# APPLICATION FORM

All applications must include the following information. Separate applications must be submitted for each eligible program. **Deadline: June 1, 2016.** Please include this application form with electronic entry.

## PROGRAM INFORMATION

**County:** County of Roanoke

**Program Title:** Neighborhood Concerns Zoning Code Enforcement Application

**Program Category:** Community & Economic Development

## CONTACT INFORMATION

**Name:** David Wray

**Title:** GIS Manager

**Department:** Communications & Information Technology

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**Telephone:** 540-777-8564 **Website:** www.roanokecountyva.gov/ZoningApp

**Email:** dwray@roanokecountyva.gov

## SIGNATURE OF COUNTY ADMINISTRATOR OR CHIEF ADMINISTRATIVE OFFICER

**Name:** Thomas C. Gates

**Title:** Roanoke County Administrator

**Signature:** Thomas C. Gates Digitally signed by Thomas C. Gates
Date: 2016.05.31 15:33:55 -04'00'

**THE PROBLEM OR CHALLENGE**

The County's Zoning Code Enforcement system was a patchwork of manual processes to receive citizen complaints, schedule zoning code inspectors, issue legal notifications, and follow up with citizens on the results of their complaints. Complaints were taken by phone call or a simple email form, which often resulted in inaccurate or incomplete complaint location addresses in need of frequent correction. Follow up with citizens was also a time-consuming process, limited to email or phone call to the responding inspector. All reports in the system were compiled and formatted manually on a monthly or quarterly basis

The driving factors in the development of the Code and Zoning Enforcement application were accountability and the need to enforce all reported violations evenly, fairly and in a timely manner. Roanoke County's Zoning Code Enforcement office needed a comprehensive system to efficiently handle the entire life cycle of the zoning code enforcement process, from complaint receipt through final disposition.

Enforcement inspections previously consisted of paper field notes, stacks of photos, with notes compiled in a single user's Excel sheet. Inspection scheduling was done by hand and relied heavily on the code enforcement officers' memory to re-inspect ongoing issues. Citizens submitted complaints online using a basic email form that did not validate against Roanoke County street addresses, resulting in complaints submitted with vague directions or incomplete addresses.

With each complaint, a single user verified the street address for each case and manually entered the location into Excel along with inspectors' field notes. Each violation also required a legally required custom violation letter to be manually typed, printed and mailed by staff.

Quarterly reporting was also a time intensive effort, compiled after all data was standardized in the Excel reporting sheet and manually formatted.

To check the status of a current complaint, citizens had to call the office to reach an inspector and in many cases wait for a return call from inspectors when they returned from their daily field work, resulting in delays fulfilling citizens' requests. The manual processes often resulted in inefficient inspector scheduling, delayed inspections and citizen follow-up, often exceeding the County's expected obligations for timely customer service and transparency.

**THE SOLUTION:**

The Neighborhood Concerns Zoning Code Enforcement Application is a comprehensive management system that addresses the complete life cycle of a reported zoning code complaint, including a mobile-compatible and map-based online submission form for citizens, workflow automation for staff inspections and reporting, automated production of legal notices, real-time inspection data entry from the field, with status updates available to citizens and front line staff alike via a web portal.

Objectives for the new system include four major categories: citizen engagement, code enforcement inspections, workflow automation, and reporting and accountability. In addition, the new system had to increase staff efficiency, accountability of staff, and provide uniform code enforcement while adhering to legal standards of notification and evidence collection. The system is built around ESRI's ArcGIS mapping suite and Microsoft Office, two software packages the County already licenses. In addition, the County contract outside consultant GISi to customize ESRI's geo-form and create the Auto Address Completion feature to validate

addresses against the County's official address database to enhance the user experience while standardizing data collection from citizens and field inspectors.

The Neighborhood Concerns Zoning Code Enforcement Application project kicked off in October 2014, with the first database design completed by the end of Q2 2015 along with a beta desktop and field data collection system for iPads. During Q3 2015 GISi implemented enhancements to the geo-form. Training and internal testing of the collection application and automated system was completed during Q4 2015. During this time both the new application and the existing system ran in parallel with citizen concerns coming in via email and staff putting them into the geo-form. The field inspection application, Neighborhood Concern submission form and the status checker went live to the public during Q1 2016. The first statistical report was run on Q1 2016 inspections and presented to staff. With the exception of the enhancements to ESRI's geo-form made by the consultant GISi, all planning, design, testing and implementation was completed by County staff.

The citizen engagement aspect of the Neighborhood Concerns Zoning Code Enforcement Application consists of a simple mobile-compatible, map-based online submission form to collect citizen complaints. The online form leverages ESRI's mobile-ready geo-form as its base and is the only part of the system requiring consultant hours to develop. The form can be found on the County's website at http://www.roanokecountyva.gov/zoningapp. The integrated geo-form offers citizens an easy to use, spatially aware, web interface to submit a complaint to staff. Features on the geo-form include:

- Form field function that enable citizens to select common zoning violations from a drop-down list, add comments as necessary, and enter option contact information for follow-up by staff.
- Auto Address Completion validated against an official database of Roanoke County addresses to minimize errors in reporting complaint locations.
- Complaint location confirmation using the map, or use the standard map controls to drag and drop complaint locations as pins on the map.
- Complaint Confirmation/Case Number automation that gives citizens a confirmation number they may use to check the status of submitted complaints after 24 hours using the Status Checker mini app at www.roanokecountyva.gov/zoningappstatus.

The status checker mini app at was built using JavaScript and also allows front counter staff to review complaint status and promptly assist citizens that may call or walk in, as opposed to transferring calls to an enforcement officer's voicemail.

Enforcement inspections in the Code and Zoning Application utilizes ESRI's Collector extension on a mobile platform. The County bought iPads enabled with a mobile data connection to perform field inspections, and Collector pulls and pushes data live to and from the County's GIS server, which allows inspections to be directly edited in real time. The iPad's on-board GPS can also route Enforcement Officers to their cases, and historical enforcement cases for parcels can be viewed from the field as well. Interactive drop-down forms promote a consistent workflow and eliminate transcription errors while allowing a violation type to trigger the selection of a subtype where applicable. Other options available include requesting updated parcel

information, and violation letters. Stacks of physical photos from the old system have been replaced by digital photographs available within the database. Collector allows staff to take pictures via the iPad's internal camera or an external Bluetooth enabled SLR camera, allowing the flexibility of taking a quick image with an iPad or taking a high quality long focal length shot using the SLR which immediately uploads to the database. Inspection records and their attached images can be instantly seen in the online status checker and desktop dashboard. The desktop dashboard has the same editing capabilities of the mobile application plus the ability to query data, plot measurements, and create maps.

Workflow automation drives the system. A nightly, server-side, automated process written by the County, in Python programming language, implements the County's business rules to process a zoning complaint, from submission, to scheduling inspections, all the way through enforcement when necessary.

Each night submitted complaints are cross referenced with parcel information from real estate, to attribute the owner name, mailing address, and physical address. The zoning information, sub district and Enforcement Officer are also attached to the record from the County's GIS layers. An inspection due date and system defaults are calculated when the layer is pushed into the inspection side of the system. The process updates the inspection records from the day with new secondary inspection dates, and populates the next enforcement action available for a case based on the violation type and County Code. Any field spot made using the iPad has a case number and parcel information assigned at this time. A daily inspection due report is also generated and sent to via email to staff. Cases marked as "In Violation" and needing an official

notification letter are processed in the next step. Using a custom Python code, cases in violation are linked to the appropriate County Code sections and staff contact information before being mail merged through Microsoft Word, where the database images are also attached. An Adobe PDF of the letter is generated and attached back to the case for archival purposes.

The new process not only saves staff time, but it also ensures that the correct letters are sent out promptly. Automation on the whole eliminates clerical work, ensures swift investigations through scheduling, and keeps cases from falling through the cracks by adhering to a uniform workflow.

Accountability to citizens is paramount amongst the goals of the Code and Zoning Application. The ability for citizens to check the status of a case online is the first tier of accountability. Daily inspection due reports help allocate inspectors efficiently while weekly and quarterly statistical reports keep inspections on track. The statistical reports parse out each violation by its type, source, number of total inspections, average time to first inspection and resolution of the case. This automated workflow and reporting assures that cases are handled in a timely manner in accordance with County Code.

**FINANCING AND STAFFING:**

The County evaluated the potential of purchasing an established enforcement management system or a custom vendor solution, and found these options to be outside the budgetary constraints. Overall these solutions would have also come with similar timelines to the system the County built using existing software and staff time. An enforcement management system

can cost tens of thousands of dollars to purchase and configure. Even turn-key solutions from vendors built around the County's existing ESRI enterprise agreement license would have added several tens of thousands of dollars. The County was able to utilize existing staff to develop a solution that required limited consultant hours. The partnership of GISi and the County of Roanoke allowed for a custom system that offered the citizens a better experience for a fraction of the cost of other solutions.

The County of Roanoke paid GISi approximately $11,000 to the develop enhancements for ESRI's geo-form. This customization and the iPads for field reporting are the only costs outside of the County's normal operating costs. However, this was only possible because of existing County resources, including staff, existing software, existing infrastructure and the open-sourced nature of the development platform. The County has a county-wide enterprise license agreement (ELA) with ESRI, our GIS software provider, which includes access to ArcGIS Online and ArcGIS server, which is an extension required to host web-based GIS data. Through ArcGIS Online, ESRI provides the open-source code base for the geo-form, the free mobile Collector application, the ESRI Web AppBuilder technology and the JavaScript API. The Neighborhood Concern submission form is a spatially aware geo-form. Collector is a mobile device-based application used for field inspection. The Web AppBuilder was configured for the desktop dashboard, so that data could be queried, measurements plotted, and maps created. The JavaScript API from ESRI was used by County staff to write the custom status checker app, as well as customize other ESRI products. The County's GIS Services staff was an integral part of the project, writing many custom scripts and enhancements to ESRI products. The existing GIS

infrastructure at the County hosted the web services, and database. On the Code and Zoning Enforcement side the new system requires one less staff member to operate. If the application were developed using outside contractors, paid on a per hour or a block hour format, the cost, potentially, could have been almost ten times the figure of the enhancement implementation with additional costs for post-delivery support and updates.

**CONCLUSION:**

All of the goals set forth for a comprehensive management system for Code and Zoning Enforcement has been meet by the new application. There are several statistics to prove the success of the new Code and Zoning Enforcement system. The first is the amount of time eliminated doing clerical work like data entry, violation research and creating the violation letters. This allows Enforcement Officers the ability to spend more time in the field performing inspections. And even though staff is spending more time in the field, the follow-up with citizens is not neglected. The ability for citizens to check the status of cases, for themselves, and for Enforcement Officers to access the contact information of complaining parties in the field mean that citizens stay informed. Cases are responded to, processed and resolved days to weeks sooner than under the former procedure.

The Code and Zoning Enforcement application is innovative, effective, and cost efficient. The program is innovative in its utilization of mobile and web based technologies. While other systems are struggling to adapt to mobile platforms, this system is designed with them in mind; bringing spatial awareness to citizen concern submissions and to inspections is a huge step

forward. Interconnecting several existing technologies in new ways created a custom solution that that meets the County's needs. The ease at which the County could build another system on this template platform brings new possibilities for citizen engagement. The effectiveness of the system can be seen in citizen engagement and the expediency of case processing. Staff time is better utilized, which is paramount in this day and age. Just as important as the effectiveness of the system is the use of existing software, staff, and limited consultant assistance to create a truly cost effective system. Not only was the system cost effective to build, but it is entirely managed and maintained in-house, saving the County money going into the future.

**OVERVIEW**

In October 2014 the County of Roanoke embarked on an effort to modernize its Zoning Code Enforcement Program through a comprehensive management system that prioritized citizen transparency and staff accountability, while maximizing efficiency. The requirements for the new system fell into four major categories: citizen engagement and ease of use, enforcement inspections, workflow automation, and reporting.

Citizens desired an online application to submit their concerns that was both easy to use and provided status updates on submitted complaints. The new system was built in-house by leveraging GIS application technology currently in use by the County, and uses a map-based interface and street address integration to help citizens easily and accurately report concerns.

The new system allows inspectors to take photographs, enter notes and update complaint status in near real time with iPads. The back end system accepts online submissions from

citizens, handles inspector scheduling and prints violation notices due including a priority destination and citizen follow-up information. Having this information readily through and automated process that runs each night.

This process also generates daily reports of inspections available increases the overall transparency for Roanoke County citizens, and increases staff efficiency to inspect, process, and resolve zoning code complaints.

**BRIEF SUMMARY**

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**Figure 1**

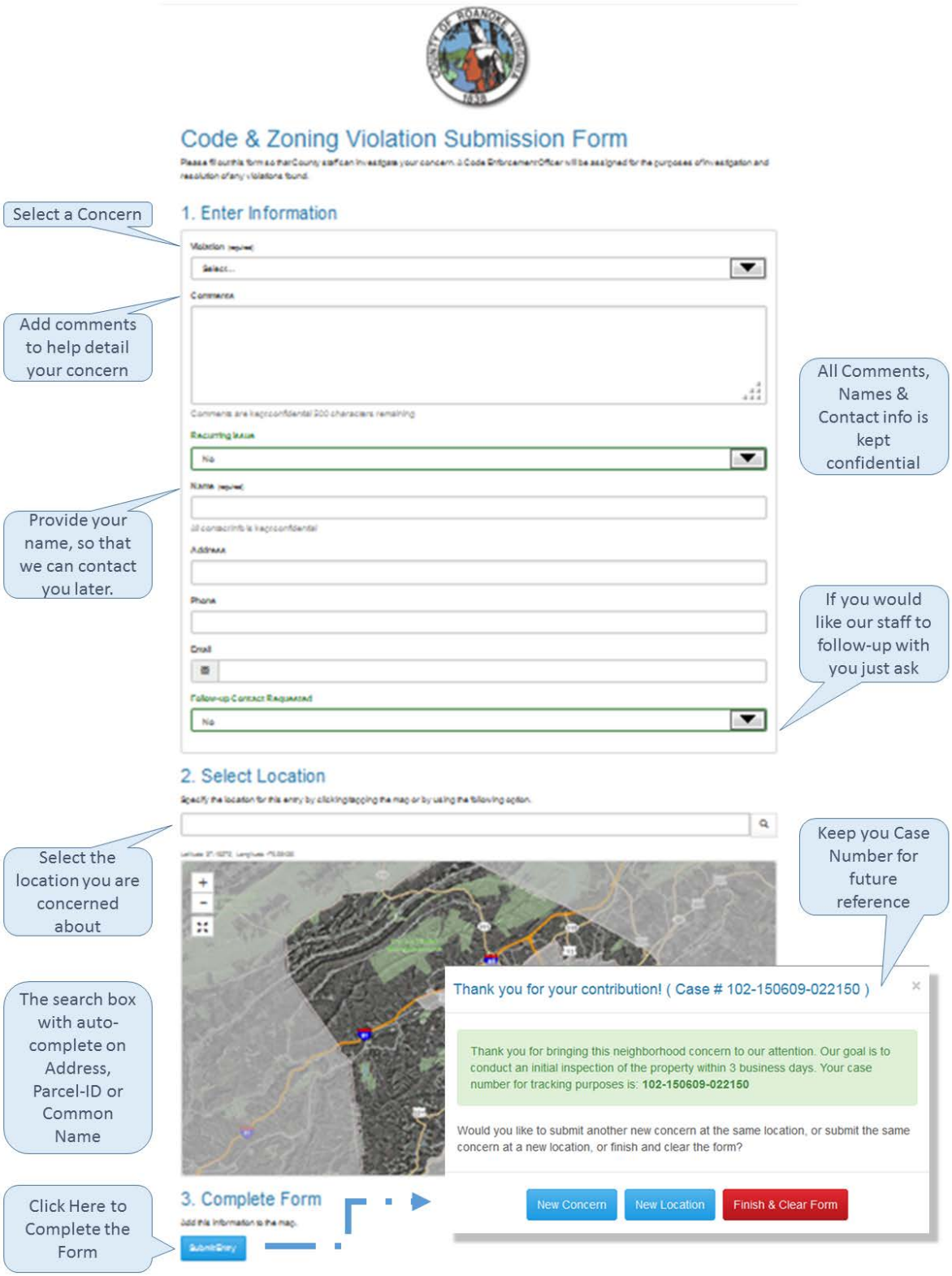
Code & Zoning Violation Submission Form
1. Enter Information
Select a Concern
Add comments to help detail your concern
All Comments, Names & Contact info is kept confidential
Provide your name, so that we can contact you later.
If you would like our staff to follow-up with you just ask
2. Select Location
Select the location you are concerned about
Keep you Case Number for future reference
The search box with auto-complete on Address, Parcel-ID or Common Name
Thank you for your contribution! ( Case # 102-150609-022150 )
Thank you for bringing this neighborhood concern to our attention. Our goal is to conduct an initial inspection of the property within 3 business days. Your case number for tracking purposes is: 102-150609-022150
Would you like to submit another new concern at the same location, or submit the same concern at a new location, or finish and clear the form?
New Concern
New Location
Finish & Clear Form
3. Complete Form
Click Here to Complete the Form

**Figure 2**

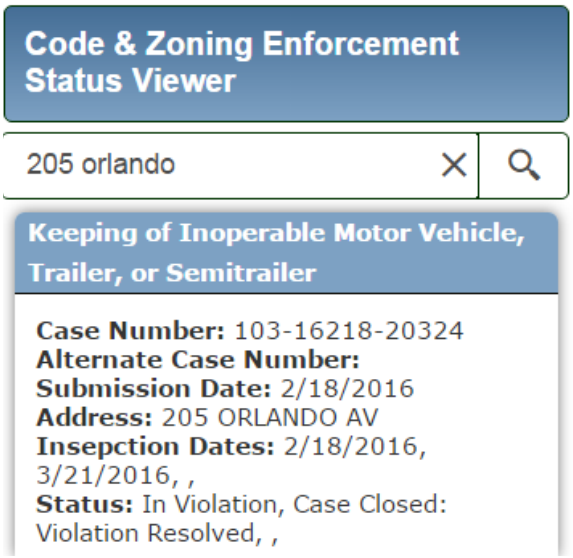


**Figure 3**

**Figure 4 (all open case shown)**

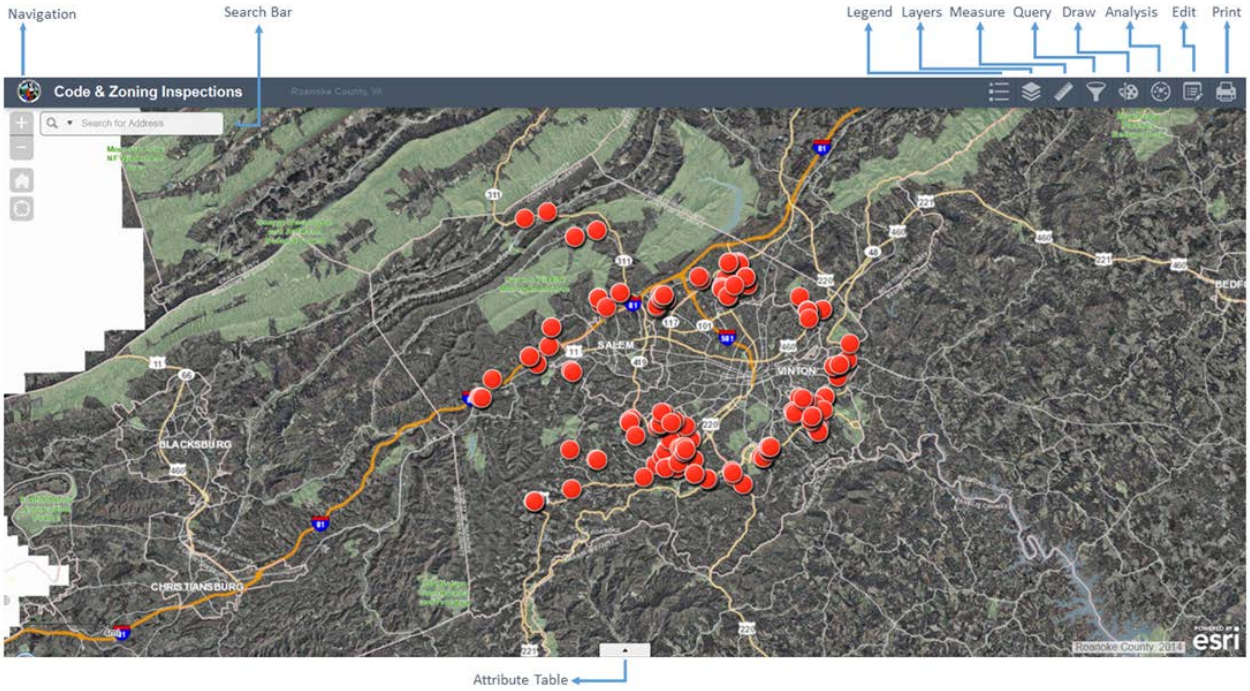

**Figure 5 (graphic representation of python automated workflow)**