Allied Radio Matrix for Emergency Response (ARMER) Phases 4-5-6 Cost Audit Report

submitted to:

Department of Public Safety
State of Minnesota

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Architects and Engineers

EBENSBURG, PENNSYLVANIA CORAOPOLIS, PENNSYLVANIA PITTSBURGH, PENNSYLVANIA HARRISBURG, PENNSYLVANIA PHILADELPHIA, PENNSYLVANIA
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ROCHESTER, NEW YORK DALLAS/FORT WORTH, TEXAS RICHMOND, VIRGINIA VIENNA, VIRGINIA CHARLESTON, WEST VIRGINIA

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1. INTRODUCTION

L. Robert Kimball & Associates, Inc. (Kimball) is pleased to submit this report of the Allied Radio Matrix for Emergency Response (ARMER) Phases Four, Five and Six (Phase 4-5-6) cost audit to the state of Minnesota (State) Department of Public Safety (DPS).

2. EXECUTIVE SUMMARY

ARMER is Minnesota's statewide public safety radio system. ARMER is designed to provide interoperable public safety communications for all emergency responders in the State. The system has been planned and designed for implementation in six phases. Phases 1 and 2 of the ARMER implementation are in the nine-county Minneapolis–St. Paul region. Phase 3, which will provide coverage in 23 additional counties, is currently underway. The State has decided to complete the construction of the system in the remaining 55 counties as one project–Phase 4-5-6. The State legislature has authorized the issuance of bonds to fund Phase 4-5-6.

The Minnesota Department of Transportation (MnDOT) is acting as the project manager and, where able, is installing and commissioning many elements of the Phase 4-5-6 deployment. MnDOT has developed cost estimates for the Phase 4-5-6 build-out.

To validate MnDOT's cost estimates, the DPS issued a Request for Proposal (RFP) in early 2008 to have an independent cost audit for the Phase 4-5-6 cost estimates performed. Kimball was selected to perform the cost audit.

Kimball was tasked with evaluating and validating the information as provided by MnDOT for Phase 4-5-6 of the ARMER project. It is anticipated that the remaining phases of the system will be in place and operational by mid-2012. Since the system deployment consists of the addition of 223 new transmitting facilities to be evenly implemented over a four year period, a model was developed based on historical economic factors to assess likely cost increases during the deployment period.

Based on the analyses performed by Kimball as part of this project, Kimball has made the following findings:

- The State has authorized $186 million for the completion of the Phase 4-5-6 backbone with an additional $3.75 million appropriated for advanced Phase 4-5-6 site work. The total available for the Phase 4-5-6 is $189.75 million. (Chapter 54, Article 1, Section 10, Subdivision 7-8 2007 Laws of Minnesota).
- The change in system design criteria increasing coverage reliability from 95 percent statewide to 95 percent county by county coverage reliability in Phase 4-5-6 resulted in an increase of 40 towers in Phase 4-5-6 (183 sites to 223 sites) which was provided for in MnDOT's cost estimates.
- MnDOT's cost estimates for Phase 4-5-6 based on their detailed design work was $176.1 million which included specified contingency funds of $11.3 million developed on a site-by-site basis.
- The difference between the total appropriated funds ($189.75 million) and MnDOT's Phase 4-5-6 site-by-site cost estimates ($176.1 million) leaves a total of $13.65 million for unspecified contingencies.
- Kimball's cost model projects potential cost increases that vary between 1.5 percent and 9.6 percent, depending on the deployment year.

- The total projected increased costs for material, labor and supplies over the term of the project is $9.6 million. This would reduce the $13.65 million unspecified contingency to $4.05 million.
- A project of this magnitude must budget for unanticipated costs. The contingency of $11.3 million in specified contingency funds included in MnDOT's cost estimates along with the additional $4.05 million in unspecified contingency funds will provide a total of $15.35 million for contingencies. This will be 8 percent of the total amount appropriated for the project.
- Based on the information available, Kimball concurs with MnDOT's estimates that indicate the project can be completed within the amounts appropriated by the legislature for the Phase 4-5-6 build-out.

3. BACKGROUND

3.1. ARMER DESCRIPTION AND HISTORY

ARMER is a statewide public safety radio communications system serving the state of Minnesota and local governments in the State. The backbone for the ARMER system was initially constructed in nine counties in the Minneapolis–St. Paul metropolitan area in 2001. Cities and counties in this metropolitan area have added infrastructure to meet their needs.

The ARMER system was initially a partnership between MnDOT and the Metropolitan Radio Board. In 2002, the Minnesota legislature adopted a proposal to provide a ubiquitous statewide public safety backbone across the state of Minnesota by expanding ARMER's backbone in the metropolitan area to the remaining 78 counties of the state. In 2004, the statewide implementation was named ARMER and Statewide Radio Board (SRB) was established. The SRB is composed of elected and public safety officials. The SRB sets technical and operational standards for ARMER. A regional radio board, known as the Metropolitan Emergency Services Board (MESB), was created to replace the Metropolitan Radio Board and provides regional coordination and technical and operational standards related to interoperable public safety communications in the Minneapolis–St. Paul area.

In 2005, the Minnesota legislature provided funding for the continued implementation of the ARMER backbone in the 23 counties of central and southeastern Minnesota. This was designated Phase 3 of the ARMER project. MnDOT is currently in the process of implementing the Phase 3 backbone and expects to complete a substantial amount of that phase by the end of 2008. Implementation in the remaining 55 counties of the state was authorized in 2007, and MnDOT is currently completing the detailed design for that implementation, which is expected to begin after July 1, 2008.

The construction of the ARMER backbone in the Minneapolis–St. Paul metropolitan area was accomplished through a RFP for a turn-key operation. This implementation provided the basic backbone and local enhancements in the metropolitan area. Motorola Communications, Inc. provided an 800 MHz trunked SmartZone™ System operating on a 6.x platform. As owner and operator of the ARMER backbone, MnDOT oversaw the implementation of the ARMER backbone in the Minneapolis–St. Paul metropolitan area and has provided maintenance and operational oversight of the ARMER backbone for over seven years.

In 2002, a plan for a statewide implementation of the ARMER backbone was presented to the Minnesota legislature. That plan called for a phased implementation of the ARMER backbone in four additional phases (Phase 3, 4, 5 and 6). The estimated costs of the statewide implementation were based upon experience with the implementation of the ARMER backbone in the Minneapolis–St. Paul metropolitan area.

Phase 3 of the ARMER system was funded in 2005 by the Minnesota legislature to implement the backbone in the 23 Phase 3 counties. Based on its experience with the implementation of the ARMER system in the Minneapolis–St. Paul metropolitan area, MnDOT, through its Office of Electronic Communication (OEC), undertook a different approach to constructing the ARMER backbone in these 23 counties. That approach was to use existing MnDOT and OEC resources to

engineer, manage, and construct the ARMER system, to competitively bid the cost of all elements of the system (including towers, tower enclosures, microwave components, antennas and Motorola radio equipment, and trunked radio control equipment), and in some instances, to competitively bid and contract for construction and implementation of the ARMER system on a site-by-site basis. MnDOT's competitive bid process is conducted by the Minnesota Department of Administration (DOA), where existing contracts exist for most elements of the ARMER backbone.

In 2007, the Minnesota legislature authorized the completion of the ARMER backbone in the remaining 55 counties of the State (Phase 4-5-6). The legislature authorized the sale of $186 million in 9-1-1 revenue bonds to finance the cost of final build-out in July of 2008 following the completion of detailed design work. The $186 million cost estimate was based upon revised figures provided to the legislature in 2006 by MnDOT and DPS, as follows:

Phases	**2002 Cost Estimates**	**2006 Estimated Cost**
Phase Four	$49,170,200	$59,004,240
Phase Five	$51,344,800	$61,613,760
Phase Six	$44,127,700	$52,953,240
Cost Sub-Total	**$144,642,700**	**$173,571,240**
Sales Tax	$9,401,776	$11,282,130
Total Cost	**$154,044,476**	**$184,853,370**

As part of the 2007 Minnesota legislation, an additional $5.4 million in funding was provided for the upgrade of the ARMER backbone in the Minneapolis–St. Paul metropolitan area to the Motorola SmartZone™ 7.x platform, and $3.75 million was also provided for advanced site development in the remaining 55 counties of the State (Phase 4-5-6).

At the present time, MnDOT is completing the detailed design work of the ARMER backbone in the remaining 55 counties of the State (Phase 4-5-6). Based upon revised technical standards proposed by the SRB (changed from a 95 percent mobile coverage calculated on a statewide basis to a 95 percent mobile coverage determined on a county-by-county basis), MnDOT is currently determining the number and location of base radio sites (towers) needed. Once these determinations are made, MnDOT will be able to determine where existing State infrastructure (tower sites, towers and microwave network) can be integrated into the plan and where new sites and infrastructure will be required. MnDOT will also provide detailed cost estimates and a detailed implementation plan identifying implementation work to be completed by MnDOT, implementation work to be contracted out and construction timelines. These detailed plans will be based upon MnDOT's implementation experience in Phase 3 where existing competitive pricing for elements of the backbone, including construction and implementation costs for work to be contracted out, already exist.

As part of the 2007 Minnesota legislation, the Commissioners of Transportation and Public Safety are required to certify to the chairs of the Minnesota House of Representatives Public Safety Finance Division of the Finance Committee and the Minnesota Senate Public Safety Budget Division of the Finance Committee that the detailed design has been completed and that the financial analysis finds that sufficient revenue will be generated by proposed changes in the 9-1-1 fee to cover all estimated debt service on revenue bonds proposed to be issued to complete the system.

3.2. COST AUDIT PROJECT OBJECTIVES

The purpose of this ARMER cost audit is to provide an external audit of the cost estimates made by MnDOT as part of the detailed design work for the implementation of the ARMER backbone in the remaining 55 counties of the state of Minnesota (Phase 4-5-6). The audit is based on existing competitive prices for various elements of the ARMER backbone and on MnDOT's experience in implementing the backbone in 23 counties of Phase 3.

3.3. COST AUDIT PROJECT GOALS

The overall goal of this project is to validate the detailed cost estimates made by MnDOT for the implementation of the ARMER backbone in the remaining 55 counties of the state of Minnesota (Phase 4-5-6). This validation is to be based on existing contracts and quotations for equipment and services for elements of the ARMER backbone and on the actual experience implementing the backbone in the 23 counties of Phase 3—approximately 73 sites. The essential objective of the project is to provide an independent audit and determination of the accuracy of the detailed cost estimates for the ARMER backbone in the remaining 55 counties of the state of Minnesota. The report of this audit will also provide the Commissioners of Transportation and Public Safety with information to assess whether those detailed cost estimates are accurate, reliable and reasonable, and to identify any areas where the detailed cost estimates might not be objectively verifiable.

4. METHODOLOGY

Pursuant to Kimball's statement of work for the ARMER cost audit, Kimball performed the following tasks to gather information and analyze the data provided to conduct the preliminary report:

4.1. KICK-OFF MEETING WITH THE STATE

A kick-off meeting was held on April 1, 2008. At the kick-off meeting, team members were introduced, the project plan was reviewed and confirmed, the task list and associated deliverables and information required for each were reviewed, and the project risks and mitigation plans were reviewed. In attendance at the kick-off meeting were representatives of Kimball, MnDOT, DPS, and the Minnesota Department of Finance.

4.2. REVIEW OF PHASE 1 AND 2 IMPLEMENTATION

Early in the project, MnDOT advised Kimball that the historical cost information for the Phases 1 and 2 ARMER implementation was so dated that it would not be of significant value in the Phase 4-5-6 analysis. It was agreed that Kimball would not use the Phases 1 and 2 historical costs to audit the cost estimates being used by MnDOT for the Phase 4-5-6 implementation.

4.3. DATA GATHERING

As part of the data gathering effort for this project, the following activities were conducted:

1. Prior to the kick-off meeting, Kimball representatives obtained background information about ARMER and the project by conference call and an on-site meeting with state of Minnesota officials.
2. Kimball staff met on site at the MnDOT Roseville, Minnesota, headquarters for the kick-off meeting with stakeholders and representatives including MnDOT, DPS, and the Minnesota Department of Finance.
3. Kimball reviewed and studied all available documentation at MnDOT offices subsequent to the kick-off meeting.
4. Telephone conferences calls with MnDOT engineers and representatives were conducted.
5. Kimball identified, gathered, collated and printed information provided by MnDOT for preliminary review of all phases of the ARMER deployment.
6. Kimball reviewed with MnDOT various engineering elements of the Phase 4-5-6 deployment including but not limited to basic system designs, Motorola prime site and zone network equipment, microwave backbone, towers, site shelters, generators, grading, interoperability, accessory equipment and site development.

7. Kimball representatives conducted telephone conferences calls and maintained an ongoing dialogue to answer developed questions with MnDOT personnel for clarification of supplied information.
8. Kimball developed and designed a costing model using historical published information that incorporated a variety of measured factors that are likely to affect future project costs.
9. Kimball calculated and aggregated annual percentage increases for variable costs projected for the phased deployment period of 2008–2012.
10. Kimball calculated the adequacy of estimated project costs as listed in the MnDOT estimates against likely future increases based on the regression model.

4.4. DATA EVALUATION AND IDENTIFICATION OF ISSUES

Using the data gathered from MnDOT, Kimball staff identified and evaluated the following costs associated with the ARMER Phase 4-5-6 deployment:

- Fixed contract items
- Variable cost items
- Identified equipment sales tax
- Tax-included equipment estimates

Kimball received from MnDOT the following documents, including but not limited to:

1. Spreadsheet listing costs by site for Phase 4-5-6 sites (Appendix X—ARMER Master Total Budget Sheet)
2. Spreadsheet listing estimated microwave costs by site (Appendix Y—ARMER Microwave Cost Estimates)
3. Spreadsheet listing estimated radio costs of a 3-site, 5-channel simulcast subnet (Appendix Z—Simulcast Site Cost Estimates)
4. Spreadsheet listing estimated radio costs of a typical 5-channel Intelli-site Repeater (ISR) (Appendix AA—ISR Site Cost Estimates)
5. Cost estimates for land, shelter and tower for a typical site used by MnDOT to develop the spreadsheet list costs by site for Phase 4-5-6 sites (Appendix BB—Site Development Cost Estimates)
6. Motorola price quotes for Phase 3 equipment, dated May 19, 2006 (Appendix CC—Motorola Prices Quotes For Phase 3 Equipment)
7. Changes to ARMER Conceptual Plan (March 2008) (Appendix DD—Changes to ARMER Conceptual Plan (March 2008)
8. Total costs based on purchase order expenditures for the 13 Phase 3 sites completed to date (Appendix EE—Phase 3 Tower Costs from Purchase Orders).

4.5. DEVELOPMENT OF COST PROJECTION MODEL

Using MnDOT's Phase 4-5-6 cost estimates, Kimball was tasked with projecting cost increases that are likely to be incurred during the period of the Phase 4-5-6 implementation. Kimball developed a cost projection model to apply estimated cost increases to non-fixed costs associated with the ARMER Phase 4-5-6 build-out. Using this cost projection model, Kimball estimated the cost increases that are likely to be imposed by various economic factors to include energy costs, steel costs, real estate costs, consumer prices, employment costs, and producer costs for Ready Mix concrete, construction materials, and long distance freight costs. These projected cost increases were aggregated to apply cost increase estimates to the MnDOT cost estimates. The cost increases are based on yearly increases during the deployment period and assume an evenly distributed build-out of the system over a four-year period. This process yielded a total cost estimate for completion of the Phase 4-5-6 project based.

5. FINDINGS

The following information was developed during discussions with MnDOT personnel:

5.1. ITASCA COUNTY SIMULCAST SUB-NET

MnDOT staff advised Kimball that the towers, shelters, microwave and radio frequency (RF) equipment in the Itasca County simulcast sub-net have already been constructed and installed by Itasca County. Kimball was also advised that the Department of Public Safety and Itasca County have entered into an agreement that provides for the State to purchase those towers and components of the basic communications system from Itasca County during Phase 6 of the project that would have been installed for the ARMER infrastructure. Since this amount was subject to future negotiations between the State and Itasca County, MnDOT has not identified a specific amount for such purchase. Rather, MnDOT has included in its cost estimates the costs of the microwave equipment and the RF equipment for these sites as the State's investment. It is assumed that the State would have constructed only sufficient sites in Itasca County to provide the minimum coverage requirement with no more than 5-channels per site. Kimball has not attempted to further identify the ultimate costs to the State for the Itasca sub-net and accepts MnDOT's cost estimates as a reasonable estimate of that cost under the circumstances. At such time as the State enters into negotiations with Itasca County, it needs to factor these budgeted amounts into the negotiation process.

5.2. ANALOG TO DIGITAL MICROWAVE ENHANCEMENT PROJECT

It was noted on the cost estimates provided by MnDOT that there were nine sites that included land, tower or a shelter that are being constructed as part of a project to upgrade the State's existing analog microwave system to a digital system. MnDOT has advised Kimball that where costs were attributed to "A/D", these elements were being funded from the microwave project, and the costs were not included in the Phase 4-5-6 cost estimates. MnDOT further verified that any new towers and shelters constructed with the A/D funding were adequate to accommodate the installation of the proposed ARMER equipment.

5.3. RF INFRASTRUCTURE

Motorola's current pricing of the RF equipment required for the project is valid through June 2008. This means that a new contract will be required with Motorola for the Phase 4-5-6 build-out.

The cost estimates for the Motorola equipment used by MnDOT are based on a detailed list of components required for ISR sites and simulcast sites. They appear to be based on discount rates

applied to Motorola's list prices for these components. The specific equipment required for the digital addressable controllers (DACs), master switching offices (MSOs), and the interoperability equipment is not listed or otherwise detailed in the cost estimates.

The Motorola bid prices provided to Kimball dated May 19, 2006, are based on sub-systems and do not provided component pricing for these sub-systems. This makes comparing these current bid prices to the prices used to develop MnDOT's cost estimates difficult. However, for those components that could be individually identified and compared, they appeared to be consistent. Kimball assumes that the cost estimates used by MnDOT to develop the Phase 4-5-6 costs for Motorola equipment reflect current Motorola prices.

Kimball has determined that the current Motorola list prices for major system components are the same as those used by MnDOT in their cost estimates. It is unknown whether Motorola will continue to offer the same discount off the current list prices for the Phase 4-5-6 build-out and the length of time such discount might be valid.

Given the four-year time table for the project, Kimball has assumed that Motorola will impose price increases that will be consistent with percentage increases in Kimball's costing model for the Phase 4-5-6 build-out.

Because MnDOT is acting as their own general contractor for the installation and optimization of the RF equipment, many items of equipment are not being provided by Motorola and are being procured independently from other vendors. This equipment is not typically subject to contractual pricing. Kimball assumes these prices will be subject to price increases over the life of the project.

5.4. PHASE 4-5-6 TIME TABLE

Kimball was advised that MnDOT expects the Phase 4-5-6 to be completed by July 1, 2012, but acknowledges that a few sites may not be completed by that date. Kimball has used the date by which all costs will be incurred as July 1, 2012, based on MnDOT's projections. Further, Kimball was advised that the expenditure of funds for all Phase 4-5-6 tasks will be generally evenly distributed over the period of time from beginning to completion. That is, sites acquisition will be spread out over this period of time and equipment will not be purchased until actually needed to build a site.

Because of this multi-year acquisition process, Kimball has projected some price increases on a variety of economic indicators and assumptions on a year-by-year basis.

5.5. PHASE 3 COST DATA

MnDOT provided Kimball with 13 files documenting purchase orders that were reported to be the final costs for construction of 13 Phase 3 sites. These expenditures did not include costs for any microwave or RF equipment at the sites. It was not entirely clear from discussions with MnDOT

staff whether all site development costs were included in the purchase orders. Because the purchase order records on these lists did not detail what was included in each purchase order, Kimball was unable to accurately compare these actual costs for the Phase 3 site work to the MnDOT's site work estimates for Phase 4-5-6. A number of these sites had 180 feet towers rather than 360 feet towers; one site had a 330 feet tower due to Federal Aviation Administration (FAA) restrictions. Only two of these sites included costs for land acquisition.

5.6. INTEROPERABILITY EQUIPMENT

The MnDOT cost estimates include a total of $3,926,000 for interoperability. In discussions with MnDOT staff, it was determined that the cost estimates for interoperability include $416,000 at each MSO for console interface capabilities at the MSOs. It was also learned that the $14,000 per site allocated for interoperability is an initial estimate. The interoperability plan is not fully developed. It is envisioned that very high frequency (VHF) high band transmitters and receivers will be installed at remote sites on frequencies yet to be determined to provide interoperability between ARMER and the VHF high band channels. Existing base stations now in use by the Highway Patrol and MnDOT may be used along with existing equipment owned by local agencies. Further, it is understood that additional funds from other sources will be necessary to fully fund the interoperability initiative. Some new VHF high band base stations may be needed to complete the interoperability program. It is assumed that any VHF high band base stations required to support this interoperable interface will be narrowband capable.

MnDOT was unable to provide an equipment list with pricing for the equipment required at the MSOs to provide the console interface but did provide an equipment list for a Phase 3 MSO, along with detailed rack diagrams identifying the arrangement used for the similar Phase 3 interconnect. Kimball assumes that the $416,000 for each MSO was based on an analysis of the equipment required in Phase 3 necessary to establish this interconnect at an MSO and that it was based on Phase 3 pricing. Kimball further assumes that the estimated $416,000 will be sufficient to construct the console interface at the MSOs including taxes. Kimball assumes that these console interfaces will be established before any interoperability investments are made for VHF RF equipment at tower sites. If the $416,000 is not sufficient, it will merely reduce the remaining funds available for the VHF RF base stations at remote sites.

6. ANALYSIS

To conduct this cost audit, Kimball attempted to evaluate and project possible cost increases for the following ARMER equipment and site costs provided by MnDOT:

Site Equipment and Backbone Costs

- Microwave Networks 4DS3, 3DS3, 28T1, and 8T1 base station microwave systems including, but not limited to, microwave radio transceivers, Premisys equipment, frequency coordination and shipping
- Motorola ISR sites including, but not limited to, base station radios, 700/800 MHz capability, racking, multicouplers, routers, preselectors, AC supplies, combiners, site software, antenna monitor, shipping and contingencies
- Motorola MSO
- DAC switching equipment
- Motorola simulcast and prime site systems including, but not limited to, base stations radios, 700/800 MHz capability, racking, multicouplers, routers, preselectors, AC supplies, combiners, comparators, multi-site controllers, antenna monitor, staging, installation and contingencies
- Interoperability equipment at the MSOs to include central electronics banks and interoperability RF equipment to be installed at other sites.

Site Accessory Costs

- Radio backbone and microwave backbone site accessory equipment including, but not limited to, tower top amplifiers, jumpers, hangers, antennas, transmission lines, waveguides, connectors, grounding kits, UPS, batteries, dehydrators and lighting arrestors
- Radio backbone and microwave backbone site installation including, but not limited to, microwave waveguide and dish installation, and microwave equipment installation

Site Development Costs

- Site land development Land costs including, but not limited to, consultant, acquisition, environmental, geotechnical and purchase costs
- Site construction costs
- Shelter deployment costs including, but not limited to, building and generator, foundation, shipping, utilities final electrical hookup and contingencies
- Tower costs including, but not limited to, foundation, erection, FAA lighting, lightning protection, structural and foundation steel, site clearing, landscaping, driveways, grounding, fencing and contingencies.

6.1. COST PROJECTION MODEL

In developing year over year estimates of potential cost increases for the Phase 4-5-6 build-out, Kimball developed a re-indexed cost projection model based on the factors that are mostly likely to affect the costs provided by MnDOT.

The following factors were identified by Kimball as likely to impact ARMER costs:

- Motor gasoline
- Steel mill products
- Real estate costs
- Consumer price index
- Employment cost index
- Producer price indexes for Ready Mix concrete, materials and components for construction and long distance freight.

These factors were chosen from many currently published and indexed government statistics. Kimball believes they best describe likely national and regional factors that will affect project costs over the duration of the deployment. Percentage changes in these factors are historically indexed to various base years that extend back as far as 24 years. Using linear regression applied to these historical indexes, the projected annual percentage increases during the period of the Phase 4-5-6 deployment were calculated (Figure 1 Year Over Year Growth Rate).

Appendices B through Q display historical information obtained through primary research from each economic factor source as listed above.

Statistical indexed values published for the Consumer Price Index; Steel Mill Products Index; Ready Mix Concrete Index, and Materials and Components for Construction Producer Price Index are referenced to a base year. Gasoline and real estate values refer to actual prices referenced to a base year. A linear regression analysis was performed for each factor data set and then appended to the published and indexed historical information. Growth was translated to percentage increases for each factor. Other types of common regression analyses used include logarithmic, power, polynomial exponential and moving average. The linear regression analysis was chosen here since nearly all of the data hovers in the low percentages of about two percent to six percent and follows a steady growth pattern where observed variability is limited.

In general, the linear regression analysis has resulted in high R-Square values to most of the factors giving the likelihood that the future values represent best from the indexed historical information published.

Analysis of the averaged incremental annual increases from 2008 to 2012 yielded an average of 6.3 percent, and a median value of 5.3 percent. This was done to determine if the data average and median average are similar. The median value indicates the bulk of the data is centered around the similar group of numbers. In this way, it is reasonable to simplify the data into single average annual multipliers.

Figure 1 Year Over Year Growth Rate

Year Over Year Growth Rate					
	2008	2009	2010	2011	2012
Motor Gasoline	6.00%	-2.00%	17.00%	2.00%	2.00%
Steel Mill Products	1.80%	2.90%	4.90%	4.60%	4.40%
Real Estate	-10.00%	22.50%	-1.80%	2.90%	2.90%
Consumer Price Index	2.60%	2.30%	2.30%	2.20%	2.10%
Materials for Construction	-0.50%	2.70%	2.70%	2.60%	2.50%
Employment Costs	3.40%	2.90%	2.80%	2.70%	2.70%
Ready Mix Concrete	6.50%	5.30%	5.00%	4.80%	4.50%
Freight - Long Distance	2.10%	4.10%	3.00%	2.90%	2.80%

Figure 2 Incremental Increases Applied to Non-Fixed Contract Items

Incremental Annual Increases Applied to Non Contract Fixed Items					
	2008	2009	2010	2011	2012
Motor Gasoline	6.00%	4.00%	15.00%	19.00%	4.00%
Steel Mill Products	1.80%	4.70%	7.80%	9.50%	9.00%
Real Estate	-10.00%	12.50%	20.70%	1.10%	5.80%
Consumer Price Index	2.60%	4.90%	4.60%	4.50%	4.30%
Materials for Construction	-0.50%	2.20%	5.40%	5.30%	5.10%
Employment Costs	3.40%	6.30%	5.70%	5.50%	5.40%
Ready Mix Concrete	6.50%	11.80%	10.30%	9.80%	9.30%
Freight - Long Distance	2.10%	6.20%	7.10%	5.90%	5.70%

MnDOT provided all current costs for site development, installation, labor, and equipment. Since not all phases can be deployed and purchased at one time, it was necessary to devise a simple model where expected relative cost increases are factored against the known 2008 base year. Percentage year over year incremental increases are factored separately over the remaining build-out against the 2008 base year (Figure 2 Incremental Increases Applied to Non-Fixed Contract Items).

Annual increase calculations were performed which indicates the expected percentage increase for each factor from the base year. Also, the resultant factors were averaged together to minimize the effect of any particular factor.

This calculation determines the increases to be expected for each future project year's purchases against the 2008 base line. Increases in the non-fixed project costs are then incrementally assessed across the life of the project. Final annual increases are summarized in Appendix T—Yearly Increase Graphic. These increases against the variable non-fixed price items are as follows:

Figure 3 Final Annual Increases

Year	% Cost Increase From Base
2008	1.5
2009	6.6
2010	9.6
2012	7.6
2013	6.1

The increase analysis in the appendices, Appendix U—Increase and Variance Analysis, shows a breakdown of the total project across the 2008 to 2012 period for contingencies, fixed contract and variable price items. Individual annual increases for all phases are factored against the remaining variable cost items.

The original total budgeted project amount by MnDOT was $176,042,879 of which $11,275,029 was identified contingencies. Projected increases based upon the model are $9,617,260. Adding the projected cost increases to MnDOT's original cost estimates yields a total project cost excluding contingencies of $174,385,110.

6.2. MOTOR GASOLINE

Gasoline, one of the main products refined from crude oil, accounts for just about 17 percent of the energy consumed in the United States. The primary use for gasoline is in automobiles and light trucks. Rapid gasoline price increases have occurred in response to crude oil shortages caused by, for example, the Arab oil embargo in 1973, the Iranian revolution in 1978, the Iran/Iraq war in 1980, and the Persian Gulf conflict in 1990. Gasoline price increases in recent years have been due in part to OPEC crude oil production cuts, turmoil in key oil producing countries, and problems with petroleum infrastructure (e.g., refineries and pipelines) within the United States. Additionally, increased demand for gasoline and other petroleum products in the United States and the rest of the world is also exerting upward pressure on prices. U.S. Department of Energy (DOE) statistics published from October 1997 to the present, analyzed through linear regression through 2012, projects year over year increases vary anywhere from -10 percent to +17 percent.

6.3. STEEL MILL PRODUCTS

Steel is one of the basic building blocks of the modern world. Automobiles, appliances, bridges, electrical and telecommunications transmission structures, oil pipelines, and buildings are all made with steel. While steel manufacturing has existed for centuries, the process for making steel continues to evolve.

6.3.1. Goods and Services

Steel mills produce steel by melting iron ore, scrap metal, and other additives in furnaces. The molten metal output is then solidified into semi-finished shapes before it is rolled, drawn, cast, and extruded to make sheet, rod, bar, tubing, beams, and wire—all structural forms used throughout the tower construction process. Other establishments in the industry fabricate finished steel products directly from purchased steel.

The least costly method of making steel uses scrap metal as its base. Steel scrap from many sources—such as old bridges, refrigerators, and automobiles—and other additives are placed in an electric arc furnace, where the intense heat produced by carbon electrodes and chemical reactions melts the scrap, converting it into molten steel. Currently, throughout the U.S., scrap steel is in very high demand for domestic as well as export consumption.

6.3.2. Recent Developments

Steel manufacturing is an intensely competitive global industry. By continually improving its manufacturing processes and consolidating businesses, the U.S. steel industry has increased productivity sufficiently to remain competitive in the global market for steel. Investment in modern equipment and worker training has transformed the industry from one of the nation's most moribund to one of the world's leaders in worker productivity and the lowest cost producer for some types of steel. As strong international and domestic competition continue for U.S. steel producers, the nature of the industry and the jobs of its workers are expected to continue to change.

Much of the demand for steel is derived from the demand for products that consume large amounts of steel. Industries that are significant users of steel include manufacturers of structural metal products used in construction, motor vehicle parts and equipment—a typical car uses about a ton of steel—and household appliances. Many of these goods are expensive so the consuming public is less likely to purchase them during economic downturns.

Currently, strong economic growth in some developing countries is driving up both the global demand for and price of steel. These developing countries use large amounts of steel in the construction of buildings, bridges, and other infrastructure. In addition, as these countries grow wealthier, their citizens are purchasing more automobiles, appliances, and other steel products. If the economic growth of developing countries continues, they will greatly affect the worldwide demand and production of steel.

U.S. Bureau of Labor Statistics (BLS) published from January 1998 to the present, analyzed through linear regression through 2012, projects year over year increases anywhere from 1.8 percent to 4.9 percent.

The rapid increases in fuel and steel prices are factors that may contribute to increases in tower construction and site development costs over the period of the project. These costs include road construction, connecting utilities, cement delivery, and transporting steel and other equipment to the sites for construction. Price increases for these commodities are difficult to predict but the increases experienced in recent months argues strongly that further significant increases can be expected.

6.4. REAL ESTATE COSTS

6.4.1. Twin Cities Real Estate Costs

To project the cost of real estate, Kimball has used the cost of a single family home in the Minneapolis–St. Paul metropolitan statistical area (MSA) as the best available indicator of real estate costs in Minnesota. No readily available cost data could be located for raw land in rural Minnesota. Nor could real estate costs be readily identified for the specific area comprising the Phase 4-5-6 geographical area. It is recognized that the variability in real estate cost increases for single-family homes in the metropolitan area may be different from that for raw land in rural areas.

6.4.1.1. Minneapolis Statistical Area

Minneapolis–St. Paul is the most populous urban area in the state of Minnesota and is composed of 188 cities and townships.

Built around the Mississippi, Minnesota and St. Croix rivers, the area is also nicknamed the Twin Cities for its two largest cities, Minneapolis and St. Paul, the state capital. The area is part of a larger U.S. Census division named Minneapolis–St. Paul–Bloomington, MN-WI, the country's 16th largest metropolitan area composed of eleven counties in Minnesota and two counties in Wisconsin. This larger area in turn is enveloped in the U.S. Census combined statistical area called Minneapolis–St. Paul–St. Cloud, MN-WI with an estimated population of 3.5 million people in 2006, ranked the 13th most populous in the U.S.

The area is growing rapidly; its population is projected to increase to four million in 20 years. When speaking of the Twin Cities, however, many local residents are referring to an older seven-county area entirely within Minnesota, which is under the jurisdiction of the Metropolitan Council. It is common for outstate Minnesotans to refer to the area as The Cities. The majority of state's residents live in the Twin Cities region, although fewer than one in four people in the metro area live in the two core cities. The area is one of several distinct regions of Minnesota.

Home price indices are designed to measure the growth in value of residential real estate in various regions across the United States. This index family includes 23 indices–20 metropolitan regional indices, two composite indices and a national index.

Yahoo data is based upon information derived through the Standard and Poor's (S&P) Case-Shiller assessment methodology for single-family homes. The methodology measures the movement in price of single-family homes in certain regions, specifically the Minneapolis–St. Paul MSA. This is done by collecting data on sale prices of specific single-family homes in the region. Each sale price is considered a data point. When a specific home is resold months or years later, the new sales price is matched to the home's first sales price. These two data points are called a "sale pair." The difference in the sale pair is measured and recorded. All the sales pairs in a region are then aggregated into one index. Sales pairs are carefully screened for any data points that would distort the index. These factors include foreclosures, non-arms length transactions (sales between family members), and suspected data errors where the order of magnitude of the change is substantially different from other sales pairs in the region.

The indices are designed to measure the change in the price of homes that have not undergone significant positive or negative changes in quality. Sales pairs are assigned weights to account for fluctuations in price that can be attributed to factors like extensive home remodeling, adding a home addition, or extreme neglect. For example, the indices assign smaller weights to sales pairs with large change in sales price relative to the community around them. The assumption is that this change is due to remodeling or neglect. Sales pairs are also weighted based on time intervals between sales.

Sales pairs with longer time intervals are given less weight than sales pairs with shorter intervals to account for the probability of physical changes.

The Case-Shiller Home Price Indices are generated and published on a monthly basis by S&P, Fiserv Inc., and Macro Markets LLC. The indices are maintained by the S&P/Case-Shiller Home Price Index Committee, which includes three full-time professional representatives from S&P and one representative from both Fiserv Inc. and Macro Markets LLC. S&P assumes no responsibility for the accuracy or completeness of the above data and disclaims all express or implied warranties in connection therewith. Yahoo Case-Schiller single-family home statistics published from January 2002 to the present, analyzed through linear regression through 2012, projects year over year increases between 0 percent to 22.5 percent.

6.5. CONSUMER PRICE INDEX

6.5.1. Consumer Price Index Minneapolis–St. Paul

The consumer price index (CPI) is a measure of the average change over time in the prices paid by urban consumers for a market basket of consumer goods and services.

The CPI affects nearly all Americans because of the many ways it is used. The following are major uses of CPI:

- As an economic indicator.
- As a deflator of other economic series.
- As a means of adjusting dollar values.

The CPI reflects spending patterns for each of two population groups: 1) all urban consumers and 2) urban wage earners and clerical workers. The all-urban consumers group represents about 87 percent of the total U.S. population. It is based on the expenditures of almost all residents of urban or metropolitan areas, including professionals, the self-employed, the poor, the unemployed and retired persons as well as urban wage earners and clerical workers.

The CPI frequently is called a cost-of-living index, but it differs in important ways from a complete cost-of-living measure. BLS has for some time used a cost-of-living framework in making practical decisions about questions that arise in constructing the CPI. A cost-of-living index is a conceptual measurement goal; however, it is not a straightforward alternative to the CPI. A cost-of-living index would measure changes over time in the amount that consumers need to spend to reach a certain utility level or standard of living. Both the CPI and a cost-of-living index would reflect changes in the prices of goods and services, such as food and clothing that are directly purchased in the marketplace, but a complete cost-of-living index would go beyond this to also take into account changes in other governmental or environmental factors that affect consumers' well-being. It is very difficult to determine the proper treatment of public goods, such as safety and education, and other broad concerns, such as health, water quality, and crime that would constitute a complete cost-of-living framework.

6.5.1.1. Goods and Services Included in the CPI

The CPI represents all goods and services purchased for consumption by the reference population. The BLS has classified all expenditure items into more than 200 categories, arranged into eight major groups. Major groups and examples of categories in each are as follows:

- Food and Beverages (breakfast cereal, milk, coffee, chicken, wine, service meals and snacks)
- Housing (rent of primary residence, owners' equivalent rent, fuel oil, bedroom furniture)
- Apparel (men's shirts and sweaters, women's dresses, jewelry)
- Transportation (new vehicles, airline fares, gasoline, motor vehicle insurance)
- Medical Care (prescription drugs and medical supplies, physicians' services, eyeglasses and eye care, hospital services)
- Recreation (televisions, pets and pet products, sports equipment, admissions);
- Education and Communications (college tuition, postage, telephone services, computer software and accessories);
- Other Goods and Services (tobacco and smoking products, haircuts and other personal services, funeral expenses).

Also included within these major groups are various government-charged user fees, such as water and sewerage charges, auto registration fees, and vehicle tolls. In addition, the CPI includes taxes (such as sales and excise taxes) that are directly associated with the prices of specific goods and services. However, the CPI excludes taxes (such as income and Social Security taxes) not directly associated with the purchase of consumer goods and services. The CPI does not include investment items, such as stocks, bonds, real estate, and life insurance. (These items relate to savings and not to day-to-day consumption expenses.)

For each of the more than 200 item categories, using scientific statistical procedures, the BLS has chosen samples of several hundred specific items within selected business establishments

frequented by consumers to represent the thousands of varieties available in the marketplace. For example, in a given supermarket, the BLS may choose a plastic bag of golden delicious apples, U.S. extra fancy grade, weighing 4.4 pounds, to represent the Apples category.

Each month, BLS data collectors, called economic assistants, visit or call thousands of retail stores, service establishments, rental units, and doctors' offices, all over the United States to obtain information on the prices of the thousands of items used to track and measure price changes in the CPI. These economic assistants record the prices of about 80,000 items each month representing a scientifically selected sample of the prices paid by consumers for the goods and services purchased.

6.5.2. CPI Calculations

The CPI is a product of a series of interrelated samples. First, using data from the 1990 Census of Population, BLS selected the urban areas from which data on prices were collected and chose the housing units within each area that were eligible for use in the shelter component of the CPI. The Census of Population also provided data on the number of consumers represented by each area selected as a CPI price collection area. Next, another sample (of about 16,800 families each year) served as the basis for a point-of-purchase survey that identified the places where households purchase various types of goods and services.

6.5.3. CPI as a Measurement of Inflation

Inflation has been defined as a process of continuously rising prices or equivalently, of a continuously falling value of money.

Various indexes have been devised to measure different aspects of inflation. The CPI measures inflation as experienced by consumers in their day-to-day living expenses; the Producer Price Index (PPI) measures inflation at earlier stages of the production and marketing process; the Employment Cost Index (ECI) measures it in the labor market; the BLS International Price Program measures it for imports and exports; and the Gross Domestic Product Deflator (GDP Deflator) measures combine the experience with inflation of governments (federal, state and local), businesses, and consumers. Finally, there are specialized measures, such as measures of interest rates and measures of consumers' and business executives' expectations of inflation.

The "best" measure of inflation for a given application depends on the intended use of the data. The CPI is generally the best measure for adjusting payments to consumers when the intent is to allow consumers to purchase, at today's prices, a market basket of goods and services equivalent to one that they could purchase in an earlier period. The CPI also is the best measure to use to translate retail sales and hourly or weekly earnings into real, or inflation free dollars.

6.5.4. Seasonally Adjusted Data

By using seasonally adjusted data, economic analysts and the media find it easier to see the underlying trend in short-term price changes. It is often difficult to tell from raw (unadjusted) statistics whether developments between any two months reflect changing economic conditions or only normal seasonal patterns. Therefore, many economic series, including the CPI, are adjusted to remove the effect of seasonal influences—those which occur at the same time and in

about the same magnitude every year. Among these influences are price movements resulting from changing climatic conditions, production cycles, changeovers of models, and holidays.

BLS annually re estimates the factors that are used to seasonally adjust CPI data, and seasonally adjusted indexes that have been published earlier are subject to revision for up to five years after their original release. Therefore, unadjusted data are more appropriate for escalation purposes. Data are published for a specific group of 13 metropolitan areas on a semiannual basis, which includes Minneapolis. These indexes, which refer to the arithmetic average for the six-month periods from January through June and July through December, are published with the release of the CPI for July and January, respectively, in August and February. BLS statistics published for the CPI from January 1997 to the present, analyzed through linear regression through 2013, projects year over year increases from 2.1 percent to 2.6 percent.

6.6. PRODUCER PRICE INDEXES

The Producer Price Index (PPI) measures change over time in selling prices received by domestic producers of goods and services; specifically identified here are Ready Mix concrete, materials and components for construction, and long distance freight. The PPI collectively refers to over 10,000 different price indexes for individual products and services and for groupings of products and services. The PPIs most widely reported in the news media—those that are analyzed in the monthly BLS press release—are the three stage-of-processing (SOP) price indexes: Crude materials for further processing; intermediate materials, supplies, and components; and finished goods.

6.6.1. Producer Price Indexes Overview

Stage of Processing (SOP) indexes are useful for analyzing inflation in the U.S. economy or, more specifically, for studying how price change for input goods—used to produce final goods—is passed through to the price of final goods. Final goods are those that are ready to be sold to consumers for personal consumption or to businesses as capital investment.

The crude materials for further processing the SOP index includes commodities that are entering the market for the first time and have not been processed. The intermediate SOP index includes partially processed materials that require further processing and components that require only assembly or installation.

In addition, this category includes fuels and lubricants, containers, and supplies consumed by businesses as inputs into the production of outputs. In accordance with national accounting conventions, the intermediate category excludes capital equipment, even though the equipment is an input into production. (Capital equipment is included in finished goods.) The finished goods SOP index includes commodities that undergo no further processing and are for sale—either to a final demand user or to the chain of distribution.

It is important to note that a particular good may be included, with appropriate weights, in more than one SOP index. This occurs because some goods are used by businesses as inputs and are also purchased by consumers for personal consumption. For example, gasoline is included in the

consumer nondurable goods component of finished goods to reflect purchases as fuel for automobiles used by individual consumers. However, gasoline is also included in the processed fuels and lubricants for manufacturing and non-manufacturing industries components of intermediate goods to reflect purchases by businesses as fuel for delivery vehicles. Though a weight for gasoline is included in both the intermediate and finished SOP indexes, its price movement is identical in the two indexes. The PPI for gasoline—like all PPIs for individual commodities—measures the average change in the prices received by producers from all types of buyers.

6.6.2. Tracking Prices

PPIs track prices prior to the retail level. Since finished goods are ready for sale to final demand, many policymakers and forecasters use the PPI, along with other statistical tools, as a leading indicator to the goods portion of the CPI.

Due to compositional differences, the overall PPI for finished goods is generally not considered comparable to the overall CPI for all urban consumers.

Major differences between these indexes include:

1. Services prices, included in the CPI, are excluded from the finished goods SOP
2. Capital equipment prices, included in the PPI, are excluded from the CPI
3. Import prices, included in the CPI, are excluded from the PPI
4. The individual PPI and CPI indexes that are considered most closely comparable in coverage are the PPI Finished Consumer Goods Index and the commodities component index of the CPI.

The crude and intermediate goods indexes are barometers of price movement for businesses' cost of materials and costs of products purchased from other firms.

Economic reasoning would suggest that rising production costs would eventually lead to rising final goods prices. Accordingly, many analysts study the crude and intermediate goods SOP indexes in an effort to anticipate future movements in the finished goods SOP index.

6.6.3. Index Linkages

There are three major qualifications to the expectation of linkage in the movements of the three PPI SOP indexes.

First is that material-input costs are but a portion of producers' total production costs. Other costs include purchased services, insurance, wages, interest, and rent. Increases in any of these excluded costs may impact finished goods prices but will not show up in the crude or intermediate goods SOP indexes.

Second, depending on competitive conditions, firms experiencing rising material input costs may be unable to pass these on to purchasers of their final goods. Also, firms experiencing productivity gains may be able to accommodate rising material input costs, without raising final goods prices.

Third, inter-industry transactions in the U.S. economy do not always follow the pattern implied by SOP indexes. The SOP model implies a forward flow of transactions towards final demand, with outputs moving between industries aligned in a series of input-output relationships. With transactions so aligned, changes in crude goods prices could be expected to influence the intermediate goods index; and changes in intermediate goods prices would eventually impact the finished goods index. In the following sections, the content and component indexes of each of the major SOP categories are described in more detail.

6.6.4. Intermediate Goods

The PPI Intermediate Goods Price Index reflects change in the prices received by firms for their sales of materials, supplies, and components to other firms. Ten of the more heavily weighted items in the Intermediate Goods SOP index include: commercial electric power, industrial chemicals, motor vehicle parts, commercial printing, steel mill products, industrial electric power, converted paper and paperboard products, miscellaneous metal products, paper, and plastic packaging. Roughly speaking, these indexes can be divided into two categories: 1) those for input that are incorporated into final goods being produced by firms and 2) those that are consumed during the production of final goods. More information on each of these sets of indexes follows.

6.6.5. Materials and Components for Manufacturing and Construction

Indexes for materials and components for manufacturing and construction are major contributors to the Intermediate Goods SOP. Examples of materials for nondurable manufacturing include industrial chemicals, as well as paperboard. Steel mill products, a commodity used in motor vehicle manufacturing, contributes primarily to materials for durable manufacturing. Other examples of materials for durable manufacturing include aluminum mill shapes and glass. Components for manufacturing, while similar to materials because they become tangible parts of an end-use product, are unlike materials, in that they are already completed and require only installation or assembly. The materials and components for construction index captures price movement for a wide range of commodities, including lumber, plywood, millwork, glass, plumbing fixtures, water heaters, and furnaces.

6.6.5.1. Materials and Components for Construction

BLS statistics published for the materials and components for construction from January 1998 to the present, analyzed through linear regression through 2013, projects year over year increases from -0.5 percent to 2.7 percent.

6.6.5.2. Ready Mix Concrete

BLS statistics published for the Ready Mix Concrete from January 2004 to the present, analyzed through linear regression through 2013, projects year over year increases from 4.3 percent to 6.5 percent.

6.6.5.3. Long Distance Freight

BLS statistics published for long distance freight from January 2004 to the present, analyzed through linear regression through 2013, projects year over year increases from 2.1 percent to 4.1 percent.

6.7. EMPLOYMENT COST INDEX – PRIVATE INDUSTRY

The Employment Cost Index (ECI) is a measure of the change in the cost of labor, free from the influence of employment shifts among occupations and industries.

The compensation series includes changes in wages and salaries and employer costs for employee benefits. The wage and salary series and the benefit cost series provide the changes for the two components of compensation.

Wages and salaries are defined as the hourly straight-time wage rate or, for workers not paid on an hourly basis, straight-time earnings divided by the corresponding hours. Straight-time wage and salary rates are total earnings before payroll deductions, excluding premium pay for overtime and for work on weekends and holidays, shift differentials, and non-production bonuses such as lump-sum payments provided in lieu of wage increases. Production bonuses, incentive earnings, commission payments, and cost-of-living adjustments are included in straight-time wage and salary rates.

Benefits covered by the ECI are:

- Paid leave–vacations, holidays, sick leave, and other leave
- Supplemental pay–premium pay for work in addition to the regular work schedule (such as overtime, weekends, and holidays), shift differentials, and non-production bonuses (such as referral bonuses and attendance bonuses)
- Insurance benefits–life, health, short-term disability, and long-term disability; retirement and savings benefits–defined benefit and defined contribution plans
- Legally required benefits–Social Security, Medicare, federal and state unemployment insurance, and workers' compensation

The ECI provides data for the civilian economy, which includes the total private non-farm economy excluding private households, and the public sector excluding the federal government. The private industry series and the state and local government series provide data for the two sectors separately.

To be included in the ECI, employees in occupations must receive cash payments from the establishment for services performed and the establishment must pay the employer's portion of Medicare taxes on that individual's wages. Major exclusions from the survey are the self-employed, individuals who set their own pay (for example, proprietors, owners, major stockholders, and partners in unincorporated firms), volunteers, unpaid workers, family members being paid token wages, individuals receiving long-term disability compensation, and U.S. citizens working overseas.

BLS statistics published for the Employment Cost Index from January 2001 to the present, analyzed through linear regression through 2013, projects year over year increases from 0 percent to 3.4 percent.

6.8. ASSUMPTIONS

Kimball has made the following assumptions in developing the cost audit:

1. **Economic Factors Used For Projections Are Limited To Listed Inputs**

   In selecting the factors to be considered in computing projected cost increases, Kimball has selected what we believe to be the most representative of the realm of factors that might impact project cost increases.

2. **Projections Are Solely Based On Published Historical Data And Do Not Necessarily Represent Future Conditions**

   Although Kimball believes that the statements of our model expectations are based on reasonable assumptions, projections are inherently uncertain and subject to risks. Actual results could differ materially from the projections.

3. **Motor Gasoline Is Used As A Surrogate For Energy Costs**

   Nearly all of the potential cost increases for the project will be impacted by energy costs. Kimball has used Motor Gasoline as a surrogate for energy costs.

4. **Single Family Homes Is Considered A Base Driver For Average Real Estate Costs**

   To project the cost of real estate, Kimball has used the cost of a single-family home as the best available indicator of real estate costs in Minnesota.

5. **Year Over Year Increases Are Aggregated Over Project Life**

   Kimball was advised that MnDOT expects the Phase 4-5-6 build-out to be completed by July 1, 2012, but estimated that approximately 20 sites may not be completed by that date. Kimball assumed 23 sites would not be completed for the cost audit to simplify calculations. We have used the date by which all costs will be incurred as early 2012. Further, Kimball was advised that the expenditure of funds for all Phase 4-5-6 tasks will be generally evenly distributed over the period of time from beginning to completion of the project. That is, site acquisition will be spread out over this period of time and equipment will not be purchased until actually needed to build a site.

6. **Assume Microwave Networks Equipment $12,292,000 Is On Stable Pricing Contract Through End Of Phase 4-5-6 Deployment**

Kimball was advised that the current prices for microwave equipment are valid through entire deployment. Kimball assumes this period to be approximately four and a half years.

7. **Assume Motorola Pricing Contract Is Only Valid Through Phase 3 Deployment**

   Kimball understands that the pricing of Motorola's components of the ARMER system are only valid until April 2008. MnDOT staff told Kimball that efforts are underway to determine Motorola pricing through the expected end of the Phase 4-5-6 construction in 2012. Kimball assumes that Motorola will impose a price increase for the RF components required in Phase 4-5-6 that follows Kimball projections.

8. **MSOs and Primary Site Controllers Are To Be Staged At Motorola In Minimum Operating Configuration**

   Kimball was advised by MnDOT that Motorola staging of MSO equipment and the prime site controllers will be minimal but sufficient to ensure proper functioning.

9. **Phase 4-5-6 Motorola GTR 8000 Radios Will Be 700 MHz/800Mhz Capable with ASTRO™ 7.x Software**

   Kimball was advised that all Motorola ASTRO™ system software for Phase 4-5-6 will be Version 7.x, to be compatible with the system upgrades that were implemented in the Phase 3 build-out.

10. **Interoperability Budget Of $3,926,000 Breaks Down To $2,449,800 For Interoperability And $1,447,620 Contingencies**

    Kimball was advised by MnDOT that the maximum from the ARMER project allocated in the conceptual plan for the Phase 4-5-6 build-out is $2,449,800. Kimball has assumed that the difference ($1,476,200) between the estimated $3,926,000 and the allocated $2,449,800 is part of the project's contingency funds.

11. **Assume $416,000 for Interoperability Equipment at Each MSO is Accurate and Includes Necessary Equipment for Central Electronics Banks (CEBs) Needed To Interconnect To ARMER Backbone**

    No detailed equipment list was provided for the interoperability equipment to be installed at the MSOs. It is Kimball understanding that this equipment includes CEBs to interconnect VHF radio systems to the ARMER backbone. Kimball was assured by MnDOT that all necessary equipment was included in the $416,000.

12. **Data Submitted For 13 Sites Has Been Referenced For Information Purposes Only Due To Small Sample Size**

    Kimball has determined that this data is insufficient to serve as a factor in the costing model. It is simply too small of a sample to assume that these are representative of the actual Phase 3 cost for site development and may not include all costs associated with

development of the sites. Kimball understands that the Phase 3 project includes 73 tower sites based on the information provided in the document entitled Changes to ARMER Conceptual Plan (March 2008).

13. **Removal Costs For Existing Site Equipment Will Be Funded From MnDOT Operating Budget**

    Kimball was advised that any costs for removing existing equipment at tower sites will be funded from MnDOT's operating budget except for existing microwave dishes that are being replaced.

14. **Project Deployment And Life To Be Considered For Cost Increases As Follows:**

Year	Sites
2008-2009	50
2009-2010	50
2010-2011	50
2011-2012	50
2012-2013	23

    See discussion above in Assumption 4.

15. **Detailed Design Plan For Number Of Towers, Trunk Base Stations, Sites, Shelters, MSOs, Zone Controllers, Trunk And Microwave Designs, 95 Percent County Propagation, IM Studies, Site Compatibility, Percentage Coverage And Other Integral Various ARMER System Elements Required Are The Responsibility Exclusively of MnDOT**

    These assumptions are based on information documented in the Minnesota Department of Public Safety's RFP for this project and Kimball's project scope statement provided to the State.

16. **No Simulcast Sites Will Be Connected To Existing Phase 3 Equipment**

    MnDOT confirmed this understanding.

17. **All Simulcast Receivers Will Be Limited To Receivers Inside Deployed Base Stations**

    MnDOT confirmed this understanding.

18. **All ISR Remote And Prime Sites Are 5-Channel Sites Utilizing Redundant Site Controllers**

    MnDOT's system design for Phase 4-5-6 calls for two 4-site, 5-channel simulcast sub-nets and one 11-site, 8-channel sub-net (Itasca County). The RF costs used by MnDOT for each of these simulcast sites was the same cost that MnDOT calculated per site for a 3-site, 5-channel simulcast site. That cost estimate divided the cost of the prime site

equipment required to support the simulcast sub-net by the number of remote RF sites in the sub-net.

Kimball re-calculated the RF cost for these simulcast sites based on the actual number of channels at each site and separated out the cost of the prime site equipment (one per simulcast sub-net) to identify a most accurate per site cost for all of the simulcast sites. That re-calculation indicates that the cost per site for these large simulcast sub-nets may be somewhat less than the estimates used by MnDOT. For the purposes of the audit, Kimball did not reduce the cost estimates for these sites.

MnDOT advised Kimball that redundant site controllers will be installed at each simulcast prime site.

19. Assume Three Remote Sites Per Simulcast Prime Site

MnDOT confirmed this understanding.

20. New Master Switching Offices (MSOs) Will Be Installed At Duluth Antenna Farm And Detroit Lakes

MnDOT confirmed this understanding.

21. Base Costing Information Submitted To Kimball By MnDOT

MnDOT provided all of the costs for site development, installation, labor, and equipment. Kimball has not attempted to independently verify the accuracy of any of these baseline costs. Kimball did verify that all component prices in the MnDOT cost estimates for Motorola equipment were consistent with the pricing listed on Motorola's RFP Amendment, Minnesota ARMER Phase III Revised Bid Schedule Summary, dated May 19, 2006. In addition, Kimball compared list prices used on MnDOT's cost estimates for a sample of major RF components with current Motorola list pricing and found those list prices to be consistent.

22. Itemized Budget Provided To Kimball By MnDOT Is Accurate And Complete

MnDOT confirmed this understanding.

23. Towers In Excess Of 330 Feet Height Are Of Guyed Design

MnDOT confirmed this understanding. Guyed towers in excess of 330 feet height are likely to be less expensive to construct than self-supporting towers.

24. A/D Towers Have Already Been Constructed With Sufficient Capacity For Any Current And Future ARMER Purposes

It was noted on the cost estimates provided by MnDOT that for nine (9) sites the land was being acquired, the tower erected and/or the shelter being constructed as part of a project to upgrade the State's existing analog microwave system to a digital system.

MnDOT has advised Kimball that where costs were attributed to "A/D," these elements were being funded from the microwave project, and the costs were not included in the Phase 4-5-6 cost estimates. MnDOT further verified that any new towers and shelters constructed pursuant to the A/D funding were adequate in accommodate the installation of the proposed ARMER equipment.

25. New EW52 Waveguide, Connectors, Dehydrators And Accessory Items Have Been Provisioned For All Phase 4-5-6 sites

Even though MnDOT indicated that some microwave EW52 waveguide, connectors, dehydrators and accessory items at existing sites may be re-used, MnDOT's cost estimates provide for new equipment at each site. MnDOT explained that they cannot determine at this time how much of this equipment can be re-used. Kimball has assumed that all of this equipment will be replaced.

26. Use of Existing Towers Assumes Structure Has Capability For Rework For ARMER Use

Seventy-two of the 224 Phase 4-5-6 sites are listed as existing towers, county tower or leased tower. Kimball has raised concerns about the ability of existing towers to handle the load of additional transmission lines, microwave and RF antennas. MnDOT was able to confirm that many of these sites are new or the MnDOT is confident that the towers can accommodate the additional load. Kimball's has assumed that MnDOT has adequately assessed tower loading for existing sites for the purposes of a preliminary design. It is also assumed that if during construction, MnDOT determines that any additional structural analyses and tower reconstruction or re-enforcing is necessary, such expenditures will be handled through the contingency funds budgeted.

27. All Existing Site Plots Are Of Sufficient Size For 12 Feet x 30 Feet Shelter With Adequate Space For Egress/Ingress And LP Tank

MnDOT has advised Kimball that all site plots are sufficient for their purposes.

28. All New Self Supporting Towers Assume Designed With 1500 PSF Ground Loading, Standard EIA/TIA-222-F Wind Load, 4000 psi Concrete, FAA Lighting, R-56 Grounding, Fencing, Two Climbing Ladders, Ice Bridges, Waveguide Ladder, 12 Omni-Directional Antennas, Tower Top Amplifiers and Nine 6-Foot Diameter Microwave Dishes And Mounts

These specifications were provided to Kimball in an RFP used for previous tower procurements in the ARMER project. Kimball assumes that same specifications will be used for Phase 4-5-6 tower procurements.

29. All New Sites Deployed With Specified Shelter, Batteries, 35 kW Generator, Transfer Switch And LP Tank

These specifications were provided to Kimball in an RFP used for previous shelter procurements in the ARMER project. Kimball assumes that same specifications will be used for Phase 4-5-6 shelter procurements.

30. Taxes Listed Directly For Microwave, ISR And Simulcast Sites

The cost estimates provided by MnDOT listed taxes as an itemized cost for the microwave system, ISR sites and simulcast sites.

31. Taxes For MSO, Interoperability and Tower Included In Budgeted Amounts

The cost estimates for the MSO sites, interoperability components, and tower equipment did not itemize sales taxes. MnDOT advised Kimball that their estimates for this equipment were computed to include the taxes. Kimball assumes all applicable Minnesota sales taxes have been included in these cost estimates.

32. Sales Tax Has Been Included As A Non-fixed Cost Item

Due to the difficulty in evaluating the taxable elements in the "Tax Included Equipment Estimates," sales tax has been included as a non-fixed cost item.

33. No Spare Antennas And Lines Will Be Installed

MnDOT verified that no spare antennas and lines would be mounted on any towers.

34. Backbone Spare Parts Are Not Included

MnDOT indicated that it was their intent to maintain some spare parts and components at their
17 service shops. No spare parts have been budgeted. Any supply of spare parts will have to be purchased from contingency funds or other funding sources.

35. Environmental And Structural Assessment Must Be Factored For New And Modified Sites

It was noted that there were nine sites listed on MnDOT's cost estimate spreadsheet where new towers were to be constructed on existing sites where there were no funds budgeted for any site work. It was explained that at most of these locations MnDOT was just replacing an existing tower. Kimball assumes that if any environmental and structural engineering evaluation costs are incurred during construction of towers at these existing sites, the costs will be covered from contingency funds.

36. No Consoles or Console Interfaces Other Than Interoperability Project Will Be Included

MnDOT confirmed that the projected cost estimates do not include any new consoles or connectivity to consoles except as provide by the interoperability equipment at the two MSOs.

37. MSO Cost Estimates Include All Required Equipment

MnDOT was unable to provide Kimball with an equipment list for the MSO. Kimball assumes that all of the necessary equipment and taxes for the MSO are included in Motorola's RFP Amendment, dated May 19, 2006; Revised Bid Schedule; 7.2 Bid Schedule 2; 7.x System Solution; and master site prices. Kimball assumes that the $4,000,000 for each of the two MSOs included in Phase 4-5-6 is sufficient to purchase all necessary equipment including taxes.

38. All Non-Contract Equipment Is Subject To Project Price Increases

Because MnDOT is acting as their own general contractor for the installation of various components, many items of equipment on the cost estimates are not being provided on a contract basis and will be procured from various vendors. This equipment is not typically subject to contractual pricing. Kimball assumes this equipment will be subject to the projected price increases.

6.9. PRICE ESTIMATE ANALYSIS OVERVIEW

The pricing analysis addresses the economic assumptions, methodology and calculations, and issues confronted when performing a pricing analysis.

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6.9.1. Price Analysis Terms and Definitions

Terms used in the validation of the MnDOT pricing estimates are:

Term	Description
Price	All final resultant costs required for the purchase and delivery of equipment and materials as listed to a specific delivery point.
Cost Analysis	Review of indicated cost of the project elements
Variable Contract Items	The manufacturer and buyer have not agreed that any purchases for finished goods reasonably expect to affect price negotiations will not be passed along to the buyer for the duration of the Phase 4-5-6 deployment.
Identified Equipment Sales Tax	A 6.5% Minnesota State sales tax has been assessed and listed as separate line items in the source documents
Tax Included Equipment Estimates	A 6.5% Minnesota State sales tax has not been separately listed and included as a separate line item in the source document but has been reportedly included in the specific cost estimate
Fixed Contract	The manufacturer and buyer have agreed any purchases for finished goods reasonably expect to affect price negotiations will not be passed along to the buyer for the duration of the Phase 4-5-6 deployment.
Pricing Analysis	All factual information that, at the time of the price agreement, the seller and buyer would reasonably expect to affect price negotiations.
Cost Projection Model Factor Inputs	Those published and recognized economical historical inputs typically used as cost drivers for use in the linear regression analysis
Linear Regression Analysis	A technique used for the modeling and analysis of numerical data consisting of values of a dependent variable and of one or more independent variables. The dependent variable in the regression equation is modeled as a function of the independent variables, value vs. time. The parameters are estimated so as to give a "best fit" of the data.
R Square	A number which often is called the coefficient of determination. It is defined as the ratio of the sum of squares explained by a regression model and the "total" sum of squares around the mean. It is an index of how well a dependent variable can be predicted from a linear combination of independent variables. It ranges from 0 (zero multiple correlation) to 1 (perfect multiple correlation), and the value of R-Square is the coefficient of determination.

Price analysis for our purposes is the process of examining and evaluating the proposed MnDOT estimates, which assumes aggregated individual cost elements and proposed profit. Comparative price analysis involves the comparison of the current proposed price with quotes or prices for the same or similar items. It is important to understand the product's technical features and capabilities in order to assure similarities. It is imperative to compare technical aspects of the product before comparing price.

Cost analysis involves the independent review and evaluation of the individual cost elements and underlying assumptions, which are then applied to determine future projected prices. It is assumed that all elements of the project will be purchased in an environment of adequate competition from competitive quotes with competitive terms and conditions.

It is assumed there is consistency between the past Phase 3 effort and the current Phase 4-5-6 effort. If there are changes in specifications, propagation models, microwave paths, general technologies or any other significant element, then the historical project element data used as a basis may be invalid.

Some circumstances exempt contracts from competitive quotation for products and services where established published catalog or market prices exist. This method, however, does not ensure the final price will be reasonable since many factors ultimately may determine a fair and reasonable price.

Aside from economic factor inputs, market factors that may affect the reasonableness of costs are assumed to be stable throughout the entire Phase 4-5-6 deployment. These are typically including but not necessarily limited to the number of buyers and sellers in the market, productivity, quality of products and services, profit and return on equity, intensity of demand, availability of substitutes for a product, intensity of the government's need, and product utility.

6.9.2. Use of Indices

Factor inputs chosen indicate the historical percentage change in price, over time, with respect to a base year. Indices can also be used to inflate or deflate pricing based on trend analysis, which helps estimate or adjust project pricing over a period of contract performance.

6.9.3. Trend Analysis

The linear regression analysis is based on the assumption that the future will follow the same pattern or trends that have been indicated in the past. Over a period of time pricing trends for project elements may develop. These trends are all likely affected economic and market factors. Analysis of the individual factor historical information are then gathered and aggregated against the base year of 2008 as a method of projecting the price of goods and services in the future.

7. CONCLUSIONS

MnDOT's estimated projected costs for completion of the ARMER Phase 4-5-6 build-out totaled $176.1 million and included $11.3 million for specified contingencies developed on a site-by-site basis. Kimball's projected potential cost increases indicate that the total cost of the project over the implementation period will be $185.7 million.

The Minnesota legislature has authorized the issuance of bonds for completion of Phase 4-5-6 in the amount of $186 million. In addition, $3.75 million was appropriated in 2007 for advanced site work for Phase 4-5-6 and that this amount is available for the Phase 4-5-6 implementation. A total of $189.75 million has been authorized by the legislature for completion of the ARMER project in Phase 4-5-6. This leaves $4.05 million for unspecified contingencies ($189.75 million less $185.7 million). The total contingency funds for the project are $13.65 million ($11.3 million specified in MnDOT's cost estimates and $4.05 million for unspecified contingencies). This will represent a total contingency of approximately 8 percent of the appropriated amount for the project.

Based on the information available, Kimball concurs with MnDOT's estimates that indicate the project can be completed within the amounts appropriated by the legislature for the Phase 4-5-6 build-out.

8. SOURCES AND REFERENCES

Information presented in our analysis includes statistical, text, and descriptive information gathered in whole or part from the following sources:

8.1. BUREAU OF LABOR STATISTICS

The Bureau of Labor Statistics (BLS), a unit of the United States Department of Labor, is the principal fact-finding agency for the U.S. government in the broad field of labor economics and statistics. The BLS is an independent national statistical agency that collects, processes, analyzes, and disseminates essential statistical data to the American public, the U.S. Congress, other federal agencies, state and local governments, business, and labor representatives. The BLS also serves as a statistical resource to the Department of Labor.

The BLS data must satisfy a number of criteria, including relevance to current social and economic issues, timeliness in reflecting today's rapidly changing economic conditions, accuracy and consistently high statistical quality, and impartiality in both subject matter and presentation.

8.2. DEPARTMENT OF ENERGY–ENERGY INFORMATION ADMINISTRATION

The Energy Information Administration (EIA), created by Congress in 1977, is an independent statistical agency within the United States Department of Energy. It is the source for official energy statistics from the U.S. Government. EIA collects, analyzes, and publishes data as directed by law to ensure efficient markets, inform policy-making, and support public understanding of energy.

EIA's mission is to provide policy-independent data, forecasts, and analyses to promote sound policy making, efficient markets, and public understanding regarding energy and its interaction with the economy and the environment.

The agency collects data on energy reserves, production, consumption, distribution, prices, technology, and related international, economic, and financial matters. This information is disseminated as policy-independent data, forecasts, and analyses. EIA publishes long- and short-term energy forecasts. EIA programs cover data on coal, petroleum, natural gas, electric, renewable and nuclear energy.

By law, EIA's products are prepared independently of policy considerations. EIA neither formulates nor advocates any policy conclusions.

The Department of Energy Organization Act allows EIA's processes and products to be independent from review by Executive Branch officials; specifically Section 205(d) says:

"The Administrator shall not be required to obtain the approval of any other officer or employee of the Department in connection with the collection or analysis of any information; nor shall the Administrator be required, prior to publication, to obtain the approval of any other officer or employee of the United States with respect to the substance of any statistical or forecasting technical reports which he has prepared in accordance with law."

8.3. YAHOO–STANDARD AND POOR'S CASE-SCHILLER PRICE INDEX

The Case-Shiller Home Price Indices are generated and published on a monthly basis by S&P, Fiserv Inc., and Macro Markets LLC. The indices are maintained by the S&P/Case-Shiller Home Price Index Committee, which includes three full-time professional representatives from S&P and one representative from both Fiserv Inc. and Macro Markets LLC. S&P assumes no responsibility for the accuracy or completeness of the above data and disclaims all express or implied warranties in connection therewith.

APPENDIX A—FACTOR INPUTS AND ASSUMPTIONS

Base Economic Factor Inputs

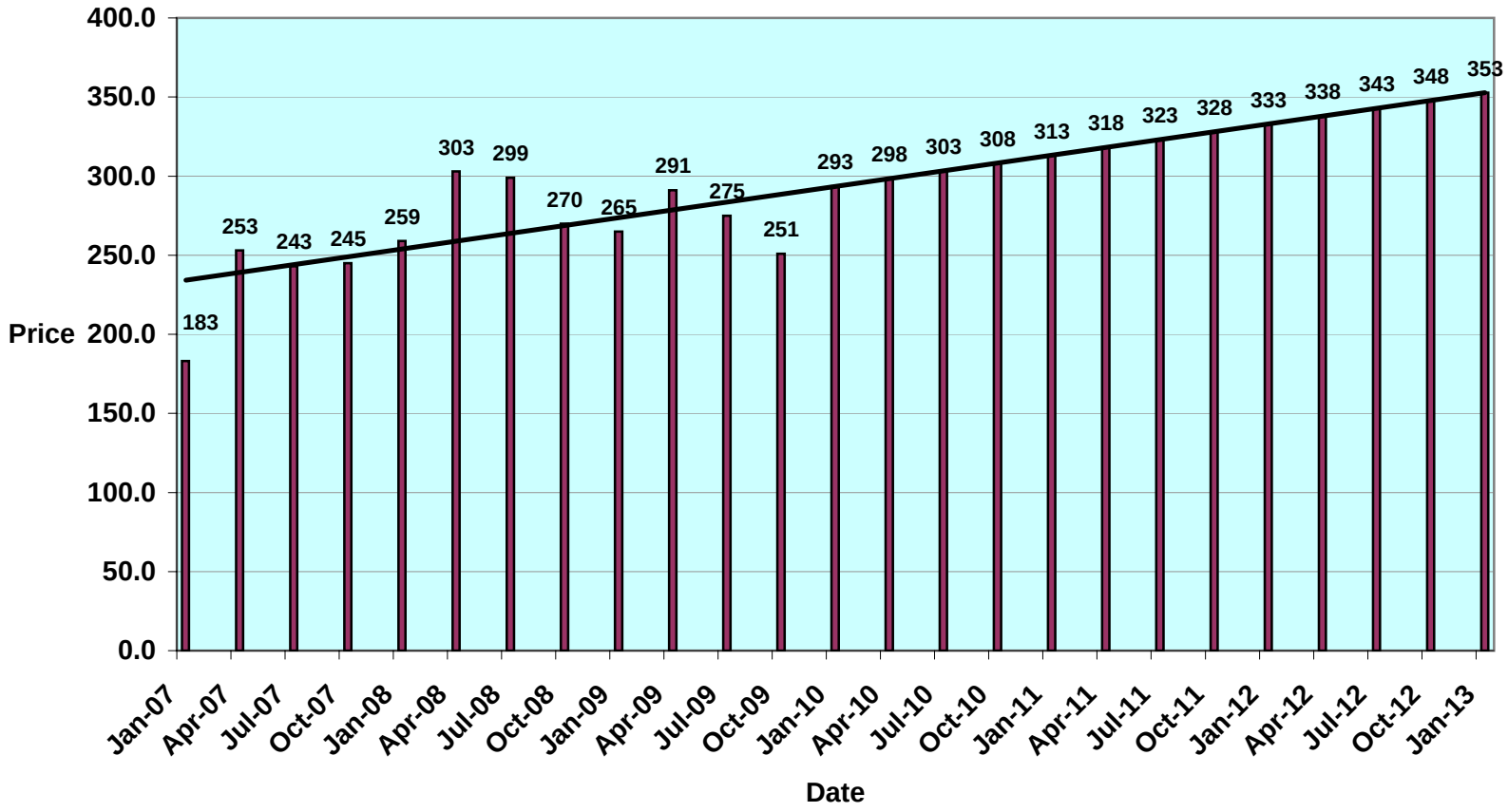
Item	Factor	Area	Source	Base Date	R Square Linear Regression Factor	2008	2009	2010	2011	2012	2013
1	Motor Gasoline	Midwest	DOE	10-2007	78.5	6.0%	-2.0%	17.0%	2.0%	2.0%	1.0%
2	Steel Mill Products	US	BLS	1-2008	92.8	1.8%	2.9%	4.9%	4.6%	4.4%	4.4%
3	Real Estate	Minneapolis	YAH	1-2008	93.9	-10.0%	22.5%	-1.8%	2.9%	2.9%	2.8%
4	Consumer Price Index	Minneapolis	BLS	1-2007	99.9	2.6%	2.3%	2.2%	2.2%	2.1%	2.1%
5	Materials for Construction	US	BLS	1-2007	95.7	-0.5%	2.7%	2.7%	2.6%	2.5%	2.5%
6	Employment Costs	Midwest	BLS	1-2007	99.9	3.4%	2.9%	2.8%	2.7%	2.7%	2.7%
7	Ready Mix Concrete	US	BLS	1-2007	99.3	6.5%	5.3%	5.0%	4.8%	4.5%	4.3%
8	Freight - Long Distance	US	BLS	1-2007	99.3	2.1%	4.1%	3.0%	2.9%	2.8%	2.7%

BLS	Bureau of Labor Statistics
DOE	Department of Energy
YAH	Yahoo Finance

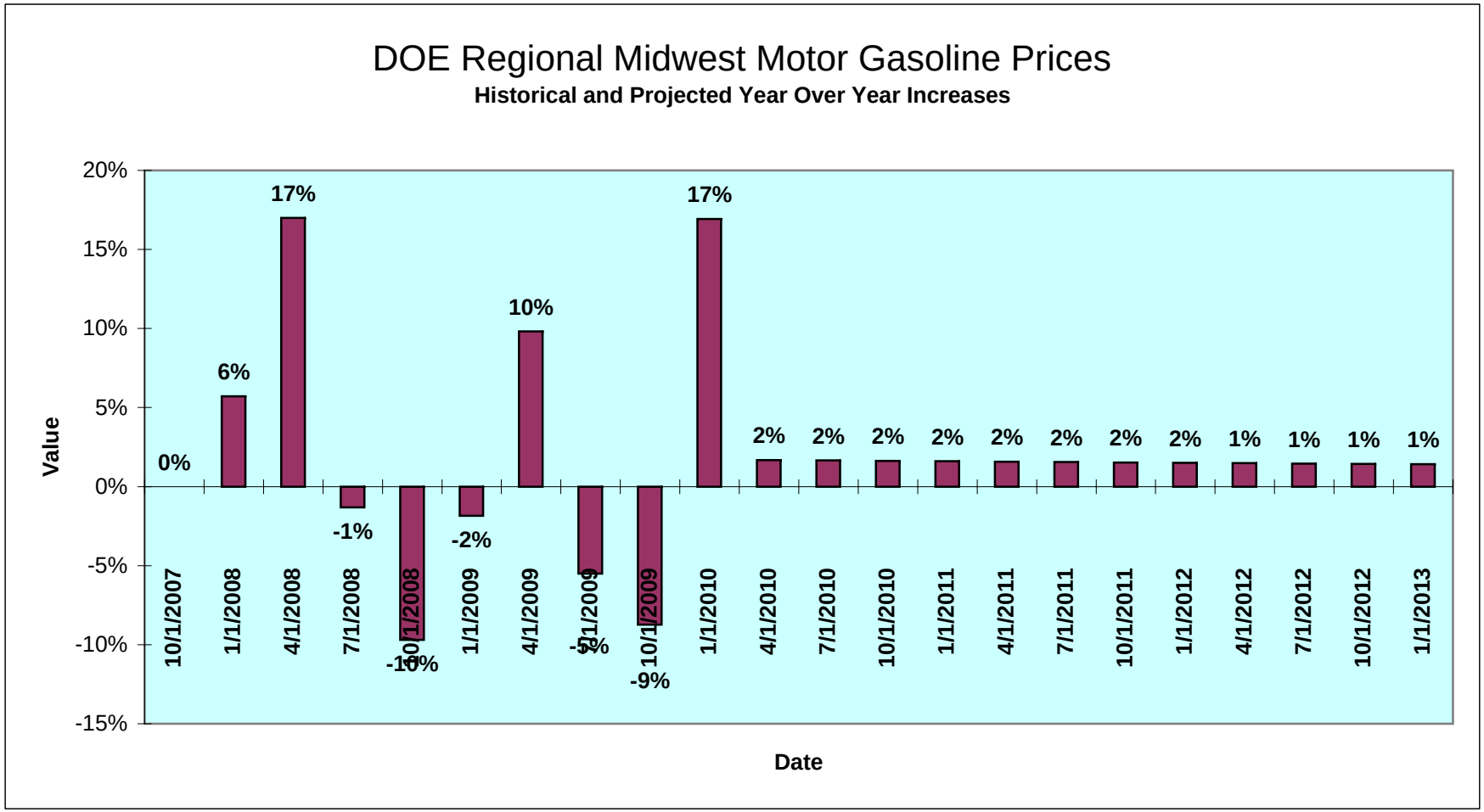
APPENDIX B—DOE REGIONAL MIDWEST MOTOR GAS–PRICESHISTORICAL PRICES AND LINEAR TRENDLINE

DOE US Regional Midwest Motor Gas Prices

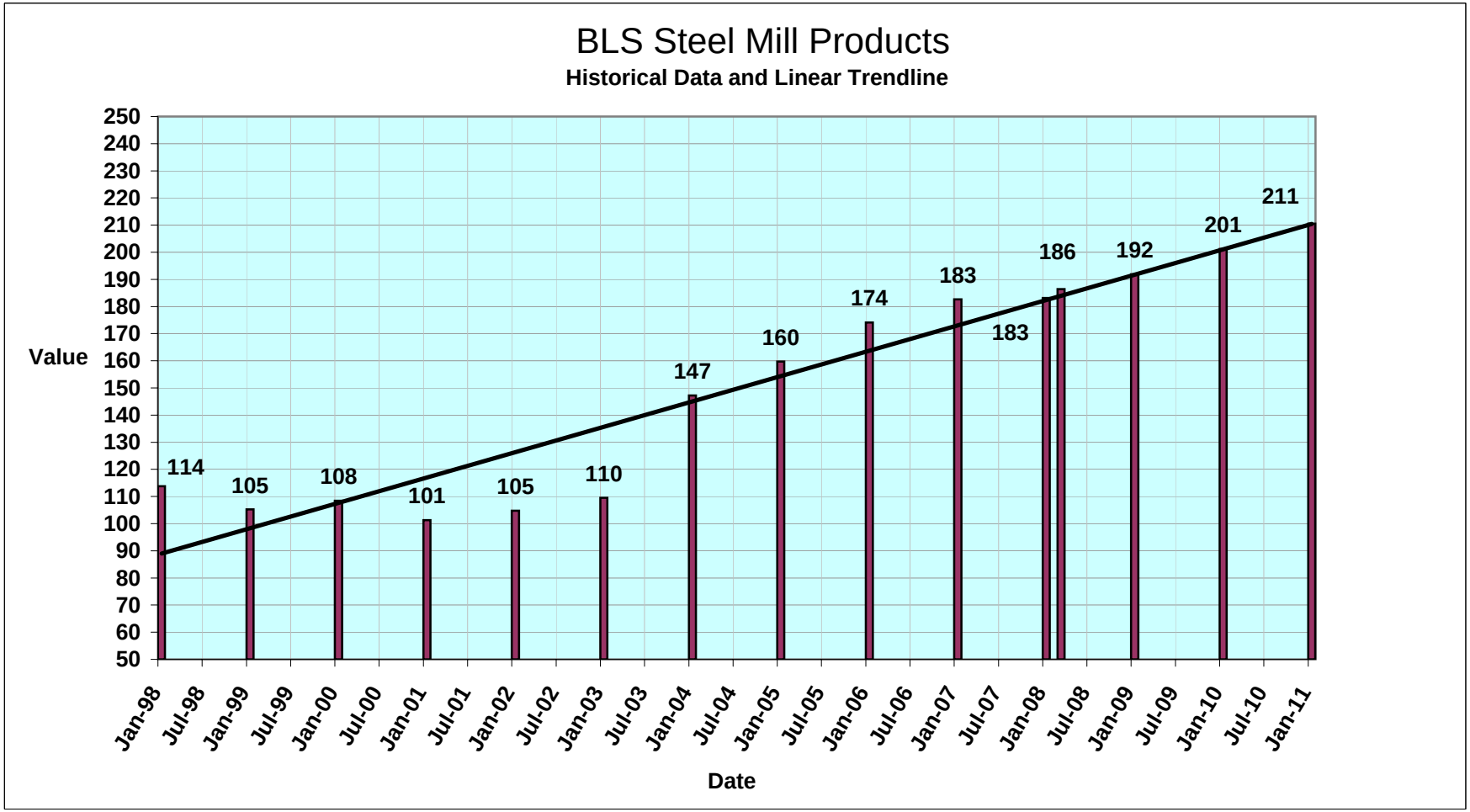
Historical Prices and Liner Trendline



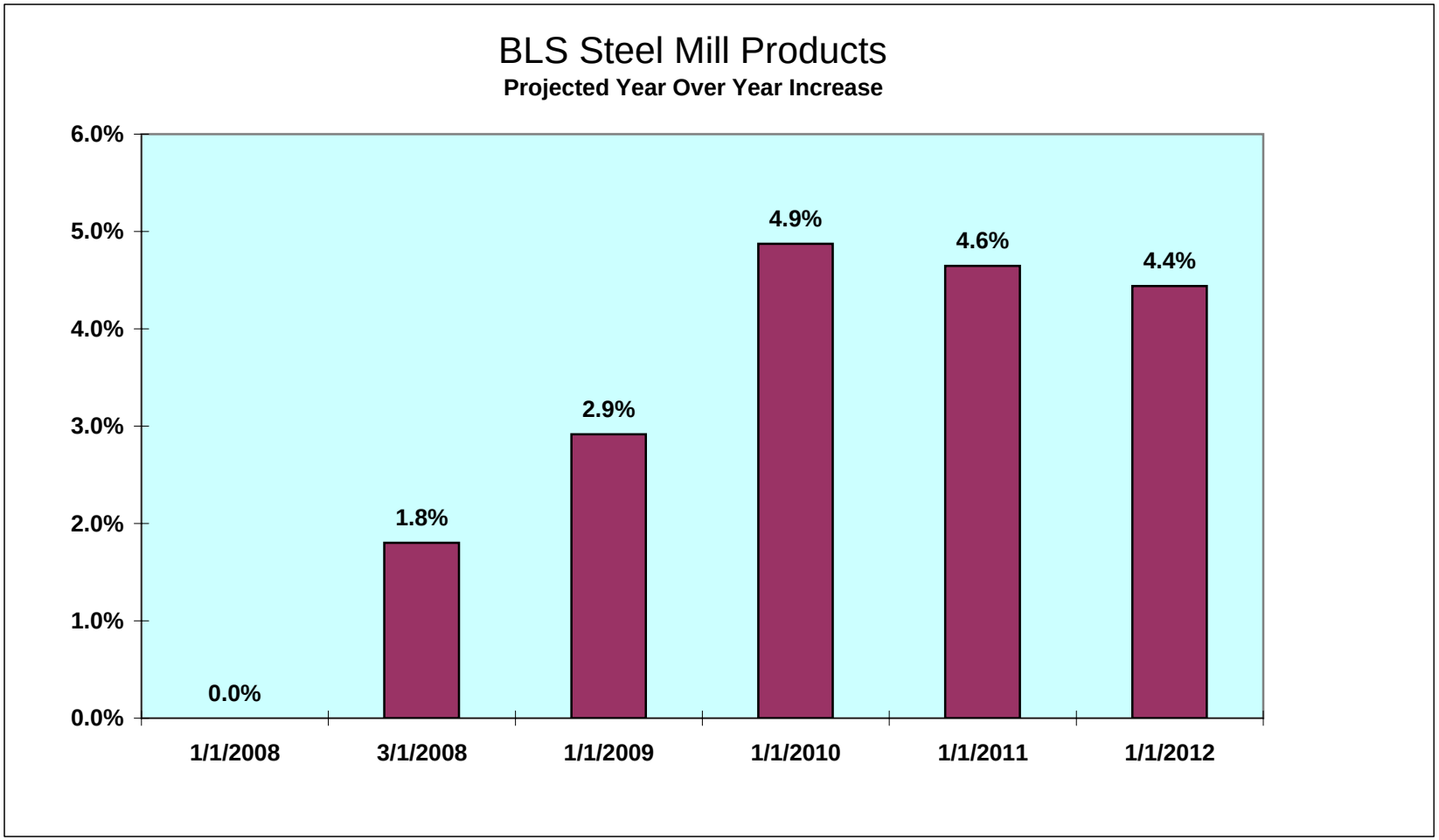
APPENDIX C—DOE REGIONAL MIDWEST MOTOR GAS PRICES– HISTORICAL AND PROJECTED YEAR OVER YEAR INCREASE


DOE Regional Midwest Motor Gasoline Prices
Historical and Projected Year Over Year Increases
Value
Date
20%
15%
10%
5%
0%
-5%
-10%
-15%
0%
6%
17%
-1%
-10%
-2%
10%
-5%
-9%
17%
2%
2%
2%
2%
2%
2%
2%
2%
1%
1%
1%
1%
10/1/2007
1/1/2008
4/1/2008
7/1/2008
10/1/2008
1/1/2009
4/1/2009
7/1/2009
10/1/2009
1/1/2010
4/1/2010
7/1/2010
10/1/2010
1/1/2011
4/1/2011
7/1/2011
10/1/2011
1/1/2012
4/1/2012
7/1/2012
10/1/2012
1/1/2013

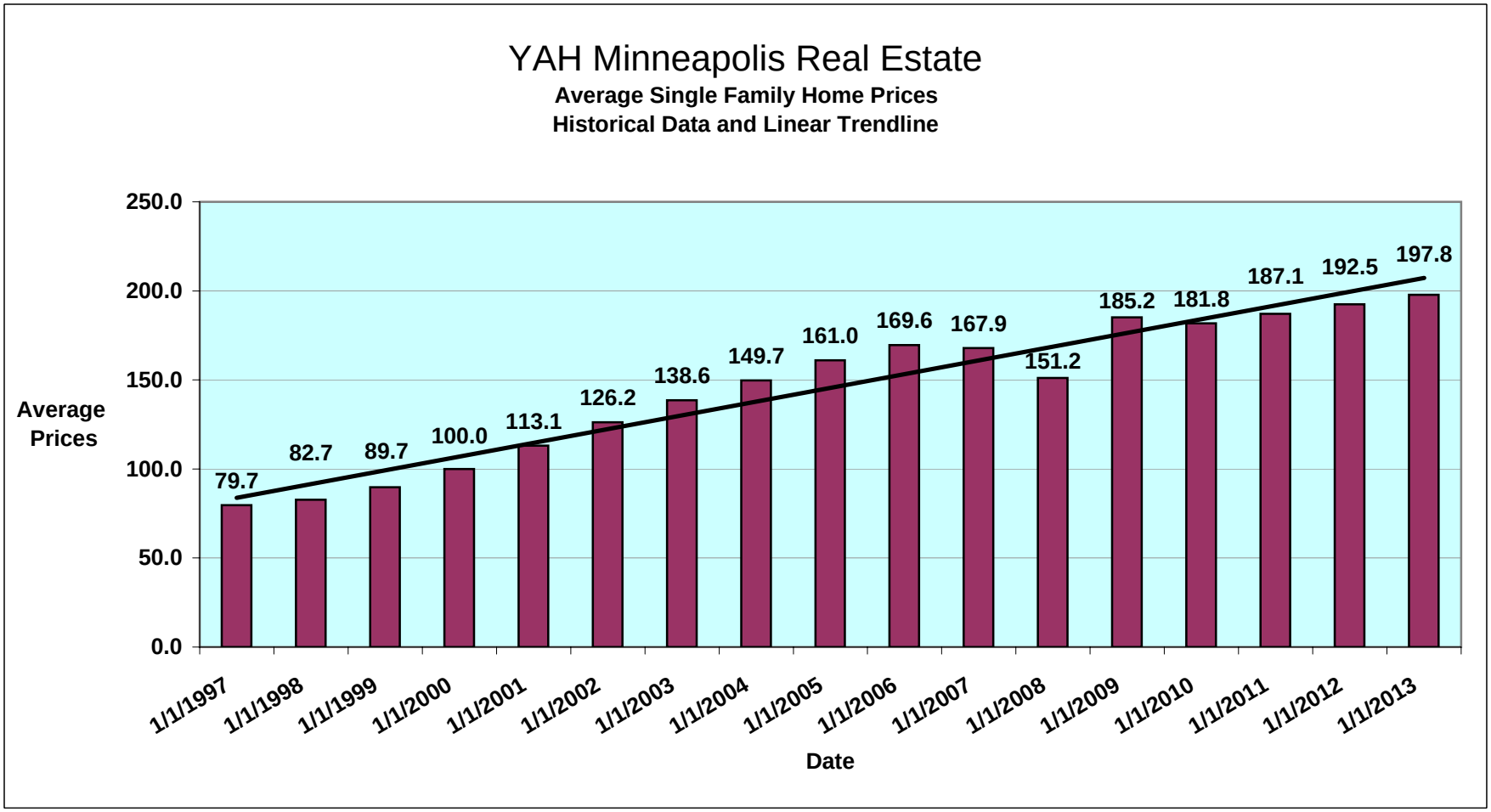
APPENDIX D—BLS STEEL MILL PRODUCTS–HISTORICAL DATA AND TRENDLINE


BLS Steel Mill Products
Historical Data and Linear Trendline
Value
Date
250
240
230
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
114
105
108
101
105
110
147
160
174
183
183
186
192
201
211
Jan-98
Jul-98
Jan-99
Jul-99
Jan-00
Jul-00
Jan-01
Jul-01
Jan-02
Jul-02
Jan-03
Jul-03
Jan-04
Jul-04
Jan-05
Jul-05
Jan-06
Jul-06
Jan-07
Jul-07
Jan-08
Jul-08
Jan-09
Jul-09
Jan-10
Jul-10
Jan-11

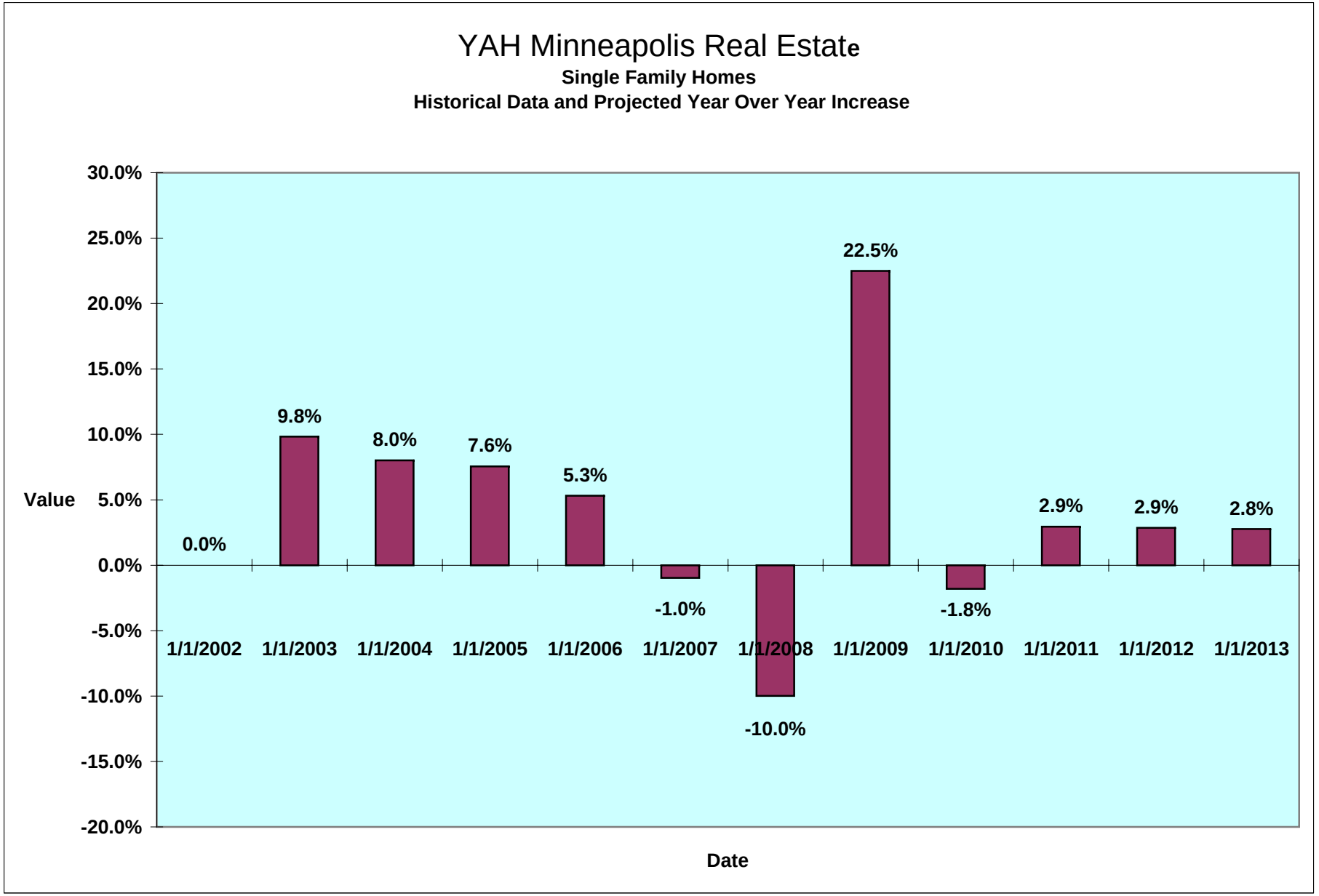
APPENDIX E—BLS STEEL MILL PRODUCTS–PROJECTED YEAR OVER YEAR INCREASE


BLS Steel Mill Products
Projected Year Over Year Increase
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
0.0%
1.8%
2.9%
4.9%
4.6%
4.4%
1/1/2008
3/1/2008
1/1/2009
1/1/2010
1/1/2011
1/1/2012

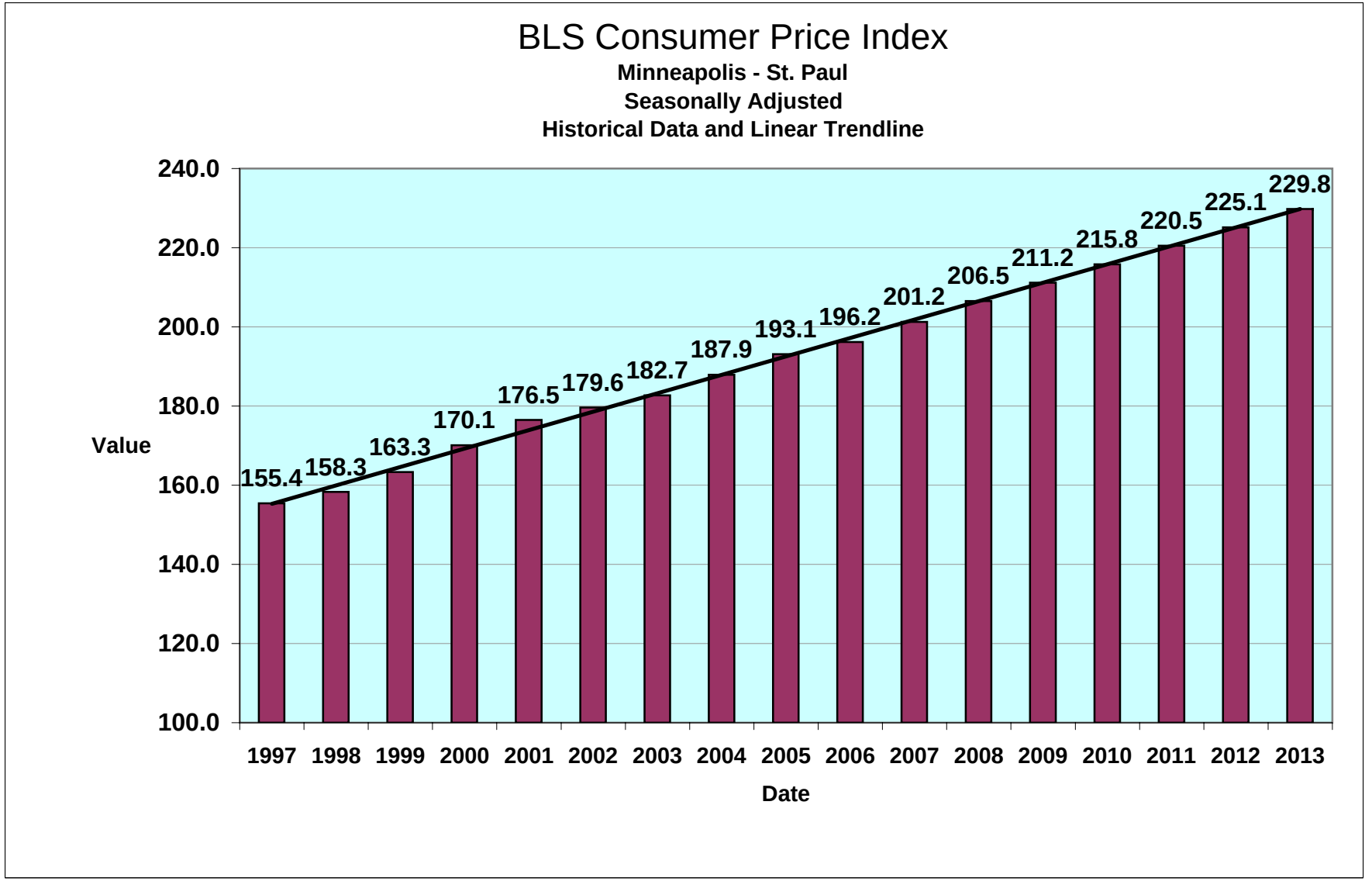
APPENDIX F—MINNEAPOLIS REAL ESTATE–AVERAGE SINGLE-FAMILY HOME PRICES–HISTORICAL AND LINEAR TRENDLINE


YAH Minneapolis Real Estate
Average Single Family Home Prices
Historical Data and Linear Trendline
Average Prices
250.0
200.0
150.0
100.0
50.0
0.0
79.7
82.7
89.7
100.0
113.1
126.2
138.6
149.7
161.0
169.6
167.9
151.2
185.2
181.8
187.1
192.5
197.8
1/1/1997
1/1/1998
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
1/1/2011
1/1/2012
1/1/2013
Date

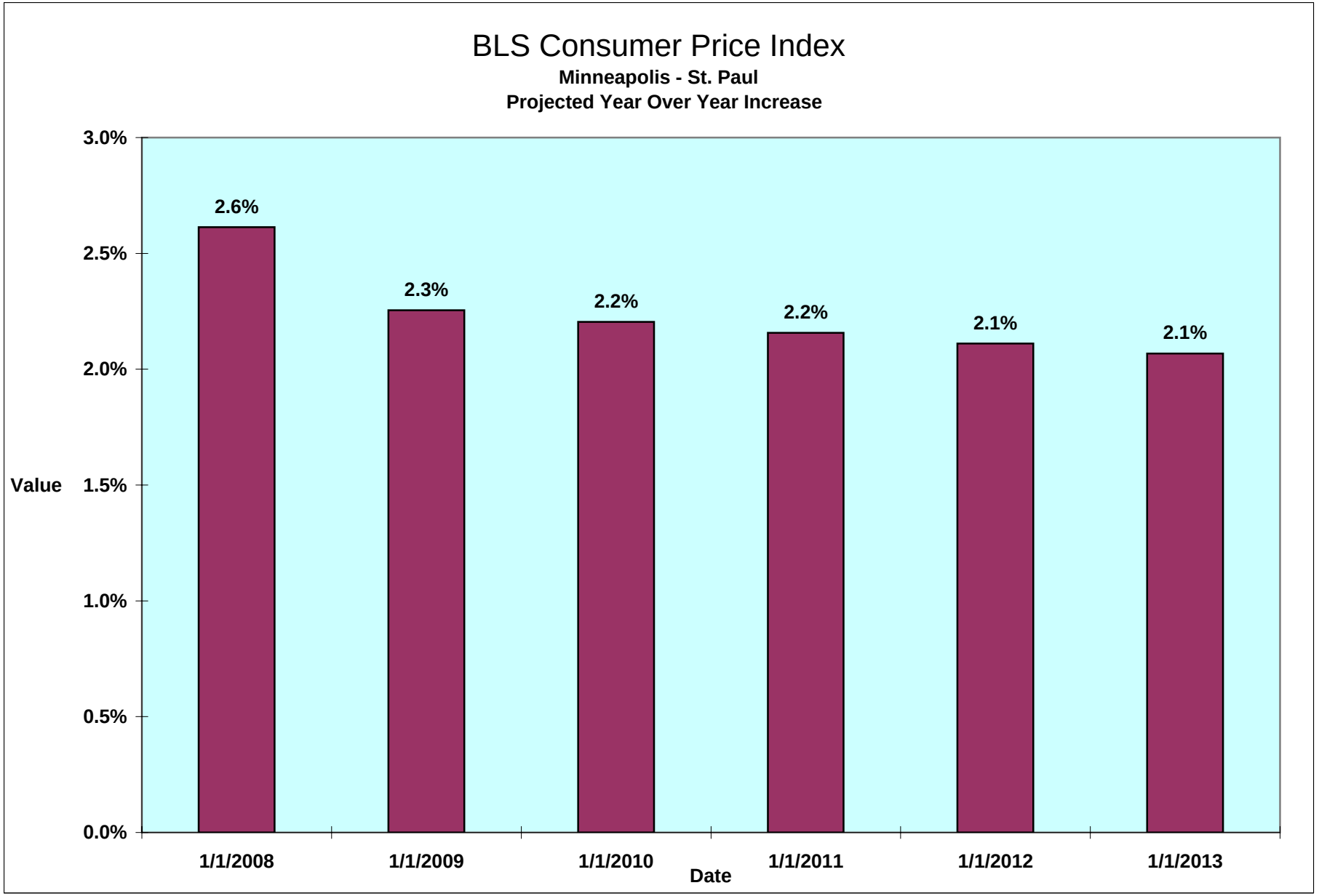
APPENDIX G—MINNEAPOLIS REAL ESTATE–SINGLE-FAMILY HOMES–HISTORICAL AND PROJECTED YEAR OVER YEAR INCREASE


YAH Minneapolis Real Estate
Single Family Homes
Historical Data and Projected Year Over Year Increase
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
-5.0%
-10.0%
-15.0%
-20.0%
Value
0.0%
9.8%
8.0%
7.6%
5.3%
-1.0%
-10.0%
22.5%
-1.8%
2.9%
2.9%
2.8%
1/1/2002
1/1/2003
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
1/1/2011
1/1/2012
1/1/2013
Date

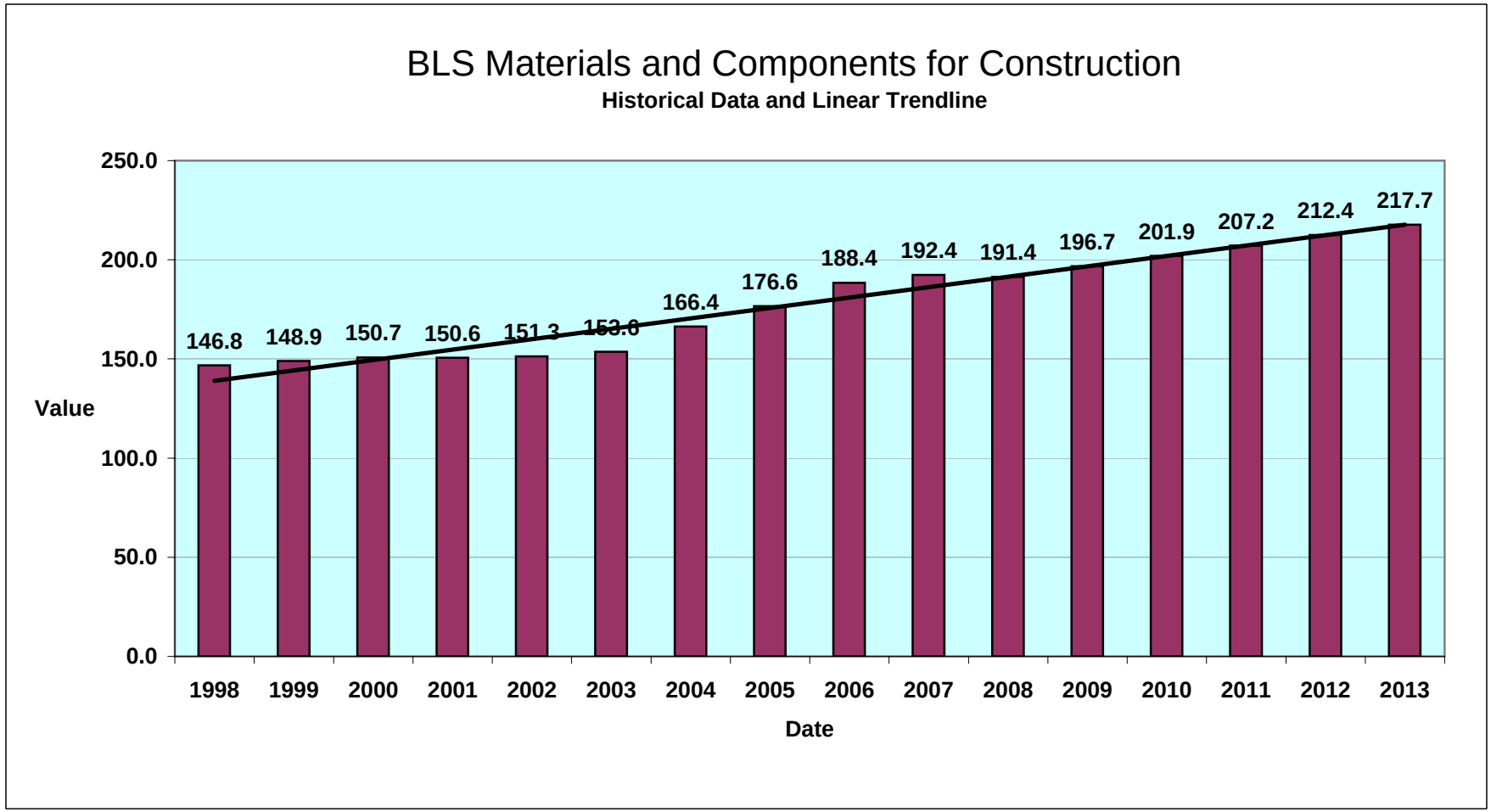
APPENDIX H—BLS CONSUMER PRICE INDEX–MINNEAPOLIS–ST. PAUL–SEASONALLY ADJUSTED–HISTORICAL DATA AND LINEAR TRENDLINE


BLS Consumer Price Index
Minneapolis - St. Paul
Seasonally Adjusted
Historical Data and Linear Trendline
Value
240.0
220.0
200.0
180.0
160.0
140.0
120.0
100.0
155.4
158.3
163.3
170.1
176.5
179.6
182.7
187.9
193.1
196.2
201.2
206.5
211.2
215.8
220.5
225.1
229.8
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Date

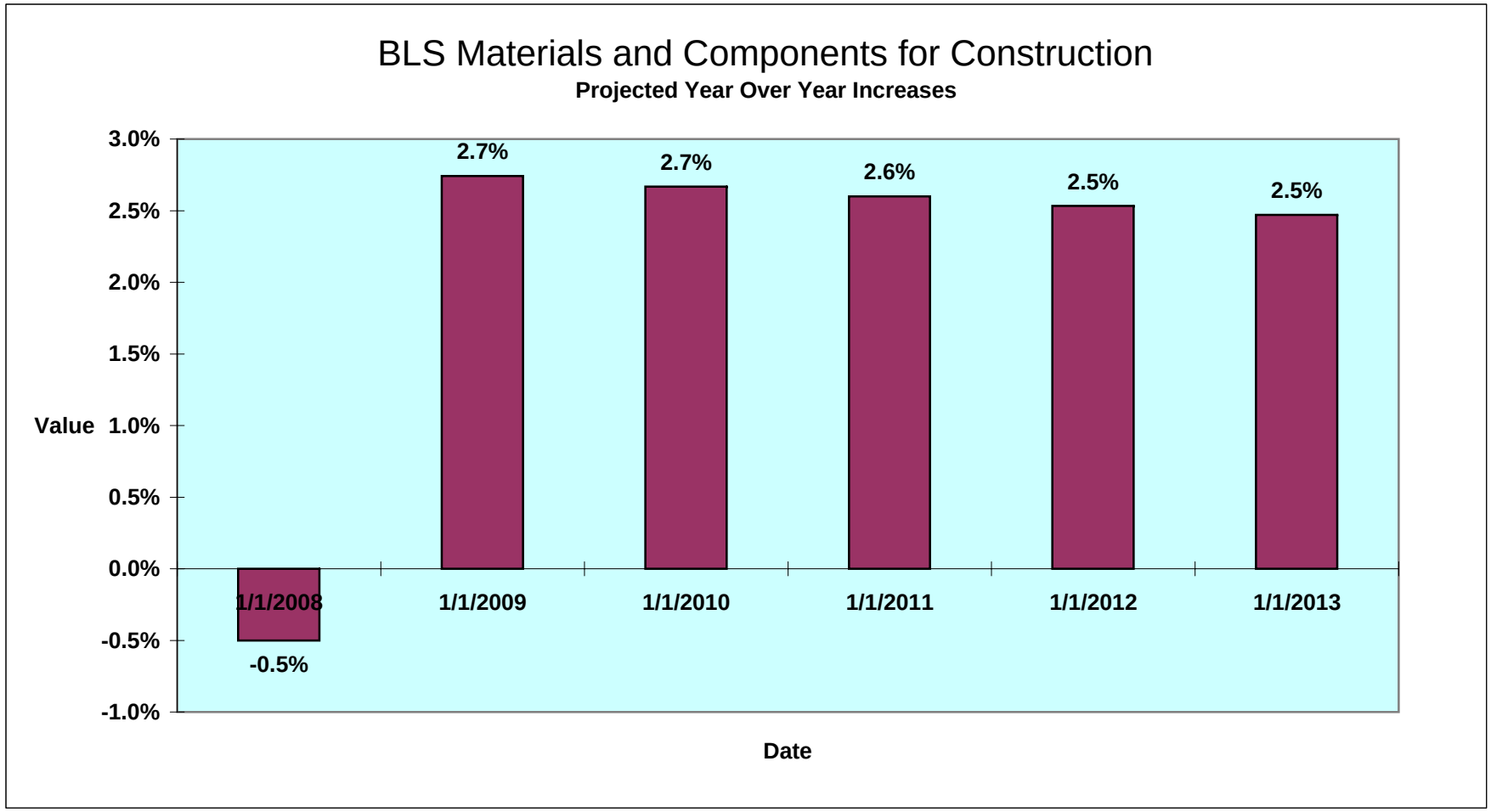
APPENDIX I—BLS CONSUMER PRICE INDEX MINNEAPOLIS–ST. PAUL–PROJECTED YEAR OVER YEAR INCREASE


BLS Consumer Price Index
Minneapolis - St. Paul
Projected Year Over Year Increase
Value
3.0%
2.5%
2.0%
1.5%
1.0%
0.5%
0.0%
2.6%
2.3%
2.2%
2.2%
2.1%
2.1%
1/1/2008
1/1/2009
1/1/2010
1/1/2011
1/1/2012
1/1/2013
Date

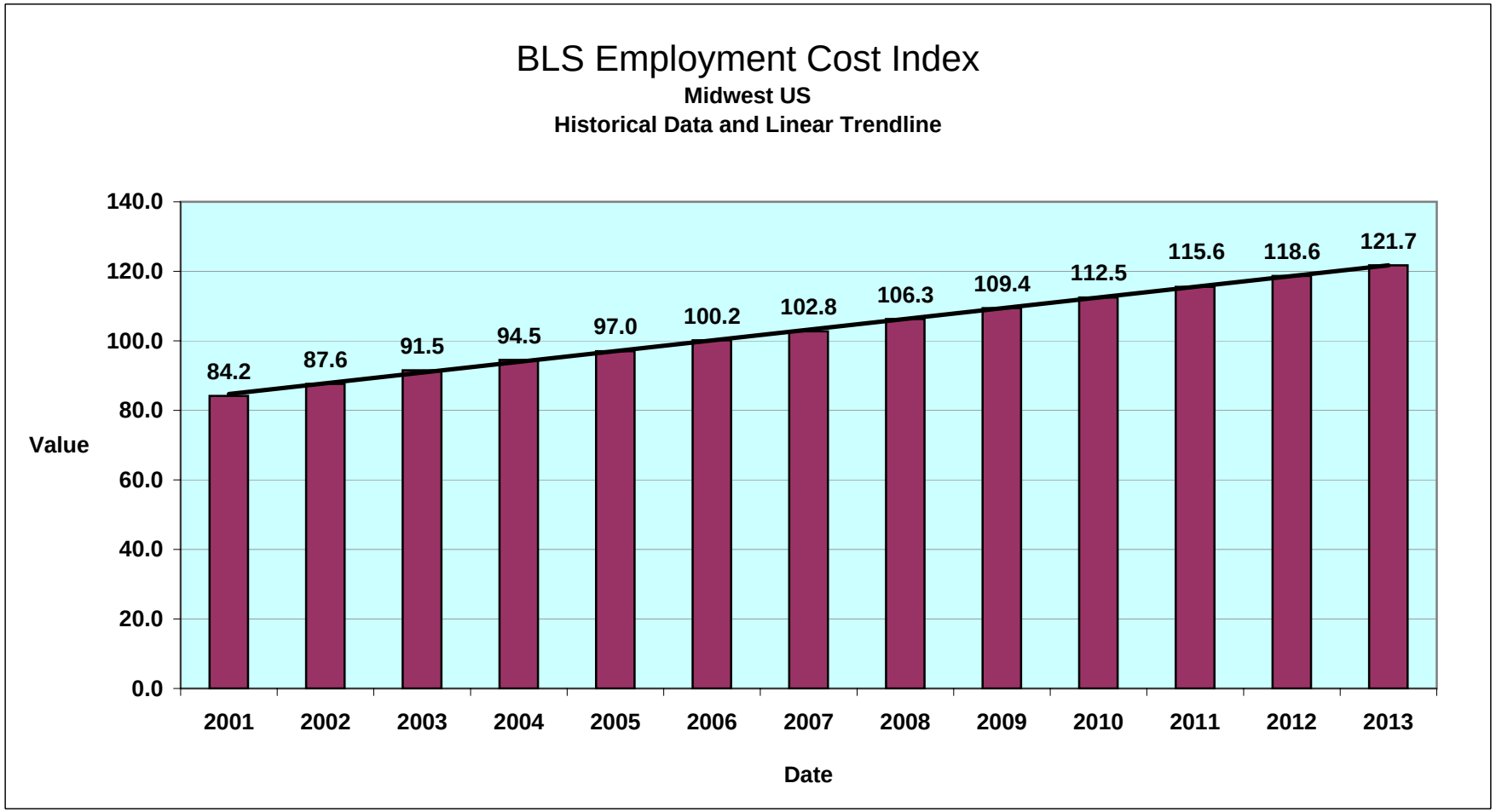
APPENDIX J—BLS MATERIALS AND COMPONENTS FOR CONSTRUCTION–HISTORICAL AND LINEAR TRENDLINE


BLS Materials and Components for Construction
Historical Data and Linear Trendline
250.0
200.0
150.0
100.0
50.0
0.0
Value
146.8
148.9
150.7
150.6
151.3
153.6
166.4
176.6
188.4
192.4
191.4
196.7
201.9
207.2
212.4
217.7
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Date

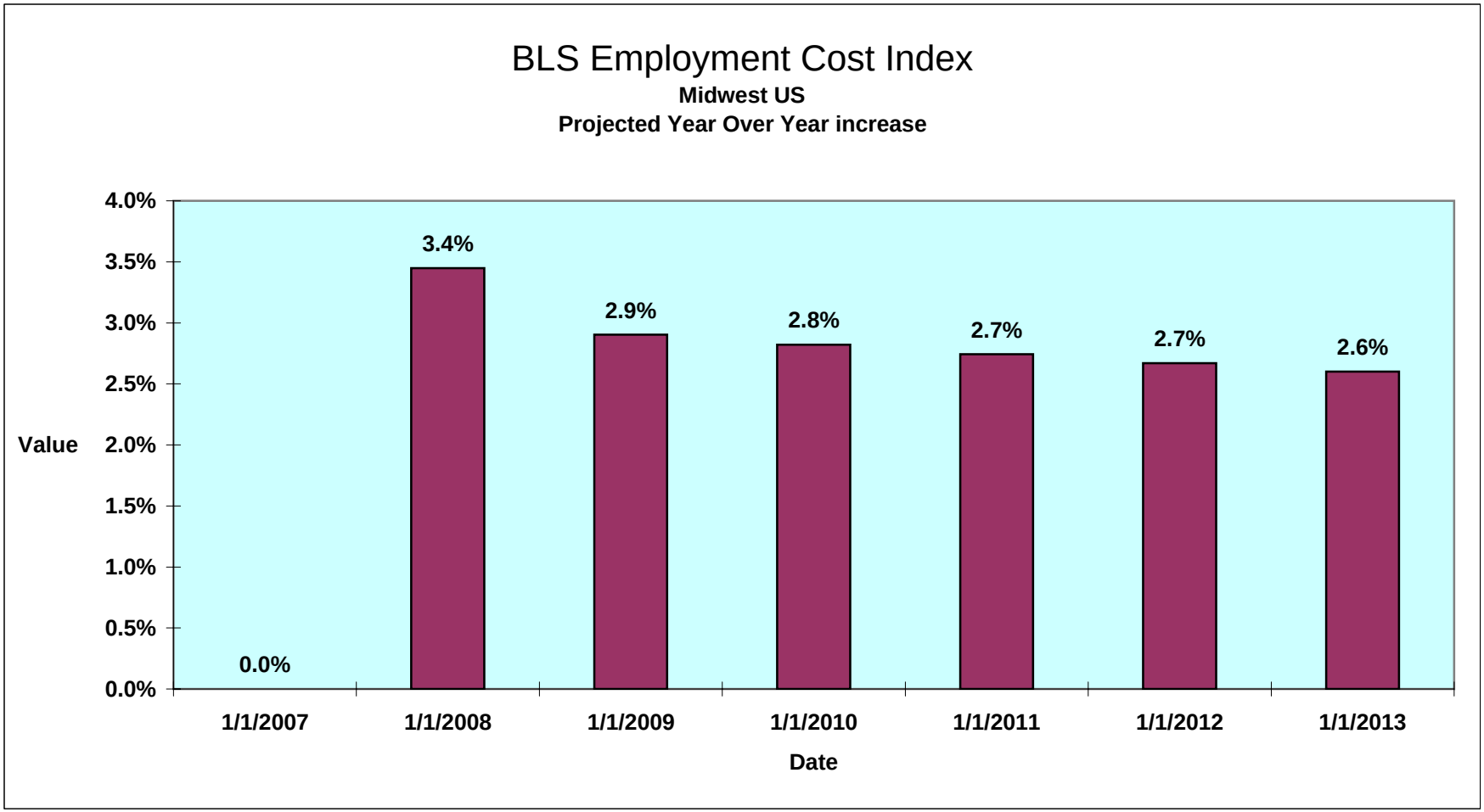
APPENDIX K—BLS MATERIALS AND COMPONENTS FOR CONSTRUCTION–PROJECTED YEAR OVER YEAR INCREASES


BLS Materials and Components for Construction
Projected Year Over Year Increases
3.0%
2.5%
2.0%
1.5%
1.0%
0.5%
0.0%
-0.5%
-1.0%
Value
2.7%
2.7%
2.6%
2.5%
2.5%
-0.5%
1/1/2008
1/1/2009
1/1/2010
1/1/2011
1/1/2012
1/1/2013
Date

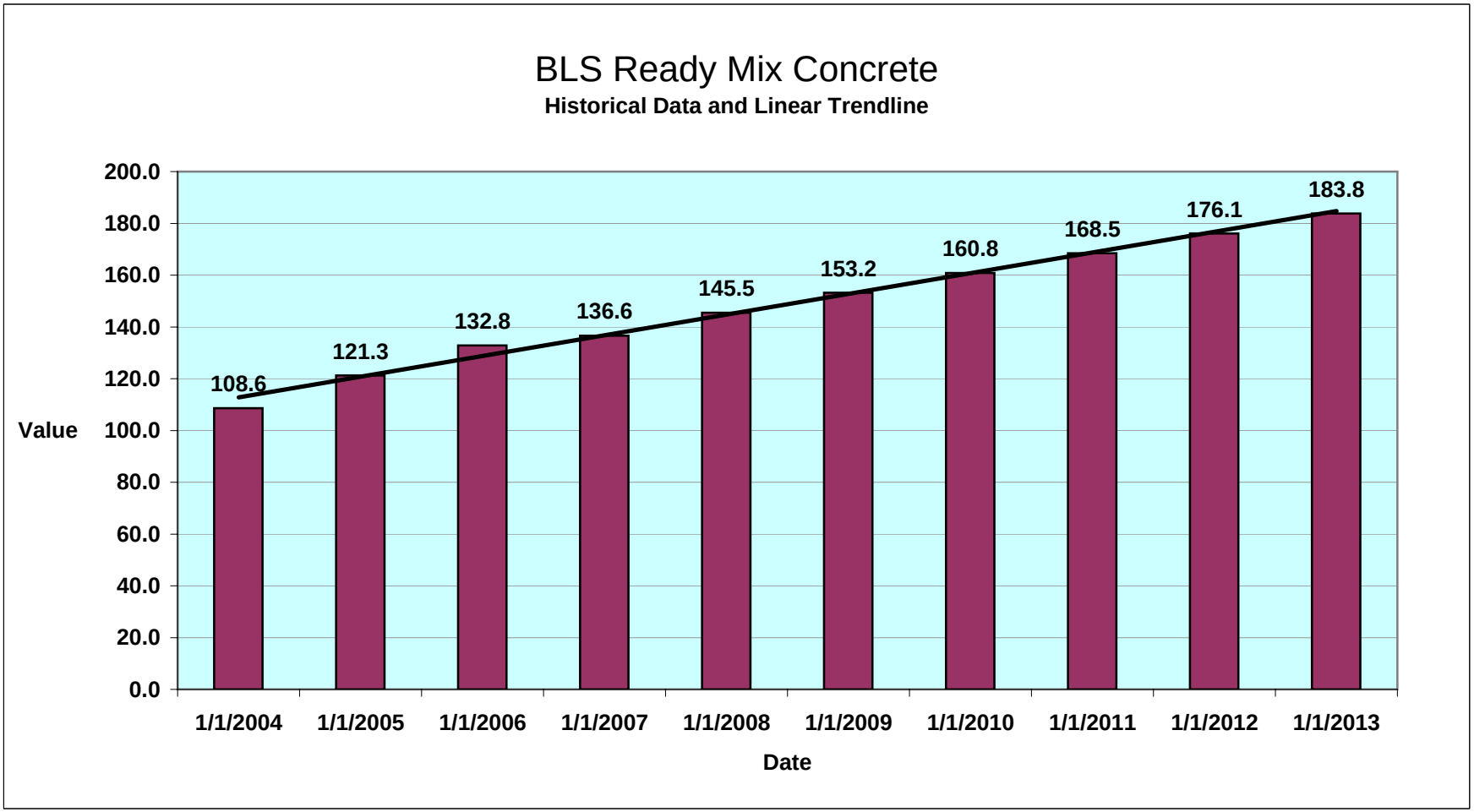
APPENDIX L—BLS EMPLOYMENT COST INDEX–MIDWEST US–HISTORICAL DATA AND TRENDLINE


BLS Employment Cost Index
Midwest US
Historical Data and Linear Trendline
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
Value
84.2
87.6
91.5
94.5
97.0
100.2
102.8
106.3
109.4
112.5
115.6
118.6
121.7
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Date

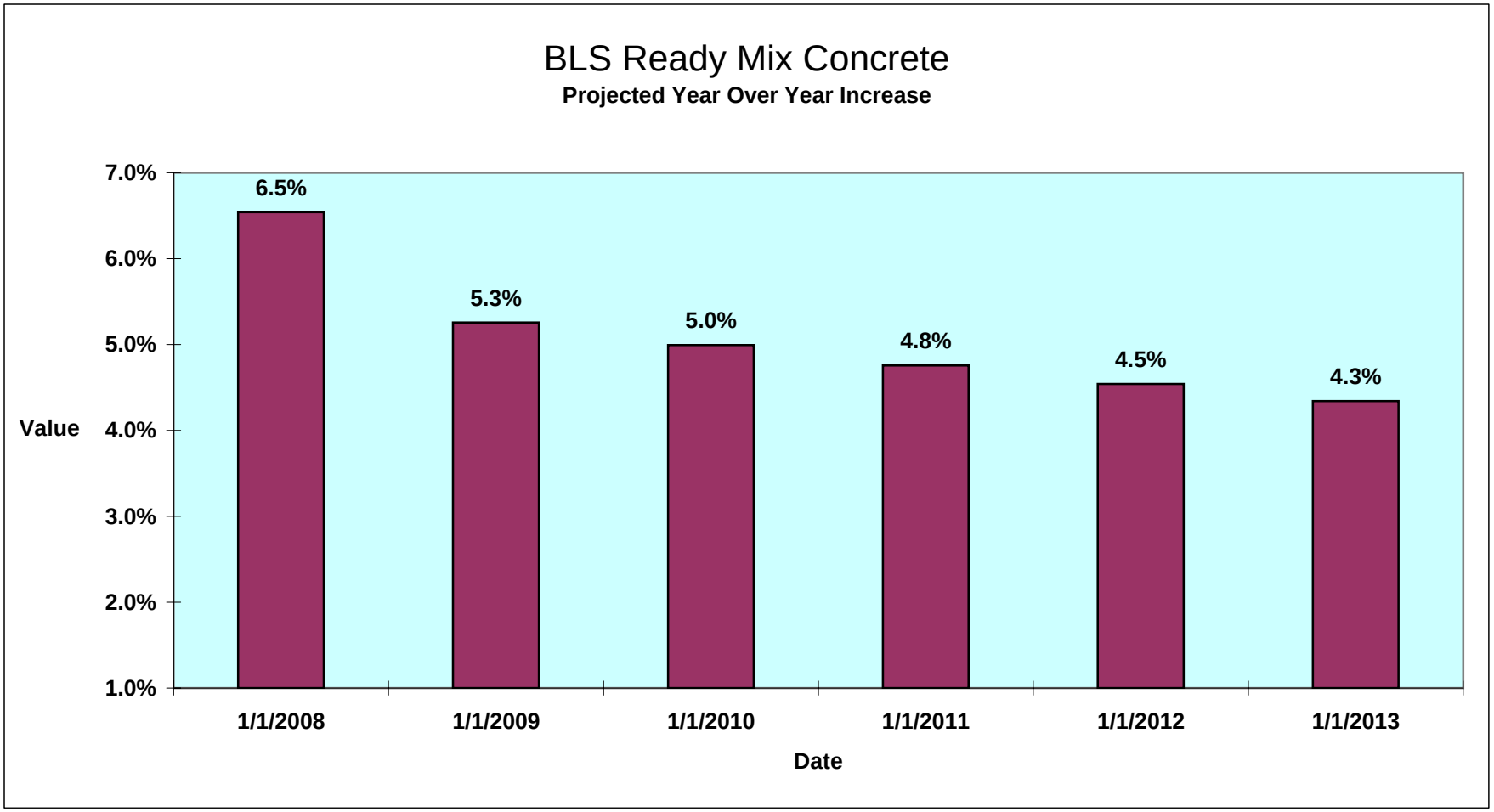
APPENDIX M—BLS EMPLOYMENT COST INDEX–MIDWEST US–PROJECTED YEAR OVER YEAR INCREASE


BLS Employment Cost Index
Midwest US
Projected Year Over Year increase
Value
4.0%
3.5%
3.0%
2.5%
2.0%
1.5%
1.0%
0.5%
0.0%
0.0%
3.4%
2.9%
2.8%
2.7%
2.7%
2.6%
1/1/2007
1/1/2008
1/1/2009
1/1/2010
1/1/2011
1/1/2012
1/1/2013
Date

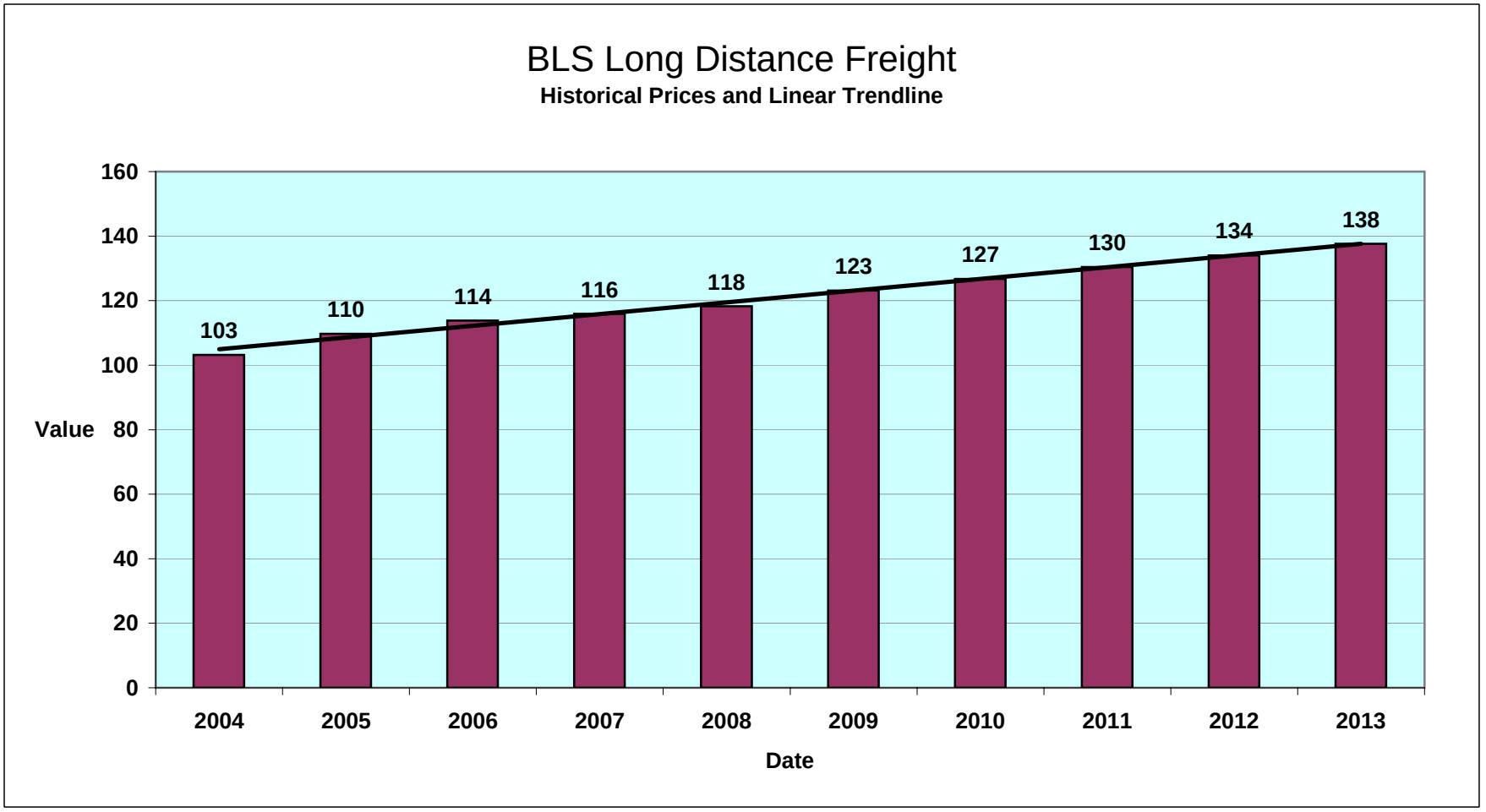
APPENDIX N—BLS READY MIX CONCRETE–HISTORICAL DATA AND LINEAR TRENDLINE


BLS Ready Mix Concrete
Historical Data and Linear Trendline
Value
200.0
180.0
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
108.6
121.3
132.8
136.6
145.5
153.2
160.8
168.5
176.1
183.8
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
1/1/2011
1/1/2012
1/1/2013
Date

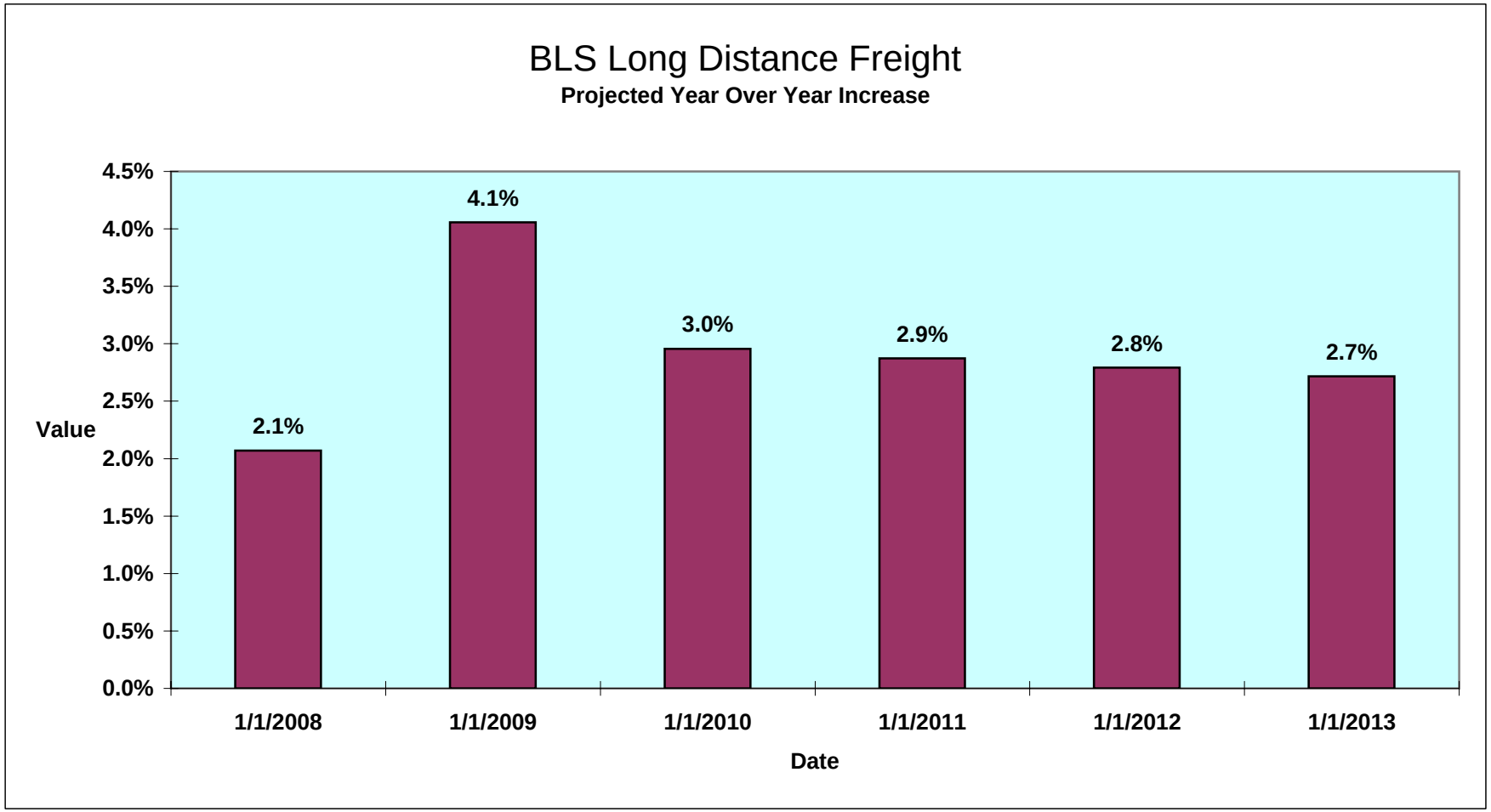
APPENDIX O—BLS READY MIX CONCRETE–PROJECTED YEAR OVER YEAR INCREASE


BLS Ready Mix Concrete
Projected Year Over Year Increase
Value
7.0%
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
6.5%
5.3%
5.0%
4.8%
4.5%
4.3%
1/1/2008
1/1/2009
1/1/2010
1/1/2011
1/1/2012
1/1/2013
Date

APPENDIX P—BLS LONG DISTANCE FREIGHT–HISTORIC PRICES AND LINEAR TRENDLINE


BLS Long Distance Freight
Historical Prices and Linear Trendline
160
140
120
100
80
60
40
20
0
Value
103
110
114
116
118
123
127
130
134
138
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Date

APPENDIX Q—BLS LONG DISTANCE FREIGHT–PROJECTED YEAR OVER YEAR INCREASE


BLS Long Distance Freight
Projected Year Over Year Increase
Value
4.5%
4.0%
3.5%
3.0%
2.5%
2.0%
1.5%
1.0%
0.5%
0.0%
2.1%
4.1%
3.0%
2.9%
2.8%
2.7%
1/1/2008
1/1/2009
1/1/2010
1/1/2011
1/1/2012
1/1/2013
Date

APPENDIX R—MAIN BUDGET BREAKDOWN

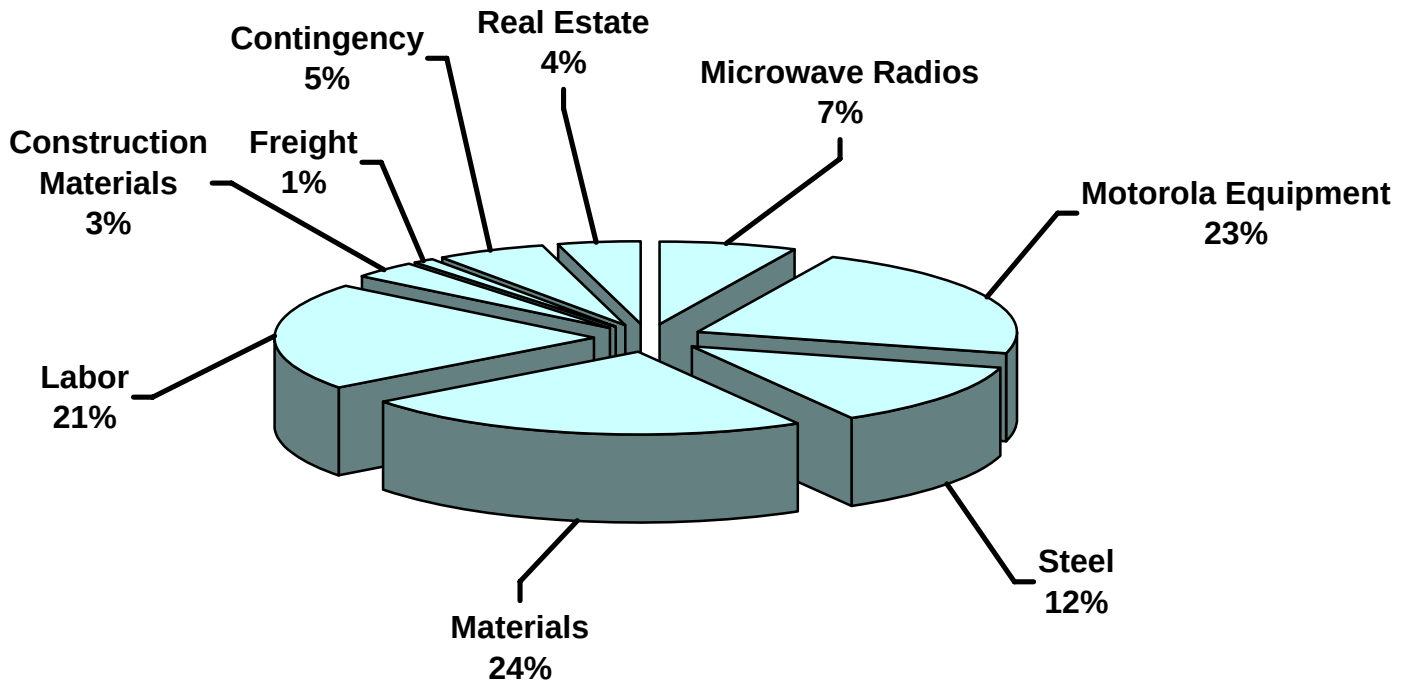
Breakdown and Assumptions

Item	Total	Microwave Radios	Motorola Equipment	Steel Mill Products	System Materials	Labor	Construction Materials	Long Distance Freight	Microwave Studies	Contingency	Real Estate
Equipment Building and Generators	$ 20,640,000.00				$ 14,448,000.00	$ 5,527,000.00		$ 665,000.00			
Land Acquisition Costs	$ 10,105,000.00					$ 1,130,500.00				$ 1,456,000.00	$ 7,518,500.00
DAC Switching Equipment	$ 1,400,000.00				$ 1,400,000.00						
Interoperability Equipment	$ 3,926,000.00		$ 2,449,800.00							$ 1,476,200.00	
Towers and Accessories	$ 48,769,000.00			$ 21,946,050.00		$ 20,970,670.00	$ 5,852,280.00				
RF Backbone and Antenna Equipment	$ 49,352,000.00		$ 32,504,286.54		$ 7,012,685.00	$ 5,067,100.00		$ 825,100.00		$ 3,942,828.46	
Master Switching Office	$ 8,000,000.00		$ 8,000,000.00								
Microwave Backbone	$ 29,450,879.00	$ 12,292,000.00			$ 11,947,179.00	$ 4,542,500.00		$ 597,500.00	$ 71,700.00		
Site and Utility Contingency	$ 4,400,000.00									$ 4,400,000.00	
TOTAL BUDGET	$ 176,042,879.00	$ 12,292,000.00	$ 42,954,086.54	$ 21,946,050.00	$ 34,807,864.00	$ 37,237,770.00	$ 5,852,280.00	$ 2,087,600.00	$ 71,700.00	$ 11,275,028.46	$ 7,518,500.00

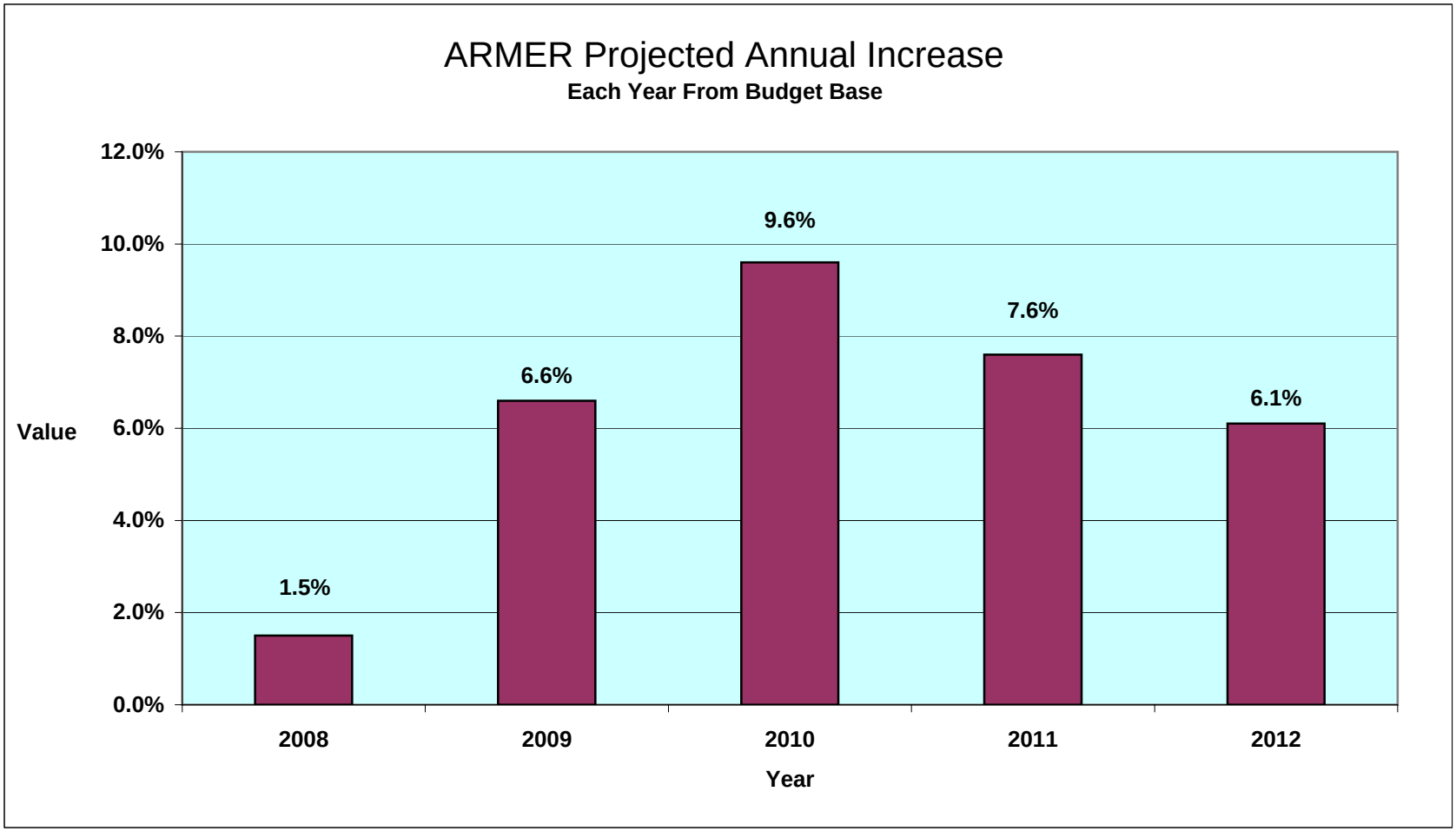
APPENDIX S—TOTAL BUDGET BREAKDOWN

ARMER Phase 4-5-6

Budget Breakdown and Assumptions



APPENDIX T—YEARLY INCREASE GRAPHIC

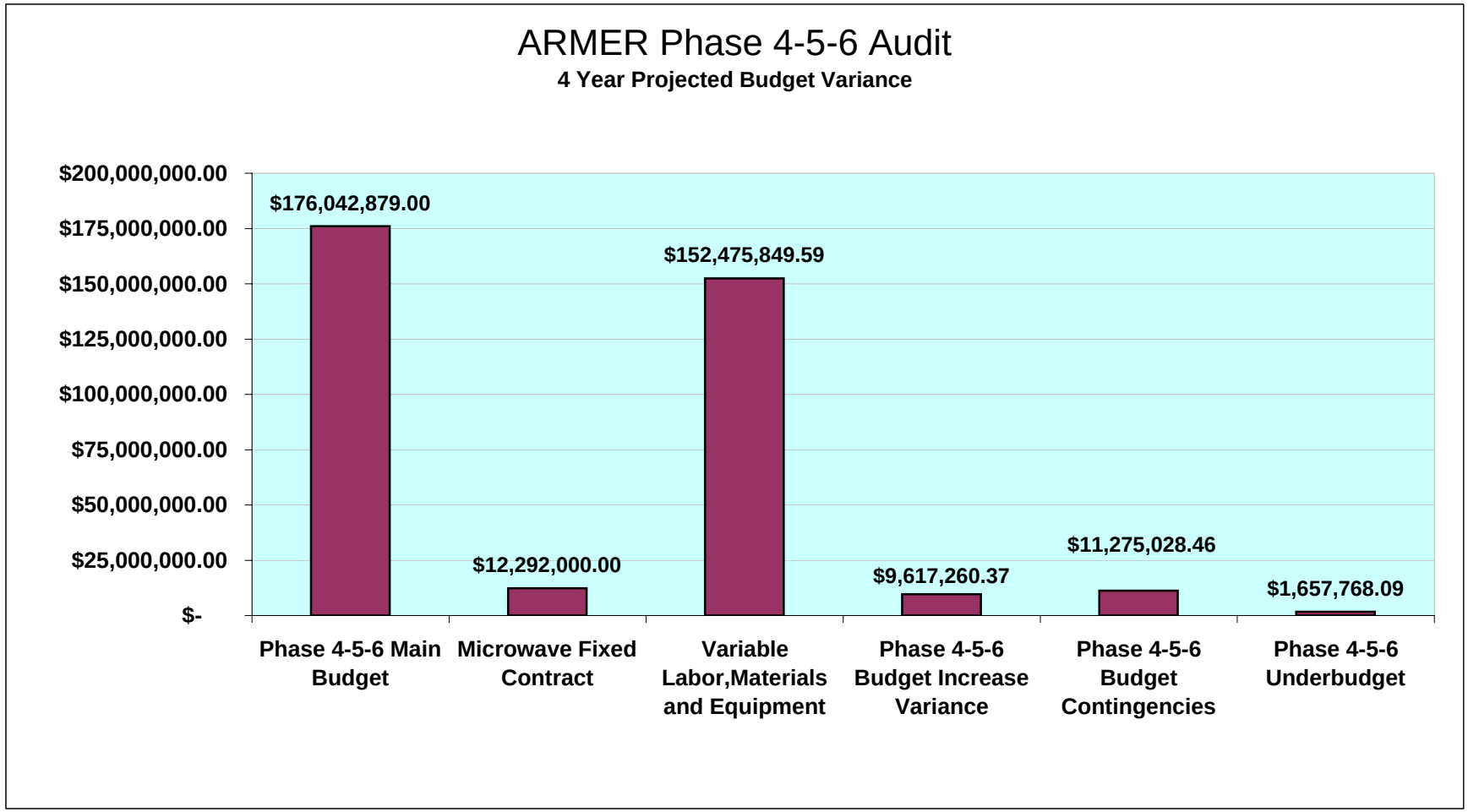

ARMER Projected Annual Increase
Each Year From Budget Base
12.0%
10.0%
8.0%
6.0%
4.0%
2.0%
0.0%
Value
1.5%
6.6%
9.6%
7.6%
6.1%
2008
2009
2010
2011
2012
Year

APPENDIX U—INCREASE AND VARIANCE ANALYSIS

Increase and Variance Analysis

	2008	2009	2010	2011	2012	Total
Annual Percentage Increase Above Base Rate	1.5%	6.6%	9.6%	7.6%	6.1%	
ARMER Phase 4-5-6 Budget	$ 39,471,497.53	$ 39,471,497.53	$ 39,471,497.53	$ 39,471,497.53	$ 18,156,888.87	$ 176,042,879.00
Yearly Microwave Fixed Base Amount	$ 2,756,053.81	$ 2,756,053.81	$ 2,756,053.81	$ 2,756,053.81	$ 1,267,784.75	$ 12,292,000.00
Yearly Budget Less Fixed Microwave Budget	$ 36,715,443.72	$ 36,715,443.72	$ 36,715,443.72	$ 36,715,443.72	$ 16,889,104.11	$ 163,750,879.00
Less Contingency	$ 2,528,033.50	$ 2,528,033.50	$ 2,528,033.50	$ 2,528,033.50	$ 1,162,895.41	$ 11,275,029.41
Net Variable Amount	$ 34,187,410.22	$ 34,187,410.22	$ 34,187,410.22	$ 34,187,410.22	$ 15,726,208.70	$ 152,475,849.59
Actual Increase	$ 508,537.73	$ 2,260,642.50	$ 3,281,991.38	$ 2,606,790.03	$ 959,298.73	$ 9,617,260.37

APPENDIX V—4 YEAR PROJECTED BUDGET VARIANCE


ARMER Phase 4-5-6 Audit
4 Year Projected Budget Variance
$200,000,000.00
$175,000,000.00
$150,000,000.00
$125,000,000.00
$100,000,000.00
$75,000,000.00
$50,000,000.00
$25,000,000.00
$-
$176,042,879.00
$12,292,000.00
$152,475,849.59
$9,617,260.37
$11,275,028.46
$1,657,768.09
Phase 4-5-6 Main Budget
Microwave Fixed Contract
Variable Labor,Materials and Equipment
Phase 4-5-6 Budget Increase Variance
Phase 4-5-6 Budget Contingencies
Phase 4-5-6 Underbudget

APPENDIX W—INITIAL WORKUP SHEET

Initial Workup Sheet

Item	Description	Gross Budget	Taxes	Contingencies	Equipment Firm Fixed Price	Equipment Not Firm Fixed Price	Labor Not Firm Fixed Price
1	Microwave	$ 29,450,878.97	$1,478,623.60		$12,292,000.00		$15,680,255.37
2	ISR Sites	$ 36,084,000.00	$1,728,355.20	$3,627,000.00			$30,728,644.80
3	Simulcast Sites	$ 13,268,000.00	$630,532.56	$1,205,096.17			$11,432,371.27
5	MSO	$ 8,000,000.00	Included			$8,000,000.00	
6	DAC	$ 1,400,000.00	Included			$1,400,000.00	
7	Land	$ 10,105,000.00	N/A	$ 1,529,500.00			$8,575,500.00
8	Tower	$ 48,769,000.00	Included	$720,000.00		$33,634,300.00	$14,414,700.00
9	Shelter	$ 20,640,000.00	N/A			$20,640,000.00	
10	Ineteroperability	$ 3,926,000.00	Included	$ 1,476,200.00		$2,449,800.00	
11	Contingency	$ 2,400,000.00		$2,400,000.00			
12	Contingency	$ 2,000,000.00		$2,000,000.00			
		$176,042,878.97	$3,837,511.36	$12,957,796.17	$12,292,000.00	$66,124,100.00	$80,831,471.44

APPENDIX X—ARMER MASTER TOTAL BUDGET SHEET

Site Name	Site Type	County	Phase	RAC	ST	Comment		Tower Height	Land	Shelter	Tower	Microwave	DACs	RF	MSO	Interop	Site Total
Onamia	ISR-5	Mille Lacs	4	CM	MN		Existing, new tower and building	330	Existing	Existing	Existing	$132,238.69			$186,000.00	$14,000.00	$332,238.69
Princeton(Pease)	RF-SIM-5+1 RF site	Mille Lacs	4	CM	MN	Simulcast with Gillman and Dulem		330		$85,000.00	$125,000.00	$400,000.00	$127,978.69		$856,000.00	$14,000.00	$1,607,978.69
Duelm	SIM-RM-5	Benton	3	CM	MN			330		$85,000.00	$125,000.00	$400,000.00	$81,906.11		$428,000.00		
Flensburg	ISR-5	Morrison	4	CM	MN			330		$85,000.00	$125,000.00	$400,000.00	$244,896.43		$186,000.00	$14,000.00	$1,054,896.43
Freedhem	ISR-5	Morrison	4	CM	MN		Existing tower and building (ok)	180	Existing		Existing	Existing	$79,598.61		$186,000.00	$14,000.00	$279,598.61
Royalton	ISR-5	Morrison	4	CM	MN			330		$85,000.00	$125,000.00	$400,000.00	$81,906.11		$186,000.00	$14,000.00	$891,906.11
Glen	ISR-5	Aitkin	4	NE	MN			180		$85,000.00	$125,000.00	$200,000.00	$127,623.69		$186,000.00	$14,000.00	$737,623.69
Lawler	ISR-5	Aitkin	4	NE	MN		Existing, new tower and building	240	Existing		Existing	Existing	$165,637.77		$186,000.00	$14,000.00	$365,637.77
Logan	ISR-5	Aitkin	4	NE	MN			330		$85,000.00	$125,000.00	$400,000.00	$81,906.11		$186,000.00	$14,000.00	$891,906.11
Quadna	ISR-5	Aitkin	4	NE	MN		ligth rohn tower and small buidling	180	DNR		$125,000.00	$200,000.00	$127,623.69		$186,000.00	$14,000.00	$652,623.69
Sandy Lake	ISR-5	Aitkin	4	NE	MN			372		$85,000.00	$125,000.00	$400,000.00	$133,530.89		$186,000.00	$14,000.00	$943,530.89
White Pine	ISR-5	Aitkin	4	NE	MN			180		$85,000.00	$125,000.00	$200,000.00	$114,843.69		$186,000.00	$14,000.00	$724,843.69
Wrenshall	SIM-RM-5	Carlton	4	NE	MN			330		$85,000.00	$125,000.00	$400,000.00	$132,238.69		$428,000.00	$14,000.00	$1,184,238.69
Mahtowa	ISR-5	Carlton	4	NE	MN		tower ok, building cramped	200	Existing		$125,000.00	Existing	$128,239.02		$186,000.00	$14,000.00	$453,239.02
Moose Lake	ISR-5	Carlton	4	NE	MN		Tower and buiding ok	100	Existing		$45,000.00	Existing	$125,162.36		$186,000.00	$14,000.00	$370,162.36
Ball Club	ISR-5	Cass	4	NE	MN	Fire Tower Site. Great River Energy Site Conceptual Plan Site.		330	Fire Tower		$125,000.00	$400,000.00	$81,906.11		$186,000.00	$14,000.00	$806,906.11
Cass Lake	ISR-5	Cass	4	NE	MN		Existing, usable	300	Existing		$45,000.00	Existing	$131,315.69		$186,000.00	$14,000.00	$376,315.69
Cuba Hill	ISR-5	Cass	4	NE	MN			330		$25,000.00	$125,000.00	$200,000.00	$119,458.69		$186,000.00	$14,000.00	$669,458.69
Draper	ISR-5	Cass	4	NE	MN		In A/D aquitition	180	Acquisition	A/D	A/D		$127,623.69		$186,000.00	$14,000.00	$327,623.69
Leader	ISR-5	Cass	4	NE	MN		existing, new tower, building cramped	330	Existing		$125,000.00	Existing	$81,906.11		$186,000.00	$14,000.00	$406,906.11
Oshawa	ISR-5	Cass	4	NE	MN			330		$85,000.00	$125,000.00	$400,000.00	$119,458.69		$186,000.00	$14,000.00	$929,458.69
Whipolt	ISR-5	Cass	4	NE	MN	Land Acquisistion Former Fire Tower Site Conceptual	A/D not constructed yet	180	Acquisition	A/D	A/D		$162,868.77		$186,000.00	$14,000.00	$362,868.77
Honeymoon Lake	RF-SIM-5	Cook	4	NE	MN		County Tower and Building	250	County	$50,000.00	$85,000.00		$80,675.44		$428,000.00	$14,000.00	$657,675.44
Lutsen	PS-SIM-5	Cook	4	NE	MN		light tower, cramped building	180	Lease		$125,000.00	$200,000.00	$123,363.69		$428,000.00	$14,000.00	$890,363.69
Maple Hill	RF-SIM-5	Cook	4	NE	MN		existing, new tower and building	180	Existing		Existing	Existing	$158,608.77		$428,000.00	$14,000.00	$600,608.77
Schroder	RF-SIM-5	Cook	4	NE	MN			330		$85,000.00	$125,000.00	$400,000.00	$127,978.69		$428,000.00	$14,000.00	$1,179,978.69
Tofte	RF-SIM-5	Cook	4	NE	MN			330		$85,000.00	$125,000.00	$400,000.00	$165,531.27		$428,000.00	$14,000.00	$1,217,531.27
Devil Fish Lake	RF-SIM-5	Cook	4	NE	MN			330		$85,000.00	$125,000.00	$400,000.00	$81,906.11		$428,000.00	$14,000.00	$1,133,906.11
Bogus Lake	RF-SIM-5	Cook	4	NE	MN		ATT tower, needs new building	330		$85,000.00	$125,000.00	Existing	$157,011.27		$428,000.00	$14,000.00	$809,011.27
Grand Portage	PS-SIM-5	Cook	4	NE	MN			330	Lease		$125,000.00	Lease	$81,906.11		$428,000.00	$14,000.00	$648,906.11
Belly Lake	RF-SIM-5	Cook	4	NE	MN			330		$85,000.00	$125,000.00	$400,000.00	$127,978.69		$428,000.00	$14,000.00	$1,179,978.69
Gunflint West	RF-SIM-5	Cook	4	NE	MN			160		$85,000.00	$125,000.00	$175,000.00	$114,228.36		$428,000.00	$14,000.00	$941,228.36
Gunflint East	PS-SIM-5	Cook	4	NE	MN			180		$85,000.00	$125,000.00	$200,000.00	$79,598.61		$428,000.00	$14,000.00	$931,598.61
Baxter	ISR-5	Crow Wing	4	NE	MN	Existing Site Conceptual Plan Site	Existin tower and building (usable) - planned replacement in building !	300	Mn/DOT		$45,000.00	Existing	$85,704.61	$175,000.00	$186,000.00	$14,000.00	$505,704.61
Borden Lake	ISR-5	Crow Wing	4	NE	MN		Newer tower(OK), building nwer but cramped	180	Existing		$125,000.00	Existing	$167,128.77		$186,000.00	$14,000.00	$492,128.77
Emily	ISR-5	Crow Wing	4	NE	MN		Exting tower, building??	280	Existing		$125,000.00	Existing	$154,703.77		$186,000.00	$14,000.00	$479,703.77
Jenkins	ISR-5	Crow Wing	4	NE	MN			330		$85,000.00	$125,000.00	$400,000.00	$81,906.11		$186,000.00	$14,000.00	$891,906.11
Olgilvie	ISR-5	Kanabec	4	NE	MN		gravel pit	330		$25,000.00	$125,000.00	$400,000.00	$81,906.11		$186,000.00	$14,000.00	$831,906.11
Woodland	ISR-5	Kanebec	4	NE	MN	Existing Site Conceptual Plan Site	Tower and buiding ok	300	Existing		$45,000.00	Existing	$81,444.61		$186,000.00	$14,000.00	$326,444.61
Beaver Bay	ISR-5	Lake	4	NE	MN		Rohn tower, Rohn building(cramped)	140		$25,000.00	$125,000.00	$200,000.00	$126,393.02		$186,000.00	$14,000.00	$676,393.02
Finland	ISR-5	Lake	4	NE	MN		lookout tower, lot of stuff on tower, building cramped	180			$125,000.00	$200,000.00	$167,128.77		$186,000.00	$14,000.00	$692,128.77
Isabella	ISR-5	Lake	4	NE	MN		ATT tower, needs new building	250	Existing		$125,000.00	existing	$170,359.27		$186,000.00	$14,000.00	$495,359.27
Forest Center	ISR-5	Lake	4	NE	MN			330		$85,000.00	$125,000.00	$400,000.00	$127,978.69		$186,000.00	$14,000.00	$937,978.69
Lake One	ISR-5	Lake	4	NE	MN			330		$85,000.00	$125,000.00	$400,000.00	$81,906.11		$186,000.00	$14,000.00	$891,906.11
Palisade Head	ISR-5	Lake	4	NE	MN		Tower and buiding ok	300	Existing		$45,000.00	Existing	$131,315.69		$186,000.00	$14,000.00	$376,315.69
Silver Cliff	ISR-5	Lake	4	NE	MN		Rohn tower, small building	160	Existing		$125,000.00	Existing	$127,008.36		$186,000.00	$14,000.00	$452,008.36
Slate Lake	ISR-5	Lake	4	NE	MN			330		$85,000.00	$125,000.00	$400,000.00	$244,896.43		$186,000.00	$14,000.00	$1,054,896.43
Wales	ISR-5	Lake	4	NE	MN		Tower OK, needs new building	250	Existing		$125,000.00	Existing	$80,675.44		$186,000.00	$14,000.00	$405,675.44
Whyte	ISR-5	Lake	4	NE	MN			330		$85,000.00	$125,000.00	$400,000.00	$81,906.11		$186,000.00	$14,000.00	
Askov	ISR-5	Pine	4	NE	MN	Existing Site. Conceptual Plan Site	Existing Tower(new), Building(new)	240	Existing		Existing	Existing	$80,521.61		$186,000.00	$14,000.00	$280,521.61
Duxbury	ISR-5	Pine	4	NE	MN			330		$85,000.00	$125,000.00	$400,000.00	$132,238.69		$186,000.00	$14,000.00	$942,238.69
Nickerson	ISR-5	Pine	4	NE	MN			330		$85,000.00	$125,000.00	$400,000.00	$132,238.69		$186,000.00	$14,000.00	$942,238.69
Pine City	ISR-5	Pine	4	NE	MN		Existing, new tower and building	330	Existing		Existing	Existing	$132,238.69		$186,000.00	$14,000.00	$332,238.69
Cloverdale	ISR-5	Pine	4	NE	MN		Gravel Pit	180		$25,000.00	$125,000.00	$200,000.00	$127,623.69		$186,000.00	$14,000.00	$677,623.69
Argus	RF-SIM-5	St. Louis	4	NE	MN	Existing Site Conceptual Plan Site: Saginaw	Existing tower(new)and building(new)	180	Existing		Existing	Existing	$169,258.77		$428,000.00	$14,000.00	$611,258.77
Arrowhead	ISR-5	St. Louis	4	NE	MN	Existing Site Replace Tower. Conceptual Plan Site	Light tower, new building	160	Existing		Existing	Existing	$127,008.36		$186,000.00	$14,000.00	$327,008.36
Brimson	ISR-5	St. Louis	4	NE	MN			330		$85,000.00	$125,000.00	$400,000.00	$81,906.11		$186,000.00	$14,000.00	$891,906.11
Duluth Antenna Far	PS-SIM-5	St. Louis	4	NE	MN		Existing tower and New Building for MSO	325	Existing		$350,000.00	$0.00	$175,950.52	$175,000.00	$428,000.00	$4,000,000.00	$416,000.00	$5,544,950.52
Line Lake	ISR-5	St. Louis	4	NE	MN			300		$85,000.00	$125,000.00	$400,000.00	$155,626.77		$186,000.00	$14,000.00	$965,626.77
Mirror Lake LO	ISR-5	St. Louis	4	NE	MN			180		$85,000.00	$125,000.00	$200,000.00	$169,258.77		$186,000.00	$14,000.00	$779,258.77
Molde	ISR-5	St. Louis	4	NE	MN		look out tower, needs new building	100	Existing		$125,000.00	Existing	$125,162.36		$186,000.00	$14,000.00	$450,162.36
Shaw	ISR-5	St. Louis	4	NE	MN		Tower Ok, newer concrete building	318	Existing		$45,000.00	Existing	$169,237.47		$186,000.00	$14,000.00	$414,237.47
Palo	ISR-5	St. Louis	4	NE	MN		Site to be aquired and developed	330		$85,000.00	$125,000.00	$400,000.00	$81,906.11		$186,000.00	$14,000.00	$891,906.11
Mantrap	ISR-5	Hubbard	4	NW	MN		existing, new tower and building	180	Existing		Existing	Existing	$233,358.93		$186,000.00	$14,000.00	$433,358.93
Nevis	ISR-5	Hubbard	4	NW	MN			330		$85,000.00	$125,000.00	$400,000.00	$81,906.11		$186,000.00	$14,000.00	$891,906.11
Lake Carlos	ISR-5	Douglas	5	CM	MN			330		$85,000.00	$125,000.00	$400,000.00	$81,906.11		$186,000.00	$14,000.00	$891,906.11
Erdahl	ISR-5	Grant	5	CM	MN			330		$85,000.00	$125,000.00	$400,000.00	$169,791.27		$186,000.00	$14,000.00	$979,791.27
Eagle Lake	ISR-5	Ottertail	5	CM	MN		Existing, new tower and building	250	Existing		Existing	Existing	$80,675.44		$186,000.00	$14,000.00	$280,675.44
Erhard	ISR-5	Ottertail	5	CM	MN		Existing tower, new building	180	Existing		Existing	Existing	$204,503.85		$186,000.00	$14,000.00	$404,503.85
Fergus Falls	ISR-5	Ottertail	5	CM	MN		Existing New tower and building	330	Existing		Existing	Existing	$207,343.85		$186,000.00	$14,000.00	$407,343.85
Henning	ISR-5	Ottertail	5	CM	MN			330		$85,000.00	$125,000.00	$400,000.00	$81,906.11		$186,000.00	$14,000.00	$891,906.11
New York Mills	ISR-5	Ottertail	5	CM	MN	Mn/DOT Gravel Pit		330		$25,000.00	$125,000.00	$400,000.00	$81,906.11		$186,000.00	$14,000.00	$831,906.11
Phelps	ISR-5	Ottertail	5	CM	MN	County Site 160' Tower		330		$85,000.00	$125,000.00	$400,000.00	$81,906.11		$186,000.00	$14,000.00	$891,906.11
Luce	ISR-5	Ottertail	5	CM	MN		Existing New tower Old Building	330	Existing		Existing	Existing	$169,791.27		$186,000.00	$14,000.00	$369,791.27
Hewitt	ISR-5	Todd	5	CM	MN			180		$85,000.00	$125,000.00	$200,000.00	$114,843.69		$186,000.00	$14,000.00	$724,843.69
Sebeka	ISR-5	Wadenna	5	CM	MN		County	330		$85,000.00	$125,000.00	$400,000.00	$132,238.69		$186,000.00	$14,000.00	$942,238.69
Aldrich	ISR-5	Wadenna	5	CM	MN		Site to be aquired and developed	180		$85,000.00	$125,000.00	$200,000.00	$162,868.77		$186,000.00	$14,000.00	$772,868.77
Comstock	ISR-5	Wilkin	5	CM	MN			330		$85,000.00	$125,000.00	$400,000.00	$127,978.69		$186,000.00	$14,000.00	$937,978.69
Kent	ISR-5	Wilkin	5	CM	MN			330		$85,000.00	$125,000.00	$400,000.00	$127,978.69		$186,000.00	$14,000.00	$937,978.69
Barnsville	ISR-5	Wilkin	5	CM	MN		IN planning A/d Tower(new), Building(new)	330	A/D		A/D	A/D	$127,978.69		$186,000.00	$14,000.00	$327,978.69
Nashau	ISR-5	Wilkin	5	CM	MN			330		$85,000.00	$125,000.00	$400,000.00	$127,978.69		$186,000.00	$14,000.00	$937,978.69
Detroit Lakes	ISR-5	Becker	5	NW	MN		?? New tower at 330, new building fpr MSO	330		$25,000.00	$300,000.00	$400,000.00	$176,181.27	$175,000.00	$186,000.00	$4,000,000.00	$416,000.00	$5,678,181.27
Juggler Lake	ISR-5	Becker	5	NW	MN		tower ?? Building??	180		$25,000.00	$125,000.00	$200,000.00	$79,598.61		$186,000.00	$14,000.00	$629,598.61
Becker Forestry	ISR-5	Becker	5	NW	MN			330		$25,000.00	$125,000.00	$400,000.00	$132,238.69		$186,000.00	$14,000.00	$882,238.69
Wolf Lake	ISR-5	Becker	5	NW	MN	Existing Site 150' Guyed Tower Building?	Replace tower and building	150		$25,000.00	$125,000.00	$175,000.00	$126,700.69		$186,000.00	$14,000.00	$651,700.69
Cormorant	ISR-5	Becker	5	NW	MN			330		$85,000.00	$125,000.00	$400,000.00	$132,238.69		$186,000.00	$14,000.00	$942,238.69
White Earth	ISR-5	Becker	5	NW	MN			330		$85,000.00	$125,000.00	$400,000.00	$169,791.27		$186,000.00	$14,000.00	$979,791.27
Felton	ISR-5	Clay	5	NW	MN			330		$85,000.00	$125,000.00	$400,000.00	$127,978.69		$186,000.00	$14,000.00	$937,978.69
Hawley	ISR-5	Clay	5	NW	MN		Tower and buiding ok	300	Existing		$45,000.00	Existing	$127,055.69		$186,000.00	$14,000.00	$372,055.69
Moorhead	ISR-5	Clay	5	NW	MN		Rent at downtownbuilding or build on city property	130	City		$125,000.00	$400,000.00	$121,825.36		$186,000.00	$14,000.00	$846,825.36
Mahnomen	ISR-5	Mahnomen	5	NW	MN			330		$85,000.00	$125,000.00	$400,000.00	$176,181.27		$186,000.00	$14,000.00	$986,181.27
Ada	ISR-5	Norman	5	NW	MN			180		$85,000.00	$125,000.00	$200,000.00	$123,363.69		$186,000.00	$14,000.00	$733,363.69
Flaming	ISR-5	Norman	5	NW	MN			330		$85,000.00	$125,000.00	$400,000.00	$127,978.69		$186,000.00	$14,000.00	$937,978.69
Flom	ISR-5	Norman	5	NW	MN		County owned , light tower, building??	330		$25,000.00	$125,000.00	$400,000.00	$81,906.11		$186,000.00	$14,000.00	$831,906.11
Lake Crystal	ISR-5	Blue Earth	5	SC	MN		leased site new building	500.15	Lease		Existing	Lease	$222,073.75		$186,000.00	$14,000.00	$422,073.75
Mapleton	ISR-5	Blue Earth	5	SC	MN			330.1	lease		$125,000.00	Lease	$132,241.77		$186,000.00	$14,000.00	$457,241.77
Mankato MSU	PS-SIM-5	Blue Earth	5	SC	MN		New Tower and Building A/D	400	A/D	A/D	A/D	A/D	$224,431.18	$175,000.00	$428,000.00	$14,000.00	
Evan	ISR-5	Brown	5	SC	MN			330.1		$85,000.00	$125,000.00	$400,000.00	$81,907.65		$186,000.00	$14,000.00	$891,907.65
New Ulm	ISR-5	Brown	5	SC	MN		newer tower and building	180.05	Existing		$45,000.00	Existing	$114,845.23		$186,000.00	$14,000.00	$359,845.23
Blue Earth	ISR-5	Faribault	5	SC	MN			330.1		$85,000.00	$125,000.00	$400,000.00	$174,055.89		$186,000.00	$14,000.00	$984,055.89
Walters	ISR-5	Faribault	5	SC	MN			330.1		$85,000.00	$125,000.00	$400,000.00	$169,795.89		$186,000.00	$14,000.00	$979,795.89
Fairmount	ISR-5	Martin	5	SC	MN			180		$85,000.00	$125,000.00	$200,000.00	$123,363.69		$186,000.00	$14,000.00	$733,363.69
Sherburn	ISR-5	Martin	5	SC	MN			330.1		$85,000.00	$125,000.00	$400,000.00	$127,981.77		$186,000.00	$14,000.00	$937,981.77
Biscay	ISR-5	McLeod	5	SC	MN		Overloaded tower, low ground cramped building, flooding	330.1		$85,000.00	$125,000.00	$400,000.00	$257,684.12		$186,000.00	$14,000.00	$1,067,684.12
New Sweden	RF-SIM-5	Nicolet	5	SC	MN			180		$85,000.00	$125,000.00	$200,000.00	$79,598.61		$428,000.00	$14,000.00	$931,598.61
St. Peter	RF-SIM-5	Nicolet	5	SC	MN		existing, new tower and building	180.05	Existing		Existing	Existing	$169,261.08		$428,000.00	$14,000.00	$611,261.08
Gaylord	ISR-5	Sibley	5	SC	MN		tower building 1995, check	330.1		$25,000.00	$125,000.00	$400,000.00	$132,241.77		$186,000.00	$14,000.00	$882,241.77
Gibbon	ISR-5	Sibley	5	SC	MN			330.1		$85,000.00	$125,000.00	$400,000.00	$119,461.77		$186,000.00	$14,000.00	$929,461.77
Janesville	ISR-5	Waseca	5	SC	MN		Tower and buiding ok	300.09	Existing		$45,000.00	Existing	$205,503.39		$186,000.00	$14,000.00	$450,503.39
Waldorf	ISR-5	Waseca	5	SC	MN			330.1		$85,000.00	$125,000.00	$400,000.00	$119,461.77		$186,000.00	$14,000.00	$929,461.77

Comfrey	ISR-5	Watonwan	5	SC	MN			330.1	Lease		$125,000.00	Lease		$81,907.65			$186,000.00		$14,000.00	$406,907.65
LaSalle	ISR-5	Watonwan	5	SC	MN					$85,000.00	$125,000.00		$400,000.00	$169,791.27			$186,000.00		$14,000.00	
Truman	ISR-5	Watonwan	5	SC	MN	ligth Rohn tower , building OK		330.1	Existing		$125,000.00		$400,000.00	$127,981.77			$186,000.00		$14,000.00	$852,981.77
Granite Falls	ISR-5	Chippewa	5	SW	MN	New tower and building, need to remove some microwave dishes		380.11	Existing		$25,000.00		$15,000.00	$216,817.29	$175,000.00		$186,000.00		$14,000.00	$631,817.29
Milan	ISR-5	Chippewa	5	SW	MN	existing, new tower and building		180.05	Existing		Existing		Existing	$167,131.08			$186,000.00		$14,000.00	$367,131.08
Woods	ISR-5	Chippewa	5	SW	MN			330.1		$85,000.00	$125,000.00		$400,000.00	$81,907.65			$186,000.00		$14,000.00	$891,907.65
Windom	ISR-5	Cottonwood	5	SW	MN	Tower and buiding ok		180.05		$85,000.00	$125,000.00		$200,000.00	$162,871.08			$186,000.00		$14,000.00	$772,871.08
Jeffers	ISR-5	Cottonwood	5	SW	MN			330		$85,000.00	$125,000.00		$400,000.00	$81,906.11			$186,000.00		$14,000.00	
Mountain Lake	ISR-5	Cottonwood	5	SW	MN			180		$85,000.00	$125,000.00		$200,000.00	$127,623.69			$186,000.00		$14,000.00	$737,623.69
Lakefield	ISR-5	Jackson	5	SW	MN			330.1		$85,000.00	$125,000.00		$400,000.00	$132,241.77			$186,000.00		$14,000.00	$942,241.77
Madison	ISR-5	Lac Qui Parle	5	SW	MN	Tower and buiding ok		180.05	Existing		$45,000.00	Existing		$123,365.23			$186,000.00		$14,000.00	$368,365.23
Waterville	ISR-5	LeSuer	5	SC	MN			330		$85,000.00	$125,000.00		$400,000.00	$81,906.11			$186,000.00		$14,000.00	$891,906.11
LeCenter	ISR-5	LeSuer	5	SC	MN			330		$85,000.00	$125,000.00		$400,000.00	$132,238.69			$186,000.00		$14,000.00	$942,238.69
Ivanhoe	ISR-5	Lincoln	5	SW	MN			330.1		$85,000.00	$125,000.00		$400,000.00	$127,981.77			$186,000.00		$14,000.00	$937,981.77
Lake Benton	ISR-5	Lincoln	5	SW	MN			150		$85,000.00	$125,000.00		$175,000.00	$122,440.69			$186,000.00		$14,000.00	$707,440.69
Marshall	ISR-5	Lyon	5	SW	MN	needs to be replaced under A/D		180.05	Existing		A/D		A/D	$162,871.08			$186,000.00		$14,000.00	$362,871.08
Russel	ISR-5	Lyon	5	SW	MN	Tower and buiding ok		300.09	Existing			$45,000.00	Existing	$209,763.39			$186,000.00		$14,000.00	$454,763.39
Chandler	ISR-5	Murray	5	SW	MN	County Land, MnDOT Rohn tower, buiding(?)		200.06	Existing			$125,000.00	Existing	$123,980.87			$186,000.00		$14,000.00	$448,980.87
Slayton	ISR-5	Murray	5	SW	MN	Newer Rohn tower, Bldg OK		250.07	Existing			$45,000.00	Existing	$170,362.50			$186,000.00		$14,000.00	$415,362.50
Tracy	ISR-5	Murray	5	SW	MN	existing, new tower and building		330.1	Existing		Existing		Existing	$132,241.77			$186,000.00		$14,000.00	$332,241.77
Brewster	ISR-5	Nobles	5	SW	MN	Existing tower(new, building(new)		290.09	Existing		Existing		Existing	$167,949.42			$186,000.00		$14,000.00	$367,949.42
Rushmore	ISR-5	Nobles	5	SW	MN	existing, new tower and building		330.1	Existing		Existing		Existing	$174,055.89			$186,000.00		$14,000.00	$374,055.89
Worthington	ISR-5	Nobles	5	SW	mn			330		$85,000.00	$125,000.00		$400,000.00	$81,906.11			$186,000.00		$14,000.00	$891,906.11
Trosky	ISR-5	Pipestone	5	SW	MN			330.1		$85,000.00	$125,000.00		$400,000.00	$127,981.77			$186,000.00		$14,000.00	$937,981.77
Holland	ISR-5	Pipestone	5	SW	MN			330.1		$85,000.00	$125,000.00		$400,000.00	$81,907.65			$186,000.00		$14,000.00	$891,907.65
Wanda	ISR-5	Redwood	5	SW	MN	County		330		$25,000.00	$125,000.00		$400,000.00	$81,906.11			$186,000.00		$14,000.00	$831,906.11
Vesta	ISR-5	Redwood	5	SW	MN	County		330		$25,000.00	$125,000.00		$400,000.00	$119,458.69			$186,000.00		$14,000.00	$869,458.69
Hector	ISR-5	Renville	5	SW	MN			330.1		$85,000.00	$125,000.00		$400,000.00	$132,241.77			$186,000.00		$14,000.00	$942,241.77
Morton	ISR-5	Renville	5	SW	MN	existing site, tower and building need replacement		330.1		$25,000.00	$125,000.00		$400,000.00	$81,907.65			$186,000.00		$14,000.00	$831,907.65
Danube	ISR-5	Renville	5	SW	MN			330.1		$85,000.00	$125,000.00		$400,000.00	$132,241.77			$186,000.00		$14,000.00	$942,241.77
Hardwick	ISR-5	Rock	5	SW	MN			180		$85,000.00	$125,000.00		$200,000.00	$123,363.69			$186,000.00		$14,000.00	$733,363.69
Beaver Creek	ISR-5	Rock	5	SW	MN			330		$85,000.00	$125,000.00		$400,000.00	$127,978.69			$186,000.00		$14,000.00	$937,978.69
Kanaranzi	ISR-5	Rock	5	SW	mn			100		$85,000.00	$125,000.00		$152,000.00	$120,902.36			$186,000.00		$14,000.00	$682,902.36
Canby	ISR-5	Yellow Medicine	5	SW	MN			330		$85,000.00	$125,000.00		$400,000.00	$127,978.69			$186,000.00		$14,000.00	$937,978.69
Cloverdale	ISR-5	Yellow Medicine	5	SW	mn			260		$85,000.00	$125,000.00		$325,000.00	$80,829.28			$186,000.00		$14,000.00	$815,829.28
Echo	ISR-5	Yellow Medicine	5	SW	MN	Under construction A/D		330.1	Existing		A/D		A/D	$207,350.00			$186,000.00		$14,000.00	$407,350.00
North West	RF-SIM-8	Itasca	6	NE	MN	County constructed		450	County		Existing		County	$181,719.27			$428,000.00		$14,000.00	$623,719.27
Colloraine	PS-SIM-8	Itasca	6	NE	MN	County constructing, Mn/DOT to pay tower		400	County			$60,000.00		$240,000.00	$173,021.77		$428,000.00		$14,000.00	$915,021.77
Deer River	RF-SIM-8	Itasca	6	NE	MN	Existing, new tower and building		330	Existing		Existing		Existing	$132,238.69			$428,000.00		$14,000.00	$574,238.69
East Central	RF-SIM-8	Itasca	6	NE	MN	County constructed		400	County		County		County	$179,411.77			$428,000.00		$14,000.00	$621,411.77
North East	RF-SIM-8	Itasca	6	NE	MN	County constructed		415	County		County		County	$134,853.86			$428,000.00		$14,000.00	$576,853.86
Itasca County	RF-SIM-8	Itasca	6	NE	MN	County constructed		450	County		County			$135,930.69			$428,000.00		$14,000.00	$577,930.69
Nashwauk	RF-SIM-8	Itasca	6	NE	MN	new county tower and building		370	County		County		County	$171,637.27			$428,000.00		$14,000.00	$613,637.27
Sugar Hill	RF-SIM-8	Itasca	6	NE	Mn	County constructed		370	County		County		County	$82,521.44			$428,000.00		$14,000.00	$524,521.44
Warba	RF-SIM-8	Itasca	6	NE	MN	County constructed		420	County		County		County	$83,290.61			$428,000.00		$14,000.00	$525,290.61
Big Fork	RF-SIM-8	Itasca	6	NE	MN	County constructed		420	County		County		County	$135,007.69			$428,000.00		$14,000.00	$577,007.69
West	RF-SIM-8	Itasca	6	NE	MN	County constructed		450	County		County		County	$135,930.69			$428,000.00		$14,000.00	$577,930.69
Big Falls	ISR-5	Koochiching	6	NE	MN			330		$85,000.00	$125,000.00		$400,000.00	$81,906.11			$186,000.00		$14,000.00	$891,906.11
Border	ISR-5	Koochiching	6	NE	MN			330		$85,000.00	$125,000.00		$400,000.00	$81,906.11			$186,000.00		$14,000.00	$891,906.11
Fort LO	ISR-5	Koochiching	6	NE	MN			330		$85,000.00	$125,000.00		$400,000.00	$132,238.69			$186,000.00		$14,000.00	$942,238.69
Little Fork	ISR-5	Koochiching	6	NE	MN	Tower and buiding ok		300	Existing		$45,000.00	Existing		$159,886.77			$186,000.00		$14,000.00	$404,886.77
Mizpah	ISR-5	Koochiching	6	NE	MN			330		$85,000.00	$125,000.00		$400,000.00	$169,791.27			$186,000.00		$14,000.00	$979,791.27
Loman	ISR-5	Koochiching	6	NE	MN			330		$85,000.00	$125,000.00		$400,000.00	$81,906.11			$186,000.00		$14,000.00	$891,906.11
Margie	ISR-5	Koochiching	6	NE	MN			330		$85,000.00	$125,000.00		$400,000.00	$174,051.27			$186,000.00		$14,000.00	$984,051.27
Northome	ISR-5	Koochiching	6	NE	MN	needs to be replaced under A/D		330	DNR		A/D		A/D	$176,181.27			$186,000.00		$14,000.00	$376,181.27
International Falls	ISR-5	Koochiching	6	NE	MN	Truck Station		100		$25,000.00	$125,000.00		$152,000.00	$82,627.94			$186,000.00		$14,000.00	$584,627.94
Chisholm	ISR-5	St. Louis	6	NE	MN	Under construction		330	Existing		A/D		A/D	$132,238.69			$186,000.00		$14,000.00	$332,238.69
Elephant Lake	ISR-5	St. Louis	6	NE	MN	Existingin, new tower and building		180	Existing		Existing		Existing	$154,348.77			$186,000.00		$14,000.00	$354,348.77
Ely	ISR-5	St. Louis	6	NE	MN	under construction phase 456		330		$25,000.00	$125,000.00		$400,000.00	$81,906.11			$186,000.00		$14,000.00	$831,906.11
Gheen	ISR-5	St. Louis	6	NE	MN	lookout tower, lot of stuff on tower, building ok		270	Existing			$45,000.00	Lease	$171,282.27			$186,000.00		$14,000.00	$416,282.27
Idington	ISR-5	St. Louis	6	NE	MN	Existing, new tower and building		300	Existing		Existing		Existing	$131,315.69			$186,000.00		$14,000.00	$331,315.69
Kabatogama	ISR-5	St. Louis	6	NE	MN	fire tower, needs new tower and building		280		$25,000.00	$125,000.00		$300,000.00	$81,136.94			$186,000.00		$14,000.00	$731,136.94
Argo Lake	ISR-5	St. Louis	6	NE	MN			330		$85,000.00	$125,000.00		$400,000.00	$132,238.69			$186,000.00		$14,000.00	$942,238.69
Medowlands	ISR-5	St. Louis	6	NE	MN			330		$85,000.00	$125,000.00		$400,000.00	$132,238.69	$175,000.00		$186,000.00		$14,000.00	$1,117,238.69
Virginia/Mid	ISR-5	St. Louis	6	NE	MN	Tower and buiding ok		300	Existing			$45,000.00	Existing	$131,315.69			$186,000.00		$14,000.00	$376,315.69
Erie Hill	ISR-5	St. Louis	6	NE	MN			414		$85,000.00	$125,000.00		$350,000.00	$122,043.09			$186,000.00		$14,000.00	$882,043.09
Vermillion Dam LO	ISR-5	St. Louis	6	NE	MN	DNR?		180		$25,000.00	$125,000.00		$200,000.00	$127,623.69			$186,000.00		$14,000.00	$677,623.69
Meander Lake	ISR-5	St. Louis	6	NE	MN	Site to be aquired and developed		180		$85,000.00	$125,000.00		$200,000.00	$79,598.61			$186,000.00		$14,000.00	$689,598.61
Crane Lake	ISR-5	St. Louis	6	NE	MN	County		196.85		$25,000.00	$125,000.00		$225,000.00	$79,857.82			$186,000.00		$14,000.00	$654,857.82
Sax	ISR-5	St. Louis	6	NE	MN			180		$85,000.00	$125,000.00		$200,000.00	$127,623.69			$186,000.00		$14,000.00	$737,623.69
Soudan	ISR-5	St. Louis	6	NE	MN			180		$85,000.00	$125,000.00		$200,000.00	$198,113.85			$186,000.00		$14,000.00	$808,113.85
Bemidji Fire LO	ISR-5	Beltrami	6	NW	MN	New 180' and building(new)		330	Existing		Existing		Existing	$169,791.27	$175,000.00		$186,000.00		$14,000.00	$544,791.27
Hines	ISR-5	Beltrami	6	NW	MN	Existing, new tower and building		180	Existing		Existing		Existing	$169,258.77			$186,000.00		$14,000.00	$369,258.77
Graylag	ISR-5	Beltrami	6	NW	MN			330		$85,000.00	$125,000.00		$400,000.00	$132,238.69			$186,000.00		$14,000.00	$942,238.69
Island Lake	ISR-5	Beltrami	6	NW	MN			330		$85,000.00	$125,000.00		$400,000.00	$169,791.27			$186,000.00		$14,000.00	$979,791.27
Red Lake	ISR-5	Beltrami	6	NW	MN			180		$85,000.00	$125,000.00		$200,000.00	$162,868.77			$186,000.00		$14,000.00	$772,868.77
Suam	ISR-5	Beltrami	6	NW	MN			330		$85,000.00	$125,000.00		$400,000.00	$81,906.11			$186,000.00		$14,000.00	$891,906.11
Washkish S	ISR-5	Beltrami	6	NW	MN			330		$85,000.00	$125,000.00		$400,000.00	$81,906.11			$186,000.00		$14,000.00	$891,906.11
Sucker Creek	ISR-5	Beltrami	6	NW	MN			330		$85,000.00	$125,000.00		$400,000.00	$132,238.69			$186,000.00		$14,000.00	$942,238.69
Alida	ISR-5	Clearwater	6	NW	MN	Existing tower(new)and building(new)		330	Existing		Existing		Existing	$132,238.69			$186,000.00		$14,000.00	$332,238.69
Bagley	ISR-5	Clearwater	6	NW	MN	Existing Rohn tower needs new building		200	Existing			$125,000.00		$400,000.00	$212,124.52		$186,000.00		$14,000.00	$937,124.52
Berner	ISR-5	Clearwater	6	NW	MN			330		$85,000.00	$125,000.00		$400,000.00	$81,906.11			$186,000.00		$14,000.00	$891,906.11
Kabekobona	ISR-5	Hubbard	6	NW	MN			330		$85,000.00	$125,000.00		$400,000.00	$81,906.11			$186,000.00		$14,000.00	$891,906.11
Northcote	ISR-5	Kittson	6	NW	MN			330		$85,000.00	$125,000.00		$400,000.00	$81,906.11			$186,000.00		$14,000.00	$891,906.11
Lake Bronson	ISR-5	Kittson	6	NW	MN	Tower and buiding ok		180	Existing			$45,000.00	Existing	$158,608.77			$186,000.00		$14,000.00	$403,608.77
Lancaster	ISR-5	Kittson	6	NW	MN			330		$85,000.00	$125,000.00		$400,000.00	$81,906.11			$186,000.00		$14,000.00	$891,906.11
Baudette	ISR-5	Lake of the Woods	6	NW	MN			330	Lease		$125,000.00		$400,000.00	$119,458.69			$186,000.00		$14,000.00	$844,458.69
Roosevelt	ISR-5	Lake of the Woods	6	NW	MN	Tower and buiding ok		300	Existing			$45,000.00	Existing	$118,535.69			$186,000.00		$14,000.00	$363,535.69
Carp	ISR-5	Lake of the Woods	6	NW	MN			330		$85,000.00	$125,000.00		$400,000.00	$81,906.11			$186,000.00		$14,000.00	$891,906.11
Faunce	ISR-5	Lake of the Woods	6	NW	MN	County Tower 320'		330		$85,000.00	$125,000.00		$400,000.00	$207,343.85			$186,000.00		$14,000.00	$1,017,343.85
Lude	ISR-5	Lake of the Woods	6	NW	MN			330		$85,000.00	$125,000.00		$400,000.00	$81,906.11			$186,000.00		$14,000.00	$891,906.11
Strandquist	ISR-5	Marshall	6	NW	MN			330		$85,000.00	$125,000.00		$400,000.00	$81,906.11			$186,000.00		$14,000.00	$891,906.11
Donaldson	ISR-5	Marshall	6	NW	MN			330		$85,000.00	$125,000.00		$400,000.00	$127,978.69			$186,000.00		$14,000.00	$937,978.69
Gatzke	ISR-5	Marshall	6	NW	MN			330		$85,000.00	$125,000.00		$400,000.00	$81,906.11			$186,000.00		$14,000.00	$891,906.11
Middle River	ISR-5	Marshall	6	NW	MN	Tower and buiding ok		280	Existing			$45,000.00	Existing	$204,267.18			$186,000.00		$14,000.00	$449,267.18
Warren NW	ISR-5	Marshall	6	NW	MN			330		$85,000.00	$125,000.00		$400,000.00	$127,978.69			$186,000.00		$14,000.00	$937,978.69
Holt	ISR-5	Marshall	6	NW	MN			330		$85,000.00	$125,000.00		$400,000.00	$132,238.69			$186,000.00		$14,000.00	$942,238.69
Highlanding	ISR-5	Pennington	6	NW	MN	Existing, new tower and building		330	Existing		Existing		Existing	$132,238.69			$186,000.00		$14,000.00	$332,238.69
Theif River	ISR-5	Pennington	6	NW	MN	Tower and buiding ok		300	Existing			$45,000.00	Existing	$259,628.93	$175,000.00		$186,000.00		$14,000.00	$679,628.93
Angus	ISR-5	Polk	6	NW	MN	Existing tower(new)and building(new)		330	County		Existing		Existing	$165,531.27			$186,000.00		$14,000.00	$365,531.27
Crookston	ISR-5	Polk	6	NW	MN	Existing, tower light, needs new building		220		$25,000.00	$125,000.00		$400,000.00	$116,074.36			$186,000.00		$14,000.00	$866,074.36
Mentor	ISR-5	Polk	6	NW	MN			180		$85,000.00	$125,000.00		$200,000.00	$127,623.69			$186,000.00		$14,000.00	$737,623.69
Trail	ISR-5	Polk	6	NW	MN	existing, new tower, buidling OK		180	Existing		Existing		Existing	$162,868.77			$186,000.00		$14,000.00	$362,868.77
Lengby	ISR-5	Polk	6	NW	MN			180		$85,000.00	$125,000.00		$200,000.00	$127,623.69			$186,000.00		$14,000.00	$737,623.69
East Grand Forks	ISR-5	Polk	6	NW	MN			180		$85,000.00	$125,000.00		$200,000.00	$79,598.61			$186,000.00		$14,000.00	$689,598.61
Eldred	ISR-5	Polk	6	NW	MN			180		$85,000.00	$125,000.00		$200,000.00	$79,598.61			$186,000.00		$14,000.00	$689,598.61
Winger	ISR-5	Polk	6	NW	MN	Minkota Power 320' Tower		330		$85,000.00	$125,000.00		$400,000.00	$169,791.27			$186,000.00		$14,000.00	$979,791.27
Dorothy	ISR-5	Red Lake	6	NW	MN			180		$85,000.00	$125,000.00		$200,000.00	$198,113.85			$186,000.00		$14,000.00	$808,113.85
Plummer	ISR-5	Red Lake	6	NW	MN	Mn/DOT Gravel P'it Addition to Plan		180		$85,000.00	$125,000.00		$200,000.00	$79,598.61			$186,000.00		$14,000.00	$689,598.61
Greenbush	ISR-5	Roseau	6	NW	MN	Existing, new tower and building		330	Existing		Existing		Existing	$211,603.85			$186,000.00		$14,000.00	$411,603.85
Skime	ISR-5	Roseau	6	NW	MN			330		$85,000.00	$125,000.00		$400,000.00	$169,791.27			$186,000.00		$14,000.00	$979,791.27

Warroad	ISR-5	Roseau	6	NW	MN	A/D not constructed yet	330	Acquisition	A/D	A/D	$132,238.69		$186,000.00		$14,000.00	$332,238.69
Haug	ISR-5	Roseau	6	NW	MN		330	$85,000.00	$125,000.00	$400,000.00	$119,458.69		$186,000.00		$14,000.00	$929,458.69
Roseau	ISR-5	Roseau	6	NW	MN	funded by leg to County, not constucted yet	330	Planned	Planned	Planned	$132,238.69		$186,000.00		$14,000.00	$332,238.69
								$10,105,000.00	$20,640,000.00	$48,769,000.00	$29,450,878.97	$1,400,000.00	$49,352,000.00	$8,000,000.00	$3,926,000.00				

Assume 12 Utility high costs	$2,400,000.00
Assume 2 additional 4 site silucast	$2,000,000.00
TOTAL	**$176,042,878.97**

APPENDIX Y—ARMER MICROWAVE COST ESTIMATES

			Microwave - Planned Paths out of this site				Number of paths	Existing	Dish	Dish Install	Radios	Comsearch	Premisys	SMART	Power
			$29,000.00	$28,000.00	$26,000.00	$22,000.00			$3,500.00	$2,500.00		$300 per path			
Site Name	County	Tower Height	4DS3	3DS3	28T1	8T1									
Onamia	Mille Lacs	330		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Princeton(Pease)	Mille Lacs	330			2		2		$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Duelm	Benton	330				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Flensburg	Morrison	330		2		3	5		$17,500.00	$12,500.00	$122,000.00	$750.00	$13,000.00	$6,000.00	$6,000.00
Freedhem	Morrison	180				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Royalton	Morrison	330				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Glen	Aitkin	180		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Lawler	Aitkin	240		2		1	3		$10,500.00	$7,500.00	$78,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Logan	Aitkin	330				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Quadna	Aitkin	180		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Sandy Lake	Aitkin	372		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
White Pine	Aitkin	180				2	2		$7,000.00	$5,000.00	$44,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Wrenshall	Carlton	330		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Mahtowa	Carlton	200		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Moose Lake	Carlton	100		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Ball Club	Cass	330				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Cass Lake	Cass	300		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Cuba Hill	Cass	330				2	2		$7,000.00	$5,000.00	$44,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Draper	Cass	180		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Leader	Cass	330				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Oshawa	Cass	330				2	2		$7,000.00	$5,000.00	$44,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Whipolt	Cass	180		2		1	3		$10,500.00	$7,500.00	$78,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Honeymoon Lake	Cook	250				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Lutsen	Cook	180			2		2		$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Maple Hill	Cook	180			2	1	3		$10,500.00	$7,500.00	$74,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Schroder	Cook	330			2		2		$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Tofte	Cook	330			2	1	3		$10,500.00	$7,500.00	$74,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Devil Fish Lake	Cook	330				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Bogus Lake	Cook	330				3	3		$10,500.00	$7,500.00	$66,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Grand Portage	Cook	330				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Belly Lake	Cook	330			2		2		$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Gunflint West	Cook	160				2	2		$7,000.00	$5,000.00	$44,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Gunflint East	Cook	180				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Baxter	Crow Wing	300			1		1		$3,500.00	$2,500.00	$26,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Borden Lake	Crow Wing	180		2	1		3		$10,500.00	$7,500.00	$82,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Emily	Crow Wing	280				3	3		$10,500.00	$7,500.00	$66,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Jenkins	Crow Wing	330				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Olgilvie	Kanabec	330				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Woodland	Kanebec	300				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Beaver Bay	Lake	140		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Finland	Lake	180		2	1		3		$10,500.00	$7,500.00	$82,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Isabella	Lake	250		2	1		3		$10,500.00	$7,500.00	$82,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Forest Center	Lake	330			2		2		$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Lake One	Lake	330				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Palisade Head	Lake	300		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Silver Cliff	Lake	160		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Slate Lake	Lake	330		2		3	5		$17,500.00	$12,500.00	$122,000.00	$750.00	$13,000.00	$6,000.00	$6,000.00
Wales	Lake	250				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Whyte	Lake	330				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Askov	Pine	240				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Duxbury	Pine	330		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Nickerson	Pine	330		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Pine City	Pine	330		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Cloverdale	Pine	180		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Argus	St. Louis	180		3			3		$10,500.00	$7,500.00	$84,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Arrowhead	St. Louis	160		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Brimson	St. Louis	330				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Duluth Antenna Fa	St. Louis	325		3			3		$10,500.00	$7,500.00	$84,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Line Lake	St. Louis	300				3	3		$10,500.00	$7,500.00	$66,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Mirror Lake LO	St. Louis	180		3			3		$10,500.00	$7,500.00	$84,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Molde	St. Louis	100		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Shaw	St. Louis	318		2		1	3		$10,500.00	$7,500.00	$78,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Palo	St. Louis	330				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Mantrap	Hubbard	180		2		3	5		$17,500.00	$12,500.00	$122,000.00	$750.00	$13,000.00	$6,000.00	$6,000.00
Nevis	Hubbard	330				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Lake Carlos	Douglas	330				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Erdahl	Grant	330		2		1	3		$10,500.00	$7,500.00	$78,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Eagle Lake	Ottertail	250				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Erhard	Ottertail	180		3		1	4		$14,000.00	$10,000.00	$106,000.00	$600.00	$13,000.00	$6,000.00	$6,000.00
Fergus Falls	Ottertail	330		2		2	4		$14,000.00	$10,000.00	$100,000.00	$600.00	$13,000.00	$6,000.00	$6,000.00
Henning	Ottertail	330				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
New York Mills	Ottertail	330				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Phelps	Ottertail	330				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Luce	Ottertail	330		2		1	3		$10,500.00	$7,500.00	$78,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Hewitt	Todd	180				2	2		$7,000.00	$5,000.00	$44,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Sebeka	Wadenna	330		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Aldrich	Wadenna	180		2		1	3		$10,500.00	$7,500.00	$78,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Comstock	Wilkin	330			2		2		$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Kent	Wilkin	330			2		2		$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Barnsville	Wilkin	330			2		2		$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Nashau	Wilkin	330			2		2		$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Detroit Lakes	Becker	330		3			3		$10,500.00	$7,500.00	$84,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Juggler Lake	Becker	180				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Becker Forestry	Becker	330		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Wolf Lake	Becker	150		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Cormorant	Becker	330		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
White Earth	Becker	330		2		1	3		$10,500.00	$7,500.00	$78,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Felton	Clay	330			2		2		$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Hawley	Clay	300			2		2		$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Moorhead	Clay	130			2		2		$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Mahnomen	Mahnomen	330		3			3		$10,500.00	$7,500.00	$84,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Ada	Norman	180			2		2		$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Flaming	Norman	330			2		2		$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Flom	Norman	330				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Lake Crystal	Blue Earth	500.15		2	1	1	4		$14,000.00	$10,000.00	$104,000.00	$600.00	$13,000.00	$6,000.00	$6,000.00
Mapleton	Blue Earth	330.1		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Mankato MSU	Blue Earth	400		4			4		$14,000.00	$10,000.00	$112,000.00	$600.00	$13,000.00	$6,000.00	$6,000.00
Evan	Brown	330.1				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
New Ulm	Brown	180.05				2	2		$7,000.00	$5,000.00	$44,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Blue Earth	Faribault	330.1		2	1		3		$10,500.00	$7,500.00	$82,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Walters	Faribault	330.1		2		1	3		$10,500.00	$7,500.00	$78,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Farimount	Martin	180			2		2		$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Sherburn	Martin	330.1			2		2		$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Biscay	McLeod	330.1		4		1	5		$17,500.00	$12,500.00	$134,000.00	$750.00	$13,000.00	$6,000.00	$6,000.00
New Sweden	Nicolet	180				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
St. Peter	Nicolet	180.05		3			3		$10,500.00	$7,500.00	$84,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Gaylord	Sibley	330.1		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Gibbon	Sibley	330.1				2	2		$7,000.00	$5,000.00	$44,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Janesville	Waseca	300.09		2		2	4		$14,000.00	$10,000.00	$100,000.00	$600.00	$13,000.00	$6,000.00	$6,000.00
Waldorf	Waseca	330.1				2	2		$7,000.00	$5,000.00	$44,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Comfrey	Watonwan	330.1				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
LaSalle	Watonwan	330		2		1	3		$10,500.00	$7,500.00	$78,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Truman	Watonwan	330.1			2		2		$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Granite Falls	Chippewa	380.11		3		1	4		$14,000.00	$10,000.00	$106,000.00	$600.00	$13,000.00	$6,000.00	$6,000.00
Milan	Chippewa	180.05		2	1		3		$10,500.00	$7,500.00	$82,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Woods	Chippewa	330.1				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Windom	Cottonwood	180.05		2		1	3		$10,500.00	$7,500.00	$78,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Jeffers	Cottonwood	330				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
Mountain Lake	Cottonwood	180		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Lakefield	Jackson	330.1		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Madison	Lac Qui Parl	180.05			2		2		$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Waterville	LeSuer	330				1	1		$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00
LeCenter	LeSuer	330		2			2		$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Ivanhoe	Lincoln	330.1			2		2		$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Lake Benton	Lincoln	150			2		2		$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00
Marshall	Lyon	180.05		2		1	3		$10,500.00	$7,500.00	$78,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00
Russel	Lyon	300.09		2	1	1	4		$14,000.00	$10,000.00	$104,000.00	$600.00	$13,000.00	$6,000.00	$6,000.00

Site Name	EW52	Entry	Hanger	Ground	Hoisting	Connector	Window	Flex	Rod	Dehydr	Vise	Angle	Mount	Sales Tax	Shipping	Equipment Install	Site Total
	$20per foot																
Onamia	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.36	$2,500.00	$15,000.00	$132,238.69
Princeton(Pease)	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,419.36	$2,500.00	$15,000.00	$127,978.69
Duelm	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Flensburg	$22,000.00	$175.00	$1,833.33	$300.00	$260.00	$1,800.00	$250.00	$1,500.00	$40.00	$2,500.00	$22.00	$300.00	$2,075.00	$12,841.10	$6,250.00	$15,000.00	$244,896.43
Freedhem	$2,400.00	$35.00	$200.00	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,704.61	$1,250.00	$15,000.00	$79,598.61
Royalton	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Glen	$4,800.00	$70.00	$400.00	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,397.69	$2,500.00	$15,000.00	$127,623.69
Lawler	$9,600.00	$105.00	$800.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,479.77	$3,750.00	$15,000.00	$165,637.77
Logan	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Quadna	$4,800.00	$70.00	$400.00	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,397.69	$2,500.00	$15,000.00	$127,623.69
Sandy Lake	$9,920.00	$70.00	$826.67	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,758.22	$2,500.00	$15,000.00	$133,530.89
White Pine	$4,800.00	$70.00	$400.00	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$5,617.69	$2,500.00	$15,000.00	$114,843.69
Wrenshall	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.36	$2,500.00	$15,000.00	$132,238.69
Mahtowa	$5,333.33	$70.00	$444.44	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,435.25	$2,500.00	$15,000.00	$128,239.02
Moose Lake	$2,666.67	$70.00	$222.22	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,247.47	$2,500.00	$15,000.00	$125,162.36
Ball Club	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Cass Lake	$8,000.00	$70.00	$666.67	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,623.02	$2,500.00	$15,000.00	$131,315.69
Cuba Hill	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$5,899.36	$2,500.00	$15,000.00	$119,458.69
Draper	$4,800.00	$70.00	$400.00	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,397.69	$2,500.00	$15,000.00	$127,623.69
Leader	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Oshawa	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$5,899.36	$2,500.00	$15,000.00	$119,458.69
Whipolt	$7,200.00	$105.00	$600.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,310.77	$3,750.00	$15,000.00	$162,868.77
Honeymoon Lake	$3,333.33	$35.00	$277.78	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,770.33	$1,250.00	$15,000.00	$80,675.44
Lutsen	$4,800.00	$70.00	$400.00	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,137.69	$2,500.00	$15,000.00	$123,363.69
Maple Hill	$7,200.00	$105.00	$600.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,050.77	$3,750.00	$15,000.00	$158,608.77
Schroder	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,419.36	$2,500.00	$15,000.00	$127,978.69
Tofte	$13,200.00	$105.00	$1,100.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,473.27	$3,750.00	$15,000.00	$165,531.27
Devil Fish Lake	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Bogus Lake	$13,200.00	$105.00	$1,100.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$7,953.27	$3,750.00	$15,000.00	$157,011.27
Grand Portage	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Belly Lake	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,419.36	$2,500.00	$15,000.00	$127,978.69
Gunflint West	$4,266.67	$70.00	$355.56	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$5,580.13	$2,500.00	$15,000.00	$114,228.36
Gunflint East	$2,400.00	$35.00	$200.00	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,704.61	$1,250.00	$15,000.00	$79,598.61
Baxter	$4,000.00	$35.00	$333.33	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$4,077.28	$1,250.00	$15,000.00	$85,704.61
Borden Lake	$7,200.00	$105.00	$600.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,570.77	$3,750.00	$15,000.00	$167,128.77
Emily	$11,200.00	$105.00	$933.33	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$7,812.44	$3,750.00	$15,000.00	$154,703.77
Jenkins	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Olgilvie	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Woodland	$4,000.00	$35.00	$333.33	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,817.28	$1,250.00	$15,000.00	$81,444.61
Beaver Bay	$3,733.33	$70.00	$311.11	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,322.58	$2,500.00	$15,000.00	$126,393.02
Finland	$7,200.00	$105.00	$600.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,570.77	$3,750.00	$15,000.00	$167,128.77
Isabella	$10,000.00	$105.00	$833.33	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,767.94	$3,750.00	$15,000.00	$170,359.27
Forest Center	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,419.36	$2,500.00	$15,000.00	$127,978.69
Lake One	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Palisade Head	$8,000.00	$70.00	$666.67	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,623.02	$2,500.00	$15,000.00	$131,315.69
Silver Cliff	$4,266.67	$70.00	$355.56	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,360.13	$2,500.00	$15,000.00	$127,008.36
Slate Lake	$22,000.00	$175.00	$1,833.33	$300.00	$260.00	$1,800.00	$250.00	$1,500.00	$40.00	$2,500.00	$22.00	$300.00	$2,075.00	$12,841.10	$6,250.00	$15,000.00	$244,896.43
Wales	$3,333.33	$35.00	$277.78	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,770.33	$1,250.00	$15,000.00	$80,675.44
Whyte	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Askov	$3,200.00	$35.00	$266.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,760.94	$1,250.00	$15,000.00	$80,521.61
Duxbury	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.36	$2,500.00	$15,000.00	$132,238.69
Nickerson	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.36	$2,500.00	$15,000.00	$132,238.69
Pine City	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.36	$2,500.00	$15,000.00	$132,238.69
Cloverdale	$4,800.00	$70.00	$400.00	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,397.69	$2,500.00	$15,000.00	$127,623.69
Argus	$7,200.00	$105.00	$600.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,700.77	$3,750.00	$15,000.00	$169,258.77
Arrowhead	$4,266.67	$70.00	$355.56	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,360.13	$2,500.00	$15,000.00	$127,008.36
Brimson	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Duluth Antenna Fa	$13,000.00	$105.00	$1,083.33	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$9,109.19	$3,750.00	$15,000.00	$175,950.52
Line Lake	$12,000.00	$105.00	$1,000.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$7,868.77	$3,750.00	$15,000.00	$155,626.77
Mirror Lake LO	$7,200.00	$105.00	$600.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,700.77	$3,750.00	$15,000.00	$169,258.77
Molde	$2,666.67	$70.00	$222.22	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,247.47	$2,500.00	$15,000.00	$125,162.36
Shaw	$12,720.00	$105.00	$1,060.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,699.47	$3,750.00	$15,000.00	$169,237.47
Palo	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Mantrap	$12,000.00	$175.00	$1,000.00	$300.00	$260.00	$1,800.00	$250.00	$1,500.00	$40.00	$2,500.00	$22.00	$300.00	$2,075.00	$12,136.93	$6,250.00	$15,000.00	$233,358.93
Nevis	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Lake Carlos	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Erdahl	$13,200.00	$105.00	$1,100.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,733.27	$3,750.00	$15,000.00	$169,791.27
Eagle Lake	$3,333.33	$35.00	$277.78	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,770.33	$1,250.00	$15,000.00	$80,675.44
Erhard	$9,600.00	$140.00	$800.00	$240.00	$208.00	$1,440.00	$200.00	$1,200.00	$40.00	$2,500.00	$22.00	$240.00	$1,660.00	$10,613.85	$5,000.00	$15,000.00	$204,503.85
Fergus Falls	$17,600.00	$140.00	$1,466.67	$240.00	$208.00	$1,440.00	$200.00	$1,200.00	$40.00	$2,500.00	$22.00	$240.00	$1,660.00	$10,787.18	$5,000.00	$15,000.00	$207,343.85
Henning	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
New York Mills	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Phelps	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Luce	$13,200.00	$105.00	$1,100.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,733.27	$3,750.00	$15,000.00	$169,791.27
Hewitt	$4,800.00	$70.00	$400.00	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$5,617.69	$2,500.00	$15,000.00	$114,843.69
Sebeka	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.36	$2,500.00	$15,000.00	$132,238.69
Aldrich	$7,200.00	$105.00	$600.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,310.77	$3,750.00	$15,000.00	$162,868.77
Comstock	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,419.36	$2,500.00	$15,000.00	$127,978.69
Kent	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,419.36	$2,500.00	$15,000.00	$127,978.69
Barnsville	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,419.36	$2,500.00	$15,000.00	$127,978.69
Nashau	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,419.36	$2,500.00	$15,000.00	$127,978.69
Detroit Lakes	$13,200.00	$105.00	$1,100.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$9,123.27	$3,750.00	$15,000.00	$176,181.27
Juggler Lake	$2,400.00	$35.00	$200.00	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,704.61	$1,250.00	$15,000.00	$79,598.61
Becker Forestry	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.36	$2,500.00	$15,000.00	$132,238.69
Wolf Lake	$4,000.00	$70.00	$333.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,341.36	$2,500.00	$15,000.00	$126,700.69
Cormorant	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.36	$2,500.00	$15,000.00	$132,238.69
White Earth	$13,200.00	$105.00	$1,100.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,733.27	$3,750.00	$15,000.00	$169,791.27
Felton	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,419.36	$2,500.00	$15,000.00	$127,978.69
Hawley	$8,000.00	$70.00	$666.67	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,363.02	$2,500.00	$15,000.00	$127,055.69
Moorhead	$3,466.67	$70.00	$288.89	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,043.80	$2,500.00	$15,000.00	$121,825.36
Mahnomen	$13,200.00	$105.00	$1,100.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$9,123.27	$3,750.00	$15,000.00	$176,181.27
Ada	$4,800.00	$70.00	$400.00	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,137.69	$2,500.00	$15,000.00	$123,363.69
Flaming	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,419.36	$2,500.00	$15,000.00	$127,978.69
Flom	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Lake Crystal	$26,674.67	$140.00	$2,222.89	$240.00	$208.00	$1,440.00	$200.00	$1,200.00	$40.00	$2,500.00	$22.00	$240.00	$1,660.00	$11,686.19	$5,000.00	$15,000.00	$222,073.75
Mapleton	$8,802.67	$70.00	$733.56	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.54	$2,500.00	$15,000.00	$132,241.77
Mankato MSU	$21,333.33	$140.00	$1,777.78	$240.00	$208.00	$1,440.00	$200.00	$1,200.00	$40.00	$2,500.00	$22.00	$240.00	$1,660.00	$11,830.07	$5,000.00	$15,000.00	$224,431.18
Evan	$4,401.33	$35.00	$366.78	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.54	$1,250.00	$15,000.00	$81,907.65
New Ulm	$4,801.33	$70.00	$400.11	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$5,617.78	$2,500.00	$15,000.00	$114,845.23
Blue Earth	$13,204.00	$105.00	$1,100.33	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,993.55	$3,750.00	$15,000.00	$174,055.89
Walters	$13,204.00	$105.00	$1,100.33	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,733.55	$3,750.00	$15,000.00	$169,795.89
Farimount	$4,800.00	$70.00	$400.00	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,137.69	$2,500.00	$15,000.00	$123,363.69
Sherburn	$8,802.67	$70.00	$733.56	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,419.54	$2,500.00	$15,000.00	$127,981.77
Biscay	$22,006.67	$175.00	$1,833.89	$300.00	$260.00	$1,800.00	$250.00	$1,500.00	$40.00	$2,500.00	$22.00	$300.00	$2,075.00	$13,621.57	$6,250.00	$15,000.00	$257,684.12
New Sweden	$2,400.00	$35.00	$200.00	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,704.61	$1,250.00	$15,000.00	$79,598.61
St. Peter	$7,202.00	$105.00	$600.17	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,700.91	$3,750.00	$15,000.00	$169,261.08
Gaylord	$8,802.67	$70.00	$733.56	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.54	$2,500.00	$15,000.00	$132,241.77
Gibbon	$8,802.67	$70.00	$733.56	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$5,899.54	$2,500.00	$15,000.00	$119,461.77
Janesville	$16,004.80	$140.00	$1,333.73	$240.00	$208.00	$1,440.00	$200.00	$1,200.00	$40.00	$2,500.00	$22.00	$240.00	$1,660.00	$10,674.85	$5,000.00	$15,000.00	$205,503.39
Waldorf	$8,802.67	$70.00	$733.56	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$5,899.54	$2,500.00	$15,000.00	$119,461.77
Comfrey	$4,401.33	$35.00	$366.78	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.54	$1,250.00	$15,000.00	$81,907.65
LaSalle	$13,200.00	$105.00	$1,100.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,733.27	$3,750.00	$15,000.00	$169,791.27
Truman	$8,802.67	$70.00	$733.56	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,419.54	$2,500.00	$15,000.00	$127,981.77
Granite Falls	$20,272.53	$140.00	$1,689.38	$240.00	$208.00	$1,440.00	$200.00	$1,200.00	$40.00	$2,500.00	$22.00	$240.00	$1,660.00	$11,365.37	$5,000.00	$15,000.00	$216,817.29
Milan	$7,202.00	$105.00	$600.17	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,570.91	$3,750.00	$15,000.00	$167,131.08
Woods	$4,401.33	$35.00	$366.78	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.54	$1,250.00	$15,000.00	$81,907.65
Windom	$7,202.00	$105.00	$600.17	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,310.91	$3,750.00	$15,000.00	$162,871.08
Jeffers	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Mountain Lake	$4,800.00	$70.00	$400.00	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,397.69	$2,500.00	$15,000.00	$127,623.69
Lakefield	$8,802.67	$70.00	$733.56	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.54	$2,500.00	$15,000.00	$132,241.77
Madison	$4,801.33	$70.00	$400.11	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,137.78	$2,500.00	$15,000.00	$123,365.23
Waterville	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
LeCenter	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.36	$2,500.00	$15,000.00	$132,238.69
Ivanhoe	$8,802.67	$70.00	$733.56	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,419.54	$2,500.00	$15,000.00	$127,981.77
Lake Benton	$4,000.00	$70.00	$333.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,081.36	$2,500.00	$15,000.00	$122,440.69
Marshall	$7,202.00	$105.00	$600.17	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,310.91	$3,750.00	$15,000.00	$162,871.08
Russel	$16,004.80	$140.00	$1,333.73	$240.00	$208.00	$1,440.00	$200.00	$1,200.00	$40.00	$2,500.00	$22.00	$240.00	$1,660.00	$10,934.85	$5,000.00	$15,000.00	$209,763.39

Chandler	Murray	200.06		2		2	$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$5,334.93	$70.00	$444.58	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,175.36	$2,500.00	$15,000.00	$123,980.87
Slayton	Murray	250.07	2	1		3	$10,500.00	$7,500.00	$82,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$10,002.80	$105.00	$833.57	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,768.13	$3,750.00	$15,000.00	$170,362.50
Tracy	Murray	330.1	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,802.67	$70.00	$733.56	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.54	$2,500.00	$15,000.00	$132,241.77
Brewster	Nobles	290.09	2		1	3	$10,500.00	$7,500.00	$78,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$11,603.60	$105.00	$966.97	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,620.86	$3,750.00	$15,000.00	$167,949.42
Rushmore	Nobles	330.1	2	1		3	$10,500.00	$7,500.00	$82,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$13,204.00	$105.00	$1,100.33	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,993.55	$3,750.00	$15,000.00	$174,055.89
Worthington	Nobles	330			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Trosky	Pipestone	330.1		2		2	$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,802.67	$70.00	$733.56	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,419.54	$2,500.00	$15,000.00	$127,981.77
Holland	Pipestone	330.1			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$4,401.33	$35.00	$366.78	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.54	$1,250.00	$15,000.00	$81,907.65
Wanda	Redwood	330			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Vesta	Redwood	330			2	2	$7,000.00	$5,000.00	$44,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$5,899.36	$2,500.00	$15,000.00	$119,458.69
Hector	Renville	330.1	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,802.67	$70.00	$733.56	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.54	$2,500.00	$15,000.00	$132,241.77
Morton	Renville	330.1			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$4,401.33	$35.00	$366.78	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.54	$1,250.00	$15,000.00	$81,907.65
Danube	Renville	330.1	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,802.67	$70.00	$733.56	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.54	$2,500.00	$15,000.00	$132,241.77
Hardwick	Rock	180		2		2	$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$4,800.00	$70.00	$400.00	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,137.69	$2,500.00	$15,000.00	$123,363.69
Beaver Creek	Rock	330		2		2	$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,419.36	$2,500.00	$15,000.00	$127,978.69
Kanaranzi	Rock	100		2		2	$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$2,666.67	$70.00	$222.22	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$5,987.47	$2,500.00	$15,000.00	$120,902.36
Canby	Yellow Medi	330		2		2	$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,419.36	$2,500.00	$15,000.00	$127,978.69
Cloverdale	Yellow Medi	260			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$3,466.67	$35.00	$288.89	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,779.72	$1,250.00	$15,000.00	$80,829.28
Echo	Yellow Medi	330.1	2		2	4	$14,000.00	$10,000.00	$100,000.00	$600.00	$13,000.00	$6,000.00	$6,000.00	$17,605.33	$140.00	$1,467.11	$240.00	$208.00	$1,440.00	$200.00	$1,200.00	$40.00	$2,500.00	$22.00	$240.00	$1,660.00	$10,787.56	$5,000.00	$15,000.00	$207,350.00
North West	Itasca	450	3			3	$10,500.00	$7,500.00	$84,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$18,000.00	$105.00	$1,500.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$9,461.27	$3,750.00	$15,000.00	$181,719.27
Colloraine	Itasca	400	2		1	3	$10,500.00	$7,500.00	$78,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$16,000.00	$105.00	$1,333.33	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,930.44	$3,750.00	$15,000.00	$173,021.77
Deer River	Itasca	330	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.36	$2,500.00	$15,000.00	$132,238.69
East Central	Itasca	400	3			3	$10,500.00	$7,500.00	$84,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$16,000.00	$105.00	$1,333.33	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$9,320.44	$3,750.00	$15,000.00	$179,411.77
North East	Itasca	415	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$11,066.67	$70.00	$922.22	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,838.97	$2,500.00	$15,000.00	$134,853.86
Itasca County	Itasca	450	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$12,000.00	$70.00	$1,000.00	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,904.69	$2,500.00	$15,000.00	$135,930.69
Nashwauk	Itasca	370	2		1	3	$10,500.00	$7,500.00	$78,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$14,800.00	$105.00	$1,233.33	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,845.94	$3,750.00	$15,000.00	$171,637.27
Sugar Hill	Itasca	370			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$4,933.33	$35.00	$411.11	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,883.00	$1,250.00	$15,000.00	$82,521.44
Warba	Itasca	420			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$5,600.00	$35.00	$466.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,929.94	$1,250.00	$15,000.00	$83,290.61
Big Fork	Itasca	420	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$11,200.00	$70.00	$933.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,848.36	$2,500.00	$15,000.00	$135,007.69
West	Itasca	450	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$12,000.00	$70.00	$1,000.00	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,904.69	$2,500.00	$15,000.00	$135,930.69
Big Falls	Koochiching	330			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Border	Koochiching	330			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Fort LO	Koochiching	330	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.36	$2,500.00	$15,000.00	$132,238.69
Little Fork	Koochiching	300		1	2	3	$10,500.00	$7,500.00	$70,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$12,000.00	$105.00	$1,000.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,128.77	$3,750.00	$15,000.00	$159,886.77
Mizpah	Koochiching	330	2		1	3	$10,500.00	$7,500.00	$78,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$13,200.00	$105.00	$1,100.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,733.27	$3,750.00	$15,000.00	$169,791.27
Loman	Koochiching	330			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Margie	Koochiching	330	2	1		3	$10,500.00	$7,500.00	$82,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$13,200.00	$105.00	$1,100.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,993.27	$3,750.00	$15,000.00	$174,051.27
Northome	Koochiching	330	3			3	$10,500.00	$7,500.00	$84,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$13,200.00	$105.00	$1,100.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$9,123.27	$3,750.00	$15,000.00	$176,181.27
International Falls	Koochiching	100		1		1	$3,500.00	$2,500.00	$26,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$1,333.33	$35.00	$111.11	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,889.50	$1,250.00	$15,000.00	$82,627.94
Chisholm	St. Louis	330	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.36	$2,500.00	$15,000.00	$132,238.69
Elephant Lake	St. Louis	180		1	2	3	$10,500.00	$7,500.00	$70,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$7,200.00	$105.00	$600.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$7,790.77	$3,750.00	$15,000.00	$154,348.77
Ely	St. Louis	330			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Gheen	St. Louis	270	2	1		3	$10,500.00	$7,500.00	$82,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$10,800.00	$105.00	$900.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,824.27	$3,750.00	$15,000.00	$171,282.27
Idington	St. Louis	300	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,000.00	$70.00	$666.67	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,623.02	$2,500.00	$15,000.00	$131,315.69
Kabatogama	St. Louis	280			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$3,733.33	$35.00	$311.11	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,798.50	$1,250.00	$15,000.00	$81,136.94
Argo Lake	St. Louis	330	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.36	$2,500.00	$15,000.00	$132,238.69
Medowlands	St. Louis	330	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.36	$2,500.00	$15,000.00	$132,238.69
Virginia/Mid	St. Louis	300	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,000.00	$70.00	$666.67	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,623.02	$2,500.00	$15,000.00	$131,315.69
Erie Hill	St. Louis	414			2	2	$7,000.00	$5,000.00	$44,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$11,040.00	$70.00	$920.00	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,057.09	$2,500.00	$15,000.00	$122,043.09
Vermillion Dam LO	St. Louis	180	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$4,800.00	$70.00	$400.00	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,397.69	$2,500.00	$15,000.00	$127,623.69
Meander Lake	St. Louis	180			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$2,400.00	$35.00	$200.00	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,704.61	$1,250.00	$15,000.00	$79,598.61
Crane Lake	St. Louis	196.85			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$2,624.67	$35.00	$218.72	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,720.43	$1,250.00	$15,000.00	$79,857.82
Sax	St. Louis	180	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$4,800.00	$70.00	$400.00	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,397.69	$2,500.00	$15,000.00	$127,623.69
Soudan	St. Louis	180	2		2	4	$14,000.00	$10,000.00	$100,000.00	$600.00	$13,000.00	$6,000.00	$6,000.00	$9,600.00	$140.00	$800.00	$240.00	$208.00	$1,440.00	$200.00	$1,200.00	$40.00	$2,500.00	$22.00	$240.00	$1,660.00	$10,223.85	$5,000.00	$15,000.00	$198,113.85
Bemidji Fire LO	Beltrami	330	2		1	3	$10,500.00	$7,500.00	$78,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$13,200.00	$105.00	$1,100.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,733.27	$3,750.00	$15,000.00	$169,791.27
Hines	Beltrami	180	3			3	$10,500.00	$7,500.00	$84,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$7,200.00	$105.00	$600.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,700.77	$3,750.00	$15,000.00	$169,258.77
Graylag	Beltrami	330	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.36	$2,500.00	$15,000.00	$132,238.69
Island Lake	Beltrami	330	2		1	3	$10,500.00	$7,500.00	$78,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$13,200.00	$105.00	$1,100.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,733.27	$3,750.00	$15,000.00	$169,791.27
Red Lake	Beltrami	180	2		1	3	$10,500.00	$7,500.00	$78,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$7,200.00	$105.00	$600.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,310.77	$3,750.00	$15,000.00	$162,868.77
Suam	Beltrami	330			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Washkish S	Beltrami	330			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Sucker Creek	Beltrami	330	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.36	$2,500.00	$15,000.00	$132,238.69
Alida	Clearwater	330	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.36	$2,500.00	$15,000.00	$132,238.69
Bagley	Clearwater	200	4			4	$14,000.00	$10,000.00	$112,000.00	$600.00	$13,000.00	$6,000.00	$6,000.00	$10,666.67	$140.00	$888.89	$240.00	$208.00	$1,440.00	$200.00	$1,200.00	$40.00	$2,500.00	$22.00	$240.00	$1,660.00	$11,078.96	$5,000.00	$15,000.00	$212,124.52
Berner	Clearwater	330			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Kabekobona	Hubbard	330			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Northcote	Kittson	330			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Lake Bronson	Kittson	180		2	1	3	$10,500.00	$7,500.00	$74,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$7,200.00	$105.00	$600.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,050.77	$3,750.00	$15,000.00	$158,608.77
Lancaster	Kittson	330			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Baudette	Lake of the \	330			2	2	$7,000.00	$5,000.00	$44,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$5,899.36	$2,500.00	$15,000.00	$119,458.69
Roosevelt	Lake of the \	300			2	2	$7,000.00	$5,000.00	$44,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,000.00	$70.00	$666.67	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$5,843.02	$2,500.00	$15,000.00	$118,535.69
Carp	Lake of the \	330			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Faunce	Lake of the \	330	2		2	4	$14,000.00	$10,000.00	$100,000.00	$600.00	$13,000.00	$6,000.00	$6,000.00	$17,600.00	$140.00	$1,466.67	$240.00	$208.00	$1,440.00	$200.00	$1,200.00	$40.00	$2,500.00	$22.00	$240.00	$1,660.00	$10,787.18	$5,000.00	$15,000.00	$207,343.85
Lude	Lake of the \	330			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Strandquist	Marshall	330			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Donaldson	Marshall	330		2		2	$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,419.36	$2,500.00	$15,000.00	$127,978.69
Gatzke	Marshall	330			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$4,400.00	$35.00	$366.67	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,845.44	$1,250.00	$15,000.00	$81,906.11
Middle River	Marshall	280	2		2	4	$14,000.00	$10,000.00	$100,000.00	$600.00	$13,000.00	$6,000.00	$6,000.00	$14,933.33	$140.00	$1,244.44	$240.00	$208.00	$1,440.00	$200.00	$1,200.00	$40.00	$2,500.00	$22.00	$240.00	$1,660.00	$10,599.41	$5,000.00	$15,000.00	$204,267.18
Warren NW	Marshall	330		2		2	$7,000.00	$5,000.00	$52,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,419.36	$2,500.00	$15,000.00	$127,978.69
Holt	Marshall	330	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.36	$2,500.00	$15,000.00	$132,238.69
Highlanding	Pennington	330	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.36	$2,500.00	$15,000.00	$132,238.69
Theif River	Pennington	300	4	1		5	$17,500.00	$12,500.00	$138,000.00	$750.00	$13,000.00	$6,000.00	$6,000.00	$20,000.00	$175.00	$1,666.67	$300.00	$260.00	$1,800.00	$250.00	$1,500.00	$40.00	$2,500.00	$22.00	$300.00	$2,075.00	$13,740.26	$6,250.00	$15,000.00	$259,628.93
Angus	Polk	330		2	1	3	$10,500.00	$7,500.00	$74,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$13,200.00	$105.00	$1,100.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,473.27	$3,750.00	$15,000.00	$165,531.27
Crookston	Polk	220			2	2	$7,000.00	$5,000.00	$44,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$5,866.67	$70.00	$488.89	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$5,692.80	$2,500.00	$15,000.00	$116,074.36
Mentor	Polk	180	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$4,800.00	$70.00	$400.00	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,397.69	$2,500.00	$15,000.00	$127,623.69
Trail	Polk	180	2		1	3	$10,500.00	$7,500.00	$78,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$7,200.00	$105.00	$600.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,310.77	$3,750.00	$15,000.00	$162,868.77
Lengby	Polk	180	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$4,800.00	$70.00	$400.00	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,397.69	$2,500.00	$15,000.00	$127,623.69
East Grand Forks	Polk	180			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$2,400.00	$35.00	$200.00	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,704.61	$1,250.00	$15,000.00	$79,598.61
Eldred	Polk	180			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$2,400.00	$35.00	$200.00	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,704.61	$1,250.00	$15,000.00	$79,598.61
Winger	Polk	330	2		1	3	$10,500.00	$7,500.00	$78,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$13,200.00	$105.00	$1,100.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,733.27	$3,750.00	$15,000.00	$169,791.27
Dorothy	Red Lake	180	2		2	4	$14,000.00	$10,000.00	$100,000.00	$600.00	$13,000.00	$6,000.00	$6,000.00	$9,600.00	$140.00	$800.00	$240.00	$208.00	$1,440.00	$200.00	$1,200.00	$40.00	$2,500.00	$22.00	$240.00	$1,660.00	$10,223.85	$5,000.00	$15,000.00	$198,113.85
Plummer	Red Lake	180			1	1	$3,500.00	$2,500.00	$22,000.00	$150.00	$13,000.00	$6,000.00	$6,000.00	$2,400.00	$35.00	$200.00	$60.00	$52.00	$360.00	$50.00	$300.00	$40.00	$2,500.00	$22.00	$60.00	$415.00	$3,704.61	$1,250.00	$15,000.00	$79,598.61
Greenbush	Roseau	330	2	1	1	4	$14,000.00	$10,000.00	$104,000.00	$600.00	$13,000.00	$6,000.00	$6,000.00	$17,600.00	$140.00	$1,466.67	$240.00	$208.00	$1,440.00	$200.00	$1,200.00	$40.00	$2,500.00	$22.00	$240.00	$1,660.00	$11,047.18	$5,000.00	$15,000.00	$211,603.85
Skime	Roseau	330	2		1	3	$10,500.00	$7,500.00	$78,000.00	$450.00	$13,000.00	$6,000.00	$6,000.00	$13,200.00	$105.00	$1,100.00	$180.00	$156.00	$1,080.00	$150.00	$900.00	$40.00	$2,500.00	$22.00	$180.00	$1,245.00	$8,733.27	$3,750.00	$15,000.00	$169,791.27
Warroad	Roseau	330	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.36	$2,500.00	$15,000.00	$132,238.69
Haug	Roseau	330			2	2	$7,000.00	$5,000.00	$44,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$5,899.36	$2,500.00	$15,000.00	$119,458.69
Roseau	Roseau	330	2			2	$7,000.00	$5,000.00	$56,000.00	$300.00	$13,000.00	$6,000.00	$6,000.00	$8,800.00	$70.00	$733.33	$120.00	$104.00	$720.00	$100.00	$600.00	$40.00	$2,500.00	$22.00	$120.00	$830.00	$6,679.36	$2,500.00	$15,000.00	$132,238.69
							$1,676,500.00	$1,197,500.00	$12,292,000.00	$71,700.00	$2,912,000.00	$1,344,000.00	$1,344,000.00	$1,820,742.80	$16,730.00	$151,728.57	$28,680.00	$24,856.00	$172,080.00	$23,900.00	$143,400.00	$8,960.00	$560,000.00	$4,928.00	$28,680.00	$198,370.00	$1,478,623.60	$597,500.00	$3,360,000.00	$29,450,878.97

APPENDIX Z—SIMULCAST SITE COST ESTIMATES

Minnesota Department of Transportation

Itemized Equipment List: 3-Site, 5-Channels per Site, 800 MHz Simulcast Trunked Subnet

Entity	Dept	Site	BidItm	Item #	APC	Qty	Nomenclature	Item Description	Unit List Price	Extended List Price	Disc. %	Unit Bid Price	Extended Bid Price
Zone 3	Ant System	RemoteSt1	Field	2	207	100	L1703	1/2" SUPERFLEX FR RISER RATED	$ 4.40	$ 440.00	10%	$ 3.96	$ 396.00
Zone 3	Ant System	RemoteSt1	Field	3	207	2	CDN6579	1/2" N MALE PLATED CONNECTOR	$ 53.00	$ 106.00	10%	$ 47.70	$ 95.40
Zone 3	Ant System	RemoteSt1	Field	4	207	2	DSF4PDMV2C	1/2" 7/16 DIN MALE CONN SFLEX	$ 29.00	$ 58.00	10%	$ 26.10	$ 52.20
Zone 3	RF Equip	RemoteSt1	CCSi	5	112	1	T7039	GTR 8000 BASE RADIO	$ 6,000.00	$ 6,000.00	22%	$ 4,680.00	$ 4,680.00
Zone 3	RF Equip	RemoteSt1	CCSi	5a	112	1	CA00025AF	ADD: CIRCUIT BASED MULTISITE BASE R	$ 13,700.00	$ 13,700.00	22%	$ 10,686.00	$ 10,686.00
Zone 3	RF Equip	RemoteSt1	CCSi	5b	112	1	CA00855AA	ADD: 700/800 MHZ MID POWER	$ 6,300.00	$ 6,300.00	22%	$ 4,914.00	$ 4,914.00
Zone 3	RF Equip	RemoteSt1	CCSi	5c	112	1	CA00883AA	ADD: 800 MHZ TX FILTER W/PMU	$ 1,000.00	$ 1,000.00	22%	$ 780.00	$ 780.00
Zone 3	RF Equip	RemoteSt1	CCSi	6c	112	1	X153AW	ADD: RACK MOUNT HARDWARE	$ -	$ -	22%	$ -	$ -
Zone 3	RF Equip	RemoteSt1	CCSi	6d	112	1	X265AH	ADD: NARROW PRESELECTOR, 800 MHZ	$ 500.00	$ 500.00	22%	$ 390.00	$ 390.00
Zone 3	RF Equip	RemoteSt1	CCSi	7	112	1	T7039	GTR 8000 BASE RADIO	$ 6,000.00	$ 6,000.00	22%	$ 4,680.00	$ 4,680.00
Zone 3	RF Equip	RemoteSt1	CCSi	7a	112	1	CA00025AF	ADD: CIRCUIT BASED MULTISITE BASE R	$ 13,700.00	$ 13,700.00	22%	$ 10,686.00	$ 10,686.00
Zone 3	RF Equip	RemoteSt1	CCSi	7b	112	1	CA00855AA	ADD: 700/800 MHZ MID POWER	$ 6,300.00	$ 6,300.00	22%	$ 4,914.00	$ 4,914.00
Zone 3	RF Equip	RemoteSt1	CCSi	7d	112	1	X153AW	ADD: RACK MOUNT HARDWARE	$ -	$ -	22%	$ -	$ -
Zone 3	RF Equip	RemoteSt1	CCSi	7e	112	1	X265AH	ADD: NARROW PRESELECTOR, 800 MHZ	$ 500.00	$ 500.00	22%	$ 390.00	$ 390.00
Zone 3	RF Equip	RemoteSt1	CCSi	8	112	1	T7039	GTR 8000 BASE RADIO	$ 6,000.00	$ 6,000.00	22%	$ 4,680.00	$ 4,680.00
Zone 3	RF Equip	RemoteSt1	CCSi	8a	112	1	CA00025AF	ADD: CIRCUIT BASED MULTISITE BASE R	$ 13,700.00	$ 13,700.00	22%	$ 10,686.00	$ 10,686.00
Zone 3	RF Equip	RemoteSt1	CCSi	8b	112	1	CA00855AA	ADD: 700/800 MHZ MID POWER	$ 6,300.00	$ 6,300.00	22%	$ 4,914.00	$ 4,914.00
Zone 3	RF Equip	RemoteSt1	CCSi	8c	112	1	X153AW	ADD: RACK MOUNT HARDWARE	$ -	$ -	22%	$ -	$ -
Zone 3	RF Equip	RemoteSt1	CCSi	8d	112	1	X265AH	ADD: NARROW PRESELECTOR, 800 MHZ	$ 500.00	$ 500.00	22%	$ 390.00	$ 390.00
Zone 3	RF Equip	RemoteSt1	CCSi	9	112	1	T7039	GTR 8000 BASE RADIO	$ 6,000.00	$ 6,000.00	22%	$ 4,680.00	$ 4,680.00
Zone 3	RF Equip	RemoteSt1	CCSi	9a	112	1	CA00025AF	ADD: CIRCUIT BASED MULTISITE BASE R	$ 13,700.00	$ 13,700.00	22%	$ 10,686.00	$ 10,686.00
Zone 3	RF Equip	RemoteSt1	CCSi	9b	112	1	CA00855AA	ADD: 700/800 MHZ MID POWER	$ 6,300.00	$ 6,300.00	22%	$ 4,914.00	$ 4,914.00
Zone 3	RF Equip	RemoteSt1	CCSi	9d	112	1	X153AW	ADD: RACK MOUNT HARDWARE	$ -	$ -	22%	$ -	$ -
Zone 3	RF Equip	RemoteSt1	CCSi	9e	112	1	X265AH	ADD: NARROW PRESELECTOR, 800 MHZ	$ 500.00	$ 500.00	22%	$ 390.00	$ 390.00
Zone 3	RF Equip	RemoteSt1	CCSi	10	112	1	T7039	GTR 8000 BASE RADIO	$ 6,000.00	$ 6,000.00	22%	$ 4,680.00	$ 4,680.00
Zone 3	RF Equip	RemoteSt1	CCSi	10a	112	1	CA00025AF	ADD: CIRCUIT BASED MULTISITE BASE R	$ 13,700.00	$ 13,700.00	22%	$ 10,686.00	$ 10,686.00
Zone 3	RF Equip	RemoteSt1	CCSi	10b	112	1	CA00855AA	ADD: 700/800 MHZ MID POWER	$ 6,300.00	$ 6,300.00	22%	$ 4,914.00	$ 4,914.00
Zone 3	RF Equip	RemoteSt1	CCSi	10c	112	1	X153AW	ADD: RACK MOUNT HARDWARE	$ -	$ -	22%	$ -	$ -
Zone 3	RF Equip	RemoteSt1	CCSi	10d	112	1	X265AH	ADD: NARROW PRESELECTOR, 800 MHZ	$ 500.00	$ 500.00	22%	$ 390.00	$ 390.00
Zone 3	RF Equip	RemoteSt1	Field	15	207	1	DS42883H01T	TTA, COMPACT AUTO QUAD 792-824 MHZ	$ 8,096.00	$ 8,096.00	10%	$ 7,286.40	$ 7,286.40
Zone 3	RF Equip	RemoteSt1	CCSi	16	207	1	DS42883H01M	16-PORT RX MULTICOUPLER DECK FOR	$ 4,335.00	$ 4,335.00	10%	$ 3,901.50	$ 3,901.50
Zone 3	RF Equip	RemoteSt1	CCSi	17	207	1	DQACM500MDMDFNH	ANTENNA AND CABLE MONITOR 500 W, 47	$ 1,688.00	$ 1,688.00	10%	$ 1,519.20	$ 1,519.20
Zone 3	RF Equip	RemoteSt1	CCSi	18	207	1	DSWIJD86208S	COMB WAV-G 851-869 8 CH 7/16 ANT, 1	$ 13,438.00	$ 13,438.00	10%	$ 12,094.20	$ 12,094.20
Zone 3	RF Equip	RemoteSt1	Field	20	207	1	DSDSXLDMA	LIGHTNING ARRESTOR, 7-16DIN MALE/FE	$ 180.00	$ 180.00	10%	$ 162.00	$ 162.00
Zone 3	RF Equip	RemoteSt1	Field	21	207	1	DSISDC50LNZ30MA	DC INJECTOR 30V M CONN ANTENNA POR	$ 150.00	$ 150.00	10%	$ 135.00	$ 135.00
Zone 3	Power	RemoteSt1	CCSi	22	207	2	DSOP820B	POWER DIST. UNIT SURGE PROTECT	$ 850.00	$ 1,700.00	10%	$ 765.00	$ 1,530.00
Zone 3	Power	RemoteSt1	CCSi	23	207	2	DS1101378	RACK MOUNTING PLATE ADAPTER , DSOP8	$ 101.00	$ 202.00	10%	$ 90.90	$ 181.80
Zone 3	Power	RemoteSt1	CCSi	24	509	2	THN1012	RACK 7' OPEN	$ 470.00	$ 940.00	30%	$ 329.00	$ 658.00
Zone 3	Network	RemoteSt1	CCSi	25	708	2	DSJ4900B	HP PROCURVE SWITCH 2626B	$ 2,250.00	$ 4,500.00	10%	$ 2,025.00	$ 4,050.00
Zone 3	Network	RemoteSt1	CCSi	26	147	1	ST2500	S2500 MULTIPROTOCOL WAN ROUTER	$ 3,100.00	$ 3,100.00	10%	$ 2,790.00	$ 2,790.00
Zone 3	Network	RemoteSt1	CCSi	27	147	1	ST2512	S2500 ROUTER T1/E1 DAUGHTER BOARD	$ 800.00	$ 800.00	10%	$ 720.00	$ 720.00
Zone 3	Chan Bnk	RemoteSt1	CCSi	29	131	1	DSPREM891830	UNIVERSAL ENCLOSURE TENSR 800	$ 1,650.00	$ 1,650.00	10%	$ 1,485.00	$ 1,485.00
Zone 3	Chan Bnk	RemoteSt1	CCSi	30	131	1	DSPREM801065	DUAL T1 E1 WAN CARD	$ 2,338.00	$ 2,338.00	10%	$ 2,104.20	$ 2,104.20
Zone 3	Chan Bnk	RemoteSt1	CCSi	31	131	1	DSPREM801460	DUAL T1E1 WAN W/ RELAYS 1:N REDUNDA	$ 2,684.00	$ 2,684.00	10%	$ 2,415.60	$ 2,415.60
Zone 3	Chan Bnk	RemoteSt1	CCSi	32	131	4	DSPREM81130	DSX CEPT PLUG IN MODULE	$ 688.00	$ 2,752.00	10%	$ 619.20	$ 2,476.80
Zone 3	Chan Bnk	RemoteSt1	CCSi	33	131	2	DSPREM8901	AC POWER SUPPLY 110/220VAC	$ 963.00	$ 1,926.00	10%	$ 866.70	$ 1,733.40
Zone 3	Chan Bnk	RemoteSt1	CCSi	34	131	1	DSPREM892060	8T1 E1 IF CARD 32K WITH MODEM	$ 2,475.00	$ 2,475.00	10%	$ 2,227.50	$ 2,227.50
Zone 3	Chan Bnk	RemoteSt1	CCSi	35	131	2	DSPREM880160	CPU 8 T1 E1 CROSS CONNT	$ 6,188.00	$ 12,376.00	10%	$ 5,569.20	$ 11,138.40
Zone 3	Chan Bnk	RemoteSt1	CCSi	36	131	2	DSPREM822560	10 PORT LD-SRU CARD	$ 4,125.00	$ 8,250.00	10%	$ 3,712.50	$ 7,425.00
Zone 3	Time Sync	RemoteSt1	CCSi	37	207	1	DSTRAK91009	REMOTE SITE CONFIG AC POWER	$ 30,066.00	$ 30,066.00	10%	$ 27,059.40	$ 27,059.40
Zone 3	Time Sync	RemoteSt1	CCSi	38	207	2	DSTRAK91061	FOUR PORT DDM	$ 688.00	$ 1,376.00	10%	$ 619.20	$ 1,238.40

Zone 3	Time Sync	PrimeSite	CCSi	39	207	1	DSTRAK91008	PRIME/MASTER SITE CONFIG AC POWER	$ 34,712.00	$ 34,712.00	10%	$ 31,240.80	$ 31,240.80
Zone 3	Chan Bnk	PrimeSite	CCSi	40	131	1	DSPREM891830	UNIVERSAL ENCLOSURE TENSR 800	$ 1,650.00	$ 1,650.00	10%	$ 1,485.00	$ 1,485.00
Zone 3	Chan Bnk	PrimeSite	CCSi	41	131	2	DSPREM8901	AC POWER SUPPLY 110/220VAC	$ 963.00	$ 1,926.00	10%	$ 866.70	$ 1,733.40
Zone 3	Chan Bnk	PrimeSite	CCSi	42	131	2	DSPREM880160	CPU 8 T1 E1 CROSS CONNT	$ 6,188.00	$ 12,376.00	10%	$ 5,569.20	$ 11,138.40
Zone 3	Chan Bnk	PrimeSite	CCSi	43	131	1	DSPREM892060	8T1 E1 IF CARD 32K WITH MODEM	$ 2,475.00	$ 2,475.00	10%	$ 2,227.50	$ 2,227.50
Zone 3	Chan Bnk	PrimeSite	CCSi	44	131	3	DSPREM801065	DUAL T1 E1 WAN CARD	$ 2,338.00	$ 7,014.00	10%	$ 2,104.20	$ 6,312.60
Zone 3	Chan Bnk	PrimeSite	CCSi	45	131	1	DSPREM801460	DUAL T1E1 WAN W/ RELAYS 1:N REDUNDA	$ 2,684.00	$ 2,684.00	10%	$ 2,415.60	$ 2,415.60
Zone 3	Chan Bnk	PrimeSite	CCSi	46	131	8	DSPREM81130	DSX CEPT PLUG IN MODULE	$ 688.00	$ 5,504.00	10%	$ 619.20	$ 4,953.60
Zone 3	Chan Bnk	PrimeSite	CCSi	47	131	4	DSPREM822560	10 PORT LD-SRU CARD	$ 4,125.00	$ 16,500.00	10%	$ 3,712.50	$ 14,850.00
Zone 3	Comparator	PrimeSite	CCSi	48	525	1	T6507	ASTRO-TAC 9600 COMPARATOR	$ 3,700.00	$ 3,700.00	20%	$ 2,960.00	$ 2,960.00
Zone 3	Comparator	PrimeSite	CCSi	48a	525	1	CA00091AA	ENH: ASTRO 25 SIMULCAST TRUNKING OP	$ 9,300.00	$ 9,300.00	20%	$ 7,440.00	$ 7,440.00
Zone 3	Comparator	PrimeSite	CCSi	48b	525	1	X153	ADD: HARDWARE, RACKMOUNT	$ -	$ -	20%	$ -	$ -
Zone 3	Comparator	PrimeSite	CCSi	48c	525	1	X224AL	ADD: 4 I/O PORTS	$ 3,000.00	$ 3,000.00	20%	$ 2,400.00	$ 2,400.00
Zone 3	Comparator	PrimeSite	CCSi	49	525	1	T6507	ASTRO-TAC 9600 COMPARATOR	$ 3,700.00	$ 3,700.00	20%	$ 2,960.00	$ 2,960.00
Zone 3	Comparator	PrimeSite	CCSi	49a	525	1	CA00091AA	ENH: ASTRO 25 SIMULCAST TRUNKING OP	$ 9,300.00	$ 9,300.00	20%	$ 7,440.00	$ 7,440.00
Zone 3	Comparator	PrimeSite	CCSi	49b	525	1	X153	ADD: HARDWARE, RACKMOUNT	$ -	$ -	20%	$ -	$ -
Zone 3	Comparator	PrimeSite	CCSi	49c	525	1	X224AL	ADD: 4 I/O PORTS	$ 3,000.00	$ 3,000.00	20%	$ 2,400.00	$ 2,400.00
Zone 3	Comparator	PrimeSite	CCSi	50	525	1	T6507	ASTRO-TAC 9600 COMPARATOR	$ 3,700.00	$ 3,700.00	20%	$ 2,960.00	$ 2,960.00
Zone 3	Comparator	PrimeSite	CCSi	50a	525	1	CA00091AA	ENH: ASTRO 25 SIMULCAST TRUNKING OP	$ 9,300.00	$ 9,300.00	20%	$ 7,440.00	$ 7,440.00
Zone 3	Comparator	PrimeSite	CCSi	50b	525	1	X153	ADD: HARDWARE, RACKMOUNT	$ -	$ -	20%	$ -	$ -
Zone 3	Comparator	PrimeSite	CCSi	50c	525	1	X224AL	ADD: 4 I/O PORTS	$ 3,000.00	$ 3,000.00	20%	$ 2,400.00	$ 2,400.00
Zone 3	Comparator	PrimeSite	CCSi	51	525	1	T6507	ASTRO-TAC 9600 COMPARATOR	$ 3,700.00	$ 3,700.00	20%	$ 2,960.00	$ 2,960.00
Zone 3	Comparator	PrimeSite	CCSi	51a	525	1	CA00091AA	ENH: ASTRO 25 SIMULCAST TRUNKING OP	$ 9,300.00	$ 9,300.00	20%	$ 7,440.00	$ 7,440.00
Zone 3	Comparator	PrimeSite	CCSi	51b	525	1	X153	ADD: HARDWARE, RACKMOUNT	$ -	$ -	20%	$ -	$ -
Zone 3	Comparator	PrimeSite	CCSi	51c	525	1	X224AL	ADD: 4 I/O PORTS	$ 3,000.00	$ 3,000.00	20%	$ 2,400.00	$ 2,400.00
Zone 3	Comparator	PrimeSite	CCSi	52	525	1	T6507	ASTRO-TAC 9600 COMPARATOR	$ 3,700.00	$ 3,700.00	20%	$ 2,960.00	$ 2,960.00
Zone 3	Comparator	PrimeSite	CCSi	52a	525	1	CA00091AA	ENH: ASTRO 25 SIMULCAST TRUNKING OP	$ 9,300.00	$ 9,300.00	20%	$ 7,440.00	$ 7,440.00
Zone 3	Comparator	PrimeSite	CCSi	52b	525	1	X153	ADD: HARDWARE, RACKMOUNT	$ -	$ -	20%	$ -	$ -
Zone 3	Comparator	PrimeSite	CCSi	52c	525	1	X224AL	ADD: 4 I/O PORTS	$ 3,000.00	$ 3,000.00	20%	$ 2,400.00	$ 2,400.00
Zone 3	Comparator	PrimeSite	CCSi	53	525	1	T6507	ASTRO-TAC 9600 COMPARATOR	$ 3,700.00	$ 3,700.00	20%	$ 2,960.00	$ 2,960.00
Zone 3	Comparator	PrimeSite	CCSi	53a	525	1	CA00091AA	ENH: ASTRO 25 SIMULCAST TRUNKING OP	$ 9,300.00	$ 9,300.00	20%	$ 7,440.00	$ 7,440.00
Zone 3	Comparator	PrimeSite	CCSi	53b	525	1	X153	ADD: HARDWARE, RACKMOUNT	$ -	$ -	20%	$ -	$ -
Zone 3	Comparator	PrimeSite	CCSi	53c	525	1	X224AL	ADD: 4 I/O PORTS	$ 3,000.00	$ 3,000.00	20%	$ 2,400.00	$ 2,400.00
Zone 3	Comparator	PrimeSite	CCSi	54	509	2	THN1012	RACK 7' OPEN	$ 470.00	$ 940.00	30%	$ 329.00	$ 658.00
Zone 3	Power	PrimeSite	CCSi	55	207	2	DSOP820B	POWER DIST. UNIT SURGE PROTECT	$ 850.00	$ 1,700.00	10%	$ 765.00	$ 1,530.00
Zone 3	RF Equip	PrimeSite	CCSi	56	207	2	DS1101378	RACK MOUNTING PLATE ADAPTER , DSOP8	$ 101.00	$ 202.00	10%	$ 90.90	$ 181.80
Zone 3	Network	PrimeSite	CCSi	57	147	1	ST6000	S6000 MNR MULTI-PROTOCOL ROUTER	$ 15,995.00	$ 15,995.00	10%	$ 14,395.50	$ 14,395.50
Zone 3	Network	PrimeSite	CCSi	58	147	1	ST6010	S6000 4-PORT ULTRAWAN MODULE	$ 3,000.00	$ 3,000.00	10%	$ 2,700.00	$ 2,700.00
Zone 3	RF Equip	PrimeSite	CCSi	59	112	1	T7038	GCP 8000 SITE CONTROLLER	$ 3,000.00	$ 3,000.00	22%	$ 2,340.00	$ 2,340.00
Zone 3	RF Equip	PrimeSite	CCSi	59a	112	1	CA00025AG	ADD: CIRCUIT BASED MULTISITE SITE C	$ 60,000.00	$ 60,000.00	22%	$ 46,800.00	$ 46,800.00
Zone 3	RF Equip	PrimeSite	CCSi	59b	112	1	CA00303AA	ADD: QTY (1) SITE CONTROLLER	$ 5,000.00	$ 5,000.00	22%	$ 3,900.00	$ 3,900.00
Zone 3	RF Equip	PrimeSite	CCSi	59c	112	1	X153AW	ADD: RACK MOUNT HARDWARE	$ -	$ -	22%	$ -	$ -
Zone 3	RF Equip	PrimeSite	CCSi	60	112	1	T7038	GCP 8000 SITE CONTROLLER	$ 3,000.00	$ 3,000.00	22%	$ 2,340.00	$ 2,340.00
Zone 3	RF Equip	PrimeSite	CCSi	60a	112	1	CA00025AG	ADD: CIRCUIT BASED MULTISITE SITE C	$ 60,000.00	$ 60,000.00	22%	$ 46,800.00	$ 46,800.00
Zone 3	RF Equip	PrimeSite	CCSi	60b	112	1	CA00303AA	ADD: QTY (1) SITE CONTROLLER	$ 5,000.00	$ 5,000.00	22%	$ 3,900.00	$ 3,900.00
Zone 3	RF Equip	PrimeSite	CCSi	60c	112	1	X153AW	ADD: RACK MOUNT HARDWARE	$ -	$ -	22%	$ -	$ -
Zone 3	Network	PrimeSite	CCSi	61	708	2	DSJ4900B	HP PROCURVE SWITCH 2626B	$ 2,250.00	$ 4,500.00	10%	$ 2,025.00	$ 4,050.00
Zone 3	Ant System	RemoteSt2	Field	62	207	100	L1703	1/2" SUPERFLEX FR RISER RATED	$ 4.40	$ 440.00	10%	$ 3.96	$ 396.00
Zone 3	Ant System	RemoteSt2	Field	63	207	2	CDN6579	1/2" N MALE PLATED CONNECTOR	$ 53.00	$ 106.00	10%	$ 47.70	$ 95.40
Zone 3	Ant System	RemoteSt2	Field	64	207	2	DSF4PDMV2C	1/2" 7/16 DIN MALE CONN SFLEX	$ 29.00	$ 58.00	10%	$ 26.10	$ 52.20
Zone 3	RF Equip	RemoteSt2	CCSi	65	112	1	T7039	GTR 8000 BASE RADIO	$ 6,000.00	$ 6,000.00	22%	$ 4,680.00	$ 4,680.00
Zone 3	RF Equip	RemoteSt2	CCSi	65a	112	1	CA00025AF	ADD: CIRCUIT BASED MULTISITE BASE R	$ 13,700.00	$ 13,700.00	22%	$ 10,686.00	$ 10,686.00
Zone 3	RF Equip	RemoteSt2	CCSi	65b	112	1	CA00855AA	ADD: 700/800 MHZ MID POWER	$ 6,300.00	$ 6,300.00	22%	$ 4,914.00	$ 4,914.00
Zone 3	RF Equip	RemoteSt2	CCSi	65c	112	1	CA00883AA	ADD: 800 MHZ TX FILTER W/PMU	$ 1,000.00	$ 1,000.00	22%	$ 780.00	$ 780.00
Zone 3	RF Equip	RemoteSt2	CCSi	65d	112	1	X153AW	ADD: RACK MOUNT HARDWARE	$ -	$ -	22%	$ -	$ -
Zone 3	RF Equip	RemoteSt2	CCSi	65e	112	1	X265AH	ADD: NARROW PRESELECTOR, 800 MHZ	$ 500.00	$ 500.00	22%	$ 390.00	$ 390.00

Zone 3	RF Equip	RemoteSt2	CCSi	66	112	1	T7039	GTR 8000 BASE RADIO	$ 6,000.00	$ 6,000.00	22%	$ 4,680.00	$ 4,680.00
Zone 3	RF Equip	RemoteSt2	CCSi	66a	112	1	CA00025AF	ADD: CIRCUIT BASED MULTISITE BASE R	$ 13,700.00	$ 13,700.00	22%	$ 10,686.00	$ 10,686.00
Zone 3	RF Equip	RemoteSt2	CCSi	66b	112	1	CA00855AA	ADD: 700/800 MHZ MID POWER	$ 6,300.00	$ 6,300.00	22%	$ 4,914.00	$ 4,914.00
Zone 3	RF Equip	RemoteSt2	CCSi	67d	112	1	X153AW	ADD: RACK MOUNT HARDWARE	$ -	$ -	22%	$ -	$ -
Zone 3	RF Equip	RemoteSt2	CCSi	67e	112	1	X265AH	ADD: NARROW PRESELECTOR, 800 MHZ	$ 500.00	$ 500.00	22%	$ 390.00	$ 390.00
Zone 3	RF Equip	RemoteSt2	CCSi	68	112	1	T7039	GTR 8000 BASE RADIO	$ 6,000.00	$ 6,000.00	22%	$ 4,680.00	$ 4,680.00
Zone 3	RF Equip	RemoteSt2	CCSi	68a	112	1	CA00025AF	ADD: CIRCUIT BASED MULTISITE BASE R	$ 13,700.00	$ 13,700.00	22%	$ 10,686.00	$ 10,686.00
Zone 3	RF Equip	RemoteSt2	CCSi	68b	112	1	CA00855AA	ADD: 700/800 MHZ MID POWER	$ 6,300.00	$ 6,300.00	22%	$ 4,914.00	$ 4,914.00
Zone 3	RF Equip	RemoteSt2	CCSi	68c	112	1	X153AW	ADD: RACK MOUNT HARDWARE	$ -	$ -	22%	$ -	$ -
Zone 3	RF Equip	RemoteSt2	CCSi	68d	112	1	X265AH	ADD: NARROW PRESELECTOR, 800 MHZ	$ 500.00	$ 500.00	22%	$ 390.00	$ 390.00
Zone 3	RF Equip	RemoteSt2	CCSi	69	112	1	T7039	GTR 8000 BASE RADIO	$ 6,000.00	$ 6,000.00	22%	$ 4,680.00	$ 4,680.00
Zone 3	RF Equip	RemoteSt2	CCSi	69a	112	1	CA00025AF	ADD: CIRCUIT BASED MULTISITE BASE R	$ 13,700.00	$ 13,700.00	22%	$ 10,686.00	$ 10,686.00
Zone 3	RF Equip	RemoteSt2	CCSi	69b	112	1	CA00855AA	ADD: 700/800 MHZ MID POWER	$ 6,300.00	$ 6,300.00	22%	$ 4,914.00	$ 4,914.00
Zone 3	RF Equip	RemoteSt2	CCSi	69d	112	1	X153AW	ADD: RACK MOUNT HARDWARE	$ -	$ -	22%	$ -	$ -
Zone 3	RF Equip	RemoteSt2	CCSi	69e	112	1	X265AH	ADD: NARROW PRESELECTOR, 800 MHZ	$ 500.00	$ 500.00	22%	$ 390.00	$ 390.00
Zone 3	RF Equip	RemoteSt2	CCSi	70	112	1	T7039	GTR 8000 BASE RADIO	$ 6,000.00	$ 6,000.00	22%	$ 4,680.00	$ 4,680.00
Zone 3	RF Equip	RemoteSt2	CCSi	70a	112	1	CA00025AF	ADD: CIRCUIT BASED MULTISITE BASE R	$ 13,700.00	$ 13,700.00	22%	$ 10,686.00	$ 10,686.00
Zone 3	RF Equip	RemoteSt2	CCSi	70b	112	1	CA00855AA	ADD: 700/800 MHZ MID POWER	$ 6,300.00	$ 6,300.00	22%	$ 4,914.00	$ 4,914.00
Zone 3	RF Equip	RemoteSt2	CCSi	70c	112	1	X153AW	ADD: RACK MOUNT HARDWARE	$ -	$ -	22%	$ -	$ -
Zone 3	RF Equip	RemoteSt2	CCSi	70d	112	1	X265AH	ADD: NARROW PRESELECTOR, 800 MHZ	$ 500.00	$ 500.00	22%	$ 390.00	$ 390.00
Zone 3	RF Equip	RemoteSt2	Field	71	207	1	DS42883H01T	TTA, COMPACT AUTO QUAD 792-824 MHZ	$ 8,096.00	$ 8,096.00	10%	$ 7,286.40	$ 7,286.40
Zone 3	RF Equip	RemoteSt2	CCSi	72	207	1	DS42883H01M	16-PORT RX MULTICOUPLER DECK FOR	$ 4,335.00	$ 4,335.00	10%	$ 3,901.50	$ 3,901.50
Zone 3	RF Equip	RemoteSt2	CCSi	75	207	1	DSWIJD86208S	COMB WAV-G 851-869 8 CH 7/16 ANT, 1	$ 13,438.00	$ 13,438.00	10%	$ 12,094.20	$ 12,094.20
Zone 3	RF Equip	RemoteSt2	CCSi	76	207	1	DQACM500MDMDFNH	ANTENNA AND CABLE MONITOR 500 W, 47	$ 1,688.00	$ 1,688.00	10%	$ 1,519.20	$ 1,519.20
Zone 3	RF Equip	RemoteSt2	Field	79	207	1	DSDSXLDMA	LIGHTNING ARRESTOR, 7-16DIN MALE/FE	$ 180.00	$ 180.00	10%	$ 162.00	$ 162.00
Zone 3	RF Equip	RemoteSt2	Field	80	207	1	DSISDC50LNZ30MA	DC INJECTOR 30V M CONN ANTENNA POR	$ 150.00	$ 150.00	10%	$ 135.00	$ 135.00
Zone 3	Power	RemoteSt2	CCSi	81	207	2	DSOP820B	POWER DIST. UNIT SURGE PROTECT	$ 850.00	$ 1,700.00	10%	$ 765.00	$ 1,530.00
Zone 3	Power	RemoteSt2	CCSi	82	207	2	DS1101378	RACK MOUNTING PLATE ADAPTER , DSOP8	$ 101.00	$ 202.00	10%	$ 90.90	$ 181.80
Zone 3	Power	RemoteSt2	CCSi	83	509	2	THN1012	RACK 7' OPEN	$ 470.00	$ 940.00	30%	$ 329.00	$ 658.00
Zone 3	Network	RemoteSt2	CCSi	84	708	2	DSJ4900B	HP PROCURVE SWITCH 2626B	$ 2,250.00	$ 4,500.00	10%	$ 2,025.00	$ 4,050.00
Zone 3	Network	RemoteSt2	CCSi	85	147	1	ST2500	S2500 MULTIPROTOCOL WAN ROUTER	$ 3,100.00	$ 3,100.00	10%	$ 2,790.00	$ 2,790.00
Zone 3	Network	RemoteSt2	CCSi	86	147	1	ST2512	S2500 ROUTER T1/E1 DAUGHTER BOARD	$ 800.00	$ 800.00	10%	$ 720.00	$ 720.00
Zone 3	Chan Bnk	RemoteSt2	CCSi	89	131	1	DSPREM891830	UNIVERSAL ENCLOSURE TENSR 800	$ 1,650.00	$ 1,650.00	10%	$ 1,485.00	$ 1,485.00
Zone 3	Chan Bnk	RemoteSt2	CCSi	90	131	1	DSPREM801065	DUAL T1 E1 WAN CARD	$ 2,338.00	$ 2,338.00	10%	$ 2,104.20	$ 2,104.20
Zone 3	Chan Bnk	RemoteSt2	CCSi	91	131	1	DSPREM801460	DUAL T1E1 WAN W/ RELAYS 1:N REDUNDA	$ 2,684.00	$ 2,684.00	10%	$ 2,415.60	$ 2,415.60
Zone 3	Chan Bnk	RemoteSt2	CCSi	92	131	4	DSPREM81130	DSX CEPT PLUG IN MODULE	$ 688.00	$ 2,752.00	10%	$ 619.20	$ 2,476.80
Zone 3	Chan Bnk	RemoteSt2	CCSi	93	131	2	DSPREM8901	AC POWER SUPPLY 110/220VAC	$ 963.00	$ 1,926.00	10%	$ 866.70	$ 1,733.40
Zone 3	Chan Bnk	RemoteSt2	CCSi	94	131	1	DSPREM892060	8T1 E1 IF CARD 32K WITH MODEM	$ 2,475.00	$ 2,475.00	10%	$ 2,227.50	$ 2,227.50
Zone 3	Chan Bnk	RemoteSt2	CCSi	95	131	2	DSPREM880160	CPU 8 T1 E1 CROSS CONNT	$ 6,188.00	$ 12,376.00	10%	$ 5,569.20	$ 11,138.40
Zone 3	Chan Bnk	RemoteSt2	CCSi	97	131	2	DSPREM822560	10 PORT LD-SRU CARD	$ 4,125.00	$ 8,250.00	10%	$ 3,712.50	$ 7,425.00
Zone 3	Time Sync	RemoteSt1	CCSi	100	207	1	DSTRAK91009	REMOTE SITE CONFIG AC POWER	$ 30,066.00	$ 30,066.00	10%	$ 27,059.40	$ 27,059.40
Zone 3	Time Sync	RemoteSt1	CCSi	101	207	2	DSTRAK91061	FOUR PORT DDM	$ 688.00	$ 1,376.00	10%	$ 619.20	$ 1,238.40
Zone 3	Ant System	RemoteSt3	Field	103	207	100	L1703	1/2" SUPERFLEX FR RISER RATED	$ 4.40	$ 440.00	10%	$ 3.96	$ 396.00
Zone 3	Ant System	RemoteSt3	Field	104	207	2	CDN6579	1/2" N MALE PLATED CONNECTOR	$ 53.00	$ 106.00	10%	$ 47.70	$ 95.40
Zone 3	Ant System	RemoteSt3	Field	105	207	2	DSF4PDMV2C	1/2" 7/16 DIN MALE CONN SFLEX	$ 29.00	$ 58.00	10%	$ 26.10	$ 52.20
Zone 3	RF Equip	RemoteSt3	CCSi	106	112	1	T7039	GTR 8000 BASE RADIO	$ 6,000.00	$ 6,000.00	22%	$ 4,680.00	$ 4,680.00
Zone 3	RF Equip	RemoteSt3	CCSi	106a	112	1	CA00025AF	ADD: CIRCUIT BASED MULTISITE BASE R	$ 13,700.00	$ 13,700.00	22%	$ 10,686.00	$ 10,686.00
Zone 3	RF Equip	RemoteSt3	CCSi	106b	112	1	CA00855AA	ADD: 700/800 MHZ MID POWER	$ 6,300.00	$ 6,300.00	22%	$ 4,914.00	$ 4,914.00
Zone 3	RF Equip	RemoteSt3	CCSi	106c	112	1	CA00883AA	ADD: 800 MHZ TX FILTER W/PMU	$ 1,000.00	$ 1,000.00	22%	$ 780.00	$ 780.00
Zone 3	RF Equip	RemoteSt3	CCSi	106d	112	1	X153AW	ADD: RACK MOUNT HARDWARE	$ -	$ -	22%	$ -	$ -
Zone 3	RF Equip	RemoteSt3	CCSi	106e	112	1	X265AH	ADD: NARROW PRESELECTOR, 800 MHZ	$ 500.00	$ 500.00	22%	$ 390.00	$ 390.00
Zone 3	RF Equip	RemoteSt3	CCSi	107	112	1	T7039	GTR 8000 BASE RADIO	$ 6,000.00	$ 6,000.00	22%	$ 4,680.00	$ 4,680.00
Zone 3	RF Equip	RemoteSt3	CCSi	107a	112	1	CA00025AF	ADD: CIRCUIT BASED MULTISITE BASE R	$ 13,700.00	$ 13,700.00	22%	$ 10,686.00	$ 10,686.00
Zone 3	RF Equip	RemoteSt3	CCSi	107b	112	1	CA00855AA	ADD: 700/800 MHZ MID POWER	$ 6,300.00	$ 6,300.00	22%	$ 4,914.00	$ 4,914.00
Zone 3	RF Equip	RemoteSt3	CCSi	107c	112	1	X153AW	ADD: RACK MOUNT HARDWARE	$ -	$ -	22%	$ -	$ -
Zone 3	RF Equip	RemoteSt3	CCSi	107d	112	1	X265AH	ADD: NARROW PRESELECTOR, 800 MHZ	$ 500.00	$ 500.00	22%	$ 390.00	$ 390.00

Zone 3	RF Equip	RemoteSt3	CCSi	108	112	1	T7039	GTR 8000 BASE RADIO	$ 6,000.00	$ 6,000.00	22%	$ 4,680.00	$ 4,680.00
Zone 3	RF Equip	RemoteSt3	CCSi	108a	112	1	CA00025AF	ADD: CIRCUIT BASED MULTISITE BASE R	$ 13,700.00	$ 13,700.00	22%	$ 10,686.00	$ 10,686.00
Zone 3	RF Equip	RemoteSt3	CCSi	108b	112	1	CA00855AA	ADD: 700/800 MHZ MID POWER	$ 6,300.00	$ 6,300.00	22%	$ 4,914.00	$ 4,914.00
Zone 3	RF Equip	RemoteSt3	CCSi	109c	112	1	X153AW	ADD: RACK MOUNT HARDWARE	$ -	$ -	22%	$ -	$ -
Zone 3	RF Equip	RemoteSt3	CCSi	109d	112	1	X265AH	ADD: NARROW PRESELECTOR, 800 MHZ	$ 500.00	$ 500.00	22%	$ 390.00	$ 390.00
Zone 3	RF Equip	RemoteSt3	CCSi	110	112	1	T7039	GTR 8000 BASE RADIO	$ 6,000.00	$ 6,000.00	22%	$ 4,680.00	$ 4,680.00
Zone 3	RF Equip	RemoteSt3	CCSi	110a	112	1	CA00025AF	ADD: CIRCUIT BASED MULTISITE BASE R	$ 13,700.00	$ 13,700.00	22%	$ 10,686.00	$ 10,686.00
Zone 3	RF Equip	RemoteSt3	CCSi	110b	112	1	CA00855AA	ADD: 700/800 MHZ MID POWER	$ 6,300.00	$ 6,300.00	22%	$ 4,914.00	$ 4,914.00
Zone 3	RF Equip	RemoteSt3	CCSi	110d	112	1	X153AW	ADD: RACK MOUNT HARDWARE	$ -	$ -	22%	$ -	$ -
Zone 3	RF Equip	RemoteSt3	CCSi	110e	112	1	X265AH	ADD: NARROW PRESELECTOR, 800 MHZ	$ 500.00	$ 500.00	22%	$ 390.00	$ 390.00
Zone 3	RF Equip	RemoteSt3	CCSi	111	112	1	T7039	GTR 8000 BASE RADIO	$ 6,000.00	$ 6,000.00	22%	$ 4,680.00	$ 4,680.00
Zone 3	RF Equip	RemoteSt3	CCSi	111a	112	1	CA00025AF	ADD: CIRCUIT BASED MULTISITE BASE R	$ 13,700.00	$ 13,700.00	22%	$ 10,686.00	$ 10,686.00
Zone 3	RF Equip	RemoteSt3	CCSi	111b	112	1	CA00855AA	ADD: 700/800 MHZ MID POWER	$ 6,300.00	$ 6,300.00	22%	$ 4,914.00	$ 4,914.00
Zone 3	RF Equip	RemoteSt3	CCSi	111c	112	1	X153AW	ADD: RACK MOUNT HARDWARE	$ -	$ -	22%	$ -	$ -
Zone 3	RF Equip	RemoteSt3	CCSi	111d	112	1	X265AH	ADD: NARROW PRESELECTOR, 800 MHZ	$ 500.00	$ 500.00	22%	$ 390.00	$ 390.00
Zone 3	RF Equip	RemoteSt3	Field	112	207	1	DS42883H01T	TTA, COMPACT AUTO QUAD 792-824 MHZ	$ 8,096.00	$ 8,096.00	10%	$ 7,286.40	$ 7,286.40
Zone 3	RF Equip	RemoteSt3	CCSi	113	207	1	DS42883H01M	16-PORT RX MULTICOUPLER DECK FOR	$ 4,335.00	$ 4,335.00	10%	$ 3,901.50	$ 3,901.50
Zone 3	RF Equip	RemoteSt3	CCSi	118	207	1	DSWIJD86208S	COMB WAV-G 851-869 8 CH 7/16 ANT, 1	$ 13,438.00	$ 13,438.00	10%	$ 12,094.20	$ 12,094.20
Zone 3	RF Equip	RemoteSt3	Field	120	207	1	DSDSXLDMA	LIGHTNING ARRESTOR, 7-16DIN MALE/FE	$ 180.00	$ 180.00	10%	$ 162.00	$ 162.00
Zone 3	RF Equip	RemoteSt3	CCSi	121	207	1	DQACM500MDMDFNH	ANTENNA AND CABLE MONITOR 500 W, 47	$ 1,688.00	$ 1,688.00	10%	$ 1,519.20	$ 1,519.20
Zone 3	RF Equip	RemoteSt3	Field	122	207	1	DSISDC50LNZ30MA	DC INJECTOR 30V M CONN ANTENNA POR	$ 150.00	$ 150.00	10%	$ 135.00	$ 135.00
Zone 3	Power	RemoteSt3	CCSi	123	207	2	DSOP820B	POWER DIST. UNIT SURGE PROTECT	$ 850.00	$ 1,700.00	10%	$ 765.00	$ 1,530.00
Zone 3	Power	RemoteSt3	CCSi	124	207	2	DS1101378	RACK MOUNTING PLATE ADAPTER , DSOP8	$ 101.00	$ 202.00	10%	$ 90.90	$ 181.80
Zone 3	Power	RemoteSt3	CCSi	125	509	2	THN1012	RACK 7' OPEN	$ 470.00	$ 940.00	30%	$ 329.00	$ 658.00
Zone 3	Network	RemoteSt3	CCSi	126	708	2	DSJ4900B	HP PROCURVE SWITCH 2626B	$ 2,250.00	$ 4,500.00	10%	$ 2,025.00	$ 4,050.00
Zone 3	Network	RemoteSt3	CCSi	127	147	1	ST2500	S2500 MULTIPROTOCOL WAN ROUTER	$ 3,100.00	$ 3,100.00	10%	$ 2,790.00	$ 2,790.00
Zone 3	Network	RemoteSt3	CCSi	128	147	1	ST2512	S2500 ROUTER T1/E1 DAUGHTER BOARD	$ 800.00	$ 800.00	10%	$ 720.00	$ 720.00
Zone 3	Chan Bnk	RemoteSt3	CCSi	131	131	1	DSPREM891830	UNIVERSAL ENCLOSURE TENSR 800	$ 1,650.00	$ 1,650.00	10%	$ 1,485.00	$ 1,485.00
Zone 3	Chan Bnk	RemoteSt3	CCSi	132	131	1	DSPREM801065	DUAL T1 E1 WAN CARD	$ 2,338.00	$ 2,338.00	10%	$ 2,104.20	$ 2,104.20
Zone 3	Chan Bnk	RemoteSt3	CCSi	133	131	1	DSPREM801460	DUAL T1E1 WAN W/ RELAYS 1:N REDUNDA	$ 2,684.00	$ 2,684.00	10%	$ 2,415.60	$ 2,415.60
Zone 3	Chan Bnk	RemoteSt3	CCSi	134	131	4	DSPREM81130	DSX CEPT PLUG IN MODULE	$ 688.00	$ 2,752.00	10%	$ 619.20	$ 2,476.80
Zone 3	Chan Bnk	RemoteSt3	CCSi	135	131	2	DSPREM8901	AC POWER SUPPLY 110/220VAC	$ 963.00	$ 1,926.00	10%	$ 866.70	$ 1,733.40
Zone 3	Chan Bnk	RemoteSt3	CCSi	136	131	1	DSPREM892060	8T1 E1 IF CARD 32K WITH MODEM	$ 2,475.00	$ 2,475.00	10%	$ 2,227.50	$ 2,227.50
Zone 3	Chan Bnk	RemoteSt3	CCSi	137	131	2	DSPREM880160	CPU 8 T1 E1 CROSS CONNT	$ 6,188.00	$ 12,376.00	10%	$ 5,569.20	$ 11,138.40
Zone 3	Chan Bnk	RemoteSt3	CCSi	139	131	2	DSPREM822560	10 PORT LD-SRU CARD	$ 4,125.00	$ 8,250.00	10%	$ 3,712.50	$ 7,425.00
Zone 3	Time Sync	RemoteSt3	CCSi	140	207	1	DSTRAK91009	REMOTE SITE CONFIG AC POWER	$ 30,066.00	$ 30,066.00	10%	$ 27,059.40	$ 27,059.40
Zone 3	Time Sync	RemoteSt3	CCSi	142	207	2	DSTRAK91061	FOUR PORT DDM	$ 688.00	$ 1,376.00	10%	$ 619.20	$ 1,238.40
								TOTAL EQUIPMENT LIST PRICE:		*$ 1,060,556.00*			

TOTAL EQUIPMENT BID PRICE: $ 879,768.40
FREIGHT: $ 9,120.00
EQUIPMENT-ONLY TOTAL: $ 888,888.40

OPTION 1 - STAGING (As Described Below): $ 89,825.00

(Equipment-Only Price plus Option 1) GRAND TOTAL: $ 978,713.40

Per site cost $ 326,237.80

NOTES:

1) Equipment list does not represent a guarantee of system performance.
2) Any additional required parts/components or restocking fees are the responsibility of MNDOT.
3) Final Acceptance is based upon equipment shipment from CCSi

Per site Tax $19,061.65
Per site

Per site	Site delivery	$500.00
Per site	Install	$15,000.00
Per site	RF EqTotal	$360,799.45

2 ST's $1500 each per day/ Est 5 days

Manufacture	Model	Description	Price Each	Amnt. Needed	Item Total
Antel	BCD-80010-EDIN 25%	Antenna, Fiberglass, Omi	$1,344.59	2	$2,689.18
ANDREW	tower top amp mounting hardware	stainless u bolts, nuts and	$35.00	1	$35.00
Microflect	860145	Mount Adjustable 3' - 5',	$184.00	2	$368.00
Andrew	DB365-SP5	clamp, antenna mounting	$92.00	4	$368.00
Andrew	L4-PDMNM-3	Jumper, 3', DIN(m) to N(r	$42.00	1	$42.00
Andrew	L4-PDMDM-8	Jumper, 8', DIN (m) to DI	$42.00	1	$42.00
RFS	TTA S80-0281-24	tower top amp, stand alor	$3,527.37	1	$3,527.37
Andrew	L4-PNMNM-8	Jumper, 8', N (m) to N (m	$42.00	1	$42.00
Andrew	L5PNF-RFC	Connector, N female	$31.65	2	$63.30
Andrew	241475-1	Weatherproof seal Kit, 7/8	$24.32	4	$97.28
Andrew	19256B	Hoisting Grip for 7/8" coa	$22.45	2	$44.90
Andrew	SGL5-06B1	Grounding Kit for 7/8" coa	$17.76	2	$35.52
Andrew	L4PNF-RFC	Connector, N female	$22.80	2	$45.60
Andrew	241474-4	Weatherproof Seal Kit, 1/	$24.32	1	$24.32
Andrew	43094	Hoisting Grip for 1/2" coa	$15.44	2	$30.88
Andrew	SGL4-06B1	Grounding Kit for 1/2" coa	$17.75	2	$35.50
Andrew	L6PDF-RFC	Connector, 7/16" DIN fem	$98.55	1	$98.55
Andrew	241475-5A	Weatherproof Seal Kit, 1-	$24.32	3	$72.96
Andrew	L6SGRIP	Hoisting Grip for 1-1/4" co	$29.35	2	$58.70
Andrew	SGL6-06B1	Grounding Kit for 1-1/4" c	$17.76	2	$35.52
Andrew	SSH-114	snap in hangar kit for 1 1/	$25.00	11	$275.00
Andrew	SSH-78	snap in kit for 7/8" coax c	$25.00	11	$275.00
Andrew	SSH-12	snap in kit for 1/2" coax	$25.00	11	$275.00
Microflect	B537A	Entry Port Boot & Cushio	$21.30	1	$21.30
Polyphaser	DC50LNZ+30-MA	Lightning Protection Modu	$66.20	1	$66.20
Microflect	B1167A	Entry Port Boot & Cushio	$14.45	1	$14.45
Polyphaser	DC50LNZ+30-MA	Lightning Protection Modu	$66.20	1	$66.20
Microflect	B11552A	Entry port for 1 1/4' coax	$14.45	1	$14.45
Polyphaser	IS-CT50HD-B-MA	Lightning Protection Modu	$103.85	1	$103.85
Graybar	5100	Strand Vise	$10.00	6	$60.00
Polyphaser	DSXL-D-MA	Surge supressor, 7/16 DI	$94.88	1	$94.88
Polyphaser	GSA-KIT-D	Adapter plate for Polypha	$9.17	1	$9.17
Andrew	F4PDMV2-C	7/16 DIN(m) connector	$20.44	2	$40.88
Andrew	F4PNMV2-HC	N(m) connector	$20.44	4	$81.76
Andrew	FSJ4RN-50B	FSJ4 (1/2", 50Ω)	$2.57	40	$102.80
Amphenol	82-66	N(f-f) bulkhead adapter	$20.50	2	$41.00
Pasternack	PE3455LF-36	N(m-m) RG142 jumpers,	$33.95	2	$67.90
Amphenol	82-5370	N(m) connector (for RG14	$8.50	1	$8.50
Crouse-Hinds-Cooper	2631	3/4" cable clamp for TOR	$0.79	2	$1.57
Carol	1380	SOOJ cable, 12/2+G, 300	$0.81	10	$8.05
Leviton	5266-CA	L5/15P right angle 15A, 1	$10.97	2	$21.94
Ideal	83-7211	Narrow spade lugs, insula	$5.28	1	$5.28
Motorola		2post steel rack - 19in x 7	$352.50	1	$352.50
Motorola		Post, Cable tie, 12/24, 6"	$5.39	5	$26.95
Harger	RGBVKIT145872A	Vertical ground bar, 72" w	$64.44	1	$64.44
Bud Industries	SA-1279-BLACK	Shelf, 19"rack mount, 20"	$75.31	1	$75.31
H.M.Cragg		UPS	$1,434.00	1	$1,434.00

OSI		BATTERY PACK	$1,235.00	1		$1,235.00
ANDREW	LDF6-50A	1 1/4' COAX CABLE	$11.31	360	ft	$4,071.60
ANDREW	LDF5-50A	7/8" COAX CABLE	$5.88	360	ft	$2,116.80
ANDREW	LDF4-50A	1/2" COAX CABLE	$2.43	360	ft	$874.80
						$19,663.16
					Tax	$1,278.11
					Shipping	$2,500.00
Tower VENDOR	LABOR	Install Antenna system	$4,500.00	1		$4,500.00
					Total	$27,941.27

Site total	$388,740.72
10% contingency	$38,874.07
	$427,614.79

APPENDIX AA—ISR SITE COST ESTIMATES

ISR - 5 Channel

Entity	Dept	Site	Qty	Nomenclature	Item Description	Unit List Price	Total Extended List Price		Unit Customer Price	Total Extended Customer Price	APC	Disc
MnDOT	Network	ISR Site	1	ST2500	S2500 MULTIPROTOCOL WAN ROUTER	$ 3,100.00	$	3,100.00	$ 2,790.00	$ 2,790.00	147	10%
MnDOT	Network	ISR Site	1	ST2512	S2500 ROUTER T1/E1 DAUGHTER BOARD	$ 800.00	$	800.00	$ 720.00	$ 720.00	147	10%
MnDOT	RF Equip	ISR Site	1	T7054	GTR 8000 EXPANDABLE SITE SUB-SYSTEM	$ 6,000.00	$	6,000.00	$ 4,200.00	$ 4,200.00	112	30%
MnDOT	RF Equip	ISR Site	1	CA00293AA	ADD: 43RU SCHROFF CABINET	$ 880.00	$	880.00	$ 616.00	$ 616.00	112	30%
MnDOT	RF Equip	ISR Site	1	CA00855AA	ADD: 700/800 MHZ MID POWER	$ 6,300.00	$	6,300.00	$ 4,410.00	$ 4,410.00	112	30%
MnDOT	RF Equip	ISR Site	1	CA00861AA	ADD: CABINET RMC W/ CAPABILITY OF 6	$ 700.00	$	700.00	$ 490.00	$ 490.00	112	30%
MnDOT	RF Equip	ISR Site	1	CA00879AA	ADD: PRIMARY 6 PORT CAVITY COMBINER	$ 8,400.00	$	8,400.00	$ 5,880.00	$ 5,880.00	112	30%
MnDOT	RF Equip	ISR Site	1	CA00883AA	ADD: 800 MHZ TX FILTER	$ 1,000.00	$	1,000.00	$ 700.00	$ 700.00	112	30%
MnDOT	RF Equip	ISR Site	1	X305AC	ADD: QTY (5) GTR 8000 BASE RADIOS	$ 61,200.00	$	61,200.00	$ 42,840.00	$ 42,840.00	112	30%
MnDOT	RF Equip	ISR Site	2	X591AF	ENH: ASTRO 25 SITE REPEATER SITE CO	$ 5,000.00	$	10,000.00	$ 3,500.00	$ 7,000.00	112	30%
MnDOT	RF Equip	ISR Site	2	CA00027AC	ADD: FRONT/BACK DOOR, LOUVERED	$ 225.00	$	450.00	$ 157.50	$ 315.00	112	30%
MnDOT	RF Equip	ISR Site	5	X591AE	ENH: ASTRO 25 SITE REPEATER SW	$ 10,700.00	$	53,500.00	$ 7,490.00	$ 37,450.00	112	30%
MnDOT	RF Equip	ISR Site	2	CA00303AB	ADD: QTY (1) SITE CONTROLLER	$ 5,000.00	$	10,000.00	$ 3,500.00	$ 7,000.00	112	30%
MnDOT	RF Equip	ISR Site	2	CA00027AB	ADD: CABINET DOOR, SOLID	$ 225.00	$	450.00	$ 157.50	$ 315.00	112	30%
MnDOT	RF Equip	ISR Site	1	DSRMP620A1	120VAC 20AMP6 OUTLET NEMA15-20,20'	$ 501.00	$	501.00	$ 450.90	$ 450.90	207	10%
MnDOT	Monitorin	ISR Site	1	DQACM500M	ANTENNA AND CABLE MONITOR 500W, 47-960 MHZ	$ 1,688.00	$	1,688.00	$ 1,519.20	$ 1,519.20	207	10%
							$	164,969.00		**$ 116,696.10**		

NOTES:
1. Equipment only for a 5 channel GTR8000 Expandable Site Subsystem
2. No programming software included (assumes MNDOT has software)
3. Motorola recommends a antenna/power monitoring port for ease of system maintenance. This is an optional device (DQACM500MDMDFNH).

LLIG Item

Sub total	$116,696.10
Tax	$7,585.25
Shipping	$1,200.00
Site delivery	$500.00
Install	$15,000.00
RF EqTotal	$140,981.35

2 ST's $1500 each per day/ Est 5 days

Manufacture	Model	Description	Price Each	Amnt. Needed	Item Total
Antel	BCD-80010-EDIN 25%	Antenna, Fiberglass, Omni, 10db gain (2 EACH)	$1,344.59	2	$2,689.18
ANDREW	tower top amp mounting hardware	stainless u bolts, nuts and extension plates	$35.00	1	$35.00
Microflect	860145	Mount Adjustable 3' - 5', side arm	$184.00	2	$368.00
Andrew	DB365-SP5	clamp, antenna mounting, up to 5"	$92.00	4	$368.00
Andrew	L4-PDMNM-3	Jumper, 3', DIN(m) to N(m), for RX	$42.00	1	$42.00
Andrew	L4-PDMDM-8	Jumper, 8', DIN (m) to DIN (m), for TX	$42.00	1	$42.00
RFS	TTA S80-0281-24	tower top amp, stand alone	$3,527.37	1	$3,527.37
Andrew	L4-PNMNM-8	Jumper, 8', N (m) to N (m), for RX	$42.00	1	$42.00
Andrew	L5PNF-RFC	Connector, N female	$31.65	2	$63.30
Andrew	241475-1	Weatherproof seal Kit, 7/8" to 1/2"	$24.32	4	$97.28
Andrew	19256B	Hoisting Grip for 7/8" coax	$22.45	2	$44.90
Andrew	SGL5-06B1	Grounding Kit for 7/8" coax	$17.76	2	$35.52
Andrew	L4PNF-RFC	Connector, N female	$22.80	2	$45.60
Andrew	241474-4	Weatherproof Seal Kit, 1/2" to 1/2"	$24.32	1	$24.32
Andrew	43094	Hoisting Grip for 1/2" coax	$15.44	2	$30.88
Andrew	SGL4-06B1	Grounding Kit for 1/2" coax	$17.75	2	$35.50
Andrew	L6PDF-RFC	Connector, 7/16" DIN female	$98.55	1	$98.55
Andrew	241475-5A	Weatherproof Seal Kit, 1-1/4" to 1/2"	$24.32	3	$72.96
Andrew	L6SGRIP	Hoisting Grip for 1-1/4" coax	$29.35	2	$58.70
Andrew	SGL6-06B1	Grounding Kit for 1-1/4" coax	$17.76	2	$35.52
Andrew	SSH-114	snap in hangar kit for 1 1/4" coax	$25.00	11	$275.00
Andrew	SSH-78	snap in kit for 7/8" coax double order, short tower	$25.00	11	$275.00
Andrew	SSH-12	snap in kit for 1/2" coax	$25.00	11	$275.00
Microflect	B537A	Entry Port Boot & Cushion for single 7/8" coax	$21.30	1	$21.30
Polyphaser	DC50LNZ+30-MA	Lightning Protection Module - RX	$66.20	1	$66.20
Microflect	B1167A	Entry Port Boot & Cushion for single 1/2" coax	$14.45	1	$14.45
Polyphaser	DC50LNZ+30-MA	Lightning Protection Module - Test	$66.20	1	$66.20

Microflect	B11552A	Entry port for 1 1/4' coax	$14.45	1	$14.45
Polyphaser	IS-CT50HD-B-MA	Lightning Protection Module - TX	$103.85	1	$103.85
Graybar	5100	Strand Vise	$10.00	6	$60.00
Polyphaser	DSXL-D-MA	Surge supressor, 7/16 DIN (m-f)	$94.88	1	$94.88
Polyphaser	GSA-KIT-D	Adapter plate for Polyphaser	$9.17	1	$9.17
Andrew	F4PDMV2-C	7/16 DIN(m) connector	$20.44	2	$40.88
Andrew	F4PNMV2-HC	N(m) connector	$20.44	4	$81.76
Andrew	FSJ4RN-50B	FSJ4 (1/2", 50Ω)	$2.57	40	$102.80
Amphenol	82-66	N(f-f) bulkhead adapter	$20.50	2	$41.00
Pasternack	PE3455LF-36	N(m-m) RG142 jumpers, 3ft	$33.95	2	$67.90
Amphenol	82-5370	N(m) connector (for RG142)	$8.50	1	$8.50
Crouse-Hinds-Coop	2631	3/4" cable clamp for TOR knockouts 100ea/bx	$0.79	2	$1.57
Carol	1380	SOOJ cable, 12/2+G, 300V	$0.81	10	$8.05
Leviton	5266-CA	L5/15P right angle 15A, 120V plug	$10.97	2	$21.94
Ideal	83-7211	Narrow spade lugs, insulated, YL, 25ea/bx	$5.28	1	$5.28
Motorola		2post steel rack - 19in x 7ft, EIA hole pattern	$352.50	1	$352.50
Motorola		Post, Cable tie, 12/24, 6"	$5.39	5	$26.95
Harger	RGBVKIT145872A	Vertical ground bar, 72" with mount kit	$64.44	1	$64.44
Bud Industries	SA-1279-BLACK	Shelf, 19"rack mount, 20" deep, 200lb	$75.31	1	$75.31
H.M.Cragg		UPS	$1,434.00	1	$1,434.00
OSI		BATTERY PACK	$1,235.00	1	$1,235.00
ANDREW	LDF6-50A	1 1/4' COAX CABLE	$11.31	360 ft	$4,071.60
ANDREW	LDF5-50A	7/8" COAX CABLE	$5.88	360 ft	$2,116.80
ANDREW	LDF4-50A	1/2" COAX CABLE	$2.43	360 ft	$874.80
					$19,663.16
				Tax	$1,278.11
				Shipping	$2,500.00
Tower VENDOR	LABOR	Install Antenna system	$4,500.00	1	$4,500.00
				Total	$27,941.27

ISR total	$168,922.62
Contigency 10%	$16,892.26
	$185,814.88

APPENDIX BB—SITE DEVELOPMENT COST ESTIMATES

Site Development Cost Estimates

Land Costs		
Consultant to do land search, appraisial		**$20,000.00**
Environmentail studies		**$5,000.00**
Soil Boring		**$3,500.00**
Land Purchase		**$45,000.00**
	TOTAL	**$73,500.00**

Shelter		
Building		**$72,000.00**
Shipping		**$5,000.00**
Foundation		**$15,000.00**
Utility		**$15,000.00**
Electrical hook up		**$2,500.00**
LP Tan and hookup		**$3,500.00**
	TOTAL	**$113,000.00**

Tower		
Tower/foundation/erection	330 foot	**$360,000.00**
Ssite grounding		**$8,000.00**
Fence		**$12,000.00**
Driveway		**$5,000.00**
Landscape rock		**$5,000.00**
Site clearing		**$5,000.00**
	TOTAL	**$395,000.00**

APPENDIX CC—MOTOROLA PRICES QUOTES FOR PHASE 3 EQUIPMENT

RFP Amendment
5/19/2006

Minnesota ARMER Phase III
Revised Bid Schedule Summary

Final Offering Phase III Price Comparison

	Option 1 7x Zones / Quantars	Option 2 7x Zones / GTR's
Zones	$ 8,024,028.00	$ 8,024,028.00
GTR Option		$ 169,015.00
Services	$ 317,827.00	$ 317,827.00
ISR Sites	$ 3,523,898.89	$ 4,700,151.00
Total	$ 11,865,753.89	$ 13,211,021.00
Estimated Customer added Combiner/Multicoupler Network	$ 600,000.00	Integral
Mixed Zone Operation Interface	$ 850,000.00	$ 850,000.00
Total	**$ 13,315,753.89**	**$ 14,061,021.00**
One Time Discount Contingent on the following stipulations: 1.) Order date no later than August 15th and delivery in 2006. 2.) Purchase a minimum of 2 Zones (Master Site Equipment) and 35 GTR8000 ISR Sites.		$ (500,000.00)
Total	**$ 13,315,753.89**	**$ 13,561,021.00**

Bill Davis
Motorola, Inc.
Government & Enterprise Mobility Solutions
608-838-4432
608-215-8405

7. BID SCHEDULE

The responder shall provide two itemized bid schedules, a 6.x solution and a 7.x solution. The 7.x solution shall also include the cost to upgrade the Metro system to allow interconnection and interoperation of the new zone controllers with the metro system.

Due to budgetary considerations the State reserves the right to make a partial award of the bid. Each line Item shall be considered discrete and shall include all services, overhead for that portion of the bid.

7.1 BID SCHEDULE 1

6.X System Solution

Item:	Bid:
1 Zone 3 Master Site equipment, staging, and delivery	$ 3,948,762.00
1a. Additional Costs to Substitute GTR8000 Stations	$ 84,563.00
2 Zone 3 Maser Site installation	$ 21,978.00
3 Zone 3 Master Site startup and commissioning	$ 24,659.00
4 Zone 3 Master Site Integration	Included in 2&3
5 Zone 3 Field Acceptance Test	$ 6,433.00
6 Zone 4 Master Site equipment, staging, and delivery	$ 3,948,762.00
6a. Additional Costs to Substitute GTR8000 Stations	$ 84,563.00
7 Zone 4 Maser Site installation	$ 21,978.00
8 Zone 4 Master Site startup and commissioning	$ 24,659.00
9 Zone 4 Master Site Integration	Included in 6&7
10 Zone 4 Field Acceptance Test	$ 6,433.00
11 Rochester/Olmsted RF system cutover	$ 76,388.00
12 St. Cloud RF system cutover	$ 76,388.00
13 Stearns RF system cutover	Included in Item 12

Item:	Bid:
14 Rochester/Olmsted console cutover	Included in Item 11
15 St. Cloud/Stearns console cutover	Included in Item 12

Line	Qty	Item	Part Number	Description	Bid	Additional Equipment Bid
1a	210	ASTRO 25 Repeater	To Include:			
			C99ED	QUANTAR/QUANTRO FAMILY	$3,052,822.50	$14,537.25
			001C	QUANTAR STATION		
			X750	ADD: 800 MHZ BAND RX 806-825 MHZ/TX		
			X591AA	EHN: ASTRO 25 SITE REPEATER		
			X287	DEL: FUNCTIONAL MANUAL		
			X394	ADD: MULTI DROP UHSO CABLING		
			X87	DEL: CABINET		
			TTN5028A	HDW RACKMNT QUANTAR STDALONE		
2a	8	Programming/Manuals	To include:			
	8		6881132E22	PSC 9600 SERVICE MANUAL	$527.84	$65.98
	8		3080369E31	PROGRAMMING CABLE	$436.00	$54.50
	8		DLN6455	CONFIGURATION/SERVICE SOFTWARE	$160.00	$20.00
3a		Controller Redundant	To include:			
	70		T6782	Site Controller - PSC9600 "AC Powered"	$83,300.00	$1,190.00
	70		CA00192AA	ASTRO 25 Multi Zone Software	$161,700.00	$2,310.00
	35		3084225N24	Cable W/Mode Plug 8 cond	$323.05	$9.23
4a		Router	To Include:			
	35		ST2500	Router	$97,650.00	$2,790.00
	35		ST2512A	T1 Daughter Board	$25,200.00	$720.00
5a	35	Switch	DSJ4813A	Network Switch	$70,875.00	$2,025.00
6a	35		0182643X12	T1/E1 Interface Panel	N/A	N/A
7a	0		0182643X14	4W Interface Panel	N/A	N/A
8a	70	Equipment Racks	THN1012	7' Equipment Racks w- Ground Bar	$30,905.00	$441.50

Line	Qty	Item	Part Number	Description	Bid	Additional Equipment Bid
1a	210	ASTRO 25 Repeater	To Include:	ASTRO 25 GTR8000 Repeater		
			T7054	GTR8000	$4,490,973.00	$128,313.50
			CA00293AA	Add 43RU		
			CA00855AA	ADD: 700/800 MHZ Mid Power		
			CA00883AA	ADD: 800MHZ Tx Filter		
			CA00877AA	ADD: Cab for Expansion Rack		
			CA00027AC	ADD: Front/back door		
			CA00879AA	ADD: Prime 6 Port Combiner		
			CA00303B	ADD: QTY 2 Site Controller		
			X306AC	ADD: QTY 6 GTR8000BR		
			X591AF	ENH: Astro 25 Site Repeater		
			X591AE	ENH: Astro 25 Site Repeater Software		
4a		Router	To Include:			
	35		ST2500	Router	$97,650.00	$2,790.00
	35		ST2512A	T1 Daughter Board	$25,200.00	$720.00
5a	35	Switch	DSJ4900B	Network Switch	$70,875.00	$2,025.00
8a	35	Equipment Racks	THN1012	7' Equipment Racks w- Ground Bar	$15,453.00	$441.50
9a	1	MCC7500	B1908	One Secure MCC 7500 IP Based Operator Position including PC hardware (No Network Equipment included)		$38,150.40

NOTE: GTR8000 Repeater line item includes Combining Network, Receiver Multicoupler Network, Redundant Site Controllers, Transmit Post Filter, and Cabinet with Doors.

Line				Additional Equipment Bid
9a	STR3000 Sub System	To Include:		
		SQM02SUM0011	STR 3000 BASE RADIO SUB-SYSTEM	$80,180.00
		X550AV	ADD: 800 MHZ PRIMARY TRANSMITTER/CO	
		CA00032AA	ADD:6 PORT 150KHZ CAV XMTR/CMB	
		CA00273AA	ADD: TRANSMIT FILTER CABLE	
		U669BE	ADD:12 CHANNEL POST TRANSMIT FILTER	
		X679AG	ADD: PRIMARY RECEIVER MULTICOUPLER	
		X699AH	ADD: STR 3000 FACTORY TEST REPORT	
		X304AB	ADD: QUANTITY 4 100 WATT DC BASE	
		CA00025AA	ADD: ASTRO 25 800 MHZ SIMULCAST TRU	
10a	STR3000 Sub System	To Include:		
		SQM02SUM0011	STR 3000 BASE RADIO SUB-SYSTEM	$98,580.00
		X550AV	ADD: 800 MHZ PRIMARY TRANSMITTER/CO	
		CA00032AA	ADD:6 PORT 150KHZ CAV XMTR/CMB	
		CA00273AA	ADD: TRANSMIT FILTER CABLE	
		U669BE	ADD:12 CHANNEL POST TRANSMIT FILTER	
		X679AG	ADD: PRIMARY RECEIVER MULTICOUPLER	
		X699AH	ADD: STR 3000 FACTORY TEST REPORT	
		X305AB	ADD: QUANTITY 5 100 WATT DC BASE	
		CA00025AA	ADD: ASTRO 25 800 MHZ SIMULCAST TRU	
11a	STR3000 Sub System	To Include:		
		SQM02SUM0011	STR 3000 BASE RADIO SUB-SYSTEM	$116,980.00
		X550AV	ADD: 800 MHZ PRIMARY TRANSMITTER/CO	
		CA00032AA	ADD:6 PORT 150KHZ CAV XMTR/CMB	
		CA00273AA	ADD: TRANSMIT FILTER CABLE	
		U669BE	ADD:12 CHANNEL POST TRANSMIT FILTER	
		X679AG	ADD: PRIMARY RECEIVER MULTICOUPLER	
		X699AH	ADD: STR 3000 FACTORY TEST REPORT	
		X306AB	ADD: QUANTITY 6 100 WATT DC BASE	
		CA00025AA	ADD: ASTRO 25 800 MHZ SIMULCAST TRU	

12a	**STR3000 Sub System**	**To Include:**		
		SQM02SUM0011	STR 3000 BASE RADIO SUB-SYSTEM	$43,380.00
		X550AV	ADD: 800 MHZ PRIMARY TRANSMITTER/CO	
		CA00032AA	ADD:6 PORT 150KHZ CAV XMTR/CMB	
		CA00273AA	ADD: TRANSMIT FILTER CABLE	
		U669BE	ADD:12 CHANNEL POST TRANSMIT FILTER	
		X679AH	ADD: EXPANSION RECEIVER MULTICOUPLER	
		X699AH	ADD: STR 3000 FACTORY TEST REPORT	
		X302AB	ADD: QUANTITY 2 100 WATT DC BASE	
		CA00025AA	ADD: ASTRO 25 800 MHZ SIMULCAST TRU	
13a	**STR3000 Station**	**T6374A**		$18,400.00
14a	**ASTROTAC**	**To Include:**		
		T6705	ASTROTAC 9600 Comparator	$2,960.00
		CA00091AA	Simulcast Trunking Option	$7,440.00
		X227AL	Add I/O Boards	$1,200.00 /per 2 I/O ports
		X153	Rack Mount Hardware	$ 0.00
15a	Network Equipment	DKN6119	CABLE,V.35,FLEXWAN,DTE 10FT	$ 112.50
16a	Network Equipment	ST2511	S2500 FLEXWAN DAUGHTER BOARD	$ 720.00
17a	Network Equipment	ST2500	S2500 MULTIPROTOCOL WAN ROUTER	$2,790.00
18a	Network Equipment	DSJ4813A (DSJ4900B)	HP PROCURVE SWITCH 2524	$2,025.00
19a	Network Equipment	DSJ4116A	HP PROCURVE SWITCH 2524 GIGABIT STA	N/A
18a	TTA	DSA490144 (DS42486A03)	TOWER TOP AMP, 1-BRANCH RX ONLY, 80	$11,945.70

7.2 BID SCHEDULE 2

7.X System Solution

The responder shall provide two itemized bid schedules. Due to budgetary considerations the State reserves the right to make a partial award of the bid. Each line Item shall be considered discrete and shall include all services, overhead for that portion of the bid.

Item:	Bid:
1 Zone 3 Master Site equipment, staging, and delivery	$ 4,012,014.00
1a. Additional Costs to Substitute GTR8000 Stations	$ 84,507.00
2 Zone 3 Maser Site installation	$ 19,806.00
3 Zone 3 Master Site startup and commissioning	$ 22,221.00
4 Zone 3 Master Site Integration	Included in 2&3
5 Zone 3 Field Acceptance Test	$ 5,797.00
6 Zone 4 Master Site equipment, staging, and delivery	$ 4,012,014.00
6a. Additional Cost to Substitute GTR8000 Stations	$ 84,507.00
7 Zone 4 Maser Site installation	$ 19,806.00
8 Zone 4 Master Site startup and commissioning	$ 22,221.00
9 Zone 4 Master Site Integration	Included in 6&7
10 Zone 4 Field Acceptance Test	$ 5,797.00
11 Rochester/Olmsted RF system cutover	$ 68,836.00
12 St. Cloud RF system cutover	$ 68,836.00
13 Stearns RF system cutover	Included in Item 12
14 Rochester/Olmsted console cutover	Included in Item 11
15 St. Cloud/Stearns console cutover	Included in Item 12
16 Upgrade of Metro System to 7.x *Upgrade Stipulation, SSA in place at time of Migration.	$ 5,395,656.00

17 Upgrade of Metro System to 7.x with UAP	$ 4,290,656.00
Additional cost for the required 3 year UAP	$ 6,963,924.00
Total Upgrade of Metro System to 7.x with 3 Year UAP	**$11,254,580.00**

Line	Qty	Item	Part Number	Description	Bid	Additional Equipment Bid
1a	210	ASTRO 25 Repeater	To Include:			
			C99ED	QUANTAR/QUANTRO FAMILY	$3,052,822.50	$14,537.00
			001C	QUANTAR STATION		
			X750	ADD: 800 MHZ BAND RX 806-825 MHZ/TX		
			X591AA	EHN: ASTRO 25 SITE REPEATER		
			X287	DEL: FUNCTIONAL MANUAL		
			X394	ADD: MULTI DROP UHSO CABLING		
			X87	DEL: CABINET		
			TTN5028A	HDW RACKMNT QUANTAR STDALONE		
2a	8	Programming/Manuals	To include:			
	8		6881132E22	PSC 9600 SERVICE MANUAL	$527.84	$65.98
	8		3080369E31	PROGRAMMING CABLE	$436.00	$54.50
	8		DLN6455	CONFIGURATION/SERVICE SOFTWARE	$160.00	$20.00
3a		Controller Redundant	To include:			
	70		T6782	Site Controller - PSC9600 "AC Powered"	$83,300.00	$1,190.00
	70		CA00192AA	ASTRO 25 Multi Zone Software	$161,700.00	$2,310.00
	35		3084225N24	Cable W/Mode Plug 8 cond	$323.05	$9.23
4a		Router	To Include:			
	35		ST2500	Router	$97,650.00	$2,790.00
	35		ST2512A	T1 Daughter Board	$25,200.00	$720.00
5a	35	Switch	DSJ4813A	Network Switch	$70,875.00	$2,025.00
6a	35		0182643X12	T1/E1 Interface Panel	N/A	N/A
7a	0		0182643X14	4W Interface Panel	N/A	N/A
8a	70	Equipment Racks	THN1012	7' Equipment Racks w- Ground Bar	$30,905.00	$441.50

Line	Qty	Item	Part Number	Description	Bid	Additional Equipment Bid
1a	210	ASTRO 25 Repeater	To Include:	ASTRO 25 GTR8000 Repeater		
			T7054	GTR8000	$4,490,973.00	$128,313.50
			CA00293AA	Add 43RU		
			CA00855AA	ADD: 700/800 MHZ Mid Power		
			CA00883AA	ADD: 800MHZ Tx Filter		
			CA00877AA	ADD: Cab for Expansion Rack		
			CA00027AC	ADD: Front/back door		
			CA00879AA	ADD: Prime 6 Port Combiner		
			CA00303B	ADD: QTY 2 Site Controller		
			X306AC	ADD: QTY 6 GTR8000BR		
			X591AF	ENH: Astro 25 Site Repeater		
			X591AE	ENH: Astro 25 Site Repeater Software		
4a		Router	To Include:			
	35		ST2500	Router	$97,650.00	$2,790.00
	35		ST2512A	T1 Daughter Board	$25,200.00	$720.00
5a	35	Switch	DSJ4900B	Network Switch	$70,875.00	$2,025.00
8a	35	Equipment Racks	THN1012	7' Equipment Racks w- Ground Bar	$15,453.00	$441.50
9a	1	MCC7500	B1908	One Secure MCC 7500 IP Based Operator Position including PC hardware (No Network Equipment included)		$38,150.40

NOTE: GTR8000 Repeater line item includes Combining Network, Receiver Multicoupler Network, Redundant Site Controllers, Transmit Post Filter, and Cabinet with Doors.

Line				Additional Equipment Bid
9a	**STR3000 Sub System**	**To Include:**		
		SQM02SUM0011	STR 3000 BASE RADIO SUB-SYSTEM	$80,180.00
		X550AV	ADD: 800 MHZ PRIMARY TRANSMITTER/CO	
		CA00032AA	ADD:6 PORT 150KHZ CAV XMTR/CMB	
		CA00273AA	ADD: TRANSMIT FILTER CABLE	
		U669BE	ADD:12 CHANNEL POST TRANSMIT FILTER	
		X679AG	ADD: PRIMARY RECEIVER MULTICOUPLER	
		X699AH	ADD: STR 3000 FACTORY TEST REPORT	
		X304AB	ADD: QUANTITY 4 100 WATT DC BASE	
		CA00025AA	ADD: ASTRO 25 800 MHZ SIMULCAST TRU	

10a	**STR3000 Sub System**	**To Include:**		
		SQM02SUM0011	STR 3000 BASE RADIO SUB-SYSTEM	$98,580.00
		X550AV	ADD: 800 MHZ PRIMARY TRANSMITTER/CO	
		CA00032AA	ADD:6 PORT 150KHZ CAV XMTR/CMB	
		CA00273AA	ADD: TRANSMIT FILTER CABLE	
		U669BE	ADD:12 CHANNEL POST TRANSMIT FILTER	
		X679AG	ADD: PRIMARY RECEIVER MULTICOUPLER	
		X699AH	ADD: STR 3000 FACTORY TEST REPORT	
		X305AB	ADD: QUANTITY 5 100 WATT DC BASE	
		CA00025AA	ADD: ASTRO 25 800 MHZ SIMULCAST TRU	
11a	**STR3000 Sub System**	**To Include:**		
		SQM02SUM0011	STR 3000 BASE RADIO SUB-SYSTEM	$116,980.00
		X550AV	ADD: 800 MHZ PRIMARY TRANSMITTER/CO	
		CA00032AA	ADD:6 PORT 150KHZ CAV XMTR/CMB	
		CA00273AA	ADD: TRANSMIT FILTER CABLE	
		U669BE	ADD:12 CHANNEL POST TRANSMIT FILTER	
		X679AG	ADD: PRIMARY RECEIVER MULTICOUPLER	
		X699AH	ADD: STR 3000 FACTORY TEST REPORT	
		X306AB	ADD: QUANTITY 6 100 WATT DC BASE	
		CA00025AA	ADD: ASTRO 25 800 MHZ SIMULCAST TRU	
12a	**STR3000 Sub System**	**To Include:**		
		SQM02SUM0011	STR 3000 BASE RADIO SUB-SYSTEM	$43,380.00
		X550AV	ADD: 800 MHZ PRIMARY TRANSMITTER/CO	
		CA00032AA	ADD:6 PORT 150KHZ CAV XMTR/CMB	
		CA00273AA	ADD: TRANSMIT FILTER CABLE	
		U669BE	ADD:12 CHANNEL POST TRANSMIT FILTER	
		X679AH	ADD: EXPANSION RECEIVER MULTICOUPLER	
		X699AH	ADD: STR 3000 FACTORY TEST REPORT	
		X302AB	ADD: QUANTITY 2 100 WATT DC BASE	
		CA00025AA	ADD: ASTRO 25 800 MHZ SIMULCAST TRU	
13a	**STR3000 Station**	**T6374A**		
14a	**ASTROTAC**	**To Include:**		

		T6705	ASTROTAC 9600 Comparator	$2,960.00
		CA00091AA	Simulcast Trunking Option	$7,440.00
		X227AL	Add I/O Boards	$1,200.00 /per 2 I/O ports
		X153	Rack Mount Hardware	$ 0.00
15a	Network Equipment	DKN6119	CABLE,V.35,FLEXWAN,DTE 10FT	$ 112.50
16a	Network Equipment	ST2511	S2500 FLEXWAN DAUGHTER BOARD	$ 720.00
17a	Network Equipment	ST2500	S2500 MULTIPROTOCOL WAN ROUTER	$2,790.00
18a	Network Equipment	DSJ4813A (DSJ4900B)	HP PROCURVE SWITCH 2524	$2,025.00
19a	Network Equipment	DSJ4116A	HP PROCURVE SWITCH 2524 GIGABIT STA	
18a	TTA	DSA490144 (DS42486A03)	TOWER TOP AMP, 1-BRANCH RX ONLY, 80	$11,945.70

Line				Additional Equipment Bid
9a	GTR8000 Sub System	To Include:		
		T7054	GTR8000	$93,033.50
		CA00293AA	Add 43RU	
		CA00855AA	ADD: 700/800 MHZ Mid Power	
		CA00883AA	ADD: 800MHZ Tx Filter	
		CA00877AA	ADD: Cab for Expansion Rack	
		CA00027AC	ADD: Front/back door	
		CA00879AA	ADD: Prime 6 Port Combiner	
		CA00303B	ADD: QTY 2 Site Controller	
		X304AC	ADD: QTY 4 GTR8000BR	
		X591AF	ENH: Astro 25 Site Repeater	
		X591AE	ENH: Astro 25 Site Repeater Software	

10a	GTR8000 Sub System	To Include:		
		T7054	GTR8000	$110,673.50
		CA00293AA	Add 43RU	
		CA00855AA	ADD: 700/800 MHZ Mid Power	
		CA00883AA	ADD: 800MHZ Tx Filter	
		CA00877AA	ADD: Cab for Expansion Rack	
		CA00027AC	ADD: Front/back door	
		CA00879AA	ADD: Prime 6 Port Combiner	
		CA00303B	ADD: QTY 2 Site Controller	
		X305AC	ADD: QTY 5 GTR8000BR	
		X591AF	ENH: Astro 25 Site Repeater	
		X591AE	ENH: Astro 25 Site Repeater Software	
11a	GTR8000 Sub System	To Include:		
		T7054 ✓	GTR8000	$128,313.50
		CA00293AA ✓	Add 43RU	
		CA00855AA ✓	ADD: 700/800 MHZ Mid Power	
		CA00883AA ✓	ADD: 800MHZ Tx Filter	
		CA00877AA ✓	ADD: Cab for Expansion Rack	
		CA00027AC ✓	ADD: Front/back door	
		CA00879AA ✓	ADD: Prime 6 Port Combiner	
		CA00303B ✓	ADD: QTY 2 Site Controller	
		X306AC ✓	ADD: QTY 6 GTR8000BR	
		X591AF ✓	ENH: Astro 25 Site Repeater	
		X591AE ✓	ENH: Astro 25 Site Repeater Software	
12a	GTR8000 Sub System	To Include:		
		T7054	GTR8000	$57,263.50
		CA00293AA	Add 43RU	
		CA00855AA	ADD: 700/800 MHZ Mid Power	
		CA00883AA	ADD: 800MHZ Tx Filter	
		CA00877AA	ADD: Cab for Expansion Rack	
		CA00027AC	ADD: Front/back door	
		CA00879AA	ADD: Prime 6 Port Combiner	
		CA00303B	ADD: QTY 2 Site Controller	
		X302AC	ADD: QTY 2 GTR8000BR	
		X591AF	ENH: Astro 25 Site Repeater	
		X591AE	ENH: Astro 25 Site Repeater Software	

APPENDIX DD—CHANGES TO ARMER CONCEPTUAL PLAN (MARCH 2008)

Changes to ARMER Conceptual Plan (March 2008)

Prepared by Mn/DOT Office of Electronic Communication

1.0 Summary of Proposed Changes

The following summary is intended to give a quick overview of the plan changes being proposed. Details of these proposed changes are outlined in the remainder of the document.

RF Coverage/Sites

Coverage criteria:

The conceptual plan had coverage criteria of 95% mobile coverage statewide. The Statewide Radio Board in May 0f 2006 adopted a new coverage criteria standard of 95% mobile coverage County by County with the exception of the area of the Boundary Waters. This new criteria has been applied and adds 40 sites to phase 4, 5 and 6. Applying this same to phase 3 adds an additional 9 new sites to phase 3.

Sites counts:

Phase 3	9 new sites from previously approved. One additional simulcast subsystem. Two sites in phase 3 added to a simulcast subsystem in phase 4.
Phase 4	Number of sites from 69 to 66
Phase 5	Number of sites from 62 to 81
Phase 6	Number of sites from 54 to 78

For Phase 4, 5 and 6 this is a change from 185 sites to 225 sites. Six simulcast subsystem in phase 456. One simulcast subsystem that includes two sites from phase 3.

MSO's

Number of Statewide MSO's

With the added sites for all phase the statewide number of MSO's required stays at 6 as indicated in the conceptual plan. This plan has capacity reserved in the MSO's for each County to add dispatch consoles and a local enhancement site.

Location of MSO's

The location of the MSO's changed with the move of Virginia to St Cloud in phase 3. The locations arte planned as Roseville, Golden Valley, Rochester, St Cloud, Detroit Lakes and Duluth.

Area served by each MSO

The areas covered by each MSO was originally planned to be the sites in the phase the MSO was purchased. The new plan is to have the MSO connect to the sites within the Regional Area Committee boundary. NW to Detroit Lakes, NE to Duluth, CM to St Cloud, SE and SC to Rochester, Metro to Golden Valley and Roseville and SW would connect to Golden Valley.

MSO Inter-zone link configuration

The inter Zone link count was increased to insure that no zone is more than two zones away from any other operating zones even with the failure of a zone.

Connectivity

The connectivity plan is a continuation of the connectivity plan approved for phase 3. This is a mix of current Mn/DOT digital microwave and new digital microwave with the use of diverse routing to provide redundant connection to critical equipment. Fiber is being researched as backup connectivity to critical microwave paths.

The connectivity is being planned for the final system build out with the implementation of the connectivity phased over the deployment as sites and routes become available.

Implementation

The conceptual plan called for the system to build phase by phase by the phased areas. With the funding available for all three phases the proposal is to build by coverage levels by populating existing state radio towers that are currently connected to digital microwave. This will provide a certain level of mobile coverage statewide that can be used immediately by regional users. Then sites would be added as they are built and the connectivity is put in place.

Interop

Will hold the money originally planned for interop equipment until planning is completed with the interop committees. ($2,500,00.00)

Cost Estimates

We are finalizing the cost estimates for Phase 4, 5 and 6. Our pricing is based on the current contract pricing for the Motorola equipment, the existing contract for microwave equipment, recent tower and shelter bids and the current bid prices from Phase 3 for the miscellaneous site equipment. Using these prices the estimates for Phase 4, 5 and 6 with the proposed site additions can be built for the appropriated $186,000,000.00.

We are still working on the estimate for the Phase 3 additions proposed. Until the remaining towers and shelters as currently approved are bid for phase 3 we will not be able to formalize what may be available in the phase 3 funding. These sites would not be built until after the current phase 3 sites are built or other funding sources identified.

2.0 Summary of adopted conceptual plan for Phases 4, 5 and 6:

2.01 RF System (coverage/site locations)

Original conceptual plan called for mobile coverage for 95% of the state.

2.02 Master Switching Offices (MSO) – Zone Controller

The conceptual plan called for the addition of one zone controller per phase with a final total of six zone controllers. Conceptual plan was for phase 3 to have and additional controller in Rochester, phase 4 adds a controller in Detroit Lakes, phase 5 adds a controller in Duluth and phase 6 adds a controller in Virginia.

2.03 Connectivity

The conceptual plan called for all sites to be interconnected by digital microwave configured in loop topologies with loop protection equipment.

2.04 Implementation Plan

The adopted conceptual plan called for an implementation by geographical phases.

2.05 Frequency Plan

Plan called for the use of 800 MHz channels. Making use of public safety channels, State assigned NPSPAC channels and County assigned NPSPAC channels.

2.06 Interop

This is directly from the conceptual plan:

A system plan will be needed to establish detail requirements for providing an interoperational system (Interop) that will facilitate communications between non-participating entities and those who choose to join the 800 MHz system.

A couple of options are under consideration at the time of this writing. It should be noted that these are offered as topics for discussion.

- *Use the existing Minnesota State Patrol VHF radio equipment that exists today. While some of this equipment is somewhat old in terms of electronics, it may serve as a temporary link between entities of dissimilar radio systems. Since the Patrol system and most equipment used by public safety agencies in the state are already programmed with the Sate Mutual Aid channels (MINSEF, MIMS and the Fire Mutual Aid frequencies) it may be the least expensive route to pursue.*

- *Use the existing county sheriff's radio system and equipment. However, this option would require all counties within the district being upgraded to participate in the shared statewide trunked system. It is unlikely that all counties will convert to the new system during the initial implementation phase, which would leave major gaps in the Interop system.*
- *Use a combination of the previously described options.*

This plan has provided some cost figures to provide for interoperability between the old and the new. Best estimates indicate that the cost to implement the Interop System statewide would be approximately $3.3 million.
Estimates and details of haw the Interop issue can be satisfied will be better addressed once funding has been approved and meetings begin with local units of government to determine their interest in participating on the Trunked System as well as their requirements.

For Phase 4, 5 and 6 the plan included $ 2,449,800.00 for Interop equipment. Basically it planned for $14,000 per site to purchase VHF repeaters.

2.07 Original Cost Estimates

Original estimates from Conceptual plan:

Phase 4 – This phase covers the Duluth and Brainerd State Patrol districts. The two districts cover 12.5 counties (half of St. Louis Co.)

	Numbers	Costs
Counties Involved	12.5	-
New Towers: Includes Land,Shelters,Generators, Site Prep Work	39	$13,472,000
Existing Towers Modifications	27 3	$ 0.00 $ 498,000
800 Fixed Equipment	5 chnl stations	$10,669,200
Interop Eqp/Control	69 sites / 1 Zone Cont	$ 4,966,000
Microwave Eqp	Loop, High cap, Hot Stand-by	$13,065,000
Engineering	Trunk & Microwave	$6,500,000
TOTALS		$49,170,200

Phase 5 –This phase encompasses three Patrol districts – Mankato, Marshall, and Detroit Lakes. This phase will include 31 counties.

	Numbers	Costs
Counties Involved	31	-
New Towers: Includes Land,Shelters,Generators, Site Prep Work	40	$13,920,000
Existing Towers Modifications	15 7	$ 0.00 $ 689,000
800 Fixed Equipment	5 chnl stations	$ 9,727,800
Interop Eqp/Control	62 sites / 1 Zone Cont	$ 4,868,000
Microwave Eqp	Loop, High cap, Hot Stand-by	$15,640,000
Engineering	Trunk & Microwave	$6,500,000
TOTALS		$51,344,800

Phase 6 –This phase covers the Virginia and Thief River Falls Patrol districts. These two districts include 11.5 counties.

	Numbers	Costs
Counties Involved	11.5	-
New Towers: Includes Land,Shelters,Generators, Site Prep Work	32	$11,136,000
Existing Towers Modifications	15 7	$ 0.00 $ 1,220,000
800 Fixed Equipment	5 chnl stations	$ 8,315,700
Interop Eqp/Control	54 sites / 1 Zone Cont	$ 4,756,000
Microwave Eqp	Loop, High cap, Hot Stand-by	$12,200,000
Engineering	Trunk & Microwave	$6,500,000
TOTALS		$44,127,700

3.0 Details of Proposed Plan Changes for Phases 4, 5 and 6.

Since the approval of funding for Phase 4, 5 and 6 Mn/DOT has been looking at what it will take to implement these phases. This work has been based on the following assumptions:

- Seamless system operation through out different ARMER phases.
- Make use of existing Mn/DOT sites where possible.
- Make use of City or County property or towers where they fit the plan and the site search area.
- Make use of existing Mn/DOT digital microwave where available and capacity exists.
- Implement the voice RF coverage within phase 4, 5 and 6 with the allocated $186 million.
- Make use of internal Mn/DOT staff where possible to keep costs in line.

3.01 RF System (Coverage/Site locations/Channel Capacity)

The RF system design from the ARMER conceptual plan was 95 % mobile coverage statewide. In 2007 the Statewide Radio Board adopted a coverage design requirement of 95 mobile converge on a county by county bases. The new target RF coverage level is 33 dbu, 95% of area, 95% of time over 95 % of each County.

See Appendix A for more detail on the coverage prediction methods used and for County maps showing the predicted coverage in Phases 4, 5 and 6.

From this the sites counts changes as follows:

Phase 4 Number of sites from 69 to 66

Phase 5 Number of sites from 62 to 81

Phase 6 Number of sites from 54 to 78

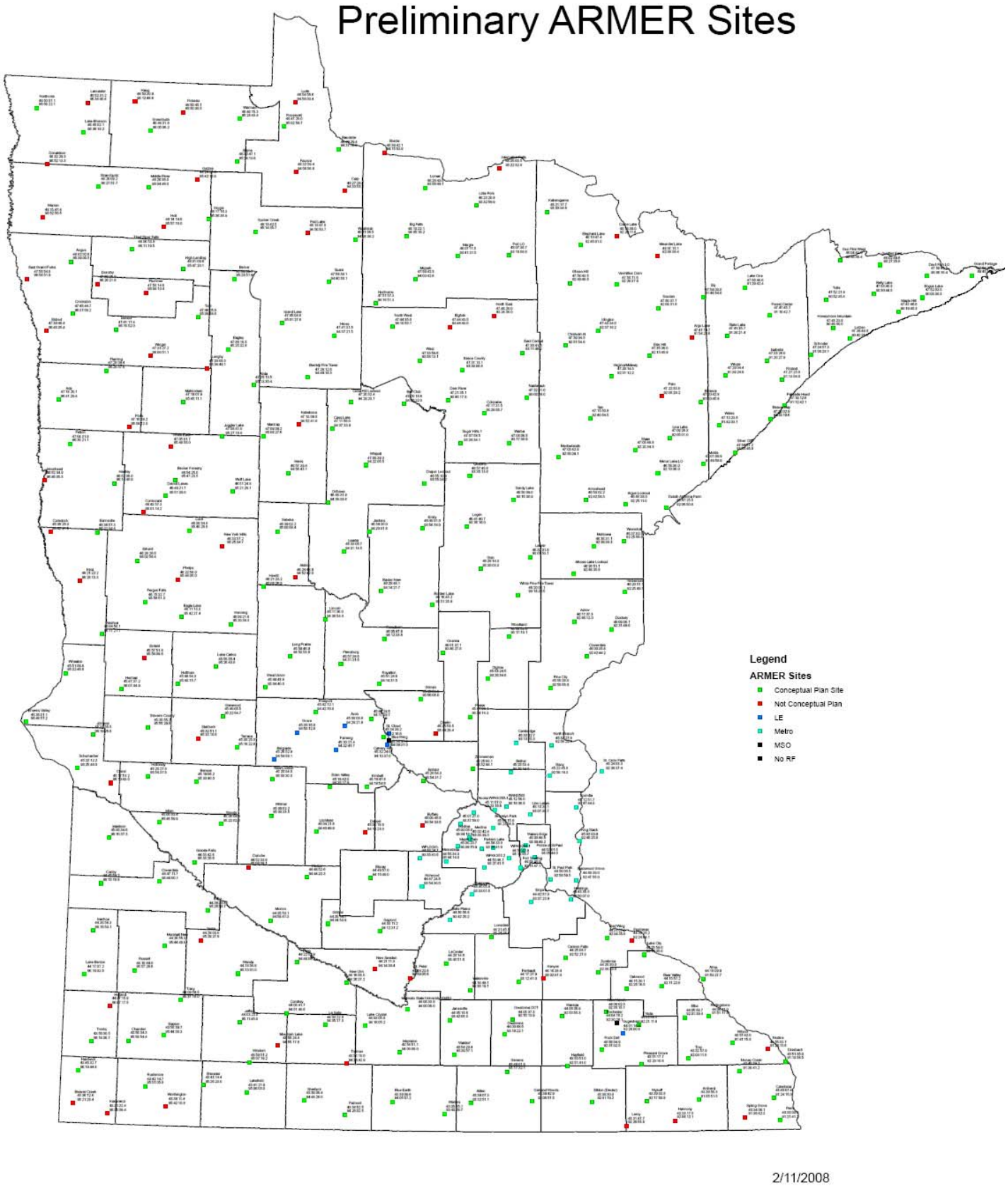
For Phase 4, 5 and 6 this is a change from 185 sites to 225 sites.

Due to frequency limitations we are also recommending the following sites be built as simulcast subsystems:

- Duluth, Argus Lookout and Wrenshall
- Maple Hill, Bogus Lake, Devil Fish LO and Grand Portage
- Gunflint East, Gunflint West, Belly Lake and Tofte
- Honeymoon Mountain, Schroeder and Lutzen

- Princeton with phase 3 sites Duelm and Gillman
- Mankato, St Peter and New Sweden

Based upon the coverage changes the following map and tables list the proposed sites for phase 4, 5 and 6. The sites names are a general area for the locations of the towers. The actual site location and names will vary as we complete the site acquisition process.



Map is missing the new site in Houston County and the new site Traverse County.

Phase 4, 5 and 6 sites Table

Phase	RAC	Zone Connection	COUNTY	SITE NAME	Site Type	Antennas System	# RF Channels
4	CM	Zone 4	Mille lacs	Onamia	ISR	800	5
4	CM	Zone 4	Mille lacs	Princeton	Simulcast-12	800	5
4	CM	Zone 4	Morrison	Flensburg	ISR	800	5
4	CM	Zone 4	Morrison	Freedhem	ISR	800	5
4	CM	Zone 4	Morrison	Royalton	ISR	800	5
4	NE	Zone 5	Aitkin	Glen	ISR	800	5
4	NE	Zone 5	Aitkin	Lawler	ISR	800	5
4	NE	Zone 5	Aitkin	Logan	ISR	800	5
4	NE	Zone 5	Aitkin	Quadna	ISR	800	5
4	NE	Zone 5	Aitkin	Sandy Lake	ISR	800	5
4	NE	Zone 5	Aitkin	White Pine Fire Tower	ISR	800	5
4	NE	Zone 5	Carlton	Mahtowa	ISR	800	5
4	NE	Zone 5	Carlton	Moose Lake Lookout	ISR	800	5
4	NE	Zone 5	Carlton	Wrenshall	Simulcast-8	800	5
4	NE	Zone 5	Cass	Ball Club	ISR	800	5
4	NE	Zone 5	Cass	Cass Lake	ISR	800	5
4	NE	Zone 5	Cass	Cuba Hill Lookout	ISR	800	5
4	NE	Zone 5	Cass	Draper Lookout	ISR	800	5
4	NE	Zone 5	Cass	Leader	ISR	800	5
4	NE	Zone 5	Cass	Oshawa	ISR	800	5
4	NE	Zone 5	Cass	Whipolt	ISR	800	5
4	NE	Zone 5	Cook	Belly Lake	Simulcast-9	800	5
4	NE	Zone 5	Cook	Bogus Lake	Simulcast-10	800	5
4	NE	Zone 5	Cook	Devil Fish LO	Simulcast-10	800	5
4	NE	Zone 5	Cook	Grand Portage	Simulcast-10	800	5
4	NE	Zone 5	Cook	Gun Flint West	Simulcast-9	800	5
4	NE	Zone 5	Cook	Gunflint East	Simulcast-9	800	5
4	NE	Zone 5	Cook	Honeymoon Mountain	Simulcast-11	800	5
4	NE	Zone 5	Cook	Lutzen	Simulcast-11	800	5
4	NE	Zone 5	Cook	Maple Hill	Simulcast-10	800	5

Phase	RAC	Zone Connection	COUNTY	SITE NAME	Site Type	Antennas System	# RF Channels
4	NE	Zone 5	Cook	Schroder	Simulcast-11	800	5
4	NE	Zone 5	Cook	Tofte	Simulcast-9	800	5
4	NE	Zone 5	Crow Wing	Baxter	ISR	800	5
4	NE	Zone 5	Crow Wing	Borden Lake	ISR	800	5
4	NE	Zone 5	Crow Wing	Emily	ISR	800	5
4	NE	Zone 5	Crow Wing	Jenkins	ISR	800	5
4	NE	Zone 1	Kanabec	Olgilvie	ISR	800	5
4	NE	Zone 1	Kanabec	Woodland	ISR	800	5
4	NE	Zone 5	Lake	Beaver Bay	ISR	800	5
4	NE	Zone 5	Lake	Finland	ISR	800	5
4	NE	Zone 5	Lake	Forest Center	ISR	800	5
4	NE	Zone 5	Lake	Isabella	ISR	800	5
4	NE	Zone 5	Lake	Lake One	ISR	800	5
4	NE	Zone 5	Lake	Palisade Head	ISR	800	5
4	NE	Zone 5	Lake	Silver Cliff	ISR	800	5
4	NE	Zone 5	Lake	Slate Lake	ISR	800	5
4	NE	Zone 5	Lake	Wales	ISR	800	5
4	NE	Zone 5	Lake	Whyte	ISR	800	5
4	NE	Zone 1	Pine	Askov	ISR	800	5
4	NE	Zone 1	Pine	Cloverdale	ISR	800	5
4	NE	Zone 1	Pine	Duxbury	ISR	800	5
4	NE	Zone 1	Pine	Nickerson	ISR	800	5
4	NE	Zone 1	Pine	Pine City	ISR	800	5
4	NE	Zone 5	St. Louis	Argus Lookout	Simulcast-8	800	5
4	NE	Zone 5	St. Louis	Arrowhead	ISR	800	5
4	NE	Zone 5	St. Louis	Brimson	ISR	800	5
4	NE	Zone 5	St. Louis	Duluth Antenna Farm	Simulcast-8	800	5
4	NE	Zone 5	St. Louis	Line Lake	ISR	800	5
4	NE	Zone 5	St. Louis	Mirror Lake LO	ISR	800	5
4	NE	Zone 5	St. Louis	Molde	ISR	800	5
4	NE	Zone 5	St. Louis	Palo	ISR	800	5
4	NE	Zone 5	St. Louis	Shaw	ISR	800	5
4	NW	Zone 6	Hubbard	Mantrap	ISR	800	5
4	NW	Zone 6	Hubbard	Nevis	ISR	800	5

Phase	RAC	Zone Connection	COUNTY	SITE NAME	Site Type	Antennas System	# RF Channels
5	CM	Zone 4	Douglas	Lake Carlos	ISR	800	5
5	CM	Zone 4	Grant	Erdahl	ISR	800	5
5	CM	Zone 4	Otter Tail	Eagle Lake	ISR	800	5
5	CM	Zone 4	Otter Tail	Erhard	ISR	800	5
5	CM	Zone 4	Otter Tail	Fergus Falls	ISR	800	5
5	CM	Zone 4	Otter Tail	Henning	ISR	800	5
5	CM	Zone 4	Otter Tail	Luce	ISR	800	5
5	CM	Zone 4	Otter Tail	New York Mills	ISR	800	5
5	CM	Zone 4	Otter Tail	Phelps	ISR	800	5
5	CM	Zone 4	Todd	Hewitt	ISR	800	5
5	CM	Zone 4	Wadena	Aldrich	ISR	800	5
5	CM	Zone 4	Wadena	Sebeka	ISR	800	5
5	CM	Zone 4	Wilkin	Barnsville	ISR	800	5
5	CM	Zone 4	Wilkin	Comstock	ISR	800	5
5	CM	Zone 4	Wilkin	Kent	ISR	800	5
5	CM	Zone 4	Wilkin	Nashua	ISR	800	5
5	NW	Zone 6	Becker	Becker Forestry	ISR	800	5
5	NW	Zone 6	Becker	Cormorant	ISR	800	5
5	NW	Zone 6	Becker	Detroit Lakes	ISR	800	5
5	NW	Zone 6	Becker	Juggler Lake	ISR	800	5
5	NW	Zone 6	Becker	White Earth	ISR	800	5
5	NW	Zone 6	Becker	Wolf Lake	ISR	800	5
5	NW	Zone 6	Clay	Felton	ISR	800	5
5	NW	Zone 6	Clay	Hawley	ISR	800	5
5	NW	Zone 6	Clay	Moorhead	ISR	800	5
5	NW	Zone 6	Mahnomen	Mahnomen	ISR	800	5
5	NW	Zone 6	Norman	Ada	ISR	800	5
5	NW	Zone 6	Norman	Flaming	ISR	800	5
5	NW	Zone 6	Norman	Flom	ISR	800	5
5	SC	Zone 3	Blue Earth	Blue Earth	ISR	800	5
5	SC	Zone 3	Blue Earth	Mankato State University KMSU	Simulcast-7	800	5
5	SC	Zone 3	Blue Earth	Mapleton	ISR	800	5
5	SC	Zone 3	Brown	Evan	ISR	800	5
5	SC	Zone 3	Brown	New Ulm	ISR	800	5

Phase	RAC	Zone Connection	COUNTY	SITE NAME	Site Type	Antennas System	# RF Channels
5	SC	Zone 3	Faribault	Blue Earth	ISR	800	5
5	SC	Zone 3	Faribault	Walters	ISR	800	5
5	SC	Zone 3	Lesuer	LeCenter	ISR	800	5
5	SC	Zone 3	Martin	Faimont	ISR	800	5
5	SC	Zone 3	Martin	Sherburn	ISR	800	5
5	SC	Zone 3	McLeod	Biscay	ISR	800	5
5	SC	Zone 3	Nicollet	New Sweden	Simulcast-7	800	5
5	SC	Zone 3	Nicollet	St. Peter	Simulcast-7	800	5
5	SC	Zone 3	Sibley	Gaylord	ISR	800	5
5	SC	Zone 3	Sibley	Gibbon	ISR	800	5
5	SC	Zone 3	Waseca	Janesville	ISR	800	5
5	SC	Zone 3	Waseca	Waldorf	ISR	800	5
5	SC	Zone 3	Watonwan	Comfrey	ISR	800	5
5	SC	Zone 3	Watonwan	La Salle	ISR	800	5
5	SC	Zone 3	Watonwan	Truman	ISR	800	5
5	SW	Zone 2	Chippewa	Granite Falls	ISR	800	5
5	SW	Zone 2	Chippewa	Milan	ISR	800	5
5	SW	Zone 2	Chippewa	Woods	ISR	800	5
5	SW	Zone 2	Cottonwood	Jeffers	ISR	800	5
5	SW	Zone 2	Cottonwood	Mountain Lake	ISR	800	5
5	SW	Zone 2	Cottonwood	Windom	ISR	800	5
5	SW	Zone 2	Jackson	Lakefield	ISR	800	5
5	SW	Zone 2	Lac Qui Parle	Madison	ISR	800	5
5	SW	Zone 2	Lesuer	Waterville	ISR	800	5
5	SW	Zone 2	Lincoln	Ivanhoe	ISR	800	5
5	SW	Zone 2	Lincoln	Lake Benton	ISR	800	5
5	SW	Zone 2	Lyon	Marshall New	ISR	800	5
5	SW	Zone 2	Lyon	Russell	ISR	800	5
5	SW	Zone 2	Murray	Chandler	ISR	800	5
5	SW	Zone 2	Murray	Slayton	ISR	800	5
5	SW	Zone 2	Murray	Tracy	ISR	800	5
5	SW	Zone 2	Nobles	Brewster	ISR	800	5
5	SW	Zone 2	Nobles	Rushmore	ISR	800	5
5	SW	Zone 2	Nobles	Worthington	ISR	800	5
5	SW	Zone 2	Pipestone	Holland	ISR	800	5

Phase	RAC	Zone Connection	COUNTY	SITE NAME	Site Type	Antennas System	# RF Channels
5	SW	Zone 2	Pipestone	Trosky	ISR	800	5
5	SW	Zone 2	Redwood	Vesta	ISR	800	5
5	SW	Zone 2	Redwood	Wanda	ISR	800	5
5	SW	Zone 2	Renville	Danube	ISR	800	5
5	SW	Zone 2	Renville	Hector	ISR	800	5
5	SW	Zone 2	Renville	Morton	ISR	800	5
5	SW	Zone 2	Rock	Beaver Creek	ISR	800	5
5	SW	Zone 2	Rock	Hardwick	ISR	800	5
5	SW	Zone 2	Rock	Kanaranzi	ISR	800	5
5	SW	Zone 2	Yellow Medicine	Canby	ISR	800	5
5	SW	Zone 2	Yellow Medicine	Cloverdale	ISR	800	5
5	SW	Zone 2	Yellow Medicine	Echo	ISR	800	5
6	NE	Zone 5	Itasca	Bigfork	Simulcast -6	800	8
6	NE	Zone 5	Itasca	Colerain	Simulcast -6	800	8
6	NE	Zone 5	Itasca	Deer River	Simulcast -6	800	8
6	NE	Zone 5	Itasca	East Central	Simulcast -6	800	8
6	NE	Zone 5	Itasca	Itasca County	Simulcast -6	800	8
6	NE	Zone 5	Itasca	Nashwauk	Simulcast -6	800	8
6	NE	Zone 5	Itasca	North East	Simulcast -6	800	8
6	NE	Zone 5	Itasca	North West	Simulcast -6	800	8
6	NE	Zone 5	Itasca	Sugar Hills 1	Simulcast -6	800	8
6	NE	Zone 5	Itasca	Warba	Simulcast -6	800	8
6	NE	Zone 5	Itasca	West	Simulcast -6	800	8
6	NE	Zone 5	Koochiching	Big Falls	ISR	800	5
6	NE	Zone 5	Koochiching	Border	ISR	800	5
6	NE	Zone 5	Koochiching	Fort LO	ISR	800	5
6	NE	Zone 5	Koochiching	International Falls	ISR	800	5
6	NE	Zone 5	Koochiching	Little Fork	ISR	800	5
6	NE	Zone 5	Koochiching	Loman	ISR	800	5
6	NE	Zone 5	Koochiching	Margie	ISR	800	5
6	NE	Zone 5	Koochiching	Mizpah	ISR	800	5
6	NE	Zone 5	Koochiching	Northome	ISR	800	5
6	NE	Zone 5	St. Louis	Argo Lake	ISR	800	5
6	NE	Zone 5	St. Louis	Chisholm N	ISR	800	5
6	NE	Zone 5	St. Louis	Crane Lake	ISR	800	5

Phase	RAC	Zone Connection	COUNTY	SITE NAME	Site Type	Antennas System	# RF Channels
6	NE	Zone 5	St. Louis	Elephant Lake	ISR	800	5
6	NE	Zone 5	St. Louis	Ely	ISR	800	5
6	NE	Zone 5	St. Louis	Erie Hill	ISR	800	5
6	NE	Zone 5	St. Louis	Gheen Hill	ISR	800	5
6	NE	Zone 5	St. Louis	Idington	ISR	800	5
6	NE	Zone 5	St. Louis	Kabetogama	ISR	800	5
6	NE	Zone 5	St. Louis	Meander Lake	ISR	800	5
6	NE	Zone 5	St. Louis	Medowlands	ISR	800	5
6	NE	Zone 5	St. Louis	Sax	ISR	800	5
6	NE	Zone 5	St. Louis	Soudan	ISR	800	5
6	NE	Zone 5	St. Louis	Vermillion Dam	ISR	800	5
6	NE	Zone 5	St. Louis	Virginia/Midway	ISR	800	5
6	NW	Zone 6	Beltrami	Bemidji Fire Tower	ISR	800	5
6	NW	Zone 6	Beltrami	Graylag	ISR	800	5
6	NW	Zone 6	Beltrami	Hines	ISR	800	5
6	NW	Zone 6	Beltrami	Island Lake	ISR	800	5
6	NW	Zone 6	Beltrami	Red Lake	ISR	800	5
6	NW	Zone 6	Beltrami	Suam	ISR	800	5
6	NW	Zone 6	Beltrami	Sucker Creek	ISR	800	5
6	NW	Zone 6	Beltrami	Washkish	ISR	800	5
6	NW	Zone 6	Clearwater	Alida	ISR	800	5
6	NW	Zone 6	Clearwater	Bagley	ISR	800	5
6	NW	Zone 6	Clearwater	Berner	ISR	800	5
6	NW	Zone 6	Hubbard	Kabekona	ISR	800	5
6	NW	Zone 6	Kittson	Lake Bronson	ISR	800	5
6	NW	Zone 6	Kittson	Lancaster	ISR	800	5
6	NW	Zone 6	Kittson	Northcote	ISR	800	5
6	NW	Zone 6	Lake of the Woods	Baudette	ISR	800	5
6	NW	Zone 6	Lake of the Woods	Carp	ISR	800	5
6	NW	Zone 6	Lake of the Woods	Faunce	ISR	800	5
6	NW	Zone 6	Lake of the Woods	Lude	ISR	800	5
6	NW	Zone 6	Lake of the Woods	Roosevelt	ISR	800	5
6	NW	Zone 6	Marshall	Donaldson	ISR	800	5
6	NW	Zone 6	Marshall	Gatzke	ISR	800	5
6	NW	Zone 6	Marshall	Holt	ISR	800	5

Phase	RAC	Zone Connection	COUNTY	SITE NAME	Site Type	Antennas System	# RF Channels
6	NW	Zone 6	Marshall	Middle River	ISR	800	5
6	NW	Zone 6	Marshall	Strandquist	ISR	800	5
6	NW	Zone 6	Marshall	Warren	ISR	800	5
6	NW	Zone 6	Pennington	High Landing	ISR	800	5
6	NW	Zone 6	Pennington	Thief River Falls	ISR	800	5
6	NW	Zone 6	Polk	Angus	ISR	800	5
6	NW	Zone 6	Polk	Crookston	ISR	800	5
6	NW	Zone 6	Polk	East Grand Forks	ISR	800	5
6	NW	Zone 6	Polk	Eldred	ISR	800	5
6	NW	Zone 6	Polk	Lengby	ISR	800	5
6	NW	Zone 6	Polk	Mentor	ISR	800	5
6	NW	Zone 6	Polk	Trail	ISR	800	5
6	NW	Zone 6	Polk	Winger	ISR	800	5
6	NW	Zone 6	Red Lake	Dorothy	ISR	800	5
6	NW	Zone 6	Red Lake	Plummer	ISR	800	5
6	NW	Zone 6	Roseau	Greenbush	ISR	800	5
6	NW	Zone 6	Roseau	Haug	ISR	800	5
6	NW	Zone 6	Roseau	Roseau	ISR	800	5
6	NW	Zone 6	Roseau	Skime	ISR	800	5
6	NW	Zone 6	Roseau	Warroad	ISR	800	5

3.02 Master Switching Office (MSO) - Zone Controllers

Each MSO is capable of handling 99 ports of connectivity. Each RF site consumes 1 port. Each dispatch location consumes 1 port. Each network management connection consumes 1 port.

The following table summarizes the number of connection needs to deploy the ARMER system. The planned ARMER sites along with the currently built local enhancements are included in the number of RF sites. An addition site is included for each county that has not currently built.

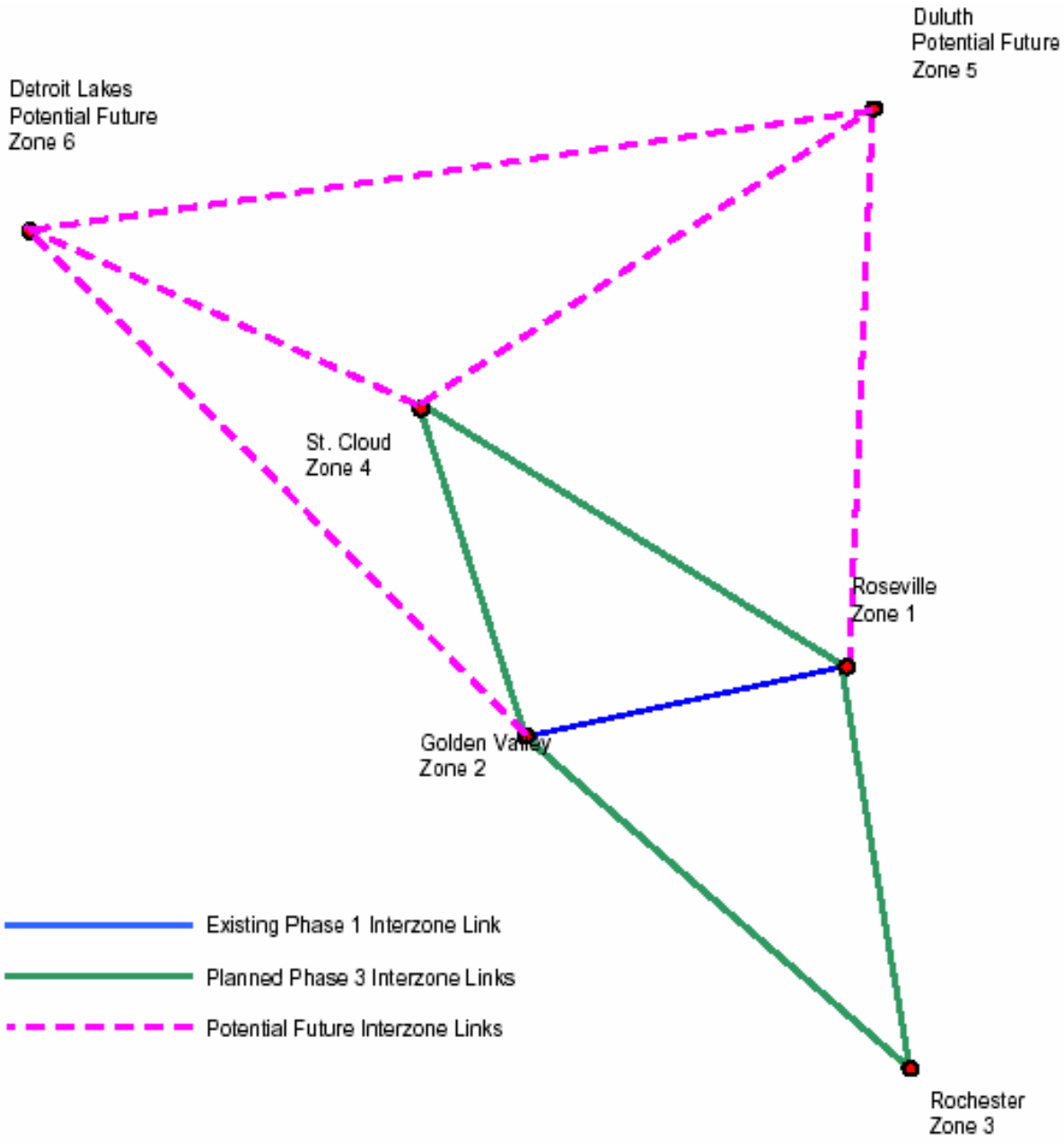
The Dispatch counts include the currently connected dispatch center and a port for each county PSAP, out state Patrol dispatch, and 2 additional connections per RAC area for EMS or Transit dispatch center.

If any of the MSO's is brought to capacity addition site or dispatch center would be shifted to the capacity in Roseville or Golden Valley.

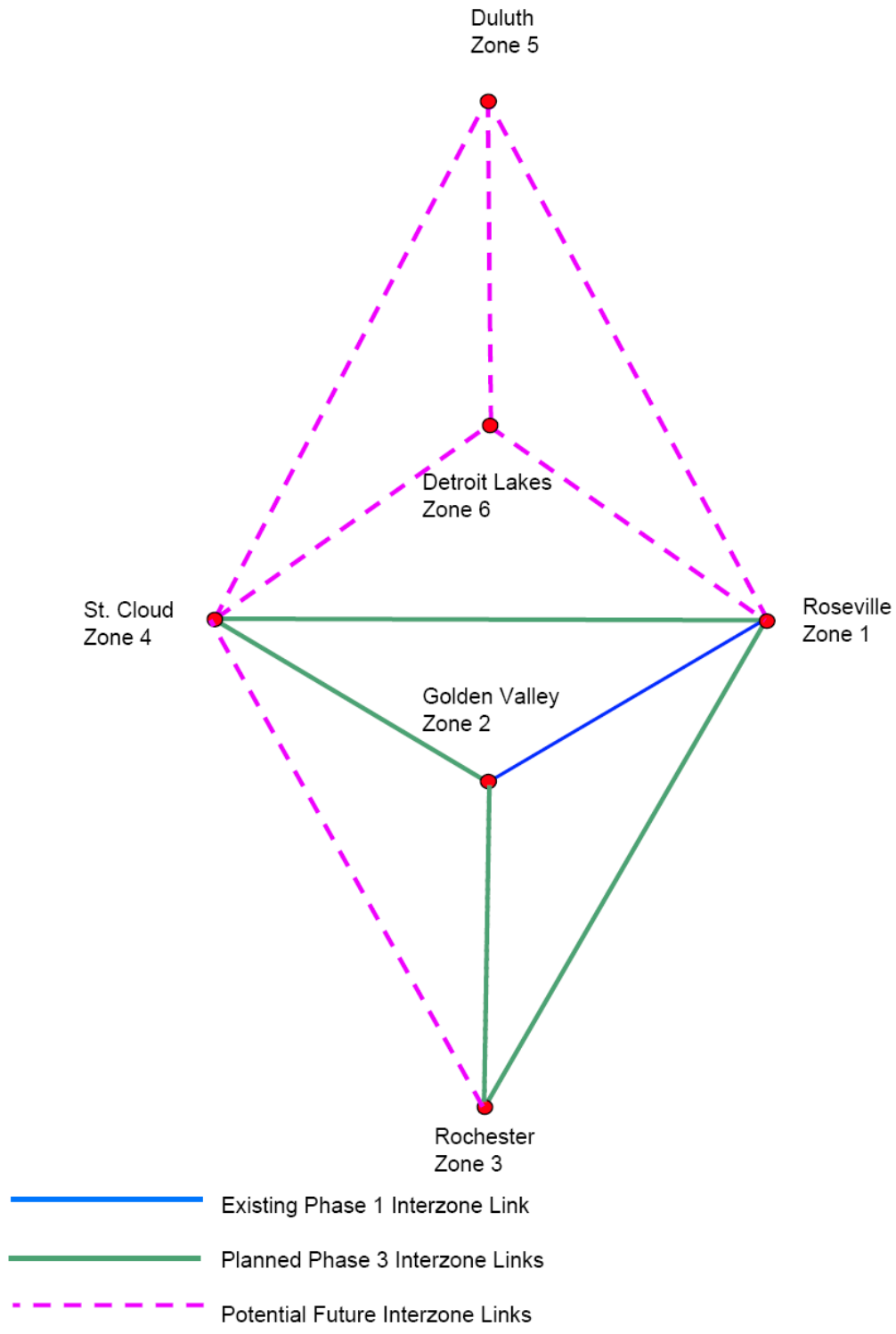
Zone assignments:

Area connected to MSO	MSO (Zone)	MSO Location	Number of Counties per MSO	Number of RF Sites per MSO	Number of Dispatch Location per MSO	Approximate Site count unassigned	Network management ports	TOTAL
Metro (Plus Pine and Kanabec Counties)	1	Roseville	9	14	20	4	6	44
Metro SW	2	Golden Valley	15	35	30	13	6	84
SE SC	3	Rochester	21	46	23	21	6	96
CM	4	St Cloud	19	50	21	19	6	96
NE (Minus Pine and Kanabec Counties)	5	Duluth	9	64	14	11	6	95
NW	6	Detroit Lakes	14	58	16	14	6	94

Previously proposed Inter-zone link plan:



New proposed Inter-zone links:



3.03 Connectivity

Microwave Radio Links

The sites in the ARMER System will be interconnected by microwave radio links. The links will be configured as shown in the maps on the following pages. The microwave connections will be 4DS3, 3DS3, 28T1 or 8T1 radios as show in the microwave maps. All radios will be configured as hot standby protected.

The basic microwave configuration will be in loop configurations with spurs to the end sites. Loop switch protection will not be used in the ARMER microwave plan; instead a method of diverse route protection will be employed for critical infrastructure protection. The diverse route protection will be based on the following guidelines:

Inter-zone Links	Required diverse routing by different microwave routes or by microwave and fiber as a alternate route.
Prime Site Controller to MSO links	Required diverse routing by different microwave routes or by microwave and fiber as a backup route.
Prime site controller to remote site links	To be determined on a site by site bases and connectivity available.
ISR site to MSO links	These sites will be bundled together, 3 or 4 sites into a single T1 that is diverse route protected.
Console to MSO links	Not protected by diverse routing. Dispatch centers should all plan on control station for backup in the event of a loss of console connectivity. The dispatch centers could also add diverse routing at their expense by provide the alternate microwave, fiber or phone line connections. All dispatch centers should also have radio control stations for backup purposes.
Conventional RF and interop equipment	Not protected by diverse routing.
Site monitoring links to MSO	Provided by a single redundant T1 system wide.

T1 assignments and T1 channel plans

The T1 assignments and Channel plans will be developed as part of the DDR and installation process. The actual T1 assignments will be determine as the system is installed. The T1 assignments will be changed as required for system additions and changes.

The plans are to assign a T1 from each radio site to the MSO and provide site interconnection at a DACS located at the MSO.

Diverse T1 routing and protection switching will be installed on the ISR sites and Simulcast PSC sites.

Since the microwave will be replacing or making use of existing Mn/DOT microwave the Mn/DOT, Patrol and DNR legacy VHF and the Patrol MDC system equipment will need to be put onto the digital microwave. This payload will be incorporated into the T1 assignments and

channels plans as the build out progresses. The Mn/DOT, Patrol and DNR legacy equipment will not make use of diverse routing unless the channels are packed into a T1 that is diverse routed for the ARMER System.

Fiber routes

Fiber connections are being investigated to connect the St Cloud MSO back to Waters Edge and from Rochester back to Waters Edge.

The St Cloud fiber connection would make use of the connecting Minnesota fiber along Interstate 94. Approximately 4 mile of new fiber will need to be added between Mn/DOT fiber and City of St Cloud fiber to complete a connection to the Mn/DOT district office. A design has not been completed and the use of connecting MN fiber has not been approved. Work on this connection is ongoing at Mn/DOT.

The St Cloud fiber connection would make use of the connecting Minnesota fiber along Interstate 94. Approximately 4 mile of new fiber will need to be added between Mn/DOT fiber and City of St Cloud fiber to complete a connection to the Mn/DOT district office. A design has not been completed and the use of connecting MN fiber has not been approved. Work on this connection is ongoing at Mn/DOT.

We are investigating the lease of dark fiber between the Metro and Rochester. This has not been finalized. Initial work indicates that dark fiber may be available at a reasonable rate.

Future RF network

The design of the microwave makes use of 3DS3 microwave as the primary links. The plan is to use 1-DS3 as a network to connect the RF sites. We are working with Motorola on the concept of connecting the sites by a network and eliminating the need for T1 type connectivity for the RF sites or console locations. This concept is not currently published on Motorola's roadmap but indications are that it is possible and will likely be added to the roadmap in the future.

Site alarming

For site alarm monitoring Mn/DOT is developing an in house system. The new system is called the Site Monitoring and Alarm Reporting Tool (SMART) System. The SMART System is being designed as an "open" and cost conscience multi-user platform providing access and configuration to all agencies while maintaining some degree of separation. The network backbone of the SMART System will utilize a small portion of bandwidth between adjacent microwave towers eliminating the need for messy cross-connects and providing separation from the 800MHz network. The database utilized by the SMART system is an enterprise grade database licensed under the GNU License meaning it is a free distribution reducing the need for costly licensing fees. During the design of the SMART system emphasis is being put

on providing support for 3rd party equipment vendors, ease of use and configuration, multi-agency access and configuration, redundant routing, intelligent notification and paging, open client access methods, and above all user and administrator friendliness.

3.04 Implementation

The conceptual plan called for the system to build phase by phase by the phased areas. With the funding available for all three phases the proposal is to build by coverage levels by populating existing state radio towers that are currently connected to digital microwave. This will provide a certain level of mobile coverage statewide that can be used immediately by regional users. Then sites would be added as they are built and the connectivity is put in place.

Phased implementation of coverage for Phase 4, 5 and 6

Mn/DOT current has or plans in 2008 to build towers and connect in the phase 456 area. At the end of 2008 we will have about 80 sites that could be populated with RF equipment.

So the plan would be to:

- Contract for system equipment and get the two remaining zones installed and inter-zoned link
- License all existing sites; install RF equipment when contract and funding is available.
- This would provide statewide 800 coverage at a lower coverage footprint by the end of 2009.
- As new sites are added and connected add them to the coverage footprint.

Phased implementation of Connectivity Plan

- Use existing microwave where available to make the RF connection needed for statewide coverage. System equipment may not have the system required diverse route connection for this initial installation.
- Upgrade links to the final planned capacity. Move replaced low capacity link out to end hops or use for temporary site connection of new sites.
- Install new sites by spur links to get added to the system. Convert the link to the final configuration as adjoining sites are brought into place.
- Make diverse route connection when the diverse paths become available.

3.05 Frequency plan

The frequency plan for Phase 456 makes use of 800 MHz and 700 MHz channels.

See Appendix D for the current listing of the NPSPSC 800 MHz frequency plan for ARMER.

The plan is to insure we have five 800 MHz channels at each of the sites in phase 4, 5 and 6. The use of 700 MHz channels is planned for channel capacity growth in the future.

We are also looking at the 700 MHz assignments to determine how we can make use of these channels. The GTR stations currently being implemented for phase are capable of 700 or 800 MHz. The GTR stations are also planned for use in phase 4, 5 and 6. Due to the increased cost of the 700/800 system antennas and tower top amps, 700 MHz channel are only being planned and installed where we find that we cannot assign enough 800 MHz channels.

All sites in the system will be capable of handling the 800 MHz only radios that are on the system.

The following criteria will be used for the use of 700 MHz channels at the ARMER sites:

- Any available 800 MHz channels will be used before 700 MHz channels are added.
- The control channel and any backup control channels will be 800 MHz channels.
- A minimum of 60% of the voice channels beyond the primary control channel will be 800 MHz with any 700 MHz channels added on top of these.
- The ARMER System interop talk groups and public safety main dispatch talkgroups will be tagged in the system and allowed only on 800 MHz channels. This is to insure all radios on the system are capable of scanning and operating on these talkgroups.

Mn/DOT has also recommended that the ARMER System standards be reviewed and updated as required to incorporate the above criteria.

At sites adjoining the metro area we will be installing 700/800 MHz capable antennas and tower top amps.

4.0 Additional Changes to Phase 3

Applying the coverage criteria adopted by the Statewide Radio Board to Phase 3 requires the addition of 8 new sites:

- Duelm, Benton County
- Starbuck, Pope County
- Dassel, Meeker County
- Harmony, Fillmore County
- Ostrander (Leroy), Fillmore County
- Frontenac, Goodhue County
- Kenyon, Goodhue County
- Wisconsin State tower in Houston County

See the table on the following pages for a complete site listing for phase 3. The proposed additional sites are highlighted in yellow.

With the added sites we also need ot add two new simulcast groups to phase 3:

- Duelm site addition requires simulcast of Duelm, Gillman and Princeton.
- WI state tower in Houston County requires the simulcast of WI Tower, Nodine and Dresback.

We have been reviewing the existing Mn/DOT microwave link between Browns Valley and Wheaton and have determined this path is partially obstructed and requires an intermediate hop to improve the path reliability. This requires the addition of a site in the area of Dumont, Traverse County.

Mn/DOT is currently working on the cost estimates for these proposed phase 3 changes. We are still working on the implementation of Phase 3 and have a number of sites to build. We have not received the actual bids on a number of the phase 3 site construction we are not able to give a definite answer as to whether the budget $45 million will have some capacity to absorb these additions.

Phase	RAC	Zone Connection	COUNTY	SITE NAME	Site Type	Antennas System	# RF Channels
3	CM	Zone 4	Benton	Duelm	Simulcast-12	800	6
3	CM	Zone 4	Benton	Gillman	Simulcast-12	800	6
3	CM	Zone 4	Big Stone	Correll	ISR	800	5
3	CM	Zone 4	Big Stone	Johnson	ISR	800	5
3	CM	Zone 4	Big Stone	Schumacher	ISR	800	5
3	CM	Zone 4	Douglas	Hoffman	ISR	800	5
3	CM	Zone 4	Grant	Hermen	ISR	800	5
3	CM	Zone 4	Kandiyohi	New London	ISR	800	5
3	CM	Zone 4	Kandiyohi	Willmar	ISR	800	5
3	CM	Zone 4	Meeker	Dassel	ISR	800	5
3	CM	Zone 4	Meeker	Eden Valley	ISR	800	5
3	CM	Zone 4	Meeker	Litchfield	ISR	800	5
3	CM	Zone 4	Pope	Glenwood	ISR	800	5
3	CM	Zone 4	Pope	Starbuck	ISR	800	5
3	CM	Zone 4	Pope	Terrace	ISR	800	5
3	CM	Zone 4	Sherburn	Zimmerman	Simulcast-4	700/800	6
3	CM	Zone 4	Stearns	Avon	ISR	800	5
3	CM	Zone 4	Stearns	Belgrade	ISR	800	5
3	CM	Zone 4	Stearns	Blue Wing	Simulcast-5	800	8
3	CM	Zone 4	Stearns	Calvery Hill	Simulcast-5	800	8
3	CM	Zone 4	Stearns	Farming	ISR	800	5
3	CM	Zone 4	Stearns	Freeport	ISR	800	5
3	CM	Zone 4	Stearns	Grove	ISR	800	5
3	CM	Zone 4	Stearns	Holdingford	Simulcast-5	800	8
3	CM	Zone 4	Stearns	Kimball	ISR	800	5
3	CM	Zone 4	Stearns	MnDOT St Cloud	Simulcast-5	800	8
3	CM	Zone 4	Stevens	Morris	ISR	800	5
3	CM	Zone 4	Swift	Benson	ISR	800	5
3	CM	Zone 4	Swift	Holloway	ISR	800	5
3	CM	Zone 4	Todd	Lincoln	ISR	800	5

Phase	RAC	Zone Connection	COUNTY	SITE NAME	Site Type	Antennas System	# RF Channels
3	CM	Zone 4	Todd	Long Prairie	ISR	800	5
3	CM	Zone 4	Todd	West Union	ISR	800	5
3	CM	Zone 4	Traverse	Browns Valley	ISR	800	5
3	CM	Zone 4	Traverse	Wheaton	ISR	800	5
3	CM	Zone 4	Traverse	Dumont	Microwave		
3	CM	Zone 4	Wright	Buffalo	Simulcast-4	700/800	6
3	CM	Zone 4	Wright	Enfield	Simulcast-4	700/800	6
3	SE	Zone 3	Dodge	Hayfield	ISR	800	5
3	SE	Zone 3	Dodge	Wasioja	ISR	800	5
3	SE	Zone 3	Fillmore	Alden	ISR	800	5
3	SE	Zone 3	Fillmore	Amherst	ISR	800	5
3	SE	Zone 3	Fillmore	Harmony	ISR	800	5
3	SE	Zone 3	Fillmore	Ostrander (Leroy)	ISR	800	5
3	SE	Zone 3	Freeborn	Geneva	ISR	800	5
3	SE	Zone 3	Freeborn	Oakland Woods	ISR	800	5
3	SE	Zone 3	Goodhue	Cannon Falls	Simulcast-1	700/800	6
3	SE	Zone 3	Goodhue	Frontenac	Simulcast-1	700/800	6
3	SE	Zone 3	Goodhue	Kenyon	Simulcast-1	700/800	6
3	SE	Zone 3	Goodhue	Red Wing	Simulcast-1	700/800	6
3	SE	Zone 3	Goodhue	Zumbrota	Simulcast-1	700/800	6
3	SE	Zone 3	Houston	Caledonia	ISR	800	5
3	SE	Zone 3	Houston	Money Creek	ISR	800	5
3	SE	Zone 3	Houston	Reno	ISR	800	5
3	SE	Zone 3	Houston	Spring Grove	ISR	800	5
3	SE	Zone 3	Houston	WI State tower	ISR	800	5
3	SE	Zone 3	LaSuer	LeCenter	ISR	800	5
3	SE	Zone 3	LaSuer	Waterville	ISR	800	5
3	SE	Zone 3	Mower	Elkton	ISR	800	5
3	SE	Zone 3	Olmsted	Mayo	Simulcast-3	800	11
3	SE	Zone 3	Olmsted	New Haven	Simulcast-3	800	11
3	SE	Zone 3	Olmsted	Pleasant Grove	Simulcast-3	800	11
3	SE	Zone 3	Olmsted	Rock Dell	Simulcast-3	800	11
3	SE	Zone 3	Olmsted	Viola	Simulcast-3	800	11

Phase	RAC	Zone Connection	COUNTY	SITE NAME	Site Type	Antennas System	# RF Channels
3	SE	Zone 3	Rice	Lonsdale	ISR		
3	SE	Zone 3	Steele	Owatonna	ISR		
3	SE	Zone 3	Wabasha	Alma, WI	ISR		
3	SE	Zone 3	Wabasha	Bear Valley	Simulcast-2		
3	SE	Zone 3	Wabasha	Lake City	Simulcast-2		
3	SE	Zone 3	Wabasha	Zumbro Falls	Simulcast-2		
3	SE	Zone 3	Waseca	New Richland	ISR		
3	SE	Zone 3	Winona	Dresbach	ISR		
3	SE	Zone 3	Winona	Elba	ISR		
3	SE	Zone 3	Winona	Nodine	ISR		
3	SE	Zone 3	Winona	Rollingstone	ISR		
3	SE	Zone 3	Winona	Troy	ISR		
3	SE	Zone 3	Winona	Wilson	ISR		

Appendix A

Coverage Predication Maps (Phases 4, 5, 6)
Added coverage for Phase 3

Coverage prediction method used for determine Phase 4, 5 and 6 coverage. This is the same method that was used and outlined in the Phase 3 conceptual plan change submitted by Mn/DOT, approved by the Statewide Radio Board Operations and Technical Committee and subsequently approved by the Statewide Radio Board.

The target RF coverage is:

Target coverage level of 33 dbu 95% of area, 95% of time, 95 % of County by County.

95% of area is defined such that in any given 3"X3" square under study the square is considered to have a level of 33 dbu if 95% of the area in the square is greater than 33 dbu.

95% of Time is defined such that due to atmospheric variations the field level in the area under study will exceed the indicated level no less than 95% of the Time.

The coverage predictions for the 800 MHz RF System were generated as follows:

Radiosoft comstudy Verion 2.2.8.8 version
3" terrain database
70 watts ERP
850 Mhz
4/3 Earth Curvature
Longley Rice 1.2.1
95% Time (This account for weather effects)
95% Area (This accounts for Raleigh fading)
20 db miscellaneous loss (this accounts for environmental loss, foliage loss and Raleigh fading)

Bullington
4/3 earth curve
30 db miscellaneous loss

These study parameters are based on field measurements done by the Office of Electronic Communications in the Virginia area, and in the Rochester area. The Virginia study was conducted using an 800 MHz base station with antennas mounted at the top of the 300' midway tower. The Rochester study was conducted using a 800 MHz base station with antennas mounted at the top of the 300' Viola tower.

A communication test set with field strength mapping software was used to record the field strength in the area of study. This is the same setup that was used to measure s field levels in the Metro system

The results of the study were compared with the predictions from different models and a model was selected and parameters adjusted to best match the field readings.

Target coverage level

15 dbu radio sensitivity
9db margin
9 db Raleigh fading
33 dbu Target level

Typical coverage targets

Mobile 30 dbu
Portable on the belt 40 dbu
Light in building add 6 db loss
Heavy in building add 12 db loss

We expect that this should provide reasonable coverage to a portable in a vertical position at head level.

Site spacing

Site spacing of no more than 18 miles for simulcast sites.

Site spacing of less than 20 miles for microwave is preferred.

Site spacing of up to 23 miles with space diversity microwave.

Microwave path clearance to surrounding sites for heavy route criteria.

Due to the size of the coverage prediction files they have been made into separate documents.

- **NE Coverage**
- **NW Coverage**
- **CM Coverage**
- **SW Coverage**
- **SE Coverage**

These PDF files will be attached or emailed separately

Appendix B

Connectivity Maps

Appendix C

Previously Approved Changes to the Conceptual Plan Changes in Phase 3

- Site changes
  - Add site at Buffalo.
  - Add site at Terrace.
  - Add site at Nodine.
  - Change Big Stone to Schumacher and Correl.
  - Add two additional sites in Houston County.
  - Add site at Cannon Falls, Hader moved to Zumbrota.
  - Remove site in Warsaw.
  - Move Hoffman from Phase 5 to Phase 3.
  - Move Lincoln from Phase 4 to Phase 3.

- Reconfigure Phase 3 Simulcast configuration/locations.
  - Move St Cloud site to a simulcast subsystem.
  - Change Enfield-Kimball to Enfield-Zimmerman- Buffalo
  - Change Faribault-Lonsdale-Warsaw-Hader to Cannon Falls-Zumbrota-Red Wing, with Faribault and Lonsdale become multicast sites, Warsaw site removed.
  - Change Winona-Alma-Troy-Wilson-Elba to Oakwood-Bear Valley-Lake City. Troy, Wilson, Winona and Elba become multicast sites.
  - Change Viola-Pleasant Grove-New Have-Rock Dell-Oakwood-Bear Valley to Viola-Pleasant Grove-New Haven-Rock Dell. Oakwood and Bear Valley moved to simulcast group covering Wabasha County.
  - Change the Holdingford site from an ISR stand-alone site to a simulcast site that will be part of the St Cloud sub-system. Increase St Cloud simulcast to 9 channels.

- Increase channel capacity at sites adjoining metro area to 6 channels.

- Add 700 Channels to frequency planning.

- Move future Phase MSO Zone controller to Phase III and locate it in St Cloud.

- Change microwave from Full Loop protection at each site to a Topology of Trunk and Spur with redundant route for protection of critical equipment.

SE Minnesota Sites	Site Type	Comments	Antenna System	RF Channel Count
Lonsdale	ISR		700/800	6
Faribault*	ISR		700/800	6
Cannon Falls	Simulcast 1		700/800	6
Zumbrota	Simulcast 1		700/800	6
Red Wing	Simulcast 1		700/800	6
Lake City*	Simulcast 2		700/800	6
Oakwood*	Simulcast 2		700/800	6
Bear Valley*	Simulcast 2		700/800	6
Owatonna	ISR		800	5
Washoja*	ISR		800	5
New Haven	Simulcast 3	In Service	800	11
Viola	Simulcast 3	In Service	800	11
Rock Dell	Simulcast 3	In Service	800	11
Pleasant Grove	Simulcast 3	In Service	800	11
Mayo Bldging	Simulcast 3	In Service (Olmstead County added site)	800	11
Alma	ISR		700/800	6
Elba*	ISR		800	5
Troy*	ISR		800	5
Rollingstone*	ISR		800	5
Wilson	ISR		800	5
Nodine*	ISR		800	5
Dresback	ISR		800	5
Albert Lea*	ISR		800	5
Geneva	ISR		800	5
Oakland Woods	ISR		800	5
Hayfield	ISR		800	5
Elkton	ISR		800	5
Wykoff*	ISR		800	5
Amherst*	ISR		800	5
Spring Grove*	ISR		800	5
Money Creek*	ISR		800	5
Caledonia*	ISR		800	5
Reno*	ISR		800	5
Rochester	MSO			0

34 sites

* Site purchase/lease work still in progress so actual site name may change, but the site will be in this general area.

CM Minnesota Sites	Site Type	Comments	Antenna Type	RF Channel Count
Zimmerman	Simulcast 4		700/800	6
Enfield	Simulcast 4		700/800	6
Buffalo*	Simulcast 4		700/800	6
St Cloud	Simulcast 5/ MSO	RF in service	800	8
Blue Wing	Simulcast 5	In Service (St Cloud added site)	800	9
Calvary Hill	Simulcast 5	In Service (St Cloud added site)	800	9
Holdingford *	Simulcast 5		800	9
Kimball	ISR		700/800	6
Eden Valley*	ISR		800	5
New London	ISR		800	5
Litchfield*	ISR		800	5
Willmar*	ISR		800	5
Terrace	ISR		800	5
Benson	ISR		800	5
Holloway*	ISR		800	5
Morris	ISR		800	5
Chokio*	ISR		800	5
Schumacher	ISR		800	5
Correl	ISR		800	5
Gilman	ISR		700/800	6
Freeport	ISR		800	5
West Union	ISR		800	5
Long Prairie	ISR		800	5
Lincoln	ISR		800	5
Glenwood	ISR		800	5
Hoffman	ISR		800	5
Herman	ISR		800	5
Wheaton	ISR		800	5
Browns Valley	ISR		800	5

29 sites

* Site purchase/lease work still in progress so actual site name may change, but the site will be in this general area.

Site changes (Six additional sites)

St Cloud coverage to come from 28 sites. This is 6 more sites than the conceptual plan. 4 of the sites were additions for coverage and 2 of the site came from the St Cloud addition ahead of the state build. 22 of the sites will be ISR-standalone sites. The remaining 6 sites will be configured in 2 simulcast subsystems.

- Add site at Buffalo.

Site need to improve coverage in Wright County. The original plan had much of the coverage for regional users in the Wright County area coming from the Metro Regional/Henn West and Norwood subsystems. After further review it was decided that this would put too much outstate traffic on Metro resources and cause a lot of unnecessary inter-zone traffic.

- Add site at Terrace.

This site was added to improve coverage and to complete microwave paths.

- Move Hoffman from Phase 5 to Phase 3.

This is an existing Mn/DOT tower and the site is moved to this phase for coverage improvements to phase 3 and to complete the microwave paths.

- Move Lincoln from Phase 4 to Phase 3.

This is an existing Mn/DOT tower and the site is moved to this phase for coverage improvements to phase 3.

33 sites will cover the Rochester area. This is 4 more sites than the conceptual plan. 3 were additions for coverage and 1 site was added by the Olmstead County addition ahead of the State build. There were 22 of the sites will be ISR-standalone sites. The remaining 11 site will be configured into 3-simulcast subsystems.

- Add site at Nodine.

Site added to complete microwave path from Wilson to Dresback. This site will also add to coverage in the area.

- Add two additional sites in Houston County.

Sites were added to improve coverage in area. Due to the terrain in this part of Minnesota these sites are needed to get the required coverage.

- Add site at Cannon Falls, Hader moved to Zumbrota.

Existing sites built by Mn/DOT ahead of the ARMER program for DOT required microwave connection from Metro to Rochester. Original plans had a single site at Hader. This would have required the microwave paths to be greater than 20 miles. The Hader move to Zumbrota and adding Cannon Falls shortened the microwave path while also providing an additional site for RF coverage improvements.

- Remove site in Warsaw.

A review of the coverage from Faribault tower and site west of Rice County showed site not needed in Warsaw area.

Reconfigure Phase 3 Simulcast configuration/locations.

- Move St Cloud site to a simulcast subsystem.

The conceptual plan called for a single site in St Cloud for the state level coverage. Since Homeland Security money was available St Cloud built ahead of the State a 3-site simulcast subsystem was built. The plans are to now share this subsystem and its operating cost and we will add additional channels for regional users.

- Change Enfield-Kimball to Enfield-Zimmerman- Buffalo

The other simulcast subsystem planned was moved from the Kimball-Enfield sites to the Zimmerman, Enfield and Buffalo sites. This was driven by frequency availability and also the site spacing between Kimball and Enfield is close to 20 miles. Motorola recommends that simulcast sites be closer than 18 miles. Also a new site is planned in Buffalo due to coverage and roaming concerns.

- Change Faribault-Lonsdale-Warsaw-Hader to Cannon Falls-Zumbrota-Red Wing, with Faribault and Lonsdale become multicast sites, Warsaw site removed.

This change is recommended after reviewing site spacing and frequency availability. The change from a single site at Hader to the Cannon Falls/Zumbrota sites also lends itself to a logical simulcast system with Red Wing to cover Goodhue County.

- Change Winona-Alma-Troy-Wilson-Elba to Oakwood-Bear Valley-Lake City. Troy, Wilson, Winona and Elba become multicast sites.

After doing a detailed review of the sites is this area this change is recommended due to frequency availability and site spacing.

- Change Viola-Pleasant Grove-New Have-Rock Dell-Oakwood-Bear Valley to Viola-Pleasant Grove-New Haven-Rock Dell. Oakwood and Bear Valley moved to simulcast group covering Wabasha County.

After doing a detailed review of the sites is this area this change is recommended due to frequency availability and site spacing.

- Increase channel capacity at sites adjoining metro area to 6 channels.

From traffic/loading history in the metro we recommend that the sites adjoining the metro area be increased from 5 to 6 channels.

- Add 700 Channels to frequency planning.

700 MHz channels will be added to the frequency plan for Phase 3. Mn/DOT recommends that all sites in the system be capable of handling the 800 MHz only radios that are on the system.

The following criteria will be used for the use of 700 MHz channels at the ARMER sites:

- Any available 800 MHz channels will be used before 700 MHz channels are added.
- The control channel and any backup control channels will be 800 MHz channels.
- A minimum of 60% of the voice channels beyond the primary control channel will be 800 MHz with any 700 MHz channels added on top of these.
- The ARMER System interop talkgroups and public safety main dispatch talkgroups will be tagged in the system and allowed only on 800 MHz channels. This is to insure all radios on the system are capable of scanning and operating on these talkgroups.

We recommend that the ARMER System standards be reviewed and updated as required to incorporate the above criteria.

At sites adjoining the metro area we will be installing 700/800 MHz capable antennas and tower top amps. These are the sites that would most like require use of 700 channels.

Master Switching Office (MSO) – Zone Controller

In reviewing the conceptual plan, one zone controller was planned to cover two different geographically separated regions. The zone controller was planned to be located in Rochester. It would appear that not a lot of thought went into this part of the conceptual plan. We looked at the plan to tie all sites in St. Cloud to Rochester and determined that the microwave costs to do these links would approach the cost of an additional zone controller.

There are 26 sites plus the dispatch centers in the St Cloud area that need to be routed to the zone controller. Even if you pack the sites together to minimize the number of T1s we still need at least a 28T1 path from St Cloud to Rochester. A minimum of 10 hops of microwave would be needed to accomplish this. At $300,000 per hop we are approaching $3,000,000 just for this interconnection. The same problem exists if you were to move the ZC to St Cloud. We also looked at putting the zone controller half way between and locating it in the Metro. The same problem exists since now all Rochester and St Cloud sites need to be linked back to the metro.

The Statewide Radio Board has approved the addition of Zone 4 in Phase III.

Connectivity

In reviewing the conceptual microwave and T1 plans we determined that the loop protected microwave consumed T1's at a high rate. This drives the need for higher capacity microwave. The higher capacity microwave also requires tower spacing to be reduced to keep the paths reliable.

We are recommending a system of 3DS3 hot standby Microwave Trunks and Spurs, see attached maps. This plan would include the addition of links at various points to close the microwave paths into various loop topologies but without loop protection switching. Instead of loop protection we recommend that critical links be T1 diverse route protected.

The following will be the guideline for determining which T1s are diverse routed:

Interzone Links	Required diverse routing by different microwave routes or by microwave and fiber as a alternate route.
Prime Site Controller to MSO links	Required diverse routing by different microwave routes or by microwave and fiber as a backup route.
Prime site controller to remote site links	To be determined on a site by site bases and connectivity available.
ISR site to MSO links	These sites will be bundled together, 3 or 4 sites into a single T1 that is diverse route protected.
Console to MSO links	Not protected by diverse routing. Dispatch centers should all plan on control station for backup in the event of a loss of console connectivity. The dispatch centers could also add diverse routing at their expense by provide the alternate microwave, fiber or phone line connections. All dispatch center should also have radio control stations for backup purposes.
Conventional RF and interop equipment	Not protected by diverse routing.
Site monitoring links to MSO	Provided by a single redundant T1 system wide.

The 3DS3 microwave will also provide the connectivity in the future when the microwave could partition a DS3 as a network and configure the network to provide a level of loop protection. See the attached network configuration proposal. We have met with Motorola and they are reviewing this proposal and we plan to continue discussing this. They have indicated it is possible but not in the immediate future it would likely be added to the roadmap for a future release.

The Lonsdale site connectivity will be through the metro by reconfiguring the south metro loop. This is required due to the height restrictions at Empire not allowing a path back to Shakopee.

We are investigating the cost of fiber links between St Cloud - Metro and Rochester - Metro. The intent of these links is to provide an alternate protection path for the inter-zone links. If these fiber paths cannot be achieved then an alternate routes microwave will be used for the interzone links.

Some microwave paths in Phase III may need to be upgraded, rerouted or reconfigured when the system is expanded into neighboring phases.

Interop (VHF to 800 MHz)

No work has been done in this area since the former interop committee chaired by Col. Beers was meeting.

Meetings with the Sate Patrol and the local entities will need to be held to determine the interoperability requirements for equipment and procedures. We recommend that Tom Cherney the DPS Interoperability Coordinator lead this task.

We area holding $1.0 million of the Phase III implementation money for the purpose of Interop.

Cost Estimates

Since not all equipment has been bid for Phase III implementation the following are estimates of Phase III costs. We are still working to fine tune these but wanted to get something down to show magnitude for planning purposes.

	Numbers	Costs
Counties involved	23	-
New Towers: Includes Land, Shelters, Generators, Site Prep Work		$12,100,000
Existing Towers Modifications	28 12	$ 0.0 $ 2,840,000
800 Fixed Equipment	Mix of 6 ch and 5 ch stations/ 2 zone controllers	$15,150,000
Interop/Control	52 sites	$ 1,000,000
Microwave Eqp	3DS3 Trunk and Spur Hot Stand-By Fiber connections	$ 14,500,000 $ 260,000
Engineering	Trunk & Microwave	Performed by Mn/DOT staff
TOTALS		$45,850,000

Appendix D

ARMER Frequency Plan

Appendix E

Phase 456 Cost Estimates

APPENDIX EE—PHASE 3 TOWER COSTS FROM PURCHASE ORDERS

Phase 3 Site Development Costs from Purchase Orders

Item	Site Name	Tower Height	Costs For Site Development on PO's
1	Cannon Falls	330	$309,305.43
2	Deer River	330	$463,625.87
3	Dresbach	180	$289,083.35
4	Empire	330	$390,105.98
5	Glenwood	180	$182,184.98
6	Hayfield	330	$413,689.98
7	Oakland Woods	330	$460,333.14
8	Onamia	330	$276,845.43
9	St. Peter	180	$309,043.97
10	Terrace	330	$396,530.72
11	Trail	180	$202,350.37
12	Wilson	300	$357,334.56
13	Zumbrota	330	$325,297.75

APPENDIX FF—PROJECT TEAM

James E. Lake, Jr., ENP
Project Manager

Mr. Lake is a Project Manager in Kimball's Harrisburg, Pennsylvania office. Jim comes to Kimball from the Commonwealth of Massachusetts Statewide Emergency Telecommunications Board where he served as a Program Director in Training and Public Education. He also has prior experience as a Communications Center Administrator, Assistant Emergency Manager, Supervisor for the Massachusetts State Police, a Police Officer, a Firefighter and EMT.

Relevant Experience

Program Director, Training and Public Education

- Manage training programs, including the Dispatch Academy, with Training Coordinator
- Lead trainers and contract trainers
- Implement new training initiatives
- Manage public education program
- Develop and implement new public education initiatives
- Manage disability access program
- Administered and maintained a $935,000 annual budget

Communications Center Administrator

- Planned and implemented a new civilian 9-1-1 communications center for a city of 30,000 residents
- Project completed on time and under budget
- Tasks during implementation:
  - Budgeting
  - Interaction with vendors
  - Management of technicians during system testing and installation
  - Coordinted with Massachussetts State 9-1-1 for the orderly transfer of 9-1-1 equpment and services
  - Developed job descriptions, advertised, tested, and hired 11 new positions
- Administered and maintained a 9-1-1 communications center within a $325,000 annual budget

Emergency Communications Education

E9-1-1 Database Management
Public Safety Software Database Training
Medical Quality Assurance
Fire Dispatch Training
E9-1-1 Telecommunicator
Public Safety Telecommunicator
Introduction to 9-1-1 Technology
Emergency Police Dispatcher
Emergency Fire Dispatcher
LEAPS/CJIS Operator
Emergency Medical Dispatcher
Public Safety Telecommunications

Instructor / Certifications

Emergency Number Professional (ENP)
National Emergency Number Association, Managing a 9-1-1 Center Instructor, February 2002
National Emergency Number Association, Leadership Instructor, June 2002
National Academies of Emergency Dispatch, Emergency Police Dispatch Instructor, Re-certified 2004
National Academies of Emergency Dispatch, Emergency Fire Dispatch Instructor, Re-certified 2004
National Academies of Emergency Dispatch, Emergency Telecommunicator Instructor, June 2004
APCO Public Safety Telecommunicator, Telecommunicator Instructor, Re-certified 2005
APCO Institute, Fire Dispatch Instructor, Re-certified 2005

Presentations

PSAP Staffing, Arizona APCO/NENA State Conference, Phoenix, Arizona, January 2007
NENA Leadership, Yuma, Arizona, April 2007

Instructor

National Emergency Number Association (per diem instructor)
National Academies of Emergency Dispatch (per diem instructor)
Association of Public Safety Communications Officers (agency instructor)

James Agostinelli
RF Project Manager

Jim Agostinelli is an RF Project Manager assigned to Kimball's State College, Pennsylvania office. Jim comes to Kimball from Continental Electronics where he was Regional Manager, identifying customer requirements, negotiating contracts and resolving application problems from proposal through construction.

Jim's prior experience includes working as the Director of Sales and Marketing for Ramsey Electronics, an electronics and RF test equipment manufacturer. Jim was also a Vice President and General Manager for Signal Services Corporation where he was responsible for RF systems consulting, development and deployment.

Related Experience

- Program / Project Management
  - Consulted on special projects including $1.5 billion domestic national large-scale wireless data communications system deployment
  - Developed, analyzed, bid and awarded and managed in-country, multi year, multi million dollar turnkey RF project in SE Asia
  - Total project responsibility for P&L and quality assurance, consistently commissioned systems on time and under budget
  - Produced, organized and hosted group training forums for stakeholders
  - Responsible for the development of communications site construction standards, timely bulletins, binders, books and CD roms
  - Regularly research and generate on time various studies, reports, documents and deliverables.
- Systems Engineering
  - Able to read drawings, schematic diagrams and interpret data from spectrum analyzers, network analyzers, TDR's and various RF test equipment
  - Proficient at understanding state and federal siting regulations
  - Expert at understanding governmental and spectrum issues. Extensive Motorola, E.F. Johnson and other manufacturers RF systems engineering experience including performing site sweeps, RF radiation measurements, transmitters, antennas, repeaters, combiners, tower and building design for low band, VHF, UHF and 800 MHz land mobile, cellular, paging, SMR and broadcast
  - Expert and experienced at spectrum issues, coverage and interference mitigation
  - Appointed to national advisory committee three years; responsible for product and strategic feedback regarding major US land mobile manufacturer products and services.

Education

Master's in Business Administration, Rochester Institute of Technology 2005
Bachelor's of Science, Business Administration, Marketing, Rochester Institute of Technology, 2003

Licenses

FCC - Commercial General Class Radiotelephone / Radar Endorsement
FCC - Amateur General Class
FAA - Private Pilot Certificate

Affiliations

Project Management Institute (PMI) – AFCEA
National Emgergency Number Association

Training / Certificates

Manufacturers 1 - 3 Day Seminars - EPA 2-day RF Radiation Seminar
Loral / Narda Microwave – Non-Ionizing 3-day RF Radiation Safety Certification
Andrew Corporation, Richardson Texas 3-day In-building Amplifier Design Certification

Thomas R. Harmon, ENP
Public Safety Consultant

Mr. Harmon is a Public Safety Consultant in Kimball's State College, Pennsylvania office. Before joining Kimball, Tom served The Pennsylvania State University Police for 33 years. As the Director of University Police for his last 15 years, he was responsible for the administration of all police and security operations at the University Park campus, and administrative oversight of security and police programs at all 24 Penn State locations.

Project Experience
- Regional Deployment Manager, Wireless 9-1-1 Deployment Project, Pennsylvania Emergency Management Agency
- Tactical Interoperability Communications Plan for the State of Michigan
- Centre County Radio Communications Assessment, PA
- Radio System Assessment and Paging System Project, Franklin County, NC

Related Experience
- The Pennsylvania State University Police, Director
  - Responsible for the functions of patrol, investigations, traffic control, parking enforcement, residence hall security, records, communications, escort service and emergency management.
  - Managed a single site, seven channel trunked radio system with more than 1,500 subscribers.
  - Managed a budget of $5.5 million
- Criminal Justice Training Center, Indiana University of Pennsylvania
  - Served as a line instructor for municipal police-in-service training courses.
- Villanova University, Interim Director of Public Safety
  - Served for five months during 2007 as the administrative head of the 75-member Department of Public Safety.

Education
Federal Bureau of Investigation National Academy, Quantico, 1986
MPA, The Pennsylvania State University, 1980
The Pennsylvania State University, 1980-1990, Doctoral Candidate, ABD, Community Systems Planning and Development
MS, Michigan State University, 1976 Criminal Justice
BA, Bowling Green State University, 1968, Sociology and Biology

Certifications
Certified Instructor, Pennsylvania Municipal Police Officers' Education and Training Commission
Technician Class Amateur Radio License KB3MTQ
Emergency Number Professional (ENP)

Affiliations
International Association of Chiefs of Police, Life Member
National Emergency Number Association (NENA)
Association of Public-Safety Communications Officials (APCO

Publications
"*Penn State's Breathalyzer Program – An Education Approach to the DUI Problem,*" Campus Law Enforcement Journal
"*Campus Police as First Response Fire Fighters,*" Campus Law Enforcement Journal
"*State College – Penn State Join in Trunked Radio System,*" Pennsylvania Chiefs of Police Association Bulletin
"*Hiring Student Security Employees – Good Sense and Good Business,*" Using Students in Campus Public Safety.