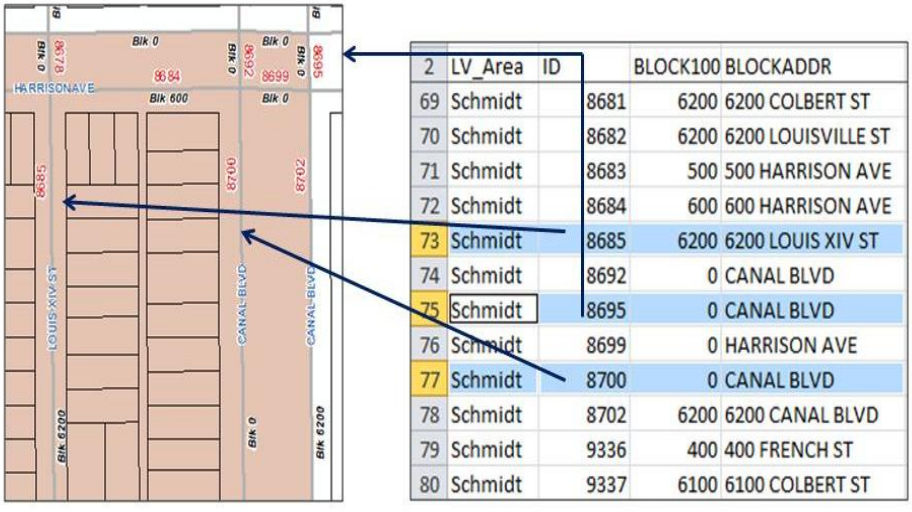
Transferring Collected Data

The best method to transfer block level data into a GIS framework is to use the street segment ID paired with the neighborhood ID. Acronyms were used for severity for each collected condition. These acronyms were later formatted as numbers as summarized in Tables 3 – 6 below. In an ideal situation, the data would be input as numbers by the volunteers in order to speed the GIS prioritization process.

Joining Collected Data: Figure 5 demonstrates how volunteers used the street ID column to join street condition data to the city's street layer. This one-to-one join allowed users to create different layers for each street condition category illustrated in the results section.

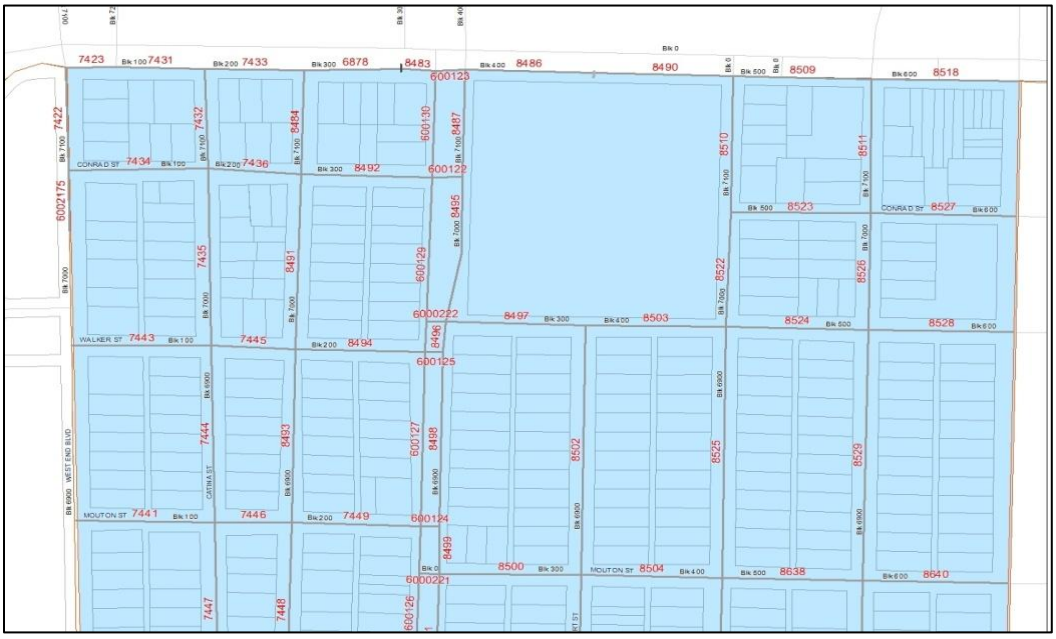
Street segment IDs are in red. Some street block may **have one or more** street segment IDs.

Figure 7: Joining Collected Data



2	LV_Area	ID	BLOCK100	BLOCKADDR
69	Schmidt	8681	6200	6200 COLBERT ST
70	Schmidt	8682	6200	6200 LOUISVILLE ST
71	Schmidt	8683	500	500 HARRISON AVE
72	Schmidt	8684	600	600 HARRISON AVE
73	Schmidt	8685	6200	6200 LOUIS XIV ST
74	Schmidt	8692	0	CANAL BLVD
75	Schmidt	8695	0	CANAL BLVD
76	Schmidt	8699	0	HARRISON AVE
77	Schmidt	8700	0	CANAL BLVD
78	Schmidt	8702	6200	6200 CANAL BLVD
79	Schmidt	9336	400	400 FRENCH ST
80	Schmidt	9337	6100	6100 COLBERT ST

Figure 8: Graffeo Map Section by Mike Madej



Results

Once values were assigned to street conditions an analysis was conducted to create the street ranking map (Figure 7) to prioritize streets in need of infrastructure repair. This is a summary across all conditions with assigned weights for severity of each condition that was inventoried. Results from the calculations determined that LCIA volunteers surveyed 1,075 of a total of 1,183 street segments within the Lakeview area. Tables 7 through 10 summarize the results of the Street Conditions Survey analysis by street segment count and percent.

Key Findings:

Road Type: 64% of the surveyed streets are composed of asphalt, 29% are composed of concrete and 7% were composed of both materials.

Table 7: Road Segments Surveyed

Road Type	Segment Count	Percent
Asphalt	693	64.5%
Concrete	307	28.5%
Both	75	7.0%
Total Road Segments:	**1075**	**100%**

Road Segment Issues: Summarizes the results for streets that have a single ranking number, 1 or 0. From the table one can see that rolling bumps, defined as road imperfections resulting in bumps resembling speed bumps, are the most abundant within the study area.

Table 8: Road Segment Issues

Problem	Problem Count	Percent
Rolling Bumps	443	41.2%
Uneven Plates	230	21.4%
Broken Curb	183	17.0%
Missing Pavement	116	10.8%
Water Leak	39	3.6%

Summarizing Results: Tables 9a, 9b, and 9c summarize the results for Raised Manhole Covers, Potholes and Clogged and Broken Storm Drains. In total 239 identified Manhole issues were identified and 52% were slightly raised, 38% were severely raised and 10% had a combination of both. Of the 277 identified Potholes 45% were small, 42% were large and 13% had a combination of both disrepairs.

The category with the least amount of identified problems was storm drains. Out of 47 identified Storm Drain issues 51% were clogged, 43% were broken and 6.4% were both clogged and broken.

Table 9a: Identified Manhole Issues

Manhole Cover	Count	Percent
Slightly Raised	125	52.3%
Severely Raised	90	37.7%
Both	24	10.0%

Table 9b: Identified Pothole Issues

Pothole	Count	Percent
Small	143	45.1%
Large	134	42.3%
Both	40	12.6%

Table 9c: Identified Storm Drain Issues

Storm Drain	Count	Percent
Clogged	24	51.1%
Broken	20	42.6%
Both	3	6.4%

Table 10: Prioritization of Major Street Issues

Category	Total Count	Percent of Lakeview Roads
Potholes	277	25.8%
Manhole Covers	239	22.2%
Storm Drains	47	4.4%

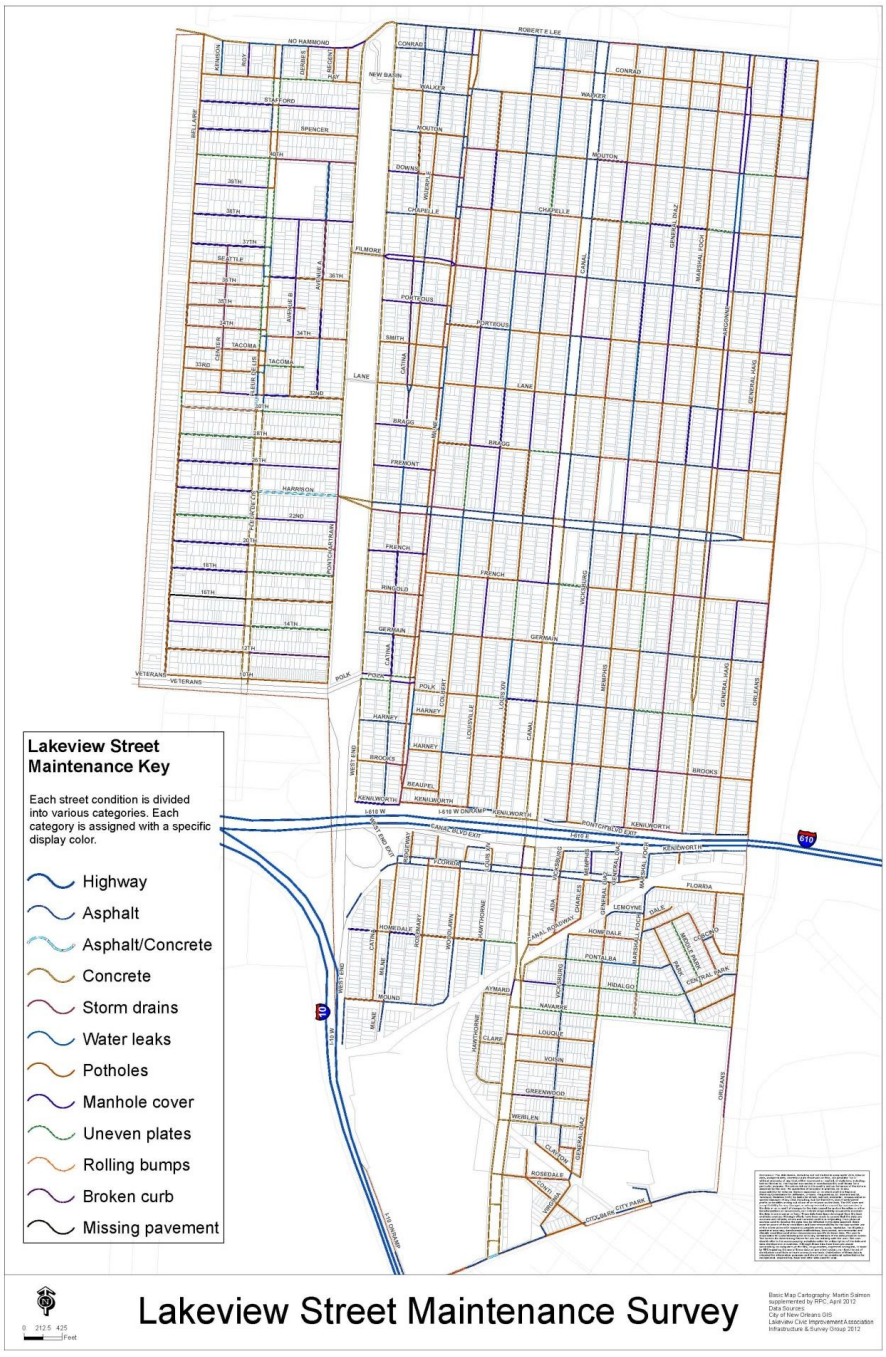
Prioritizing Results

Table 10 provides a prioritized list of the major street issues identified on Lakeview area roads. With over one quarter, 25.8%, of Lakeview streets containing Potholes this is the most common identified street condition in Lakeview. Raised Manhole covers are an identified concern on

22.2% of Lakeview streets. At only 4.4% Storm Drains present the least amount of problems in Lakeview.

Figure 7 is a map showing an accumulation of all street issues identified by LCIA volunteers. This map served as an initial survey inventory for the conditions surveyed but it did not serve the overall need in communicating priority issues.

Figure 9: Final Lakeview Street Survey Map



Calculating Data for Figure 10: To identify street priority rankings numerical values were assigned to each street condition. Streets were assigned priority based on their rankings. ESRI ArcGIS can be used to transfer the acronym data as entered into numerical values. New columns are made for each condition and formatted as numbers.

A basic "field calculation" can that be made for each column noting conditions.

Example: a value of "SL" = 1; "SV" = 2; "SV_SL" = 3.

1) Select by attribute under Manhole Cover for each condition. Use the field calculator in new column formatted as a number for Manhole Cover.
2) In new Manhole Cover column assign values to records.
   - Example, all selected Manhole Cover with SL records are assigned a value of "1" in the field calculator. "SL" = 1; "SV" = 2; "SV_SL" = 3.

A simple summation of the weighted values for each condition across all surveyed conditions resulted in the final ranking for each block.

Table 11: Street Condition Rankings

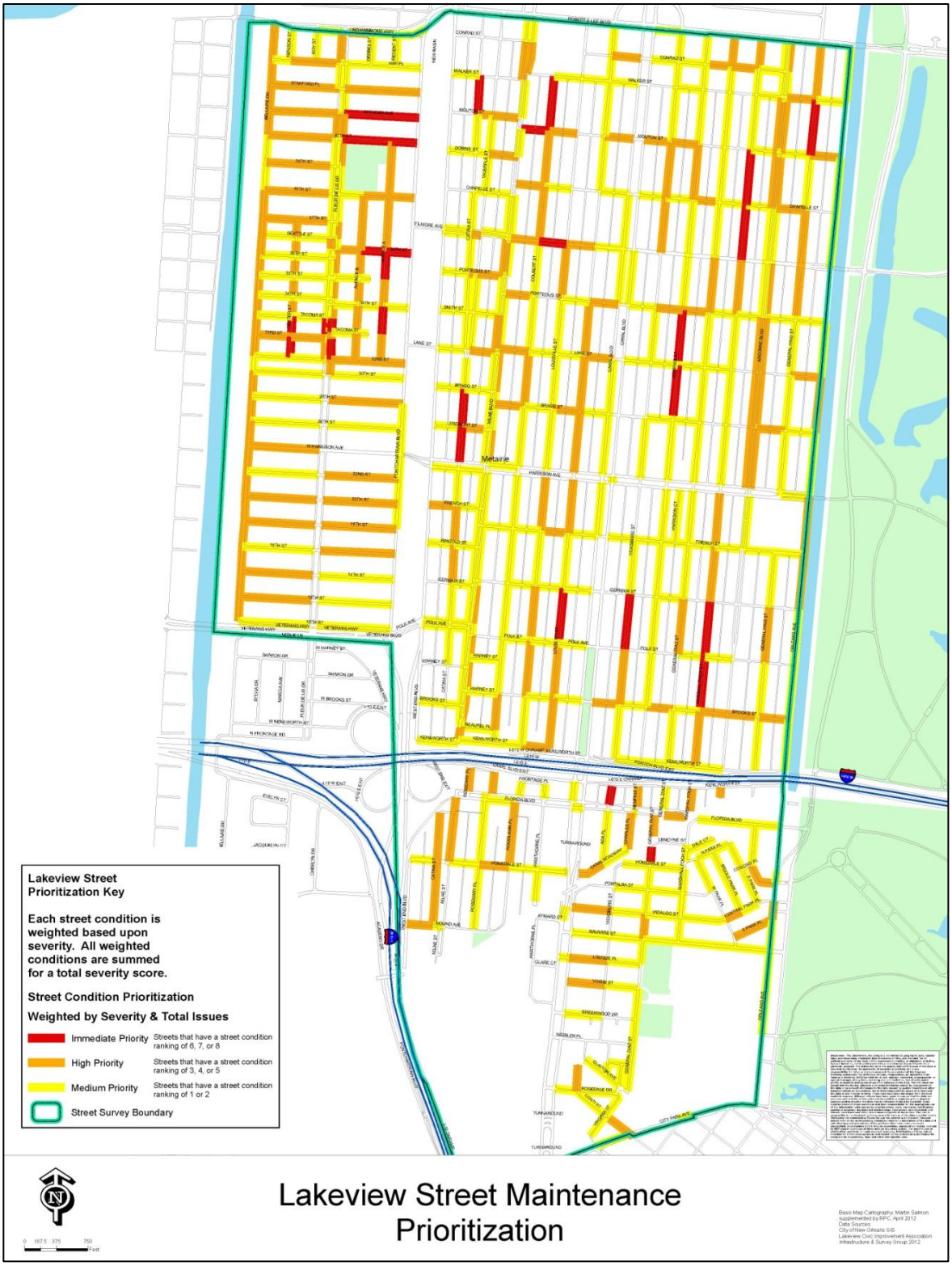
Street Condition Ranking Key	Street Condition Rankings
Immediate Priority	7, 8, or 9
High Priority	4, 5, or 6
Medium Priority	1, 2, or 3

Analyzing Results: According to Table 12 2.5% of the streets in Lakeview are identified as immediate priority, 17.5% are high priority, and 79.9% are medium priority.

Table 12: Street Priority Rankings

Priority	Ranking	Count	Percent
Immediate Priority	9, 8, 7	30	2.5%
High Priority	6, 5, 4	210	17.5%
Medium Priority	3, 2, 1	959	79.9%

Figure 10: Initial Lakeview Street Priority Map



Recommendations

General and Specific recommendations have been developed from an analysis of the Lakeview Area street maintenance survey to improve the overall effectiveness of PPGIS.

General Recommendations

1) Cultivate an open dialogue with community groups before, during, and after surveying to maintain consistent data collection techniques.

2) Improve data and GIS formatting to enhance mapping capabilities that better communicate results.

3) Although street maintenance issues were identified it could be helpful to include conditions of alleys as a feature in future maps. Doing so would better improve the overall street conditions in the Lakeview area.

4) Discuss the purpose, use and anticipated release of the report and (if desired) project data to the Municipal Departments that may be interested in the results.

5) Provide time-stamped images using the municipal address; if possible, use a geographic reference so they can be tied to an internet mapping service.

6) After the initial study, review and revise the maintenance repair priorities based upon the field findings and priorities of the community.

Specific Recommendations

Communicating with Volunteers

The following are specific recommendations that should be considered when working with resident and non-resident volunteers:

1. Communicate the overall purpose of the project in a variety of medium: community meeting, website, survey flyer, etc.
2. Provide pre-field condition and data entry as part of the powerpoint trainings on the survey process. This will allow community members to demonstrate an understanding of what steps are involved to create a successful community-led survey.
3. Develop clear communication between stakeholders and planners is imperative in developing a work plan. An open dialogue provides an outlet to deal with any technical misunderstandings between stakeholders and planners.
4. Provide stakeholders with basic GIS understanding helps them better discern why collecting consistent data is important and how the data collected will aid in the creation of maps.
5. If any new technologies and applications are implemented during the survey process planners must educate stakeholders in how and why these technologies will be used.

6. For the Lakeview Area street survey the role of the unique ID and its relationship to the physical block was an extremely important issue to communicate.
7. Provide context and walking maps for all volunteers.

Working with Volunteers

Typically, the biggest hurdle is gathering consistent and comparable data. The following recommendations are based on materials created by Sarah Green, the Community Liaison at Project Homecoming and mapping techniques used by WhoData.org:

Pre-Survey

Work with Community Organizations Early

Identify Benchmarks

Identify needs and prioritize the data that will be collected.

Establish a timeline that will allow both the community and planners to evaluate the progress of the survey.

Survey and Data Collection

Create Field Reference Sheet (Figure 9)

Include pictures of types of infrastructure problems may look like.

Provide definitions underneath pictures to help clarify any confusion volunteers may have in the field

Create Survey Sheet (this was not used for LCIA survey but would have helped)

Formalize all major data to be collected.

Create visual and informative maps that clearly identify the surveyed streets by unique ID. (Figure 10)

Create walking maps, clearly identifying the area in which they will be collecting field data. (Figure 10)

Create a “Comments” section to allow volunteers to indicate any additional issues they would like to address or errors they might find. (Figure 11)

Train Volunteers

Demonstrate proper data collection

Answer volunteer questions.

Create Field Data Binders

Provide context map, project description, survey forms, walking maps, etc. in binders.

Binders will be used to manage data entry and for future mapping.

Figure 11: Volunteer Walking Map

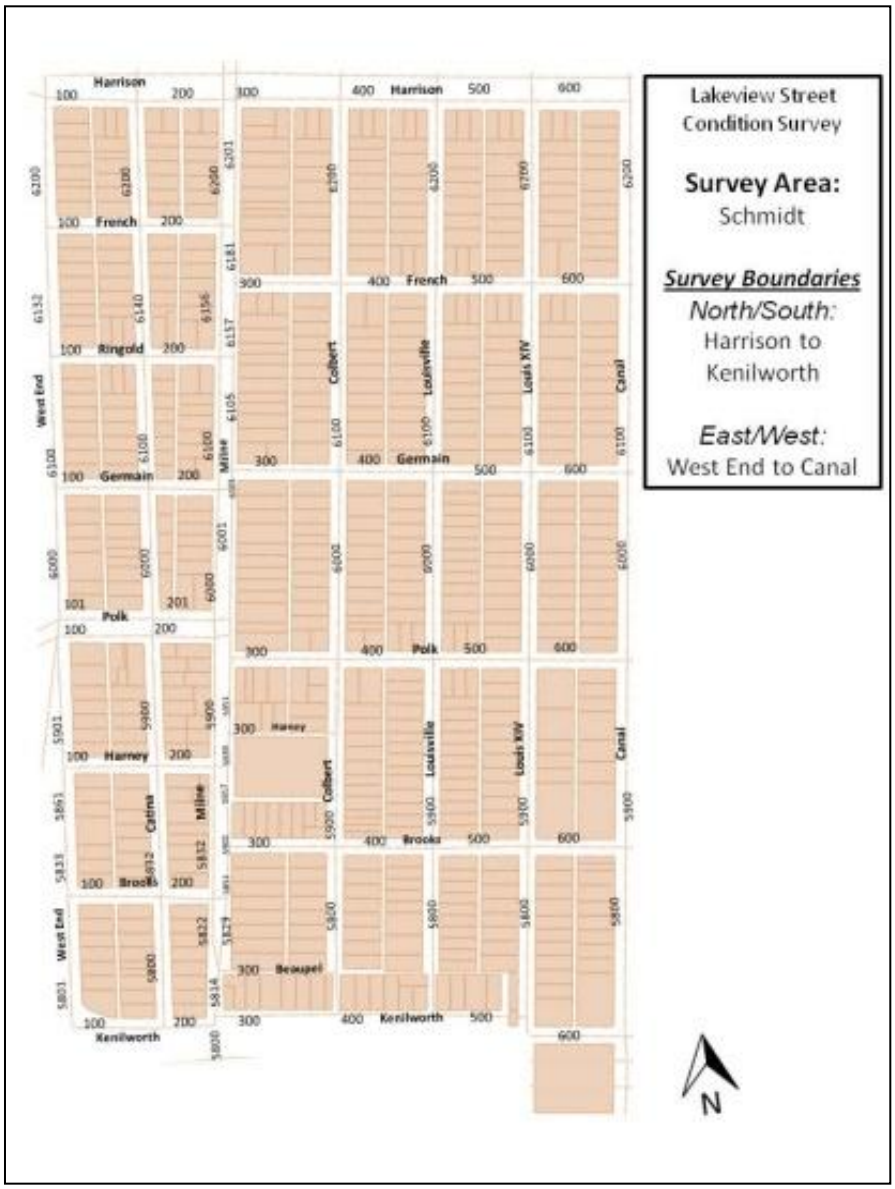


Figure 12: Volunteer Survey Form

Block #	Block Name	Road Type	Manhole Cover	Pothole	Storm Drains
5500	Canal Blvd	☒ Asphalt	☐ Slightly Raised	☐ Small Potholes	☐ Clogged
		☐ Concrete	☐ Severely Raised	☒ Large Potholes	☐ Broken
			☐ Sunken	☐ Small & Large Potholes	☒ Clogged & Broken
			☐ Slightly & Severly Raised		

If any of the street conditions below are true, place an "X" in the appropriate box

☒ Missing Pavement ☐ Broken Curbs ☐ Plates Uneven ☒ Road Bumps ☐ Water Leak

Comments: Road bumps in Multiple segments

Future Research, Data and GIS Formatting

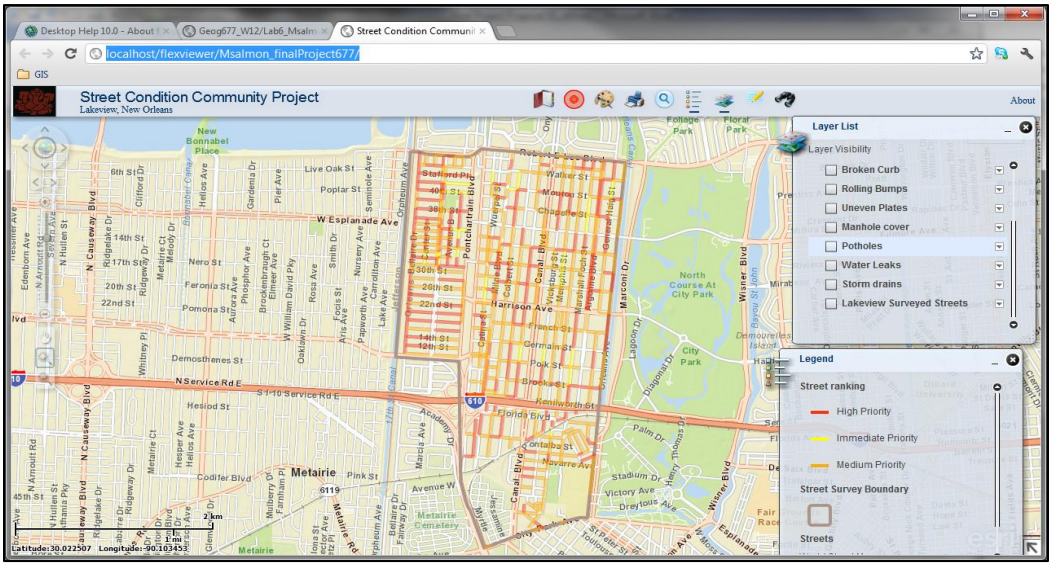
In developing the street maintenance survey with the LCIA geospatial mapping has proven it can empower communities and allow them to create visual representations of identified prioritized infrastructure needs. As seen in Figure 8, a map containing a culmination of all data collected can be cumbersome for stakeholders to utilize. Volunteers used of multiple maps to more easily review each street condition category. Improving the layout of a map to easily identify the severity of each street condition will improve a community's ability to distinguish specific street conditions. Displaying this data would allow residents to understand each street condition as well as the priority segments. Handheld GPS locators and smartphone applications can be used by volunteers in the field to generate survey techniques. Volunteers would need additional training to assist in obtaining point specific data.

Improving Online Capabilities

Currently there are various compelling examples of volunteerd geographic information that increases the success of PPGIS implementation. 'Anyone that has access to a smartphone or the Internet can contribute information to several online GIS websites' (Goodchild, 2007). WhoData.org is one example of an online GIS application community members utilize in New Orleans to help residents assess their own neighborhoods and identify public infrastructure needs. Open source GIS applications (similar to Google maps/Google Earth) allow people to contribute with continuous monitoring for accuracy (Goodchild, 2007).

In an attempt to make the Lakeview Street Survey map more accessible to residents and the general public a dynamic map was created (Figure 12). An online interactive map was created using Flex Viewer was temporarily hosted on a University of Maryland Server and used to show LCIA volunteers a future use of their static mapping. Although the final product provided online access to the map it did not afford users the capability to add information. Information was layered in a way which required people viewing the online map to turn layers on and off.

Figure 13: Screenshot of Dynamic Map Created for Lakeview Street Conditions Survey



Connecting Residents with an Online Database: Through researching online PPGIS applications, like WhoData.org, Internet data collection has proven a successful technique in spatial mapping. Input from users and partners has proven valuable in both addressing the concerns of transparency and expanding data resources. Improved online data collaboration provides pertinent information for individuals and organizations interested in measuring the progress of economic and community development at both the neighborhood and city level. Advanced online capabilities can help eliminate redundant data-gathering efforts while providing a methodology that allows all users to identify priorities, track rebuilding efforts and analyze change.

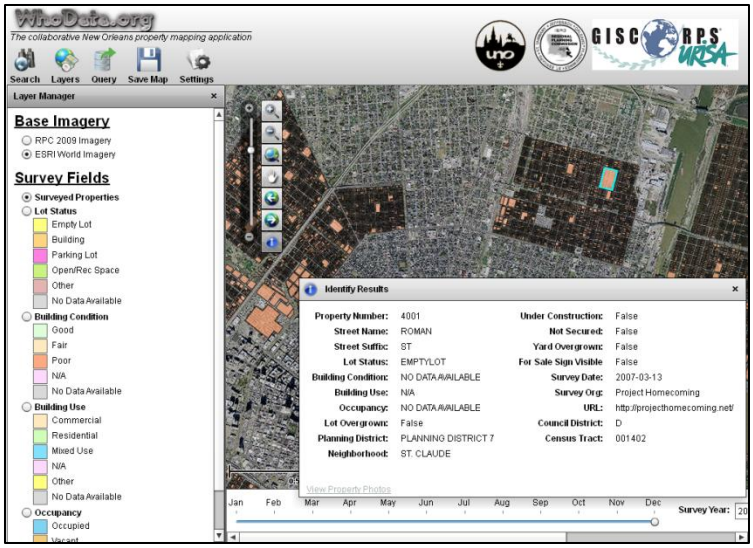


Figure 14: WhoData.org Online Mapping Snapshot

This image shows an example from WhoData.org, an online database which can be populated by users. This specific example allows people to provide updated property information from their neighborhood. Identified conditions include lot status, building condition, building use and occupancy. Each surveyed property includes a pop-up menu containing information on the date submitted, information on identified conditions, and the name of person/organization submitting the information.

As seen in Figure 13 WhoData.org users are able to populate an online map to report information collected from property surveys conducted in New Orleans. Similar to other PPGIS WhoData.org uses volunteers and staff periodically cross check and approve all submitted updates. With PPGIS applications like the one shown above volunteer organizations are able to provide up-to-date information on survey work being completed in the field. Empowering individuals and organizations with mapping and analysis tools has proven successful; WhoData.org has already exceeded 1 million unique hits since its launch (Thompson, 2011). As a next phase for the LCIA streets survey, this information is being considered for WhoDAta.org website integration.

Conclusion

Spatial mapping is not a quick or simple process. Numerous steps must be clearly established for successful spatial mapping to produce a usable map that clearly identifies priorities. One step that can result in frustrations for both community organizations and planners alike is the process of incorporating field data into a GIS application that can allow seamless integration with municipal (State, Region, and Local) data. For field data to be successfully incorporated

into a GIS application it must be properly transferred and formatted to minimize data errors. This process can be a cumbersome and in many instances field data is transferred two to three times before it is considered useable. In addition, community organizations typically do not have the capacity, equipment/software or technical skills necessary to quickly convert data. To help transfer data, community organizations generally form partnership with public and/or private institutions.

For volunteer organizations looking to provide residents with up-to-date online information between data collection and the production of an official map a "placeholder" map can be created. A "placeholder" map can range from creating and populating a Google Map to utilizing more complex open source GIS applications. These maps allow volunteer organizations to quantify their work while official maps are being created. Furthermore, improved access to the Internet via smartphone can provide volunteers with additional capabilities to aid in their data collection process. An example of improved data collection capabilities include locating the specific latitude and longitude of severe point damage, linking pictures of identified infrastructure issues would also be useful. Decreasing data transfer time can be accomplished by directly linking data collected in the field with an Excel spreadsheet or online database through a phone or web app. Improvements in volunteer data collection can decrease the amount of time it takes to produce a quality map through initially collecting more accurate, consistent data in a manner which is formatted to work within a GIS application.

As these new technologies are implemented consistent communication between the volunteer organization and planners throughout the entire mapping process is important. Delays in surveying or the addition of any new data gathering techniques must be communicated in a manner which is understood by all parties involved. Establishing regular meetings and conference calls between the volunteers and the planners is typically the best way for everyone involved to alleviate frustrations and misunderstandings that come with field data collection. Improving spatial mapping relies on both the ability of planners to keep volunteer organizations up-to-date with the mapping process as well as volunteer abilities to clearly communicate their concerns and successes to planners.

This project achieved numerous results and provides a case study for how to use volunteered geographic information to inform residents, improve the quality of life and assist the city of New Orleans with a new way to use citizen participation in the neighborhood planning process. Ultimately the process of creating the Lakeview Street Maintenance Prioritization map has provided the LCIA with two key assets. First, they have an extensive database of street maintenance issues in the Lakeview area. This database can be used as a foundation for comparison of future street conditions to gauge whether or not street improvements in the survey area have been made. Second, LCIA is now using this data to leverage infrastructure FEMA investments in the appropriate areas in coordination with City of New Orleans Department of Public Works and the New Orleans Sewerage and Water Board. The findings

and experience of the Lakeview are survey demonstrate that open lines of communication, improved data collection techniques, and proper volunteer training a symbiotic relationship between planners and community can blossom that benefits community organizations and planners while improving the overall health and safety of the community as a whole.

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