

# Campus Primary Electrical Distribution System

**Kansas State University**  
Manhattan, Kansas

**Final**  
March 2013



**Stanley Consultants** INC.

A Stanley Group Company  
Engineering, Environmental and Construction Services - Worldwide

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# Executive Summary

## **Purpose and Objective**

The purpose and objective of this study is to evaluate the Campus Primary Distribution System as follows:

1. Update the loading condition on each loop after converting 4,160 volt loads to 12,470 volts.
2. Evaluate the electrical primary system including the substations and the 12,470 volt campus loops for future expansion of the campus up to the year 2025.
3. Review the electrical distribution system, including discussions with engineering and plant personnel.
4. Review of the present and future projected load capabilities.
5. Review and analyze the existing electrical loads and verify the appropriate modification work which should be performed.
6. Assess the existing low voltage unit substations, in buildings fed from the 4160V Loop, conditions and compliance with the applicable electrical code.
7. Provide recommendations to modify and upgrade the existing system to current code requirements and provisions for anticipated future electrical system loads and expansion.
8. Provide cost estimates of the proposed recommendations for upgrade of the electrical distribution system.

This study does not reflect any detail design for recommendations provided. It is recommended that a detailed design be performed based on applicable local and national standards in coordination with individual building and utility requirements.

## **Existing Electrical Distribution System**

The present Kansas State University (KSU) Campus electrical distribution system is supplied from two (2) sources provided by Westar Energy:

1. The Southwest Substation has a maximum rated capacity of 21 MVA.
2. The Campus Substation has a maximum rated capacity of 22.4 MVA.

Two (2) underground distribution systems are utilized on the campus:

1. 4,160 volts
2. 12,470 volts.

In 2010 the University converted the majority of the 4,160 volt loads to 12,470 volts;

1. The yet to be converted, 4,160 volt system consists of sixteen (16) feeders directly fed from a 5 MVA transformer located at the Power Plant. It should be noted here that the Power Plant no longer has operational generators. This being the case there are no sync issues to contend with across the “Open” switches” in the East, Center and West Loops.
2. The 12,470 volt system consists of fifty-six (56) feeders organized into three (3) feeder loops that feed the east, west, and central parts of the campus. The Campus and Southwest substations were recently updated to carry these loops.

A study was performed July 25, 2007 by Morrow Engineering to identify the loop configurations. During this time, Morrow Engineering also performed short circuit and load flow studies to determine the adequacy of the equipment ratings.

As-Built drawings, labeled “12.5kV DISTRIBUTION SYSTEM MODIFICATION MODIFICATIONS PROJECT A-010700”, were also provided to KSU from Morrow Engineering on December 20, 2010 for the conversion of several 4,160 volt fed buildings to the 12,470 volt campus loop system.

## **Primary Distribution System Analysis and Electrical Equipment Evaluation**

### **Substations**

The existing substations have sufficient capacity to feed the existing campus under normal conditions. Based on utility data through February 2012, the maximum peak demand load occurred on September 2011 for both substations and was 23.536 MW. The Combined Substations load comparison for the period from November 2010 through February 2012 shows a decline of -0.611 %.

In the event the Southwest substation is lost during summer (i.e. August and September) peak conditions, the Campus substation (with a maximum capacity of 22.4 MVA) will be at or above its capability to supply the peak demand load.

An additional substation will be required for future loops to the farm area in the far northwest part of campus and for the proposed chiller plant.

### **Proposed Chiller Plant**

The proposed chiller plant will require direct feeds from the 12,470 volt system to feed the chillers and the building they will be housed in. In order to achieve this, a new substation is required, as the existing loop system does not have enough capacity for this additional load. For this electrical analysis, we will explore the worst case scenario which requires six (6) 2,000 ton chillers. It is assumed that every 1,000 tons of cooling requires 351.4 kVA. The first phase of the chiller installation, in the year 2013, will require 4,000 tons, or 1.405.6 MVA. The second phase of the chiller installation, in the year 2017, will require an additional 2,000 tons, or 0.7028 MVA. The third phase of the chiller installation, in year 2020, will require 6,000 tons, or 2.108.4 MVA. In total, 4.2168 MVA will be required just to run the chillers. It is recommended to provide 6 MVA to the chiller plant to account for building and auxiliary loads. A new substation with a capacity of 20 MVA is recommended. Due to the limited space on campus, the favorable location for the new chiller plant is near Vet Med, as there is ample land for a new substation. The proposed location of this chiller plant is east of the Wind Erosion Laboratory as shown on sheet 8 of the plan drawings located in Appendix A.

### **12,470 Volt Distribution**

This system was recently updated and is in good condition per the University's comments. Based on cable ampacity, each loop has an approximate capacity of 13 MVA, allowing a maximum total load of 39 MVA for three loops. With proposed loads added to the loop system, the approximate peak demand load on the combined loop system is 26.1MW.

### **4,160 Volt Distribution**

Most of the 4,160 volt distribution is in poor condition and is not code compliant. This distribution will be converted to 12,470 volts and shall be code compliant at that time.

### **480 Volt Unit Substation**

The existing 480 volt unit substations fed off the 4,160 volt distribution are in poor condition and do not comply with current code. These unit substations will be updated at the same time the 4,160 volt system is converted to a 12,470 volt system and shall be code compliant at that time.

### **Metering Equipment**

Currently, the primary system is metered by Westar and there is one meter at each substation. The University does not have a centralized data collection system. The University is in the process of updating the secondary metering system by connecting the low voltage metering to the building automation system. An effective way to manage the demand load, maximum peak demand load, outages, control switching, future modifications, and monitor the entire campus power system is to have a Supervisory Control and Data Acquisition (SCADA) system. A SCADA system uses power monitoring devices, distributed throughout the system, to collect power data and to determine the condition of the power system in real time.

## **NFPA 70E Requirements**

The National Fire Protection Association Standard for Electrical Safety in the Workplace (NFPA 70E) requires facility owners to perform an arc flash hazard analysis prior to allowing a worker to perform a task on energized equipment. An arc flash hazards analysis evaluates the potential for incident energy levels resulting from a potential arc flash occurrence. Analysis results determine the flash protection boundary distance, and are the basis for the selection of personal protective equipment (PPE) required for working in various situations. The policies concerning the use and type of PPE are the burden of the Owner and Operator of the facility. Analysis results are also used to develop the basic approach for performing electrical modification or design to reduce arc flash hazards. A short circuit study and a protective relay coordination study must be performed as part of the arc flash hazards analysis for the entire campus primary and secondary systems. These studies should include all facilities on the campus.

Electrical inspectors are enforcing the new labeling requirement published in the National Electrical Code (NEC 110.16) that states a warning label must be placed on electrical equipment that may remain energized during maintenance or repair.

## **Alternative Energy Sources**

Using alternative energy sources can help reduce the electrical load on the campus loop system. This study does not provide in-depth research of alternative energy sources for the Kansas State University campus. However, the following are energy sources that the campus may want to explore.

- **Solar (Photovoltaic) Energy:** Solar energy is a possible option for individual buildings. Typically these systems will not provide enough energy to serve an entire building, however they may work well for smaller loads.
- **Wind Energy:** Wind is a possible option for sections of the campus. There is a requirement for large empty land for the wind farm to be installed. Also, the proximity of the wind farm to the campus is important for human and animal comfort.

## **Conclusions and Recommended Projects**

### **Conclusions**

#### **Substations**

Each of the two existing substations will continue to serve the campus in the existing and future load conditions, with the exception of the new chiller plant.

The combined total nominal capacity of all of the transformers at both substations is 35 MVA. The maximum campus peak demand load based on utility data is 23.54 MW. In the event that either substation lost power, the other substation would be unable to supply the peak demand load.

#### **Distribution**

The current campus distribution consists of three 12,470 volts loops. Each loop has a several sectionalizing switches. One of the sectionalizing switches (i.e. the “Tie Point”) located

approximately near the “electrical middle” of the loop is normally operated in the “OPEN” position. During normal operations approximately half of each loop is fed from the Southwest Substation and the other half is fed from the Campus Substation. This results in an increase in reliability by being able to feed the loads from either the Campus or Southwest substations sources and allows for maintenance of each piece of equipment. The current capacity of these loops is sufficient to maintain the system during normal operating conditions.

Not all campus buildings are fed directly from the 12,470 volt system. Several buildings are fed through a 4,160 volt system that is directly fed from a 5,000 kVA transformer located at the powerhouse. If this transformer were to fail, it would be extremely difficult to feed the 20 buildings that are currently being fed from that system. It is worth noting that switching these buildings to the 12,470 volt loop system will not increase the distribution system capacity requirements as they are already accounted for via the 4,160 volts, 5,000 kVA transformer located at the Powerhouse.

The Campus Creek Complex is currently using a 480 volts transformer as the main source for this building. The 480 volts feed comes from the Chem/Biochem building nearby. This transformer is undersized due to several expansions to the building, and it is not directly connected to a reliable loop system. If there were any shut down at the Chem/Biochem building, the Campus Creek Complex would also have to shut down as well.

The effects of the additional campus building expansion on the loop system are shown below.

**Table ES-1 Load Summary - Campus Loops (Current Conditions)**

<b>Loop</b>	<b>Connected Load (kW)</b>	<b>Demand (kW)</b>	<b>Coincidence Factor</b>	<b>Coincidence Peak (kW)</b>
West Loop	15,726	12,002	0.6	7,202
Center Loop	22,984	15,546	0.6	9,328
East Loop	14,650	9,011	0.6	5,407
<b>TOTAL</b>	<b>53,360</b>	<b>36,559</b>		<b>21,937</b>

Source: Stanley Consultants, Inc.

**Table ES-2 Load Summary - Campus Loops (Proposed Conditions)**

<b>Loop</b>	<b>Connected Load (kW)</b>	<b>Demand (kW)</b>	<b>Coincidence Factor</b>	<b>Coincidence Peak (kW)</b>
West Loop	20,031	15,040	0.6	9,025
Center Loop	21,895	14,723	0.6	8,859
East Loop	21,178	13,720	0.6	8,238
<b>TOTAL</b>	<b>63,104</b>	<b>43,483</b>		<b>26,122</b>

Source: Stanley Consultants, Inc.

## Recommendations

### Substations

- Provide an additional substation and loop for all campus expansion beyond the year 2025.
- A substation of minimum capacity of 20 MVA is recommended to be constructed on the east side Wind Erosion Laboratory. Proposed location is shown on sheet 8 of the plan drawings located in appendix A

### Distribution

The remaining loads served by the 4,160 volt system at present should be migrated to the 12,470 volt system in the near future. Transfer of the loads to the 12,470 volt system should be carefully planned such that each loop will be balanced.

To provide the system with the necessary serviceable equipment for safe and reliable operation, the following action items are recommended:

- Increase the kVA rating from 112.5 to 300 of the transformer at the Campus Creek Complex.
- Provide the remaining section of the 12,470 volt duct bank and cable feeders to the Campus Creek Complex.
- Complete the replacement of all 4,160 volt to 12,470 volt distribution.
- Installation of metering equipment and SCADA for the 12,470 volt distribution system and interconnection with the campus building management system.
- Change the sectionalizing “Tie-points” on the 12,470 volt loops to enable better balancing of the loads on the loop system.
- Convert remaining overhead lines located on campus property to underground distribution.
- Main service entrance panels are recommended to be replaced in 21 buildings after they are converted from 4,160 volts to 12,470 volts.
- Perform a complete short circuit, coordination, and arc flash analysis with labeling to comply with NFPA 70E for the safety of KSU staff and technicians.

A detailed construction cost estimate has been provided in Appendix C. Below is a summary:



**Table ES-3 Cost Summary**

<b>Project</b>	<b>Estimated Cost</b>
4,160 volts to 12,470 volts Conversion	\$3,050,786
New Loads - Loop Additions	\$689,765
New Substation*	\$6,022,724
<b>TOTAL</b>	<b>\$9,763,275</b>

Source: Stanley Consultants, Inc.

\* Equipment only. Primary feeder to new substation and connection not included.

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# General Description

### **Purpose and Objective**

The purpose and objective of this study is to evaluate the campus primary distribution system as follows:

1. Update the loading condition on each loop after converting 4,160 volt loads to 12,470 volts.
2. Evaluate the electrical primary system including the substations and the 12,470 volt campus loops for future expansion of the campus up to the year 2025.
3. Review the electrical distribution system, including discussions with engineering and plant personnel.
4. Review of the present and future projected load capabilities.
5. Review and analyze the existing electrical loads and verify the appropriate modification work which should be performed.
6. Assess the existing low voltage unit substations, in buildings fed from the 4160V Loop, conditions and compliance with the applicable electrical code.
7. Provide recommendations to modify and upgrade the existing system to current code requirements and provisions for anticipated future electrical system loads and expansion.
8. Provide cost estimates of the proposed recommendations for upgrade of the electrical distribution system.

### **Electrical Systems Evaluation Data**

Information and data regarding the current operation of the facility have been gathered by the following means:

- Meetings with key personnel at Kansas State University.
- Site surveys.
- December 20, 2010 Morrow Engineering as-built 12.5 kV drawings.
- July 25, 2007 Morrow Engineering Study (Rev 1).
- Discussions with Westar Energy.

See Appendix D for list of data received.

# Existing Electrical Systems

### **Existing Electrical Primary System Description**

The present Kansas State University (KSU) Campus electrical distribution system is being supplied from two (2) sources provided by Westar Energy. The sources are as follows:

1. Southwest Substation
2. Campus Substation

The total capacity of both transformers at the Southwest Substation is rated for 15/17.8/21 MVA, and the Campus Substation (which has only one transformer) is rated for 20/22.4 MVA.

The two (2) different sources of power distribution with loop connections provide the campus with redundancy in the primary distribution system.

Kansas State University receives power from Westar Energy at two (2) locations: Campus and Southwest substations for the 12,470 volt (12.47 kV) distribution system. Voltage is stepped down at the Power Plant substation for the 4,160 volt distribution system.

### **12,470 Volt Primary Loop Feeders and Distribution**

Duct bank for the 12,470 kV system on campus is owned by KSU. Cables are also owned by KSU. Maximum total capacity of the Campus Substation is 22.4 MVA and the maximum total capacity of the Southwest Substation is 21 MVA.

The Campus Substation contains one transformer to step down the power from 115 kV to 12.47 kV. According to record drawings and Westar Energy, the capacity of the transformer is 20 MVA with a maximum rating of 22.4 MVA. Three feeders run from the Campus substation to supply the Center, East, and West 12.47 kV loops. These feeders consist of three (3) 750 kcmil, 15 kV, copper cables in 6" duct. The Campus Substation feeds KSU and a small Westar circuit (typically

around 1 MW, sometimes up to 5 MW or more if Westar does switching on the system for maintenance).

The Southwest Substation contains two (2) transformers to step down the power from 34.4 kV to 12,470 V (12.47 kV). According to nameplate data, the two transformers are rated at 7.5/8.4/10.5 MVA and 7.5/9.375/10.5 MVA. Three (3) feeders run from the Southwest Substation to supply the Center, East, and West 12.5 kV loops respectively. These feeders vary randomly in cable sizing within each loop and consist of either three (3) 1,000 kcmil or three (3) 750 kcmil, 15 kV, copper cables in 6" duct depending upon location within the loop. Appendix A (Drawings E-020C, E-020E, and E-020W) illustrates the existing system Single Line Diagram.

Feeder cable capacity is limited by the smallest cable size connected in each primary loop. Thus 750 kcmil will be used in the following cable power capacity calculation.

The cable ampacity for 750 kcmil is based on NEC Table 310.60(C)(77), MV-105 degrees C, copper, underground duct bank:

#### Cable Power Capacity

For 750 kcmil copper, 15 kV shielded

$$I (\text{Cable}) = 610 \text{ amperes, } \rho (\text{Earth}) = 90, \text{ Load Factor} = 100$$

$$\text{Feeder Load Capacity} = 12,470 \text{ V} \times 610 \text{ A} \times 1.732 / 1,000$$

$$\text{Feeder Load Capacity} = 13,175 \text{ kVA}$$

Switching of 12.47 kV feeders is accomplished by pad-mounted S&C fusible switches and at transformer load break disconnects.

Cable rating, type, and sizes were taken from the as-built drawings, labeled "12.5kV DISTRIBUTION SYSTEM MODIFICATION MODIFICATIONS PROJECT A-010700", which were provided to KSU from Morrow Engineering on December 20, 2010 for the conversion of several 4,160 volt fed buildings to the 12,470 volt campus loop system.

#### **4,160 Volt Primary Radial Feeders**

The Power Plant substation has a triple-rated (5/5.6/7 MVA) 12.47-4.16 kV transformer with a maximum capacity of 7 MVA utilizing the forced air rating. The transformer is owned by KSU.

The existing main switchgear for the 4,160 volt distribution consists of seven separate sections of metal-enclosed fusible-switches located on the second floor of the Power Plant. The switchgear is conventional indoor-type full-height equipment.

The majority of the 4,160 volt loops are direct buried.



## Existing Electrical Power Demand

Westar Energy records were obtained which provide values for demand load over a 16 month period and provide a good statistical base to evaluate the existing load conditions.

The following Tables 2-1 and 2-2 show the average hourly demand load and peak demand load for both Southwest and Campus Substations.

**Table 2-1 Southwest Substation**

<b>Billing Month</b>	<b>Average Hourly Demand Load (kW)</b>	<b>Peak Demand Load (kW)</b>
Nov 2010	4,971	6,648
Dec 2010	4,650	6,195
Jan 2011	4,000	5,417
Feb 2011	4,231	5,469
Mar 2011	4,161	6,324
Apr 2011	4,924	7,530
May 2011	5,307	8,204
Jun 2011	6,100	8,515
Jul 2011	6,881	8,735
Aug 2011	6,672	9,474
Sept 2011	6,180	9,824
Oct 2011	5,381	8,022
Nov 2011	4,880	7,322
Dec 2011	6,283	8,515
Jan 2012	6,110	8,359
Feb 2012	6,523	8,502

Source: Stanley Consultants, Inc.

12.47 kV Average Hourly Demand: 5,453 kW

12.47 kV Maximum Peak Demand 9,824 kW

**Table 2-2 Campus Substation**

<b>Billing Month</b>	<b>Average Hourly Demand Load (kW)</b>	<b>Peak Demand Load (kW)</b>
Nov 2010	7,156	12,156
Dec 2010	6,436	8,398
Jan 2011	6,440	8,320
Feb 2011	6,931	9,072
Mar 2011	7,161	10,342
Apr 2011	7,552	9,901
May 2011	7,676	11,923
Jun 2011	8,560	11,768
Jul 2011	9,844	12,727
Aug 2011	10,076	13,427
Sept 2011	8,760	13,712
Oct 2011	8,052	11,197
Nov 2011	7,280	10,446
Dec 2011	4,712	6,039
Jan 2012	4,452	5,884
Feb 2012	4,897	5,988

Source: Stanley Consultants, Inc.

12.47 kV Average Hourly Demand: 7,249 kW

12.47 kV Maximum Peak Demand 13,712 kW

### **Calculated 12,470 Volt Loop Distribution System Loads**

Since the buildings are not metered, loading for the radial feeds was determined from calculated loads based upon building size, type and standard wattage demand and a coincident load factor of 0.6. See Appendix B for details.

In order to distribute future loads in a balanced manner, it is important to ascertain the loading on each end of primary system loop.

A breakdown of the 12,470 volt loads based on the current loop switching configuration is as follows:

**Table 2-3 Load Summary - 12,470 Volts – West Loop**

<b>Buildings</b>	<b>Feeder</b>	<b>Connected Load (kW)</b>	<b>Maximum Demand Load (kW)</b>	<b>Transformer Size (kVA)</b>	<b>Coincidence Factor</b>	<b>Coincident Peak (KW)</b>
West Stadium	1WA	113	62	500	0.6	37
Ahearn Natatorium	1WA	426	320	500	0.6	192
Fiedler Hall	1WA	581	407	1,500	0.6	244
<b>SOUTHWEST SUBSTATION</b>		<b>1,120</b>	<b>789</b>	<b>-</b>	<b>-</b>	<b>473</b>
Ackert Hall	1WB	893	715	1,500	0.6	429
Chalmers Hall	1WB	893	715	1,500	0.6	429
Cardwell Hall ACCELERATOR	1WB	1,000	1,000	1,000	0.6	600
Throckmorton Hall	1WB	2,862	2,003	7,250	0.6	1,202
Kansas State University Gardens/ Conservatory Greenhouse D Conservatory	1WB	29	20	750	0.6	12
*Old Dairy Outside	1WB	-	-	750	0.6	-
New Dairy Inside	1WB	156	62	750	0.6	37
Dole Hall	1WB	382	229	500	0.6	137
Coles Hall	1WB	1,548	1,238	3,500	0.6	743
Trotter Hall	1WB	1,213	728	1,000	0.6	437
Mosier Hall	1WB	3,981	3,184	4,000	0.6	1,911
Pat Roberts Hall (Biosecurity Research Institute / Roberts Hall)	1WB	1,649	1,319	5,000	0.6	792
<b>CAMPUS SUBSTATION</b>		<b>14,606</b>	<b>11,213</b>	<b>-</b>	<b>-</b>	<b>6,729</b>
<b>COMBINED SUBSTATION</b>		<b>15,726</b>	<b>12,002</b>	<b>-</b>	<b>-</b>	<b>7,202</b>

Source: Stanley Consultants, Inc

\* Square footage was not provided. Coincident load added matches New Dairy Farm.

**Table 2-4 Load Summary - 12,470 Volts – Center Loop**

<b>Buildings</b>	<b>Feeder</b>	<b>Connected Load (KW)</b>	<b>Maximum Demand Load (kW)</b>	<b>Transformer Size (kVA)</b>	<b>Coincidence Factor</b>	<b>Coincident Peak (kW)</b>
Durland/Rathbone	2CA	1,207	845	3,000	0.6	507
Chiller Plant (Power Plant Bldg)	2CA	160	128	5,000	0.6	77
Seaton Court	2CA	407	244	4,000	0.6	147
Seaton Engineering + Seaton West	2CA	2,112	1,267	1,500	0.6	760
Seaton Env Eng	2CA	99	79	500	0.6	47
<b>SOUTHWEST SUBSTATION</b>		<b>3,985</b>	<b>2,563</b>	-	-	<b>1,538</b>
4,160V Bldgs (From Power Plant XFMR)	2CB	8,677	5,754	5,000	0.6	3,452
Hale-Farrell Library	2CB	1,682	1,346	2,500	0.6	807
Ward Hall	2CB	260	156	1,000	0.6	94
Waters Hall	2CB	1,839	1,287	800	0.6	772
Waters Hall Annex	2CB	197	138	300	0.6	83
Feed Technology	2CB	138	96	750	0.6	58
Shellenberger Hall	2CB	373	261	1,000	0.6	157
Willard Hall	2CB	1,247	748	1,000	0.6	449
King Hall	2CB	414	332	500	0.6	199
Dickens Hall	2CB	365	219	500	0.6	131
Bluemont Hall	2CB	1,546	1,082	1,500	0.6	649
Leadership Studies Building	2CB	307	184	750	0.6	111
International Student Center	2CB	75	45	500	0.6	27
Wind Erosion Laboratory	2CB	201	161	500	0.6	97
Weber Hall	2CB	1,678	1,174	500	0.6	705
<b>CAMPUS SUBSTATION</b>		<b>18,999</b>	<b>12,983</b>	-	-	<b>7,791</b>
<b>COMBINED SUBSTATIONS</b>		<b>22,984</b>	<b>15,546</b>	-	-	<b>9,328</b>

Source: Stanley Consultants, Inc.

**Table 2-5 Load Summary - 12,470 Volts – East Loop**

<b>Buildings</b>	<b>Feeder</b>	<b>Connected Load (kW)</b>	<b>Maximum Demand Load (kW)</b>	<b>Transformer Size (kVA)</b>	<b>Coincidence Factor</b>	<b>Coincident Peak (kW)</b>
East Stadium	3EA	89	49	500	0.6	29
KSU Union / Bosco Plaza	3EA	1,227	736	2,500	0.6	442
K-State Parking Structure /Information Booth	3EA	18	11	500	0.6	7
Calvin Hall	3EA	606	364	500	0.6	218
Nichols Hall	3EA	936	655	1,000	0.6	393
Fairchild Hall	3EA	682	409	1,000	0.6	246
McCain Auditorium	3EA	1,140	656	2,500	0.6	394
Beach Art Museum	3EA	509	407	750	0.6	244
President's Residence	3EA	34	24	112.5	0.6	14
<b>SOUTHWEST SUBSTATION</b>		<b>5,241</b>	<b>3,311</b>	<b>-</b>	<b>-</b>	<b>1,987</b>
Chemistry/Biochemistry (Campus Creek)	3EB	831	665	3,500	0.6	399
Justin Hall	3EB	938	562	1,500	0.6	337
Putnam Hall	3EB	523	209	2,000	0.6	125
Van Zile Hall	3EB	496	198	*	0.6	119
Boyd Hall	3EB	523	209	*	0.6	126
Derby Dining Center (West and Ford added)	3EB	3,765	2,824	4,750	0.6	1,694
Haymaker Hall	3EB	964	385	500	0.6	231
Moore Hall	3EB	964	385	500	0.6	231
Child Development Center	3EB	400	260	500	0.6	156
B18 Parking Lot & Garden Maintenance Building.	3EB	4	1	300	0.6	1
"Toddville" (near B18 Parking Lot)	3EB	3	2	300	0.6	1
<b>CAMPUS SUBSTATION</b>		<b>9,409</b>	<b>5,700</b>	<b>-</b>	<b>-</b>	<b>3,420</b>
<b>COMBINED SUBSTATIONS</b>		<b>14,650</b>	<b>9,011</b>	<b>-</b>	<b>-</b>	<b>5,407</b>

Source: Stanley Consultants, Inc.

\* The Putnam transformer feeds Van Zile Hall and Boyd Hall.

Based on the information shown in Tables 2-3, 2-4, and 2-5, it can be concluded:

- Estimated load values (coincident peak) compared to the utility peak demand loads are within a range of 755 kW (3%) and as a result are considered of sufficient accuracy to use as a base for future load planning.
- The loading on each loop based on the existing loop “OPEN” sectionalizing switches “Tie Points” shows significant unbalance between Southwest Substation and Campus Substation.
  - Consideration should be given to utilizing different sectionalizing switches. While providing for a better balanced loading between the substations, this would also lower line losses and to arrive at a more optimum “electrical middle” balance.
- Transformer sizes for each radial feed appear to be adequate for current loading with the exception of Campus Creek.

## **Electrical Equipment Evaluation**

### **Medium Voltage Distribution**

#### **Substation Equipment**

Westar Energy owns and maintains the two substations feeding the campus.

The three transformers that supply 12,470 volt power to the University are located at the substations.

The Campus and Southwest substations are generally in a good state of maintenance and repair. Open buswork, take off structures in the substation, circuit breakers, and air switches are in good condition in the substation and are expected to have a serviceable life for many years.

#### **Underground Duct Bank**

Underground duct bank is owned by the University. All of the main primary distribution circuiting is presently run in duct bank.

The condition of the majority of the existing duct banks is good, based on conversations with KSU staff. As new cable paths are needed, additional new duct banks could be constructed to accommodate the new circuits.

#### **Cabling**

The 12,470 volt cable system is owned and has been installed by the University.

#### **Manholes**

Existing manholes were not inspected. Based on conversations with KSU staff, the manholes do not have permanent sump pumps, but are in good condition.

## **Switchgear**

### **12,470 Volt System**

Based on field observation, existing switchgears/switches located at the Campus and Southwest substations are in good condition.

### **4,160 Volt System**

Existing distribution switchgear is located on the second floor of the Power Plant. This switchgear is outdated and not code compliant.

## **Switching Equipment**

### **12,470 Volt System**

Switching on the 12,470 volt distribution consists of S&C Vista type units. These switches are fairly new and appear to be in good condition.

Transformers are equipped with load-break disconnect switches.

### **4,160 Volt System**

Existing switches are in poor condition and are not code compliant. These switches are located in various buildings. See Appendix E for details.

### **Overhead Distribution System**

The farm area located northwest of the main campus is fed by overhead lines. According to KSU staff, the power to the farm area has been unreliable due to power outages caused by weather conditions. Westar Energy's overhead lines come from Marlatt north to a metering point. KSU's overhead lines run from that metering point, on their property, to a transformer located in the farm area.

There are also overhead lines in the parking lot adjacent to Weber Hall.

## **Low Voltage Distribution System**

### **Unit Substations**

The existing low voltage unit substations that are fed from 12,470 volts are generally in good condition.

The existing low voltage unit substations that are fed from 4,160 volts are generally in poor condition and not code compliant.

The existing 480 volt service feeding Campus Creek complex is unreliable and has experienced numerous outages. The Campus Creek Complex is fed from the 480 volt switchgear located in the basement of the Chem/Biochem building. The existing 480/208 volt transformer is undersized due to building expansions over several years.

# Campus Electrical Distribution System and Future Expansion

## Primary Distribution System Analysis

### Distribution System Considerations

A requirement for providing effective primary electric distribution for the various facilities on the Kansas State University campus includes the determination of the voltage level and type of system to use in accomplishing that goal.

### Voltage Level

Distribution systems that have a medium voltage level in the range of 2.4 kV to 35 kV are commonly utilized for campus systems. Generally, the majority of systems supplying primary distribution voltages are of the 15 kV class or less. The individual distribution components and energy losses will establish the most economical voltage level from an overall point of view.

### Voltage Options

The most common voltage levels and general guidelines for selection are as follows:

1. 2,400 Volt System. A 2,400 volt system is used where total capacity does not exceed 5,000 kVA, but only when utility company service is at that voltage.
2. 4,160 Volt System. A 4,160 volt system is used for maximum demands not exceeding 7,500 kVA, but only when a utility company delivers electric power at that voltage level. Switchgear and cable at 4,160 volts will give a more economical installation than one at 2,400 volt. For loads including motors of 250 hp and over, and for groups of motors up to 7,000 kVA, the 4,160 volt system is more economical than any other voltage level.



3. 12,000 Volt to 13,800 Volt Systems. These systems can be economically used for demands of 7,500 kVA and over.
4. 15,000 Volt to 34,500 Volt Systems. These systems can be economically used for demands of 20,000 kVA and over, especially when the distances involved are considerable.

## **System Configuration**

The basic systems commonly used for campus medium-voltage distribution are as follows:

1. Modern Simple-Radial Distribution System. The modern simple-radial distribution system provides feeders to each transformer and load center and can be used for capacities in excess of 1,000 kVA. The length of low-voltage feeders is kept to a minimum, reducing cable cost and energy losses. Transformers are sized to handle the peak load of the area served. The main shortfall of this system is that a fault in the primary circuit can interrupt service to all transformers.
2. Modified Modern Simple-Radial Distribution System. The modified modern simple-radial distribution system provides all the features of the modern simple-radial type, but includes all the feeders from a central panel which provides important improvements in reliability. The initial cost, however, is higher.
3. Loop Primary-Radial Distribution Type. The loop primary-radial distribution system has the same characteristics as the modern simple-radial distribution type, but in addition provides a single loop with two-position switches at each transformer and allow for a quicker restoration of service in the event of primary feeder or transformer failure. Advantages are lower installation costs and energy losses.
4. Primary Selective-Radial Distribution System. The primary selective-radial distribution system differs from the modern simple-radial distribution type in that it uses two or more primary feeders instead of one, and provides each feeder with enough capacity to carry the entire load. The extra investment of providing for alternate primary feeders and selector switches allows quick service restoration in the event of primary feeder failure.

## **System Configuration and Voltage Analysis**

The use of the existing 12,470 volt distribution is within the general guidelines range based upon demand and allows for future demand increase.

The most desirable system feature for the University is the ability to quickly restore power in the event of single cable or switchgear failure. With a loop system this is possible. Continuation and future extension of the existing loop arrangement will provide a good measure of redundancy.

### **12,470 Volt Distribution System**

Power to buildings on campus is supplied by three (3) 12,470 volt feeders from the Campus and Southwest Substations. Transformer losses are paid by KSU and metering is on the secondary side.

An electrical loop is established as a result of the existing switching arrangement, which permits the buildings to be supplied from two different sources. The loop is normally operated with both power sources feeding at opposite ends of the loop and a switching break that balances the load on each source.

### West Loop

**Table 3-1 West Loop: Proposed Load Summary - 12,470 Volts**

<b>Buildings</b>	<b>Feeder</b>	<b>Connected Load (kW)</b>	<b>Maximum Demand Load (kW)</b>	<b>Transformer Size (kVA)</b>	<b>Coincidence Factor</b>	<b>Coincident Peak (KW)</b>
<b>West Stadium</b>	<b>1WA</b>	<b>122</b>	<b>67</b>	<b>500</b>	<b>0.6</b>	<b>40</b>
Ahearn Natatorium	1WA	426	320	500	0.6	192
<b>College of Engineering Expansion (Proposed)</b>	<b>1WA</b>	<b>584</b>	<b>409</b>	<b>500</b>	<b>0.6</b>	<b>246</b>
Fiedler Hall	1WA	581	407	1,500	0.6	244
<b>SOUTHWEST SUBSTATION</b>		<b>1,713</b>	<b>1,203</b>	<b>-</b>	<b>-</b>	<b>722</b>
<b>*Ackert Hall</b>	<b>1WB</b>	<b>1,600</b>	<b>1,280</b>	<b>1,500</b>	<b>0.6</b>	<b>768</b>
Chalmers Hall	1WB	893	715	1,500	0.6	429
Cardwell Hall ACCELERATOR	1WB	1,000	1,000	1,000	0.6	600
<b>Myers Hall / Military Science</b>	<b>1WB</b>	<b>455</b>	<b>273</b>	<b>225</b>	<b>0.6</b>	<b>164</b>
Throckmorton Hall	1WB	2,862	2,003	7,250	0.6	1,202
Kansas State University Gardens/ Conservatory Greenhouse D Conservatory	1WB	29	20	750	0.6	12
*Old Dairy Outside	1WB	-	-	750	0.6	-
New Dairy Inside	1WB	156	62	750	0.6	37
Dole Hall	1WB	382	229	500	0.6	137

<b>Buildings</b>	<b>Feeder</b>	<b>Connected Load (kW)</b>	<b>Maximum Demand Load (kW)</b>	<b>Transformer Size (kVA)</b>	<b>Coincidence Factor</b>	<b>Coincident Peak (KW)</b>
<b>College of Veterinary Medicine Chiller Plant (Proposed)</b>	<b>1WB</b>	<b>2,550</b>	<b>1,785</b>	<b>3,000</b>	<b>0.6</b>	<b>1,071</b>
Coles Hall	1WB	1,548	1,238	3,500	0.6	743
Trotter Hall	1WB	1,213	728	1,000	0.6	437
Mosier Hall	1WB	3,981	3,184	4,000	0.6	1,911
Pat Roberts Hall (Biosecurity Research Institute / Roberts Hall)	1WB	1,649	1,319	5,000	0.6	792
<b>CAMPUS SUBSTATION</b>		<b>18,318</b>	<b>13,836</b>	<b>-</b>	<b>-</b>	<b>8,303</b>
<b>COMBINED SUBSTATIONS</b>		<b>20,031</b>	<b>15,040</b>	<b>-</b>	<b>-</b>	<b>9,025</b>

Source: Stanley Consultants, Inc.

\*Ackert Hall addition (76,000 SF) has been added to the existing building electrical system.

Buildings shown in bold are proposed additions to the loop or modifications to existing loads.

### Center Loop

**Table 3-2 Center Loop: Proposed Load Summary - 12,470 Volts**

<b>Buildings</b>	<b>Feeder</b>	<b>Connected Load (KW)</b>	<b>Maximum Demand Load (kW)</b>	<b>Transformer Size (kVA)</b>	<b>Coincidence Factor</b>	<b>Coincident Peak (kW)</b>
Durland/Rathbone	2CA	1,207	845	3,000	0.6	507
Chiller Plant (Power Plant Bldg)	2CA	160	128	5,000	0.6	77
<b>*Seaton Court</b>	<b>2CA</b>	<b>1,079</b>	<b>647</b>	<b>4,000</b>	<b>0.6</b>	<b>388</b>
Seaton Engineering + Seaton West	2CA	2,124	1,274	1,500	0.6	764
Seaton Env Eng	2CA	99	79	500	0.6	47
<b>SOUTHWEST SUBSTATION</b>		<b>4,669</b>	<b>2,930</b>	<b>-</b>	<b>-</b>	<b>1,783</b>
<b>English/Counseling Services</b>	<b>2CB</b>	<b>209</b>	<b>125</b>	<b>225</b>	<b>0.6</b>	<b>75</b>

<b>Buildings</b>	<b>Feeder</b>	<b>Connected Load (KW)</b>	<b>Maximum Demand Load (kW)</b>	<b>Transformer Size (kVA)</b>	<b>Coincidence Factor</b>	<b>Coincident Peak (kW)</b>
<b>Facility Grounds</b>	<b>2CB</b>	<b>13</b>	<b>8</b>	<b>75</b>	<b>0.6</b>	<b>5</b>
<b>Power Plant</b>	<b>2CB</b>	<b>370</b>	<b>222</b>	<b>675</b>	<b>0.6</b>	<b>133</b>
<b>Holtz Hall</b>	<b>2CB</b>	<b>77</b>	<b>46</b>	<b>45</b>	<b>0.6</b>	<b>28</b>
<b>Holton Hall</b>	<b>2CB</b>	<b>155</b>	<b>93</b>	<b>225</b>	<b>0.6</b>	<b>56</b>
<b>Eisenhower Hall</b>	<b>2CB</b>	<b>609</b>	<b>366</b>	<b>300</b>	<b>0.6</b>	<b>220</b>
Hale-Farrell Library	2CB	1,682	1,346	2,500	0.6	807
<b>Leasure Hall</b>	<b>2CB</b>	<b>515</b>	<b>309</b>	<b>225</b>	<b>0.6</b>	<b>186</b>
Ward Hall	2CB	260	156	1,000	0.6	94
<b>Burt Hall</b>	<b>2CB</b>	<b>436</b>	<b>262</b>	<b>300</b>	<b>0.6</b>	<b>157</b>
<b>General Classroom Building (Proposed)</b>	<b>2CB</b>	<b>416</b>	<b>333</b>	<b>500</b>	<b>0.6</b>	<b>200</b>
<b>Cardwell Hall</b>	<b>2CB</b>	<b>1094</b>	<b>766</b>	<b>1000</b>	<b>0.6</b>	<b>460</b>
<b>Cardwell Hall Expansion (Proposed)</b>	<b>2CB</b>	<b>118</b>	<b>83</b>	<b>112.5</b>	<b>0.6</b>	<b>50</b>
<b>Bushnell Hall</b>	<b>2CB</b>	<b>339</b>	<b>271</b>	<b>500</b>	<b>0.6</b>	<b>162</b>
Waters Hall	2CB	1,838	1,287	800	0.6	772
Waters Hall Annex	2CB	197	138	300	0.6	83
<b>Future Building North of Dickens Hall (Proposed)</b>	<b>2CB</b>	<b>630</b>	<b>441</b>	<b>500</b>	<b>0.6</b>	<b>265</b>
Feed Technology	2CB	138	96	750	0.6	58
<b>Shellenberger Hall</b>	<b>2CB</b>	<b>373</b>	<b>261</b>	<b>1,750</b>	<b>0.6</b>	<b>157</b>
Willard Hall	2CB	1,247	748	1,000	0.6	449
King Hall	2CB	414	332	500	0.6	199
Dickens Hall	2CB	365	219	500	0.6	131
Bluemont Hall	2CB	1,546	1,082	1,500	0.6	649
<b>Campus Creek Complex</b>	<b>2CB</b>	<b>140</b>	<b>84</b>	<b>225</b>	<b>0.6</b>	<b>50</b>
Leadership Studies Building	2CB	307	184	750	0.6	111

<b>Buildings</b>	<b>Feeder</b>	<b>Connected Load (KW)</b>	<b>Maximum Demand Load (kW)</b>	<b>Transformer Size (kVA)</b>	<b>Coincidence Factor</b>	<b>Coincident Peak (kW)</b>
<b>International Student Center Expansion (Proposed)</b>	<b>2CB</b>	<b>82</b>	<b>49</b>	<b>75</b>	<b>0.6</b>	<b>29</b>
International Student Center	2CB	75	45	500	0.6	27
<b>Dykstra Hall</b>	<b>2CB</b>	<b>389</b>	<b>234</b>	<b>337.5</b>	<b>0.6</b>	<b>140</b>
<b>Umberger Hall</b>	<b>2CB</b>	<b>680</b>	<b>408</b>	<b>500</b>	<b>0.6</b>	<b>245</b>
<b>Call Hall Chiller</b>	<b>2CB</b>	<b>425</b>	<b>319</b>	<b>500</b>	<b>0.6</b>	<b>191</b>
Wind Erosion Laboratory	2CB	201	161	500	0.6	97
Weber Hall	2CB	1,678	1,174	500	0.6	705
<b>Call Hall</b>	<b>2CB</b>	<b>838</b>	<b>586</b>	<b>1000</b>	<b>0.6</b>	<b>352</b>
<b>CAMPUS SUBSTATION</b>		<b>17,226</b>	<b>11,793</b>	<b>-</b>	<b>-</b>	<b>7,076</b>
<b>COMBINED SUBSTATIONS</b>		<b>21,895</b>	<b>14,723</b>	<b>-</b>	<b>-</b>	<b>8,859</b>

Source: Stanley Consultants, Inc.

\*Seaton Hall expansion (75,000 SF) has been added to the existing building electrical system.

Buildings shown in bold are proposed additions to the loop or modifications to existing loads.

### East Loop

**Table 3-3 East Loop: Proposed Load Summary - 12,470 Volts**

<b>Buildings</b>	<b>Feeder</b>	<b>Connected Load (kW)</b>	<b>Maximum Demand Load (kW)</b>	<b>Transformer Size (kVA)</b>	<b>Coincidence Factor</b>	<b>Coincident Peak (kW)</b>
<b>Ahearn Hall</b>	<b>3EA</b>	<b>1,409</b>	<b>1,056</b>	<b>750</b>	<b>0.6</b>	<b>634</b>
<b>East Stadium</b>	<b>3EA</b>	<b>139</b>	<b>76</b>	<b>500</b>	<b>0.6</b>	<b>46</b>
<b>**KSU Union / Bosco Plaza</b>	<b>3EA</b>	<b>1,689</b>	<b>1,014</b>	<b>2,500</b>	<b>0.6</b>	<b>608</b>
K-State Parking Structure / Information Booth	3EA	18	11	500	0.6	7
<b>Anderson Hall</b>	<b>3EA</b>	<b>595</b>	<b>357</b>	<b>500</b>	<b>0.6</b>	<b>214</b>
Calvin Hall	3EA	606	364	500	0.6	218
<b>Kedzie Hall</b>	<b>3EA</b>	<b>262</b>	<b>157</b>	<b>600</b>	<b>0.6</b>	<b>94</b>

<b>Buildings</b>	<b>Feeder</b>	<b>Connected Load (kW)</b>	<b>Maximum Demand Load (kW)</b>	<b>Transformer Size (kVA)</b>	<b>Coincidence Factor</b>	<b>Coincident Peak (kW)</b>
Nichols Hall	3EA	936	655	1,000	0.6	393
Fairchild Hall	3EA	682	409	1,000	0.6	246
<b>Thompson Hall</b>	<b>3EA</b>	<b>417</b>	<b>292</b>	<b>500</b>	<b>0.6</b>	<b>175</b>
<b>Danforth and All Faiths Chapel</b>	<b>3EA</b>	<b>63</b>	<b>41</b>	<b>45</b>	<b>0.6</b>	<b>25</b>
McCain Auditorium	3EA	856	471	1,500	0.6	283
Beach Art Museum	3EA	509	407	750	0.6	244
President's Residence	3EA	34	24	112.5	0.6	14
<b>College of Business Administration (Proposed)</b>	<b>3EA</b>	<b>756</b>	<b>454</b>	<b>500</b>	<b>0.6</b>	<b>272</b>
<b>SOUTHWEST SUBSTATION</b>		<b>8,971</b>	<b>5,788</b>	-	-	<b>3,479</b>
Chemistry / Biochemistry	3EB	831	665	3,500	0.6	399
<b>Justin Hall</b>	<b>3EB</b>	<b>978</b>	<b>587</b>	<b>1,500</b>	<b>0.6</b>	<b>352</b>
Putnam Hall	3EB	523	209	2,000	0.6	125
Van Zile Hall	3EB	496	198	*	0.6	119
Boyd Hall	3EB	523	209	*	0.6	126
Derby Dining Center (West and Ford added)	3EB	3,765	2,824	4,750	0.6	1,694
Haymaker Hall	3EB	964	385	500	0.6	231
Moore Hall	3EB	964	385	500	0.6	231
Child Development Center	3EB	400	260	500	0.6	156
B18 Parking Lot and Garden						
Maintenance Building	3EB	4	1	300	0.6	1
"Toddville" (near B18 Parking Lot)	3EB	3	2	300	0.6	1
<b>College of Veterinary Medicine (Proposed)</b>	<b>3EB</b>	<b>2,757</b>	<b>2,206</b>	<b>2,250</b>	<b>0.6</b>	<b>1,324</b>
<b>CAMPUS SUBSTATION</b>		<b>12,208</b>	<b>7,932</b>	-	-	<b>4,759</b>
<b>COMBINED SUBSTATIONS</b>		<b>21,178</b>	<b>13,720</b>	-	-	<b>8,238</b>

Source: Stanley Consultants, Inc.

- \* The Putnam transformer feeds Van Zile Hall and Boyd Hall.
  - \*\* K-State Union Additions (89,000 SF) have been added to the existing building electrical system.
- Buildings shown in bold are proposed additions to the loop or modifications to existing loads.

Based on the Chiller Master Plan Study, by year 2020, it is estimated that a total of 12,000 tons of cooling will be added to the campus. The total estimated power required is 8,400 kVA for the chiller load and 1,600 for the chiller building and auxiliary loads. The required 10 MVA to support this system is not available in the existing loop system. The master plan study also provides three options for the location of the proposed chiller plant. It is recommended to build the plant near the campus substation, as there ample space for the plant and a future substation to feed the new chiller plant.

Refer to Appendix A for single lines and plan drawings.

## **Equipment and System Deficiencies**

### **General**

Use and continuation of the 12,470 volt system is beneficial to the University to supply loads in campus area. In order to improve the campus distribution system reliability, the 4,160 volt system should be converted to the 12,470 volt system.

### **Substations**

If both the Southwest and Campus Substations are available, there is adequate capacity for existing demand load as well as future campus building expansion.

The proposed chiller plant, recommended in the chiller master plan study, requires a new substation to be built. The proposed location of this chiller plant is east of the Wind Erosion Laboratory as shown on sheet 8 of the plan drawings located in Appendix A.

Due to the limited capacity of the existing loops, it is recommended to temporarily feed the proposed chiller plant directly from Westar until a new substation is built. The chiller plant has a maximum proposed load of 12,000 tons being fed from electric chillers. The capacity required for the chillers is approximately 8.4 MVA, considering 700 kVA per 1,000 tons. An additional 1,600 kVA is estimated for the chiller building and auxiliary loads. It is recommended that the minimum size of the new substation be 20 MVA to feed the chiller plant and future campus loads.

#### **12,470 Volt Distribution**

Completion of the distribution loop from existing 12,470 volt switching devices to buildings that are currently fed from a 4,160 volt radial feeder is needed to provide service flexibility and greater reliability.

#### **4,160 Volt Distribution**

A program has been undertaken in recent years to eliminate the 4,160 volt distribution system, remove outdated switches, remove direct buried cables, and replace cables in duct bank.

The overall objective is to have all the 4,160 volt feeders changed to 12,470 volts.

**Table 3-4 Existing 4,160 Volt Buildings to be Converted to 12,470 Volts**

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Facility Grounds	Dykstra Hall
English/Counseling Services	Umberger Hall
Power House	Call Hall
Holtz Hall	Call Hall Chiller
Holton Hall	Ahearn Field House
Eisenhower Hall	Anderson Hall
Leasure Hall	Kedzie Hall
Burt Hall	Danforth and All Faiths Chapels
Cardwell Hall	Thompson Hall
Bushnell Hall	General Richards B. Myers Hall
Shellenberger (750 kVA Transformer)	

---

Source: Stanley Consultants, Inc.

#### **480 Volt Distribution**

The Campus Creek Complex is currently fed from a 480 volt source from the Chem/Biochem building. The existing transformer size could not be determined due to a damaged nameplate. It is assumed to be 112.5 kVA based on its physical size and load served. This transformer is undersized due to building expansions over several years.



# Recommendations and Cost Summary

### **Power System Recommendations**

Work has been underway during the last three to four years to deal with cable and switching deficiencies of the 4,160 volt, and to a lesser degree the 12,470 volt electrical distribution system. This work has been consistent with the overall 12,470 volt distribution system upgrades described in this report. Scope of effort for completed projects has included new feeders, new switching, and new duct bank and manholes.

Kansas State University should continue with expansion of the 12,470 volt distribution.

#### **A. Substations**

Each of the two existing substations will continue to serve the mid-range (year 2017) as well as the long range (year 2025) needs of the school under normal operating conditions.

An “Interim Contingency Plan” should be laid out to address handling the following issue:

- The total maximum capacity of the transformers at both substations is 43.4 MVA. The maximum campus peak demand load based on utility data is 23.54 MW. In the event that the Southwest substation lost power during summer months (i.e. August and September) peak conditions, the Campus substation (with maximum of 22.4 MVA capacity) will be at or above its capacity to supply peak demand load.

#### **B. Distribution**

The remaining loads served by the 4,160 volt system should be shifted to the 12,470 volt system. Transfer of the loads to the 12,470 volt system should be carefully planned such that each loop will be balanced.

Opening and closing distribution switches changes the “Tie-Point” on the 12,470 volt loops.

- Consideration should be given to utilizing different existing sectionalizing switches on each loop. While providing for a better balanced loading between the substations, this would also lower line losses and to arrive at a more optimum “electrical middle” balance.
- Load balancing can be achieved as required to keep pace with building construction.

In order to provide the system with the necessary serviceable equipment for safe and reliable operation, the following recommendations should be implemented:

- Increase the size of the transformer at the Campus Creek Complex.
- Provide the remaining section of the 12,470 volt duct bank and cable feeders to the Campus Creek Complex.
- Complete the replacement of all 4,160 volt to 12,470 volt distribution.
- Install metering equipment and SCADA for the 12,470 volt distribution system and interconnect with the campus building management system.
- Perform a complete short circuit, coordination, and arc flash analysis and labeling to comply with NFPA 70E for safety of the KSU staff and technicians.
- Install a new substation with a total capacity of 20 MVA for the new chiller plant and future campus loads.

## Cost Summary

The estimated costs for major projects are shown below. For a detailed summary, see Appendix C.

**Table 4-1 Cost Summary**

<b>Project</b>	<b>Estimated Cost</b>
4,160 volts to 12,470 volts Conversion	\$3,050,7856
New Loads - Loop Additions	\$689,765
Overhead line to Underground	*
New Substation**	\$6,022,724
SCADA and Metering	*
<b>TOTAL</b>	<b>\$9,763,275</b>

Source: Stanley Consultants, Inc.

\* Estimated cost not provided due to undefined scope parameters.

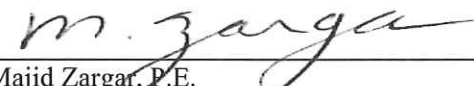
\* Equipment only. Primary feeder to new substation and connection is not included.

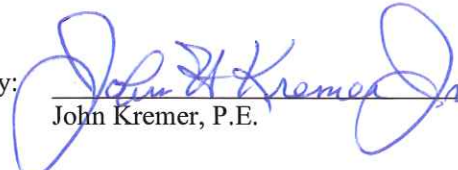
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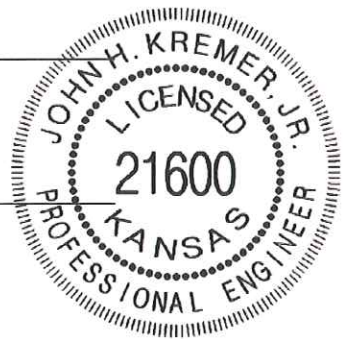
Respectfully submitted,

Stanley Consultants, Inc.

Prepared by:   
\_\_\_\_\_  
Latrice Baggett, P.E.

Reviewed by:   
\_\_\_\_\_  
Majid Zargar, P.E.

Approved by:  03/11/2013  
\_\_\_\_\_  
John Kremer, P.E.



LB/MZ/JK/mk/PW/24036\07-Design\04-ProjManual\02-Final\Printed-Final

**Feasibility Disclaimer**

All recommendations and/or advice presented in this document are Stanley Consultants' opinions of probable project conditions. Project conditions are based on the information and data sources that are readily available to us, input by the client, and other reliable sources, all of which are believed to be accurate. Our recommendations and/or advice are made on the basis of our experience and represent our judgment and opinions. We have no control over new and/or non-public information, changed conditions, cost of land, cost of labor, materials, equipment, and/or other construction costs, or over competitive bidding or market conditions. Therefore, we do not guarantee that actual conditions or actual costs will not vary from those presented in this report, study, plan, etc.

**"Cost Estimates" Disclaimer**

All cost estimates presented in this report are Stanley Consultants' opinions of probable project, construction, and/or operation and maintenance costs. Costs estimates are made on the basis of our experience and represent our best judgment. We have no control over cost of labor, materials, equipment, contractor's methods, or over competitive bidding or market conditions. Therefore, we do not guarantee that proposals, bids, or actual construction costs will not vary from estimates of project costs, construction, and/or operation and maintenance costs presented. The estimates do not include inflation.

## Appendix A

### Single Line Diagrams and Plan Drawings

**GENERAL NOTES:**

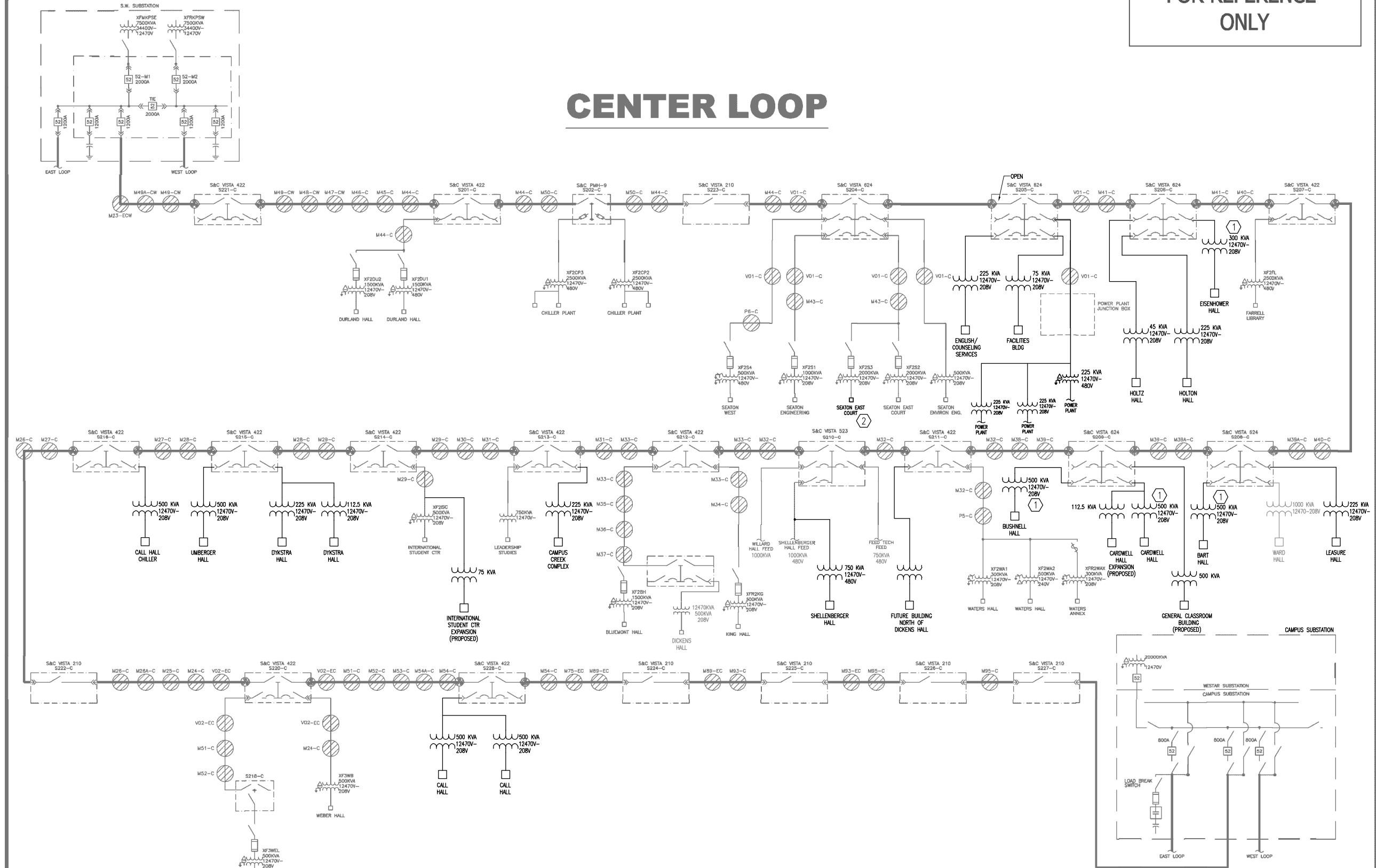
1. BOLD LINE WORK INDICATES A PROPOSED LOADS ADDED TO THE SYSTEM.

**KEYED NOTES:**

1. EXISTING DUAL TAP TRANSFORMER TO STAY.
2. BUILDING EXPANSION LOADS SHALL BE ADDED TO EXISTING ELECTRICAL SYSTEM.

**FOR REFERENCE ONLY**

# CENTER LOOP



KANSAS STATE UNIVERSITY – CENTER LOOP SINGLE LINE DIAGRAM

**KSTATE**  
K-STATE FACILITIES  
PLANNING OFFICE  
300 SW JACKSON, SUITE 800  
MANHATTAN, KANSAS 66506  
TEL: 785-532-4377

**MORROW**  
ENGINEERING, INC.

KSU DWG. NO.  
**DR2009-018**  
SHEET  
**3 OF 8**  
TOTAL SHEETS IN SET  
**90**  
MORROW PROJECT NO.  
**08978**

Department of Administration  
Division of Facilities Management  
London State Office Building  
900 SW Jackson, Suite 800  
Manhattan, Kansas 66506  
Telephone 785-286-8898 Fax 785-286-8898

KANSAS STATE UNIVERSITY  
12.5KV DISTRIBUTION SYSTEM  
MODIFICATIONS  
MANHATTAN, KS 66506  
DATE: 12/20/2010  
DRAWN BY: J.MARTIN  
CHECKED BY: P.O'BRIEN  
REV: 01

CENTER LOOP  
SINGLE LINE DIAGRAM  
A-010700  
E-020B  
AS-BUILT

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**GENERAL NOTES:**

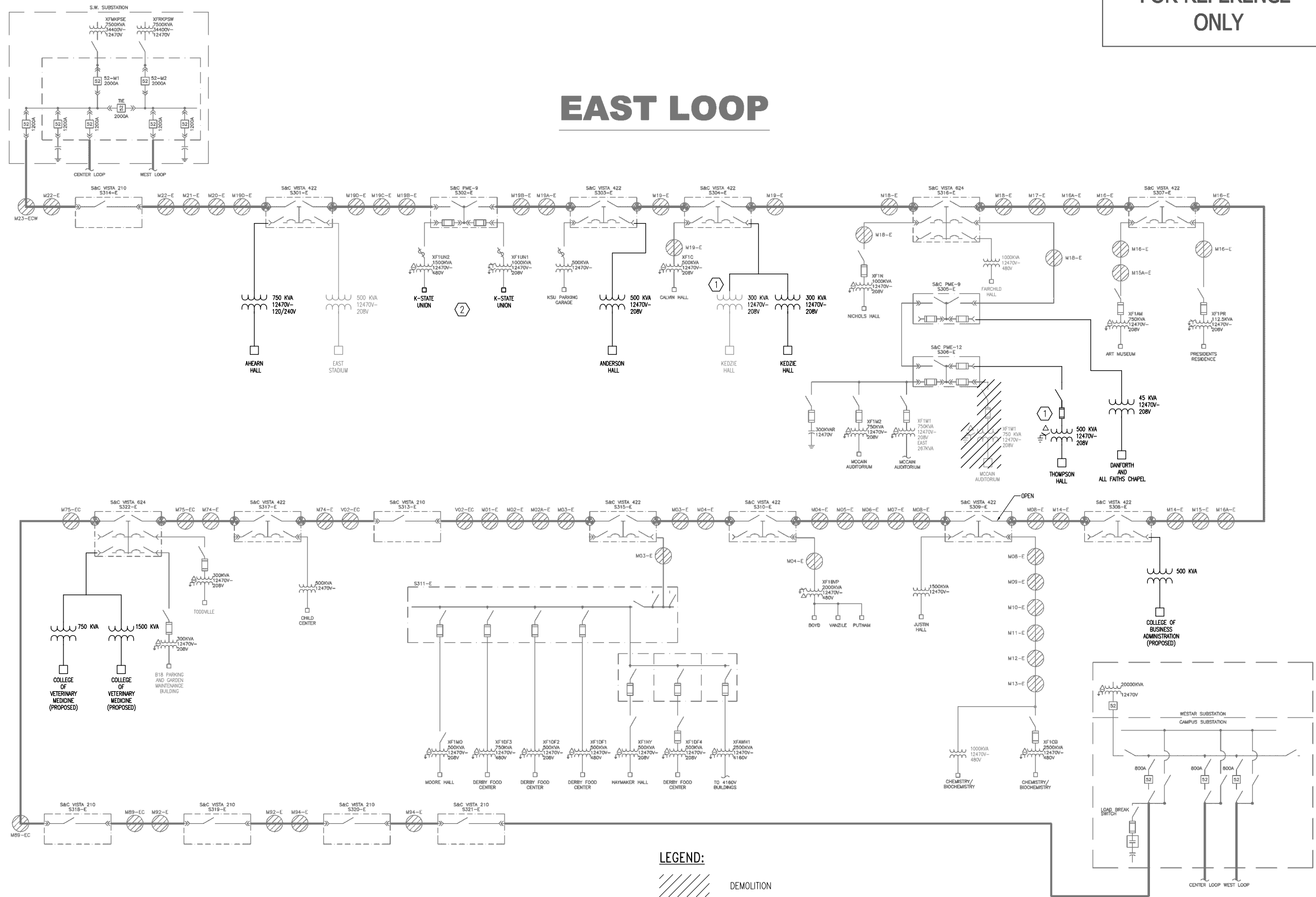
- BOLD LINE WORK INDICATES A PROPOSED LOADS ADDED TO THE SYSTEM.

**KEYED NOTES:**

- EXISTING DUAL TAP TRANSFORMER TO STAY.
- BUILDING EXPANSION LOADS SHALL BE ADDED TO EXISTING ELECTRICAL SYSTEM.

**FOR REFERENCE ONLY**

# EAST LOOP



**LEGEND:**  
 DEMOLITION

KANSAS STATE UNIVERSITY - EAST LOOP SINGLE LINE DIAGRAM

CADD 04-R3  
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**GENERAL NOTES:**

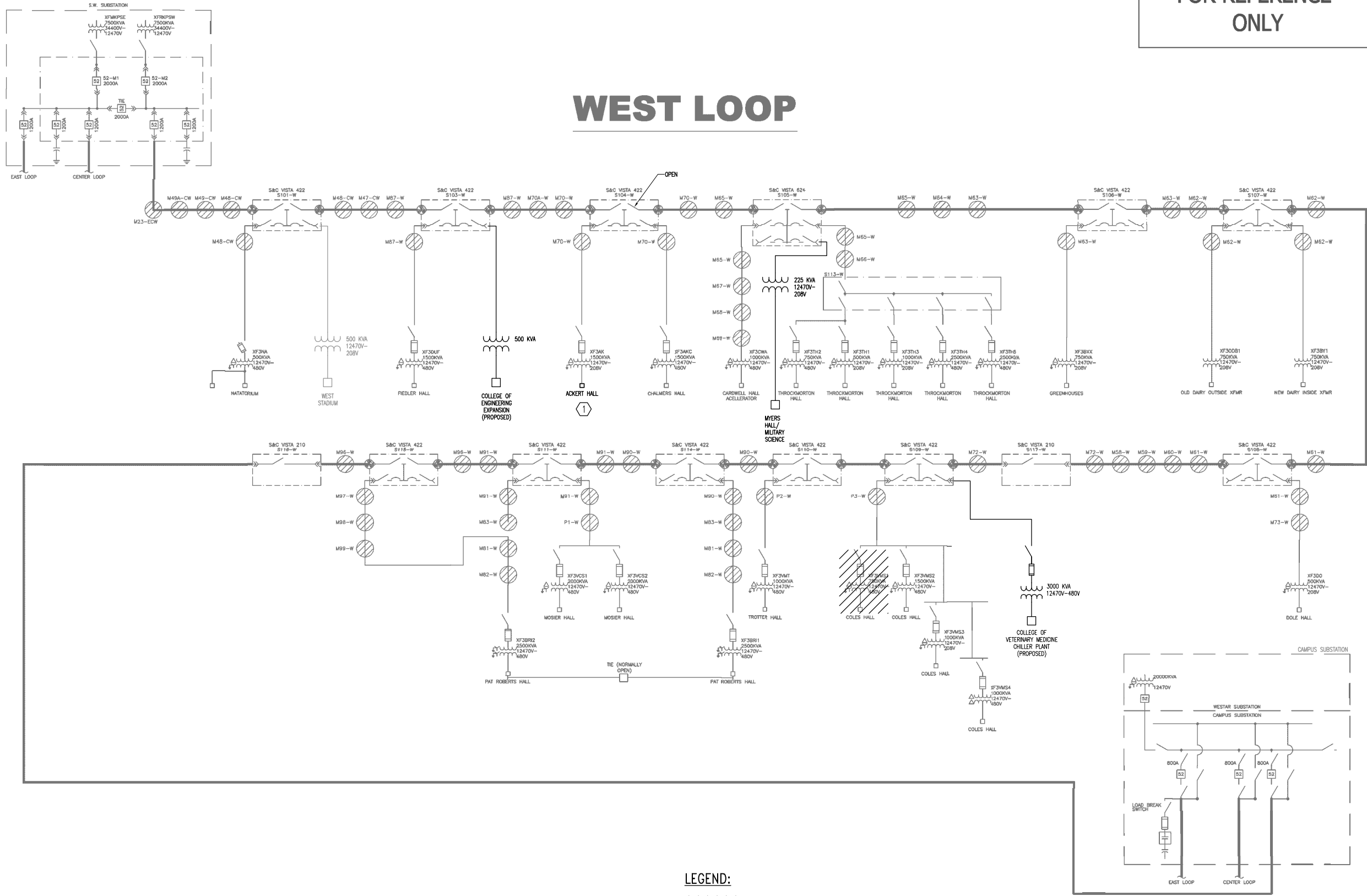
1. BOLD LINE WORK INDICATES A PROPOSED LOADS ADDED TO THE SYSTEM.

**KEYED NOTES:**

1. BUILDING EXPANSION LOADS SHALL BE ADDED TO EXISTING ELECTRICAL SYSTEM.

**FOR REFERENCE ONLY**

# WEST LOOP



**LEGEND:**  
 DEMOLITION

KANSAS STATE UNIVERSITY – WEST LOOP SINGLE LINE DIAGRAM

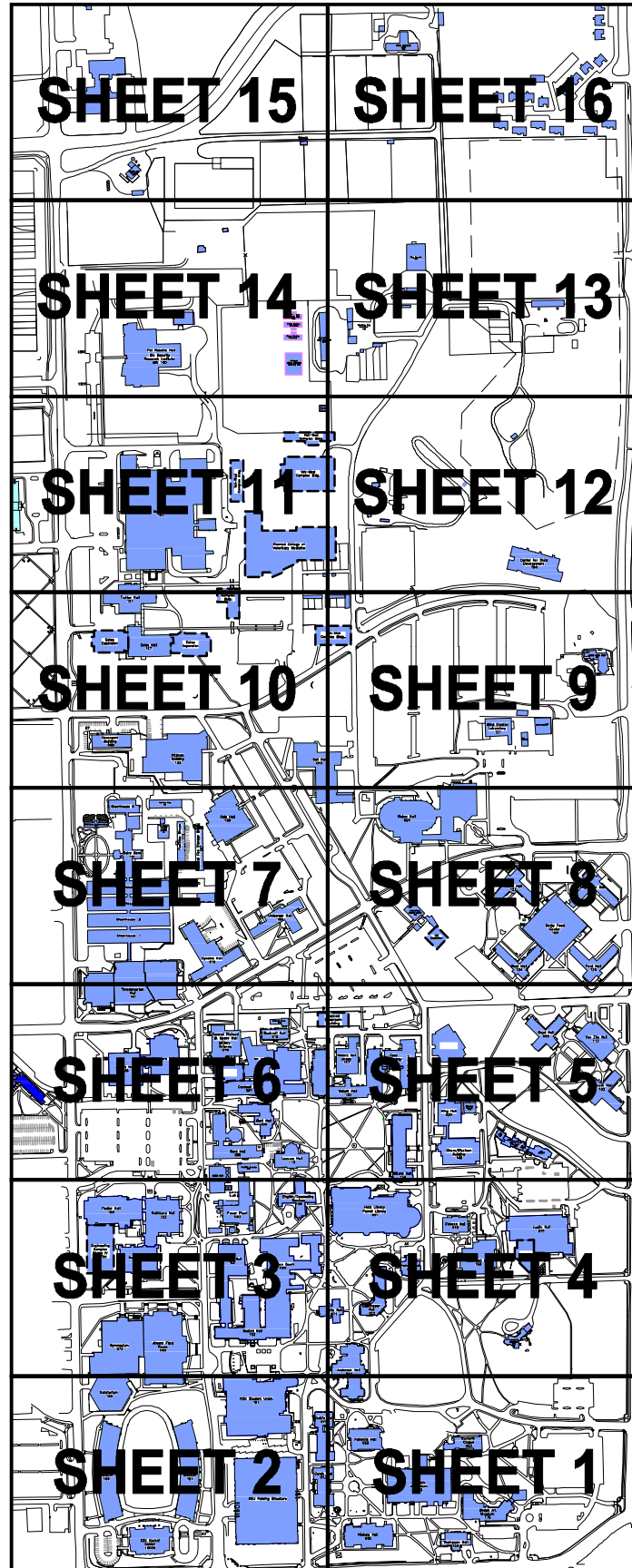
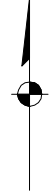
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Stanley Consultants INC.

NORTH



**LEGEND:**

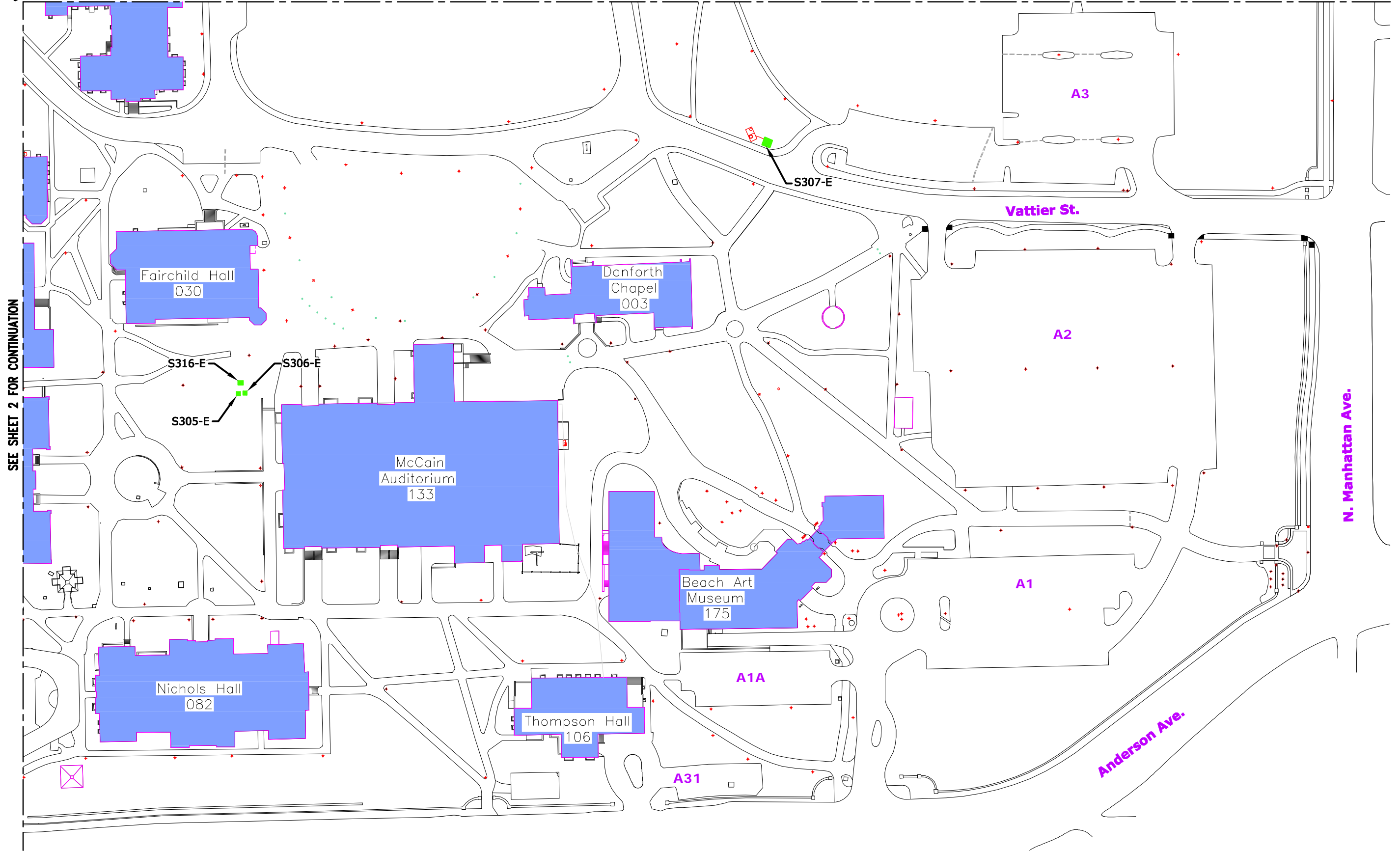
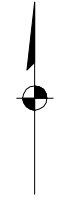


SWITCH

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NORTH



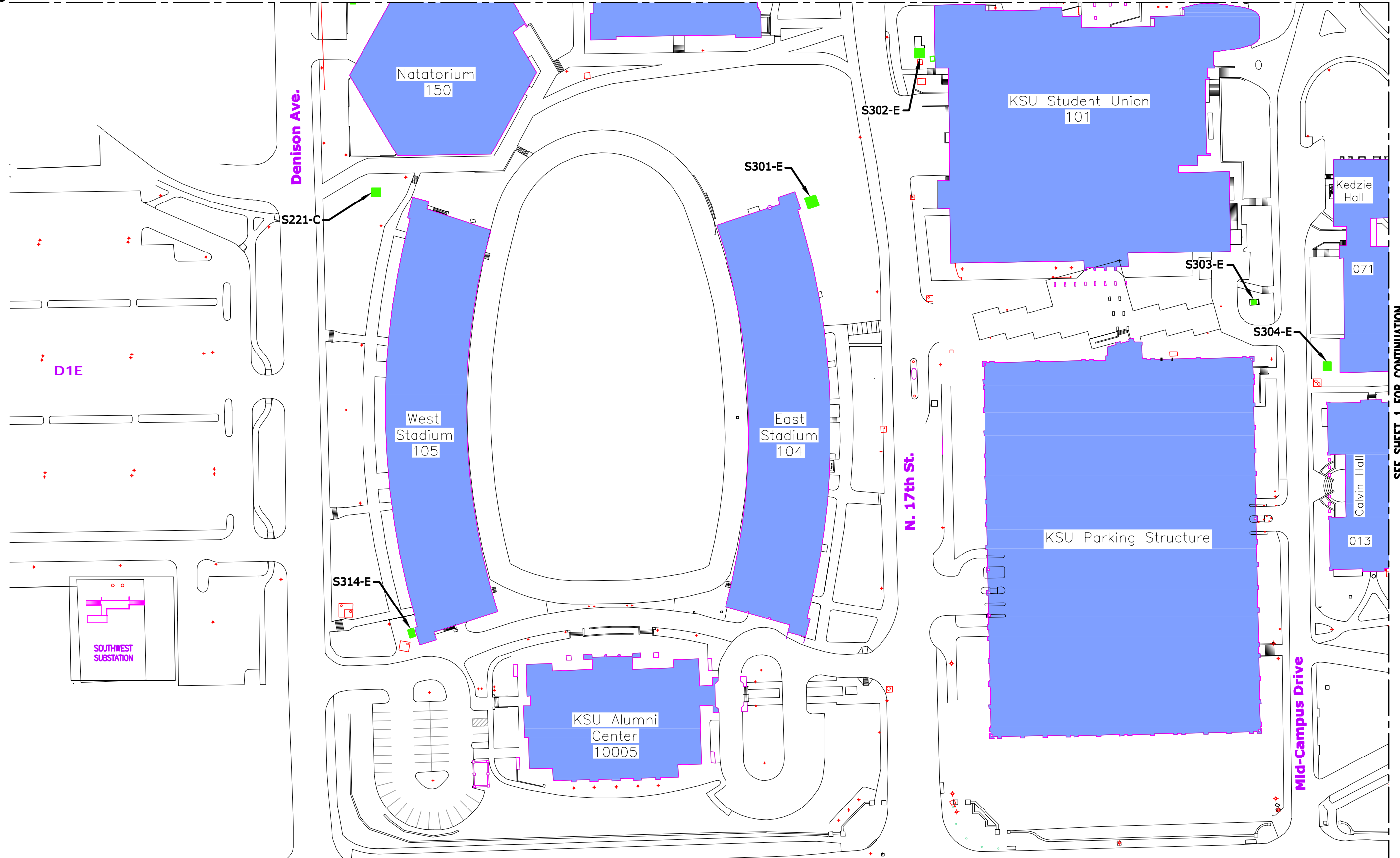
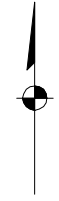
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SEE SHEET 3 FOR CONTINUATION

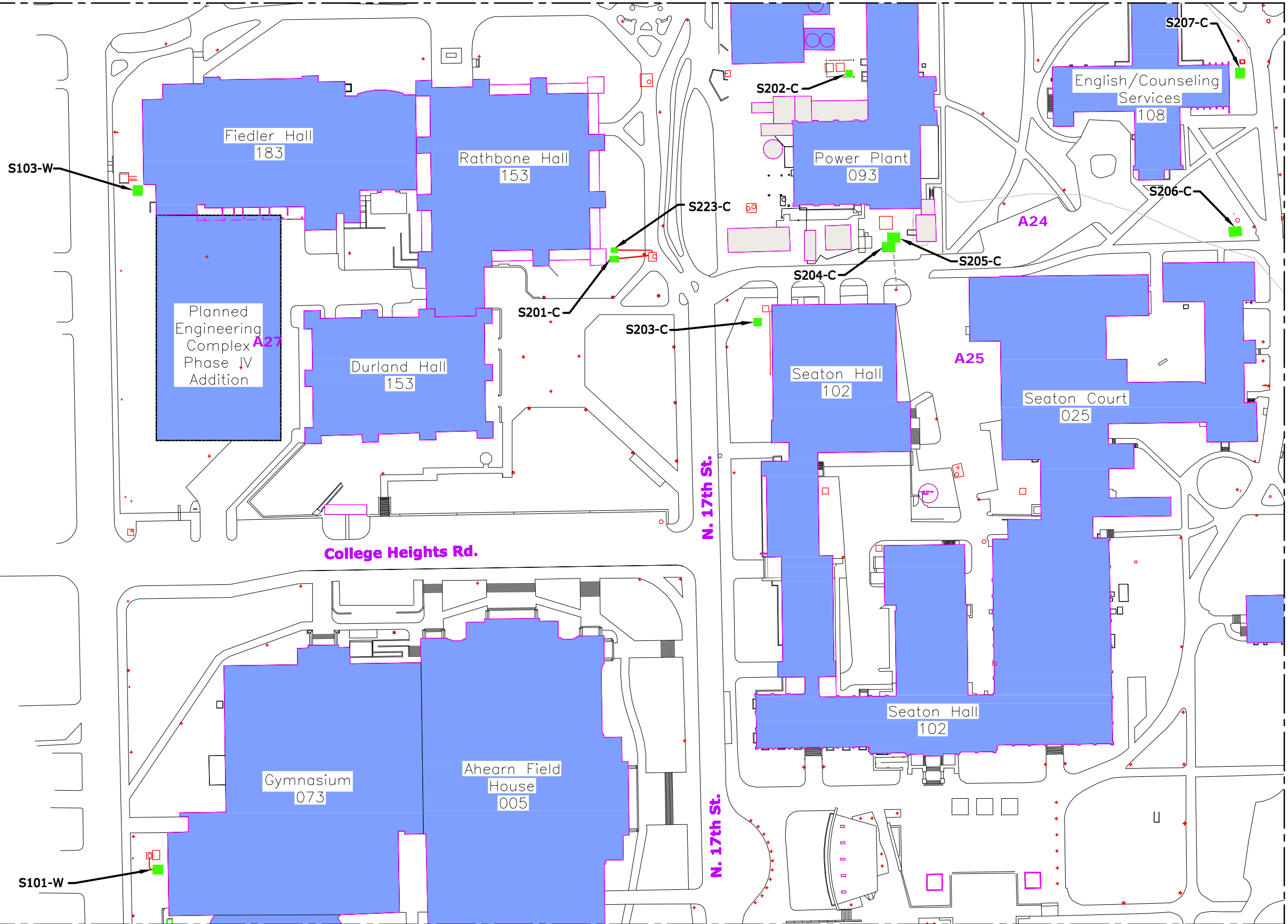
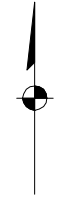
NORTH



SEE SHEET 1 FOR CONTINUATION



NORTH



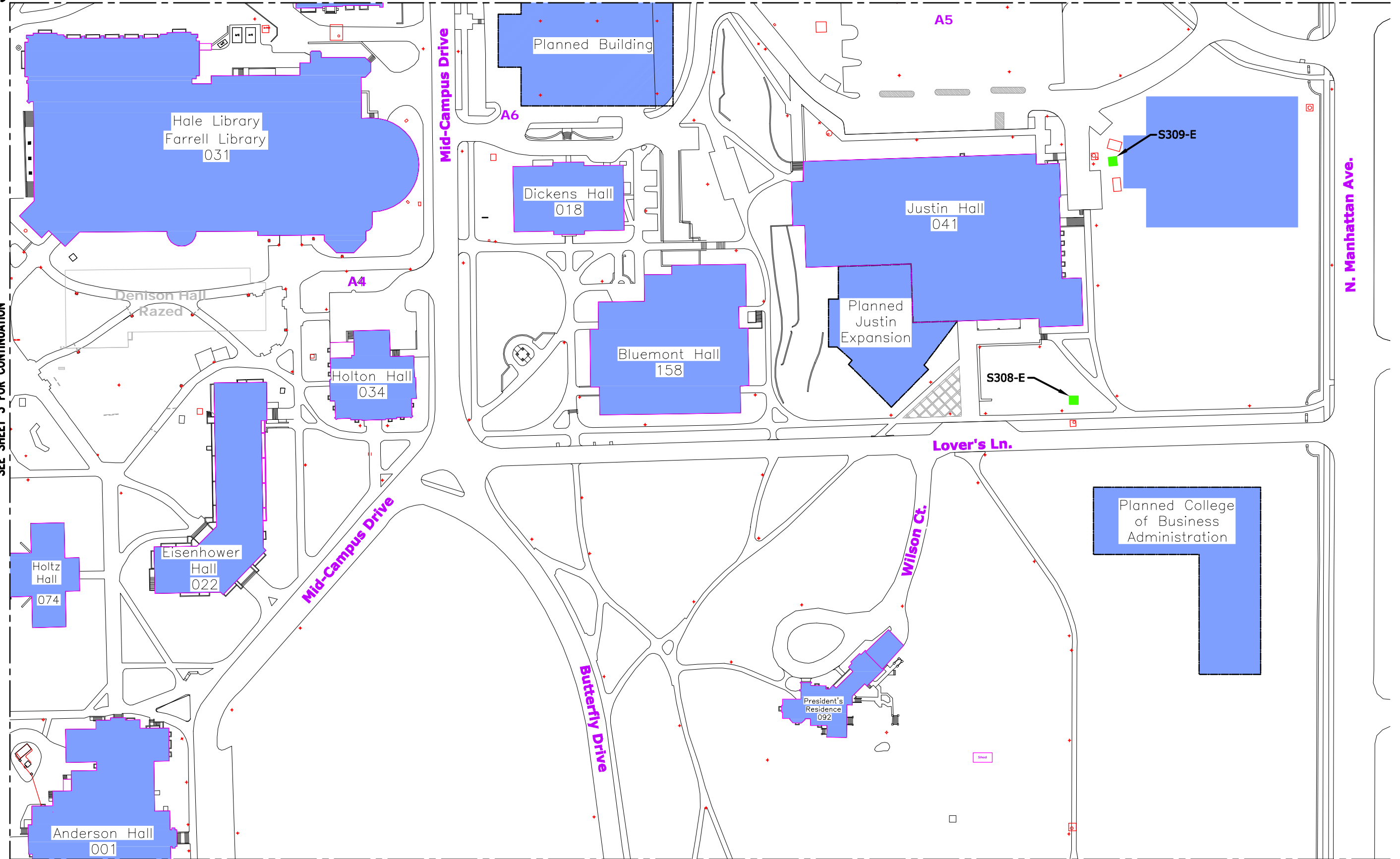
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SEE SHEET 5 FOR CONTINUATION

NORTH

SEE SHEET 3 FOR CONTINUATION

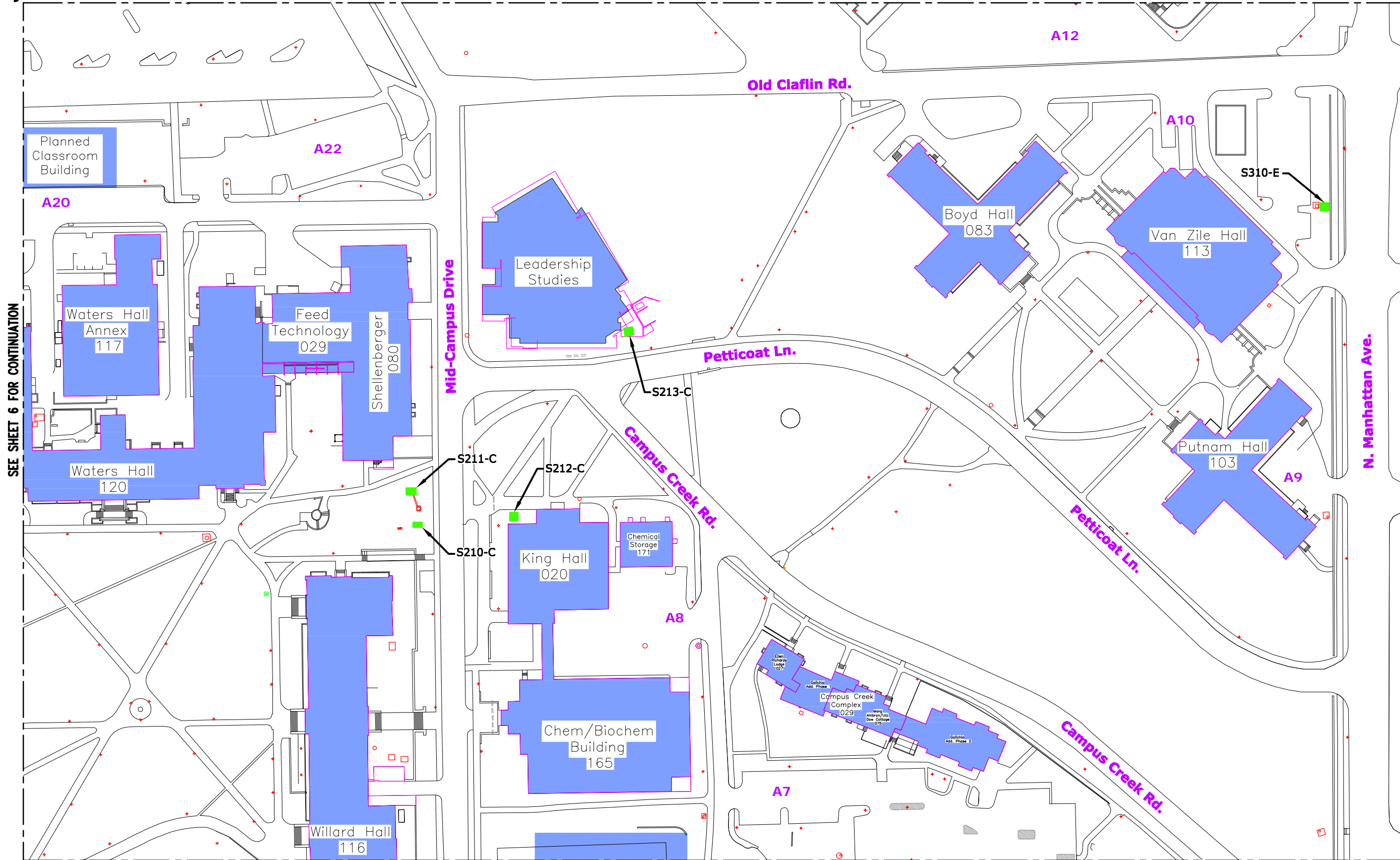


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NORTH

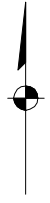


SEE SHEET 6 FOR CONTINUATION



SEE SHEET 7 FOR CONTINUATION

NORTH



S105-W

Throckmorton Hall 161

S113-W

Clafin Rd.

Clafin Rd.

A18

Planned Classroom Building

Bushnell Annex 008

Bushnell Hall 010

A19

General Richard B. Myers Hall Military Science 079

Ion Lab

Planned Cardwell Expansion

Cardwell Hall 091

D3

Goodnow Hall 078

S104-W

Ackert Hall 136

Chalmers Hall

N. 17th St.

SEE SHEET 5 FOR CONTINUATION

D2

A28

S209-C

Burt Hall 009

Ward Hall 085

S208-C

Leisure Hall 112

Chilling Plant

Facilities Grounds 097

SEE SHEET 3 FOR CONTINUATION



SEE SHEET 10 FOR CONTINUATION

NORTH

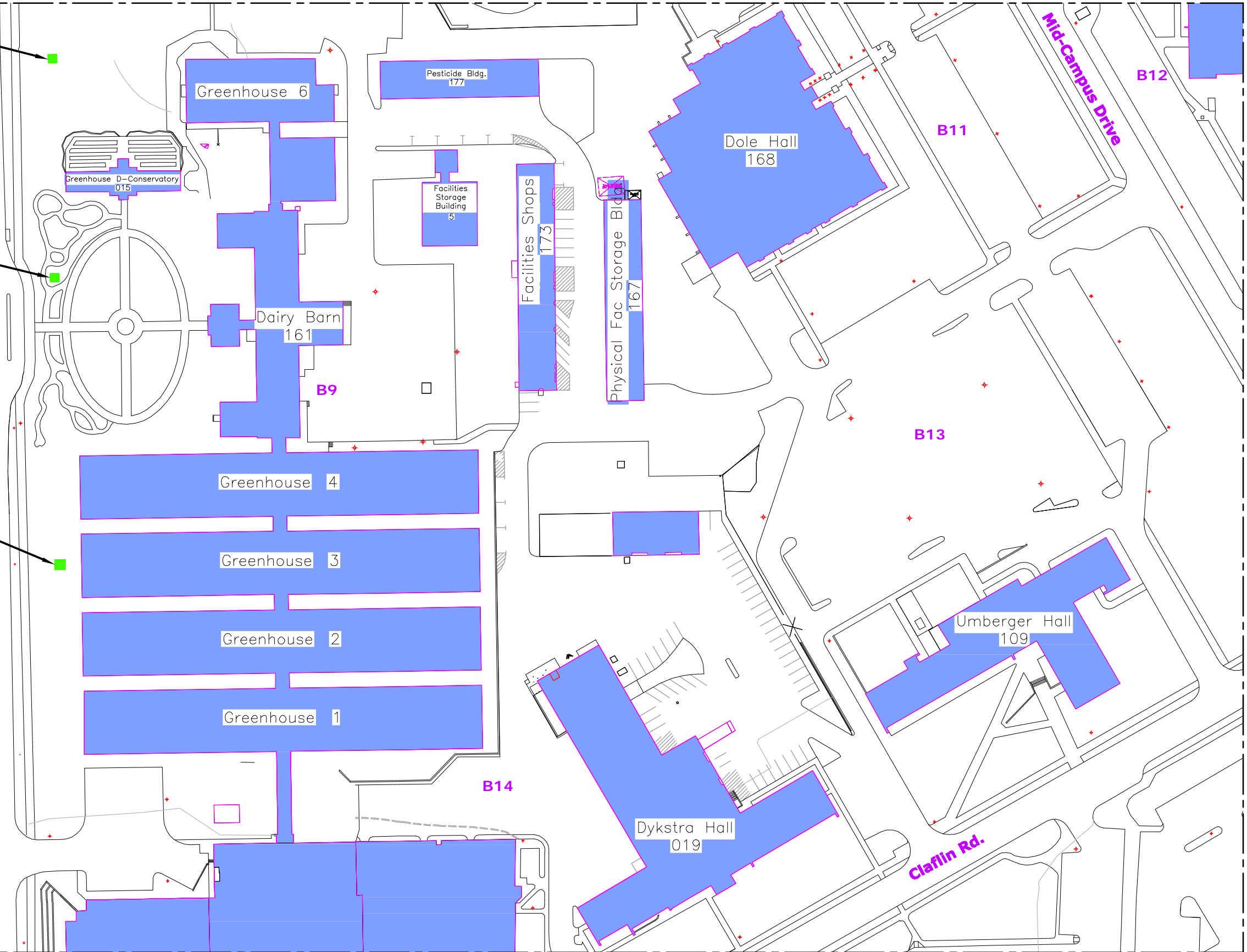


S108-W

S107-W

S106-W

Todd Rd.



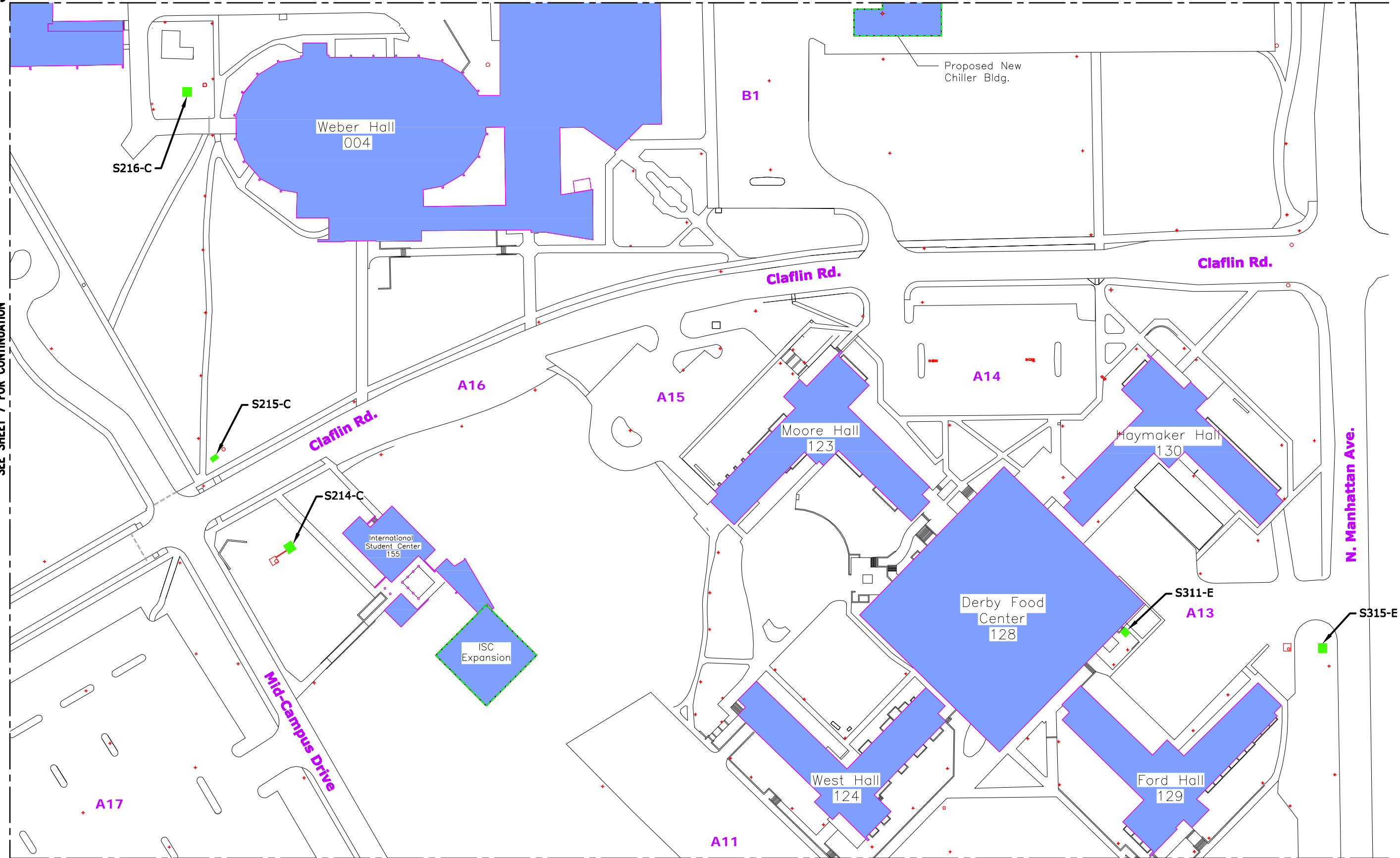
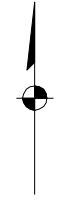
SEE SHEET 6 FOR CONTINUATION

SEE SHEET 8 FOR CONTINUATION





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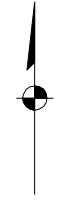


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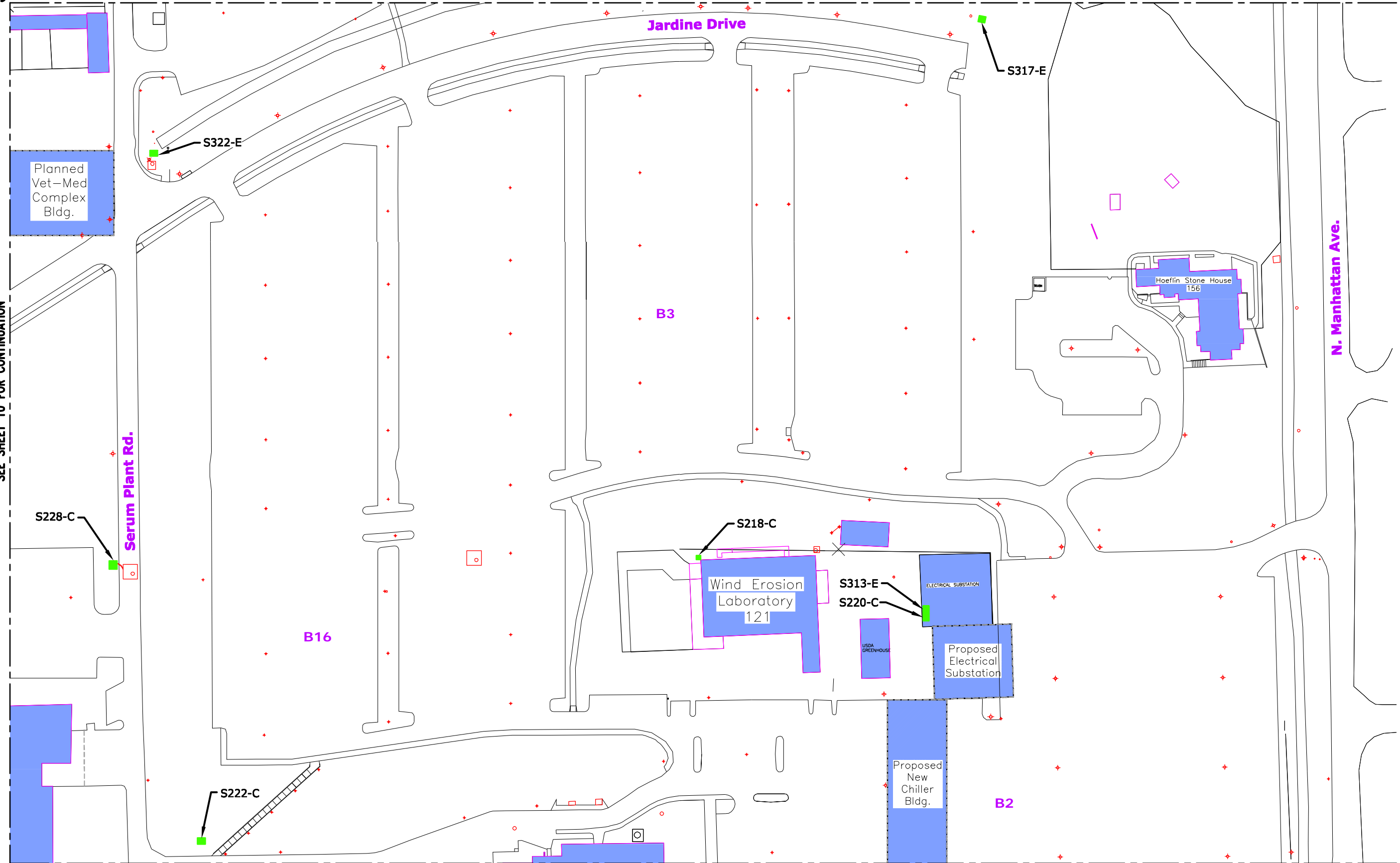


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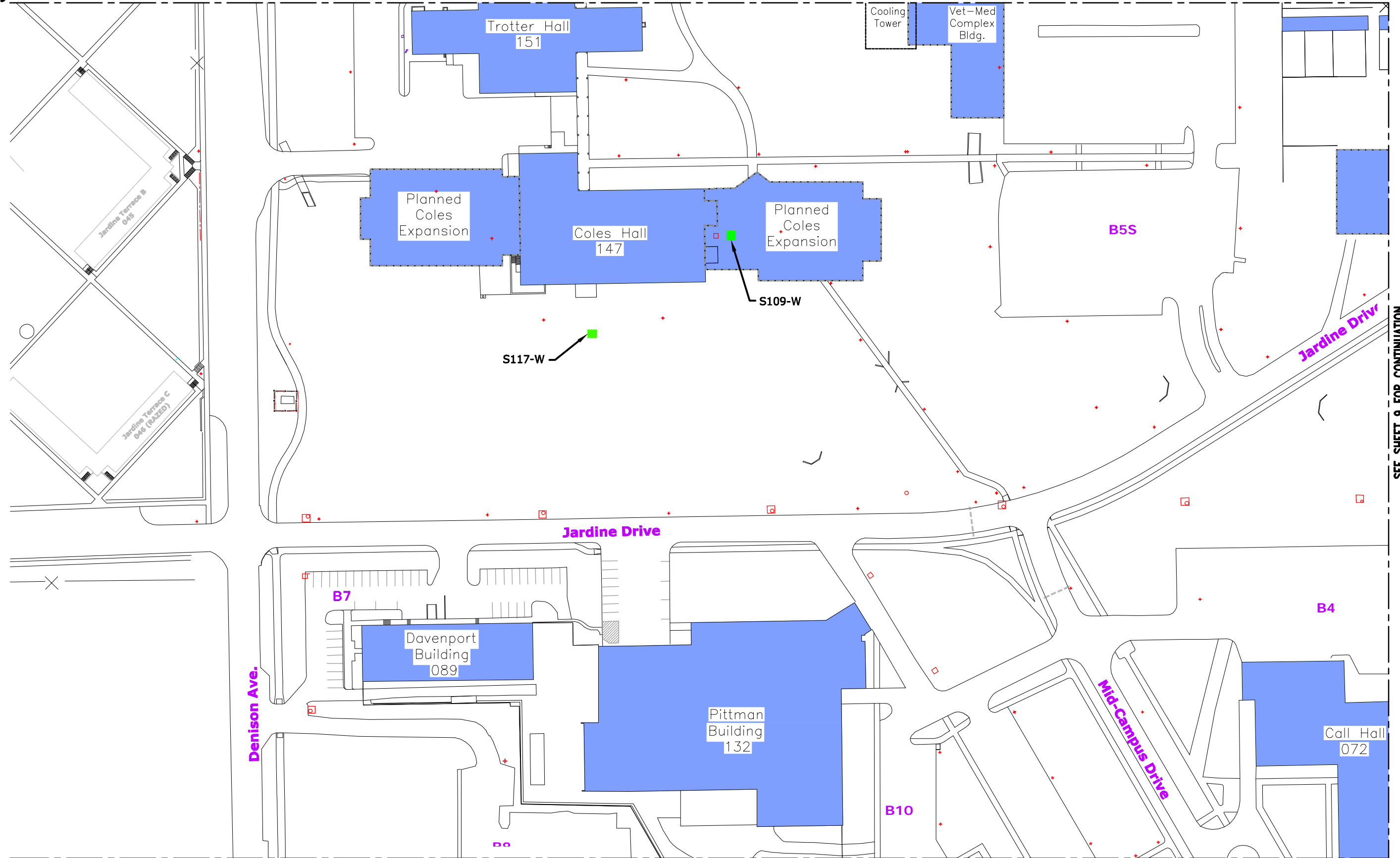
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SEE SHEET 8 FOR CONTINUATION

SEE SHEET 11 FOR CONTINUATION

NORTH



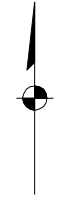
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SEE SHEET 9 FOR CONTINUATION



NORTH



10002

S319-E

S225-C

S111-W

S114-W

Planned Vet-Med Complex Bldg.

Model May Shed Floor - 11164

Planned Vet-Med Complex Bldg.

Planned Vet-Med Complex Bldg.

Mosier Hall 154

Planned College of Veterinary Medicine

C3

B8

Kerr Dr.

Denison Ave.

S110-W

B5N

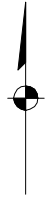
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SEE SHEET 13 FOR CONTINUATION

NORTH



SEE SHEET 11 FOR CONTINUATION

S318-E

S224-C

Serum Plant Rd.

B18

Center for Child Development  
194

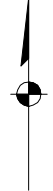
N. Manhattan Ave.

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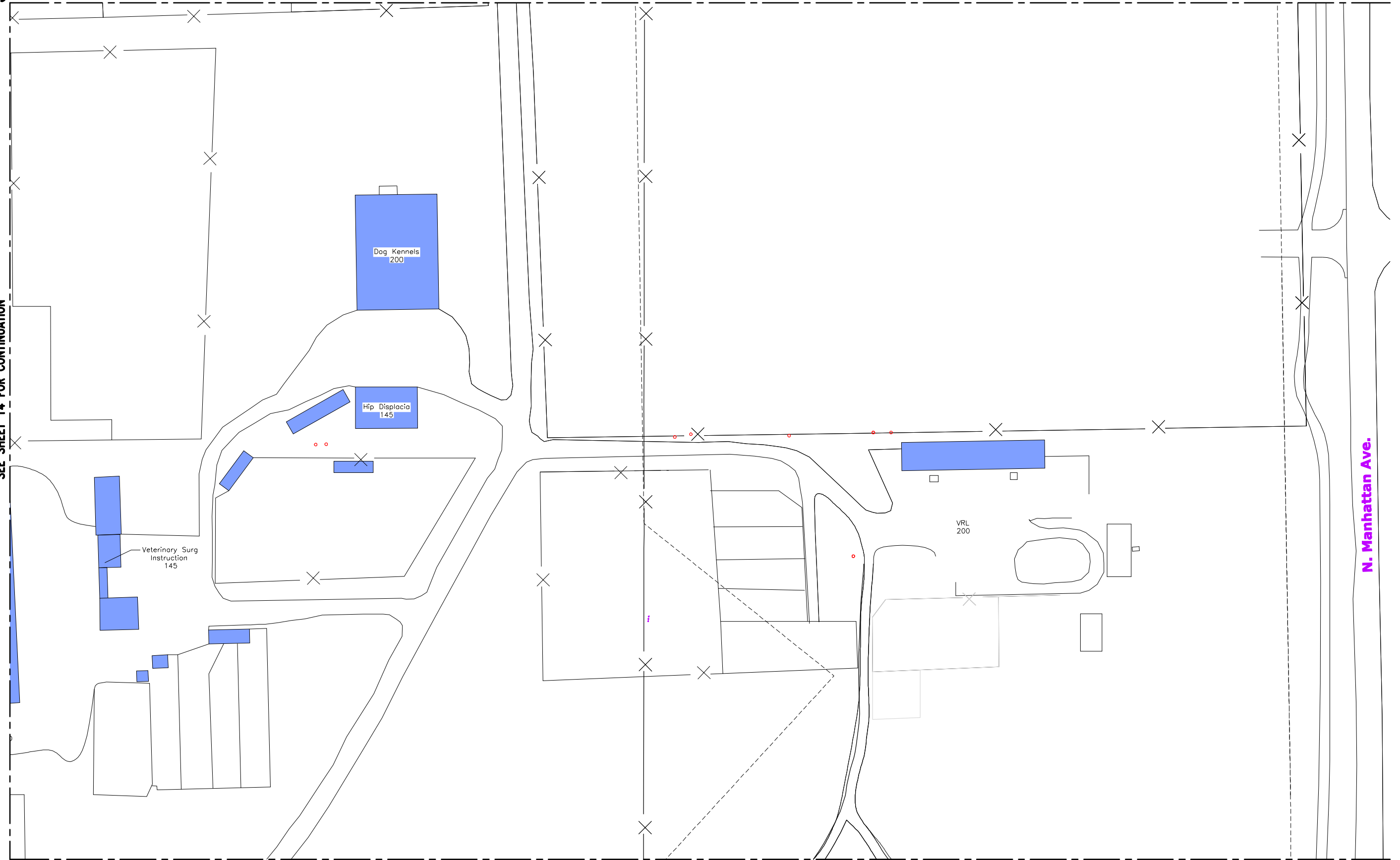


SEE SHEET 16 FOR CONTINUATION

NORTH



SEE SHEET 14 FOR CONTINUATION



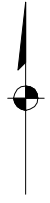
N. Manhattan Ave.

SEE SHEET 12 FOR CONTINUATION



SEE SHEET 15 FOR CONTINUATION

NORTH



Denison Ave.

S320-E  
S226-C  
S115-W

Pat Roberts Hall  
Bio Security  
Research Institute  
BRI 190

ARF - Dog  
Research Facil.  
232

Future Modular  
Structures

Future Modular  
Structures

Food Animal  
Barn and Shed

Proposed  
Animal Resource  
Laboratory Site

224

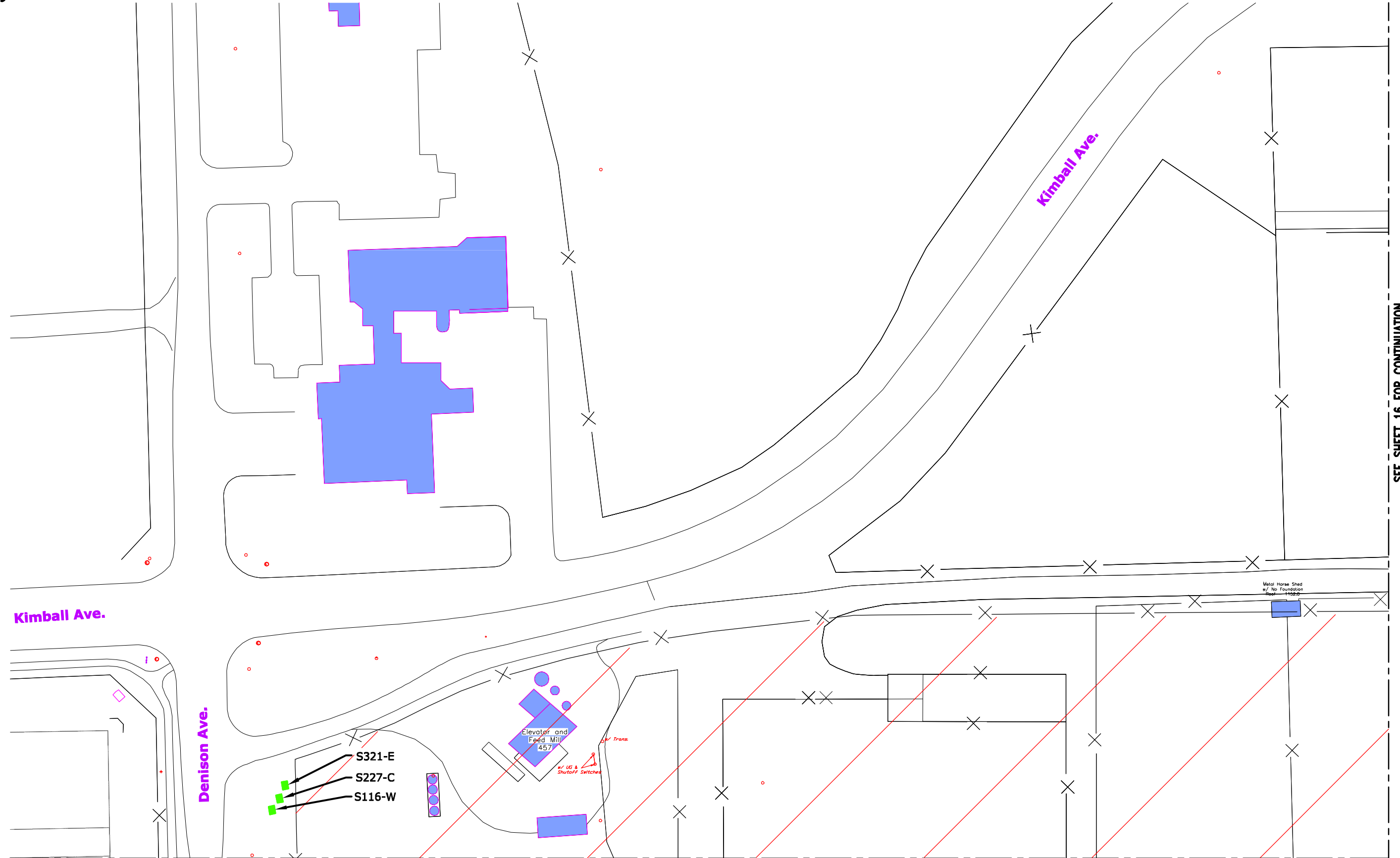
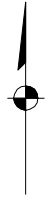
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SEE SHEET 11 FOR CONTINUATION





NORTH



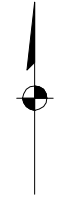
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SEE SHEET 14 FOR CONTINUATION

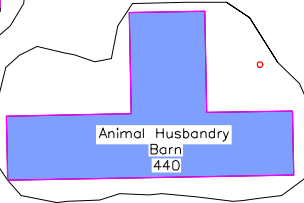




NORTH



SEE SHEET 15 FOR CONTINUATION



Serum Plant Rd.

N. Manhattan Ave.

RETAINING WALL

SEE SHEET 13 FOR CONTINUATION

## Appendix B

### Electrical Building Loads

**Existing Building Loads**  
**Proposed Building Loads**

Kansas State University  
Building List  
Existing Electrical Distribution

Property Code	BULDING #	Property Name	Occupancy Type	Sq ft	System Loop	Switch	Lighting Load (Watts/Sq ft)*	Device Load (Watts/Sq ft)*	HVAC Load (Watts/Sq ft)*	Misc. Load (Watts/Sq ft)*	Total Load (Watts/Sq ft)	Watts Connected	Demand Factor %	Watts Demand
DU/DUR/DUF	153	Durland/Rathbone	SCIENCE	165,398	C	S201-C	3.0	3.0	0.0	1.3	7.3	1,207,405	70%	845,184
		Chiller Plant (Power Plant Bldg)	PLANT	22,864	C	S202-C	3.0	2.0	1.0	1.0	7.0	160,048	80%	128,038
SC	25	Seaton Court	ADMIN/CLASS	45,515	C	S204-C	3.0	2.0	2.7	1.3	9.0	407,359	60%	244,416
S	102	Seaton Engineering + Seaton West	ADMIN/CLASS	235,967	C	S204-C	3.0	2.0	2.7	1.3	9.0	2,111,905	60%	1,267,143
ERL	21	Seaton Env Eng	LABS	6,762	C	S204-C	3.0	5.0	5.3	1.3	14.6	98,725	80%	78,980
PP	93	Power Plant	PLANT	52,792	C	S205-C	3.0	2.0	1.0	1.0	7.0	369,544	80%	295,635
		4160V Bldgs (From Power Plant XFMR)										8,308,050		5,457,531
HL	31	Hale-Farrell Library	LIBRARY	357,927	C	S207-C	2.5	0.8	0.0	1.4	4.7	1,682,257	80%	1,345,806
WD	85	Ward Hall	ADMIN/CLASS	41,222	C	S208-C	3.0	2.0	0.0	1.3	6.3	259,699	60%	155,819
WA	120	Waters Hall	SCIENCE	147,102	C	S211-C	3.0	3.0	5.2	1.3	12.5	1,838,775	70%	1,287,143
WAX	117	Waters Hall Annex	SCIENCE	15,658	C	S211-C	3.0	3.0	5.3	1.3	12.6	197,291	70%	138,104
FT	29	Feed Technology	SCIENCE	18,837	C	S210-C	3.0	3.0	0.0	1.3	7.3	137,510	70%	96,257
SH	80	Shellenberger Hall	SCIENCE	51,051	C	S210-C	3.0	3.0	0.0	1.3	7.3	372,672	70%	260,871
W	116	Willard Hall	ADMIN/CLASS	109,459	C	S220-C	3.0	2.0	5.1	1.3	11.4	1,246,519	60%	747,911
KG	20	King Hall	LABS	44,559	C	S212-C	3.0	5.0	0.0	1.3	9.3	414,399	80%	331,519
D	18	Dickens Hall	ADMIN/CLASS	31,435	C	S212-C	3.0	2.0	5.3	1.3	11.6	364,646	60%	218,788
BH	158	Bluemont Hall	SCIENCE	122,700	C	S212-C	3.0	3.0	5.3	1.3	12.6	1,546,020	70%	1,082,214
LSP	195	Leadership Studies Building	ADMIN/CLASS	26,485	C	S212-C	3.0	2.0	5.3	1.3	11.6	307,226	60%	184,336
ISC	155	International Student Center	ADMIN/CLASS	6,439	C	S214-C	3.0	2.0	5.3	1.3	11.6	74,692	60%	44,815
WEL	121/205	Wind Erosion Laboratory	LABS	13,780	C	S220-C	3.0	5.0	5.3	1.3	14.6	201,188	80%	160,950
WB	4	Weber Hall	AUD/SCIENCE	133,161	C	S220-C	3.0	1.3	3.0	5.3	12.6	1,677,829	70%	1,174,480
												<b>22,983,759</b>	<b>SUM</b>	<b>15,545,939</b>
ES	104	East Stadium	AUDITORIUM	22,357	E	S301-E	2.5	0.5	0.2	0.8	4.0	89,428	55%	49,185
UN	101	KSU Union / Bosco Plaza	MULTI-USE	235,957	E	S302-E	2.0	1.9	0.0	1.3	5.2	1,226,976	60%	736,186
KPS	163/192	K-State Parking Structure /Information Booth	PARKING	12,295	E	S303-E	0.5	0.5	0.0	0.5	1.5	18,443	60%	11,066
C	13	Calvin Hall	ADMIN/CLASS	52,261	E	S304-E	3.0	2.0	5.3	1.3	11.6	606,228	60%	363,737
N	82	Nichols Hall	SCIENCE	74,277	E	S316-E	3.0	3.0	5.3	1.3	12.6	935,890	70%	655,123
F	30	Fairchild Hall	ADMIN/CLASS	58,828	E	S316-E	3.0	2.0	5.3	1.3	11.6	682,405	60%	409,443
M	133	McCain Auditorium	AUDITORIUM	112,639	E	S306-E	2.5	1.0	3.3	0.8	7.6	856,056	55%	470,831
	3/106	CHAPEL AND THOMPSON (4160V LOADS)		42,429			1.8	0.8	3.3	0.8	6.7	284,274	65%	184,778
BA	175	Beach Art Musuem	MUSEUM	48,920	E	S307-E	2.5	0.8	5.7	1.4	10.4	508,768	80%	407,014
PR	92	President's Residence	RESIDENCE	9,096	E	S307-E	2.0	0.5	1.0	0.2	3.7	33,655	70%	23,559
CB	165	Chemistry/Biochemistry (Campus Creek)	LABS	89,350	E	S309-E	3.0	5.0	0.0	1.3	9.3	830,955	80%	664,764
JU	41	Justin Hall	ADMIN/CLASS	148,768	E	S309-E	3.0	2.0	0.0	1.3	6.3	937,238	60%	562,343
PU	103	Putnam Hall	DORM	67,920	E	S310-E	1.5	1.2	4.0	1.0	7.7	522,984	40%	209,194
VZ	113	Van Zile Hall	DORM	64,373	E	S310-E	1.5	1.2	4.0	1.0	7.7	495,672	40%	198,269
BD	83	Boyd Hall	DORM	67,920	E	S310-E	1.5	1.2	4.0	1.0	7.7	522,984	40%	209,194
DF	124/128/129	Derby Dining Center (West and Ford added)	RESTAURANT	289,645	E	S315-E	2.5	2.0	6.8	1.7	13.0	3,765,385	75%	2,824,039
HY	130	Haymaker Hall	DORM	125,132	E	S315-E	1.5	1.2	4.0	1.0	7.7	963,516	40%	385,407

Kansas State University  
Building List  
Existing Electrical Distribution

Property Code	BULDING #	Property Name	Occupancy Type	Sq ft	System Loop	Switch	Lighting Load (Watts/Sq ft)*	Device Load (Watts/Sq ft)*	HVAC Load (Watts/Sq ft)*	Misc. Load (Watts/Sq ft)*	Total Load (Watts/Sq ft)	Watts Connected	Demand Factor %	Watts Demand
MO	123	Moore Hall	DORM	125,132	E	S315-E	1.5	1.2	4.0	1.0	7.7	963,516	40%	385,407
CCD	194	Child Development Center	CHILD CARE	34,747	E	S317-E	3.0	1.9	5.3	1.3	11.5	399,591	65%	259,734
	179	B18 Parking Lot & Garden Maintenance Building.		2,250	E	S322-E	1.0	0.2	0.2	0.2	1.6	3,600	40%	1,440
		"Toddsville" (near B18 Parking Lot)		2,000	E	S322-E	1.0	0.2	0.2	0.2	1.6	3,200	50%	1,600
												<b>14,650,765</b>	<b>SUM</b>	<b>9,012,310</b>
WS	105	West Stadium	AUDITORIUM	28,156	W	S101-W	2.5	0.5	0.2	0.8	4.0	112,624	55%	61,943
NA	150	Ahearn Natatorium	GYM/FIELDHOUSE	49554	W	S101-W	2	1	4.5	1.1	8.6	426,164	75%	319,623
	153	Fiedler Hall	SCIENCE	79643	W	S103-W	3.0	3.0	0.0	1.3	7.3	581,394	70%	406,976
AK/AKC	136	Ackert	LABS	96035	W	S104-W	3.0	5.0	0.0	1.3	9.3	893,126	80%	714,500
	136	Chalmers Hall	LABS	96035	W	S104-W	3.0	5.0	0.0	1.3	9.3	893,126	80%	714,500
CW	91	Cardwell Hall ACCELERATOR	SCIENCE		W	S105-W	-	-	-	-	-	1,000,000	100%	1,000,000
TH	161	Throckmorton Hall	SCIENCE	392058	W	S105-W	3.0	3.0	0.0	1.3	7.3	2,862,023	70%	2,003,416
GHD	15	Kansas State University Gardens/conservatory Greenhouse D Conservatory	SCIENCE	2279	W	S106-W	3.0	3.0	5.3	1.3	12.6	28,715	70%	20,101
	161	Old Dairy Outside			W	S107-W	-	-	-	-	-	-	-	-
	167/171/174	New Dairy Inside	STORAGE	47254	W	S107-W	1	0.8	1	0.5	3.3	155,938	40%	62,375
DO	168	Dole Hall	ADMIN/CLASS	32923	W	S108-W	3.0	2.0	5.3	1.3	11.6	381,907	60%	229,144
VMS	147	Coles Hall	LABS	106030	W	S109-W	3.0	5.0	5.3	1.3	14.6	1,548,038	80%	1,238,430
VMT	151	Trotter Hall	ADMIN/CLASS	104,601	W	S110-W	3.0	2.0	5.3	1.3	11.6	1,213,372	60%	728,023
VCS	154	Mosier Hall	LABS	272640	W	S111-W	3.0	5.0	5.3	1.3	14.6	3,980,544	80%	3,184,435
BRI	190	Pat Roberts Hall (Biosecurity Research Institute / Roberts Hall)	LABS	112955	W	S114-W / S115-W	3.0	5.0	5.3	1.3	14.6	1,649,143	80%	1,319,314
												<b>15,726,114</b>	<b>SUM</b>	<b>12,002,783</b>

Kansas State University  
Building List  
Proposed Electrical Distribution

Property Code	BULDING #	Property Name	Sq ft	System Loop	Switch	Lighting Load (Watts/Sq ft)*	Device Load (Watts/Sq ft)*	HVAC Load (Watts/Sq ft)*	Misc. Load (Watts/Sq ft)*	Total Load (Watts/Sq ft)	Watts Connected	Demand Factor %	Watts Demand
DU/DUR/DUF	153	Durland/Rathbone	165,398	C	S201-C	3.0	3.0	0.0	1.3	7.3	1,207,405	70%	845,184
		Chiller Plant (Power Plant Bldg)	22,864	C	S202-C	3.0	2.0	1.0	1.0	7.0	160,048	80%	128,038
SC	25	Seaton Court	120,515	C	S204-C	3.0	2.0	2.7	1.3	9.0	1,078,609	60%	647,166
S	102	Seaton Engineering + Seaton West	235,967	C	S204-C	3.0	2.0	2.7	1.3	9.0	2,123,703	60%	1,274,222
ERL	21	Seaton Env Eng	6,762	C	S204-C	3.0	5.0	5.3	1.3	14.6	98,725	80%	78,980
PP	93	Power Plant	52,792	C	S205-C	3.0	2.0	1.0	1.0	7.0	369,544	60%	221,726
FG	97	Facilities Grounds	4,221	C	S205-C	1.0	0.5	0.5	1.0	3.0	12,663	60%	7,598
ECS	108	English/Counseling Services	33,666	C	S205-C	3.0	2.0	0.0	1.2	6.2	208,729	60%	125,238
HZ	74	Holtz Hall	6,950	C	S206-C	3.0	2.0	4.8	1.3	11.1	76,937	60%	46,162
HH	34	Holton Hall	24,552	C	S206-C	3.0	2.0	0.0	1.3	6.3	154,678	60%	92,807
EH	22	Eisenhower Hall	54,893	C	S206-C	3.0	2.0	4.8	1.3	11.1	609,312	60%	365,587
HL/FL	31	Hale-Farrell Library	357,927	C	S207-C	2.5	0.8	0.0	1.4	4.7	1,682,257	80%	1,345,806
LS	112	Leasure Hall	44,354	C	S208-C	3.0	2.0	5.3	1.3	11.6	514,506	60%	308,704
WD	85	Ward Hall	41,222	C	S208-C	3.0	2.0	0.0	1.3	6.3	259,699	60%	155,819
BT	9	Burt Hall	39,291	C	S208-C	3.0	2.0	4.8	1.3	11.1	436,130	60%	261,678
CW	91	Cardwell Hall	149,866	C	S209-C	3.0	3.0	0.0	1.3	7.3	1,094,022	70%	765,815
		Cardwell Hall Expansion	16,200	C	S209-C	3.0	3.0	0.0	1.3	7.3	118,260	70%	82,782
BU	10	Bushnell Hall + Annex	23,219	C	S209-C	3.0	5.0	5.3	1.3	14.6	338,997	80%	271,198
		General Classroom Building	66,000	C	S209-C	3.0	2.0	0.0	1.3	6.3	415,800	80%	332,640
WA	120	Waters Hall	147,102	C	S211-C	3.0	3.0	5.2	1.3	12.5	1,837,892	70%	1,286,525
WAX	117	Waters Hall Annex	15,658	C	S211-C	3.0	3.0	5.3	1.3	12.6	197,291	70%	138,104
		Future Building (North of Dickens Hall)	100,000	C	S211-C	3.0	2.0	0.0	1.3	6.3	630,000	70%	441,000
FT	29	Feed Technology	18,837	C	S210-C	3.0	3.0	0.0	1.3	7.3	137,510	70%	96,257
SH	80	Shellenberger Hall	51,051	C	S210-C	3.0	3.0	0.0	1.3	7.3	372,672	70%	260,871
W	116	Willard Hall	109,459	C	S220-C	3.0	2.0	5.1	1.3	11.4	1,246,519	60%	747,911
KG	20/171	King Hall	44,559	C	S212-C	3.0	5.0	0.0	1.3	9.3	414,399	80%	331,519
D	18	Dickens Hall	31,435	C	S212-C	3.0	2.0	5.3	1.3	11.6	364,646	60%	218,788
BH	158	Bluemont Hall	122,700	C	S212-C	3.0	3.0	5.3	1.3	12.6	1,546,020	70%	1,082,214
LSP	195	Leadership Studies Building	26,485	C	S213-C	3.0	2.0	5.3	1.3	11.6	307,226	60%	184,336
ER	27	Campus Creek Complex	22,175	C	S213-C	3.0	2.0	0.0	1.3	6.3	139,703	60%	83,822
ISC	155	International Student Center	6,439	C	S214-C	3.0	2.0	5.3	1.3	11.6	74,692	60%	44,815
		International Student Center Expansion	13,000	C	S214-C	3.0	2.0	0.0	1.3	6.3	81,900	60%	49,140
DY	19	Dykstra Hall	37,095	C	S215-C	3.0	2.0	4.3	1.2	10.5	389,498	60%	233,699
UM	109	Umberger Hall	58,611	C	S215-C	3.0	2.0	5.3	1.3	11.6	679,888	60%	407,933
CL	72	Call Hall	66,492	C	S216-C	3.0	3.0	5.3	1.3	12.6	837,799	70%	586,459
WEL	121/205	Wind Erosion Laboratory	13,780	C	S220-C	3.0	5.0	5.3	1.3	14.6	201,188	80%	160,950
WB	4	Weber Hall	133,161	C	S220-C	3.0	1.3	3.0	5.3	12.6	1,677,829	70%	1,174,480
		Call Hall Chiller		C	S228-C					0.0	425,000	75%	318,750
											<b>22,521,696</b>	<b>SUM</b>	<b>15,204,720</b>
AFH	5/73	Ahearn Field House + Gymnasium	163,799	E	S301-E	2.0	1.0	4.5	1.1	8.6	1,408,671	75%	1,056,504
ES	104	East Stadium	34,700	E	S301-E	2.5	0.5	0.2	0.8	4.0	138,800	55%	76,340
UN	101	KSU Union / Bosco Plaza	324,957	E	S302-E	2.0	1.9	0.0	1.3	5.2	1,689,776	60%	1,013,866
KPS	163/192	K-State Parking Structure /Information Booth	12,295	E	S303-E	0.5	0.5	0.0	0.5	1.5	18,443	60%	11,066
A	1	Anderson Hall	66,439	E	S303-E	3.0	2.0	2.7	1.3	9.0	594,629	60%	356,777
C	13	Calvin Hall	52,261	E	S304-E	3.0	2.0	5.3	1.3	11.6	606,228	60%	363,737
K	71	Kedzie Hall	41,616	E	S304-E	3.0	2.0	0.0	1.3	6.3	262,181	60%	157,308
N	82	Nichols Hall	74,277	E	S316-E	3.0	3.0	5.3	1.3	12.6	935,890	70%	655,123
F	30	Fairchild Hall	58,828	E	S316-E	3.0	2.0	5.3	1.3	11.6	682,405	60%	409,443

Kansas State University  
Building List  
Proposed Electrical Distribution

Property Code	BULDING #	Property Name	Sq ft	System Loop	Switch	Lighting Load (Watts/Sq ft)*	Device Load (Watts/Sq ft)*	HVAC Load (Watts/Sq ft)*	Misc. Load (Watts/Sq ft)*	Total Load (Watts/Sq ft)	Watts Connected	Demand Factor %	Watts Demand
DC	3	Danforth and All Faiths Chapels	9,337	E	S305-E	1.8	0.8	3.3	0.8	6.7	62,558	65%	40,663
M	133	McCain Auditorium	112,639	E	S306-E	2.5	1.0	3.3	0.8	7.6	856,056	55%	470,831
T	106	Thompson Hall	33,092	E	S306-E	3.0	3.0	5.3	1.3	12.6	416,959	70%	291,871
BA	175	Beach Art Musuem	48,920	E	S307-E	2.5	0.8	5.7	1.4	10.4	508,768	80%	407,014
PR	92	President's Residence	9,096	E	S307-E	2.0	0.5	1.0	0.2	3.7	33,655	70%	23,559
		College of Business Administration	120,000	E	S308-E	3.0	2.0	0.0	1.3	6.3	756,000	60%	453,600
CB	165	Chemistry/Biochemistry	89,350	E	S309-E	3.0	5.0	0.0	1.3	9.3	830,955	80%	664,764
JU	41	Justin Hall	155,233	E	S309-E	3.0	2.0	0.0	1.3	6.3	977,968	60%	586,781
PU	103	Putnam Hall	67,920	E	S310-E	1.5	1.2	4.0	1.0	7.7	522,984	40%	209,194
VZ	113	Van Zile Hall	64,373	E	S310-E	1.5	1.2	4.0	1.0	7.7	495,672	40%	198,269
BD	83	Boyd Hall	67,920	E	S310-E	1.5	1.2	4.0	1.0	7.7	522,984	40%	209,194
DF	124/128/129	Derby Dining Center (West and Ford added)	289,645	E	S315-E	2.5	2.0	6.8	1.7	13.0	3,765,385	75%	2,824,039
HY	130	Haymaker Hall	125,132	E	S315-E	1.5	1.2	4.0	1.0	7.7	963,516	40%	385,407
MO	123	Moore Hall	125,132	E	S315-E	1.5	1.2	4.0	1.0	7.7	963,516	40%	385,407
CCD	194	Child Development Center	34,747	E	S317-E	3.0	1.9	5.3	1.3	11.5	399,591	65%	259,734
		College of Veterinary Medicine	296,500	E	S322-E	3.0	5.0	0.0	1.3	9.3	2,757,450	80%	2,205,960
	179	B18 Parking Lot & Garden Maintenance Building.	2,250	E	S322-E	1.0	0.2	0.2	0.2	1.6	3,600	40%	1,440
		"Toddville" (near B18 Parking Lot)	2,000	E	S322-E	1.0	0.2	0.2	0.2	1.6	3,200	50%	1,600
											<b>21,177,841</b>	<b>SUM</b>	<b>13,719,488</b>
WS	105	West Stadium	30,500	W	S101-W	2.5	0.5	0.2	0.8	4.0	122,000	55%	67,100
NA	150	Ahearn Natatorium	49554	W	S101-W	2	1	4.5	1.1	8.6	426,164	75%	319,623
	153	Fiedler Hall	79643	W	S103-W	3.0	3.0	0.0	1.3	7.3	581,394	70%	406,976
		College of Engineering Expansion	80000	W	S103-W	3.0	3.0	0.0	1.3	7.3	584,000	70%	408,800
AK/AKC	136	Ackert Hall	172035	W	S104-W	3.0	5.0	0.0	1.3	9.3	1,599,926	80%	1,279,940
	136	Chalmers Hall	96035	W	S104-W	3.0	5.0	0.0	1.3	9.3	893,126	80%	714,500
CW	91	Cardwell Hall ACCELERATOR	149866	W	S105-W	-	-	-	-	-	1,000,000	100%	1,000,000
TH	161	Throckmorton Hall	392058	W	S105-W	3.0	3.0	0.0	1.3	7.3	2,862,023	70%	2,003,416
MS	79	General Richards B. Myers Hall	39,206	W	S105-W	3.0	2.0	5.3	1.3	11.6	454,790	60%	272,874
GHD	15	Kansas State University Gardens/conservatory Greenhouse D Conservatory	2,279	W	S106-W	3.0	3.0	5.3	1.3	12.6	28,715	70%	20,101
	161	Old Dairy Outside *	1000	W	S107-W								
	167/171/174	New Dairy Inside	47254	W	S107-W	1	0.8	1	0.5	3.3	155,938	40%	62,375
DO	168	Dole Hall	32923	W	S108-W	3.0	2.0	5.3	1.3	11.6	381,907	60%	229,144
		VetMed Chiller Plant									2,550,000	70%	1,785,000
VMS	147	Coles Hall	106,030	W	S109-W	3.0	5.0	5.3	1.3	14.6	1,548,038	80%	1,238,430
VMT	151	Trotter Hall	104,601	W	S110-W	3.0	2.0	5.3	1.3	11.6	1,213,372	60%	728,023
VCS	154	Mosier Hall	272,640	W	S111-W	3.0	5.0	5.3	1.3	14.6	3,980,544	80%	3,184,435
BRI	190	Pat Roberts Hall (Biosecurity Research Institute / Roberts Hall)	112955	W	S114-W / S115-W	3.0	5.0	5.3	1.3	14.6	1,649,143	80%	1,319,314
											<b>20,031,079</b>	<b>SUM</b>	<b>15,040,053</b>

\* FED FROM NEW DAIRY FARM

	CONSTRUCTION IN PROGRESS
	PROPOSED FOR LOOP (EXISTING 4160 VOLT BUILDING)
	PROPOSED BUILDINGS AND EXPANSIONS BY 2017
	PROPOSED BUILDINGS AND EXPANSIONS BY 2025
	VETMED SHOWN FOR LOADING PURPOSE (BEYOND 2025)

## Appendix C

### Construction Cost Estimates

**Cost Estimate – 4160 Volts to 12,470 Volts Conversion**

**Cost Estimate - New Buildings and Expansions**

**Cost Estimate – 115 kV / 12.47 kV Substation**

## COST ESTIMATE - 4160V-12470V CONVERSION

### LOCATION: FACILITY GROUNDS

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
75KVA TRANSFORMER	EA.	1	\$ 10,000.00	\$ 10,000.00
200A PANELBOARD (208V)	EA.	1	\$ 5,000.00	\$ 5,000.00
4/0 MV-105 12.47kv	C.L.F.	14.25	\$ 930.00	\$ 13,252.50
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 100.00	\$ 20,000.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	275	\$ 75.00	\$ 20,625.00
4/0 CABLE 600V	C.L.F.	6	\$ 900.00	\$ 5,400.00
<b>SUBTOTAL</b>				<b>\$ 74,277.50</b>

### LOCATION: ENGLISH COUNSLING

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
225KVA TRANSFORMER	EA.	1	\$ 16,000.00	\$ 16,000.00
800A SWITCHBOARD (208V)	EA.	1	\$ 13,000.00	\$ 13,000.00
4/0 MV-105 12.47kv	C.L.F.	18.9	\$ 930.00	\$ 17,577.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 100.00	\$ 20,000.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	430	\$ 75.00	\$ 32,250.00
500KCMIL (2 SETS) CABLE 600V	C.L.F.	6	\$ 1,700.00	\$ 10,200.00
<b>SUBTOTAL</b>				<b>\$ 109,027.00</b>

### LOCATION: POWER HOUSE

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
225KVA TRANSFORMER (208V)	EA.	2	\$ 16,000.00	\$ 32,000.00
225KVA TRANSFORMER (480V)	EA.	1	\$ 16,000.00	\$ 16,000.00
800A SWITCHBOARD (208V)	EA.	2	\$ 13,000.00	\$ 26,000.00
400A SWITCHBOARD (480V)	EA.	1	\$ 6,000.00	\$ 6,000.00
4/0 MV-105 12.47kv	C.L.F.	3	\$ 930.00	\$ 2,790.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	100	\$ 100.00	\$ 10,000.00
500KCMIL (2 SETS) CABLE 600V	C.L.F.	24	\$ 1,700.00	\$ 40,800.00
350KCMIL CABLE 600V	C.L.F.	6	\$ 1,350.00	\$ 8,100.00
<b>SUBTOTAL</b>				<b>\$ 141,690.00</b>

### LOCATION: HOLTZ HALL

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
45KVA TRANSFORMER (208V)	EA.	1	\$ 10,000.00	\$ 10,000.00
100A PANELBOARD (208V)	EA.	1	\$ 5,000.00	\$ 5,000.00
4/0 MV-105 12.47kv	C.L.F.	13.5	\$ 930.00	\$ 12,555.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 100.00	\$ 20,000.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	250	\$ 75.00	\$ 18,750.00
1 AWG CABLE 600V	C.L.F.	6	\$ 450.00	\$ 2,700.00
<b>SUBTOTAL</b>				<b>\$ 69,005.00</b>

### LOCATION: HOLTON HALL

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
225KVA TRANSFORMER (208V)	EA.	1	\$ 16,000.00	\$ 16,000.00
800A SWITCHBOARD (208V)	EA.	1	\$ 13,000.00	\$ 13,000.00
4/0 MV-105 12.47kv	C.L.F.	18	\$ 930.00	\$ 16,740.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 100.00	\$ 20,000.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	400	\$ 75.00	\$ 30,000.00
500KCMIL (2 SETS) CABLE 600V	C.L.F.	12	\$ 1,700.00	\$ 20,400.00
<b>SUBTOTAL</b>				<b>\$ 116,140.00</b>



## COST ESTIMATE - 4160V-12470V CONVERSION

### LOCATION: EISENHOWER HALL

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
1000A SWITCHBOARD (208V)	EA.	1	\$ 17,000.00	\$ 17,000.00
4/0 MV-105 12.47kV	C.L.F.	14.1	\$ 930.00	\$ 13,113.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 100.00	\$ 20,000.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	270	\$ 75.00	\$ 20,250.00
350KCMIL (3 SETS) CABLE 600V	C.L.F.	18	\$ 1,350.00	\$ 24,300.00
<b>SUBTOTAL</b>				<b>\$ 94,663.00</b>

### LOCATION: LEASURE HALL

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
225KVA TRANSFORMER (208V)	EA.	1	\$ 16,000.00	\$ 16,000.00
800A SWITCHBOARD (208V)	EA.	1	\$ 13,000.00	\$ 13,000.00
4/0 MV-105 12.47kV	C.L.F.	1.5	\$ 930.00	\$ 1,395.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	50	\$ 100.00	\$ 5,000.00
500KCMIL (2 SETS) CABLE 600V	C.L.F.	12	\$ 1,700.00	\$ 20,400.00
<b>SUBTOTAL</b>				<b>\$ 55,795.00</b>

### LOCATION: BURT HALL

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
1000A SWITCHBOARD (208V)	EA.	1	\$ 17,000.00	\$ 17,000.00
4/0 MV-105 12.47kV	C.L.F.	9	\$ 930.00	\$ 8,370.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 100.00	\$ 20,000.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	100	\$ 75.00	\$ 7,500.00
350KCMIL (3 SETS) CABLE 600V	C.L.F.	18	\$ 1,350.00	\$ 24,300.00
<b>SUBTOTAL</b>				<b>\$ 77,170.00</b>

### LOCATION: CARDWELL HALL

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
750/1000KVA TRANSFORMER (208V)	EA.	1	\$ 37,000.00	\$ 37,000.00
2500A SWITCHBOARD (208V)	EA.	1	\$ 20,000.00	\$ 20,000.00
4/0 MV-105 12.47kV	C.L.F.	9	\$ 930.00	\$ 8,370.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 100.00	\$ 20,000.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	100	\$ 75.00	\$ 7,500.00
500KCMIL (8 SETS) CABLE 600V	C.L.F.	48	\$ 1,700.00	\$ 81,600.00
<b>SUBTOTAL</b>				<b>\$ 174,470.00</b>

### LOCATION: BUSHNELL HALL

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
500VA TRANSFORMER (208V)	EA.	1	\$ 27,000.00	\$ 27,000.00
1600A SWITCHBOARD (208V)	EA.	1	\$ 18,000.00	\$ 18,000.00
4/0 MV-105 12.47kV	C.L.F.	19.5	\$ 930.00	\$ 18,135.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 100.00	\$ 20,000.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	450	\$ 75.00	\$ 33,750.00
500KCMIL (4 SETS) CABLE 600V	C.L.F.	24	\$ 1,700.00	\$ 40,800.00
<b>SUBTOTAL</b>				<b>\$ 157,685.00</b>

### LOCATION: CAMPUS CREEK

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
225KVA TRANSFORMER (208V)	EA.	1	\$ 16,000.00	\$ 16,000.00
800A SWITCHBOARD (208V)	EA.	1	\$ 13,000.00	\$ 13,000.00
4/0 MV-105 12.47kV	C.L.F.	15	\$ 930.00	\$ 13,950.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 100.00	\$ 20,000.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	300	\$ 75.00	\$ 22,500.00
500KCMIL (2 SETS) CABLE 600V	C.L.F.	12	\$ 1,700.00	\$ 20,400.00
<b>SUBTOTAL</b>				<b>\$ 105,850.00</b>

## COST ESTIMATE - 4160V-12470V CONVERSION

### LOCATION: DYKSTRA HALL

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
112.5KVA TRANSFORMER (480V)	EA.	1	\$ 14,000.00	\$ 14,000.00
225KVA TRANSFORMER (208V)	EA.	1	\$ 16,000.00	\$ 16,000.00
200A SWITCHBOARD (208V)	EA.	1	\$ 5,000.00	\$ 5,000.00
800A SWITCHBOARD (208V)	EA.	1	\$ 13,000.00	\$ 13,000.00
4/0 MV-105 12.47kV	C.L.F.	29.1	\$ 930.00	\$ 27,063.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 100.00	\$ 20,000.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	770	\$ 75.00	\$ 57,750.00
4/0 CABLE 600V	C.L.F.	6	\$ 900.00	\$ 5,400.00
500KCMIL (2 SETS) CABLE 600V	C.L.F.	12	\$ 1,700.00	\$ 20,400.00
<b>SUBTOTAL</b>				<b>\$ 178,613.00</b>

### LOCATION: UMBERGER HALL

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
500KVA TRANSFORMER (208V)	EA.	1	\$ 27,000.00	\$ 27,000.00
1600A SWITCHBOARD (208V)	EA.	1	\$ 18,000.00	\$ 18,000.00
4/0 MV-105 12.47kV	C.L.F.	28.5	\$ 930.00	\$ 26,505.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 100.00	\$ 20,000.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	750	\$ 75.00	\$ 56,250.00
500KCMIL (4 SETS) CABLE 600V	C.L.F.	24	\$ 1,700.00	\$ 40,800.00
<b>SUBTOTAL</b>				<b>\$ 188,555.00</b>

### LOCATION: CALL HALL

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
500KVA TRANSFORMER (208V)	EA.	2	\$ 27,000.00	\$ 54,000.00
1600A SWITCHBOARD (208V)	EA.	2	\$ 18,000.00	\$ 36,000.00
4/0 MV-105 12.47kV	C.L.F.	12	\$ 930.00	\$ 11,160.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 100.00	\$ 20,000.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 75.00	\$ 15,000.00
500KCMIL (8 SETS) CABLE 600V	C.L.F.	48	\$ 1,700.00	\$ 81,600.00
<b>SUBTOTAL</b>				<b>\$ 217,760.00</b>

### LOCATION: CALL HALL CHILLER

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
500KVA TRANSFORMER (208V)	EA.	1	\$ 27,000.00	\$ 27,000.00
1600A SWITCHBOARD (208V)	EA.	1	\$ 18,000.00	\$ 18,000.00
4/0 MV-105 12.47kV	C.L.F.	2.1	\$ 930.00	\$ 1,953.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	70	\$ 100.00	\$ 7,000.00
500KCMIL (4 SETS) CABLE 600V	C.L.F.	24	\$ 1,700.00	\$ 40,800.00
<b>SUBTOTAL</b>				<b>\$ 94,753.00</b>

### LOCATION: AHEARN HALL

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
750KVA TRANSFORMER (120/240V)	EA.	1	\$ 35,000.00	\$ 35,000.00
2000A SWITCHBOARD (120/240V)	EA.	1	\$ 20,000.00	\$ 20,000.00
4/0 MV-105 12.47kV	C.L.F.	17.4	\$ 930.00	\$ 16,182.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 100.00	\$ 20,000.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	380	\$ 75.00	\$ 28,500.00
500KCMIL (4 SETS) CABLE 600V	C.L.F.	24	\$ 1,700.00	\$ 40,800.00
<b>SUBTOTAL</b>				<b>\$ 160,482.00</b>

## COST ESTIMATE - 4160V-12470V CONVERSION

### LOCATION: ANDERSON HALL

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
500KVA TRANSFORMER (208V)	EA.	1	\$ 27,000.00	\$ 27,000.00
1600A SWITCHBOARD (208V)	EA.	1	\$ 18,000.00	\$ 18,000.00
4/0 MV-105 12.47kV	C.L.F.	13.5	\$ 930.00	\$ 12,555.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 100.00	\$ 20,000.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	250	\$ 75.00	\$ 18,750.00
500KCMIL (4 SETS) CABLE 600V	C.L.F.	24	\$ 1,700.00	\$ 40,800.00
<b>SUBTOTAL</b>				<b>\$ 137,105.00</b>

### LOCATION: KEDZIE HALL

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
300KVA TRANSFORMER (208V)	EA.	1	\$ 18,000.00	\$ 18,000.00
1000A SWITCHBOARD (208V)	EA.	1	\$ 17,000.00	\$ 17,000.00
4/0 MV-105 12.47kV	C.L.F.	9.9	\$ 930.00	\$ 9,207.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	330	\$ 100.00	\$ 33,000.00
500KCMIL (3 SETS) CABLE 600V	C.L.F.	18	\$ 1,700.00	\$ 30,600.00
<b>SUBTOTAL</b>				<b>\$ 107,807.00</b>

### LOCATION: THOMPSON HALL

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
500KVA TRANSFORMER (208V)	EA.	1	\$ 27,000.00	\$ 27,000.00
1600A SWITCHBOARD (208V)	EA.	1	\$ 18,000.00	\$ 18,000.00
4/0 MV-105 12.47kV	C.L.F.	18.6	\$ 930.00	\$ 17,298.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 100.00	\$ 20,000.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	420	\$ 75.00	\$ 31,500.00
500KCMIL (3 SETS) CABLE 600V	C.L.F.	18	\$ 1,700.00	\$ 30,600.00
<b>SUBTOTAL</b>				<b>\$ 144,398.00</b>

### LOCATION: DANFORTH AND ALL FAITHS CHAPEL

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
45KVA TRANSFORMER (208V)	EA.	1	\$ 10,000.00	\$ 10,000.00
150A SWITCHBOARD (208V)	EA.	1	\$ 5,000.00	\$ 5,000.00
4/0 MV-105 12.47kV	C.L.F.	12	\$ 930.00	\$ 11,160.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 100.00	\$ 20,000.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 75.00	\$ 15,000.00
1/0 CABLE 600V	C.L.F.	6	\$ 530.00	\$ 3,180.00
<b>SUBTOTAL</b>				<b>\$ 64,340.00</b>

### LOCATION: SHELLENBERGER HALL

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
750KVA TRANSFORMER (480V)	EA.	1	\$ 16,000.00	\$ 16,000.00
1200A SWITCHBOARD (480V)	EA.	1	\$ 15,000.00	\$ 15,000.00
4/0 MV-105 12.47kV	C.L.F.	0.3	\$ 930.00	\$ 279.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	10	\$ 100.00	\$ 1,000.00
350KCMIL (3 SETS) CABLE 600V	C.L.F.	18	\$ 1,350.00	\$ 24,300.00
<b>SUBTOTAL</b>				<b>\$ 56,579.00</b>

## COST ESTIMATE - 4160V-12470V CONVERSION

### LOCATION: MYERS HALL / MILITARY SCIENCE

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
225KVA TRANSFORMER (208V)	EA.	1	\$ 16,000.00	\$ 16,000.00
800A SWITCHBOARD (208V)	EA.	1	\$ 13,000.00	\$ 13,000.00
4/0 MV-105 12.47kV	C.L.F.	30	\$ 930.00	\$ 27,900.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 100.00	\$ 20,000.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	800	\$ 75.00	\$ 60,000.00
350KCMIL (3 SETS) CABLE 600V	C.L.F.	18	\$ 1,350.00	\$ 24,300.00
<b>SUBTOTAL</b>				<b>\$ 161,200.00</b>
DEMOLITION	EA BUILDING	21	\$ 20,000.00	\$ 420,000.00
<b>TOTAL</b>				<b>\$ 3,050,785.50</b>

**COST ESTIMATE - 4160V-12470V CONVERSION**

**COST ESTIMATE - NEW BUILDINGS AND EXPANSIONS (THROUGH 2025)**

**LOCATION: GENERAL CLASSROOM BUILDING**

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
500KVA TRANSFORMER (208V)	EA.	1	\$ 27,000.00	\$ 27,000.00
1500A SWITCHBOARD (208V)	EA.	1	\$ 18,000.00	\$ 18,000.00
4/0 MV-105 12.47kV	C.L.F.	15.9	\$ 930.00	\$ 14,787.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 100.00	\$ 20,000.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	330	\$ 75.00	\$ 24,750.00
500KCMIL (4 SETS) CABLE 600V	C.L.F.	24	\$ 1,700.00	\$ 40,800.00
<b>SUBTOTAL</b>				<b>\$ 145,337.00</b>

**LOCATION: INTERNATIONAL STUDENT CENTER**

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
75KVA TRANSFORMER (208V)	EA.	1	\$ 10,000.00	\$ 10,000.00
4/0 MV-105 12.47kV	C.L.F.	0.3	\$ 930.00	\$ 279.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	10	\$ 55.00	\$ 550.00
225A PANELBOARD (208V)	EA.	1	\$ 100.00	\$ 100.00
4/0 CABLE 600V	C.L.F.	6	\$ 650.00	\$ 3,900.00
<b>SUBTOTAL</b>				<b>\$ 14,829.00</b>

**LOCATION: CARDWELL HALL EXPANSION**

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
112.5KVA TRANSFORMER (208V)	EA.	1	\$ 14,000.00	\$ 14,000.00
4/0 MV-105 12.47kV	C.L.F.	0.3	\$ 930.00	\$ 279.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	10	\$ 100.00	\$ 1,000.00
400A PANELBOARD (208V)	EA.	1	\$ 7,000.00	\$ 7,000.00
500KCMIL CABLE 600V	C.L.F.	6	\$ 1,700.00	\$ 10,200.00
<b>SUBTOTAL</b>				<b>\$ 32,479.00</b>

**LOCATION: COLLEGE OF VETERINARY MEDICINE**

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
750KVA TRANSFORMER (208V)	EA.	1	\$ 30,500.00	\$ 30,500.00
1500KVA TRANSFORMER (208V)	EA.	1	\$ 43,500.00	\$ 43,500.00
4000A SWITCHBOARD (208V)	EA.	1	\$ 30,000.00	\$ 30,000.00
2000A SWITCHBOARD (208V)	EA.	1	\$ 18,000.00	\$ 18,000.00
4/0 MV-105 12.47kV	C.L.F.	18	\$ 930.00	\$ 16,740.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 100.00	\$ 20,000.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	400	\$ 75.00	\$ 30,000.00
500KCMIL (15 SETS) CABLE 600V	C.L.F.	90	\$ 1,700.00	\$ 153,000.00
<b>SUBTOTAL</b>				<b>\$ 341,740.00</b>

**LOCATION: COLLEGE OF BUSINESS ADMINISTRATION**

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
75KVA TRANSFORMER (208V)	EA.	1	\$ 10,000.00	\$ 10,000.00
225A PANELBOARD (208V)	EA.	1	\$ 5,000.00	\$ 5,000.00
4/0 MV-105 12.47kV	C.L.F.	6	\$ 930.00	\$ 5,580.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 100.00	\$ 20,000.00
4/0 CABLE 600V	C.L.F.	6	\$ 650.00	\$ 3,900.00
<b>SUBTOTAL</b>				<b>\$ 44,480.00</b>

**LOCATION: COLLEGE OF ENGINEERING EXPANSION**

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
500KVA TRANSFORMER (208V)	EA.	1	\$ 27,000.00	\$ 27,000.00
1500A PANELBOARD (208V)	EA.	1	\$ 18,000.00	\$ 18,000.00
4/0 MV-105 12.47kV	C.L.F.	6	\$ 930.00	\$ 5,100.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	200	\$ 100.00	\$ 20,000.00
500KCMIL (4 SETS) CABLE 600V	C.L.F.	24	\$ 1,700.00	\$ 40,800.00
<b>SUBTOTAL</b>				<b>\$ 110,900.00</b>

## COST ESTIMATE - 4160V-12470V CONVERSION

### LOCATION: FUTURE BUILDING NORTH OF DICKENS HALL

DESCRIPTION	UNITS	QUANTITY	PER UNIT	TOTAL
500KVA TRANSFORMER (208V)	EA.	1	\$ 27,000.00	\$ 27,000.00
1500A PANELBOARD (208V)	EA.	1	\$ 18,000.00	\$ 18,000.00
4/0 MV-105 12.47kV	C.L.F.	18.3	\$ 930.00	\$ 5,100.00
DUCT BANK (WITH TRENCH AND BACKFILL)	L.F.	610	\$ 100.00	\$ 61,000.00
500KCMIL (4 SETS) CABLE 600V	C.L.F.	24	\$ 1,700.00	\$ 40,800.00
<b>SUBTOTAL</b>				<b>\$ 151,900.00</b>
<b>TOTAL</b>				<b>\$ 689,765.00</b>

# "Stanley Chicago Office" - Budget Estimate for Clients' 115 KV / 12.47 KV Substation Project

Rough Estimate for Comparison Purposes

	QTY	DESCRIPTION	UNIT MATL	UNIT LABOR	unit combined M + L	EXT combined M + L	EXT MATL	EXT LABOR	EXT TOTAL	% of Total	
EQUIPMENT	12	115 KV PT (1 lines; 3 buses)	\$5,000	\$2,000		\$0	\$60,000	\$24,000	\$84,000	1.5%	
	6	12.47 KV PT (1 xfmr)	\$5,000	\$2,000		\$0	\$30,000	\$12,000	\$42,000	0.7%	
	3	PT Junction box (bus)	\$1,000	\$500		\$0	\$3,000	\$1,500	\$4,500	0.1%	
	1	PT Junction box (line)	\$1,000	\$500		\$0	\$1,000	\$500	\$1,500	0.0%	
	6	115 KV switch (2X4 bkrs; 1 line)	\$5,000	\$3,000		\$0	\$30,000	\$18,000	\$48,000	0.8%	
	3	115 KV Fused Cut-Out (1 line)	\$500	\$300		\$0	\$1,500	\$900	\$2,400	0.0%	
	0	115 KV Motor Operators for switch (0 line)	\$2,600	\$1,400		\$0	\$0	\$0	\$0	0.0%	
	12	115 KV arrester (1 line; 2 buses; 1 bus/xfmr)	\$1,000	\$750		\$0	\$12,000	\$9,000	\$21,000	0.4%	
	6	12.47 KV arrester (2 bus/xfmr)	\$1,000	\$750		\$0	\$6,000	\$4,500	\$10,500	0.2%	
	2	35 KV breaker (4 buses)	\$40,000	\$5,000		\$0	\$80,000	\$10,000	\$90,000	1.6%	
	0	12.47 KV breaker (4 buses)	\$15,000	\$5,000		\$0	\$0	\$0	\$0	0.0%	
	2	115 KV Circuit Switcher (1 xfmr)	\$120,000	\$5,000		\$0	\$240,000	\$10,000	\$250,000	4.4%	
	72	115 KV CT (18 per 115 KV breaker; 4 bkrs)	\$2,500	\$1,000		\$0	\$180,000	\$72,000	\$252,000	4.4%	
	36	12.47 KV CT (18 per 12.47 KV breaker; 2 bkrs)	\$2,500	\$1,000		\$0	\$90,000	\$36,000	\$126,000	2.2%	
	0	115 KV CT Circuit Switcher (1 xfmr)	\$2,500	\$1,000		\$0	\$0	\$0	\$0	0.0%	
	18	115 KV CT (18 per 1 xfmr; 2 xfms)	\$2,500	\$1,000		\$0	\$45,000	\$18,000	\$63,000	1.1%	
	27	115 KV insulator (24 post High buses, 3 string deadend)	\$300	\$500		\$0	\$8,100	\$13,500	\$21,600	0.4%	
	18	115 KV insulator (12 post Low bus + 2 X 3 xfmr buses)	\$300	\$500		\$0	\$5,400	\$9,000	\$14,400	0.3%	
	6	12.47 KV insulator (2 X 3 post, 0 string deadend)	\$300	\$500		\$0	\$1,800	\$3,000	\$4,800	0.1%	
	0	12.47 KV insulator (12 post Low bus)	\$300	\$500		\$0	\$0	\$0	\$0	0.0%	
	0	Revenue metering for 115 KV line	\$3,000	\$500		\$0	\$0	\$0	\$0	0.0%	
	2	Revenue metering for xfms	\$3,000	\$500		\$0	\$6,000	\$1,000	\$7,000	0.1%	
	1	Relay and control panel for 115 KV lines	\$30,000	\$2,000		\$0	\$30,000	\$2,000	\$32,000	0.6%	
	2	Relay and control panel for 115 KV bus breakers	\$25,000	\$2,000		\$0	\$50,000	\$4,000	\$54,000	0.9%	
	2	Relay and control panel for transformer	\$30,000	\$2,000		\$0	\$60,000	\$4,000	\$64,000	1.1%	
	0	Relay and control panel for cap banks	\$20,000	\$2,000		\$0	\$0	\$0	\$0	0.0%	
	1	Satellite Clock (relays)	\$1,000	\$500		\$0	\$1,000	\$500	\$1,500	0.0%	
	2	transformer 10 MVA 115/12.47 KV	\$350,000	\$35,000		\$0	\$700,000	\$70,000	\$770,000	13.4%	
	2	Pad mount xfmr (1 ph 100 kVA 13.8 kV-240/120)	\$750	\$500		\$0	\$1,500	\$1,000	\$2,500	0.0%	
	1	Automatic Transfer Switch	\$1,200	\$500		\$0	\$1,200	\$500	\$1,700	0.0%	
	1	Station Wet Cell Battery (125 VDC)	\$8,000	\$2,000		\$0	\$8,000	\$2,000	\$10,000	0.2%	
	2	Battery Chargers	\$1,500	\$500		\$0	\$3,000	\$1,000	\$4,000	0.1%	
	0	115 KV Cap bank w/o harmonic filters, 10 MVAR	\$100,000	\$20,000		\$0	\$0	\$0	\$0	0.0%	
	2	Fiber or radio terminals	\$20,000	\$20,000		\$0	\$40,000	\$40,000	\$80,000	1.4%	
	1	Telephone/Communication Panels	\$5,000	\$5,000		\$0	\$5,000	\$5,000	\$10,000	0.2%	
	1	RTU	\$15,000	\$5,000		\$0	\$15,000	\$5,000	\$20,000	0.3%	
	STRUCTURES	2	115 KV 2-pole deadend	\$30,000	\$10,000		\$0	\$60,000	\$20,000	\$80,000	1.4%
		6	Lightning mast	\$3,000	\$1,000		\$0	\$18,000	\$6,000	\$24,000	0.4%
		4	115 KV switch, horizontal mtg	\$5,000	\$2,000		\$0	\$20,000	\$8,000	\$28,000	0.5%
		10	115 KV bus support, 3-phase	\$4,000	\$1,000		\$0	\$40,000	\$10,000	\$50,000	0.9%
4		115 KV PT, 3-phase (bus)	\$2,000	\$1,000		\$0	\$8,000	\$4,000	\$12,000	0.2%	
2		12.47 KV PT, 3-phase (bus)	\$2,000	\$1,000		\$0	\$4,000	\$2,000	\$6,000	0.1%	
2		12.47 KV switch, horizontal	\$2,000	\$300		\$0	\$4,000	\$600	\$4,600	0.1%	
2		12.47 KV cable termination and jumper insul support	\$2,000	\$300		\$0	\$4,000	\$600	\$4,600	0.1%	
FOUNDATIONS	24	115 KV bus support			\$3,000	\$72,000	\$0	\$0	\$72,000	1.3%	
	8	115 KV Deadend column			\$10,000	\$80,000	\$0	\$0	\$80,000	1.4%	
	2	Transformer			\$10,000	\$20,000	\$0	\$0	\$20,000	0.3%	
	2	Transformer oil containment berm			\$1,000	\$2,000	\$0	\$0	\$2,000	0.0%	
	8	Control building			\$1,500	\$12,000	\$0	\$0	\$12,000	0.2%	
	2	115 KV breaker			\$2,000	\$4,000	\$0	\$0	\$4,000	0.1%	
	0	115 KV Circuit Switcher			\$2,000	\$0	\$0	\$0	\$0	0.0%	
	4	115 KV switch column			\$3,000	\$12,000	\$0	\$0	\$12,000	0.2%	
	0	115 KV cap bank			\$3,000	\$0	\$0	\$0	\$0	0.0%	
	4	Lightning mast			\$1,500	\$6,000	\$0	\$0	\$6,000	0.1%	
	2	12.47 KV switch riser			\$1,500	\$3,000	\$0	\$0	\$3,000	0.1%	
	2	12.47 KV switch, horizontal			\$1,500	\$3,000	\$0	\$0	\$3,000	0.1%	
	2	12.47 KV cable termination and jumper insul support			\$1,500	\$3,000	\$0	\$0	\$3,000	0.1%	
	2	12.47 KV breaker			\$1,500	\$3,000	\$0	\$0	\$3,000	0.1%	

MISC

QTY	DESCRIPTION	UNIT MATL	UNIT LABOR	unit combined M + L	EXT combined M + L	EXT MATL	EXT LABOR	EXT TOTAL	% of Total	
5,000	Conduit 4" PVC/Innerduct feet	\$2.00	\$7.00		\$0	\$10,000	\$35,000	\$45,000	0.8%	
2	Manholes	\$2,000	\$500		\$0	\$4,000	\$1,000	\$5,000	0.1%	
400	Trenwa (pedestrian rated - 20"W X 15"D)	\$51.00	\$15.00		\$0	\$20,400	\$6,000	\$26,400	0.5%	
9,660	Cable, site lighting (6 X 4 wires @ 350/run ave @ 15% tails)	\$1.50	\$1.00		\$0	\$14,490	\$9,660	\$24,150	0.4%	
8,050	Cable, equipment receptacles/outlets (5 X 4 wires @ 350/run ave @ 15% tails)	\$1.50	\$1.00		\$0	\$12,075	\$8,050	\$20,125	0.4%	
0	Cable, CVTs (6 X 3 CVTs, 4 wires each @ 350/run ave @ 15% tails)	\$1.50	\$1.00		\$0	\$0	\$0	\$0	0.0%	
6,440	Cable, PT's (115 KV) (4 wires @ 350/run ave @ 15% tails)	\$1.50	\$1.00		\$0	\$9,660	\$6,440	\$16,100	0.3%	
3,220	Cable, PT's (12.47 KV) (4 wires @ 350/run ave @ 15% tails)	\$1.50	\$1.00		\$0	\$4,830	\$3,220	\$8,050	0.1%	
11,270	Cable, breakers control (115 KV) (14 wires @ 350/run ave @ 15% tails)	\$2.50	\$2.00		\$0	\$0	\$0	\$0	0.0%	
9,660	Cable, breakers control (12.47kV) (14 wires @ 300/run ave @ 15% tails)	\$2.50	\$2.00		\$0	\$24,150	\$19,320	\$43,470	0.8%	
0	Cable, MOD switches control (115 KV) (14 wires @ 350/run ave @ 15% tails)	\$2.50	\$2.00		\$0	\$0	\$0	\$0	0.0%	
0	Cable, MOD switches control (12.47 KV) (14 wires @ 350/run ave @ 15% tails)	\$2.50	\$2.00		\$0	\$0	\$0	\$0	0.0%	
57,960	Cable, breakers CT's ( 18 CT's per bkr, 4 wires @ 350/run ave @ 15% tails)	\$2.00	\$1.50		\$0	\$115,920	\$86,940	\$202,860	3.5%	
33,120	Cable, xfmsr CT's ( 18 CT's per xfmr, 4 wires @ 200/run ave @ 15% tails)	\$2.00	\$1.50		\$0	\$66,240	\$49,680	\$115,920	2.0%	
3,220	Cable, breakers AC (115 KV) (4 wires @ 350/run ave @ 15% tails)	\$1.50	\$1.00		\$0	\$4,830	\$3,220	\$8,050	0.1%	
2,760	Cable, breakers AC (12.47 KV) (4 wires @ 300/run ave @ 15% tails)	\$1.50	\$1.00		\$0	\$4,140	\$2,760	\$6,900	0.1%	
1,610	Cable, breakers DC (115 KV) (2 wires @ 350/run ave @ 15% tails)	\$1.50	\$1.00		\$0	\$2,415	\$1,610	\$4,025	0.1%	
2,760	Cable, breakers DC (12.47 KV) (2 wires @ 300/run ave @ 15% tails)	\$1.50	\$1.00		\$0	\$4,140	\$2,760	\$6,900	0.1%	
2,415	Cable, Communications (6 wires @ 350/run ave @ 15% tails)	\$1.50	\$1.00		\$0	\$3,623	\$2,415	\$6,038	0.1%	
13,520	Grounding - 4/0 cable (17 X 400' + 21 X 320')	\$1.20	\$7.00		\$0	\$16,224	\$94,640	\$110,864	1.9%	
99	Grounding - rods (Every 40' 9 X 11 - 99)	\$15.00	\$16.00		\$0	\$1,485	\$1,584	\$3,069	0.1%	
411	Grounding - connections (17 X 21 X 15 % extras)	\$17.00	\$20.00		\$0	\$6,987	\$8,220	\$15,207	0.3%	
0	Grounding - xfmr neutral grounding resistor	\$10,000.00	\$2,000.00		\$0	\$0	\$0	\$0	0.0%	
1	Site Lighting mounted to structures (lot)	\$5,000.00	\$1,000.00		\$0	\$5,000	\$1,000	\$6,000	0.1%	
128,000	Site work - grading \$0.40/sq ft			\$0.40	\$51,200	\$0	\$0	\$51,200	0.9%	
128,000	Site work - rock \$0.20/sq ft			\$0.20	\$25,600	\$0	\$0	\$25,600	0.4%	
1,440	Fencing - feet of chainlink (320' + 400' +320' + 400'/2 = 1240')	\$12.50	\$16		\$0.00	\$18,000	\$23,040	\$41,040	0.7%	
1	Fencing - vehicle gate			\$1,100.00	\$1,100.00	\$0	\$0	\$1,100	0.0%	
1	Fencing - man gate			\$500.00	\$500.00	\$0	\$0	\$500	0.0%	
0	Bus tubing, feet of 4"	\$8.00	\$58		\$0.00	\$0	\$0	\$0	0.0%	
1,560	Bus tubing, feet of 2 1/2"	\$8.00	\$58		\$0.00	\$12,480	\$90,480	\$102,960	1.8%	
960	Bus wire strain, feet of 1590 doubled (120' X 2 X 4 bkrs)	\$8.00	\$58		\$0.00	\$7,680	\$55,680	\$63,360	1.1%	
1	Bus, connectors (lot)	\$18,000	\$15,000		\$0	\$18,000	\$15,000	\$33,000	0.6%	
1	Control Building, pre-fab w/o relaying and controls	\$200,000	\$30,000		\$0	\$200,000	\$30,000	\$230,000	4.0%	
1	Power Distribution Center, Eleven (11) 12.47 KV Breakers with pre-fab relaying and controls	\$385,000	\$30,000		\$0	\$385,000	\$30,000	\$415,000	7.2%	
1	Placarding/Arc Flash (Lot)	\$0	\$0		\$0	\$0	\$0	\$0	0.0%	
1	Engineering (design) (See Estimate Below)	\$0	\$0		\$0	\$0	\$0	\$0	0.0%	
1	Mobilization by contractor		\$30,000		\$0	\$0	\$30,000	\$30,000	0.5%	
1	Checkout		\$120,000		\$0	\$0	\$120,000	\$120,000	2.1%	
	<b>SUBTOTAL</b>					\$298,400	\$2,754,269	\$1,130,819	\$4,309,488	75.1%

Contractor Profit @ 10% \$430,949 7.5%

Substation subtotal #1 \$4,740,436 83%

Substation Contingencies @ 10% \$474,044 8.3%

Substation subtotal #2 \$5,214,480 91%

Undeveloped Design Details @ 10% \$521,448 9.1%

Substation subtotal #3 \$5,735,928 100%

Lot	115 KV exit transmission lines							\$0	
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Engineering (design)/Studies (soil, fault, etc.) @ 5% of Total = \$286,796.39

**Total Project Crude Budget Estimate \$6,022,724**

Prepared by Kremer  
CHICAGO Office Budget - Rough Estimate



## Appendix D

### Data Received

#### **Item Description**

Westar Correspondence

Existing Building Data

## Zargar, Majid

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**From:** Jack Carlson [jec@k-state.edu]  
**Sent:** Thursday, April 26, 2012 4:14 PM  
**To:** Zargar, Majid  
**Cc:** sparks@ksu.edu; Mahmood, Ali; Dale Boggs; A. Fattaey; Wagner, Mark; Mindy Hodges  
**Subject:** Re: KSU-Electrical master Plan - 4-24-12-Weekly Progress Report  
**Attachments:** StanleyGroupElec1.xls

Majid:

- 1) The Power Plant SF includes the Chiller Plant SF on the spreadsheet given to you earlier. You will see on the attached spreadsheet that we separated out the Power Plant bldg 093 and Chiller Plant bldg # 093A with their appropriate square footage's.
- 2) As we talked on the phone yesterday, both transformers will be 500kva, the East Stadium switch will be fed from the East 12.5kv loop located at the NE corner of East Stadium, the West Stadium switch will be on the West 12.5kv loop and fed from the switch on the NW corner of the building.
- 3) Toddville SF has been updated on the attached spreadsheet.
- 4) As discussed on the telephone yesterday, the Dairy Barn has two transformers fed from the West 12.5kv loop.
- 5) Dale Boggs is collecting this data and will report this to you when the electricians have taken the readings, no meter is connected to this building yet.

Sincerely,  
JackC

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**From:** "Majid Zargar" <zargarmajid@stanleygroup.com>  
**To:** "Dale Boggs" <boggs@k-state.edu>  
**Cc:** sparks@ksu.edu, jec@k-state.edu, "Ali Mahmood" <mahmoodali@stanleygroup.com>  
**Sent:** Tuesday, April 24, 2012 11:31:52 AM  
**Subject:** KSU-Electrical master Plan - 4-24-12-Weekly Progress Report

Dale/ Jack,

Please see attached weekly progress report. Please note the following information that need to be verified or provided by KSU.

Verify that the Power plant square footage does not include the Chiller plant.

Provide the loop and switch that the east and west stadium loads will be connected to. Also provide the transformer sizes for those loads.

"Toddville" located near B18 parking lot (on the East loop) is not listed as a building. Please provide the estimated square footage for the building.

"Old Dairy Outside" (located on the west loop) does not have an associated square footage. Please provide the approximate load for this area or an estimated square footage.

What is the approximate load of the Cardwell hall accelerator? Is this considered a separate load from the building?

Land Development Planning Report.

SKM files from Master Plan Study dated 2004 by Morrow Engineering. (Denied by Morrow Engineering per previous email)

ACAD files for primary distribution system single line diagrams.(hard copies were provided by Jack at kickoff meeting)

Should you have any questions, please contact us.

Thanks

Majid Zargar, P.E.  
Project Manager  
Stanley Consultants Inc.  
8501 W. Higgins Rd. Suite 730  
Chicago, IL 60631  
Tel: 773-693-9624  
Fax:773-693-7690  
[Email:zargarmajid@stanleygroup.com](mailto:zargarmajid@stanleygroup.com)

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Jack E. Carlson  
KSU Facilities Planning Office  
211 Dykstra Hall  
Manhattan, KS 66506-0903  
Tel: 785-532-1722  
Cel: 785-313-1816  
Fax: 785-532-6363

## Zargar, Majid

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**From:** Dale Boggs [boggs@k-state.edu]  
**Sent:** Friday, April 13, 2012 4:30 PM  
**To:** Baggett, Latrice  
**Cc:** Jack Carlson; boggs@ksu.edu; sparks@ksu.com; Zargar, Majid  
**Subject:** Re: Electrical Distribution Loop System

Latrice,

Justin Hall, English and Counseling Service Building, and Ackert Hall.

Dale Boggs

On 4/13/2012 2:55 PM, Baggett, Latrice wrote:  
Good Afternoon,

After reviewing the distribution loop single lines, we noticed that there is no clear indication of which switch is open in loop. Usually the open switch is located in the center of each loop, but we do not want to assume which switch that would be. If possible, can you provide the open switch label for each loop?

Also, I would like to confirm that the contact person at Westar is Kelsey McCabe 785-587-2312. Would she be the appropriate person to contact for information on the new substation near the farm area?

Thanks and have a great weekend,

Latrice Baggett, P.E.  
Electrical Engineer  
Stanley Consultants Inc.  
8501 Higgins Road  
Suite 730  
Chicago, IL 60631  
Office: 773-693-9624  
Direct: 773-714-2035

## Zargar, Majid

---

**From:** Kelsey.Williams@westarenergy.com  
**Sent:** Wednesday, May 09, 2012 11:18 AM  
**To:** Zargar, Majid  
**Subject:** RE: KSU Electrical Mater Study - Data request

It has a rating of 22.4 MVA. That transformer currently feeds KSU and a small Westar circuit (typically around 1 MW, sometimes up to 5 MW or more if we do switching on our system for maintenance). In the event the SW substation were lost, we would not be able to supply the peak load from just the KSU campus substation. If we have advance notice, we may be able supply the load for maintenance or during an emergency during off-peak times, but it would require us to check loads and possibly do some switching on our system first.

Kelsey J. Williams  
Westar Energy  
Business Manager  
818 S. Kansas Ave.  
PO BOX 889  
Topeka, KS 66601  
(785) 575-8057  
(785) 575-1870 (fax)

"Zargar, Majid" <[zargarmajid@stanleygroup.com](mailto:zargarmajid@stanleygroup.com)>

To <[Kelsey.Williams@westarenergy.com](mailto:Kelsey.Williams@westarenergy.com)>

cc

05/09/2012 10:22 AM

Subject RE: KSU Electrical Mater Study - Data request

Kelsey,

Pursuant to our conversation this morning I was wondering if you can provide us with full rating of the 20MVA transformer at Campus Substation.

Based on Utility records, the peak demand recorded at Campus sub was 9,824 KW and 13,712 kW at SW substation with total peak demand of 23,536 KW. We are trying to find out if all the campus can be feed from one sub in the event we lose one of the two subs.

Thanks

Majid Zargar, P.E.  
Project Manager  
Stanley Consultants Inc.  
8501 W. Higgins Rd. Suite 730  
Chicago, IL 60631  
Tel: 773-693-9624  
Fax:773-693-7690  
Email:[zargarmajid@stanleygroup.com](mailto:zargarmajid@stanleygroup.com)

**From:** Zargar, Majid

**Sent:** Friday, May 04, 2012 8:33 AM  
**To:** 'Kelsey.Williams@westarenergy.com'  
**Subject:** FW: KSU Electrical Mater Study - Data request

Kelsey,

WE got the attached excel sheet while ago from Roy Mayfield at KSU however, we are little confuse about the number of meters at each substation. I was wondering if you have a better data for both substations that display past 24 months Monthly average KW and Peak KW demand.

Also I was wondering if the metering are on primary side of the transformer or secondary. If the meters are located on secondary side is that mean KSU is paying for transformer losses.

Thanks

Majid Zargar, P.E.  
Project Manager  
Stanley Consultants Inc.  
8501 W. Higgins Rd. Suite 730  
Chicago, IL 60631  
Tel: 773-693-9624  
Fax:773-693-7690  
Email:zargarmajid@stanleygroup.com

**From:** Rob Mayfield [<mailto:rmafld@ksu.edu>]  
**Sent:** Friday, March 09, 2012 1:23 PM  
**To:** Dale Boggs  
**Cc:** Zargar, Majid; [jec@k-state.edu](mailto:jec@k-state.edu)  
**Subject:** Re: KSU Electrical Mater Study - Data request

On 3/9/2012 11:13 AM, Dale Boggs wrote:  
Rob,

Would you please get this information and send it to all of us listed in this email?

Dale Boggs

On 3/9/2012 10:33 AM, Zargar, Majid wrote:

Sent from my iPhone

On Mar 8, 2012, at 2:33 PM, "Zargar, Majid" <[zargarmajid@stanleygroup.com](mailto:zargarmajid@stanleygroup.com)> wrote:

Dale,

Per our meeting on 3/7/12 we would like to request electric utility demand for past twelve months for both campus sub and SW sub.

Thanks

Majid Zargar

Stanley Consultants Inc.  
Sent from my iPhone

## Zargar, Majid

---

**From:** Kelsey.Williams@westarenergy.com  
**Sent:** Wednesday, May 02, 2012 8:58 AM  
**To:** Zargar, Majid  
**Subject:** RE: Approx location of KSU Farm extension area

Majid-

Here are the best answers I can gather on our side:

1. Is there separate metering for each loop (East, Center, and West) at Main Campus and South West substations? We have utility bills for past twelve months at each substation but interested to know if there are separate metering installed at each loop. I do not believe there is a separate Westar meter for each loop, just for each delivery point. We only have one meter at the main substation, we have two at the west substation but it depends on how the KSU system is after that whether it matches up with a loop or not (we have two feeds going into a KSU switchgear, and they have multiple breakers coming off of it).
2. KSU is interested changing the overhead lines currently feeding Dairy farms west of the campus to underground lines due to some failures they had in past. We are considering couple of options such as installing a new substation on west of the campus for Dairy farms and future expansions or feed from SW substation. We would like to know if there is enough capacity or spare breaker at SW substation to install a new feed to the Dairy farms.  
There is enough room at the SW substation (Westar's "West KSU Stadium" substation) to move the expected 150 kW of load to it. KSU has their own switchgear, I don't know if there's a spare breaker or not.
3. We would like to know who would be financially responsible for changing the overhead lines to underground KSU or Westar. There are two portions of line - Westar's overhead from Marlatt north to a metering point, and KSU's overhead from that metering point on their property. KSU would be responsible for changing their portion of line. If they want our portion of line put underground we would charge them.
4. Who would be financially responsible for installation of new substation nearby the Dairy farms? Assume KSU will provide the land.  
KSU

Kelsey J. Williams  
Westar Energy  
Business Manager  
818 S. Kansas Ave.  
PO BOX 889  
Topeka, KS 66601  
(785) 575-8057  
(785) 575-1870 (fax)

"Zargar, Majid" <[zargarmajid@stanleygroup.com](mailto:zargarmajid@stanleygroup.com)>

To <[kelsey.williams@westarenergy.com](mailto:kelsey.williams@westarenergy.com)>

cc

05/02/2012 07:59 AM

Subject RE: Approx location of KSU Farm extension area

Kelsey,



I was just wondering if you had a chance to go over our request and questions we sent to you last week. I am available this week If you would prefer to have a conference call to go over questions.

Thanks

Majid Zargar, P.E.  
Project Manager  
Stanley Consultants Inc.  
8501 W. Higgins Rd. Suite 730  
Chicago, IL 60631  
Tel: 773-693-9624  
Fax:773-693-7690  
Email:zargarmajid@stanleygroup.com

**From:** Zargar, Majid  
**Sent:** Friday, April 27, 2012 11:22 AM  
**To:** 'kelsey.williams@westarenergy.com'  
**Subject:** Approx location of KSU Farm extension area

Kelsey,

Per your request, please see link below for the location of farmlands. Thanks

**[3101 College Ave](#)**  
Manhattan, KS 66502

[Show on Google Maps](#)

Majid Zargar, P.E.  
Project Manager  
Stanley Consultants Inc.  
8501 W. Higgins Rd. Suite 730  
Chicago, IL 60631  
Tel: 773-693-9624  
Fax:773-693-7690  
Email:zargarmajid@stanleygroup.com

Kansas State University - #367		as of December 2011									
Notes as of 12/19/2011	Building Name	Bldg #	Address	City	State	Zip	Square Footage	Year Built/ Purchased	Year Razed/ Discontinued	Floors	Electrical Source (V)
	Anderson Hall	00001	102 Anderson Hall	Manhattan	KS	66506	66,439	1879		3	4160
	Danforth/All Faiths Chapel	00003	Danforth/All Faiths Chapel	Manhattan	KS	66506	9,337	1949		1	12470
	Weber Hall	00004	232 Weber Hall	Manhattan	KS	66506	133,161	1957		2	12470
	Ahearn Field House	00005	202 Ahearn Field House	Manhattan	KS	66506	90,096	1951		1	4160
	Bushnell Annex	00008	103 Bushnell Annex	Manhattan	KS	66506	2,328	1969		1	4160
	Burt Hall	00009	207 Burt Hall	Manhattan	KS	66506	39,291	1923		3	4160
now part of CMG. Researching costs	Bushnell Hall	00010	304 Bushnell Hall	Manhattan	KS	66506	23,219	1949		3	4160
	KSU Housing	00012		Manhattan	KS	66506	270	1947			WESTAR
	Calvin Hall	00013	101 Calvin Hall	Manhattan	KS	66506	52,261	1908		3	12470
	Greenhouse D - Conservatory	00015	Denison Ave & Elaine Drive	Manhattan	KS	66506	2,279	1907		1	12470
	Dickens Hall	00018	201 Dickens Hall	Manhattan	KS	66506	31,435	1907		3	12470
	Dykstra Hall	00019	109 Dykstra Hall	Manhattan	KS	66506	37,095	1955		2	4160
	King Hall	00020	104 King	Manhattan	KS	66506	44,559	1966		3	12470
	Environmental Res Lab	00021	101 Env Research Lab	Manhattan	KS	66506	6,762	1963		2	12470
	Eisenhower Hall	00022	117 Eisenhower Hall	Manhattan	KS	66506	54,893	1951		3	4160
	Seaton Court	00025	211 Seaton Hall	Manhattan	KS	66506	45,515	1874		2	12470
	Campus Creek Complex	00027	139 Campus Creek Complex	Manhattan	KS	66506	22,175	1949		2	480
	Feed Technology Wing	00029	101 Feed Technology	Manhattan	KS	66506	18,837	1956		4	12470
duplicate record	Fairchild Hall	00030	103 Fairchild Hall	Manhattan	KS	66506	58,828	1894		3	12470
duplicate record	Hale-Farrell Library	00031	214 Hale Library	Manhattan	KS	66506	357,927	1927		5	12470
duplicate record	Holton Hall	00034	101 Holton Hall	Manhattan	KS	66506	24,552	1900		2	12470
duplicate record	Jardine Terrace Y	00040	1601 Hillcrest Drive	Manhattan	KS	66506	15,249	1957		2	WESTAR
multiple buildings	Dairy - Tie Stall Barn w/office	00041	2090 Marlatt Ave	Manhattan	KS	66502	7,900	1991		1	WESTAR
	Justin Hall	00041	225 Justin Hall	Manhattan	KS	66506	148,768	1960		3	12470
	Jardine Terrace P	00042	1700 Hillcrest Drive	Manhattan	KS	66506	15,249	1957		2	WESTAR
	Jardine Terrace Q	00043	2050 Kerr Drive	Manhattan	KS	66506	15,249			2	WESTAR
	Jardine Terrace D	00047	1604 Roof Drive	Manhattan	KS	66506	15,249			2	WESTAR
	Jardine Terrace E	00048	1600 Roof Drive	Manhattan	KS	66506	15,249			2	WESTAR
	Jardine Terrace F	00049	1605 Roof Drive	Manhattan	KS	66506	15,249			2	WESTAR
	Jardine Terrace G	00050	1601 Roof Drive	Manhattan	KS	66506	15,249			2	WESTAR
	Jardine Terrace H	00051	1544 International Court	Manhattan	KS	66506	15,249			2	WESTAR
	Jardine Terrace I	00052	1540 International Court	Manhattan	KS	66506	15,249	1950		2	WESTAR
	Jardine Terrace J	00053	1949 Kerr Drive	Manhattan	KS	66506	15,249	1957		2	WESTAR
	Jardine Terrace L	00055	1605 Hillcrest Drive	Manhattan	KS	66506	15,249	1957		2	WESTAR
	Jardine Terrace M	00056	1545 International Court	Manhattan	KS	66506	15,249	1957		2	WESTAR
	Jardine Terrace N	00057	1541 International Court	Manhattan	KS	66506	15,249	1957		2	WESTAR
	Jardine Terrace R	00058	2051 Kerr Drive	Manhattan	KS	66506	15,249	1957		2	WESTAR
future	Jardine Terrace S	00059	2020 Tunstall Circle	Manhattan	KS	66506	15,249	1957		2	WESTAR
future	Jardine Terrace T	00060	2050 Jardine Drive	Manhattan	KS	66506	15,249	1957		2	WESTAR
future	Jardine Terrace U	00061	1604 Hillcrest Drive	Manhattan	KS	66506	15,249	1957		2	WESTAR
	Jardine Terrace V	00062	1600 Hillcrest Drive	Manhattan	KS	66506	15,249	1957		2	WESTAR
	Jardine Terr Washhouse 2	00064		Manhattan	KS	66506	1,370	1959		1	WESTAR
	Jardine Terr Washhouse 3	00065		Manhattan	KS	66506	942	1959		1	WESTAR
	Jardine Terr Washhouse 4	00066		Manhattan	KS	66506	941	1959		1	WESTAR
	Jardine Terrace W	00069	1701 Hillcrest Drive	Manhattan	KS	66506	15,249	1963		2	WESTAR
	Jardine Terrace X	00070	1605 Hillcrest Drive	Manhattan	KS	66506	15,249	1963		2	WESTAR
	Kedzie Hall	00071	105 Kedzie Hall	Manhattan	KS	66506	41,616	1897		2	4160
	Call Hall	00072	139 Call Hall	Manhattan	KS	66506	66,492	1963		2	4160
	Gymnasium	00073	101 Gymnasium (College Heig	Manhattan	KS	66506	73,703	1951		3	4160
	Holtz Hall	00074	100 Holtz Hall	Manhattan	KS	66506	6,950	1876		1	4160
	Marlatt Hall	00076	1 Marlatt Hall	Manhattan	KS	66506	124,872	1964		6	WESTAR
	Kramer Food Center	00077	1 Kramer Dining Center	Manhattan	KS	66506	39,097	1960		2	WESTAR
	Goodnow Hall	00078	1 Goodnow Hall	Manhattan	KS	66506	124,872	1960		6	WESTAR
	Gen Richard B Meyer Military Science Hall	00079	101 Gen. Richard B. Myers Ha	Manhattan	KS	66506	39,206	1943		2	4160
	Shellenberger Hall	00080	201 Shellenberger Hall	Manhattan	KS	66506	51,051	1960		3	12470
	R. V. Christian Track (Locker Facility)	00081	1800 College Avenue	Manhattan	KS	66506	2,800	2005		1	N/A
	Nichols Hall	00082	107 Nichols Hall	Manhattan	KS	66506	74,277	1911		3	12470
	Boyd Hall	00083	17 Boyd Hall	Manhattan	KS	66506	67,920	1951		4	12470
	Ward Hall	00085	133 Ward Hall	Manhattan	KS	66506	41,222	1961		1	12470
	Jardine Storm Shelter 1	00087		Manhattan	KS	66506	1,035	1970		1	N/A
Exists - behind Waters Annex	Jardine Storm Shelter 2	00088		Manhattan	KS	66506	1,035	1970		1	N/A

Draft as of  
2012-3-27  
We are still collecting  
information from the  
Ag Research Farms  
and Extension  
Agencies located in  
the Off Campus areas.

Kansas State University - #367		as of December 2011									
Notes as of 12/19/2011	Building Name	Bldg #	Address	City	State	Zip	Square Footage	Year Built/ Purchased	Year Razed/ Discontinued	Floors	Electrical Source (V)
	Davenport Building-Housing Maintenance	00089	1548 N Denison	Manhattan	KS	66506	13,497	1966		1	WESTAR
	Cardwell Hall	00091	116 Cardwell Hall	Manhattan	KS	66506	149,866	1963		4	4160
	President's Residence	00092	100 Wilson Court	Manhattan	KS	66506	9,096	1923		3	12470
Do you want the utility address as well?	Power Plant	00093		Manhattan	KS	66506	52,792	1928		3	4160
Do you want the utility address as well?	Facilities Grounds	00097	109 Dykstra Hall	Manhattan	KS	66506	4,018	1918		1	4160
Do you want the utility address as well?	Smurthwaite House	00100	331 North 17th Street	Manhattan	KS	66506	15,301	1961		2	WESTAR
	K-State Union	00101	100 K-State Student Union	Manhattan	KS	66506	263,194	1956		1	12470
lease 367-556	Seaton Hall	00102	211 Seaton Hall	Manhattan	KS	66506	235,967	1922		3	12470
West Marlat Beef Research	Putnam Hall	00103	1 Putnam Hall	Manhattan	KS	66506	67,920	1953		4	12470
West Marlat Beef Research	East Stadium	00104	109 East Stadium	Manhattan	KS	66506	22,357	1922		2	4160
West Marlat Beef Research	West Stadium	00105	101 West Stadium	Manhattan	KS	66506	28,156	1922		2	4160
West Marlat Beef Research	Thompson Hall	00106	108 Thompson Hall	Manhattan	KS	66506	33,092	1921		2	4160
West Marlat Beef Research	English/Counseling Services	00108	232 English/Counsel Serv	Manhattan	KS	66506	33,666	1960		2	4160
duplicate entries	Umberger Hall	00109	101 Umberger Hall	Manhattan	KS	66506	58,611	1956		3	4160
aka Feed Center	Leasure Hall	00112	3 Leasure Hall	Manhattan	KS	66506	44,354	1908		3	4160
Hay Shed	Van Zile Hall	00113	1 Van Zile Hall	Manhattan	KS	66506	64,373	1926		3	12470
	Willard Hall	00116	322 Willard Hall	Manhattan	KS	66506	109,459	1939		3	12470
Need to do	Waters Hall Annex	00117	001 Waters Hall Annex	Manhattan	KS	66506	15,658	1923		1	12470
a site check on	Waters Hall	00120	113 Waters Hall	Manhattan	KS	66506	147,102	1923		3	12470
	Wind Erosion Lab	00121	101 Wind Erosion Lab	Manhattan	KS	66506	11,920	1963		1	12470
the farms.	Moore Hall	00123	1 Moore Hall	Manhattan	KS	66506	125,132	1965		9	12470
	West Hall	00124	1 West Hall	Manhattan	KS	66506	66,946	1962		5	12470
site number, has multiple buildings	Derby Food Center	00128	1 Derby Dining Center	Manhattan	KS	66506	97,567	1965		2	12470
	Ford Hall	00129	1 Ford Hall	Manhattan	KS	66506	125,132	1966		9	12470
	Haymaker Hall	00130	1 Haymaker Hall	Manhattan	KS	66506	125,132	1967		9	12470
	Pittman Building	00132	104 Pittman Bldg	Manhattan	KS	66506	63,511	1967		2	WESTAR
	McCain Auditorium	00133	109 McCain Auditorium	Manhattan	KS	66506	112,639	1970		3	12470
	Bill Snyder Family Stadium	00134	1800 College Avenue	Manhattan	KS	66506	125,006	1968		2	WESTAR
	Edwards Hall	00135	103 Edwards Hall	Manhattan	KS	66506	54,758	1967		3	WESTAR
	Ackert/Chalmers Hall	00136	116 Ackert Hall	Manhattan	KS	66506	192,069	1970		5	12470
	Handball Building	00146	001 Handball Bldg	Manhattan	KS	66506	4,980	1969		1	WESTAR
	Coles Hall - Veterinary Medical Science	00147	1800 Denison	Manhattan	KS	66506	106,030	1972		3	12470
	Vanier Football Complex	00149	1800 College Avenue	Manhattan	KS	66506	58,351	1972		2	WESTAR
	Natorium	00150	1A Natatorium	Manhattan	KS	66506	49,554	1973		1	12470
AKA Hessian Fly Greenhouse waiting on Gro	Trotter Hall - Veterinary Medical Science	00151	1800 Denison	Manhattan	KS	66506	104,601	1973		3	12470
	Durland/Rathbone/Fiedler Hall	00153	1005 Durland Hall	Manhattan	KS	66506	245,041	1976		3	12470
lease 367-715	Mosier Hall - Veterinary Medical Science	00154	1800 Denison	Manhattan	KS	66506	272,640	1978		2	12470
future	International Student Center	00155	104 International Student Cen	Manhattan	KS	66506	6,439	1977		1	12470
future	Hoefflin Stone House	00156	1701 N. Manhattan Ave	Manhattan	KS	66506	16,273	1800?		2	12470
future	Dairy - Maternity Barn	00157	2090 Marlatt Ave	Manhattan	KS	66502	6,100	1976		1	WESTAR
future construction	Dairy Research Center (ASI)	00157	1515 College Ave	Manhattan	KS	66506	2,475				WESTAR
	Dairy - Milking Parlor/Office Bldg	00157A	2090 Marlatt Ave	Manhattan	KS	66502	2,400	1976		2	WESTAR
	Dairy - Special Needs Facility	00157B	2090 Marlatt Ave	Manhattan	KS	66502	3,800	1976		1	WESTAR
	Dairy - Commodities Barn	00157C	2090 Marlatt Ave	Manhattan	KS	66502	4,000	1976		1	WESTAR
	Dairy - Small Equipment Storage	00157D	2090 Marlatt Ave	Manhattan	KS	66502	3,500	1976		1	WESTAR
	Dairy - Hay Shed	00157E	2090 Marlatt Ave	Manhattan	KS	66502	5,100	2004		1	WESTAR
	Dairy - Shop Building	00157F	2090 Marlatt Ave	Manhattan	KS	66502	3,500	1976		1	WESTAR
AKA: Pesticide Storage Building	Bluemont Hall	00158	1100 Mid-Campus Drive	Manhattan	KS	66506	122,700	1981		5	12470
site has multiple buildings. AKA Athletics Gr	Peters Rec Center	00159	101 Peters Rec Complex	Manhattan	KS	66506	169,995	1980		2	WESTAR
looking for drawing file	International Grains Program Conf Center	00160	1980 Kimball Ave	Manhattan	KS	66506	19,732	2004		2	WESTAR
	Throckmorton Hall	00161	2021 Throckmorton Plant Scie	Manhattan	KS	66506	392,058	1981		4	12470
	Brandebery Indoor Practice Fac	00162	1800 College Avenue	Manhattan	KS	66506	25,915	1980		1	WESTAR
Sargent Farm (76 on the map)	Bramlage Coliseum	00164	1800 College Avenue	Manhattan	KS	66506	176,073	1988		1	WESTAR
Sargent Farm (#75 on the Map)	Chemistry/Biochemistry	00165	213 Chem/Biochem Bldg	Manhattan	KS	66506	89,350	1988		4	12470
Sargent Farm (no map number)	Public Safety Srv I (Hazardous Waste Bldg)	00166	101 Public Safety Srv I	Manhattan	KS	66506	2,500	1987		1	WESTAR
Sargent Farm (73 on the map)	Physical Facilities Storage Bldg	00167		Manhattan	KS	66506	6,650	1987		1	12470
Sargent Farm	Dole Hall	00168	128 Bob Dole Hall	Manhattan	KS	66506	32,923	1990		1	12470
Sargent Farm	College Courts	00169	13 College Court Bldg	Manhattan	KS	66506	26,508	1945		1	WESTAR
Sargent Farm	Frith Community Building	00170	2002 Tunstall Circle	Manhattan	KS	66506	4,884	1990		1	WESTAR
Sargent Farm (79 on the map)	Chemical Storage Bldg	00171	101 Chemical Storage Bldg	Manhattan	KS	66506	2,608	1989		1	12470
Sargent Farm (80 on the map)	KSU Foundation Center (two-story bldg)	00172	2323 Anderson Ave	Manhattan	KS	66506	66,086	1954		2	WESTAR

Kansas State University - #367		as of December 2011									
Notes as of 12/19/2011	Building Name	Bldg #	Address	City	State	Zip	Square Footage	Year Built/ Purchased	Year Razed/ Discontinued	Floors	Electrical Source (V)
building number is for the site	Facility Shops	00173	101 Facility Shops	Manhattan	KS	66506	8,785	1993		1	12470
building number is for the site	Facilities Grounds Storage Bldg	00174		Manhattan	KS	66506	5,335	1994			12470
building number is for the site	Beach Art Museum	00175	701 Beach Lane	Manhattan	KS	66506	48,920	1996		2	12470
duplicated/also known as Poultry Farm Shop	Indoor Practice Facility	00176	1800 College Avenue	Manhattan	KS	66506	97,248	1993		1	WESTAR
	Facilities Grounds Storage	00177	109 Dykstra Hall	Manhattan	KS	66506	5,250	1995		1	WESTAR
	Intramural Fields Bldg	00178	101 Intramural Fields Bldg	Manhattan	KS	66506	576	1996		1	WESTAR
looking for drawing file	KSU Garden Maintenance Bldg	00179	101 Garden Maint Bldg	Manhattan	KS	66506	2,250	1995		1	12470
	Press Box (part of stadium)	00180					21,996				WESTAR
	Mechanical Eng Lab (Aircraft Cabin ERL)	00182	1500 Hayes Dr	Manhattan	KS	66506	10,800	1996		1	WESTAR
	Public Safety Service II	00184	101 Public Safety Srv II Bldg	Manhattan	KS	66506	3,600	2000		1	WESTAR
	Tointon Stadium / Meyer Field	00185	1800 College Avenue	Manhattan	KS	66506	13,055	2000		2	WESTAR
	Biological & Indust Value Added Prog (BIVAP)	00186	1980 Kimball Ave	Manhattan	KS	66506	33,439	2004		1	WESTAR
	Pat Roberts Hall Bio Security Research Institute	00190	1041 Pat Roberts Hall	Manhattan	KS	66506	112,955	2007		3	12470
	Hal Ross Flour Mill	00191	103 Ross Flour Mill	Manhattan	KS	66506	26,736	2007			WESTAR
looking for drawing file	Parking Garage	00192	1 KSU Parking Garage	Manhattan	KS	66506	443,887				12470
	Center for Child Development	00194	1 Jardine Drive	Manhattan	KS	66506	34,747	2010			12470
	Leadership Studies	00195	Leadership Bldg	Manhattan	KS	66506	26,485				12470
	Facilities Storeroom Bldg (brand: Liberty )	00201	101 Facilities Storeroom Bldg	Manhattan	KS	66506	8,028				4160
# 22 on the map	Entomology Greenhouse (Donated by USDA)	00205	101 Wind Erosion Lab	Manhattan	KS	66506	1,860	1963			12470
#24 on the map	CMG - Research Lab Building - Floor Cover	00207	101 CMG Office/Lab Building	Manhattan	KS		19,113	2011			WESTAR
# 20 on the map	CMG - Hooved Stock Barn	00208	101 CMG Office/Lab Building	Manhattan	KS		9,805	2011			WESTAR
#18 on the map	CMG - Office/Storage/Shop Building	00209	101 CMG Office/Lab Building	Manhattan	KS		8,712	2011			WESTAR
possibly razed in 2009 for NBAF	CMG - Hay Barn	00210	101 CMG Office/Lab Building	Manhattan	KS		2,452	2011			WESTAR
	CMG - Caretakers Residence	00212	101 CMG Office/Lab Building	Manhattan	KS		1,929	2011			WESTAR
	Wood Kiln Building	00217					2,690				WESTAR
	Indoor Rowing Training Facility	00217	101 Indoor Rowing Training Facility	Manhattan	KS	66506	8,600	2013		1	WESTAR
	Food Animal Barn and Shed (Vet Med)	00224					841	1980			WESTAR
	Vet Hay Barn (Vet Med)	00231					5,735				N/A
	Animal Resource Facility (Modular for Dogs)	00232		Manhattan	KS		1,216	2006			WESTAR
	Classroom/TR Manhattan (Grain Science ?)	00258	1800 Denison	Manhattan	KS	66506	1,200	1980		1	WESTAR
	Class Lab Service	00258A	1800 Denison	Manhattan	KS	66506	1,200	1980		1	WESTAR
	Pole Shed Metal Clad (Grain Science)	00261		Manhattan	KS		4,000	1989			WESTAR
	Building 1 Apartments	00265	1615 Denison Ave	Manhattan	KS	66506	31,342			3	WESTAR
	Building 1A Apartments	00266	1804 Jardine Drive	Manhattan	KS	66506	31,342	2006		3	WESTAR
	Building 2 Apartments	00267	1711 Denison Ave	Manhattan	KS	66506	31,342			3	WESTAR
	Building 3 Apartments	00268	1725 Denison Ave	Manhattan	KS	66506	31,249			3	WESTAR
	Building 4 Apartments	00269	1803 Kerr Drive	Manhattan	KS	66506	22,498			3	WESTAR
	Building 5 Apartments	00270	2000 Tunstall Circle	Manhattan	KS	66506	22,498			3	WESTAR
	Building 6 Apartments	00271	2016 Tunstall Circle	Manhattan	KS	66506	22,498	2006		3	WESTAR
	Building 7 Apartments	00272	2012 Tunstall Circle	Manhattan	KS	66506	22,498			3	WESTAR
razed	Building 8 Apartments	00273	2008 Tunstall Circle	Manhattan	KS	66506	22,498	2006		3	WESTAR
	Building 9 Apartments (Saunders Barracks)	00274	2004 Tunstall Circle	Manhattan	KS	66506	31,249			3	WESTAR
	Building 10 Apartments	00275	1602 Hillcrest Drive	Manhattan	KS	66506	31,249			3	WESTAR
	Building 11 Apartments	00276	1705 Hillcrest Drive	Manhattan	KS	66506	31,249			3	WESTAR
	Building 12 Apartments	00277	1609 Hillcrest Drive	Manhattan	KS	66506	15,675			3	WESTAR
	Building 13 Apartments	00278	1603 Hillcrest Drive	Manhattan	KS	66506	31,249			3	WESTAR
	Building 14 Apartments	00279					in design				WESTAR
future	Building 15 Apartments	00280					in design				WESTAR
	Building 16 Apartments	00281					in design				WESTAR
	Poultry - Building 1 (#73 on the map) Layer Research/Judging	00300	2000 Marlatt Ave	Manhattan	KS	66502	500	1968		1	WESTAR
	Poultry - Building 8 (#70 on the map) Office	00300A	2000 Marlatt Ave	Manhattan	KS	66502	4,500	1968		1	WESTAR
	Feed Storage by Elevator (ASI)	00302					1,095				WESTAR
	Poultry - Building 4 (#66 on the map) Broiler Research	00304	2000 Marlatt Ave	Manhattan	KS	66502	2,500	1968		1	WESTAR
	Poultry - Building 5 North (#63 on the map) All Purpose Research	00306	2000 Marlatt Ave	Manhattan	KS	66502	4,500	1968		1	WESTAR
	Poultry - Building 5 South (#67 on the map) Battery/Feed Mix/Hen House	00306A	2000 Marlatt Ave	Manhattan	KS	66502	4,500	1968		1	WESTAR
	Poultry - Building 2 (#71 on the map) Floor Layer Research	00308	2000 Marlatt Ave	Manhattan	KS	66502	4,500	1968		1	WESTAR
	Poultry - Building 6 (#68 on the map) Pullet Growout	00308A	2000 Marlatt Ave	Manhattan	KS	66502	4,500	1968		1	WESTAR
	Poultry - Building 3 (#72 on the map) Natural Raise/Outdoor	00310	2000 Marlatt Ave	Manhattan	KS	66503	4,500				WESTAR
	Poultry - Building 7 (#69 on the map) Shop	00312	2000 Marlatt Ave	Manhattan	KS	66502	4,500	1968		1	WESTAR
lease 367-449	Poultry - Building 9 (#64 on the map) Storage Shed	00314	2000 Marlatt Ave	Manhattan	KS	66502	4,500				WESTAR
	K.K.S.U. Transmitter Bldg (Ext Admin)	00330					310				WESTAR

Kansas State University - #367		as of December 2011									
Notes as of 12/19/2011	Building Name	Bldg #	Address	City	State	Zip	Square Footage	Year Built/ Purchased	Year Razed/ Discontinued	Floors	Electrical Source (V)
	U.S. Grain Marketing Res Cntr (USDA) (Ext Admin)	00331					59,213				WESTAR
lease 367-752	Chemical Storage Shed (Entomology)	00347		Manhattan	KS	66506	476	2002		1	12470
	Facilities Herdsman House (Academic)	00355		Manhattan	KS	66506	1,443				WESTAR
leased from KSU Foundation	Farm Shop - Hay Storage (open grid)	00373	2900 College Ave	Manhattan	KS	66502	1,990				WESTAR
leased from KSU Foundation	KABSU Mobile Office Unit (KABSU-Office Building)	00374	3171 Tuttle Creek Blvd	Manhattan	KS		1,600	1972			WESTAR
	KABSU - Storage and Shipping Training Barn Morton 30x83	00377	3171 Tuttle Creek Blvd	Manhattan	KS		2,500	1986			WESTAR
	KABSU Collection & Lab Bldg)	00379	3171 Tuttle Creek Blvd	Manhattan	KS		6,050	2009			WESTAR
	Sheep Research Center (ASI)	00401					12,458				WESTAR
	Purebred Beef Complex Main Barn and Office (ASI)	00440	1912 Denison Ave	Manhattan	KS	66502	6,000	1957		2	WESTAR
	Purebred Beef Processing Shed	00440A	1912 Denison Ave	Manhattan	KS	66502	200	1957		1	WESTAR
	Purebred Beef Commodities Shed	00440B	1912 Denison Ave	Manhattan	KS	66502	800	1957		1	WESTAR
	Purebred Beef Animal Shelter	00442	1912 Denison Ave	Manhattan	KS	66502	500	1957		1	WESTAR
looking for drawing file	Farm Shop House	00445	2900 College Ave	Manhattan	KS	66502	2,400	1968		1	WESTAR
need to call Housing about this	Morton Shed 120x54 LMIC (ASI)	00450		Manhattan	KS		6,480	1986			WESTAR
	Farm Shop - Main Shop & Office	00451	2900 College Ave	Manhattan	KS	66502	2,400	1968		1	WESTAR
	Morton Shed 120x54 LMIC (ASI)	00451A		Manhattan	KS		6,480	1988			WESTAR
	Elevator and Feed Mill (ASI)	00457					2,758				WESTAR
	Swine - Breeding Barn	00462	3101 College Ave	Manhattan	KS	66502	10,000	1968		1	WESTAR
	Swine, TR unit, Office-Manhattan (ASI)	00462					7,466				WESTAR
	Swine - Office Bulding	00462B	3101 College Ave	Manhattan	KS	66502	2,800	1968		1	WESTAR
	Swine - Machine Shed	00462C	3101 College Ave	Manhattan	KS	66502	800	1968		1	WESTAR
	Swine Early Wean - North SEW Barn (#1 on the map) LMIC	00463	3223 College Ave	Manhattan	KS	66502	3,200	1994		1	WESTAR
storage; City of Manhattan owns bldg	Swine MEW Morton LMIC (ASI) North Barn	00463					3,200				WESTAR
future	Swine Early Wean - South SEW Barn (#2 on the map) LMIC	00463A	3223 College Ave	Manhattan	KS	66502	3,200	1994		1	WESTAR
	BCRC - Feedmill	00464	3115 College Ave	Manhattan	KS	66502	4,800	1968		1	WESTAR
	Beef - Animal Shelter	00464-1	1912 Denison Ave	Manhattan	KS	66502	500	1957		1	WESTAR
	Beef - Commodities Shed	00464-2	1912 Denison Ave	Manhattan	KS	66502	800	1957		1	WESTAR
future	Beef - Processing Shed	00464-3	1912 Denison Ave	Manhattan	KS	66502	200	1957		1	WESTAR
	BCRC - Feeding Barn A	00464A	3115 College Ave	Manhattan	KS	66502	3,200	1968		1	WESTAR
	BCRC - Feeding Barn B	00464B	3115 College Ave	Manhattan	KS	66502	3,200	1968		1	WESTAR
	BCRC - Feeding Barn C	00464C	3115 College Ave	Manhattan	KS	66502	3,200	1968		1	WESTAR
	BCRC - Feeding Barn D	00464D	3115 College Ave	Manhattan	KS	66502	3,200	1968		1	WESTAR
	BCRC - Metabolism Barn E	00464E	3115 College Ave	Manhattan	KS	66502	5,500	1968		1	WESTAR
	BCRC - Boiler Room	00464F	3115 College Ave	Manhattan	KS	66502	240	1968		1	WESTAR
	BCRC - Grain Storage Bay	00464G	3115 College Ave	Manhattan	KS	66502	372	2000		1	WESTAR
	BCRC - North Commodities Shed	00464H	3115 College Ave	Manhattan	KS	66502	2,555	1998		1	WESTAR
	BCRC - South Commodities Shed	00464I	3115 College Ave	Manhattan	KS	66502	3,240	1990		1	WESTAR
looking for drawing file	Horse - Main Barn & Office (AKA Horse Research Center)	00465	3120 College Ave	Manhattan	KS	66502	1,800	1973		1	WESTAR
shed	Horse - Horse Shed and Tool Storage	00465A	3120 College Ave	Manhattan	KS	66502	600	1973		1	WESTAR
barn	Horse - Horse Shed	00465B	3120 College Ave	Manhattan	KS	66502	200	1973		1	WESTAR
barn	Horse - Horse Shed	00465C	3120 College Ave	Manhattan	KS	66502	200	1973		1	WESTAR
	Horse - Horse Shed	00465D	3120 College Ave	Manhattan	KS	66502	200	1973		1	WESTAR
barn	Horse - Hay Shed with Lean-to	00465E	3120 College Ave	Manhattan	KS	66502	1,250	1973		1	WESTAR
shed/barn	Dairy - Calf Prep Shed	00466	2090 Marlatt Ave	Manhattan	KS	66502	580	1992		1	WESTAR
office	Swine - Commercial Finishing Barn	00468	3101 College Ave	Manhattan	KS	66502	20,000	2008		1	WESTAR
delete / NA	BCRC - Processing Building & Lab	00470	3115 College Ave	Manhattan	KS	66502	1,500	2009		1	WESTAR
	Sheep - Lambing Barn	00471	2117 Denison Ave	Manhattan	KS	66502	4,500	1957		1	WESTAR
	Bull Building (ESH) - 40'x40'	00472		Manhattan	KS		1,600				WESTAR
	KABSU Bull Building 40x40	00472	3171 Tuttle Creek Blvd	Manhattan	KS		1,600	2010		1	WESTAR
	KABSU Loafing Shed/Bard (ESH) 16x72	00473	3171 Tuttle Creek Blvd	Manhattan	KS		1,152	2010		1	WESTAR
Is this one gone?	KABSU Loafing Shed/Bard (ESH) 16x72	00474	3171 Tuttle Creek Blvd	Manhattan	KS		1,152	2010		1	WESTAR
	KABSU Loafing Shed/Bard (ESH) 16x72	00475	3171 Tuttle Creek Blvd	Manhattan	KS		1,152	2010		1	WESTAR
	Feed Mill - Dairy Feed Mill	00475-1	1830 Denison Ave	Manhattan	KS	66502	1,200	1979		3	WESTAR
	Feed Mill - Main Feed Mill & Office	00475-2	1830 Denison Ave	Manhattan	KS	66502	3,000	1957		3	WESTAR
	Feed Mill - Storage building	00475-3	1830 Denison Ave	Manhattan	KS	66502	400	1957		1	WESTAR
	Horse - Feed Storage Shed	00476	3120 College Ave	Manhattan	KS	66502	150	1973		1	WESTAR
lease (?367-832?)	Ranelles Headquarters - Nonclass Lab (Agronomy)	00493		Manhattan	KS	66506	3,780	1975		1	WESTAR
	Mower Shed 12x16 AGF (AGR)	00494					192				WESTAR
	Residence 2300 Kimball AGF (AGR)	00495					3,160				WESTAR
	Storage Shed 1 30x60 AGF (AGR)	00496					7,800				WESTAR
	Storage Shed 2 32x96 AGF (AGR)	00497					3,072				WESTAR



## Baggett, Latrice

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**From:** Jack Carlson <jec@k-state.edu>  
**Sent:** Tuesday, February 26, 2013 6:35 PM  
**To:** Wagner, Mark  
**Cc:** Mahmood, Ali; Zargar, Majid; Baggett, Latrice; Mark Taussig; Melanie Klein; A. Abe Fattaey  
**Subject:** Fwd: Master Plan up date - Future Buildings time line

Mark:

The most up to date KSU Master Plan is sent via your Secure File transfer.

JackC

----- Forwarded Message -----

From: "A. Abe Fattaey" <[abepeaia@k-state.edu](mailto:abepeaia@k-state.edu)>  
To: "Kevin King" <[kking@asg-architects.com](mailto:kking@asg-architects.com)>  
Cc: "Bynum Walter" <[bwalter@asg-architects.com](mailto:bwalter@asg-architects.com)>, "Mark Taussig" <[taus@ksu.edu](mailto:taus@ksu.edu)>, "'Melanie Klein' ([melaniek@k-state.edu](mailto:melaniek@k-state.edu))" <[melaniek@k-state.edu](mailto:melaniek@k-state.edu)>, "Jack Carlson" <[jec@k-state.edu](mailto:jec@k-state.edu)>, "Annette Rohde ([airohde@k-state.edu](mailto:airohde@k-state.edu))" <[airohde@k-state.edu](mailto:airohde@k-state.edu)>, "Pat Cox" <[pat@bgcons.com](mailto:pat@bgcons.com)>, "mahmoodali" <[mahmoodali@stanleygroup.com](mailto:mahmoodali@stanleygroup.com)>  
Sent: Monday, February 25, 2013 4:18:31 PM  
Subject: Fwd: Master Plan up date - Future Buildings time line

Kevin:

The updated planned building list as prepared below is being provided to you and utility infrastructure consultants so you all have the same possible future development outlook.

Buildings to be built in next Five Years: by 2017

College of Engineering Phase 4 Addition	80,000 GSF
College of Business Administration - New Building	140,000 GSF
East Memorial Stadium Student Welcome Center -Total Renovation	34,700 GSF
West Memorial Stadium	30,500 GSF
Seaton Hall Addition College of Architecture	125,000 GSF
-----	
Kramer Complex -New Residents and Dining Hall ( Kramer Complex will have stand alone Boiler and chillers )	128,250 GSF
Indoor Rowing Facility ( under Construction) ( stand alone HVAC )	10,000 GSF

Buildings to be possibly built by 2025:

General Classroom Building	66,000 GSF
K-State Union Additions	89,000 GSF
Cardwell Hall Expansion	16,200 GSF
Internationa Student Center Expansion	13,000 GSF
North of Dickens Hall -New Building	10,000 GSF
Ackert Hall Addition	76,000 GSF

Buildings to be possibly built beyond 2025:

North Of College of Engineering - New Buildings	288,000 GSF
East of Justin Hall - New Building	66,000 GSF
Performing Arts - New Building	64,400 GSF
North of performing Art- New Building	375,000 GSF
North of Waters Hall- lot A-17 - New Buildings	186,000 GSF
North of Waters Hall- Lot A-18 - New Buildings	88,000 GSF
Dole Hall Addition	60,000 GSF
north of Umberger Hall- New Building	128,000 GSF
S.W. of Weber Hall- New Building	96,000 GSF

Please let Mark Taussig and I know if you may have any questions or comments.

Thank you.  
Abe,



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Cindy Bontrager  
Interim Vice President, Administration and Finance Kansas State University  
105 Anderson Hall  
Manhattan, KS 66506-0106  
Ph: 785-532-6440  
Fax: 785-532-6693  
E-mail: [cab@ksu.edu](mailto:cab@ksu.edu)  
<http://www.ksu.edu/vpaf>

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Jack E. Carlson

Kansas State University

Campus Planning and Facilities Management

211 Dykstra Hall

Manhattan, KS 66506-0903

Tel: 785-532-1722

Cel: 785-313-1816

Fax: 785-532-6363

## Baggett, Latrice

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**From:** Melanie Klein <[melaniek@k-state.edu](mailto:melaniek@k-state.edu)>  
**Sent:** Monday, March 04, 2013 1:17 PM  
**To:** Jack Carlson  
**Cc:** A. Abe Fattaey; Mahmood, Ali; Zargar, Majid; Baggett, Latrice; Mark Taussig  
**Subject:** Re: Final Utility Master Plans  
**Attachments:** KSU\_MasterPlan2012  
\_ProposedGSF\_AND\_YEARGUESS\_providedByFattaeyAndBontrager\_02\_26\_2013.xlsx

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Dear Stanley Consultants,  
Abe Fattaey and Cindy Bontrager provided a written list of "possible future development outlook" on Feb.25, 2013. After discussing it with Mark Taussig, I took those possible years and incorporated them into this spreadsheet in the column labeled "year guess" because Jack Carlson stated you would need these for your utility study.  
Thank you,  
Melanie

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Melanie Klein, RLA, ASLA  
Landscape Architect II / Project Manager for Campus Master Plan Update Campus Planning & Facilities Management,  
Kansas State University [melaniek@ksu.edu](mailto:melaniek@ksu.edu)  
785-231-8067

----- Original Message -----

From: "Jack Carlson" <[jec@k-state.edu](mailto:jec@k-state.edu)>  
To: "Mark Taussig" <[taus@k-state.edu](mailto:taus@k-state.edu)>  
Cc: "Melanie Klein" <[melaniek@k-state.edu](mailto:melaniek@k-state.edu)>, "A. Abe Fattaey" <[abepeaia@ksu.edu](mailto:abepeaia@ksu.edu)>, "Ali Mahmood" <[mahmoodali@stanleygroup.com](mailto:mahmoodali@stanleygroup.com)>, "Majid Zargar" <[zargarmajid@stanleygroup.com](mailto:zargarmajid@stanleygroup.com)>, "Latrice Baggett" <[baggettlatrice@stanleygroup.com](mailto:baggettlatrice@stanleygroup.com)>  
Sent: Friday, February 1, 2013 3:13:45 PM  
Subject: Fwd: Final Utility Master Plans

Mark T.:

In order for Stanley Consultants to finalize their part of the Master Planning they need information on the items Mark W. identifies below.

In my conversation with Mark Wagner with Stanley Consultants he and his group will be away from their Office the week of February 11-15, 2013.

JackC

----- Original Message -----

From: "Mark Wagner" <[WagnerMark@stanleygroup.com](mailto:WagnerMark@stanleygroup.com)>  
To: "Jack Carlson" <[jec@k-state.edu](mailto:jec@k-state.edu)>

Cc: "Tom Morgan" <[MorganTom@stanleygroup.com](mailto:MorganTom@stanleygroup.com)>, "Majid Zargar" <[zargarmajid@stanleygroup.com](mailto:zargarmajid@stanleygroup.com)>, "Ali Mahmood" <[mahmoodali@stanleygroup.com](mailto:mahmoodali@stanleygroup.com)>, "Matthew Wilkey" <[WilkeyMatthew@stanleygroup.com](mailto:WilkeyMatthew@stanleygroup.com)>, "Latrice Baggett" <[BaggettLatrice@stanleygroup.com](mailto:BaggettLatrice@stanleygroup.com)>  
Sent: Thursday, January 31, 2013 5:29:29 PM  
Subject: Final Utility Master Plans

Jack,

In order to address your comments and concerns presented in the review meeting on January 28 th , we need to have answers and clarifications to the following:

- On the attached list, we only included the “Planned” projects. Please indicate what year they are to be on-line.
- Provide square-footage for Kramer Complex Expansion.
- On the attached list, indicate if any of the buildings in the “Master Plan Proposed” section are to be included and what year.
- We will add student housing to our model, including the Kramer Complex and the Derby Complex as discussed. Please confirm you would like the following housing included in our model:
  - o Boyd
  - o Davenport
  - o Derby
  - o Ford
  - o Haymaker
  - o Jardine
  - o Moore
  - o Putnam
  - o Van Zile
  - o West
- Provide square-footage and year of any new housing projects to be considered.
- For the electrical study, should we consider any additional buildings being expanded or added other than the following:
  - o Justin Hall
  - o West Stadium

- o East Stadium
- o College of Business
- o General Classroom building
- o Vet Med
- o Cardwell Hall
- o International Student Center
- o Kramer
- o Rowing facility

With answers to these questions by Tuesday 2/5/13, we can have the reports revised within a week.

Regards,

Mark Wagner, P.E., P.M.P.

Senior Mechanical Engineer

Stanley Consultants

Office: 773-693-9624

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Jack E. Carlson

Kansas State University

Campus Planning and Facilities Management

211 Dykstra Hall

Manhattan, KS 66506-0903

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Cel: 785-313-1816

Fax: 785-532-6363

<b>Kansas State Univ. - Master Plan</b>													
<b>Project &amp; Phasing Plan</b>													
Date: 15 October 2012, with additions from ASG phone calls added to GREEN highlighted cells on Feb. 7							GREEN						
with additions of year guess from Abe Fattaey/Cindy Bontrager on Feb25							IN YELLOW						
Project Name	Use / Type	Approx. Footprint GSF	# of Floors	Approx. Total GSF	Map Reference	year (guess)							
<b>PLANNED</b>													
College of Business Administration - New Building	Academic			120,000	W	2017							
General Classroom Building (North of Waters Hall)	Academic			66,000	Q	2024							
College of Veterinary Medicine Master Plan	Academic/Research												
Coles 1				58,500	J	BEYOND 2025							
Teaching & Student Center				18,500									
Coles 2				69,500									
KS VDL				78,000									
Collaborative Lab				27,000									
Equine Center				17,000									
Clinic				12,500									
LARC Addition				15,500									
				296,500									
Cardwell Hall Expansion	Academic	5,400	3	16,200	L	2024							
International Student Center Expansion	Student Life	6,500	2	13,000	S	2024							
Kramer Complex	Student Life				D								
Dining Center Renovation/Expansion or Replacement	(replacement)			78,375		2017							
New Residence Hall(s) First Hall	Student Life (450 beds)			128,275		2017							
New Residence Hall(s) Second Hall	Student Life (425-525 beds)			150,000		BEYOND 2025							
College of Engineering Complex - Phase IV	Academic	20,000	4	80,000	G	2017							
Indoor Rowing Facility	Athletics			10,000	A	2017							
<b>TOTAL GSF - Planned New Construction</b>				<b>601,700</b>									
<b>MASTER PLAN PROPOSED</b>													
K-State Union Additions	Student Life				I	2024							

<i>East</i>		10,000	2	20,000			
<i>Southwest</i>		12,000	3	36,000			
<i>Southeast</i>		11,000	3	33,000			
				89,000			
Seaton Hall Additions	Academic				H	2017	
<i>East Wing</i>		25,000	3	75,000			
				75,000			
North of College of Engineering Complex (Lot A-28)	Academic/Research				F	BEYOND 2025	
<i>South</i>		22,000	4	88,000			
<i>East</i>		28,000	4	112,000			
<i>North</i>		22,000	4	88,000			
				288,000			
Ackert Hall Addition	Academic	19,000	4	76,000	E	2024	
North of Dickens Hall	Academic	25,000	4	100,000	U	2024	
East of Justin Hall	Academic	22,000	3	66,000	V	BEYOND 2025	
Performing Arts - New Building (Lot A-2)	Performing Arts	32,200	2	64,400	X	BEYOND 2025	
North of Performing Arts - New Bldg (Lot A-2)	Academic	12,500	3	37,500		BEYOND 2025	
North of Waters Hall (Lot A-17)	Academic/Research				P	BEYOND 2025	
<i>Bldg 1</i>		15,000	4	60,000			
<i>Bldg 2</i>		9,500	4	38,000			
<i>Bldg 3</i>		22,000	4	88,000			
				186,000			
Northwest of Waters Hall (Lot A-18)	Academic/Research	22,000	4	88,000	P	BEYOND 2025	
Mid-Campus Drive Infill	Academic/Research				K	BEYOND 2025	
<i>Dole Hall Addition</i>		15,000	4	60,000			
<i>North of Umburger Hall - New Bldg</i>		17,000	4	68,000			
				128,000			
SW of Weber Hall Site Infill	Academic/Research	24,000	4	96,000	O	BEYOND 2025	
Parking Garage (East of Weber Hall) <i>1,200 cars at 320 gsf/space</i>	Structured Parking	96,000	4	384,000	R	BEYOND 2025	
North of proposed Parking Garage	Academic/Research	12,500	4	50,000			
North of Weber Hall (Lot B-16/17)	Collaborative Research				N	BEYOND 2025	
<i>Bldg 1</i>		41,000	4	164,000			







## Appendix E

### Existing Equipment Conditions



Leisure Hall – Outdated Equipment and Non-Code Compliant Transformer.



Campus Creek – Undersized Transformer



Umberger Hall – Outdated 4160-volt switches.



Military Science – Service Entrance Panel outdated and not code compliant.





Military Science – Outdated 4160-volt switches.



Leisure Hall – Service Entrance in Common Hallway. Clearance space not code compliant.



Ahern Field House – Outdated 4160-volt switches.



Ahern Field House – Outdated 4160-volt switches.



Ahern Field House – Outdated and Non-Code Compliant Transformer.



Call Hall – Outdated Unit Substation.





Call Hall – Outdated electrical equipment.



Call Hall – Outdated electrical equipment. Clearance space not code compliant.





Eisenhower Hall – Outdated and Non-Code Compliant Transformer.



Eisenhower Hall – Clearance space not code compliant.



English/Counseling Services – Outdated electrical equipment.



Power House - Outdated equipment and Non-Code Compliant Transformer.



Power House - Outdated 4160-volt switches.