

>> [ Please standby for realtime captions. ]

>> The morning and thank you for coming to my presentation. I am Bill Sudduth, the head of government information department. I am here today to talk about a series of exciting projects that we have done with our aerial photography collection. The first slide is a little misleading, it is a tribute to our first funder the Dorothy Donnelly foundation. They gave us our first grant to scan and you rectify our collection of historic aerial photography for the low country. The Donnelly foundation is based in Chicago, Illinois. They do have a connection to the low country and they were very generous. As I get into the presentation we will talk a little more about their continued generosity. I am going to talk about three additional grants that we have received. One is in progress. Shortly after we received the Donnelly grant in July in July 2013, about four months later we received an anonymous grant from a group in Chester County South Carolina to do three of the counties in the upper Midlands. There is also a poster in the back that has the counties highlighted.

>> Two years ago we had a rain event in South Carolina. You might have seen it on the news. The area that was the worst was how I got to work. I had to do this work around, which was not bad. It was not like our AUL, whose home was completely engulfed. Our immediate research immediately put out grants where you could study -- what is it called -- perishable data. We consider our collection perishable because it is getting degraded. But they funded our Richland County collection. Since then we have received and other grant to do Pickens County, which is up in the Northwest and has the other school that we refer to gingerly, Clemson.

>> Again, all of the projects have the same goal, the nice thing about the Donnelly foundation is for being our first grant they had rules. They wanted us to have deliverables. They wanted to know things. We have to do a formal proposal and we had an on-site reviewer that came and reviewed if we had the collection. The goal is to scan and geographically rectify the aerial photography of Thomas Cooper's map collection. It is not a complete collection those of you who know aerial photography, it was done from the 1930s-1980s. They were replaced by satellite photography. Now the cool thing is Lidar. I know the kids know it, but we do not have that imagery. The goal is to make these images available to the low end user and then also to give the data files. We did not end up doing that, it was the initial plan. The files will be available to the South Carolina digital library, which we are one of the three core libraries that do that. Once we did that we would move our tangible collection to remote storage. This is the preservation aspect. Before I go into this the collection with used 90% -- [ Lost Audio ]

>> Quickly again this is the college transfer that we got on April 13. We got a little over 31 We got a little over 3100 images. This really helped to fill in the gaps. When you can fill in the gaps you get better results. As I mentioned, about six months after that we got anonymous money from someone in Chester County. We started about that in August 2014. We completed the scanning -- scanning in 2015. We are almost ready to complete the grant. We are missing, I believe, the 50s and one set of 70s images that have not been rectified. Fairfield and cursor counties have been done and are considered the Midlands. They are north of Richmond County. They are going toward Charlotte.

>> Two years ago we got money from the Vice President for research. We got \$15,000. We ended up going over budget with this grant by about \$2000. We were on a tight project timeline. We did not complete the project by the deadline, but we had another water incident and hurricane Matthew came along and pushed everyone's timeline back. We really didn't have to do -- the grant deadlines were not until the conference that we had in Columbia on November 18. It was supposed to be in October, we were all closed that day. We finished the grant last December. The other problem we had with the Richland County grant was we pre-scan some of the images at 300 dpi. We decided to do the rest of the project at 300 dpi. All the other projects are done at 400 dpi. A year ago we got another grant. We put in a request to do Pickens County and Oconee County. The Fairburn foundation is co-run by two brothers, one lives in Silver Spring Maryland, I believe. Either that or it came from Florida. Kind of like the Chester

grant, they came over the tram type of thing. What was interesting is I have a Donnelly foundation that said you must give us a progress report every year. Whereas, Chester and Fairburn said here is the money. So who do you do first? The people who put you on that deadline? To all future people will want to give me grant money, put me on a deadline. Here is the map of what we have done so far. The green is the original Donnelly project. We expanded that to what I call the title areas of the low country. The blue is the Richland County, the purple is the Chester and then various Pickens County up there. Again, you can see why we put in for Oconee and Pickens. You can probably tell all of this has been done by foundation grant money and not federal. Again, that is the route that we have had to go because these are federal products. It is really hard to get federal money to work on federally produced information. The next series of slides show you how different years and what gaps show up in the different years of some of our collection.

>> This is Jasper County, it is our most southern County along the Georgia border, probably best known for anyone who keeps up between the agreement or disagreement between Georgia and South Carolina about expanding the facilities along the Beaufort River. The new were the images the more less gaps that we have. Again, Beaufort County is probably best known for being the home of Hilton head. These are the images that I really like to show people. The reason we did this is that land changes over time. Sometimes you think that takes thousands of years. Of course along the coast, we know it happens every day. Here is the tip of Beaufort County, 1939. This is an image taken three years ago for 2014. Let me see if I can go back. Again, part of Beaufort County, this was Beaufort County 1955. It is the same image today. Golf courses, shopping malls, nice homes for retirees. 278 is the main roadway that takes you off of 95 toward Beaufort County. When we did this this is what we showed the reviewer who came to us, the former director of Brook Ring gardens. It is just below Myrtle Beach. We show them the images from Myrtle Beach, the images from Hilton head, and images from around the green garden. I love telling the story. He was more fascinated about Brook regarding the the other two places, where you can obviously see man had change the environment. He was shifting over these images and pointed to a section in fact, you know, we found out in this corner over here and Brook regarding the used to grow peppers. I leaned over to our collection development person and said, that was my great-grandfather. Part of Brook Ring gardens, the family had a plantation back toward the 1900s. After the war my great-great-grandfather grew peppers, made his own pepper sauce and sold the rest to a little company in Louisiana. That is why you see me with my red sauce.

>> I was impressed that he was seeing that connection. The other nice thing about Donnelly was because they wanted deliverables I capped information. I tracked this. What we didn't know when we went into this project was how much did it cost to do an image? Of course that is why we went \$65,000 under budget, we were flying on the seats of our pants. I said when we started this project that by the end I wanted to be telling future grantees how much we can do the project for. The other problem about doing this project is these images came in three sizes: 9 x 9, 12 x 12, and 24 x 24. You also have to be lucky enough to have a special machine to do the 24 x 24. We had gotten ourselves a really nice one that does up to 30 x 30 images. This is the kind of tracking I did. What I got to do was track the cost of image over time. How many images were rectified? How many hours were spent? How many images per hour? You can see we got a great deal of efficiency as we got further into the project. The first thing that we figured out was you do the newer images first. The newer images are more like your base maps right now and it is easier to find the match points. You do not start with 1939. 1939 in Orie County, the picture is nothing but Swamp. There are no roadways to match it against. If you start in 1981 and work back you can work off of the previously rectified images.

>> Here is the tracking I have done for all of the different projects. Again, the Chester project is not as efficient. We had an individual start and we have to go back and redo about 750 images. We lost a little cost savings on that. Richland County was a little more expensive, because what we were left working on were larger images. The larger images are more expensive to scan. What you do for this is, this is the

cost for GL rectification. We found out it is about one dollar per image to scan. We give a really good round number for that. This is a visualization of the poster that I have in the back. This is the latest one that talks about our metadata, it talks about the process, more specifically our processing, what we did to process the images. I invited one of my students who graduated last year to come. She works here in Crystal city and is going to graduate school at the University of Maryland. She did not make it, I was going to rely on her for answering most of the technical questions. We are going to come back to this. Quickly, I want to talk about this being really good for the library. It is good to reconnect with the geography department. Our geography department is customer number seven, which has been a really good thing. It has also been good for the students. These are the first three students on the list, the first three who started on the project. Mark came to me from the United States Army. He was a great influence on the other two young gentlemen on this list. He was there at a quarter of the hour, he said he was going to be there and he was there at the corner of the hour after the hour. All three of these young men were curious and wanted to do things better every day. Mark is now the GIS person for me at Carolina electric, Angel is working for Milliken for street, which he was able to sell because he was able to say I have already seen all of the photos of trees. Daniel was my typical undergraduate who transferred from a school in Pennsylvania. Throughout most of his junior year he was like I will show up and do a little bit. He got an internship in California that summer and he came back one changed individual. He was Mr. nose to the grind stone. At the end of the year by that December he was working in Charlotte as an analyst. He is one of the folks you, and if you are having problems he helps you walk through it. Fourth on here is Terrance, he came from the military. He still had his security clearance. When he graduated this past May there were people crawling all over to hire this young man. He was hired by a company out of Florida. I do not know where he started, but it is what I make or a little more. I am really glad he was able to do that. Kylie, I was hoping she was show up today. She is in the Masters services. These are all going to be people who are going to be doing great things for us in the future, whether it is our electrical grid or working for our Armed Forces.

>> And a lot of in-house students are able to use this project work course credits and in-house internships. We've had six of them who have done that. External internships, Terrance work for scanner, which you might've heard, it was in the news lately because they cannot finish building the nuclear power plant because ratepayers like me have paid \$2 million to see that get done. The South Carolina Department of Transportation, Payson and Sawyer, central Carolina alliance, and I did not get Logan's internship and they are, but it was an engineering firm. My contact information, but let's go to the webpage. The other reason we were \$65,000 under budget was because we put in \$38,000 in our budget for a web developer. This piece of work was done by a Masters in geography student over one summer at \$15 per hour. Every time I show this I feel like I have taken the young lady for all of her good work. She is in a doctoral program somewhere. I do not remember where. What she had done, some of you are familiar, she has taken basic tools and turn them and taken what we thought would be a basic search system. The way that it is set up you choose your County. I am going to go to Georgetown. And then you choose the year that you want your imagery. I am going to go back to 1939. What it does is it populates. One of the things that we do is we run these images through a program that allows us to zoom. We can go home and the images. We have a limited amount and then it starts to pixelate. It's is pretty good. We have two things. We have a series of nine different base maps that you can run from and change the up a city to look at the base map. -- opacity To look at the base map. I can also slide the image back and forth like that. I can reset if I want to go to another year. You can also search by a location. You can say where is my location? I do not want to do that because it was the room and onto Arlington, Virginia. That will not help me. You can do measurements. They are good and bad. What you need to know to be accurate is what the root mean square is for each image. The average that we have created it going from the original, including the original photography so when we put it up on the screen here, our group mean is about three, which means we are about 10 feet off, which is not bad, I do not

think it is bad. I mean, if you want to throw a grenade from an airplane onto a rabbit in a certain field, sent by -- 10 feet might be off, but it is not that for what we have been doing. Some of the projects I researched before this, this individual put up a YouTube and he was so proud that his root mean square with nine. You are in the middle of the city and you are off by 30 feet? The students were very competitive about how good they could get their RMS. I am very happy with the three.

>> Again, we can change our base map. When we finished the Chester project we had a special project that we are going to add to this. We want to GR rectify the hurricane Hugo storm surge imagery so that both can see and remember how bad Hugo was. They can pull out the modern base map and see this is the level of innovation. With that I will stop and take questions.

>> I was wondering what DPI are these photos scanned in? Are they available for download?

>> Everything other than richly -- Richmond County is 400 dpi. While you would love to want to do eight, that is a . Even with a 48 TB server. Richmond County, we had pre-done something that 300. When we finished Richland County we kept everything at 300, but everything else is four. They need to request down low. There are companies out there that sell the imagery. We had a company just before we were starting this project that came to us and wanted to copy a lot of our imagery. These companies can be very entrepreneurial. They can be very sneaky and that they can hire local students who come in and will do 10 and 15 at a time. We say no. If you need it, contact me and we find a way to get it to you. We do not want to make people come in, but we want to control the images on the server because we do not want to be taken. It is free, we do not charge people anything, but we did not want someone to one night come in and walk away with it.

>> Do you have any plans to fill in gaps in some of the fears from the archives or USDA?

>> That is what we did with our index. We have the indexes separately, the Mosaic indexes is a separate link off of my webpage. We paid a lot of money for that. We had leftover money one year, like \$25,000 to make sure we had the complete index collection. I work very closely with our foundation and grant development, that is part of the main development. He is out there looking for new projects. Spartanburg County has shown interest. It is easier when you group these things, sometimes it is easier to sell them group. The northeast corner of our state, it is Dylan Dorchester -- they are just four County fair that would get me to the PD, which will be oriented Lawrence County, they just got the environmental approval about four months ago to complete Interstate 73. I would think there is someone out there who would like to see this done quickly so that they can be -- they can more efficiently do their phase I or their next phases. We are trying to sell them as groups, but we might take on a project from Spartanburg where the aerial photo are actually done locally with someone hanging out of an airplane. But, we will do a test project on that. It is not like when the agricultural research service or its predecessor did these. There were guidelines and rules, this is how you did it, this is how fast you blue and things like that. -- flew And things like that. I have gotten to the point where I can look at certain trees say that is an apple tree or a peach tree.

>> This is really helpful for people doing forest management. They see what was there and what could be there. Sorry, long answer.

>> I am looking from a user side. Do you have -- [ Lost Audio ]