Virginia Association of Counties
ACHIEVEMENT AWARDS

VACo

Virginia Association of Counties

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: __York County__

Program Title: __File Structure and Accountability__

Program Category: __Information Technology__

CONTACT INFORMATION

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SIGNATURE OF COUNTY ADMINISTRATOR OR CHIEF ADMINISTRATIVE OFFICER

Name: __Neil Morgan__

Title: __County Administrator__

Signature: _____

County of York, Virginia

VACo 2016 Achievement Award Submission

File Structure & Accountability

OVERVIEW

Computer file sharing has become a foundation for coordination, integration, and collaboration

between constitutional officers and their staffs, County departments, and divisions. This file sharing can

be jeopardized by lapses in security and required cumbersome administrative support processes. Over

the course of two decades, the York County file sharing system had become an unsustainable dumping

ground for millions of documents.   Over the course of 16 months, the entire file storage and sharing

structure was revamped with no funding, no additional staff, no custom programming, or third-party

software. File-related work orders are now completed in seconds instead of hours with 100% accuracy.

End-users have an intuitive organizational structure providing file storage that is also customized to their

specific agency's or division's needs and style. Additionally, the solution itself is flexible and scalable

enough to be utilized in any organization with any number of employees.

SUMMARY

Since the inception of York County's IT network in 1996, the file sharing and accountability system was a progressive evolution, simply reacting to current needs with the fastest resolution available at that time. Unfortunately, over almost two decades, this system had grown to two and a half million files, accessed through hundreds of possible connections, and thousands of unique security assignments. Any individual network user could have associated with them a dozen or more generic security group names, which may be nested within other groups, which would lead to still more groups. Each of these groups and the user account itself, had unique permission access levels and were assigned to dozens if not hundreds of different locations. These permissions were undocumented, unintuitive, and changed on a daily basis. With hundreds of connections, some users had run out of available Microsoft letters to map (A-Z = 26), and the same location may be one user's J drive, and another user's H drive, and yet another's Y drive, causing immense confusion among staff. Simple accountability requests, such as, "Which files does a particular employee have write access to?" took hours to investigate and were 80% accurate at best. Requests for who could access an individual file resulted in researching every folder's permission, through every possible connection, for every listed user account and group. Normal staff turnover resulted in multiple work orders submitted days and even weeks after the user was set up. Mistakes were the norm when mirroring former employee's permissions and creating potential liability if a user ended up with more access than was intended. Instead of supporting and encouraging collaboration, County staff was frustrated with what appeared to be barriers to the efficient flow and sharing of information. Concurrently, IT staff was forced to spend an exorbitant amount of time researching responses to seemingly simple file access requests.

SOLUTION

York County's solution to these issues was to set up a new completely unique file organization structure, allowing for simple user organization and total accountability of access. This was achieved via a combination of some industry best-practices, while implementing some little known software features. The design and the entire implementation process were completed by existing County staff. The initial design was completed by one staff member over two months, while continuing their existing duties. The Treasurer's office was chosen as the pilot program, for which meetings, implementation, and testing took an additional month to complete. County-wide implementation was 90% complete at the end of six months. The majority of this time was spent working with County staff to identify their unique needs and reclassify all of their existing files based on desired access permissions. Technical implementation usually took a few hours for each agency or division.

FOLDER STRUCTURE

A structure of 4 network disk drive letters for every employee was created consisting of a personal (P), division/organization (O), department (S), and county-wide information drive (I) that are mapped to a consistent letter through the organization (see Exhibit A). With the exception of a handful of legacy application connections, these are the only drive designations in use.

Within each of these drive designations are IT controlled folder names, each corresponding to a unique permission set referenced as "root folders." A core aspect of this entire system is the fact that permissions only change at the root folders. There are three categories of these root level folders with unique permissions: the "_COMMON" folder, standard folders, and restricted folders (see Exhibit B).

The "_COMMON" folder is the only required folder in every connection/share and everyone who has access to that share has full access to everything within that "_COMMON" folder. This is a common collaboration location for every division and department. Standard folders consist of a name like the

"HRSCANNER" folder in Exhibit B. Everyone who has access to that share can view the files within but only certain users can write or modify files. Finally the restricted folders all start with a tilde, like "~BENEFITS_COMPENSATION" and "~EMPLOYEE_RELATIONS" in Exhibit B. Within these restricted folders, only certain users can write and modify files, and only specific people can even read or view the folder and contents. The ~ at the beginning is simply a visual reminder to staff that the contents have been identified as sensitive and restricted for certain employees, and to take care when using the files within. Under these root folders, employees are free to utilize any folder structure names and organization systems best suited to their organization without any IT involvement (see Exhibit C).

When a request for a new folder is created, the lowest common relationship between users needing access is identified. For example, if three users in Finance's Budgeting Office and one user in Finance's Accounts Payable (both in the Finance department) need access to the file, the folder would be located on the Finance Department's "S" drive. If in that same scenario, one user in Economic Development (not in the Finance Department) also needed access, it would be moved to the County-wide Information "I" drive. York County's IT structure connects over 20 organizations and departments, and during the design phase one of the major obstacles was avoiding too many folders on the County I drive. A free, little known feature of Microsoft file servers was identified, called access-based enumeration. This feature hides any files or folders to which the user has no access and was implemented on all York County file shares. With this feature, a standard user accessing the I drive sees very few folders (see Exhibit D), while in reality there are almost a hundred root folders at this location (see Exhibit E). This serves another critical function of focusing each employee on only folders and files that relate to their specific job function.

Another obstacle was access for directors and upper management, since they needed access to possibly dozens of different divisions or departments that they oversee. Microsoft only allows a user to have a

single O drive, for example, and we wanted to avoid having Accounts Payable's O drive to be their department head's R drive, which plagued the original system. To resolve this, a fifth share was created for these users called the "Shortcut Drive." There are shortcuts to each of the departments and divisions, and each one mirrors the same permissions as the actual department or division share. In addition, with accessed-based enumeration, only the shortcuts for which that user has permission will appear. This method creates a very concise list.

PERMISSIONS

The permissions structure was the second major aspect to this solution. The first step was to mirror industry best practices by creating groups for all permissions. However from past experience, it was realized that an organization structure needed to be applied to the group names themselves. The share permissions are "FOLDER_<share name>," while the root folders are "FOLDER_<share name>_<folder name>_<access>" (see Exhibit F). The <access> is either RO for Read-Only or RW for Read and Write. The first letter of the share name and folder names are capitalized for clarification since some folders contain an underscore in the name.

Simply by checking a user's account, a clear, obvious list of permissions is shown. Screenshots or text outputs can be created and sent to the requesting supervisor with little to no further explanation needed (Exhibit G). In a similar manner, if a user requests to know who can write to a location, the information is easily accessed and communicated (Exhibit H).

During initial testing, a major obstacle was discovered with moving files between folders. A foundation of Microsoft design principles states that when you copy a file you change permissions, but when you move a file you maintain permissions. When users copied a file from one folder to another the permissions changed to the new folder and the system worked as intended. Unfortunately, when users moved that same file it kept the permissions of the original folder, defeating the purpose. Through

research, County staff was able to identify a registry key that was changed to override this default process. This allows the end users the ability to move files and achieve the expected results of permission changes whether they copied or moved the file. Furthermore, if for any reason there is corruption to file permissions at any level of the structure, it can be resolved simply with a half dozen clicks to replace all file object permissions from any root folder.

COST

While many organizations quickly rebounded from the Great Recession, York County has been plagued with the closing of major industries, decreased revenue due to military cutbacks, and having to compensate for decreased state funding for school systems. The mantra of "Do More with Less" has become a way of life for each and every County employee. The funding for this project, like many others, was $0. With ever increasing IT demands, the IT organization realized it needed to implement time efficiencies in order to sustain the increasing workload. In a self-directed initiative, County staff took it upon themselves to work harder and temporarily invest additional time to create this concept and implement the restructure. It was done purely with existing systems and staff. Months were invested in meeting with every department, division, and agency to ensure this one system would fulfill both the end-users' and IT's needs. There are no additional maintenance or software costs, and there has been a drastic reduction of staff time needed to maintain the system. File system requests consumed a yearly average of 200 hours of server IT staff, 75 hours of PC IT staff, and 75 hours of non-IT staff. While most of the benefits were produced in decreased liability, increased accountability, and improved organization, the direct work order related staff time savings are approximately $9,250 yearly.

RESULTS

The effect this system has had on the County's file organization has been revolutionary. The process itself has increased file security awareness. The County employees have 4 major file shares with a dozen other minor shares for special application needs. All requests related to permissions take IT staff less than a quarter hour each week, and have no errors in the data being provided. All new non-IT employees have a basic orientation focusing on the use and benefits of our file structure, explained in a simple two-minute presentation.

One of our IT employees was recently hired as an Infrastructure Engineer in the private sector working for a credit union with over a dozen branches. Within the first three months, he began implementing this system to increase efficiency and organization in the competitive corporate environment due to its proven results at York County. This implementation is only one small example of the flexibility potential. Any computer system utilizing a Microsoft network can implement this exact structure with the same benefits to their organization.

WORTHINESS

Many businesses and organizations are often applauded for their multi-million dollar investments into new state-of-the-art programs. While issues and mistakes arise, the answer is too often simply to throw more money at the problem until it is solved. York County, Virginia doesn't have that luxury or desire to compete in that arena. Here, every thousand dollar line item in our budget is scrutinized for months by management and taxpayers, resulting in our County often implementing processes and systems that have been implemented by hundreds of other jurisdictions before they are even considered. While this methodology is the backbone of sustainability in our County, sometime issues are compounded over years, requiring the County to blaze the trail of innovation in order to sustain our core budget.

While individually some of the components of this solution are in use by some organizations, the unique combination and design work together to create a one-of-a-kind optimized solution that beats or rivals other companies' multi-million dollar solutions. Every organization has files and associated permissions. Many implement Microsoft's best practice of permissions assigned to domain local groups, assigned to global groups, assigned to user accounts. Blind implementation of this practice makes it difficult, if not impossible, to output all permissions a user has in a single step. There are third-party programs for tens of thousands of dollars that can make some aspects of this happen, but York County has done it at no cost. In addition, these third-party software and hardware solutions require a unique interface and expertise to implement, and create a reliance on a vendor that can go bankrupt, or whose service quality can deteriorate over time. York County has completed the same task with a never before seen combination of little known Microsoft options. This combination required no custom programming, which has to be completely supported in-house, and continually maintained by internal programmers that many organizations accept as unquestioned overhead. At the end of the day, York County's IT department strives to allow the employees to complete their specialty duties, oblivious to the complexities that are required for seemingly simple tasks like where they save files, while simultaneously reducing budgetary requirements. This project is a testament to the bounds that motivated employees can accomplish to improve their County's efficiency and sustainability and a model for other localities to follow.
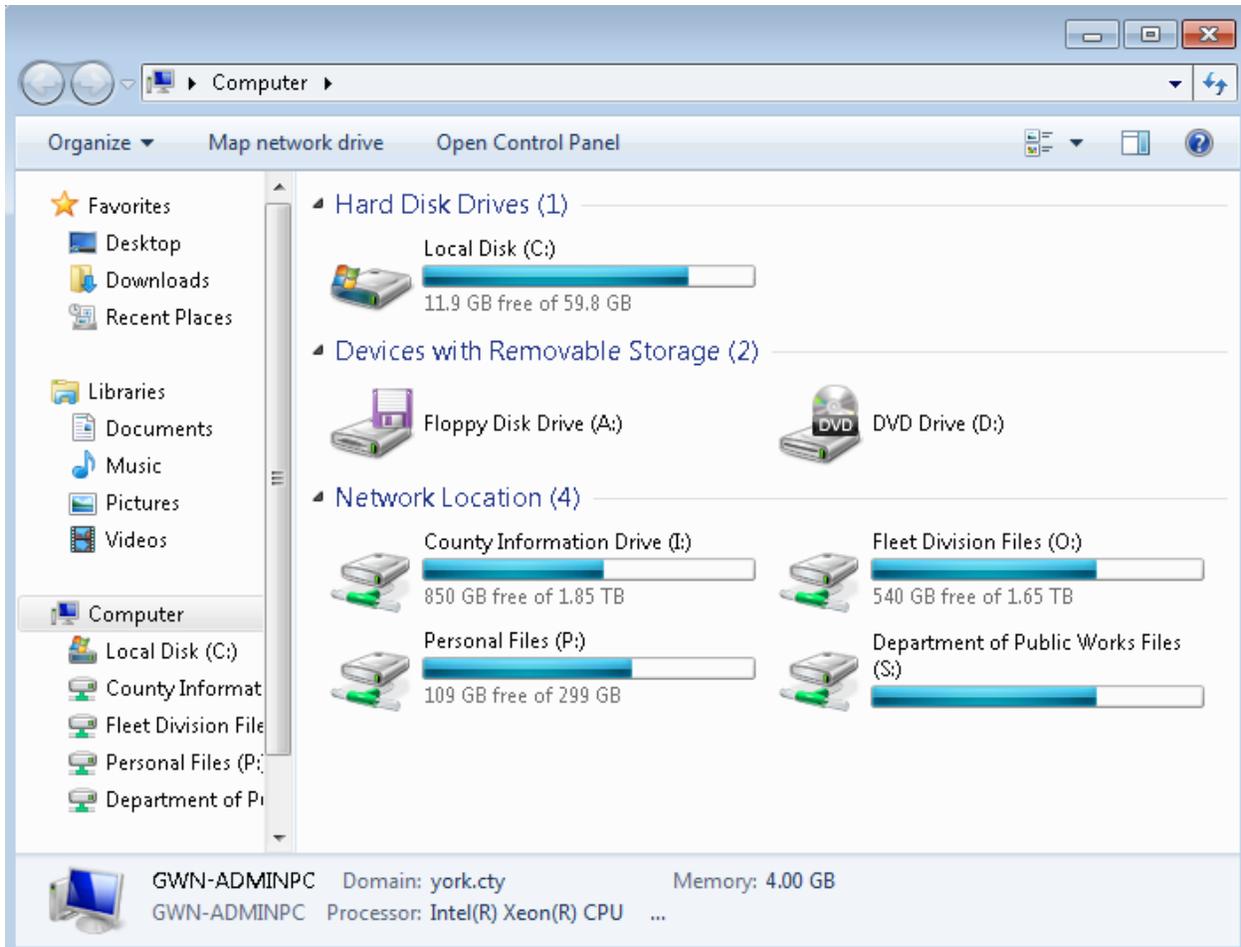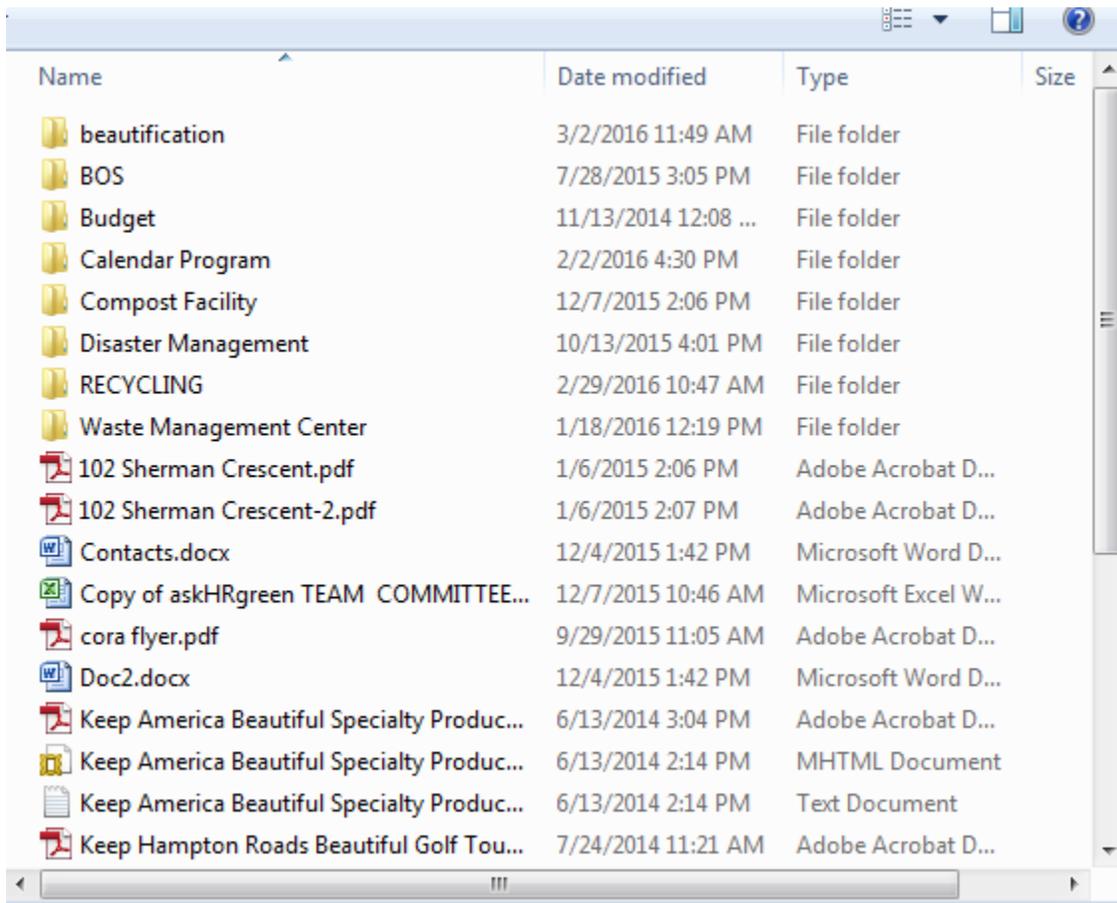
File Structure & Accountability

Supplemental

Exhibit A

Computer

Organize ▼   Map network drive   Open Control Panel

Favorites
- Desktop
- Downloads
- Recent Places

Libraries
- Documents
- Music
- Pictures
- Videos

Computer
- Local Disk (C:)
- County Informat
- Fleet Division File
- Personal Files (P:
- Department of P

▲ Hard Disk Drives (1)

Local Disk (C:)
11.9 GB free of 59.8 GB

▲ Devices with Removable Storage (2)

Floppy Disk Drive (A:)   DVD Drive (D:)

▲ Network Location (4)

County Information Drive (I:)
850 GB free of 1.85 TB

Fleet Division Files (O:)
540 GB free of 1.65 TB

Personal Files (P:)
109 GB free of 299 GB

Department of Public Works Files (S:)

GWN-ADMINPC   Domain: york.cty   Memory: 4.00 GB
GWN-ADMINPC   Processor: Intel(R) Xeon(R) CPU   ...

Exhibit B

| Name	Date modified	Type
_COMMON	2/29/2016 4:49 PM	File folder
~BENEFITS_COMPENSATION	2/25/2016 8:37 AM	File folder
~EMPLOYEE_RELATIONS	3/1/2016 9:09 AM	File folder
HRSCANNER	3/1/2016 4:48 PM	File folder

Exhibit C

Name	Date modified	Type	Size
beautification	3/2/2016 11:49 AM	File folder	
BOS	7/28/2015 3:05 PM	File folder	
Budget	11/13/2014 12:08 ...	File folder	
Calendar Program	2/2/2016 4:30 PM	File folder	
Compost Facility	12/7/2015 2:06 PM	File folder	
Disaster Management	10/13/2015 4:01 PM	File folder	
RECYCLING	2/29/2016 10:47 AM	File folder	
Waste Management Center	1/18/2016 12:19 PM	File folder	
102 Sherman Crescent.pdf	1/6/2015 2:06 PM	Adobe Acrobat D...	
102 Sherman Crescent-2.pdf	1/6/2015 2:07 PM	Adobe Acrobat D...	
Contacts.docx	12/4/2015 1:42 PM	Microsoft Word D...	
Copy of askHRgreen TEAM COMMITTEE...	12/7/2015 10:46 AM	Microsoft Excel W...	
cora flyer.pdf	9/29/2015 11:05 AM	Adobe Acrobat D...	
Doc2.docx	12/4/2015 1:42 PM	Microsoft Word D...	
Keep America Beautiful Specialty Produc...	6/13/2014 3:04 PM	Adobe Acrobat D...	
Keep America Beautiful Specialty Produc...	6/13/2014 2:14 PM	MHTML Document	
Keep America Beautiful Specialty Produc...	6/13/2014 2:14 PM	Text Document	
Keep Hampton Roads Beautiful Golf Tou...	7/24/2014 11:21 AM	Adobe Acrobat D...	

Exhibit D
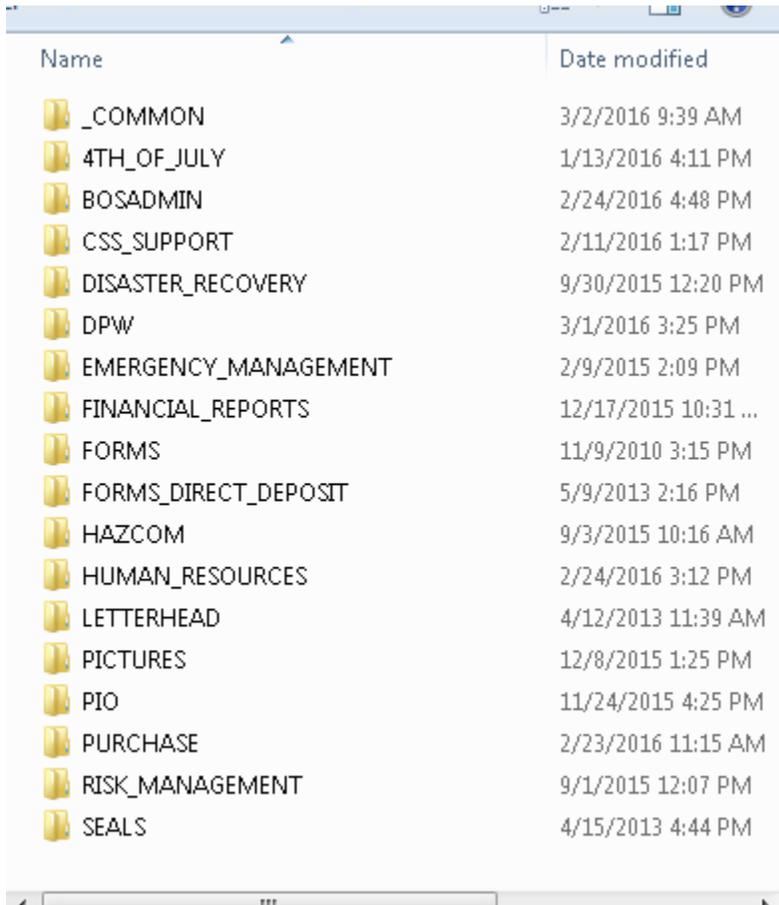
Name	Date modified
_COMMON	3/2/2016 9:39 AM
4TH_OF_JULY	1/13/2016 4:11 PM
BOSADMIN	2/24/2016 4:48 PM
CSS_SUPPORT	2/11/2016 1:17 PM
DISASTER_RECOVERY	9/30/2015 12:20 PM
DPW	3/1/2016 3:25 PM
EMERGENCY_MANAGEMENT	2/9/2015 2:09 PM
FINANCIAL_REPORTS	12/17/2015 10:31 ...
FORMS	11/9/2010 3:15 PM
FORMS_DIRECT_DEPOSIT	5/9/2013 2:16 PM
HAZCOM	9/3/2015 10:16 AM
HUMAN_RESOURCES	2/24/2016 3:12 PM
LETTERHEAD	4/12/2013 11:39 AM
PICTURES	12/8/2015 1:25 PM
PIO	11/24/2015 4:25 PM
PURCHASE	2/23/2016 11:15 AM
RISK_MANAGEMENT	9/1/2015 12:07 PM
SEALS	4/15/2013 4:44 PM

Exhibit E

Name	Date modified
_COMMON	3/2/2016 9:39 AM
~5_YEAR_OPERATION_BUDGET	9/24/2015 11:17 AM
~2014_BOND_RATING_PRESENTATIONS	3/1/2016 4:54 PM
~AFFORDABLE_CARE_ACT	12/22/2015 1:43 PM
~AP_DISTRIBUTION	2/11/2016 9:33 AM
~BCALENDAR	10/23/2015 3:50 PM
~BOS_WEEKLY_INFORMATION	2/26/2016 10:42 AM
~BUDGET_2013	5/20/2013 10:26 AM
~BUDGET_2014	8/13/2014 5:29 PM
~BUDGET_2016	2/2/2016 10:33 AM
~BUDGET_2017	2/26/2016 2:12 PM
~BUSINESS_CONTACT	1/11/2013 3:43 PM
~BUSINESS_DEVELOPMENT	12/30/2009 4:45 PM
~CAPITAL_ASSETS	7/17/2015 1:56 PM
~CASCANNER	3/1/2016 3:17 PM
~CDBG_GRANT_PROJECTS	10/1/2013 10:32 AM
~CHECK_LOOKUP_PROCESSING	8/24/2015 12:22 PM
~COMMUNICATIONS_COMM	3/1/2016 4:06 PM
~COURT_SCANS	4/28/2015 4:45 PM
~CROSSROADS	11/13/2014 6:18 PM
~CSA_POOL_REIMBURSEMENTS	3/1/2016 10:26 AM
~DEFERRED_COMPENSATION_COMMIT...	8/8/2014 8:50 AM
~EDA_ZONING	1/7/2016 10:52 AM
~EDS_DRAWINGS	3/1/2016 1:39 PM
~EDS_PERMIT_REPORTS	2/3/2016 1:03 PM
~ELECTRONIC_REGISTERS_ACTSPAYABLE	7/30/2015 2:58 PM
~ELECTRONIC_REGISTERS_PAYROLL	6/30/2015 12:10 PM
~ELECTRONIC_REGISTERS_SOCIAL	4/22/2013 5:05 PM
~EMSBILLING	12/29/2015 4:26 PM
~EOQ	1/4/2016 4:51 PM
~EQUITY	4/19/2013 3:43 PM
~FINANCIAL_OPERATING_WORKING_GR...	1/11/2016 5:43 PM
~FREIGHT_SHED	12/14/2015 11:01 ...
~GO_GREEN	8/21/2013 3:18 PM
~GRANT_HAZARD_MITIGATION	3/1/2016 2:46 PM
~GRANT_HEAD_START	3/1/2016 11:46 AM
~GRANT_OVW_PTEAP	1/7/2016 10:26 AM
~HEALTH_INSURANCE	2/29/2016 11:44 AM
~HERMIONE	2/3/2016 4:42 PM

Exhibit F

```
Name
  Folder_Attorney
  Folder_Board
  Folder_Budget
  Folder_Building
  Folder_Building_~Potter_RO
  Folder_Building_~Potter_RW
  Folder_Building_Administration_RW
  Folder_Building_Building_regulation_RW
  Folder_Building_Incidents_RW
  Folder_Building_Manager_RW
  Folder_Building_Plan_review_RW
  Folder_Cbh
  Folder_Cbh_Checks_RW
  Folder_Child
  Folder_Child_~Manager_RO
  Folder_Child_~Manager_RW
  Folder_Child_Administration_RW
  Folder_Child_Coordinators_RW
  Folder_Comser
  Folder_Comser_~Director_RO
  Folder_Comser_~Director_RW
  Folder_Comser_~Intern_RO
  Folder_Comser_~Intern_RW
  Folder_Comser_~Management_RO
  Folder_Comser_~Management_RW
  Folder_Comser_~Special_programs_RO
  Folder_Comser_~Special_programs_RW
  Folder_Comser_Administration_RW
  Folder_Comser_Juvenile_services_RW
  Folder_Comser_Library_RW
  Folder_Comser_New_employee_orientation_RW
  Folder_Cp
  Folder_Cp_Boles_RW
  Folder_Cp_Halla_RW
  Folder_Cp_Haney_RW
  Folder_Cp_Policies_RW
  Folder_Cp_Robinson_RW
  Folder_Cp_Stokes_RW
  Folder_Cp_Web_RW
  Folder_Cwa
  Folder_Cwa_~Cims_RO
  Folder_Cwa_~Cims_RW
  Folder_Devcomp
  Folder_Devcomp_~Sup_logs_RO
```
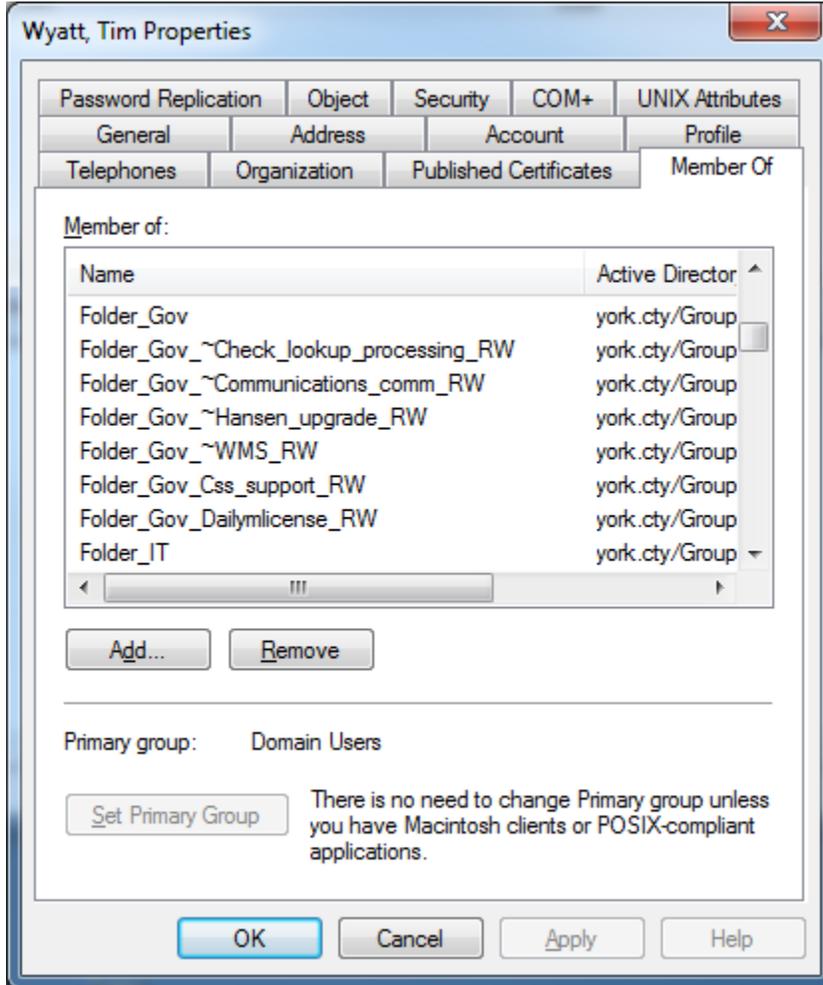
Exhibit G

Exhibit H

Folder_juv_ser_~Crossroads_RW Properties

Tabs: Object | Security | UNIX Attributes | Attribute Editor
General | Members | Member Of | Managed By

Members:

Name	Active Directory Domain Services Fo
Bennink, Carol	york.cty/Community Services/Stand
Brown, Darryl	york.cty/Community Services/Stand
Brown, John	york.cty/Community Services/Stand
Coleman, Laurie	york.cty/Community Services/Stand
DeVane, Mollie	york.cty/Community Services/Stand
Ferguson, Laurence	york.cty/Community Services/Stand
Johnson, Wayne	york.cty/Community Services/Stand
Justiniano, Michelle	york.cty/Community Services/Stand
Lofquist, Kathryn	york.cty/Community Services/Stand
McCoy, Brian	york.cty/Community Services/Stand
McGettigan, Vivian	york.cty/County Administration/Stan
Moore, Gary	york.cty/Community Services/Stand
Radcliffe, Carolyn	york.cty/Community Services/Stand

Add... | Remove

OK | Cancel | Apply | Help