



King County

*Always at your service*

*at*

*intergate.east*  
A TECHNOLOGY CAMPUS

**King County Data Center**  
**at**  
**Sabey Data Center 52**

**Table of Contents**

<b>I.</b>	<b>Basis of Design Overview</b>	<b>Pg 1</b>
<b>II.</b>	<b>Architectural Overview – Specific to King County</b>	<b>Pg 4</b>
<b>III.</b>	<b>Interior Program Summary: Net Areas by Function</b>	<b>Pg 7</b>
<b>IV.</b>	<b>Fire Protection Systems</b>	<b>Pg 8</b>
<b>V.</b>	<b>Interior Construction and Finishes</b>	<b>Pg 8</b>
<b>VI.</b>	<b>Security / Access Systems Provided</b>	<b>Pg 9</b>
<b>VII.</b>	<b>Mechanical Overview</b>	<b>Pg 9</b>
<b>VIII.</b>	<b>Electrical</b>	<b>Pg 17</b>
<b>IX.</b>	<b>Communications and Racks</b>	<b>Pg 22</b>
<b>X.</b>	<b>SDC 52 Peer Review RFP</b>	<b>Pg 30</b>
<b>XI.</b>	<b>Project Team</b>	<b>Pg 31</b>
<b>XII.</b>	<b>Sabey Corporation Overview</b>	<b>Pg 31</b>



**Sabey DataCenter 52 (SDC 52)**  
**Basis of Design**  
**-Revisions Specific to King County Data Center-**

**I. Basis of Design Overview**

Sabey DataCenter is developing a data center in an existing building in Tukwila, Washington. The new data center facility is called SDC 52. The building is International Gateway East, Building 5, 3355 South 120<sup>th</sup> Place, Seattle, WA 98168 also known as SDC 5.

SDC 52 will be a multi-tenant facility and will have 30,000 square feet of IT equipment space supporting an ultimate 4.5 MW of IT load. There will be three tenant modules – each with approximately 10,000 square feet and up to 1.5 MW of IT load. King County Data Center requirement is 1.05MW.

Tenant requirements may vary somewhat, but the base infrastructure (generators, chillers, etc.) will be designed to support the stated objective.

The facility has the ability to be built in three phases for the three tenants; Suite 5201, Suite 5202, and Suite 5203.

**Phasing Philosophy**

To maintain budgetary controls we will defer additional suite costs until an additional Tenant requirement justifies the build-out without sacrificing redundancy. Design and Construction will take into account that the existing data center can not be impacted during construction of later phases. Overall project cost is also important. The developer, Sabey Data Center LLC understands that there will be some cost impact as a result of extra mobilizations and decreased efficiency. The design will minimize increased costs by (1) envisioning what the later work will require and (2) incurring costs in the earlier phases where appropriate to minimize impact on overall project cost.

System design redundancy objective is according to the industry standard set by the Uptime Institute of Tier 3- Concurrently Maintainable;

IT equipment will be located on the 2<sup>nd</sup> floor. Generator and UPS modules will be on the 1<sup>st</sup> floor. Mechanical air handlers utilizing energy saving airside economizer with evaporative cooling may be placed internally on the third floor within one floor of SDC52. Air-cooled chillers will be on the roof.

**Electrical**

Electrical topology is distributed redundant with major equipment as follows:

Equipment	Phase 1	Phase 2	Phase 3	Total
2.5 MW Generators	2	1	1	4
3000 kVA Transformers	2	1	1	4
UPS Modules	4	4	4	12
STS/PDU's	12	12	12	36

Each Phase has a UPS Group, with a 4-to-make-3 design – if any UPS is taken off line, its load fails to the other three UPS modules, via STS. The STS/PDU's are paired for A and B sources to servers. Dual cord failover occurs without increasing the load on a specific UPS pair. Successful operations require strict management of load to ensure it does not exceed pre-determined limits.

For example, UPS Group 1 consists of UPS A1, UPS B1, UPS C1, and UPS D1.

These UPS modules feed 12 STS/PDU's – AB1, BA1, AC1, CA1, AD1, DA1, BC1, CB1, BD1, DB1, CD1 and DC1. STS AB1 is fed from UPS A1 and B1, with UPS A1 as its primary source. STS BA1 is fed from UPS A1 and B1, with UPS B1 as its primary source.

Dual cording occurs between STS/PDU pairs. AB1 is paired with BA1, AC1 is paired with CA1, and so forth.

**Mechanical**

Mechanical scheme is air-cooled chillers and air-handlers, utilizing air-side economizer. Major equipment as follows:

Equipment	Phase 1	Phase 2	Phase 3	Total
Air Cooled Chillers	4	2	2	8
Chilled water pumps	2	1	1	4
Air Handlers	2	1	1	4

Mechanical equipment will be aligned with the electrical topology, so that it also has a 4-to-make-3 concept. Failure of any single electrical or mechanical component should not cause an unacceptable impact on the IT equipment or its environment.

Where 4-to-make-3 is not optimal (e.g. fuel pumps), it is permissible to arrange mechanical equipment in a 2-to-make-1 or 3-to-make-2 concept, so long as redundancy is maintained. Utilizing an ATS to

maintain redundancy is also a possibility. No single electrical failure should cause a data center failure – on any system.

## **II. Architectural Overview – Specific to King County**

### **Data Center Area – 2<sup>nd</sup> Floor**

#### **Data Center Module: 7492sf. With an additional 3834sf of expansion space**

Racks will be installed on the concrete slab on grade and will not require an access floor system. The server area will be electrically supported by a dual overhead busway system. The busways will be fully supported by UPS and generator.

Floor loading is 125lbs/sf.

Communications cabling will be distributed by an overhead cable tray system.

All racks will be configured in the ASHRAE TC9.9 “Hot Aisle/Cold Aisle” arrangement. A hot aisle containment system will be used to isolate cool supply air from the hot return air. The containment system will be installed above the racks to the ceiling grid and will be composed of metal channel framing and insulated sheet metal panels. The ceiling tiles will be removed over the hot aisle between the rack rows.

Supply air will be flooded into the space from the third floor air handling units and will flow along the cold aisles to the faces of the server racks. Hot return air will be rejected into the hot aisle, where it will flow upwards to the ceiling return air plenum back to the air handling units. It will be important to install blanking plates in any unoccupied rack units for the containment system to function properly. The module will be separated from other suites by 1-hour fire resistive construction

### **Expansion Space**

There will be an additional 3834sf of additional space to the north of the existing data center module. These two areas will be separated by a 1-hour fire resistive construction wall. This space will require additional installation of overhead duct work, racks, separation panels, electrical busway and cable tray prior to implementation.

**MPOE (Main Point of Entry)** Two building MPOE Rooms will be support telecommunications access to the modules and provide for the entrance of telecommunications conduit from the site communications vaults. MPOE Rooms will not house any active electronic equipment and will be used for transit of communications cable only. These are restricted areas and are located at opposite sides of the building. The North MPOE will be located within the Suite 5201 Expansion Space and will need to be accessible by approved Building personnel.

Each SDC 52 module will receive one 4” dedicated conduits from each of two diverse MPOE rooms. The MPOE rooms are considered as building common space and will only be accessible to persons approved by building management, in accordance with security protocols.

**MDF Cage: Approx 200 sf**

The MDF cage will provide for 12 telecommunications racks and will be located on the east perimeter wall in the Data Center area. All active carrier and King County backbone communications equipment will be housed in this cage.

One each 4" communications conduit will be installed from each of the MPOE Rooms via overhead routing to the MDF Cage.

Power and cabling distribution inside the MDF will be by an overhead system similar to the Data Center area.

The MDF Room must be supported on UPS and generator and will share the Data Center cooling system.

The MDF Room will be separated from the Data Center with Cage material, height to be determined and will be open on the top. A slider door will provide egress.

The back wall or exterior wall will be covered with vertical hung 4x8' fire-rated plywood. Fire rating stamp not to be painted.

**Entry Vestibule: Approx 200 sf**

Access to the Data Center is via a double door entry vestibule. Access to rooms outside of the Data Center are via the secure exterior door. Entrance into the Data Center area is via a second secure door.

**Network Operations Center: Approx 700 sf**

The Operations Center will support Network Operations & Engineering staff, including monitoring stations for network operations. Networking staff will be located in standard workstations. The Operations Center is located to be able to monitor personnel entering Data Center area, provide close access to Print Room, easy access to Data Center, visibility through windows into the Data Center area where Tapes and Mainframe equipment are located.

The module will be separated from other areas by 1-hour fire resistive construction

**Secure Storage/ Server Build Room: approx 250sf**

The Secure Storage/ Server Build Room will provide a room to uncrate equipment, provide short term storage area and do initial burn-in tests on new equipment. This room will be outside of the Data Center envelope to reduce card board contamination of the Data Center. Access to this room is outside of the Data Center.

The module will be separated from other areas by 1-hour fire resistive construction

**Print Room: approx 1300sf**

The Print Room will provide a dedicated room to house King County printers for specific applications. This room will be outside of the Data Center envelope to reduce paper contamination of the Data Center. Delivery of paper to this room is via a door to the common access corridor. An interior door allows access to the Entry Vestibule.

The module will be separated from other areas by 1-hour fire resistive construction.

**Restroom Facilities:**

The Data Center common area restrooms are located off the 2<sup>nd</sup> floor Elevator Lobby approximately 100 feet away from Data Center Entry Vestibule. Both Men's and Women's bathrooms are available and both are ADA compliant

## **Office & Storage Area – 1<sup>st</sup> Floor**

### **Office Area – 4078sf**

The Office Area will include: 30 work stations comprising the following; Managers- 4, Production Support- 9, Call Center-6, Production Engineering- 8, Production- 3, an Incidence Response/Conference Room, Manager/Conference Room, Break Room and an IDF room.

### **Restroom Facilities: Common**

The Office Area common area restrooms are located approximately 30 feet outside the Office Area entrance. Both Men's and Women's bathrooms are available and both are ADA compliant.

### **Kitchen Area & Break Room: Common**

The Kitchen Area is a common area with countertop, sink, refrigerator and overhead cabinets. It is within 30 feet of the main entrance of the Office Area. Vending machines, a microwave and tables with chairs are currently installed.

### **Storage Area: approx- 750sf**

A dedicated, secure storage area for paper storage is located on the first floor. The storage area is adjacent to a roll-up door for ease of deliveries.

### **Entry to the Building:**

The primary entrance to the building is in the SE corner of the building. This entry is a ballistics grade lobby and entry to the building is limited to the entrance lobby without a security card. Secure entry to the building is via maintrap entries. All doors beyond the entry lobby require a security card.

A secure area for up to 2 security officers to visually monitor access to secure areas and receive visitors is provided. A visitor counter includes a glass security screen with a pass through and intercom.

The area includes video security monitors, key station and other security related equipment. Security officers are also responsible for issuing building access badges.

Security officers have unrestricted visual access to all areas of the Lobby and the Security Vestibule.

This entry is unlocked during normal business hours. After normal business hours a key card is required. This entrance has a security officer posted during normal business hours. Off hours, the security officer may be at the Entrance facility or on rounds.

### **Loading Dock and Shipping/Receiving Areas: Common**

A secure Loading Dock Area is directly accessible from the exterior and incorporates two "dock levelers" inside of two electric roll-up doors. Access to the Shipping/Receiving Area is restricted when the either or both of the Loading doors are open. The Shipping/Receiving Area is directly connected to the Loading dock and provides a larger area for processing shipments, repackaging or uncrating shipments

## **Utility Areas – 1<sup>st</sup> Floor**

**Building Switch Gear Room: Restricted**

The Building Main Switch Gear Room houses the primary service entrance switch gear from the utility.

The room is located along the perimeter of the building for access of feeders from the site distribution stations.

**Generator Room: Restricted**

As previously described, SDC 52 will be a multi-Tenant, “shared infrastructure” environment. The generating capacity for all three modules will be collocated within the Generator Room. The Generator Room will house up to 4 – 2,500 kw standby diesel generators and will include multiple day tanks for the generators in this room. Unit substations will also be housed in the Generator Room.

The Generator Room will be separated from other areas by 1-hour fire resistive construction.

**UPS Electrical Room: Restricted**

As previously described, SDC 52 will be a multi-Tenant, “shared infrastructure” environment. The UPS capacity for all three modules will be collocated within the UPS Electrical Room. The UPS Electrical Room will house both the “Normal” electrical distribution equipment and the UPS system for the “Critical” distribution equipment for the Data Center Module and certain loads in the Office Area.

The room will be required to be 1-hour fire resistive construction.

**Sprinkler Valve Room: Restricted**

Multiple Sprinkler Valve Rooms house the incoming fire service and pre-action valves for the building. The pre-action sprinkler valves for the King County spaces are located in a room directly adjacent to the Generator Room. It has a secure exterior entrance for fire department access as well as authorized maintenance and security staff.

**III. Interior Program Summary: Net Areas by Function**

**King County Office & Data Center Room Comparison**

Room	Sabey	Criteria
Data Center	7492	6383
Data Center Expansion	3834	
UPS	NA	295
MDF	~200	350
Command Center/NOC	~700	648
Printer Room/Paper storage	1318	1240
Server Build Room	250	n/a
Incident Response	In General Office	250
Break Room	In General Office	240
General Office	4078	2712
Dedicated Paper Storage	750	600

Tape Storage	In Data Center area	350
Managers Conf Room	In General Office	n/a

#### **IV. Fire Protection Systems**

The building is fully protected equipped with an automatic fire sprinkler system. Three primary types of sprinkler systems are used: Wet pipe sprinkler systems are installed in two corridors. Dry sprinkler pipes are installed in the open air alley areas on the first floor and double interlocked pre-action sprinkler systems are installed for the balance of the building

Fire extinguishers in office areas, corridors, and data halls are housed in semi-recessed cabinets. Fire extinguishers in electrical and mechanical spaces are installed on wall mounted brackets.

#### **VESDA System**

A VESDA or Very Early Smoke Detection Alarm system or similar incipient smoke detection system will be installed in SDC5201 and is planned for all three SDC52 modules. Each module will be separately monitored.

**VESDA™** is a brand of air-sampling smoke detector which is capable of detecting the microscopic particles of smoke. Most of the detectors in the VESDA™ range are aspirating smoke detectors. Generally, aspirating smoke detectors, which are 'active' in nature vs. conventional detectors which are 'passive' in nature, work by drawing air in through a network of small-bore pipes laid out above or below a ceiling in parallel runs covering a protected area. Small holes are drilled into each pipe to form a matrix of holes (sampling points), providing an even distribution across the pipe network. The air sample is drawn past a sensitive optical device (in the case of most VESDA™ detectors a robust solid state laser) tuned to detect the extremely small particles of combustion. A VESDA™ detector may be used to trigger automatic fire responses in high value, or mission critical areas such as archives or computer server rooms.

VESDA™ and similar smoke detection systems (HSSD's or High Sensitivity Smoke Detectors) provide multiple levels of alarm threshold such as: Alert, Action, Fire 1 and Fire 2. Thresholds may be set at levels across a very wide range of smoke levels. This allows the earliest possible notification of a developing fire allowing intervention before a fire develops beyond the smouldering stage - allowing increased time for evacuation, or the implementation of Emergency Response or Business Continuity Plans. Fire thresholds may be used to notify local or municipal emergency responders and ultimately to discharge fire suppression systems.

The environmental sensitivity for VESDA™ and other HSSD's are well known for their ability to not commonly cause false alarms, however VESDA and similar smoke detectors can be adjusted to accommodate temporary changes to alarm thresholds in non-emergency conditions. Alternatively VESDA™ detectors offer a referencing capability where a reference detector allows the influence of widespread smoke to be eliminated while maintaining absolute sensitivity in the areas where it is required.

VESDA™ is owned and operated by Xtralis, formerly known as Vision Fire & Security of Melbourne, Australia. [www.vesda.com](http://www.vesda.com)

#### **V. Interior Construction and Finishes**

##### **Interior Finishes by Functional Area and Room**

Room or Area	Flooring	Walls	Ceiling
Data Center Area	VCT w/non-static wax	Painted GWB	2' x 2' ACT



Office Area	Existing building carpet	Painted GWB	4' x 2' ACT
Storage Area	Sealed concrete	Painted GWB	Open to deck above

**VI. Security / Access Systems Provided**  
**by Functional Area and Room**

Room or Area	Access Control	Cameras
Data Center Area	Exterior doors only	Exterior doors only
Office Area	Exterior door only	Common hallway only
Storage Area	Exterior door only	None

**VII. Mechanical Overview**

**HVAC Advantages and Features  
of SDC52**

**Choice of Economizer Mode vs. Critical Mode is determined by Building Automation System:**

The third floor cooling and ventilating (HVAC) equipment installed for King County can function in parallel with other equipment serving the neighboring SDC52 Tenant spaces to reliably and efficiently meet each tenant's individual temperature and humidity requirements (within a broadly anticipated range - see "Criteria Summary" below - or otherwise as negotiated with other tenants). When "all systems are go" (no smoke alarms, equipment failures, maintenance shutdowns nor poor outdoor air quality), the building control system will operate the air handlers in the "Economizer" Mode described below. Upon equipment failure, maintenance shutdown, detection of poor air quality or certain types of smoke detection, the building control system will operate the air handlers in the "Critical Mode" described below. Each individual tenant's space conditions (temperature, humidity, airflow and room pressurization) will be unaffected by this change in the HVAC System Mode.

**Tenant HVAC Systems can operate Separately or Combined:**

The selection of four air handlers' groupings to serve three individual tenants through three sets of supply and return shafts is intended to reliably provide "Critical Mode" cooling to each tenant despite a variety of foreseeable disruptions including smoke detection in the tenant's own space, smoke detection in a neighbor's space, or smoke detected in an individual air handler. Deliberate design decisions were made to comply with exceptions Building Code and Mechanical Code provisions that would otherwise require automatic (smoke) shutoffs and dampers in positions that might create "single points of failure". See diagram 1 on sheet M-1, the "HVAC Schematic Diagram", where the system separation dampers are indicated by name, and see the scenario chart on this page which lists the foreseeable disruptive events along with the automatic (Building Control System) response. Each of these foreseeable scenarios results in a continuation of cooling to each tenant.

Power to the HVAC system comes through at least two electrical power distribution busses. Eventually there will be four distribution busses serving the tenant network on the 2nd floor north. HVAC system

fans and refrigeration equipment will be equally loaded onto each distribution buss. To meet the landlord's 150W/ft<sup>2</sup> criteria and provide redundancy, enough cooling for 1.5 megawatts of critical load may eventually be placed on each distribution buss, to provide power and cooling to the tenants even when one buss is taken out of operation. Since 480V double-conversion UPS systems are expected to back up all critical loads, the transformer and UPS heat rejection will bring the cooling load to 1.65 megawatts of heat removal capacity per buss. The electrical energy component of operating costs does favor the partially loaded scenario so there is no burden on the tenant even though King County's total heat removal requirement is expected to be less than 1.2 megawatt.

### **Energy Efficient operation with Improved Reliability:**

Equipment heat is removed from this tenant's space using two methods. A separated hot aisle enclosure will surround the initial arrangement of cabinets, ensuring no hot spots occur while allowing very high wattage servers to be placed wherever desired in the cabinets without need for air balancing adjustments. To achieve these goals, it will be necessary for the operators to place readily available "blanking plates" between servers within the cabinets to maintain the separation barrier between hot and cold sides. Heat-producing equipment that isn't cabinet-mounted (such as the floor-mounted printers and legacy mainframe computers) will be located in a designated area of the room where the second heat removal method (dilution with cold air from adjustable overhead ductwork) has been provided. There are two modes of operation of the tenants' HVAC system, a reliable "critical" chilled water cooled mode (using no outside air) and an ultra efficient "economizer" mode (using outside air).

The system routinely operates in the economizer mode but whenever poor outdoor air quality occurs, or a loss of utility water pressure, or a necessary maintenance shutdown, or an equipment failure; in which case the transition to the critical mode will be automatic and alarmed. Both HVAC operating modes use variable air volume (VAV) control to save energy, meaning the room's supply air temperature and humidity remain constant and while the quantity of air moving through the tenant space varies in order to remove the heat being produced by the equipment at that time. It is up to the tenant to operate at least 10 kW of equipment in order to provide some heat, the desired temperature and humidity cannot be maintained in spaces that do not require cooling.

### **Criteria Summary:**

#### **TENANT'S SPACE CONDITIONS:**

entering computers: 66°±2°F (however, higher energy savings are available @ 72 ±) with 45±10% relative humidity.

in printer room: 72°F with 40±10% relative humidity (including space for open paper packages)

in paper storage 72°F with no humidity control (paper will be kept in shipping wrappers)

UPS/battery room maintained within manufacturer's recommended temperature and humidity.

#### **INFORMATION TAKEN FROM SUBMITTALS:**

Xerox 4110ST Printer heat output: 3100W (10,580 Btuh) with accessories

Xerox HLC128: 35,850 Btuh (operating) recommended 74°±4°F with 50±15% r.h.

MGE 500kva UPS module: 4070 cfm exhaust & 110,750 Btuh each, recommended 32°F to 104°F with 0-90% rh.

#### HVAC LOAD CALCULATION BY ROOM:

Printer room equipment total 46.5 Mbh, Lights 1.5 Mbh, People 1 Mbh. Total peak 50 Mbh to be met with up to 2700 cfm of 55°F air. At owner's requested condition (supply air cooled to 51°F for dehumidification), only 2300 cfm peak is required.

NOC room load is unspecified. 2.5 cfm/ft<sup>2</sup> or 2000 cfm will be provided. With supply air cooled to 51°F for dehumidification, that will remove 15 kW from the room if the temperature setpoint is 75°F. Office space on 1st floor is provided with 0.75 cfm/ft<sup>2</sup> to account for 1W/ft<sup>2</sup> lights, 2W/ft<sup>2</sup> equipment, and 35 people/4000ft<sup>2</sup>.

**Tukwila water-cooled CHW plant**  
**Serving 1.09 Megawatt Tenant**  
**Mechanical System Options**  
**11/2/07 7:47 AM**

Using Seattle Weather Data  
 Using SCL MDS suburban rates;  
 basically \$6/kWhr  
 with (average) \$1/kW demand  
 charge.  
 water \$10 per CCF incl. Sewer

Jeff Sloan, McKinstry Co.  
 jeff@mckinstry.com

**Key Variables**

**First cost factors - Mechanical contractor**

Critical refrigeration tonnage	353 tons
Airflow quantity, fully populated	256,000 cfm
Peak (hot day) city water draw	13 gpm
Tank that would be required for 24 hours water storage	19,700 gallons
Thermal storage tank volume to allow chillers to restart	14,117 gallons

**First cost factors - Electrical Contractor**

HVAC load on generator, Utility distribution	505 kW
Number of 3ø Components to Connect	

**First cost factors - General Contractor**

Indoor HVAC Equipment space	
Need for access floor, suspended ceiling	Both recommended
HVAC space on roof	Cooling towers

**Total Annual Operating Cost:**

Computers, UPS, and Transformer	\$687,562
HVAC Electrical Cost	\$494,802
HVAC Water Cost	\$158,160
Maintenance Cost	\$14,800

**Reliability factors**

Method for avoiding hot spots:	frequent adjustment of floor & RA dampers
Hours out of a typical year system can operate without chillers	0 hours

328 tons
137,149 cfm
11 gpm
15,500 gallons
13,168 gallons

364 tons
256,000 cfm
13 gpm
20,400 gallons
14,546 gallons

353 tons
256,000 cfm
13 gpm
19,700 gallons
14,117 gallons

512 kW
--------

553 kW
--------

Both recommended
Cooling towers
\$654,968
\$494,802
\$145,885
\$14,501

Neither recommended
CHW airhandlers, towers
\$659,797
\$494,802
\$62,060
\$3,135

all adjusted automatically
4913 hours

Both recommended
Cooling towers
\$654,968
\$494,802
\$145,885
\$14,501

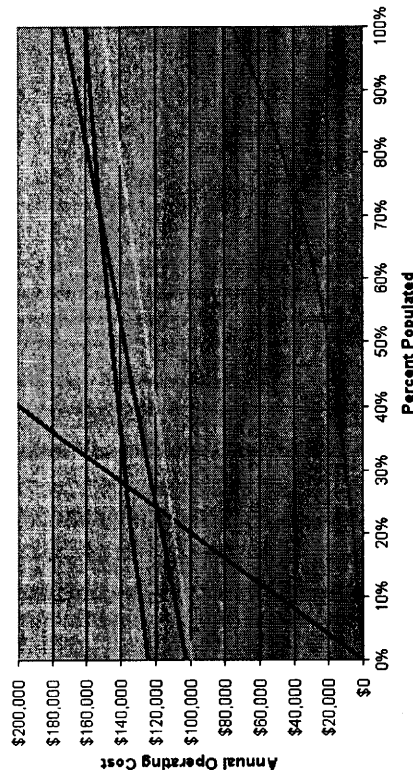
frequent adjustment of floor & RA dampers
3972 hours

frequent adjustment of floor & RA dampers
582 hours

<b>Owner's criteria:</b>	<b>N+1 redundancy</b>	<b>100% Populated</b>
Computer heat density	100 W/ft <sup>2</sup>	Demand kW of racks
Area of cabinets and aisles:	10,000 ft <sup>2</sup>	Additional load for UPS, PDUs
cold aisle temperature:	66 °F	minimum % rh in cold aisle:
Cycles of concentration:	6.0 cycles	maximum %rh in cold aisle:
		1,000 kW
		90 kW
		35%
		45%

<b>Base</b>	<b>Option A</b>	<b>Option B</b>	<b>Option C</b>
Chilled Water CRAC units with no Economizer whatsoever	Chilled Water CRAC Units with Water Economizer, Steam Humidifier	Chilled Water CRAC Units with Air Economizer, Steam Humidifier	Chilled Water Air Handlers with Evaporative Air Economizer
Open Hot-Cold Aisles	Open Hot-Cold Aisles	Open Hot-Cold Aisles	Separated Hot-Cold Aisles

**HVAC Options Annual Operating Cost Summary**



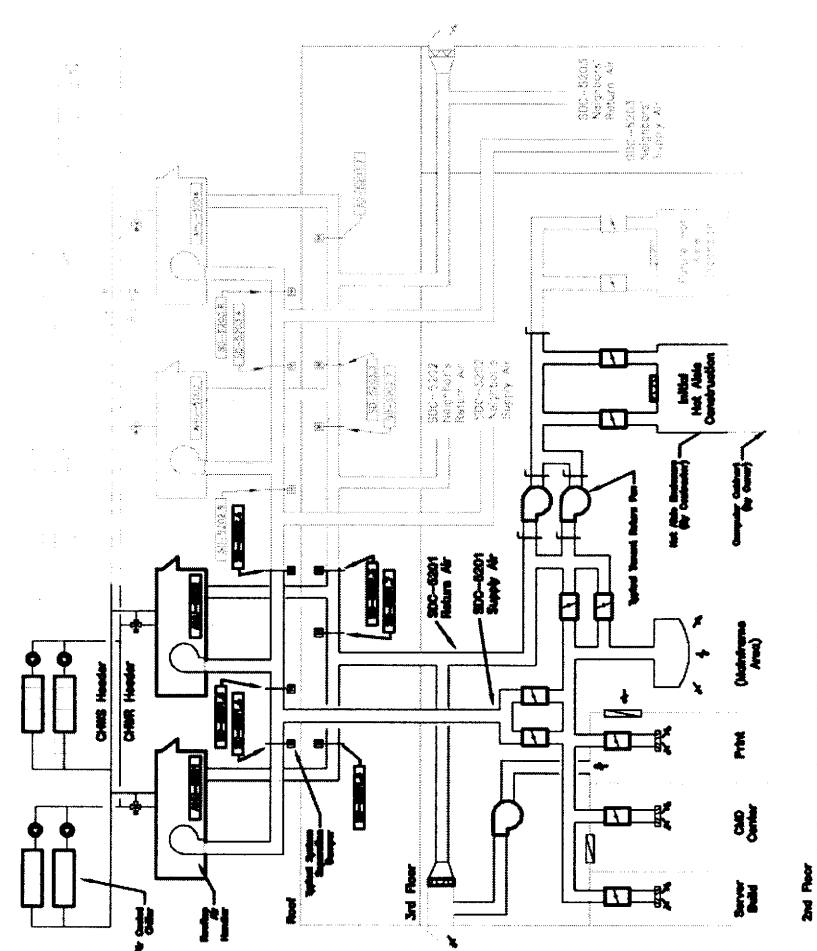
**Mckinstry**  
 Mechanical  
 Electrical  
 Plumbing

**KING COUNTY  
 DATA CENTER  
 AT SABEY CORP  
 TUK 5 BUILDING  
 SBC 5201  
 Tukwila, WA 98148**

No license. PDF produced by PSoft (c) F. Segner - <http://www.fhs-netz-frankfurt.de/psft/>

NO.	REVISION	DATE	BY	CHKD.	DESCRIPTION
1					ISSUE FOR PERMITTING
2					ISSUE FOR PERMITTING
3					ISSUE FOR PERMITTING
4					ISSUE FOR PERMITTING
5					ISSUE FOR PERMITTING
6					ISSUE FOR PERMITTING
7					ISSUE FOR PERMITTING
8					ISSUE FOR PERMITTING
9					ISSUE FOR PERMITTING
10					ISSUE FOR PERMITTING
11					ISSUE FOR PERMITTING
12					ISSUE FOR PERMITTING
13					ISSUE FOR PERMITTING
14					ISSUE FOR PERMITTING
15					ISSUE FOR PERMITTING
16					ISSUE FOR PERMITTING
17					ISSUE FOR PERMITTING
18					ISSUE FOR PERMITTING
19					ISSUE FOR PERMITTING
20					ISSUE FOR PERMITTING
21					ISSUE FOR PERMITTING
22					ISSUE FOR PERMITTING
23					ISSUE FOR PERMITTING
24					ISSUE FOR PERMITTING
25					ISSUE FOR PERMITTING
26					ISSUE FOR PERMITTING
27					ISSUE FOR PERMITTING
28					ISSUE FOR PERMITTING
29					ISSUE FOR PERMITTING
30					ISSUE FOR PERMITTING
31					ISSUE FOR PERMITTING
32					ISSUE FOR PERMITTING
33					ISSUE FOR PERMITTING
34					ISSUE FOR PERMITTING
35					ISSUE FOR PERMITTING
36					ISSUE FOR PERMITTING
37					ISSUE FOR PERMITTING
38					ISSUE FOR PERMITTING
39					ISSUE FOR PERMITTING
40					ISSUE FOR PERMITTING
41					ISSUE FOR PERMITTING
42					ISSUE FOR PERMITTING
43					ISSUE FOR PERMITTING
44					ISSUE FOR PERMITTING
45					ISSUE FOR PERMITTING
46					ISSUE FOR PERMITTING
47					ISSUE FOR PERMITTING
48					ISSUE FOR PERMITTING
49					ISSUE FOR PERMITTING
50					ISSUE FOR PERMITTING
51					ISSUE FOR PERMITTING
52					ISSUE FOR PERMITTING
53					ISSUE FOR PERMITTING
54					ISSUE FOR PERMITTING
55					ISSUE FOR PERMITTING
56					ISSUE FOR PERMITTING
57					ISSUE FOR PERMITTING
58					ISSUE FOR PERMITTING
59					ISSUE FOR PERMITTING
60					ISSUE FOR PERMITTING
61					ISSUE FOR PERMITTING
62					ISSUE FOR PERMITTING
63					ISSUE FOR PERMITTING
64					ISSUE FOR PERMITTING
65					ISSUE FOR PERMITTING
66					ISSUE FOR PERMITTING
67					ISSUE FOR PERMITTING
68					ISSUE FOR PERMITTING
69					ISSUE FOR PERMITTING
70					ISSUE FOR PERMITTING
71					ISSUE FOR PERMITTING
72					ISSUE FOR PERMITTING
73					ISSUE FOR PERMITTING
74					ISSUE FOR PERMITTING
75					ISSUE FOR PERMITTING
76					ISSUE FOR PERMITTING
77					ISSUE FOR PERMITTING
78					ISSUE FOR PERMITTING
79					ISSUE FOR PERMITTING
80					ISSUE FOR PERMITTING
81					ISSUE FOR PERMITTING
82					ISSUE FOR PERMITTING
83					ISSUE FOR PERMITTING
84					ISSUE FOR PERMITTING
85					ISSUE FOR PERMITTING
86					ISSUE FOR PERMITTING
87					ISSUE FOR PERMITTING
88					ISSUE FOR PERMITTING
89					ISSUE FOR PERMITTING
90					ISSUE FOR PERMITTING
91					ISSUE FOR PERMITTING
92					ISSUE FOR PERMITTING
93					ISSUE FOR PERMITTING
94					ISSUE FOR PERMITTING
95					ISSUE FOR PERMITTING
96					ISSUE FOR PERMITTING
97					ISSUE FOR PERMITTING
98					ISSUE FOR PERMITTING
99					ISSUE FOR PERMITTING
100					ISSUE FOR PERMITTING

M1.0



1 HVAC SYSTEM SCHEMATIC DIAGRAM

## **Mechanical Scope of Work Break-down**

Mechanical work to be performed by the McKinstry Company  
Proposed Scope of Work, Updated 2-15-2008

### **Project Description:**

All mechanical systems associated with a fully functional build out for suite 5201 along with piping and ductwork infrastructure as practical to accommodate build-out of suites 5202 and 5203. Additionally, equipment will be included as required for N+1 redundancy for suite 5201.

### **Basis of Design**

#### **Server Room:**

Load: Cooling will be provided for a 1.05 MW server load.

Environment: The servers will be supplied with 75°F ± 2°F and a relative humidity of 40% to 70%. Humidity will be provided by evaporative humidifiers located (and designed into) the custom rooftop units.

Redundancy: The system will be designed to Tier 3 Data Center Standards and will be concurrently maintainable.

Air distribution: Conditioned air will be provided by custom chilled water air handling units located on the third floor. The air will be ducted down from the roof, through the third floor, to the second floor for distribution within the server room and ancillary spaces. The servers will be arranged in a hot/cold aisle configuration. The hot aisles will be separated from the conditioned server room area. The heat discharged from the servers into the hot aisle will be collected by return air fans and ducted up to the roof for rejection to the outside.

#### **Printer Room:**

The printer room will be conditioned with supply air (ducted down from the third floor units) to the space. A variable air volume (VAV) terminal unit will provide conditioned air as needed to the room (to maintain the rooms temperature set point). Heat from the printers will be collected and ducted up to the return/relief air system.

#### **Office Area:**

The office area will be conditioned with supply air (ducted down from the third floor units) to the space. A variable air volume (VAV) terminal unit will provide conditioned air as needed to the room (to maintain the rooms temperature set point).

Note: The above descriptions are a brief narrative. Please refer to schematic diagram of proposed systems for a detailed depiction of the interaction of all systems.

### **Mechanical Systems Scope of Work:**

#### **Generator Room**

##### **Area Clarifications:**

- Louvers at generator engine radiator cooling intake by others. (Sabey Construction- SCI.)
- All fuel pipe trenching (cutting, concrete, etc) by others- SCI. McKinstry will provide the fuel pipe

only.

- Fuel pipe is standard schedule 40 screwed pipe. No double containment is included.
- There is leak detection in the fuel trench.
- Fuel pipe point of connection is assumed to be above the slab.
- It is assumed that generator exhaust piping can run up the side of the building.
- Generators are provided and installed by others- SCI
- Day tank is by others. It is assumed that a return pump will be provided with this tank.

Area Scope (by McKinstry):

- Installation of emergency generator mufflers. Mufflers and flex provided by others.
- All required emergency generator exhaust piping (welded and wrapped) from each generator, out the side of the building, up to a height of 12' above roof parapet.
- Fuel supply and return piping from man hole located in the generator room vicinity to day tank (tank by others) and then distributed to each of the emergency generators.
- Fuel vent piping for the day tank.
- Exhaust for generator room / transfer switch area, including associated ductwork, grilles, and fittings.
- Sound traps at generator radiator discharge plenums (approximately 10'x10', total of four).
- Sound trap at room intake opening (approximately 20'x10', total of one).
- Rework and drop sprinkler heads as necessary for fire protection.

Phase Breakdown – it is assumed that two generators will be installed for phase A, one for phase B, and one for phase C, for a total of four.

#### UPS and Battery Room

Area Scope (by McKinstry):

- Two (2) suspended evaporative cooling units.
- All ductwork, grilles, and fittings.
- Battery room exhaust fans and associated ductwork.
- Fire protection (Preaction with VESDA detection).

Server Room Cooling – Custom Rooftop Units ducted down shafts to the second floor.

Area Clarifications:

- Shafts will be required through the third floor for both supply and return air ducts.
- Units will be located on the 3rd floor. There will be openings required above the units for outside air intake hoods.

Area Scope (by McKinstry)

- Provide and install Two (2) custom chilled water air handler units (115,000 cfm each). 1 unit required to meet load requirements + 1 redundant unit. Includes factory roof curbs, integral relief fans, supply and return air fans, VFD's, filters, 100% outside air economizer, evaporative humidification.
- Provide and install approximately 500 tons of chiller capacity – Multistack modular air cooled chillers located on third floor.
- Chilled water pump skid with pumps, chemical treatment package and all accessories. Sized as necessary for future tenant suites.
- Domestic water piping to each AHU for evaporative humidification (back flow preventer included).

- Chilled water piping as required for a complete and functioning system (insulated as required by code). Piping will run from Chillers to coils located in custom roof top units.
- Fire protection: Preaction with Vesda detection. One preaction zone per suite.

General inclusions:

- Insulation as required by governing Energy Codes.
- Direct digital controls: including graphics, user work station, and programming.
- Variable frequency drives as necessary for supply and relief fans.
- Crane Hoisting (one mobilization per phase).
- Commissioning, testing, adjusting, and balancing.
- Permits and Coordination with local code officials.
- Start-up and functional performance testing of equipment.
- As-built drawings and O&M manuals.
- One year warranty.

Items included in McKinstry scope;

Shell and Core HVAC (Equipment/Duct and piping)

UPS and Battery Rooms

Generator mechanical and fuel piping inside generator room

Tenant Space – Distribution ductwork + hot aisle fans

Tenant Space – Aisle Separation

Scope includes fire protection, VESDA, plumbing, and HVAC for each of the areas broken out above.

Mechanical Engineering and Preconstruction are included.

General Exclusions to be performed by others (Sabey Construction)

- Doors at hot aisle entrances.
- Engineering and CAD services (soft costs)
- Cutting, patching, painting, core drilling, concrete cutting, demolition, and disposal.
- Shafts and shaft walls.
- Structural modifications or engineering.
- Acoustical consultant fees.
- Warranty for existing system components.
- Extra hangers or bracing to the existing systems.
- Electrical work, starters, or disconnects.
- Heat tracing.
- Seismic upgrades to existing systems.
- Performance bond.
- Painting of existing, priming of new, and finish painting of new ductwork or piping.
- Washington State Sales Tax.



## **VIII. Electrical**

### **Project Description**

Provide all electrical line voltage systems for a fully functional build out of Suite 52-01. Provide infrastructure for the future build out of Suites 52-02 and 52-03. This includes main switchgear, generators, transfer switches, unit sub-stations, UPS units, distribution gear, branch circuiting to racks, lighting, cable and fiber tray, and office build out. Provide 1.05 MW of UPS power and distribution for the Server Room area.

#### **Infrastructure**

- Provide one 1200A, dual bus, 27 kv switchboard (MSG-2) with tie breaker. The switchboard will have two separate incoming high voltage feeds (Bus #1 and Bus #2). Provide two 1200A frame 27 kv circuit breakers with relay trip on each bus. Provide one spare space for a future circuit breaker on each bus.
- Provide two 3000 kva unit sub-stations. This transforms the power from 26.2 kv to 480 volts. Each to be dual fed by a breaker from each bus on MSG-2.
- Provide two 4000A distribution switchboards (480 volt) for power to the UPS units, lighting and mechanical loads. Provide breaker space to accommodate a 1600A mechanical distribution board, four UPS units, two 50A misc loads and a breaker to feed a factory mounted TVSS unit. Provide dual input feeds with automatic transfer control module. This serves to transfer the load from utility to generator supply.
- Provide two Caterpillar 2500 kw generators (480 volt). Make provision for temporary load bank connection. Provide day tank. Mechanical to provide piping and connections to building fuel storage system.
- Provide four 562 kw (625 kva) UPS units with static and maintenance bypass and 5 minutes of full load battery back-up. Preferred UPS vendors are MGE and Mitsubishi.
- Provide fire alarm per local Code and Sabey Data Center. Provide interface for Vesda controls. Vesda is provided as an alternate.
- Provide perimeter security, access control and video surveillance.

#### **Server Room**

- Provide redundant runs of 225A or 400A Starline busway for distribution over the equipment cabinets.
- Provide EPO shut-off as required by Code.
- Mechanical design is based on McKinstry's hot aisle, cold aisle system.
- Provide two circuits to each floor cabinet (quantity to be verified). Each circuit will feed a dedicated L21-30R device and each will be fed from a different source bus.
- Provide fluorescent lighting centered on aisles at 50 fc minimum. Provide zoned switching. Lighting to be direct/indirect where appropriate. Note: If a grid ceiling is installed, we will use 2x4 direct/indirect layin fixtures. Provide power to mainframe area computers.
- Provide power and connections to eight 40 hp w/VFD return air fans.
- Provide cable tray centered above cabinets.
- Provide fiber tray centered above cabinets.
- Provide conduits to Server Room from building MDF.

#### **Printer Room**

- Provide UPS power to printers
- Provide lighting at 50 fc minimum and local switching.
- Provide power and data rough-in for counter mounted misc printers and faxes.

#### Office Area

- Provide UPS power for computers (at least one outlet per cubicle) and normal power for non-critical loads
- Provide lighting at 50 fc minimum and occupancy sensors controls as required by Code.
- Provide data outlets (rough-in only) at all cubicles and workstations.

#### Generator Room

- Generators to be provided and maintained by Sabey Data Center.
- Units to be 2500 kw (3125 kva) Caterpillar diesel generators with day tank.
- Provide lighting, power and connections consistent with the other generator rooms in the facility.
- Provide monitoring consistent with other facility installations.

#### Operations and NOC

- Provide UPS power to all equipment.
- Provide lighting at 50 fc minimum with a combination of dimming fixtures and local switching.
- Provide data outlets (rough-in opening only) at all workstation locations.

#### Switchgear and UPS Room

- Provide two 4000A 480 volt switchboards. Each are to be dual feed with automatic transfer control modules.
- Switchboard to have breakers to feed four UPS units each.
- Provide two 1600A distribution panels for mechanical loads.
- Provide misc transformers and panelboards for lighting and receptacle loads.
- Provide four 562 kw (625 kva) UPS units. These will be 480 volt 3 phase input; 480 volt 3 phase output.
- Battery back up time at full load to be 5 minutes.
- Provide four maintenance bypass panels, one for each UPS.
- Preferred vendors are MGE and Mitsubishi.
- Provide lighting centered between equipment at 30 to 50 fc with local switching.

#### Roof

- Provide power and connections to two rooftop units.
- Provide power and connections to four chiller units.
- Provide misc power and connections for heat trace (FBO) and circ pumps.

#### Inclusions

1. Asbuilt drawings and O&M manuals.
2. One year warranty.
3. Permits.
4. Start up and testing.
5. Coordination and cooperation for commissioning.

#### Exclusions (by SCI)

6. Washington State Sales Tax.
7. Reprographic costs.
8. Cutting, patching, painting, core drilling, concrete cutting, demolition and disposal.
9. Heat tracing except for circuit connections.
10. Structural modifications and engineering.

11. Shafts and shaft walls.
12. Seismic upgrades to existing systems.
13. Performance bond.
14. Engineering and CAD services (soft costs)

Electrical One Line Drawings on following two pages:

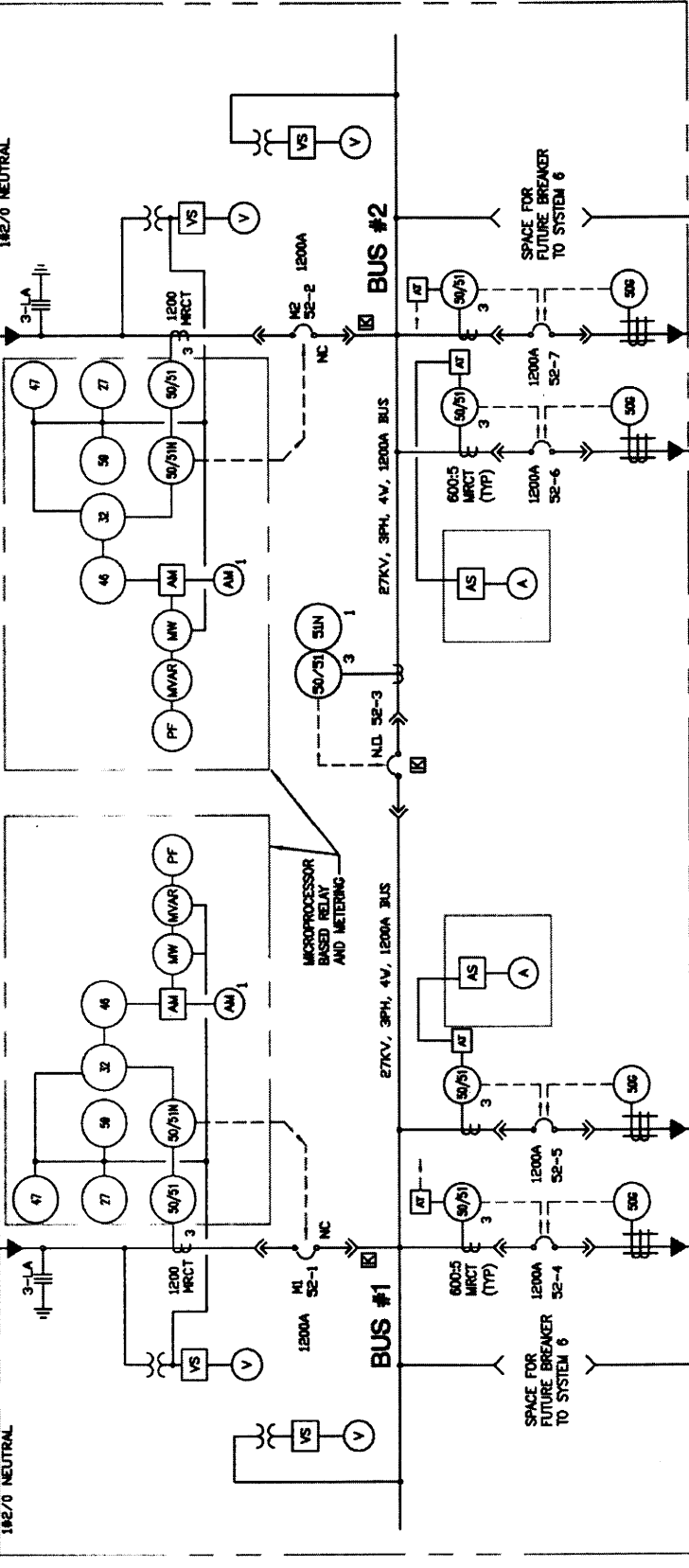
**NOTES:**



TO SITE POWER DISTRIBUTION  
 (2) 6°C, 3#350KCM, 1#2/0 GROUND, 1#2/0 NEUTRAL

**27KV SWITCHGEAR - MSG-2**

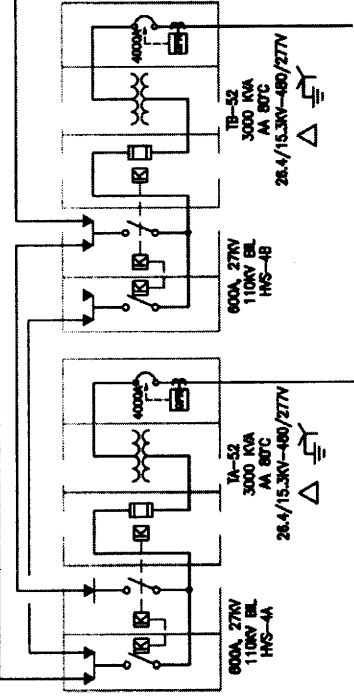
TO SITE POWER DISTRIBUTION  
 (2) 6°C, 3#350KCM, 1#2/0 GROUND, 1#2/0 NEUTRAL



6°C - 3 - 1/2 #300KCMIL, 3#KV & 1# 2/0 NEUTRAL

TO SYSTEM 5, SHEET NO. E5.5

TO SYSTEM 5, SHEET NO. E5.5 (FUTURE)





## **IX. Communications and Racks**

Included below is the documentation from Cochran for the communications cabling and racks. This was initially outside the scope of this project but at the request of King County is now included.

November 16, 2007

To: Marcelo Garces  
Sabey Construction

RE: King County Data Center – Draft Design  
Communication Design Criteria / Specifications / Clarifications/ Deviations

Attached is our Drawing Package for the Telecommunications portion of the King County Data Center at the Intergate East Campus. It includes a one line drawing schematic of how we propose the cabling would support the hardware needs, and 1<sup>st</sup> draft of the DD set of the telecommunications floor plans. Additional Elevation drawings and details are available for further clarification if needed.

In addition, please review the following sections for clarifications of our draft design.

### **Design Criteria Changes/ Clarifications/ Deviations**

### **Major Design Changes affecting Budget**

### **Value Engineering Ideas**

### **Design Scope Changes from Original Budget**

Kind Regards,

Alex Walkup  
Project Engineer  
Cochran Technologies  
206-719-3425 cell  
awalkup@cochraninc.com  
[www.cochraninc.com](http://www.cochraninc.com)  
"Integrity. Innovation. Quality"

## **Design Criteria Changes/ Clarifications/ Deviations**

I have defined three types of Scope clarifications from the original documents in order to clarify my notes on changes to the Design criteria documents. These consist of the following types, listed below.

**1) Clarifications:** Note site specific features that effect the design criteria

**2) TBD (to be determined):** Scope and budgets not definable until customer identifies hardware type and quantities. Completion of audits and instruction from future Move Consultant and King County stake holders will be needed in order to solidify these items.

**3) Design Change:** Based on meetings held with King County Representatives

## **King County Data Center Design Criteria - Telecommunications** **February 16, 2007 – Sazan Group Project No. 298-0612**

### **3.3 Data Center Communications Systems**

3.3 A. 3. Coax Backbone Requirements and Budget to be determined(TBD) when cell phone/PCS communication hardware is identified.

3.3 A. 5. Wireless Connectivity to KCPAN Requirements and Budget to be determined when wireless hardware is identified.

3.3 A. 6 Wireless Connectivity to KCWAN Requirements and Budget to be determined when wireless hardware is identified.

### **4.2 Data Center Structure**

4.2 A. 1. Clarification: There is only a single Entrance room for the Data Center

### **7.2 Telecommunications Cabling**

7.2 B. 2. b. 1. Design Change: Multimode will be 50-um

### **7.5 Equipment Cabinets**

7.5 A. Accessories: Blanking panels/208V 3-phase, 30A Cabinet Distribution units Requirements and Budget quantities to be determined when actual cabinet hardware density is identified

7.5 A. 1. To Be Determined (currently not incorporated into design or budget): Customer has recently requested different cabinets. 45 rack units Teraframe Solution by Chatsworth (FF3U-112C-C22 for Zero cab, FF2U-112C-C22 for cabinet) as Per Rick Gideon and David Millar. As per David and

Rick's email, the FF2U-110C-C22 is the preferred type for server cabinets, however the FF2U-110C-C22 has no rear door, and as such, I have changed their part #s to allow for one. Same for the FF3U-112C-C22.

\*In addition, these new cabinets are different widths than the cabinets listed in the specifications. 27.6 inches wide for the server cabinets, and 31.5" for the Zero IDF/Zone Cabinet.

### **7.7 Connector Blocks (Systimax VisiPatch 360 System)**

7.7 B. Clarification: Future space will be left vertically on the bottom two thirds for workstation terminations and PBX extensions. (Due to the top one third being used for backbone and network interface cables.)

### **7.11 Telecommunications Outlet/Connector Assemblies**

7.11 A. 8. Clarification: Jacks shall be labeled as "A", "B", "C", and "D" (due to some locations have 4 cables per location.)

7.11 C. 1 Design Change: Optical Fiber Connectors will be 50um multimode.



**Major Design Changes affecting Budget**

Increased quantity of Cabinets from 85 to 131 for budget purposes  
(aprox. 70k in added costs)

Increased from 24 ports per cabinet to 72 ports per cabinet & Significantly Increased Preterminated  
Hydra quantities  
(aprox. 560k in added costs)

Changed Backbone Fiber to 144strand Multimode and 144strand Singlemode  
(aprox. 35k in added costs)

**Cat.5e Cable Solution Budget**

<b>Revised Budgetary Sell Price</b>	<b>\$</b>	<b>969,229</b>
-------------------------------------	-----------	----------------

<b>Original Budgetary Sell Price</b>	<b>\$</b>	<b>422,504</b>
--------------------------------------	-----------	----------------

**Cat.6 Cable Solution Budget**

<b>Revised Budgetary Sell Price</b>	<b>\$</b>	<b>1,080,873</b>
-------------------------------------	-----------	------------------

<b>Original Budgetary Sell Price</b>	<b>\$</b>	<b>457,559</b>
--------------------------------------	-----------	----------------

Budget Pricing does not include sales tax and is valid for 30 days.

## Value Engineering Ideas

Switching from Cat.6 to Cat.5e would save aprox. 110k in added costs while still supporting gigabit Ethernet.

I have provided alternate budget pricing for a Cat.5e option and a Cat.6 augmented 10-gig capable solution. Both Cat.5e and Cat.6 are approved for 1000BaseT (or 1-gig) network connections. Cat.6 isnt any faster, though it provides better headroom for extreme environments where distance from the termination points is an issue. For shorter runs in a controlled environment, Cat.5e from a high end manufacturer (like Systimax) that exceeds standards is just as good as Cat.6. Cat.6 augmented is designed for equipment capable of 10-Gig speeds. While equipment capable of these speeds over copper is currently rare, it will become much more frequent and less expensive over the next couple of years.

I expect widespread use within four years, similar to the cycle we saw with 1 gig. If the customer plans to stay in this location for more than four years, I would strongly recommend a combination of a Cat.5e and Cat.6 augmented 10-Gig solution. Cat.6 has been shown to do a limited distance of 10gig, depending on the quality of the solution you choose and quality of installation combined with environmental factors. However, in a non-plenum rated environment where the cable cost ceases to be such a factor, a Cat6 augmented solution provides more value and the assurance that the system will handle 10gig speeds readily.

Our original pricing assumed that we would be installing at a minimum providing 1056 switch ports for distribution to the cabinet rows. Assuming potential growth of 200%, we had recommended providing a minimum of 24 copper ports per cabinet and 24 fiber ports per zone (approximately 8-10 cabinets per zone), which would provide us with approx. 12 ports per cabinet of network connectivity to start and 12 ports for future growth. Revised Design as per Rick G. has 72 ports per cabinet, with 24 ports for Ethernet, 24 ports for storage, and 24 ports for Out-of-Band.

Pricing for patch cords, blanking panels, and other items with undefined quantities are not included in the budget at this time, as specific quantities will need to be identified before ordering. Price also does not include any electrical scope (basket tray, receptacles, power strips, grounding, etc) as instructed during the original site walkthru.

## **Design Scope Changes from Original Budget**

**Final Design requires completed audits of systems to be moved, SAN requirements defined (I-SCSI cabling requirements?), and quantity agreements for misc. items such as patch cords, blanking panels, etc.**

Provide and Install (116) CPI "Server Cabinets" and (12) CPI "Network Cabinets" in the data center 40x area.

Provide and Install from IDF/Zone Network Cabinet to each Server Cabinet (2)12 pack Hydra Cat.6 cables to 24 port Patch Panels and (48) Cat.6 cables to 24 port Patch Panels

Provide and Install Cat.6 Cabling for (55) Outlets in Office and NOC. 4 jacks/4 cables per work station in the NOC. 3 jacks/3 cables per work station in office areas. Provide (4) Wall phone outlets with 1 jack/1 cable at TBD locations.

Provide and Install audio visual cabling for Conference Room consisting of (1) VGA cable, (1) component video cable, and (1) S-Video Cable from Ceiling projector location to outlet in same room.

Provide and Install (72) ports of Cat.6 Feeds for (8) TBD Misc. Data Center Areas outside of the Hot Aisle cabinet enclosures.

Provide and Install (1) 48 strand 50um multimode fiber cables from the MDF Fiber Rack to each (12) IDF/Zone Network Cabinet.

Provide and Install (1) 144 strand 50um multimode and (1) 144 strand singlemode fiber optic cable from the MDF Fiber Rack to the Entrance/Demarc room.

Provide and Install 2x2 Fiber tray in IDF rows and MDF rows for Fiber patch cord routing

Provide and Install Visipatch 360 wall field in 1<sup>st</sup> Floor offices IDF for all Terminations for this area.

Provide and Install 100 pair Riser feed from MDF to 1<sup>st</sup> Floor office IDF for voice connections

Provide and Install (1) 24 strand Multimode and (1) 24 strand Singlemode Fiber optic cable to 1<sup>st</sup> Floor office IDF.

Provide and Install (1) 48 strand Multimode 50um Fiber Optic Cable from the MDF to each (12) IDF/Zone Cabinet.

**KC DC - Sabey Cat.6 Option**

Original Qty	Qty	Unit	Manf.	Description
<b>Station Locations (Tie to VisiPatch)</b>				
221	221	ea	Systimax	RJ-45 Jack CAT6
55	55	ea	Systimax	4-Port Faceplate
55	55	ea	Systimax	Dust Cover/Blank
1	1	ea	Systimax	Wallphone Plate
38675	38675	ft	Systimax	CAT6 Cable Plenum
6	4	ea	Systimax	VP360-12U-96P Visipatch 360 Wall Field
6	4	ea	Systimax	VP360-12U-10VTCM Visipatch 360 Vertical CM
1	2	ea	Systimax	VP360-HCM-KIT-27 Visipatch 360 Horizontal CM 37"
4000	4000	ft	Systimax	RG-6 Plenum Cable for NOC video connections
4	4	ea	Systimax	1-Port Faceplate
8	8	ea	Systimax	F-Type Connector Insert
<b>Cabinet Cabling</b>				
2040	8,976	ea	Cochran	Per Port Pull Cable from IDF/Zone Rack to Server Cabinets
122400	538560	ft.	Systimax	CAT6 PVC Cable for Hydras and Telco Ties
170	508	ea	Systimax	24-Port CAT6 Patch Panels for Cabinet Ties(3 per Cabinet)
44	0	ea	Systimax	24-Port UMP Blank Panels
88	496	ea	Systimax	Hydra cabling - 12 packs (3 per Server Cabinet Budgeted)
<b>Racks</b>				
14	14	ea	CPI	7' x 19" Racks
14	14	ea	CPI	Rack base dust cover
14	14	ea	CPI	Rack Top Mount Cable trough
12	12	ea	CPI	MCS-EFX Master Cabling Section
2	2	ea	CPI	CCS-EFX Combination Cabling Section
14	14	ea	CPI	Large Horizontal Ring Panel
50	50	ea	CPI	Small Peripheral Shelf
50	50	ea	CPI	Heavy Duty Equipment Shelf
50	50	ea	CPI	Double Sided Equipment Shelf
14	14	ea	CPI	Concrete Floor Installation Kit
14	14	ea	CPI	Rack Seismic Gusset Kit
14	14	ea	CPI	10" Cable Runway Dropout
<b>Cabinets</b>				
85	116	ea	CPI	TeraFrame Series 24" wide freestanding modular type
85	116	ea	CPI	Multi-Mount Hardware Kit
85	116	ea	CPI	Large Horizontal Ring Panel
1	1	ea	CPI	MegaFrame Fixed Shelf
1	1	ea	CPI	Filler Panel 4u
1	1	ea	CPI	Filler Panel 6u
1	1	ea	CPI	Filler Panel 10u
1	1	ea	CPI	Snap-in filler panel 1u
1	1	ea	CPI	Snap-in filler panel 1u (square punch)
1	1	ea	CPI	Snap-in filler panel 2u

1	1	ea	CPI	Snap-in filler panel 2u (square punch)
540	131	ft	CPI	concrete Floor installation Kit

**Copper and Fiber Riser**

1040	0	ft	Corning	24-Strand SM 8/125 OFNR Fiber Cable
1040	0	ft	Corning	24-Strand MM 62.5/125 OFNR Fiber Cable
1000	1000	ft	Corning	24-Strand SM 8/125 OFNP Fiber Cable
1000	1000	ft	Corning	24-Strand MM 62.5/125 OFNP Fiber Cable
500	1500	ft	Corning	48-Strand SM 8/125 OFNR Fiber Cable
500	3300	ft	Corning	48-Strand MM 50/125 OFNR Fiber Cable
500	500	ft	Mohawk	300x CMR Cable
500	500	ft	Mohawk	50x CMR Cable PBX connections to Visipatch field
500	500	ft	Belden	CATV Backbone Cable
4	4	ea	Corning	1U Rack Mount Fiber Enclosure
2	2	ea	Corning	4U Rack Mount Fiber Enclosure
56	56	ea	Corning	12-Port LC MM Adapter Panel
56	56	ea	Corning	12-Port LC SM Adapter Panel
672	864	ea	Corning	LC MM Fiber Connectors
672	288	ea	Corning	LC SM Fiber Connectors

**Closet Hardware**

0	12	ea	CPI	7' x 19" Racks
0	2	ea	CPI	Vertical Wire Management 7'hX6"w Double Sided
0	11	ea	CPI	Vertical Wire Management 7'hX12"w Double Sided
6	20	ea	Systemax	VP360-12U-96P Visipatch 360 Wall Field
6	20	ea	Systemax	VP360-12U-10VTCM Visipatch 360 Vertical CM
1	10	ea	Systemax	VP360-HCM-KIT-27 Visipatch 360 Horizontal CM 37"

**Misc**

1	1	Lot	Cochran	Misc Materials & Terminations
300	300	ea	Cochran	Cable Pathways
1	1	ea	Cochran	Permit
1	1	Lot		Firestopping

Revised	\$	1,080,873
Budgetary Sell Price		

Original	\$	457,559
Budgetary Sell Price		

## **X. SDC52 Design Peer Review RFP**

Below is the cover letter for our Peer Review document that we sent out for competitive bid. The peer review contract was awarded to Glumac

### Sabey DataCenter 52 (SDC 52) Peer Review Request for Proposals

#### Background

Sabey DataCenter (SDC) is developing a scalable data center and desires to contract for electrical and mechanical design peer review.

The design reviewers will focus on: (1) identifying any single points of failure that may have been missed by the designers, (2) checking relevant design calculations, and (3) identifying general areas of opportunity for design improvement – especially from a standpoint of reliability enhancement and cost savings. Initial cost and TCO are both of concern – point out opportunities for energy conservation and utility rebates.

The design reviewers will review design documents at three major design milestones. The design reviewers will provide a report outlining their comments. The design reviewers will allot a reasonable amount of time for communication between the designer, design reviewer, and developer.

Design reviewers may propose on just the electrical design, just the mechanical design, or both. In addition to a firm price for the basic scope, respondents will list hourly rates for additional work.

The project schedule is aggressive. Design reviewers will commit to be prompt and thorough in their reviews. Design reviewers will indicate in their response the amount of time they will require to produce a report on each design step.

Design reviewers will indicate in their proposal their company's qualifications for doing the proposed work and the individual(s) proposed for this job. Design reviewers will indicate their philosophy in conducting peer review.

SDC will evaluate proposals based on price, schedule responsiveness, and qualifications. SDC may choose to award the design reviews to one company, separate companies, or none of the companies.

At this time, SDC only intends to conduct peer review of the major systems (electrical and mechanical). Responding firms may provide optional proposals for reviewing other systems (architectural, fire, etc.) The price for such proposals should be broken out separately.

The design review price will be for Phase 1. It will include overall feasibility for building Phases 2 and 3, but it will not include the exact details of those designs.

## **XI. Project Team**

Developer - **Sabey DataCenter (SDC)**

Architect – **Callison**

Structural Engineer- **Engineers Northwest**

General Contractor - **Sabey Construction**

Electrical Contractor- **Veca Electric**

Mechanical Design-**McKinstry**

Design Review- **Glumac**

Communications- **Cochran**

As the Developer, SDC leads the project team.

**Sabey Corporation** began building computer rooms, as they were called then, in 1983 for Boeing Computer Services. During that time we also built-out the Abasco computer room and the regional computer center for ADP.

The design reviewers will focus on: (1) identifying any single points of failure that may have been missed by the designers, (2) checking relevant calculations, and (3) identifying any general areas of opportunity for design improvement.

The tenants, and their representatives, will be involved in the design to varying levels (up to and including design approval), depending on the specifics of their agreements with SDC.

## **XII. Sabey Overview**

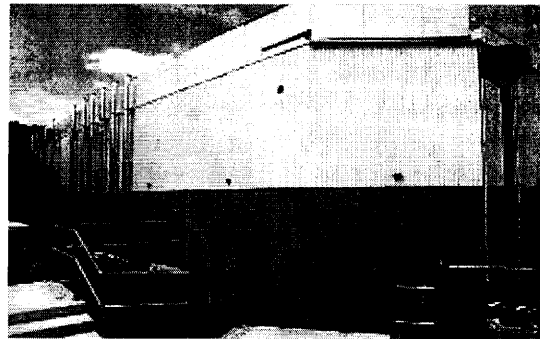
For over 38 years Sabey Corporation – a \$500 million commercial real estate development company – and its affiliate, Sabey Construction, Inc. (SCI), have constructed, renovated, and redeveloped over 27 million square feet of office, data center, manufacturing, warehouse, and retail space for hundreds of clients – Fortune 500 companies, institutions of higher education, and branches of the U.S. Government.



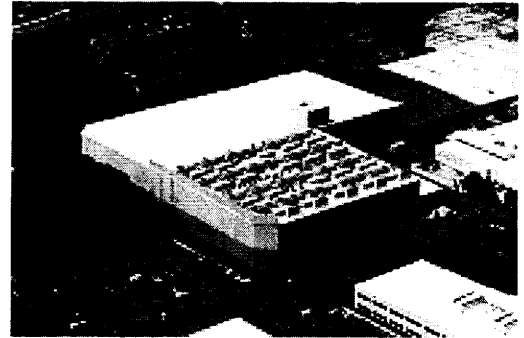
Today, we own and manage over 4.5 million

square feet of office, technology, data center, industrial and residential properties in Washington State and have current construction projects totaling over \$100 million. Sabey has either owned or constructed projects in California, Oregon, Texas, Utah, Alaska, Idaho, Arizona, Montana, and of course, Washington. Seventy-five percent of our portfolio is leased to marquee companies, including Group Health, American Express, Washington Mutual, Qwest Communications, Hearst Newspapers, Microsoft, Swedish Medical Center, United States Government, SAVVIS and Internap.

Our construction experience is diverse, ranging in size from \$10,000 to over \$150 million. Each new building is a challenge, whether it is the renovation of an existing building or new construction.



Some projects have been extremely specialized, like the high-security buildings in which Boeing Airplane Company designed and built the B-2 bomber, or the newly constructed Department of Homeland Security Regional Headquarters; many are highly technical such as bio-tech and electronic clean rooms designed for cancer research and chip manufacturing or collocation and



data center spaces designed with 100% redundant systems; still others are unique to the region, such as

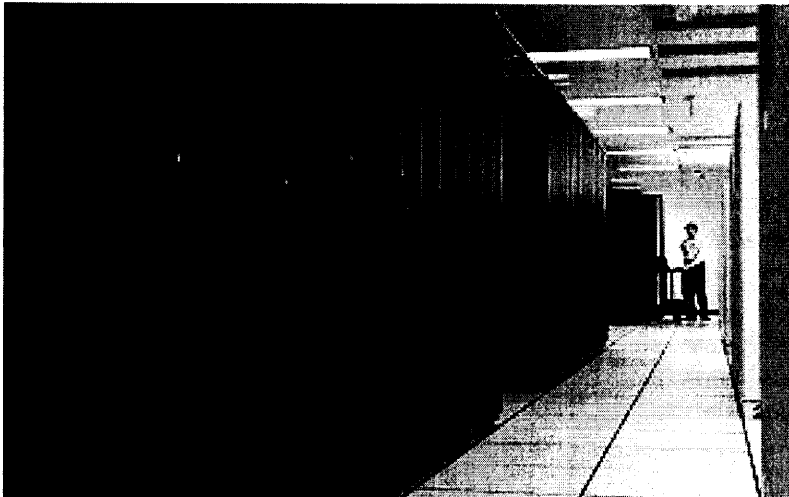


the King County Aquatics complex built for the U.S. – Soviet Goodwill games in 1990. None of these projects were standard development and construction jobs – either the timeline was unusually short or the structure highly



specialized. Presented with these challenges, we excel.

In every instance, what has helped the process along is our in-house full service capability,



including development, construction, architecture and planning, property management, leasing and marketing divisions. Within these areas, Sabey Corporation and Sabey Construction, Inc. have

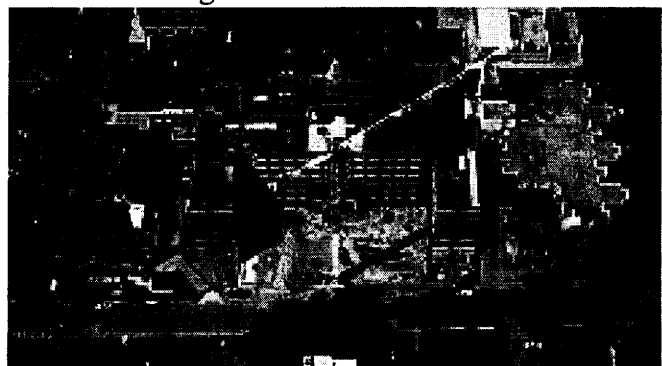
and

the ability to provide any one or all of the steps necessary to develop or redevelop property:

- Code analysis
- Construction management
- Estimating
- Entitlement
- Environmental assessments
- Financial and cash flow analysis
- Leasing
- Legal
- Marketing
- Planning and permitting
- Space planning
- Tenant Improvement

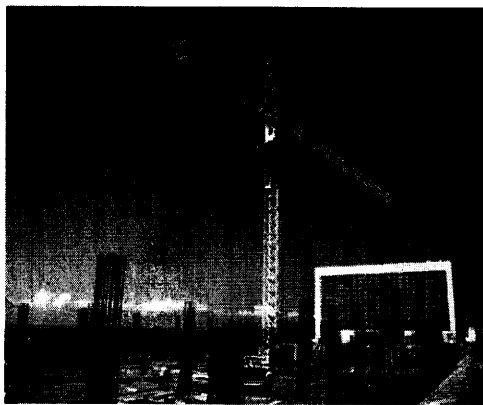
### **Sabey Construction Services**

Sabey Construction, Inc. (SCI) brings decades of experience to each project. Because we frequently build for our own account, SCI offers a full range of in-house services that extend far beyond those normally available through



general contractors, including: site research and acquisition, land reclamation, complete construction management, post-construction follow through, and assistance in planning for future expansion or changes in use. Our staff includes professionals in estimating, purchasing, cost scheduling, accounting, and management support as well as experienced project managers, superintendents and foremen.

In addition, SCI has the in-house support of Sabey Architecture, financial and legal services, as well as a number of consulting/engineering firms with whom we have established close working



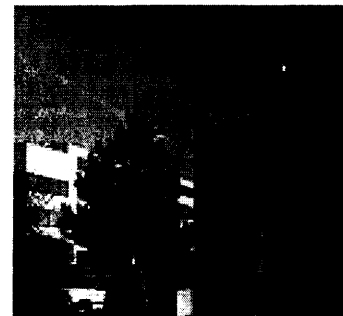
relationships over the years.

SCI is able to field a professional crew wherever needed. We are able to increase capacity to meet unusual jobs and time requirements while maintaining excellent quality, thorough safety standards and buttoned-down cost control. And, SCI is very successful at accelerating

timeframes, for instance by overlapping activities and managing more trades on a job site, so that our customers are up and running faster than they might expect.

A strong working relationship is created in all Sabey Corporation/Construction design/build projects by emphasizing the importance of team effort.

development experts, engineers, estimators, project and other project professionals within arm's reach has our clients an extremely responsive team, adept at problem-Being under the same roof allows us to define clear channels



Having managers, afforded solving.

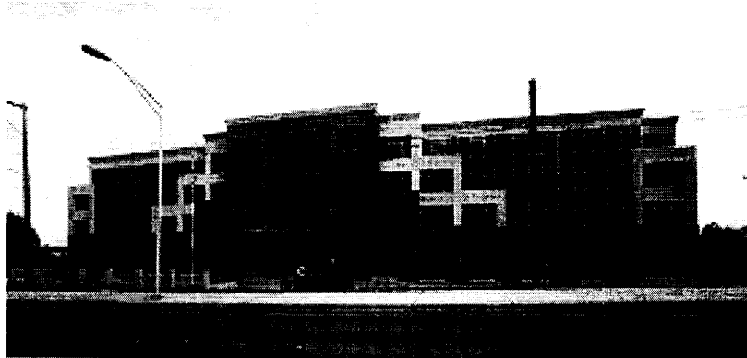
of communication and division of responsibility early in any project. Through this team approach, Sabey Corporation and SCI offer the unique ability to provide a seamless flow from development to design

requirements through construction and into the opening of a facility. This premise holds true if projects are developed using in-house services or teamed up with outside architectural and engineering firms to deliver projects for our clients that are on time and on budget.

Using SCI as a resource throughout the development life cycle is a great example of how we use our powerful resources to the customer's advantage. SCI's ability to move in tandem with the entitlement phase, thereby maximizing the team's time-lines, will provide the earliest practical delivery of the best fit for this overall development. Numerous examples and details exist as to our method of maximizing the optimal outcome from the proposed team and will remain as evidence resonating from the demonstration of excellence through execution.

We are uniquely qualified for and gravitate to real estate solutions that offer less orthodox delivery methods and challenge us to "think outside the nine dots." Our comprehensive and world class network of business partners provides scale, perspective and value to our customers. Based on our long term success and

experience with both our own estate developments and our significant third party services (including development, design,



real

construction, leasing and facility operations), we are confident that our team will provide King County with the value-added real estate solution it seeks.