Swedish Medical Center
Strategic Energy Management Plan

SEATTLE, WASHINGTON
22 APRIL 2011

FOR THE LIFE OF YOUR BUILDING

Contents

SECTION 1. EXECUTIVE SUMMARY
- 1.1 SEMP Overview
- 1.2 Summary of Actions Performed
- 1.3 Summary of Findings and Recommendations
- 1.4 Conclusion and Next Steps

SECTION 2. ENERGY AUDIT REPORT
- 2.1 Utility Data Analysis
- 2.2 Utility Data Benchmarking

SECTION 3. BUILDING SYSTEM DESCRIPTIONS
- 3.1 Swedish First Hill Campus
- 3.2 Swedish Cherry Hill Campus

SECTION 4. PROPOSED FACILITY IMPROVEMENT MEASURES (FIM)
- 4.1 Summary Table of FIMs
- 4.2 FIM Detail Sheets

APPENDICES
- A. Energy Management Performance
  - *Energy Management Performance Goals*
  - *Settle City Light Resource Conservation Mgmt Plan*
  - *Resource Conservation Management Plan*
  - *Resource Conservation Management Plan Results*
- B. Campus Maps
- C. Building System Descriptions
  - *System Diagrams*
  - *Swedish Cherry Hill Lighting Audit*
  - *Swedish First Hill Lighting Audit*
  - *Swedish Cherry Hill Plumbing Fixture Audit*
  - *Swedish First Hill Plumbing Fixture Audit*

Executive Summary

1.1 STRATEGIC ENERGY MANAGEMENT PLAN (SEMP) OVERVIEW

McKinstry is pleased to present this portion of the Strategic Energy Management Plan for Swedish Medical Center. Swedish Medical Center engaged McKinstry as a part of the City of Seattle's Community Power Works program to assist in the development of Swedish Medical Center's overall SEMP for its First Hill and Cherry Hill campuses located in Seattle, WA. The intent of this strategic energy management plan is to provide Swedish Medical Center a plan over the next 5 years for infrastructure improvements that will help this organization meet its energy goals, while providing the flexibility needed to further economize its healthcare delivery operations. Keeping in mind the critical nature of the medical services provided, facility operations often dictate which energy efficiency plans can move forward. In this complex process, it is a great help to have a document in place to steer the decision making process. Many of the options McKinstry studied as a part of this SEMP were considered not just to provide energy savings but also to provide operational flexibility as the needs of the occupants change.

This section of the SEMP is organized to show Swedish Medical Center a list of facility improvements that they should consider implementing immediately, followed by future phases of work that will allow Swedish Medical Center to continue to operate more efficiently from an energy and facility perspective. The initial list of recommended improvements has solid returns on the required investment, and sets up Swedish Medical Center for making future changes. The follow-on measures are a more infrastructure intensive - The return for these measures based solely on energy use isn't as compelling, but the options are there to help Swedish Medical Center plan for future building programming options. When combined with other, non-energy benefits, many of these secondary measures will have a favorable net present value to Swedish.

1.2 SUMMARY OF ACTIONS PERFORMED

UTILITY HISTORY REVIEW AND BENCHMARKING

In order to establish utility consumption and costs, three years of utility history for the First Hill and Cherry Hill buildings was collected. The utility history is used to identify irregularities in consumption or billing. Each building's energy use index (EUI) and Energy Cost Index (ECI) was benchmarked against other similar hospital buildings in the Puget Sound region. This helps to inform successes and opportunities for improvement. Section 2 of this report provides a detailed summary of the Utility Data Analysis.

Energy Star is also a useful tool for tracking utility consumption. Swedish Medical Center uses this tool to actively measure increases or drops in consumption at each campus. Swedish Medical Center created an Energy Star account as a benchmarking tool for the SEMP created in 2008 and continues to track progress with this site.

CAMPUS AUDITS AND INTERVIEWS

A baseline of the facility was completed through a combination of site visits, interviews with building staff, and a review of available mechanical, electrical and controls drawings. During these visits, information was gathered to determine the installed water, waste, mechanical and electrical system, maintenance practices and operating methods. Any previously completed audits and facility improvement measure lists were reviewed. If these items were still relevant, we incorporated them into this study.

Executive Summary

Table 1.1 McKinstry Primary SEMP Deliverable Team

Contact	Job Title	Role/Responsibility
Tom Kelly	Account Executive	Account Manager
Ron Fues, P.E., LEED A.P.	Program Manager	Project manager
Richard Ma, PhD.	Energy Engineer	Cherry Hill analyst, auditor and report author
Katie Rossmann, P.E., LEED A.P.	Energy Engineer	First Hill analyst, auditor and report author

Multiple subcontractors and consultants with knowledge of energy consuming systems at Swedish were also interviewed. Below is a list of subcontractors assisting with the SEMP.

Table 1.2 McKinstry Primary SEMP Deliverable Team

Subcontractor	Area of Expertise
Building Envelope Solutions	Building Envelope
Hudson Bay Insulation	Mechanical Insulation
Hydrametrics	Plumbing Fixture Conservation
Green Hoods	Lab and Kitchen Hoods

COORDINATION MEETINGS

An important element of implementing conservation measures is measure cost. When viable, Seattle City Light and Seattle Public Utilities will offer rebates or incentives to lower the measure cost. In an effort to identify potential for rebates, an initial meeting occurred between Seattle City Light, McKinstry, and Swedish. For measures that save both Energy and Water, an initial meeting also occurred between Seattle Public Utilities, McKinstry, and Swedish.

For energy saving measures that would require Washington State Department of Health (DOH) approval, a 4 hour working session was conducted with Steve Pennington of DOH. The following FIMs were specifically discussed, in addition to general Department of Health process concerns.

- Plumbing Fixture Upgrades (18.01-SFH Water Conservation and 18.01-SCH Water Conservation)

  The DOH prefers the use of the low-flow sink laminar flow tips. These fixtures are beneficial to infectious disease control since it reduces the splashout frequently seen with the high-flow hand washing sinks. The DOH does not object to retrofitting the flows on water closets, bathroom lavatories or showers.

- Air-side Retrofit FIMs (03.01-SFH Air-side Heat Recovery, 03.03-SFH 2 SW Upgrades, 03.04-SFH 3-6 SW Upgrades, 04.02-SFH DDC Upgrades, 08.02-SFH Variable Speed Drives, 25.01-SFH and 25.01-SCH Commissioning-Retro or Re, 29.01-SFH Main Surgery Upgrade, 29.02-SFH South Bldg Critical Supply and Exhaust Upgrade, 04.01-PPB AHU System Upgrades and DDC Upgrades, 03.01-SCH-03.04-SCH AHU Upgrades)

    - When making revisions to the fans supplying air to critical environments, upgrades to the distribution are not required, as long as changes are only to the supply fan.

- When making revisions to an OR or patient room, the DOH will not re-review the layout, they care more about how things are controlled. If air setback is proposed, DOH will require a clear and reliable written standard procedure for going between occupied and unoccupied air change modes. A specific method was not prescribed in this meeting, but DOH would need to review and approve this written procedure. Turn down is only allowed based upon air changes, not space temperature.
- When duct lining is present in a system, this must be noted with DOH, but may not necessarily require removal.
- When upgrading a fan system serving a sterile space, duct cleaning may be required (Review with DOH required).

MEASURE IDENTIFICATION

Facility Improvement Measures (FIMs) were developed and proposed for the building, along with expected rough order of magnitude payback periods. A table summarizing these FIMs is included in this report. Cost effective measures have been separated out for implementation over a phased period of 5 years.

Table 1.3: Recommended FIMs for 2011

FIM Name	Building	Implementation Year
01.01-CUP Add Stack Economizer for Boilers	Cherry Hill - Central Plant	2011
03.03-SCH Center Building AHU Upgrades	Cherry Hill – Hospital	2011
09.01-SCH Lighting Upgrades	Cherry Hill – Hospital	2011
13.01-SCH Insulation - Pipes and Equipment, and Ducts	Cherry Hill – Hospital	2011
18.01-SCH Water Conservation	Cherry Hill – Hospital	2011
25.01-SCH Retro-Commissioning	Cherry Hill – Hospital	2011
01.02-SFH Steam Traps	First Hill	2011
03.03-SFH 2 SW Upgrades	First Hill	2011
04.01-SFH Controls Hardware Upgrade	First Hill	2011
08.01-SFH East Tower VFD Retrofits	First Hill	2011
09.01-SFH Lighting Upgrades	First Hill	2011
13.02-SFH Insulation - Pipes and Equipment, and Ducts	First Hill	2011
18.01-SFH Water Conservation	First Hill	2011
29.02-SFH South Bldg Critical Supply and Exhaust Upgrade	First Hill	2011

1.3 SUMMARY OF FINDINGS AND RECOMMENDATIONS

Swedish has a track record of implementing energy efficiency measures. In 2008 Swedish created a Strategic Energy Management Plan in order to facilitate changes in their business as it relates to energy consumption and cost. As a metric for tracking this change in the culture of their business, Swedish also had a goal of reaching a target Energy Star score of 75 by 2011. To achieve this goal, the Swedish Medical Center strived to implement various energy efficiency measures as well as active energy management.

Swedish Medical Center increased the hospital square footage by 17% when the new Swedish Orthopedic Institute (SOI) was first opened in 2009. However, energy use only increased by 2% that year because energy conservation efforts were happening concurrently in the older buildings. The extra square footage was therefore essentially free from an energy cost perspective.

Executive Summary

The electricity, natural gas and purchased steam consumptions do show the trends of decrease over the years from 2008 to 2010. By the end of September 2010, the First Hill Campus achieved an Energy Star score of 77, which exceeds the target of 75, and the Cherry Hill Campus had an Energy Star score of 71. In order to achieve the score of 75, a 5% reduction of energy consumption is necessary. If the energy conservation measures with implementation year of 2011 in this study are implemented, the 5% total energy reduction and the Energy Star score of 75 can be achieved.

The First Hill Campus Energy Star score is also slightly misleading. Swedish First Hill is provided with steam energy by district steam. The EPA recently adjusted the source efficiency factor for district steam. Part of the score increase at First Hill is due to this efficiency factor rather than actual facilities savings. First Hill is the only Swedish facility receiving steam from Seattle Steam. Through audits and benchmarking, it has been determined that there are still lucrative opportunities for energy savings at the First Hill Campus.

Where the 2008 SEMP document focused on a paradigm shift towards energy-focused business decisions, this SEMP is designed to assist the hospital administration with decision making in regards to phasing and implementation of cost-effective energy conservation measures. This is a living document to provide Swedish with maximum flexibility. As master planning decisions are made by Swedish Medical Center, certain FIMs should be revisited to ensure projects will meet future load requirements.

McKinstry developed 43 Facility Improvement Measures. As stated above, these FIMs include a consolidated list of measures to be phased over a 5 year period. Rough cost and savings numbers were assigned to FIMS, which were then categorized based on 3 broad payback categories: Positive NPV, Neutral NPV, and Needs Based. Due to the volatile nature of pricing and energy costs, the FIMs are only presented based on their payback expectations. Swedish is continuing to refine an official policy goal, but tentatively they are looking at setting an 18% energy use reduction goal and Energy Star for both campuses in 5 years and a goal of 150 kBTU/SF/yr (site) in 10 years. Meeting these goals is contingent on the 15% IRR limit.

1.4 CONCLUSIONS AND NEXT STEPS

This project represents an excellent opportunity for Swedish to greatly improve its facilities while saving energy. McKinstry looks forward to working with Swedish in making these projects a success. It is McKinstry's intent to continue to work with Swedish to take Phase I projects to guaranteed maximum pricing and savings in an effort to apply for CRIF funding. Before implementation, Phase II-V projects should be taken to guaranteed maximum pricing and savings as a part of future efforts.

The phasing plan over the next 5 years provides a strategy that allows for maximum flexibility. The purpose behind this phasing is to allow Swedish Medical Center to determine which FIMs make the most sense as campus master planning changes. It is recommended that the most cost effective measures are immediately implemented in the buildings that are most likely to remain part of the Swedish portfolio for the longest time.

2.1 UTILITY DATA ANALYSIS

CHERRY HILL CAMPUS UTILITY DATA SUMMARY

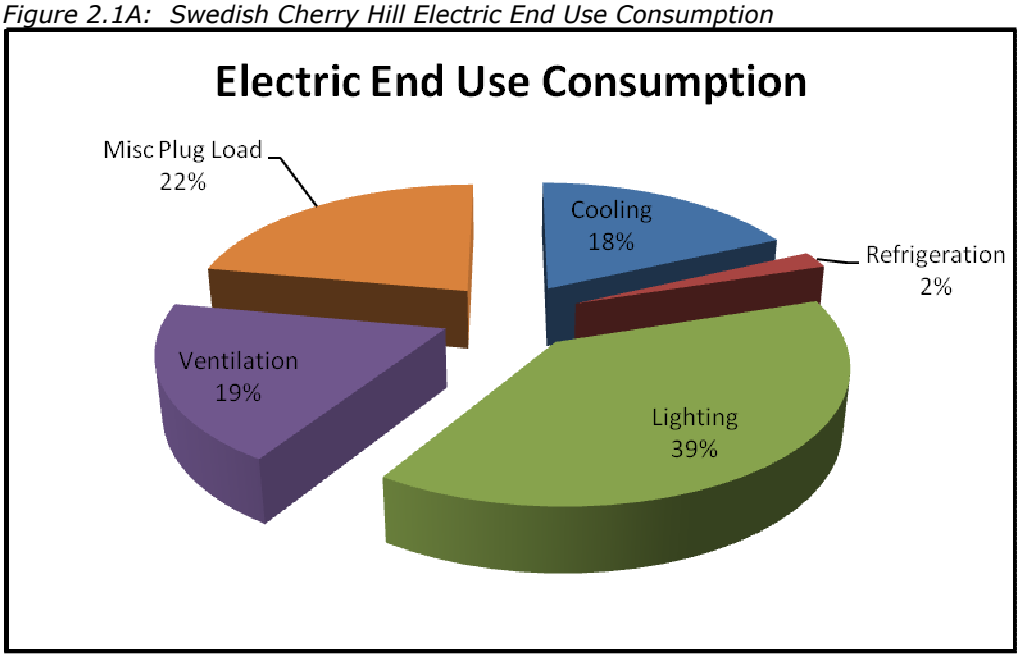
Energy consumption and costs were analyzed over the January 2006 through September 2010 year period. This analysis is based on historic utility data as provided by Seattle City Light (electricity), Puget Sound Energy (natural gas) and Seattle Public Utilities (water and sewer).

The Cherry Hill Campus has an energy use index (EUI) of **236.7 kBtu/sf/year** for the most recent 12-month period. By comparison, typical Seattle or Puget Sound hospital EUI's tend to be in the 150 to 250 kBtu/sf/year. Of this energy consumption, natural gas consumption represents the most at **149 kBtu/sf/year (63%).**

CHERRY HILL CAMPUS UTILITY DATA END USE BREAKOUT

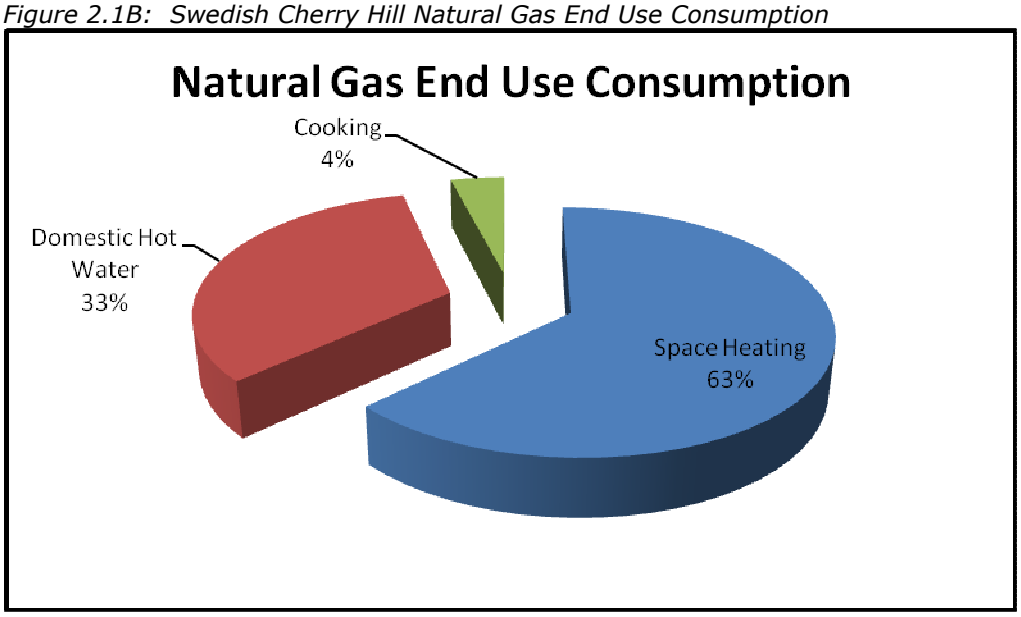
There are three electric meters serving the majority of the hospital and one more dedicated electric meter serving the Professional Building. The summary of electricity use breakouts is below:

Figure 2.1A: Swedish Cherry Hill Electric End Use Consumption



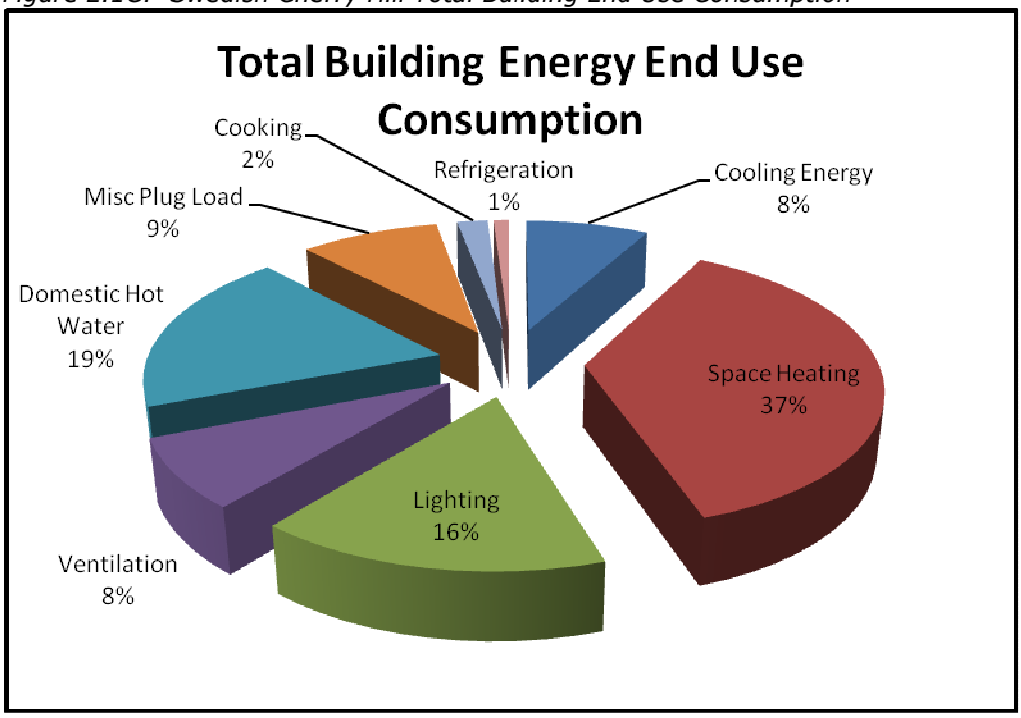
Natural gas is used to generate heating hot water and domestic hot water in the building and for kitchen cooking use. The summary of natural gas use breakouts is below:

Figure 2.1B: Swedish Cherry Hill Natural Gas End Use Consumption



By converting electricity energy (kWh) and natural gas energy (therm) to common unit (kBtu = 3.413 x kWh = 100 x therm), the summary of energy use breakouts is below:

Figure 2.1C: Swedish Cherry Hill Total Building End Use Consumption



Based on the breakouts noted above, energy savings opportunities with the greatest impact would include boiler plant upgrades, lighting upgrades, air handling unit upgrades and control optimization, and chiller plant upgrades.

During the most recent 12-month period (Oct 2009 – Sep 2010), the majority of utility cost was electric consumption at **$848,632** or **44%** of all utility costs. Natural gas costs followed as the number two utility cost at **$758,451 or 39%** of total costs. Water and sewer costs were at **$335,704** or **17%**.

Swedish Medical Center
Cherry Hill Campus

Table 2.2A Swedish Cherry Hill One-Year Utility Data Summary

Facility:	Swedish Cherry Hill	**Electric Provider:**	Seattle City Light	**Notes:**	No electric demand charges by the utility
Address:	500 17th Ave, Seattle, WA	**Gas Provider:**	Puget Sound Energy		
Floor Area:	585,530	**Water Provider:**	Seattle Public Utilities		

Month	Electricity				Natural Gas		Steam		Water & Wastewater		Total
	Metered Demand kW	Billed Demand kW	Usage (kWh)	Total Charges ($)	Usage (Therms)	Total Charges ($)	Usage (kBtu)	Total Charges ($)	Usage (kGal)	Total Charges ($)	Utility Charges ($)
Oct-09	-	-	1,413,057	$ 69,549	74,313	$ 76,102	-	-	3,258	$ 25,682	$ 171,333
Nov-09	-	-	1,178,603	$ 58,869	82,336	$ 66,061	-	-	2,775	$ 22,351	$ 147,282
Dec-09	-	-	1,236,891	$ 61,112	98,955	$ 87,651	-	-	2,777	$ 22,581	$ 171,344
Jan-10	-	-	1,285,897	$ 68,162	83,884	$ 74,749	-	-	2,870	$ 23,831	$ 166,743
Feb-10	-	-	1,274,615	$ 71,575	73,881	$ 67,215	-	-	2,857	$ 23,686	$ 162,477
Mar-10	-	-	921,258	$ 63,430	84,906	$ 75,603	-	-	3,066	$ 25,204	$ 164,237
Apr-10	-	-	1,176,613	$ 66,770	76,056	$ 66,133	-	-	2,856	$ 23,540	$ 156,443
May-10	-	-	1,236,563	$ 72,259	70,308	$ 57,786	-	-	3,303	$ 28,291	$ 158,336
Jun-10	-	-	1,170,094	$ 68,924	58,966	$ 51,106	-	-	3,750	$ 32,463	$ 152,492
Jul-10	-	-	1,486,076	$ 87,143	54,964	$ 44,910	-	-	3,918	$ 33,540	$ 165,593
Aug-10	-	-	1,439,309	$ 84,889	55,930	$ 44,910	-	-	5,167	$ 46,234	$ 176,033
Sep-10	-	-	1,289,632	$ 75,948	55,877	$ 46,225	-	-	3,404	$ 28,301	$ 150,474
Totals	**0**	**0**	**15,108,608**	**$ 848,632**	**870,376**	**$ 758,451**	**0**	**$ -**	**40,000**	**$ 335,704**	**$ 1,942,787**

Utility Indices *

Electric			Natural Gas	Steam	Water	EUI **	ECI
W/ft²/Yr	**kBTU/ft²/Yr**	**Avg LF**	**kBTU/ft²/Yr**	**kBTU/ft²/Yr**	**Gal/ft²/Yr**	**kBTU/ft²/Yr**	**$/ft²/Yr**
N/A	**88.0**	**N/A**	**148.65**	**N/A**	**68.3**	**236.7**	**$2.74**

Notes:

* EUI and ECI do not include water utility information

** Conversions used to calculate EUI include: Electric (kWh * 3412 = BTU), Natural Gas (Therms * 100,000 = BTU)

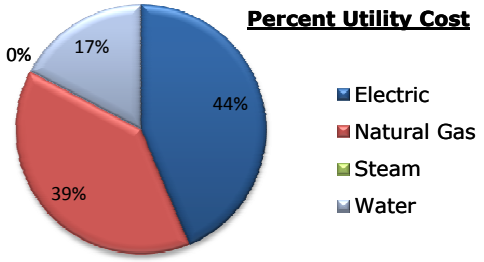


Figure 2.2B Swedish Cherry Hill One-Year Electricity Usage and Demand Summary

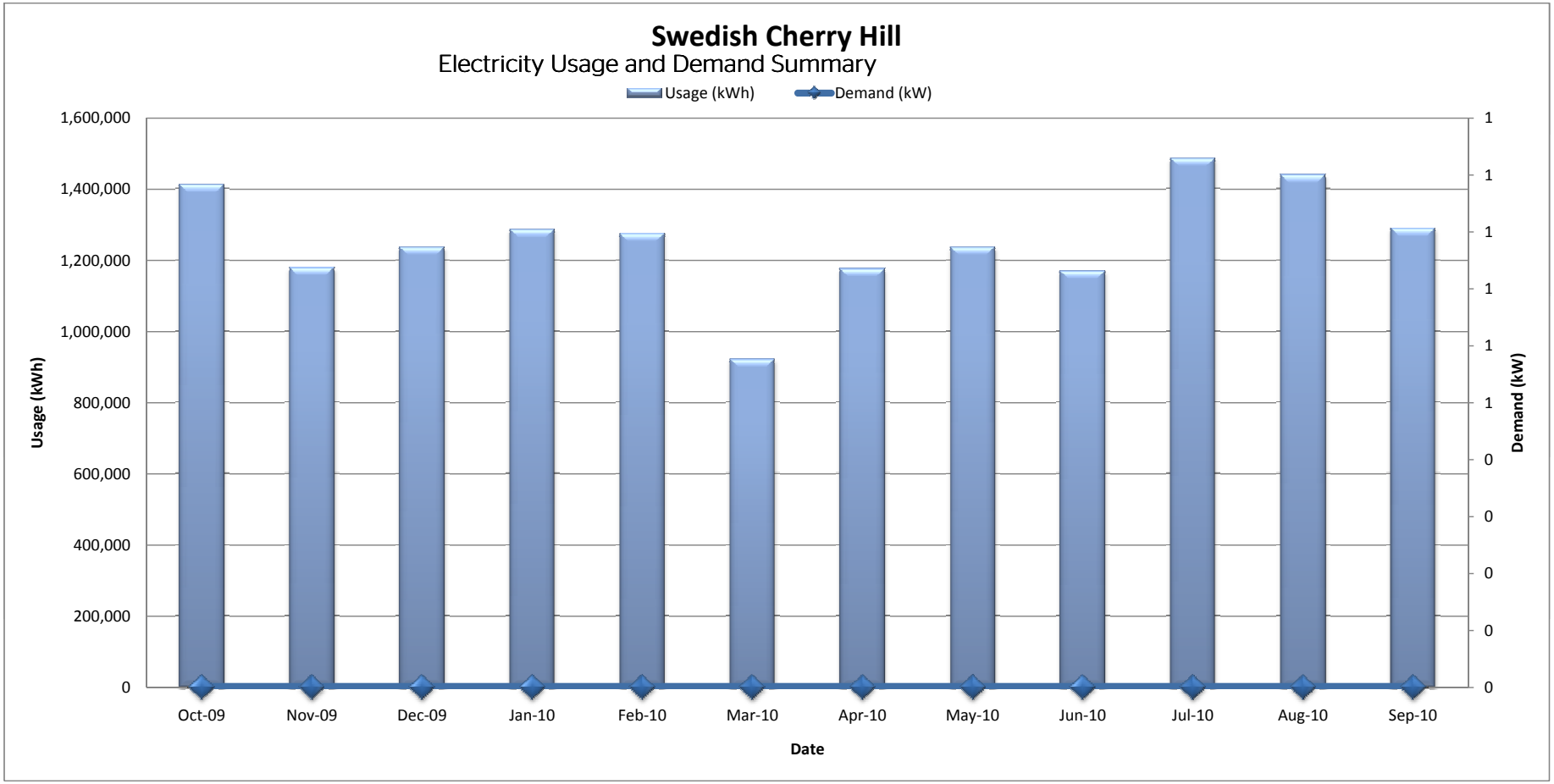


Figure 2.2C Swedish Cherry Hill One-Year Natural Gas Consumption Summary

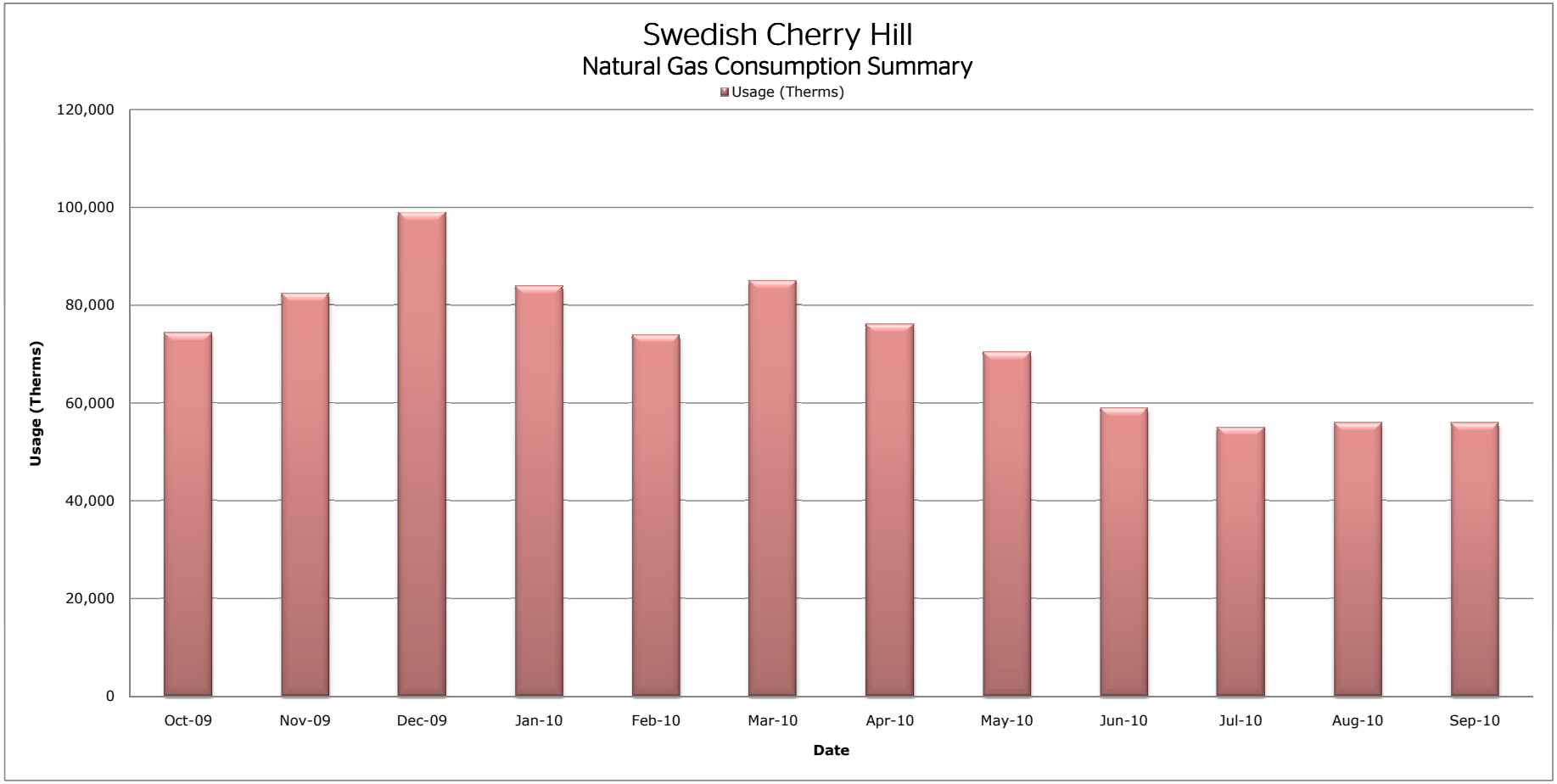


Figure 2.2D Swedish Cherry Hill One-Year Water and Wastewater Consumption Summary

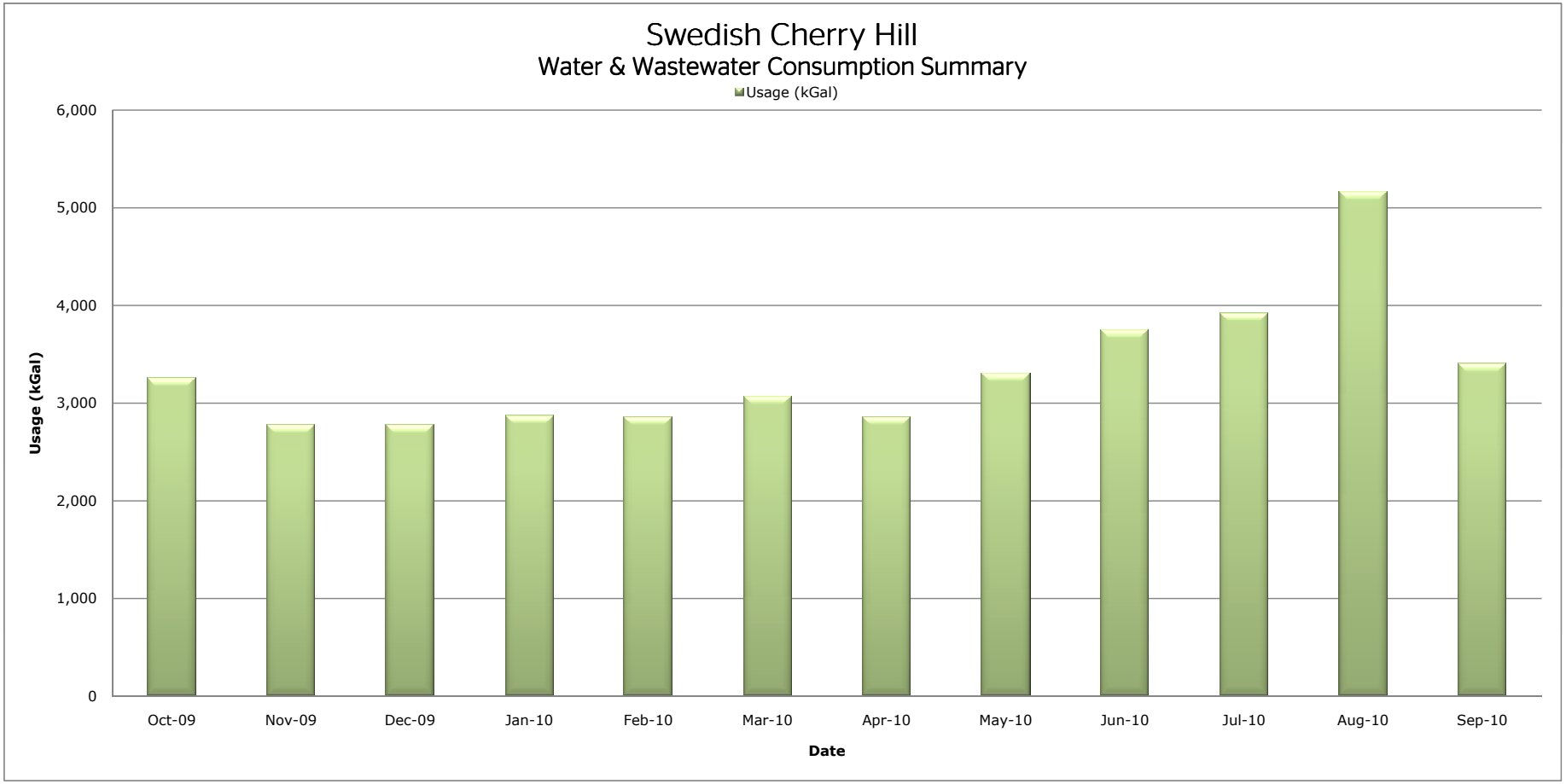
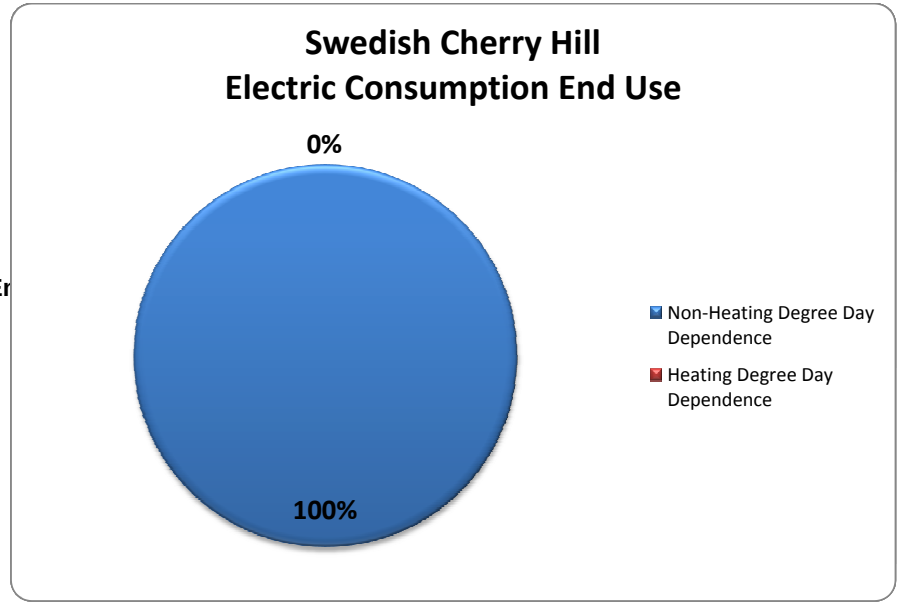
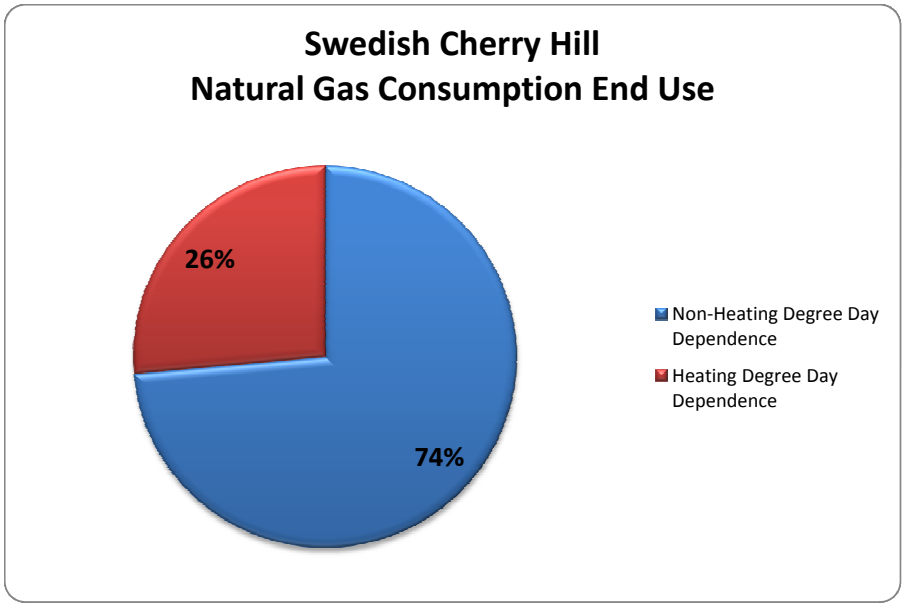
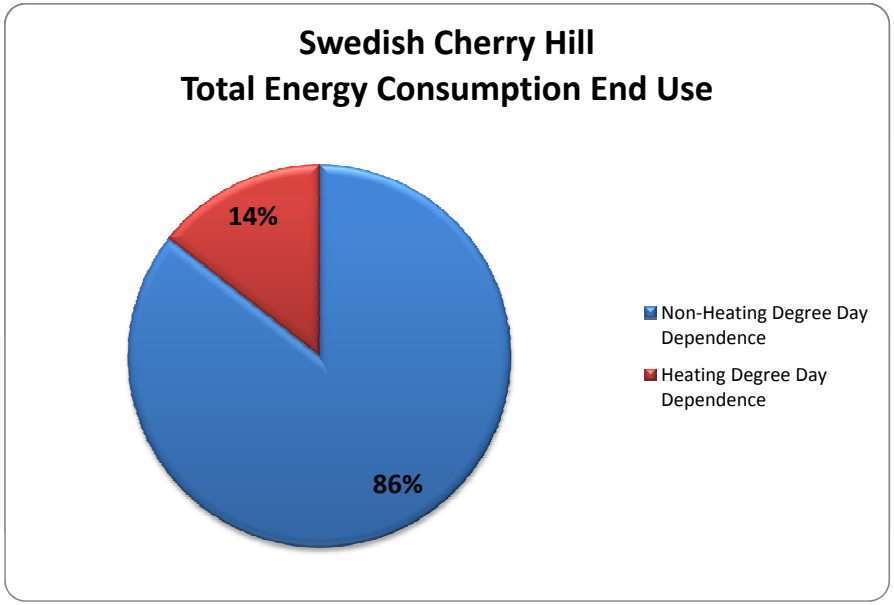


Figure 2.2E Swedish Cherry Hill One-Year Weather Dependence







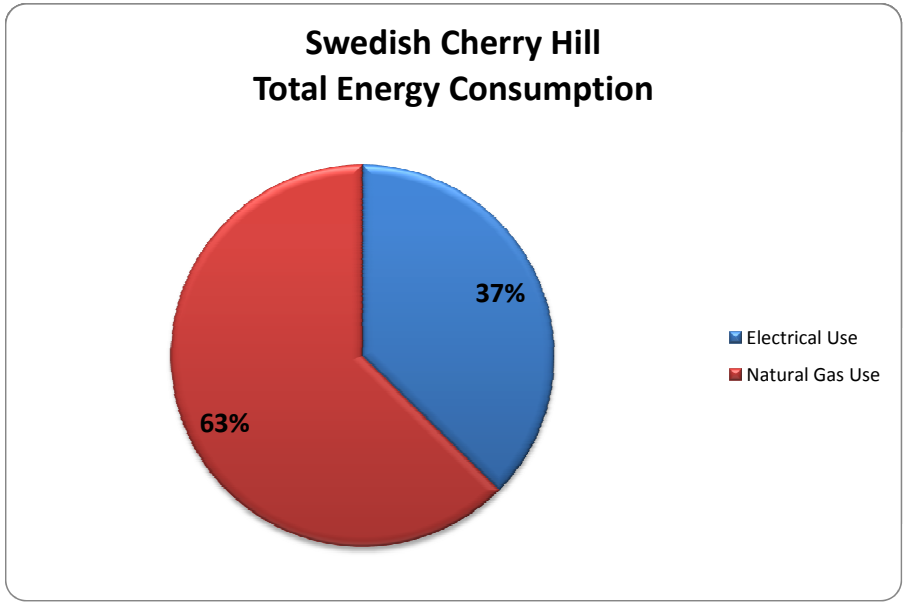
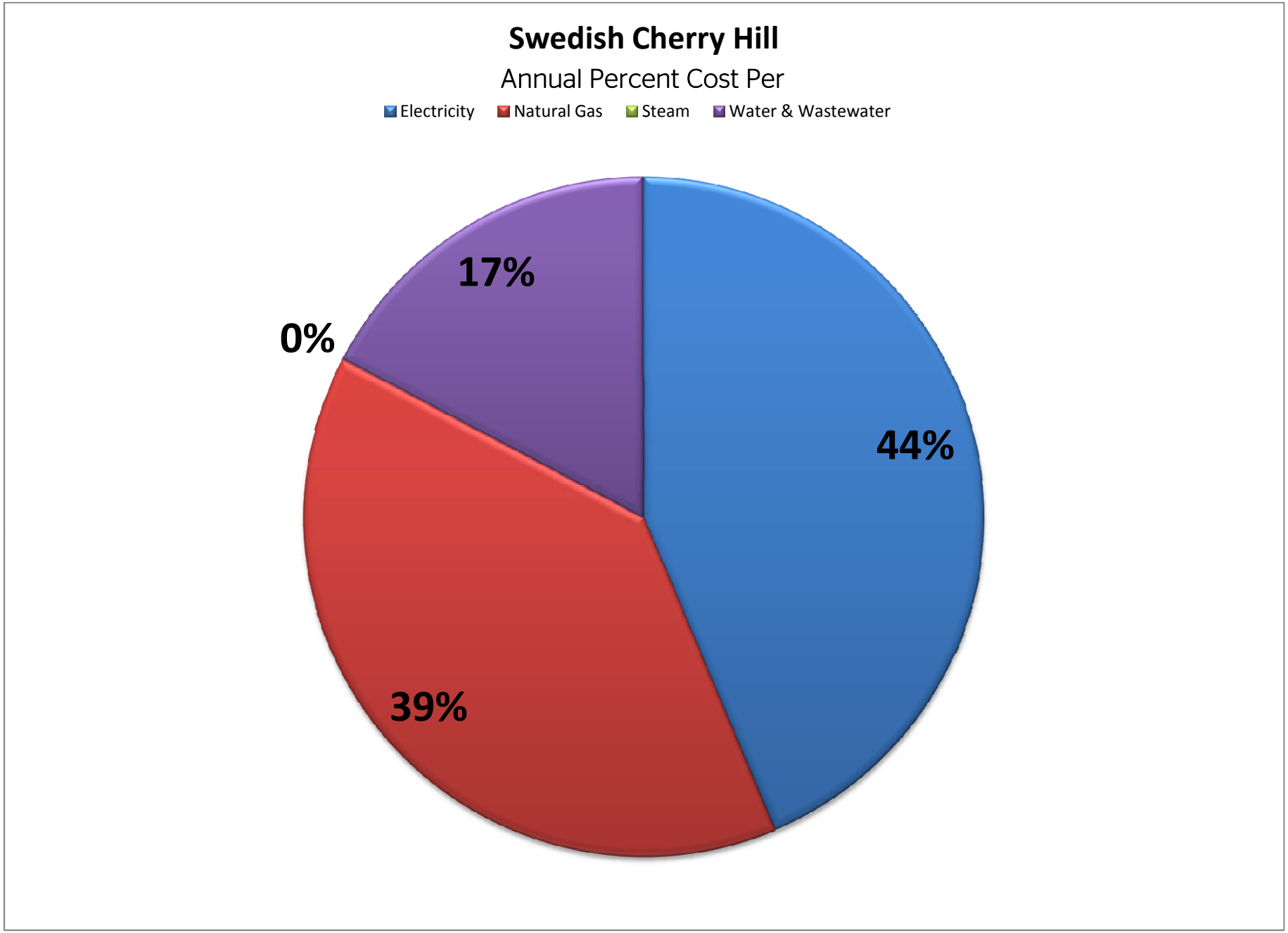


Figure 2.2F Seattle Cherry Hill: Annual Cost per Commodity



Energy Audit Report

CHERRY HILL CAMPUS CONSUMPTION VARIANCE

Swedish Cherry Hill Electricity Consumption

When looking at four year periods (2006 - 2010), the electricity consumption trend is decreasing except year 2006 to 2008 when the electricity usage was increasing (see graph). This is in accordance with the implementation of 2008 SEMP and other energy conservation projects.

Figure 2.3A Swedish Cherry Hill Electricity Consumption Variance from 2006-2007

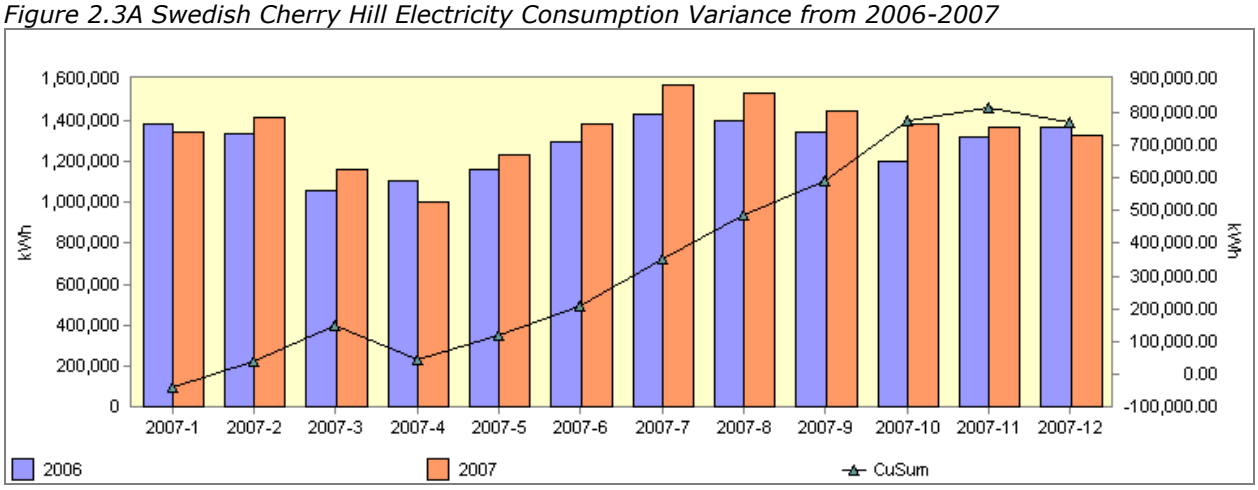
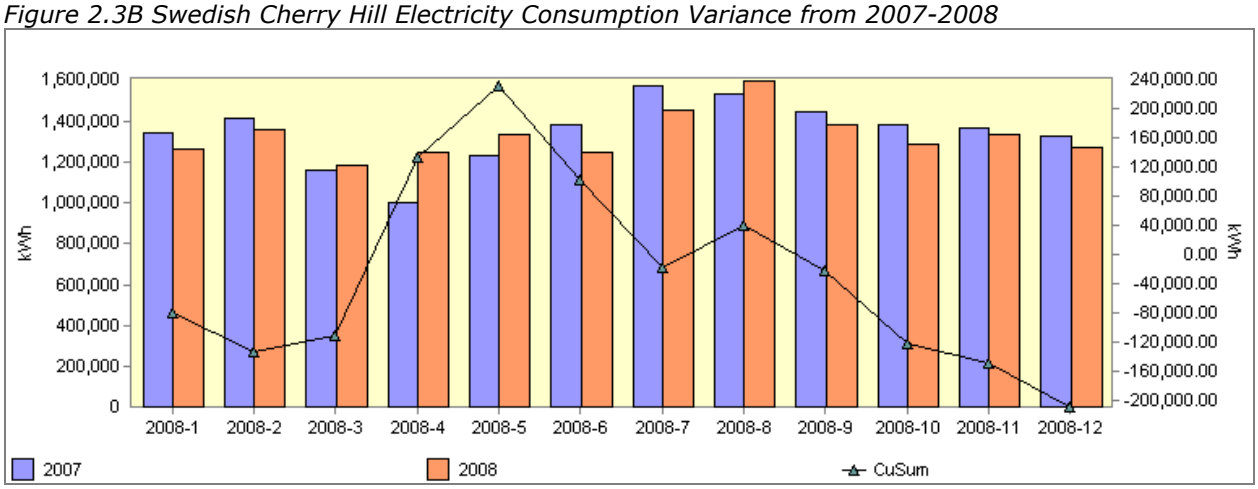


Figure 2.3B Swedish Cherry Hill Electricity Consumption Variance from 2007-2008



Swedish Cherry Hill Electricity Consumption (Cont'd)

Figure 2.3C Swedish Cherry Hill Electricity Consumption Variance from 2008-2009

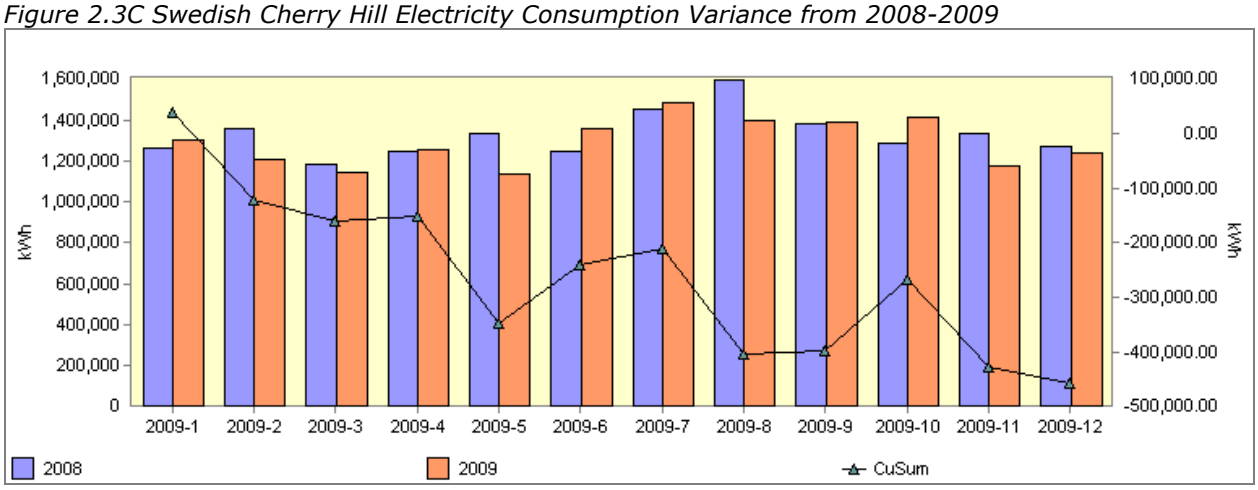
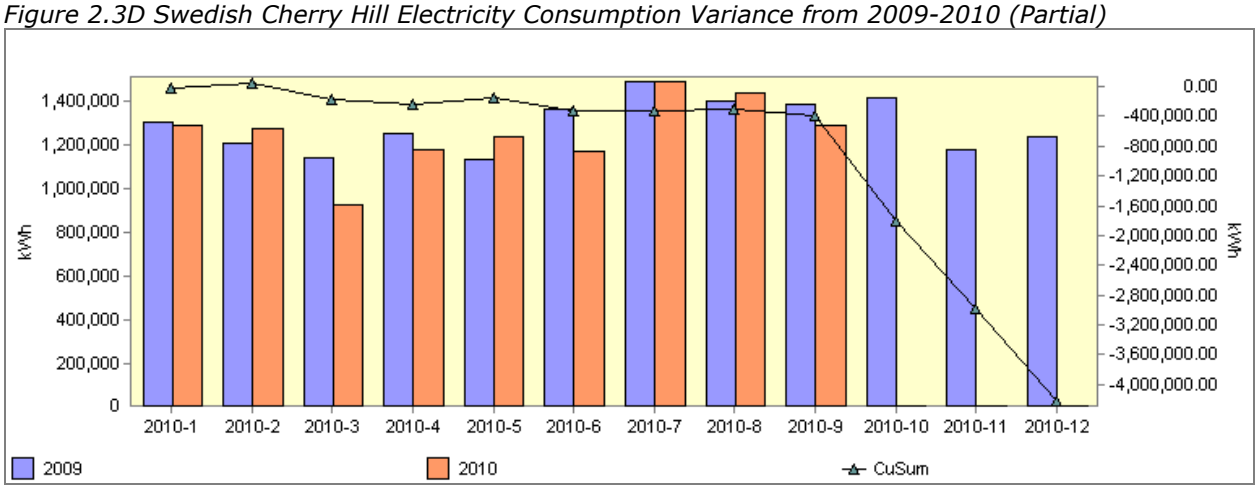


Figure 2.3D Swedish Cherry Hill Electricity Consumption Variance from 2009-2010 (Partial)



Swedish Cherry Hill Natural Gas Consumption

During the four year periods (2006 - 2010), the natural gas consumption trend is decreasing except year 2006 to 2007 when the gas usage was increasing (see graph).

Figure 2.4A Swedish Cherry Hill Natural Gas Consumption Variance from 2006-2007

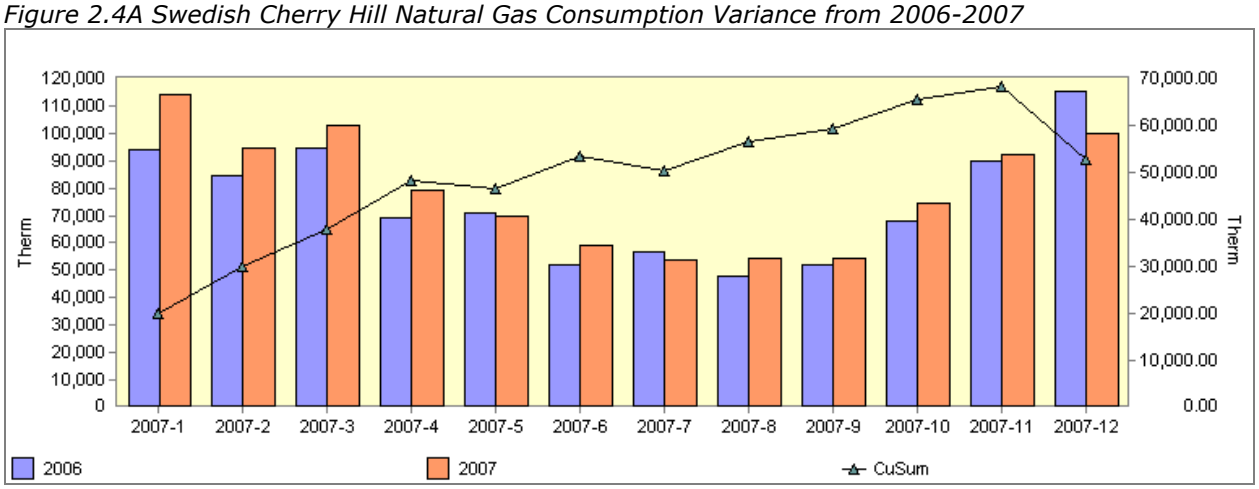
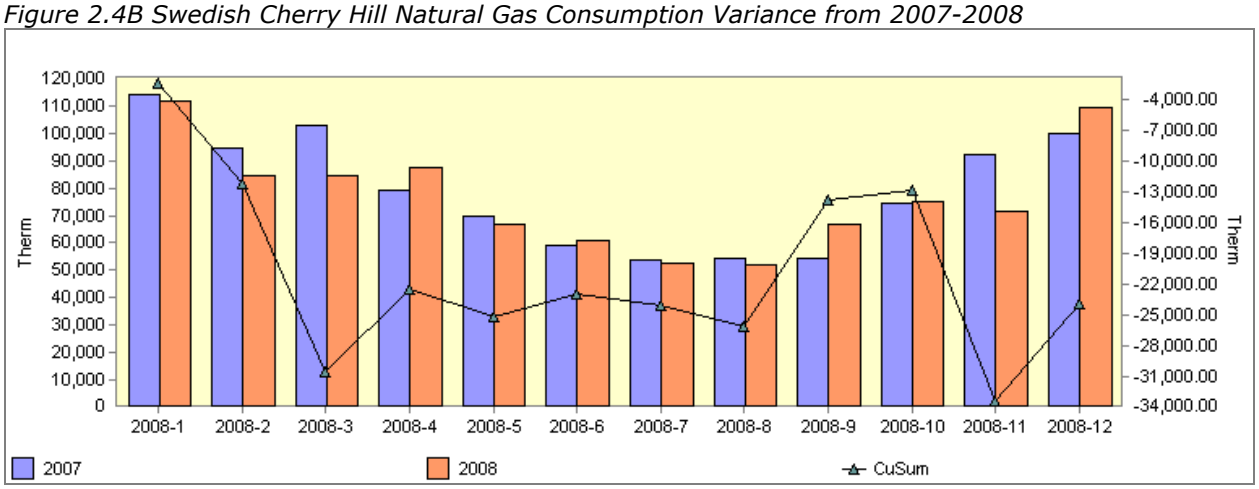


Figure 2.4B Swedish Cherry Hill Natural Gas Consumption Variance from 2007-2008



Swedish Cherry Hill Natural Gas Consumption (Cont'd)

Figure 2.4C Swedish Cherry Hill Natural Gas Consumption Variance from 2008-2009

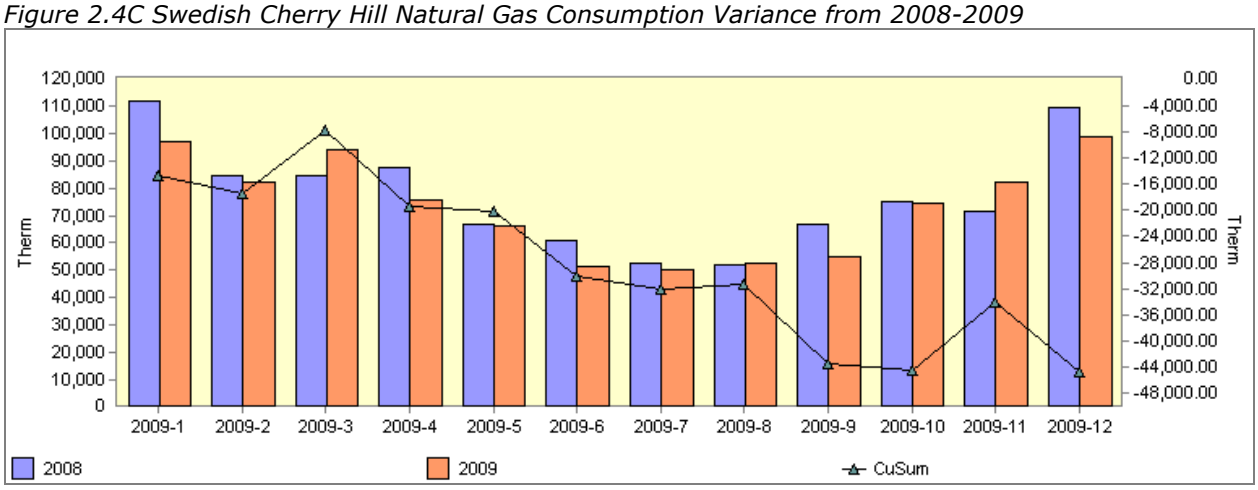
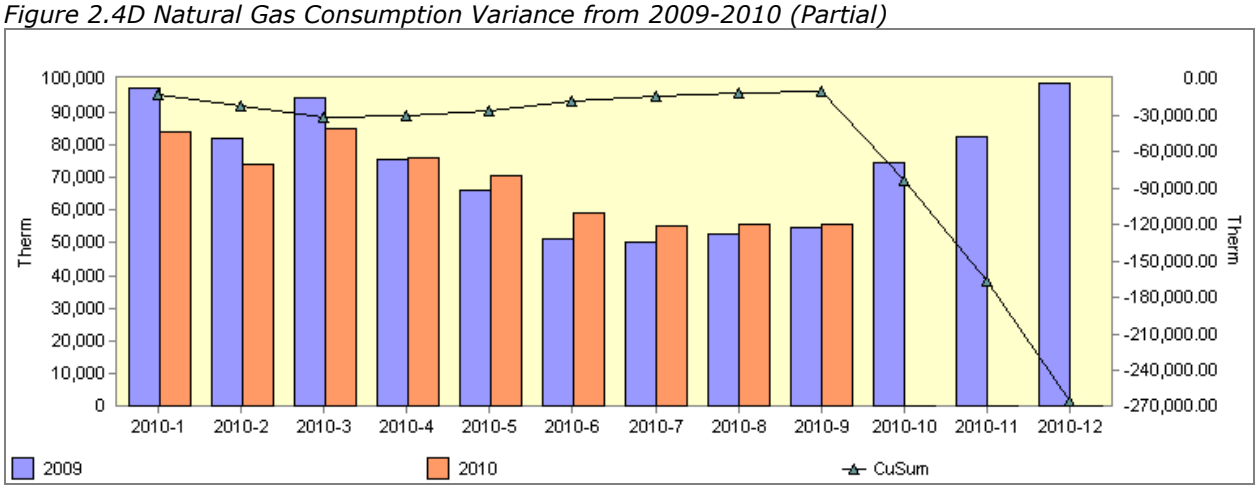


Figure 2.4D Natural Gas Consumption Variance from 2009-2010 (Partial)



Energy Audit Report

Swedish Cherry Hill Potable Water Consumption

Figure 2.5A Swedish Cherry Hill Potable Water Consumption Variance from 2006-2007

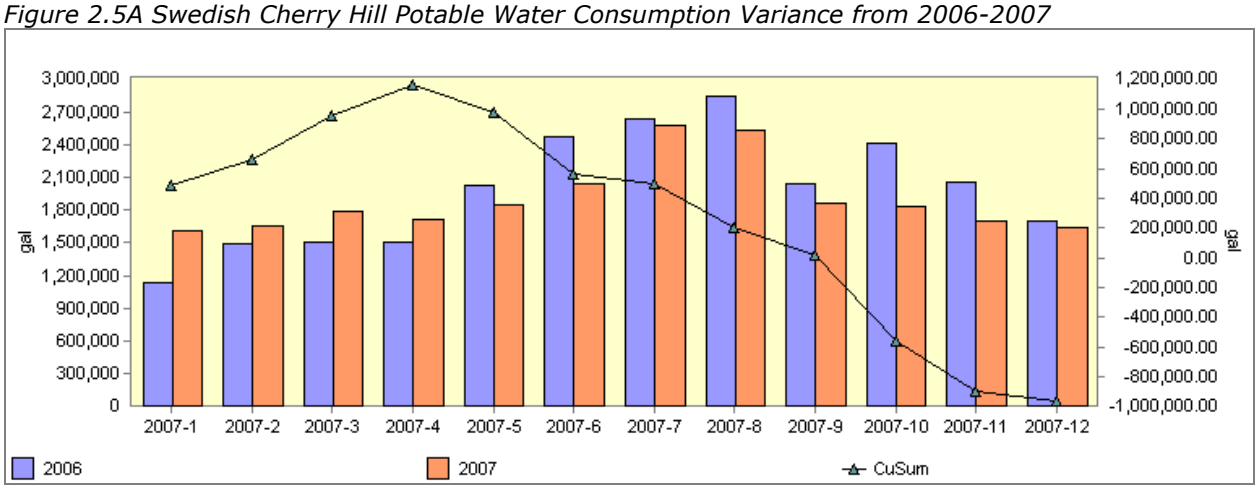
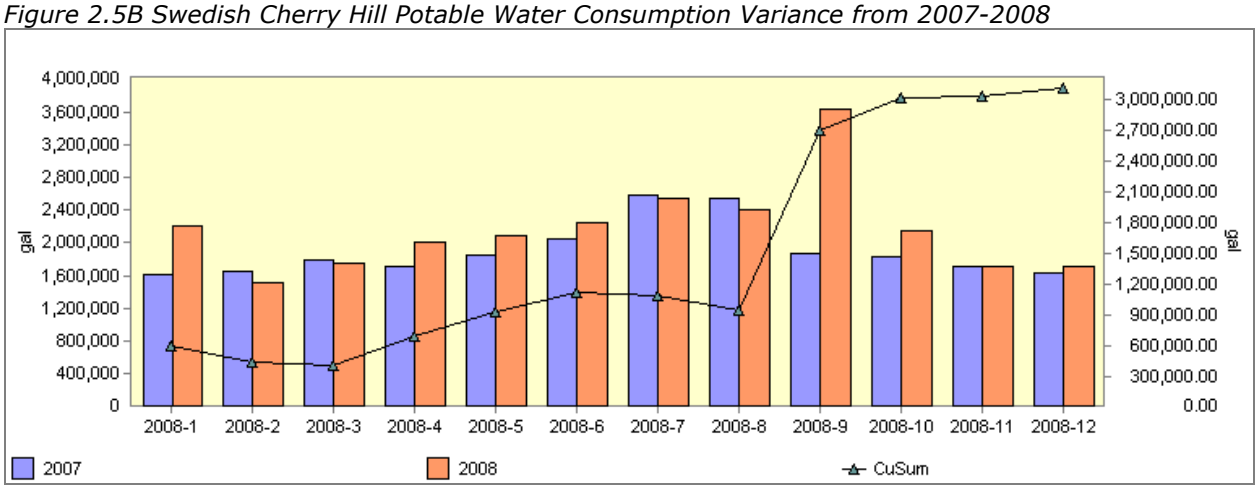


Figure 2.5B Swedish Cherry Hill Potable Water Consumption Variance from 2007-2008



Swedish Cherry Hill Potable Water Consumption (cont'd)

Figure 2.5C Swedish Cherry Hill Potable Water Consumption Variance from 2008-2009

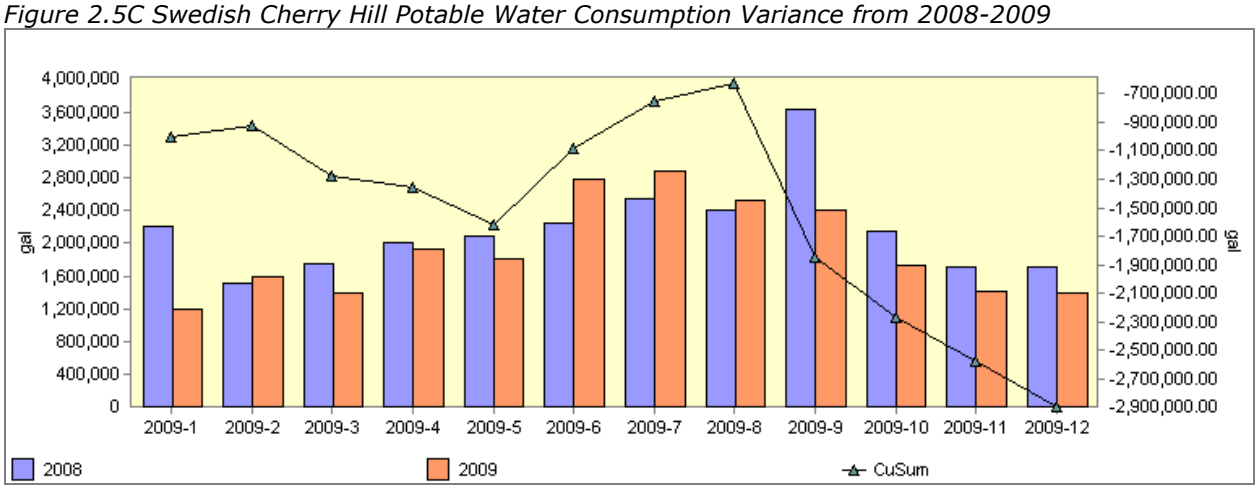
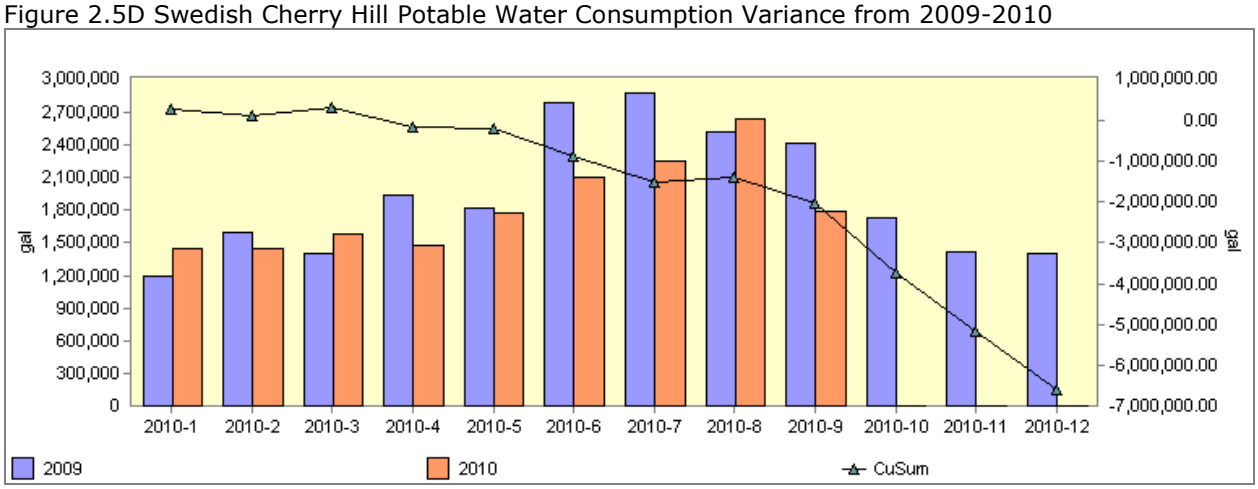


Figure 2.5D Swedish Cherry Hill Potable Water Consumption Variance from 2009-2010



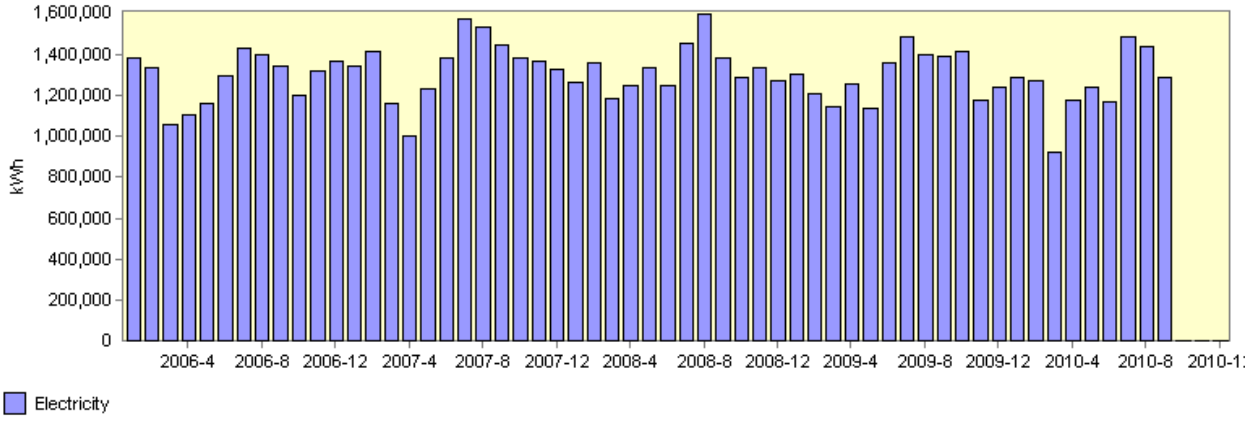
Energy Audit Report

CHERRY HILL CAMPUS UTILITY CONSUMPTION HISTORY

Swedish Cherry Hill Electricity Consumption

The electrical consumption shows a rise in the summer months due to higher cooling loads.

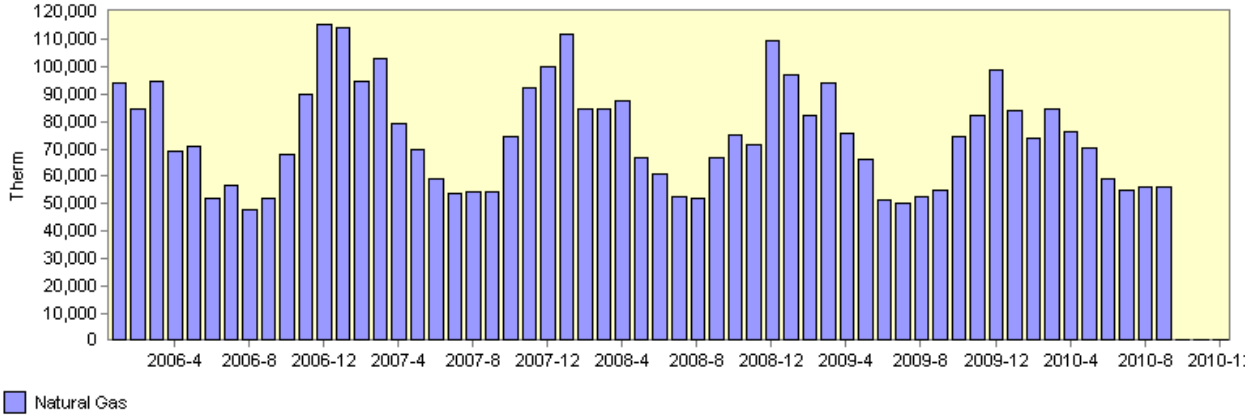
Figure 2.6A Swedish Cherry Hill Electricity Consumption (2006-2010)



Swedish Cherry Hill Natural Gas Consumption

The natural gas consumption shows a reduction in the summer months due to lower heating loads, but the summer gas consumption is high, which means there were some reheat at terminal boxes.

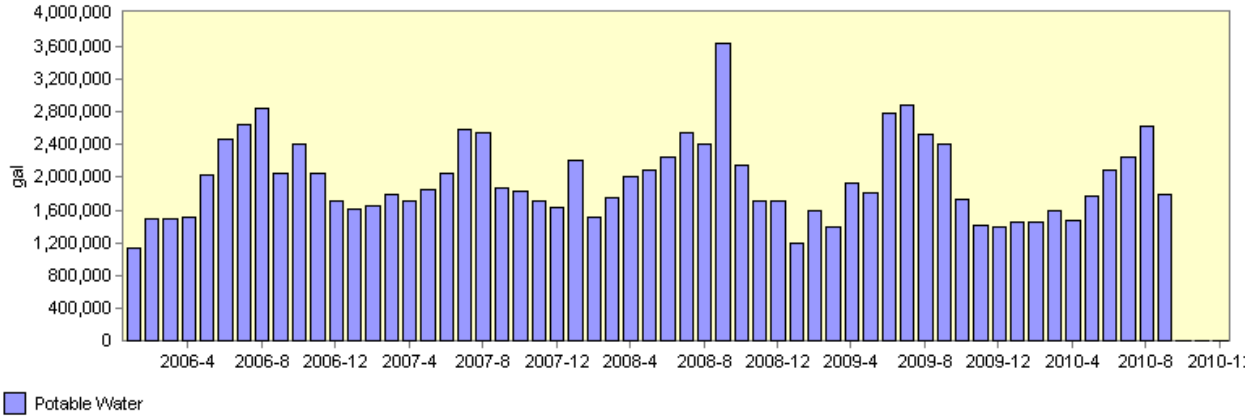
Figure 2.6B Swedish Cherry Hill Natural Gas Consumption (2006-2010)



Swedish Cherry Hill Potable Water Consumption

Water consumption is comprised of mainly domestic water uses, however, water consumption is consistently highest in the summer months due to irrigation and cooling tower water evaporation and drift.

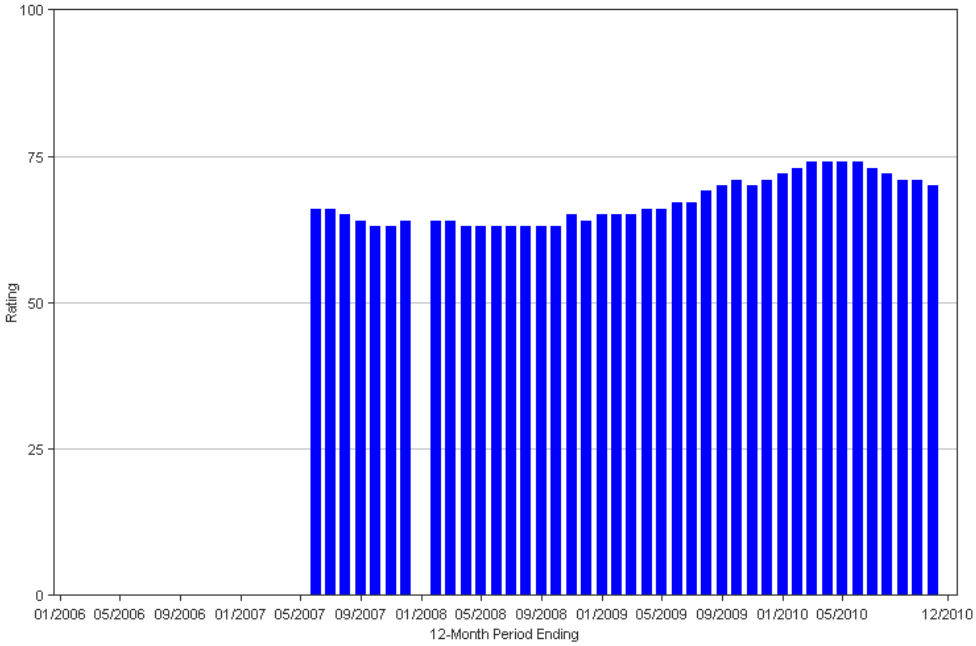
Figure 2.6C Swedish Cherry Hill Potable Water Consumption (2006-2010)



Swedish Cherry Hill Energy Star Scoring

As described in the 2008 SEMP issued by Swedish Medical Center, an Energy Star account was set up to actively track energy consumption. Jeff Grinzel made considerable efforts to perform quality control on the data entered into Portfolio Manager. With this exercise, there were some discrepencies with square footage and metering that were corrected. As illustrated in the graph below, the Cherry Hill Campus is close to the Energy Star score of 75.

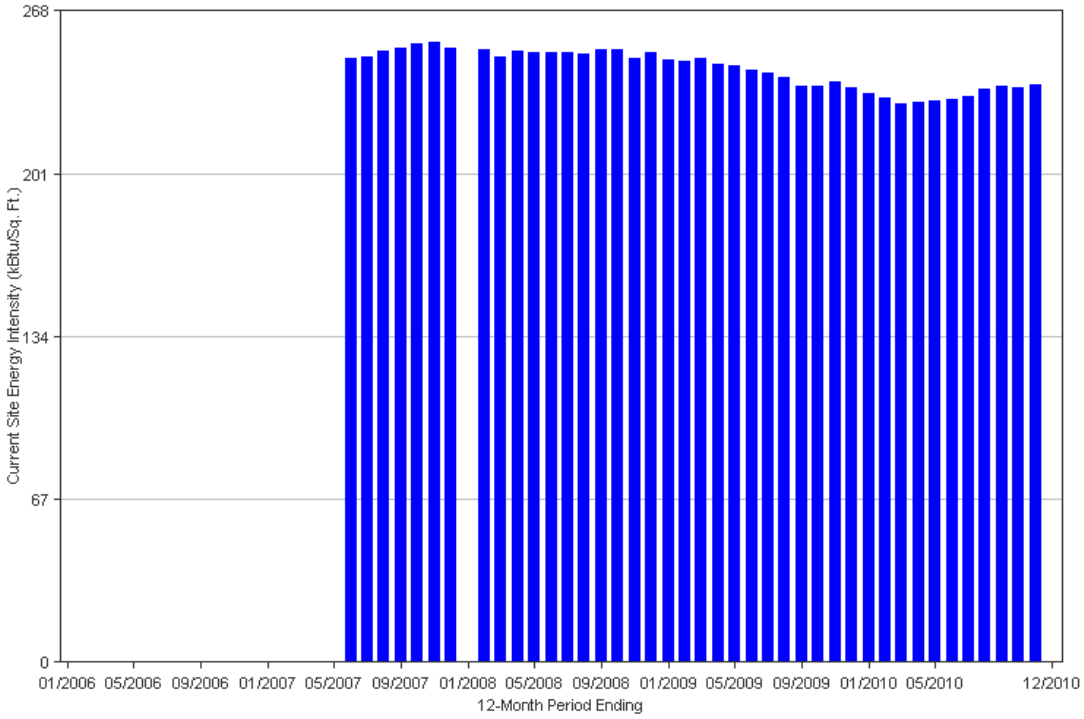
Figure 2.6D Swedish Cherry Hill Monthly Energy Star Score (2007-present)



Swedish Cherry Hill EUI Trending

Below is a monthly EUI for the Cherry Hill Campus. This is an output from Portfolio Manager, which also illustrates the corrections made to the campus square footage in addition to the downward trend of energy consumption.

Figure 2.6E Swedish Cherry Hill Monthly EUI (kbtu/SF) (2007-present)



Energy Audit Report

SWEDISH MEDICAL CENTER-FIRST HILL CAMPUS

FIRST HILL CAMPUS UTILITY DATA SUMMARY

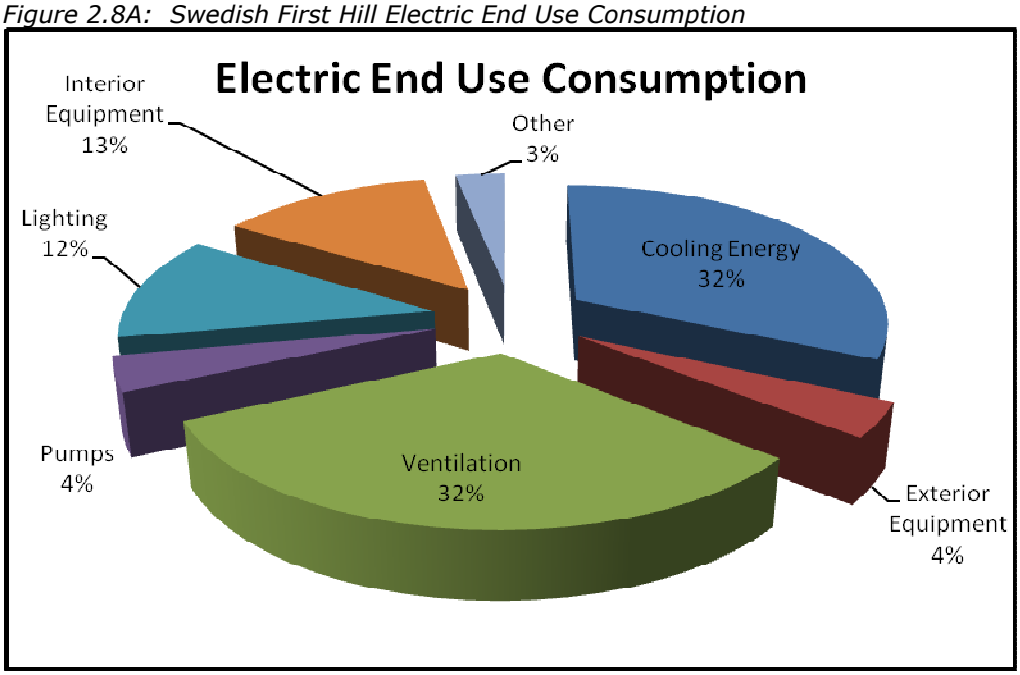
Energy consumption and costs were analyzed over the January 2006 through September 2010 year period. This analysis is based on historic utility data as provided by Seattle City Light (electricity), Puget Sound Energy (natural gas), Seattle Steam (district steam) and Seattle Public Utilities (water and sewer).

The First Hill Campus has an energy use index (EUI) of **167 kBtu/sf/year** for the most recent 12-month period. By comparison, typical Seattle or Puget Sound hospital EUI's tend to be in the 150 to 250 kBtu/sf/year. However, the energy cost indice (ECI) for First Hill is **$3.52** per sf/year, compared to similar hospitals with an ECI between $2.00-$2.50 per sf/year. This is due to the higher cost per Btu of steam than that of natural gas. For example, the heating energy available for 125 psig saturated steam can be derived from steam enthalpy (1193 Btu/lb) and atmospheric condensate enthalpy (181 Btu/lb), resulting in is 1012 Btu/lb steam of heat available. Considering the steam rate at First Hill is about $26/klb steam, the cost per kBtu for steam is $0.0257/kBtu. For reference, at Cherry Hill, assuming the boiler efficiency of 78% and the gas rate of $0.8 per them, the cost per kBtu for gas is $0.0103/kBtu. This is less than half the cost than that of purchased steam at First Hill. With the high cost of the steam resource, reducing the steam consumption is high priority for Swedish First Hill.

FIRST HILL CAMPUS UTILITY DATA END USE BREAKOUT

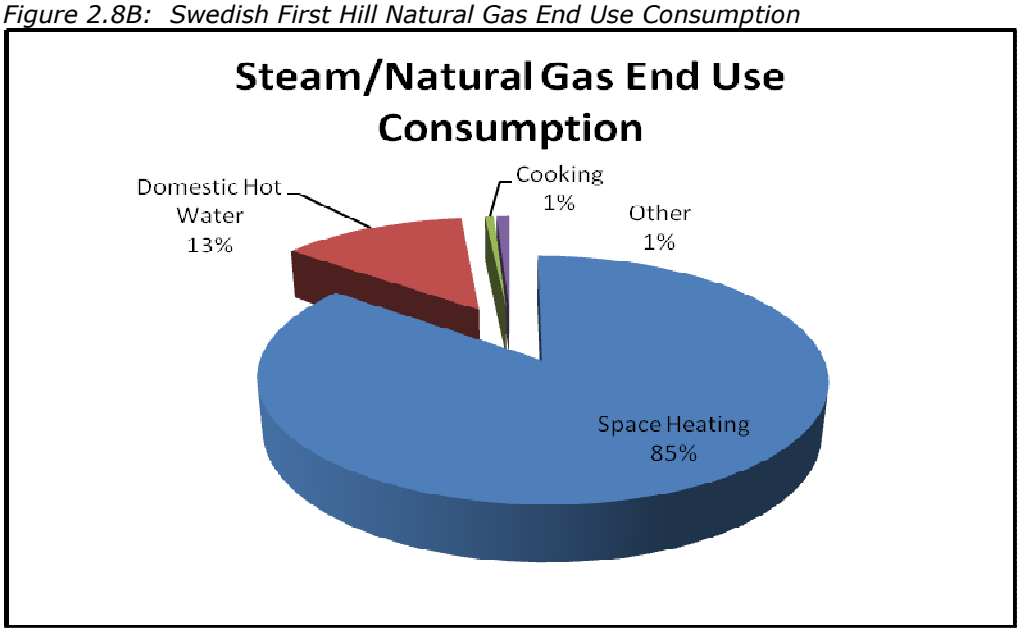
There are four electric meters serving the First Hill Campus. The summary of electricity use breakouts is below:

Figure 2.8A: Swedish First Hill Electric End Use Consumption



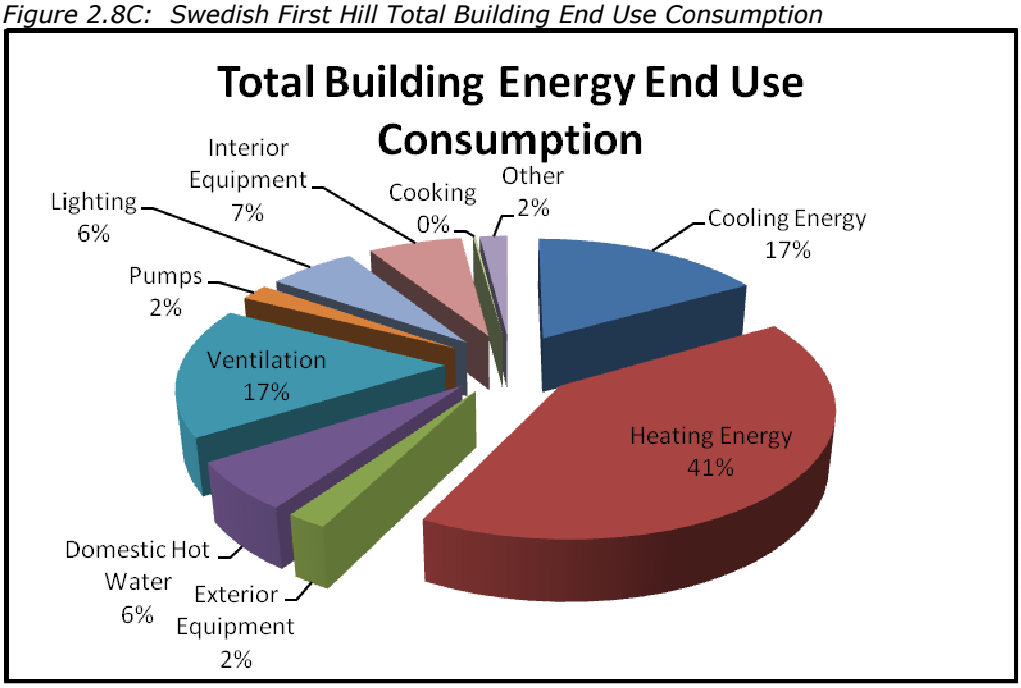
Natural gas is used mainly to serve the kitchen and cooking areas, while district steam generates heating hot water and domestic hot water in the building. The summary of the natural gas and steam use breakouts is below:

Figure 2.8B: Swedish First Hill Natural Gas End Use Consumption



By converting electricity energy (kWh), natural gas energy (therm), and steam energy (klbs) to common unit (kBtu), the summary of energy use breakouts is below:

Figure 2.8C: Swedish First Hill Total Building End Use Consumption



Based on the breakouts noted above, energy savings opportunities with the greatest impact would include steam plant optimization, air handling unit upgrades, control optimization, and chiller plant upgrades.

During the most recent 12-month period (Oct 2009 – Sep 2010), the majority of utility cost was steam consumption at **$3,395,030** or **51%** of all utility costs. Electricity costs followed as the number two utility cost at **$2,354,881 or 35%** of total costs. Water and sewer costs were at **$898,007** or **13%,** and the natural gas costs were **$8,901** or less than **1%** of the utility costs.

Swedish Medical Center
First Hill Campus

Table 2.7A Swedish First Hill One-Year Utility Data Summary

Facility:	Swedish First Hill	**Electric Provider:**	Seattle City Light	**Steam Provider:**	Seattle Steam
Address:	747 Broadway, Seattle, WA	**Gas Provider:**	Puget Sound Energy	**Notes:**	No electric demand charges by the utility.
Floor Area:	1,635,376	**Water Provider:**	Seattle Public Utilities		

Month	Electricity				Natural Gas		Steam		Water & Wastewater		Total
	Metered Demand kW	Billed Demand kW	Usage (kWh)	Total Charges ($)	Usage (Therms)	Total Charges ($)	Usage (kBtu)	Total Charges ($)	Usage (kGal)	Total Charges ($)	Utility Charges ($)
Oct-09	-	-	3,733,576	$ 186,165	649	$ 694	10,468,000	$ 268,293	7,599	$ 59,166	$ 514,318
Nov-09	-	-	3,333,425	$ 168,334	760	$ 807	12,020,000	$ 309,191	6,685	$ 51,828	$ 530,159
Dec-09	-	-	3,392,925	$ 170,091	673	$ 718	15,258,000	$ 404,951	8,671	$ 66,549	$ 642,309
Jan-10	-	-	3,635,028	$ 195,237	679	$ 725	11,422,000	$ 298,983	8,229	$ 67,171	$ 562,116
Feb-10	-	-	3,341,484	$ 190,339	694	$ 740	10,979,000	$ 287,475	8,621	$ 70,187	$ 548,741
Mar-10	-	-	3,415,998	$ 194,715	651	$ 696	12,818,000	$ 335,248	7,868	$ 64,142	$ 594,801
Apr-10	-	-	3,226,410	$ 184,778	604	$ 656	11,150,000	$ 291,917	8,868	$ 71,463	$ 548,814
May-10	-	-	3,045,873	$ 179,848	776	$ 844	9,474,000	$ 249,182	9,205	$ 78,321	$ 508,194
Jun-10	-	-	3,332,528	$ 197,790	649	$ 722	10,562,000	$ 277,538	11,205	$ 96,993	$ 573,043
Jul-10	-	-	4,056,288	$ 240,112	668	$ 742	8,455,000	$ 222,624	10,657	$ 90,490	$ 553,968
Aug-10	-	-	3,670,503	$ 223,408	708	$ 798	8,587,000	$ 226,065	11,941	$ 101,988	$ 552,259
Sep-10	-	-	3,597,351	$ 224,065	681	$ 759	8,491,000	$ 223,563	10,766	$ 79,711	$ 528,098
Totals	**0**	**0**	**41,781,389**	**$ 2,354,881**	**8,192**	**$ 8,901**	**129,684,000**	**$ 3,395,030**	**110,315**	**$ 898,007**	**$ 6,656,820**

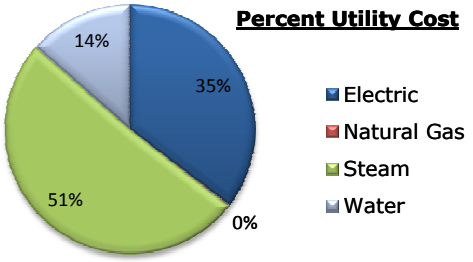
Utility Indices *

Electric			Natural Gas	Steam	Water	EUI **	ECI
W/ft²/Yr	kBTU/ft²/Yr	Avg LF	kBTU/ft²/Yr	kBTU/ft²/Yr	Gal/ft²/Yr	kBTU/ft²/Yr	$/ft²/Yr
N/A	**87.2**	**N/A**	**0.50**	**79.30**	**67.5**	**167.0**	**$3.52**

Notes:

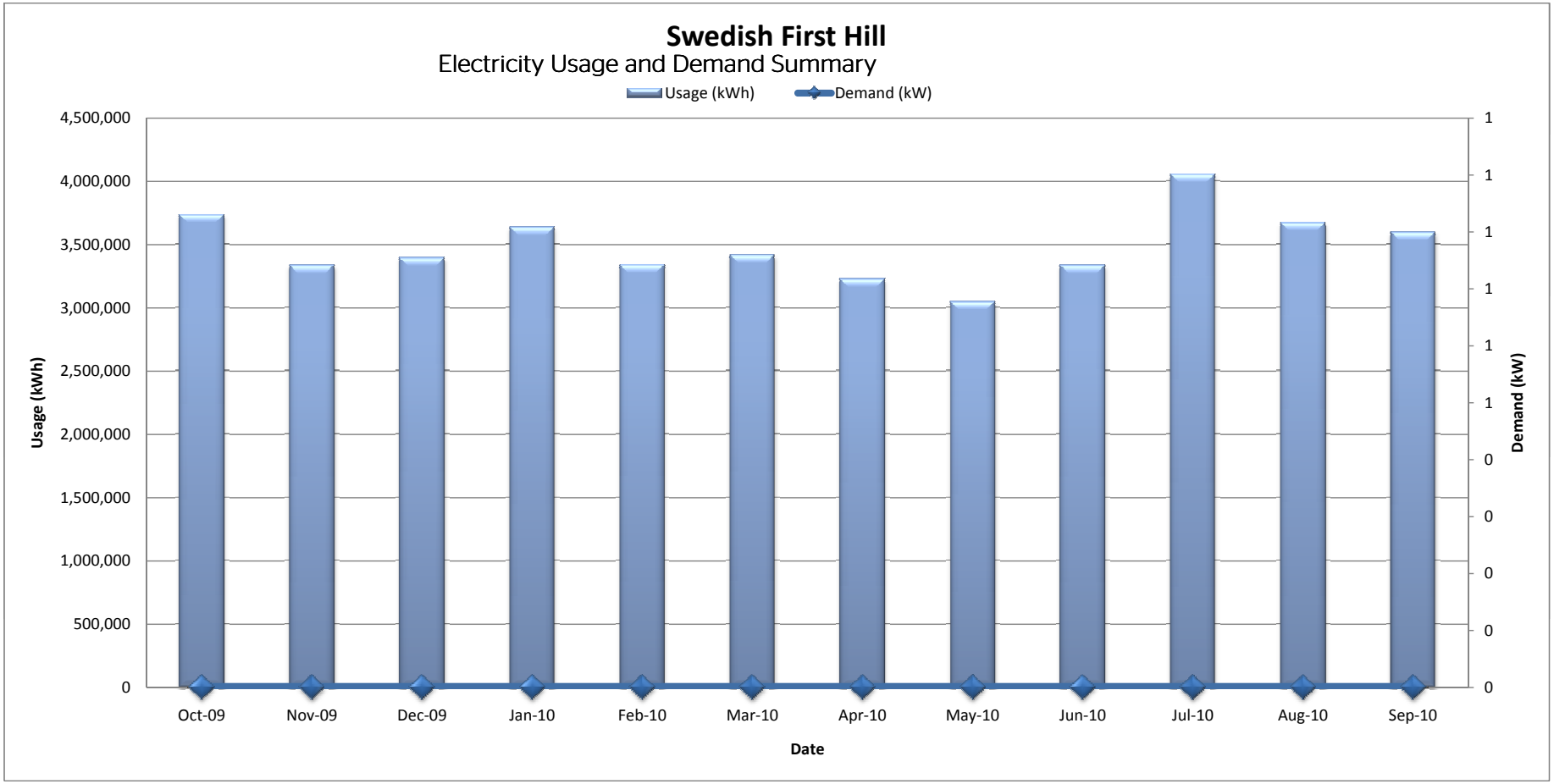
* EUI and ECI do not include water utility information

** Conversions used to calculate EUI include: Electric (kWh * 3412 = BTU), Natural Gas (Therms * 100,000 = BTU)



Note: During the 2008 SEMP Report issued by Swedish Medical Center, the Swedish First Hill campus square footage was 1,502,923 SF. With the addition of the SOI building in 2009, the Square footage is now 1,635,376.

Figure 2.27B Swedish First Hill One-Year Electricity Usage and Demand Summary



Swedish Medical Center
First Hill Campus

Figure 2.7C Swedish First Hill One-Year Natural Gas Consumption Summary

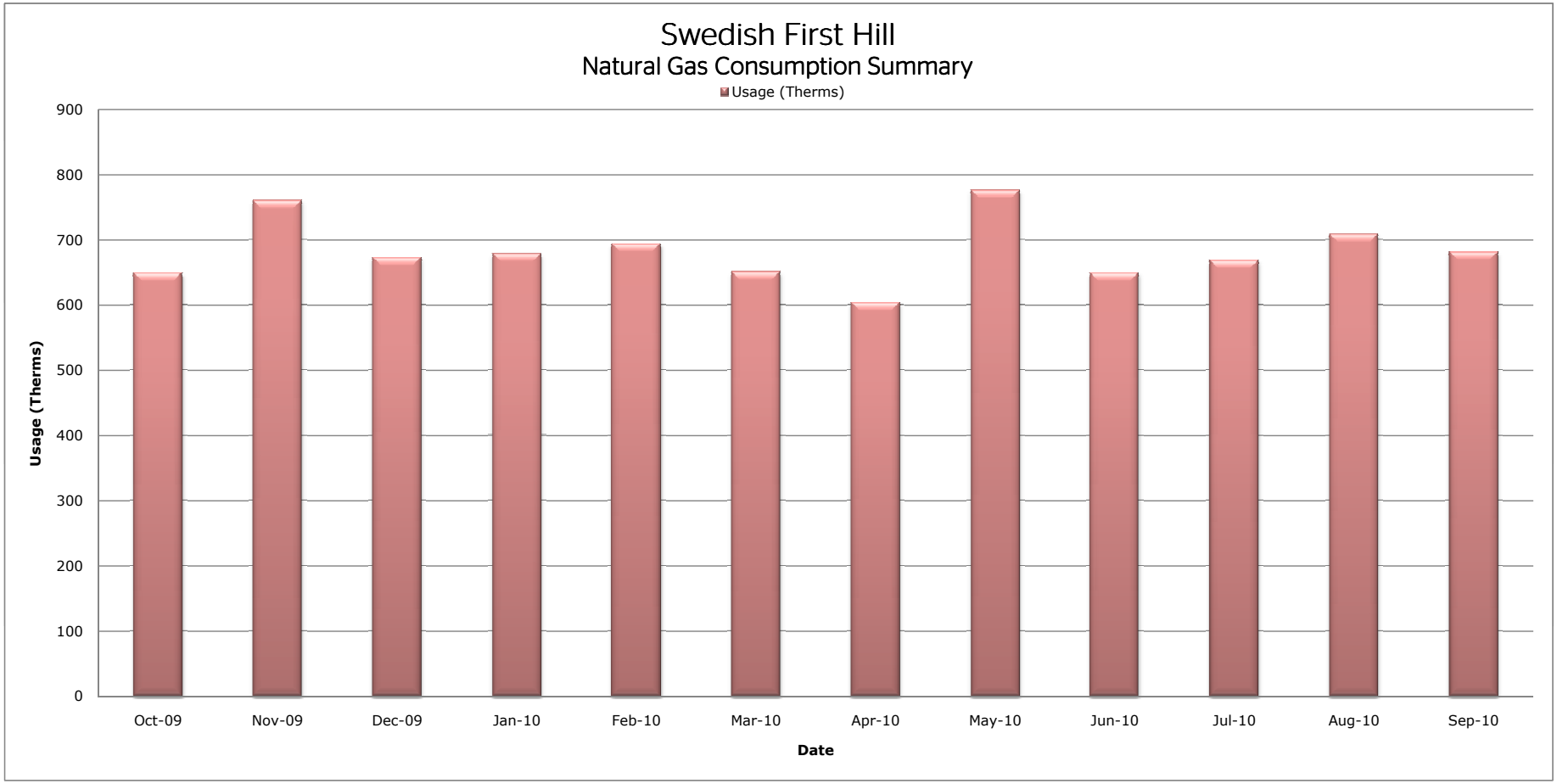


Figure 2.7D Swedish First Hill One-Year Steam Consumption Summary

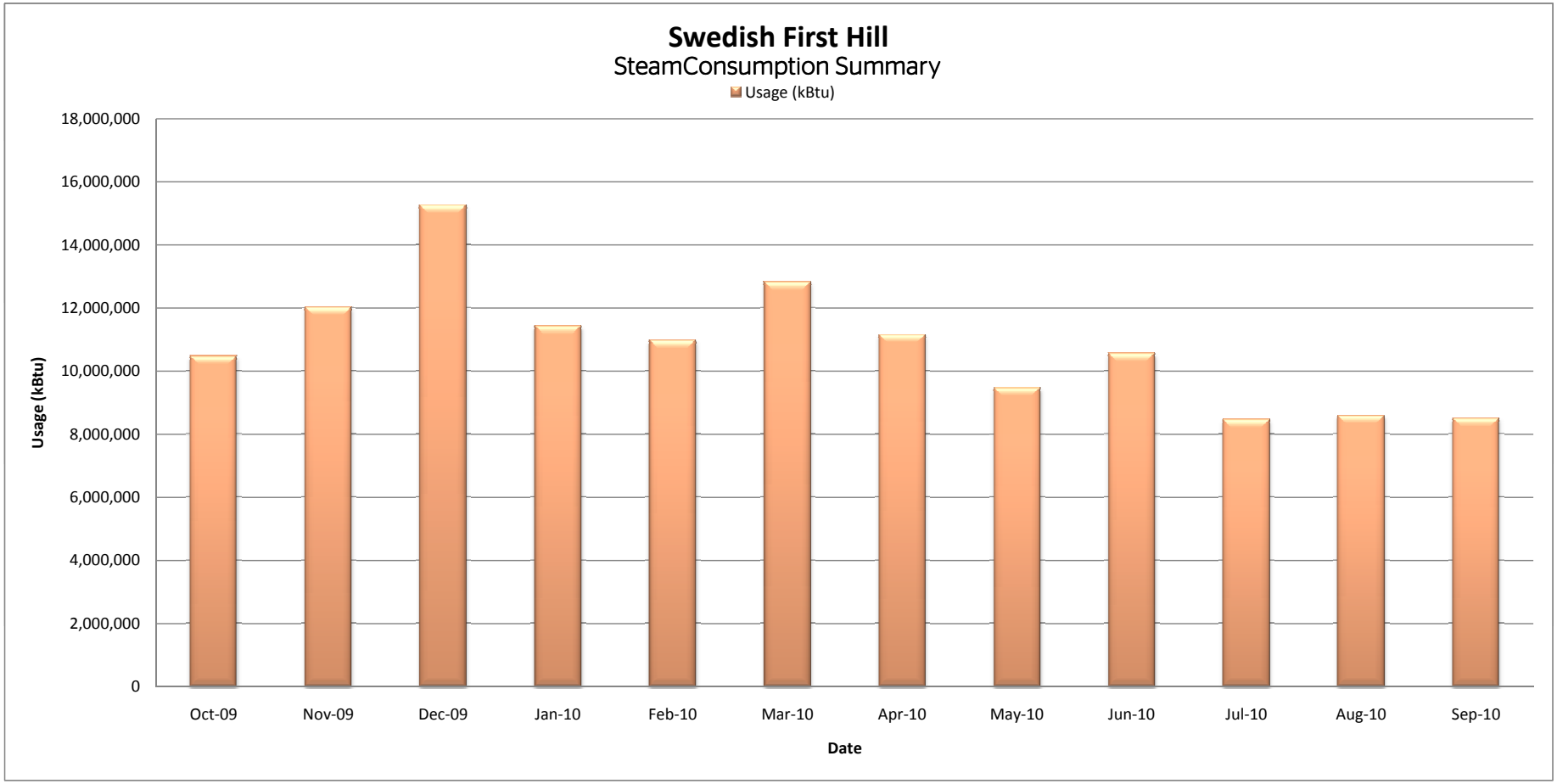


Figure 2.7E Swedish First Hill One-Year Water and Wastewater Consumption Summary

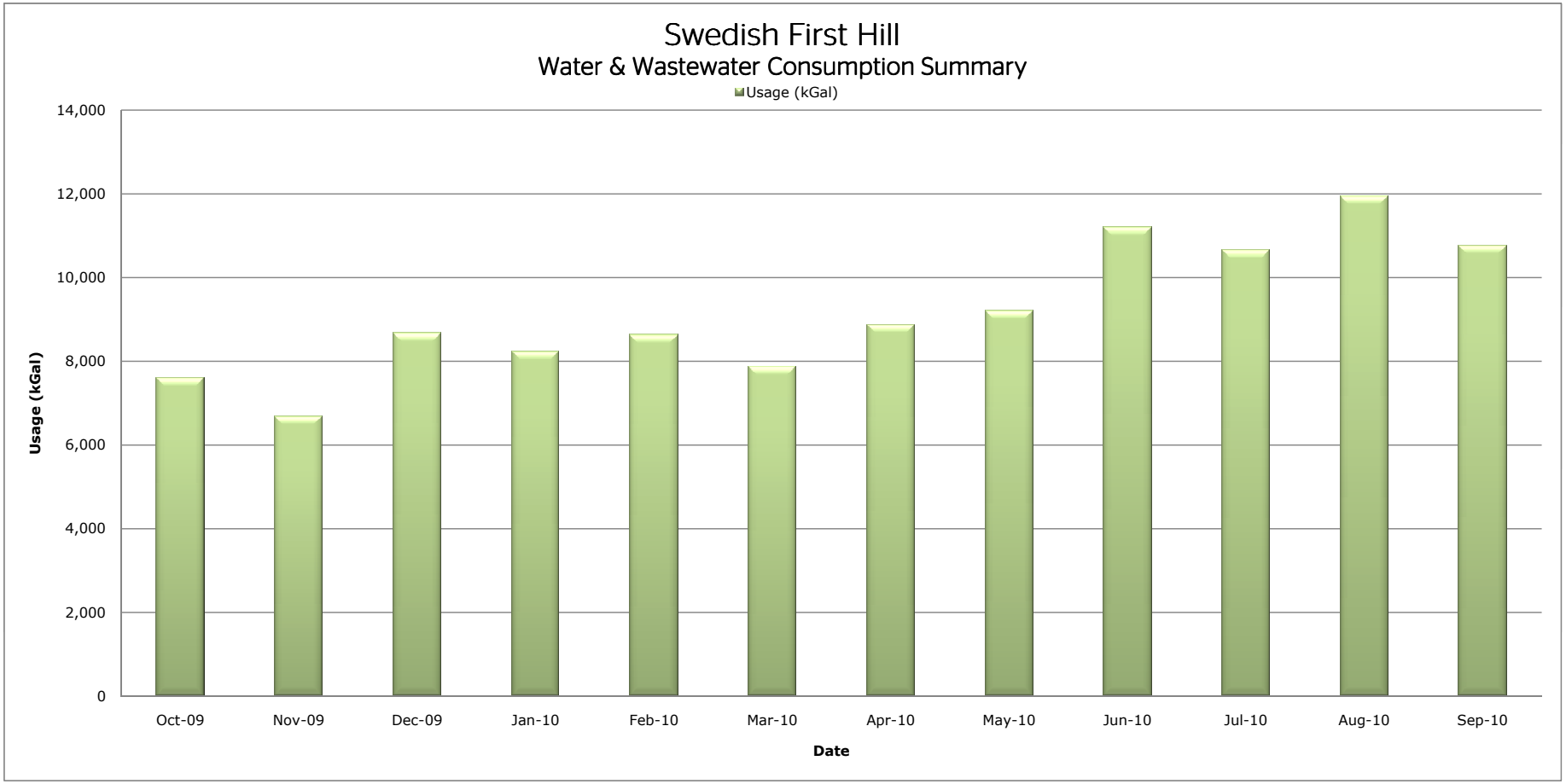
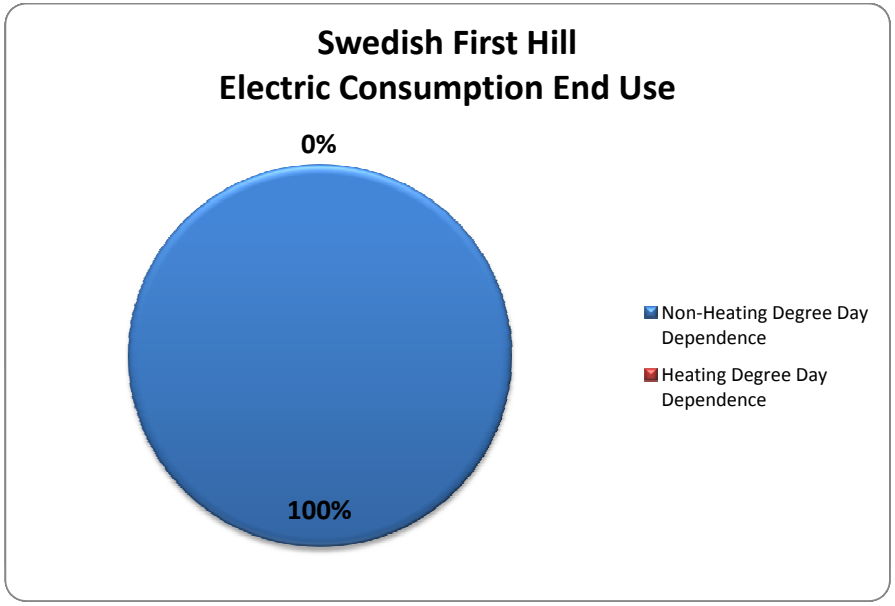
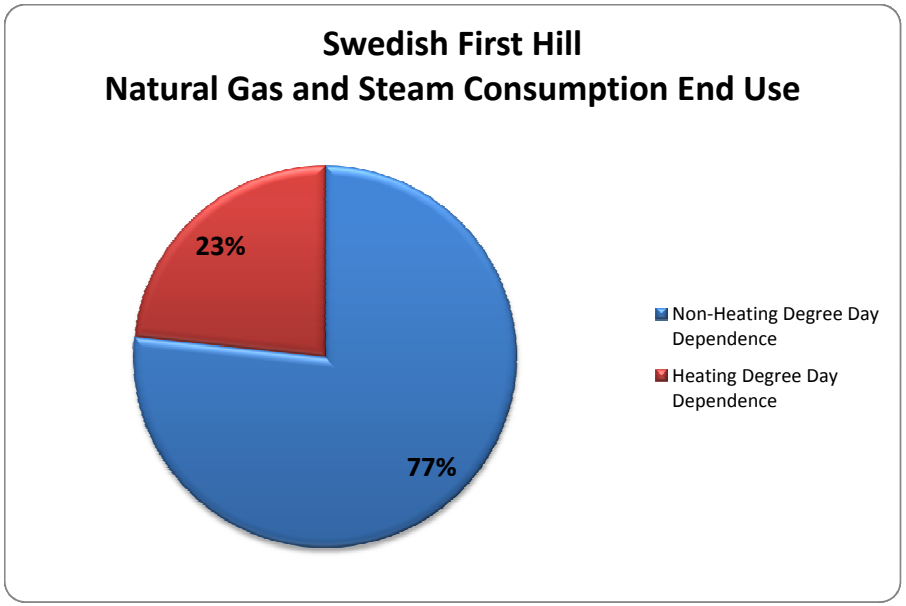
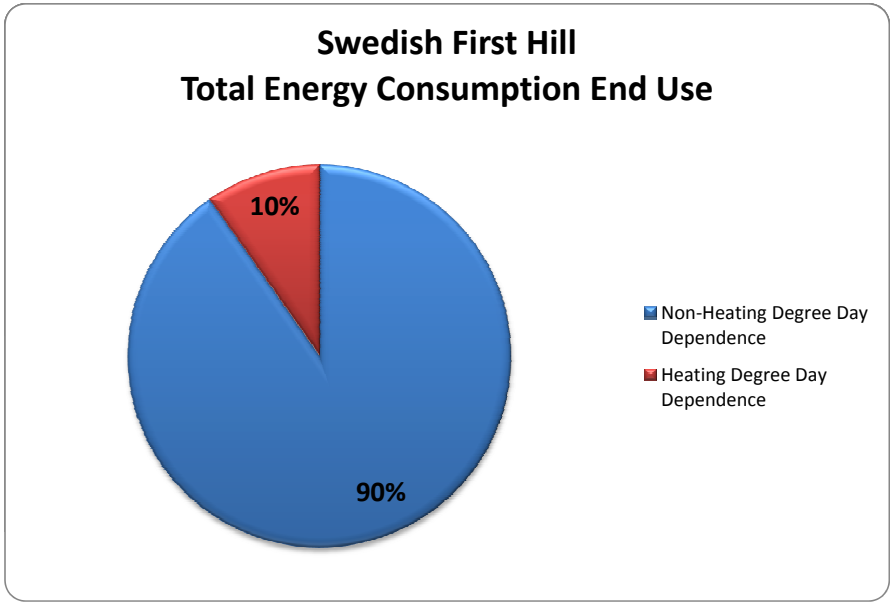


Figure 2.7F Swedish First Hill One-Year Weather Dependence







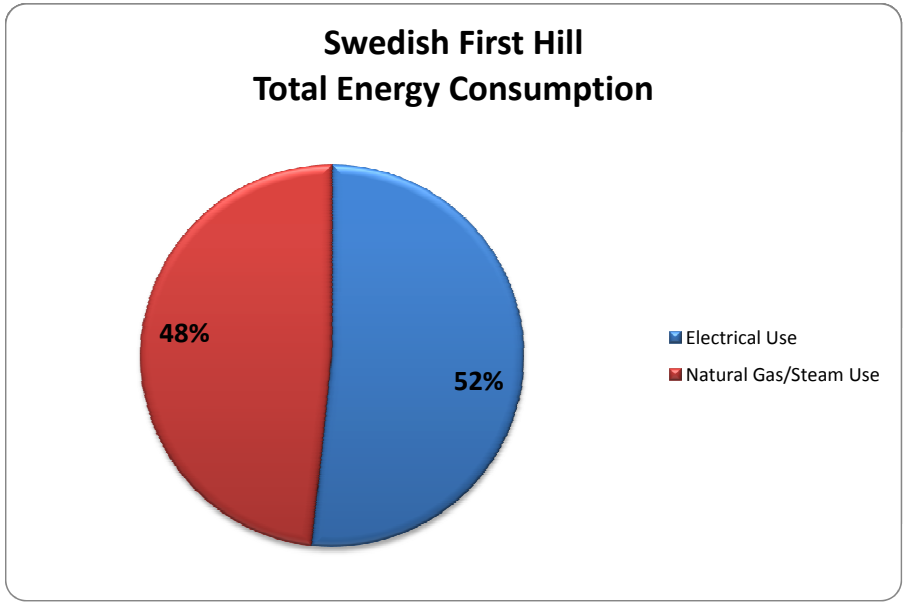
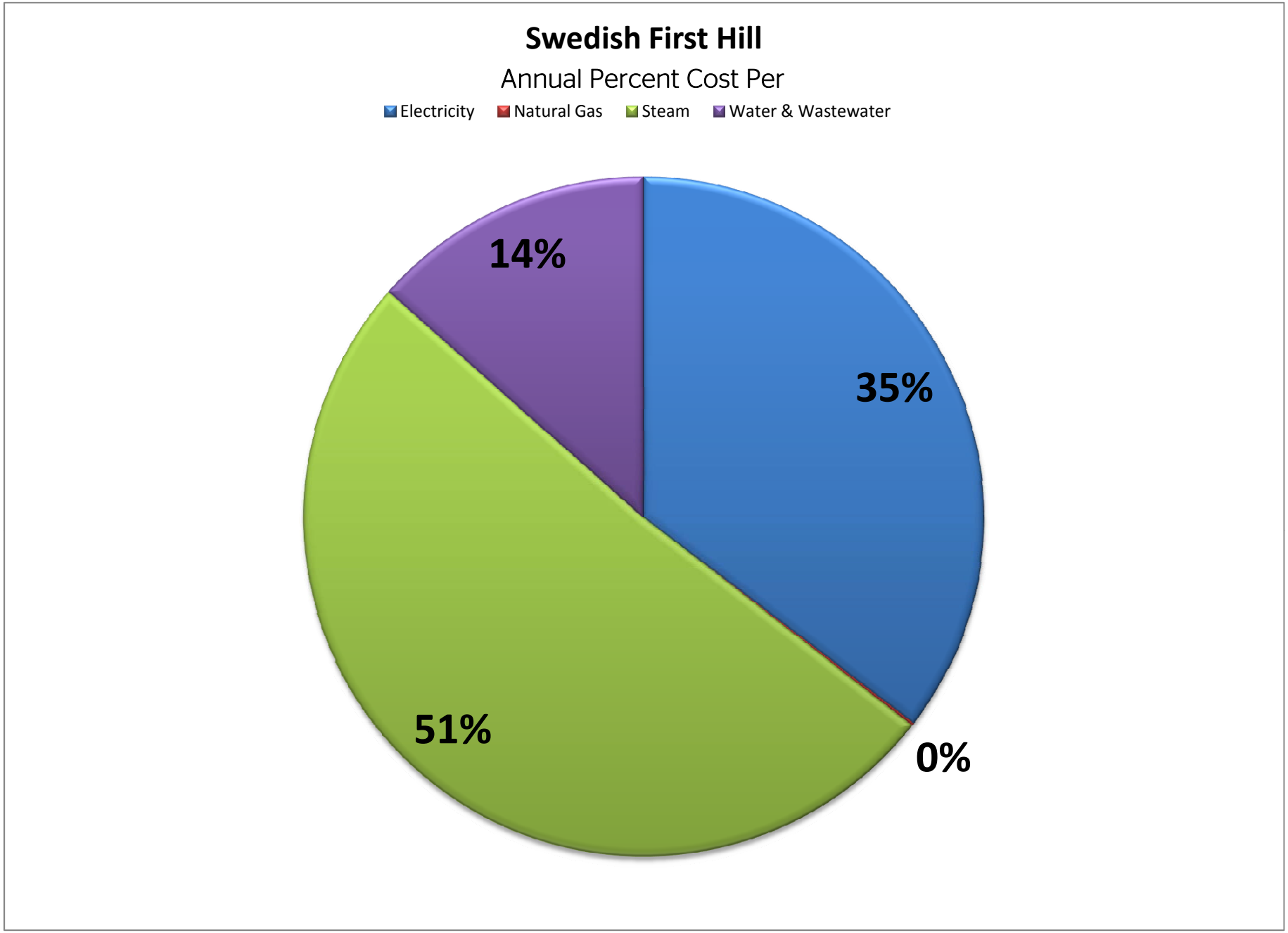


Figure 2.2G Seattle First Hill: Annual Cost per Commodity



Energy Audit Report

FIRST HILL CAMPUS CONSUMPTION VARIANCE

Swedish First Hill Electricity Consumption

When looking at four year periods (2006 - 2010), the electricity consumption is trending upward in 2007, before the initial SEMP was written in 2008. Toward the beginning of 2008, the consumption is trending downward, with a jump toward the end of 2008/beginning of 2009 with the addition of the SOI building. The consumption then continues to trend downward in the end of 2009/beginning of 2010.

Figure 2.9A Swedish First Hill Electricity Consumption Variance from 2006-2007

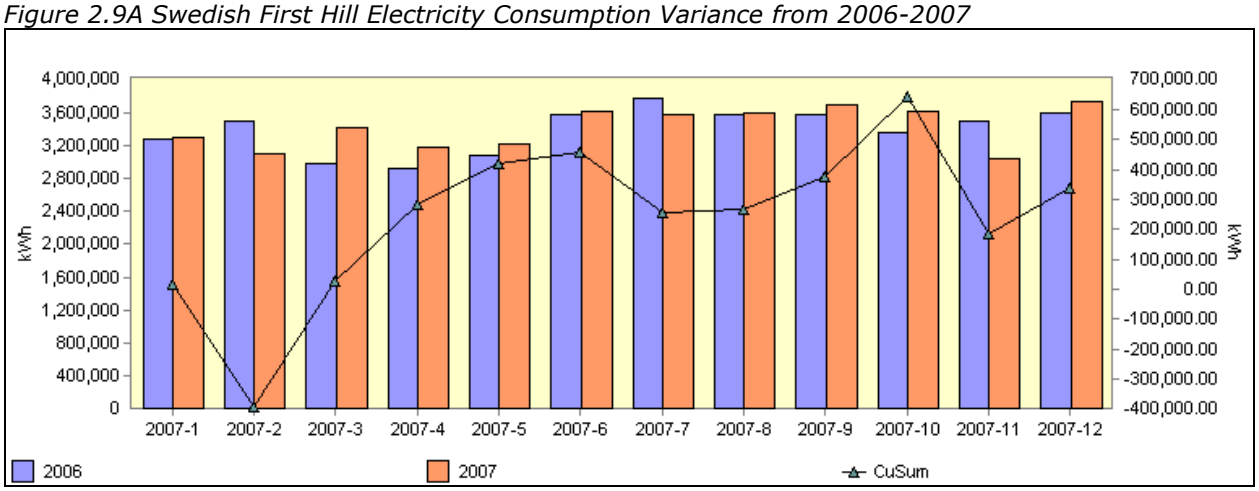
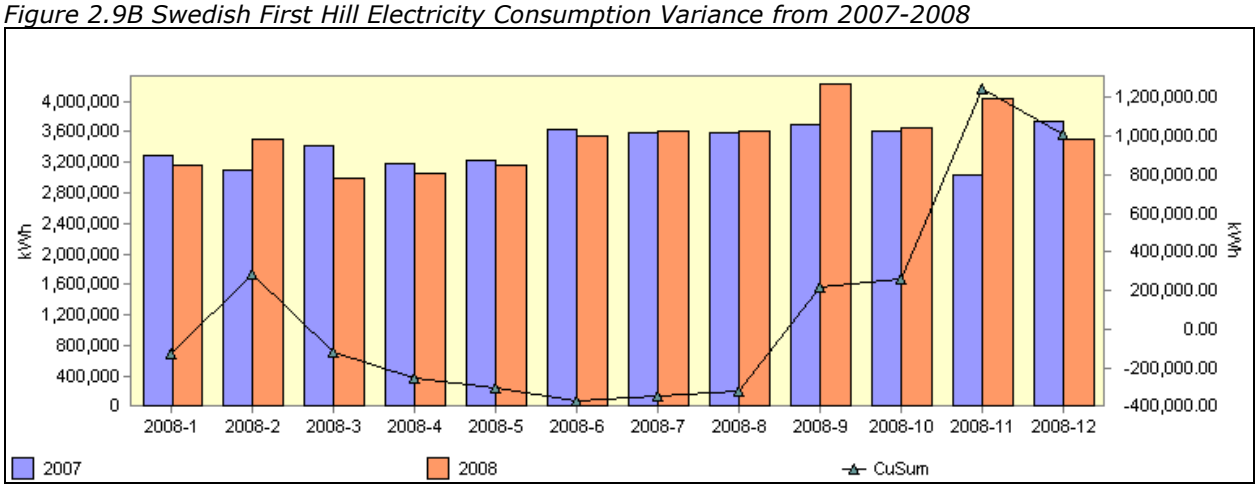


Figure 2.9B Swedish First Hill Electricity Consumption Variance from 2007-2008



Swedish First Hill Electricity Consumption (Cont'd)

Figure 2.9C Swedish First Hill Electricity Consumption Variance from 2008-2009

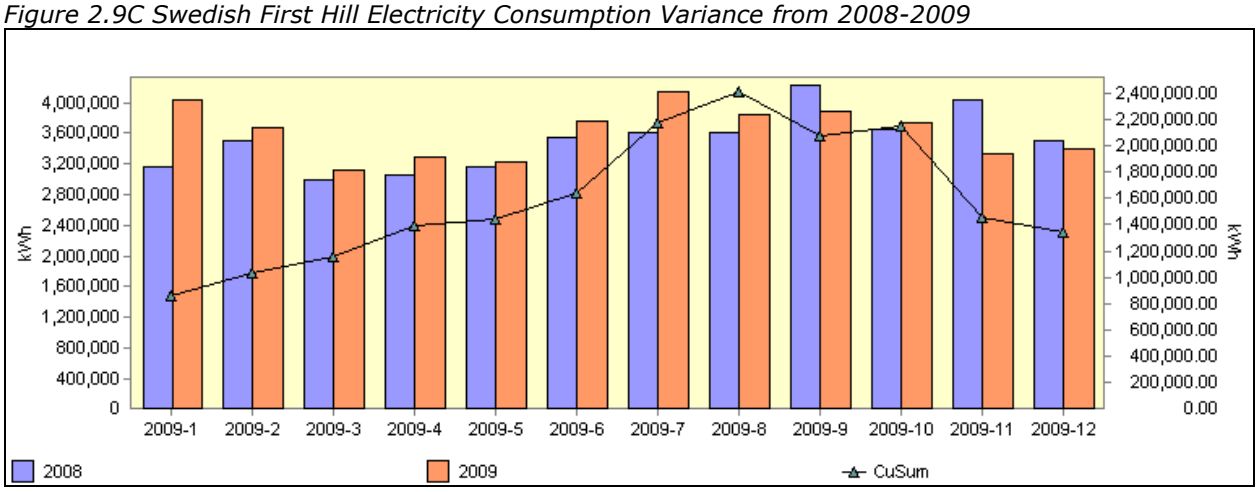
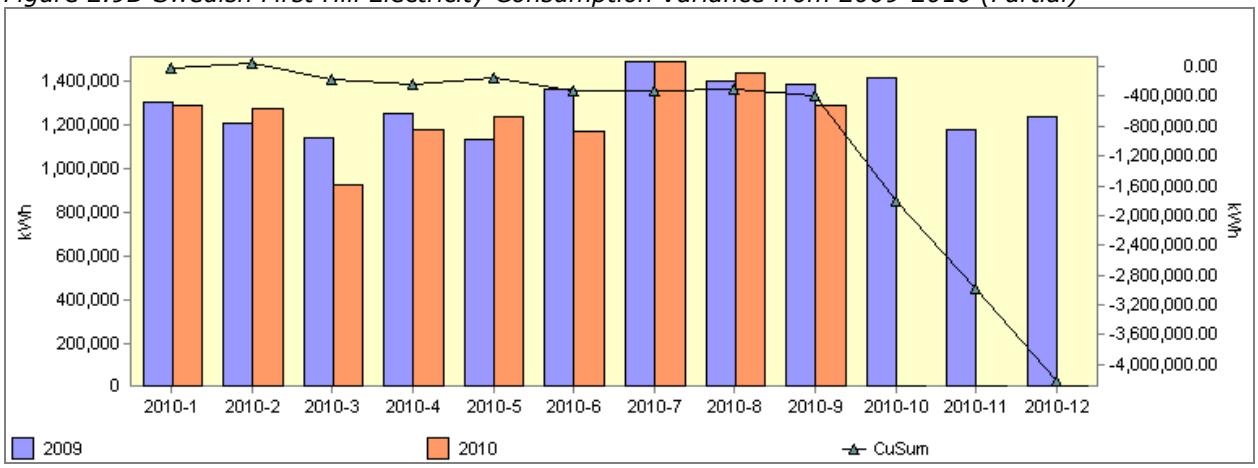


Figure 2.9D Swedish First Hill Electricity Consumption Variance from 2009-2010 (Partial)



Swedish First Hill Natural Gas Consumption

The natural gas service is primarily used for the kitchen equipment. This is a very small portion of the annual bill, so the SEMP efforts will focus primarily on the steam and electricity consumption.

Figure 2.10A Swedish First Hill Natural Gas Consumption Variance from 2006-2007

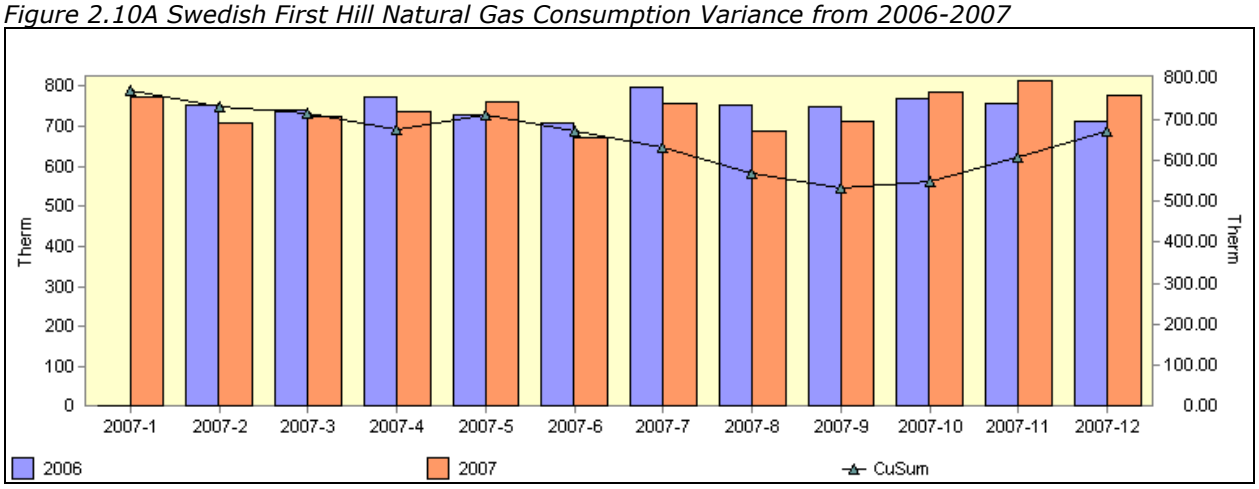
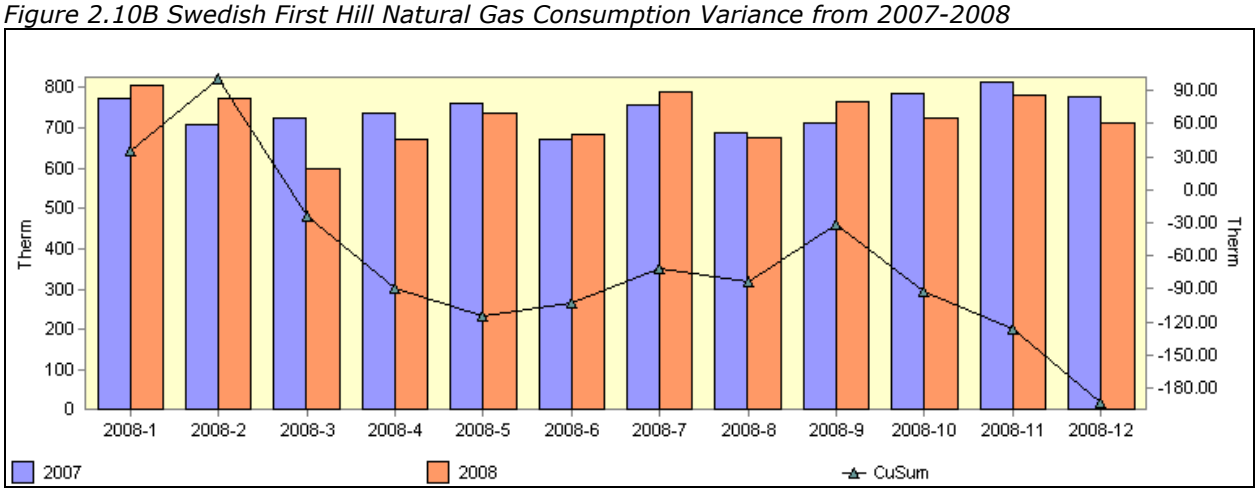


Figure 2.10B Swedish First Hill Natural Gas Consumption Variance from 2007-2008



Swedish First Hill Natural Gas Consumption (Cont'd)

Figure 2.10C Swedish First Hill Natural Gas Consumption Variance from 2008-2009

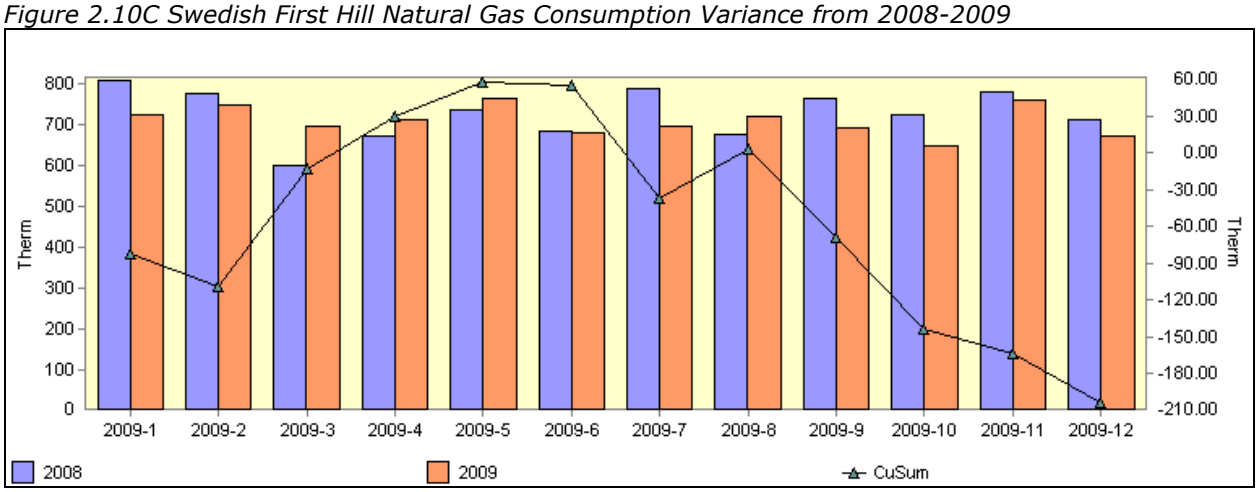
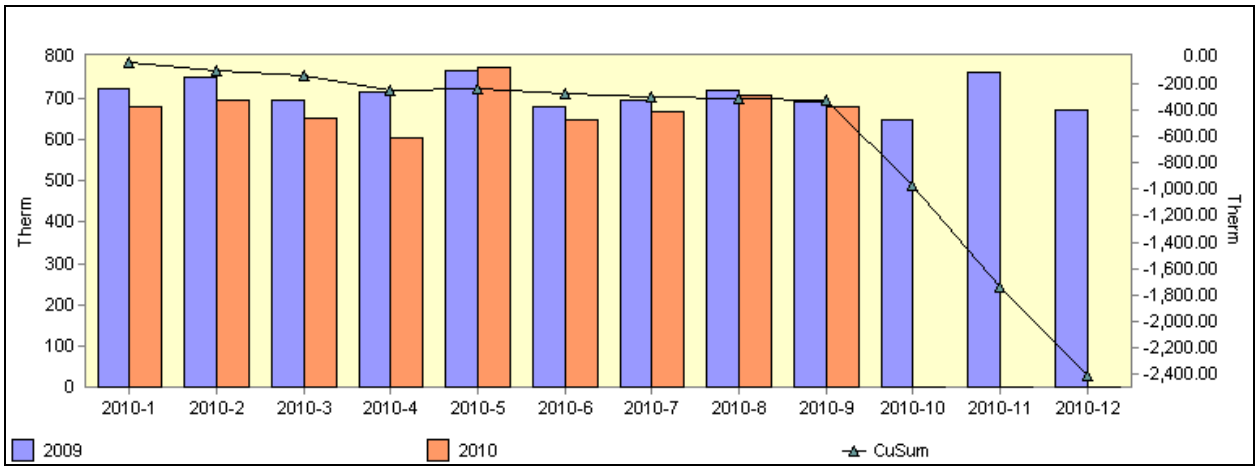


Figure 2.10D Swedish First Hill Natural Gas Consumption Variance from 2009-2010 (Partial)



Swedish First Hill Steam Consumption

When looking at four year periods (2006 - 2010), the steam consumption is trending down in 2007, before the initial SEMP was written in 2008. Toward the beginning of 2008, the consumption is slightly higher, with a jump toward the end of 2008/beginning of 2009 with the addition of the SOI building. The steam consumption then trends down dramatically towards the end of 2009 and beginning of 2010 due to improvements made in the building heating operations. A downward trend continues throughout 2010.

Figure 2.11A Swedish First Hill Steam Consumption Variance from 2006-2007

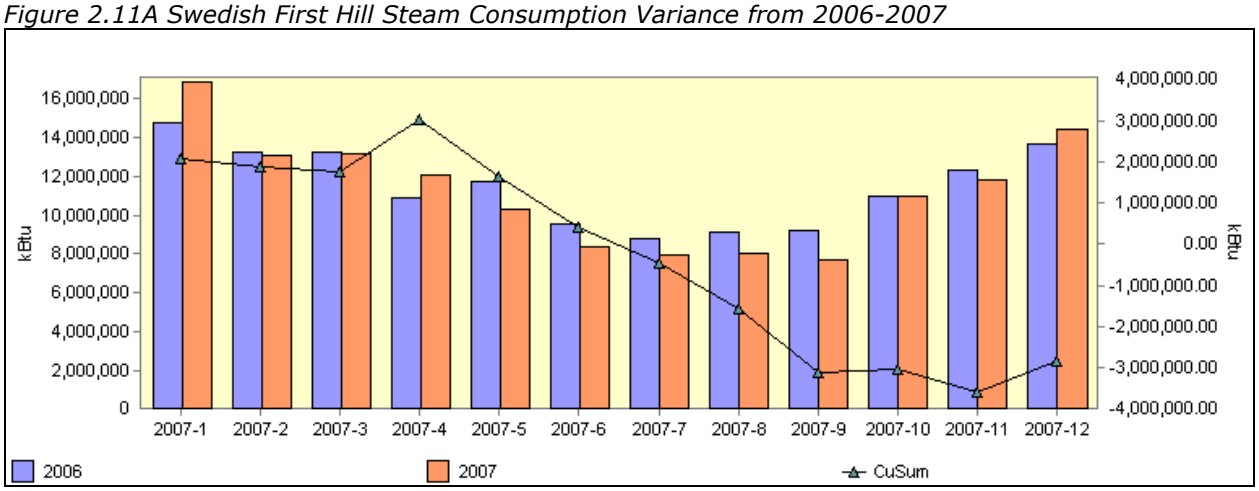
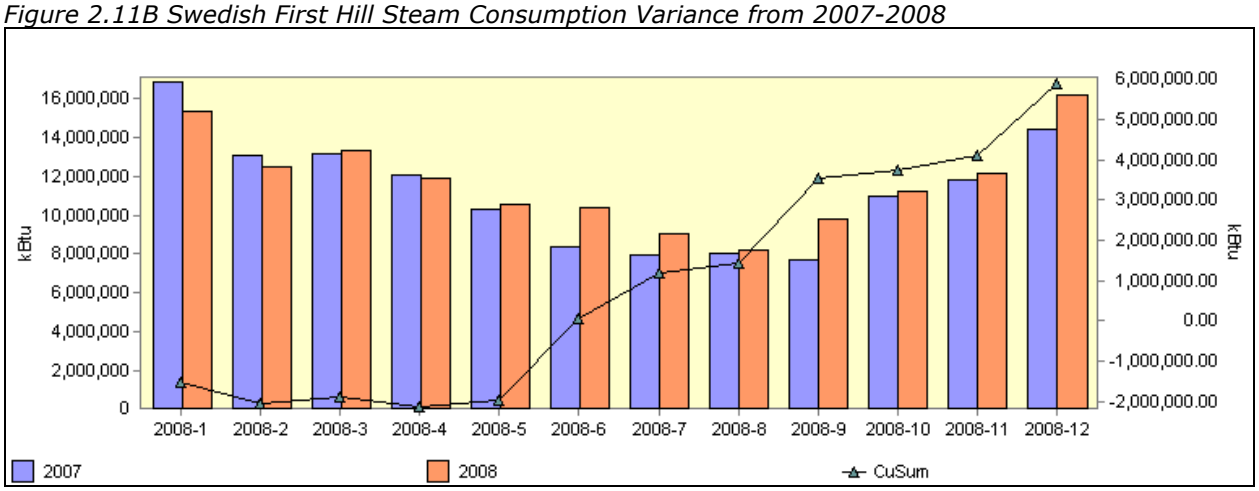


Figure 2.11B Swedish First Hill Steam Consumption Variance from 2007-2008



Swedish First Hill Steam Consumption (Cont'd)

Figure 2.11C Swedish First Hill Steam Consumption Variance from 2008-2009

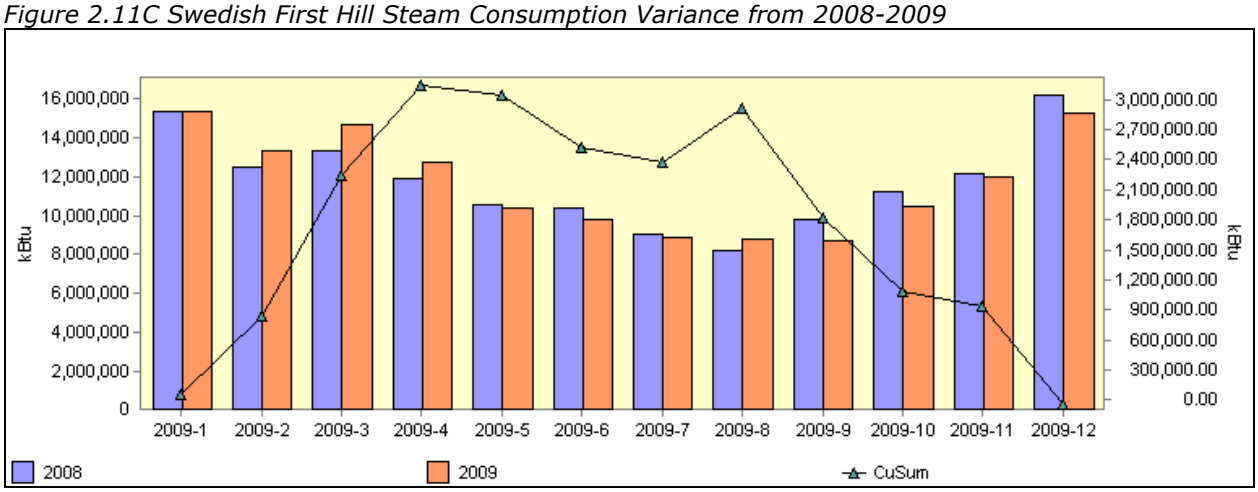
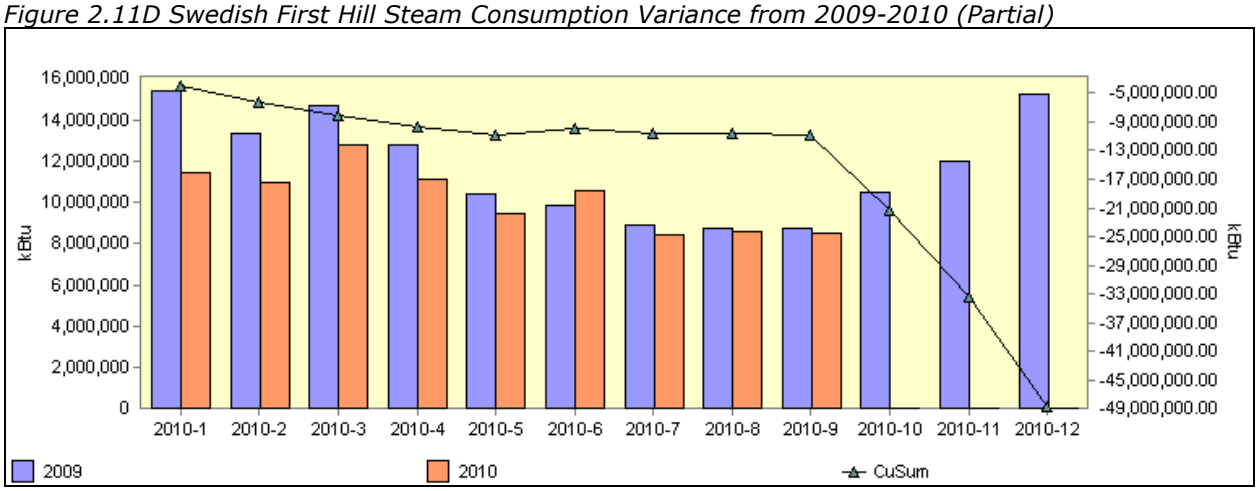


Figure 2.11D Swedish First Hill Steam Consumption Variance from 2009-2010 (Partial)



Energy Audit Report

Swedish First Hill Potable Water Consumption

Figure 2.12A Swedish First Hill Potable Water Consumption Variance from 2006-2007

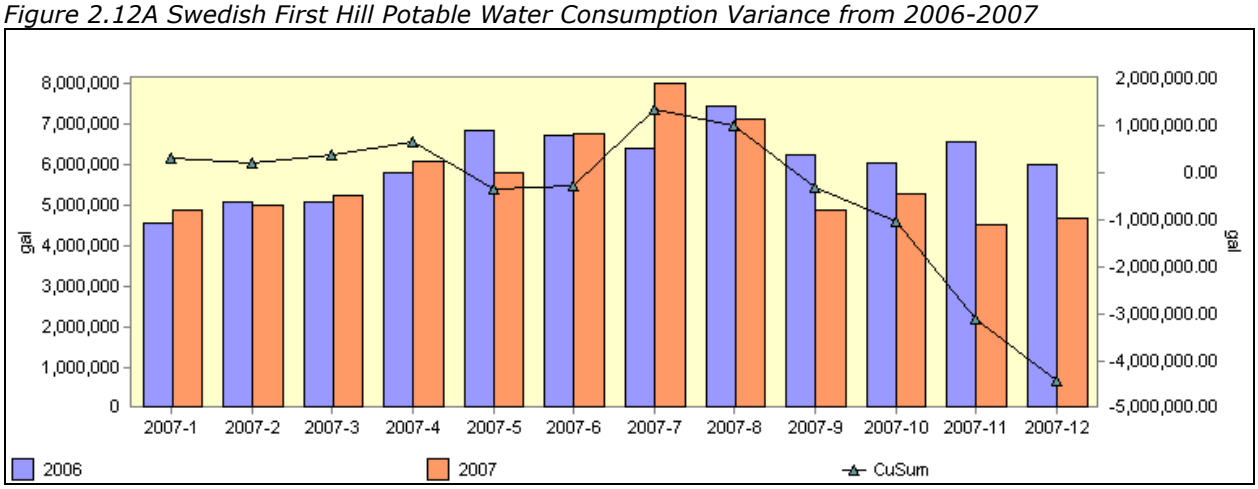
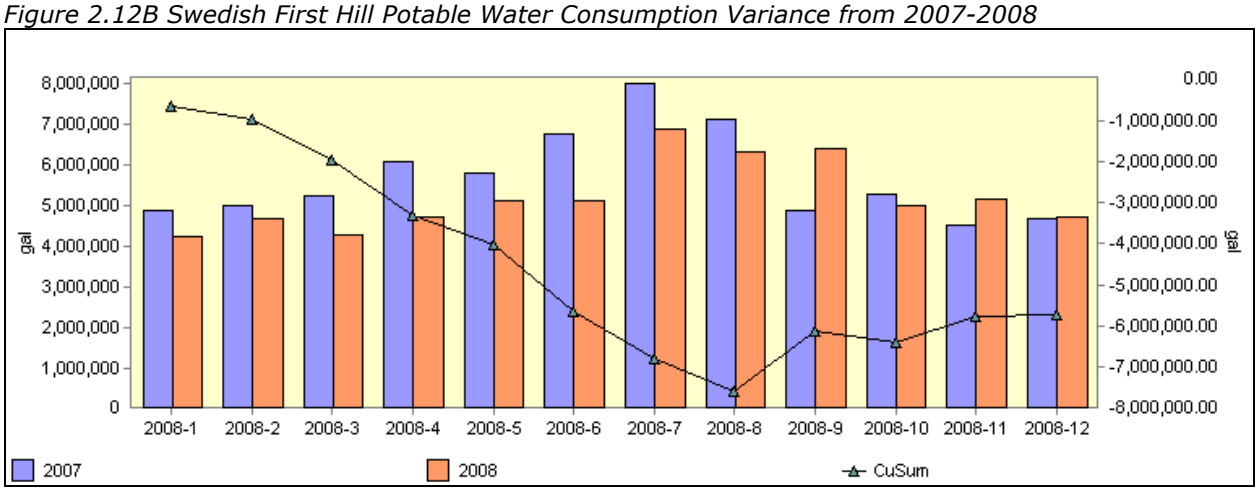


Figure 2.12B Swedish First Hill Potable Water Consumption Variance from 2007-2008



Swedish First Hill Potable Water Consumption (cont'd)

Figure 2.12C Swedish First Hill Potable Water Consumption Variance from 2008-2009

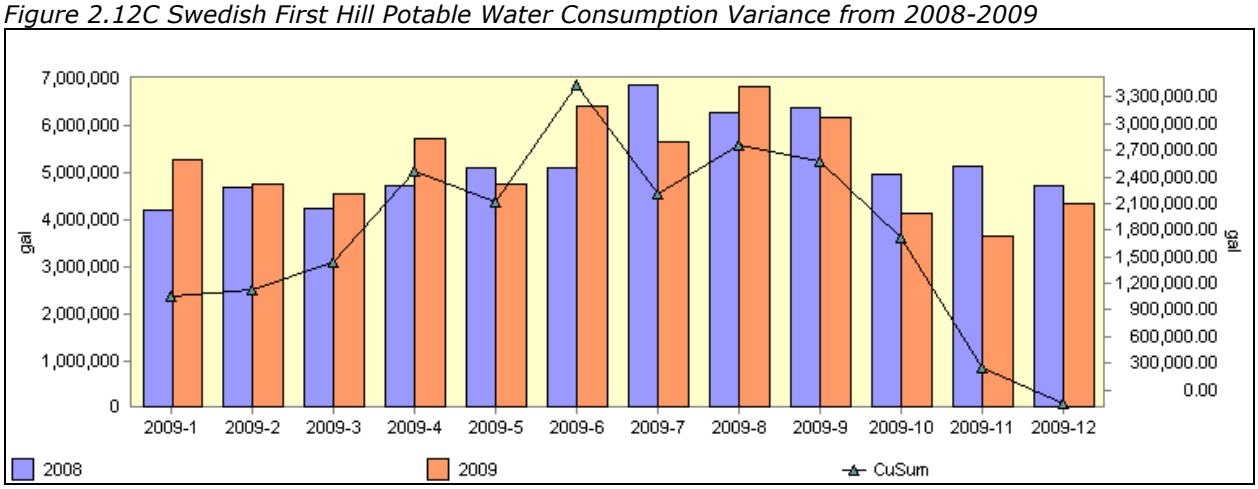
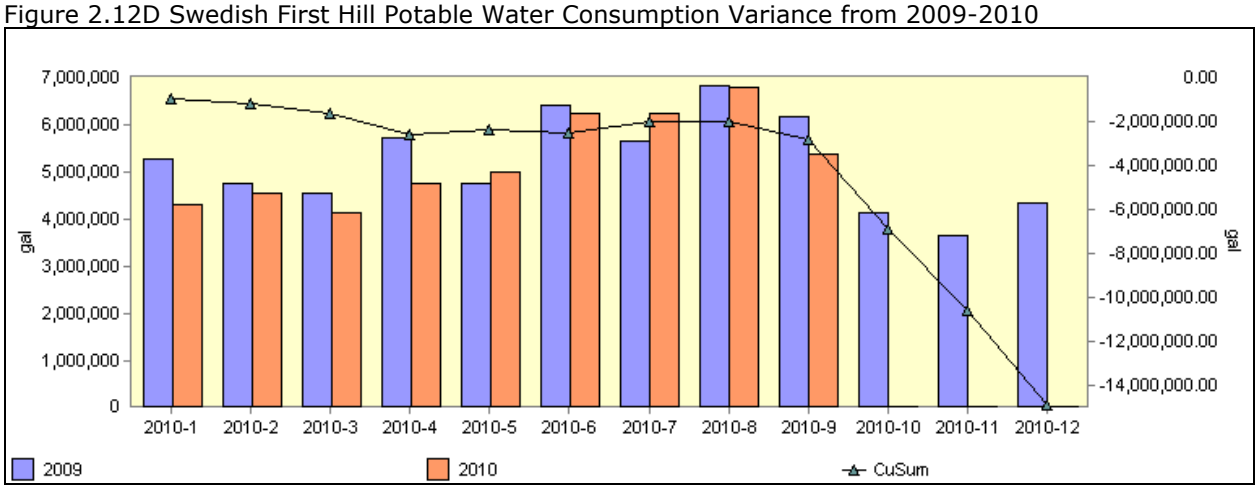


Figure 2.12D Swedish First Hill Potable Water Consumption Variance from 2009-2010



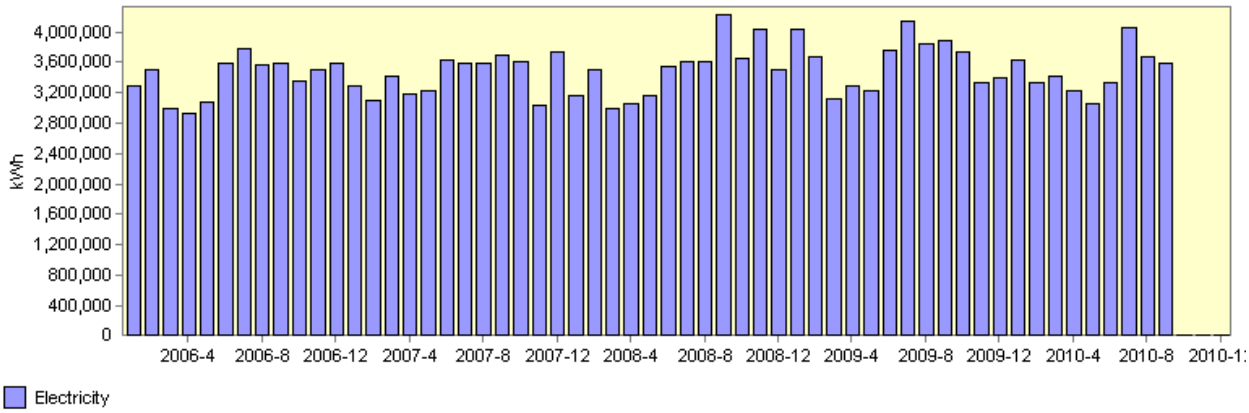
Energy Audit Report

FIRST HILL CAMPUS UTILITY CONSUMPTION HISTORY

Swedish First Hill Electricity Consumption

The electrical consumption shows a rise in the summer months due to higher cooling loads.

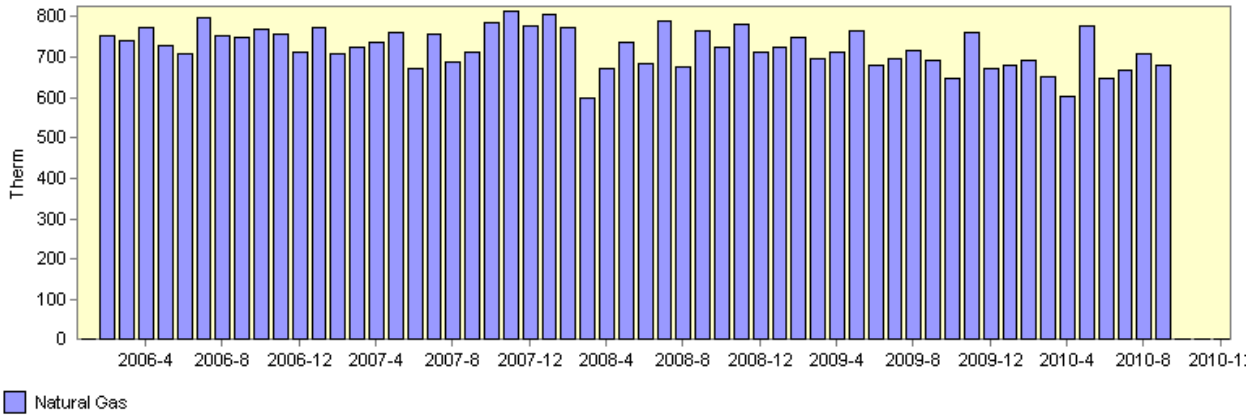
Figure 2.13A Swedish First Hill Electricity Consumption (2006-2010)



Swedish First Hill Natural Gas Consumption

The natural gas is primarily for kitchen usage, therefore, the consumption is not weather dependant, and relatively steady throughout the year.

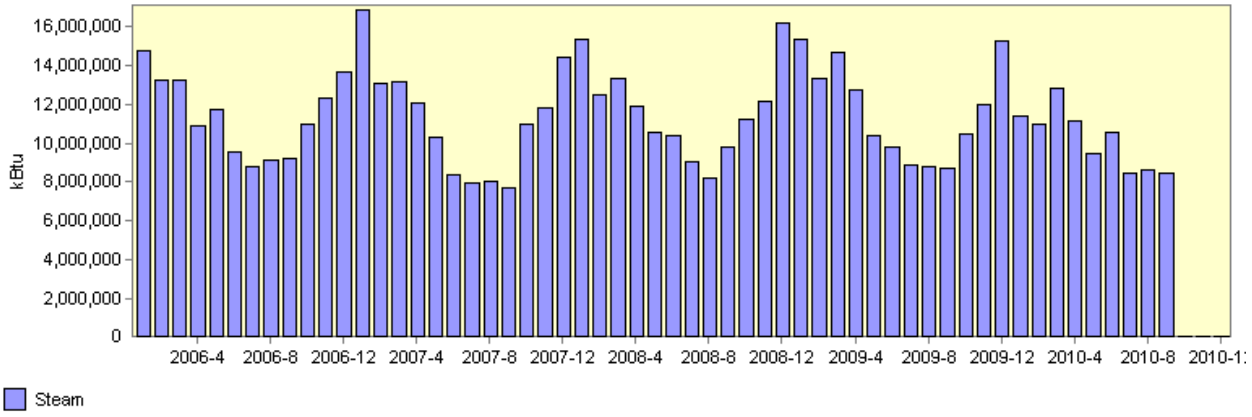
Figure 2.13B Swedish First Hill Natural Gas Consumption (2006-2010)



Swedish First Hill Steam Consumption

The steam consumption shows a reduction in the summer months due to lower heating loads. There is still consumption in the summer months for domestic hot water, process loads and reheat at terminal boxes.

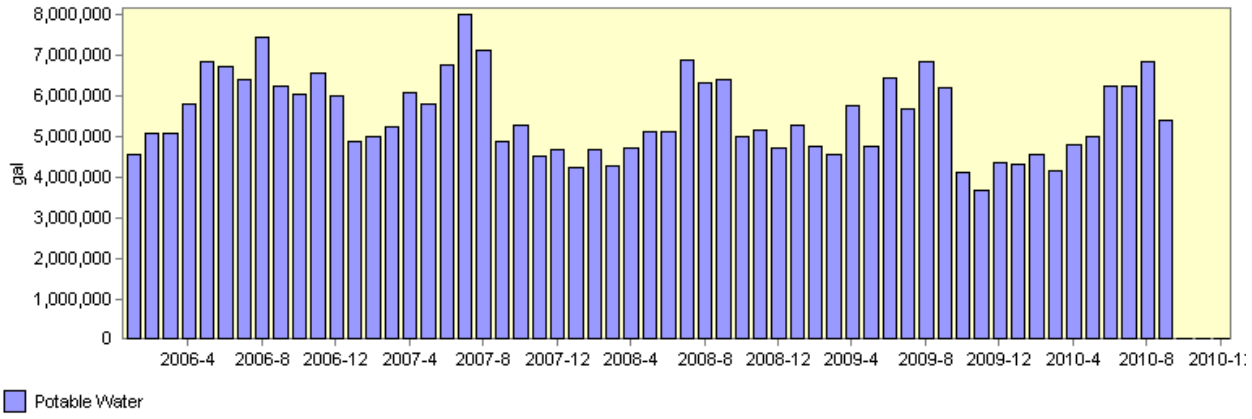
Figure 2.13C Swedish Cherry Hill Potable Water Consumption (2006-2010)



Swedish First Hill Potable Water Consumption

Water consumption is comprised of mainly domestic water uses, however, water consumption is consistently highest in the summer months due to irrigation and cooling tower water evaporation and drift.

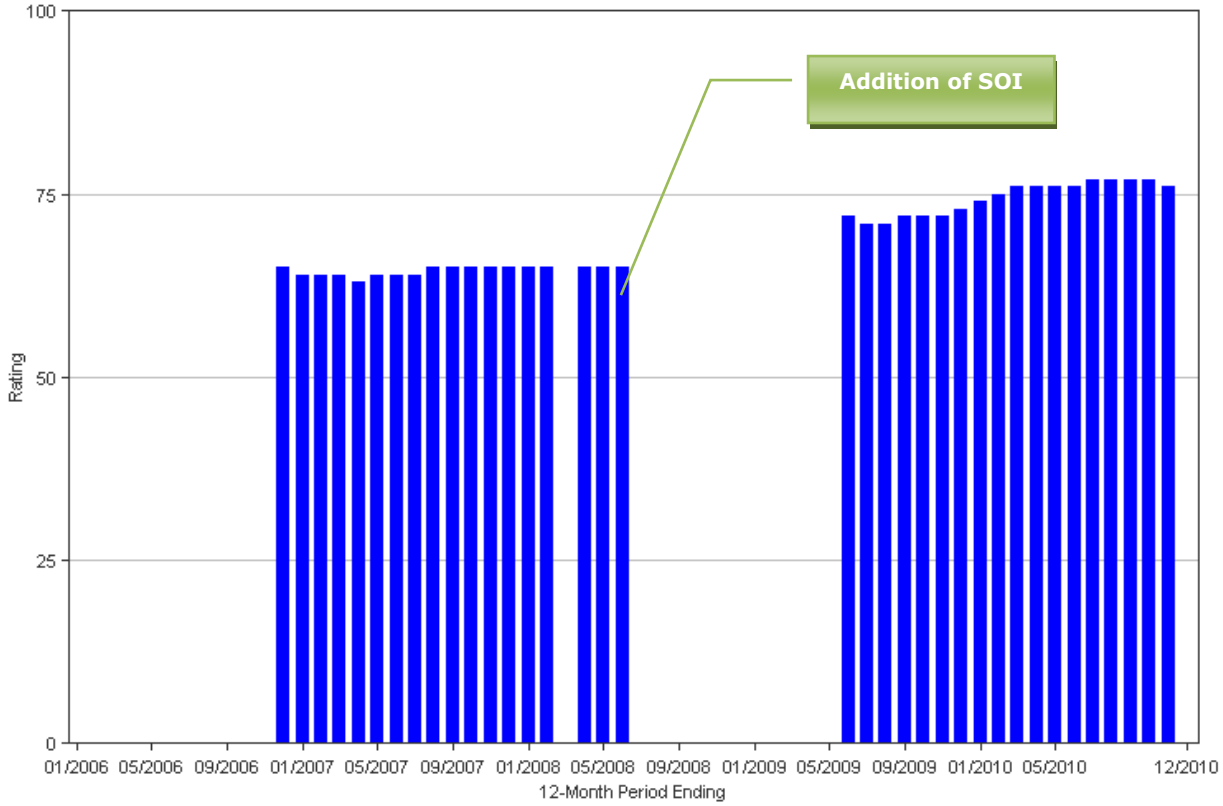
Figure 2.13C Swedish Cherry Hill Potable Water Consumption (2006-2010)



Swedish First Hill Energy Star Scoring

Jeff Grinzel also performed quality control on the data entered for Swedish First Hill, and was able to correct discrepancies with square footage and metering. There is a gap in data due to the SOI addition. Energy Star looks at usage for a whole period, so there is no rating within the year of the SOI addition. It is also evident when Jeff was able to implement the RCM strategies mentioned in Appendix A, with a considerable jump in the Energy Star Score in 2009.

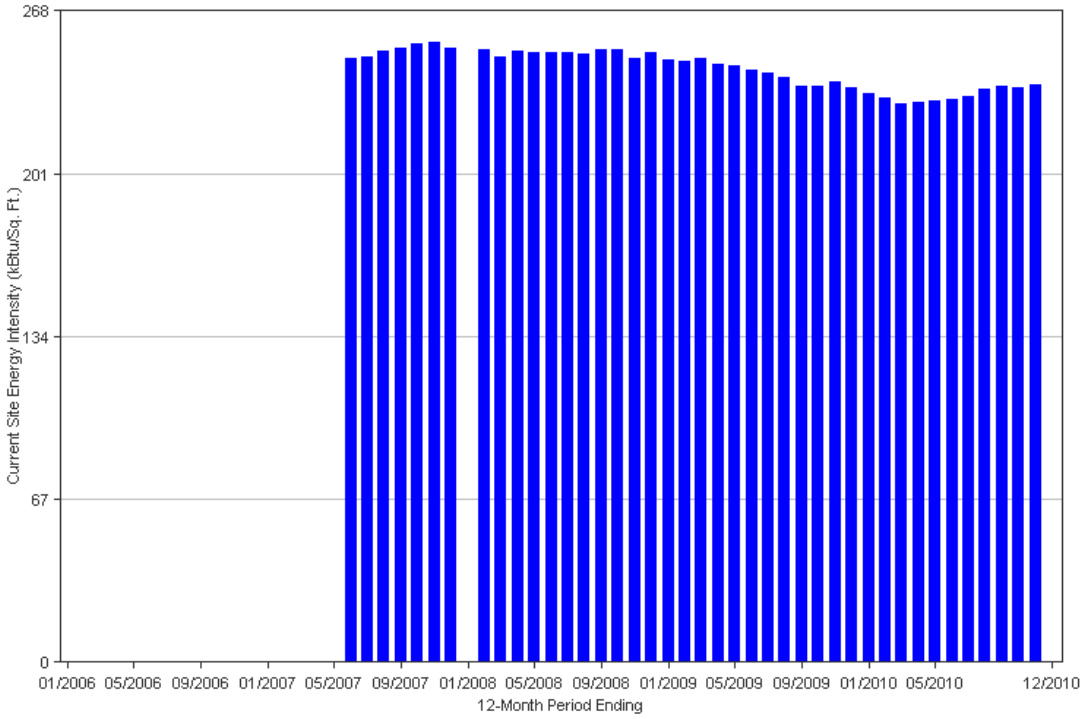
Figure 2.13D Swedish Cherry Hill Monthly Energy Star Score (2007-present)



Swedish First Hill EUI Trending

Below is a monthly EUI for the First Hill Campus. Again, this output from Portfolio Manager illustrates the corrections made to the campus square footage in addition to the downward trend of energy consumption due to RCM activities.

Figure 2.13E Swedish First Hill Monthly EUI (kbtu/SF) (2007-present)



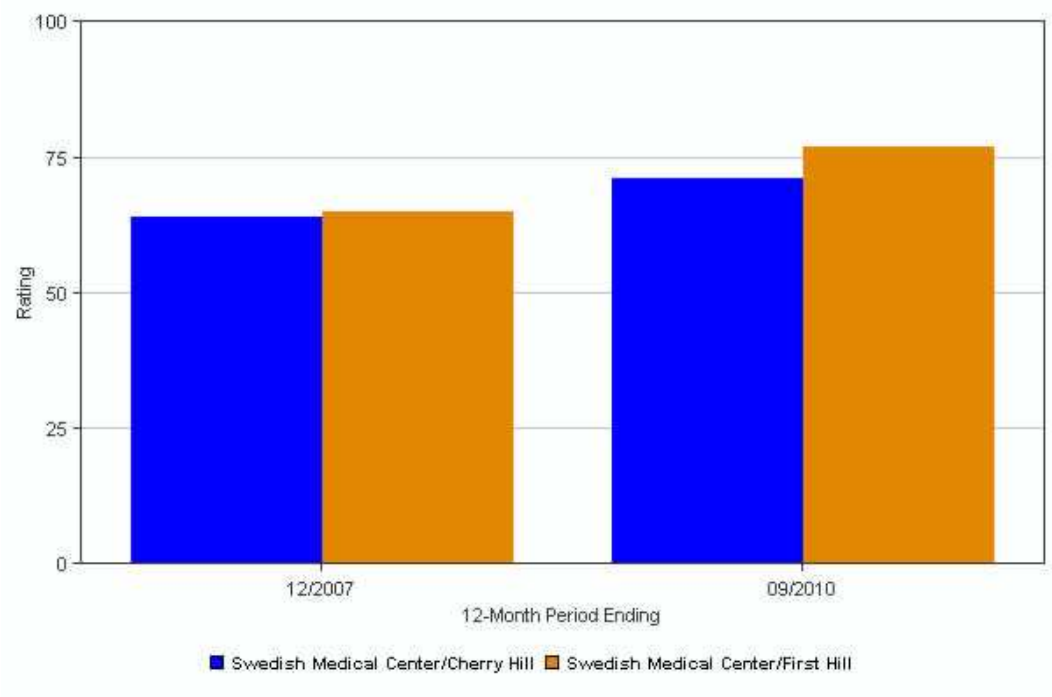
2.2 UTILITY BENCHMARKING

SWEDISH MEDICAL CENTER PORTFOLIO MANAGER PERFORMANCE

Swedish Medical Center Energy Score Tracking

Swedish Medical Center has made considerable strides in energy conservation since the implementation of the 2008 SEMP report and the efforts of an engineer on staff, Jeff Grinzel, who is dedicated to energy conservation. With the implementation of this SEMP it is the intent to show continued improvement in energy performance.

Figure 2.14A Swedish Medical Center Energy Star Score Improvement



Swedish Medical Source Vs. Site Energy Intensity

The graph below also illustrates the decrease in EUI due to energy efficiency efforts at Swedish Medical Center. This graph also illustrates the Source Efficiency factor adjustment for district steam. During the period between 2007 and the present, the EPA adjusted the source efficiency factor for district steam. Due to this efficiency factor, more savings is shown on the source EUI than the site EUI for First Hill.

Figure 2.14B Swedish Medical Center Portfolio Manager EUI Improvement

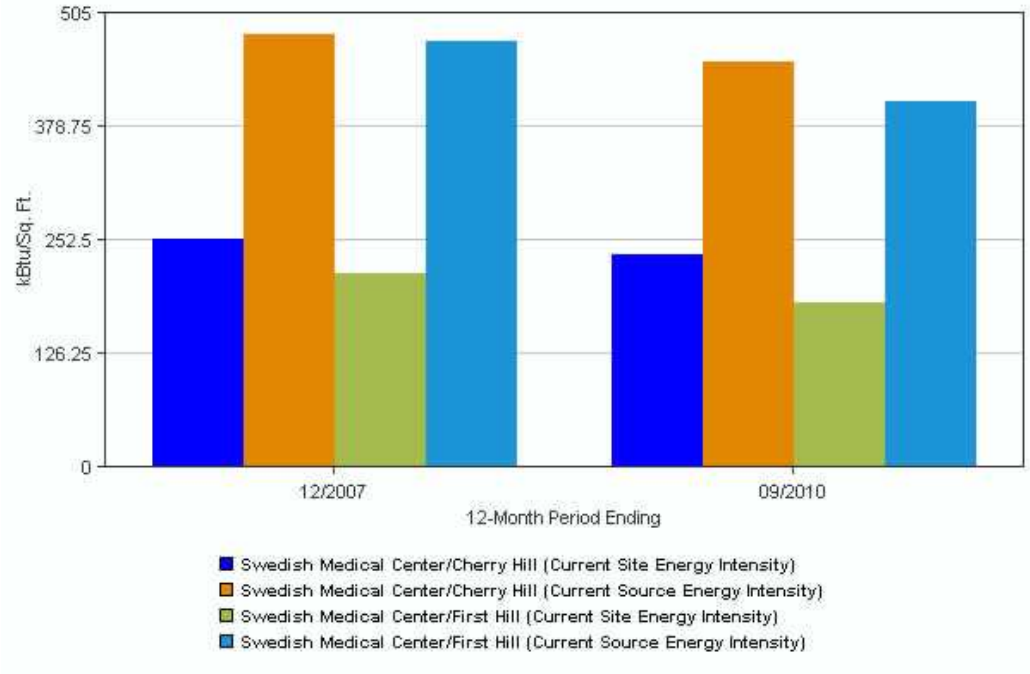


Figure 2.15A Seattle Healthcare Benchmarking: EUI per Facility

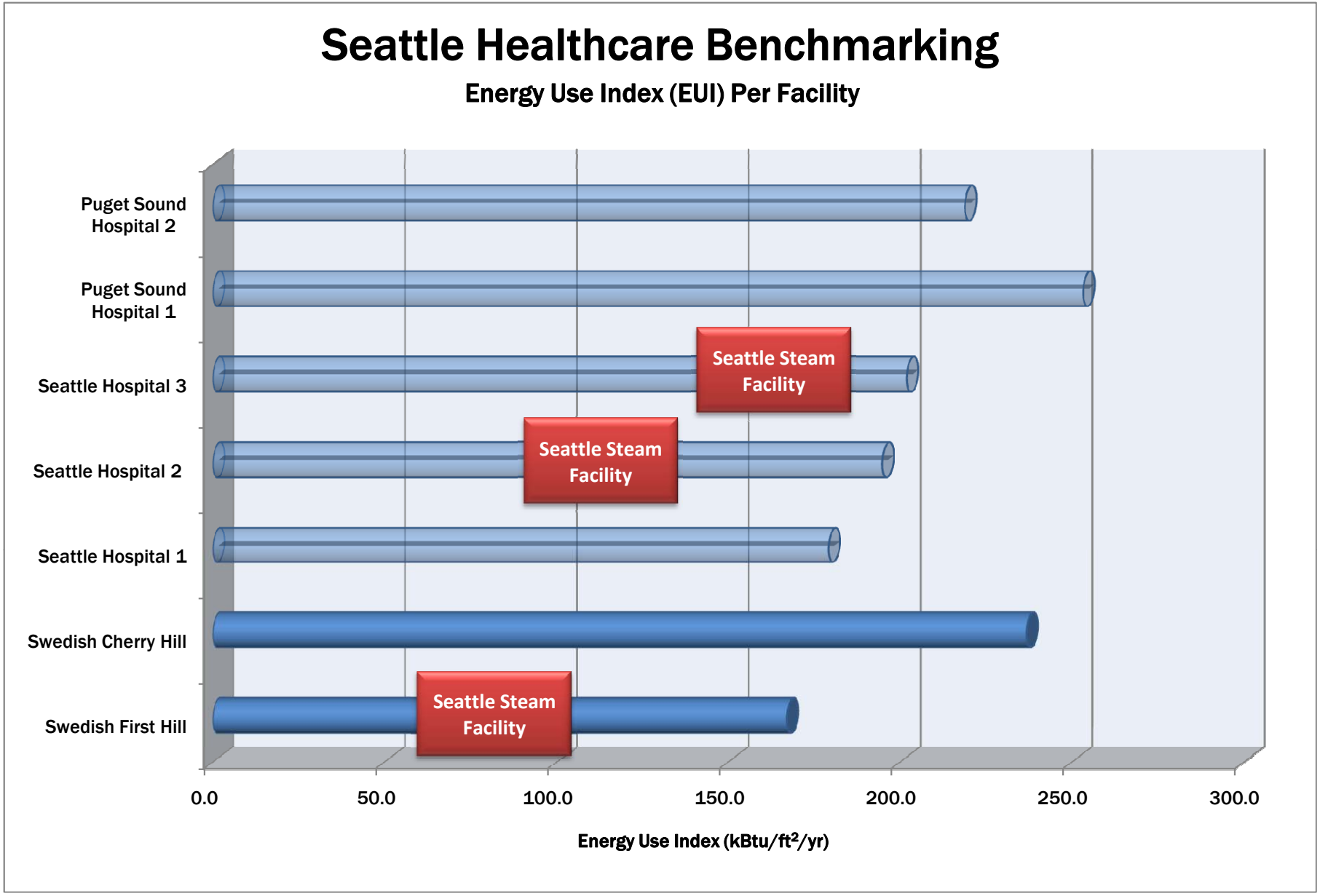


Figure 2.15B Seattle Healthcare Benchmarking: Annual Utility cost per Facility

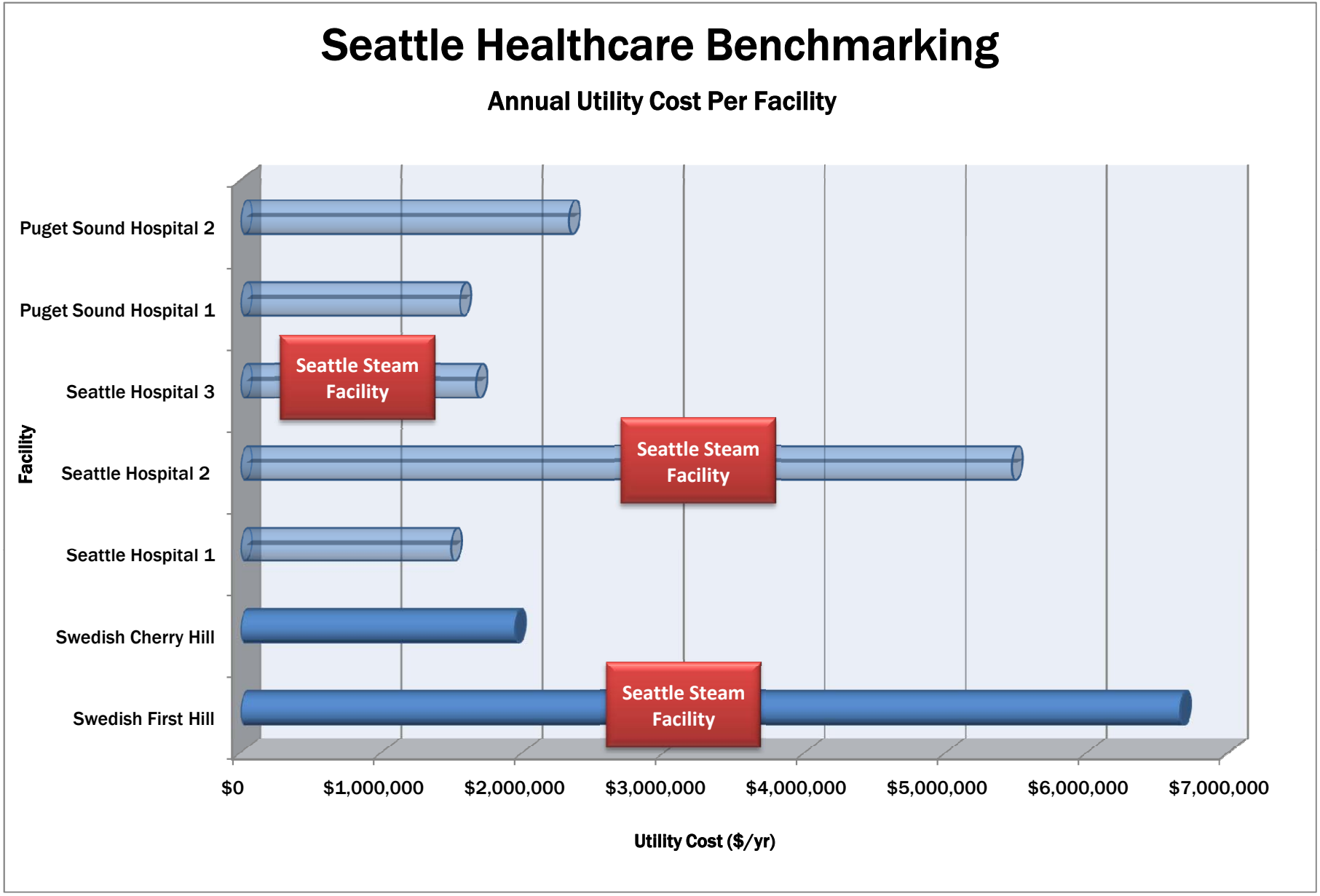


Figure 2.15C Seattle Healthcare Benchmarking: ECI per Facility

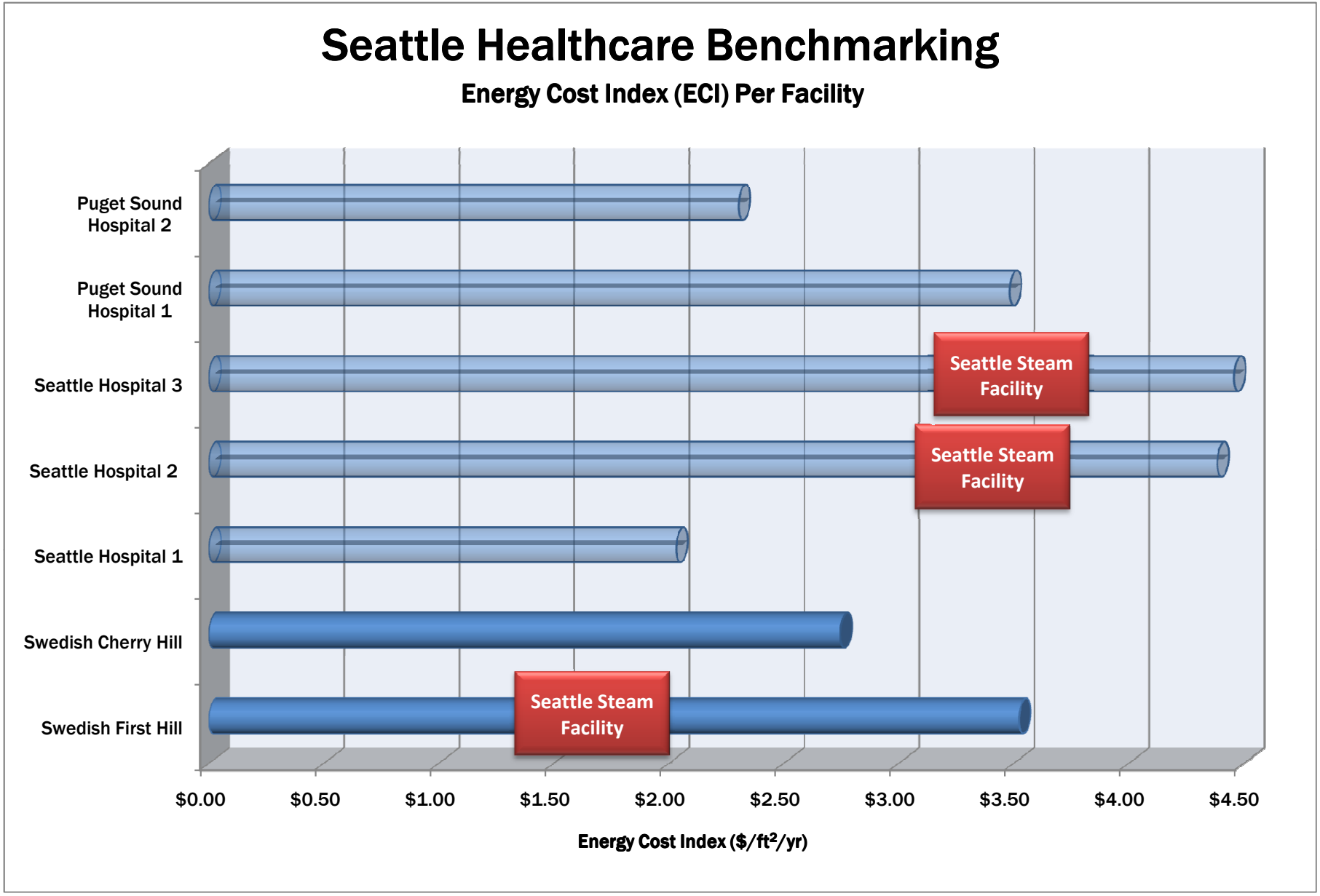


Figure 2.15D Seattle Healthcare Benchmarking: Monthly Heating Vs. HDD

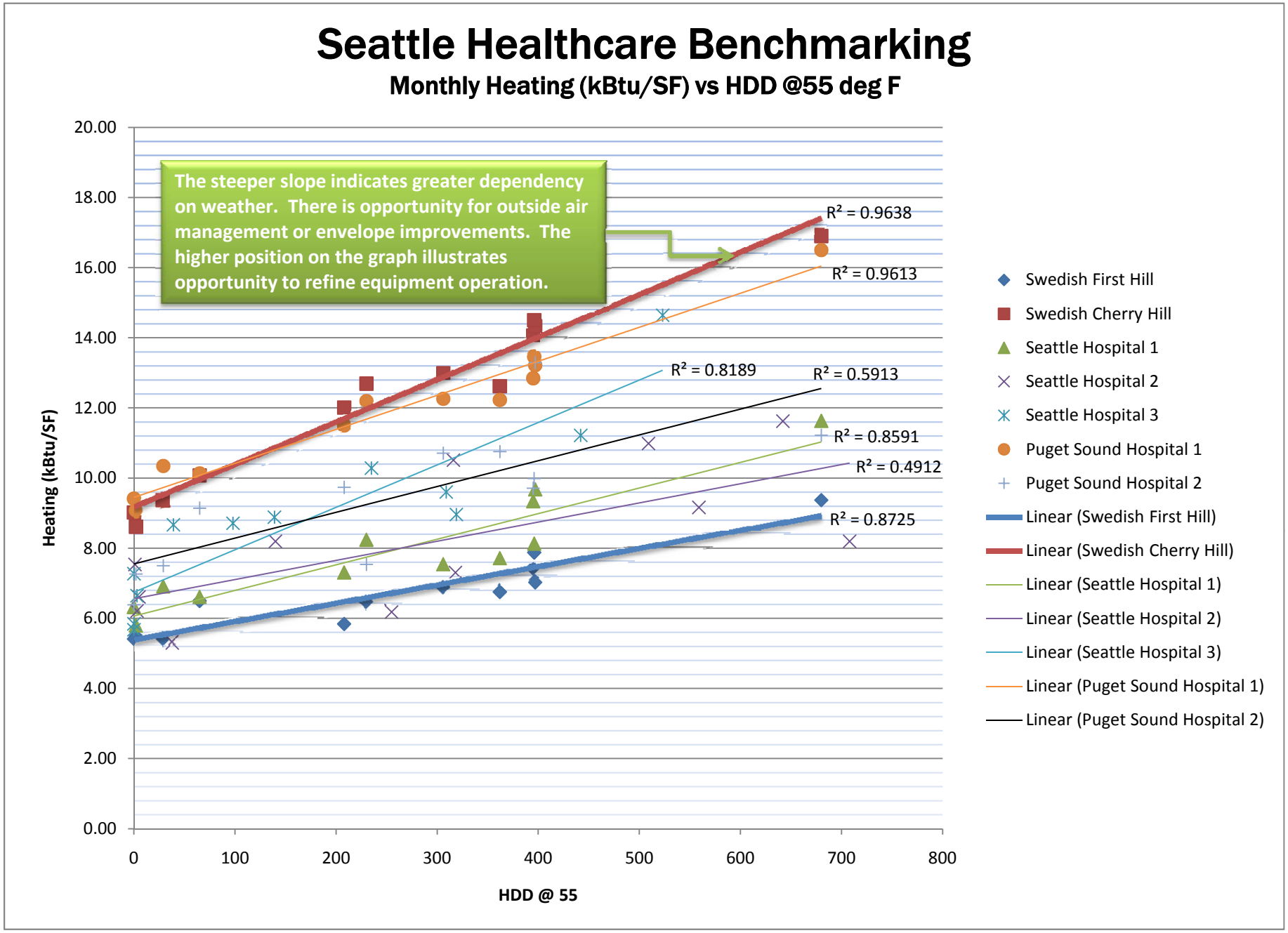
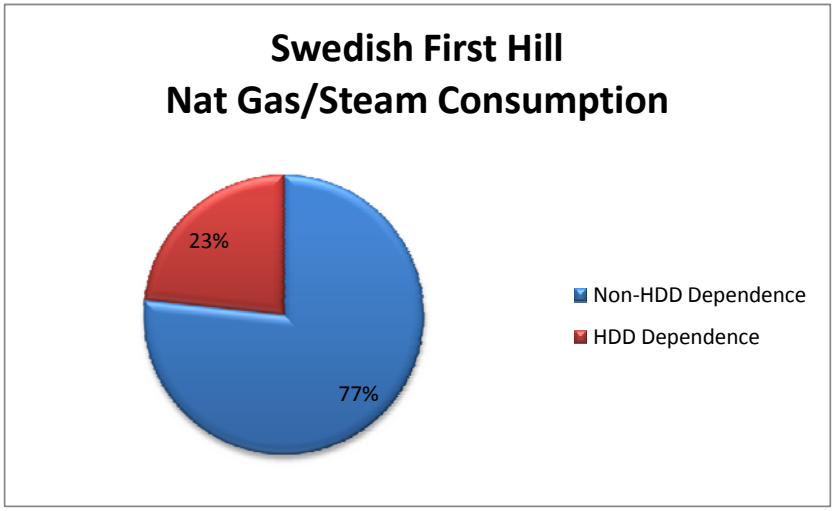
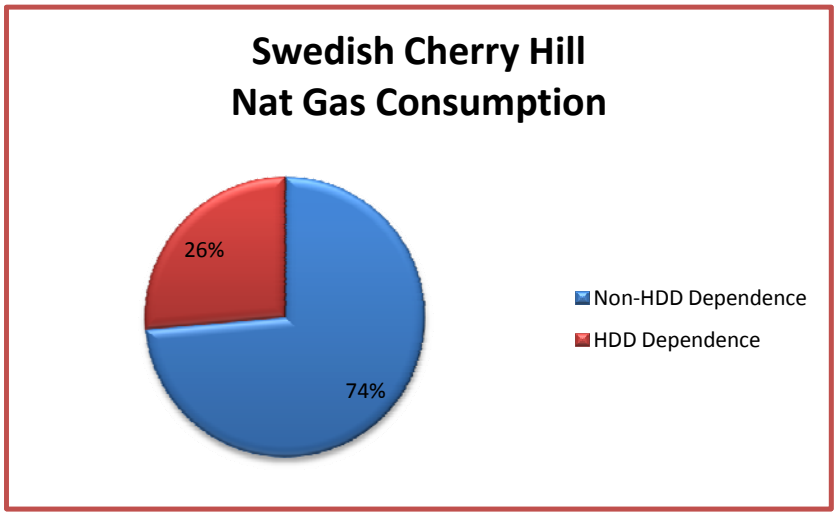
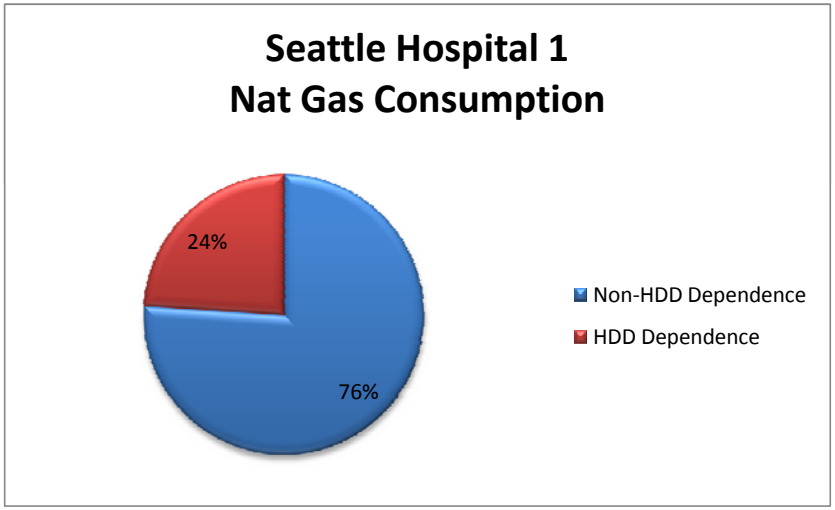


Figure 2.15E Seattle Healthcare Benchmarking: Weather Dependence







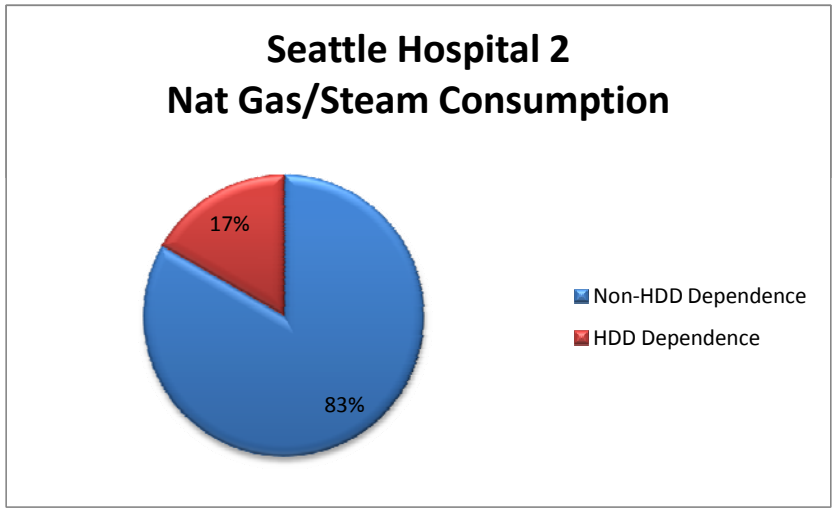
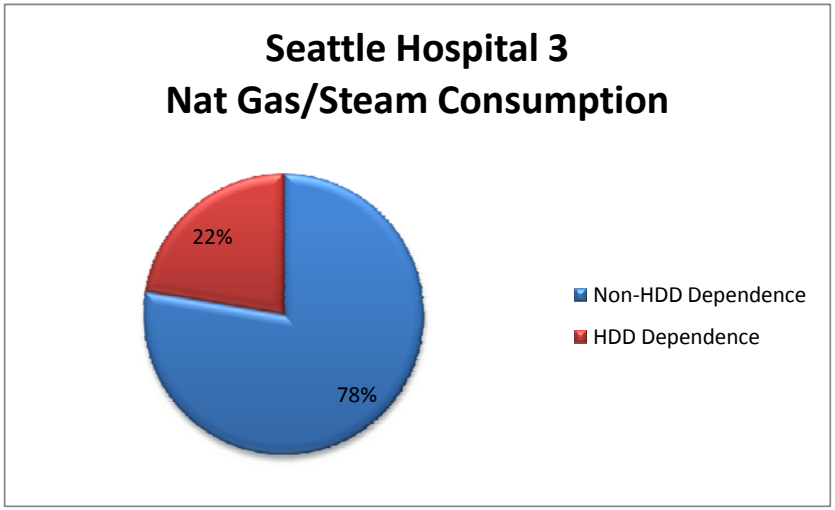
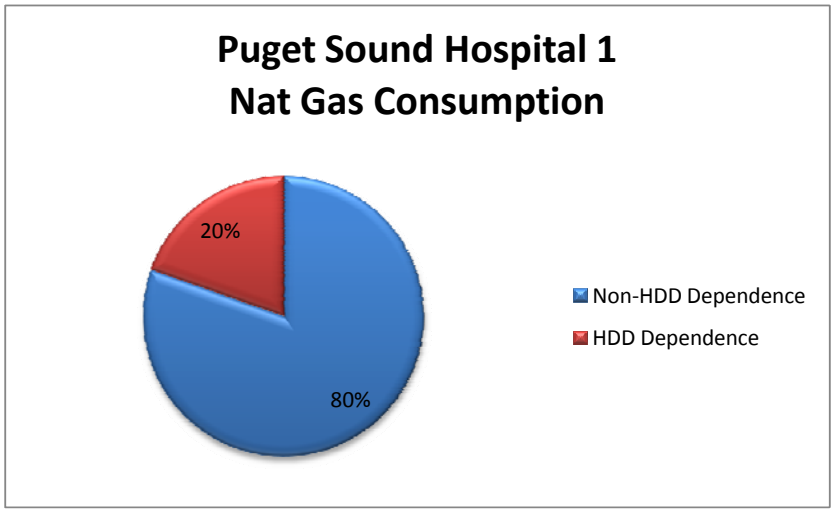


Figure 2.15E Seattle Healthcare Benchmarking: Weather Dependence (Cont'd)





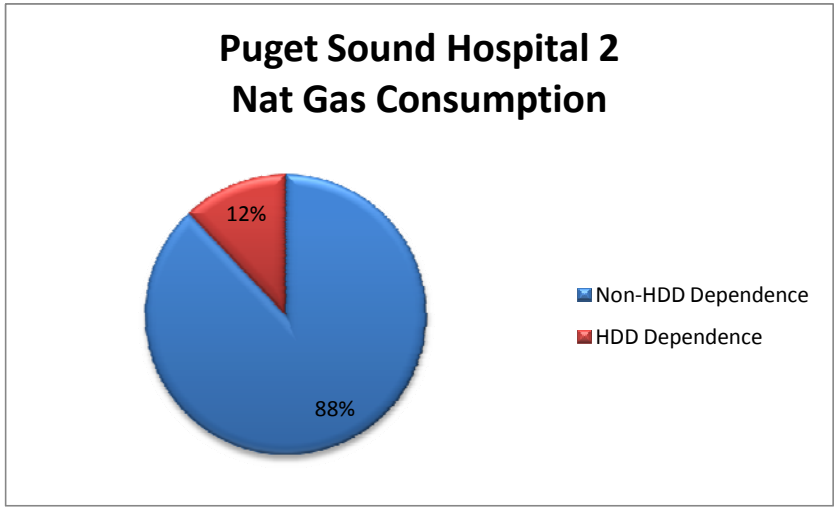
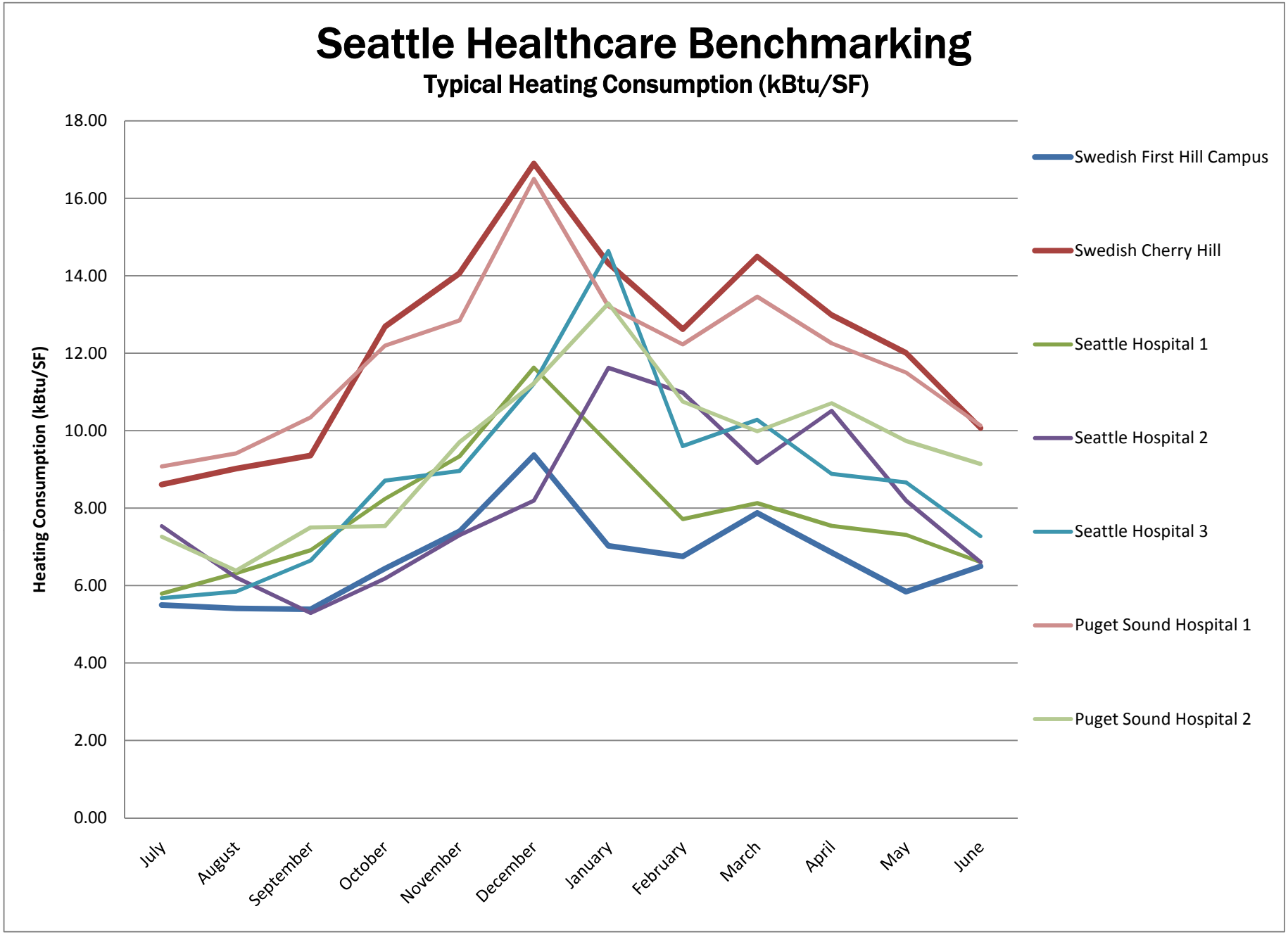


Figure 2.15F Seattle Healthcare Benchmarking: Typical Monthly Heating Consumption



3.0 BUILDING SYSTEM DESCRIPTIONS

3.1 CHERRY HILL CAMPUS BUILDING SYSTEM DESCRIPTIONS

GENERAL FACILITY DESCRIPTION

The Cherry Hill Campus consists of several buildings including Center Building, West Tower, East Tower, South Building, Jefferson Tower, Professional Building and James Tower. During this study, the Jefferson Tower and James Tower are excluded from the scope. For a full campus map, refer to Appendix B.

Swedish confirmed during interviews that their policy for renovations and tenant improvements is to upgrade the envelope as part of these projects. Due to this policy McKinstry was directed by Swedish to focus on previously identified envelope issues, rather than a whole building envelope audit. On the Cherry Hill Campus, the focus is on the Professional building due to pressurization issues due to a leaky envelope and single-pane windows.

HVAC SYSTEM

The West Tower areas are served by three major systems as outlined below.

Tower airside system

The majority of floors 1 through 6 of the West Tower are served by one built up Supply Fan and one Exhaust fan. The system is a 100% outdoor air system with no air recirculation. The supply fan is located on the roof. The air moves through prefilters, final filters, a hot water heating coil, a cooling coil, and the supply fan. The fan is sized to provide 57,500 cfm of air to the six floors. The air is split into two main ducts, one serving the interior of the floors and one serving the perimeter rooms. The interior supply duct is routed through the central shaft and serves pressure independent, hot water reheat boxes on each floor. The duct risers extend downward through all six floors and provide air to room induction units. The room induction units are piped with heating water for individual room heating control.

Air is exhausted from the patient room bathrooms as well as some interior areas. Two exhaust ducts terminate into the central shaft on each floor. The exhaust air is drawn, unducted through the central shaft, by the exhaust fan which is located in the rooftop fan room.

The Tower Exhaust Fan is normally controlled by a static pressure sensor located in the building. The sensor controls the variable frequency drive which modulates the fan flow rate to maintain set-point. However, currently the fan has been manually set at 100% speed and is not controlled by the static pressure sensor.

General Airside System

A built up air handler and exhaust fan comprise the General System. The General System serves A-Level and half of B-Level. The distribution system consists of pressure independent, constant volume, dual duct terminal boxes. The supply fan is located on Level A in the Mechanical Room. The fan intake connects to the combined intake located adjacent to East Cherry Street. The air moves through prefilters, bag type final filters, a steam heating coil, and the supply fan. The fan is designed to provide 46,100 cfm of air. The air splits into a hot supply air duct and a cold supply air duct. The hot duct has a hot water coil followed by a steam heating coil. The cold duct has automatic dampers followed by a cooling coil. The dampers modulate to maintain the static pressure set-point in the ductwork. The result is the airflow rate is varied based on cold air demand from the terminal units. In addition a separate duct, with a cooling coil, serves the Decontamination Area.

The system is a 100% outdoor air system with no air recirculation. Therefore all of the supply air is exhausted from the various rooms. The air is ducted back to the General Exhaust Fan located in the A-Level mechanical

room. The fan discharge combines with the Surgery exhaust fan and discharges the exhaust air through a tunnel and out through a relief opening adjacent to East Cheery Street. The exhaust air opening is located approximately 60 feet from the air intake to avoid any recirculation of the exhaust.

The General Exhaust Fan is controlled by a static pressure sensor located in the building. The sensor controls the variable frequency drive which modulates the fan flow rate to maintain set-point. The current set-point is 0.025 inches w.g. The exhaust fan shares a common discharge with the Surgery Exhaust Fan. Neither fan has discharge backdraft dampers. Therefore the two fans are interlocked electronically, so that if one fan is shut down or loses power then both fans shut down. This prevents the active fan from pressurizing the inactive fans ductwork.

Surgery Airside System

The west half of Level B houses the surgeries and support areas. A separate built up air handler and exhaust fan serve this area. The distribution system consists of pressure independent, constant volume, dual duct terminal boxes. The supply fan is located on Level A in the Mechanical Room. The fan intake connects to the combined intake located adjacent to East Cherry Street. The air moves through prefilters, final filters, a steam heating coil, a cooling coil, and the supply fan. The fan is designed to provide 31,000 cfm of air. The air splits into a hot supply air duct and a cold supply air duct. The hot duct has automatic dampers followed by a hot water coil and a steam heating coil. The dampers modulate to maintain the static pressure set-point in the ductwork. The result is the airflow rate is varied based on hot air demand from the terminal units. The cold duct has a chilled water coil.

The system is a 100% outdoor air system with no air recirculation. Therefore all of the supply air is exhausted from the various rooms. The air is ducted back to the Surgery Exhaust Fan located in the A-Level mechanical room. The fan discharge combines with the General exhaust fan and discharges the exhaust air through a tunnel and out through a relief opening adjacent to East Cherry Street. The exhaust air opening is located approximately 60 feet from the air intake to avoid any recirculation of the exhaust.

The room temperatures are maintained by mixing variable amounts of cold and hot air in the terminal units to match the required conditions. Additional filters are installed downstream of the terminal units which supply the surgeries and other critical areas. This provides additional protection from airborne contaminants.

The Surgery Exhaust Fan is a constant volume fan which operates continuously. There is no additional control on this fan. The exhaust fan shares a common discharge with the General Exhaust Fan. Neither fan has discharge backdraft dampers. Therefore the two fans are interlocked electronically, so that if one fan is shut down or loses power then both fans shut down. This prevents the active fan from pressurizing the inactive fans ductwork.

Labor/Delivery/Recovery

In 1984, the first floor courtyard was remodeled into a Labor/Delivery/Recovery area. The space includes several birthing rooms, C-section delivery rooms, and support areas. A packaged built-up air handling unit (AHU) serves this area. The AHU consists of a supply fan and exhaust fan. The supply air moves through prefilters, the supply fan, a steam pre-heat coil, and cooling coil before entering the ductwork. Final filters are located in the ductwork as well as reheat coils for individual temperature control. The air is exhausted from each space and is ducted back to the AHU.

East Tower

AHU-13 and AHU-16 serve the east and west sides of the floors 2-6. Both AHU's are VAV systems and have return air, hot water coils and chilled water coils. AHU-14 is the kitchen makeup air unit with 100% OSA and 2-pipe chilled water or hot water coils. AHU-15 serves the dining room areas with return air and 2-pipe chilled water or hot water coils. AHU-19 is a VAV system with return air, chilled water coils serving the auditorium.

Center Building

Building System Descriptions

The Center Building has two separate mechanical rooms. In the basement mechanical room, there are four AHU's (AHU-1 through AHU-4) serving the building Level A and B. AHU-1 includes return air, hot water heating coils and chilled water cooling coils serving the Cath labs with supply and exhaust terminal boxes in the zones to maintain the zone temperature set-point, air change rate and pressure relationship. AHU-3 includes return air, hot water heating coils and chilled water cooling coils serving the Cardiovascular OR suites with supply and exhaust terminal boxes in the zones to maintain the zone temperature set-point, air change rate and pressure relationship. AHU-2 and AHU-4 also includes return air and 2-pipe chilled water or hot water coils serving some offices, exam rooms and treatment rooms. All the supply and return fans have VFD's.

AHU-5 through AHU-9 are located in the penthouse mechanical room. AHU-5, AHU-7 and AHU-9 have return air and chilled water coils. AHU-6 and AHU-8 are 100% outside air systems and chilled water coils. AHU-8 also contains one air side heat recovery coil to recover the heat from exhaust air, but the run around loop has been abandoned, but the heat recovery coils are still in place.

Jefferson Tower

AHU-21 is located in the radiation oncology mechanical room and it includes return air and 2-pipe hot water or chilled water coils.

South Building

South Building is mainly surgery suites. AHU-10 and AHU-11 are VAV systems and include return air, hot water coils and chilled water coils. There are supply and exhaust terminal boxes in the zones to maintain the zone temperature set-point, air change rate and pressure relationship. The zone level terminal boxes also contain hot water reheat coils and humidifiers.

Professional Building

The building is served by one central air handling unit AHU-61 with supply and return fans and chilled water coils. AHU-61 is a VAV AHU with VAV boxes in the zone and the perimeter VAV boxes have electric resistance reheat. The perimeter zones also have electric baseboard heating. During the site visit, it was observed that the outside air damper actuator operation was problematic. It was reported that the AHU has not enough air flow. The building has full DDC down to the terminal box level. The existing system is Siemens Staefa DDC system.

HEATING

Boiler Plant

Boiler 1
Kiehler Boiler originally installed in about 1964 with Cohen Burner that was rebuilt in 2003-2004 with Autoflame controls (Proctor Sales). 28,000 #/ Hour capacity.

Boiler 2
Kiehler Boiler originally installed in about 1964 with Cohen Burner that was rebuilt in 2003-2004 with Autoflame controls (Proctor Sales). 28,000 #/ Hour capacity.

Boiler 3
Cleaver Brooks 350 BHP fire tube Boiler originally installed in about 1991. In 2007 the burner was rebuilt by Cole Industrial and derated to 238 BHP so it did not have to comply with Pudget sound air polution criteria (single digit NOX with as little as 4-1 turndown). Originally the boiler had about 14,000 #/ Hour capacity. Now has about 8200 #/ Hour with turn down to about 1200 #/ hour. The boiler input had to be less than 10,000,000 BTUH.

Building System Descriptions

COOLING

Chiller Plant

There are several chiller plants providing chilled water to the buildings. The Center Building chiller plant contains three chillers. CH-1 is a 333-ton Carrier R-134A chiller with VFD. CH-3 is a 320-ton Trane R-11 chiller. CH-15 is a 111-ton Trane R-22 pony chiller. These chillers are on the same chilled water loop and have total cooling capacity of 764 ton providing cooling for South Building, Jefferson Tower and Center Building. Two open cooling towers and one fluid cooler located on the roof reject the condenser heat from the chillers. All the cooling tower fans have VFD's.

The West Tower chiller plant contains three chillers. CH-4 is a 260-ton Trane R-11 chiller. CH-5 is a 309-ton Trane R-22 chiller. CH-7 is a 104-ton Trane R-22 pony chiller. This chiller plant has total cooling capacity of 673 ton. The East Tower chiller plant contains one chiller, CH-6 which is a 500-ton Trane R-11 chiller. The West Tower and East Tower chiller plant tie into one chilled water loop providing cooling for West Tower, East Tower, and Professional Building. Two open cooling towers located on the roof reject the condenser heat from the chillers. The cooling tower fans on the West Tower roof have VFD's. The cooling tower fans on the East Tower roof operate at constant speed.

CHILLER	CH-01	CH-03	CH-04	CH-05	CH-06	CH-07	CH-15
BLDG	CB	CB	WT	WT	ET	WT	CB
YEAR INSTALLED	2004		1984	1994	1989	2005	2002
TONS	333	320	260	309	500	104.4	111.4
MFR	CARRIER	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE
MODEL #	19XRV2122277BHS		CVHE 025 GB	RTHA300	CVHE050FA	RTWA-100	RTWA-100
SERIAL #							
REFRIDGERANT	R-134a	R-11	R-11	R-22	R-11	R-22	R-22
EVAP EWT	54		52	52	55	54	55
EVAP LWT	44		44	42	45	44	42
EVAP GPM	800		780	741	1200	250	199
EVAP DP (FT)	17.4		25	24	25.3	15.5	10.1
MIN. GPM	367						
EVAP K FACTOR (GPM)	263	193	215.4	209.2	328.7	89.3	86.9
EVAP K FACTOR (GPM)	167	123	137	133	328.7	56.8	55.3
COND EWT	80		85	80	85	85	80
COND LWT	90		95	89.4	94.6	95	90
COND GPM	944		735	930	1500	305	319
COND DP (FT)	13.2		18.5	22	23.7	14.3	15.7
MIN. GPM	467						
KW @ FULL LOAD	212		167	189	344	87	83.5
RLA / COMPRESSOR	315		229	273	502	72	72
LRA / COMPRESSOR			1475	1272	2763	410	410
MCA / CHILLER	356					162	162
MOP AMPS						225	

BUILDING CONTROLS

Most of the air handling units and chillers are equipped with DDC control. There are three brands of DDC control on the campus: Honeywell, Alerton and Siemens. The Jefferson Tower AHU-21 control is on the Alerton

system. The Professional Building has Siemens control to the terminal box level. The majority of the mechanical system controls are on Honeywell DDC system.

PLUMBING

A detailed audit of the plumbing fixtures at Swedish Cherry Hill was performed. For detailed fixture counts and condition descriptions, please refer to Appendix C.

LIGHTING SYSTEMS

The lighting throughout accessible spaces on the Cherry Hill campus is primarily two-lamp T8, and many have switches which are turned off as part of office closing. The hospital does have a small amount of T12 lighting remaining. In the west tower, some patient rooms have been converted to offices but still have patient room fixtures. This measure will install T8 fixtures in identified areas and provide daylighting and occupancy sensors where optimal. There is also opportunity to provide LEDs for a number of downlights. Refer to Appendix C for detailed lighting descriptions.

Table 3.1A: Swedish Cherry Hill Supply and Exhaust Fan Equipment Information

Swedish Medical Center - Cherry Hill Campus
Building HVAC equipment schedule-Fans

KEY:			
HRC	Heat recovery	BPV	Bypass valve
ERW	Energy recovery wheet (heat wheel)	HRV	Heat recovery control valve (gpm)
STPRH	Steam preheat (lb/hr)	CHMV	Chilled Water control valve (gpm)
HWPRH	Hot water preheat	STMV	Steam control valve (lb/hr)
SHX	Steam heat exchanger (gpm)	HWV	Hot water control valve (gpm)
		STMV	Steam control valve (lb/hr)

#	Building	Location	Type	Tag	System	Areas Served	Control	HP	Volt	Amp	Qty	Capacity		Pressure
1	Center Building	Center Building Basement	AHU	AHU01	AHU with RA, HW preheat, chilled water, VAV SF.	AHU 1 CTR BLDG level A areas BA and BD (CATH and EP LABs)	Honeywell DDC	60	460	71	1	40000		6.5
2	Center Building	Center Building Basement	AHU	AHU02	AHU with RA, chilled water, VAV SF.	AHU 2 SERVING LEVEL A AREAS A&B, LEVEL B AREA A	Honeywell DDC		460		1			
3	Center Building	Center Building Basement	AHU	AHU03	AHU with RA, HW preheat, chilled water, VAV SF.	AHU 3 CTR BLDG level B AREA BB (CVOR) also temp feed to IR Body in West Tower B level	Honeywell DDC	75	460	88	1	25000		10
4	Center Building	Center Building Basement	AHU	AHU04	AHU with RA, 2-pipe hot water or chilled water, VAV SF.	AHU 4 CTR BLDG Level A AREA AC (EMERGENCY Department)	Honeywell DDC		460		1			
5	Center Building	Center Building Penthouse	AHU	AHU05	AHU with RA, chilled water, CV SF.	AHU 5 CTR BLDG AREA 1D HEART CTR	Honeywell DDC		460		1	10280		5.6
6	Center Building	Center Building Penthouse	AHU	AHU06	AHU 100% OSA, chilled water, CV SF.	AHU 6 CTR BLDG level 2 AREAS 2C & 2D Intesive care Units	Honeywell DDC		460		1			
7	Center Building	Center Building Penthouse	AHU	AHU07	AHU with RA, chilled water, CV SF.	AHU 7 CTR BLDG AREAS 1A & 1B (ADDMITTING)	Honeywell DDC		460		1	10880		6.4
8	Center Building	Center Building Penthouse	AHU	AHU08	AHU 100% OSA with heat recovery coil abandoned, chilled water, CV SF.	AHU 8 CTR BLDG Level 2, AREAS 2A & 2B (Intensive Care Units)	Honeywell DDC		460		1			
9	Center Building	Center Building Penthouse	AHU	AHU09	AHU with RA, chilled water, CV SF.	AHU 9 CTR BLDG (OLD AHU 5A) AREA 1C	Honeywell DDC		460		1	6340		4.9
10	South Building	South Building Basement	AHU	AHU10	AHU with RA, HW preheat, chilled water, VAV SF.	SOUTH BUILDING LEVEL B	Honeywell DDC	125	460	139	1	50000		9.4
11	South Building	South Building Basement	AHU	AHU11	AHU with RA, HW preheat, chilled water, VAV SF.	SOUTH BUILDING LEVEL A	Honeywell DDC	100	460	109	1	44000		8
12	East Tower	East Tower Level A	AHU	AHU13	AHU with RA, HW preheat, chilled water, VAV SF.	AHU13 SERVES EAST SIDE OF EAST PATIENT TOWER FLOORS 2 THOUGH 6 (OLD AHU 1)	Honeywell DDC		460		1	32580		5
13	East Tower	East Tower Level A	AHU	AHU14	AHU 100% OSA with 2-pipe chilled water or hot water, CV SF.	AHU 14 (OLD AHU 2) SERVES KITCHEN	Honeywell DDC		460		1	11960		5.5
14	East Tower	East Tower Level A	AHU	AHU15	AHU with RA, 2-pipe hot water or chilled water, CV SF.	AHU 15 (OLD AHU 3) FEEDS DINNING AREA	Honeywell DDC		460		1	19970		5
15	East Tower	East Tower Level A	AHU	AHU16	AHU with RA, hot water, chilled water, VAV SF.	AHU16 SERVES EAST END OF EAST PATIENT TOWER FLOORS 2 THOUGH 6 (OLD AHU 4)	Honeywell DDC		460		1			
16	East Tower	East Tower Level A	AHU	AHU17		AHU 17 (OLD AHU 5) SERVES MECHANICAL ROOM	Honeywell DDC				1			
17	East Tower	East Tower Level A	AHU	AHU18		AHU 18 (OLD AHU 6) SERVES EAST TOWER ELEVATOR PENTHOUSE	Honeywell DDC		440		1			
18	East Tower	East Tower Level A	AHU	AHU19	AHU with RA, chilled water, VAV SF.	AHU 19 (OLD AHU 7) SERVES AUDITORIUM	Honeywell DDC		460		1			
19	Jefferson Tower	Radiation Oncology Mechanical Room	AHU	AHU21	AHU with RA, 2-pipe hot water or chilled water, VAV SF.	AHU 21 SERVES Jefferson Tower Level B North (Storage)	Alerton DDC	40	460	47	1	18000		7
20			AHU	AHU22		MRI COMPUTOR ROOM COOLING								

#	Building	Location	Type	Tag	System	Areas Served	Control	HP	Volt	Amp	Qty	Capacity		Pressure
21	West Tower	West Tower Level A	AHU	AHU31	AHU 100% OSA, preheatig and precooling coil, chilled water in cold deck and hot water and steam in hot deck, CV SF.	AHU 31 GENERAL SURGERY	Honeywell DDC	50	460		1	31000		7
22	West Tower	West Tower Level A	AHU	AHU32	AHU 100% OSA, preheatig coil, chilled water in cold deck and hot water and steam in hot deck, CV SF.	AHU 32 (GENERAL) ALL A LEVEL,EAST B LEVEL	Honeywell DDC	75	460		1	46100		6
23	West Tower	West Tower Level A	AHU	AHU33		AHU 33 (OLD TOWER FAN) Out of Service			460		1			
24	West Tower		AHU	AHU34		AHU 34 West Tower Level A West (old MATERIALS MANAGMENT OFFICES)			460		1			
25	West Tower	West Tower Low Roof	AHU	AHU35		AHU 35 Serves West Tower Level 1 South (old LDR)			460		1	10880		6.4
26	West Tower	West Tower Roof	AHU	AHU36	AHU 100% OSA with RA fan and duct, hot water and chilled water, VAV SF	WEST TOWER ROOFTOP UNIT SERVES WEST TOWER Levels 1-6	Honeywell DDC	100	460		1	58000		7.5
27	Annex		AHU	AHU51		AHU 51 ANNEX ROOFTOP UNIT SERVES 2ND FLOOR			460		1			
28	Annex		AHU	AHU52		AHU 52 Annex			460		1			
29	Central Plant		AHU	AHU55		AHU55 FACILITIES ENGINEERING FRONT OFFICE AHU			460		1			
30			AHU	AHU56		AHU 56 MAIN PHONE SWITCH ROOM / DATA ROOM WATER COOLED UNIT			460		1			
31			AHU	AHU57		AHU 57, BACKUP UNIT FOR MAIN PHONE SWITCH / DATA ROOM (DX UNIT)		5	460	6.2	1	10000		2.9
32	Professional Building		AHU	AHU61	AHU with RA, chilled water, VAV SF.	AHU 61 MAIN PPB AHU	Siemens Staefa DDC	75	460	96	1	55000	4.5	
33	Professional Building		AHU	AHU64		AHU 64 PPB SUITE 404 SURGERY			460		1			
34			AHU	AHU71	AHU 100% OSA, heat whell, hot water, chilled water, CV SF	AHU71 LARGE AC UNIT IN CORNER OF COMPUTOR RM	Honeywell DDC							
35	James Tower		AHU	AHU95		AHU95 SERVING JAMES TOWER LEVEL 1 SOUTH SWEDISH EDUCATIONAL CONFERENCE CENTER	Alerton DDC							
36	Center Building	Center Building Basement	SF	SF01		FANS - SUPPLY FAN 1 SERVING CENTER BUILDING LEVEL B AREAS C AND D (EP & CATH)								
37	Center Building	Center Building Basement	SF	SF02		FANS - SUPPLY FAN 2 SERVING CENTER BUILDING LEVEL B AREAS A, LEVEL A AREA A & B								
38	Center Building	Center Building Basement	SF	SF03		FANS - SUPPLY FAN 3 SERVING CENTER BUILDING LEVEL B AREAS B (CV SURGERY)								
39	Center Building	Center Building Basement	SF	SF04		FANS - SUPPLY FAN 4 SERVING CENTER BUILDING LEVEL A AREAS C (EMERGENCY DEPT)								
40	Center Building	Center Building Penthouse	SF	SF05		FANS - SUPPLY FAN 5 SERVING CENTER BUILDING LEVEL 1 AREA C (HEART CENTER)								
41	Center Building	Center Building Penthouse	SF	SF06		FANS - SUPPLY FAN 6 SERVING CENTER BUILDING LEVEL 2 AREAS C & D								
42	Center Building	Center Building Penthouse	SF	SF07		FANS - SUPPLY FAN 7 SERVING CENTER BUILDING LEVEL 1 AREAS A & B (ADMITTING)								
43	Center Building	Center Building Penthouse	SF	SF08		FANS - SUPPLY FAN 6 SERVING CENTER BUILDING LEVEL 2 AREAS A & B								

#	Building	Location	Type	Tag	System	Areas Served	Control	HP	Volt	Amp	Qty	Capacity		Pressure
44	Center Building	Center Building Penthouse	SF	SF09		FANS - SUPPLY FAN 9 SERVING CENTER BUILDING LEVEL 1 AREAS C (OLD 5A)								
45	South Building	South Building Basement	SF	SF10		SOUTH BUILDING LEVEL B								
46	South Building	South Building Basement	SF	SF11		SOUTH BUILDING LEVEL A								
47			SF	SF12		FANS - WEST TOWER BODY IR BOOSTER FAN								
48	East Tower	East Tower Level A	SF	SF13		FANS - FAN, SUP.AHU-1 ET								
49	East Tower	East Tower Level A	SF	SF14		FANS - FAN,SUP.AHU-2 ET								
50	East Tower	East Tower Level A	SF	SF15		FANS - FAN,SUP.AHU-3 ET								
51	East Tower	East Tower Level A	SF	SF16		FANS - FAN, SUP. AHU-4 ET								
52	East Tower	East Tower Level A	SF	SF17		FANS - FAN, SUP.AHV-5 ET								
53	East Tower	East Tower Level A	SF	SF18		FANS - FAN, SUP.AHV-6 ET								
54	East Tower	East Tower Level A	SF	SF19		FANS - FAN, SUP.AHV-7 ET								
55	Jefferson Tower	Radiation Oncology Mechanical Room	SF	SF21		FANS - RAD. ONC. AHU SF								
56			SF	SF26		FANTF - B16C MAKEUP AIR (TRANSFER FAN)								
57	West Tower	West Tower Level A	SF	SF31		FANS - FAN, SUP. SURGERY WT								
58	West Tower	West Tower Level A	SF	SF32		FANS - GENERAL SUPPLY FAN								
59	West Tower	West Tower Level A	SF	SF33		FANS - FAN, SUP. TOWER WT								
60			SF	SF34		FANS - MAT. MGT.								
61	West Tower	West Tower Low Roof	SF	SF35		FANS - Supply Fan 35 serving Level 1 South, West Tower (old LDR)								
62	West Tower	West Tower Roof	SF	SF36		FANS - FAN,SUP.VAULT T/751 WT								
63			SF	SF37		FANS - WAREHOUSE SUPPLY FAN								
64			SF	SF51		FANS - SUPPLY FAN TO AHU51N								
65			SF	SF57		FANS - FAN, GARAGE SUPPLY FAN LEVEL P1								
66			SF	SF58		FANS - FAN, GARAGE SUPPLY FAN LEVEL P3								
67			SF	SF64		FANS - FAN, SUP. 404 PPB								
68	James Tower		SF	SF 095		SF095 SUPPLY FAN SERVING JAMES TOWER LEVEL 1 SOUTH SWEDISH EDUCATIONAL CONFERENCE CENTER								
69			EF	EF01		FANE - EF 1 SERVES B LEVEL AREA A HOT ROOM								
70			EF	EF02		FANE - EF 2 REST ROOM EXH. LEVEL B AREA A								
71			EF	EF03		FANE - EF 3 LEVEL 3 AREA A ALSO TB EXHAUST FOR A13C,A14C,A16C								
72			EF	EF04		FANE - EF 4 REST ROOMS LEVEL A AREA A								
73			EF	EF05		FANE - EF 5 SOILED UTILITY ROOMS LEVEL A AREA B								
74			EF	EF06		FANE - EF 6 (OLD RF-6) SERVES CCU AREAS								

#	Building	Location	Type	Tag	System	Areas Served	Control	HP	Volt	Amp	Qty	Capacity		Pressure
75			EF	EF07		FANE - SEE RETURN FAN 7								
76			EF	EF08		FANE - EF 8 (OLD RETURN FAN 8)								
77			EF	EF09		FANE - EF 9 (S1)STAIRWELL EXHAUST FAN								
78			EF	EF10		FANE - EF 10 LEVEL 2 AREA A SOILED UTILITY ROOMS								
79			EF	EF11		FANE - EF 11 LEVEL 2 AREA B REST ROOMS								
80			EF	EF12		FANE - EF 12 SERVES LEVELS A&B AREA C REST ROOMS								
81			EF	EF13		FANE - EF 13 SERVES LEVEL B AREA C SOILED UTILITY ROOMS								
82			EF	EF14		FANE - EF 14 LEVEL 1 AREA C TOILETS								
83			EF	EF15		FANE - EF 15 LEVEL 2 AREA C DARK ROOM								
84			EF	EF16		FANE - EF 16 LEVEL 2 AREA'S C & D TOILETS								
85			EF	EF17		FANE - EF 17 LEVEL B AREA D DARKROOMS								
86			EF	EF18		FANE - EF 18 LEVEL B AREA D LAB								
87			EF	EF19										
88			EF	EF20		FANE - EF 20 LEVEL A AREA D GENERAL EXHAUST								
89			EF	EF21		FANE - EF 21 LEVEL 1 AREA D LABS								
90			EF	EF22		FANE - EF 22 (OLD EF-07)								
91			EF	EF23		FANE - EF 23 (OLD EF-8)								
92			EF	EF27		FANE - EF 27 CV ROOMS 16 AND 17 EDIT								
93			EF	EF28		FANE - EF 28 CV ROOMS 14 AND 15 EDIT								
94			EF	EF29		FANE - EF 29 ISOLATION ROOMS								
95			EF	EF30		FANE - EF 30 CB TB ISOLATION EFON ROOF								
96			EF	EF31		SOUTH BUILDING EF								
97			EF	EF31		FANE - EF 31 TRANSFORMER ROOM (CITY LIGHT VAULT)								
98			EF	EF32		CB MECH ROOM EF NEEDS TO BE ADDED								
99			EF	EF34		FANE - EF 34 SPARE (DID SERVE STAT LAB HOOD)								
100			EF	EF41		FANE - EF 41 EAST TOWER MAIN EXHAUST (OLD EF 1)								
101			EF	EF42		FANE - EF 42 (OLD KEF 2)								
102			EF	EF43		FANE - EF 43 KITCHEN EXHAUST (OLD KEF 3)								
103			EF	EF44		FANE - EF 44 SERVES CHILLER ROOM A10E (OLD EF 4)								
104			EF	EF45		FANE - EF 45 SERVES DIETARY DISHWASHER (OLD EF 5)								
105			EF	EF46		FANE - EF 46 SERVES CONTROL AIR COMPRESSOR ROOM A09E (OLD EF 6)								
106			EF	EF47		FANE - TB EXHAUST FAN, EAST TOWER								
107			EF	EF48		FANE - TB EXHAUST FAN, EAST TOWER								
108			EF	EF54		FANE - EF 54 3T MRI EMERGENCY PURGE EXHAUST FAN								
109			EF	EF55		FANE - EF 55 1.5T MRI EMERGENCY PURGE EXHAUST FAN								
110			EF	EF56		FANE - EF 56 RADIATION ONCOLOGY EXHAUST FAN								
111			EF	EF57		FANE - EF 57 SB GARAGE EXHAUST FAN LEVEL PB								
112			EF	EF58		FANE - EF 58 SB GARAGE EXHAUST FAN LEVEL PC								

#	Building	Location	Type	Tag	System	Areas Served	Control	HP	Volt	Amp	Qty	Capacity		Pressure
113			EF	EF59		FANE - EHAUST FAN 59 ON TOP OF PPB (OLD ETO EF)								
114			EF	EF60		FANE - EHAUST FAN 60 ON TOP OF PPB (OLD ETO EF)								
115			EF	EF61		FANE - EF 61 (OLD EF 1) PPB SAME DAY SURGERY								
116			EF	EF62		FANE - EF 62 (OLD EF-2) PPB SAME DAY SURGERY								
117			EF	EF63		FANE - EF 63 (OLD EF 3) PPB SAME DAY SURGERY								
118			EF	EF64		FANE - EF 64 (OLD EF 4) PPB SAME DAY SURGERY								
119			EF	EF65		FANE - EF 65 PUBLIC REST ROOM EXHAUST, PPB								
120			EF	EF66		FANE - EF 66 PPB ETO EXHAUST SERVES PROCCESSING ETO SYSTEM								
121			EF	EF67		FANE - EF 67 PPB ETO EXHAUST SERVES PROCCESSING ETO SYSTEM								
122			EF	EF68		FANE - REST ROOM EXHAUST SUITE 100								
123			EF	EF69		EF069 EXHAUST FAN SERVING PPB LEVEL 1 SOUTH ELEVATOR MACHINE ROOM.								
124			EF	EF70		FANE - EF 70 PPB LEVEL B ELEVATOR ROOM EXHAUST FAN								
125			EF	EF71		FANE - EF 71 GENERAL SURGERY EXHAUST								
126			EF	EF72		FANE - EF 72 SERVES B, A/B & A LEVELS OF THE WEST TOWER COMPLETE								
127			EF	EF73		FANE - EF 73 (OLD TOWER EXHAUST FAN)								
128			EF	EF74		FANE - EF 74 CART WASH EXHAUST FAN DEMO'D THIS FAN?								
129			EF	EF75		FANE - EF 75 SERVES GENERAL SURGERY DECONTAM ROOM								
130			EF	EF77		FANE - EF 77 SERVES (A42W) WASTE CHEMICAL ROOM								
131			EF	EF78		FANE - EF 78 SERVES BACK AREA OF FLAMABLE STORAGE ROOM								
132			EF	EF79		FANE - EF 79 SERVES FRONT AREA OF FLAMABLE STORAGE ROOM								
133			EF	EF80		FANE - EF 80 SERVES (A44W) TANK STORAGE ROOM								
134			EF	EF81		FANE - EF 81 Level 1 South West Tower EXHAST FAN (old LDR)								
135			EF	EF82		FANE - EF 82 RECIEVING WHEREHOUSE EXHAUST FAN								
136			EF	EF84		FANE - EF 84 ELEVATOR PENTHOUSE EXHAUST (ELEV. 11, 12)								
137			EF	EF85		FANE - EF 85 WEST TOWER EAST SHAFT EXHAUST								
138			EF	EF86		FANE - EF 86 WEST TOWER WEST SHAFT EXHAUST								
139			EF	EF87		FANE - EF 87 MATERIALS MANAGEMENT AND BIO HAZARD ROOM								
140			EF	EF88		FANE - EF 88 DOCUMENT CENTER EXHAUST FAN								

#	Building	Location	Type	Tag	System	Areas Served	Control	HP	Volt	Amp	Qty	Capacity		Pressure
141			EF	EF89		FANE - EF 89 WT LEVEL 6 OLD CFH FAN ON ROOF								
142			EF	EF90		FANE - EF 90 WT TB EXHAUST ON ROOF								
143			EF	EF91		FANE - EF 91 GENERATOR ROOM EXHAUST (OLD EF-1)								
144			EF	EF92		FANE - EF 92 GENERATOR CONTROL ROOM EXHAUST (OLD EF-2)								
145			EF	EF94A		FANE - EF 94A BOILER ROOM EXHAUST FAN								
146			EF	EF94B		FANE - EF 94B BOILER ROOM EXHAUST FAN								
147			EF	EF95		FANE - EF 95 JOHN'S LOFT								
148			EF	EF095		EF095 EXHAUST FAN SERVING JAMES TOWER LEVEL 1 SOUTH SWEDISH EDUCATIONAL CONFERENCE CENTER								
149			EF	EF96		FANE - EF 96 TUNNEL TRANSFER FAN (FROM TUNNEL TO BOILER ROOM)								
150			EF	EF97		FANE - EF 97 JAMES TOWER LEVEL 6 SOUTHWEST CARDIO CLINIC								
151			EF	EF98		CHPB SUITE 404 SURGERY SUITE GENERAL EXHAUST								
152			EF	EF99		CHPB SUITE 404 SURGERY SUITE SMOKE EXHAUST								
153			EF	EF100		CHPB LEVEL 1 ELEV MACH RM EXHAUST								
154			RF	RF07		FANR - RETURN FAN 7								
155			RF	RF10		SOUTH BUILDING LEVEL B								
156			RF	RF11		SOUTH BUILDING LEVEL A								
157			RF	RF12		CHPB SUITE 404 SURGERY SUITE								
158			RF	RF13		FANR - RF 13 (OLD RF-1)								
159			RF	RF16		FANR - RF 16 (OLD RF-4)								
160			RF	RF21		FANR - RF 21 RADIATION ONCOLOGY RETURN FAN								
161			RF	RF61		FANR - RF 61 PPB MAIN RETURN FAN								
162			RF	RF62		FANR - RF 62 (OLD RF-1) SAME DAY SURGERY								
163			RF	RF095		RF095 RETURN FAN SERVING JAMES TOWER LEVEL 1 SOUTH SWEDISH EDUCATIONAL CONFERENCE CENTER								

Table 3.1B: Swedish Cherry Hill Chiller Equipment Information

Swedish Medical Center - Cherry Hill Campus
Building HVAC equipment schedule-Chillers

	Building	Location	Tag	YEAR INSTALLED	TONS	MFR	MODEL #	REFRIDGERANT	EVAP EWT	EVAP LWT	EVAP GPM	EVAP DP (FT)	MIN. GPM	COND EWT	COND LWT	COND GPM	COND DP (FT)	MIN. GPM
1	CB	Center Building Basement Mechanical Room	CH-01	2004	333	CARRIER	19XRV2122277BHS	R-134a	54	44	800	17.4	367	80	90	944	13.2	467
2	CB	Center Building Basement Mechanical Room	CH-03		320	TRANE		R-11										
3	WT	West Tower Basement Mechanical Room	CH-04	1984	260	TRANE	CVHE 025 GB	R-11	52	44	780	25		85	95	735	18.5	
4	WT	West Tower Basement Mechanical Room	CH-05	1994	309	TRANE	RTHA300	R-22	52	42	741	24		80	89.4	930	22	
5	ET	East Tower Mechanical Room	CH-06	1989	500	TRANE	CVHE050FA	R-11	55	45	1200	25.3		85	94.6	1500	23.7	
6	WT	West Tower Basement Mechanical Room	CH-07	2005	104.4	TRANE	RTWA-100	R-22	54	44	250	15.5		85	95	305	14.3	
7	CB	Center Building Basement Mechanical Room	CH-15	2002	111.4	TRANE	RTWA-100	R-22	55	42	199	10.1		80	90	319	15.7	

Table 3.1C: Swedish Cherry Hill Pump Equipment Information

Swedish Medical Center - Cherry Hill Campus

Building HVAC equipment schedule-Pumps

KEY:			
CHW	Chilled Water	Condensate	Condensate Return
HW	Heating Hot Water	CDW	Condenser Water
DHW	Domestic Hot Water	CW	Potable Cold Water
Fuel	Boiler Fuel or Generator Diesel	FW	Boiler Feed Water
PHW	Process Hot Water	SUMP	Sump Water

	Building	**Location**	**Type**	**Tag**	**System**
1			CHW	CHWP01	CHILLED WATER PUMP SERVING CHILLER-01
2			CHW	CHWP02	CHILLED WATER PUMP FOR FUTURE CHILLER-02
3			CHW	CHWP03	CHILLED WATER PUMP SERVING CHILLER-03
4			CHW	CHWP16	PROCESS CHILLED WATER PUMP IN RAD. ONC. MECH RM (CHWP-06-JT)
5			CHW	CHWP17	PROCESS CHILLED WATER PUMP IN RAD. ONC. MECH RM (CHWP-07-JT)
6			Condensate	CRPU01	PUMPCR - CONDENSATE RETURN PUMPING UNIT CENTER BUILDING
7			Condensate	CRPU02	PUMPCR - CONDENSATE RETURN PUMPING UNIT UNDER WEST TOWER HEAT EXCHANGERS
8			Condensate	CRPU03	PUMPCR - CONDENSATE RETURN PUMPING UNIT ON C LEVEL
9			Condensate	CRPU04	PUMPCR - CONDENSATE RETURN PUMPING UNIT
10			CDW	CWP01	PUMPCW - CONDENSER WATER PUMP,(OLD P9) CENTER BUILDING
11			CDW	CWP02	PUMPCW - CONDENSER WATER PUMP (OLD P-10)CENTER BUILDING
12			CDW	CWP03	PUMPCW - CONDENSER WATER PUMP (OLD-P3)CENTER BUILDING
13			CDW	CWP04	PUMPCW - CONDENSER WATER PUMP (OLD CWP3) EAST TOWER
14			CDW	CWP05	PUMPCW - CONDENSER WATER PUMP 05 (OLD CWP 1)
15			CDW	CWP06	PUMPCW - CONDENSER WATER PUMP 06 (OLD CWP-2)
16			CDW	CWP07	PUMPCW - CONDENCER WATER PUMP 07 (OLD CWP-4) SERVES MULTI-STACK CHILLER
17			Fuel	DFP01	PUMPDFS - BOILER FUEL PUMP #1
18			Fuel	DFP02	PUMPDFS - BOILER FUEL PUMP #2
19			Fuel	DFP13	PUMPDFS - 120 VAC DIESEL TRANSFER PUMP FROM UST01-PSMC TO DT01-CP. (OLD P3)
20			Fuel	DFP14	PUMPDFS - 24 VDC EMERGENCY DIESEL TRANSFER PUMP FROM UST01-PSMC TO DT01-CP. (P4)
21			Fuel	DFP15	PUMPDFR - 120 VAC DIESEL TRANSFER PUMP, RETURN FROM DT01-CP TO UST01-PSMC. (OLDP3)
22			DHW	DWCP01	PUMPDHR - DOMESTIC HOT WATER CIRCULATING PUMP #1 SERVING SOUTH BUILDING SOILED/DECONTAM EQUIPMENT
23			DHW	DWCP03	PUMPDHR - DOMESTIC HOT WATER CIRCULATING PUMP #3 SERVING CENTER BUILDING
24			DHW	DWCP04	PUMPDHR - DOMESTIC HOT WATER CIRCULATING PUMP #4 SERVING CENTRAL PLANT AND ANNEX
25			DHW	DWCP09	PUMPDHR - DOMESTIC HOT WATER CIRCULATING PUMP #9 SERVING EAST TOWER (CP-7)
26			DHW	DWCP10	PUMPDHR - DOMESTIC HOT WATER CIRCULATING PUMP #10 SERVING PPB
27			DHW	DWCP11	PUMPDHR - DOMESTIC HOT WATER CIRCULATING PUMP #11 SERVING WEST TOWER
28			DHW	DWCP12	PUMPDHR - DOMESTIC HOT WATER CIRCULATING PUMP #12 SERVING WEST TOWER
29			DHW	DWCP13	PUMPDHR - DOMESTIC HOT WATER CIRCULATING PUMP #13 SERVING WEST TOWER

	Building	Location	Type	Tag	System
30			DHW	DWCP14	PUMPDHR - DOMESTIC HOT WATER CIRCULATING PUMP #14 SERVING WEST TOWER
31			PHW	DWCP15	PUMPDHR - 180 DEG. CARTWASH HOT WATER CIRCULATING PUMP
32			CW	DWP01	PUMPDWE - EMERGENCY POTABLE WATER PUMP
33			CW	DWP03	PUMPDWB - POTABLE WATER BOOSTER PUMP, PPB
34			CW	DWP04	PUMPDWB - POTABLE WATER BOOSTER PUMP, ET
35			CW	DWP05	PUMPDWB - POTABLE WATER BOOSTER PUMP, ET
36			CW	DWP06	PUMPDWB - POTABLE WATER BOOSTER PUMP, ET
37			CW	FP02	PUMPF - Fire Booster pump serving the halway hose cabinets on all levels of PPB
38			FW	FWP01	PUMPBF - BOILER FEEDWATER PUMP #1
39			FW	FWP02	PUMPBF - BOILER FEEDWATER PUMP #2
40			FW	FWP03	PUMPBF - BOILER FEEDWATER PUMP #3
41			HW	HWLP01	PUMPHW - PUMP, HOTWELL-1 BR
42			HW	HWLP02	PUMPHW - PUMP, HOTWELL-2 BR
43			HW	HWP01	HEATING WATER PUMP SERVING CENTER BUILDING
44			HW	HWP02	HEATING WATER PUMP SERVING CENTER BUILDING
45			HW	HWP03	HEATING WATER PUMP SERVING CENTER BUILDING
46			HW	HWP04	HEATING WATER PUMP SERVING AHU-1 IN CENTER BUILDING
47			HW	HWP05	HEATING WATER PUMP SERVING AHU-1 IN CENTER BUILDING
48			HW	HWP06	HEATING WATER PUMP SERVING AHU3 IN CENTER BUILDING
49			HW	HWP07	HEATING WATER PUMP SERVING AHU3 IN CENTER BUILDING
50			HW	HWP08	HEATING WATER PUMP SERVING AHU4 IN CENTER BUILDING
51			HW	HWP09	HEATING WATER PUMP SERVING AHU-10 IN SOUTH ADDITION
52			HW	HWP10	PUMPDHR - HEATING WATER PUMP 10 (OLD HWP-4) SERVING EAST TOWER
53			HW	HWP10	HEATING WATER PUMP SERVING AHU-10 IN SOUTH ADDITION (HWP-10-CB)
54			HW	HWP11	PUMPDHR - HEATING WATER PUMP 11 (OLD HWP-5) SERVING EAST TOWER
55			HW	HWP11	HEATING WATER PUMP SERVING AHU-11 IN SOUTH ADDITION (HWP-11-CB)
56			HW	HWP12	HEATING WATER PUMP SERVING AHU-11 IN SOUTH ADDITION
57			HW	HWP13	HEATING WATER PUMP SERVING AHU-21 IN RADIATION ONC.
58			HW	HWP17	PUMPHW - HEATING WATER PUMP 17 (OLD HWP-4) SERVING WEST TOWER
59			HW	HWP18	PUMPHW - HEATING WATER PUMP 18 (OLD HWP-5) SERVING WEST TOWER
60			HW	HWP19	PUMPHW - HEATING WATER PUMP #1 INSIDE AHU35-WT (LDR)
61			HW	HWP20	PUMPHW - HEATING WATER PUMP #2 INSIDE AHU35-WT LDR
62				PUMPW001	PUMPIRRIG - IRRIGATION WELL PUMP # 1 LEVEL B-ET
63				PCHWP01	PUMPCWP - PUMP, PCHWP-1 WT
64				PCHWP02	PUMPCWP - PUMP, PCHWP-2 WT
65				PCHWP03	PUMPCWP - PUMP, PCHWP-3 ET
66				SCHWP01	PUMPCWS - PUMP, SCHWP-1 WT
67				SCHWP02	PUMPCWS - PUMP, SCHWP-2 ET
68			CHW	SCHWP03	PUMPCWS - SECONDARY CHILLED WATER PUMP #3 EAST TOWER
69				SGCP01	PUMPCW - PUMP, GLYCOL #1 GEN
70				SGCP02	PUMPCW - PUMP, GLYCOL #2 GEN
71				SGCP03	PUMPCW - PUMP, GLYCOL #3 GEN
72			HW	SHWP01	PUMPHW - PUMP, HWP-1 WT
73			HW	SHWP02	PUMPHW - PUMP, HWP-2 WT

	Building	Location	Type	Tag	System
74			HW	SHWPF02	VFDSCHW - VFD SERVING (SHWP02-WT) SECONDARY HEATING WATER PUMP 2 IN THE WEST TWR
75			SUMP	SP01	PUMPBF - SUMP PUMP #1 BOILER ROOM
76			SUMP	SP01	SUMP PUMP IN SOUTH ADDITION MECH ROOM (SP-01-CB)
77			SUMP	SP02	PUMPBF - SUMP PUMP #2 BOILER ROOM
78			SUMP	SP02	SUMP PUMP IN SOUTH ADDITION MECH ROOM (SP-02-CB)
79			SUMP	SP03	PUMPGW - PUMP,SUMP SP-1 ET
80			SUMP	SP04	PUMPGW - PUMP,SUMP SP-2 ET
81			SUMP	SP05	PUMPGW - PUMP,SUMP#1
82			SUMP	SP06	PUMPGW - PUMP,SUMP #2 WT
83				WTP01	PUMPCM - PUMP,CHEM#2 B

Building System Descriptions

3.2 FIRST HILL CAMPUS BUILDING SYSTEM DESCRIPTIONS

GENERAL FACILITY DESCRIPTION

The First Hill Campus consists of the buildings listed below. For a full Campus Map, refer to Appendix B.

- 600 Broadway
- 819 Boylston
- 1101 Madison
- Alcoa Building
- 1120 Cherry
- Arnold Building
- Swedish Orthopedic Institute (SOI)
- Swedish First Hill/747 Broadway

This study will focus on the Swedish First Hill/747 Broadway Building. This building includes the East Wing (1947), Heath Building (1968), North Wing, SE Wing, South Building (1980), SW Wing (Built in two stages, C through 6 and 7 through 13), and the West Wing (built in three stages, D through 3, 4 through 5, and 6 through 9). The North Wing is scheduled for complete renovation in the near future, therefore, no high-cost work is recommended here.

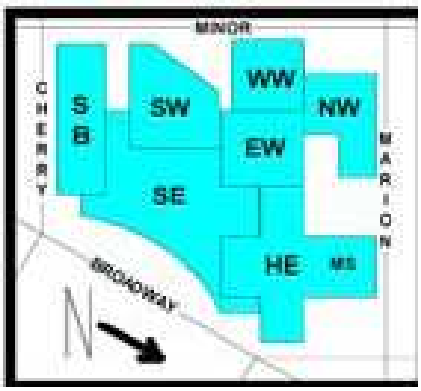


Figure 2.2A: Swedish First Hill 747 Broadway Building Map

ENVELOPE CONDITIONS

Swedish confirmed during interviews that their policy for renovations and tenant improvements is to upgrade the envelope as part of these projects. Due to this policy McKinstry was directed by Swedish to focus on previously identified comfort or pressurization issues, rather than a whole building envelope audit. On the First Hill campus, special attention was paid to the East Wing and South Building.

The East Wing is brick construction with no insulation. As a result, there is a long morning warm up, comfort issues and frequent freeze protection issues. Building insulation in the Old East Wing is addressed in FIM 13.05-SFH.

The South Building has comfort issues due to solar gain on the East and South-facing façade. Window film is recommended on the glazing with high solar load. This is addressed in FIM 13.04-SFH.

HVAC SYSTEM

The HVAC systems are mostly served by systems independent to each wing of the hospital. In some cases, energy optimizing controls such as discharge air temperature reset and equipment scheduling has been implemented. However, there is still opportunity for fine-tuning schedules, temperature resets, and air setbacks. These strategies are addressed in FIMs 04.02-SFH DDC Upgrades, 08.01-SFH East Tower VFDs, 08.02-SFH East Tower VFD Retrofits, and 25.01-SFH Commissioining Retro and Re. The following description focuses on major fan systems to provide a general description. Refer to table 3.2D and 3.2E for detailed equipment information

Building System Descriptions

East Wing Airside System

The majority of floors 1 through 6 of the East Wing are served by one built up Supply Fan and one exhaust fan. The system is a 100% outdoor air system with a heat recovery run around loop. The supply fan is located on the sixth floor penthouse. The air volume is controlled by an inlet guide vane. The Old East Wing Exhaust Fan is constant volume. The supply fan currently runs 24/7, despite building occupancy.

Heath Building Airside System

The Heath Building was constructed in stages. The surgery wing was constructed in 1963 to house the Main Surgery Suites. The Suites are served by two 100% O/A dual duct systems with constant volume fans and corresponding dedicated exhaust fans. There is a third 100% outside air dual duct unit serving the surrounding areas. This unit operation has been optimized to provide discharge air temperature reset based upon outside air temperature. One constant volume exhaust fan serves the surrounding area, and other serves the restrooms.

The Heath Building addition was constructed in 1968. There are two 100% outside air, constant volume fans with corresponding exhaust fans serving the space. One fan serves the interior spaces, another the exterior. There is a separate dedicated exhaust fan for the restrooms. The unit operation for these fans has been optimized to provide discharge air temperature reset based upon outside air temperature.

North Wing Airside System

The North Wing is served by one constant volume supply fan with a dedicated exhaust. This fan is constant volume. With Swedish Medical Center's direction to only propose short pay-back items for the North Wing, the airside systems in the North Wing were not observed in great detail. There is some opportunity to better schedule the unit based upon occupancy.

SE Wing (East Tower) Airside System

The South East Wing has four mechanical rooms located on the B level, 3rd floor, 13th floor and 14th floor. The five units in the 3rd floor mechanical serve the first through the fourth floors and are 100% Outside air with inlet guide vane control. There are also three units located on the B level. The eight primary units located in the South East wing are on the 13th and 14th floor. These units are 100% outside air equipped with Heat Recovery run around loops with hot water preheat and chilled water coils. Five of the AHU's serve the South West Wing. All eight units have inlet guide vanes to control air volume. The IGVs are worn out and defective. These are proposed to be replaced in FIM 8.01-SFH East Tower VFDs.

South Building Airside System

The South Building 7th floor mechanical room houses four Air Handling Units. Two units are 100% outside air with a heat wheel. The 100% outside air unit serving the south building general supply is equipped with a VFD. The induction unit supply is constant volume. The remaining two units on the 7th floor are mixed air units with variable cone control on the supply and return fan. All of these units are DDC control.

The South Critical Supply Fan is located on the D/C/B floor. This unit serves day surgery, emergency and NICU. This unit is constant volume 100% outside air with a heat wheel. An energy upgrade was recently performed to reset the discharge air temperature setpoint based on a schedule for the supply fan. The discharge air setpoint is reset during the hours of 7 pm to 5 am. This unit is proposed for replacement equipped with a VFD and night setback operation. This is addressed in FIM 29.02-SFH.

South West Building Airside System

The South West Building was built in two stages. The C Floor through the 6th floor is the original building. Floors 7 through 13 are an addition. Much of the air supply for the South West building is located in the SE mechanical room. The original mechanical room is located on the A floor. The 1st floor auditorium AHU is located in this space. This is a mixed air constant volume unit with a supply and return fan.

Building System Descriptions

The mechanical room constructed during the addition is located on the 13th floor. There are two 100% outside air units located in this space. One unit serves the general perimeter interior zones on floors 10, 11 and 12, and the other serves the induction units on floors 7 through 8. The units were originally constructed with heat recovery capabilities, but the coils have since been removed.

West Wing Airside System

The West Wing was constructed in three phases. The initial construction was levels D through 3 followed by 4 and 5, and finally levels 6 through 9. There are two 100% outside air units located in the D floor mechanical room. One units serves the labs, kitchen makeup air and cafeteria dining space. The other unit serves levels C through 5. Both units are constant volume with a shared steam coil. A constant volume rooftop unit equipped with a supply and return fan is located on the first floor room. This serves the 2nd floor occupied space. Finally, there is a 100% outside air unit located in the 10th floor mechanical room. This unit is constant volume and serves floors 6 through 9 interior reheat zones and exterior induction unit zones.

HEATING

The First Hill Building is heated with steam provided by the Seattle Steam Company. Steam enters the campus at a pressure of approximately 120 PSIG in several locations, and is reduced first to 60 PSIG, and subsequently to 15 PSIG for most uses. Steam is used to heat hydronic loops, which is (for the most part) the transport medium out to the end point-of-use. Refer to table 3.2B for detailed converter information.

Steam is used directly in Air Handling unit coils for pre heating ventilation air in most of the building. Hydronic heating water coils are present in AHUs in the East Tower, Heath Building, and some of the West Wing.

Steam is also used to heat domestic hot water within the facility. Different loops provide 120°F water, while 140°F water is provided for kitchen use.

Because the steam is purchased from the Seattle Steam Company which does not have condensate return pipes, the condensate is not returned, and is discarded to drain. Several heat exchangers have been installed to extract all possible heat from the condensate. Where required, the condensate is tempered to below 140°F (as required by SPU) by addition of water from the domestic water system.

In some areas, there is opportunity to reset the hot water supply temperature setpoint based on outside air temp or turn off heating water pumps based on occupancy schedule and outside air temperature lock out. This opportunity is addressed in FIMs 25.01-SFH and 04.02-SFH.

COOLING

Most of the central campus has cooling provided by two central chiller plants. One chiller plant is located in the Heath Building basement, and the other is located in the SW Building basement. The North Building air handling units are served by two air-cooled chillers located on the roof of the North Building, and one heat recovery chiller located in the Heath Building 4th floor mechanical room serves the North and South main surgery supply fans. An energy upgrade on the chiller plant was recently done to reset the chilled water supply temp setpoint based on outside air temperature, and turn off the chilled water pumps based on an occupancy schedule and an outside air temperature lockout.

A number of chilled water control valves are beyond repair or retrofit. In some instances, existing 3-way control valves bypasses chilled water which reduces efficiency of chilled water plant. A FIM to replace these valves is proposed in FIM 02.01-SFH.

The cooling towers for the Heath Building machines are located on the Heath Building roof, and the cooling towers for the Southwest Building are located on the East Tower roof.

Refer to table 3.2C for detailed equipment information.

Building System Descriptions

BUILDING CONTROLS

The First Hill campus equipment is controlled using a combination of pneumatics and DDC. The DDC control system on campus is an outdated JCi controls system. The backbone, programming, graphics and scheduling are out of date. With the current system, it is difficult to control the equipment and program equipment schedules.

PLUMBING

A detailed audit of the plumbing fixtures at Swedish First Hill was performed. For detailed fixture counts and condition descriptions, please refer to Appendix C.

LIGHTING SYSTEMS

The lighting throughout accessible spaces on the First Hill campus is primarily two-lamp T8. The hospital does have a small amount of T12 lighting remaining. This measure will install T8 fixtures in identified areas and provide daylighting and occupancy sensors where optimal. Refer to the detailed lighting audit in Appendix C for detailed lighting descriptions.

Table 3.2B: Swedish First Hill Steam Converter Equipment Information

Project	Swedish Medical Center-First Hill	**FIM Name**	All Project
Job #	C10184	**Engineer**	KMR
Description	Steam Converter Equip Information	**Date**	4/22/2011

Tag	Building	Location	Type	System	Areas Served	Control	Qty	Capacity	HX Pressure	EWT	LWT
WW0DSHX-1	West Wing	D Floor	HW	Steam to hot water heat exchanger	West Wing heating	pneumatic	1	2000	15	140	180
WW0DSHX-2	West Wing	D Floor	HW	Steam to hot water heat exchanger	West Wing heating	pneumatic	1	1449	15	140	160
WW1-SHX-3	West Wing	10th Floor Mechanical Room	HW	Steam to hot water heat exchanger	WW 6-9th floors induction units, reheat coils	pneumatic	1	1591	15	140	160
WW10HWP-5,6	West Wing	10th Floor Mechanical Room	HW	Steam to hot water heat exchanger	WW 6-9th floors induction units, reheat coils	pneumatic	2	160	40	140	160
HE04SHX-2	Heath	4th floor mechanical room	HW	Steam to hot water heat exchanger	Heath induction units, reheat coilds. HW supply temp design is 140 deg F for both types of units	pneumatic	1	2499	15	180	200
HE04SHX-1	Main Surgery	Heath 4th floor mechanical room	HW	Steam to hot water heat exchanger	North and South main surgery hot deck heating coils	pneumatic	1	1670		140	180
HE04HWP-1,2	Main Surgery	Heath 4th floor mechanical room	HW	Steam to hot water heat exchanger	North and South main surgery hot deck heating coils. Connecting Link SF HW heating coil	TBD	2	85	25	140	180
HE04HWP-3,4	Main Surgery	Heath 4th floor mechanical room	HW	Steam to hot water heat exchanger	HW pumps for OR N5 and OR N8. HW served by SHX for the main surgery heating water coils	TBD	2			140	180
	North/NE	2nd Floor	HW	Steam to hot water heat exchanger		TBD	1			140	180
SW0BSHX-8A,B	SW	B floor	HW	steam to hot water heat exchanger	South building reheat	DDC	1	4700	5	108	120
SW0ASHX-9A,9B (not installed)	SW	A floor	HW	steam to hot water heat exchanger	SW interior reheat coils floors A through 6. Abandoned in place. Cross tie into the heating water lines to South building; SW0BSHX-8 serves HE system now.	Pneumatic	1	4500	5	140	180
SW13SHX-10	SW	13th floor	HW	steam to hot water heat exchanger	SW induction unit reheat floors 7-12	Pneumatic	1	835	10	90	110
SB0DSHX-1	South	D floor	HW	steam to hot water exchanger	south building reheat system (backup only)	Pneumatic	1	Backup only	Backup only	Backup only	Backup only
ET0FSHX-	East Tower	F floor	HW	steam to hot water heat exchanger	heating water for reheat East Tower Level F through 4	DDC	1			140	160
SW05SHX-7	East Tower	5th floor	HW	steam to hot water heat exchanger	Induction unit heating water system in Old East, Old D&T, C/B/A floors SW 2-6 reheat zones, induction units, breezway to old East	DDC	1	4400	5	140	180
ET0BSHX	East Tower	B floor	HW	AHU preheat hot water	ET level B AHU's	TBD	1			140	160
ET13SHX-4A,4B	East Tower	13th floor	HW	steam to hot water heat exchanger	ET hot water reheat Level 5-12	DDC	1	5200	30	140	160
ET13SHX-5A,5B	East Tower	13th floor	HW	steam to hot water heat exchanger	ET AHU hot water preheat	DDC	1	8530	30	130	160

Table 3.2C: Swedish First Hill Chiller Equipment Information

Project	Swedish Medical Center-First Hill	**FIM Name**	All Project
Job #	C10184	**Engineer**	KMR
Description	Chiller Equip Information	**Date**	4/22/2011

Tag	Building	Location	Type	System	Size	Areas Served	Condenser Water Served By
HE04CH-1	Main Surgery	Heath 4th floor mechanical room	HR	Heat recovery chiller	TBD	North and south main surgery supply fans	N/A
HEBCH-1	Heath	Heath Basement mechanical room	CHW	Chiller	800 Ton	Primary Chilled Water Loop	HCT-1 through HCT-4 on Heath Building Roof (level 10)
HEBCH-1	Heath	Heath Basement mechanical room	CHW	Chiller	500 Ton	Primary Chilled Water Loop	HCT-1 through HCT-4 on Heath Building Roof (level 10)
HEBCH-1	Heath	Heath Basement mechanical room	CHW	Chiller	450 Ton	Primary Chilled Water Loop	HCT-1 through HCT-4 on Heath Building Roof (level 10)
SWBCH-1	SW Building	SW Basement Mechanical Room	CHW	Chiller	800 Ton	Primary Chilled Water Loop	SWCT-1 through SWCT-7 on East Tower Roof
SWBCH-1	SW Building	SW Basement Mechanical Room	CHW	Chiller	1200 Ton	Primary Chilled Water Loop	SWCT-1 through SWCT-7 on East Tower Roof
SWBCH-1	SW Building	SW Basement Mechanical Room	CHW	Chiller	1200 Ton	Primary Chilled Water Loop	SWCT-1 through SWCT-7 on East Tower Roof
N06CH-1	North/NE	Roof	CHW	Air cooled chiller	TBD	North/NE AHU	N/A
N06CH-2	North/NE	Roof	CHW	Air cooled chiller	TBD	North/NE AHU	N/A

Table 3.2D: Swedish First Hill AHU Equipment Information

Project	Swedish Medical Center-First Hill	**FIM Name**	All Project
Job #	C10184	**Engineer**	KMR
Description	AHU Equipment Information	**Date**	4/22/2011

Tag	Type	Building	Location	System	Areas Served	Control	HP	Volt	Amp	Qty	Capacity (CFM)	Static Pressur	Pre Heat Coil		Heating Coil		Heat Recovery Coil		Cooling Coil		Equipment Condition*
													Coil	Fluid	Coil	Fluid	Coil	Fluid	Coil	Fluid	
WW10GSF	AHU	West Wing	10th Floor Mechanical Room	AHU 100% OSA, Steam preheat, chilled water, CV SF.	WW 6-9th floors. Interior HW reheat zones and exterior induction unit zones	pneumatic	20	460	24	1	12510	6.5	x	Steam					x	CHW	
WW01RTUSF	AHU	West Wing	1st Floor Roof	RTU, Heat recovery, preheat, chilled water, CV SF	WW 2nd Floor	TBD	15	460		1	9000	2.5	x	HW			x	HW	x	CHW	
WW0DGSF	AHU	West Wing	D Floor	AHU 100% OSA, Steam preheat (shared coil), chilled water, CV SF	WW C,B,A,1st-5th floors	DDC	40	460	51	1	38000	4	x	Steam					x	CHW	
WW0DKSF	AHU	West Wing	D Floor	AHU 100% OSA, Steam preheat (shared coil), chilled water, CV SF	WW C,B floors Labs and Kitchen Supply fan, Cafeteria dining	DDC	40	460	51	1	33000	4	x	Steam					x	CHW	
HE04PSF	AHU	Heath	4th floor mechanical room	AHU 100% OSA, roll filter, final filter, steam preheat, chilled water, CV SF	Heath perimeter supply fan	DDC	40	460		1	21448	7.5	x	Steam					x	CHW	
HE04ISF	AHU	Heath	4th floor mechanical room	AHU 100% OSA, roll filter, final filter, steam preheat, chilled water, CV SF	Heath interior supply fan	DDC	75	460		1	44160	7.5	x	Steam					x	CHW	
HE04MSNSF	AHU	Main Surgery	Heath 4th floor mechanical room	AHU 100% OSA steam preheat, chilled water, CV SF, cold deck, hot deck (HW)	North main surgery supply fan	DDC	25	460		1	19030	5.5	x	Steam	x	HW			x	CHW	
HE04MSSSF	AHU	Main Surgery	Heath 4th floor mechanical room	AHU 100% OSA steam preheat, chilled water, CV SF, cold deck, hot deck (HW)	South main surgery supply fan	DDC	25	460		1	17620	5.5	x	Steam	x	HW			x	CHW	
HE04CLSF-001	AHU	Main Surgery	Heath 4th floor mechanical room	AHU 100% steam preheat, chilled water, CV SF, cold deck, hot deck (HW)	Connecting link supply fan. Areas around main surgery. EW level A, 1.	DDC	20	460	25	1	15430	5	x	Steam	x	HW			x	CHW	
N06AHU-1	AHU	North/NE	Roof	AHU MA, steam preheat, chilled water with pump, CV SF	North/NE 5th Floor	TBD		460					x	Steam					x	CHW	
EW06SF-001	AHU	East Wing	6th Floor	AHU 100% OSA, plate heat exchanger, steam preheat, chilled water, CV SF with inlet vanes	East Wing Levels 2,3,4,5	TBD	40	460	51	1	11000	4.5	x	Steam			x	HW	x	CHW	
EW06SF-002	AHU	East Wing	6th Floor	AHU 100% OSA, plate heat exchanger, steam preheat, chilled water, CV SF with inlet vanes	East Wing Level 4 and 3	TBD	25	460	31	1	8200	7.5	x	Steam			x	HW	x	CHW	
SW0ASF-001	SF	SW	A floor	AHU 100% OSA, steam preheat, CV SF	SW B/A floor mechanical room supply fan	TBD	5	460		1	5250	1.5	x	Steam							
SW0AAHU-001	AHU	SW	A floor	AHU MA, steam preheat, chilled water, CV SF, CV EF	SW 1st floor auditorium	DDC	10	460		1	6400	2.5	x	Steam					x	CHW	
SW13AHU-001	AHU	SW	13th floor	AHU 100% OSA, heat wheel, steam preheat, CV SF tube axial no inlet vanes, chilled water (2,1 to 12th floor, 1 to 10-11th floors)	SW general perimeter and interior zones floors 10,11, and 12 general supply fan	DDC	60	460	68	1	30000	8.5	x	Steam			N/A	N/A	x	CHW	VFD's are inoperable, fans running in bypass. Heat recovery coil was clogged with grease and beyond working condition, itcould not be cleaned and was removed.
SW13AHU-002	AHU	SW	13th floor	AHU 100% OSA, heat wheel, steam preheat, chilled water, CV SF	SW induction unit supply fan floors 7,8,9	DDC	30	460	34.5	1	11000	9.5	x	Steam			N/A	N/A	x	CHW	VFD's are inoperable, fans running in bypass. Heat recovery coil was clogged with grease and beyond working condition, itcould not be cleaned and was removed.
SB0CCSF	AHU	South	D/C/B floor	AHU 100% OSA, heat wheel, hot water, chilled water, CV SF	C floor Day Surgery, A floor emergency dept., 2nd floor NICU	DDC		460			48900	9			x	HW	ERW	Air	x	CHW	In need of replacement.
SB07GSF	AHU	South	7th Floor	AHU 100% OSA, prefilter, heat wheel, chilled/hw, CV SF vane axial with VFD	south building general supply fan. Floors 5 through C	DDC		460							x	HW	ERW	Air	x	CHW	
SB07IUSF	AHU	South	7th Floor	AHU 100% OSA, prefilter, heat wheel, chilled/htg water, steam preheat, CV SF vane axial	South builing induction unit supply fan. Floors 4,3, and 1	DDC	15	460		1	5290	3	x	Steam	x	HW	ERW	Air	x	CHW	
SB07AHU-001	AHU	South	7th Floor	AHU MA Econ (OA/RA/EA), pre filter, SF with variable cone, hot water coil, chilled water, final filter, RF with variable cone, OA/SA/RA flow measuring	South building CV reheat boxes on floors 4-6	DDC	40	460		1	25500	4.75			x	HW			x	CHW	
AB07AHU-002	AHU	South	7th Floor	AHU MA Econ (OA/RA/EA), pre filter, SF with variable cone, hot water coil, chilled water, final filter, RF with variable cone, OA/SA/RA flow measuring	south building C section area on 5th floor	DDC	5	460		1	2940	4			x	HW			x	CHW	
ET03AHU-004	AHU	East Tower (SE Wing)	3rd floor	AHU 100% OSA, HRC, HW Preheat, CHW CC, CV SF-4SA, SF-4SB with IGV	ET level 4, OR W4	TBD	TBD	460		2	TBD	TBD	x	HW			x	HW	x	CHW	Worn out or defective inlet guide vanes.
ET03AHU-005	AHU	East Tower (SE Wing)	3rd floor	AHU 100% OSA	AHU-3, AHU-4 and AHU-15	TBD	TBD	460		1	TBD	TBD	x	HW							
ET03AHU-006	AHU	East Tower (SE Wing)	3rd floor	AHU 100% OSA	SE01 and SE02 South Side	TBD	TBD	460													
ET03AHU-007	AHU	East Tower (SE Wing)	3rd floor	AHU 100% OSA	SE01 and SE02 North Side	TBD	TBD	460													
ET03AHU-015	AHU	East Tower (SE Wing)	3rd floor	AHU 100% OSA, HRC, HW Preheat, CHW CC	OR 84	TBD	TBD	460		1	TBD	TBD	x	HW					x	CHW	
ET0BAHU-008	AHU	East Tower (SE Wing)	B floor	AHU 100% OSA	AHU-11 and AHU-12	TBD	TBD	460		1	TBD	TBD									
ET0BAHU-011	AHU	East Tower (SE Wing)	B floor	AHU 100% OSA	O.R. 9	TBD	TBD	460		1	TBD	TBD									

Tag	Type	Building	Location	System	Areas Served	Control	HP	Volt	Amp	Qty	Capacity (CFM)	Static Pressur	Pre Heat Coil		Heating Coil		Heat Recovery Coil		Cooling Coil		Equipment Condition*
													Coil	Fluid	Coil	Fluid	Coil	Fluid	Coil	Fluid	
ET0BAHU-012	AHU	East Tower (SE Wing)	B floor	AHU 100% OSA	O.R. 10	TBD	TBD	460		1	TBD	TBD									
ET033AHU-020	AHU	East Tower (SE Wing)	13th floor	AHU 100% OSA, HRC, HW Preheat, CHW CC, CV SF-4SA, SF-4SB with IGV	ET Nursing Level 5-11 North	TBD	125	460		1	TBD	TBD	x	HW			x	HW	x	CHW	Worn out or defective inlet guide vanes.
ET03AHU-021	AHU	East Tower (SE Wing)	13th floor	AHU 100% OSA, HRC, HW Preheat, CHW CC, CV SF-4SA, SF-4SB with IGV	ET Nursing Level 5-11 South	TBD	125	460		1	TBD	TBD	x	HW			x	HW	x	CHW	Worn out or defective inlet guide vanes.
ET03AHU-022	AHU	East Tower (SE Wing)	13th floor	AHU 100% OSA, HRC, HW Preheat, CHW CC, CV SF-4SA, SF-4SB with IGV	ET Nursing Level 5-11 Center core	TBD	150	460		1	TBD	TBD	x	HW			x	HW	x	CHW	Worn out or defective inlet guide vanes.
ET03AHU-023	AHU	East Tower (SE Wing)	13th floor	AHU 100% OSA, HRC, HW Preheat, CHW CC, CV SF-4SA, SF-4SB with IGV	ET Nursing Level 12 (Oncology)	TBD	50	460		1	TBD	TBD	x	HW					x	CHW	Worn out or defective inlet guide vanes.
ET03AHU-024	AHU	East Tower (SE Wing)	14th floor	AHU 100% OSA, HRC, HW Preheat, CHW CC, CV SF-4SA, SF-4SB with IGV	SW North General	TBD	150	460		1	TBD	TBD	x	HW			x	HW	x	CHW	Worn out or defective inlet guide vanes.
ET03AHU-025	AHU	East Tower (SE Wing)	14th floor	AHU 100% OSA, HRC, HW Preheat, CHW CC, CV SF-4SA, SF-4SB with IGV	SW North General	TBD	150	460		1	TBD	TBD	x	HW					x	CHW	Worn out or defective inlet guide vanes.
ET03AHU-026	AHU	East Tower (SE Wing)	13th floor	AHU 100% OSA, HRC, HW Preheat, CHW CC, CV SF-4SA, SF-4SB with IGV	SW Nursing General Floors 1-6	TBD	150	460		1	TBD	TBD	x	HW					x	CHW	Worn out or defective inlet guide vanes.
ET03AHU-027	AHU	East Tower (SE Wing)	14th floor	AHU 100% OSA, HRC, HW Preheat, CHW CC, CV SF-4SA, SF-4SB with IGV	SW Induction Units floors 1-6	TBD	60	460		1	TBD	TBD	x	HW					x	CHW	Worn out or defective inlet guide vanes.

*Equipment condition: The focus of this study is energy efficiency, equipment condition assessment was not a priority during the audit.

Table 3.2E: Swedish First Hill Exhaust Fan Equipment Information

Project	Swedish Medical Center-First Hill	**FIM Name**	All Project
Job #	C10184	**Engineer**	KMR
Description	Exhaust Fan Equipment Information	**Date**	4/22/2011

Tag	Type	Building	Location	System	Areas Served	Control	HP	Volt	Amp	Qty	Capacity (CFM)	Static Pressur	Heat Recovery Coil		Equipment Condition*
													Tag	Fluid	
WW10GEF	EF	West Wing	10th Floor Mechanical Room	CV EF, heat recovery coil	WW C through 11 floors	pneumatic	20	460		1	47610		x	HW	
WW10LEF	EF	West Wing	10th Floor Mechanical Room	CV EF, heat recovery coil	WW C floor labs, 9th floor exhaust	pneumatic	5	460		1	7100		x	HW	
WW01RTUEF	EF	West Wing	1st Floor Roof	RTU, Heat recovery, CV EF	WW 2nd Floor	TBD	7.5	460		1	9350	2.25	x	HW	
HE11EF-1	EF	Heath	11th floor mechanical room	CV EF, with inlet vanes	Heath building East exhaust fan	TBD	15	460		1	35828	1			
HE11EF-2	EF	Heath	11th floor mechanical room	CV EF, with inlet vanes	Heath building West exhaust fan	TBD	10	460		1	24772	1			
HE11EF-3	EF	Heath	11th floor mechanical room	CV EF	Heath building toilet exhaust fan	TBD	1	460		1	3396	1			
HE04MSNEF	EF	Main Surgery	Heath 4th floor mechanical room	CV EF with inlet vanes, heat recovery coil	North main surgery supply fan	DDC	7.5	460		1	17400	1.5	x	HW	
HE04MSSEF	EF	Main Surgery	Heath 4th floor mechanical room	CV EF with inlet vanes, heat recovery coil	South main surgery exhaust fan	DDC	7.5	460		1	14500	1.25	x	HW	
HE04CLEF-001	EF	Main Surgery	Heath 4th floor mechanical room	CV EF	Connecting link supply fan. Areas around main surgery. EW level A, 1.	DDC	5	460	6.5	1					
HE04EF-002	EF	Main Surgery	Heath 4th floor mechanical room	CV EF	Connecting link toilet exhaust fan. Areas around main surgery	DDC	3	460	4.5	1					
N06EF-1	EF	North/NE	Roof	CV EF	North/NE 5th Floor	TBD		460							
EW06EF-001	EF	East Wing	6th Floor	CV EF, plate heat exchanger	East Wing Levels 2,3,4,5	TBD	40	460	51		20400	2.5	x	HW	
SW0AEF-001	EF	SW	A floor	CV EF	SW B/A floor mechanical room exhaust fan	TBD	5	460		1	5250	0.75			
SW13EF-001	EF	SW	13th floor	CV EF vane axial, heat wheel with SW13 general supply fan	SW perimeter exhaust fan. Patient rooms floors 2 through 12	TBD	25	460	35	1	33500	2.5	N/A	N/A	Heat recovery coil was clogged with grease and beyond working condition, it could not be cleaned and was removed.
SW13EF-002	EF	SW	13th floor	CV EF vane axial	SW north exhaust fan. SW level C through 12. interior zones, non patient room exhaust	TBD	50	460		1	49000	3.5			
SW12EF-003	EF	SW	13th floor	CV EF vane axial	SW north exhaust fan. SW level C through 12. interior zones, non patient room exhaust	TBD	50	460		1	38400	3.25			
SB0CCEF	EF	South	D/C/B floor	CV EF, heat recovery	C floor Day Surgery, A floor emergency dept., 2nd floor NICU	DDC		460			48900	9	ERW	Air	
SB07GEF	EF	South	7th Floor	CV EF with VFD, prefilter, heat wheel, bypass heat recovery coil	South building general exhaust fan. Floors 5 through C	DDC		460					ERW	Air	
SB07IUEF	EF	South	7th Floor	CV EF vane axial, prefilter, heat wheel	South building induction unit exhaust fan. Floors 1 through 6	DDC		460		1	9660		ERW	Air	
SB07EF-001	EF	South	7th Floor	CV EF with VFD, HEPA filter	south building isolation room exhaust	TBD	1.5	460		1	910	1.75			
ET03EF-004	EF	East Tower (SE Wing)	3rd floor	EF-4EA, EF-4EB, two fans in parallel, HRC	ET level 4	TBD		460		1	TBD	TBD	x	HW	Worn out or defective inlet guide vanes.
ET03EF-020	EF	East Tower (SE Wing)	14th floor	CV EF with IGV, HRC	ET Nursing Level 5-11 North	TBD	60	460		1	TBD	TBD	x	HW	Worn out or defective inlet guide vanes.
ET03EF-021	EF	East Tower (SE Wing)	14th floor	CV EF with IGV, HRC	ET Nursing Level 5-11 South	TBD	60	460		1	TBD	TBD	x	HW	Worn out or defective inlet guide vanes.

Tag	Type	Building	Location	System	Areas Served	Control	HP	Volt	Amp	Qty	Capacity (CFM)	Static Pressur	Heat Recovery Coil		Equipment Condition*
													Tag	Fluid	
ET03EF-022	EF	East Tower (SE Wing)	14th floor	CV EF with IGV, HRC	ET Nursing Level 5-11 Center core	TBD	60	460		1	TBD	TBD	x	HW	Worn out or defective inlet guide vanes.
ET03EF-023	EF	East Tower (SE Wing)	14th floor	CV EF with IGV, HRC	ET Nursing Level 12 (Oncology)	TBD	25	460		1	TBD	TBD	x	HW	Worn out or defective inlet guide vanes.
ET03EF-024	EF	East Tower (SE Wing)	14th floor	CV EF with IGV, HRC	SW North General	TBD	75	460		1	TBD	TBD	x	HW	Worn out or defective inlet guide vanes.

*Equipment condition: The focus of this study is energy efficiency, equipment condition assessment was not a priority during the audit.

Table 3.2F: Swedish First Hill Pump Equipment Information

Project	Swedish Medical Center-First Hill	**FIM Name**	All Project
Job #	C10184	**Engineer**	KMR
Description	Pump equipment Information	**Date**	4/22/2011

Tag	Building	Location	Type	System	Areas Served	Control Type	HP	Volt	Amp	Eff	Qty	Motor Speed Control	Capacity (gpm)	TDH (ft H20)	Equipment Condition*
WW0DHWP-1,2	West Wing	D Floor	HW	heating water pumps	West Wing heating	pneumatic	3	460	4.1	82.5	2	CV	100	60	
WW0DSHP-3	West Wing	D Floor	HW	heating water pumps	West Wing heating	pneumatic	1.5	460	2.8		1	CV	145	25	
WW0DHWP-4	West Wing	D Floor	HW	heating water pumps	West Wing heating	pneumatic	1.5	460	2.4	78.5	1	CV	145	25	
WW10CHWP-1,2	West Wing	10th Floor Mechanical Room	CHW	Chilled water induction unit loop pumps	WW 6-9th floors induction units	DDC	3	460	4.3		2	CV	150	40	
WW0DCHP	West Wing	D Floor	CHW	Chilled water pump with VFD	Chilled water booster pump on main chilled water loop	Stand alone						VFD			
HE04HWP-5	Heath	4th floor mechanical room	HW	Heating water pump	Heath induction units, reheat coilds. HW supply temp design is 140 deg F for both types of units	None	15	460	20		1	CV	600	65	
HE04HWP-6	Heath	4th floor mechanical room	HW	Heating water pump	Heath convector units	None	0.5				1	CV	10	25	
HE04CHP-1	Heath	4th floor mechanical room	CHW	chilled water induction unit loop pump	Heath induction units. CHW supply temp design is 55 deg F	DDC	10	460	13.5		1	CV	400	65	
SW0BHWP-30,31	SW	B floor	HW	heating water pumps, diff bypass valve	south building reheat flooors C through 7 (up to AHU's) SW interior reheat coild loop SW floors A through 6	DDC	50	460	57	95	2	CV	822	130	
SW0AHWP-1,2	SW	A floor	HW	heating water pumps, diff bypass valve	SW induction unit reheat floors 1 through 6	None	7.5	460			2	CV	225	70	
SW13HWP-1,2	SW	13th floor	HW	heating water pumps - reheat coils	SW reheat coils floors 7-12	Pneumatic	5	460	6.5	86.5	2	CV	210	45	
SW13HWP-3,4	SW	13th floor	HW	heating water pumps - fin tube radiation coils	SW radiation coils floors 7-12	Pneumatic	2	460	2.6	84	2	CV	63	45	
SW13HWP-5,6	SW	13th floor	HW	heating waster pumps - induction unit heating coils	SW induction unit coils floors 7,8,9	Pneumatic	5	460	6.5	86.5	2	CV	190	46	
SW13CWHP-7,8	SW	13th floor	CHW	chilled water induction unit loop pumps. VFD's on pumps, DP sensors (2) on floor 6	SW induction unit coils floors 7,8,9	DDC	5	460	6.5	86.5	2	VFD	180	45	
SW13CWHP-9,10	SW	13th floor	CHW	LAF chilled water pumps	SW LAF chilled water system and chiller	TBD	3	460	4	86.5	2	CV	60	75	
SW13CDWP-11,12	SW	13th floor	CDW	LAF condenser water pumps	SW LAF chilled water system and chiller	TBD	1	460	1.35	82.5	2	CV	45	33	
SB0DHWP-5,6	South	D floor	HW	heating water pumps	south building fin tube radiation system	Pneumatic						CV			
SB0DHWP-7,8	South	D floor	HW	heating water pumps	south building reheat system - reheat coils, induction units	Pneumatic	15	460	18	92.4	2	CV	442	80	
SB0DCWHP-9	South	D floor	CHW	chilled water induction unit loop pumps	south building induction unit	DDC	5	460	7.1		1	CV	87	75	
ETF0HWP-1A,1B	East Tower	F floor	HW	heating water pumps. VFD disables, in bypass	heating water for reheat East Tower Level F through 4	DDC	25	460	30	92.4	2	VFD	745	100	
SW05HWP-41,43	East Tower	5th floor	HW	heating water pumps	Induction unit heating water system in Old East, Old D&T, C/B/A floors SW 2-6 reheat zones, induction units, breezway to old East	DDC	7.5	460	9.2	91.7	2	CV	200	75	
ET04CHP-40	East Tower	4th floor	CHW	chilled water induction unit loop pump	Old D&T induction unit pump. Serves chilled water system that runs around old SW, East wing, pharmacy (level 1) fcu's	DDC	7.5	460	9.2	91.7	1	CV	230	70	
ET04CHP-41	East Tower	4th floor	CHW	chilled water induction unit loop pump	SW Nursing tower induction units. SW floors 1 through 6	DDC	7.5	460	9.2	91.7	1	CV	200	70	

Tag	Building	Location	Type	System	Areas Served	Control Type	HP	Volt	Amp	Eff	Qty	Motor Speed Control	Capacity (gpm)	TDH (ft H20)	Equipment Condition*
ET03HWP-17A,17B	East Tower	B floor	HW	AHU preheat hot water	ET level B AHU's	DDC	5	460	6.7	90.2	2	CV	120	55	
ET13HWP-29A,29B	East Tower	13th floor	HW	heating water pumps	ET hot water reheat Level 5-12	DDC	15	460	17.8		2	CV	500	74	
ET13HWP-18A,18B	East Tower	13th floor	HW	heating water pumps	ET AHU hot water preheat	DDC	25	460	29.1	94.1	2	CV	650	80	Current bypass valve and system leaks by during winter causing over heating of heat recovery coils causing a call for cooling.

*Equipment condition: The focus of this study is energy efficiency, equipment condition assessment was not a priority during the audit.

Proposed FIMs

4.0 Proposed Facility Improvement Measures (FIM)

Facility Improvement Measures (FIMs) were developed and proposed for the building, along with expected rough order of magnitude payback periods. This list of measures will act as a guide to Swedish Medical Center when making decisions regarding facility improvements and energy conservation. Along with the FIM information included in this document, Swedish Medical Center also has a measure tracking tool complete with cost and savings information. This tool will assist in phasing and prioritizing the energy conservation work at Swedish Medical Center. Table 4.1 lists each measure along with initial phasing recommendations, energy impacts, and non-energy benefits. FIM detail sheets are also included for further scope information on each measure.

Facility Improvement Measure (FIM) Summary
Five Year Facility Energy Assessment

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Date	April 22, 2011

				Energy Net Present Value			Non-Energy Benefits	
FIM Name	SEMP Implementation Comments	Building	Phasing Recommendation	Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost
01.01-CUP Add Stack Economizer for Boilers	The boiler plant has three boilers, but only one boiler has stack economizer. Install stack economizers for one boiler. Install boiler surface blow down heat recovery system for one boiler. Date greater than 2012 since the NPV of this FIM is expected to be less favorable vs. other FIMs on the list.	Cherry Hill - Central Plant	2011		√			
03.03-SCH Center Building AHU Upgrades	Further research required. The implementation of the FIM requires coordination with the hospital to relocate patients and/or provide temporary ventilation units.	Cherry Hill - Hospital	2011			√	√	√
09.01-SCH Lighting Upgrades	2011 is shown since the audit is far along, and the net present value will be favorable.	Cherry Hill - Hospital	2011	√			√	√
13.01-SCH Insulation - Pipes and Equipment, and Ducts	This measure will improve insulation on piping, equipment and ductwork. 2011 is entered since Hudson Bay has already made some progress on developing this FIM.	Cherry Hill - Hospital	2011	√				
18.01-SCH Water Conservation	This measure will upgrade and commission high-consumption plumbing fixtures throughout the Cherry Hill campus. 2011 is shown since the investment grade water audit is nearly done, and the net present value will be favorable.	Cherry Hill - Hospital	2011	√			√	
25.01-SCH Retro-Commissioning	This is recommended only for areas with controls and equipment that won't be upgraded or modified in the next 5 years.	Cherry Hill - Hospital	2011	√			√	
01.02-SFH Steam Traps	Primarily a steam trap FIM.	First Hill	2011	√				
03.03-SFH 2 SW Upgrades	2011 is shown since budgeting and conceptual design have begun.	First Hill	2011			√	√	√

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Date	April 22, 2011

				Energy Net Present Value			Non-Energy Benefits	
FIM Name	SEMP Implementation Comments	Building	Phasing Recommendation	Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost
04.01-SFH Controls Hardware Upgrade	This project is already approved.	First Hill	2011		√			√
08.01-SFH East Tower VFD Retrofits	VFD retrofit project for East Tower fans. Already approved by Swedish contingent on a 70% utility grant. Grant calculations are underway.	First Hill	2011	√				
09.01-SFH Lighting Upgrades	2011 is shown since the audit is far along, and the net present value will be favorable.	First Hill	2011	√			√	√
13.02-SFH Insulation - Pipes and Equipment, and Ducts	This measure will improve insulation on piping, equipment and ductwork. 2011 is entered since Hudson Bay has already made some progress on developing this FIM.	First Hill	2011	√				
18.01-SFH Water Conservation	This measure will upgrade and commission high-consumption plumbing fixtures throughout the First Hill campus. 2011 is shown since the investment grade water audit is nearly done, and the net present value will be favorable.	First Hill	2011	√			√	
29.02-SFH South Bldg Critical Supply and Exhaust Upgrade	Day Surgery supply and exhaust fan replacement with fan array, VAV and heat recovery. 2011 shown due to urgent need for redundancy.	First Hill	2011			√	√	√
02.01-SCH Add VFDs to Cooling Towers	2012 is shown since this is a straightforward measure with a favorable net present value.	Cherry Hill - Hospital	2012	√				
02.02-SCH Chiller Plant Upgrades	One existing 260-ton R-11 chiller CH-4 in the West Tower mechanical room is old and running 25% of the time. The chiller plant in the Center Building has three chillers. CH-3 is old with R-11. Replace the R-11 chillers with more efficient chillers. This FIM may include heat recovery chillers. The heat recovery chillers max out at 140 degrees which isn't sufficient for the reheat loops.	Cherry Hill - Hospital	2012			√		√
02.03-SCH Address CHW Low Delta T	Most of the chilled water coil valves are 3-way with bypass. Replace the 3-way valves 2-way valves and modulate the chilled water pump speed based on the pressure difference. Consider pressure-independent control valves.	Cherry Hill - Hospital	2012	√				

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Date	April 22, 2011

				Energy Net Present Value			Non-Energy Benefits	
FIM Name	SEMP Implementation Comments	Building	Phasing Recommendation	Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost
03.01-SCH East Tower AHU System Upgrades	AHU-15 serves the dining room. The auditorium is served by AHU-19 and the supply and return fans have inlet guide vanes to control the air flow. Lock the IGV's open and install VFD on the fans. Install CO2 sensor to implement demand control ventilation based on the actual occupancy.	Cherry Hill - Hospital	2012		√		√	√
03.04-SCH Center Building Basement AHU Upgrades	AHU-2 and AHU-4 serve Center Building level A and B. Both AHUs are old with leaking housing and failing dampers. Some other AHUs are also old and original to the building. Replace AHUs with new custom built AHUs with fan arrays. The implementation of the FIM requires coordination with the hospital to relocate patients and/or provide temporary ventilation units.	Cherry Hill - Hospital	2012			√	√	√
16.01-SCH Kitchen Hood Exhaust Demand Control Ventilation	This FIM would modulate cooking hood CFM based on heat and smoke load sensors.	Cherry Hill - Hospital	2012		√			
04.01-PPB AHU System Upgrades and DDC Upgrades	This measure includes upgrading the existing AHU-61 and terminal units control to Siemens system using the existing control panel.	Cherry Hill - Professional Building	2012		√		√	√
12.01-PPB Domestic Water Booster Pump VFD	The existing domestic water pump operates at constant speed to maintain proper water pressure. Install VFD on the pump and modulate the pump speed based on the need.	Cherry Hill - Professional Building	2012	√				
13.01-PPB Building Window Upgrades	This measure includes upgrading the windows to double pane glazing and seal the envelope to reduce leakage. This measure is shown as 2012 even though the net present value based solely on energy will not be favorable for the windows. It's assumed that the comfort and aesthetic benefits would make this a viable FIM. The envelope air sealing portion of this FIM will have a favorable net present value.	Cherry Hill - Professional Building	2012			√	√	
02.01-SFH Address CHW Low Delta T	2011 isn't shown since more development and budget approval will be needed, but we do anticipate that this will be a viable FIM.	First Hill	2012	√				
03.01-SFH Air-side Heat Recovery	2013 is shown since the net present value will be less favorable than some other FIMs. The West Wing air handlers seemed like good candidates, but if it's possible to shut the air handlers down at night, that would be a better option. Also the future of the West Wing is in question.	First Hill	2012		√			

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Date	April 22, 2011

				Energy Net Present Value			Non-Energy Benefits	
FIM Name	SEMP Implementation Comments	Building	Phasing Recommendation	Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost
04.02-SFH DDC Upgrades	This is recommended only for areas with equipment that won't be upgraded or modified in the next 7 years. This would include air handler as well as zone level controls.	First Hill	2012		√		√	√
04.03-SFH Submetering	Provide submetering on HW and CHW loops. Tie this in to the existing BMS	First Hill	2012		√			
08.02-SFH Variable Speed Drives	For any VFDs no included in other FIMs.	First Hill	2012	√				
13.03-SFH PV on Parking Garage and EV Charging Station	2012 is shown since Swedish indicated that the topic of EV charging already has some traction.	First Hill	2012			√		
13.04-SFH Window Film	Some energy savings, but primarily for comfort on hot sunny days for South, East, and West exposures.	First Hill	2012			√	√	
18.02-SFH Dishwasher Replacement	The measure would need to be done in conjunction with a needs based dishwasher replacement in order to be cost effective.	First Hill	2012		√			
25.01-SFH Commissioning - Retro or Re	This is recommended only for areas with controls and equipment that won't be upgraded or modified in the next 5 years.	First Hill	2012	√			√	
29.01-SFH Main Surgery Upgrade	Upgrade Fans including VFDs, heat recovery, zone level VAV upgrade, and controls. 2011 shown since some pricing and preliminary design have already occurred.	First Hill	2012			√	√	√
04.01-SCH DDC Upgrades (cypress = 1/2 this cost)	This is recommended only for areas with equipment that won't be upgraded or modified in the next 7 years. This would include air handler as well as zone level controls.	Cherry Hill - Hospital	2013		√		√	√
08.03-SFH Kitchen Hood Exhaust DCV	This FIM would modulate cooking hood CFM based on heat and smoke load sensors.	First Hill	2013		√			
20.01-SFH Medical Waste Management	Install Sanipak medical waste treatment and management system. 2014 is shown since this won't be eligible for CRIF funding.	First Hill	2013		√			
20.01-CUP Medical Waste Management	Install Sanipak medical waste treatment and management system. 2014 is shown since this won't be eligible for CRIF funding.	Cherry Hill - Central Plant	2014		√			

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Date	April 22, 2011

				Energy Net Present Value			Non-Energy Benefits	
FIM Name	SEMP Implementation Comments	Building	Phasing Recommendation	Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost
03.02-SCH West Tower AHU Upgrades	AHU-36 is operating at 100% outside air, but the return air fan and duct are in place, but they are not connected. Retrofit the 100% OA system with return air. Add return air duct and grille at floor level. Cap the existing exhaust duct openings. AHU-31 and AHU-32 are 100% OA dual duct constant volume systems. The supply fans and the exhaust fan have backup fan located offline. Retrofit the supply and exhaust fans with fan walls and install air-side heat recovery system for the system. Replace the existing dual duct CV systems with dual duct VAV systems. Implement air change rate setback during the unoccupied hours. The implementation of the FIM requires coordination with the hospital to relocate patients and/or provide temporary ventilation units. At least the AHU-36 portion of this FIM should be part of the CPW round 1 application since DPD is holding up other permits until it's done.	Cherry Hill - Hospital	2014			√	√	√
03.02-SFH Kitchen Refrigeration Heat Recovery	Further research required.	First Hill	2014		√			
03.04-SFH 3-6 SW Upgrades	2014 is shown since this will require significant budget approval.	First Hill	2014			√	√	√
13.05-SFH Wall Insulation	For walls that have no insulation. 2015 is shown since the net present value will be poor if judged strictly on energy savings.	First Hill	2015			√	√	
10.01-CUP Combined Heat and Power	The boilers generate 100 psi steam and then PRV's reduce the steam pressure to medium and low pressure for sterilizer and heating use. Install back pressure steam turbine to generate electricity and reduce steam pressure in lieu of pressure reducing valves.	Cherry Hill - Central Plant	2018			√		

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	April 22, 2011

FIM Number	7648	Cherry Hill - Professional Building

FIM Description 04.01-PPB AHU System Upgrades and DDC Upgrades

GENERAL
The building is served by one central air handling unit AHU-61 with VFD supply and return fans and chilled water coils. AHU-61 is a VAV AHU with VAV boxes in the zone and the perimeter VAV boxes have electric resistance reheat. Currently AHU-61 operates 24/7. This measure includes upgrading the existing AHU-61 (75 HP and 55000 CFM) and terminal units control to Siemens system using the existing control panel. Replace the AHU damper actuators and the 3-way chilled water valve. Implement SAT reset and TOD schedule and reduce the air change rate for previous surgery rooms. Install hot water coils to AHU for pre-heating. There are three electric domestic hot water heaters serving the building. Replace them with heater via hot water or gas-fired hot water heater.

SCOPE OF WORK INCLUDES
Mechanical:
Replace one (1) 3-way control valve with one (1) 4" 2-way pressure independent control valve. Reuse the existing electric actuator if possible.
Remove and replace insulation around chilled water control valves.
Inspect existing unit. Replace bearings. Replace damper actuators with electric actuators. Clean coil, inside of unit, fan wheels, and OSA intake.
Provide 200-ft 4" hot water supply and return piping from the Center Building mechanical room hot water converters. Provide (1) 5-hp hot water pump.
Provide preheating coils to AHU-61 and connect to the hot water piping.
□
Controls:
Reuse the existing Siemens Point Expansion Modules to upgrade the existing (1) AHU and (77) terminal units Staefa control system to Siemens Apogee system. Provide new terminal box controllers if needed.
Replace the existing return air temp, mixed air temp and discharge air temp sensors with Siemens system compatible sensors.
Add preheating coil valve, hot water pump control to DDC control system.
Revise the programming to implement discharge air temp reset and static pressure reset.
Revise the VAV box air flow set-points to reduce the air change rate to match the existing function use of the spaces. Provide TAB on the AHU system.
□
Electrical:
Provide power to the new hot water pump.

Specialty:
Commissioning: provide functional performance test and point to point test on the new DDC system and the programming sequence.

Demolition and Removal: None

Allotments: None

EXCLUSIONS
Hazardous material abatement.

SEMP Phasing Comments

This measure includes upgrading the existing AHU-61 and terminal units control to Siemens system using the existing control panel.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
	√		√	√	**2012**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	April 22, 2011

FIM Number	7892	Cherry Hill - Professional Building

FIM Description 12.01-PPB Domestic Water Booster Pump VFD

GENERAL
The existing domestic water pump operates at constant speed to maintain proper water pressure. Install VFD on the pump and modulate the pump speed based on the need.

SCOPE OF WORK INCLUDES
Mechanical: None

Controls: None

Electrical:
Provide (1) new 10-hp VFD for the pump: Provide control panel with 460VAC/3ph, single point power connection, PID pump controller, variable frequency drives, individual VFD circuit breakers, HOA, door mounted graphic display and sealed membrane keypad, plain English operator interface, manual speed control, control transformer, pump failure protection, audio-visual alarm, low suction & high system protection, remote start/stop input terminals, general alarm terminals, no demand shutdown controls and includes BMS connection with Bacnet protocol.
Provide all necessary controls wiring for VFD pump package.
Start-up and factory checkout. The water pressure set-point is TBD and the estimated average pump speed will be around 50%.

Structural: None

Architectural: None

Acoustical: None

Specialty: None

Demolition and Removal: None

Allotments: None

EXCLUSIONS
Hazardous material abatement.

SEMP Phasing Comments

The existing domestic water pump operates at constant speed to maintain proper water pressure. Install VFD on the pump and modulate the pump speed based on the need.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
√					**2013**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	April 22, 2011

FIM Number	7891	Cherry Hill - Professional Building

FIM Description 13.01-PPB Building Window Upgrades

GENERAL
The building has difficulty to keep the building pressure positive, and both duct sealing and windows have been identified as contributors. This measure includes upgrading the windows to double pane glazing. Install weatherization. Investigate the existing duct work conditions and seal the leaking ducts.

SCOPE OF WORK INCLUDES
Mechanical:
Investigate the existing ductwork conditions and seal the leaking ducts (400 ft ductwork per floor x 3 floors).
☐
Controls: None
☐
Electrical: None

Structural: None

Architectural:
Upgrade the existing single pane windows with double pane high performance glazings (400 ft x 9 ft x 3 floors=10,800 SF).
Add weather-stripping on the windows and doors and improve the building air sealing.

Acoustical: None

Specialty: None

Demolition and Removal: None

Allotments: None

EXCLUSIONS
Hazardous material abatement.

SEMP Phasing Comments

This measure includes upgrading the windows to double pane glazing and seal the envelope to reduce leakage. This measure is shown as 2012 even though the net present value based solely on energy will not be favorable for the windows. It's assumed that the comfort and aesthetic benefits would make this a viable FIM. The envelope air sealing portion of this FIM will have a favorable net present value.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
		√	√		**2012**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	April 22, 2011

FIM Number	8021	Cherry Hill - Hospital

FIM Description 02.01-SCH Add VFDs to Cooling Towers

GENERAL
The cooling towers for CH-6 in the East Tower fans have no VFD. Install VFDs on cooling tower fans.

SCOPE OF WORK INCLUDES
Mechanical: None

Controls:
Add programming to the existing DDC system to modulate the fan speed.
Controls commissioning (point-to-point verification and functional performance testing)

Electrical:
Provide (2) new 20-hp VFD's with line reactors for the cooling tower fans. Provide all necessary controls wiring for VFD. Start-up and factory checkout.

Structural: None

Architectural: None

Acoustical: None

Specialty:
Commissioning: Provide functional performance test and point to point test on the updated control programming and sequences.
Demolition and Removal: None

Allotments: None

EXCLUSIONS
Hazardous material abatement.

SEMP Phasing Comments

2012 is shown since this is a straightforward measure with a favorable net present value.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
√					**2012**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	April 22, 2011

FIM Number	7650	Cherry Hill - Hospital

FIM Description 02.02-SCH Chiller Plant Upgrades

GENERAL
One existing 260-ton R-11 chiller CH-4 in the West Tower mechanical room is old and running 25% of the time. Upgrade the chiller with water-cooled VFD centrifugal chiller or modular chiller.
The chiller plant in the Center Building has three chillers. CH-3 is old with R-11. Replace the chiller with more efficient and environment friendly centrifugal chiller with VFD or heat recovery chiller or modular chiller.

SCOPE OF WORK INCLUDES
Mechanical:
Install two (2) new chillers
One Heat Recovery modular chiller (CH-3), sized for 320 tons cooling
One Heat Recovery modular chiller (CH-4), sized for 3500 MBH heat rejection (heating), or ~250 tons cooling.
For each chilled water system:
Install one double wall Heat Exchanger for domestic hot water preheat and one heat exchanger for heat rejection through cooling tower. Include bypass valve for control.
Chilled Water Pumps
Provide one 15-hp primary chiller pump. Re-use existing secondary chilled water pumps.
Heat Recovery Pumps
Install (2) heat recovery pumps to deliver the condenser water to the heat exchangers. Add VFD's, one per pump. (2) 15 HP

Controls:
Upgrade the existing Honeywell control system to include the heat recovery operation.
Specific controls points as described in separate controls points list. The following points should be specifically included: Heat recovery pump start/stop, Heat recovery pump status, Heat recovery pump speed, and 3-way control valves.

Electrical:
Provide power for two (2) new chillers and (3) pumps. Add VFD's to pumps.

Acoustical:
Ensure all chillers have vibration isolation from building structure. Ensure all screw chillers have factory noise attenuation.

Specialty:
Commissioning: Provide functional performance test and point to point test on the updated control programming and sequences. Perform test and balancing.

Demolition and Removal:
Remove four existing chillers and pump.

EXCLUSIONS
Hazardous material abatement.
Existing chillers have R-11.

SEMP Phasing Comments

One existing 260-ton R-11 chiller CH-4 in the West Tower mechanical room is old and running 25% of the time.
The chiller plant in the Center Building has three chillers. CH-3 is old with R-11.
Replace the R-11 chillers with more efficient chillers. This FIM may include heat recovery chillers.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
		√		√	**2011**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	April 22, 2011

FIM Number	7669	Cherry Hill - Hospital

FIM Description 02.03-SCH Address CHW Low Delta T

GENERAL:
Replace existing chilled water control valves with pressure independent control valves. The existing pneumatically actuated control valves will be replaced with DDC actuation. Chilled water valves shall be connected to the buildings existing ATS control system.

SCOPE OF WORK INCLUDES:
Mechanical:
Replace four (27) 2-way or 3-way pneumatic control valves for AHU chilled water coils with 2-way Delta P Valves with electric actuators per the following:

Valve size	Qty
2"	3
2 1/2"	6
3"	8
4"	5
5"	2
6"	3

Remove and replace insulation around chilled water control valves.

Controls:
Disconnect and reconnect existing controls for chilled water control valves.
Commission new control valves.

Electrical:
Provide (2) new 20-hp VFD's with line reactors for the chilled water pumps. Provide all necessary controls wiring for VFD. Start-up and factory checkout.

Specialty:
Commissioning
Open the existing chilled water coils balancing valve wide open.
Review valve and control submittal.
Review control contractor documentation of successful calibration and functional performance testing.

EXCLUSIONS AND CLARIFICATIONS
Balancing of existing hydronic and air systems downstream of AHU's and systems not modified by this proposal is excluded.
Hazardous material abatement is excluded.

SEMP Phasing Comments

Most of the chilled water coil valves are 3-way with bypass. Replace the 3-way valves 2-way valves and modulate the chilled water pump speed based on the pressure difference. Consider pressure-independent control valves.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
√					**2012**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	April 22, 2011

FIM Number	8022	Cherry Hill - Hospital

FIM Description 03.01-SCH East Tower AHU System Upgrades

GENERAL
AHU-15 serves the dining room. The auditorium is served by AHU-19 and the supply and return fans have inlet guide vanes to control the air flow. Lock the IGV's open and install VFD on the fans. Install CO2 sensor to implement demand control ventilation based on the actual occupancy.

SCOPE OF WORK INCLUDES
Mechanical:
Replace outside air, return air and mixed air damper actuators. Clean and repair all the dampers.
AHU-15 (19,970 CFM): Mechanical design to optimize ventilation air flows. Includes: Review of existing HVAC systems including ASHRAE 62.1 calculation for AHU and associated terminal box to determine modified ventilation air flows. Provide demand ventilation control diagram. Provide schedule of revised ventilation and primary air flows. Fabricate airtight sheet metal enclosure to house CO2 sensor and associated controls wiring. Mount enclosure on mechanical room wall near AHU. Provide 1" CPVC piping between supply duct and CO2 sensor enclosure. Provide 1" CPVC piping between return duct and CO2 sensor enclosure. Provide 1" CPVC piping between outside air duct and CO2 sensor enclosure. Install (1) one-inch 3-way valve to connect the supply and outside air CPVC piping back to the CO2 enclosure.

Controls:
Add AHU-15 and AHU-19 VFD to the existing Honeywell DDC system including CO2 sensor, VFD signal and VFD alarm. Controls commissioning (point-to-point verification and functional performance testing)
Auditorium AHU-19:
Provide and install one CO2 sensor in the space. Provide protective cover for CO2 sensor.
Revise DDC programming per new sequence of operations narrative provided by mechanical designer to maintain CO2 set point.
AHU-15:
Provide and install CO2 sensor in new sensor enclosure.
Furnish 3-way valve to allow sensing between outside and supply or return air CO2 levels.
Revise DDC programming per new sequence of operations narrative provided by mechanical designer.

Electrical:
Provide (1) 20 HP and (1) 25 HP VFD and electrical service to the fans.
Provide fused disconnect. Wire from electric panel to new disconnect, extend wiring from VFD to motor.
Provide conduit and controls wiring from VFD to DDC panel. Provide all necessary controls wiring for new VFD fan package. Start-up and factory checkout

Specialty:
Commissioning: Provide functional performance test and point to point test on the updated control programming and sequences. Perform test and balancing.

EXCLUSIONS
Hazardous material abatement.

SEMP Phasing Comments

AHU-15 serves the dining room. The auditorium is served by AHU-19 and the supply and return fans have inlet guide vanes to control the air flow.
Lock the IGV's open and install VFD on the fans. Install CO2 sensor to implement demand control ventilation based on the actual occupancy.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
		√	√	√	**2013**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	April 22, 2011

FIM Number	7661	Cherry Hill - Hospital

FIM Description 03.02-SCH West Tower AHU Upgrades

GENERAL
AHU-36 is operating at 100% outside air, but the return air fan and duct are in place, but they are not connected. Retrofit the 100% OA system with return air. Add return air duct and grille at floor level. Cap the existing exhaust duct openings. AHU-31 and AHU-32 are 100% OA dual duct constant volume systems. The supply fans and the exhaust fan have backup fan located offline. Retrofit the supply and exhaust fans with fan walls and install air-side heat recovery system for the system. Replace the existing dual duct CV systems with dual duct VAV systems. Implement air change rate setback during the unoccupied hours.

SCOPE OF WORK INCLUDES
Mechanical:
AHU-31 and AHU-32:
Replace the existing airfoil bladed fans on AHU-31 (existing fan 50 HP and 31000 CFM) and AHU-32 (existing fan 75 HP and 46100 CFM) with VFD fan walls with redundancy. Provide Heat Recovery Coils on the outside air intake of AHU-31 and AHU-32. Provide heat recovery coils, prefilters, support frame, isolation valves, balancing valves, and thermometers. Re-balance supply fans to accommodate the additional static pressure of the heat recovery coils. Furnish and install run around loop from AHUs to exhaust fan. Provide 10 HP heat recovery pump. Provide expansion tank. Replace the existing (66) dual duct constant volume terminal boxes in general supply fan AHU-32 with dual duct VAV boxes. Replace the existing (48) dual duct constant volume terminal boxes in surgery supply fan AHU-31 with dual duct VAV boxes, and add (48) exhaust terminal boxes for corresponding VAV supply boxes. Reuse the existing hot deck and cold deck supply ductwork and existing exhaust ductwork.
Exhaust Fan EF-72:
Replace the existing vane axial fan on EF-72 (existing fan 60 HP and 80000 CFM) with VFD fan walls with redundancy. Provide a heat recovery coil and prefilter in the common exhaust plenum. Balance EF-72 to accommodate additional static from heat recovery coils. Furnish and install piping, valves and fittings to new coils.
AHU-36:
Provide return air grilles at each floor and return air ductwork (60 ft/floor x 6 floors). Connect the return air duct to the existing return air shaft. Cap the existing non-essential exhaust duct openings at each floor. Re-balance supply fans, return fans and exhaust fans.
Mechanical design and permitting.

Controls:
Upgrade the existing pneumatic actuators on the AHU systems to electric actuators. Add the heat recovery system control to the existing Honeywell DDC system. Provide DDC controls to new VAV supply and exhaust terminal boxes. Provide and install (X) new annunciator control panels and associated control wiring in the space (one per Operating Room). Panels shall contain the following: Manual override button that will restore the full air change rate and Indication lights for whether the unit is in "Full Airflow" or "Reduced Airflow". Revise EMCS system sequence to have occupied and unoccupied mode for air flow settings based on the building time of day schedule. Integrate the exhaust fan system control to existing Honeywell DDC system. Provide start-up and checkout of new sequence.

Electrical:
Provide power to the new fan wall, VAV supply and exhaust terminal boxes. Provide (1) new 10-hp VFD for the heat recovery pump. Provide all necessary controls wiring for VFD. Start-up and factory checkout.

Structural: None

Specialty:
Commissioning: Provide functional performance test and point to point test on the updated DDC system and control programming and sequences. Test and balance the air side system and the heat recovery system.

SEMP Phasing Comments

AHU-36 is operating at 100% outside air, but the return air fan and duct are in place, but they are not connected. Retrofit the 100% OA system with return air. Add return air duct and grille at floor level. Cap the existing exhaust duct openings.
AHU-31 and AHU-32 are 100% OA dual duct constant volume systems. The supply fans and the exhaust fan have backup fan located offline. Retrofit the supply and exhaust fans with fan walls and install air-side heat recovery system for the system. Replace the existing dual duct CV systems with dual duct VAV systems. Implement air change rate setback during the unoccupied hours.

At least the AHU=36 portion of this FIM should be part of the CPW round 1 application since DPD is holding up other permits until it's done.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
		√	√	√	**2014**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	April 22, 2011

FIM Number	8016	Cherry Hill - Hospital

FIM Description 03.03-SCH Center Building AHU Upgrades

GENERAL
Center Building Penthouse A has ten small exhaust fans (EF-1 through EF-10) that blow into an abandoned heat recovery coil that is no longer being used. Penthouse C has ten small exhaust fans (EF-12 through EF-21). Replace these small exhaust fans with two more efficient fan wall EF's with VFD. Upsize the existing Central Building AHU-6 and AHU-8 with fan walls to meet the demand. The size of the existing ductwork is ok.

SCOPE OF WORK INCLUDES
Mechanical:
Remove the existing supply fans for AHU-6 and AHU-8 and the associated support. Replace the existing supply fans on AHU-6 and AHU-8 with VFD fan walls with redundancy. Reuse the existing ductwork and connect the supply fans to the existing ductwork. Provide spring isolation and support framing. Provide mechanical design to upsize the AHU capacity to meet the air flow demand in the zones. Remove the existing small exhaust fans and ductwork in the mechanical rooms. Provide two sets of fan wall (8000 CFM each) and exhaust plenum. Provide exhaust ductwork and connect the exhaust plenum and existing exhaust openings. Re-commission the existing run around loop heat recovery system (AHU-6 in penthouse C). Provide supply and exhaust prefilters. Replace the pump, valves, fittings and expansion tanks if needed. Provide Heat Recovery Coils on the outside air intake of AHU-8. Provide heat recovery coils, prefilters, isolation valves, balancing valves, and thermometers. Re-balance supply fans to accommodate the additional static pressure of the heat recovery coils. Furnish and install run around loop from AHU to exhaust fan. Provide 5 HP heat recovery pump. Provide expansion tank. Provide a heat recovery coil and prefilter in the common exhaust plenum. Balance EF to accommodate additional static from heat recovery coils. Furnish and install piping, valves and fittings to new coils. Retrofit the existing (27) constant volume terminal boxes in supply fan AHU-5 with dampers and flow rings to VAV boxes, and add (27) exhaust terminal boxes for corresponding VAV supply boxes. Retrofit the existing (25) constant volume terminal boxes in supply fan AHU-8 with dampers and flow rings to VAV boxes, and add (25) exhaust terminal boxes for corresponding VAV supply boxes. Reuse the existing supply ductwork and exhaust ductwork.
Mechanical design and permitting.

Controls:
Upgrade the existing pneumatic actuators on the AHU systems to electric actuators. Add the heat recovery system control to the existing Honeywell DDC system. Provide DDC controls to new VAV supply and exhaust terminal boxes. Revise EMCS system sequence to have occupied and unoccupied mode for air flow settings based on the building time of day schedule. Integrate the exhaust fan system control to existing Honeywell DDC system. Provide start-up and checkout of new sequence.

Electrical:
Provide power to the new fan wall, VAV supply and exhaust terminal boxes. Provide (1) new 5-hp VFD for the heat recovery pump. Provide all necessary controls wiring for VFD. Start-up and factory checkout.

Specialty:
Commissioning: Provide functional performance test and point to point test on the updated DDC system and control programming and sequences. Test and balance the air side system and the heat recovery system.

Demolition and Removal:
Remove the existing supply and exhaust fans.

Allotments: None

EXCLUSIONS
Hazardous material abatement.

SEMP Phasing Comments

Further research required.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
		√	√	√	**2015**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	April 22, 2011

FIM Number	8017	Cherry Hill - Hospital

FIM Description 03.04-SCH Center Building Basement AHU Upgrades

GENERAL
The Center Building basement mechanical room has four custom built air handling units. AHU-2 and AHU-4 are old and in poor condition. Replace both AHU's with new AHU's including fan wall with VFD, casings and dampers. AHU-1 and AHU-3 are recently replaced. Retrofit the AHU's with fan walls. AHU-1 and AHU-3 serve the Cath Lab and Cardiovascular OR Suites, and already have supply and exhaust boxes. Implement air change rate setback during the unoccupied hours.

SCOPE OF WORK INCLUDES
Mechanical:
AHU-2 and AHU-4:
Replace the existing fans on AHU-2 (existing supply fan 60 HP and 40000 CFM and return fan 30 HP and 42,000 CFM) and AHU-4 (existing supply fan 30 HP and 25000 CFM) with VFD fan walls with redundancy.
Furnish both AHU's with outside air damper, return air damper and relief air damper and chilled water and hot water coils. Reuse and clean the existing supply and return ductwork.
AHU-1 and AHU-3:
Retrofit the existing fans on AHU-1 (existing supply fan 60 HP and 40000 CFM) and AHU-3 (existing supply fan 30 HP and 25000 CFM) with VFD fan walls with redundancy.
Return Fan RF-1, RF-3, and RF-4:
Retrofit the existing return fans RF-1 (existing fan 15 HP and 21000 CFM), RF-3 (existing fan 15 HP and 21000 CFM) and RF-4 (existing fan 20 HP and 23000 CFM) with VFD fan walls with redundancy.
Mechanical design and permitting.

Controls:
Upgrade the existing pneumatic actuators on the AHU systems to electric actuators. Reuse the existing control panel and sensors on the existing AHU's.
Provide and install (X) new annunciator control panels and associated control wiring in the space (one per Operating Room). Panels shall contain the following: Manual override button that will restore the full air change rate and Indication lights for whether the unit is in "Full Airflow" or "Reduced Airflow"
Revise EMCS system sequence to have occupied and unoccupied mode for air flow settings based on the building time of day schedule. Provide start-up and checkout of new sequence.

Electrical:
Provide power to the new fan walls and VFD's.

Specialty:
Commissioning: Provide functional performance test and point to point test on the updated DDC system and control programming and sequences. Test and balance the air side system.

Demolition and Removal:
Remove the existing AHU-2 and AHU-4.

Allotments: None

EXCLUSIONS
Hazardous material abatement.

SEMP Phasing Comments

AHU-2 and AHU-4 serve Center Building level A and B. Both AHUs are old with leaking housing and failing dampers. Some other AHUs are also old and original to the building. Replace AHUs with new custom built AHUs with fan arrays.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
		√	√	√	**2015**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	April 22, 2011

FIM Number	8835	Cherry Hill - Hospital

FIM Description 04.01-SCH DDC Upgrades (cypress = 1/2 this cost)

GENERAL
Provide DDC controls upgrade to existing pneumatically controlled terminal units. As an alternative, upgrade the existing pneumatic thermostats to wireless thermostats.

SCOPE OF WORK INCLUDES
Mechanical: None

Controls:
Provide an upgrade of the existing pneumatic control system to existing DDC system (AHU's are out of the scope since they are already on DDC):
AHU-2: (66) supply boxes
AHU-3: (11) supply boxes and (4) exhaust boxes
AHU-4: (26) supply boxes and (10) exhaust boxes
EF-27: (6) exhaust boxes
AUH-6: (27) boxes
AHU-7: (16) boxes
AHU-9: (13) boxes
AHU-36: (194) induction units with heating coils
AHU-13: (19) boxes
AHU-14: (1) box
AHU-15: (4) boxes
AHU-16: (55) boxes
Provide graphics and all necessary programming to interface with the new system. Provide programming for morning warm up, optimum start, and holiday scheduling.
Replace pneumatic controls. Provide controls checkout (point to point and functional testing) on new system. Provide owner training for new system. ☐
Add Alternative: Upgrade the existing pneumatic thermostats to wireless thermostats.

Electrical:
Provide electrical power to control panel. Provide low voltage control wiring as required. Include conduit as required.

Specialty:
Commissioning: Perform point-to-point and functional performance testing and associated new programming.

Demolition and Removal:
Remove all pneumatic thermostats abandoned by this project.

Allotments: None

EXCLUSIONS
Hazardous material abetment
Pneumatic tubing demolition beyond required modification.
Correction of any unknown existing system deficiencies.

SEMP Phasing Comments

This is recommended only for areas with equipment that won't be upgraded or modified in the next 7 years. This would include air handler as well as zone level controls.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
	√		√	√	**2012**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	April 22, 2011

FIM Number	8822	Cherry Hill - Hospital

FIM Description 09.01-SCH Lighting Upgrades

The lighting throughout accessible spaces on the Cherry Hill campus is primarily two-lamp T8, and many have switches which are turned off as part of office closing. The hospital does have a small amount of T12 lighting remaining. In the west tower, some patient rooms have been converted to offices but still have patient room fixtures. This measure will install T8 fixtures in identified areas and provide daylighting and occupancy sensors where optimal. There is also opportunity to provide LEDs for a number of downlights.

SEMP Phasing Comments

2011 is shown since the audit is far along, and the net present value will be favorable.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
√			√	√	**2011**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	April 22, 2011

FIM Number	8015	Cherry Hill - Hospital

FIM Description 13.01-SCH Insulation - Pipes and Equipment, and Ducts

GENERAL
Most of the insulation on the piping and equipment are in good condition. But some steam, hot water, condensate and chilled water piping, fittings and equipment have missing or deteriorated insulation. This measure will improve insulation on piping, equipment and ductwork.

SCOPE OF WORK INCLUDES:
Mechanical:
Provide and install insulation on various systems.
Insulate steam, condensate, hot water, chilled water and/or domestic hot water piping using 1.5-2" (or per code) thick mineral fiber insulation. Fit all fittings with PVC covers.
Install removable blankets on selected valves located through out the building.

Controls: None

Electrical: None

Structural: None

Architectural: None

Acoustical: None

Specialty: None

Demolition and Removal: None

Allotments: None

EXCLUSIONS:
Hazardous material abatement excluded

SEMP Phasing Comments

This measure will improve insulation on piping, equipment and ductwork. 2011 is entered since Hudson Bay has already made some progress on developing this FIM.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
√					**2011**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	April 22, 2011

FIM Number	8833	Cherry Hill - Hospital

FIM Description 16.01-SCH Kitchen Hood Exhaust Demand Control Ventilation

GENERAL
The exhaust fan EF-43 serves the main kitchen hoods and it runs all the time. Install VFD on the exhaust fan and implement demand control ventilation on the kitchen hoods.

SCOPE OF WORK INCLUDES
Mechanical:
Provide Halton Marvel kitchen hood retrofit system including ABD Dampers, IR Sensor Bar, Pressure transducers, Room T-Stat, Control Panel, Exhaust VFD, and Hood Controller Box.
Install cut out existing manual balancing dampers, weld in new automatic balancing dampers, install retrofit kits for each hood, and install control panel and VFD to control fans.
Provide power to control panel and to each hood to power pressure transducer, fans for IR sensors, IR sensors and temp sensor. Bring power to room temp sensor.
Provide VFD for the MUA fan AHU-14.

Controls:
Add programming to the existing DDC system to modulate the fan speed. Add monitoring of the kitchen hood VFD and demand control ventilation system to the DDC.
Controls commissioning (point-to-point verification and functional performance testing)

Electrical:
Provide (2) new 15-hp VFD's with line reactors for the exhaust fan and MUA fan. Provide all necessary controls wiring for VFD. Start-up and factory checkout.

Structural: None

Architectural: None

Acoustical: None

Specialty:
Commissioning: Provide functional performance test and point to point test on the updated control programming and sequences. Perform test and balancing.

Demolition and Removal: None

Allotments: None

SEMP Phasing Comments

This FIM would modulate cooking hood CFM based on heat and smoke load sensors.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
	√				**2013**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	April 22, 2011

FIM Number	9043	Cherry Hill - Hospital

FIM Description 18.01-SCH Water Conservation

GENERAL
A detailed plumbing fixture audit was performed at this building and identified several existing fixtures (toilets, urinals, sinks, showers) that were operating at high consumption levels. This measure will increase the operational performance of the existing systems with the minimum water required to create sustainable savings. The end result of this campus wide retrofit will be a reduction in water consumption and standardization of plumbing fixture parts and accesssories. In addtion, a small amount of gas will be saved by reducing the amount of hot water that is needed for the sinks.

SCOPE OF WORK INCLUDES
Mechanical
Retrofit/tune the existing systems and replace the internal parts to standardize inventories across the campus.
Flushometers: Remove and replace flushometer valve assemblies. Remove and replace spuds and flushtubes. Remove and replace control stop components.
Aerators: Remove existing aerator (if applicable). Replace with new, vandal-proof flow control device with appropriate flow rate and pattern. Include appropriate adapter (if necessary) to ensure uniformity across the affected buildings. Note that installation of low flow aerators will reduce the risk of cross-contamination by preventing excess water from splashing out of the sink bowl.
Wall mount and handheld showerheads: Remove existing showerhead and replace with new head (either handheld or wall mount).

Demolition and Removal
Dispose of existing water equipment as indicated above and in the water audit. Recycle when appropriate.

EXCLUSIONS AND CLARIFICATIONS
The scope of work does not include replacement of any other plumbing components that may be defective.
Requires working flushometer control stops and shutoff valves at the time of implementation. McKinstry is not responsible for pre-existing conditions and is therefore not responsible for drips or non-function that results from normal exercise (open/close) of the control stops or shut-off valves.
Excludes work on faucets that are not compatible with standard faucet aerators.
Excludes aerator replacement on faucets where the condition does not accommodate replacement (e.g. threads are worn; aerator is seized and cannot be removed).

SEMP Phasing Comments

This measure will upgrade and commission high-consumption plumbing fixtures throughout the First Hill campus. 2011 is shown since the investment grade water audit is nearly done, and the net present value will be favorable.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
√			√		**2011**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	April 22, 2011

FIM Number	8834	Cherry Hill - Hospital

FIM Description 25.01-SCH Retro-Commissioning

GENERAL
This measure includes retro-commissioning of the mechanical systems listed under the scope of work below. The retro-commissioning process will verify current operation condition (both mechanical and controls) compared to the original design intent and current operational needs. The testing will result in a prioritized observation log listing all issues found and recommended resolution. Repairs will be implemented as budget allows starting with the high priority issues. Issues representing higher energy reduction will be given higher priority.

SCOPE OF WORK INCLUDES
Mechanical:
Modify Systems as necessary

Controls:
Assist commissioning agent in functional performance testing.

Specialty:
Commissioning:
Gather current information from maintenance staff (through customized questionnaire form and verbal interview) and facility records for specific known conditions.
Functional Performance Testing of the following Systems:
AHU-1, 3, 5, 7, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 21, 34, 35, 36, 51, 52, 55, 56, 57, 95.
25% of Terminal Units
HVAC Cooling Chilled Water System and Process Chilled Water System (total of 5 chillers)
Heating Water System (total of three gas boilers)
Generate a prioritized observation log noting issues found (ranked 1-3) recommended resolution, and ROM repair costing.
Perform nominal cost, quick fix repairs as they are found.
Issue a final report containing functional performance test and observation log.
Perform repairs as budget allows beginning with high priority issues

Demolition and Removal: None

Scheduling: None

EXCLUSIONS
Hazardous material abatement.
Any additional work beyond what is specifically listed in this scope of work that is necessary to upgrade.

SEMP Phasing Comments

This is recommended only for areas with controls and equipment that won't be upgraded or modified in the next 5 years.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
√			√		**2011**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	April 22, 2011

FIM Number	7645	Cherry Hill - Central Plant

FIM Description 01.01-CUP Add Stack Economizer for Boilers

GENERAL
The boiler plant has three boilers, but only one boiler has stack economizer. Install one stack economizer for other boilers. Install boiler surface blow down heat recovery system.

SCOPE OF WORK INCLUDES
Mechanical:
Provide one stack economizer system (non-condensing mode) have a design case capacity of 27,000 lb/hr of water at an operating temperature of 280°F @ 100 psig (fluid inlet temperature of 200°F) when supplied with 32,000 lb/hr of boiler flue gas at 350°F.
Provide one induced draft fan in the stack.
Provide hot water piping and associated appurtenances between the DA tank and the new stack economizer.
Cut through the existing stack and provide adapters to connect the stack economizer HR system to the existing stack.

Controls:
Furnish the stack economizer heat recovery system with control panel and necessary control points including: ID fan on/off, ID fan status, ID fan speed, gas and liquid inlet and outlet temp, control valves, high water temp cutout, high gas temp cutout and low water flow cutout.

Electrical:
Provide (1) 20-hp VFD for the ID fan.

Structural: None

Architectural: None

Acoustical: None

Specialty:
Commissioning: Provide functional performance test and point to point test on the new stack economizer heat recovery system control programming and sequences. Perform test and balancing.

Demolition and Removal: None

Allotments: None

SEMP Phasing Comments

The boiler plant has three boilers, but only one boiler has stack economizer. Install stack economizers for one boiler. Install boiler surface blow down heat recovery system for one boiler. Date greater than 2012 since the NPV of this FIM is expected to be less favorable vs. other FIMs on the list.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
	√				**2014**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	April 22, 2011

FIM Number	8100	Cherry Hill - Central Plant

FIM Description 10.01-CUP Combined Heat and Power

GENERAL
The boilers generate 100 psi steam and then PRV's reduce the steam pressure to medium and low pressure for sterilizer and heating use. Install back pressure steam turbine to generate electricity and reduce steam pressure in lieu of pressure reducing valves.

SCOPE OF WORK INCLUDES
Mechanical:
Provide one 250 kW back pressure steam turbine (inlet steam pressure = 200 psig and exhaust pressure = 60 psig)
Increase the boiler operation steam pressure (existing max pressure is 250 psig) and make the modifications to the existing boilers to accommodate for the increased pressure.
Provide steam piping to connect the main steam header to the new steam turbine. Connect the steam turbine exhaust to the existing distribution piping. Provide switching in steam piping to allow bypass of the steam turbine.
Re-configure the pressure reducing valves in the mechanical rooms to allow for switching between high pressure and medium pressure steam.

Controls:
Provide controls to the new back pressure turbine generator system. Monitor the operation of the system in DDC system.

Electrical
Provide electric generator with inverter with capacity in accordance with the steam turbine.
Provide electric switchgear and electric wiring to connect the back pressure turbine generator set to the existing electric distribution system.
Provide one electric meter to measure the electricity feed into the distribution network.
Structural:
Provide housekeeping pad and structural upgrades for the steam turbine and the generator set.

Architectural: None

Acoustical: None

Specialty:
Commissioning: Perform point-to-point and functional performance testing on the new system.

Demolition and Removal: None

Allotments: None

SEMP Phasing Comments

The boilers generate 100 psi steam and then PRV's reduce the steam pressure to medium and low pressure for sterilizer and heating use. Install back pressure steam turbine to generate electricity and reduce steam pressure in lieu of pressure reducing valves.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
		√			**2015**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	April 22, 2011

FIM Number	7674	Cherry Hill - Central Plant

FIM Description 20.01-CUP Medical Waste Management

GENERAL
This measure includes analyzing the possible application of a system for regulated medical waste processing in a more cost effective manner.

SCOPE OF WORK INCLUDES
Specialty-Onsite Waste Treatment
Provide equipment to treat, sterilize and manage infectious waste on-site. Basis of design: San-I-Pak integrated high-density sterilizer/compactor system.
Prepare the site with large area close to the building with easy access for truck disposal.
Provide and install San-I-Pak integrated high-density sterilizer/compactor system with yellow containers.
Provide electrical wiring (460V/3P) from panel to the unit.
Provide makeup water assembly to the San-I-Pak unit.

EXCLUSIONS AND CLARIFICATIONS
Excludes hazardous material abetment.
Assumes location for san-i-pak equipment is available on campus.

SEMP Phasing Comments

Install Sanipak medical waste treatment and management system. 2014 is shown since this won't be eligible for CRIF funding.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
	√				**2014**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	7918	First Hill

FIM Description 01.02-SFH Steam Optimization

GENERAL
There are approximately 200 steam traps located throughout the Swedish First Hill Campus. It is common in steam systems to have approximately 10% of the installed steam traps fail. Failing traps will either plug, which results in comfort complaints from the occupant, or fail in an open position, allowing live steam to escape into the condensate return system.This measure will survey all steam traps and repair or replace inoperable traps.

SCOPE OF WORK INCLUDES
Mechanical
Survey all steam traps to determine quantity, size and current condition. Test steam traps to determine if they are functioning properly and not cold plugging or failing in an open position and allowing live steam to escape into the condensate return system.
Repair traps or replace traps if they fail open. Unplug traps that are causing comfort complaints or performance deficiencies.

Demolition and Removal
Remove and replace steam traps that cannot be repaired.

EXCLUSIONS AND CLARIFICATIONS
Excludes hazardous material abetment.
Excludes Correction of any unknown existing system deficiencies.

SEMP Phasing Comments

Primarily a steam trap FIM.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
√					**2012**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	8836	First Hill

FIM Description 02.01-SFH Address CHW Low Delta T

GENERAL
This measure will replace existing chilled water control valves with pressure independent control valves. Remove chilled water bypass and three way control valve to help increase the chilled water delta T. Chilled water valves shall be connected to the buildings existing JCI control system.

SCOPE OF WORK INCLUDES
Mechanical
Replace valves on 45 chilled water coils throughout Swedish First Hill Campus.
Replace 3-way control valves with 2-way Delta P Valves with a JCI actuator. Demo and cap unused bypass line.
Replace 2- way control valves with 2-way Delta P Valves with a JCI actuator.
Set the CCWS balancing valves following the supply pumps 100% open.

Controls
Disconnect and reconnect existing controls for one (1) chilled water control valves.
Valves purchased and installed by Mechanical. Controls contractor to review valve submittal prior to purchase.
Commission new control valves.

Commissioning
Review control contractor documentation of successful calibration and functional performance testing.
Verify maximum chilled water flow for modified coils.

Demolition and Removal
Demo chilled water 3-way valves. Replace with spool piece and cap unused bypass branch.
Demo controls for 3-way control valve.

Insulation
Remove and replace insulation around chilled water control valves.

EXCLUSIONS
Balancing of existing hydronic and air systems downstream of AHU's and systems not modified by this contract is excluded.
Hazardous material abatement is excluded
Does not include material costs or labor to repair or replace existing equipment.
Does not include repairs to existing code violations.

SEMP Phasing Comments

2011 isn't shown since more development and budget approval will be needed, but we do anticipate that this will be a viable FIM.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
√					**2012**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	7916	First Hill

FIM Description 03.01-SFH Air-side Heat Recovery

GENERAL
There are a number of 100% OA Supply fans serving the First Hill campus. Retrofit 100% OA fans with a return air configuration where applicable. Provide additional filtration for these systems. Investigate the feasibility of run-around heat recovery systems for other 100% OA systems. Some existing 100% OA air handling units already have air-side run around loop heat recovery system, but they were disabled. Investigate the issues with existing systems, re-commission the air-side heat recovery system for 100% OA systems.

SCOPE OF WORK INCLUDES
Mechanical
Provide a Heat Recovery Loop within the Main Surgery 4th floor mech room
Provide a heat recovery coil for the 7460 CFM surgery supply fan. Install a horizontal coil within the exhaust ductwork. Provide the necessary sheave changes to the exhaust fan in order to match existing airflow. Install heat recovery coils in exhaust ductwork of EF-001 (6155 CFM) and EF-002 (2652 CFM). Provide a pre-filter within the exhaust ductwork, prior to the heat recovery coil and a condensate drain pan for each coil. Route condensate to nearest floor drain. Modify exhaust ductwork as necessary to accommodate the coil, a pre-filter, and condensate drain pan. Provide a heat recovery pump, expansion tank, makeup water assembly, and glycol make-up system
Provide a Heat Recovery Loop within the 2-SW Wing A floor mech room
Provide a heat recovery coil for the 5250 CFM supply fan. Install a horizontal coil within the exhaust ductwork. Provide the necessary sheave changes to the exhaust fan in order to match existing airflow. Install heat recovery coils in exhaust ductwork of the 5250 CFM exhaust fan. Provide a pre-filter within the exhaust ductwork, prior to the heat recovery coil and a condensate drain pan for each coil. Route condensate to nearest floor drain. Modify exhaust ductwork as necessary to accommodate the coil, a pre-filter, and condensate drain pan. Provide a heat recovery pump, expansion tank, makeup water assembly, and glycol make-up system

Controls
The existing JCI building DDC system shall provide a pump start/stop signal. Optimize the heat recovery operation to run the pumps when heat recovery is available. Retro-commission the controls to verify that all DDC points are operational.☐

Electrical
Provide power to the new heat recovery pumps.

Structural
Provide a new house-keeping pad for the heat recovery pumps.

Commissioning
Provide pre and post airflow measurements for the supply fan and exhaust fans.
Provide functional testing on the heat recovery system.

Demolition and Removal
Demolish ductwork as needed to install heat recovery system.

SEMP Phasing Comments

2013 is shown since the net present value will be less favorable than some other FIMs. The West Wing air handlers seemed like good candidates, but if it's possible to shut the air handlers down at night, that would be a better option. Also the future of the West Wing is in question.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
	√				**2013**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	8819	First Hill

FIM Description 03.02-SFH Kitchen Refrigeration Heat Recovery

GENERAL
This measure will analyze the possibility of recovering heat from refrigeration equipment on the First Hill campus.

SCOPE OF WORK INCLUDES
Specialty-Kitchen refrigeration heat recovery
Provide preheat for hot water or outside air by recovering heat from the nearby refrigeration equipment.

EXCLUSIONS AND CLARIFICATIONS
Excludes hazardous material abetment.

SEMP Phasing Comments

Further research required.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
	√				**2014**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	8839	First Hill

FIM Description 03.03-SFH 2 SW Upgrades

GENERAL
The second floor of the SW tower has an outdated mechanical room and single-pane windows. This measure will replace the single-pane windows and update the mechanical equipment to accommodate the building load.

SCOPE OF WORK INCLUDES
Mechanical
Provide overhead HVAC equipment to serve the space. Size the equipment to meet current building use, envelope conditions and occupancy.

Architectural
Upgrade the existing single pane windows with double pane high performance glazing. Add weather-stripping on the windows and doors and improve the building air sealing.

Demolition and Removal
Remove unnecessary induction units located along the building perimeter. Repair wall and flooring to match existing.

EXCLUSIONS
Hazardous material abatement.

SEMP Phasing Comments

2011 is shown since budgeting and conceptual design have begun.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
		√	√	√	**2011**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	8840	First Hill

FIM Description	03.04-SFH 3-6 SW Upgrades

GENERAL
The third through sixth floors of the SW tower have an outdated mechanical room and single-pane windows. This measure will replace the single-pane windows and update the mechanical equipment to accommodate the building load.

SCOPE OF WORK INCLUDES
Mechanical
Provide overhead HVAC equipment to serve the space. Size the equipment to meet current building use, envelope conditions and occupancy.

Architectural
Upgrade the existing single pane windows with double pane high performance glazing. Add weather-stripping on the windows and doors and improve the building air sealing.

Demolition and Removal
Remove unnecessary induction units located along the building perimeter. Repair wall and flooring to match existing.

EXCLUSIONS
Hazardous material abatement.

SEMP Phasing Comments

2014 is shown since this will require significant budget approval.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
		√	√	√	**2014**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	8823	First Hill

FIM Description	04.01-SFH Controls Hardware Upgrade

GENERAL
The First Hill Campus equipment is monitored and operating using an outdated JCi controls system. The controls backbone, programming, graphics and scheduling are out of date. This measure will update this backbone to better operate the controls system at First Hill.

SCOPE OF WORK INCLUDES
Controls
Using the existing setpoints and sequences, update the JCi backbone to support the hospital HVAC operations.

Commissioning
Provide functional performance test and point to point testing on the existing sequence and setpoints.

EXCLUSIONS
Excludes Hazardous material abatement.
Excludes building systems other than mechanical

SEMP Phasing Comments

This project is already approved.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
	√			√	**2011**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	7920	First Hill

FIM Description 04.02-SFH DDC Upgrades

GENERAL
The First Hill Campus has equipment that is still operated using the original pneumatic system. Pneumatic controls do not allow for the same controllability and energy savings as a central BMS. The pneumatic technology is also becoming obsolete. This measure will remove pneumatic controls and replace with DDC which will communicate with the existing BMS. This will allow for efficient building operation strategies such as heating water supply temperature reset, discharge air reset, space temperature setback and more refined scheduling of equipment.

SCOPE OF WORK INCLUDES
Controls
Provide graphics and all necessary programming to interface with the existing system. Replace pneumatic controls. Provide controls checkout (point to point and functional testing) on new system. Provide owner training for new system. Provide electrical power to control panel. Provide low voltage control wiring as required. Include conduit as required. Provide programming for morning warm up, optimum start, and holiday scheduling.

Commissioning
Provide functional performance test and point to point testing on the existing sequence and setpoints.

EXCLUSIONS AND CLARIFICATIONS
A. Excludes hazardous material abetment.
B. Assumes existing pneumatic controls (compressor, dryer, dampers, damper actuators) are in good condition and able to be re-used without further work.
C. Excludes pneumatic tubing demolition beyond required modification.
D. Assumes all motor starters are in good condition and able to continue in service.
E. Excludes Correction of any unknown existing system deficiencies.

SEMP Phasing Comments

This is recommended only for areas with equipment that won't be upgraded or modified in the next 7 years. This would include air handler as well as zone level controls.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
	√		√	√	**2012**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	8825	First Hill

FIM Description	04.03-SFH Submetering

GENERAL
This measure will automate the collection of data for the heating and chilled water loops throughout the First Hill campus. This data will be collected at one central data collection point using the existing BMS.

SCOPE OF WORK INCLUDES
Mechanical
Install (16) heating water meters and (8) chilled water meters.

Controls
The meters will communicate to the integration/data collection panel through TCP communication via Campus Ethernet network.

Electrical
Install Network connection to new meters for communication to the network. Include wiring and Conduit as necessary for connections.

Commissioning
Verify proper communication from meter to the network. Verify meter is reading accurately.

EXCLUSIONS AND CLARIFICATIONS
Hazardous material abatement is excluded.
This proposal does not include material costs or labor to repair or replace existing equipment.
This proposal does not include repairs to existing code violations.
The First Hill network is assumed to be in good working order. This project does not address campus network redundancy or stability.

SEMP Phasing Comments

Provide submetering on HW and CHW loops. Tie this in to the existing BMS

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
	√				**2012**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	8824	First Hill

FIM Description	08.01-SFH East Tower VFD Retrofits

GENERAL
The Air Handling Units in the East Tower are equipped with Inlet Guide Vanes to control the airflow. These units serve constant volume boxes. This measure will remove the inlet guide vanes and provide VFD control on the fans. This will reduce static pressure loss and the BHP needed to maintain the same discharge static pressure setpoint.

SCOPE OF WORK INCLUDES
Mechanical
Provide inverter duty premium efficiency motors where needed.

Controls
Provide VFD status.

Electrical
Provide VFD fan packages with line reactors for the fans. Provide all necessary controls wiring for VFD. Start-up and factory checkout.

Commissioning
Provide functional performance test and point to point test on the updated control programming and sequences. Perform test and balancing.

EXCLUSIONS
Hazardous material abatement.

SEMP Phasing Comments

VFD retrofit project for East Tower fans. Already approved by Swedish contingent on a 70% utility grant. Grant calculations are underway.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
√					**2011**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	7914	First Hill

FIM Description 08.02-SFH Variable Speed Drives

GENERAL
Air Handling Units and pumps throughout the First Hilll campus are constant volume, which contributes to inefficiencies when zone occupancy and demand vary. This measure will provide variable air volume capabilities and occupant-based control for constant volume fans and variable flow capabilities for heating and chilled water systems with two-way control or PICVs. Also included in this scope are VFDs on the cooling towers.

This measure will analyze the air volume provided to spaces throughout the First Hill campus and identify opportunities for equipment scheduling, setback and/or rebalancing. This measure will encompass the surgery and patient areas as well as parking garages and lab/kitchen hoods.

SCOPE OF WORK INCLUDES
Mechanical
Provide inverter duty premium efficiency motors where needed.

Controls
Provide VFD status. Some controls scope is covered under FIM 4.02-SFH DDC Upgrades.

Electrical
Provide VFD fan packages with line reactors for constant volume fans not included in fan upgrade measures. Provide all necessary controls wiring for VFD. Start-up and factory checkout.

Provide VFD pump packages with line reactors for chilled and heating water pumps above 5 hp. Provide all necessary controls wiring for VFD. Start-up and factory checkout.

Provide VFD packages with line reactors for (4) 75-hp cooling towers in the Heath Building and (7) 40-hp cooling towers in the East Tower Building. Provide all necessary controls wiring for VFD. Start-up and factory checkout.

Commissioning
Provide functional performance test and point to point test on the updated control programming and sequences. Perform test and balancing.

EXCLUSIONS
Hazardous material abatement.

SEMP Phasing Comments

For any VFDs no included in other FIMs.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
√					**2012**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	8813	First Hill

FIM Description 08.03-SFH Kitchen Hood Exhaust DCV

GENERAL
The exhaust fan serving the main kitchen hoods runs 24/7. This measure will install a VFD on the exhaust fan and implement demand control ventilation on the kitchen hoods.

SCOPE OF WORK INCLUDES
Mechanical:
Provide Halton Marvel kitchen hood retrofit system including ABD Dampers, IR Sensor Bar, Pressure transducers, Room T-Stat, Control Panel, Exhaust VFD, and Hood Controller Box.
Install cut out existing manual balancing dampers, weld in new automatic balancing dampers, install retrofit kits for each hood, and install control panel and VFD to control fans.
Provide power to control panel and to each hood to power pressure transducer, fans for IR sensors, IR sensors and temp sensor. Bring power to room temp sensor.
Provide VFD for the MUA fan.

Controls:
Add programming to the existing DDC system to modulate the fan speed. Add monitoring of the kitchen hood VFD and demand control ventilation system to the DDC.
Controls commissioning (point-to-point verification and functional performance testing)

Electrical:
Provide (2) new VFD's with line reactors for the exhaust fan and MUA fan. Provide all necessary controls wiring for VFD. Start-up and factory checkout.

Specialty:
Commissioning: Provide functional performance test and point to point test on the updated control programming and sequences. Perform test and balancing.

EXCLUSIONS
Hazardous material abatement.

SEMP Phasing Comments

This FIM would modulate cooking hood CFM based on heat and smoke load sensors.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
	√				**2013**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	7915	First Hill

FIM Description 09.01-SFH Lighting Upgrades

The lighting throughout most of the First Hill campus is primarily two-lamp T8, and many have switches which are turned off as part of office closing. The hospital does have a small amount of T12 lighting remaining. This measure will install T8 fixtures in identified areas and provide daylighting and occupancy sensors where optimal. There is also opportunity to provide LEDs for a number of downlights.

SEMP Phasing Comments

2011 is shown since the audit is far along, and the net present value will be favorable.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
√			√	√	**2011**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	7928	First Hill

FIM Description 13.01-SFH Building Envelope Upgrades

GENERAL
The Swedish First Hill Building construction dates back to 1950. Changes in buildings standards and construction methods throughout the years have left the Swedish First Hill Campus with varying envelope conditions and in some cases envelope defficiencies. In addition air leakage in ductwork contributes to an increase in fan energy and starving locations for air. This measure will address these deficiencies by sealing air cracks in the envelope and ductwork.

SCOPE OF WORK INCLUDES
Mechanical
Survey the envelope conditions. Identify air leakage in roofing, walls, window frames, doors and penetrations/shafts. Provide weather stripping and sealing for air leaks.
Survey ductwork for large leaks or breaks in sheet metal. Patch ductwork to prevent leakage.

Commissioning
Test fan power before and after duct repairs.

Demolition and Removal
Remove and replace steam traps that cannot be repaired.

EXCLUSIONS AND CLARIFICATIONS
Excludes hazardous material abetment.
Excludes Correction of any unknown existing system deficiencies.

SEMP Phasing Comments

This measure will improve the building envelope by utilizing window film, replacing windows as needed, improving air sealing and envelope insulation,

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
		√	√		**2013**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	7927	First Hill

FIM Description 13.02-SFH Insulation - Pipes and Equipment, and Ducts

GENERAL
Most of the insulation on the piping and equipment are in good condition. But some steam, hot water, condensate and chilled water piping, fittings and equipment have missing or deteriorated insulation. This measure will improve insulation on piping, equipment and ductwork.

SCOPE OF WORK INCLUDES:
Mechanical:
Provide and install insulation on various systems.
Insulate steam, condensate, hot water, chilled water and/or domestic hot water piping using 1.5-2" (or per code) thick mineral fiber insulation. Fit all fittings with PVC covers.
Install removable blankets on selected valves located through out the building.

EXCLUSIONS:
Hazardous material abatement excluded.
Piping labels excluded.

SEMP Phasing Comments

This measure will improve insulation on piping, equipment and ductwork. 2011 is entered since Hudson Bay has already made some progress on developing this FIM.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
√					**2011**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	8816	First Hill

FIM Description	13.03-SFH PV on Parking Garage and EV Charging Station

GENERAL
Swedish Medical Center seeks to continue to meet its mission critical goals of caring for the community, optimizing the healing and working environment, and improving the hospital's financial position by reducing energy costs. This measure will provide (4) Electric Vehicle charging stations for use by the community and visitors to the hospital. 15kW of rooftop solar PV will contribute to offsetting the electrical consumption of the charging stations.

SCOPE OF WORK INCLUDES
Electrical
Provide (4) EV charging stations. Provide the infrastructure to accommodate each charging station.
Provide a 15 kW grid-connected solar PV array.

Structural
Include a structural review to ensure structure can accommodate the weight of the new PV system frame and equipment. The exact location of the PV system may be adjusted slightly as recommended by the structural reviewer.
Provide attachment of support pole mounting system frame to roof structure.

Commissioning:
Perform point to point functional testing of the new boilers and control sequence modifications.
Perform boiler flue tests on each boiler to verify efficiency.

EXCLUSIONS/CLARIFICATIONS
Excludes repairs to existing electrical system.
Excludes hazardous material abatement.

SEMP Phasing Comments

2012 is shown since Swedish indicated that the topic of EV charging already has some traction.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
		√			**2012**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	8815	First Hill

FIM Description	13.04-SFH Window Film

GENERAL
This project will provide window film for improved sun control along the Southern and West facing glazing.

SCOPE OF WORK INCLUDES
Architectural
Provide window film on the South and West Facade windows

EXCLUSIONS/CLARIFICATIONS
Hazardous material abatement.
Window replacement or repairs to existing windows with defects or imperfections which will affect final appearance of film.
Window and window frame cleaning to enable adequate window film application.

SEMP Phasing Comments

Some energy savings, but primarily for comfort on hot sunny days for South, East, and West exposures.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
		√	√		**2012**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	8820	First Hill

FIM Description 13.05-SFH Wall Insulation

GENERAL
The Swedish First Hill Building construction dates back to 1950. Some of the older buildings have brick construction with little or no wall insulation. This measure will improve insulation in the occupied spaces to minimize heat transfer to the outside.

SCOPE OF WORK INCLUDES
Architectural
Survey the envelope conditions. Provide insulation for uninsulated or minimally insulated portions of the building.

EXCLUSIONS AND CLARIFICATIONS
Excludes hazardous material abetment.
Excludes Correction of any unknown existing system deficiencies.

SEMP Phasing Comments

For walls that have no insulation. 2015 is shown since the net present value will be poor if judged strictly on energy savings.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
		√	√		**2015**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	7924	First Hill

FIM Description 18.01-SFH Water Conservation

GENERAL
A detailed plumbing fixture audit was performed at this building and identified several existing fixtures (toilets, urinals, sinks, showers) that were operating at high consumption levels. This measure will increase the operational performance of the existing systems with the minimum water required to create sustainable savings. The end result of this campus wide retrofit will be a reduction in water consumption and standardization of plumbing fixture parts and accesssories. In addtion, a small amount of gas will be saved by reducing the amount of hot water that is needed for the sinks.

SCOPE OF WORK INCLUDES
Mechanical
Retrofit/tune the existing systems and replace the internal parts to standardize inventories across the campus.
Flushometers: Remove and replace flushometer valve assemblies. Remove and replace spuds and flushtubes. Remove and replace control stop components.
Aerators: Remove existing aerator (if applicable). Replace with new, vandal-proof flow control device with appropriate flow rate and pattern. Include appropriate adapter (if necessary) to ensure uniformity across the affected buildings. Note that installation of low flow aerators will reduce the risk of cross-contamination by preventing excess water from splashing out of the sink bowl.
Wall mount and handheld showerheads: Remove existing showerhead and replace with new head (either handheld or wall mount).

Demolition and Removal
Dispose of existing water equipment as indicated above and in the water audit. Recycle when appropriate.

EXCLUSIONS AND CLARIFICATIONS
The scope of work does not include replacement of any other plumbing components that may be defective.
Requires working flushometer control stops and shutoff valves at the time of implementation. McKinstry is not responsible for pre-existing conditions and is therefore not responsible for drips or non-function that results from normal exercise (open/close) of the control stops or shut-off valves.
Excludes work on faucets that are not compatible with standard faucet aerators.
Excludes aerator replacement on faucets where the condition does not accommodate replacement (e.g. threads are worn; aerator is seized and cannot be removed).

SEMP Phasing Comments

This measure will upgrade and commission high-consumption plumbing fixtures throughout the First Hill campus. 2011 is shown since the investment grade water audit is nearly done, and the net present value will be favorable.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
√			√		**2011**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	8817	First Hill

FIM Description	18.02-SFH Dishwasher Replacement

GENERAL
This measure will replace the existing dishwasher with a more efficient dishwasher, resulting in domestic hot water heating savings and water savings.

SCOPE OF WORK INCLUDES
Electrical
Provide power to dishwasher. Assume the panel is within 50' of dishwasher.

Specialty – Kitchen Equipment
Provide one (1) commercial dish washer with an electric booster

Demolition
Demo and Remove one (1) existing dishwasher.

ASSUMPTIONS
Existing building electrical distribution system has sufficient capacity to handle new electrical load.

SEMP Phasing Comments

The measure would need to be done in conjunction with a needs based dishwasher replacement in order to be cost effective.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
	√				**2013**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	7926	First Hill

FIM Description	20.01-SFH Medical Waste Management

GENERAL
This measure includes analyzing the possible application of a system for regulated medical waste processing in a more cost effective manner.

SCOPE OF WORK INCLUDES
Specialty-Onsite Waste Treatment
Provide equipment to treat, sterilize and manage infectious waste on-site. Basis of design: San-I-Pak integrated high-density sterilizer/compactor system.

EXCLUSIONS AND CLARIFICATIONS
Excludes hazardous material abetment.
Assumes location for san-i-pak equipment is available on campus.

SEMP Phasing Comments

Install Sanipak medical waste treatment and management system. 2014 is shown since this won't be eligible for CRIF funding.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
	√				**2014**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	7919	First Hill

FIM Description 25.01-SFH Commissioning - Retro or Re

The Swedish First Hill campus is primarily operated through the existing BMS. As good practice, the building operations should be recommissioned periodically to ensure optimum operation and efficiency. This measure will recommission the Mechanical System DDC-operated equipment.

SCOPE OF WORK INCLUDES
Commissioning
Conduct RCx on the major mechanical systems. Develop Site Specific Functional Performance Tests (FPT), execute P2P and FPT and develop a prioritized observation log with suggested corrective action for the following systems:
-Steam distribution, coils and heat exchangers
-Heating water distribution, pumping and AHU heating water coils
-Chiller and cooling tower operation, chilled water distribution, pumping and AHU chilled water coils
-Heat recovery systems
-Supply and Exhaust fans, air distribution, filtration

Optimize the operation of each system including but not limited to discharge air temperature reset, static pressure reset, pump differential pressure reset, and demand controlled ventilation.

Document issues found on prioritized observation log. Establish a 2-week trend plan and implement it before starting the investigation to capture the current working condition of systems in scope. Document existing schedules and setpoints. Review with property manager and adjust as appropriate. Implement low cost repairs (less that $500) as they are identified during the investigation. This project will also include an allotment for larger repairs. Provide training to the facility operators on what was found and system modifications or repairs to ensure operators understand the impact of the findings. Provide final RCx report and training.

EXCLUSIONS
Excludes hazardous material abatement
Excludes building systems other than mechanical

SEMP Phasing Comments

This is recommended only for areas with controls and equipment that won't be upgraded or modified in the next 5 years.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
√			√		**2011**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	8810	First Hill

FIM Description 29.01-SFH Main Surgery Upgrade

GENERAL
The Main Surgery supply fans are approaching end of life. This measure will replace the existing fans and upgrade the controls.

SCOPE OF WORK INCLUDES
Mechanical:
Remove the existing supply fans for the Main Surgery Supply Fans. Replace the existing supply fans with VFD fan walls with redundancy. Reuse the existing ductwork and connect the supply fans to the existing ductwork. Provide spring isolation and support framing. Mechanical design and permitting.

Controls:
Upgrade the existing pneumatic actuators on the AHU systems to electric actuators. Revise EMCS system sequence to have occupied and unoccupied mode for air flow settings based on the building time of day schedule. Provide start-up and checkout of new sequence.

Electrical:
Provide power to the new fan walls. Provide all necessary controls wiring for VFD. Start-up and factory checkout.

Specialty:
Commissioning: Provide functional performance test and point to point test on the updated DDC system and control programming and sequences. Test and balance the air side system.

Demolition and Removal:
Remove the existing supply fans.

Allotments: None

EXCLUSIONS
Hazardous material abatement.

SEMP Phasing Comments

Upgrade Fans including VFDs, heat recovery, zone level VAV upgrade, and controls. 2011 shown since some pricing and preliminary design have already occurred.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
		√	√	√	**2011**

FIM Detail Report

Project	Swedish Hospital SEMP
Scenario	SEMP Report
Company	Swedish Medical Center
Report Generated On:	March 1, 2011

FIM Number	8812	First Hill

FIM Description 29.02-SFH South Bldg Critical Supply and Exhaust Upgrade

GENERAL
The Day Surgery supply and exhaust fans are approaching end of life. This measure will replace the existing fans, upgrade the controls, provide heat recovery and upgrade the CV boxes to VAV.

SCOPE OF WORK INCLUDES
Mechanical:
Remove the existing supply fan. Replace the existing supply fan with VFD fan wall with redundancy. Reuse the existing ductwork and connect the supply fan to the existing ductwork. Provide spring isolation and support framing.
Remove the existing exhaust fan. Replace the existing fan with VFD fan wall with redundancy. Reuse the existing ductwork and connect the exhaust fan to the existing ductwork.

Provide run around loop heat recovery system. Provide supply and exhaust prefilters. Provide heat recovery pump, valves, fittings and expansion tanks if needed. Provide Heat Recovery Coil on the outside air intake of the AHU. Provide heat recovery coil, prefilter, isolation valves, balancing valves, and thermometers. Re-balance supply fans to accommodate the additional static pressure of the heat recovery coils. Furnish and install run around loop from AHU to exhaust fan.
Provide 5 HP heat recovery pump. Provide a heat recovery coil and prefilter in the exhaust ductwork. Balance EF to accommodate additional static from heat recovery coils. Furnish and install piping, valves and fittings to new coil.

Retrofit the existing constant volume terminal boxes with dampers and flow rings to VAV boxes, and add exhaust terminal boxes for corresponding VAV supply boxes. Reuse the existing supply ductwork and exhaust ductwork.

Controls:
Upgrade the existing pneumatic actuators on the AHU systems to electric actuators. Add the heat recovery system control to the existing JCI DDC system. Provide DDC controls to new VAV supply and exhaust terminal boxes. Revise EMCS system sequence to have occupied and unoccupied mode for air flow settings based on the building time of day schedule. Integrate the exhaust fan system control to existing JCI DDC system. Provide start-up and checkout of new sequence.

Electrical:
Provide power to the new fan wall, VAV supply and exhaust terminal boxes. Provide (1) new 5-hp VFD for the heat recovery pump. Provide all necessary controls wiring for VFD. Start-up and factory checkout.

Specialty:
Commissioning: Provide functional performance test and point to point test on the updated DDC system and control programming and sequences. Test and balance the air side system and the heat recovery system.

Demolition and Removal:
Remove the existing supply and exhaust fans.

EXCLUSIONS

SEMP Phasing Comments

Day Surgery supply and exhaust fan replacement with fan array, VAV and heat recovery. 2011 shown due to urgent need for redundancy.

Energy Life Cycle Cost Positive	Energy Life Cycle Cost Neutral	Needs Based	Improves Patient Care	Reduces Maintenance/Repair Cost	Phasing Recommendation
		√	√	√	**2011**

Appendix A

ENERGY MANAGEMENT PERFORMANCE

Swedish Medical Center seeks to continue to meet its mission critical goals of caring for the community, optimizing the healing and working environment, and improving the hospital's financial position by reducing energy costs. These reports are included as a record of these energy savings.

- Swedish Hospital Energy Management Performance Goals
- Seattle City Light Resource Conservation Manager Plan with Swedish Medical Center
- Resource Conservation Management Plan
- Resource Conservation Management Results to Date

Appendix A

Swedish Medical Center hired a RCM in December of 2008 to dedicate a resource for the implementation of the Swedish Medical Center Strategic Energy Management Plan (SEMP). The Strategic Energy Management Plan's performance goal is to reduce energy consumption by a minimum of 10%.

Prioritized improvements

PHASE 1 – FACILITIES OPERATIONS

1. Establish a means of communication for facilities services to the general hospital employees with the primary goal of raising the level of energy awareness.

2. Establish a dedicated resource for the Building Automation Systems.

3. Establish an in house training program for facilities personnel.

4. Establish a means of communication for facilities staff to be aware of what is happening in terms of building performance.

5. Continue to identify and implement O&M best practices.

PHASE 2 – CONTINUED IMPROVEMENT

1. Specifically define tasks and procedures for commissioning of existing HVAC systems and the Building Automation System.

2. Improve alarming and reporting capability of the Building Automation System to alert facilities staff to potential problems.

3. Implement modifications to existing HVAC systems sequences of operations.

4. Propose and implement building performance improvement projects.

5. Communicate energy savings activities, actual savings and success stories within the hospital community.

DOCUMENTED IMPROVEMENT

During the 2008 the facilities staff engaged in major energy savings projects at the First Hill Campus. The main projects with targeted energy savings included energy efficient lighting upgrades in the campus garages, optimizing the garage ventilation systems and improvements to the chilled water system that provide cooling to the campus facilities. These projects paid dividends during the 2009 year. The efficiencies and energy savings gained have offset the increase in utility costs on the First Hill Campus when the new Swedish Orthopedic Institute opened in June of 2008. The SOI building added approximately 17% square footage of maintained space while the amount of energy consumed per square foot on the First Hill Campus has decreased. Also, the cost per square foot to pay for that energy decreased from 2008 to 2009. The facilities services team has compared the First Hill Campus to other hospitals in the country through the EPA's Energy Star for commercial buildings program and through June 2008 (before SOI was added) the campus achieved a score of 57 (50 is the national average), through June 2009 that score improved to 65 and through June 2010 the score is now 72. Eventually it is the goal to have the First Hill Campus Energy Star score of 75 and be recognized with other hospitals in the country as achieving excellent energy efficiency and performance in one of the most demanding and high energy use types of facilities. Projects completed in 2008 on First Hill Campus:

1. Garage lighting retrofit to change obsolete T12 lamps and ballasts with high efficiency T8 lamps and ballasts.

2. Garage exhaust fan control retrofit.

    a. Addition of variable frequency drives (VFD) on garage exhaust fans.

    b. Addition of carbon monoxide sensors in the garages to monitor and maintain ventilation to keep the carbon monoxide below acceptable levels.

    c. DDC programming to energize on/off the garage exhaust fans VFD's and modulate the speed of the fans to maintain acceptable CO levels.

3. SW0B Chiller Plant Variable Primary Flow Retrofit and Optimization.

    a. Addition of adaptive variable frequency drives (VFD) on 600Ton and 1200Ton Chillers. The VFD's allow the chillers to modulate in capacity to match system demand.

    b. Addition of variable frequency drives (VFD) on primary chilled water pumps. Conversion of chilled water pumping system from constant flow/constant speed to variable flow through the chillers and through the system to match system demand.

    c. Update DDC building automation system and control programming to optimize the chiller plant operation to match the system demand.

    d. Update DDC building automation system and control programming to optimize the cooling tower operation to match chiller demand and increase chiller efficiency.

    e. Realized kWh savings in improved chiller performance optimizing the chiller kW/ton to system load, savings in variable chilled water flow and reduced pump speed, savings in optimization of cooling towers.

    f. Improved performance of chilled water plant allowed facilities to shut down another chilled water plant during the fall-winter-spring (Oct through June) for additional electrical savings. Year 2009 to 2008 overall kWh savings of 742,240 (437,000) at a cost savings of $34,717. (Note small fraction of savings ~20% are attributed to garage lighting retrofit).

4. Even though the Swedish Orthopedic Institute is a new building it was not per performing up to the standards set by Swedish when it first opened. The facilities team has lead efforts to improve the building performance through the warranty period.

    a. Addition of insulation that was discovered to be missing.

    b. Sealing openings in the building envelope.

    c. Implement lighting control strategies for public spaces and exterior lights.

    d. Correcting deficiencies left over in the building automation system.

    e. Improvements to the building automation system control programming to optimize system performance.

        i. Supply duct static pressure reset strategies to reduce air handler supply/return fan speeds.

        ii. Supply discharge air temperature reset strategies to match the discharge air temperature setpoint to system demand.

iii. Control loop tuning.

iv. Implement occupancy schedules and setback temperature setpoints.

v. Ensure that the air systems are functioning as balanced.

vi. Improve building pressurization control to minimize outside air infiltration.

vii. The building automation system has been reprogrammed by facilities staff to optimize the performance of the building HVAC systems.

f. Swedish Orthopedic Institute opened in June of 2008. Improvements (re-commissioning) to the building started in January of 2009 and continue. Compared to the first year of operations (June 2008-July 2009) the last 12 months (Aug 2009-July 2010).

i. Total electrical usage has decreased 16.5% for an electrical cost savings of $14,352 (6.8% decrease).

ii. Total chilled water usage has decreased 15.4% for an electrical cost savings of $12,847 (13.9% decrease).

iii. Total steam usage has decreased 24.7% for a cost savings of $114,768 (25.4% decrease).

iv. Total energy reduction of 20.4%.

v. Current kbtu/square ft/year for the SOI hospital building is 161.

vi. Zero capital expense for re-commissioning.

Swedish Hospital and Medical Center
Strategic Energy Management Plan
2008-2012

Executive Summary

Swedish Hospital and Medical Center is committed to excellence in patient care and community stewardship. A component of this commitment is the use of best practices in the design, construction, and operation of healthcare facilities. Increasingly, facility energy use is both a cost and environmental stewardship consideration. This Strategic Energy Management Plan (SEMP) provides specific energy management performance goals and a set of commitments to changes in energy related business practices that improve the organization's financial performance and establish Swedish as a leader in the effective stewardship of energy resources.

In 2009, a 10% reduction in energy use will be achieved at the three main Swedish campuses (First Hill, Cherry Hill, and Ballard). This energy use reduction will save approximately $750,000 in operating costs. The majority of these savings will occur from relatively low cost operations-based equipment tune up measures in combination with energy using equipment purchasing practices based on total cost of ownership criteria. A 2009 resource allocation of $250,000 is made to complete engineering assessments of operations optimization opportunities and to implement the tune up measures.

By 2011, all three Swedish campuses will achieve energy use and cost reductions sufficient to achieve the U.S. Environmental Protection Agency's ENERGY STAR Building Award. This accomplishment will indicate that these facilities are performing in the top quartile of all healthcare facilities in the United States. The energy use and cost reductions from achieving this goal will be approximately $1,405,000 (from 2007 baseline year). Capital investment in new energy savings technologies will be required to achieve this goal. Financial incentives from Seattle City Light and Puget Sound Energy will be used, when available, to offset (40% to 70%) of this requirement. Estimates for capital project needs will be calculated as part of engineering grade investment audits and presented annually in facility budget requests. All capital investment requests will meet or exceed a 15% internal rate of return.

For new construction projects, Swedish commits to energy management best practices in design and construction. An integrated design process will be required from the A/E teams and include an energy performance requirement of 25% below code level performance for all new construction. An integrated design process is expected to provide this enhanced level of energy performance at no cost premium.

The SEMP outlines a set of energy related business practices goals and objectives that outline specific steps and timelines to achieve the requirements of this Plan. The Director of Facilities is designated for lead accountability for the implementation of the actions described in the SEMP.

This Strategic Energy Management Plan (SEMP) builds on Swedish Hospital and Medical Center's (Swedish) commitment to excellence and its core values of community stewardship. Excellence in facility energy management represents both a sound business proposition and an opportunity for natural resource stewardship – an increasingly important societal issue. This SEMP establishes a set of energy management performance goals and a roadmap for a systematic review of and change to energy related business practices.

Effective energy management requires an organization wide commitment, a detailed focus on the range of energy related business practices, and the support of senior management of the hospital in providing the vision, guidance, and resources to achieve results. Importantly, a SEMP also needs an energy champion who will commit to the principles and energy management goals described here. The Director of Facilities is designated by this Plan to be the energy champion for Swedish and will take lead responsibility and accountability for realizing the goals of the SEMP.

Energy Management is a Strategic Issue

Every healthcare and administrative function at Swedish requires some form of energy provided by a utility. From the operating rooms to the child birthing center, Swedish facilities are powered by electricity, natural gas, and steam energy. The organization has energy utility relationships across all facilities including Seattle City Light, Puget Sound Energy (also including natural gas wholesalers), and Seattle Steam.

Total annual energy costs across the main acute care campuses (First Hill, Cherry Hill, and Ballard) were $7,733,394 (2007) powering 2,088,453 of floor space or approximately $3.70 per square foot. While the cost of energy represents just less than 1% of total institutional expenses, they do represent nearly 40% of total facility operating costs.

Energy Cost Volatility

Energy is now recognized as a significant economic and environmental issue at all levels of society. Cost projections for basic commodities such as electricity and natural gas are forecast to show continued high prices from late 1990's levels and continued volatility and wholesale market electricity costs subject to high on-peak price spikes. The potential effect of carbon regulation creates additional uncertainty of future prices as well.

As energy is an essential commodity for Swedish operations, the institution is exposed to price increases and price volatility over the next five years and beyond. Moreover, the relationship between energy use and carbon emissions is an increasing public policy concern with implications for energy costs (due to monetization of carbon emissions) and for community stewardship values.

This SEMP provides a strategic approach to address energy costs and associated environmental concerns that mitigate risk and capitalize on opportunities for energy management technologies and practices that offer attractive returns on investment.

Guiding Principles
Swedish's energy management activities described in this Plan will be guided by a core set of principles.

- Energy management will be internalized into the organization's everyday decision-making, policies, and operating procedures will help assure substantial and long lasting reductions in energy use and cost throughout the institution.
- Strategic energy management will directly support Swedish's mission critical goals of caring for the community, optimizing the healing and working environment, and improving the hospital's financial bottom line by reducing unnecessary energy costs.
- The essence of this strategic approach is the consistent incorporation of energy management into Swedish's core practices and decision-making in the planning and budgeting process.
- Financial analysis methods will consider life cycle cost economics and total cost of ownership perspectives.

Energy Baseline and Benchmark
Swedish has implemented a number of successful energy savings projects across all its major campuses to reduce cost and improve facility performance. For example, Swedish has partnered with Seattle City Light for more than $1,000,000 of financial incentives for energy saving projects since 1985.

In 2007, energy costs for First Hill, Cherry Hill, and Ballard campuses totaled nearly $7.75M. By commodity the costs were;

Electricity (Seattle City Light)	$3,076,586
Natural Gas (wholesale commodity and Puget Sound Energy transport)	$1,232,462
Seattle Steam[1]	$3,424,346
TOTAL	$7,733,394

Seattle City Light is the sole provider of electricity for the three Swedish campuses. As a public utility who owns hydropower generating resources as well as preference rights to power from the Bonneville Power Administration, the utility's rate are well below national average electricity rates. Seattle City Light is, however, a resource constrained utility who is endeavoring to meet future load growth of its customers through least cost resource planning and development. As such, it strongly encourages and provides financial incentives to its customers to implement cost effective energy efficiency measures.

[1] Seattle Steam is a private for profit purveyor of steam energy. Only the First Hill campus purchases this commodity – other campuses generate steam at the central plants through natural gas boilers.

Natural gas is a de-regulated commodity at the wholesale level. Swedish has, since 2002, purchased natural gas on wholesale markets and paid Puget Sound Energy for transport charges related to the deliver of the commodity. This has provided overall cost reductions for Swedish (as compared to direct retail purchasing), but excluded the hospital from participating in any financial incentive programs offered by Puget Sound Energy for the conservation of natural gas.

Seattle Steam is a private for-profit company with a steam generating facility located on the waterfront in downtown Seattle. A steam distribution system was developed in the early 1900's to serve steam energy to the core of the downtown and up to and including hospitals located in the First Hill area. The Seattle Steam system has no condensate return so that post process use condensed water must be disposed by Swedish into the sewer system. Most recently, an on site dual fuel boiler has been added at First Hill for emergency back up for steam energy should there be a supply interruption from Seattle Steam.[2]

Benchmarking Performance

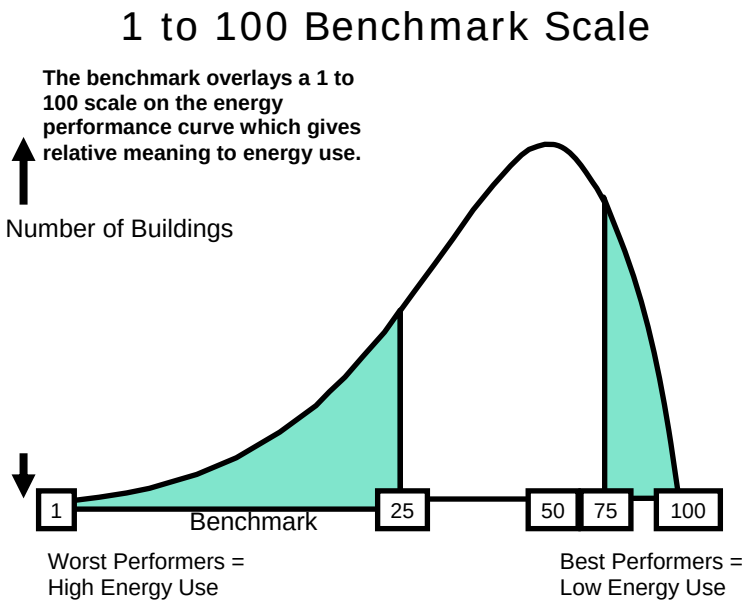
Measuring and benchmarking performance is a critical aspect of this SEMP. For purposes of benchmarking energy performance, the nationally recognized ENERGY STAR[3] program provides a host of tools. This SEMP uses the Portfolio Manager benchmarking tool to assess the three Swedish campuses.

ENERGY STAR uses a national database of building performance for hospitals to benchmark peer matched facilities for overall energy (use) performance. Overall energy intensity is compared and a benchmark score on a 1 to 100 scale is issued.

An ENERGY STAR score of 75 indicates that the facility is operating in the top quartile of energy performance when compared to peer facilities nationwide. Facilities that achieve that score are eligible for recognition by the U.S. Environmental Protection Agency as an ENERGY STAR qualified building.

[2] More discussion on commodity purchase options is included later in this Plan

[3] ENERGY STAR is a program of the US Environmental Protection Agency and is the world's most recognized brand for energy efficiency.



The three Swedish Hospital campuses scored as follows (date of benchmark: December 2007):

Facility	Energy-Use Baseline[4]	ENERGY STAR Score
Ballard	254.0 kBTU/sq. ft.	66
Cherry Hill	267.8 kBTU/sq. ft.	52
First Hill	225.1 kBTU/sq. ft.	48

These performance benchmarks indicate that there are significant opportunities for improving energy management and reducing operating costs at all three campuses.

Business Proposition

Energy efficient technologies and practices are proven to be low risk and high return investments that reduce overall operating costs, improve net operating income, and mitigate risk against future energy price volatility. These same investments also enhance non-quantifiable benefits, but nonetheless important, contributions to community stewardship and environmental sustainability. Many of these investments in energy efficient technologies can leverage financial rebate dollars from Seattle City Light and Puget Sound Energy. Both utilities offer incentives for qualifying measures, some up to 70% of installed technology cost.

Cost reductions from energy efficiency investments can be compared in rate of return to alternatives in revenue generating investments. For example, if net operating income (NOI) averages 5%, a $2500,000 operating cost reduction from energy efficiency is equivalent to more than $5M of new revenue.

[4] kBTU/sq.ft is a metric of total facility energy use. All energy forms are converted to British Thermal Units (BTUs), summed, and then divided by facility square footage.

Energy Performance Goal in Existing Facilities[5]

To capture the attractive investment opportunity of energy efficiency at the three Swedish campuses, an energy performance goal of 10% overall reduction is established for the first year of this Plan. Further, by 2011, all three campuses will achieve an ENERGY STAR rating of at least 75 and achieve recognition by the U.S. EPA. The 2009 energy performance goal yield approximately $765,225 (2008 dollars) in operating cost reduction, equivalent to $15,300,000 in new revenue generation. These savings are expected to persist over the lifetime of the measures (12 to 15 years) and at the end of equipment life be replaced by technology that will improve over that timeframe. All energy efficiency projects will be expected to meet a 15% internal rate of return investment threshold. By 2011, when ENERGY STAR award qualifications are met, the energy cost reduction will be $1,405,000.

This energy performance goal will be achieved over a three year time frame with intermediate performance goals as follows.

Year	Energy-Use Reduction	Operating-Cost Reduction
2009	10%	$770,000
2011	ENERGY STAR (20% est.)	$1,405,000

These cost-efficient energy savings anticipated by the 2009 goal can be accomplished through a combination of relatively low-cost operational and maintenance improvements, and life-cycle cost-sensitive procurement policies Initial screening investigation into this opportunity has been conducted at all three Swedish campuses by independent energy engineers associated with BetterBricks[6]. This work suggests that facility operations opportunities, described in this plan as “building tune-ups” and “enhanced operations and maintenance” can deliver the 2009 10% savings goal. To affect these operational opportunities, a commitment of $250,000 is made here for the scoping, diagnostics, and implementation of operational improvements at the three campuses.

The discounted internal rate of return for this investment is over 75%.

Meeting the energy performance goal in 2011 will require capital investment in new energy savings technologies. These opportunities will be assessed through investment grade engineering audits and presented for funding consideration in annual facility budget requests. Utility incentive funding to defray capital requirements will be explored. This opportunity for leveraging capital can reduce installed project costs by 40% - 70%. To provide reward for aggressive annual energy cost reductions, at least 50% of annual energy cost savings will be made available to the Director of Facilities for funding of additional cost effective energy measures.

Energy Management Goals for Energy Related Business Practices

[5] Energy performance goals for new facility construction are established later in this Plan.

[6] BetterBricks is a program of the region’s electric utilities and has provided technical and financial support for the development of this SEMP and engineering screening of operational opportunity at the 3 campuses.

The SEMP outlines the following goals to fully capitalize on the opportunities for best practices in energy management.

Goal 1 – Obtain Executive Involvement and Approval

Action: Approval of this plan by the Chief Operating Officer and key senior executives who play critical roles in leading the business practice changes described, including;

- Vice President of Facilities
- Chief Strategic Officer
- Chief Financial Officer
- Chief Information Officer

Timing: Present plan to executives by 7/31/2008

Goal 2 – Develop and Adopt Best Practices Program for Facility Operations & Maintenance

Action: Review current O&M practices. Develop and implement best practices O&M procedures, including staff training plan.
Action: Assess opportunity and engage a qualified third party service contractor to implement periodic "building tune-up" program to deliver cost effective energy savings from selected equipment and systems.
Timing: Complete review and training plan by 12/31/2008. Implement best practices by 3/1/2009. Assess third party service contractors for tune-up plan by 10/1/2008.

Action: Maintain energy accounting and benchmarking system (using Advantage IQ and ENERGY STAR Portfolio Manager) and utilize data for proactive energy management program.
Timing: Energy accounting currently in place & to be maintained monthly.

Goal 3 – Establish Financial Analysis and Decision-making Process

Action: Use life cycle cost/total cost of ownership financial analysis methods for investment decision criteria for energy-related investments.
Action: Establish an investment hurdle rate with senior executives to guide decision-making for energy investments and present investment opportunities, where appropriate, in terms of internal rate of return and/or net present value.
Timing: Hurdle rate established by 9/1/2008

Goal 4 – Implement Facility Upgrades for Improved Energy Performance

Action: Inventory capital project opportunities that improve energy performance and prioritize those projects by financial performance criteria. Implement project where life cycle cost analysis justifies the investment.
Action: Seek all available financial incentives for project opportunities from Seattle City Light and Puget Sound Energy (as applicable).

Action: Apply for ENERGY STAR listed facility whenever Portfolio Manager score meets or exceeds 75.
Timing: Meet ENERGY STAR performance goal by 2011

Goal 5 – Establish Procurement Policy for Selected Energy Using Equipment & Services

Action: Working with relevant purchasing/procurement and information systems personnel, purchase only ENERGY STAR qualified computers and peripherals.
Action: Identify non-medical related purchasing opportunities that affect energy use (goods and services) and investigate and implement purchasing policies that meet life cycle cost criteria.
Timing: ENERGY STAR purchasing specification by 9/1/2008. Develop list of other purchasing specifications by 1/1/2009.

Goal 6 – Use Best Practices Integrated Design for New Construction

Action: Require architect and engineering design teams to use an integrated design approach for new construction and renovation projects. Modify RFP for design services to solicit qualifications and experience in the integrated design process.
Action: Establish energy performance goal of at least 25% below code levels as a part of the design process and hold design and construction teams to meeting that goal.
Action: Immunize energy savings investments in new construction from the value engineering process when those investments meet a positive total cost of ownership test.
Timing: Adopt integrated design commitment and energy performance goal for new construction by 9/1/2008.

Goal 7 – Assess Energy Commodity Purchasing Options

Action: Utilizing internal and external resources, analyze risks, costs, and opportunities associated with the continued use of Seattle Steam versus self generation of steam energy at First Hill (including co-generation). Develop options paper detailing economics, engineering, and timelines associated with different approaches for providing steam at First Hill.
Action: Assess the risks, costs, and opportunities in moving to retail purchase of natural gas. Analysis to look at potential risk and reward of continuing wholesale purchase of the commodity as well as the value of access to financial incentives for conservation associated with retail purchasing.
Timing: Complete steam analysis and options paper by 8/1/2009. Complete natural gas purchasing analysis by 1/1/2009.

SWEDISH MEDICAL CENTER

Seattle City Light Resource Conservation Manager Plan with Swedish Medical Center

EXECUTIVE SUMMARY

- Agreement with Seattle City Light to provide incentive dollars to support dedicated resources for the implementation of the Swedish Medical Center Strategic Energy Management Plan.
- Benefits for Swedish Medical Center.
  - Upfront incentive for energy conservation measures.
  - Increased operational savings.
  - Increased life expectancy of equipment.
  - Improved building performance.
- The performance goal for energy conservation is to reduce overall electrical usage by 10% over 3 years across all Swedish campuses. With the Seattle City Light incentive of $0.03 per kWh target savings the program would pay the following approximate amounts.

Year	Target Savings	kWh saved	RCMP Incentive Paid ($0.03/kWh)	Operational Savings ($0.05/kWh)
2009	3.33%	2167073	$65,012.19	$108,353.65
2010	3.33%	2123732	$63,711.95	$106,186.58
2011	3.33%	2038782	$61,163.47	$101,939.12
Total	10%	6329587	$189,887.61	$316,479.35

- Implementation for energy conservation.
  - Senior Leadership support.
  - Require a change in culture.
  - Communication across the hospital community to raise awareness.
  - Facilities services taking an active role in improving building performance and energy efficiency.
  - Focus on energy conservation measures in construction projects.

Seattle City Light

Conservation Resources

Energy Conservation Incentive Agreement

This Agreement is entered into between The City of Seattle, a Washington municipal corporation, through its Seattle City Light Department ("City Light") and Swedish Health Services d/b/a Swedish Medical Center ("SMC").

WHEREAS, Seattle City Light is a publicly owned utility, created by the citizens of Seattle in 1902, and recognized as a national leader in energy efficiency and environmental stewardship. Seattle City Light provides stable, competitively priced and environmentally sound electricity to its customers; and

WHEREAS, Swedish Medical Center is a Seattle based medical facility and customer of City Light. SMC wishes to participate in an Energy Conservation Incentive Program offered by City Light.

NOW, THEREFORE, in consideration of the foregoing recitals and the agreements and covenants contained in this Agreement, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, City Light and SMC agree as follows:

1. Energy Conservation Incentive Program

City Light, through its energy conservation program, can provide to its customer(s) an opportunity to participate in an Energy Conservation Incentive Program that offers an incentive to the customer to hire or commit a mutually agreed upon existing employee as a Resource Conservation Manager (RCM).

The RCM can organize and oversee the implementation of projects, at customer sites within City Light's service territory that will lead to the documentable conservation of electric energy. Such projects include, but are not limited to:

- capital projects including control system upgrades (capital projects);
- pre- and post-occupancy commissioning of the energy-consuming systems of new, or newly-retrofitted buildings (commissioning projects);
- post-occupancy re-commissioning of previously installed energy consuming systems (retrocommissioning projects); and
- other projects that can lead to documentable energy savings, such as facilitating occupant behavioral changes or implementation of improved operations & maintenance plans.

2. Swedish Medical Center

During calendar 2008, Swedish Medical Center consumed over 65M kWh of electrical energy at a cost of $3.18 million, across all three SMC campuses in SCL's service territory. To reduce this cost, SMC has developed a Strategic Energy Management Plan ("the Plan").

Under the Plan, Swedish intends to implement energy conservation projects that are intended to achieve a goal of reducing electrical use by approximately 10% (approximately 3.3% per year) over a three-year program period, with an incremental, cumulative savings of approximately 2.1M first-year kWh during each year. Following the third program year, annual electric savings are projected to total approximately 6.3M kWh/year.

Swedish expects Strategic Energy Management Plan projects to realize additional benefits beyond lower energy costs, such as increased equipment life expectancy and improved facility performance.

Hiring a Resource Conservation Manager or appointing a mutually agreed upon existing employee to manage SMC's energy conservation projects is essential to SMC's ability to successfully implement the Plan.

For purpose of this Agreement, "program period" shall be defined as one calendar year.

3. Incentives from City Light to encourage implementation of the Plan

To provide SMC an incentive for the implementation of the Plan, and to provide additional incentives to focus attention on electrical energy conservation projects, City Light will offer the following financial incentives:

- An incentive to hire or designate an employee as a Resource Conservation Manager, as described below, and,
- Additional incentives for capital, commissioning and retrocommissioning projects, with incentive amounts to be calculated per proposed project using City Light's usual procedures for determining incentives for such projects.

4. Resource Conservation Manager Incentive

Swedish Medical Center will retain the services of a Resource Conservation Manager whose primary function will be to plan, identify and implement electric energy conservation projects.

SMC, by participating in City Light's rebate program, may realize up to 100% of the cost of the RCM's salary plus benefits, through reimbursement amounts to be determined on the basis of the total electric energy savings projects delivered by the RCM during each year of the projected three-year Plan.

The rebate incentive will be calculated at a rate of $0.03 per first-year kWh of electric energy savings attributable to projects identified and implemented by SMC, as per the example in Table 1.

Table 1: Example – RCM incentive calculation based on hypothetical projects

Project	**First-year kWh saved as a result of project**	**RCM incentive @ $0.03/first-year kWh**
HVAC controls Proj. 1	200,000	$6,000
HVAC controls Proj. 2	150,000	$4,500
Lighting retrofit	1,300,000	$39,000
Third-party commissioning of new building	200,000	$6,000
Third-party retrocommissioning of existing building	300,000	$9,000
Retrocommissioning of existing building personally performed by RCM	150,000	$4,500
Totals	**2,300,000**	**$69,000**

The incentive payment will be calculated and made annually at the conclusion of each program year, upon submittal of documentation from SMC showing both the total kWh saved (itemized by project) during that program year. In the example in Table 1, the maximum City Light would pay for the RCM rebate in that year would be $69,000. If the calculated incentive exceeds the cost of the RCM's actual salary and benefits, the incentive will be capped at the then current salary of the RCM.

The incentive can be calculated and submitted for payment as early as the anniversary of each program year from the execution date of this Agreement.

The annual savings used to calculate the incentive payment (per the hypothetical example in Table 1), will be the sum of energy conservation projects agreed to by SMC and City Light during the relevant 12-month period, including the following project types:

- Capital projects eligible for additional City Light conservation incentives,
- Third-party commissioning and retrocommissioning projects eligible for City Light conservation incentives,
- Projects of a nature not envisioned in the two preceding bullet points which provide documented kWh savings and are eligible for City Light conservation incentives, and
- Commissioning and retrocommissioning activities performed by the RCM or other people under the direction of the RCM, which are documented to the same standard of proof of energy savings as would be required by City Light for a third-party commissioning or retrocommissioning project.

5. Additional incentives

City Light will continue to offer assistance through its energy conservation program for the analysis and funding of capital projects and third-party commissioning and retrocommissioning projects.

City Light's Energy Management Analyst(s) will continue to be available to SMC to assist in the analysis of these opportunities, per City Light's typical conservation program.

The RCM and SMC are encouraged to submit additional projects proposed by the RCM to City Light's conservation program, for analysis and determination as to eligibility and amounts.

The RCM will be expected to work with City Light to identify and create proposals for qualifying capital and commissioning projects, and to work with SMC management to get approval for those proposals.

6. Minimum performance

If the annual kWh savings documented by SMC and accepted by City Light fall below 500,000 first-year kWh/year for any program year period for which SMC submits documentation for the RCM incentive, City Light reserves the right to terminate this agreement.

7. Term

This agreement is intended to fund up to 100% of the salary of SMC's assigned RCM for 36 months. Upon mutual agreement by City Light and SMC, the agreement can be extended on the same terms for 12-month periods following the initial 36-month period. Either party may terminate this Agreement without cause and without penalty or premium upon sixty (60) days' written notice to the other party.

8. Compliance Correction

In the event either party's performance of any provision of this Agreement could jeopardize the tax-exempt status of SMC, or the full accreditation of SMC or any of its facilities by the Joint Commission, or by any other regulatory agency, or if, for any other reason, such performance would be deemed illegal or would preclude payment for services rendered, either party may at its option give notice of termination; provided, however, that in the event of any such termination under this paragraph, the parties shall first attempt in good faith to enter into a new agreement in a form satisfactory to both.

9. Severability

In the event any provision of this Agreement shall be held to be invalid and unenforceable, the remaining provisions shall be valid and binding upon the parties. One or more waivers by either party of any provision, term, condition or covenant shall not be construed by the other party as a waiver of a subsequent breach of the same by the other party.

10. Applicable Law

This Agreement shall be governed by the laws of the state of Washington.

IN WITNESS WHEREOF, in consideration of the terms, conditions and covenants contained herein, or attached and incorporated and made a part hereof, the Parties have executed this Agreement by having their respective representatives affix their signature below.

Swedish Medical Center	**Seattle City Light**
By_____	By_____
Name_____	Name_____
Title_____	Title_____
Date_____	Date_____

Strategic Energy Management Plan

Swedish Medical Center hired a RCM in December of 2008 to dedicate a resource for the implementation of the Swedish Medical Center Strategic Energy Management Plan (SEMP). The Strategic Energy Management Plan's performance goal is to reduce energy consumption by a minimum of 10%.

Prioritized improvements

PHASE 1 – FACILITIES OPERATIONS

1. Establish a means of communication for facilities services to the general hospital employees with the primary goal of raising the level of energy awareness.

2. Establish a dedicated resource for the Building Automation Systems.

3. Establish an in house training program for facilities personnel.

4. Establish a means of communication for facilities staff to be aware of what is happening in terms of building performance.

5. Continue to identify and implement O&M best practices.

PHASE 2 – CONTINUED IMPROVEMENT

1. Specifically define tasks and procedures for commissioning of existing HVAC systems and the Building Automation System.

2. Improve alarming and reporting capability of the Building Automation System to alert facilities staff to potential problems.

3. Implement modifications to existing HVAC systems sequences of operations.

4. Propose and implement building performance improvement projects.

5. Communicate energy savings activities, actual savings and success stories within the hospital community.

During the 2008 the facilities staff engaged in major energy savings projects at the First Hill Campus. The main projects with targeted energy savings included energy efficient lighting upgrades in the campus garages, optimizing the garage ventilation systems and improvements to the chilled water system that provide cooling to the campus facilities. These projects paid dividends during the 2009 year. The efficiencies and energy savings gained have offset the increase in utility costs on the First Hill Campus when the new Swedish Orthopedic Institute opened in June of 2008. The SOI building added approximately 17% square footage of maintained space while the amount of energy consumed per square foot on the First Hill Campus has decreased. Also, the cost per square foot to pay for that energy decreased from 2008 to 2009. The facilities services team has compared the First Hill Campus to other hospitals in the country through the EPA's Energy Star for commercial buildings program and through June 2008 (before SOI was added) the campus achieved a score of 57 (50 is the national average), through June 2009 that score improved to 65 and through June 2010 the score is now 72. Eventually it is the goal to have the First Hill Campus Energy Star score of 75 and be recognized with other hospitals in the country as achieving excellent energy efficiency and performance in one of the most demanding and high energy use types of facilities. Projects completed in 2008 on First Hill Campus:

1. Garage lighting retrofit to change obsolete T12 lamps and ballasts with high efficiency T8 lamps and ballasts.

2. Garage exhaust fan control retrofit.

a. Addition of variable frequency drives (VFD) on garage exhaust fans.

b. Addition of carbon monoxide sensors in the garages to monitor and maintain ventilation to keep the carbon monoxide below acceptable levels.

c. DDC programming to energize on/off the garage exhaust fans VFD's and modulate the speed of the fans to maintain acceptable CO levels.

3. SW0B Chiller Plant Variable Primary Flow Retrofit and Optimization.

   a. Addition of adaptive variable frequency drives (VFD) on 600Ton and 1200Ton Chillers. The VFD's allow the chillers to modulate in capacity to match system demand.

   b. Addition of variable frequency drives (VFD) on primary chilled water pumps. Conversion of chilled water pumping system from constant flow/constant speed to variable flow through the chillers and through the system to match system demand.

   c. Update DDC building automation system and control programming to optimize the chiller plant operation to match the system demand.

   d. Update DDC building automation system and control programming to optimize the cooling tower operation to match chiller demand and increase chiller efficiency.

   e. Realized kWh savings in improved chiller performance optimizing the chiller kW/ton to system load, savings in variable chilled water flow and reduced pump speed, savings in optimization of cooling towers.

   f. Improved performance of chilled water plant allowed facilities to shut down another chilled water plant during the fall-winter-spring (Oct through June) for additional electrical savings. Year 2009 to 2008 overall kWh savings of 742,240 (437,000) at a cost savings of $34,717. (Note small fraction of savings ~20% are attributed to garage lighting retrofit).

4. Even though the Swedish Orthopedic Institute is a new building it was not per performing up to the standards set by Swedish when it first opened. The facilities team has lead efforts to improve the building performance through the warranty period.

   a. Addition of insulation that was discovered to be missing.

   b. Sealing openings in the building envelope.

   c. Implement lighting control strategies for public spaces and exterior lights.

   d. Correcting deficiencies left over in the building automation system.

   e. Improvements to the building automation system control programming to optimize system performance.

      i. Supply duct static pressure reset strategies to reduce air handler supply/return fan speeds.

      ii. Supply discharge air temperature reset strategies to match the discharge air temperature setpoint to system demand.

      iii. Control loop tuning.

iv. Implement occupancy schedules and setback temperature setpoints.

v. Ensure that the air systems are functioning as balanced.

vi. Improve building pressurization control to minimize outside air infiltration.

vii. The building automation system has been reprogrammed by facilities staff to optimize the performance of the building HVAC systems.

f. Swedish Orthopedic Institute opened in June of 2008. Improvements (re-commissioning) to the building started in January of 2009 and continue. Compared to the first year of operations (June 2008-July 2009) the last 12 months (Aug 2009-July 2010).

i. Total electrical usage has decreased 16.5% for an electrical cost savings of $14,352 (6.8% decrease).

ii. Total chilled water usage has decreased 15.4% for an electrical cost savings of $12,847 (13.9% decrease).

iii. Total steam usage has decreased 24.7% for a cost savings of $114,768 (25.4% decrease).

iv. Total energy reduction of 20.4%.

v. Current kbtu/square ft/year for the SOI hospital building is 161.

vi. Zero capital expense for re-commissioning.

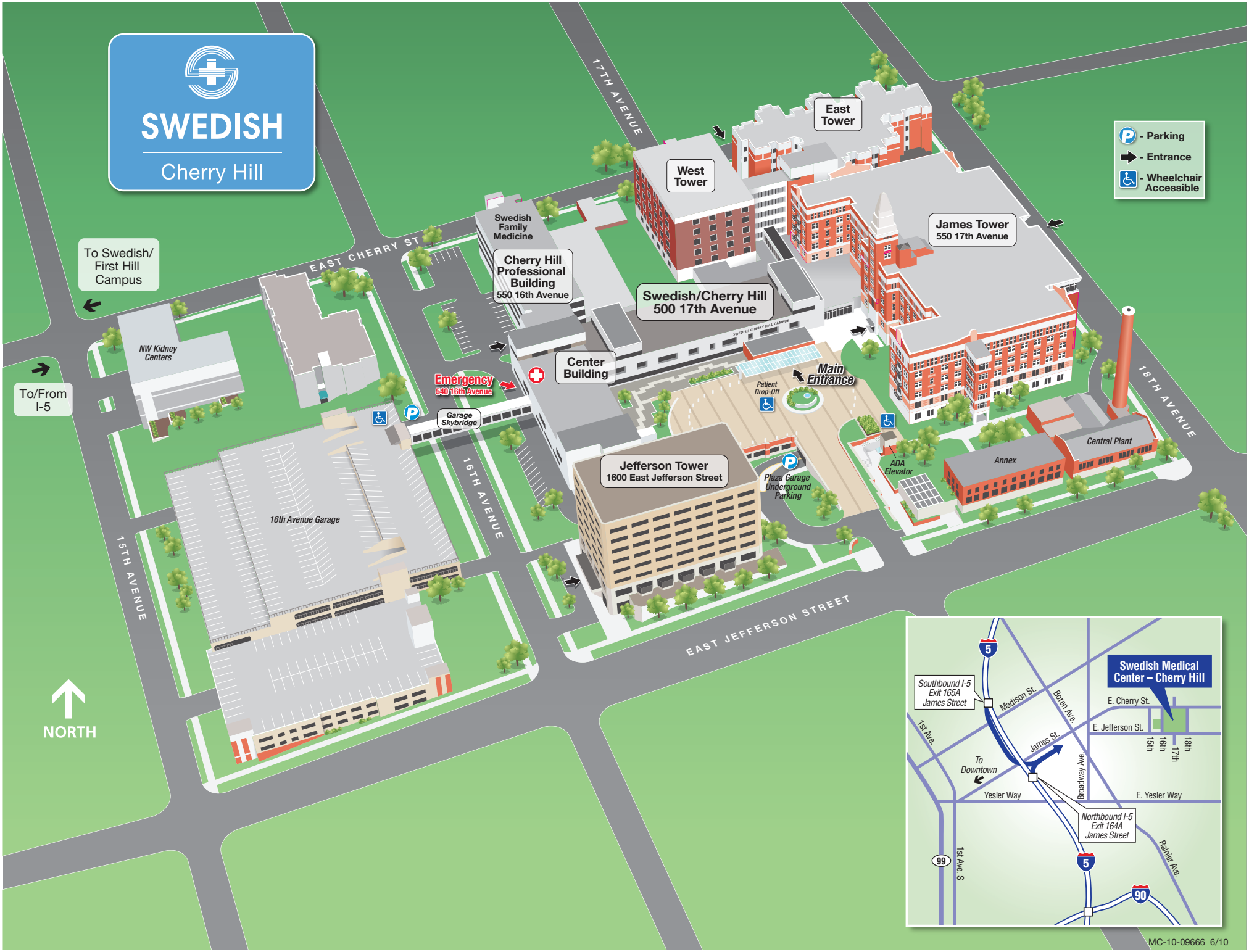
Appendix B

CAMPUS MAPS

The following maps are provided for reference when discussing building orientation and locations

- Swedish First Hill Campus Map
- Swedish Cherry Hill Campus Map

SWEDISH
First Hill
To Downtown Seattle
To/From I-5
1101 Madison Tower
P - Parking
Entrance (Wheelchair Accessible)
Swedish Cancer Institute
Arnold Pavilion
1221 Madison St.
Madison Tower Skybridge
West Tower
MARION STREET
SUMMIT AVENUE
BOREN AVE.
CHERRY STREET
Invex Building
715-725 Minor Ave.
Cherry Building
1120 Cherry St.
Southwest Tower
Swedish/First Hill
747 Broadway
North Tower
Nordstrom Tower
1229 Madison St.
MADISON STREET
Emergency
700 Minor Ave.
Arnold Skybridge
First Hill Diagnostic Imaging
1001 Boylston Ave.
Minor Avenue Garage
Emergency Parking
MINOR AVE.
East Tower
Minor & James Building
515 Minor Ave.
South Tower
Heath Building
801 Broadway
Swedish Orthopedic Institute (SOI)
601 Broadway
SOI Entrance
South Entrance
JAMES STREET
Boylston Building
821/819 Boylston Ave.
BOYLSTON AVE.
Swedish Family Medicine
1401 Madison St.
Main Entrance
Hospital Parking Garage
BROADWAY
600 Broadway Building
CHERRY STREET
COLUMBIA STREET
Seattle University
To Swedish/ Cherry Hill Campus
NORTH
Swedish Medical Center – First Hill
Southbound I-5 Exit 165A James Street
To Downtown
Boren Ave.
Madison St.
Marion St.
Cherry St.
James St.
1st Ave.
E. Cherry St.
E. Jefferson St.
Yesler Way
E. Yesler Way
Broadway Ave.
Northbound I-5 Exit 164A James Street
1st Ave. S
Rainier Ave.
5
99
90
MC-10-09667 6/10



MC-10-09666 6/10

Appendix C

BUILDING SYSTEM DESCRIPTIONS

Within this appendix are building system diagrams for First Hill and Cherry Hill.

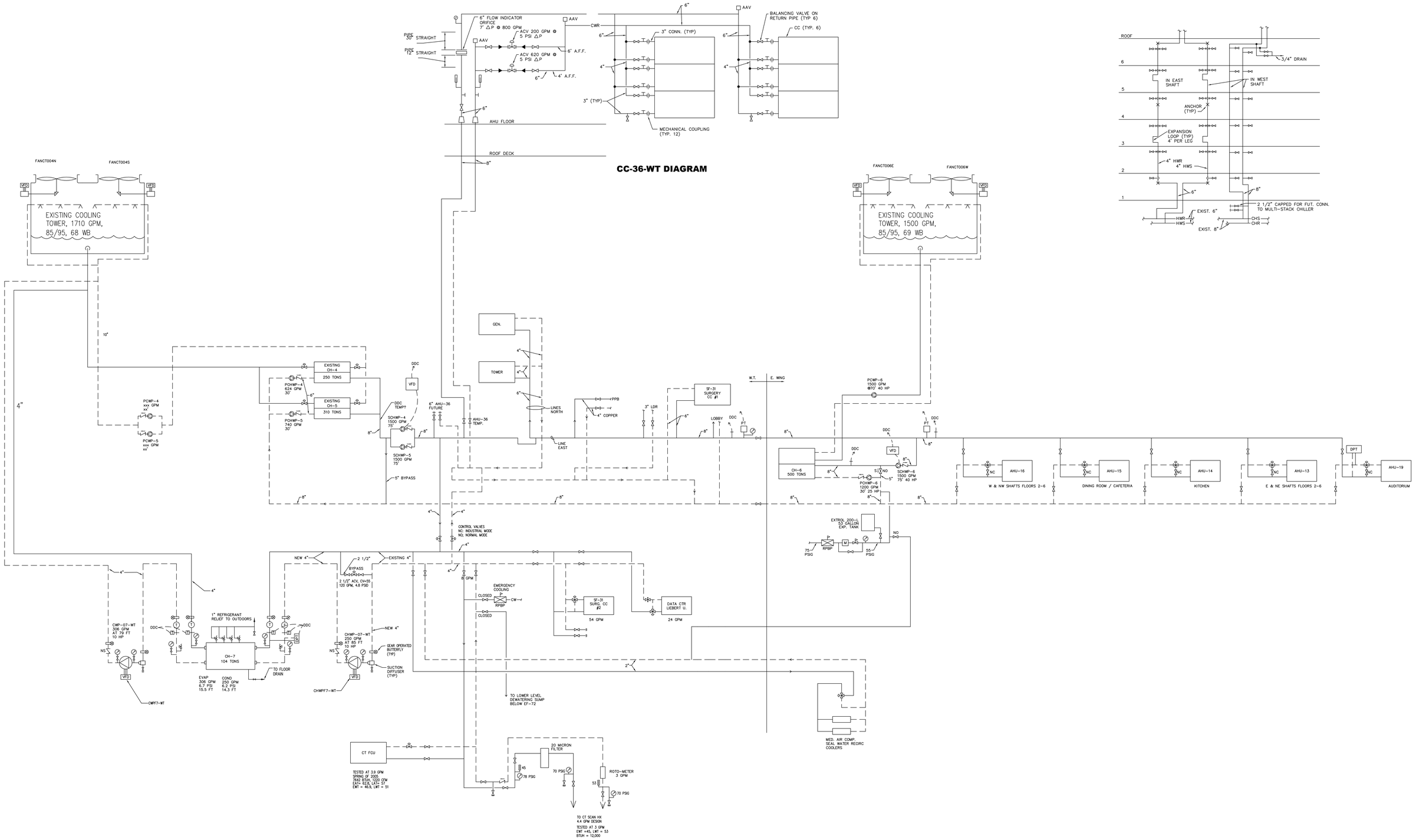
- Cherry Hill Campus System Diagrams

These diagrams are provided as a record of the plant configuration at the time of the SEMP report. It is recommended that these diagrams be viewed electronically for better viewing.

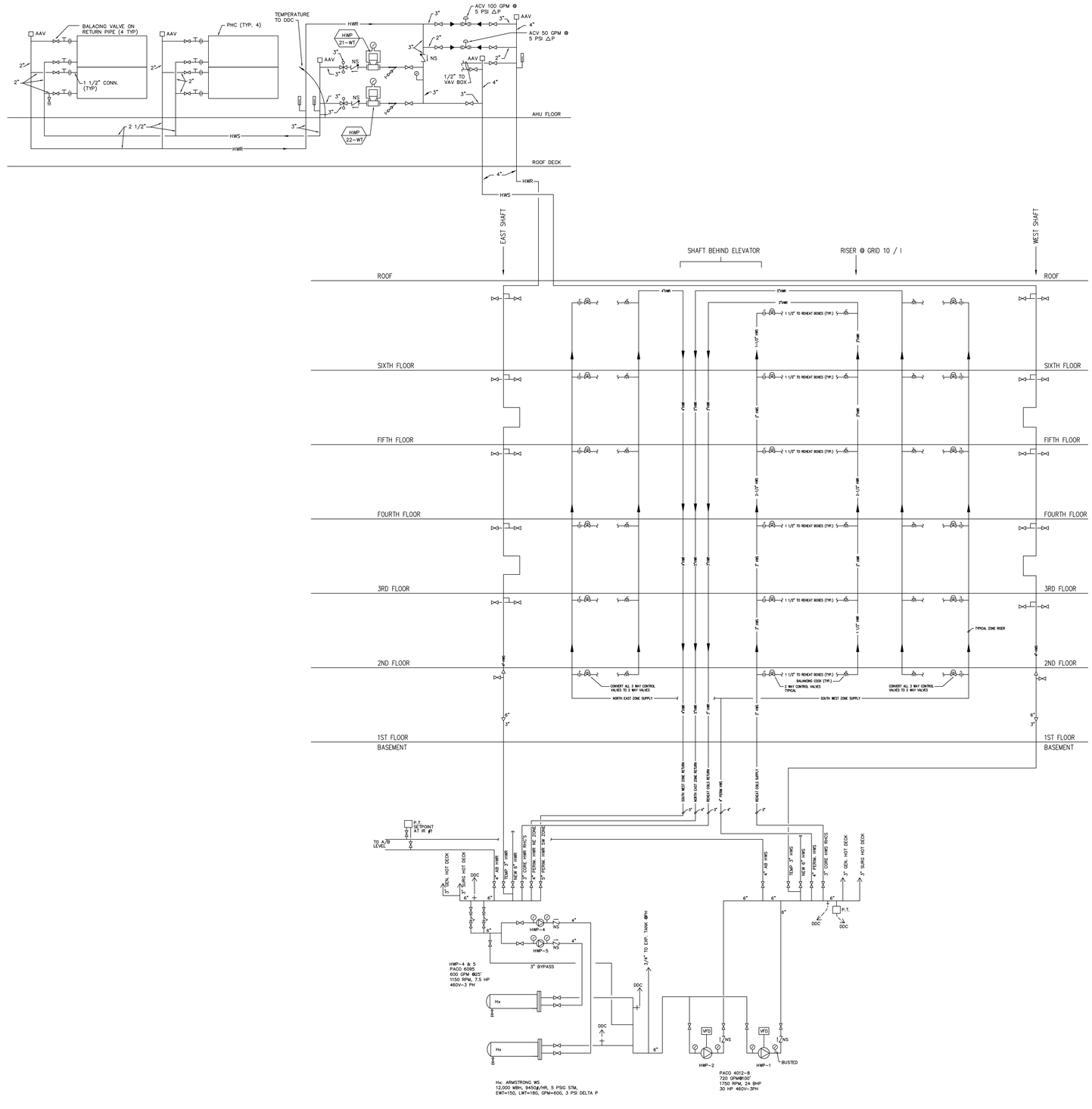
- First Hill Campus System Diagrams

These diagrams are provided as a record of the plant configuration at the time of the SEMP report. It is recommended that these diagrams be viewed electronically for better viewing.

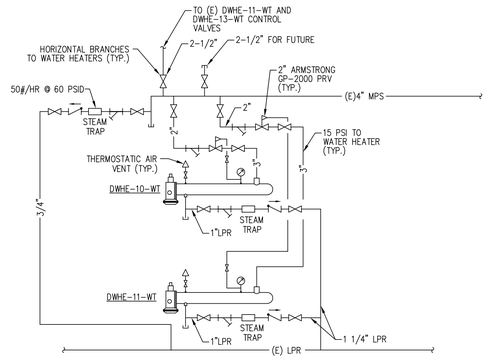
- Cherry Hill Campus Lighting Audits
- First Hill Campus Lighting Audits
- Cherry Hill Campus Plumbing Fixture Audits
- First Hill Campus Plumbing Fixture Audits



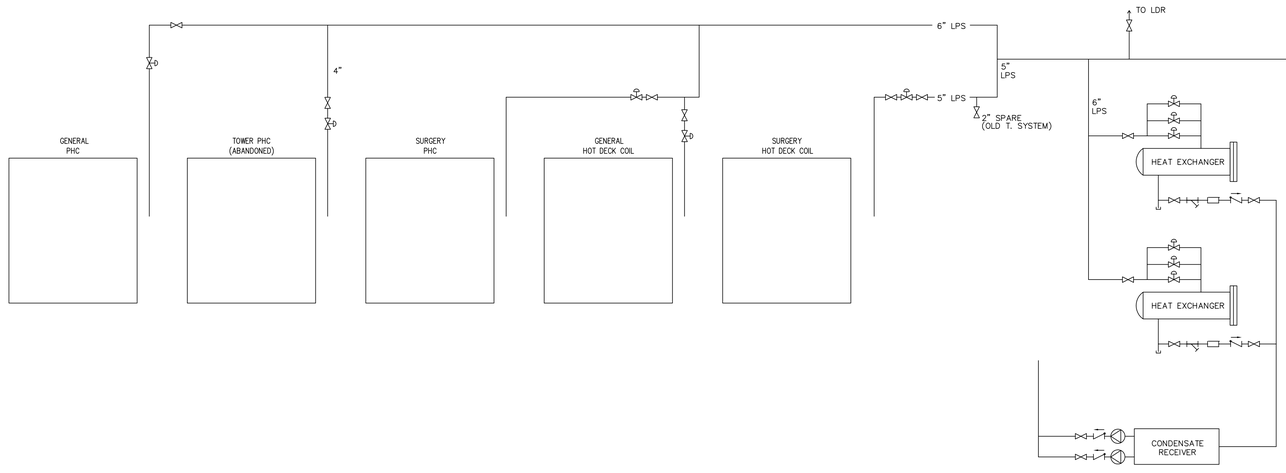
WEST TOWER & EAST TOWER CHILLED/CONDENSER WATER DIAGRAM

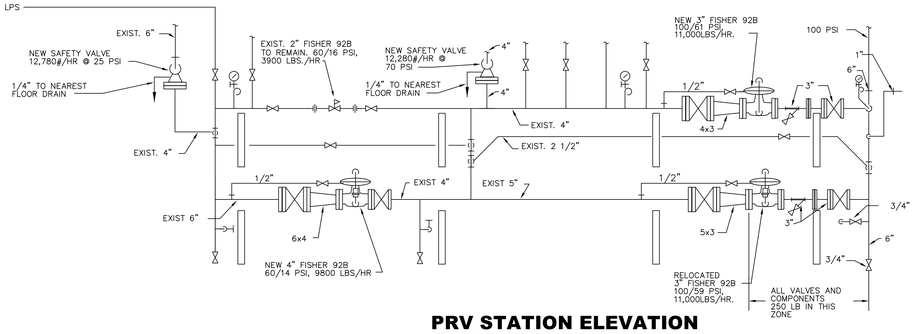


WEST TOWER HEATING WATER DIAGRAM



WEST TOWER WATER HEATER STEAM DIAGRAM





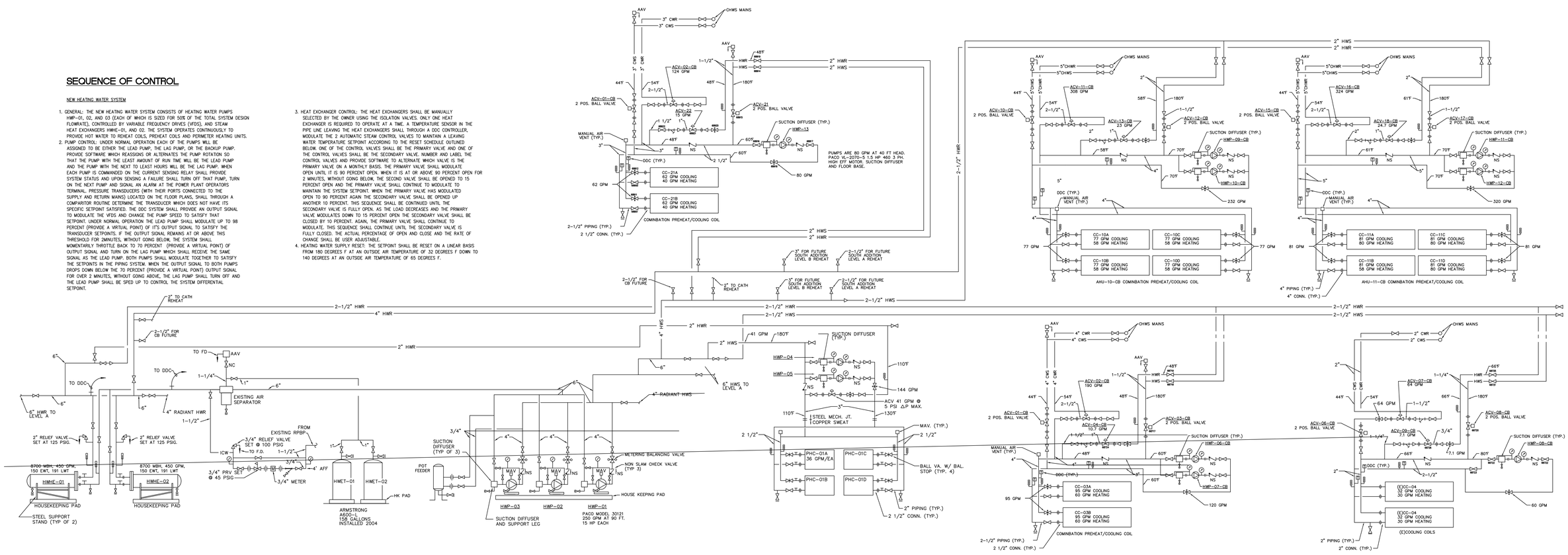
PRV STATION ELEVATION

WEST TOWER STEAM DIAGRAM

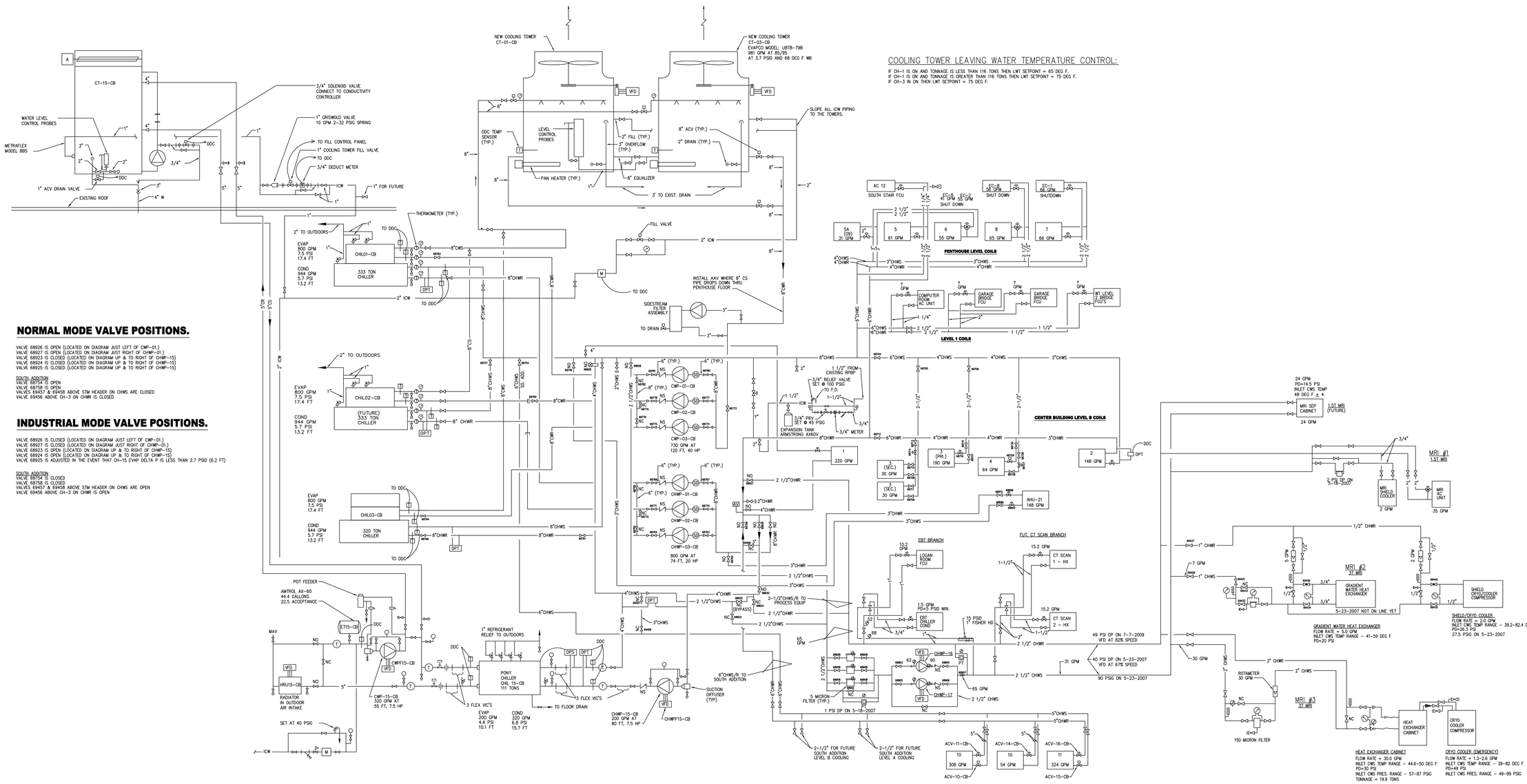
SEQUENCE OF CONTROL

NEW HEATING WATER SYSTEM

1. GENERAL: THE NEW HEATING WATER SYSTEM CONSISTS OF HEATING WATER PUMPS HWP–01, 02, AND 03 (EACH OF WHICH IS SIZED FOR 50% OF THE TOTAL SYSTEM DESIGN FLOWRATE), CONTROLLED BY VARIABLE FREQUENCY DRIVES (VFDS), AND STEAM HEAT EXCHANGERS HWHE–01, AND 02. THE SYSTEM OPERATES CONTINUOUSLY TO PROVIDE HOT WATER TO REHEAT COILS, PREHEAT COILS AND PERIMETER HEATING UNITS.
2. PUMP CONTROL: UNDER NORMAL OPERATION EACH OF THE PUMPS WILL BE ASSIGNED TO BE EITHER THE LEAD PUMP, THE LAG PUMP, OR THE BACKUP PUMP. PROVIDE SOFTWARE WHICH REASSIGNS OR ALTERNATES THE PUMP ROTATION SO THAT THE PUMP WITH THE LEAST AMOUNT OF RUN TIME WILL BE THE LEAD PUMP AND THE PUMP WITH THE NEXT TO LEAST HOURS WILL BE THE LAG PUMP. WHEN EACH PUMP IS COMMANDED ON THE CURRENT SENSING RELAY SHALL PROVIDE SYSTEM STATUS AND UPON SENSING A FAILURE SHALL TURN OFF THAT PUMP, TURN ON THE NEXT PUMP AND SIGNAL AN ALARM AT THE POWER PLANT OPERATORS TERMINAL. PRESSURE TRANSDUCERS (WITH THEIR PORTS CONNECTED TO THE SUPPLY AND RETURN MAINS) LOCATED ON THE FLOOR PLANS, SHALL THROUGH A COMPARITOR ROUTINE DETERMINE THE TRANSDUCER WHICH DOES NOT HAVE ITS SPECIFIC SETPOINT SATISFIED. THE DDC SYSTEM SHALL PROVIDE AN OUTPUT SIGNAL TO MODULATE THE VFDS AND CHANGE THE PUMP SPEED TO SATISFY THAT SETPOINT. UNDER NORMAL OPERATION THE LEAD PUMP SHALL MODULATE UP TO 98 PERCENT (PROVIDE A VIRTUAL POINT) OF IT'S OUTPUT SIGNAL TO SATISFY THE TRANSDUCER SETPOINTS. IF THE OUTPUT SIGNAL REMAINS AT OR ABOVE THIS THRESHOLD FOR 2MINUTES, WITHOUT GOING BELOW, THE SYSTEM SHALL MOMENTARILY THROTTLE BACK TO 70 PERCENT (PROVIDE A VIRTUAL POINT) OF OUTPUT SIGNAL AND TURN ON THE LAG PUMP WHICH SHALL RECEIVE THE SAME SIGNAL AS THE LEAD PUMP. BOTH PUMPS SHALL MODULATE TOGETHER TO SATISFY THE SETPOINTS IN THE PIPING SYSTEM. WHEN THE OUTPUT SIGNAL TO BOTH PUMPS DROPS DOWN BELOW THE 70 PERCENT (PROVIDE A VIRTUAL POINT) OUTPUT SIGNAL FOR OVER 2 MINUTES, WITHOUT GOING ABOVE, THE LAG PUMP SHALL TURN OFF AND THE LEAD PUMP SHALL BE SPED UP TO CONTROL THE SYSTEM DIFFERENTIAL SETPOINT.
3. HEAT EXCHANGER CONTROL: THE HEAT EXCHANGERS SHALL BE MANUALLY SELECTED BY THE OWNER USING THE ISOLATION VALVES. ONLY ONE HEAT EXCHANGER IS REQUIRED TO OPERATE AT A TIME. A TEMPERATURE SENSOR IN THE PIPE LINE LEAVING THE HEAT EXCHANGERS SHALL THROUGH A DDC CONTROLLER, MODULATE THE 2 AUTOMATIC STEAM CONTROL VALVES TO MAINTAIN A LEAVING WATER TEMPERATURE SETPOINT ACCORING TO THE RESET SCHEDULE OUTLINED BELOW. ONE OF THE CONTROL VALVES SHALL BE THE PRIMARY VALVE AND ONE OF THE CONTROL VALVES SHALL BE THE SECONDARY VALVE. NUMBER AND LABEL THE CONTROL VALVES AND PROVIDE SOFTWARE TO ALTERNATE WHICH VALVE IS THE PRIMARY VALVE ON A MONTHLY BASIS. THE PRIMARY VALVE SHALL MODULATE OPEN UNTIL IT IS 90 PERCENT OPEN. WHEN IT IS AT OR ABOVE 90 PERCENT OPEN FOR 2 MINUTES, WITHOUT GOING BELOW, THE SECOND VALVE SHALL BE OPENED TO 15 PERCENT OPEN AND THE PRIMARY VALVE SHALL CONTINUE TO MODULATE TO MAINTAIN THE SYSTEM SETPOINT. WHEN THE PRIMARY VALVE HAS MODULATED OPEN TO 90 PERCENT AGAIN THE SECONDARY VALVE SHALL BE OPENED UP ANOTHER 10 PERCENT. THIS SEQUENCE SHALL BE CONTINUED UNTIL THE SECONDARY VALVE IS FULLY OPEN. AS THE LOAD DECREASES AND THE PRIMARY VALVE MODULATES DOWN TO 15 PERCENT OPEN THE SECONDARY VALVE SHALL BE CLOSED BY 10 PERCENT. AGAIN, THE PRIMARY VALVE SHALL CONTINUE TO MODULATE. THIS SEQUENCE SHALL CONTINUE UNTIL THE SECONDARY VALVE IS FULLY CLOSED. THE ACTUAL PERCENTAGE OF OPEN AND CLOSE AND THE RATE OF CHANGE SHALL BE USER ADJUSTABLE.
4. HEATING WATER SUPPLY RESET: THE SETPOINT SHALL BE RESET ON A LINEAR BASIS FROM 180 DEGREES F AT AN OUTSIDE AIR TEMPERATURE OF 32 DEGREES F DOWN TO 140 DEGREES AT AN OUTSIDE AIR TEMPERATURE OF 65 DEGREES F.



CENTER BUILDING HEATING WATER DIAGRAM



COOLING TOWER LEAVING WATER TEMPERATURE CONTROL:

IF CH-1 IS ON AND TONNAGE IS LESS THAN 116 TONS THEN LWT SETPOINT = 65 DEG F.
IF CH-1 IS ON AND TONNAGE IS GREATER THAN 116 TONS THEN LWT SETPOINT = 75 DEG F.
IF CH-3 IN ON THEN LWT SETPOINT = 75 DEG F.

NORMAL MODE VALVE POSITIONS.

VALVE 68926 IS OPEN (LOCATED ON DIAGRAM JUST LEFT OF CWP-01.)
VALVE 68927 IS OPEN (LOCATED ON DIAGRAM JUST RIGHT OF CHWP-01.)
VALVE 68923 IS CLOSED (LOCATED ON DIAGRAM UP & TO RIGHT OF CHWP-15)
VALVE 68924 IS CLOSED (LOCATED ON DIAGRAM UP & TO RIGHT OF CHWP-15)
VALVE 68925 IS CLOSED (LOCATED ON DIAGRAM UP & TO RIGHT OF CHWP-15)

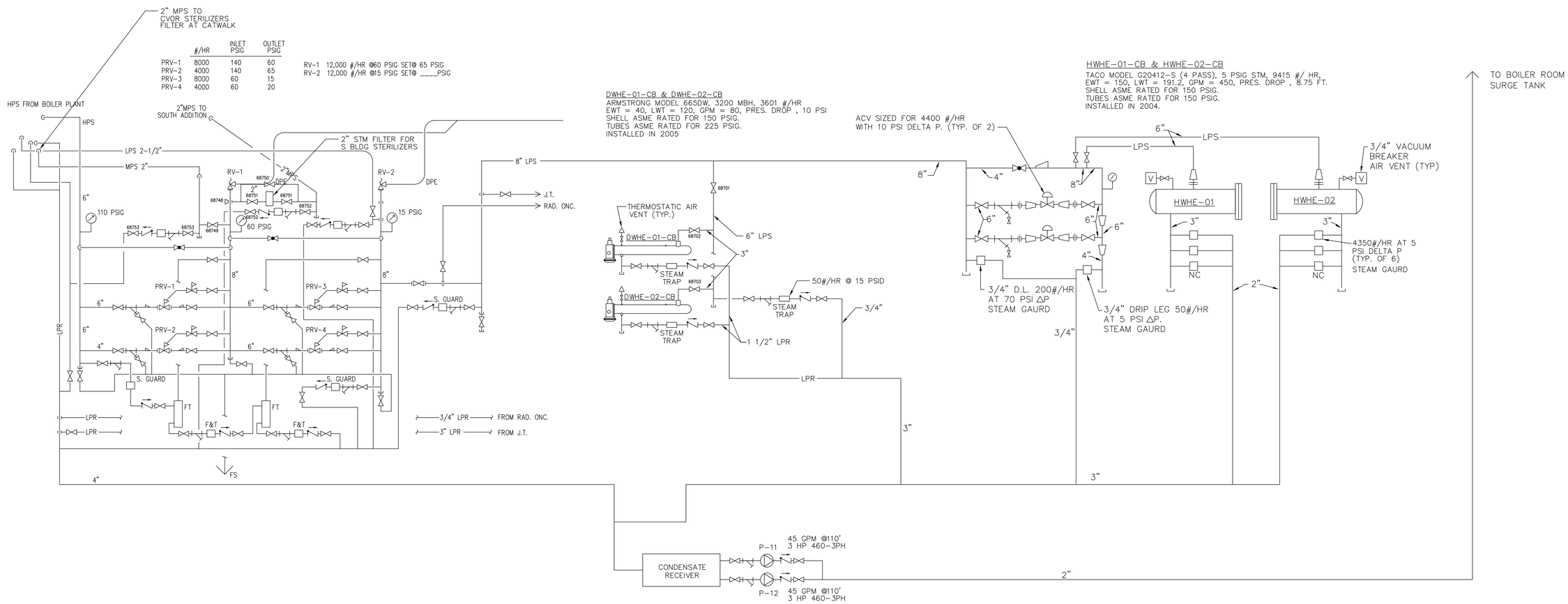
SOUTH ADDITION
VALVE 68754 IS OPEN
VALVE 68758 IS OPEN
VALVES 69457 & 69458 ABOVE STM HEADER ON CHWS ARE CLOSED
VALVE 69456 ABOVE CH-3 ON CHWR IS CLOSED

INDUSTRIAL MODE VALVE POSITIONS.

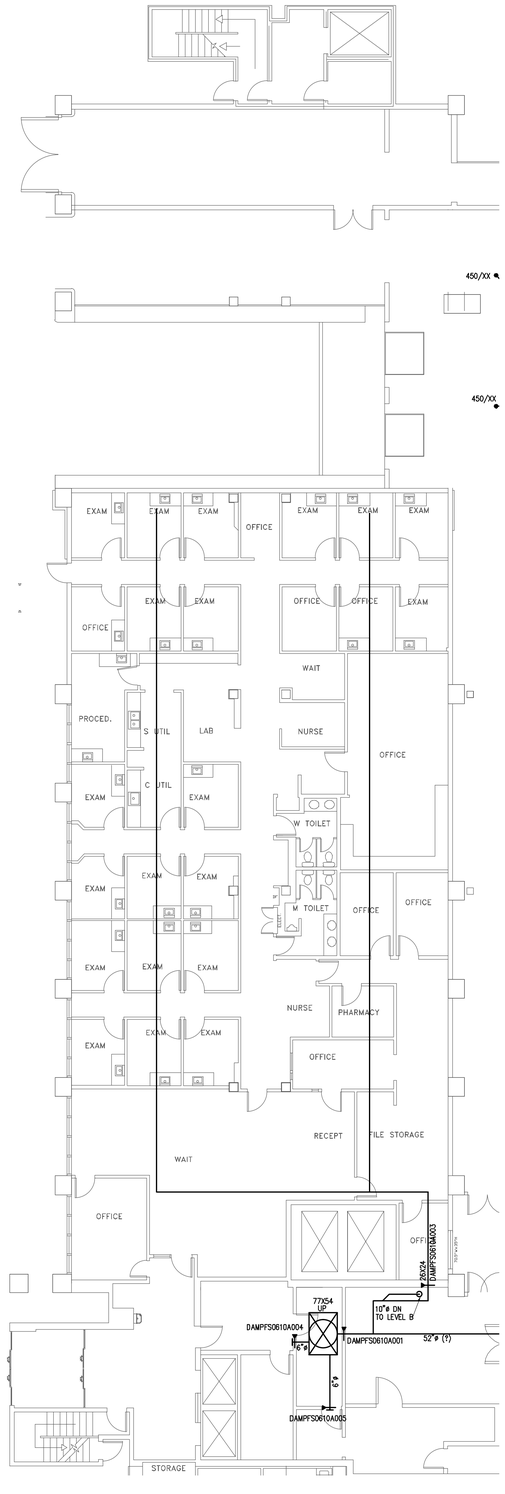
VALVE 68926 IS CLOSED (LOCATED ON DIAGRAM JUST LEFT OF CWP-01.)
VALVE 68927 IS CLOSED (LOCATED ON DIAGRAM JUST RIGHT OF CHWP-01.)
VALVE 68923 IS OPEN (LOCATED ON DIAGRAM UP & TO RIGHT OF CHWP-15)
VALVE 68924 IS OPEN (LOCATED ON DIAGRAM UP & TO RIGHT OF CHWP-15)
VALVE 68925 IS ADJUSTED IN THE EVENT THAT CH-15 EVAP DELTA P IS LESS THAN 2.7 PSID (6.2 FT)

SOUTH ADDITION
VALVE 68754 IS CLOSED
VALVE 68758 IS CLOSED
VALVES 69457 & 69458 ABOVE STM HEADER ON CHWS ARE OPEN
VALVE 69456 ABOVE CH-3 ON CHWR IS OPEN

CENTER BUILDING CHILLED/CONDENSER WATER DIAGRAM



CENTER BUILDING STEAM DIAGRAM

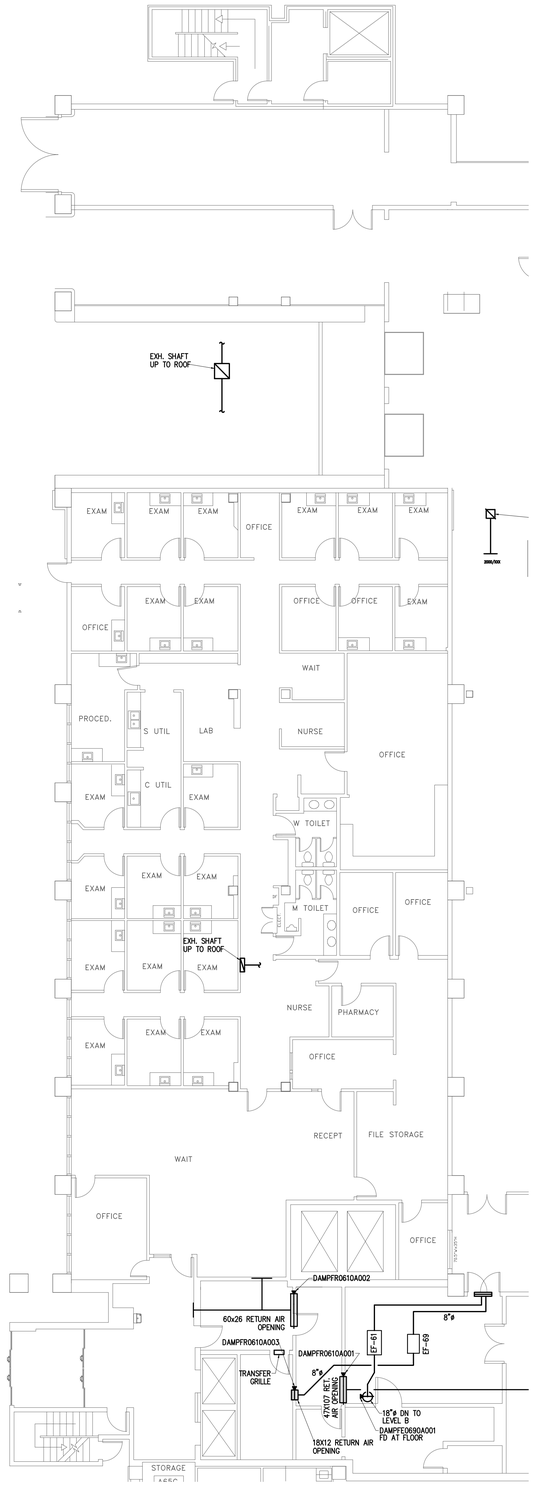


SHEET NOTES:

1. THIS FLOOR IS NOT FULLY SPRINKLERED.

C.H.P.B. 1ST FLOOR SUPPLY AIR DIAGRAM

NORTH

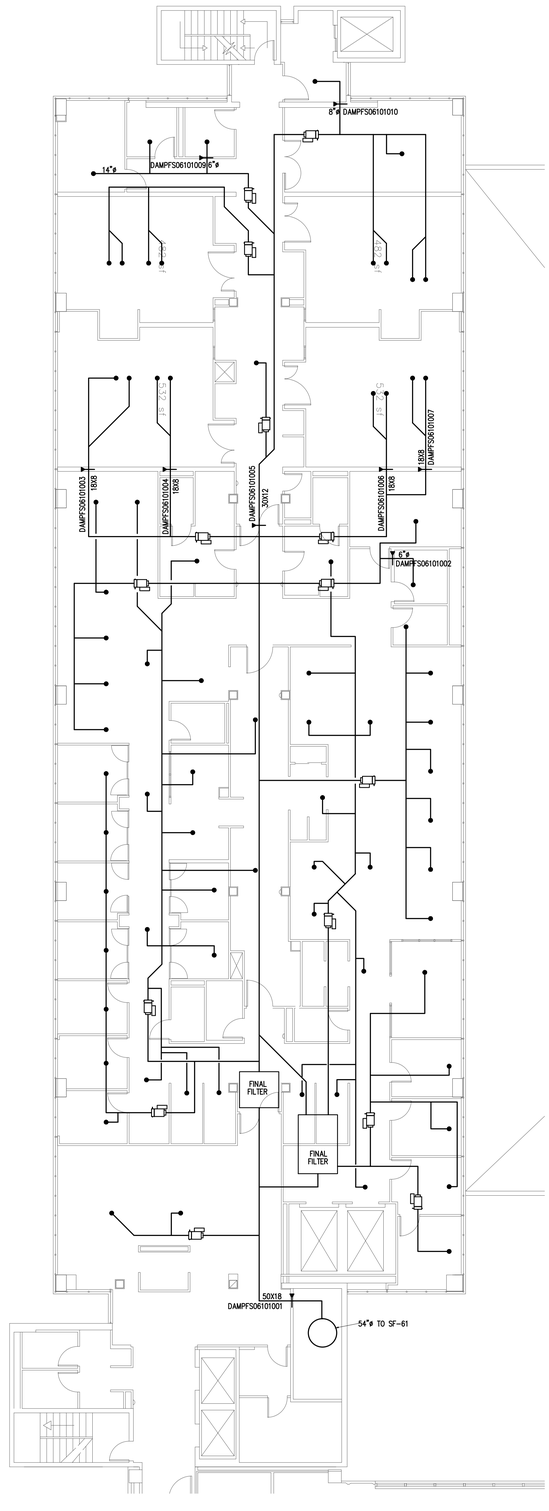


SHEET NOTES:

1. THIS FLOOR IS NOT FULLY SPRINKLERED.

C.H.P.B. 1ST FLOOR EXHAUST/RETURN AIR DIAGRAM

NORTH

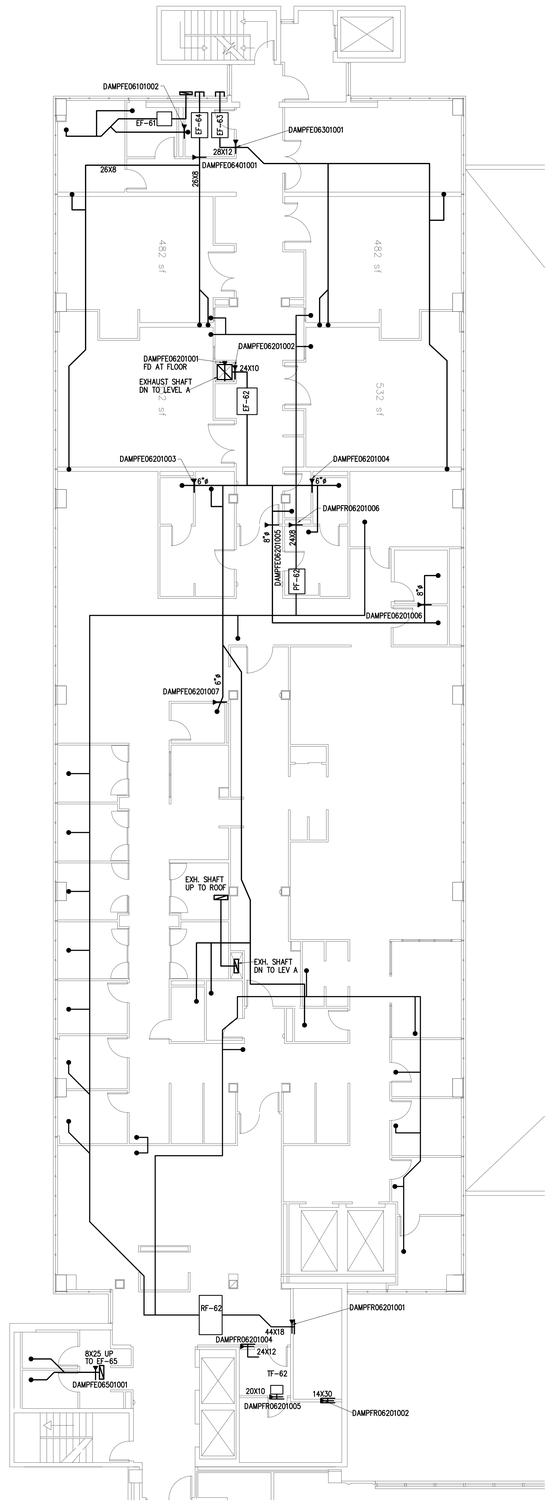


SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.

C.H.P.B. 2ND FLOOR SUPPLY AIR DIAGRAM

NORTH

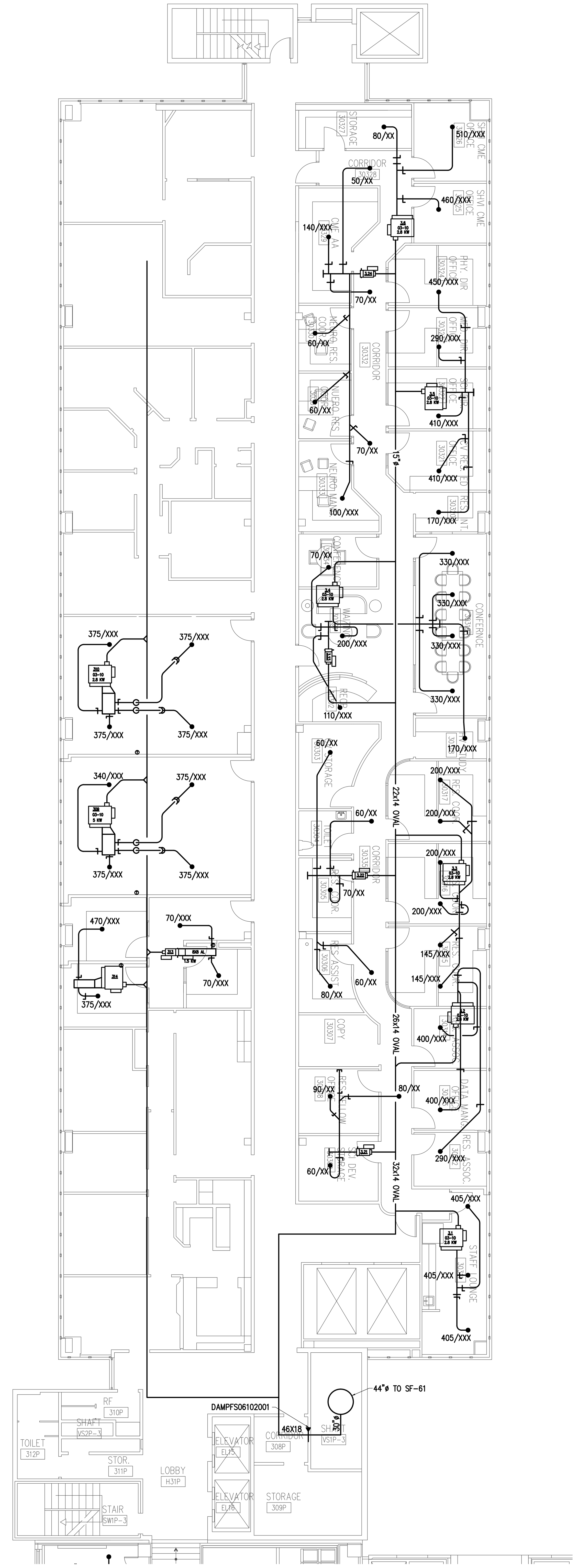


SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.

C.H.P.B. 2ND FLOOR EXHAUST/RETURN AIR DIAGRAM

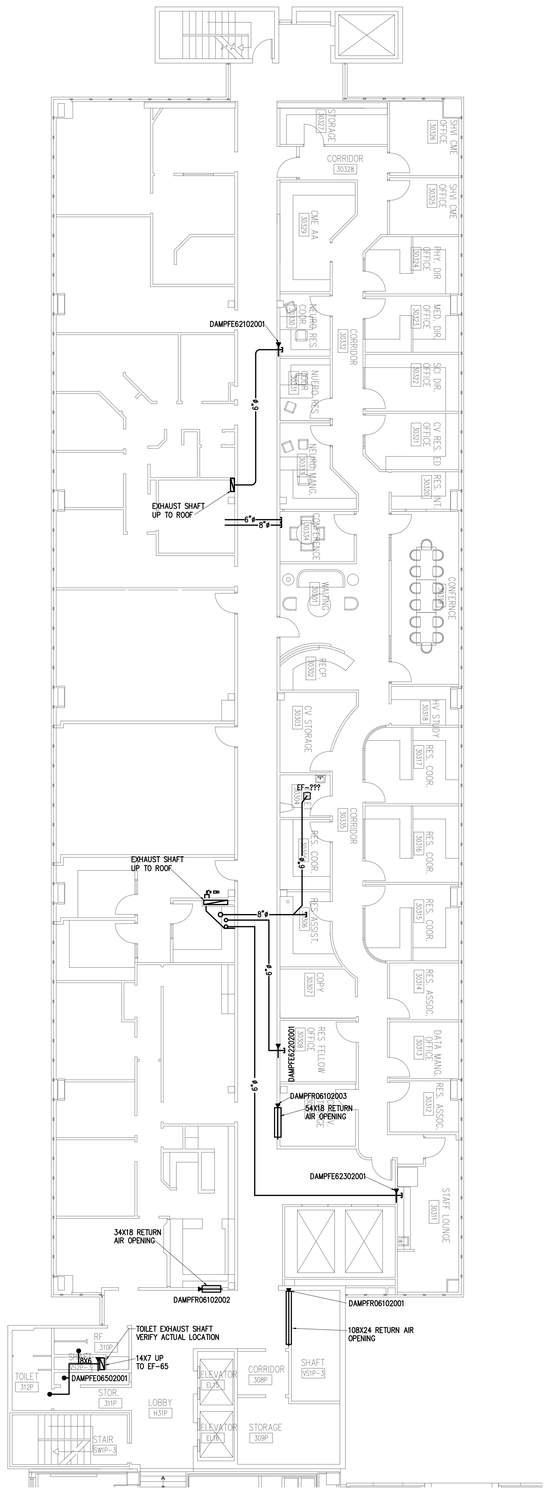
NORTH



SHEET NOTES:
1. THIS FLOOR IS NOT FULLY SPRINKLERED.

C.H.P.B. 3RD FLOOR SUPPLY AIR DIAGRAM

NORTH

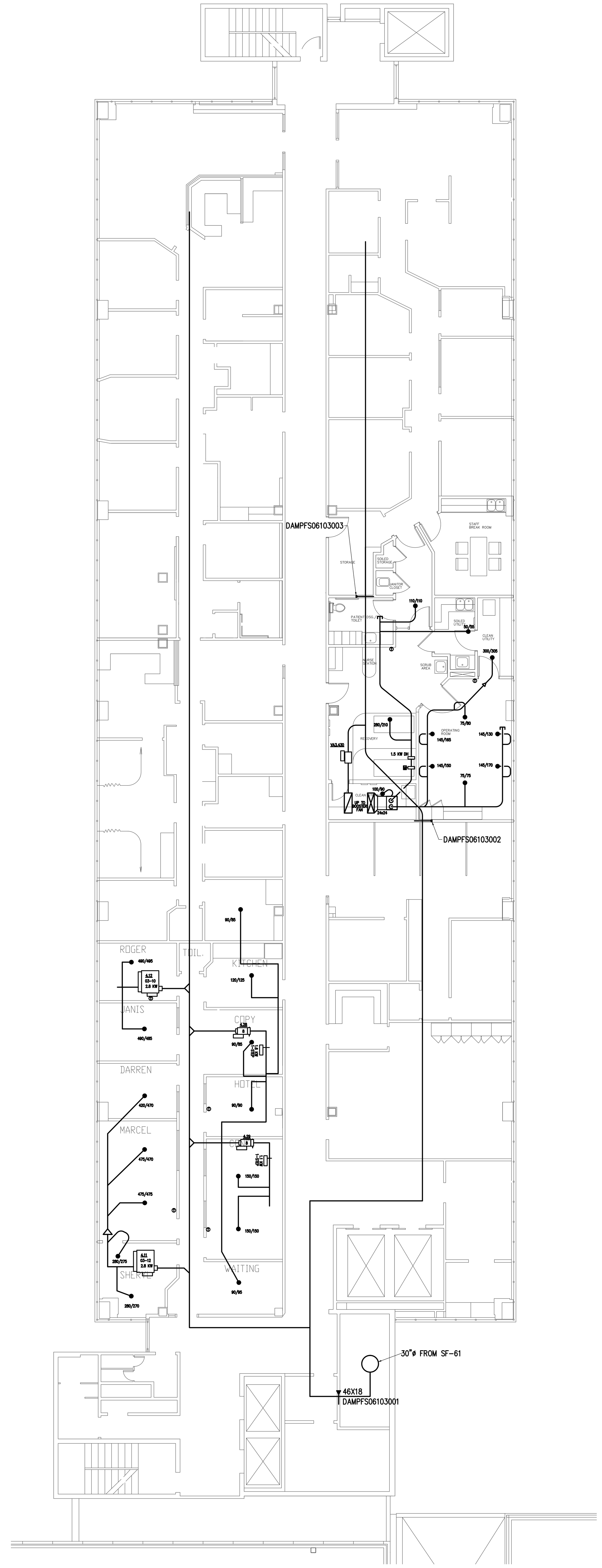


SHEET NOTES:

1. THIS FLOOR IS NOT FULLY SPRINKLERED.

C.H.P.B. 3RD FLOOR EXHAUST/RETURN AIR DIAGRAM

NORTH

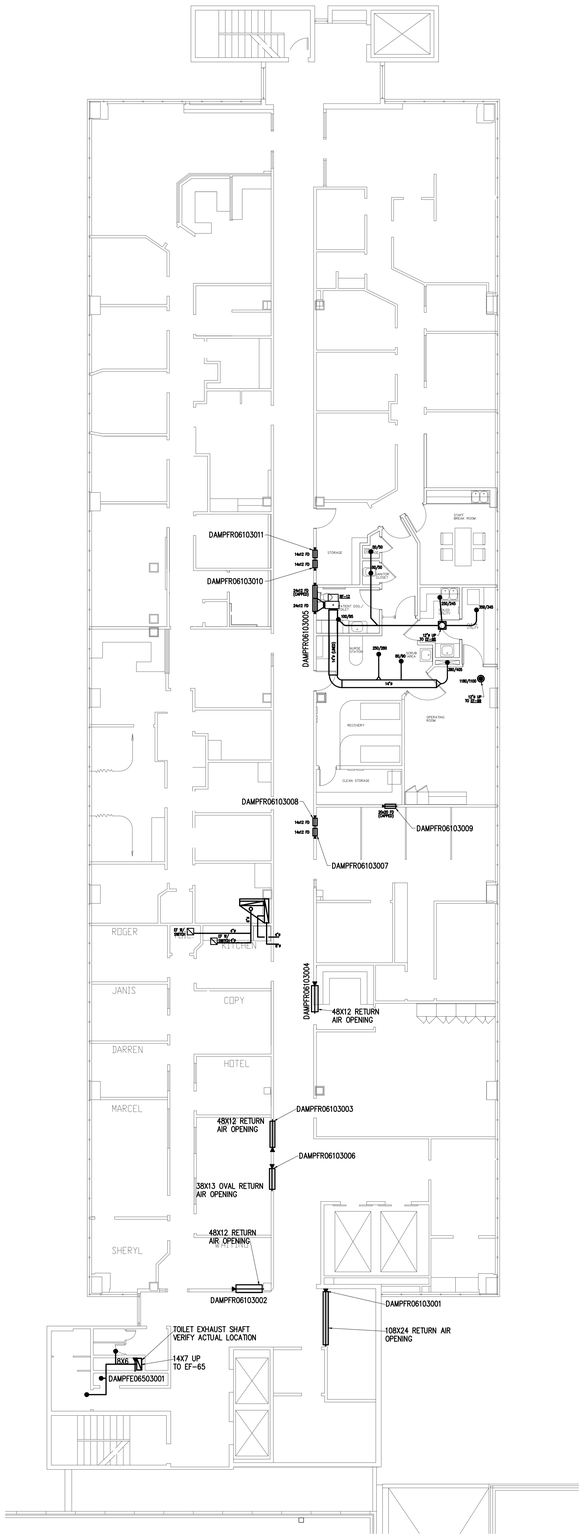


SHEET NOTES:

1. THIS FLOOR IS NOT FULLY SPRINKLERED.

C.H.P.B. 4TH FLOOR SUPPLY AIR DIAGRAM

NORTH

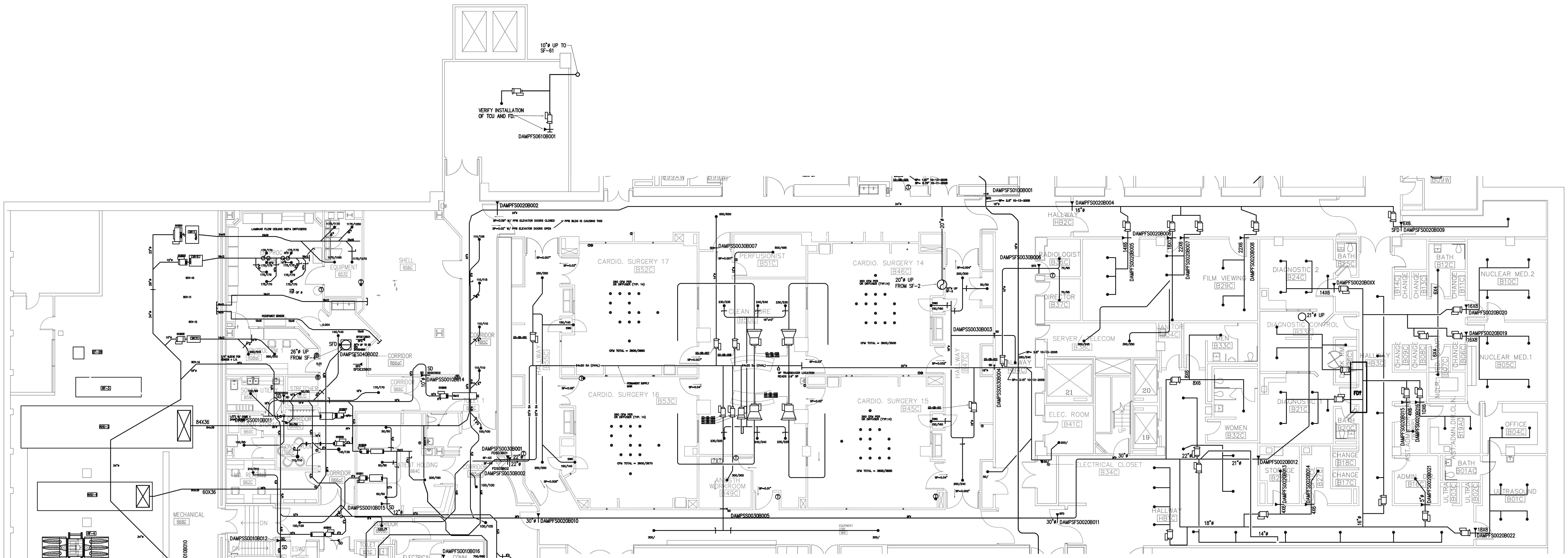
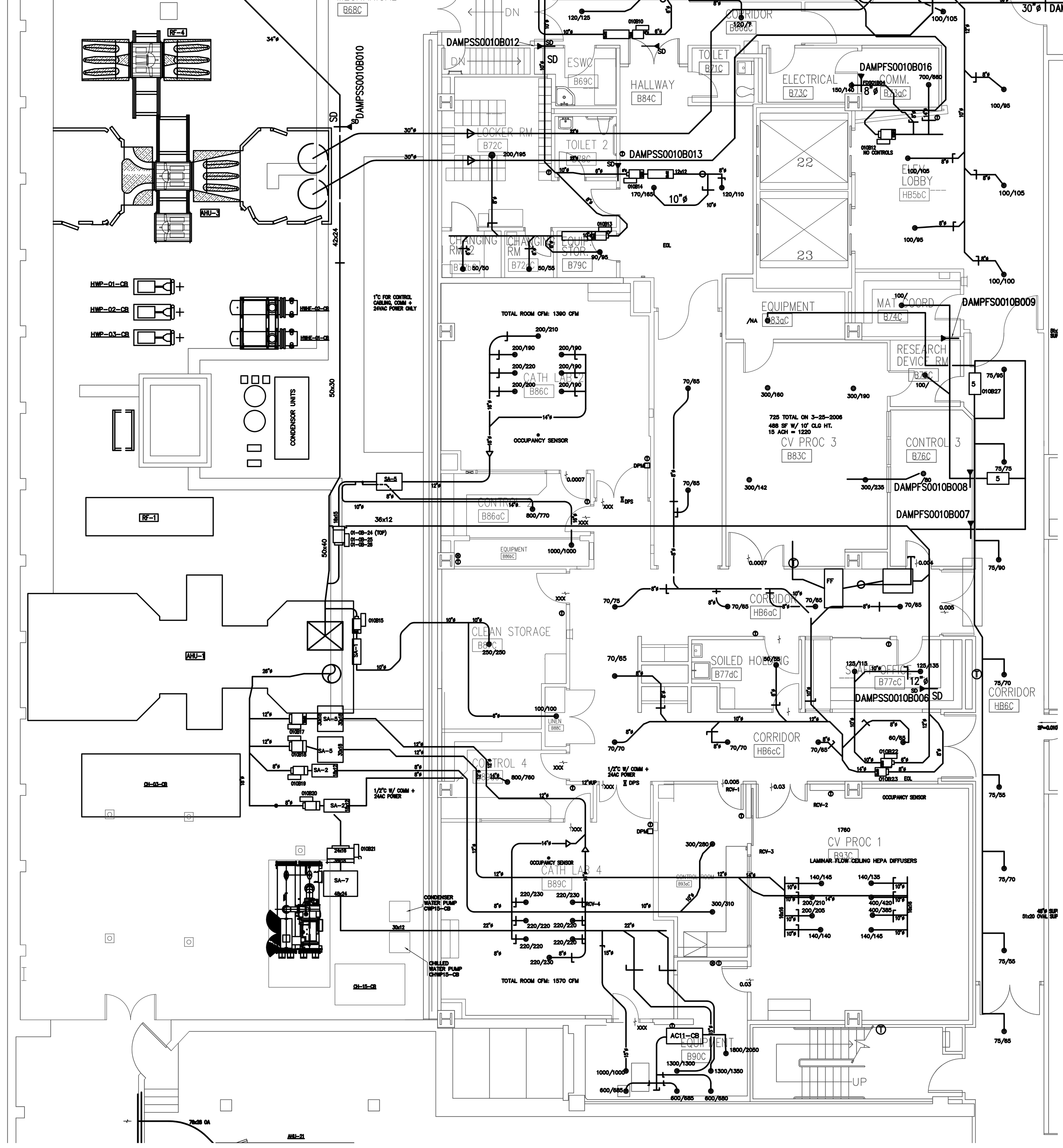


SHEET NOTES:

1. THIS FLOOR IS NOT FULLY SPRINKLERED.

C.H.P.B. 4TH FLOOR EXHAUST/RETURN AIR DIAGRAM

NORTH

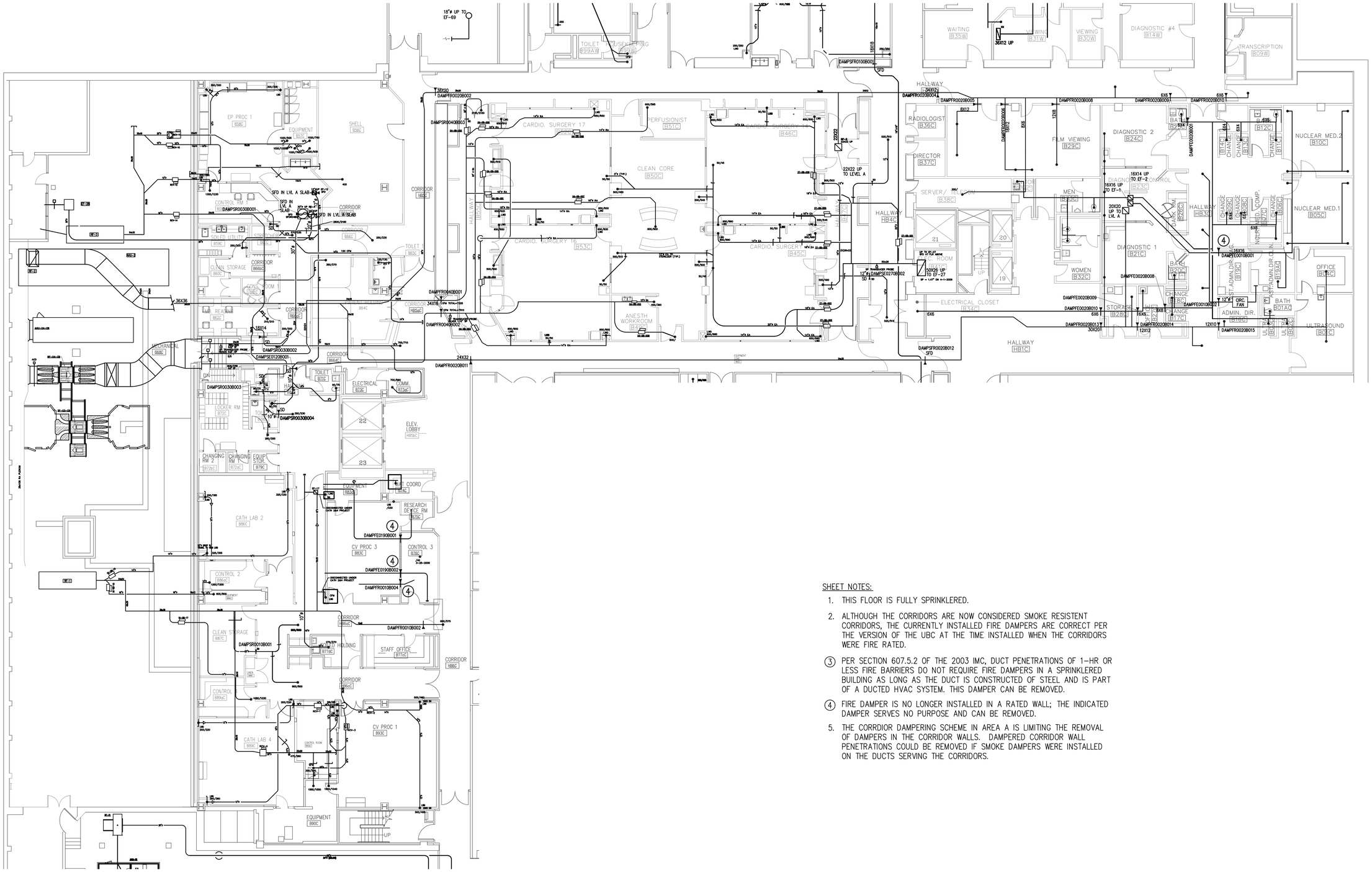



SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.
2. ALTHOUGH THE CORRIDORS ARE NOW CONSIDERED SMOKE RESISTENT CORRIDORS, THE CURRENTLY INSTALLED FIRE DAMPERS ARE CORRECT PER THE VERSION OF THE UBC AT THE TIME INSTALLED WHEN THE CORRIDORS WERE FIRE RATED.
3. (3) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1–HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.
4. (4) FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.
5. THE CORRDIOR DAMPERING SCHEME IN AREA A IS LIMITING THE REMOVAL OF DAMPERS IN THE CORRIDOR WALLS. DAMPERED CORRIDOR WALL PENETRATIONS COULD BE REMOVED IF SMOKE DAMPERS WERE INSTALLED ON THE DUCTS SERVING THE CORRIDORS.

CENTER BUILDING LEVEL B SUPPLY AIR DIAGRAM

NORTH



SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.
2. ALTHOUGH THE CORRIDORS ARE NOW CONSIDERED SMOKE RESISTENT CORRIDORS, THE CURRENTLY INSTALLED FIRE DAMPERS ARE CORRECT PER THE VERSION OF THE UBC AT THE TIME INSTALLED WHEN THE CORRIDORS WERE FIRE RATED.

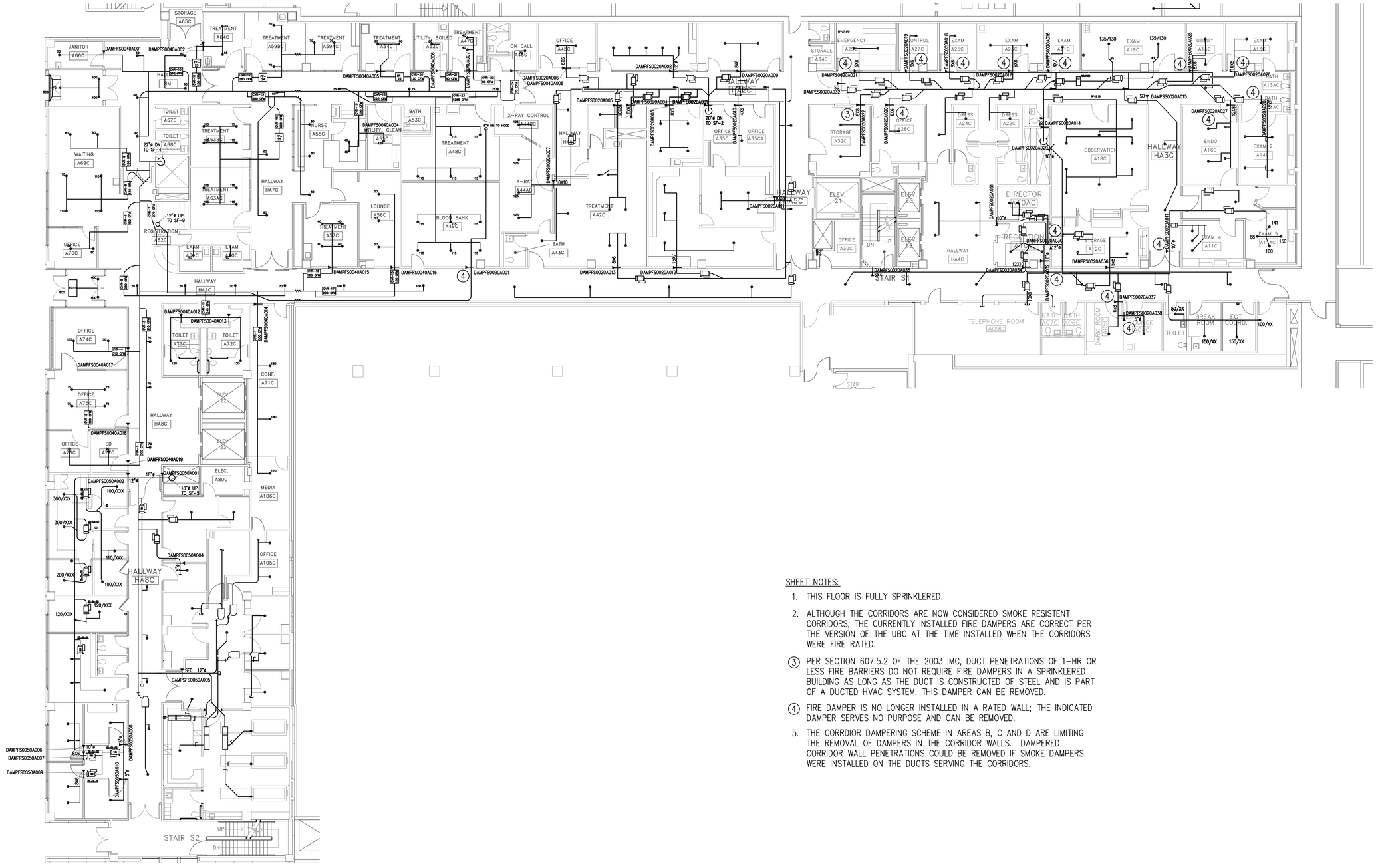
(3) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

(4) FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.

5. THE CORRDIOR DAMPERING SCHEME IN AREA A IS LIMITING THE REMOVAL OF DAMPERS IN THE CORRIDOR WALLS. DAMPERED CORRIDOR WALL PENETRATIONS COULD BE REMOVED IF SMOKE DAMPERS WERE INSTALLED ON THE DUCTS SERVING THE CORRIDORS.

CENTER BUILDING LEVEL B EXHAUST/RETURN AIR DIAGRAM

NORTH



SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.
2. ALTHOUGH THE CORRIDORS ARE NOW CONSIDERED SMOKE RESISTENT CORRIDORS, THE CURRENTLY INSTALLED FIRE DAMPERS ARE CORRECT PER THE VERSION OF THE UBC AT THE TIME INSTALLED WHEN THE CORRIDORS WERE FIRE RATED.

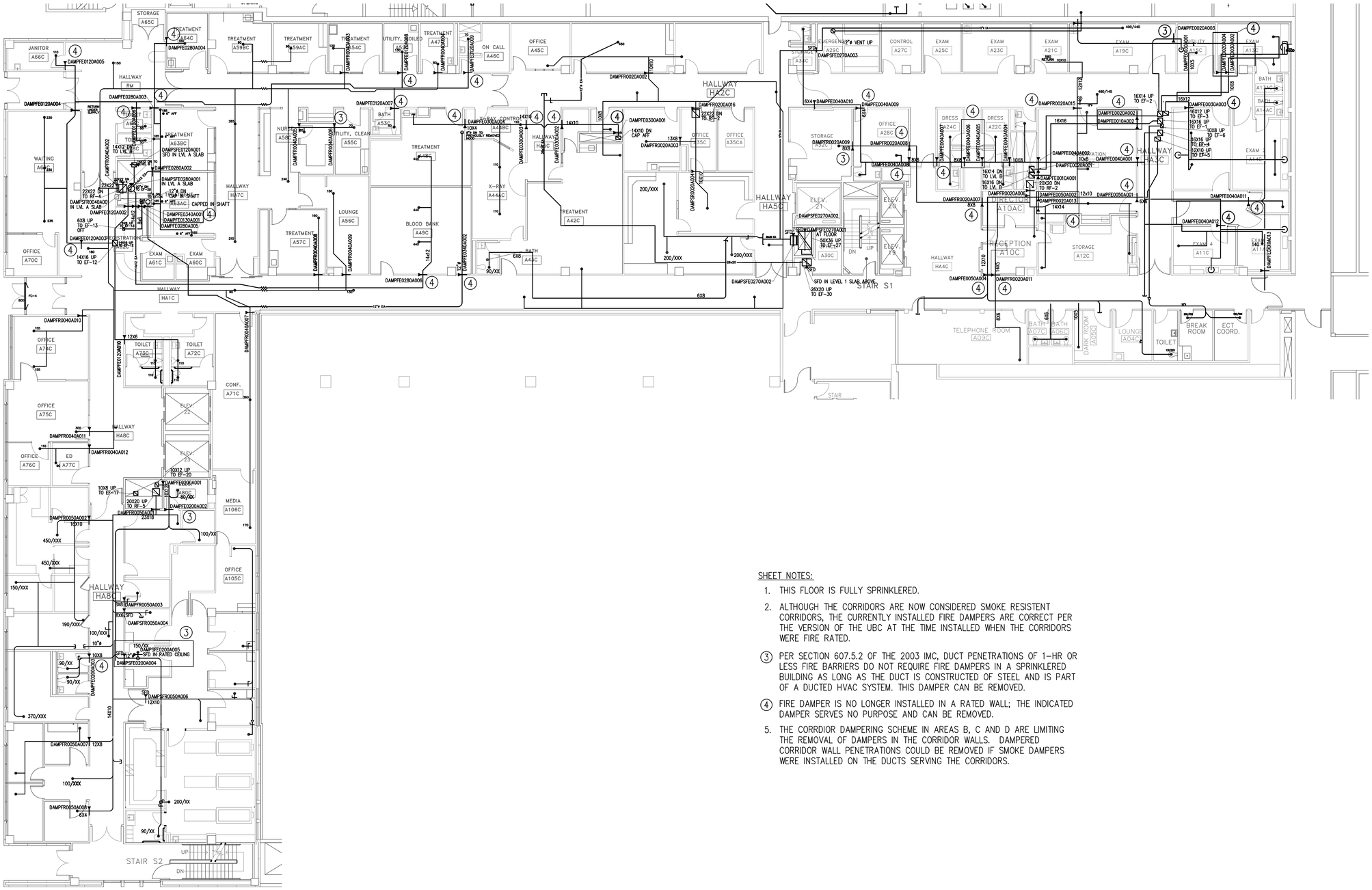
(3) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

(4) FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.

5. THE CORRDIOR DAMPERING SCHEME IN AREAS B, C AND D ARE LIMITING THE REMOVAL OF DAMPERS IN THE CORRIDOR WALLS. DAMPERED CORRIDOR WALL PENETRATIONS COULD BE REMOVED IF SMOKE DAMPERS WERE INSTALLED ON THE DUCTS SERVING THE CORRIDORS.

CENTER BUILDING LEVEL A SUPPLY AIR DIAGRAM

NORTH



SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.
2. ALTHOUGH THE CORRIDORS ARE NOW CONSIDERED SMOKE RESISTENT CORRIDORS, THE CURRENTLY INSTALLED FIRE DAMPERS ARE CORRECT PER THE VERSION OF THE UBC AT THE TIME INSTALLED WHEN THE CORRIDORS WERE FIRE RATED.

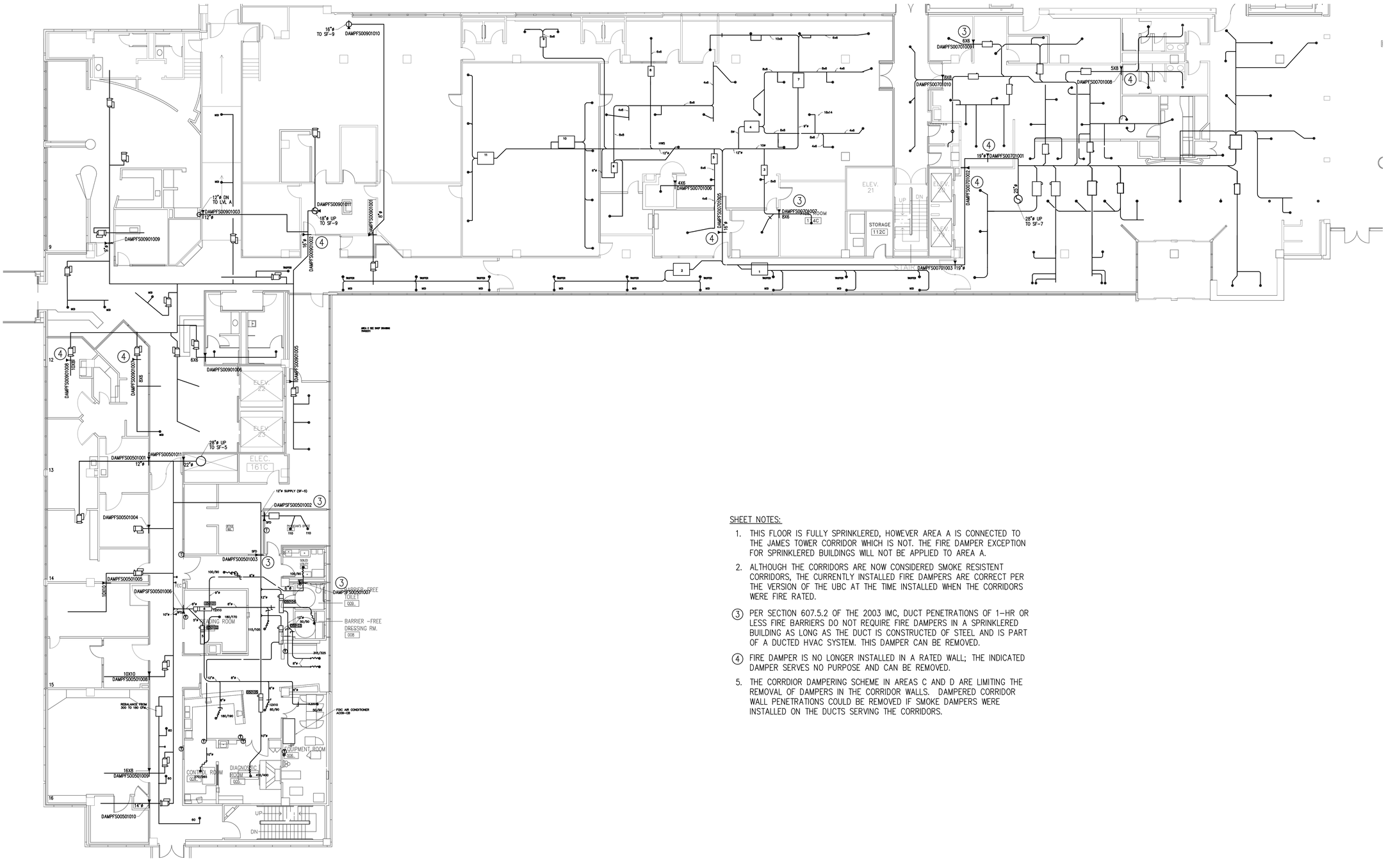
(3) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

(4) FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.

5. THE CORRDIOR DAMPERING SCHEME IN AREAS B, C AND D ARE LIMITING THE REMOVAL OF DAMPERS IN THE CORRIDOR WALLS. DAMPERED CORRIDOR WALL PENETRATIONS COULD BE REMOVED IF SMOKE DAMPERS WERE INSTALLED ON THE DUCTS SERVING THE CORRIDORS.

CENTER BUILDING LEVEL A EXHAUST/RETURN AIR DIAGRAM

NORTH



SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED, HOWEVER AREA A IS CONNECTED TO THE JAMES TOWER CORRIDOR WHICH IS NOT. THE FIRE DAMPER EXCEPTION FOR SPRINKLERED BUILDINGS WILL NOT BE APPLIED TO AREA A.
2. ALTHOUGH THE CORRIDORS ARE NOW CONSIDERED SMOKE RESISTENT CORRIDORS, THE CURRENTLY INSTALLED FIRE DAMPERS ARE CORRECT PER THE VERSION OF THE UBC AT THE TIME INSTALLED WHEN THE CORRIDORS WERE FIRE RATED.

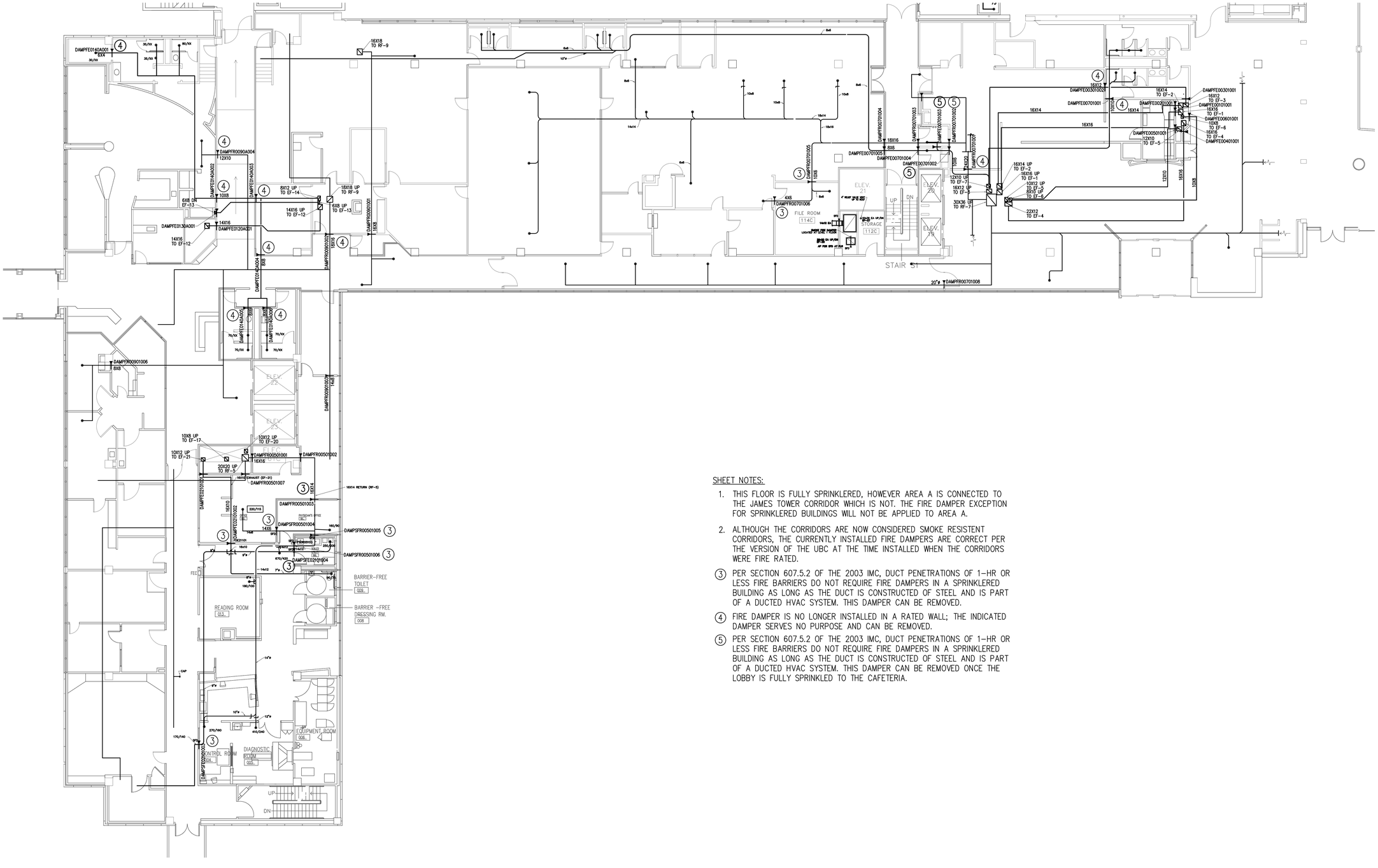
(3) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

(4) FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.

5. THE CORRDIOR DAMPERING SCHEME IN AREAS C AND D ARE LIMITING THE REMOVAL OF DAMPERS IN THE CORRIDOR WALLS. DAMPERED CORRIDOR WALL PENETRATIONS COULD BE REMOVED IF SMOKE DAMPERS WERE INSTALLED ON THE DUCTS SERVING THE CORRIDORS.

CENTER BUILDING 1ST FLOOR SUPPLY AIR DIAGRAM

NORTH



SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED, HOWEVER AREA A IS CONNECTED TO THE JAMES TOWER CORRIDOR WHICH IS NOT. THE FIRE DAMPER EXCEPTION FOR SPRINKLERED BUILDINGS WILL NOT BE APPLIED TO AREA A.
2. ALTHOUGH THE CORRIDORS ARE NOW CONSIDERED SMOKE RESISTENT CORRIDORS, THE CURRENTLY INSTALLED FIRE DAMPERS ARE CORRECT PER THE VERSION OF THE UBC AT THE TIME INSTALLED WHEN THE CORRIDORS WERE FIRE RATED.

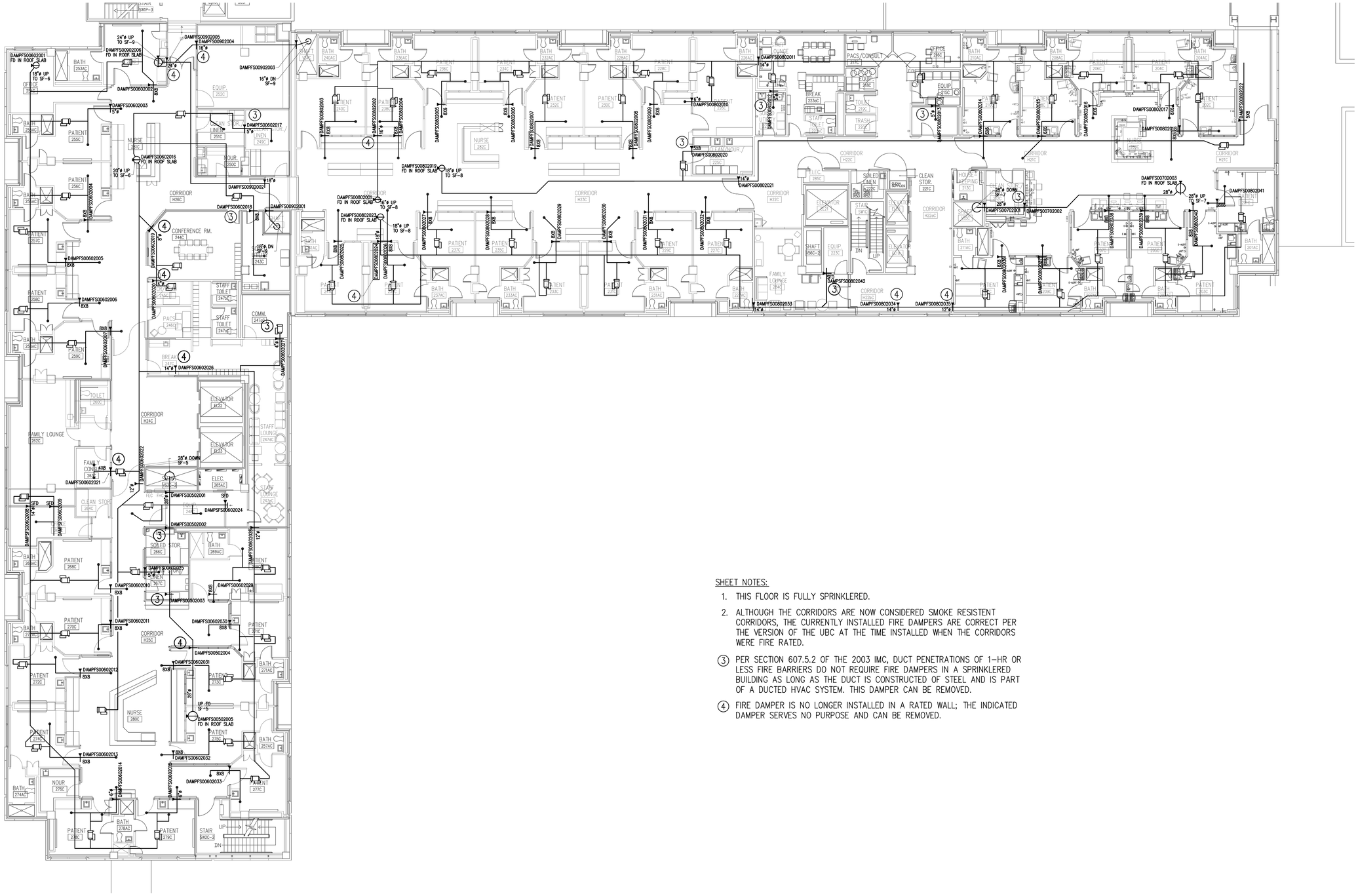
(3) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

(4) FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.

(5) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED ONCE THE LOBBY IS FULLY SPRINKLED TO THE CAFETERIA.

CENTER BUILDING 1ST FLOOR EXHAUST/RETURN AIR DIAGRAM

NORTH



SHEET NOTES:

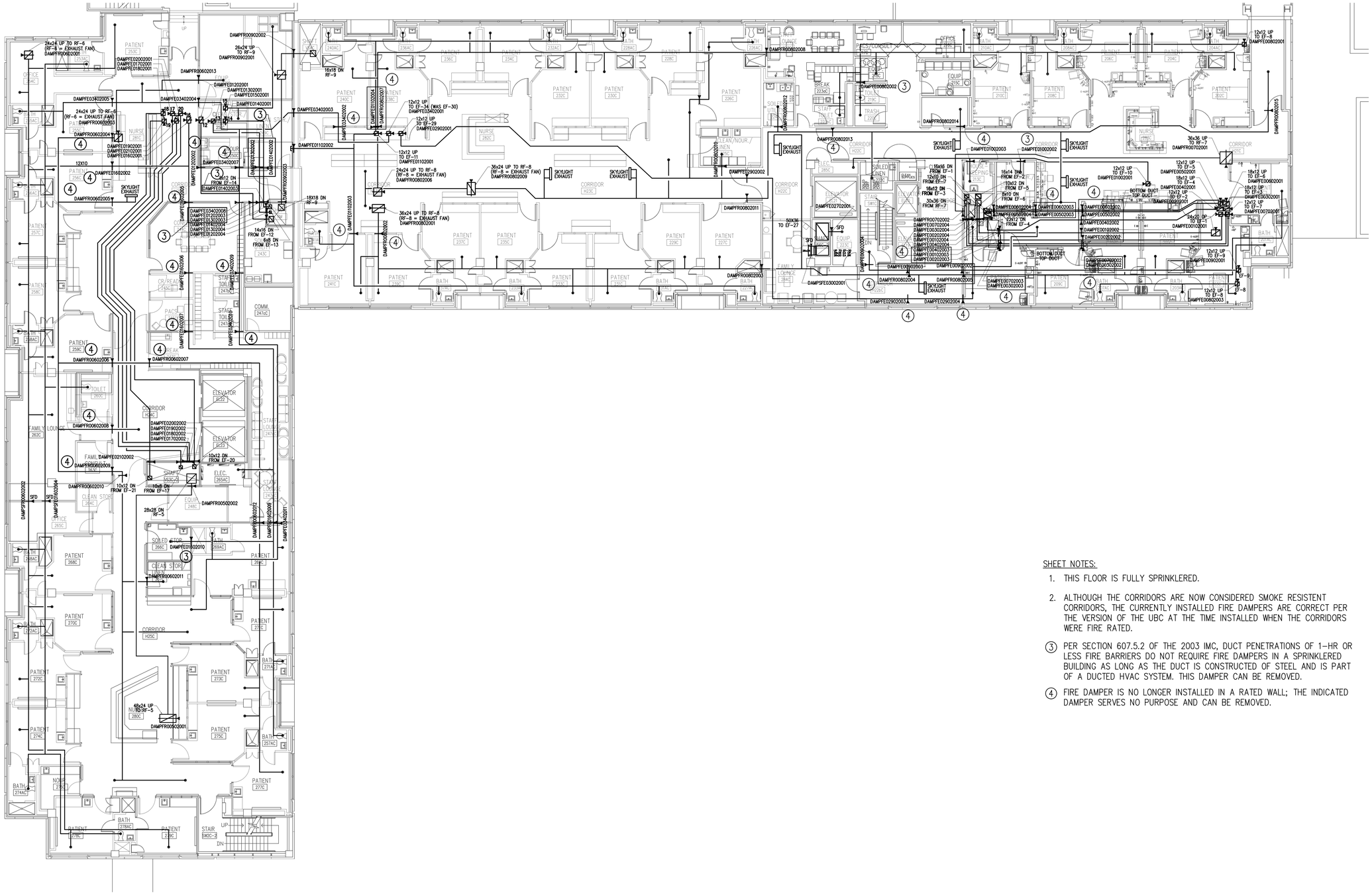
1. THIS FLOOR IS FULLY SPRINKLERED.
2. ALTHOUGH THE CORRIDORS ARE NOW CONSIDERED SMOKE RESISTENT CORRIDORS, THE CURRENTLY INSTALLED FIRE DAMPERS ARE CORRECT PER THE VERSION OF THE UBC AT THE TIME INSTALLED WHEN THE CORRIDORS WERE FIRE RATED.

(3) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

(4) FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.

CENTER BUILDING 2ND FLOOR SUPPLY AIR DIAGRAM

NORTH



SHEET NOTES:

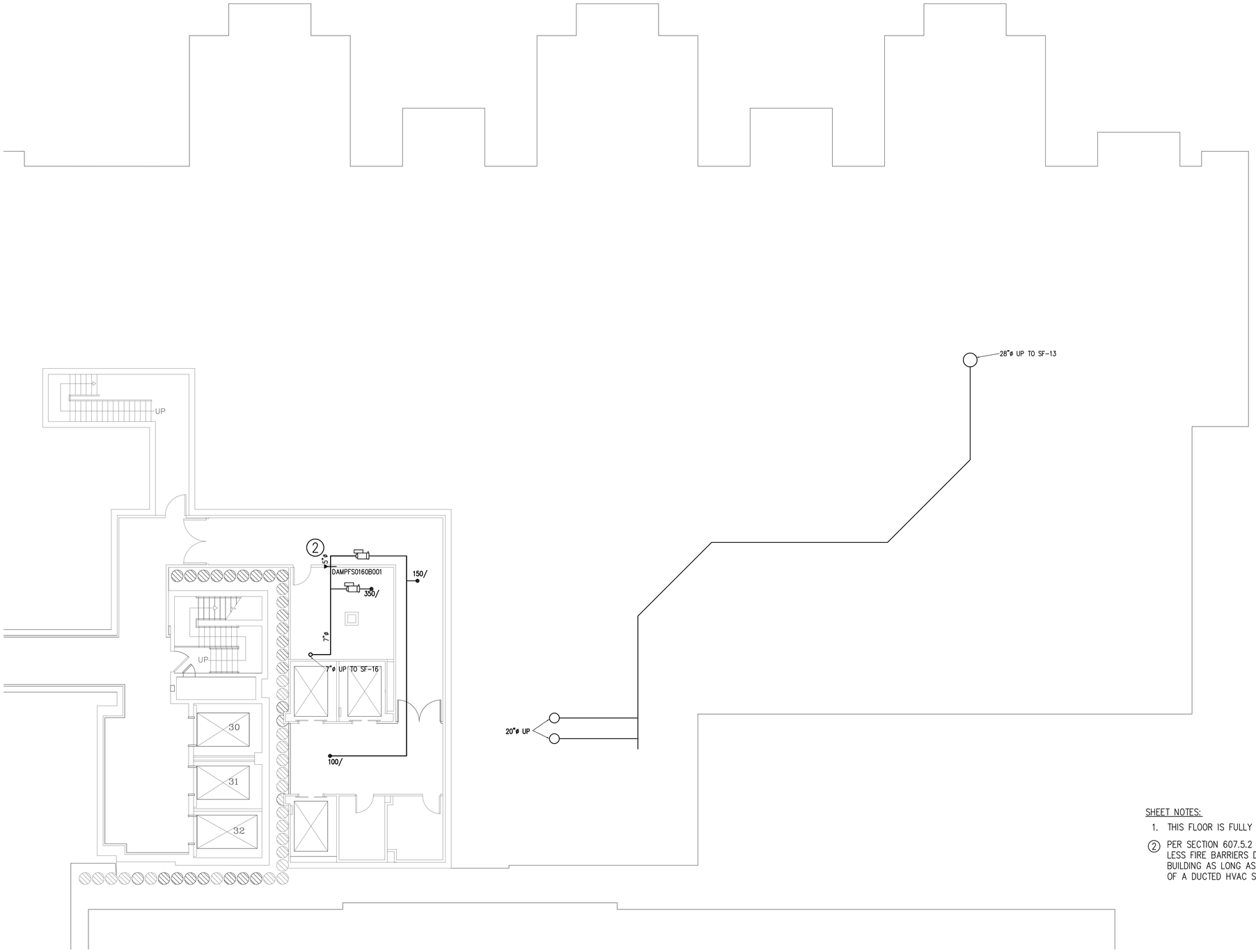
1. THIS FLOOR IS FULLY SPRINKLERED.
2. ALTHOUGH THE CORRIDORS ARE NOW CONSIDERED SMOKE RESISTENT CORRIDORS, THE CURRENTLY INSTALLED FIRE DAMPERS ARE CORRECT PER THE VERSION OF THE UBC AT THE TIME INSTALLED WHEN THE CORRIDORS WERE FIRE RATED.

(3) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

(4) FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.

CENTER BUILDING 2ND FLOOR EXHAUST/RETURN AIR DIAGRAM

NORTH



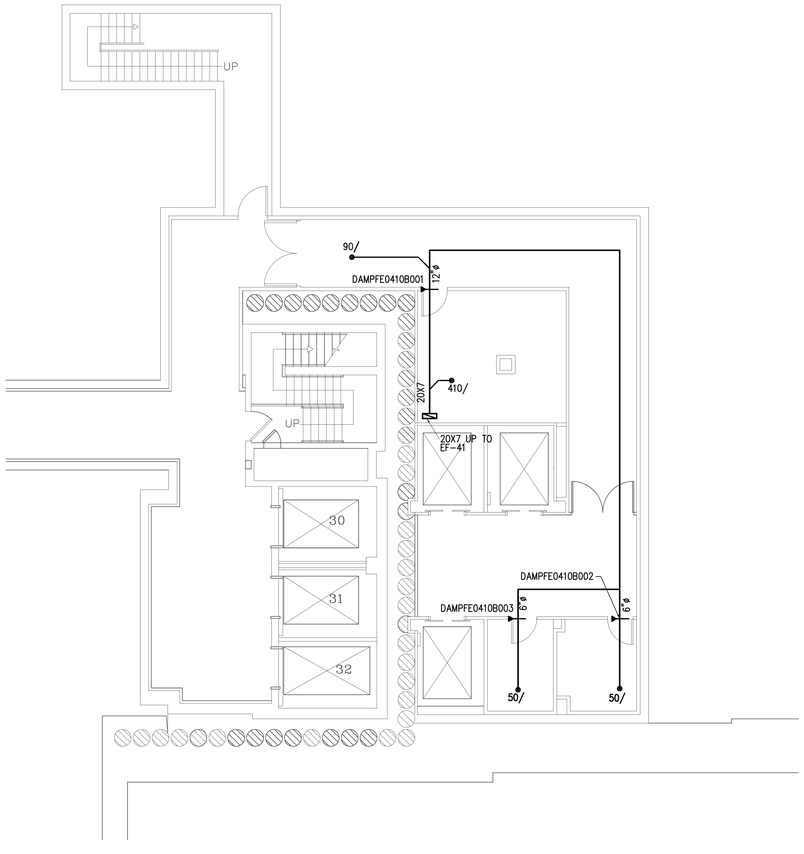
SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.

2. PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

EAST WING LEVEL B SUPPLY AIR DIAGRAM

NORTH



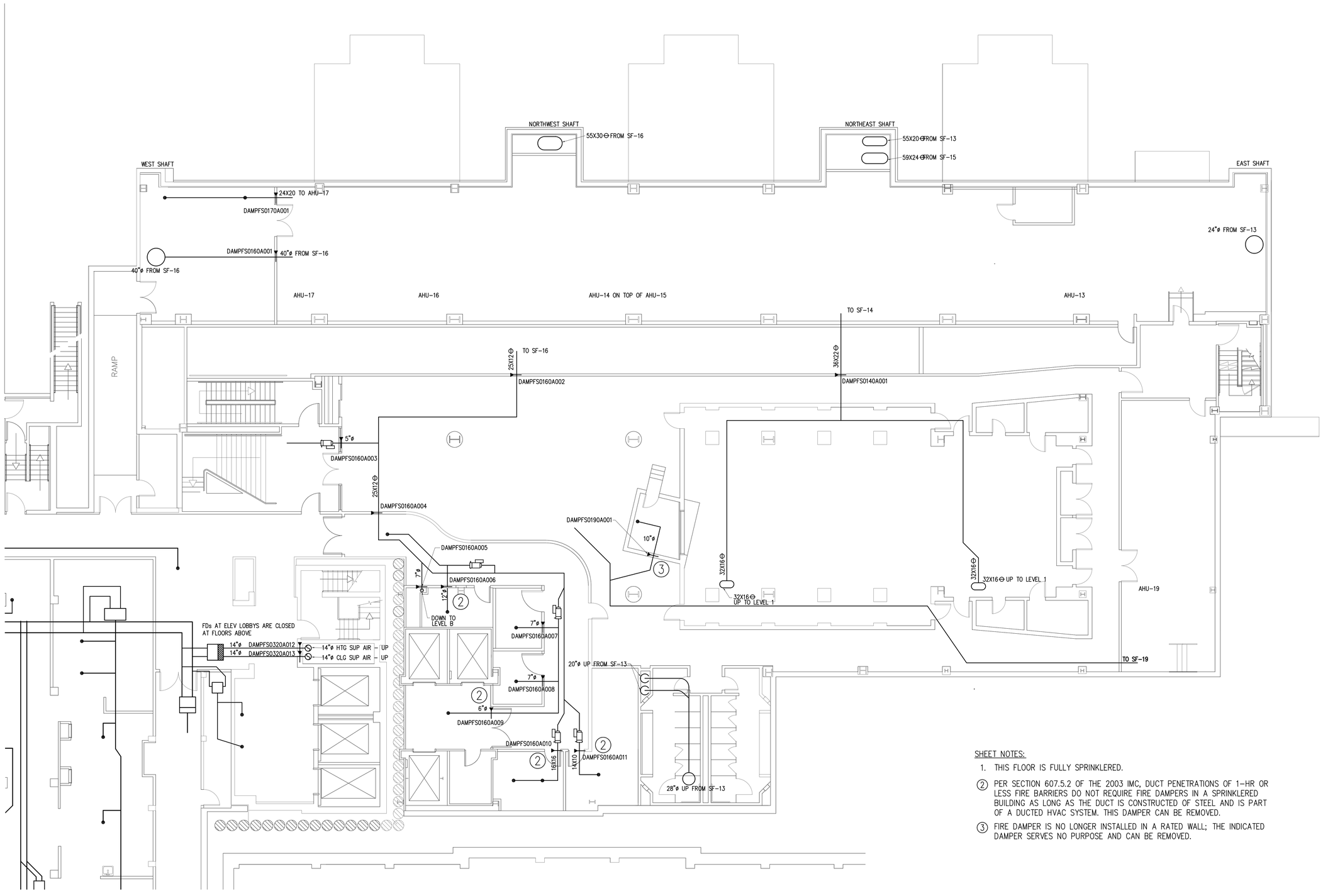
SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.

(2) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

EAST WING LEVEL B EXHAUST/RETURN AIR DIAGRAM

NORTH

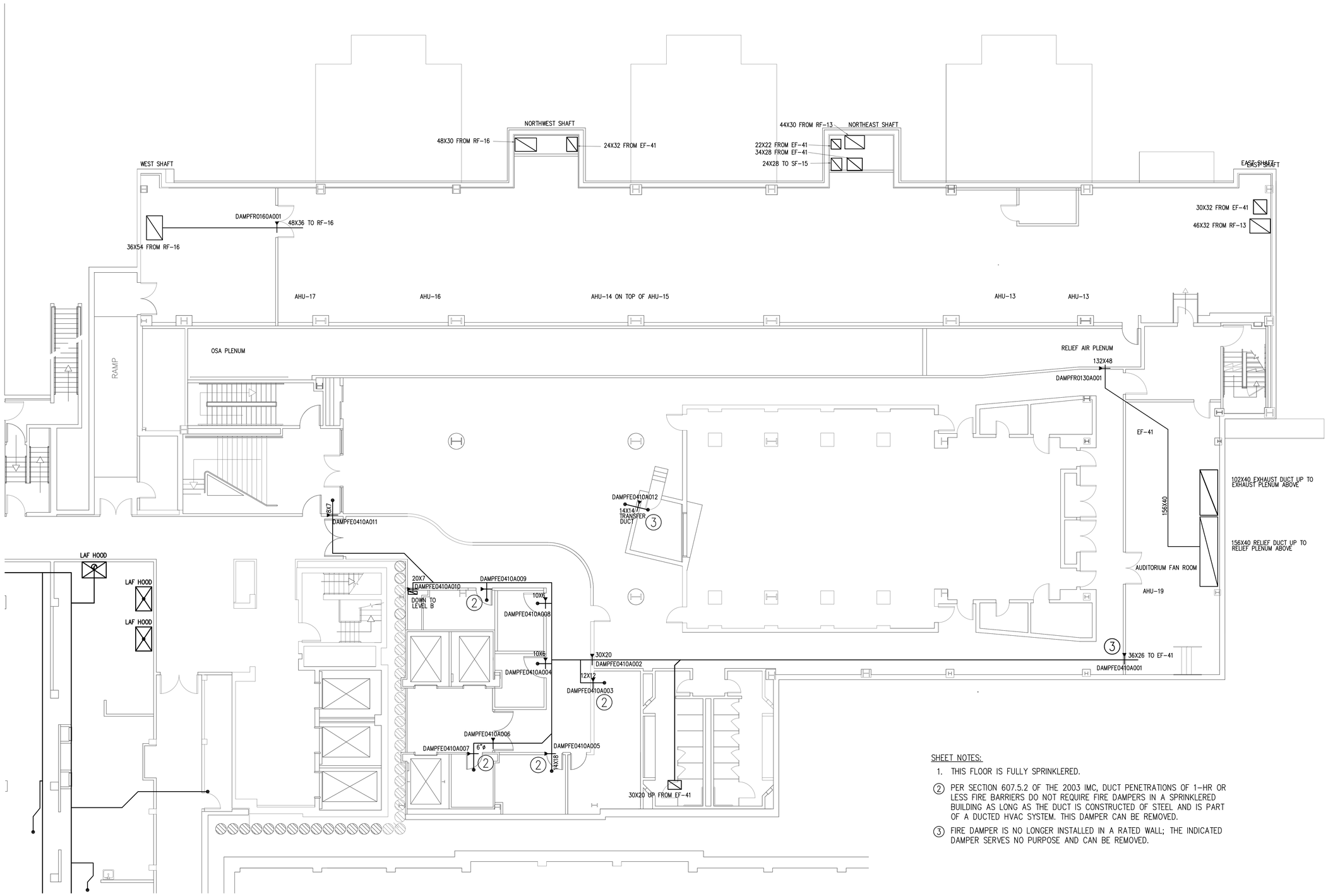


SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.
2. PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.
3. FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.

EAST WING LEVEL A SUPPLY AIR DIAGRAM

NORTH



SHEET NOTES:

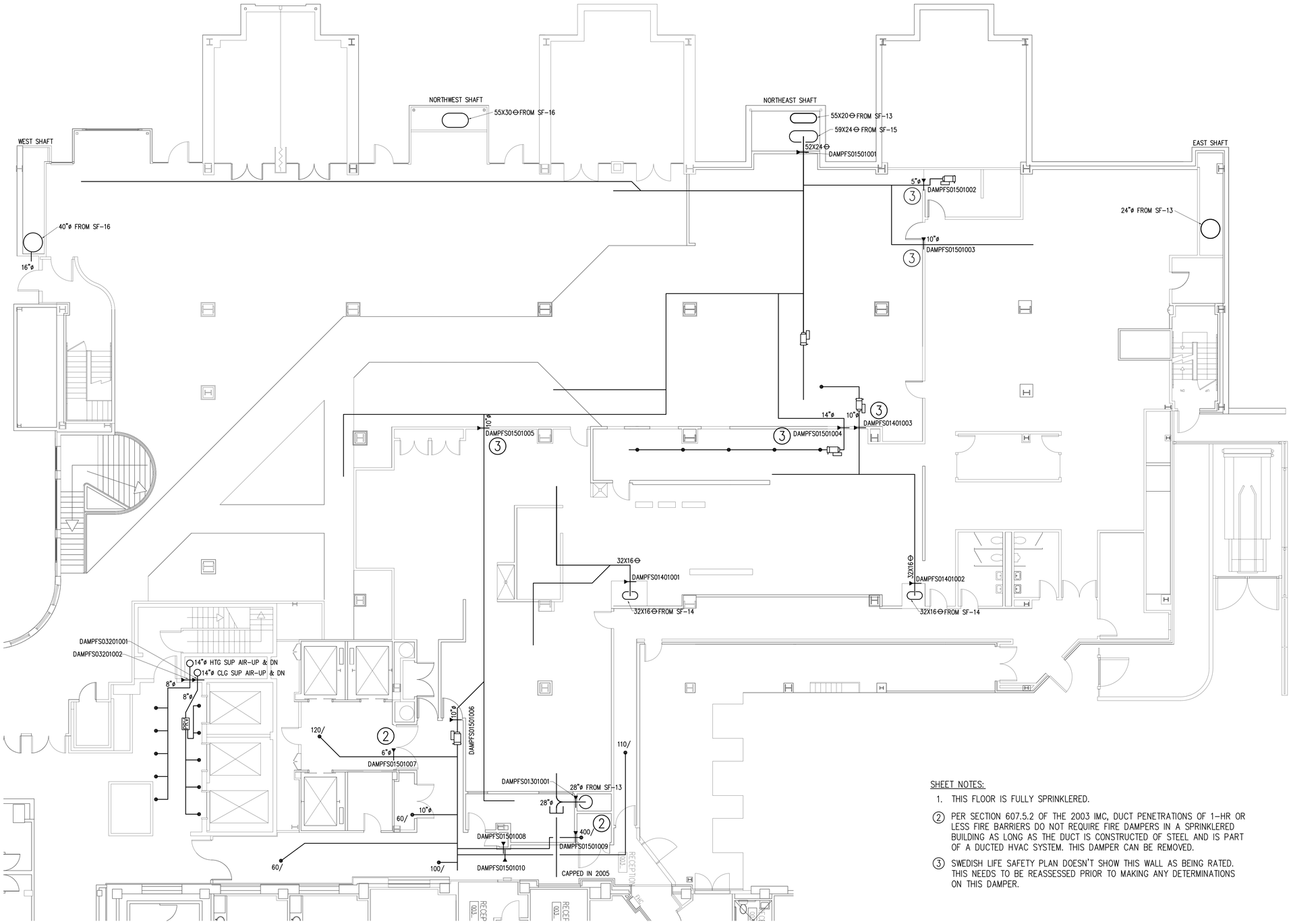
1. THIS FLOOR IS FULLY SPRINKLERED.

(2) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

(3) FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.

EAST WING LEVEL A EXHAUST/RETURN AIR DIAGRAM

NORTH



SHEET NOTES:

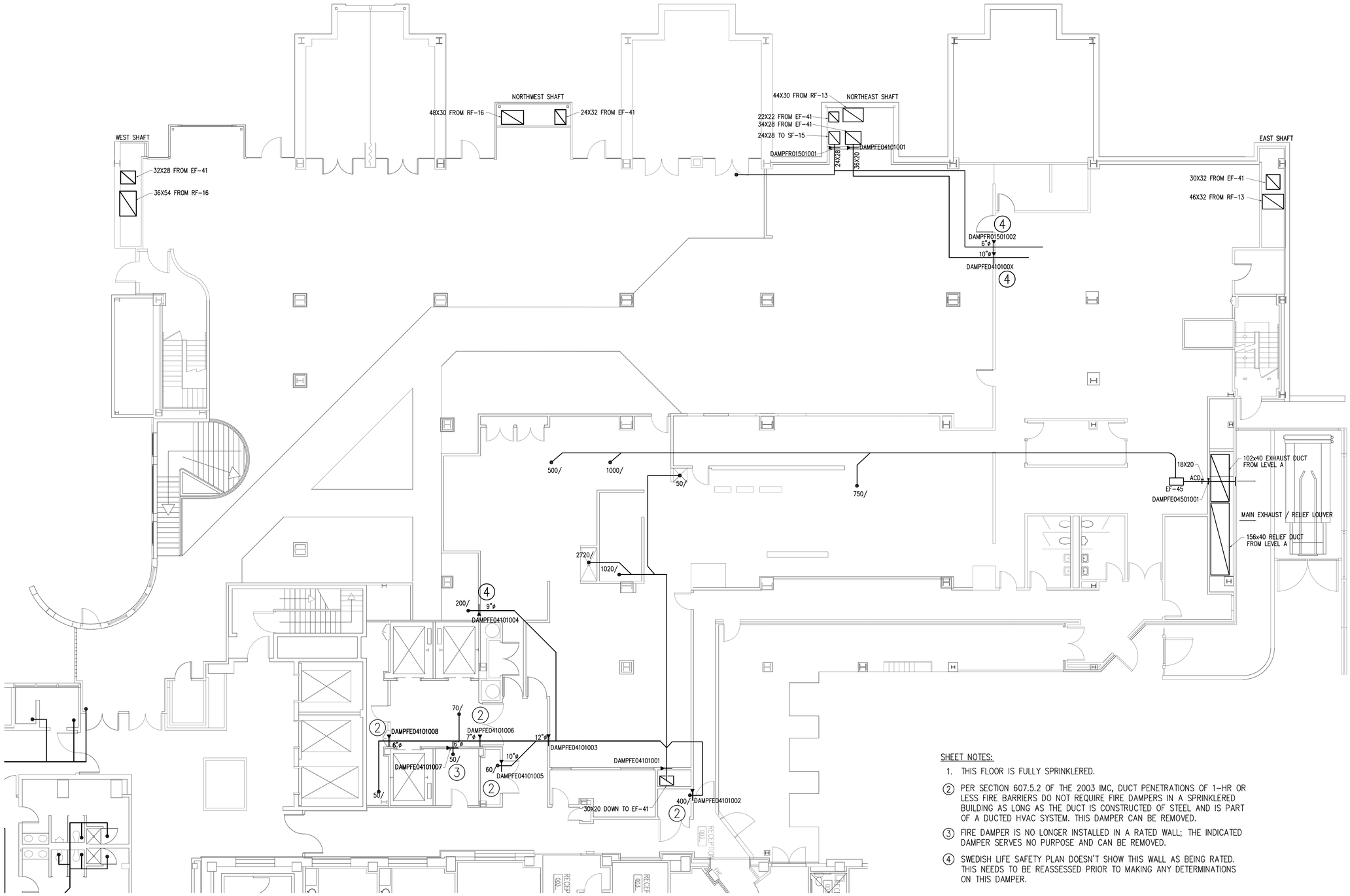
1. THIS FLOOR IS FULLY SPRINKLERED.

(2) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

(3) SWEDISH LIFE SAFETY PLAN DOESN'T SHOW THIS WALL AS BEING RATED. THIS NEEDS TO BE REASSESSED PRIOR TO MAKING ANY DETERMINATIONS ON THIS DAMPER.

EAST WING 1ST FLOOR SUPPLY AIR DIAGRAM

NORTH

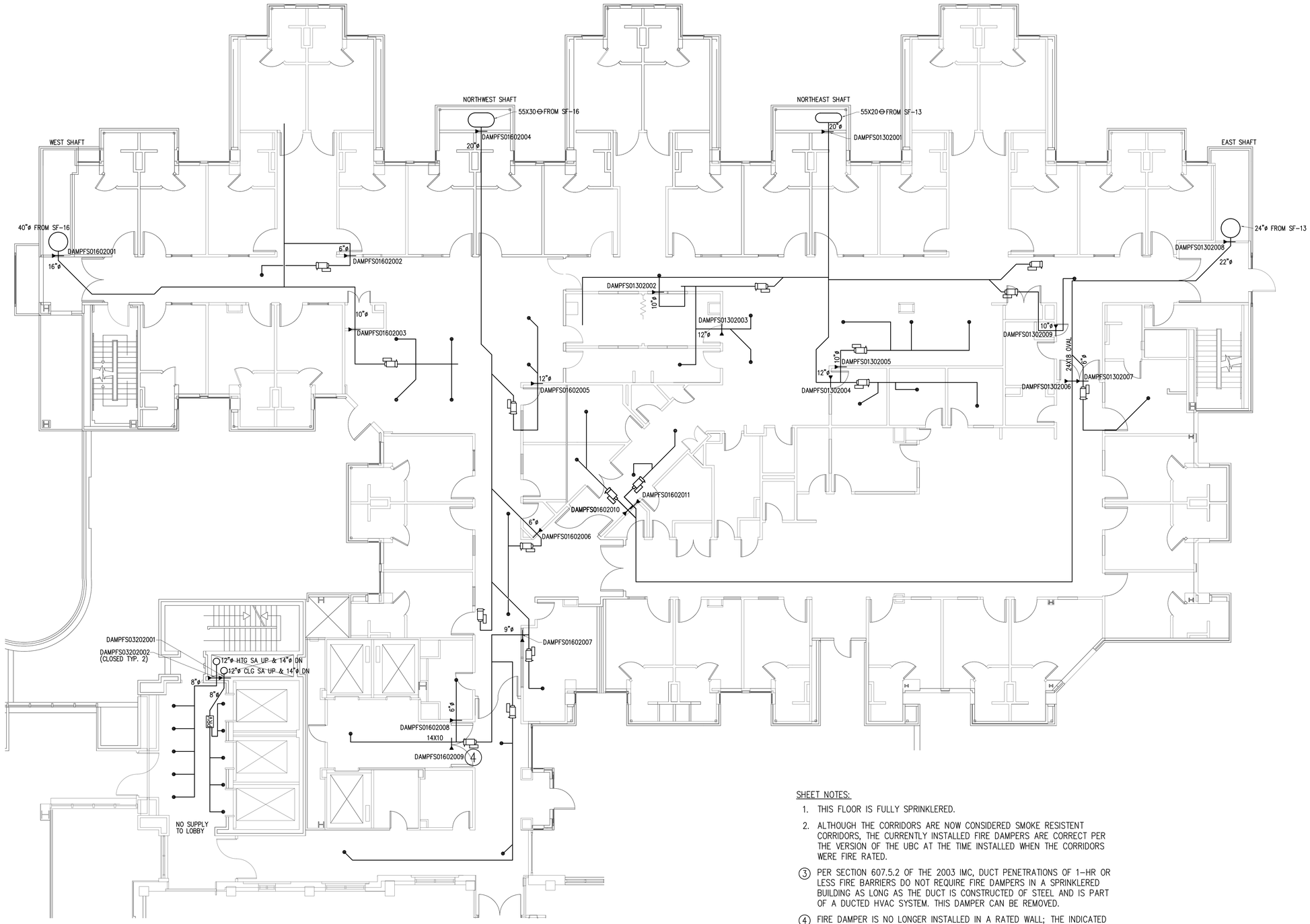


SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.
2. PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.
3. FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.
4. SWEDISH LIFE SAFETY PLAN DOESN'T SHOW THIS WALL AS BEING RATED. THIS NEEDS TO BE REASSESSED PRIOR TO MAKING ANY DETERMINATIONS ON THIS DAMPER.

EAST WING 1ST FLOOR EXHAUST/RETURN AIR DIAGRAM

NORTH



SHEET NOTES:

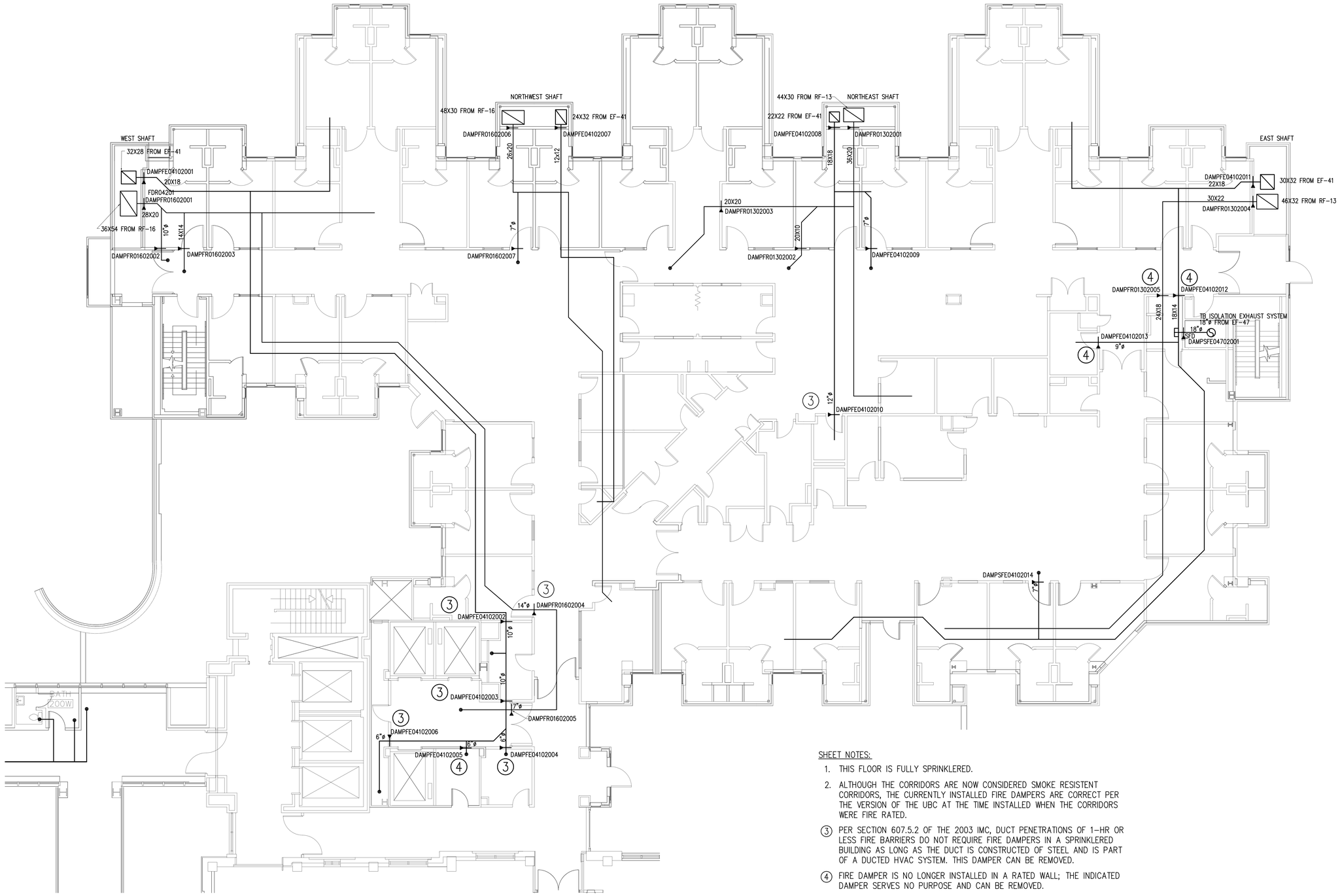
1. THIS FLOOR IS FULLY SPRINKLERED.
2. ALTHOUGH THE CORRIDORS ARE NOW CONSIDERED SMOKE RESISTENT CORRIDORS, THE CURRENTLY INSTALLED FIRE DAMPERS ARE CORRECT PER THE VERSION OF THE UBC AT THE TIME INSTALLED WHEN THE CORRIDORS WERE FIRE RATED.

(3) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

(4) FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.

EAST WING 2ND FLOOR SUPPLY AIR DIAGRAM

NORTH



SHEET NOTES:

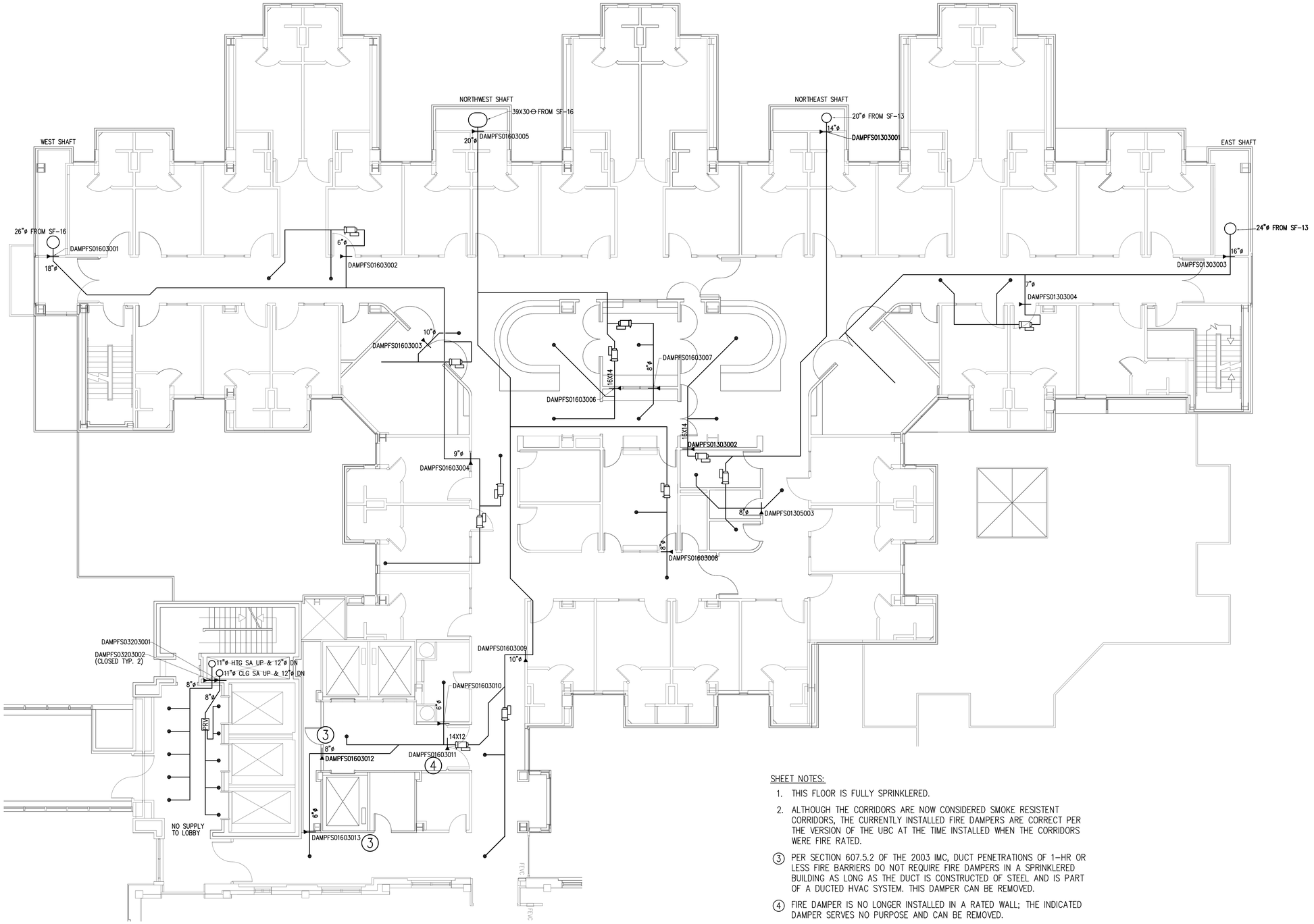
1. THIS FLOOR IS FULLY SPRINKLERED.
2. ALTHOUGH THE CORRIDORS ARE NOW CONSIDERED SMOKE RESISTENT CORRIDORS, THE CURRENTLY INSTALLED FIRE DAMPERS ARE CORRECT PER THE VERSION OF THE UBC AT THE TIME INSTALLED WHEN THE CORRIDORS WERE FIRE RATED.

(3) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

(4) FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.

EAST WING 2ND FLOOR EXHAUST/RETURN AIR DIAGRAM

NORTH



SHEET NOTES:

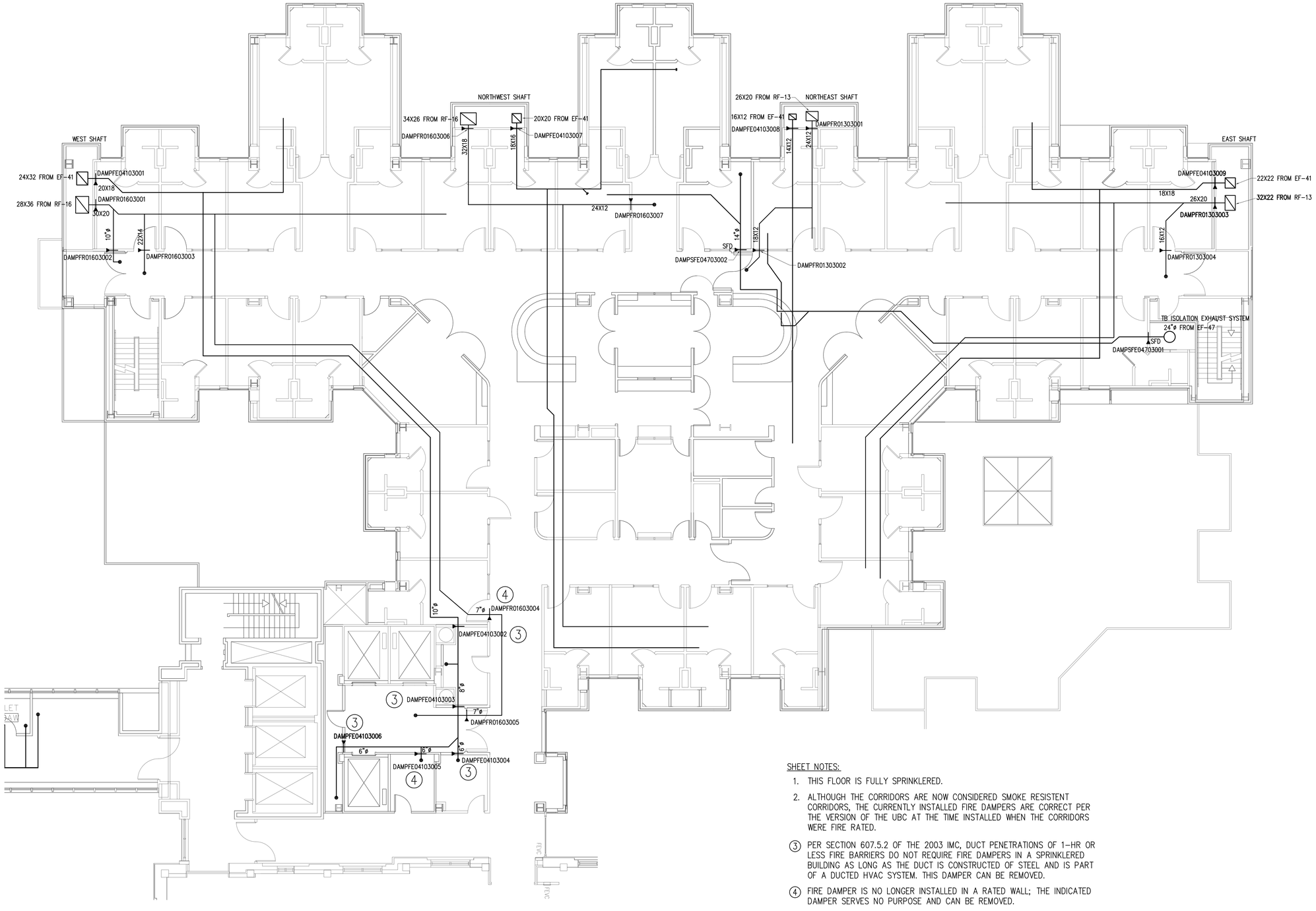
1. THIS FLOOR IS FULLY SPRINKLERED.
2. ALTHOUGH THE CORRIDORS ARE NOW CONSIDERED SMOKE RESISTENT CORRIDORS, THE CURRENTLY INSTALLED FIRE DAMPERS ARE CORRECT PER THE VERSION OF THE UBC AT THE TIME INSTALLED WHEN THE CORRIDORS WERE FIRE RATED.

(3) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

(4) FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.

EAST WING 3RD FLOOR SUPPLY AIR DIAGRAM

NORTH



SHEET NOTES:

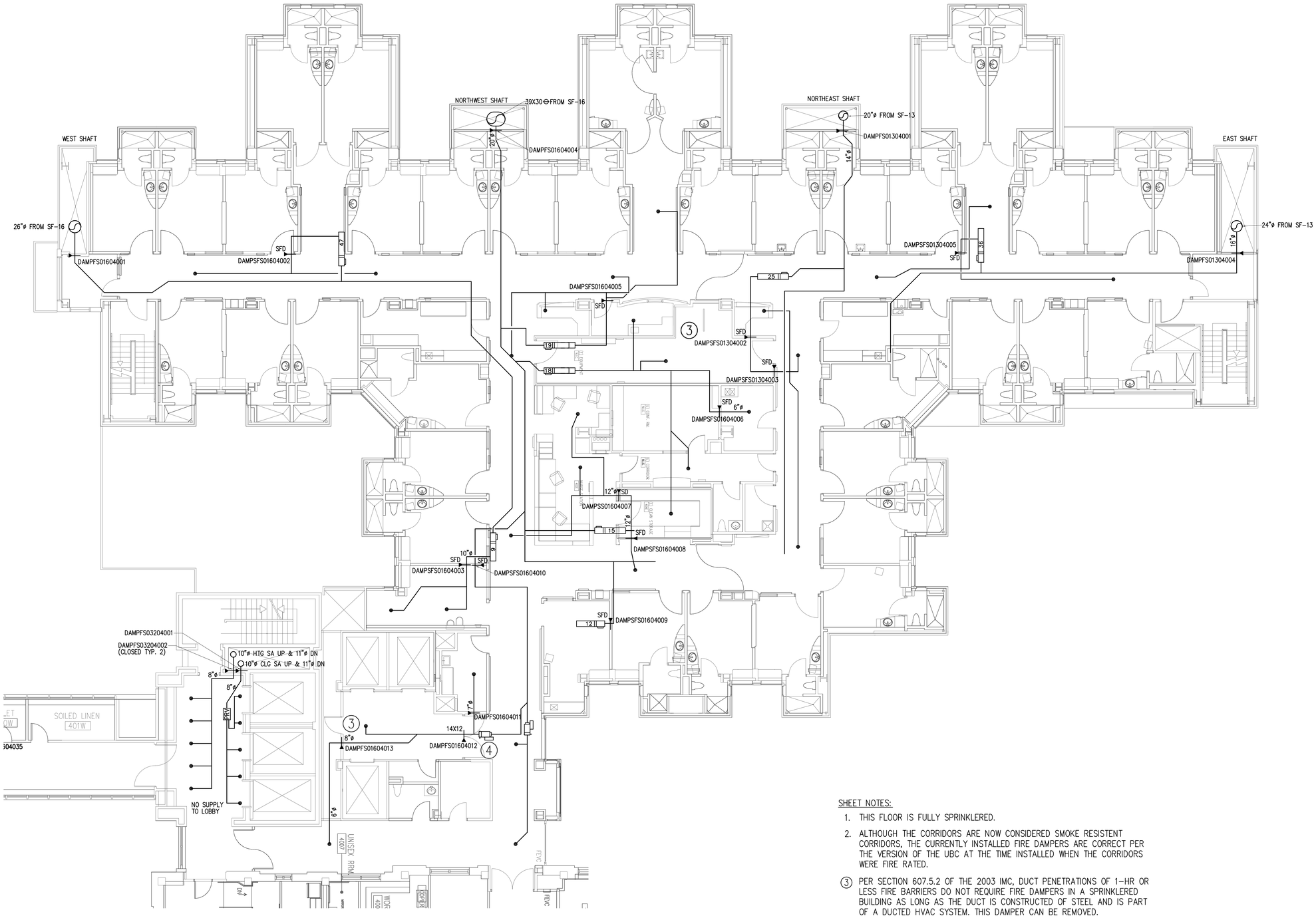
1. THIS FLOOR IS FULLY SPRINKLERED.
2. ALTHOUGH THE CORRIDORS ARE NOW CONSIDERED SMOKE RESISTENT CORRIDORS, THE CURRENTLY INSTALLED FIRE DAMPERS ARE CORRECT PER THE VERSION OF THE UBC AT THE TIME INSTALLED WHEN THE CORRIDORS WERE FIRE RATED.

(3) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

(4) FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.

EAST WING 3RD FLOOR EXHAUST/RETURN AIR DIAGRAM

NORTH



SHEET NOTES:

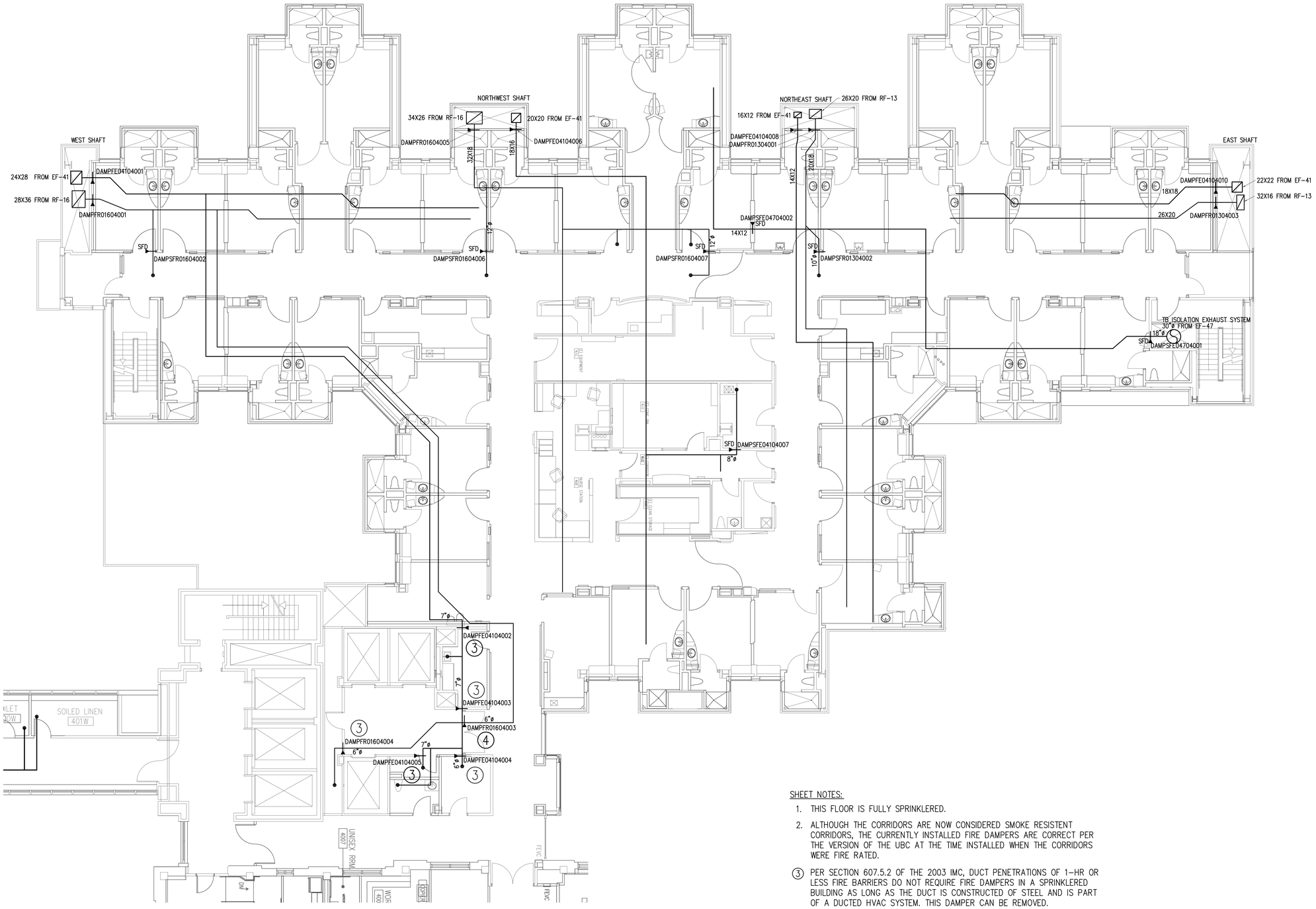
1. THIS FLOOR IS FULLY SPRINKLERED.
2. ALTHOUGH THE CORRIDORS ARE NOW CONSIDERED SMOKE RESISTENT CORRIDORS, THE CURRENTLY INSTALLED FIRE DAMPERS ARE CORRECT PER THE VERSION OF THE UBC AT THE TIME INSTALLED WHEN THE CORRIDORS WERE FIRE RATED.

(3) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

(4) FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.

EAST WING 4TH FLOOR SUPPLY AIR DIAGRAM

NORTH



SHEET NOTES:

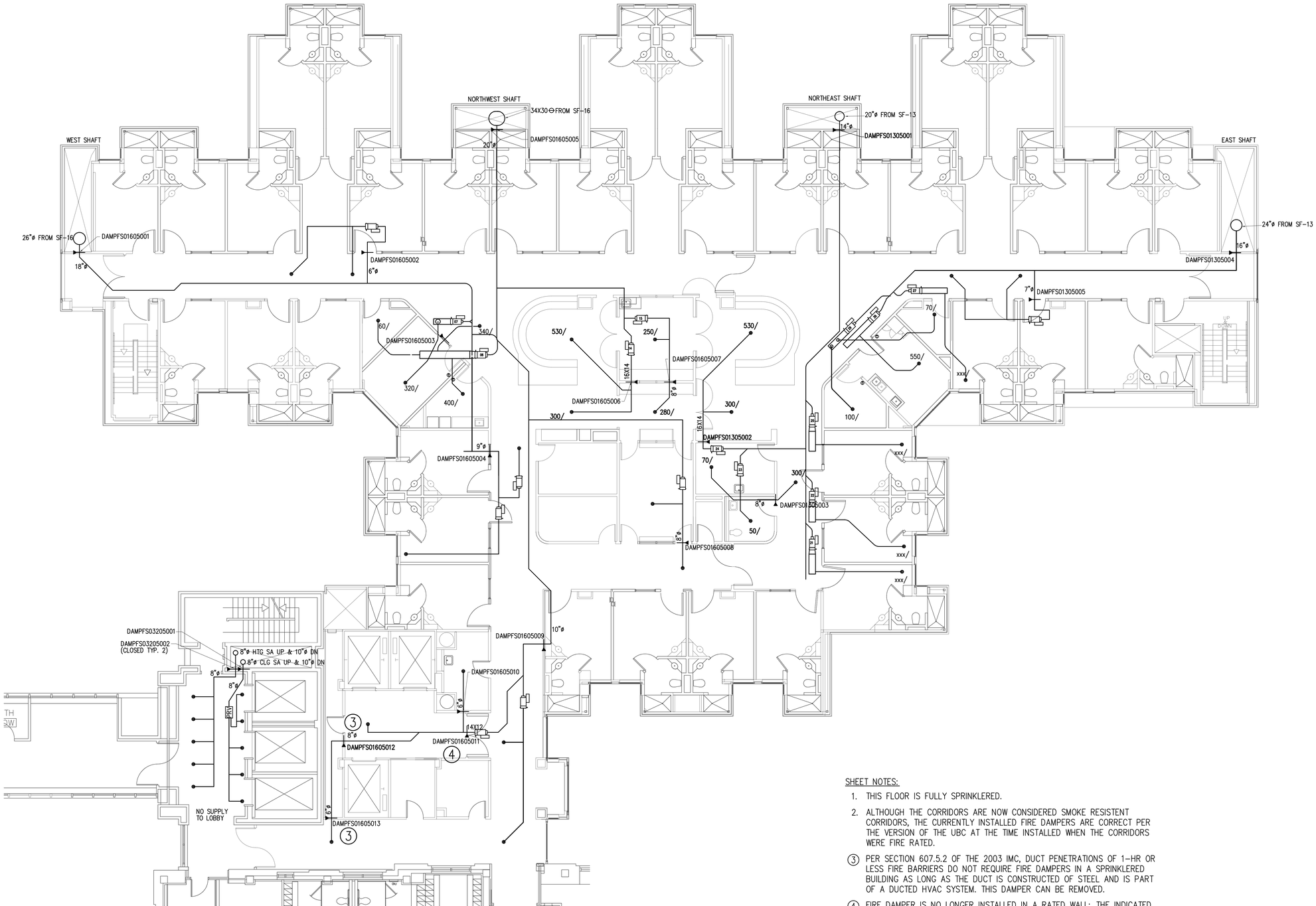
1. THIS FLOOR IS FULLY SPRINKLERED.
2. ALTHOUGH THE CORRIDORS ARE NOW CONSIDERED SMOKE RESISTENT CORRIDORS, THE CURRENTLY INSTALLED FIRE DAMPERS ARE CORRECT PER THE VERSION OF THE UBC AT THE TIME INSTALLED WHEN THE CORRIDORS WERE FIRE RATED.

(3) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

(4) FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.

EAST WING 4TH FLOOR EXHAUST/RETURN AIR DIAGRAM

NORTH



SHEET NOTES:

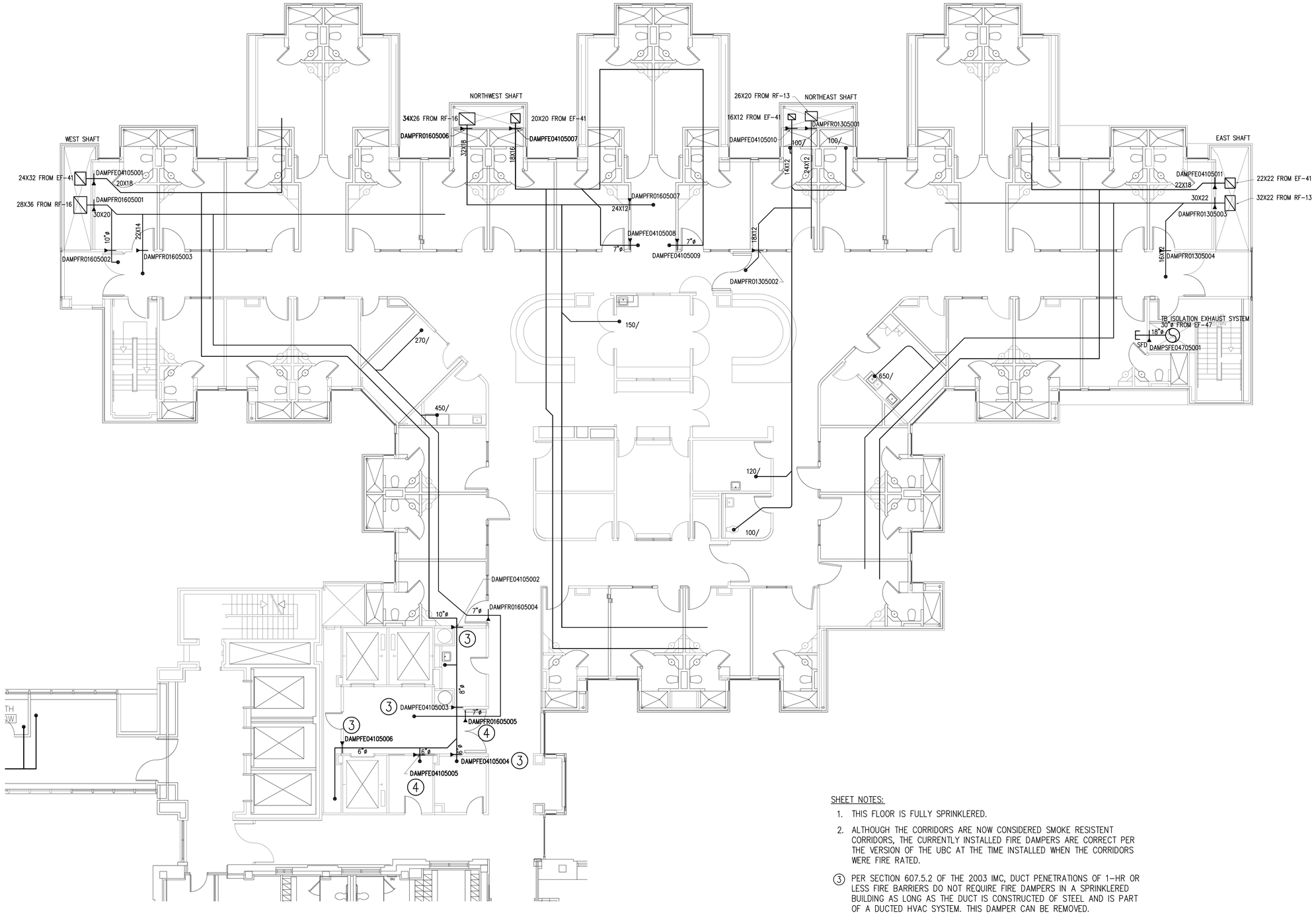
1. THIS FLOOR IS FULLY SPRINKLERED.
2. ALTHOUGH THE CORRIDORS ARE NOW CONSIDERED SMOKE RESISTENT CORRIDORS, THE CURRENTLY INSTALLED FIRE DAMPERS ARE CORRECT PER THE VERSION OF THE UBC AT THE TIME INSTALLED WHEN THE CORRIDORS WERE FIRE RATED.

(3) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

(4) FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.

EAST WING 5TH FLOOR SUPPLY AIR DIAGRAM

NORTH



SHEET NOTES:

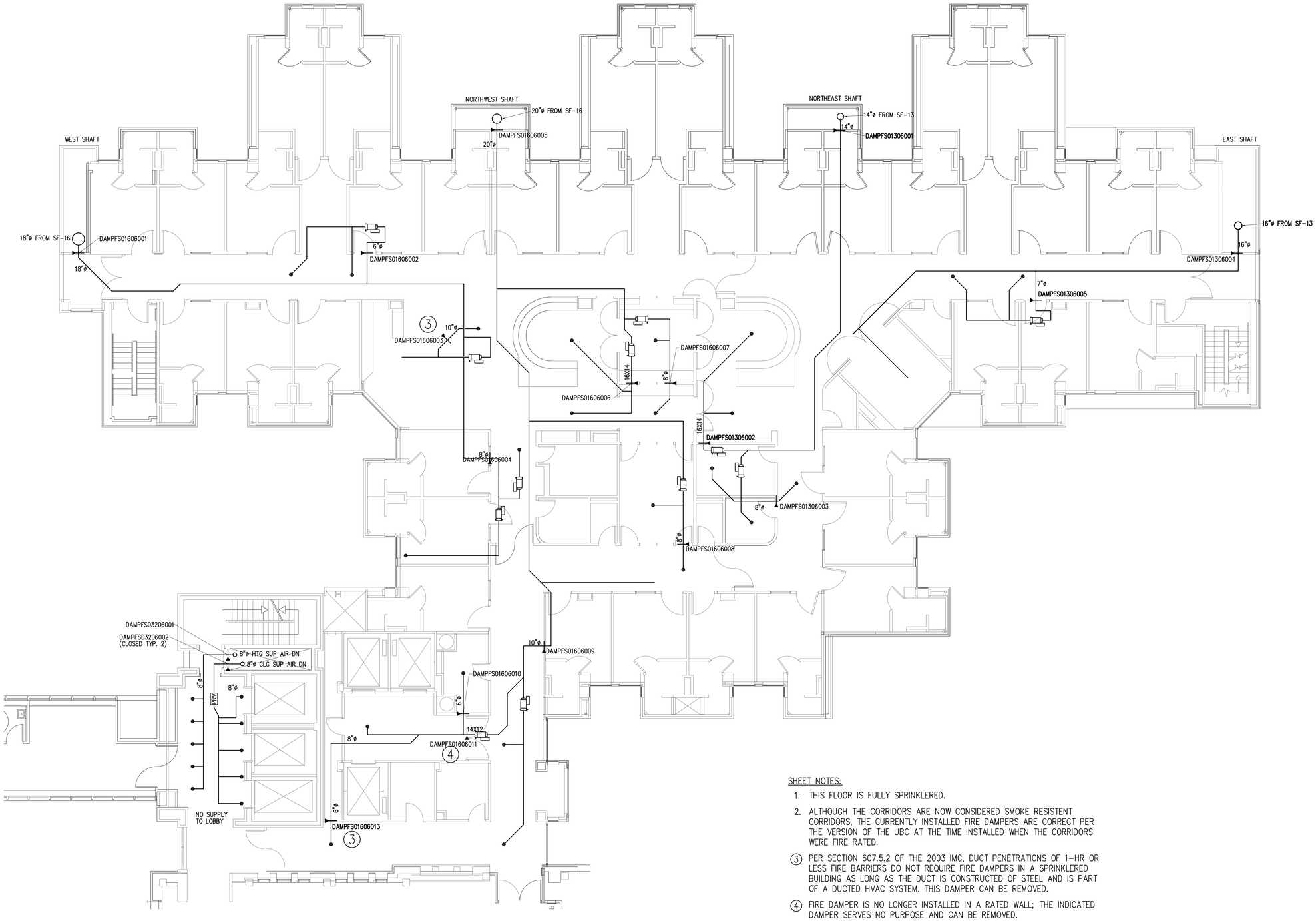
1. THIS FLOOR IS FULLY SPRINKLERED.
2. ALTHOUGH THE CORRIDORS ARE NOW CONSIDERED SMOKE RESISTENT CORRIDORS, THE CURRENTLY INSTALLED FIRE DAMPERS ARE CORRECT PER THE VERSION OF THE UBC AT THE TIME INSTALLED WHEN THE CORRIDORS WERE FIRE RATED.

(3) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

(4) FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.

EAST WING 5TH FLOOR EXHAUST/RETURN AIR DIAGRAM

NORTH



SHEET NOTES:

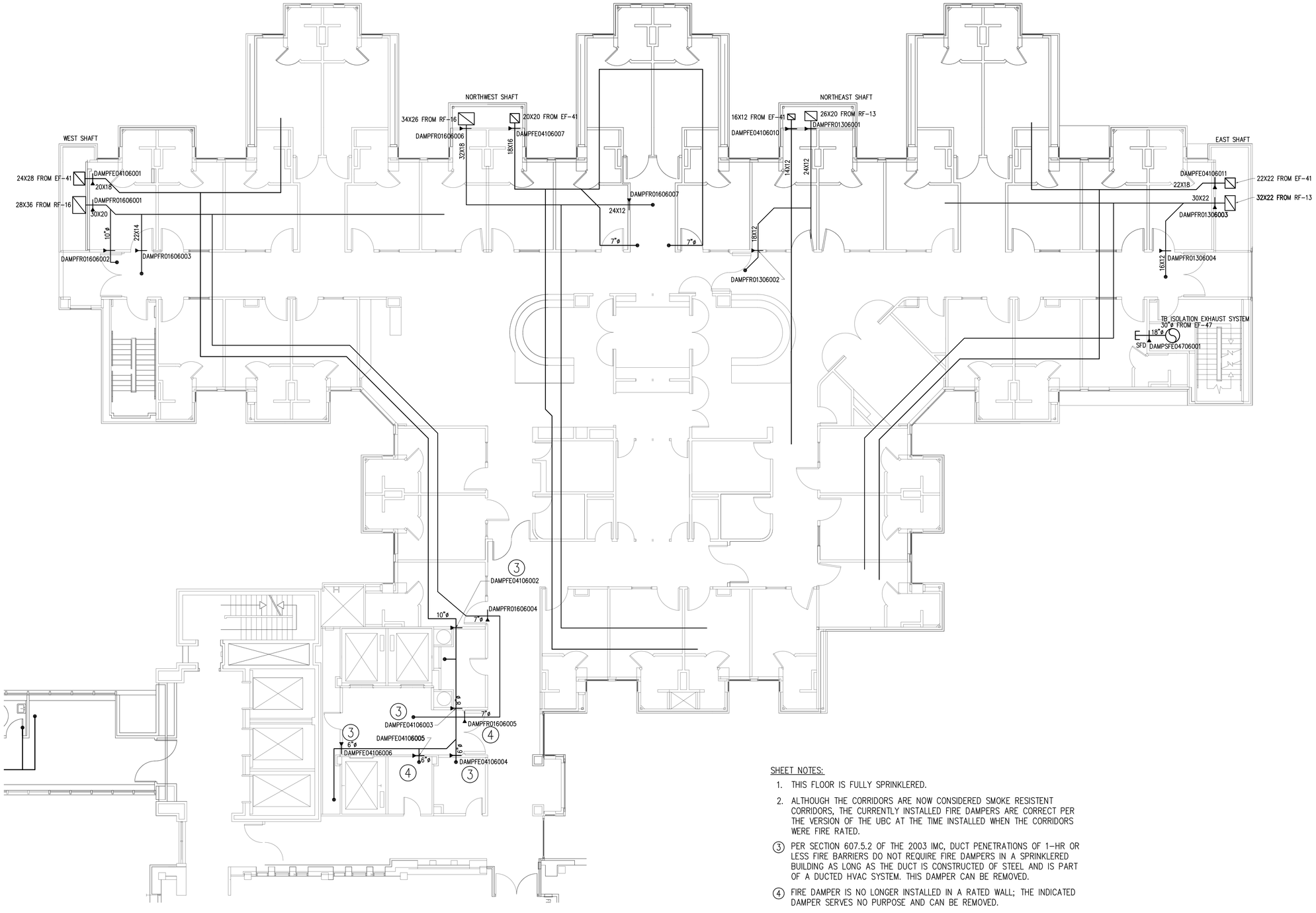
1. THIS FLOOR IS FULLY SPRINKLERED.
2. ALTHOUGH THE CORRIDORS ARE NOW CONSIDERED SMOKE RESISTENT CORRIDORS, THE CURRENTLY INSTALLED FIRE DAMPERS ARE CORRECT PER THE VERSION OF THE UBC AT THE TIME INSTALLED WHEN THE CORRIDORS WERE FIRE RATED.

(3) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

(4) FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.

EAST WING 6TH FLOOR SUPPLY AIR DIAGRAM

NORTH



SHEET NOTES:

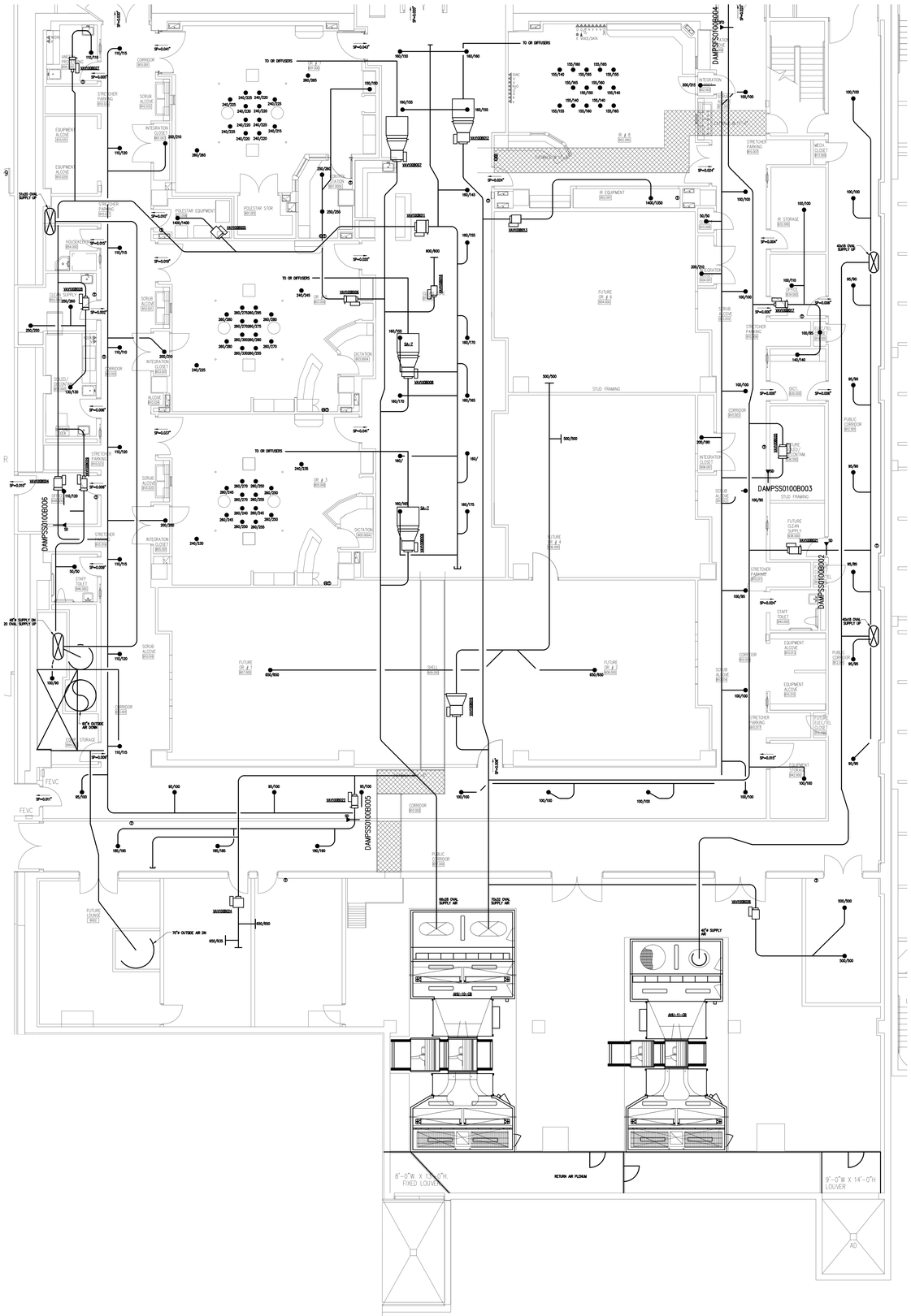
1. THIS FLOOR IS FULLY SPRINKLERED.
2. ALTHOUGH THE CORRIDORS ARE NOW CONSIDERED SMOKE RESISTENT CORRIDORS, THE CURRENTLY INSTALLED FIRE DAMPERS ARE CORRECT PER THE VERSION OF THE UBC AT THE TIME INSTALLED WHEN THE CORRIDORS WERE FIRE RATED.

(3) PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

(4) FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.

EAST WING 6TH FLOOR EXHAUST/RETURN AIR DIAGRAM

NORTH

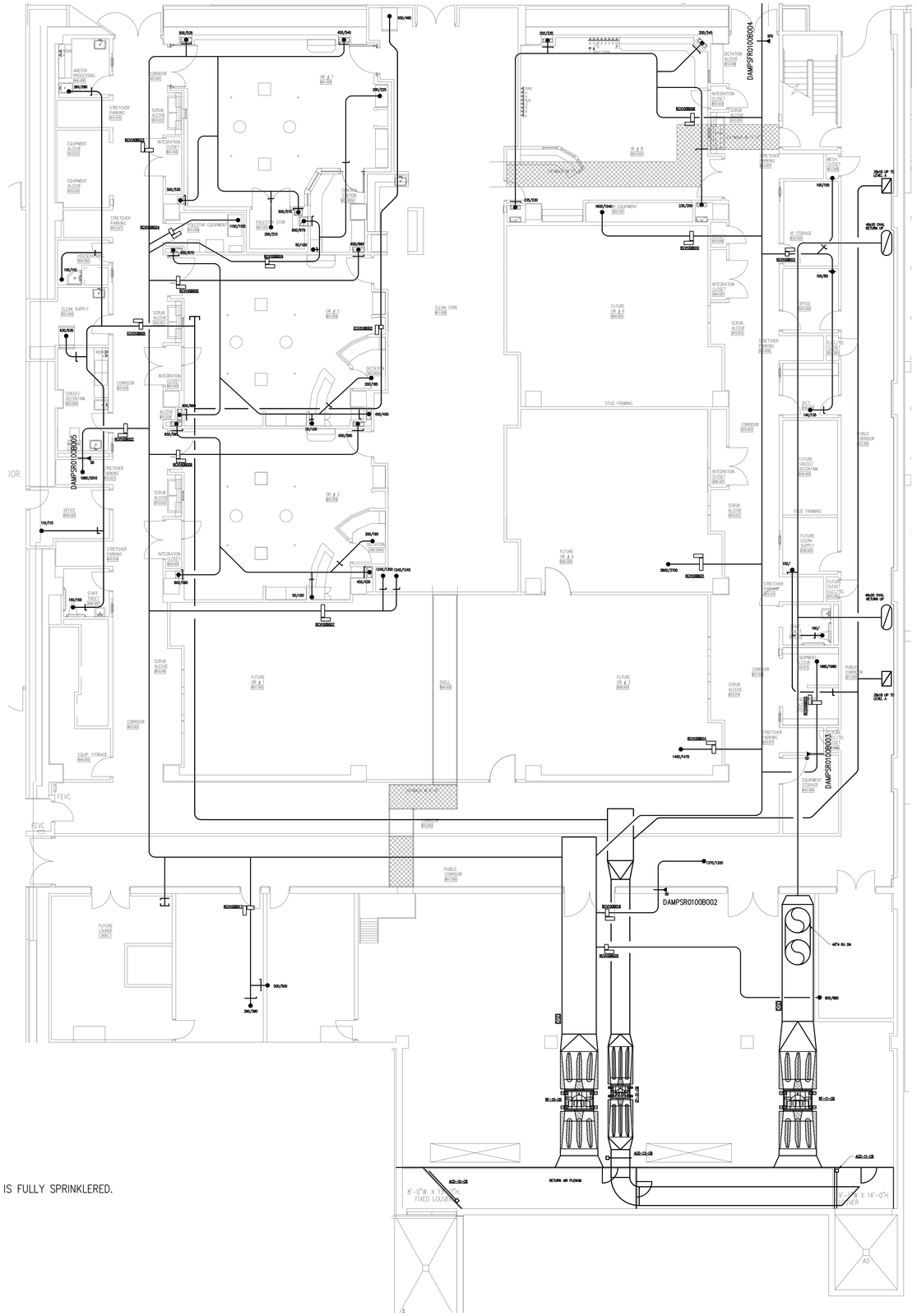


SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.

SOUTH BUILDING LEVEL B SUPPLY AIR DIAGRAM

NORTH

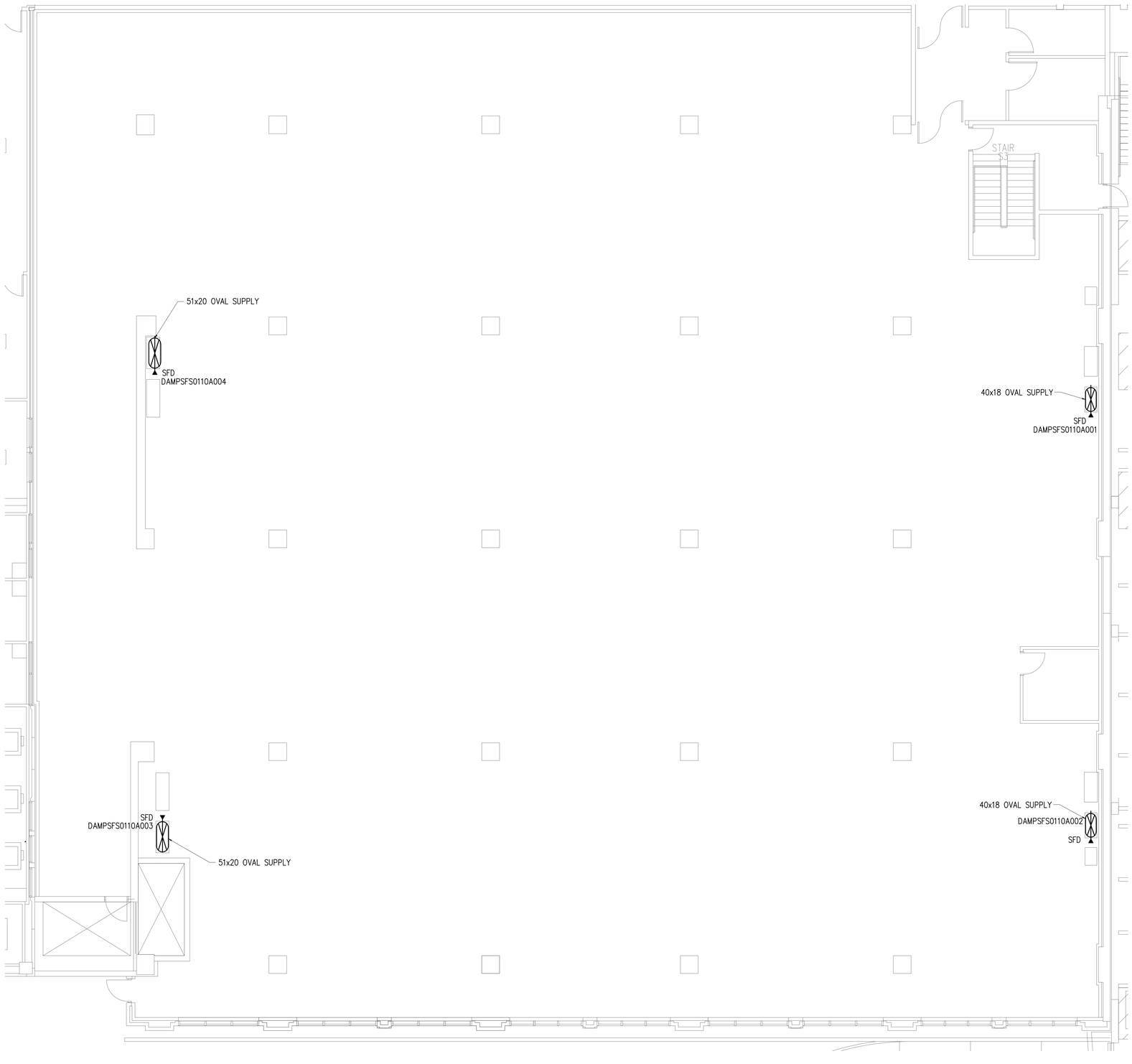


SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.

SOUTH BUILDING LEVEL B EXHAUST/RETURN AIR DIAGRAM

NORTH

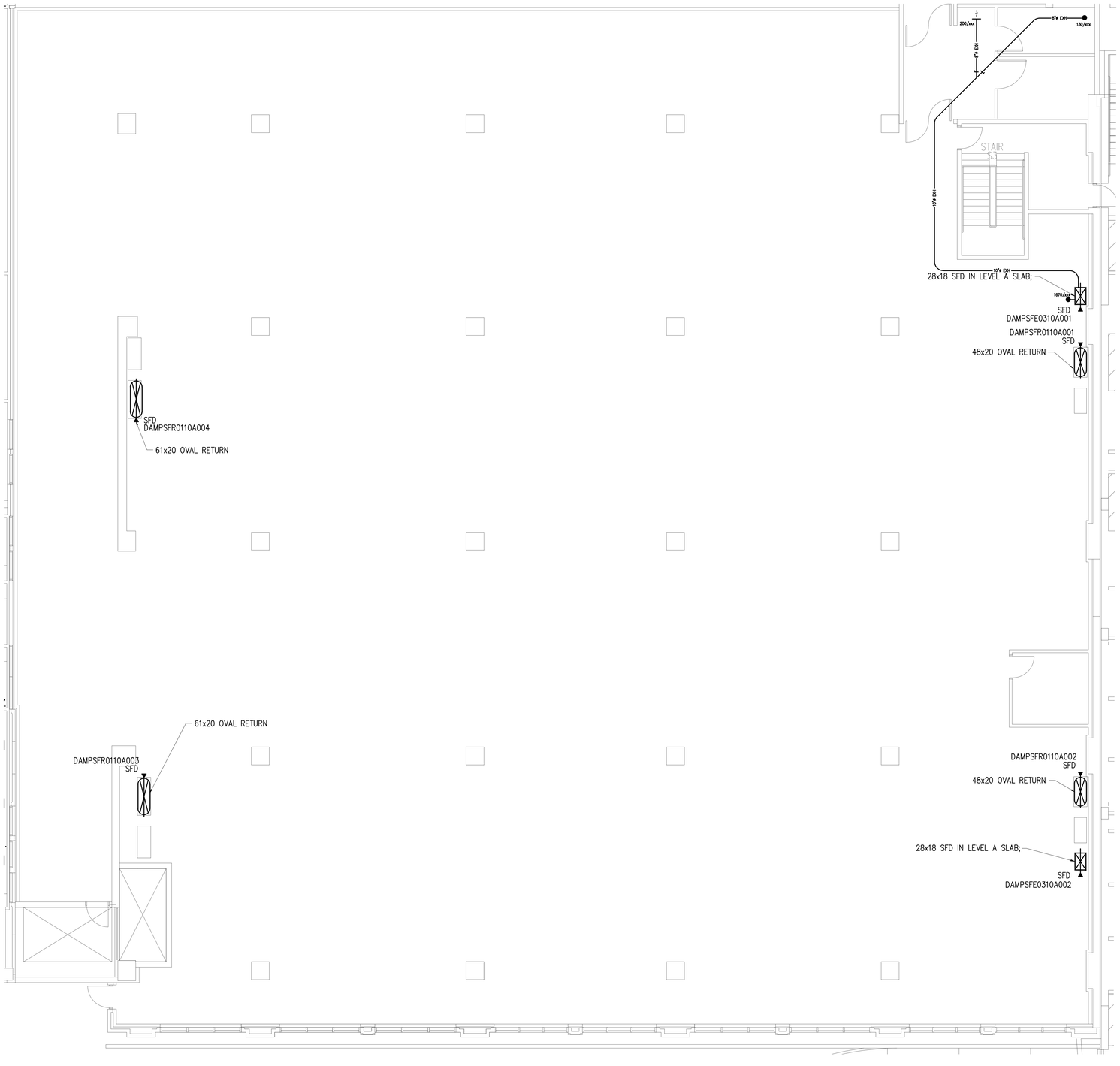


SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.

SOUTH BUILDING LEVEL A SUPPLY AIR DIAGRAM

NORTH

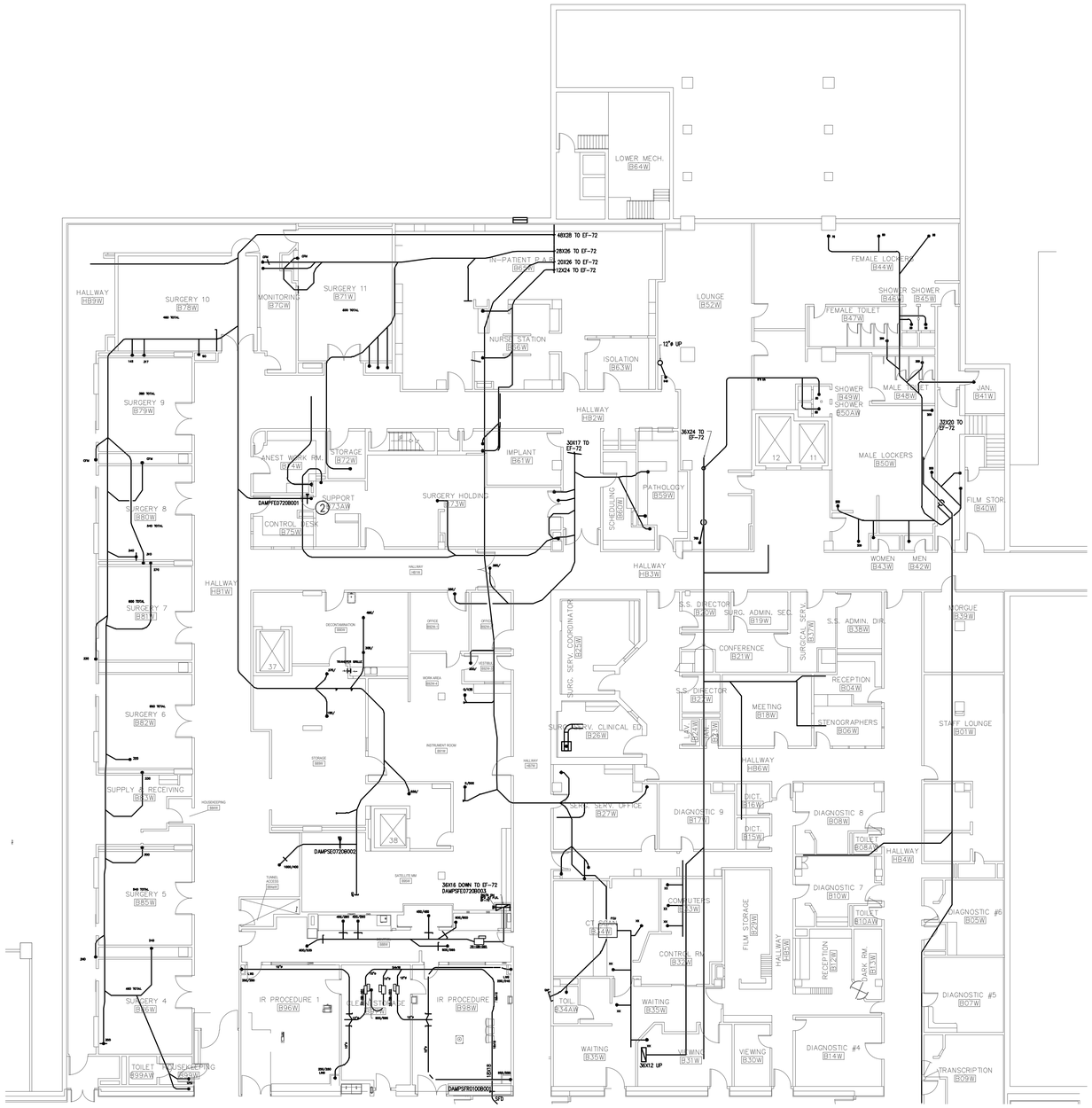


SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.

SOUTH BUILDING LEVEL A EXHAUST/RETURN AIR DIAGRAM

NORTH

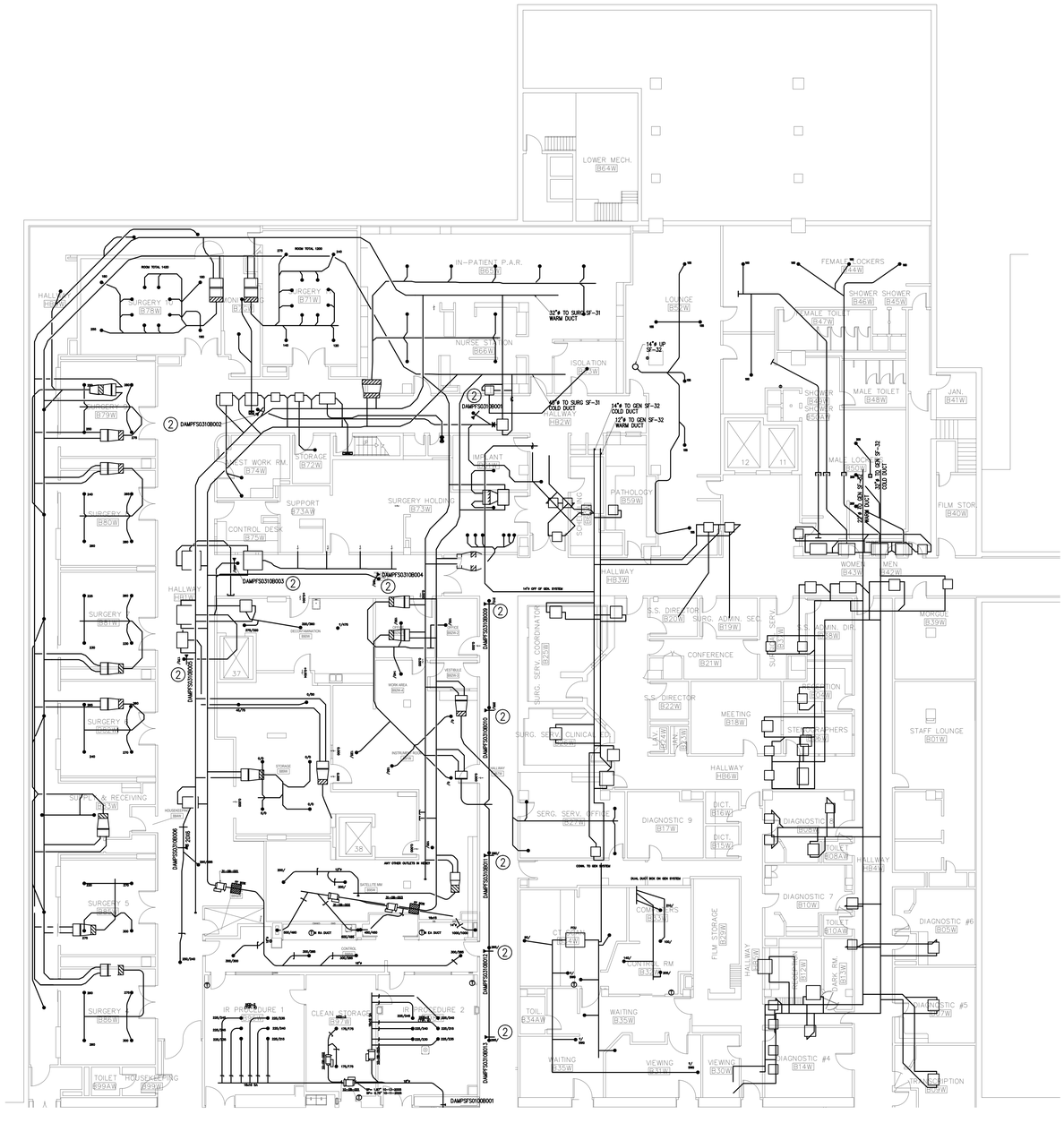


SHEET NOTES:

1. THIS FLOOR IS PARTIALLY SPRINKLERED.
2. CEILING IS NO LONGER RATED; FIRE DAMPERS AT CEILING GRILLES SERVE NO PURPOSE AND CAN BE REMOVED.

WEST TOWER LEVEL B EXHAUST/RETURN AIR DIAGRAM

NORTH



SHEET NOTES:

1. THIS FLOOR IS PARTIALLY SPRINKLERED.

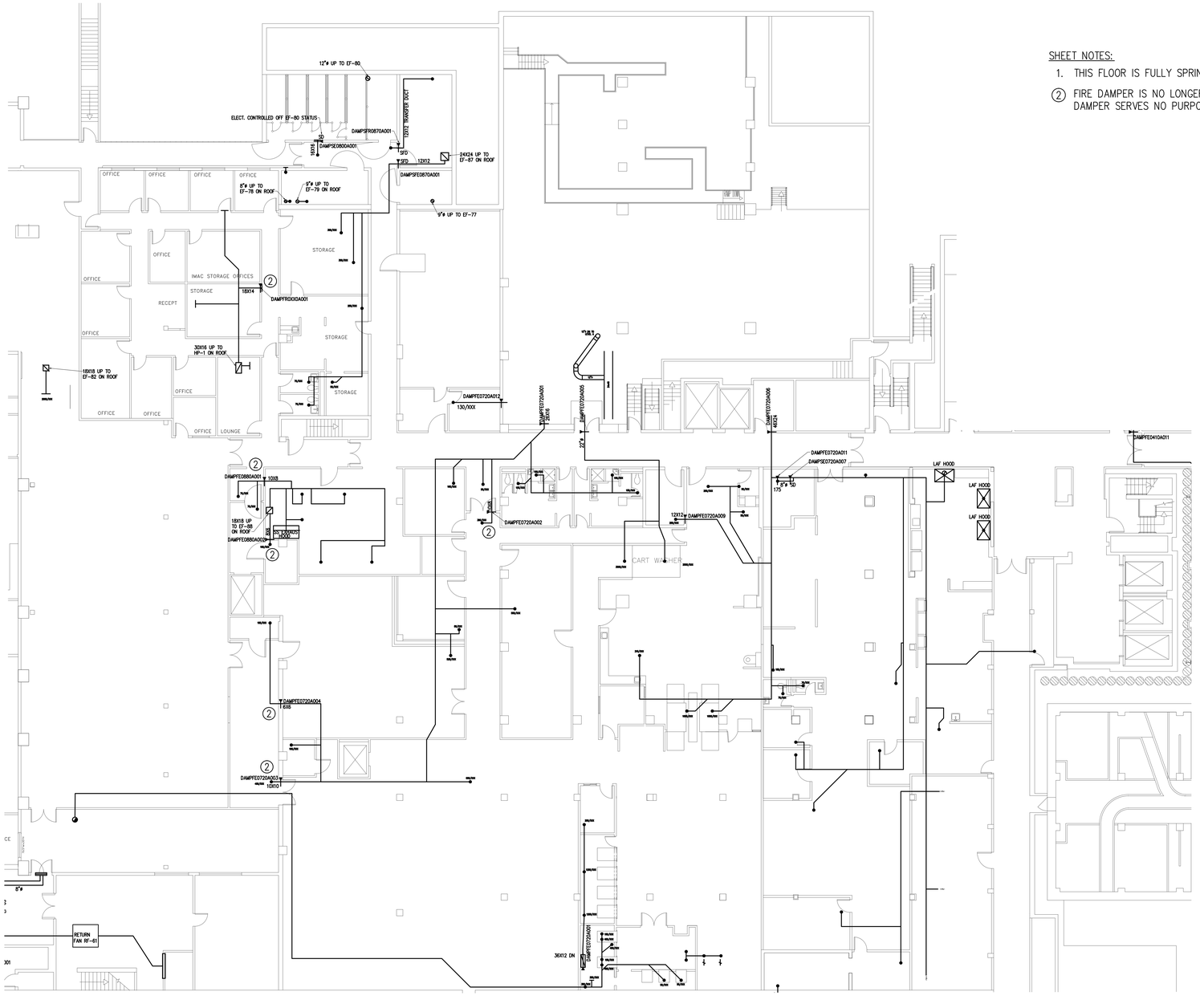
(2) CEILING IS NO LONGER RATED; FIRE DAMPERS AT CEILING DIFFUSERS SERVE NO PURPOSE AND CAN BE REMOVED.

WEST TOWER LEVEL B SUPPLY AIR DIAGRAM

NORTH

SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.
2. FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.



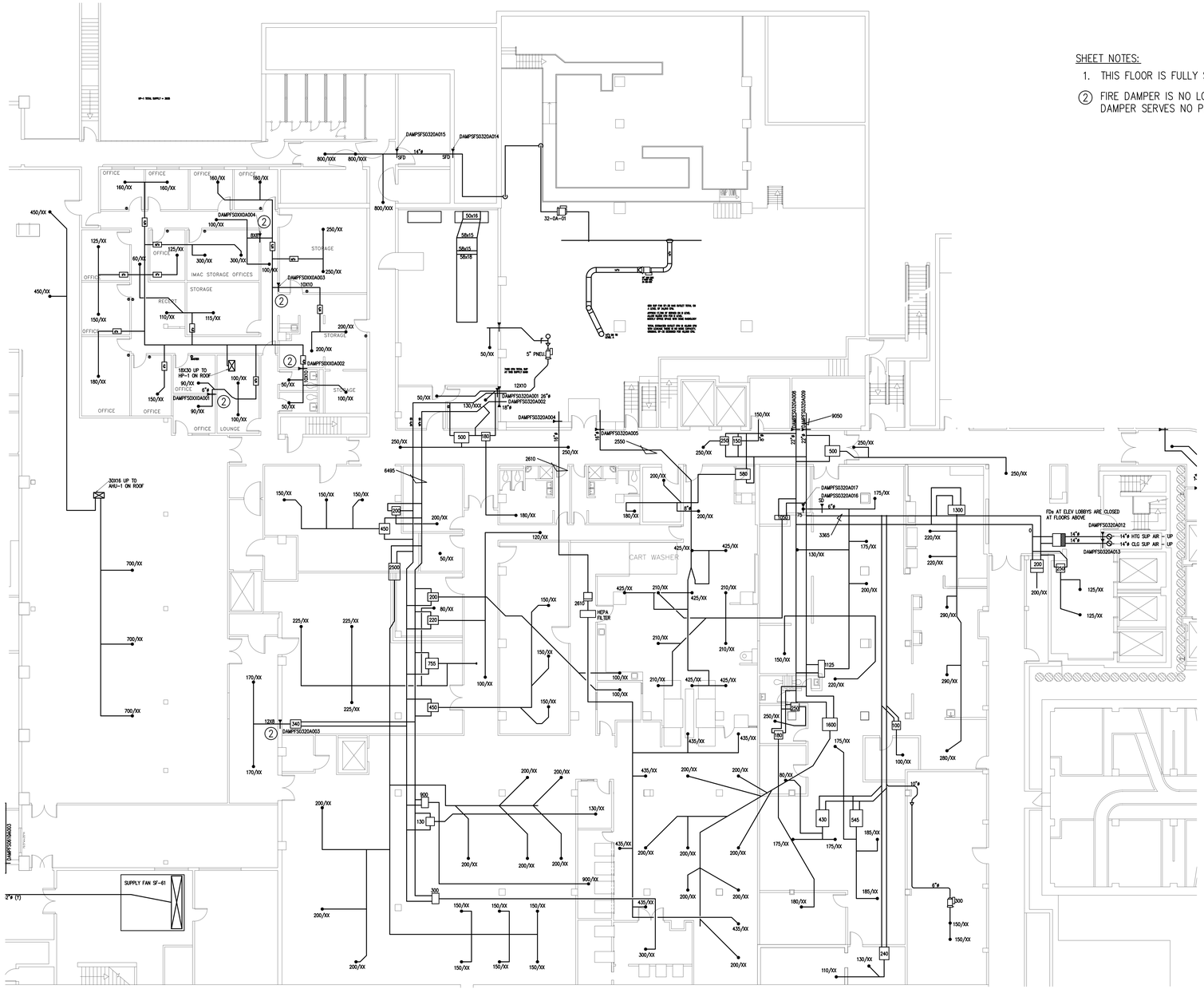
WEST TOWER LEVEL A EXHAUST/RETURN AIR DIAGRAM

NORTH

SHEET NOTES:

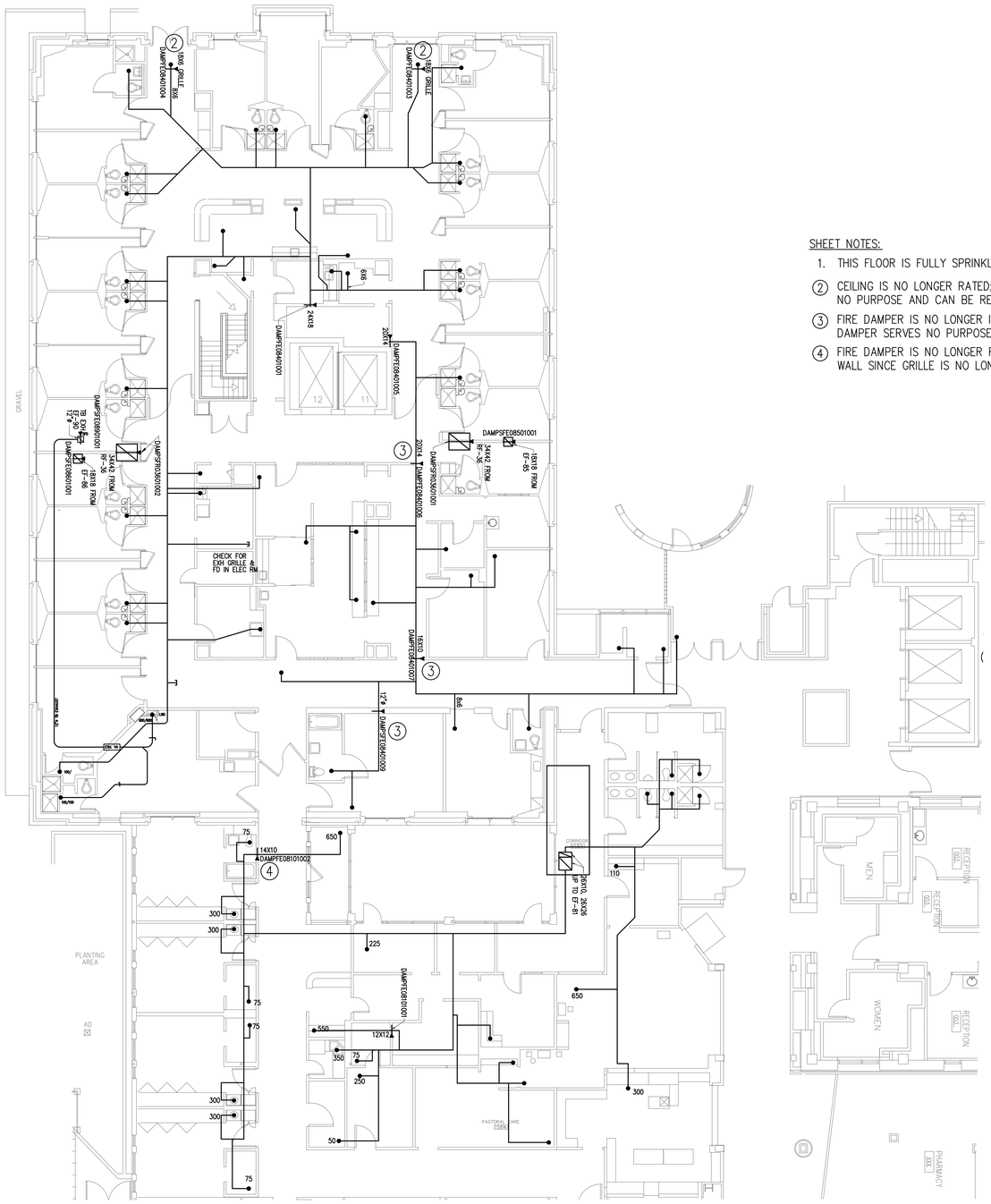
1. THIS FLOOR IS FULLY SPRINKLERED.

(2) FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.



WEST TOWER LEVEL A SUPPLY AIR DIAGRAM

NORTH

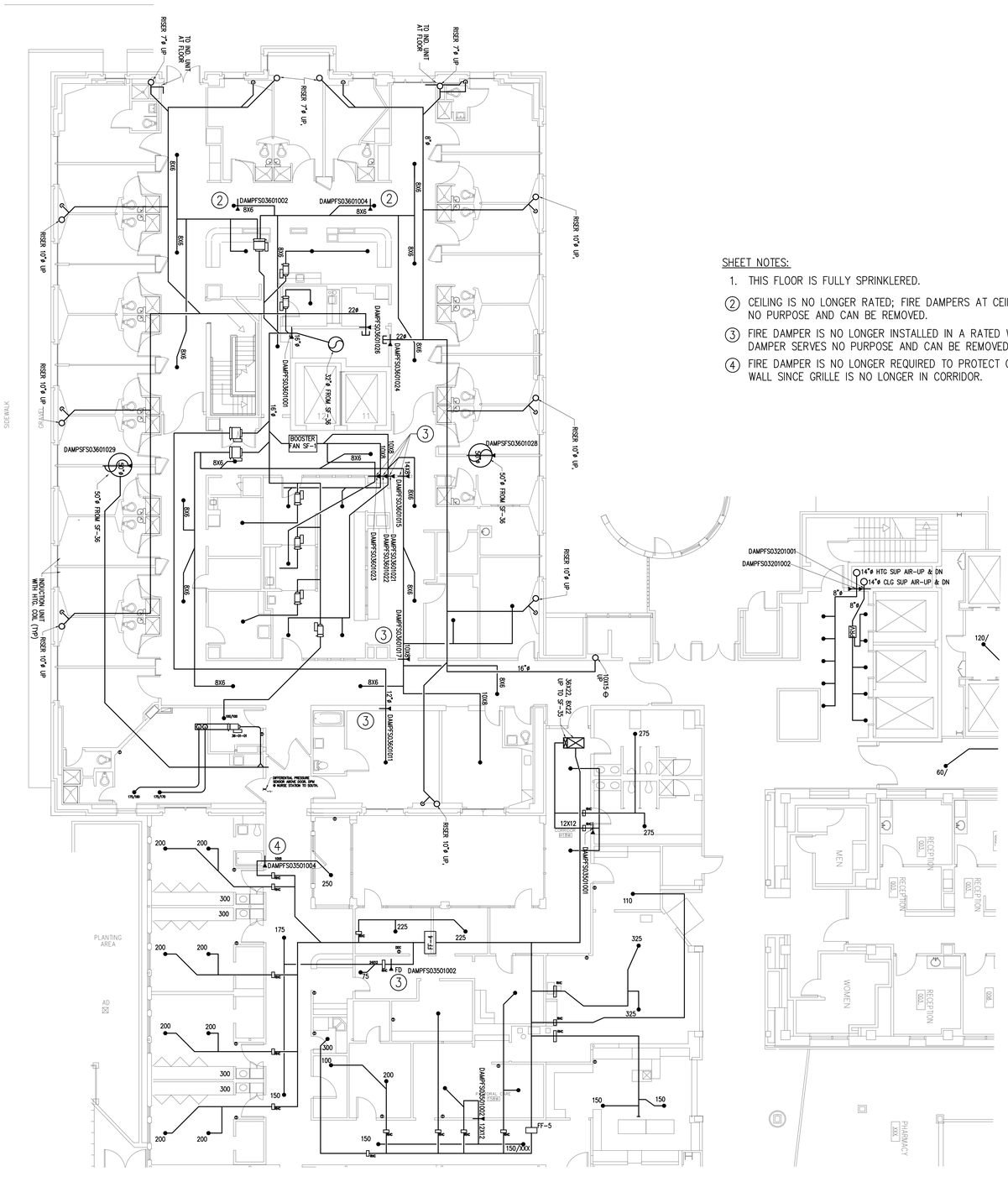


SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.
2. CEILING IS NO LONGER RATED; FIRE DAMPERS AT CEILING GRILLES SERVE NO PURPOSE AND CAN BE REMOVED.
3. FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.
4. FIRE DAMPER IS NO LONGER REQUIRED TO PROTECT ONE HOUR CORRIDOR WALL SINCE GRILLE IS NO LONGER IN CORRIDOR.

WEST TOWER 1ST FLOOR EXHAUST/RETURN AIR DIAGRAM

NORTH

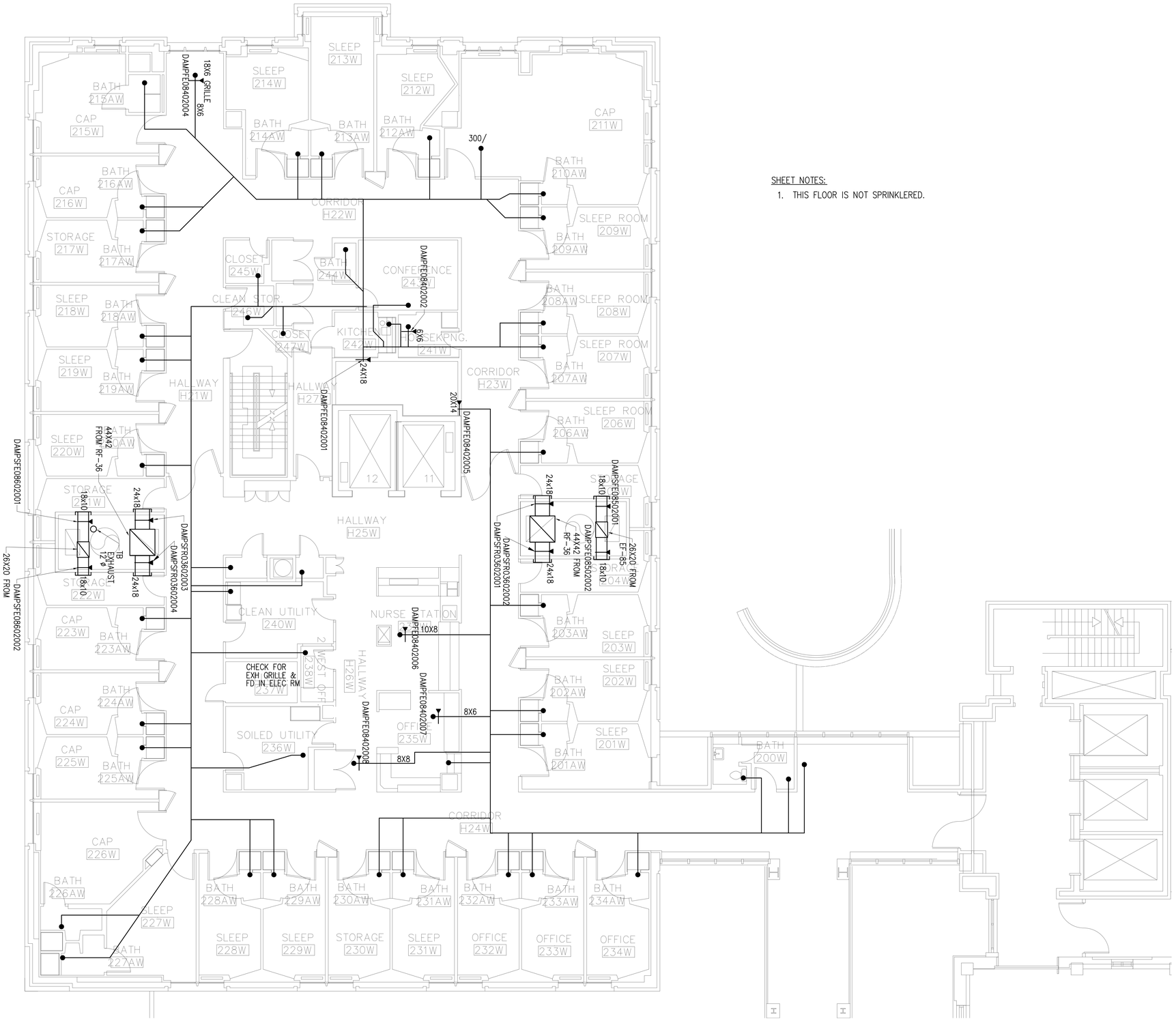


SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.
2. CEILING IS NO LONGER RATED; FIRE DAMPERS AT CEILING DIFFUSERS SERVE NO PURPOSE AND CAN BE REMOVED.
3. FIRE DAMPER IS NO LONGER INSTALLED IN A RATED WALL; THE INDICATED DAMPER SERVES NO PURPOSE AND CAN BE REMOVED.
4. FIRE DAMPER IS NO LONGER REQUIRED TO PROTECT ONE HOUR CORRIDOR WALL SINCE GRILLE IS NO LONGER IN CORRIDOR.

WEST TOWER 1ST FLOOR SUPPLY AIR DIAGRAM

NORTH

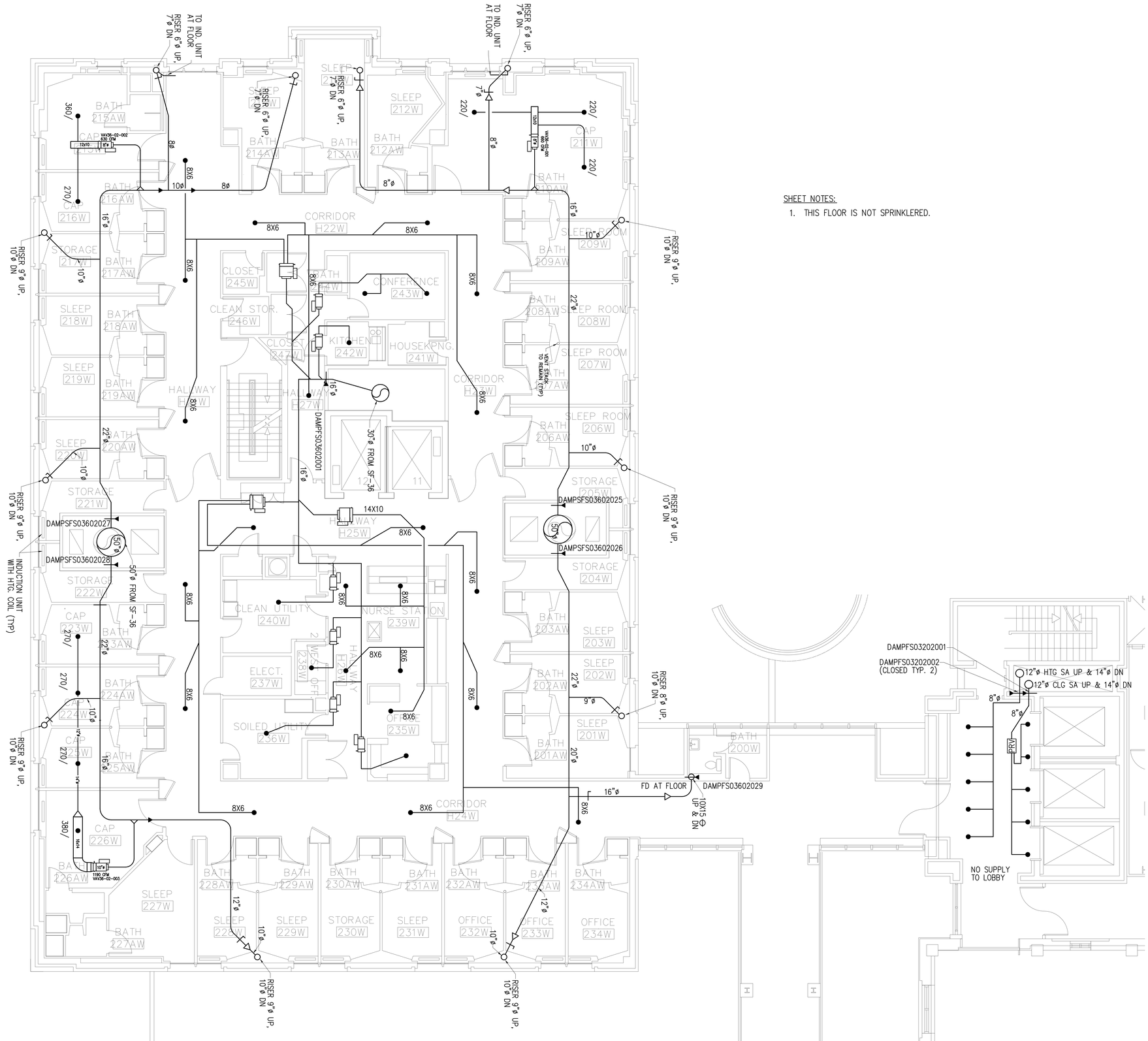


SHEET NOTES:

1. THIS FLOOR IS NOT SPRINKLERED.

WEST TOWER 2ND FLOOR EXHAUST/RETURN AIR DIAGRAM

NORTH

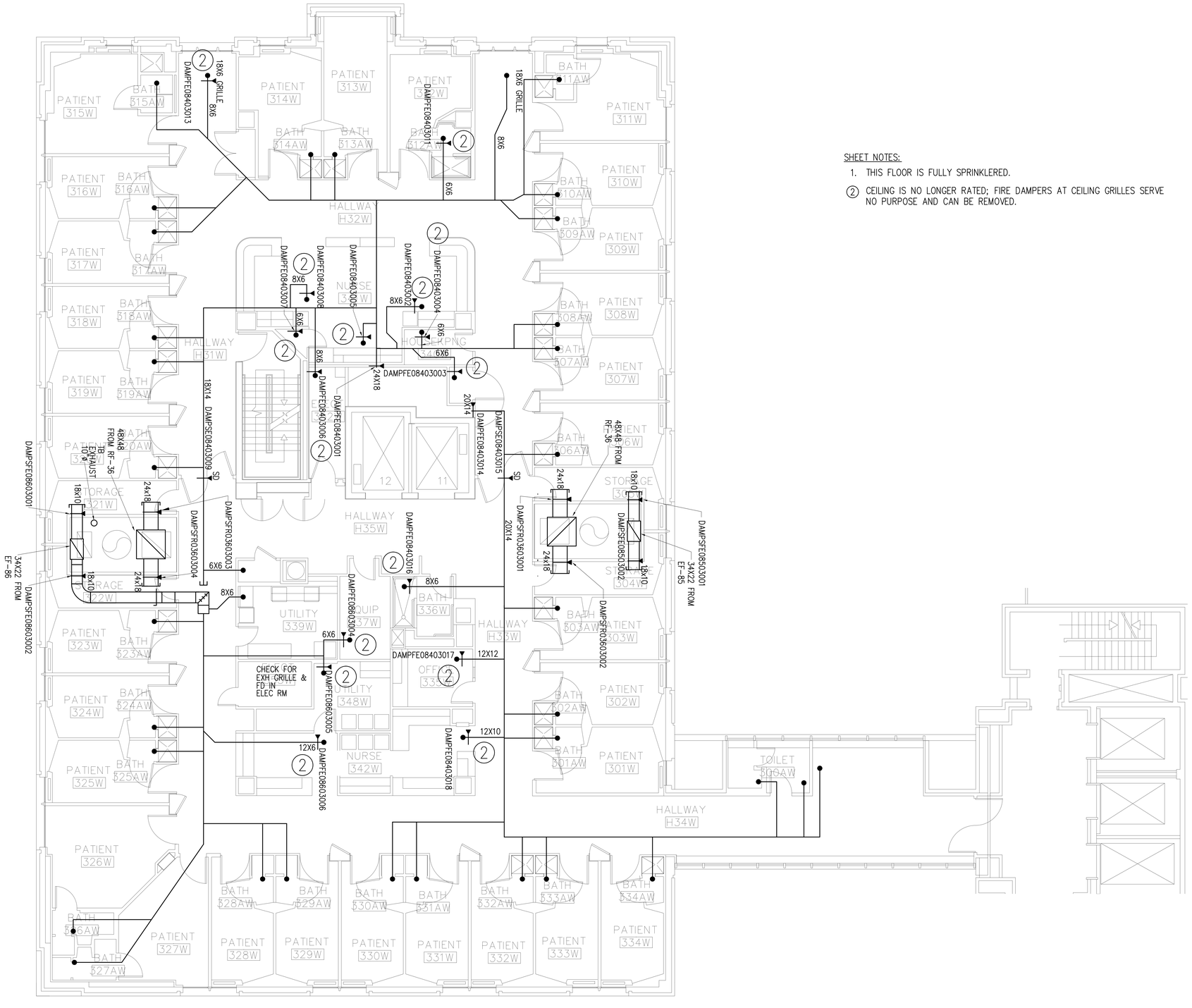


SHEET NOTES:

1. THIS FLOOR IS NOT SPRINKLERED.

WEST TOWER 2ND FLOOR SUPPLY AIR DIAGRAM

NORTH

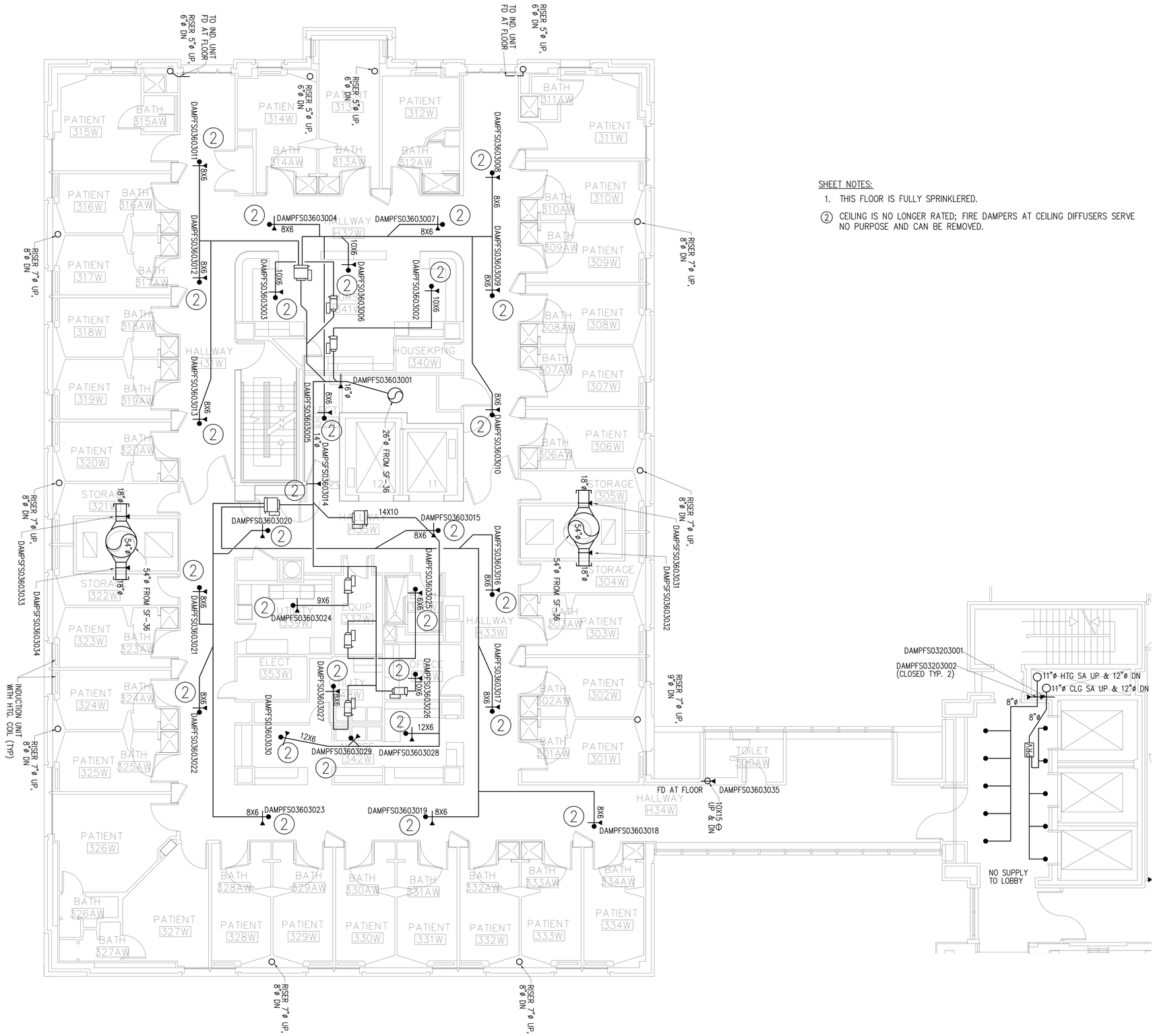


SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.
2. CEILING IS NO LONGER RATED; FIRE DAMPERS AT CEILING GRILLES SERVE NO PURPOSE AND CAN BE REMOVED.

WEST TOWER 3RD FLOOR EXHAUST/RETURN AIR DIAGRAM

NORTH

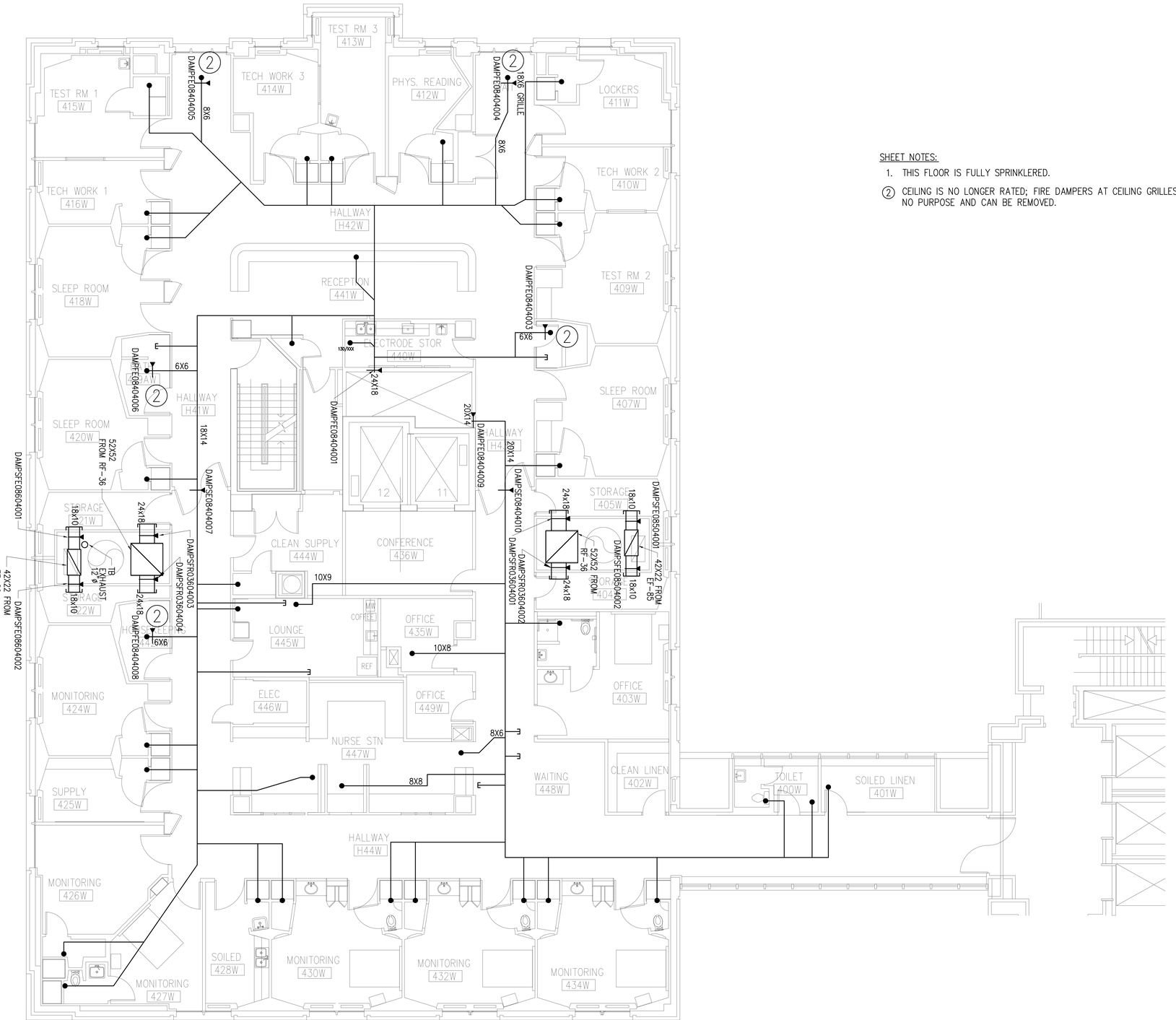


SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.
2. CEILING IS NO LONGER RATED; FIRE DAMPERS AT CEILING DIFFUSERS SERVE NO PURPOSE AND CAN BE REMOVED.

WEST TOWER 3RD FLOOR SUPPLY AIR DIAGRAM

NORTH



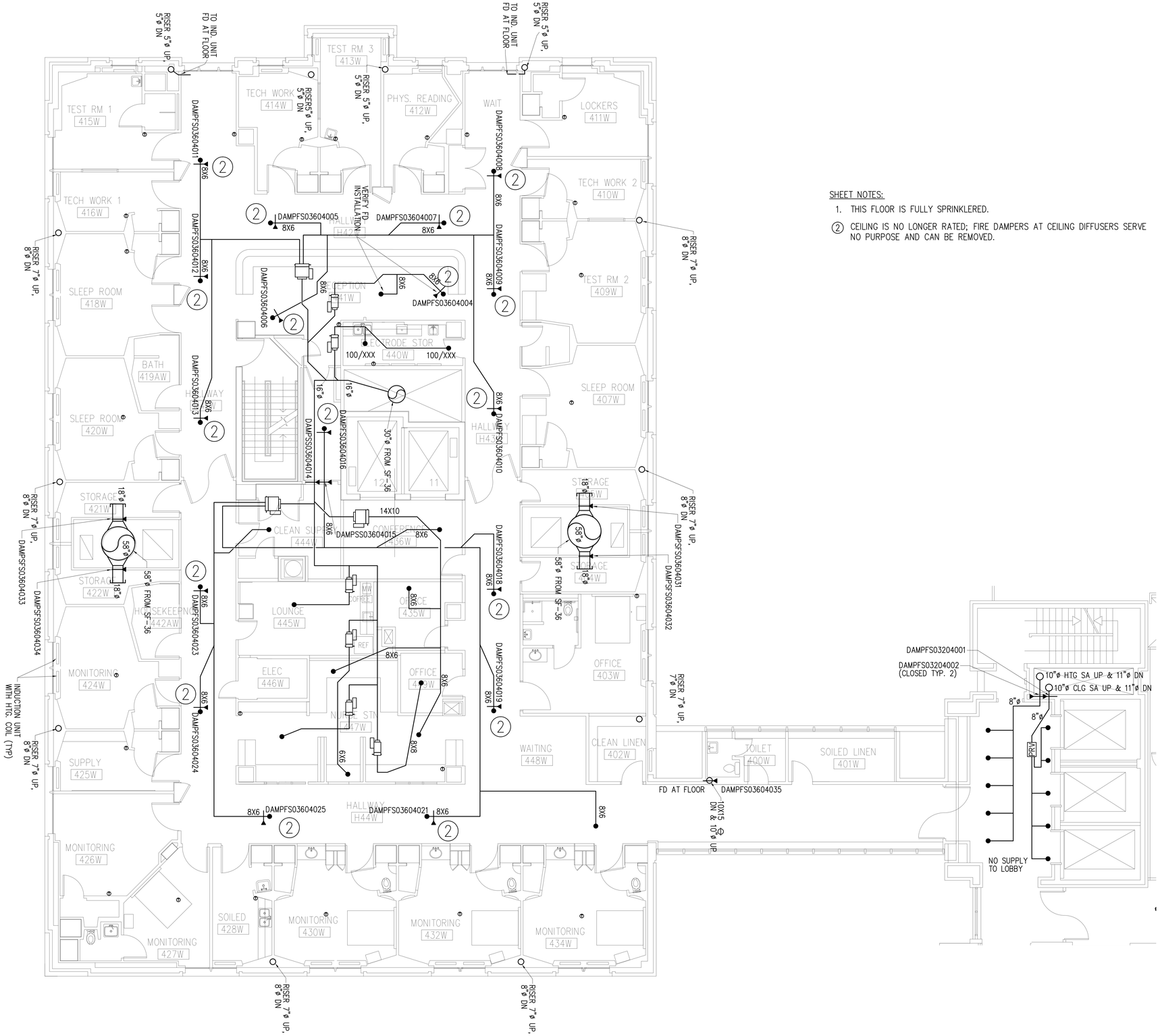
SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.

(2) CEILING IS NO LONGER RATED; FIRE DAMPERS AT CEILING GRILLES SERVE NO PURPOSE AND CAN BE REMOVED.

WEST TOWER 4TH FLOOR EXHAUST/RETURN AIR DIAGRAM

NORTH



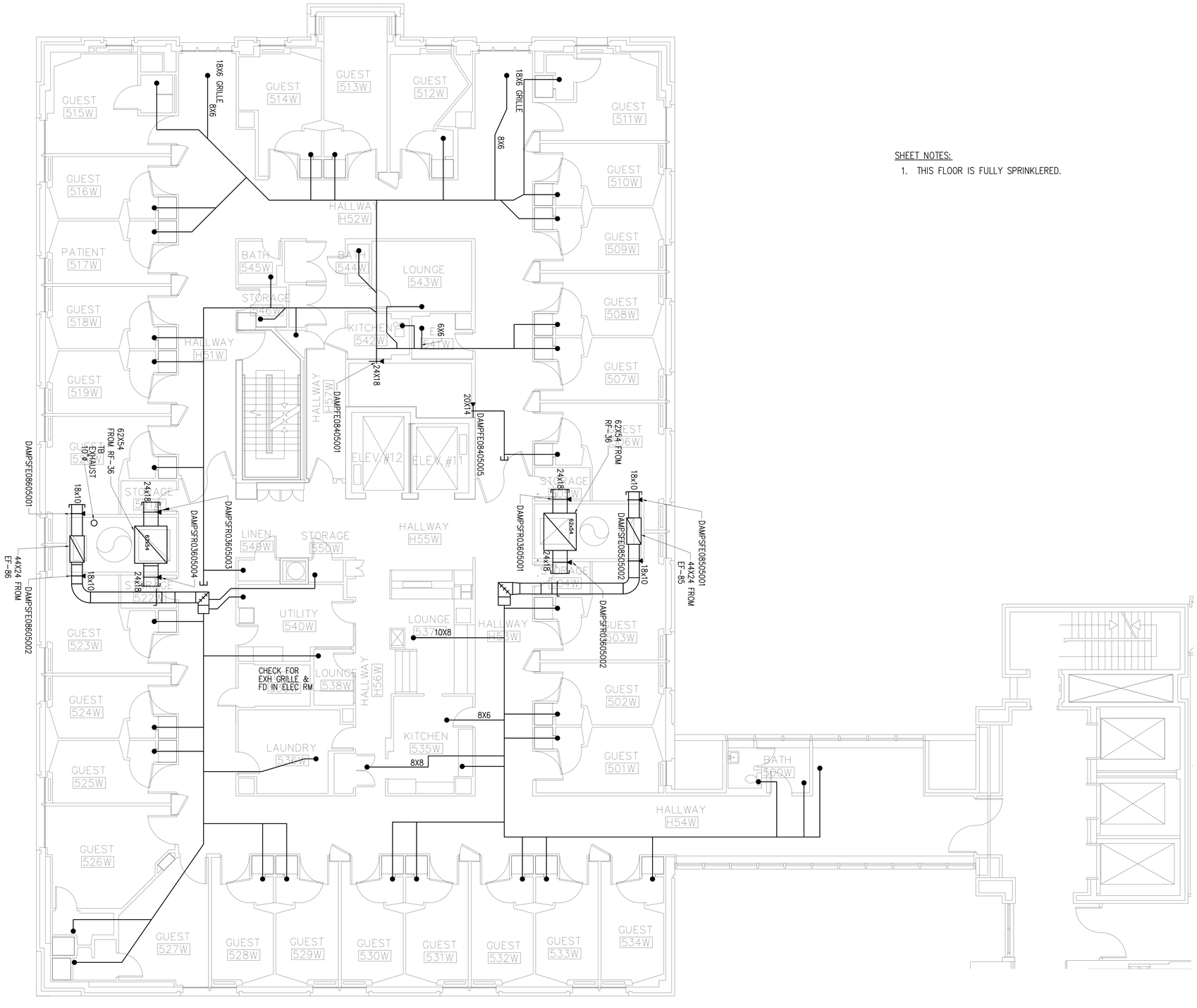
SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.

(2) CEILING IS NO LONGER RATED; FIRE DAMPERS AT CEILING DIFFUSERS SERVE NO PURPOSE AND CAN BE REMOVED.

WEST TOWER 4TH FLOOR SUPPLY AIR DIAGRAM

NORTH

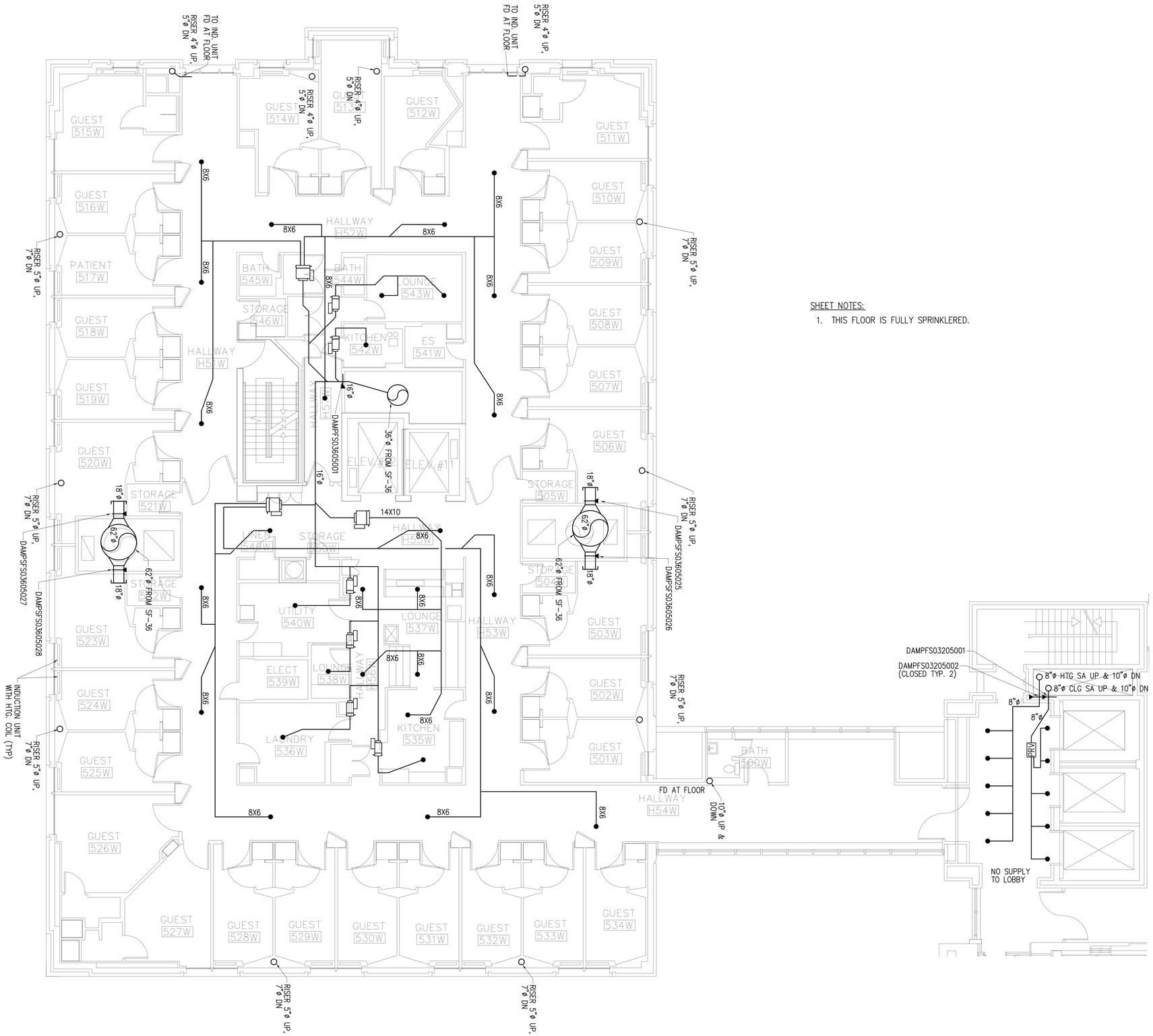


SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.

WEST TOWER 5TH FLOOR EXHAUST/RETURN AIR DIAGRAM

NORTH

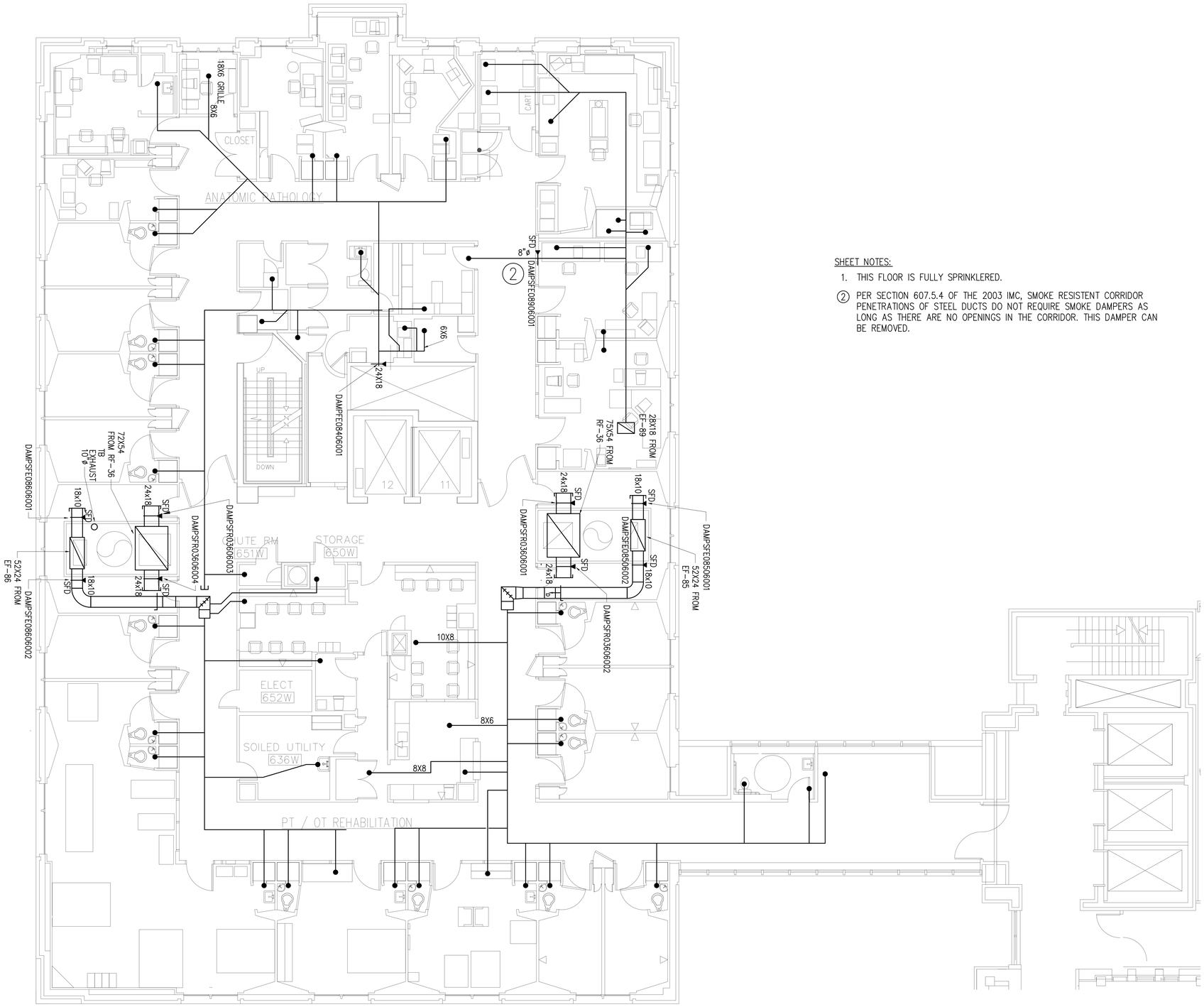


SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.

WEST TOWER 5TH FLOOR SUPPLY AIR DIAGRAM

NORTH



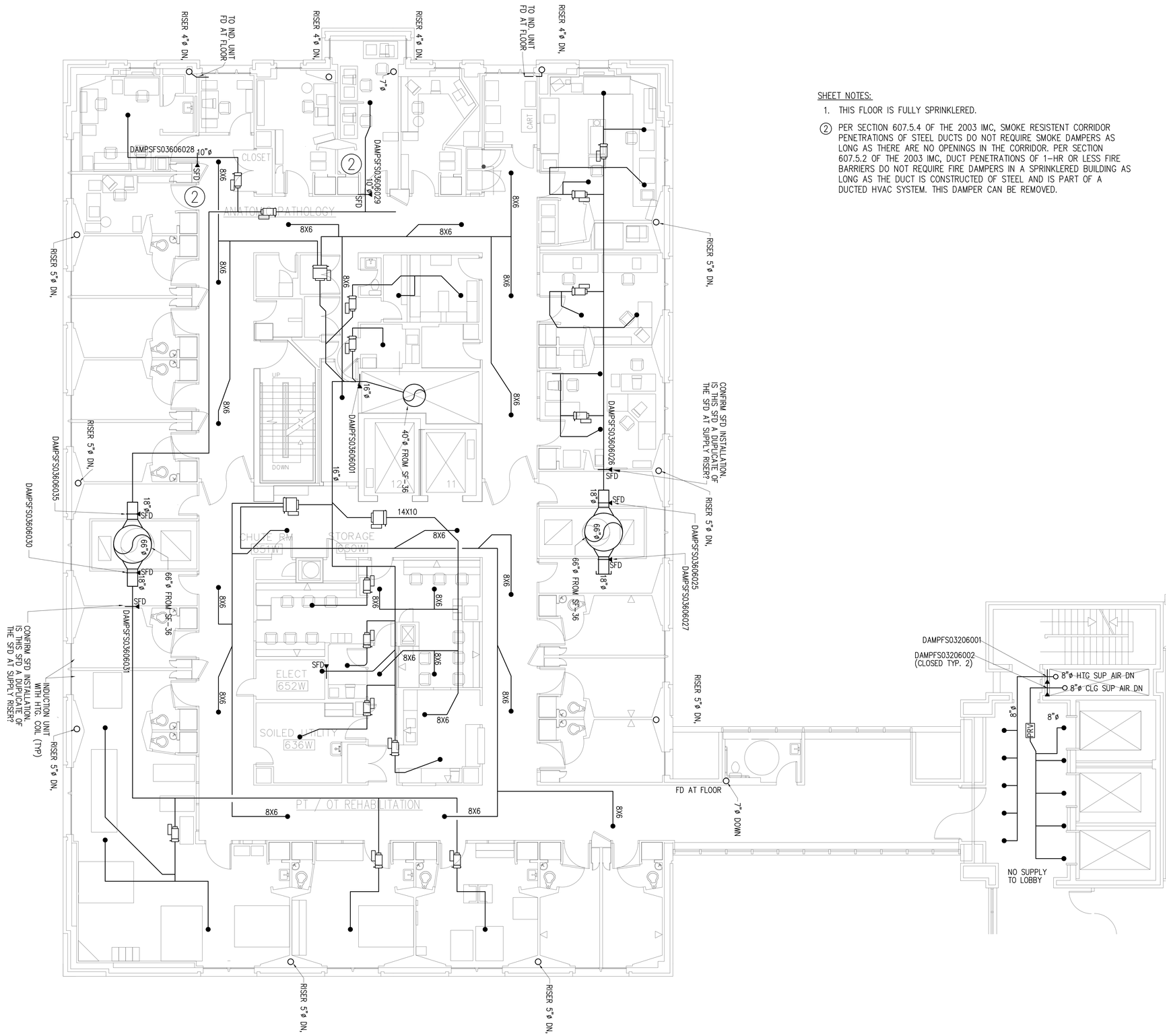
SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.

2. PER SECTION 607.5.4 OF THE 2003 IMC, SMOKE RESISTENT CORRIDOR PENETRATIONS OF STEEL DUCTS DO NOT REQUIRE SMOKE DAMPERS AS LONG AS THERE ARE NO OPENINGS IN THE CORRIDOR. THIS DAMPER CAN BE REMOVED.

WEST TOWER 6TH FLOOR EXHAUST/RETURN AIR DIAGRAM

NORTH



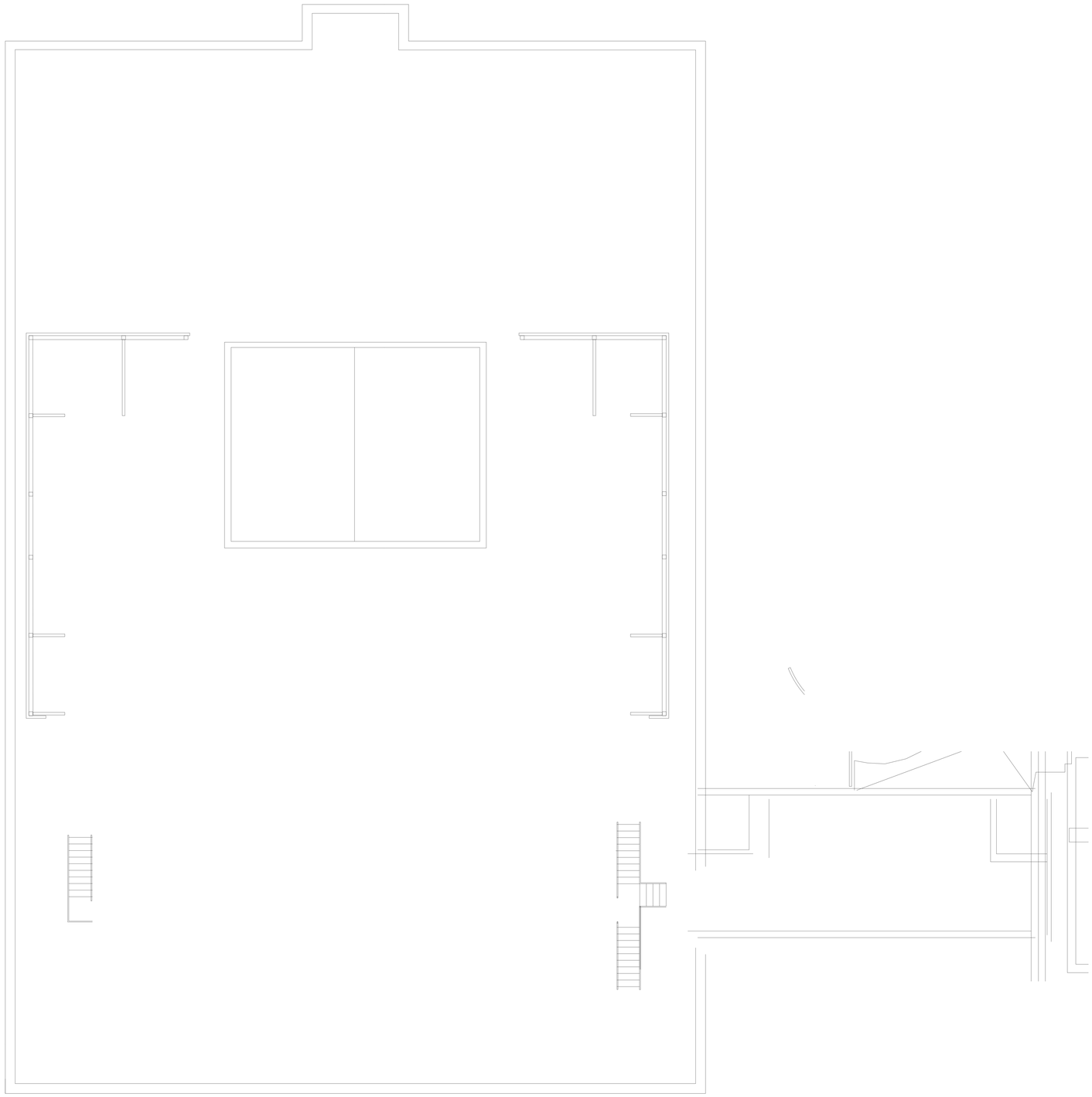
SHEET NOTES:

1. THIS FLOOR IS FULLY SPRINKLERED.

(2) PER SECTION 607.5.4 OF THE 2003 IMC, SMOKE RESISTENT CORRIDOR PENETRATIONS OF STEEL DUCTS DO NOT REQUIRE SMOKE DAMPERS AS LONG AS THERE ARE NO OPENINGS IN THE CORRIDOR. PER SECTION 607.5.2 OF THE 2003 IMC, DUCT PENETRATIONS OF 1-HR OR LESS FIRE BARRIERS DO NOT REQUIRE FIRE DAMPERS IN A SPRINKLERED BUILDING AS LONG AS THE DUCT IS CONSTRUCTED OF STEEL AND IS PART OF A DUCTED HVAC SYSTEM. THIS DAMPER CAN BE REMOVED.

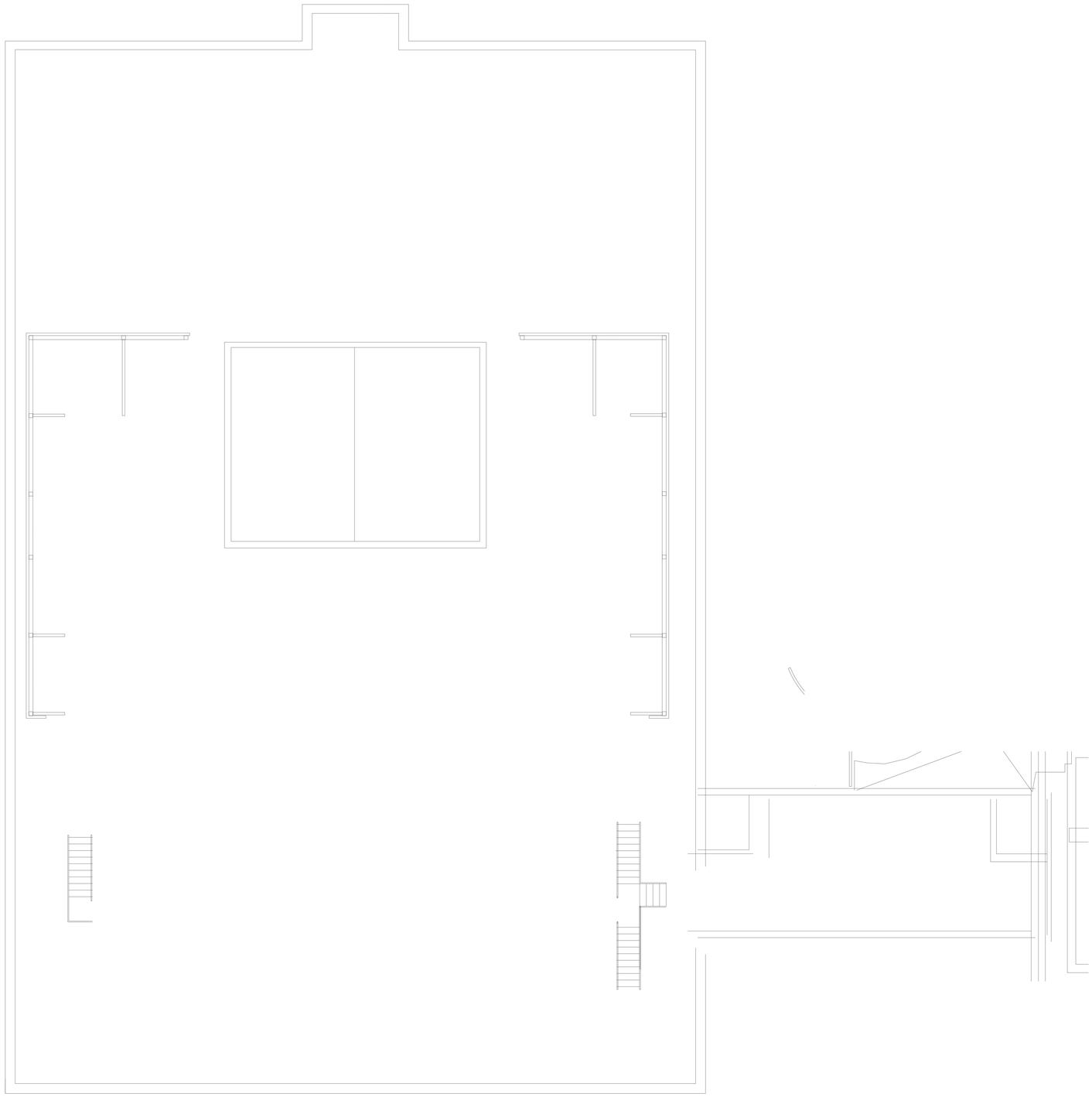
WEST TOWER 6TH FLOOR SUPPLY AIR DIAGRAM

NORTH



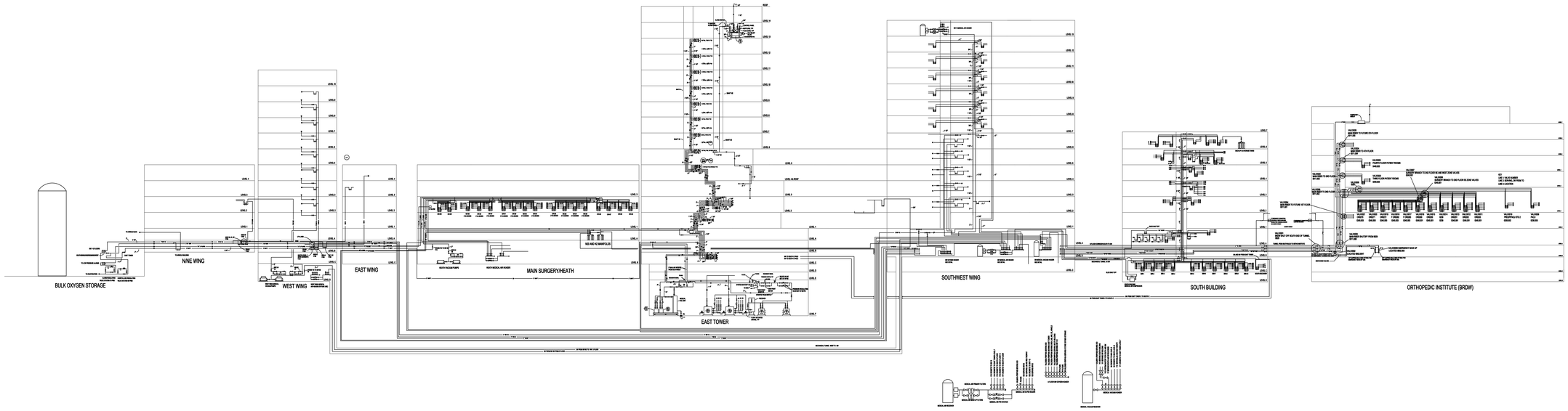
WEST TOWER 7TH FLOOR FIRE PROTECTION DIAGRAM

NORTH



WEST TOWER 7TH FLOOR FIRE PROTECTION DIAGRAM

NORTH



DETAIL OF SW MEDICAL AIR, OXYGEN AND MEDICAL VACUUM HEADERS

Not to Scale

HUMPHREYS, LLC
P.O. BOX 1457
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

MEDICAL GAS SYSTEM

South Bldg.
M7.62

Southwest
M7.63

MA & VA Headers
M7.64

East Tower
M7.65

Heath
M7.66

Main Surgery
M7.66

West Wing
M7.67

East Wing
M7.67

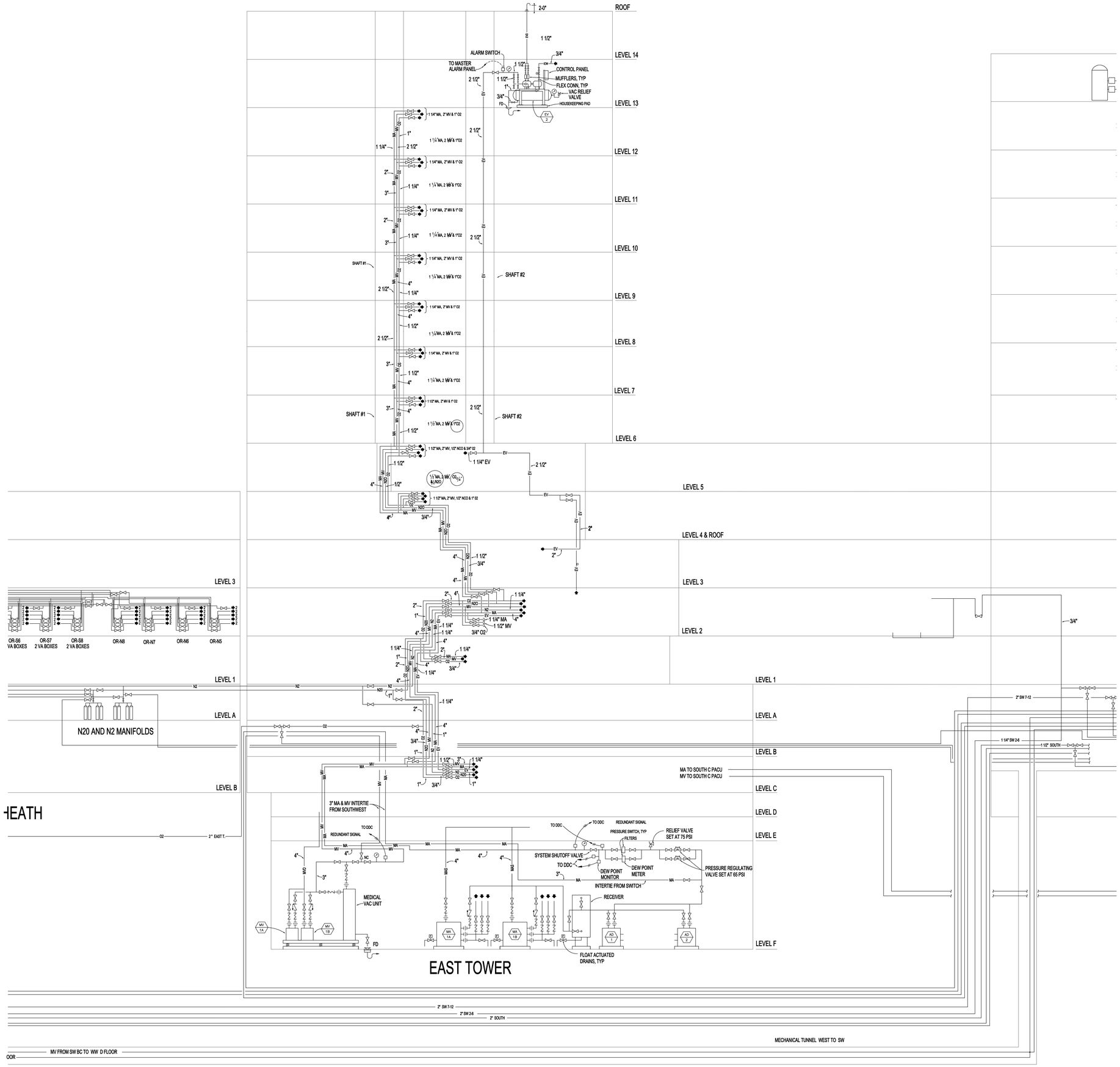
N/NE Wing
M7.67

REV'S	DATE	DESCRIPTION
2	02/01/06	Global Revisions
1	05/04/07	Global Revisions Including SOV

DESIGNED BY:
CHECKED BY:
PROG. NO.
DATE: **12/01/2005**

DWG.
FH Campus Medical Gas Diagram
Not to Scale

DWG.
M7.61



Not to Scale

HUMPHREYS, LLC
P.O. BOX 1452
MERCER ISLAND, WA. 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

MEDICAL GAS SYSTEM

East Tower Building

REV	DATE	DESCRIPTION
2	02/05/08	Global Revisions
1	06/24/07	Global Revisions including SOI

DESIGNED BY: CHECKED BY:

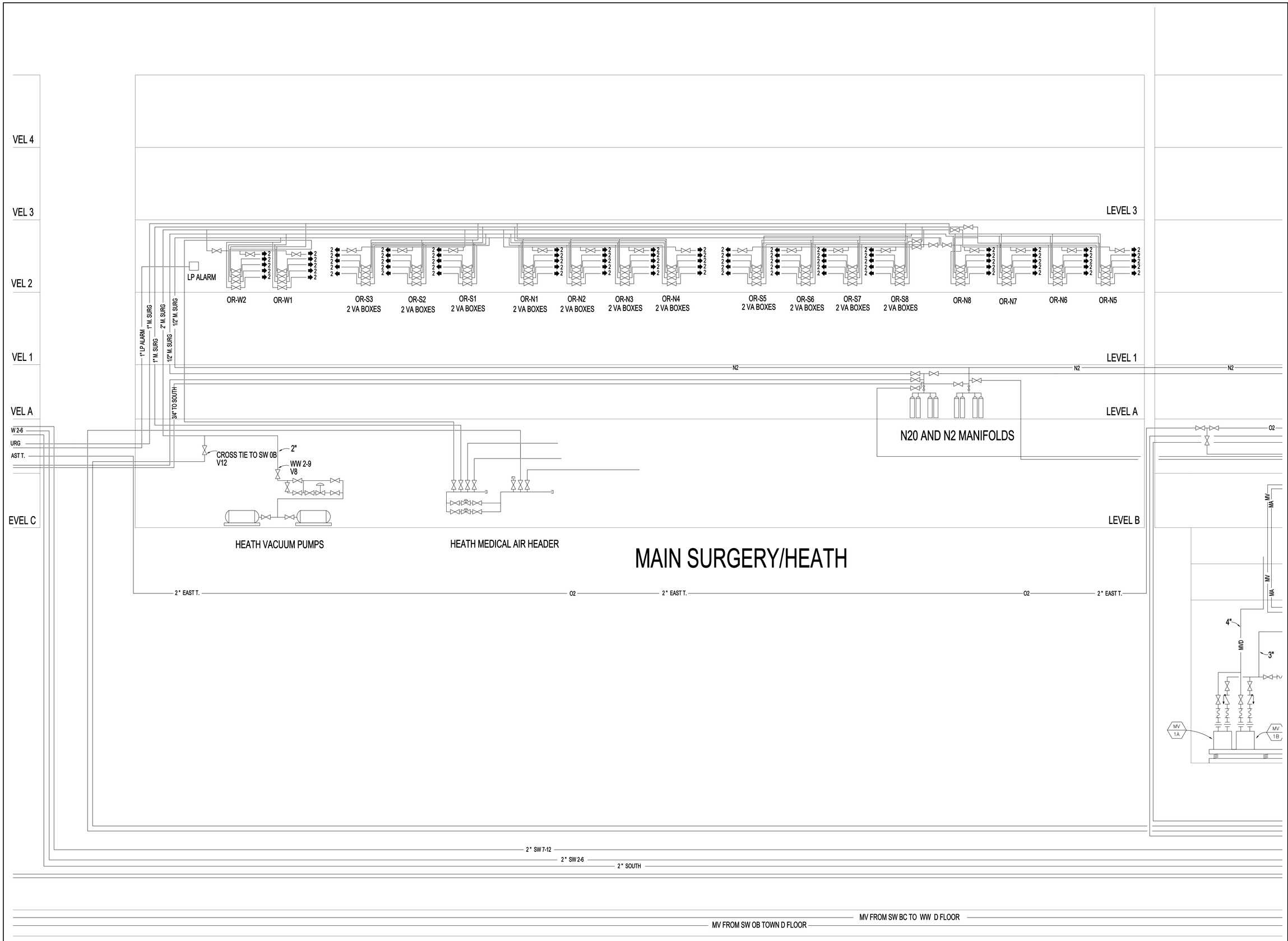
PROG. NO.

DATE: 12/01/2005

DWG.
East Tower Medical Gas Diagram

Not to Scale

DWG.
M7.65



Not to Scale

HUMPHREYS, LLC
P.O. BOX 1452
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

MEDICAL GAS SYSTEM

Heath Bldg.

Main Surgery Building

REV.	DATE	DESCRIPTION
2	02/01/05	Global Revisions
1	05/24/07	Global Revisions including SOI

DESIGNED BY: CHECKED BY:

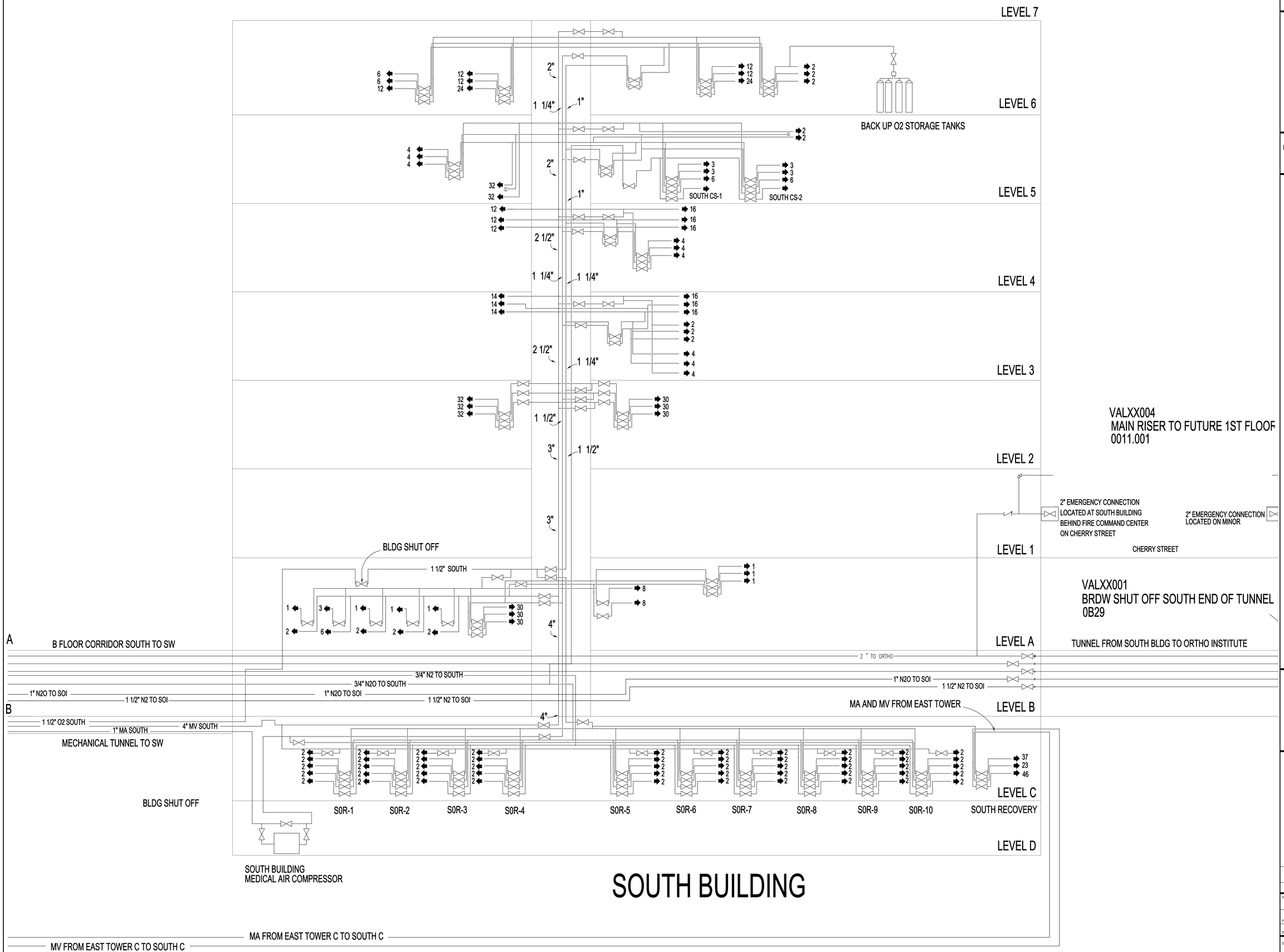
PROG. NO.

DATE **12/01/2005**

DWG. **Heath Bldg. Main Surgery Medical Gas Diagram**

Not to Scale

DWG. **M7.66**



VALXX004
MAIN RISER TO FUTURE 1ST FLOOR
0011.001

Not to Scale

HUMPHREYS, LLC
P.O. BOX 1453
MERCER ISLAND, WA 98040
(206) 931-9280

SWEDISH
Medical Center

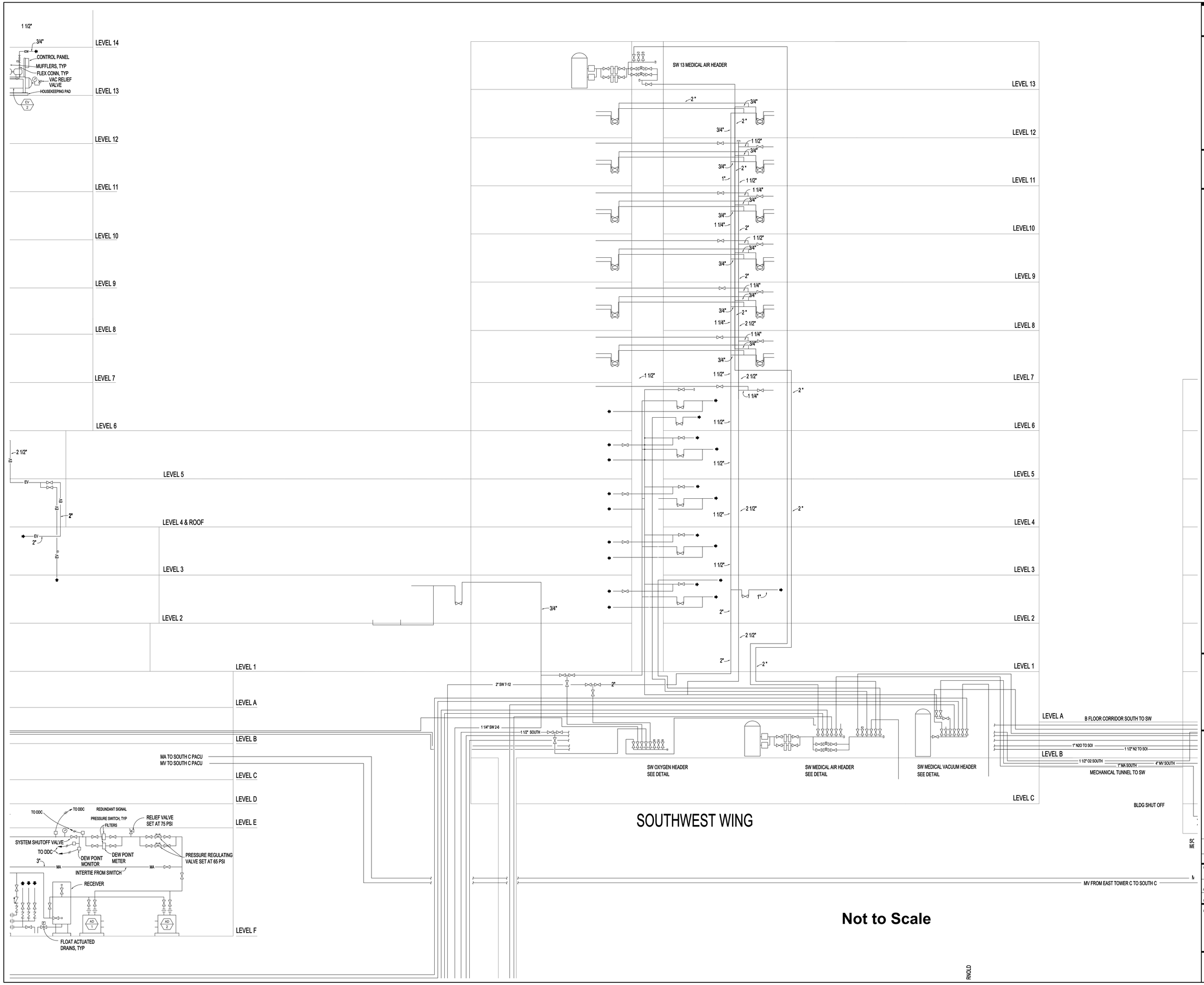
First Hill Campus
747 Broadway
Seattle, WA 98122

MEDICAL GAS SYSTEM

South Building

REV	DATE	DESCRIPTION
2	02/01/05	Global Revisions
1	08/24/07	Global Revisions Including S/OR

DESIGNED BY:
CHECKED BY:
PROG. NO.
DATE **12/01/2005**
DWG. **South Building Medical Gas Diagram**
Not to Scale
DWG. **M7.62**



HUMPHREYS, LLC
P.O. BOX 1422
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

MEDICAL GAS SYSTEM

Southwest Building

REV.	DATE	DESCRIPTION
2	02/02/06	Global Revisions
1	05/24/07	Global Revisions including SOI

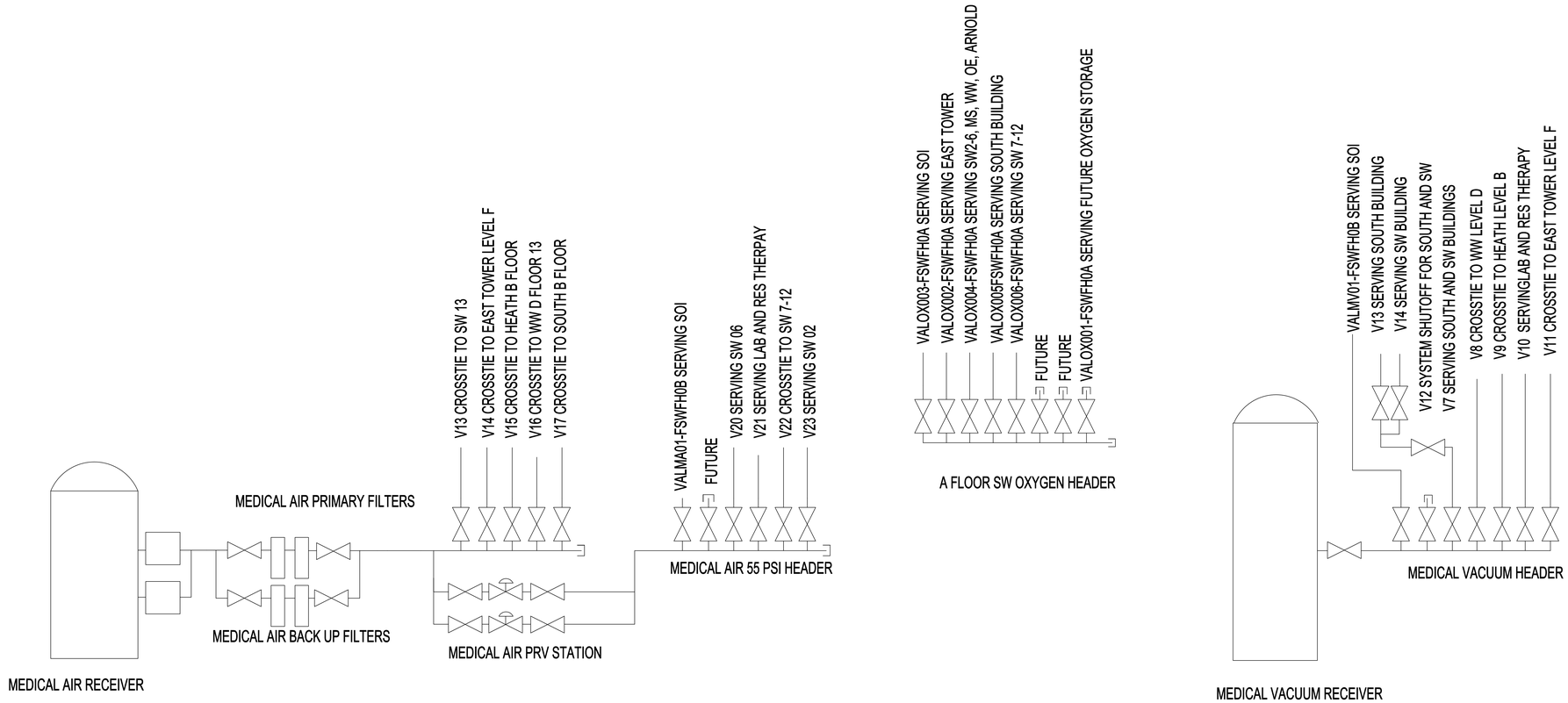
DESIGNED BY: CHECKED BY:

PROG. NO.

DATE: 12/01/2005

DWG.
Southwest Medical Gas Diagram
Not to Scale

DWG.
M7.63



DETAIL OF SW MEDICAL AIR, OXYGEN AND MEDICAL VACUUM HEADERS

Not to Scale

HUMPHREYS, LLC
P.O. BOX 1452
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

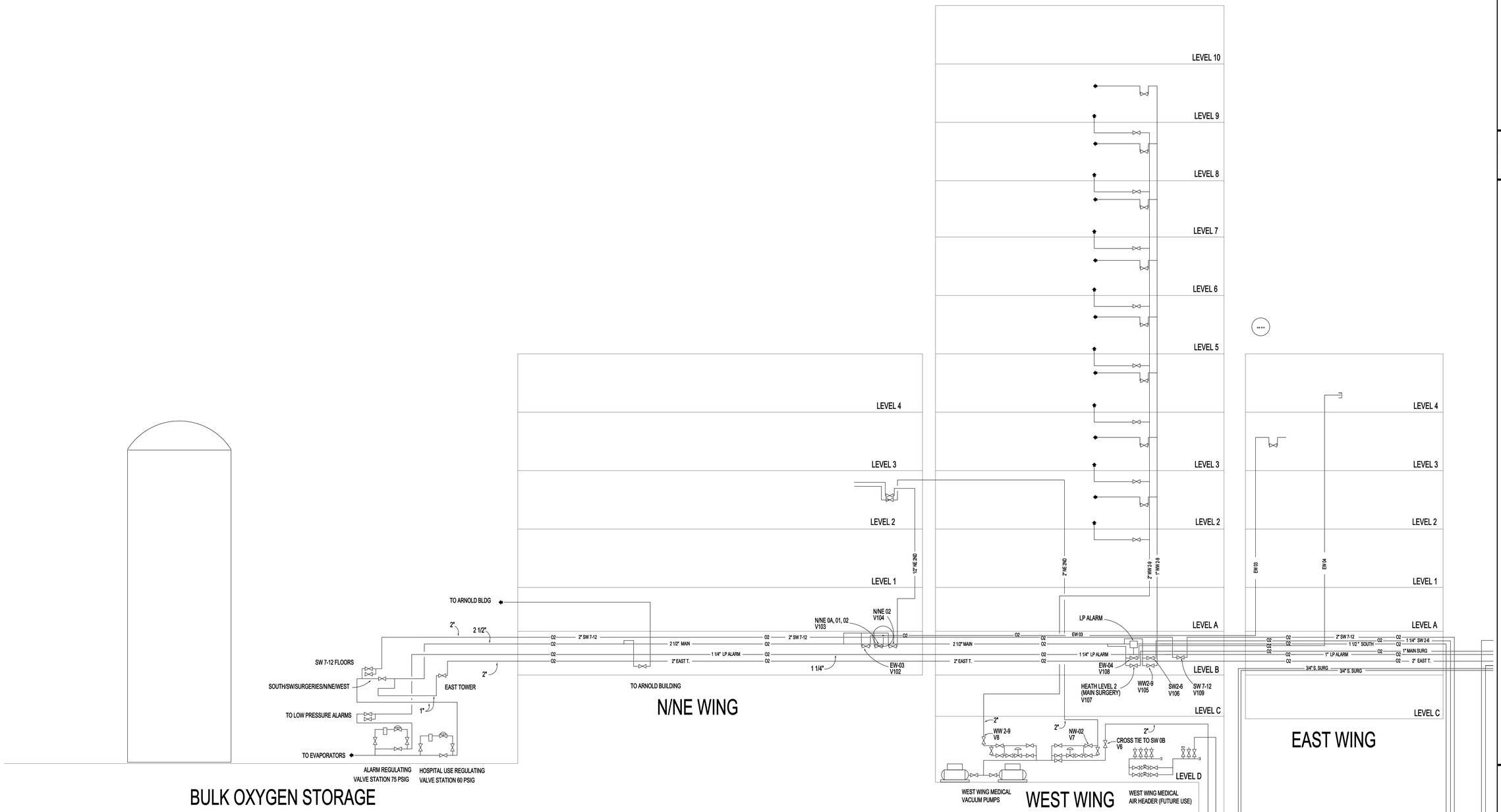
First Hill Campus
747 Broadway
Seattle, WA 98122

MEDICAL GAS SYSTEM

Details of Southwest Building MA & MV Headers

REV.	DATE	DESCRIPTION
2	02/01/06	Global Revisions
1	02/24/07	Global Revisions Including SOI

DESIGNED BY:
CHECKED BY:
PROG. NO.
DATE 12/01/2005
DWG. **Southwest MA & Mv Headers Medical Gas Diagram**
Not to Scale
DWG. **M7.64**



Not to Scale

HUMPHREYS, LLC
P. O. BOX 1457
MERCER ISLAND, WA 98040
(206) 932-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

MEDICAL GAS SYSTEM

East Wing

West Wing

N/NE Wing

Oxygen Storage

REV	DATE	DESCRIPTION
2	02/01/06	Global Revisions
1	06/02/07	Global Revisions including SOI

DESIGNED BY: CHECKED BY:

PROG. NO.

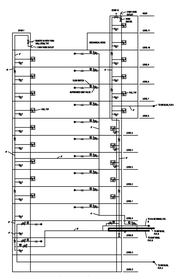
DATE **12/01/2005**

DWG. **East Wing West Wing N/NE Wing Oxygen Storage Medical Gas Diagram**

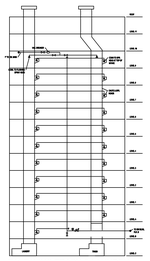
Not to Scale

DWG.

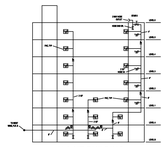
M7.67



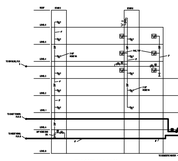
WEST WING



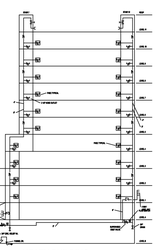
EAST WING TRASH & LAUNDRY



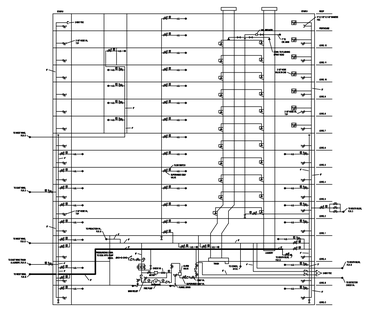
N & NE BUILDING



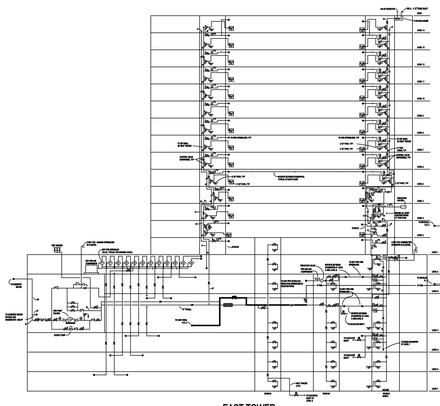
EAST WING



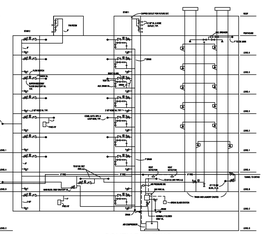
HEATH BUILDING



SOUTHWEST BUILDING



EAST TOWER



SOUTH BUILDING

Not to Scale

HUMPHREYS, LLC
P.O. BOX 1456
MERCER ISLAND, WA 98040
(206) 933-9250

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

FIRE PROTECTION WATER SYSTEM

South Bldg.
M7.82

East Tower
M7.82

Southwest
M7.83

Heath Bldg.
M7.83

East Wing
M7.83

N & NE Bldg.
M7.84

EW Trash and Laundry
M7.84

West Wing
M7.84

REV	DATE	DESCRIPTION
2	02/01/06	Global Revisions
1	05/02/07	Global Revisions including SOI

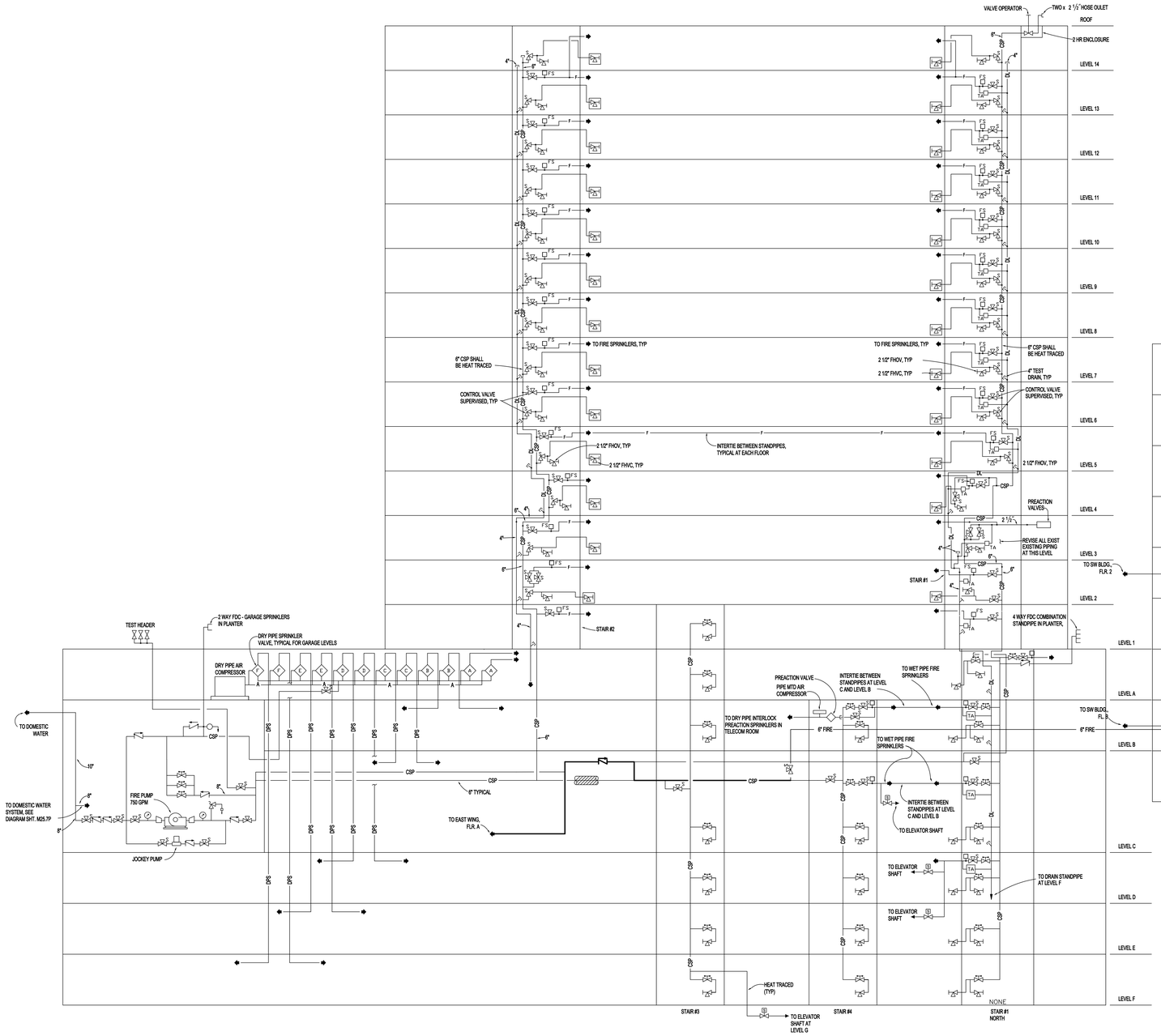
DESIGNED BY:
CHECKED BY:
PROG. NO.
DATE 12/01/2005
DWG.

First Hill Campus

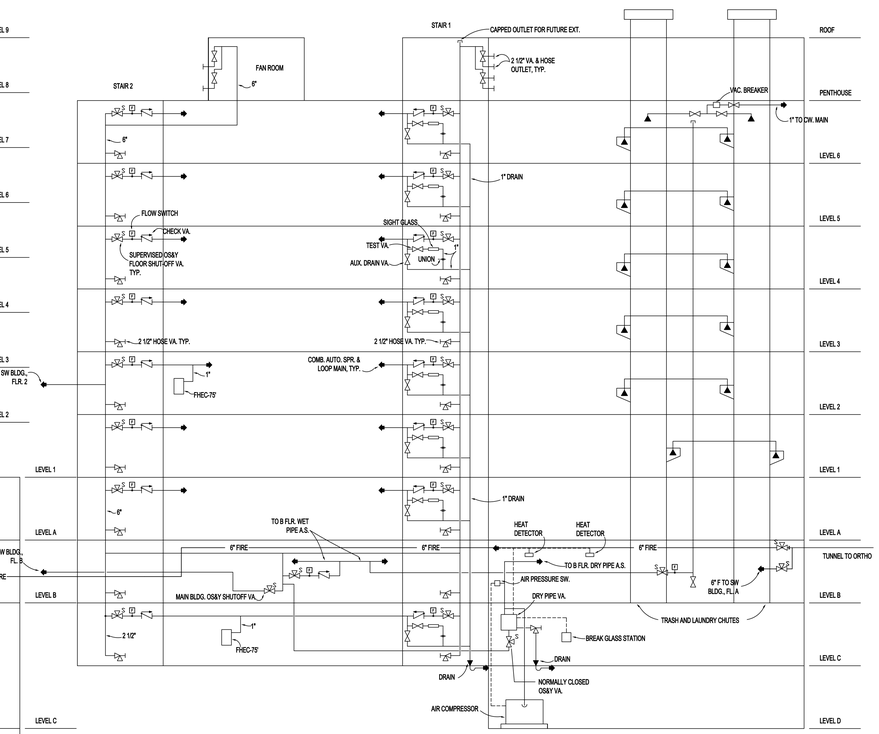
Fire Protection Water Diagram

Not to Scale

DWG.
M7.81



EAST TOWER



SOUTH BUILDING

Not to Scale

HUMPHREYS, LLC
P.O. BOX 1452
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

FIRE PROTECTION WATER SYSTEM

South Building

East Tower Building

REV.	DATE	DESCRIPTION
2	02/01/05	Global Revisions
1	05/24/07	Global Revisions including SOV

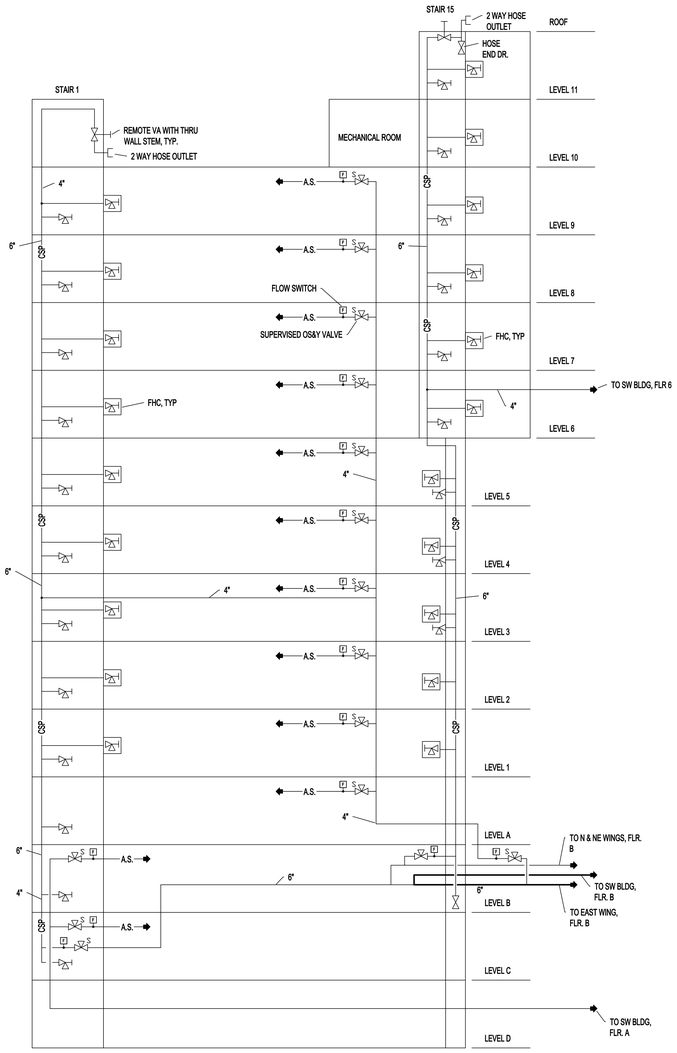
DESIGNED BY:
CHECKED BY:
PROG. NO.
DATE: 12/01/2005

DWG.
South Building East Tower

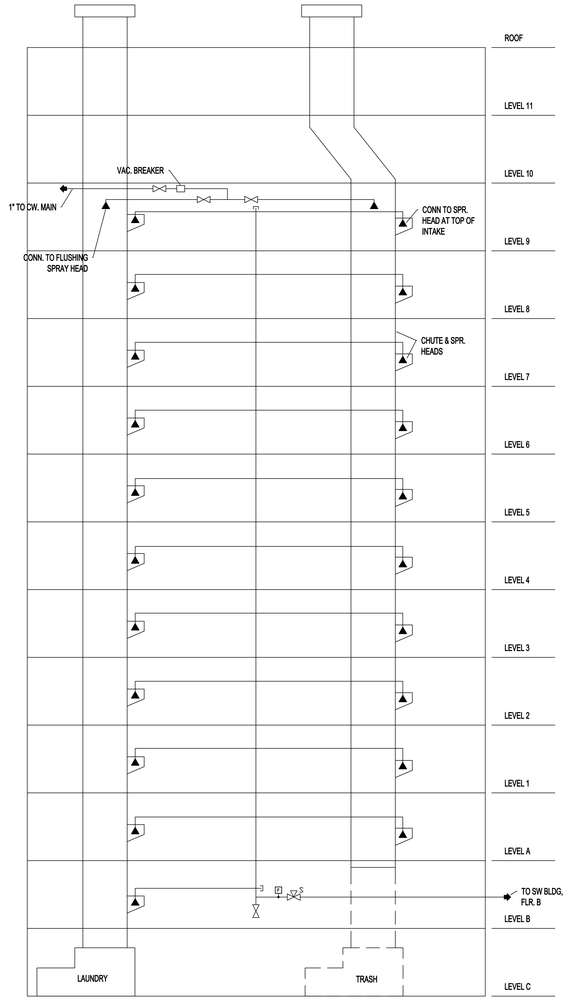
Fire Protecton Water Diagram

Not to Scale

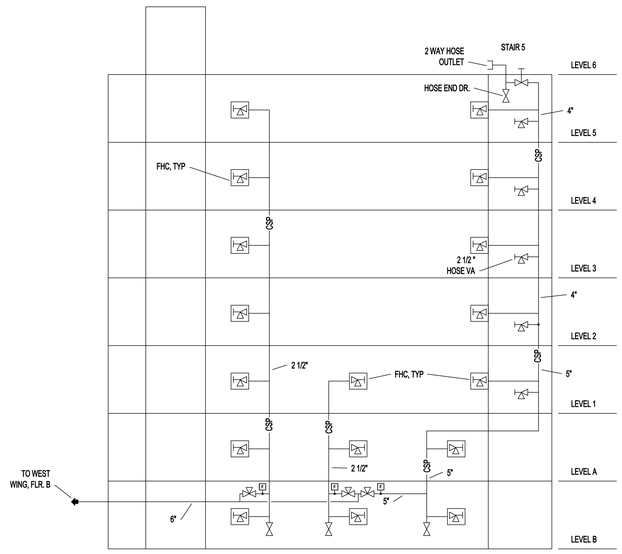
DWG.
M7.82



WEST WING



EAST WING TRASH & LAUNDRY



N & NE BUILDING

Not to Scale

HUMPHREYS, LLC
P.O. BOX 1482
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

FIRE PROTECTION WATER SYSTEM

N and NE Building

East Wing Trash and Laundry

West Wing

REV	DATE	DESCRIPTION
2	02/01/06	Global Revisions
1	05/24/07	Global Revisions including SC6

DESIGNED BY: CHECKED BY:

PROG. NO.

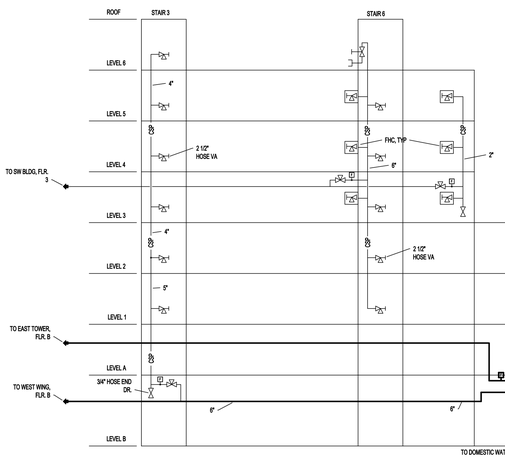
DATE 12/01/2005

DWG.
N & NE Building
East Wing
Trash & Laundry
West Wing

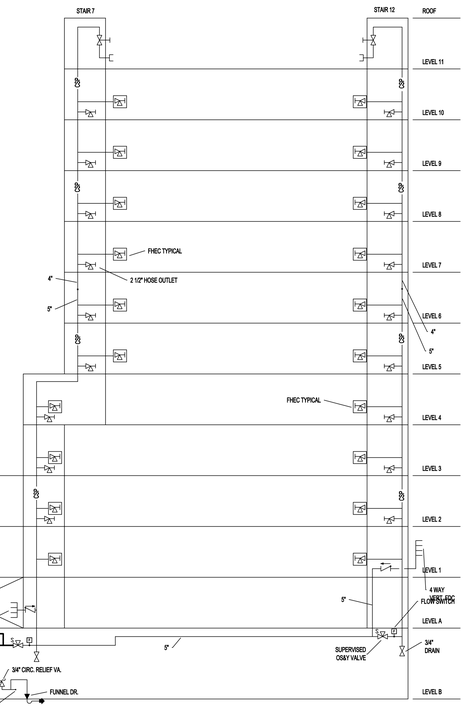
Fire Protecton Water Diagram

Not to Scale

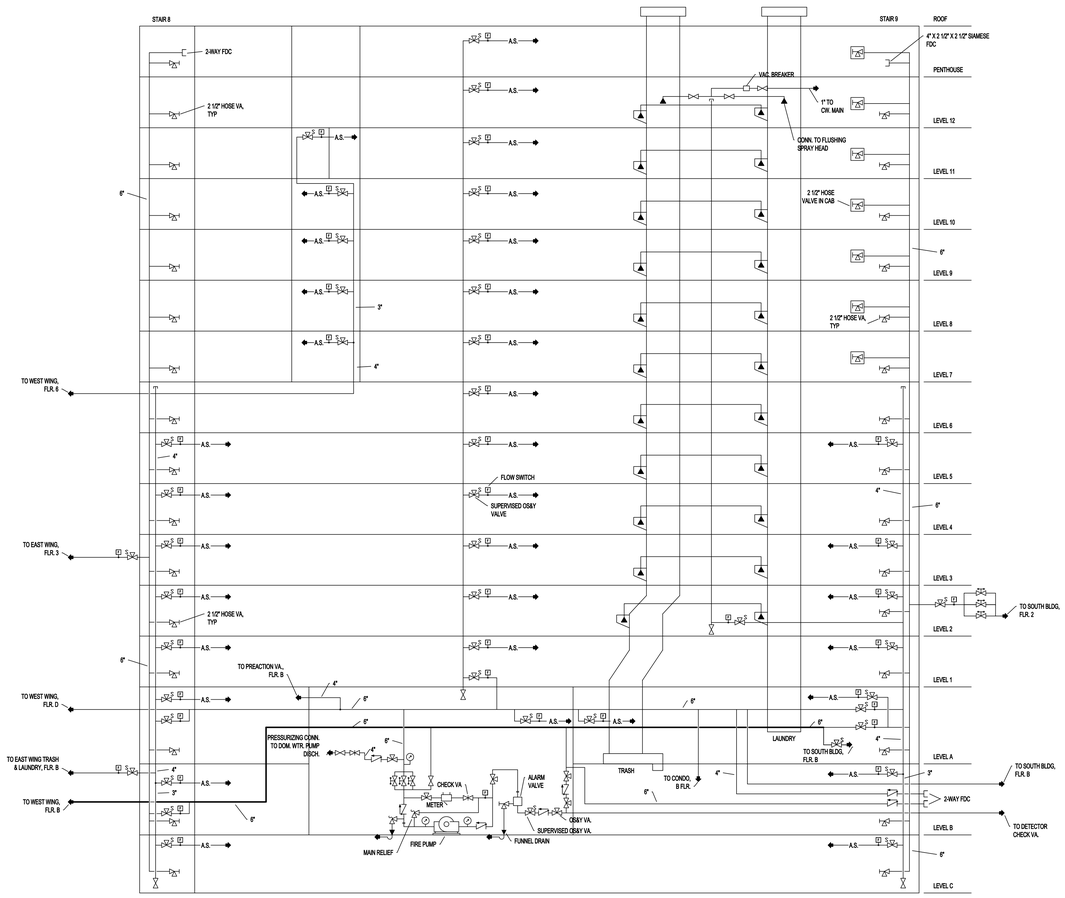
DWG.
M7.84



EAST WING



HEATH BUILDING



SOUTHWEST BUILDING

Not to Scale

HUMPHREYS, LLC
P.O. BOX 1452
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

FIRE PROTECTION WATER SYSTEM

Southwest Building

Heath Building

East Wing

REV.	DATE	DESCRIPTION
2	02/03/06	Global Revisions
1	05/25/07	Global Revisions Including SOB

DESIGNED BY: CHECKED BY:

PROG. NO.

DATE: **12/01/2005**

DWG.

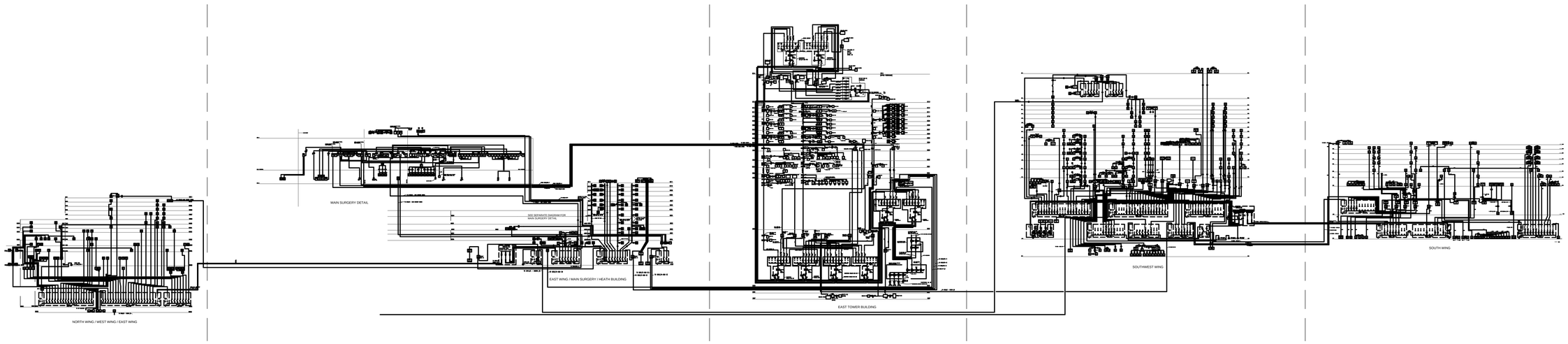
Southwest Bldg.
Heath Bldg.
East Wing

Fire Protecton Water Diagram

Not to Scale

DWG.

M7.83



Not to Scale

HUMPHREYS, LLC
P.O. BOX 1452
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

ELECTRICAL SYSTEMS

South Bldg.
M7.72

Southwest
M7.73

East Tower
M7.74

Heath
M7.75

Main Surgery
M7.75

East Wing
M7.75

West Wing
M7.76

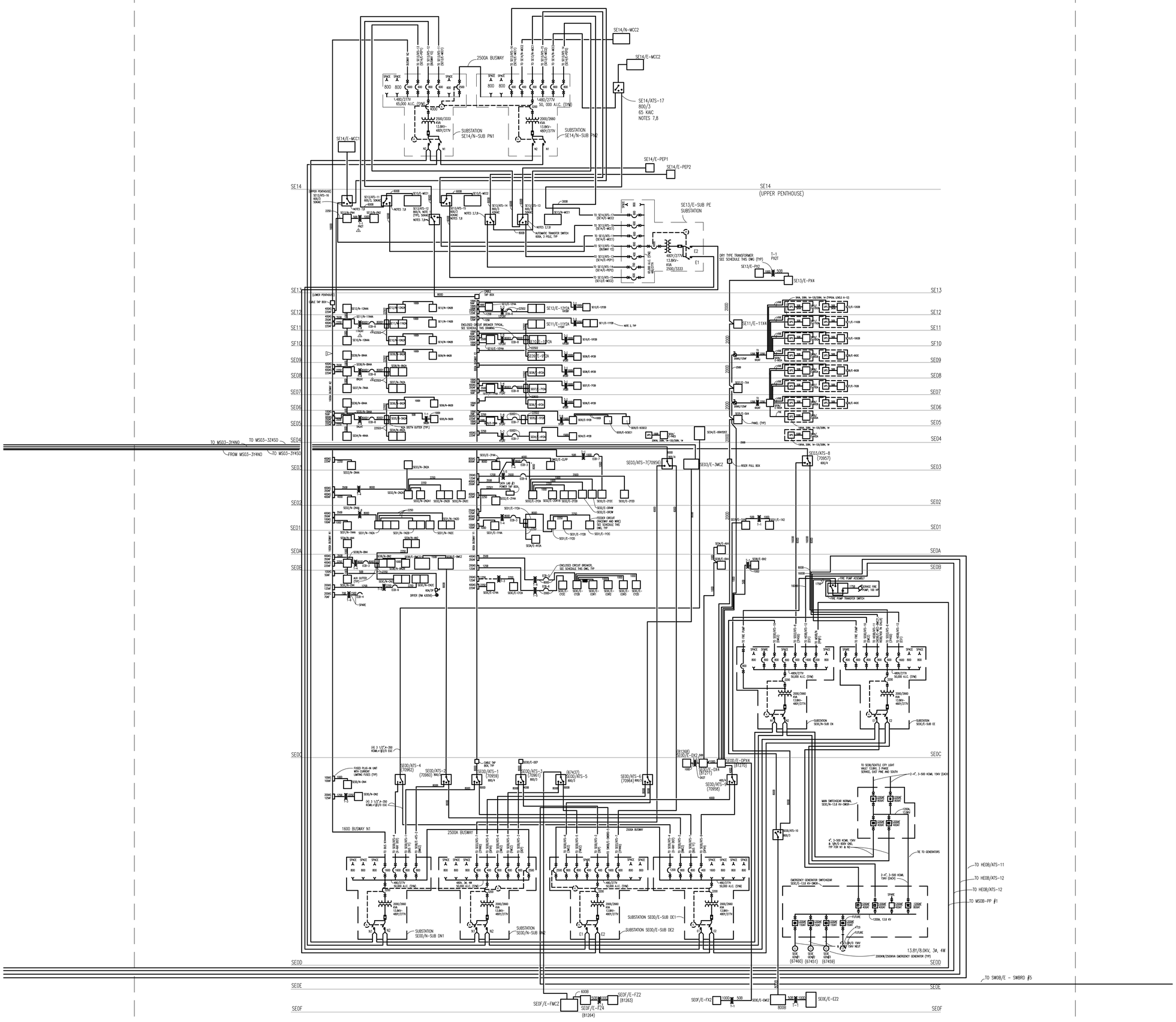
North Wing
M7.76

REV.	DATE	DESCRIPTION
2	02/01/05	Global Revisions
1	05/24/07	Global Revisions including SDI

DESIGNED BY:
CHECKED BY:
PROG. NO.
DATE 12/01/2005

DWG.
First Hill Campus Electrical Diagram
Not to Scale

DWG.
M7.71



EAST TOWER BUILDING

Not to Scale

HUMPHREYS, LLC
P.O. BOX 1453
MERCER ISLAND, WA 98040
(206) 931-0280

SWEDISH
Medical Center

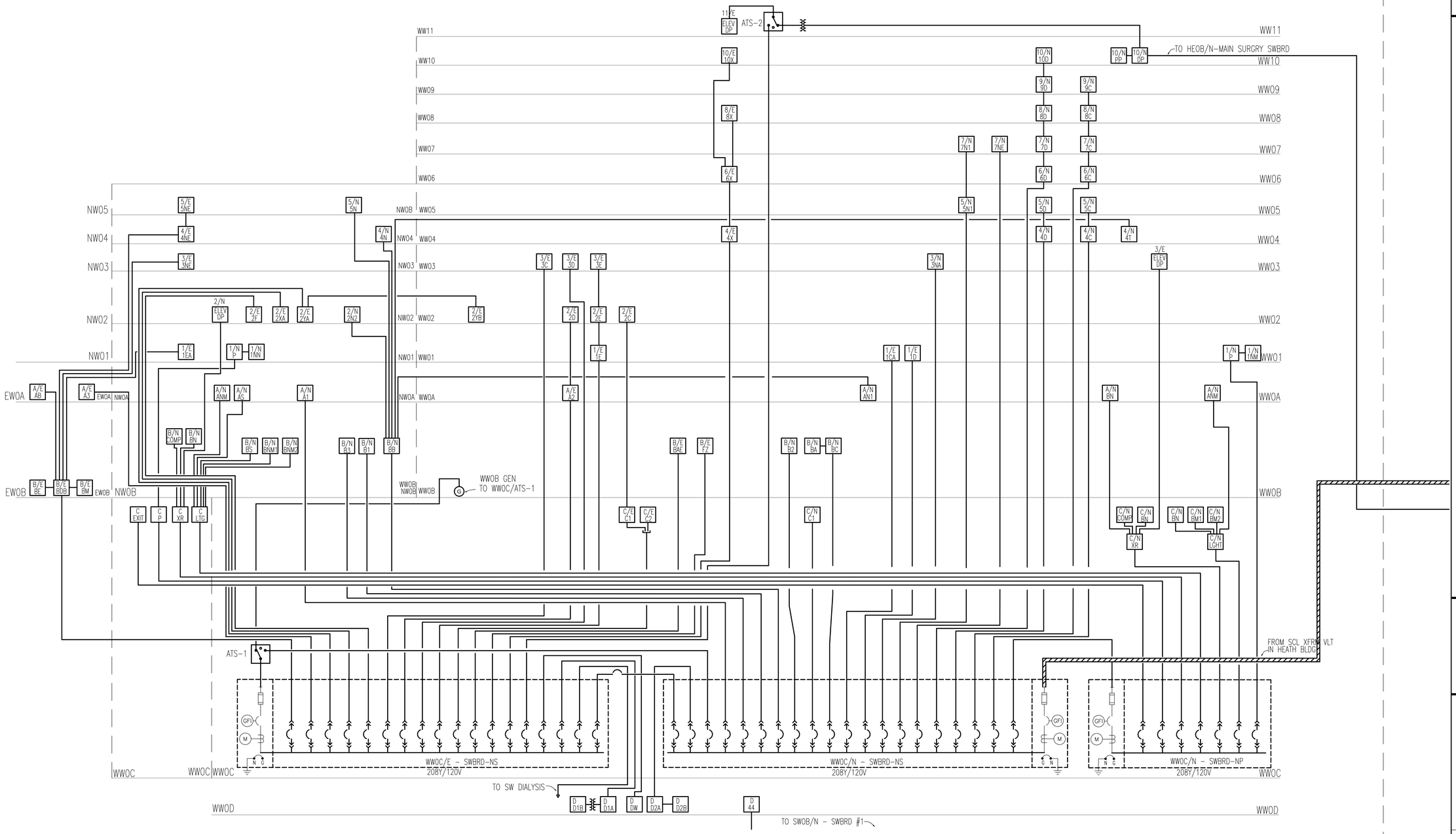
First Hill Campus
747 Broadway
Seattle, WA 98122

ELECTRICAL SYSTEMS

East Tower Building

REV.	DATE	DESCRIPTION
2	02/01/06	Global Revisions
1	05/24/07	Global Revisions including SCN

DESIGNED BY:
CHECKED BY:
PROG. NO.
DATE: **12/01/2005**
DWG.
East Tower Electrical Diagram
Not to Scale
DWG.
M7.74



NORTH WING / WEST WING / EAST WING

Not to Scale

HUMPHREYS, LLC
P.O. BOX 1452
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

ELECTRICAL SYSTEMS

East Wing

West Wing

North Wing

REV.	DATE	DESCRIPTION
2	02/25/08	Global Revisions
1	05/24/07	Global Revisions including SOI

DESIGNED BY: CHECKED BY:

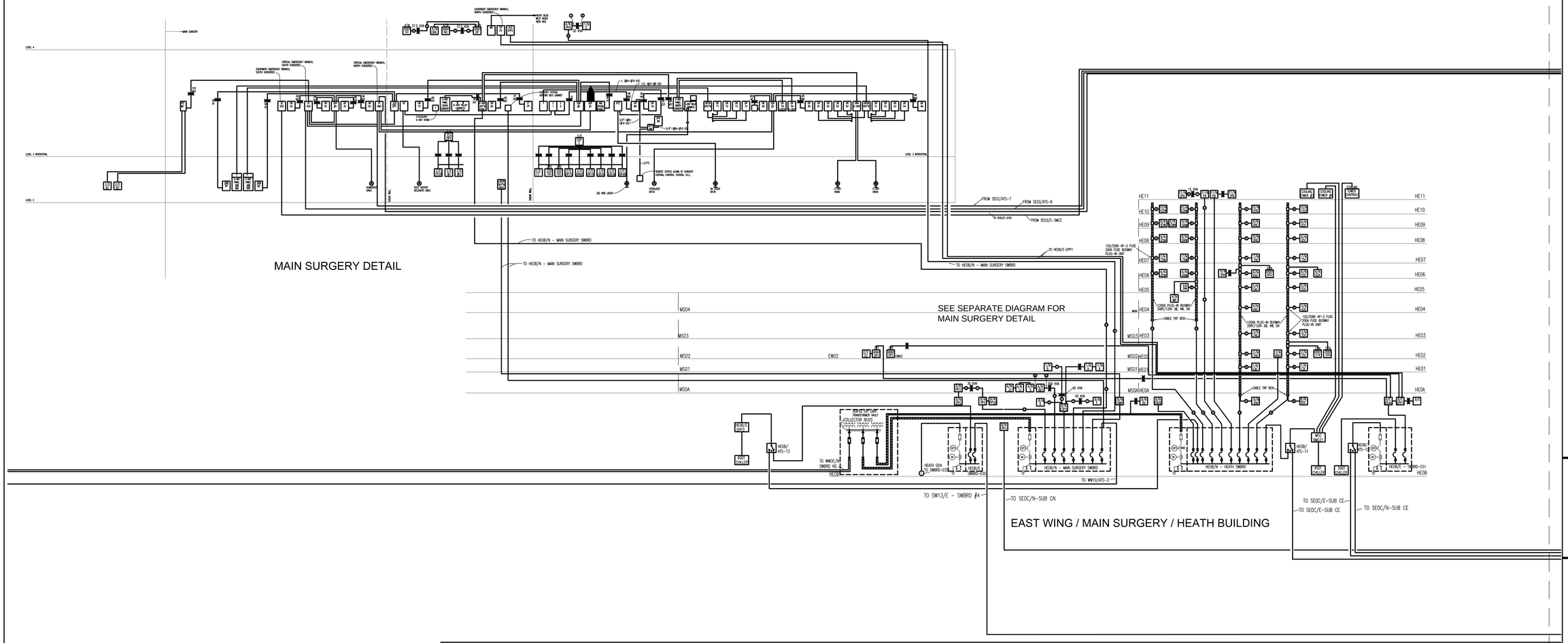
PROG. NO.

DATE **12/01/2005**

DWG. **East Wing West Wing North Wing Electrical Diagram**

Not to Scale

DWG. **M7.76**



Not to Scale

HUMPHREYS, LLC
P.O. BOX 1457
MERCER ISLAND, WA 98040
(206) 931-0260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

ELECTRICAL SYSTEMS

Heath Building

Main Surgery

East Wing

REV	DATE	DESCRIPTION
2	02/01/06	Global Revisions
1	05/04/07	Global Revisions Including SC6

DESIGNED BY: CHECKED BY:

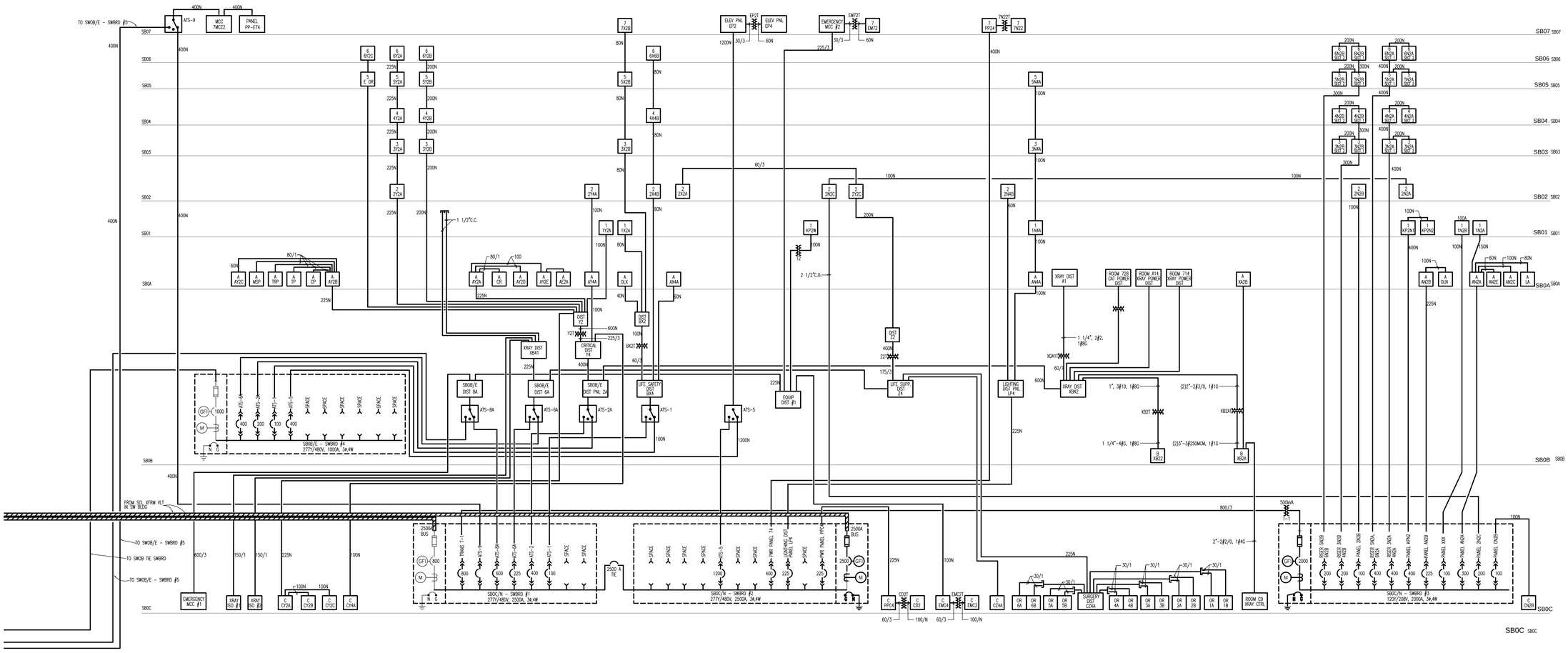
PROG. NO.

DATE **12/01/2005**

DWG. **Heath Bldg. Main Surgery East Wing Electrical Diagram**

Not to Scale

DWG. **M7.75**



SOUTH WING

Not to Scale

HUMPHREYS, LLC
P.O. BOX 1452
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

ELECTRICAL SYSTEMS

South Building

REV	DATE	DESCRIPTION
2	02/01/08	Global Revisions
1	05/24/07	Global Revisions including SOI

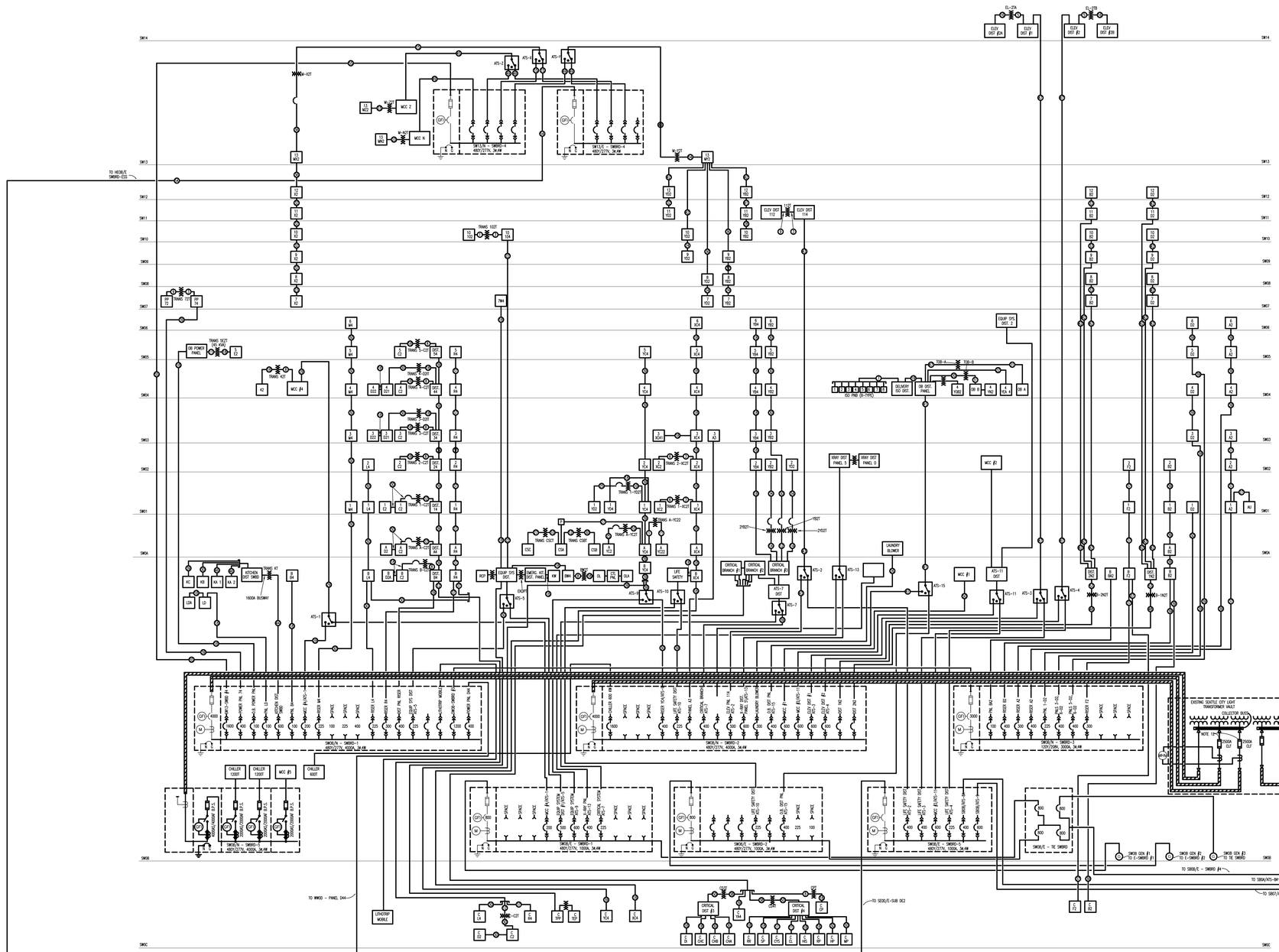
DESIGNED BY: CHECKED BY:

PROG. NO.

DATE 12/01/2005

DWG.
South Building Electrical Diagram
Not to Scale

DWG.
M7.72



Not to Scale

HUMPHREYS, LLC
P.O. BOX 1432
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

ELECTRICAL SYSTEMS

Southwest Building

REV	DATE	DESCRIPTION
2	02/01/06	Global Revisions
1	06/04/07	Global Revisions including SOI

DESIGNED BY: CHECKED BY:

PROG. NO.

DATE: 12/01/2005

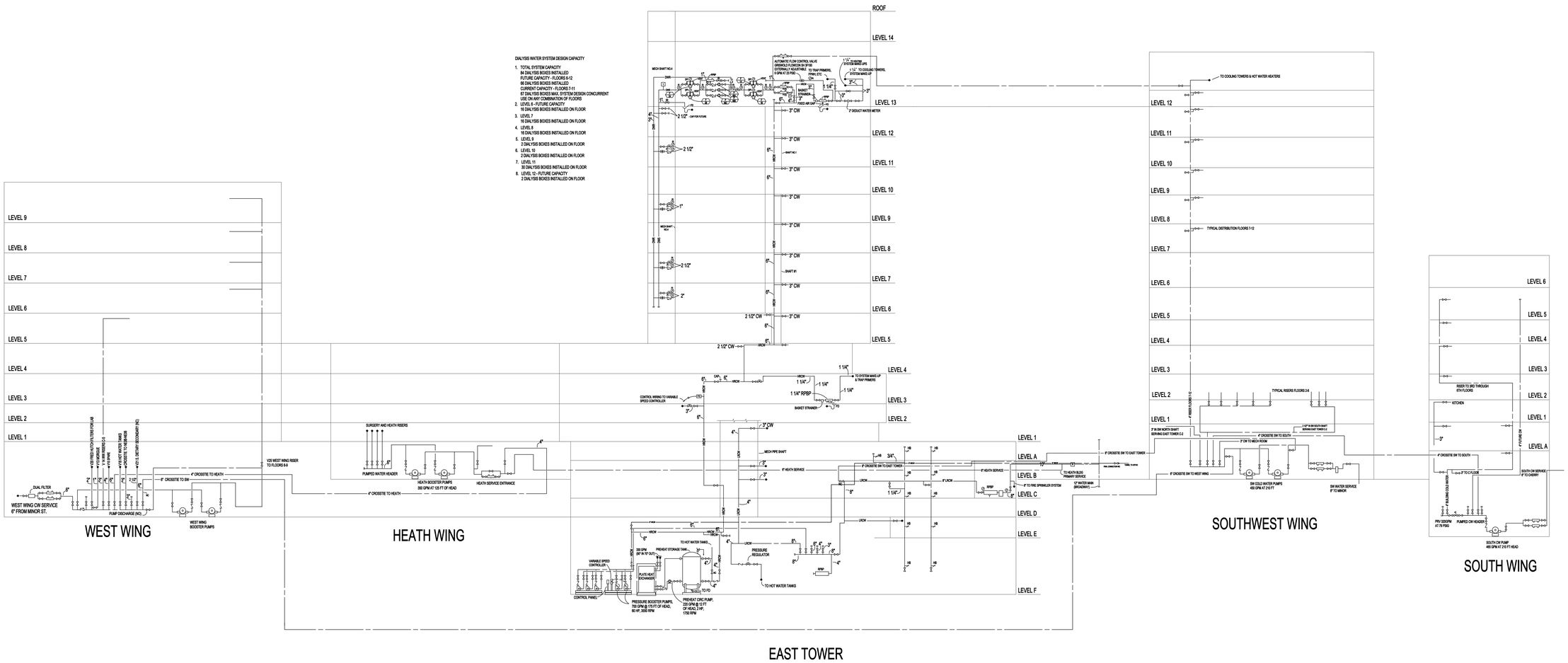
DWG.
Southwest Building Electrical Diagram

Not to Scale

DWG.
M7.73

DIALYSIS WATER SYSTEM DESIGN CAPACITY

1. TOTAL SYSTEM CAPACITY
   84 DIALYSIS BOXES INSTALLED
   FUTURE CAPACITY - FLOORS 8-12
   66 DIALYSIS BOXES INSTALLED
   CURRENT CAPACITY - FLOORS 7-11
   67 DIALYSIS BOXES MAX. SYSTEM DESIGN CONCURRENT
   USE ON ANY COMBINATION OF FLOORS
2. LEVEL 6 - FUTURE CAPACITY
   16 DIALYSIS BOXES INSTALLED ON FLOOR
3. LEVEL 7
   16 DIALYSIS BOXES INSTALLED ON FLOOR
4. LEVEL 8
   16 DIALYSIS BOXES INSTALLED ON FLOOR
5. LEVEL 9
   2 DIALYSIS BOXES INSTALLED ON FLOOR
6. LEVEL 10
   2 DIALYSIS BOXES INSTALLED ON FLOOR
7. LEVEL 11
   30 DIALYSIS BOXES INSTALLED ON FLOOR
8. LEVEL 12 - FUTURE CAPACITY
   2 DIALYSIS BOXES INSTALLED ON FLOOR



Not to Scale

HUMPHREYS, LLC
P.O. BOX 1452
MERCER ISLAND, WA 98040
(206) 931-9250

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

DOMESTIC COLD WATER SYSTEM

South M7.02

Southwest Building M7.02

East Tower Building M7.03

Heath Building M7.04

West Wing M7.04

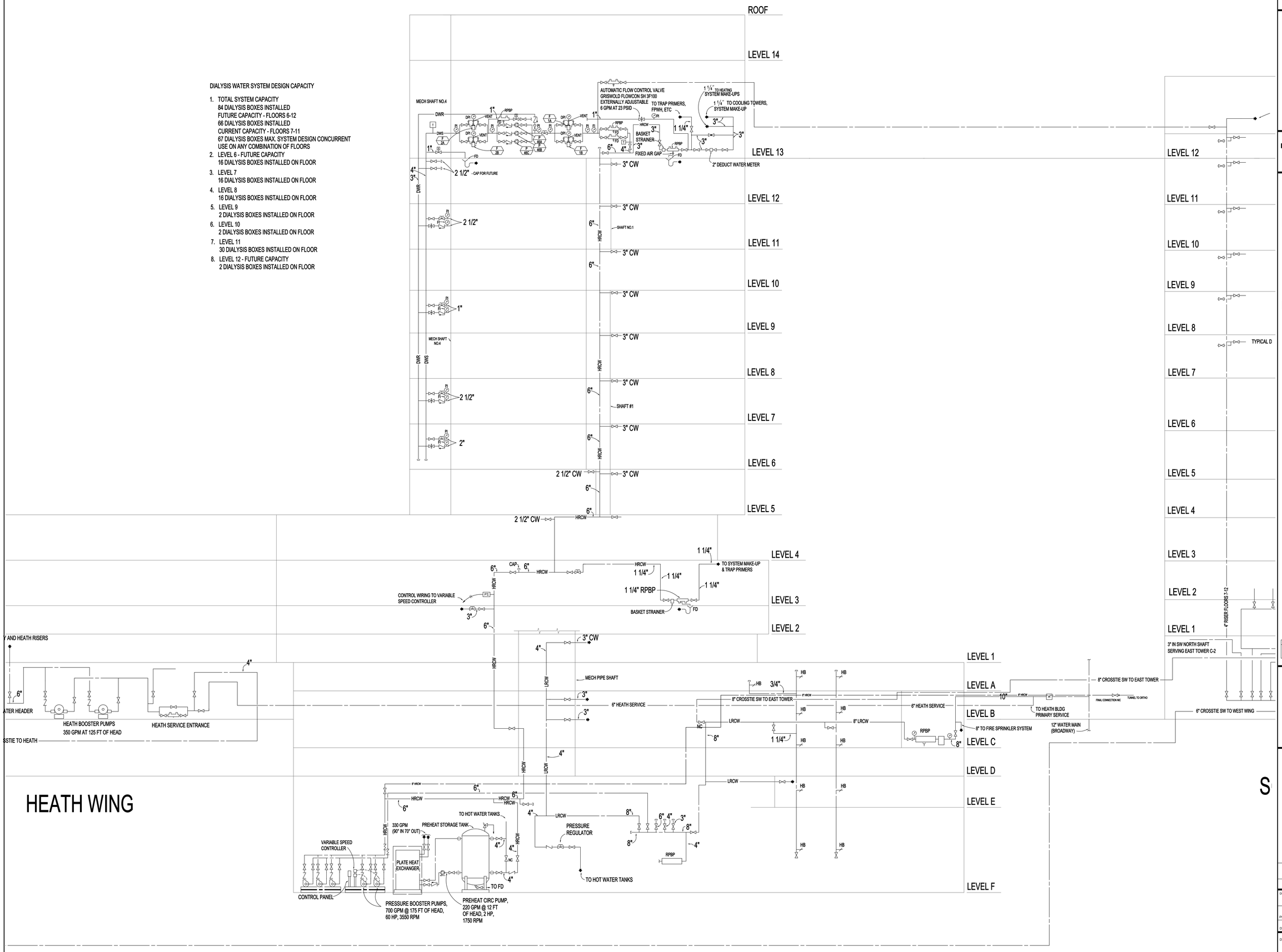
KEY
- STREET PRESSURE WATER (LRCW)
- PUMPED WATER (VRCW)
- DIALYSIS WATER (DCW)

REV	DATE	DESCRIPTION
2	02/01/06	Clinical Revisions
1	05/24/07	Clinical Revisions Including DOH

DESIGNED BY:
CHECKED BY:
PROG. NO.
DATE: 12/01/2005
DWG.
First Hill Campus Domestic Cold Water Diagram
Not to Scale
DWG.
M7.41

DIALYSIS WATER SYSTEM DESIGN CAPACITY

1. TOTAL SYSTEM CAPACITY
   84 DIALYSIS BOXES INSTALLED
   FUTURE CAPACITY - FLOORS 6-12
   66 DIALYSIS BOXES INSTALLED
   CURRENT CAPACITY - FLOORS 7-11
   67 DIALYSIS BOXES MAX. SYSTEM DESIGN CONCURRENT
   USE ON ANY COMBINATION OF FLOORS
2. LEVEL 6 - FUTURE CAPACITY
   16 DIALYSIS BOXES INSTALLED ON FLOOR
3. LEVEL 7
   16 DIALYSIS BOXES INSTALLED ON FLOOR
4. LEVEL 8
   16 DIALYSIS BOXES INSTALLED ON FLOOR
5. LEVEL 9
   2 DIALYSIS BOXES INSTALLED ON FLOOR
6. LEVEL 10
   2 DIALYSIS BOXES INSTALLED ON FLOOR
7. LEVEL 11
   30 DIALYSIS BOXES INSTALLED ON FLOOR
8. LEVEL 12 - FUTURE CAPACITY
   2 DIALYSIS BOXES INSTALLED ON FLOOR



HUMPHREYS, LLC
P.O. BOX 1457
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

DOMESTIC COLD WATER SYSTEM

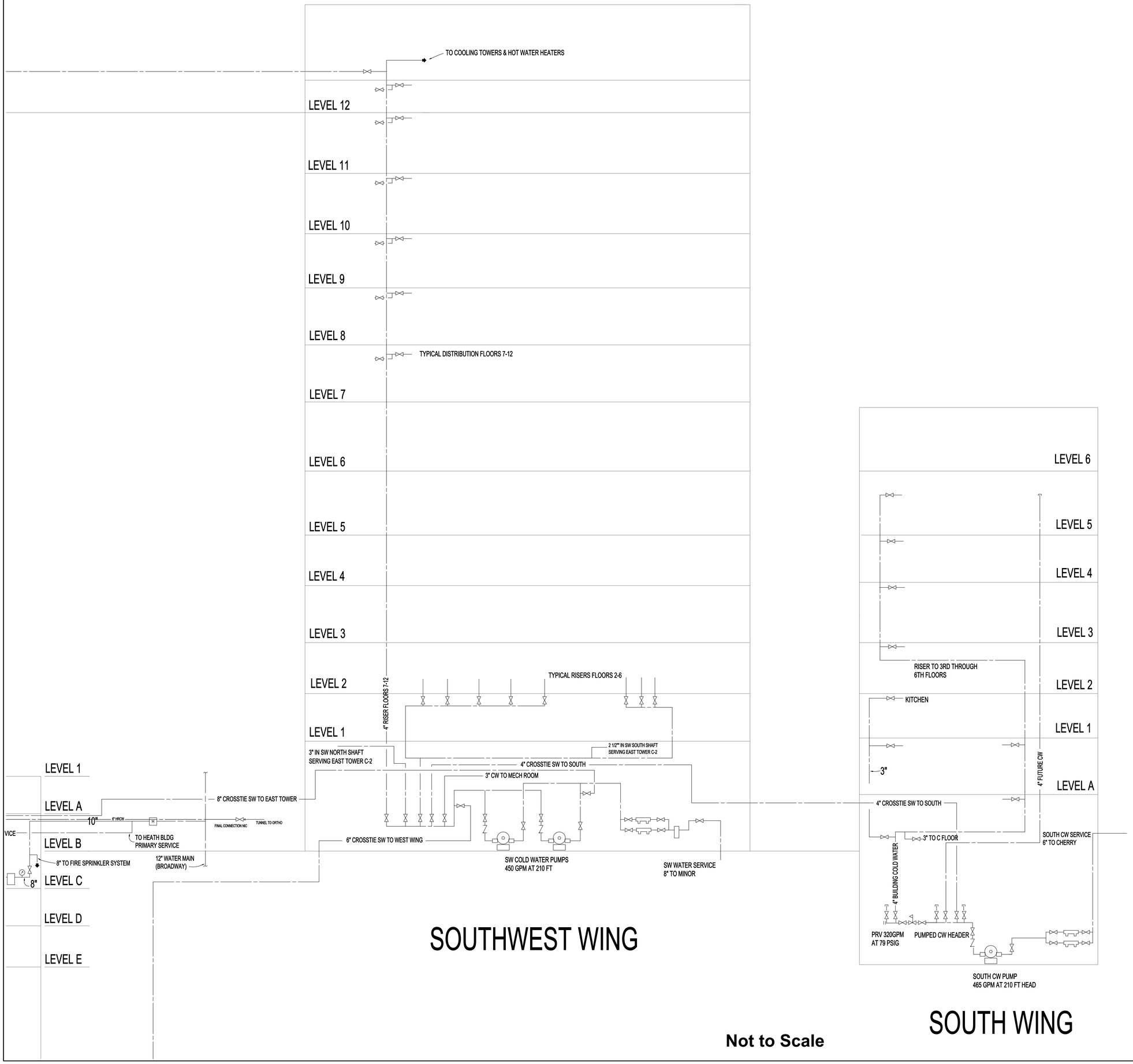
East Tower Building

REV.	DATE	DESCRIPTION
2	5/27/2006	Global Revisions
1	05/24/07	Global Revisions including SCH

DESIGNED BY:
CHECKED BY:
PROG. NO.
DATE 12/01/2005

DWG.
East Tower Bldg. Domestic Cold Water Diagram
Not to Scale

DWG.
M7.43



Not to Scale

HUMPHREYS, LLC
P.O. BOX 1452
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

DOMESTIC COLD WATER SYSTEM

South Building

Southwest Building

KEY
STREET PRESSURE WATER (LRCW)
PUMPED WATER (HRCW)
DIALYSIS WATER (DCW)

REV	DATE	DESCRIPTION
2	02/01/08	Global Revisions
1	05/24/07	Global Revisions including SOI

DESIGNED BY: CHECKED BY:

PROG. NO.

DATE 12/01/2005

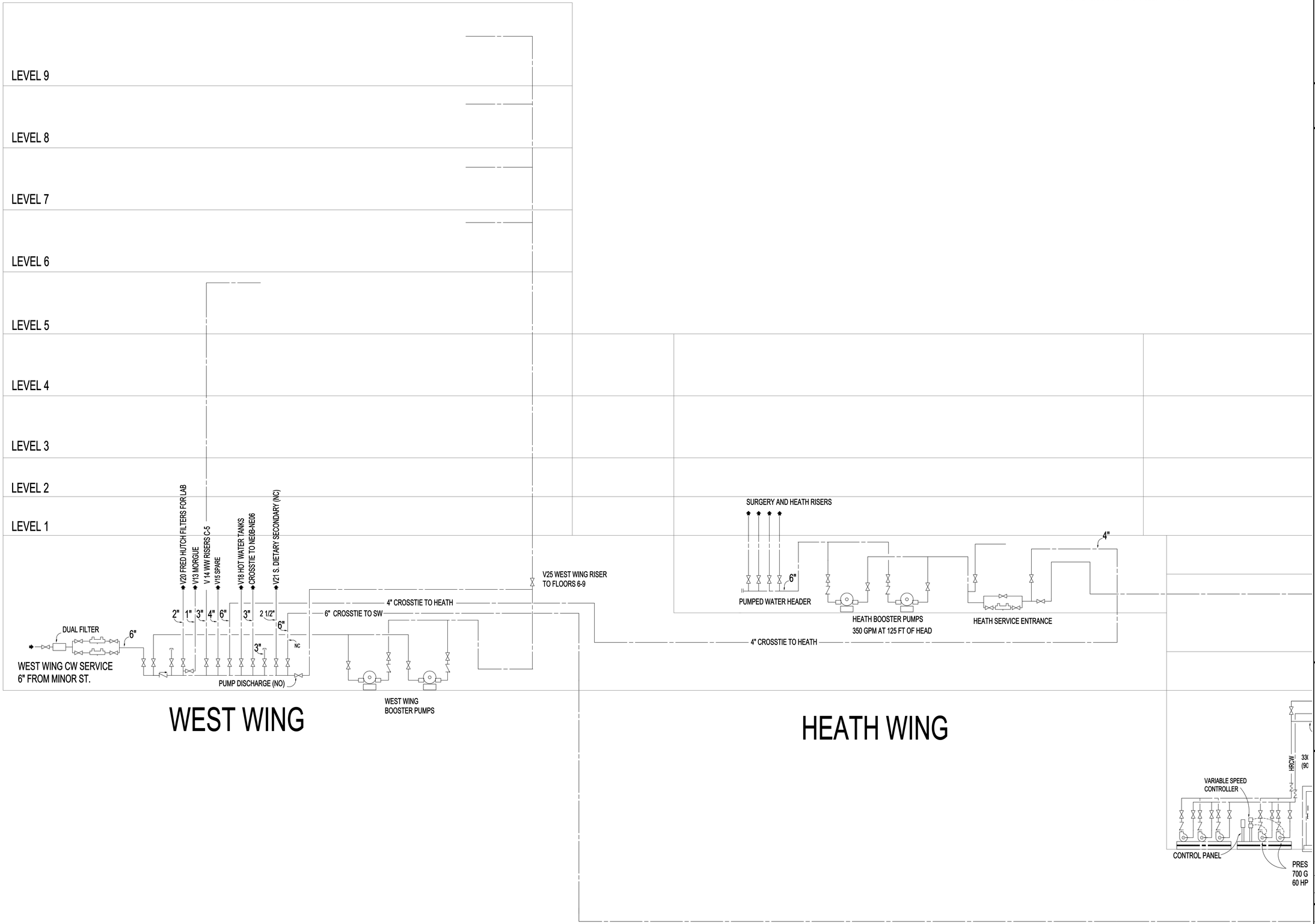
DWG. South Bldg. Southwest Bldg. Domestic Cold Water Diagram

Not to Scale

DWG. **M7.42**

2 DIALYSIS BOXES INSTALLED ON FLOOR

6. LEVEL 10
   2 DIALYSIS BOXES INSTALLED ON FLOOR
7. LEVEL 11
   30 DIALYSIS BOXES INSTALLED ON FLOOR
8. LEVEL 12 - FUTURE CAPACITY
   2 DIALYSIS BOXES INSTALLED ON FLOOR



Not to Scale

HUMPHREYS, LLC
P.O. BOX 1457
MERCER ISLAND, WA 98040
(206) 931-0260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

DOMESTIC COLD WATER SYSTEM

Heath Building and West Wing

KEY
- STREET PRESSURE WATER (LRCW)
- PUMPED WATER (HRCW)
- DIALYSIS WATER (DCW)

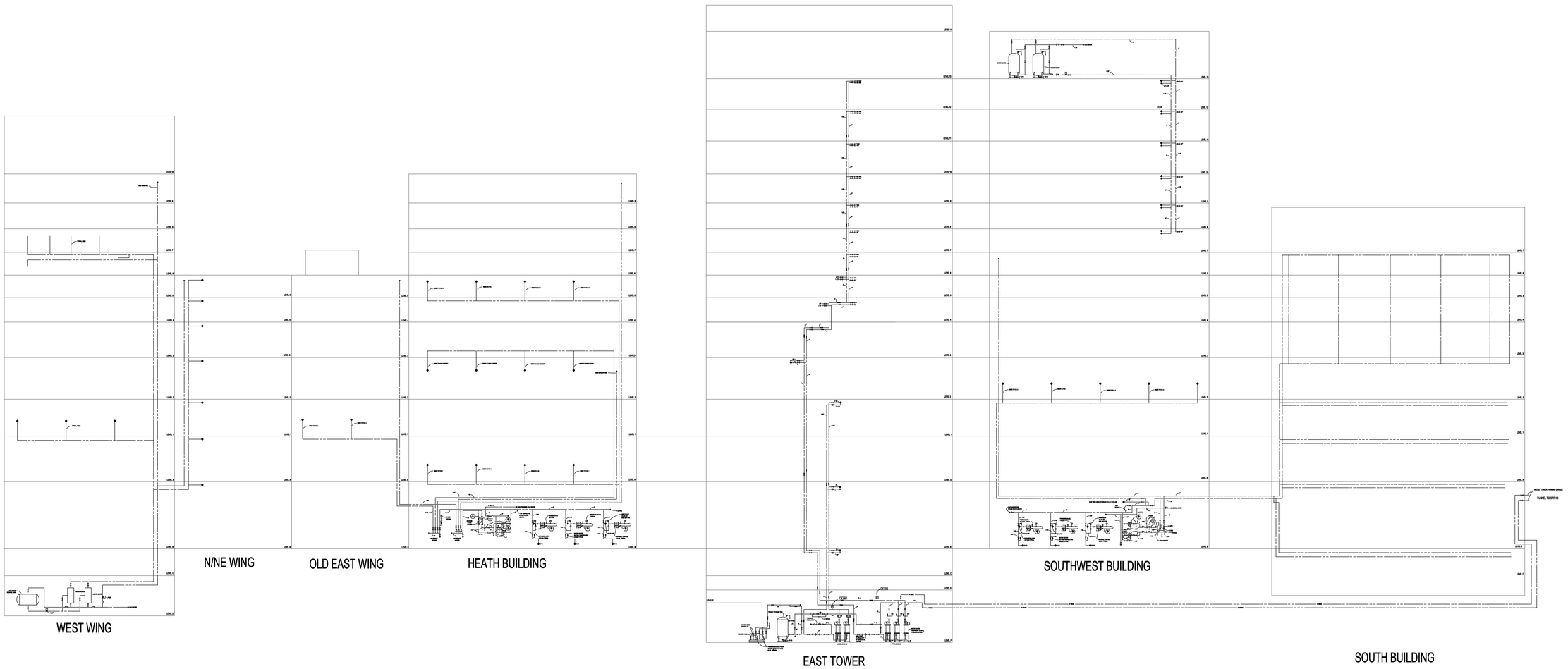
REV	DATE	DESCRIPTION
2	02/01/06	Global Revisions
1	02/24/07	Global Revisions including SOR

DESIGNED BY:
CHECKED BY:
PROG. NO.
DATE 12/01/2005

DWG. **Heath Bldg. West Wing Domestic Cold Water Diagram**

Not to Scale

DWG. **M7.44**



Not to Scale

HUMPHREYS, LLC
P.O. BOX 1457
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

DOMESTIC HOT WATER SYSTEM

South Building M7.52

Southwest Building M7.52

East Tower Building M7.52

Heath Building M7.53

East Wing M7.53

West Wing M7.53

KEY
COLD WATER
PUMPED COLD WATER
HOT WATER HC
HOT WATER CIRCULATION
PREHEATED WATER

PREV	DATE	DESCRIPTION
1	12/01/05	Global Revisions

DESIGNED BY: CHECKED BY:

PROG. NO.

DATE: 12/01/2005

DWG.

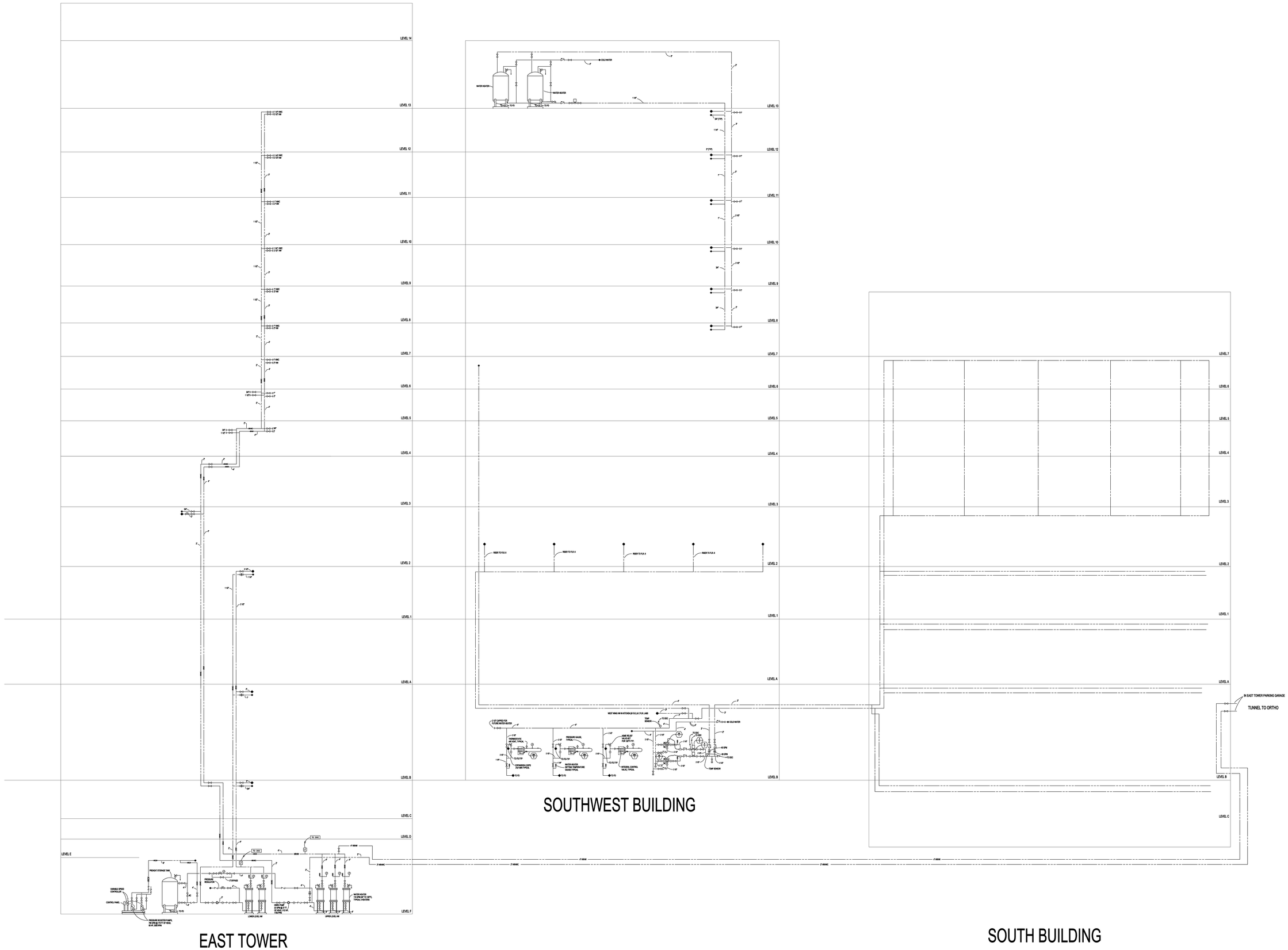
First Hill Campus

Domestic Hot Water Diagram

Not to Scale

DWG.

M7.51



Not to Scale

HUMPHREYS, LLC
P.O. BOX 1457
MERCER ISLAND, WA 98040
(206) 931-9250

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

DOMESTIC HOT WATER SYSTEM

South Building

Southwest Building

East Tower Building

KEY
COLD WATER
HOT WATER COLD WATER
HOT WATER HC
HOT WATER CIRCULATION
PREHEATED WATER

REV	DATE	DESCRIPTION
1	02/01/05	Global Revisions

DESIGNED BY: CHECKED BY:

PROG. NO.

DATE 12/01/2005

DWG.

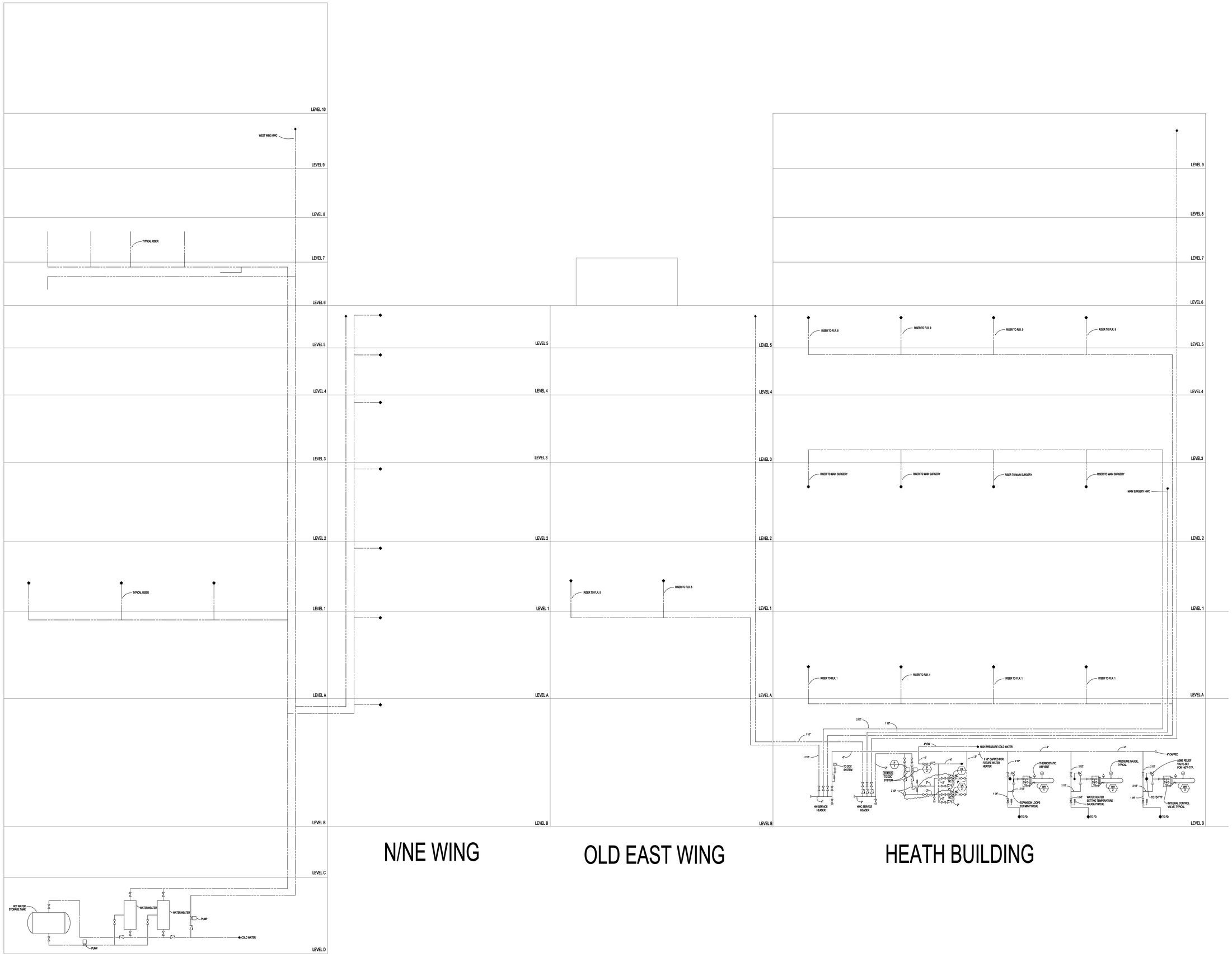
South Building
Southwest
East Tower

Domestic Hot Water Diagram

Not to Scale

DWG.

M7.52



Not to Scale

HUMPHREYS, LLC
P.O. BOX 1452
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

DOMESTIC HOT WATER SYSTEM

Heath Building

Old East Building

North and Northeast Building

West Wing

KEY
- COLD WATER
- PUMPED COLD WATER
- HOT WATER
- HOT WATER CIRCULATION
- PREHEATED WATER

REV	DATE	DESCRIPTION
1	02/03/06	Global Revisions

DESIGNED BY: CHECKED BY:

PROG. NO.

DATE 12/01/2005

DWG.

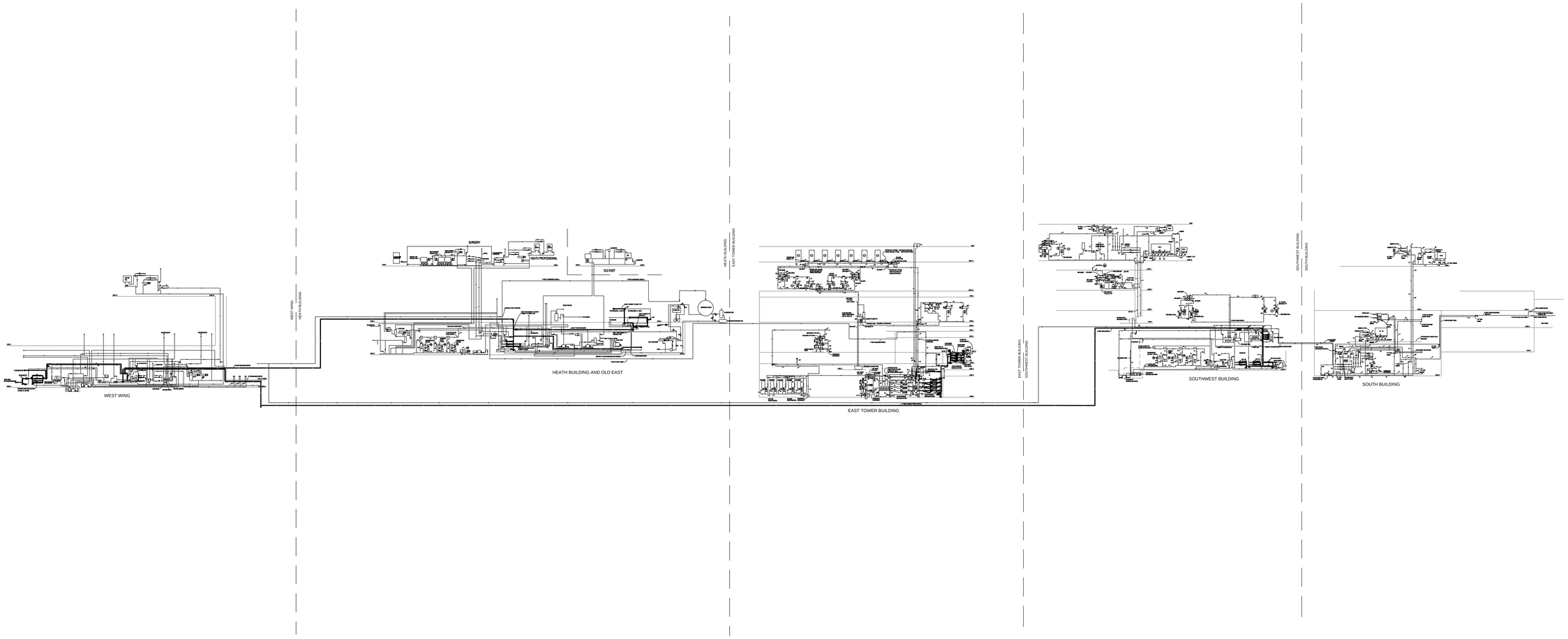
Heath
Old East
North Northeast
West
WingSouthwest

Domestic Hot Water Diagram

Not to Scale

DWG.

M7.53



Not to Scale

HUMPHREYS, LLC
P.O. BOX 1452
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

STEAM AND CONDENSATE SYSTEM

South Bldg.
M7.02

Southwest
M7.03

East Tower
M7.04

Heath Bldg.
M7.05

Old East Bldg.
M7.05

West Wing
M7.05

KEY	
LPS	Low Pressure Steam
LPR	Low Pressure Return
MPS	Medium Pressure Steam
MPR	Medium Pressure Return
HPS	High Pressure Steam

REV.	DATE	DESCRIPTION
2	02/01/08	Global Revisions
1	05/24/07	Global Revisions including SOI

DESIGNED BY: CHECKED BY:

PROG. NO.

DATE **12/01/2005**

DWG.

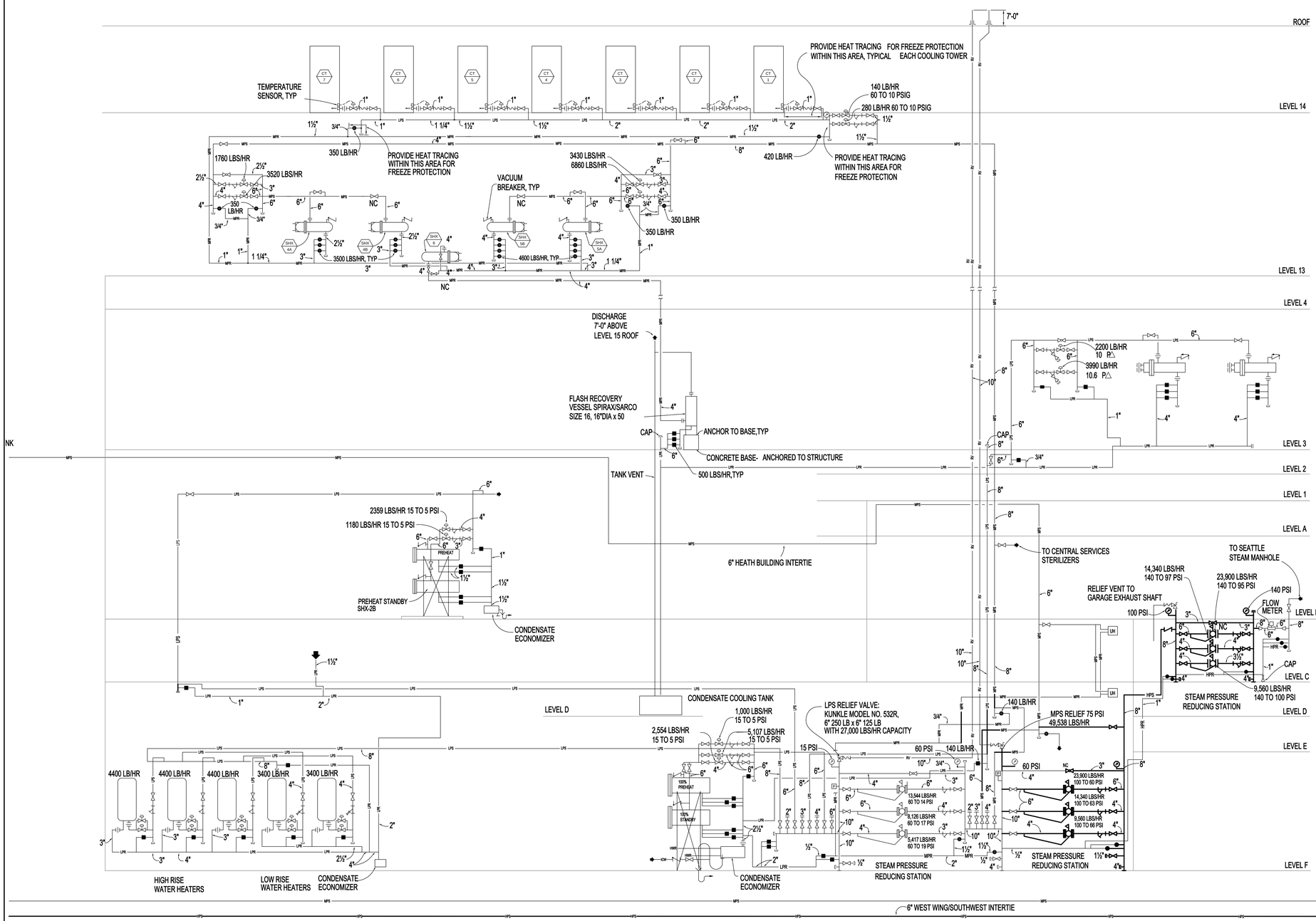
First Hill Campus

Steam and Condensate Diagram

Not to Scale

DWG.

M7.01



EAST TOWER BUILDING

EAST TOWER BUILDING

SOUTHWEST BUILDING

Not to Scale

HUMPHREYS, LLC
P.O. BOX 1457
MERCER ISLAND, WA 98040
(206) 933-9255

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

STEAM AND CONDENSATE SYSTEM

East Tower Building

KEY	
LPS	Low Pressure Steam
LPR	Low Pressure Return
MPS	Medium Pressure Steam
MPR	Medium Pressure Return
HPS	High Pressure Steam

REV	DATE	DESCRIPTION
2	03/01/06	Global Revisions
1	06/24/07	Global Revisions including SOI

DESIGNED BY: CHECKED BY:

PROG. NO.

DATE 12/01/2005

DWG.

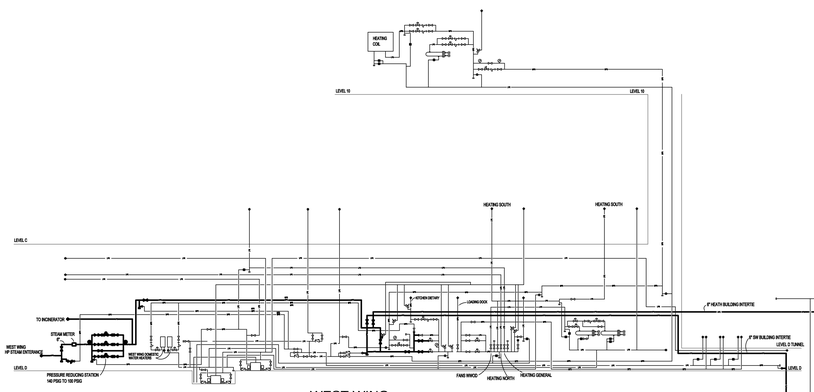
East Tower Building

Steam and Condensate Diagram

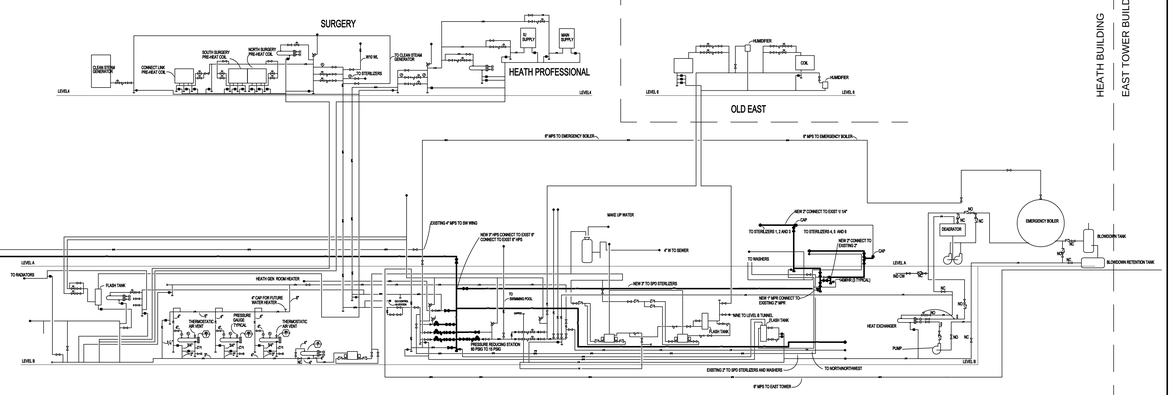
Not to Scale

DWG.

M7.04



WEST WING



HEATH BUILDING AND OLD EAST

HEATH BUILDING

EAST TOWER BUILDING

Not to Scale

HUMPHREYS, LLC
P.O. BOX 1457
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

STEAM AND CONDENSATE SYSTEM

Heath Building

Old East Building

West Wing

KEY	
LPS	Low Pressure Steam
LPR	Low Pressure Return
MPS	Medium Pressure Steam
MPR	Medium Pressure Return
HPS	High Pressure Steam

REV	DATE	DESCRIPTION
2	02/01/06	Global Revisions
1	05/24/07	Global Revisions including SOI

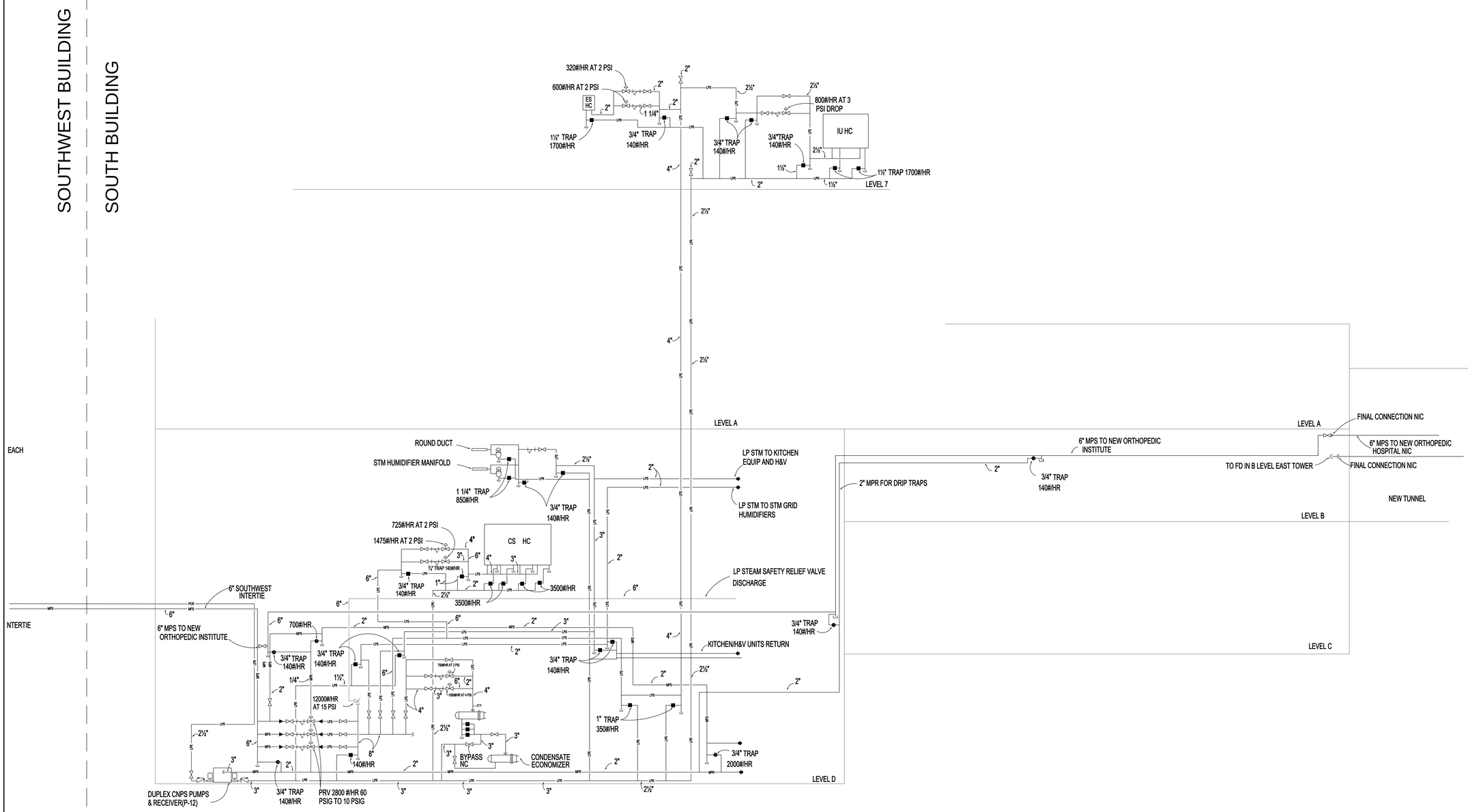
DESIGNED BY:
CHECKED BY:
PROG. NO.
DATE: **12/01/2005**

DWG.
Heath Building Old East Building West Wing

Steam and Condensate Diagram

Not to Scale

DWG.
M7.05



SOUTH BUILDING

Not to Scale

HUMPHREYS, LLC
P.O. BOX 1452
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

STEAM AND CONDENSATE SYSTEM

South Building

East Tower Building

KEY	
LPS	Low Pressure Steam
LPR	Low Pressure Return
MPS	Medium Pressure Steam
MPR	Medium Pressure Return
HPS	High Pressure Steam

REV	DATE	DESCRIPTION
2	02/01/06	Global Revisions
1	06/24/07	Global Revisions including SOI

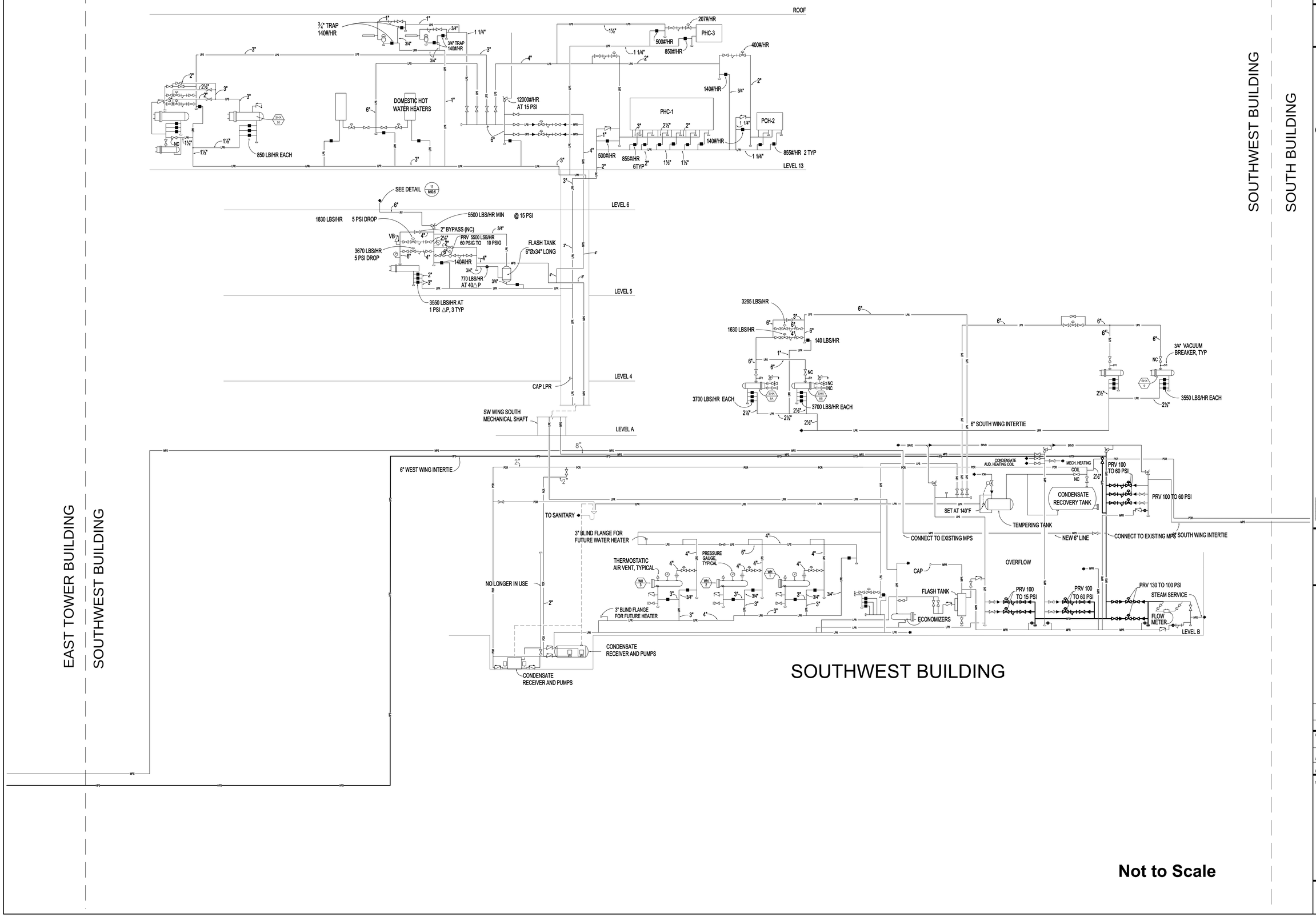
DESIGNED BY:
CHECKED BY:
PROG. NO.
DATE **12/01/2005**
DWG.

South Building

Steam and Condensate Diagram

Not to Scale

DWG.
M7.02



Not to Scale

HUMPHREYS, LLC
P.O. BOX 1487
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

STEAM AND CONDENSATE SYSTEM

Southwest Building

KEY	
LPS	Low Pressure Steam
LPR	Low Pressure Return
MPS	Medium Pressure Steam
MPR	Medium Pressure Return
HPS	High Pressure Steam

REV	DATE	DESCRIPTION
2	02/01/05	Global Revisions
1	05/24/07	Global Revisions including SOI

DESIGNED BY:
CHECKED BY:
PROG. NO.
DATE 12/01/2005
DWG.

Southwest Building

Steam and Condensate Diagram

Not to Scale

DWG.
M7.03

Not to Scale

HUMPHREYS, LLC
P.O. BOX 1457
MERCER ISLAND, WA 98040
(206) 931-0260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

HOT WATER HEATING SYSTEMS

South Bldg M7.12

Southwest M7.12

East Tower M7.12

Heath Bldg. M7.13

East Wing M7.13

West Wing M7.13

REV	DATE	DESCRIPTION
2	02/01/06	Global Revisions
1	06/24/07	Global Revisions including SOI

DESIGNED BY: CHECKED BY:

DATE **12/01/2005**

PROG. NO.

DWG.

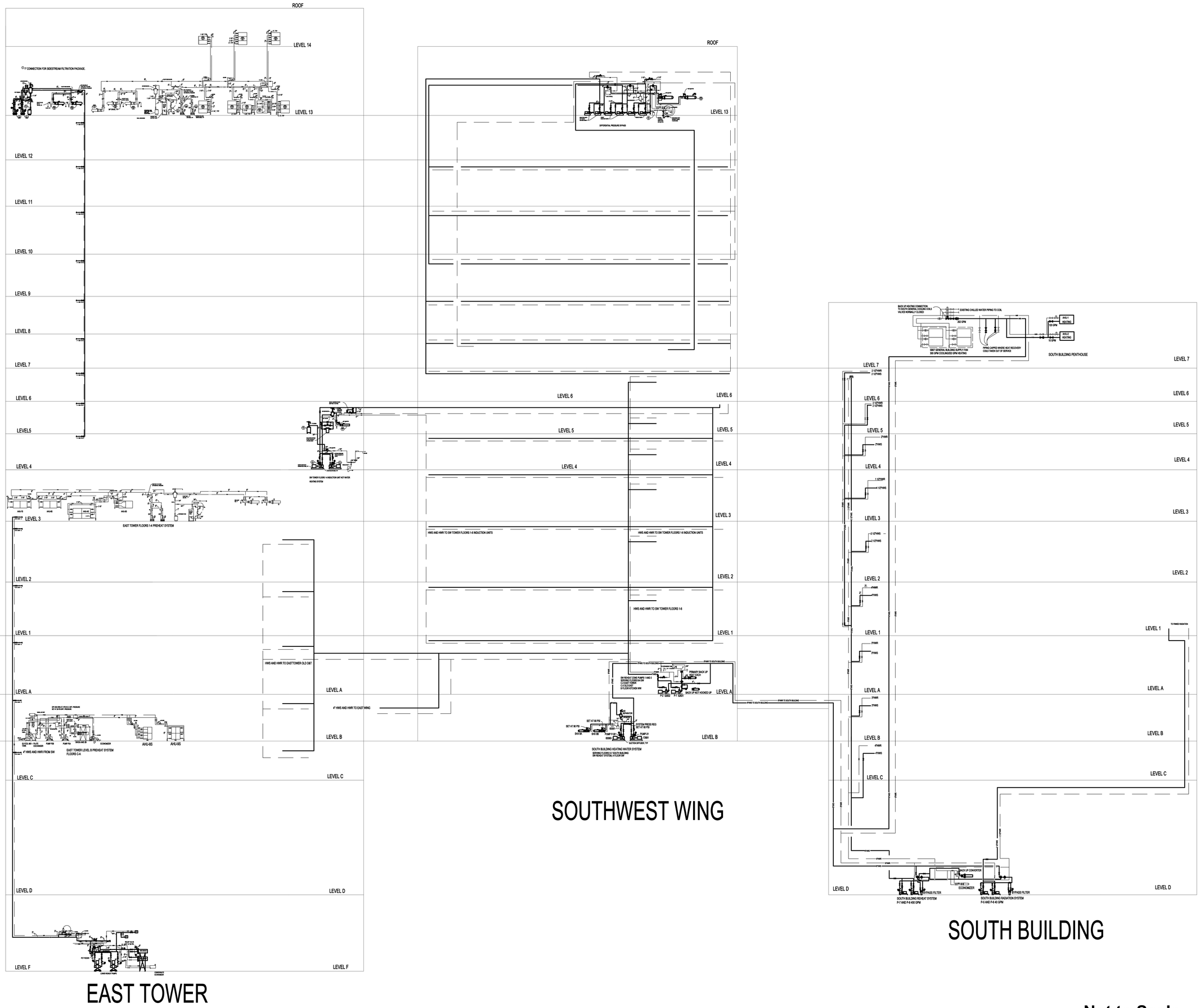
FH Campus

Hot Water Heating Diagram

Not to Scale

DWG.

M7.11



Not to Scale

HUMPHREYS, LLC
P.O. BOX 1457
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

HOT WATER HEATING SYSTEMS

South Building

Southwest Building

East Tower Building

REV.	DATE	DESCRIPTION
2	03/01/06	Global Revisions
1	05/24/07	Global Revisions including SOI

DESIGNED BY: CHECKED BY:

DATE 12/01/2005

PROG. NO.

DWG.

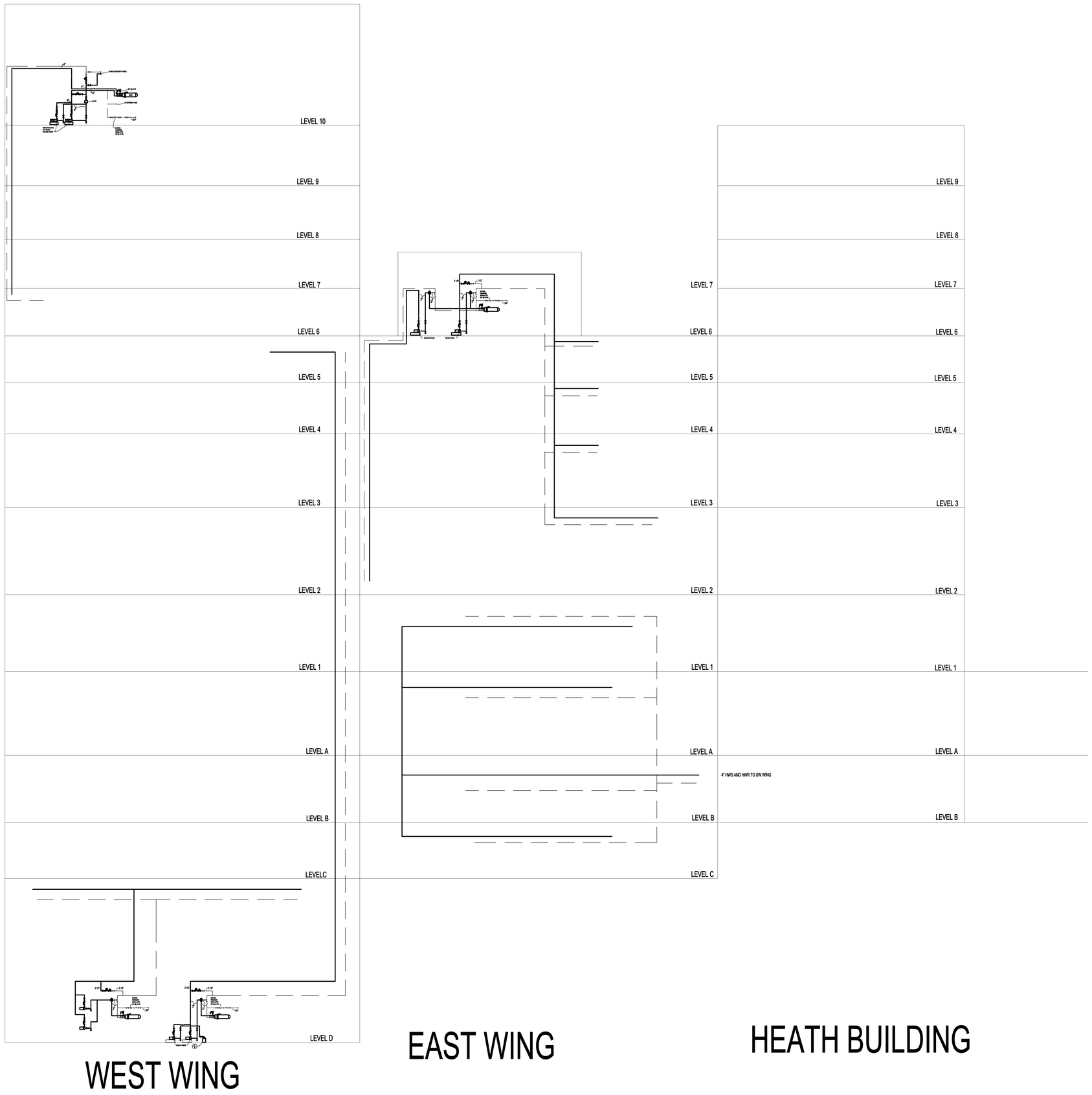
South Building
Southwest
East Tower

Hot Water Heating Diagram

Not to Scale

DWG.

M7.12



Not to Scale

HUMPHREYS, LLC
P.O. BOX 1427
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

HOT WATER HEATING SYSTEMS

Heath Building

East Wing

West Wing

REV	DATE	DESCRIPTION
2	02/01/08	Global Revisions
1	02/22/07	Global Revisions including SOI

DESIGNED BY: CHECKED BY:

DATE: 12/01/2005

PROG. NO.

DWG.

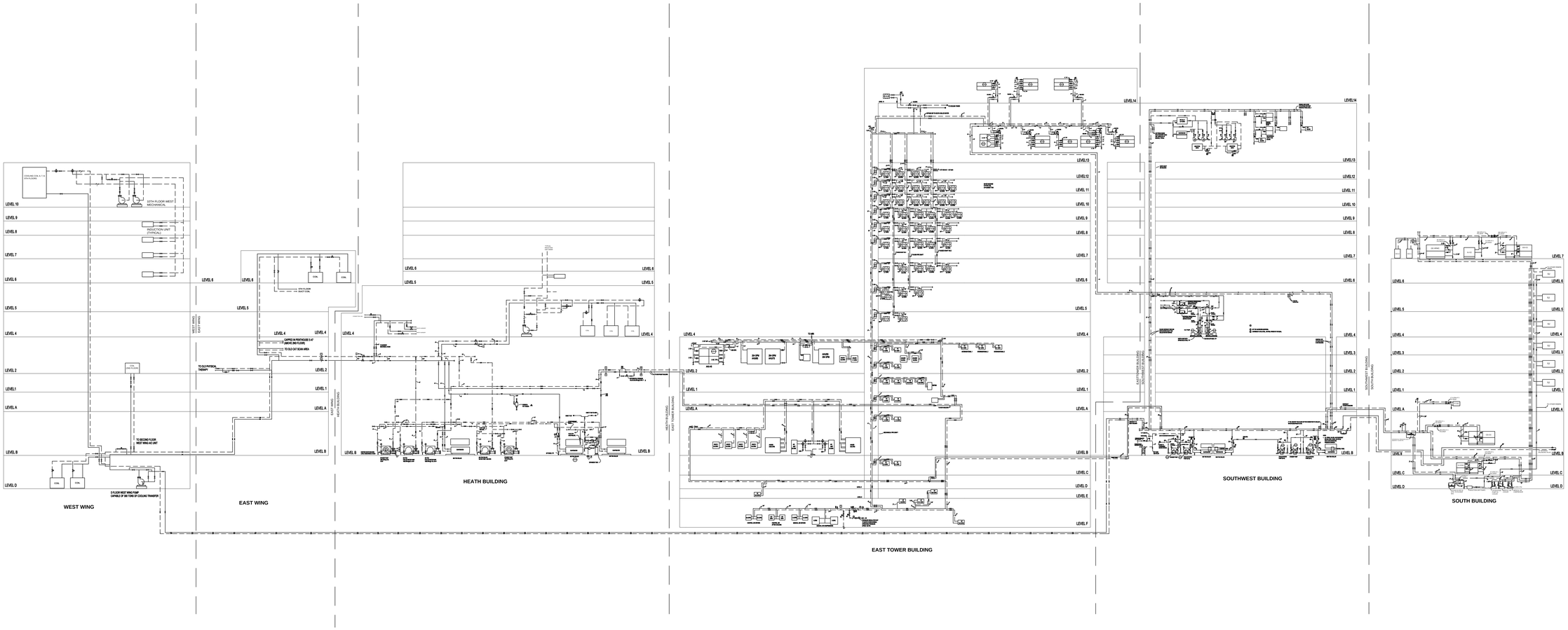
Heath Building
East Wing
West Wing

Hot Water Heating Diagram

Not to Scale

DWG.

M7.13



Not to Scale

HUMPHREYS, LLC
P.O. BOX 1452
MERCER ISLAND, WA 98040
(206) 933-9250

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

CHILLED WATER SYSTEM

South Building M7.02

Southwest Building M7.03

East Tower Building M7.04

Heath Building M7.05

East Wing M7.06

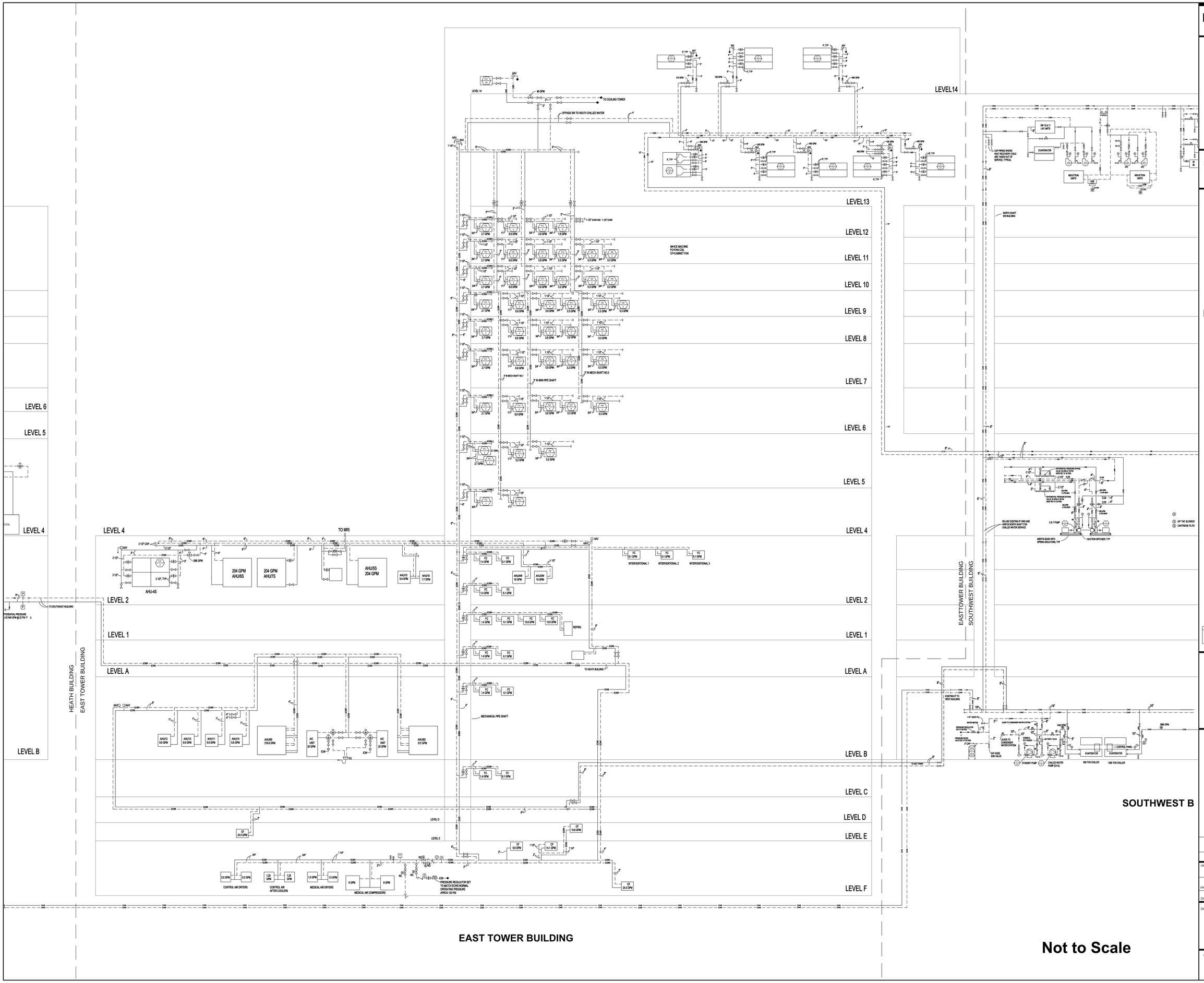
West Wing M7.06

KEY
CHILLED WATER SUPPLY
CHILLED WATER RETURN

REV	DATE	DESCRIPTION
2	02/01/06	Global Revisions
1	05/02/07	Global Revisions including SOI

DESIGNED BY:
CHECKED BY:
PROG. NO.
DATE 12/01/2005
DWG. First Hill Campus Chilled Water Diagram
Not to Scale

DWG. M7.21



HUMPHREYS, LLC
P.O. BOX 1452
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

CHILLED WATER SYSTEM

East Tower Building

KEY
CHILLED WATER SUPPLY
CHILLED WATER RETURN

REV	DATE	DESCRIPTION
2	02/02/06	Global Revisions
1	06/24/07	Global Revisions including SQK

DESIGNED BY: | CHECKED BY:

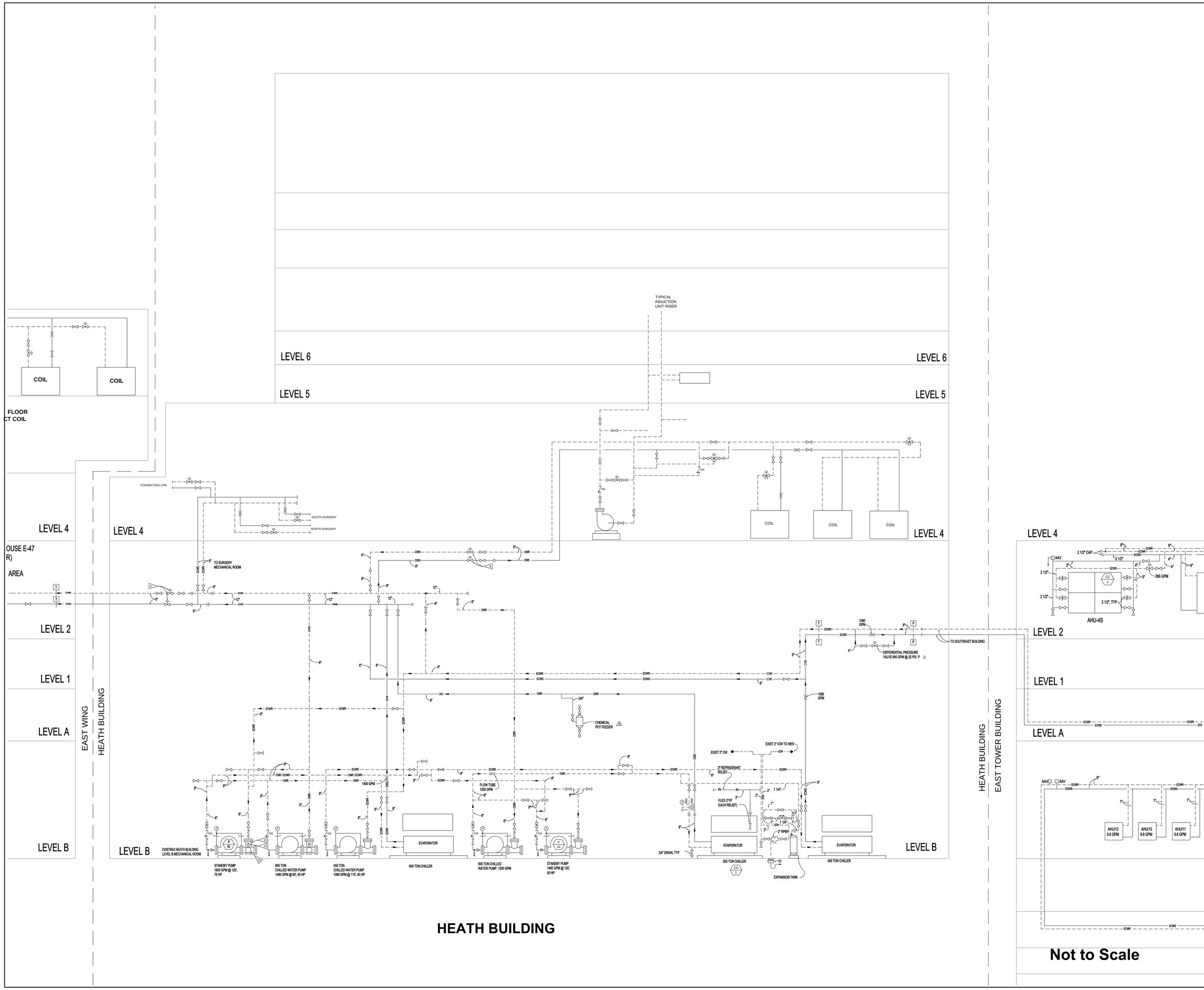
PROG. NO.

DATE: 12/01/2005

DWG.
East Tower Chilled Water Diagram

Not to Scale

DWG.
M7.24



HUMPHREYS, LLC
P.O. BOX 1452
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

CHILLED WATER SYSTEM

Heath Building

KEY
CHILLED WATER SUPPLY
CHILLED WATER RETURN

REV	DATE	DESCRIPTION
2	02/01/05	Global Revisions
1	02/02/2007	Global Revisions including SOI

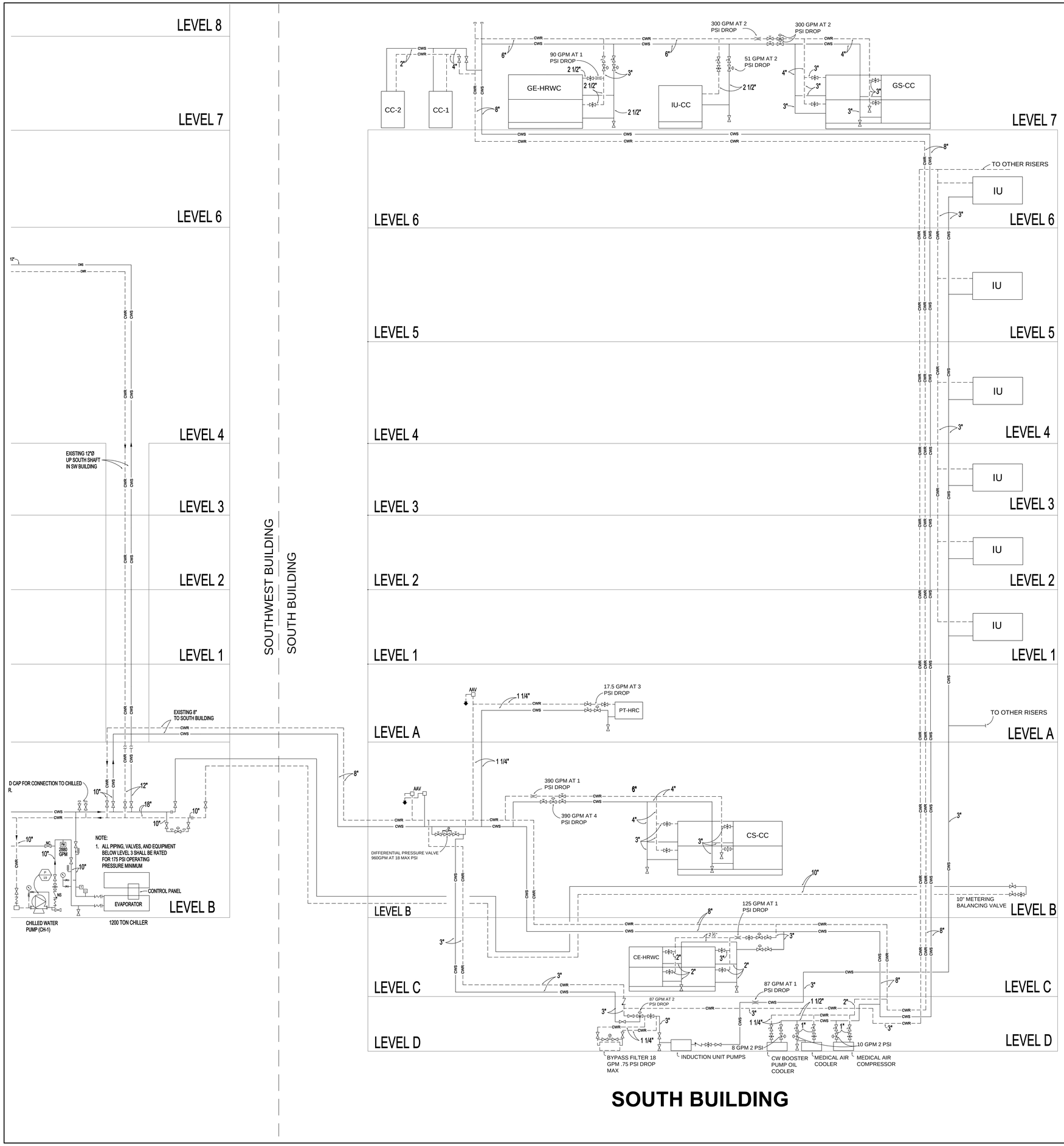
DESIGNED BY: CHECKED BY:

PROG. NO.

DATE: 12/01/2005

DWG.
Heath Building Chilled Water Diagram
Not to Scale

DWG.
M7.25



SOUTH BUILDING

Not to Scale

HUMPHREYS, LLC
P.O. BOX 1452
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

CHILLED WATER SYSTEM

South Building

KEY
CHILLED WATER SUPPLY
CHILLED WATER RETURN

REV.	DATE	DESCRIPTION
2	02/01/06	Global Revisions
1	05/24/07	Global Revisions including SOI

DESIGNED BY: CHECKED BY:

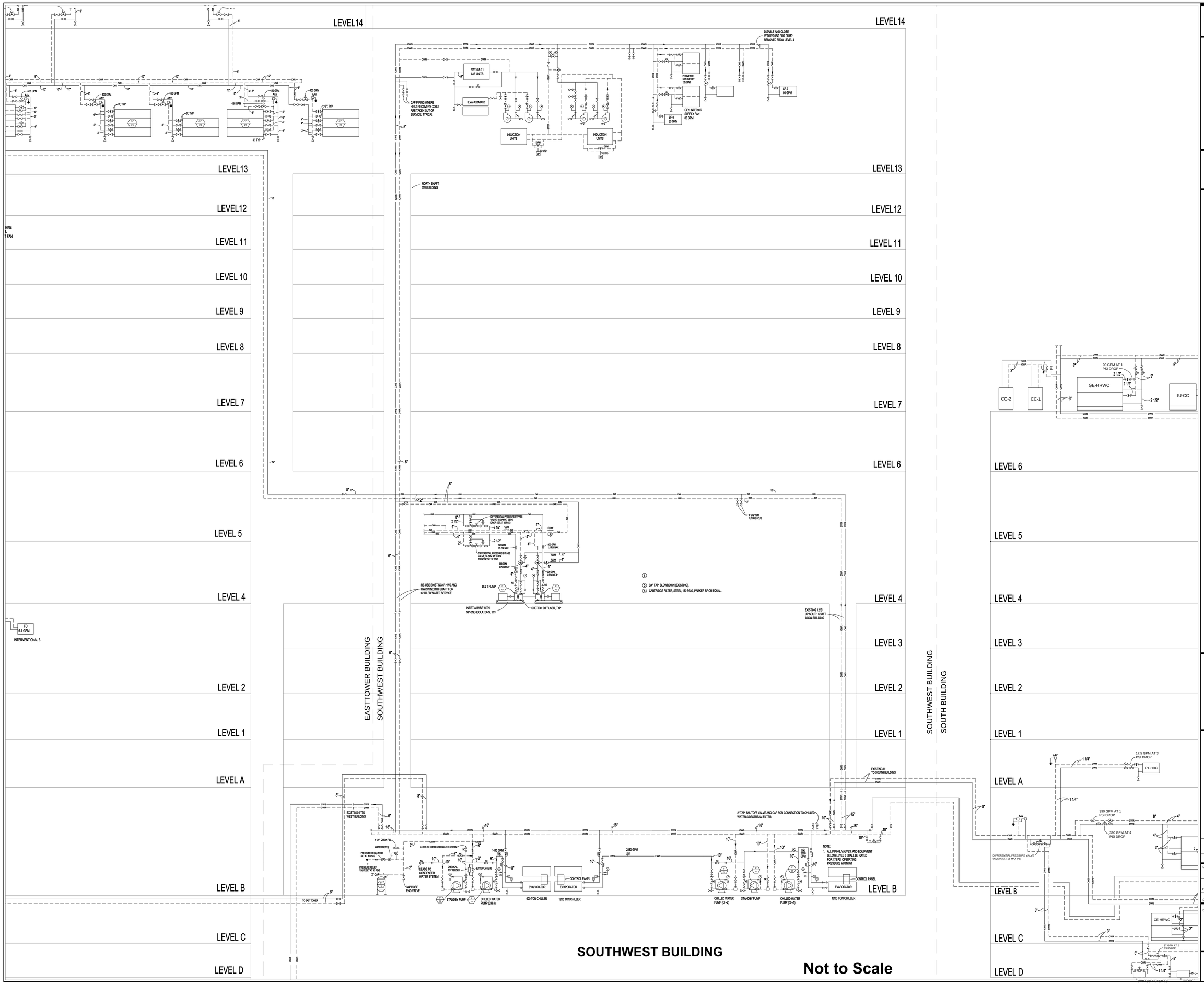
PROG. NO.

DATE: 12/01/2005

DWG. **South Building Chilled Water Diagram**

Not to Scale

DWG. **M7.22**



HUMPHREYS, LLC
P.O. BOX 1457
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

CHILLED WATER SYSTEM

Southwest Building

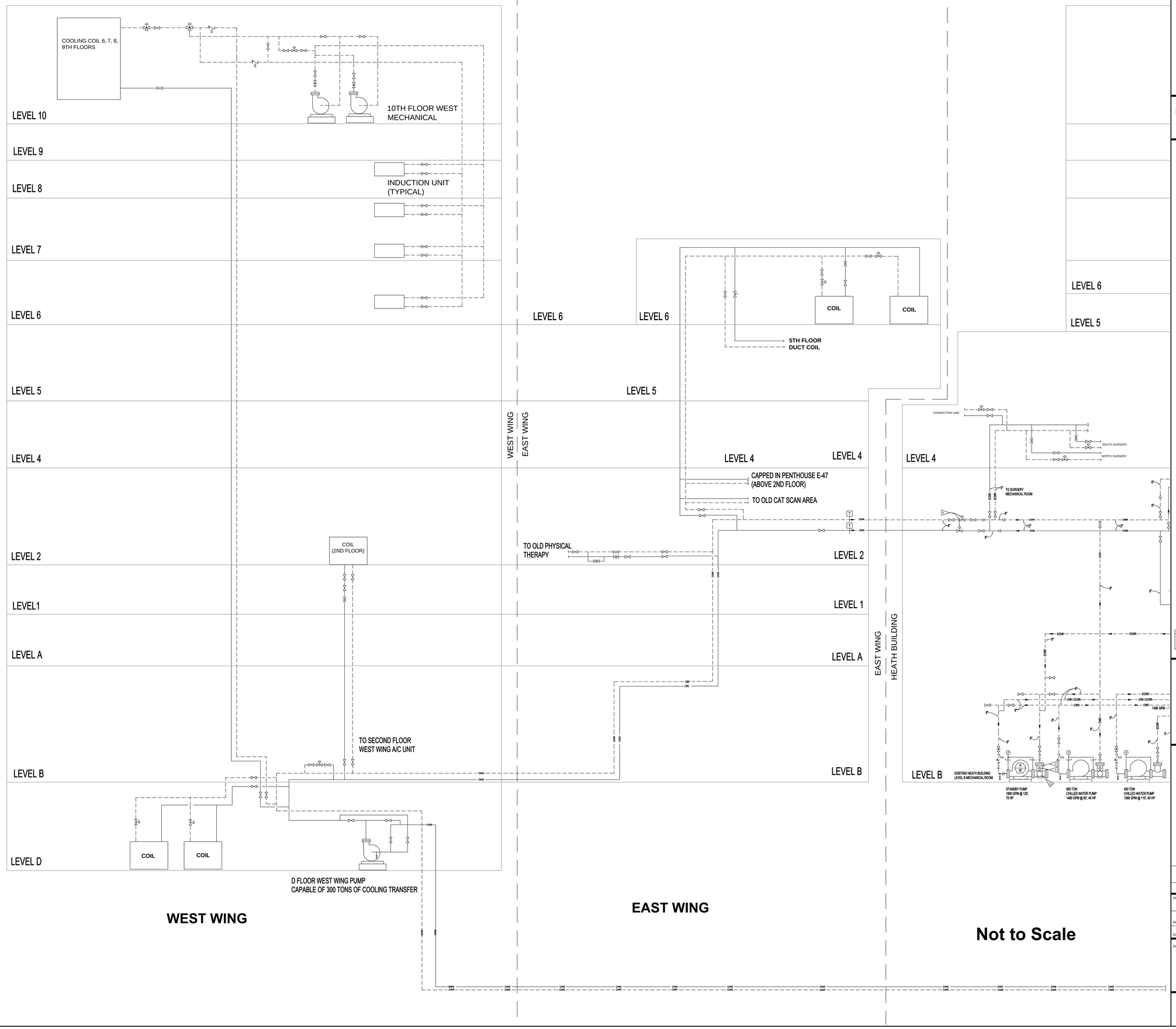
KEY
CHILLED WATER SUPPLY
CHILLED WATER RETURN

REV	DATE	DESCRIPTION
2	02/08/06	Global Revisions
1	05/24/07	Global Revisions including DSR

DESIGNED BY:
CHECKED BY:
PROG. NO.
DATE 12/01/2005

DWG.
Southwest Bldg. Chilled Water Diagram
Not to Scale

DWG.
M7.23



HUMPHREYS, LLC
P.O. BOX 1487
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

CHILLED WATER SYSTEM

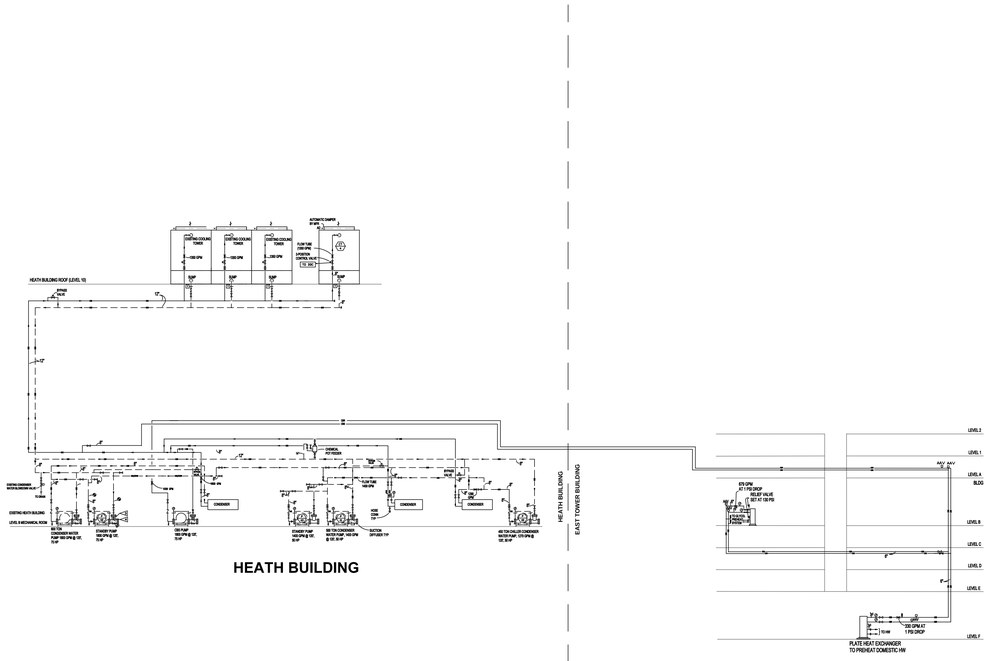
East Wing and West Wing

REV.	DATE	DESCRIPTION
2	02/25/08	Global Revisions
1	05/24/07	Global Revisions including SOI

DESIGNED BY:
CHECKED BY:
PROG. NO.
DATE: 12/01/2005

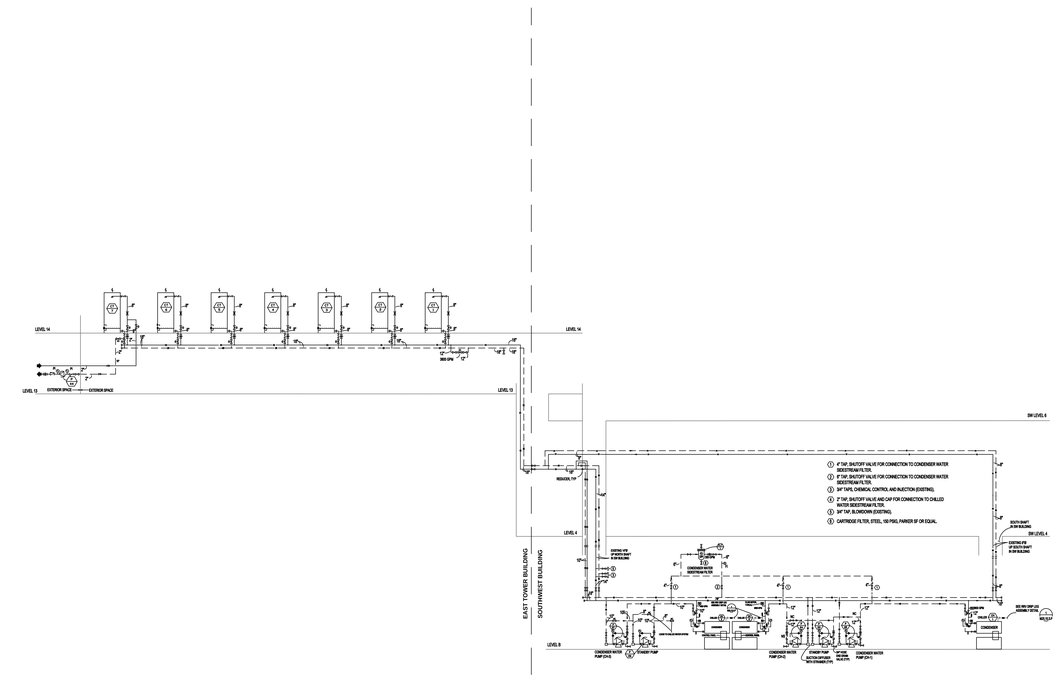
DWG. East Wing West Wing Chilled Water Diagram
Not to Scale

DWG. **M7.26**



HEATH BUILDING

EAST TOWER BUILDING



SOUTHWEST BUILDING

KEY
CONDENSER SUPPLY
CONDENSER RETURN

HUMPHREYS, LLC
P.O. BOX 1452
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

CONDENSER WATER SYSTEM

Southwest Building M7.32

Heath Building M7.33

REV	DATE	DESCRIPTION
1	02/01/08	Global Revisions

DESIGNED BY: CHECKED BY:

PROG. NO.

DATE 12/01/2005

DWG.

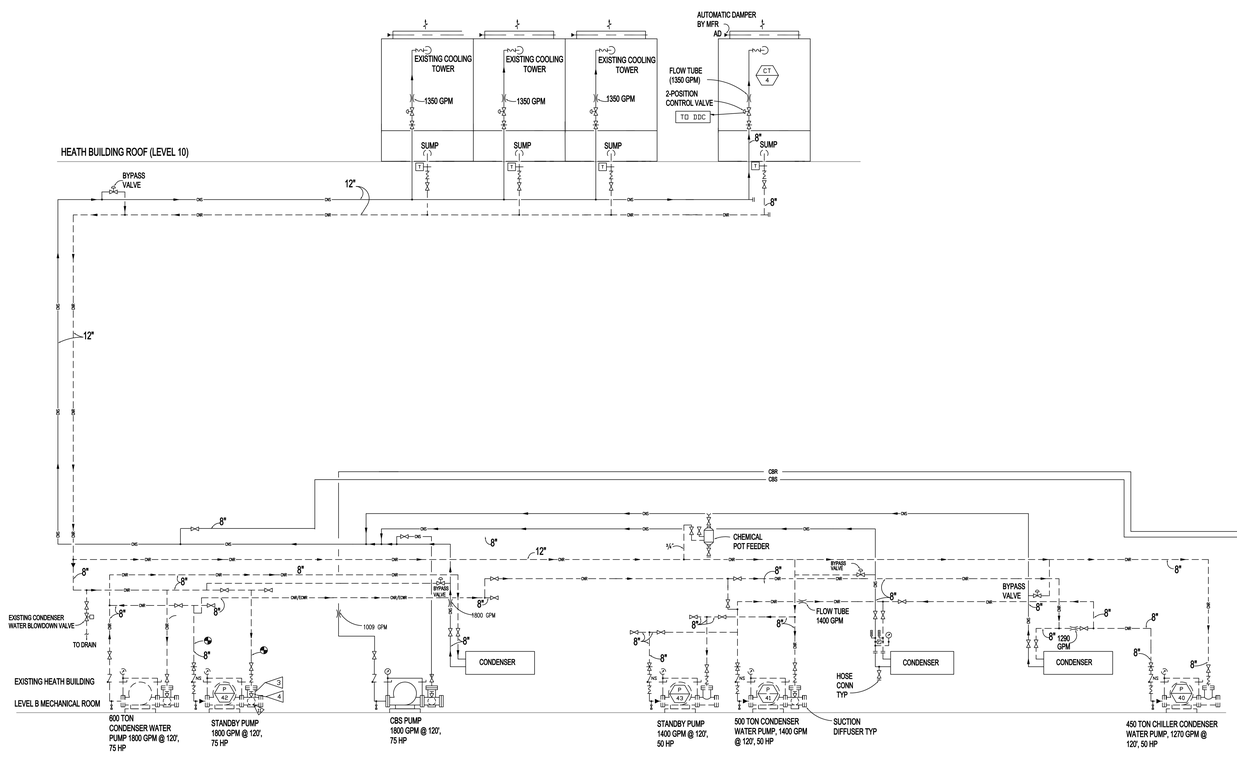
First Hill Campus

Chiller Plant Conderser Water Diagram

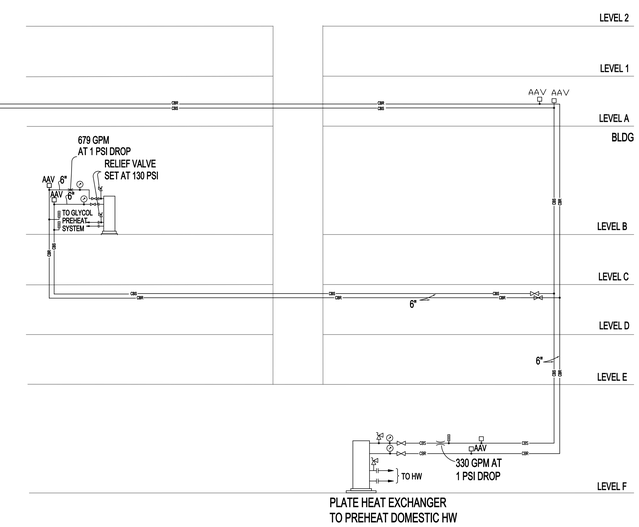
Not to Scale

DWG.

M7.31



HEATH BUILDING



EAST TOWER BUILDING

Not to Scale

HUMPHREYS, LLC
P.O. BOX 1453
MERCER ISLAND, WA 98040
(206) 933-9280

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

CONDENSER WATER SYSTEM

Heath Building

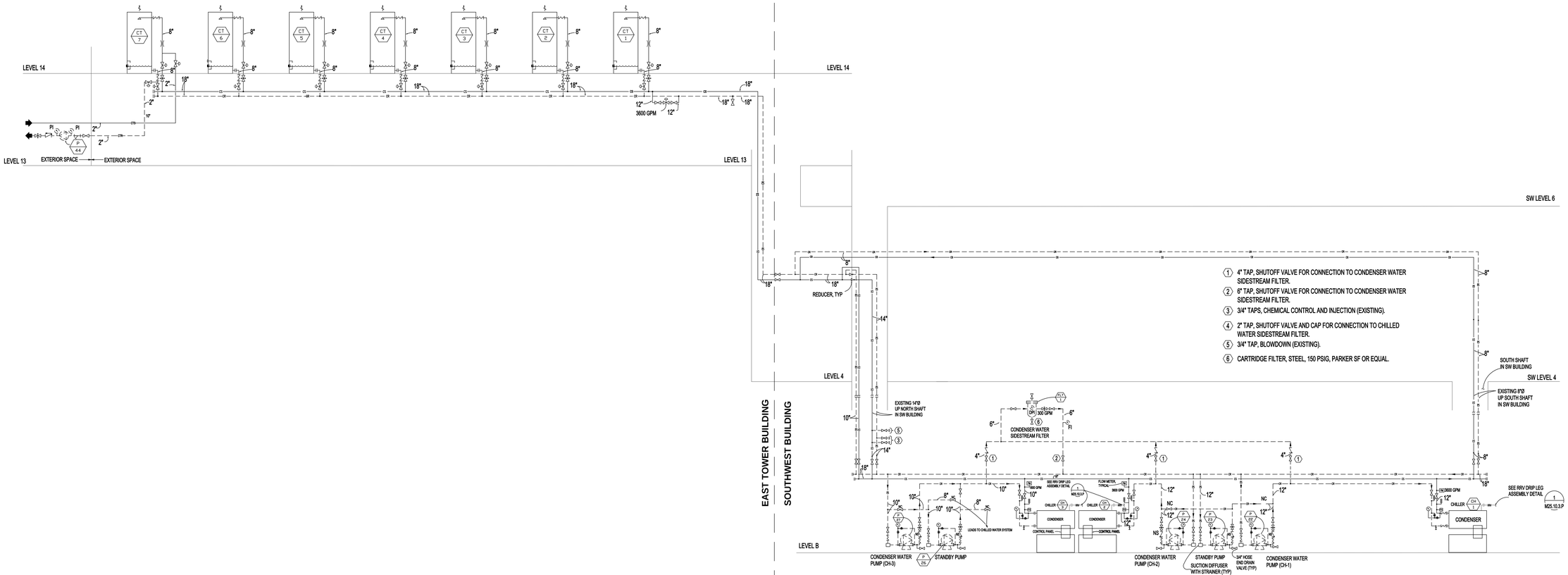
KEY	
——	CONDENSER SUPPLY
— —	CONDENSER RETURN

REV	DATE	DESCRIPTION
1	02/01/06	Global Revisions

DESIGNED BY:
CHECKED BY:
PROG. NO.
DATE 12/01/2005

DWG. **Heath Building Chiller Plant Conderser Water Diagram**
Not to Scale

DWG. **M7.33**



SOUTHWEST BUILDING

Not to Scale

HUMPHREYS, LLC
P.O. BOX 1452
MERCER ISLAND, WA 98040
(206) 931-9260

SWEDISH
Medical Center

First Hill Campus
747 Broadway
Seattle, WA 98122

CONDENSER WATER SYSTEM

Southwest Building

KEY
CONDENSER SUPPLY
CONDENSER RETURN

REV.	DATE	DESCRIPTION
1	02/01/06	Global Revisions

DESIGNED BY: CHECKED BY:

PROG. NO.

DATE 12/01/2005

DWG. **Southwest Chiller Plant Conderser Water Diagram**

Not to Scale

DWG. **M7.32**

				Existing				Proposed					Energy						
ID	Building Name	Location	Time Code	Description	# of Fixtures	Watts per Fixture	Operating Hours	Fixture Code	Description	# of Fixtures (if different from existing)	Watts per Fixture	Operating Hours	Existing kW	Proposed kW	Existing kWh	Proposed kWh	kW Savings per Month	kW Savings per Year	kWh Savings per Year
72	Cherry Hill Central Plant	Office B03N	714	2x4 Prismatic / 32W Fluorescent, 4'-0" T8 / Electronic, T8	3	86	5256	N	No Retrofit Proposed	3	86	3679	0.2	0.2	1,288	902	0.00	0.00	386
73	Cherry Hill Central Plant	Offices 108N, 109N	708	2x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Energy Savings Magnetic, T12	3	144	2920	RK24-2	Retrokit with reflector, (2) 32W T8 & EB2L electronic ballast	3	55	2044	0.4	0.2	1,198	320	0.25	3.04	878
74	Cherry Hill Central Plant	Corridors	708	2x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Energy Savings Magnetic, T12	3	144	2920	RK24-2	Retrokit with reflector, (2) 32W T8 & EB2L electronic ballast	3	55	2920	0.4	0.2	1,198	458	0.25	3.04	741
75	Cherry Hill Central Plant	Paint Booth	506	Wet Location / 34W Fluorescent, 4'-0" T12 / Energy Savings Magnetic, T12	3	72	1564	EB2LL	Lamp & Ballast retrofit, (2) 32W T8 & low ballast factor electronic ballast.	3	48	1564	0.2	0.1	321	214	0.07	0.82	107
76	Cherry Hill Central Plant	Office 101AN and 101BN	510	2x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Energy Savings Magnetic, T12	4	144	2607	RK24-2	Retrokit with reflector, (2) 32W T8 & EB2L electronic ballast	4	55	1825	0.5	0.2	1,427	381	0.34	4.06	1,045
77	Cherry Hill Central Plant	Upper rest room	506	1x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	1	82	1564	EB2LL	Lamp & Ballast retrofit, (2) 32W T8 & low ballast factor electronic ballast.	1	48	1095	0.1	0.0	122	50	0.03	0.39	72
78	Cherry Hill Central Plant	Open file area	508	1x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	1	130	2086	EB2LL	Lamp & Ballast retrofit, (2) 32W T8 & low ballast factor electronic ballast.	1	48	2086	0.1	0.0	258	95	0.08	0.93	162
79	Cherry Hill Central Plant	Open file area	508	1x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	1	82	2086	EB2LL	Lamp & Ballast retrofit, (2) 32W T8 & low ballast factor electronic ballast.	1	48	2086	0.1	0.0	162	95	0.03	0.39	67
80	Cherry Hill Central Plant	Storage	504	1x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	1	48	1043	EB1LL	Lamp & Ballast retrofit, (1) 32W T8 & low ballast factor electronic ballast.	1	25	1043	0.0	0.0	48	25	0.02	0.26	23

Room Data

				Existing				Proposed					Energy						
ID	Building Name	Location	Time Code	Description	# of Fixtures	Watts per Fixture	Operating Hours	Fixture Code	Description	# of Fixtures (if different from existing)	Watts per Fixture	Operating Hours	Existing kW	Proposed kW	Existing kWh	Proposed kWh	kW Savings per Month	kW Savings per Year	kWh Savings per Year
81	Cherry Hill Central Plant	File room	504	1x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	1	48	1043	EB1LL	Lamp & Ballast retrofit, (1) 32W T8 & low ballast factor electronic ballast.	1	25	1043	0.0	0.0	48	25	0.02	0.26	23
82	Cherry Hill Central Plant	File room	504	8' Strip / 75W Fluorescent, 8'-0" T12, Slimline / Standard Magnetic, T12	2	100	1043	RK8C-2	Socket & channel retrokit for 8'-0" strip, (2) 32W T8 lamps and (1) EB2L electronic ballasts.	2	55	1043	0.2	0.1	198	109	0.09	1.03	89
83	Cherry Hill Central Plant					0	0				0	0	0.0	0.0	0	0	0.00	0.00	0
84	Cherry Hill Central Plant					0	0				0	0	0.0	0.0	0	0	0.00	0.00	0
85	Cherry Hill Central Plant					0	0				0	0	0.0	0.0	0	0	0.00	0.00	0
86	Cherry Hill Central Plant					0	0				0	0	0.0	0.0	0	0	0.00	0.00	0
88	Cherry Hill Central Plant	First floor offices	504	2x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Energy Savings Magnetic, T12	18	144	1043	RK24-2	Retrokit with reflector, (2) 32W T8 & EB2L electronic ballast	18	55	730	2.5	0.9	2,568	687	1.52	18.26	1,881
89	Cherry Hill Annex	First floor corridor	508	34W Fluorescent, 4'-0" T12 / Energy	1	144	2086	RK24-2	reflector, (2) 32W T8 & EB2L	1	55	2086	0.1	0.1	285	109	0.08	1.01	176
90	Cherry Hill Annex	First floor offices	504	34W Fluorescent, 4'-0" T12 / Energy	3	72	1043	EB2LL	retrofit, (2) 32W T8 & low ballast	3	48	1043	0.2	0.1	214	143	0.07	0.82	71
91	Cherry Hill Annex	Second floor offices	506	34W Fluorescent, 4'-0" T12 / Energy	13	72	1564	EB2LL	retrofit, (2) 32W T8 & low ballast	13	48	1095	0.9	0.6	1,391	649	0.30	3.56	742
92	Cherry Hill Annex	Conference room	502	34W Fluorescent, 4'-0" T12 / Energy	5	144	521	EB4LL	retrofit, (4) 32W T8 & low ballast	5	95	365	0.7	0.5	357	165	0.23	2.79	192
93	Cherry Hill Annex	Second floor offices	506	34W Fluorescent, 4'-0" T12 / Energy	1	144	1564	EB4LL	retrofit, (4) 32W T8 & low ballast	1	95	1095	0.1	0.1	214	99	0.05	0.56	115
94	Cherry Hill Annex	Second floor corridor	508	34W Fluorescent, 4'-0" T12 / Energy	4	72	2086	EB2LL	retrofit, (2) 32W T8 & low ballast	4	48	2086	0.3	0.2	571	380	0.09	1.09	190
95	Cherry Hill Professional Building	Stairwells	724	32W Fluorescent, 4'-0" T8 / Electronic, T8	12	63	8760	FW14-2/SENSOR	wraparound, (1) 32W T8 Lamp, (1) F17T8 Lamp,	12	32	8760	0.7	0.4	6,291	3,196	0.35	4.24	3,096
96	Cherry Hill Professional Building	Floor 4 corridors	514	34W Fluorescent, 4'-0" T12 / Standard Magnetic,	19	82	3650	RK22-2L17	retrokit for 2'x2' troffer, (2) 17W T8 lamps and	19	32	3650	1.5	0.6	5,402	2,108	0.90	10.83	3,294
97	Cherry Hill Professional Building	Floor 4 offices	510	2x2 Paracube / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	74	82	2607	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	74	32	1825	5.8	2.2	15,029	4,106	3.52	42.18	10,924

				Existing				Proposed					Energy						
ID	Building Name	Location	Time Code	Description	# of Fixtures	Watts per Fixture	Operating Hours	Fixture Code	Description	# of Fixtures (if different from existing)	Watts per Fixture	Operating Hours	Existing kW	Proposed kW	Existing kWh	Proposed kWh	kW Savings per Month	kW Savings per Year	kWh Savings per Year
98	Cherry Hill Professional Building	Conference room	506	2x2 Paracube / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	6	82	1564	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	6	32	1095	0.5	0.2	731	200	0.29	3.42	531
99	Cherry Hill Professional Building	Meeting room	506	2x2 Paracube / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	20	82	1564	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	20	32	1095	1.6	0.6	2,437	666	0.95	11.40	1,771
100	Cherry Hill Professional Building	Office corridors	510	2x2 Paracube / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	14	82	2607	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	14	32	2607	1.1	0.4	2,843	1,110	0.67	7.98	1,734
101	Cherry Hill Professional Building	Lounge	510	2x2 Paracube / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	8	82	2607	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	8	32	2607	0.6	0.2	1,625	634	0.38	4.56	991
102	Cherry Hill Professional Building	Floor 3 corridors	514	2x2 Paracube / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	21	82	3650	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	21	32	3650	1.6	0.6	5,971	2,330	1.00	11.97	3,641
103	Cherry Hill Professional Building	Floor 3 various areas	508	2x2 Paracube / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	40	82	2086	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	40	32	1460	3.1	1.2	6,499	1,775	1.90	22.80	4,724

				Existing				Proposed					Energy						
ID	Building Name	Location	Time Code	Description	# of Fixtures	Watts per Fixture	Operating Hours	Fixture Code	Description	# of Fixtures (if different from existing)	Watts per Fixture	Operating Hours	Existing kW	Proposed kW	Existing kWh	Proposed kWh	kW Savings per Month	kW Savings per Year	kWh Savings per Year
104	Cherry Hill Professional Building	Floor 1 level A exam rooms	508	2x2 Paracube / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	104	82	2086	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	104	32	1460	8.1	3.2	16,898	4,616	4.94	59.28	12,282
105	Cherry Hill Professional Building	Floor 1 level A				0	0				0	0	0.0	0.0	0	0	0.00	0.00	0
106	Cherry Hill Professional Building					0	0				0	0	0.0	0.0	0	0	0.00	0.00	0
107	Cherry Hill Professional Building					0	0				0	0	0.0	0.0	0	0	0.00	0.00	0
108	Cherry Hill Professional Building					0	0				0	0	0.0	0.0	0	0	0.00	0.00	0
109	Cherry Hill Professional Building					0	0				0	0	0.0	0.0	0	0	0.00	0.00	0
110	Cherry Hill Center Building	Floor 1 staff lounge	714	34W Fluorescent, 4'-0" T12 /	4	82	5256	EB2LL	retrofit, (2) 32W T8 & low ballast	4	48	3679	0.3	0.2	1,638	671	0.13	1.55	967
111	Cherry Hill Center Building	Floor 1 140/141C	510	34W Fluorescent, 4'-0" T12 /	4	164	2607	RK24-2	reflector, (2) 32W T8 & EB2L	4	55	2607	0.6	0.2	1,625	545	0.41	4.97	1,080
112	Cherry Hill Center Building	Floor 1 138C and reception	510	2x4 Prismatic	2	164	2607	RK24-2	reflector, (2) 32W T8 & EB2L	2	55	2607	0.3	0.1	812	272	0.21	2.49	540
113	Cherry Hill Center Building	139C	510	34W Fluorescent, 4'-0" T12 /	2	164	2607	RK24-2	reflector, (2) 32W T8 & EB2L	2	55	2607	0.3	0.1	812	272	0.21	2.49	540
114	Cherry Hill Center Building	142C	504	lamp, 34W Fluorescent, T12 /	6	82	1043	RK22-2L17	retrokit for 2'x2' troffer, (2) 17W	6	32	1043	0.5	0.2	487	190	0.29	3.42	297
115	Cherry Hill Center Building	160C	510	lamp, 34W Fluorescent, T12 /	1	82	2607	RK22-2L17	retrokit for 2'x2' troffer, (2) 17W	1	32	2607	0.1	0.0	203	79	0.05	0.57	124
116	Cherry Hill Center Building	160C	510	34W Fluorescent, 4'-0" T12 /	1	164	2607	RK24-2	reflector, (2) 32W T8 & EB2L	1	55	2607	0.2	0.1	406	136	0.10	1.24	270
117	Cherry Hill Center Building	160C	510	34W Fluorescent, 4'-0" T12 /	12	130	2607	RK24-2	reflector, (2) 32W T8 & EB2L	12	55	2607	1.5	0.6	3,864	1,635	0.86	10.26	2,229
118	Cherry Hill Center Building	Lunch room	510	2x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	2	164	2607	RK24-2	Retrokit with reflector, (2) 32W T8 & EB2L electronic ballast	2	55	1825	0.3	0.1	812	191	0.21	2.49	622
119	Cherry Hill Center Building	Lunch room	510	2x2 Prismatic / U-lamp, 34W Fluorescent, T12 / Standard Magnetic, T12	1	82	2607	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	1	32	1825	0.1	0.0	203	55	0.05	0.57	148
120	Cherry Hill Center Building	Rest room 135 and 136	714	1x4 Prismatic / 32W Fluorescent, 4'-0" T8 / Electronic, T8	2	63	5256	N	No Retrofit Proposed	2	63	3679	0.1	0.1	629	440	0.00	0.00	189

Room Data

				Existing				Proposed					Energy						
ID	Building Name	Location	Time Code	Description	# of Fixtures	Watts per Fixture	Operating Hours	Fixture Code	Description	# of Fixtures (if different from existing)	Watts per Fixture	Operating Hours	Existing kW	Proposed kW	Existing kWh	Proposed kWh	kW Savings per Month	kW Savings per Year	kWh Savings per Year
121	Cherry Hill Center Building	Rest room 135 and 136	714	Downlight / Compact Fluorescent, 26W Triple / N/A	2	30	5256	N	No Retrofit Proposed	2	30	3679	0.1	0.1	300	210	0.00	0.00	90
122	Cherry Hill Center Building	Two store rooms	704	2x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Energy Savings Magnetic,	4	72	1460	EB2LL	Lamp & Ballast retrofit, (2) 32W T8 & low ballast factor electronic	4	48	1022	0.3	0.2	399	186	0.09	1.09	213
123	Cherry Hill Center Building	Hallway H13C	724	2x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Energy	3	72	8760	EB2LL	Lamp & Ballast retrofit, (2) 32W T8 & low ballast	3	48	8760	0.2	0.1	1,798	1,198	0.07	0.82	599
124	Cherry Hill Center Building	Stairwells	724	32W Fluorescent, 4'-0" T8 / Electronic, T8	20	63	8760	FW14-2/SENSOR	wraparound, (1) 32W T8 Lamp, (1) F17T8 Lamp,	20	32	8760	1.2	0.6	10,486	5,326	0.59	7.07	5,160
125	Cherry Hill Center Building	Floor B 27C,28C,01C	510	2x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Energy Savings Magnetic,	6	112	2607	RK24-2	Retrokit with reflector, (2) 32W T8 & EB2L electronic ballast	6	55	1825	0.6	0.3	1,664	572	0.32	3.90	1,092
126	Cherry Hill Center Building	B24C	510	2x2 Prismatic / U-lamp, 34W Fluorescent, T12 / Standard Magnetic,	4	82	2607	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and	4	32	1825	0.3	0.1	812	222	0.19	2.28	590
127	Cherry Hill Center Building	B23C,07C	510	34W Fluorescent, 4'-0" T12 / Energy Savings Magnetic,	2	72	2607	EB2LL	retrofit, (2) 32W T8 & low ballast factor electronic	2	48	2607	0.1	0.1	357	238	0.05	0.55	119
128	Cherry Hill Center Building	B12C	510	Vanity / Incandescent, A lamp / N/A	1	120	2607	V2-2	2'-0" Vanity, (2) 17W T8 lamp, EB2L17 Electronic Ballast.	1	34	1825	0.1	0.0	297	59	0.08	0.98	238
129	Cherry Hill Center Building	B36C,B37C	508	34W Fluorescent, 4'-0" T12 / Energy Savings Magnetic, T12	2	144	2086	RK24-2	Retrokit with reflector, (2) 32W T8 & EB2L electronic ballast	2	55	1460	0.3	0.1	571	153	0.17	2.03	418
130	Cherry Hill Center Building	Corridor HB1C	724	Fluorescent, 4'-0" T12 / Standard	4	82	8760	EB2LL	retrofit, (2) 32W T8 & low ballast	4	48	8760	0.3	0.2	2,730	1,598	0.13	1.55	1,132
131	Cherry Hill Center Building	Floor A Security	724	34W Fluorescent, 4'-0" T12 /	4	82	8760	EB2LL	retrofit, (2) 32W T8 & low ballast	4	48	8760	0.3	0.2	2,730	1,598	0.13	1.55	1,132
132	Cherry Hill Center Building	Various areas this level	508	2x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	25	82	2086	EB2LL	Lamp & Ballast retrofit, (2) 32W T8 & low ballast factor electronic ballast.	25	48	1669	1.9	1.1	4,062	1,902	0.81	9.69	2,160
133	Cherry Hill Center Building	Various areas this level	508	34W Fluorescent, 4'-0" T12 / Standard Magnetic,	25	130	2086	RK24-2	reflector, (2) 32W T8 & EB2L electronic ballast	25	55	1669	3.1	1.3	6,440	2,180	1.78	21.38	4,260
134	Cherry Hill Center Building	Various areas this level	508	34W Fluorescent, 4'-0" T12 / Energy	10	144	2086	RK24-2	reflector, (2) 32W T8 & EB2L	10	55	1669	1.4	0.5	2,853	872	0.85	10.15	1,981
135	Cherry Hill West Tower	Floor 6 gym	710	32W Fluorescent, 4'-0" T8 /	8	63	3650	N	No Retrofit Proposed	8	63	2555	0.5	0.5	1,748	1,223	0.00	0.00	524
136	Cherry Hill West Tower	Floor 6 corner office	710	32W Fluorescent, 4'-0" T8 /	6	63	3650	N	No Retrofit Proposed	6	63	2555	0.4	0.4	1,311	918	0.00	0.00	393
137	Cherry Hill West Tower	Floor 6 offices	706	32W Fluorescent, 4'-0" T8 /	50	63	2190	N	No Retrofit Proposed	50	63	1533	3.0	3.0	6,554	4,588	0.00	0.00	1,966
138	Cherry Hill West Tower	Floor 6 corridor	724	32W Fluorescent, 4'-0" T8 /	5	63	8760	N	No Retrofit Proposed	5	63	7008	0.3	0.3	2,621	2,097	0.00	0.00	524

Room Data

				Existing				Proposed					Energy						
ID	Building Name	Location	Time Code	Description	# of Fixtures	Watts per Fixture	Operating Hours	Fixture Code	Description	# of Fixtures (if different from existing)	Watts per Fixture	Operating Hours	Existing kW	Proposed kW	Existing kWh	Proposed kWh	kW Savings per Month	kW Savings per Year	kWh Savings per Year
139	Cherry Hill West Tower	Floor 4 424W	510	34W Fluorescent, 4'-0" T12 /	2	164	2607	RK24-2	reflector, (2) 32W T8 & EB2L	2	55	2607	0.3	0.1	812	272	0.21	2.49	540
140	Cherry Hill West Tower	Floor 4 405W	504	34W Fluorescent, 4'-0" T12 /	2	82	1043	EB2LL	retrofit, (2) 32W T8 & low ballast	2	48	1043	0.2	0.1	162	95	0.06	0.78	67
141	Cherry Hill West Tower	Stairwells	724	32W Fluorescent, 4'-0" T8 /	12	63	8760	FW14-2/SENSOR	wraparound, (1) 32W T8 Lamp, (1)	12	32	8760	0.7	0.4	6,291	3,196	0.35	4.24	3,096
142	Cherry Hill West Tower	Floor 4 Misc	510	lamp, 34W Fluorescent, T12 /	15	82	2607	RK22-2L17	retrokit for 2'x2' troffer, (2) 17W	15	32	2216	1.2	0.5	3,046	1,011	0.71	8.55	2,036
143	Cherry Hill West Tower	Floor 4 Misc	510	34W Fluorescent, 4'-0" T12 /	15	82	2607	EB2LL	retrofit, (2) 32W T8 & low ballast	15	48	2216	1.2	0.7	3,046	1,516	0.48	5.81	1,531
144	Cherry Hill East Tower	Elevator lobbies 2 thru 6	724	32W Fluorescent, 4'-0" T8 /	15	86	8760	N	No Retrofit Proposed	15	86	6132	1.2	1.2	10,735	7,515	0.00	0.00	3,221
145	Cherry Hill East Tower	Floor 5/6 patient rooms	508	34W Fluorescent, 4'-0" T12 /	72	164	2086	EB2LL	retrofit, (2) 32W T8 & low ballast	144	48	2086	11.2	6.6	23,397	13,696	4.65	55.81	9,701
146	Cherry Hill East Tower	Floor 5/6 patient rooms	504	Fluorescent, 2'-0" T12 / Standard	64	45	1043	EB2L17N	retrofit, (2) 17W T8 & normal	64	34	1043	2.7	2.1	2,853	2,156	0.67	8.03	697
147	Cherry Hill East Tower	Floor 5/6 corridor	724	Fluorescent, 4'-0" T12 / Standard	8	48	8760	EB1LL	retrofit, (1) 32W T8 & low ballast	8	25	8760	0.4	0.2	3,196	1,664	0.17	2.10	1,531
148	Cherry Hill East Tower	Floor 5/6 nurses	716	Fluorescent, 2'-0" T12 / Standard	48	45	5840	EB2L17N	retrofit, (2) 17W T8 & normal	48	34	5840	2.1	1.6	11,984	9,054	0.50	6.02	2,929
149	Cherry Hill East Tower	Floor 5/6 conf room	706	34W Fluorescent, 4'-0" T12 / Energy	6	112	2190	EB3LL	retrofit, (3) 32W T8 & reduced light	6	71	2190	0.6	0.4	1,398	886	0.23	2.80	512
150	Cherry Hill East Tower	Floor 5/6 waiting	706	Fluorescent, 4'-0" T12 / Standard	16	48	2190	EB1LL	retrofit, (1) 32W T8 & low ballast	16	25	2190	0.7	0.4	1,598	832	0.35	4.20	766
151	Cherry Hill East Tower	Floor 4 patient rooms	508	34W Fluorescent, 4'-0" T12 /	35	164	2086	EB2LL	retrofit, (2) 32W T8 & low ballast	72	48	2086	5.5	3.3	11,373	6,848	2.17	26.04	4,526
152	Cherry Hill East Tower	Floor 4 corridors and misc	710	2x2 Paracube / FT40DL / Program Rapid Start T5	42	75	3650	Relamp FT40	replace (2) FT40 lamps with (2) FT28 watt lamps	42	53	3650	3.0	2.1	10,923	7,719	0.88	10.53	3,204
153	Cherry Hill East Tower	Floor 4 patient rooms	504	Fluorescent, 2'-0" T12 / Standard	35	24	1043	EB1LL17	retrofit, (1) 17W T8 & reduced light	35	17	1043	0.8	0.6	832	589	0.23	2.79	243
154	Cherry Hill East Tower	Floor 3 patient rooms	508	34W Fluorescent, 4'-0" T12 /	36	164	2086	EB2LL	retrofit, (2) 32W T8 & low ballast	72	48	2086	5.6	3.3	11,698	6,848	2.33	27.91	4,851
155	Cherry Hill East Tower	Floor 3 patient rooms	504	Fluorescent, 2'-0" T12 / Standard	32	45	1043	EB2L17N	retrofit, (2) 17W T8 & normal	32	34	1043	1.4	1.0	1,427	1,078	0.33	4.01	349
156	Cherry Hill East Tower	Floor 3 corridors	710	FT40DL / Program Rapid Start T5	42	75	3650	Relamp FT40	replace (2) FT40 lamps with (2)	42	53	3650	3.0	2.1	10,923	7,719	0.88	10.53	3,204
157	Cherry Hill East Tower	Floor 2 patient rooms	508	34W Fluorescent, 4'-0" T12 /	36	164	2086	EB2LL	retrofit, (2) 32W T8 & low ballast	72	48	2086	5.6	3.3	11,698	6,848	2.33	27.91	4,851
158	Cherry Hill East Tower	Floor 2 patient rooms	504	Fluorescent, 2'-0" T12 / Standard	32	45	1043	EB2L17N	retrofit, (2) 17W T8 & normal	32	34	1043	1.4	1.0	1,427	1,078	0.33	4.01	349
159	Cherry Hill East Tower	Floor 2 corridors	710	FT40DL / Program Rapid Start T5	32	75	3650	Relamp FT40	replace (2) FT40 lamps with (2)	32	53	3650	2.3	1.6	8,322	5,881	0.67	8.03	2,441
160	Cherry Hill East Tower	Stairs	724	34W Fluorescent, 4'-0" T12 /	24	82	8760	FW14-2/SENSOR	wraparound, (1) 32W T8 Lamp, (1)	24	32	8760	1.9	0.7	16,378	6,391	1.14	13.68	9,986
Total	**88**				**1,225**					**1,406**			**103**	**57**	**288,338**	**148,163**	**46**		**140,175**

Room Data

				Existing				Proposed					Energy						
ID	Building Name	Location	Time Code	Description	# of Fixtures	Watts per Fixture	Operating Hours	Fixture Code	Description	# of Fixtures (if different from existing)	Watts per Fixture	Operating Hours	Existing kW	Proposed kW	Existing kWh	Proposed kWh	kW Savings per Month	kW Savings per Year	kWh Savings per Year
1	First Hill Alcoa Building	Lower level parking	724	Fluorescent, 4'-0" T12 / Standard	63	82	8760	WL04T802/ SENSOR	wrap w/ (2) T8 lamp operated via	63	33	8760	4.9	2.0	42,991	17,301	2.93	35.19	25,690
2	First Hill Alcoa Building	Lower level parking	724	Drum / Incandescent, A lamp / N/A	2	120	8760	WL04T802/ SENSOR	4' Wet location wrap w/ (2) T8 lamp operated via one Quickstart electronic ballast	2	33	8760	0.2	0.1	1,997	549	0.17	1.98	1,448
3	First Hill Alcoa Building	Rest rooms	512	Downlight / Compact Fluorescent, 18W PL / N/A	20	38	3129	N	No Retrofit Proposed	20	38	2346	0.7	0.7	2,259	1,694	0.00	0.00	565
4	First Hill North Tower	Floor A corridors	712	2x2 Prismatic / U-lamp, 34W Fluorescent, T12 / Standard Magnetic, T12	28	82	4380	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	28	32	4380	2.2	0.9	9,554	3,728	1.33	15.96	5,825
5	First Hill North Tower	Floor A vestibule	724	4' Acrylic Wrap / 34W Fluorescent, 4'-0" T12 / Energy Savings Magnetic, T12	1	144	8760	EB4LL	Lamp & Ballast retrofit, (4) 32W T8 & low ballast factor electronic ballast.	1	95	8760	0.1	0.1	1,198	791	0.05	0.56	408
6	First Hill North Tower	Floor A offices	510	2x2 Prismatic / U-lamp, 34W Fluorescent, T12 / Standard Magnetic, T12	33	82	2607	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	33	32	2607	2.6	1.0	6,702	2,615	1.57	18.81	4,087
7	First Hill North Tower	Floor A lunch room	712	2x2 Prismatic / U-lamp, 34W Fluorescent, T12 / Standard Magnetic, T12	9	82	4380	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	9	32	3066	0.7	0.3	3,071	839	0.43	5.13	2,232
8	First Hill North Tower	Floor 1 corridor	724	2x2 Prismatic / U-lamp, 34W Fluorescent, T12 / Standard Magnetic, T12	7	82	8760	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	7	32	8760	0.5	0.2	4,777	1,864	0.33	3.99	2,913

				Existing				Proposed					Energy						
ID	Building Name	Location	Time Code	Description	# of Fixtures	Watts per Fixture	Operating Hours	Fixture Code	Description	# of Fixtures (if different from existing)	Watts per Fixture	Operating Hours	Existing kW	Proposed kW	Existing kWh	Proposed kWh	kW Savings per Month	kW Savings per Year	kWh Savings per Year
9	First Hill North Tower	Floor 1 corridor	724	2x2 Prismatic / 34W Fluorescent, 4'-0" T12 / Energy Savings Magnetic, T12	1	43	8760	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	1	32	8760	0.0	0.0	358	266	0.01	0.13	92
10	First Hill North Tower	Floor 1 corridor	724	2x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	9	82	8760	EB2LL	Lamp & Ballast retrofit, (2) 32W T8 & low ballast factor electronic ballast.	9	48	8760	0.7	0.4	6,142	3,595	0.29	3.49	2,547
11	First Hill North Tower	Floor 3 corridor	514	2x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	11	82	3650	EB2LL	Lamp & Ballast retrofit, (2) 32W T8 & low ballast factor electronic ballast.	11	48	3650	0.9	0.5	3,128	1,831	0.36	4.26	1,297
12	First Hill North Tower	Floor 3 corridor	514	2x2 Prismatic / U-lamp, 34W Fluorescent, T12 / Standard Magnetic, T12	1	82	3650	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	1	32	3650	0.1	0.0	284	111	0.05	0.57	173
13	First Hill North Tower	Floor 4 corridor	514	2x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	29	82	3650	EB2LL	Lamp & Ballast retrofit, (2) 32W T8 & low ballast factor electronic ballast.	29	48	3650	2.3	1.3	8,246	4,827	0.94	11.24	3,419
14	First Hill North Tower	Floor 4 corridor	514	2x2 Prismatic / 20W Fluorescent, 2'-0" T12 / Standard Magnetic, T12	2	88	3650	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	2	32	3650	0.2	0.1	610	222	0.11	1.28	388

Room Data

				Existing				Proposed					Energy						
ID	Building Name	Location	Time Code	Description	# of Fixtures	Watts per Fixture	Operating Hours	Fixture Code	Description	# of Fixtures (if different from existing)	Watts per Fixture	Operating Hours	Existing kW	Proposed kW	Existing kWh	Proposed kWh	kW Savings per Month	kW Savings per Year	kWh Savings per Year
15	First Hill North Tower	Stairwell NN50 OOA	724	1x8 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	12	82	8760	FW14-2/SENSOR	4'-0" Prismatic wraparound, (1) 32W T8 Lamp, (1) F17T8 Lamp, Integral Occ Sensor and Two programmed start ballasts	1	32	8760	0.9	0.0	8,189	266	0.90	10.85	7,923
16	First Hill North Tower	Stairwell NN50 OOA	724	Exit Sign / Incandescent, A lamp / N/A	1	30	8760	X-2B	Double-face LED Exit Sign w/battery back-up	1	3	8760	0.0	0.0	250	25	0.03	0.31	225
17	First Hill OE Tower	Loading dock area	724	2x2 Prismatic / U-lamp, 34W Fluorescent, T12 / Standard Magnetic, T12	10	82	8760	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	10	32	8760	0.8	0.3	6,824	2,663	0.48	5.70	4,161
18	First Hill OE Tower	Floor A corridors	724	2x2 Prismatic / U-lamp, 34W Fluorescent, T12 / Standard Magnetic, T12	6	82	8760	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	6	32	8760	0.5	0.2	4,094	1,598	0.29	3.42	2,497
19	First Hill OE Tower	Floor 1 corridors	724	2x2 Prismatic / U-lamp, 34W Fluorescent, T12 / Standard Magnetic, T12	4	82	8760	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	4	32	8760	0.3	0.1	2,730	1,065	0.19	2.28	1,664
20	First Hill OE Tower	Floor 1 corridors	724	2x2 Prismatic / 20W Fluorescent, 2'-0" T12 / Standard Magnetic, T12	7	88	8760	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	7	32	8760	0.6	0.2	5,126	1,864	0.37	4.47	3,262

				Existing				Proposed					Energy						
ID	Building Name	Location	Time Code	Description	# of Fixtures	Watts per Fixture	Operating Hours	Fixture Code	Description	# of Fixtures (if different from existing)	Watts per Fixture	Operating Hours	Existing kW	Proposed kW	Existing kWh	Proposed kWh	kW Savings per Month	kW Savings per Year	kWh Savings per Year
21	First Hill OE Tower	Floor 2 corridors	724	2x2 Prismatic / U-lamp, 34W Fluorescent, T12 / Standard Magnetic, T12	35	82	8760	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	35	32	8760	2.7	1.1	23,884	9,321	1.66	19.95	14,564
22	First Hill OE Tower	Floor 3 corridors	514	2x2 Prismatic / U-lamp, 34W Fluorescent, T12 / Standard Magnetic, T12	12	82	3650	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	12	32	3650	0.9	0.4	3,412	1,332	0.57	6.84	2,081
23	First Hill OE Tower	Floor 3 corridors	514	2x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	12	82	3650	EB2LL	Lamp & Ballast retrofit, (2) 32W T8 & low ballast factor electronic ballast.	12	48	3650	0.9	0.5	3,412	1,997	0.39	4.65	1,415
24	First Hill OE Tower	Floor 5 corridors	724	2x2 Prismatic / U-lamp, 34W Fluorescent, T12 / Standard Magnetic, T12	14	82	8760	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	14	32	8760	1.1	0.4	9,554	3,728	0.67	7.98	5,825
25	First Hill OE Tower	Floor 5 corridors	724	2x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	4	82	8760	RK24-2	Retrokit with reflector, (2) 32W T8 & EB2L electronic ballast	4	55	8760	0.3	0.2	2,730	1,831	0.10	1.23	899
26	First Hill OE Tower	Mechanical room E26	510	4' Industrial w/reflectors / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	2	82	2607	EB2LL	Lamp & Ballast retrofit, (2) 32W T8 & low ballast factor electronic ballast.	2	48	2607	0.2	0.1	406	238	0.06	0.78	168
27	First Hill OE Tower	Room E27	506	4' Industrial w/reflectors / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	13	82	1564	EB2LL	Lamp & Ballast retrofit, (2) 32W T8 & low ballast factor electronic ballast.	13	48	1564	1.0	0.6	1,584	927	0.42	5.04	657

				Existing				Proposed					Energy						
ID	Building Name	Location	Time Code	Description	# of Fixtures	Watts per Fixture	Operating Hours	Fixture Code	Description	# of Fixtures (if different from existing)	Watts per Fixture	Operating Hours	Existing kW	Proposed kW	Existing kWh	Proposed kWh	kW Savings per Month	kW Savings per Year	kWh Savings per Year
28	First Hill OE Tower	Stairwell OE50	724	1x8 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	20	82	8760	FW14-2/SENSOR	4'-0" Prismatic wraparound, (1) 32W T8 Lamp, (1) F17T8 Lamp, Integral Occ Sensor and Two programmed start ballasts	20	32	8760	1.6	0.6	13,648	5,326	0.95	11.40	8,322
29	First Hill OE Tower	Stairwell OE51	724	1x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	5	82	8760	FW14-2/SENSOR	4'-0" Prismatic wraparound, (1) 32W T8 Lamp, (1) F17T8 Lamp, Integral Occ Sensor and Two programmed start ballasts	5	32	8760	0.4	0.2	3,412	1,332	0.24	2.85	2,081
30	First Hill OE Tower	Stairwell OE51	724	Exit Sign / Incandescent, A lamp / N/A	1	30	8760	X-2B	Double-face LED Exit Sign w/battery back-up	1	3	8760	0.0	0.0	250	25	0.03	0.31	225
31	First Hill OE Tower	Corridors to East Wing	724	2x2 Prismatic / 17W Fluorescent, 2'-0" T8 /	45	34	8760	RK22-2L17/DIM	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W	45	29	8760	1.5	1.2	12,733	10,860	0.21	2.57	1,872
32	First Hill Southwest Tower	Upper mechanical/electrical	508	4' Acrylic Wrap / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	75	82	2086	EB2LL	Lamp & Ballast retrofit, (2) 32W T8 & low ballast factor electronic ballast.	75	48	2086	5.8	3.4	12,186	7,133	2.42	29.07	5,053
33	First Hill Southwest Tower	Stairs SW 52- #9	724	4' Acrylic Wrap / 32W Fluorescent, 4'-0" T8 / Electronic, T8	26	63	8760	FW14-2/SENSOR	4'-0" Prismatic wraparound, (1) 32W T8 Lamp, (1) F17T8 Lamp, Integral Occ Sensor and Two programmed start ballasts	26	32	8760	1.6	0.8	13,631	6,924	0.77	9.19	6,708

				Existing				Proposed					Energy						
ID	Building Name	Location	Time Code	Description	# of Fixtures	Watts per Fixture	Operating Hours	Fixture Code	Description	# of Fixtures (if different from existing)	Watts per Fixture	Operating Hours	Existing kW	Proposed kW	Existing kWh	Proposed kWh	kW Savings per Month	kW Savings per Year	kWh Savings per Year
34	First Hill Southwest Tower	Stairs SW 51- #8	724	4' Acrylic Wrap / 32W Fluorescent, 4'-0" T8 / Electronic, T8	40	63	8760	FW14-2/SENSOR	4'-0" Prismatic wraparound, (1) 32W T8 Lamp, (1) F17T8 Lamp, Integral Occ Sensor and Two programmed start ballasts	40	32	8760	2.4	1.2	20,971	10,652	1.18	14.14	10,319
35	First Hill South Tower	Various	714	2x2 Prismatic / U-lamp, 34W Fluorescent, T12 / Standard Magnetic, T12	170	82	5256	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	170	32	4730	13.2	5.2	69,605	24,447	8.08	96.90	45,159
36	First Hill South Tower	Various	714	1x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	95	82	5256	EB2LL	Lamp & Ballast retrofit, (2) 32W T8 & low ballast factor electronic ballast.	135	48	4730	7.4	6.2	38,897	29,120	1.24	14.93	9,777
37	First Hill South Tower	Various	714	2x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	185	164	5256	RK24-2	Retrokit with reflector, (2) 32W T8 & EB2L electronic ballast	185	55	4730	28.8	9.7	151,494	45,725	19.16	229.88	105,768
38	First Hill South Tower	Stairwell SB 51	724	1x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	20	82	8760	FW14-2/SENSOR	4'-0" Prismatic wraparound, (1) 32W T8 Lamp, (1) F17T8 Lamp, Integral Occ Sensor and Two programmed start ballasts	20	32	8760	1.6	0.6	13,648	5,326	0.95	11.40	8,322
39	First Hill South Tower	Stairwell SB 52	724	1x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	20	82	8760	FW14-2/SENSOR	4'-0" Prismatic wraparound, (1) 32W T8 Lamp, (1) F17T8 Lamp, Integral Occ Sensor and Two programmed start ballasts	20	32	8760	1.6	0.6	13,648	5,326	0.95	11.40	8,322

				Existing				Proposed					Energy						
ID	Building Name	Location	Time Code	Description	# of Fixtures	Watts per Fixture	Operating Hours	Fixture Code	Description	# of Fixtures (if different from existing)	Watts per Fixture	Operating Hours	Existing kW	Proposed kW	Existing kWh	Proposed kWh	kW Savings per Month	kW Savings per Year	kWh Savings per Year
40	First Hill Southwest Tower	Corridors to South Wing	724	2x2 Prismatic / U-lamp, 34W Fluorescent, T12 / Standard Magnetic, T12	36	82	8760	RK22-2L17/DIM	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and dimming electronic ballast.	36	29	8760	2.8	1.0	24,567	8,688	1.81	21.75	15,878
41	First Hill Southwest Tower	Corridors to South Wing	724	2x2 Prismatic / U-lamp, 34W Fluorescent, T12 / Standard Magnetic, T12	15	82	8760	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	15	32	8760	1.2	0.5	10,236	3,995	0.71	8.55	6,242
42	First Hill West Tower	Stairwell WW 50	724	4' Acrylic Wrap / 32W Fluorescent, 4'-0" T8 / Electronic, T8	12	63	8760	FW14-2/SENSOR	4'-0" Prismatic wraparound, (1) 32W T8 Lamp, (1) F17T8 Lamp, Integral Occ Sensor and Two programmed start ballasts	12	32	8760	0.7	0.4	6,291	3,196	0.35	4.24	3,096
43	First Hill West Tower	Stairwell WW 51	724	4' Acrylic Wrap / 32W Fluorescent, 4'-0" T8 / Electronic, T8	27	63	8760	FW14-2/SENSOR	4'-0" Prismatic wraparound, (1) 32W T8 Lamp, (1) F17T8 Lamp, Integral Occ Sensor and Two programmed start ballasts	27	32	8760	1.6	0.8	14,156	7,190	0.80	9.54	6,966
44	First Hill West Tower	E 37 Elevator room	724	4' Industrial w/reflectors / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	3	82	8760	EB2LL	Lamp & Ballast retrofit, (2) 32W T8 & low ballast factor electronic ballast.	3	48	8760	0.2	0.1	2,047	1,198	0.10	1.16	849
45	First Hill West Tower	E 37 Elevator room	704	4' Industrial w/reflectors / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	9	82	1460	EB2LL	Lamp & Ballast retrofit, (2) 32W T8 & low ballast factor electronic ballast.	9	48	1460	0.7	0.4	1,024	599	0.29	3.49	424
46	First Hill OLTI	Floor B corridors	724	2x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic,	14	82	8760	EB2LL	Lamp & Ballast retrofit, (2) 32W T8 & low ballast factor electronic	14	48	8760	1.1	0.6	9,554	5,592	0.45	5.43	3,961

				Existing				Proposed					Energy						
ID	Building Name	Location	Time Code	Description	# of Fixtures	Watts per Fixture	Operating Hours	Fixture Code	Description	# of Fixtures (if different from existing)	Watts per Fixture	Operating Hours	Existing kW	Proposed kW	Existing kWh	Proposed kWh	kW Savings per Month	kW Savings per Year	kWh Savings per Year
47	First Hill OLTI	Floor 1 corridors	712	1x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	3	82	4380	EB2LL	EB2LL	3	48	4380	0.2	0.1	1,024	599	0.10	1.16	424
48	First Hill Main Surgery	Surgery rooms	724	34W Fluorescent, 4'-0" T12 / Standard Magnetic,	34	82	8760	EB2LN	retrofit, (2) 32W T8 & normal ballast factor	34	55	8760	2.6	1.8	23,202	15,562	0.87	10.47	7,640
49	First Hill Main Surgery	Surgery rooms	724	34W Fluorescent, 4'-0" T12 / Standard Magnetic,	171	164	8760	EB2LN	retrofit, (2) 32W T8 & normal ballast factor	342	55	8760	26.6	17.9	233,382	156,537	8.77	105.27	76,845
50	First Hill Main Surgery	Rest of surgery	724	Compact Fluorescent, 5W / N/A	2	14	8760	X-2B	Double-face LED Exit Sign w/battery back-up	2	3	8760	0.0	0.0	233	50	0.02	0.25	183
51	First Hill Main Surgery	Rest of surgery	712	34W Fluorescent, 4'-0" T12 / Standard Magnetic,	121	164	4380	RK24-2	reflector, (2) 32W T8 & EB2L electronic ballast	121	55	3066	18.9	6.3	82,571	19,384	12.53	150.35	63,187
52	First Hill Main Surgery	Rest of surgery	712	2x2 Prismatic / 20W Fluorescent, 2'-0" T12 / Standard Magnetic, T12	20	88	4380	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	20	32	4380	1.7	0.6	7,323	2,663	1.06	12.77	4,660
53	First Hill Main Surgery	Rest of surgery	712	1x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	130	82	4380	EB2LL	Lamp & Ballast retrofit, (2) 32W T8 & low ballast factor electronic ballast.	130	48	3066	10.1	5.9	44,356	18,175	4.20	50.39	26,181
54	First Hill Main Surgery	Rest of surgery	712	2x2 Prismatic / U-lamp, 34W Fluorescent, T12 / Standard Magnetic, T12	23	82	4380	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	23	32	4380	1.8	0.7	7,848	3,062	1.09	13.11	4,785
55	First Hill Main Surgery	Rest of surgery	712	2x4 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	8	130	4380	RK24-2	Retrokit with reflector, (2) 32W T8 & EB2L electronic ballast	8	55	4380	1.0	0.4	4,327	1,831	0.57	6.84	2,497
56	First Hill Main Surgery	Rest of surgery	712	1x8 Prismatic / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	13	164	4380	EB4LL	Lamp & Ballast retrofit, (4) 32W T8 & low ballast factor electronic ballast.	13	95	4380	2.0	1.2	8,871	5,139	0.85	10.23	3,732

				Existing				Proposed					Energy						
ID	Building Name	Location	Time Code	Description	# of Fixtures	Watts per Fixture	Operating Hours	Fixture Code	Description	# of Fixtures (if different from existing)	Watts per Fixture	Operating Hours	Existing kW	Proposed kW	Existing kWh	Proposed kWh	kW Savings per Month	kW Savings per Year	kWh Savings per Year
57	First Hill East Tower	Stairs #4	724	1x4 Prismatic / 32W Fluorescent, 4'-0" T8 / Electronic, T8	9	63	8760	FW14-2/SENSOR	4'-0" Prismatic wraparound, (1) 32W T8 Lamp, (1) F17T8 Lamp, Integral Occ Sensor and Two programmed start ballasts	9	32	8760	0.5	0.3	4,719	2,397	0.27	3.18	2,322
58	First Hill OE Tower	Stairs #051	724	2x2 Prismatic / U-lamp, 34W Fluorescent, T12 / Standard Magnetic, T12	2	82	8760	RK22-2L17	Lamps & reflector retrokit for 2'x2' troffer, (2) 17W T8 lamps and EB2L17 electronic ballast.	2	32	8760	0.2	0.1	1,365	533	0.10	1.14	832
59	First Hill East Tower	Stairs #3	724	1x4 Prismatic / 32W Fluorescent, 4'-0" T8 / Electronic, T8	12	63	8760	FW14-2/SENSOR	4'-0" Prismatic wraparound, (1) 32W T8 Lamp, (1) F17T8 Lamp, Integral Occ Sensor and Two programmed start ballasts	12	32	8760	0.7	0.4	6,291	3,196	0.35	4.24	3,096
60	First Hill East Tower	Stairs #2	724	1x4 Prismatic / 32W Fluorescent, 4'-0" T8 / Electronic, T8	26	63	8760	FW14-2/SENSOR	4'-0" Prismatic wraparound, (1) 32W T8 Lamp, (1) F17T8 Lamp, Integral Occ Sensor and Two programmed start ballasts	26	32	8760	1.6	0.8	13,631	6,924	0.77	9.19	6,708
61	First Hill East Tower	Corridors on floors 5 thru 12	712	2x2 Paracube / FT40DL / Program Rapid Start T5	250	75	4380	Relamp FT40	Relamp Only - replace (2) FT40 lamps with (2) FT28 watt lamps	250	53	4380	17.8	12.6	78,019	55,133	5.23	62.70	22,886
62	First Hill East Tower	Various	724	Exit Sign / Compact Fluorescent, 5W / N/A	5	14	8760	X-2B	Double-face LED Exit Sign w/battery back-up	5	3	8760	0.1	0.0	583	125	0.05	0.63	458

				Existing				Proposed					Energy						
ID	Building Name	Location	Time Code	Description	# of Fixtures	Watts per Fixture	Operating Hours	Fixture Code	Description	# of Fixtures (if different from existing)	Watts per Fixture	Operating Hours	Existing kW	Proposed kW	Existing kWh	Proposed kWh	kW Savings per Month	kW Savings per Year	kWh Savings per Year
63	First Hill East Tower	ET 227	724	4' Industrial w/reflectors / 34W Fluorescent, 4'-0" T12 / Standard Magnetic, T12	16	82	8760	EB2LL	Lamp & Ballast retrofit, (2) 32W T8 & low ballast factor electronic ballast.	16	48	8760	1.2	0.7	10,918	6,391	0.52	6.20	4,527
64	First Hill East Tower	Level G elevator room	506	Strip / 20W Fluorescent, 2'-0" T12 / Standard Magnetic, T12	5	45	1564	EB2L17N	Lamp & Ballast retrofit, (2) 17W T8 & normal ballast factor electronic ballast.	5	34	1564	0.2	0.2	334	253	0.05	0.63	82
65	First Hill East Tower	Level 1 lobby	724	Downlight / Compact Fluorescent, 32W Triple / N/A	30	33	8760	LED LR6	LED downlight retrokit	30	12	8760	0.9	0.3	8,239	2,996	0.60	7.18	5,243
66	First Hill East Tower	Level 1 rest rooms	724	1x4 Prismatic / 32W Fluorescent, 4'-0" T8 / Electronic, T8	8	63	8760	N	No Retrofit Proposed	8	63	6132	0.5	0.5	4,194	2,936	0.00	0.00	1,258
67	First Hill East Tower	Level 1 rest rooms	724	Compact Fluorescent, 32W Triple / N/A	10	33	8760	N	No Retrofit Proposed	10	33	6132	0.3	0.3	2,746	1,922	0.00	0.00	824
68	First Hill East Tower	Corridors floors 1-2, and 4-12	716	Indirect / 32W Fluorescent, 4'-0" T8 / Electronic, T8	400	30	5840	N	No Retrofit Proposed	400	30	4088	11.4	11.4	66,576	46,603	0.00	0.00	19,973
69	First Hill East Tower	Common bathrooms	712	Indirect / 32W Fluorescent, 4'-0" T8 / Electronic, T8	60	63	4380	N	No Retrofit Proposed	60	63	3066	3.6	3.6	15,729	11,010	0.00	0.00	4,719
70	First Hill Exterior	Short poles on west side near emergency	712	Shoebox / MH 175W / HID Magnetic	12	210	4380	LED35	LED retrofit for shoebox fixtures	12	35	4380	2.4	0.4	10,486	1,748	2.00	23.94	8,738
71	First Hill Exterior	Short poles on west side near emergency	712	Shoebox / HPS 100W / HID Magnetic	5	120	4380	LED35	LED retrofit for shoebox fixtures	5	35	4380	0.6	0.2	2,497	728	0.40	4.85	1,768
Total	**71**				**2,541**					**2,741**			**208**	**112**	**######**	**615,641**	**96**		**619,332**