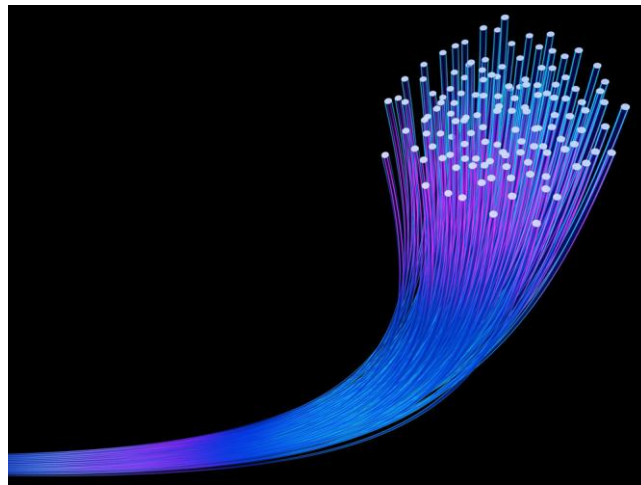


**ECONOMIC
IMPACT
ANALYSIS**

**An Extension
Community
Economics Program**

**Sibley-Renville
Fiber-to-the-Home
Economic Impact Study**



**Prepared by:
Dr. William Lazarus, David A. Nelson, and Tim Dolan
University of Minnesota Department of Applied Economics
University of Minnesota Extension Center for Community Vitality**

**With assistance from:

Brigid Tuck
University of Minnesota Extension Center for Community Vitality**


UNIVERSITY OF MINNESOTA
EXTENSION

December 2010

Table of Contents

Title	Page
Introduction	1
Highlights of the Fiber-To-The-Home Study	3
Study Area	4
Economic Impact Analysis	6
Construction	6
Operations	9
Methodology	12
Notes of Caution	14
Conclusions	15

Introduction

Recent research by the United States Department of Agriculture (USDA) has pointed to the potential benefits of broadband in rural America. A recent article in Rural Cooperatives concludes “Studies indicate that investment in rural broadband boosts economic growth, promotes new businesses and increases the growth of existing firms. For example, USDA’s Economic Research Service notes that ‘rural counties with broadband Internet service in 2000 had greater subsequent employment and income growth than similar rural counties without service’” (Mayberry 2010).

Given the current technology climate, a majority of citizens identified the need for dependable, affordable, and ubiquitous broadband technology in Sibley County. A group of county leaders embarked on a strategy to assess the feasibility of establishing a broadband network to each home and business in the greater Sibley County area. This strategy included securing a grant of approximately \$80,000 to assess the feasibility and economic impact of constructing and operating a state-of-the-art broadband network to every premise in the county using Fiber-to-the-Home (FTTH) technology. The goal of the grant, feasibility study, and impact study was to further inform the citizens regarding the cost and capability of the infrastructure. The study geography was later expanded to consider the extension of the fiber optic cable to the eastern reaches of neighboring Renville County.

The proposed technology would offer cable-access TV, telephone, and data services to any premise in the county. Two options are considered in the feasibility profile; one to city residences and businesses only and one to all entities including farms, rural businesses, and the cities within Sibley County. For *both* options, the feasibility study assumes a 70% acquisition rate for residential cable TV services. The study also assumes a 10% reduction in existing rates (from prior carriers) and a total package rate (including telephone, CATV and high-speed internet) of \$100 per month.

Results of the feasibility study conducted by CCG Consulting LLC, project a total infrastructure expenditure for the city-only plan of \$23.3 million and a total capital requirement of \$34 million. The countywide, all entity plan projects an infrastructure expenditure of \$43 million with a total capital requirement of \$63 million.

Given the information provided by CCG Consulting, University of Minnesota Extension was commissioned to conduct a study to estimate the economic impact of this proposed Fiber-To-The-Home (FTTH) infrastructure. The following report is a summary of the analysis and the findings. This study was conducted under Extension’s Economic Impact Analysis program. The Economic Impact Analysis program is designed to assist communities in examining and discussing the economic consequences of a change in the community. Lead researcher on

this project was Dr. William Lazarus of the Department of Applied Economics. Assistance and guidance was provided by David Nelson, Tim Dolan, and Brigid Tuck of the University of Minnesota Extension Center for Community Vitality. Project cost estimates were obtained from the Sibley County FTTH feasibility study conducted by Doug Dawson and CCG Consulting LLC.

Highlights of the Sibley-Renville Fiber-to-the-Home Economic Impact Study

In a 2010 study conducted by University of Minnesota Extension examining the economic impact of a proposed new Fiber-To-The-Home (FTTH) infrastructure to business and residences in Renville-Sibley counties, Minnesota it was found that:

- Output in the Sibley County economy is predicted to increase by \$4.5 million annually due to the daily operation of the facility/infrastructure.
- Employment in the study area is predicted to increase by 13 jobs annually due to the daily operation of the facility.
- Labor income in the local economy is predicted to increase by \$0.6 million annually due to the daily operation of the facility.
- The telecommunications industry, the service & repair of non-residential structures industry, and the food service and drinking industry will be the industries most significantly impacted due to the operation of the facility.
- Output in the local economy is expected to increase by \$26 million per year for two consecutive years due to construction of the facility/infrastructure.
- Employment in the study area is expected to increase by 288 jobs for two years due to construction of the facility.
- Labor income in the local economy is expected to increase by \$10.6 million per year for two years due to construction of the facility.



UNIVERSITY OF MINNESOTA
EXTENSION

Study Area

The first step in an economic impact analysis is to determine the boundaries of the economy to be studied or the study area. In this case, local officials decided to use Sibley County as the study area. Selecting an appropriate study area is important. Sibley County is now the local economy.

According to United States Census Bureau estimates, the total population of the study area is 14,925 individuals. Of the local residents, approximately 58 percent, or 8,761 individuals, are in the labor force. There are a total of 5,772 households in the study area with an average household income of \$41,458 in 2000 and \$52,360 in 2008.¹

Total output, employment, and labor income by major industry for the study area is detailed in Table 1. These industries combined to produce \$953 million of sales (output) in 2008. They created 6,535 jobs that paid a total of \$197 million in labor income.

Table 1: Output, Employment, and Labor Income for the Study Area²

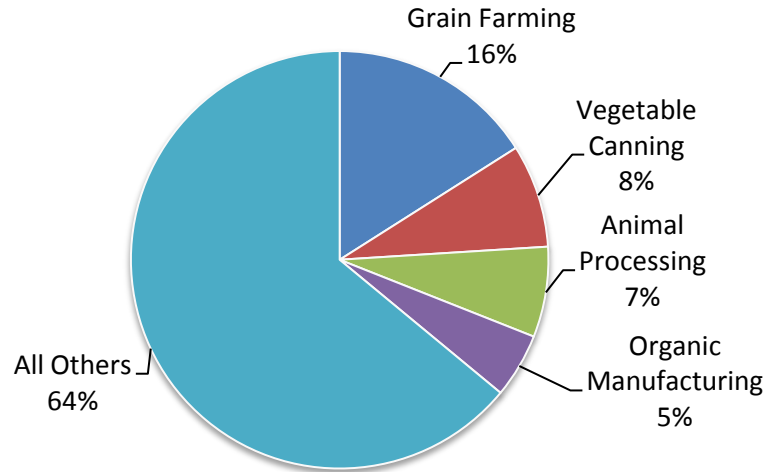
Industry	Output (\$ millions)	Employment	Labor Income (\$ millions)
Agriculture	\$ 263.4	1,478	\$ 27.7
Mining	\$ -	0	\$ -
Construction	\$ 52.9	427	\$ 18.0
Manufacturing	\$ 355.2	840	\$ 45.2
TIPU	\$ 34.9	353	\$ 13.5
Trade	\$ 39.4	567	\$ 14.6
Service	\$ 152.5	1,933	\$ 36.2
Government	\$ 54.7	936	\$ 42.2
Total (all industries)	\$953.0	6,535	\$197.4

The grain farming industry is the area's largest producer in terms of output and contributes approximately 16 percent of total output. The vegetable canning industry is the second largest in terms of output with 8 percent of total sales production. The animal processing (except poultry) industry is the third largest contributor to the economy and produces 7 percent of total output. See Chart 1.

¹ All estimates in this section are from the 2000 United States Census or IMPLAN software.

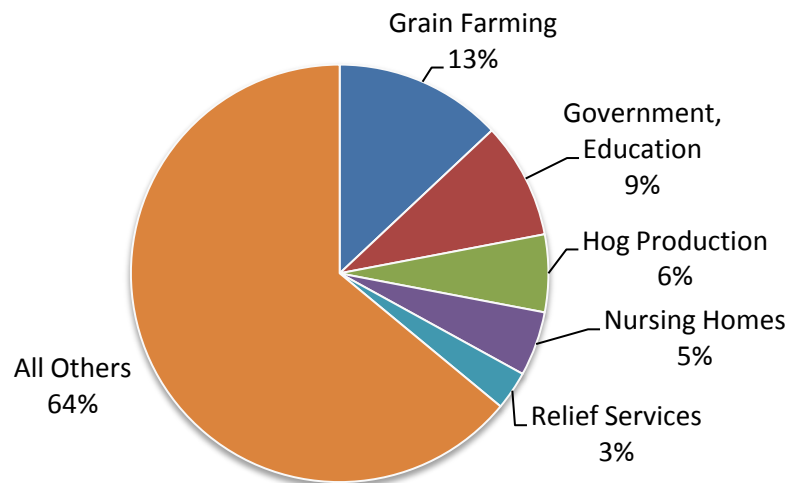
² Values were taken from the IMPLAN software.

**Chart 1: Industry Share of Total Output
Sibley County 2008**



There are 6,535 jobs in the study area. Grain farming is also the largest employer contributing 13% of total employment to the local economy. State and local government, education is the second largest employer in the study area. The hog production industry and the nursing care facilities industry are the third and fourth largest employers respectively. See Chart 2.

**Chart 2: Industry Share of Total Employment
Sibley County 2008**



Economic Impact Analysis

The proposed new Fiber-To-The-Home (FTTH) project will affect the local economy in two phases. The first phase of the project will be the construction of the new infrastructure/facility. The local economy will feel a boost in economic activity from the construction of the facility. This will be a relatively large initial economic impact as the construction costs are fairly significant. However, these effects will be short-term as construction will last about two years. When construction is complete, these economic impacts will dissipate. The second phase of the project will be the daily operation of the FTTH utility. Once the facility is completed, there will be day-to-day costs associated with running the FTTH company. This impact will be smaller, but it will be long-term. The economic impact of each phase will be calculated in this report using IMPLAN (IMpact Analysis for PLANning) software. For more about the software and terminology, please refer to the methodology section of this report.

Construction

The first economic impact from the new FTTH facility will be due to construction. Sibley County officials (from CCG Consulting's feasibility study) provided cost estimates for the construction phase (Table 2). Construction costs are expected to total \$44,564,000 over a two-year construction period, or \$23,359,000 per year. Project planners estimate that \$25 million will be used for fiber cable installation in the ground. Another \$13 million will be spent on the home-bound excavation and cable attachment. Finally, \$5.5 million will be invested in technology equipment, the building, software, and the major phone switch.

Table 2: Proposed Construction Costs for New Fiber Optic Cable in Sibley/Renville counties, Minnesota

Category	Proposed Cost
Inventory and tools	\$650,000
Vehicles	\$150,000
Building, furniture, computers	\$1,380,000
Phone switch, Internet equipment, software	\$1,028,000
CATV equipment	\$3,383,000
FTTH on homes	\$6,501,000
Fiber drops to home	\$6,327,000
Fiber network in ground	\$25,146,000
<hr/>	
Total	\$44,564,000
Total for one year (of two)	\$23,359,000

All of these expenditures are necessary to complete the proposed FTTH system. However, not all of these expenditures will be made locally. *Only local*

expenditures are used as the direct impact and are included in the model. The figures provided in Table 2 are the total expenditures necessary to construct the fiber system. The amount of this spending that is local must be determined in order to quantify the value that is entered into the model as the direct effect.

It was determined that \$21,281,940 of the total expenditures were local expenditures and therefore used as the direct impact in the local model. Expenditures in the amount of \$2,077,060 were determined to be non-local and therefore excluded from the analysis and model. Table 3 summarizes what costs from Table 2 are considered local (and therefore direct) and the total value of the direct impact that was entered into IMPLAN as a direct effect.

Table 3: Construction Costs/Year as Entered into IMPLAN for Direct Effect

Category	Direct Effect for IMPLAN
Equipment and electronics	\$8,329,000
In-ground cable and trenching	\$13,692,000
Building costs, furniture, computers	\$600,000
Vehicles, inventory, tools, and other	\$640,000
Total Direct Effect	\$21,281,940

According to CCG Consulting, an estimated 478 person-years of employment will be involved in the construction or 239 person-years per year over the two-year period. Some of these jobs will be continuous during the construction phase and some will be intermittent. The IMPLAN software also estimates that labor directly involved with the construction will receive \$9,256,500 worth of payments per year. These are the direct effects as listed in Table 4. These output, employment, and labor income amounts are those that occur directly at the construction site.

As construction progresses, expenditures will begin to occur in the local economy. The construction companies will make some local purchases of supplies and labor. The employees at the site will begin to make local purchases. As these purchases occur, they will trigger additional spending in the local economy. This additional spending that occurs as a result of the direct spending can be measured and labeled as indirect/induced effects. See Table 4. When \$21.3 million is spent directly on construction, another \$1.9 million worth of spending occurs in the local economy. In total, construction of the facility is expected to increase output in the local economy by \$25.8 million per year.

Table 4: Total Economic Impact of Construction of Proposed Fiber-To-The-Home, Sibley and Renville Counties, Minnesota

	Direct/per year ³	Indirect/Induced Per year	Total Per year
Output	\$21,281,940	\$4,478,970	\$25,760,910
Employment (Full & Part-Time)	239	49	288
Labor Income	\$9,256,500	\$1,376,619	\$10,633,119
Estimates by University of Minnesota Extension Center for Community Vitality			

Local spending by the construction companies and their employees will stimulate additional spending in the local economy. As this happens, businesses in the study area will have to increase employment to meet increased demand. This employment is listed as the indirect/induced employment in Table 4. The additional spending that occurs as a result of construction of the facility also affects employment. In addition to the estimated 239 employees working on the construction of the facility over a two-year period, 49 new jobs are expected to be created in the area. Jobs at the construction site plus additional jobs created by construction spending can be added to arrive at total change in employment. Total employment in the study area is predicted to increase by 288 full-and part-time jobs as a result of construction of a new fiber optic system.

Labor income in the local economy will also be affected by construction of the new fiber system. IMPLAN estimates that labor directly utilized in the construction of the facility will generate \$9.3 million per year in income. The additional spending triggered by the construction will pay \$1.4 million per year in labor income. Therefore, total labor income in the local economy will increase by \$10.6 million per year as a result of construction of a new Fiber-to-the-Home infrastructure.

Table 5 provides more detail on what industries would be most affected by the construction of new FTTH infrastructure. The direct effects of \$21.3 million per year in the construction industry are in the construction sector. As a result of this direct effect, other sectors in the study area will see an increase in output of \$4.5 million (indirect/induced). The majority of these additional impacts will be in the service industry (architectural design for example), the trade industry and the transportation, information and public utilities industry.

³ Direct output and employment estimates are from the feasibility study conducted by CCG Consulting LLC. Direct labor income is an estimate from the IMPLAN software based on estimated output and employment.

Table 5: Impact on Industry *Output* in Sibley County as a Result of Construction of a Proposed Fiber-To-The-Home, per Year

Industry	Direct (\$)	Total (\$)
Construction Trades	\$21,281,940	\$21,347,661
Services	\$0	\$3,074,859
Trade, Retail and Wholesale	\$0	\$906,926
Transportation, Information, Public Utilities	\$0	\$192,908
Manufacturing	\$0	\$103,830
Government, Federal, State and Local	\$0	\$93,475
Agriculture	\$0	\$41,252
Total	\$21,281,940	\$25,760,910

Table 5 (b): Impact on Industry *Employment* in Sibley County as a Result of Construction of a Proposed Fiber Optic System, per Year

Industry	Direct (\$)	Total (\$)
Construction Trades	239	240
Services	0	31
Trade, Retail and Wholesale	0	14
Transportation, Information, Public Utilities	0	2
Government, Federal, State and Local	0	1
Manufacturing	0	< 1
Agriculture	0	< 1
Total	239	288

Operations

The second economic impact from the new Fiber-To-The-Home (FTTH) facility will be due to daily operations. On a daily basis, FTTH will be spending money for labor and for supplies. Labor includes spending for all the people that work in the facility. Supplies cover a wide range of inputs necessary for the facility to function including, but not limited to: utilities, replacement parts, vehicles, and office supplies. Since this is a proposed facility, no operating budget currently exists. However, there are some other comparable FTTH facilities in operation in the nation and a feasibility study was completed on the operation. Total expenditures (a budget) for this facility are estimated in the feasibility study.

According to CCG Consulting's feasibility study, the facility is estimated to spend \$4.1 million dollars a year to operate. This is the direct effect of the proposed new FTTH company. The IMPLAN software estimates the facility will employ 8 individuals. Finally, the IMPLAN software indicates the facility is expected to

expend \$461,000 for its labor. These are the direct effects to output, employment, and labor income in the study area as listed in Table 6.

Table 6: Total Economic Impact of Daily Operations of Proposed Fiber-To-The-Home, Sibley & Renville Counties, Minnesota

	Direct	Indirect/Induced	Total
Output	\$4,092,412	\$409,217	\$4,501,629
Employment (Full & Part-Time)	8	5	13
Labor Income	\$460,960	\$139,139	\$600,099
Estimates by University of Minnesota Extension Center for Community Vitality			

The direct costs and employment needed to operate a FTTH System on a daily basis are only part of the total economic impact of the facility. As the facility makes local purchases and as workers spend their paychecks, additional spending will be created in the local economy. This additional spending constitutes the indirect and induced effect shown in Table 6. The direct spending on inputs and supplies by the FTTH and by its employees will trigger a “ripple” effect in the economy and create an additional \$409,217 worth of spending in other industries. When this additional spending is added to the direct spending by the facility, the figure totals \$4.5 million. Total output in the local economy is estimated to increase by \$4.5 million on an annual basis due to the proposed FTTH project.

The FTTH operation is predicted to employ 8 individuals on a full- or part-time basis. As spending from the FTTH and its employees works its way through the economy, local businesses will have to increase their level of employment to meet the new level of demand. IMPLAN estimates that another 5 full- and part-time jobs will be created by this demand. Thus, total employment in the study area will increase by 13 jobs annually due to the proposed FTTH project.

The FTTH project will also affect labor income in the study area. The facility is anticipated to expend \$460,960 for labor annually. This is the direct effect of labor income. As spending from the Fiber-To-The-Home and its employees occur, employment will increase in the area. As employment increases, so do payments for labor. The “ripple” effect from direct expenditures by the FTTH project and its employees is expected to generate an additional \$139,000 in labor income. In total, labor income in the local economy is predicted to increase by \$600,099 on an annual basis due to the FTTH.

Some industries will experience a greater increase in total output from the new infrastructure than other industries. Details on how the impact will be spread across major industries in the study area are shown in Table 7. The direct effect of FTTH operations will be in the service industry (telecommunications). The construction and trade industries will be the top two other industries affected by

operations of the FTTH. While not shown, the majority of new employment created will be in the service industry.

Table 7: Impact on Industry *Output* in Study Area as a Result of the *Operation* of a Proposed Project

Industry	Direct (\$)	Total (\$)
Services	\$4,092,412	\$4,357,959
Construction Trades	\$0	\$51,563
Trade, Retail and Wholesale	\$0	\$41,444
Government, Federal, State and Local	\$0	\$25,694
Transportation, Information and Public Utilities	\$0	\$19,389
Manufacturing	\$0	\$2,892
Agriculture	\$0	\$2,688
Mining	\$0	\$0
Total	4,092,412	4,501,629

Methodology

Special models, called input-output models, exist to conduct economic impact analysis. There are several input-output models available. IMPLAN (Impact Analysis for PLANning, Minnesota IMPLAN Group)⁴ is one such model. Many economists use IMPLAN for economic contribution analysis because it can measure output and employment impacts, is available on a county-by-county basis, and is flexible for the user. IMPLAN has some limitations and qualifications, but it is one of the best tools available to economists for input-output modeling. Understanding the IMPLAN tool, its capabilities, and its limitations will help ensure the best results from the model.

One of the most critical aspects of understanding economic impact analysis is the distinction between the “local” and “non-local” economy. The local economy is identified as part of the model-building process. Either the group requesting the study or the analyst defines the local area. Typically, the study area is a county or a group of counties that share economic linkages.

A few definitions are essential in order to properly read the results of an IMPLAN analysis. The terms and their definitions are provided below.

Output

Output is measured in dollars and is equivalent to total sales. The output measure can include significant “double counting.” Think of corn, for example. The value of the corn is counted when it is sold to the mill, again when it is sold to the dairy farmer, again as part of the price of fluid milk, and yet again when it is sold as cheese. The value of the corn is built into the price of each of these items and then the sales of each of these items are added up to get total sales (or output).

Employment

Employment includes full- and part-time workers and is measured in annual average jobs. IMPLAN includes total wage and salaried employees, as well as the self-employed, in employment estimates. Because employment is measured in jobs and not in dollar values, it tends to be a very stable metric.

Labor Income

Labor income measures the value added to the product by the labor component. So, in the corn example when the corn is sold to the mill, a certain percentage of the sale goes to the farmer for his/her labor. Then when the mill sells the corn as feed to the dairy farmer, it includes some markup for its labor costs in the price. When the dairy farmer sells the milk to the cheese manufacturer, he/she includes a value for his/her labor. These individual value increments for labor can be

⁴ IMPLAN Version 3.0 is used in this analysis. For the full report, the data set for Minnesota 2008 is employed. The individual factsheets apply the 2008 data for those counties. The trade flows model with SAM multipliers is implemented.

measured, which amounts to labor income. Labor income does *not* include double counting.

Direct Impact

Direct impact is equivalent to the initial activity in the economy. In this study, it is construction impacts and operating expenditures of the proposed Sibley County FTTH project.

Indirect Impact

The indirect impact is the summation of changes in the local economy that occur due to **spending for inputs** (goods and services) by the industry or industries directly impacted. For instance, if employment in a manufacturing plant increases by 100 jobs, this implies a corresponding increase in output by the plant. As the plant increases output, it must also purchase more inputs, such as electricity, steel, and equipment. As the plant increases purchases of these items, its suppliers must also increase production, and so forth. As these ripples move through the economy, they can be captured and measured. Ripples related to the purchase of goods and services are indirect impacts.

Induced Impact

The induced impact is the summation of changes in the local economy that occur due to **spending by labor**, which is spending by employees in the industry or industries directly impacted. For instance, if employment in a manufacturing plant increases by 100 jobs, the new employees will have more money to spend to purchase housing, buy groceries, and go out to dinner. As they spend their new income, more activity occurs in the local economy. This can be quantified and is called the induced impact.

Total Impact

The total impact is the summation of the direct, indirect, and induced impacts.

Notes of Caution

Several notes of caution should be kept in mind when interpreting this report. First, the estimates for the cost of construction and operations are just that: *estimates*. These estimates were taken from the feasibility study as provided to the University of Minnesota by CCG Consulting. The University of Minnesota did not review or verify the results of the feasibility study. The total economic impact is contingent on those estimates. If actual expenditures are lower than estimated, then the total economic impact of the FTTH project will also be lower than predicted. Input-output analysis makes the implicit assumption that the community is energetic and efficient at capturing the economic gains from a new activity. If the community is not efficient at capturing these gains, then additional leakages will occur and the economic impact will not be as high as predicted.

Second, in this study, substitution will be occurring. The new FTTH is expected to replace current broadband and communications technology in the county. Therefore, while the FTTH company will employ 8 people, it is entirely possible that some individuals already working for competitors may lose their jobs or be relocated to another county.

Finally, this study examines the economic impact of the construction and operation of the facility. No consideration was given to potential “forward” linkages, such as increased business efficiency or productivity due to broadband technology.

Conclusions

Constructing and operating new Fiber-To-The-Home (FTTH) technology in Sibley/Renville counties will create new economic activity in the region. During the construction phase, economic activity in the study area will increase by \$25.8 million per year for a period of two years. This will cause an additional 288 jobs to be created in the study area to support the construction with 239 of the jobs being for workers at the site. In addition, over \$10.6 million per year of labor income will be infused into the economy while the facility is being constructed. These are short-term effects and will disappear when the construction is completed.

Once the facility is completed and operating, the region will see an additional increase in economic activity from expenditures related to day-to-day spending by the FTTH company on goods, services, and labor. The FTTH company itself will spend \$4.1 million per year. This will create an additional \$0.4 million of economic activity in the region. Therefore, total output in the study area of Sibley County will increase by \$4.5 million annually. The FTTH company will employ 8 individuals in the telecommunications industry. As a result of the daily operations of the facility, an additional 5 jobs will be created in the study area. Total employment in the study area will increase by 13 jobs as a result of the operation of the new FTTH company. Labor income will also increase in the region. Income for labor related to the 8 jobs at the facility will be \$461,000 in wages, salaries, and benefits. Spending by the FTTH company and its employees will generate an additional \$105,000 in labor income. Thus, in total, labor income in the area will increase by \$600,000 annually as a result of the new FTTH company.

Output in the studied region will increase by a total of \$4.5 million on an annual basis. Households in the region will clearly benefit the most from the proposed construction of new fiber optic system. The operation of a fiber optic utility is not labor intensive. The majority of the operations budget is payments to “network fees”. Locally, households can expect a modest increase of \$600,000 in income. Certain industries in the region will also receive significant benefits from the operation of the FTTH company. The industries that will see the largest increase in output are: telecommunications, maintenance and repair, and food and beverage. The FTTH company is in the telecommunications services industry. Traditionally, the telecommunications industry has been relatively stable and growing despite fluctuations in the economy. The telecommunications infrastructure is also more difficult to outsource. The study area’s economy is primarily based on agriculture, manufacturing, and construction. A new business in the telecommunications industry could add diversity to the economy.

The jobs created at the FTTH company will also likely require some specific training. However, the facility will also need some semi-skilled and trained employees. This implies that either workers that already have the training will

need to move into the area or individuals in the area will need to be trained to fill these positions.

To conclude, a new fiber optic utility in the Sibley and Renville County area will increase the annual output of the region studied by \$4.5 million and will increase employment by 13 jobs annually. The construction phase, expected to last about 24 months, will increase output in the region by \$25.8 million per year and will add 288 new jobs to the local economy while the construction takes place.

Appendix 1: Bibliography

Mayberry, Anne. "Cooperatives delivering broadband to rural Missouri communities". *Rural Cooperatives*. United States Department of Agriculture. November-December 2010.