

11.3.13 Details of the Data Center Facilities Proposed Solution

Introduction

The specifications contained within this document have been based on the Schedule 4 Comprehensive Infrastructure Agreement and other industry planning documentation. Our design meets or exceeds the stated requirements for a Tier 3 Data Center Facility and current local and standard building codes to include seismic specifications. This document has been prepared to address our intended design criteria and represents our professional opinion to meet the Client requirements. Please consider this document as “schematic” only. Additional study and design time will be required to determine particular detailed aspects of design requirements.

Basis of Design

The basis of this proposal was developed from our practical experience on comparable data centers and the following information, which was taken from the Uptime Institute, which is one of the leading sources of information regarding data center design and reliability:



“With the explosive growth of the Internet comes an increased demand for computer hardware reliability. Information technology customers expect reliability of “Five Nines,” or 99.999%. Unfortunately, the substantial investment a business makes to achieve “Five Nines” in its computer hardware is insufficient to protect its mission-critical computing functions. These significant investments must be accompanied by a solid understanding of how well their site infrastructure can support their availability goals.”
- W. Pitt Turner IV, P.E. and Kenneth G. Brill, *Industry Standard Tier Classifications Define Site Infrastructure Performance*, Uptime Institute, 2001.

Tier IV

Tier IV reliability is defined as follows by the Uptime Institute: Multiple active power and cooling distribution paths, redundant components, fault tolerant, 99.995% availability for system + system redundancy (i.e. N+N redundancy). Fault tolerant is defined as a site that can sustain at least one “unplanned” worst-case site infrastructure failure with no critical load impact. Maintenance is a concern for Tier IV data centers as the site must be able to perform planned site infrastructure activity without shutting down critical load. Data centers are typically composed of at least twenty major mechanical, electrical, fire protection, security and other systems, each includes additional subsystems and components. All of these must be concurrently maintainable for the entire site to be fault tolerant.

Construction dollars per square foot of raised floor for a tier IV data center average \$1,100+ and require 15-20 months to implement. This requires 100% support space to raised floor ratio. And finally, Tier IV reliability requires dual power computer hardware that moves the last point of electrical redundancy from within the UPS to the computer hardware itself. This came about upon the realization that 95% of all site infrastructure failures occur between the UPS and the computer load itself.

Tier III

Tier III reliability is defined as follows by the Uptime Institute: Multiple power and cooling distribution paths, but only one path active, redundant components, concurrently maintainable, 99.982% availability. This is considered N+1 redundancy with an average cost of \$900 per square foot of raised floor and implementation time of 15-20 months. Tier III data centers have a support space to raised floor ratio of 80-90%.

From our history of practical experience we have found that the cost per square foot figures provided by the Uptime Institute are significantly higher than the actual prices paid for these systems.

Keeping with what we have evaluated, an ideal solution would be one that provides a high availability data center, while keeping costs in check. As you can see from the criteria listed above, it is an extremely complicated process to provide multiple paths to achieve Tier IV stability without designing to an N+N configuration. In theory, a system can be designed to provide the redundant paths required for a Tier IV data center without the expense of an N+N configuration. Unfortunately, this is almost impossible to achieve in the budget and planning stage of a project. What we would like to propose for the purpose of this exercise is a level of redundancy that provides reliability greater than the N+1 but not to the high level of expense required for achieving N+N configuration.

Physical Site

In accordance with Schedule 4 Section 1.2, the Data Center Facility has been designed to include a vehicle protection barrier and secure equipment yards. Parking for employees and visitors, as well as driveways for loading, has also been provided.

Structural Design

Applicable Criteria

The structural design for this project will be in accordance with the following design codes:

- Virginia Uniform Statewide Building Code, 2000 Edition
- International Building Code 2000, with applicable supplements
- Requirements of an “essential” Level 3 Data Center Facility, met or exceeded

The IBC 2000 indicates a ninety (90) mile per hour three (3) second gust wind speed for the **Redacted** area. The minimum roof live load and snow load is anticipated to be twenty (20) pounds per square foot (psf) and twenty-four (24) psf respectively. The current design criteria would require conformance with the IBC 2000 based on Essential facility use.

Building Foundation

It is anticipated the foundation system will consist of shallow continuous wall footings and isolated spread footings. An existing 129,600 SF foundation pad should be utilized based on confirmation with the construction requirements from the previous soils investigation. Prior to

determining the new seismic requirements, a more detailed evaluation of the geotechnical data would be needed to determine the current Site Class characteristics under the IBC and any other required site specific data for structural risk assessments. Potentially, this information may be obtained from the original Geotechnical Report performed for this project which is not available at this time.

The floor slab is anticipated to be a floating reinforced slab on grade underlain with granular porous fill, designed for a minimum of 150 pounds per square foot (psf) live load. The slab on grade will be depressed in areas of architectural raised floor locations, to allow it to be flush with the standard floor.

Structural Framing System

The building will be a one-story steel framed structure to achieve a wide-bay structural grid, maximizing interior layout flexibility. Steel roof deck will span between steel joists, which span between joist girders. The joist girders will frame into wide flange or tube columns. The building envelope is anticipated to consist of 8-inch thick pre-cast insulated sandwich panels. The lateral load resisting system will be provided by steel moment frames between the joist girders and columns in the transverse direction and the pre-cast panels act as shear walls in the longitudinal direction. The steel roof deck acts as a diaphragm to distribute these lateral loads to the individual frame and wall components.

Architectural Design

Applicable Criteria

This project has been designed to meet or exceed all applicable local, state and national building code requirements.

Interior Spaces & Function

The Data Center Facility has been designed to include one (1) primary secure entrance located near the Administrative Office Area. This secure entrance will be used by authorized employees and approved visitors only. A Security Office is located adjacent to the Entry Vestibule and Reception Lobby for security clearance and monitoring purposes. The Administrative Office Area for approximately fifty (50) employees and a Conference Room is located just off of the Reception Lobby. A Vending / Lounge Area and restrooms are also provided for employee use. This “front end” area is separated from the core Data Center and equipment areas by a full height demising wall for additional security.

General Description of Tenant Improvements

The Developer has included an allowance for the design and construction of tenant improvements within the building. Design services will include direct meetings with the Commonwealth to determine the needs of the occupants, and necessary follow-up meetings to discuss and finalize alternative design approaches. The allowance included in the lease rates assumes the materials and scope of work described in the facility staffing requirements and space allowances in the proposal document.

Lobby and Common Areas

The Entry Vestibule, Reception Lobby, Vending / Lounge Area and Corridors shall be finished with 12” x 12” vinyl or ceramic floor tile. Interior partitions shall be finished with vinyl base and vinyl wall covering for durability and ease of maintenance. Ceilings will be a combination of

acoustical tile and gypsum board as required for security purposes in an attractive design.

- Administrative Areas** The Security Office and Conference Room shall receive direct glue down carpet floor covering. The Administrative Office Area shall receive carpet floor covering over twelve inch (12") high access flooring. All interior partitions shall be painted gypsum wall board. Ceilings throughout these areas shall receive an acoustical ceiling tile and grid system. Square footage has been allotted for fifty (50) enclosed offices / open office workstations, workrooms, operations center, and corridors to be arranged to accommodate user's operational requirements following Client interviews. This allows for 220 gross square feet per occupant.
- Restrooms** One set of Men's and Women's restrooms will be provided near the facility entrance and adjacent to the Administrative Office Area. Restrooms shall be finished with ceramic mosaic floor tile and complementary wall tile to 7'0" above finished floor at wet walls, and vinyl wall covering at other walls. A combination of recessed cove and recessed down lighting in gypsum ceilings shall be provided.
- Mechanical, Electrical, and Storage Spaces** Finishes for these areas will include sealed concrete floors, painted gypsum board walls with an exposed ceiling structure above. The Battery Room shall also be constructed with a concrete curb of sufficient height to trap any acid spills within the UPS battery rack area. The floor slab inside the curbed containment area shall be finished with an acid-resistant coating.
- Core Data Center** The Core Data Center shall receive raised access flooring as required. The slab will be depressed for level floor access to adjacent areas. Floor drains will be provided under the access floor to provide emergency drainage. The enclosing partitions will be full height insulated GWB partitions with RF shielding. An acoustical tile ceiling system will be provided at twelve feet (12') above finished access flooring to reduce dust and limit the volume of space requiring cooling.

Architectural Building Systems Specifications

- Exterior Partitions** The building exterior walls will be 28 feet high and constructed in a system of two (2) 8" inch thick pre-cast reinforced concrete sandwich panels, each with a rigid insulation core. The pre-cast concrete panels will have an R-value of 11 and will be anchored to the exterior of the structural floor and column system, providing only shear and seismic loading resistance rather than vertical load support. The exterior of the facility will have decorative recess and reveals. Surfaces shall be painted to blend with adjacent facilities and will not receive special texturing application.
- Interior Partitions** Partitions within the administrative areas, and on the interior face of exterior walls at the Administrative Areas, will be constructed using 2½" 25-gauge steel studs at 16" on center and 5/8" gypsum board, floor to ceiling.
- Demising partitions between the suites, around the Conference and Electrical Rooms will be slab-to-roof deck using 6" steel studs at 16" on

center with 5/8" Type X gypsum board and sound batt insulation. Partitions will be one (1) hour rated as required by local building codes.

Partitions surrounding the core Data Center will be 2-hour fire-rated constructed of 6", 18 gauge steel studs at 16" on center from floor to the underside of the roof. Data Center partitions will be finished with (2) layers of 5/8" Type-X gypsum board on both sides, batt insulation, a vapor barrier, and a layer of heavy gauge, welded-wire mesh on the exterior side of the stud framing.

Partitions surrounding the Mechanical, Battery, and Secure Storage rooms will be 2-hour fire-rate constructed of 8", horizontal-reinforced concrete masonry units to the underside of the roof deck.

Doors

The building entry will be accessed by one storefront glass door. The remainder of the building exterior will have the minimum number of steel personnel doors required for emergency egress and equipment access. These doors will be operable only from the interior of the building.

One 10'0" x 12'0" overhead door and dock leveler will be provided for delivery of large equipment to the secure storage receiving area. Other 10'0" x 12'0" overhead doors will be provided at the Electrical and Mechanical rooms to provide a means to install the equipment in these rooms that is too large to be moved through the building. These doors will be secured and not used once the equipment is installed except in the event of equipment replacement.

The Mechanical, Electrical, Generator, Battery, and core Data Center Rooms will each have a pair of 4'0" wide x 9'0" high steel security doors to accommodate delivery and installation of large equipment during the life of the facility. Security steel frame and hardware, including bio-metric scanning access controls, will be included in these areas.

Typical interior office doors will be provided for convenient tenant access throughout the building, as well as required fire egress. Corridor entry doors will be 3'-0" x 7'-0" pre-finished seven ply solid core wood with hardwood edge bands to match face veneers. Veneers to be plain sliced Red Oak stained with a catalyzed lacquer satin sheen topcoat. Doors are to be provided with a manufacturer's lifetime warranty and be prepared to receive concealed closers, mortise locksets and four hinges.

Door Hardware

Suite entry doors will have mortise lever-type locksets. Interior tenant doors will have extra heavy duty cylindrical lever locksets. The finish for all hardware will be satin chromium plated with a standard six pin keyway lockset. Suite entry doors will have overhead fully concealed closers. Electromagnetic locks will be surface mounted.

Windows

Windows will have aluminum frames and glazing designed to withstand 120 mph winds. Glazing will be high performance low-E insulated, glazing units with the inside pane 1/4" (6mm) nominal laminated glass. Windows will be located in the office areas only.

Window Treatments

Horizontal one inch (1") aluminum louver window blinds will be provided

by Landlord in a color to be determined by Landlord.

Raised Access Flooring	<p>The Administrative Office Areas will be built upon 12 inch stringer-less access flooring with anti-static carpet tiles.</p> <p>The Core Data Center will be built upon an adjustable 30 inch high raised flooring system over sealed concrete. The raised floor system shall be CRH, (computer room heavy) with a minimum capacity of 1250 pounds concentrated loads and 250 psf uniform load, stringers, and static dissipative plastic laminate. Mechanical, data, and communications infrastructure will be distributed under the raised flooring system to simplify access for ongoing changes in function and layout.</p>
Carpet Tile	<p>The Administrative Office Areas and Security Office shall receive a commercial grade 30 oz. carpet tile made with a manufacturer's ten year warranty. Installation to be direct glue down (as per carpet manufacturer guidelines) in the Security Office and as per raised access system manufacturer guidelines in the Administrative Area. Carpet colors and patterns are to be selected by the Tenant.</p>
Vinyl Composition Tile (VCT)	<p>The Entry Vestibule, Reception Lobby, Vending / Lounge Area and Corridors shall receive a 12" x 12" x 1/8" standard commercial grade tile in a standard manufacturer color as selected by the Tenant.</p>
Ceramic Tile	<p>Restrooms shall be finished with ceramic mosaic floor tile and complementary wall tile to 7'0" above finished floor at wet walls. Floor tiles shall be 12" x 12" x 1/8" standard commercial grade floor tile. A ceramic cove wall base shall be used with ceramic floor tile. All colors are to be selected by the Tenant from manufacturer standard colors.</p>
Vinyl Wall Base	<p>A standard 4" high straight vinyl wall base shall be used in areas scheduled to receive carpet tile and a 4" high vinyl cove base where VCT flooring is used. All colors shall be selected by the Tenant from manufacturer standard colors.</p>
Acid Containment	<p>The Battery Room will be constructed with a concrete curb of sufficient height to trap any acid spills within the UPS battery rack area. The floor slab inside the curbed containment area will be finished with an acid-resistant coating.</p>
Vinyl Wallcovering	<p>The Entry Vestibule, Reception Lobby, Vending / Lounge Area and Corridors shall be receive a Type II commercial vinyl wall covering finish for durability and ease of maintenance. Colors and patterns shall be selected by the Tenant.</p>
Paint	<p>All interior partitions, unless an alternate finish is specified, are to receive two (2) coats of wall paint in a color to be selected by Tenant. The two (2) coats include a prime coat and one coat of latex paint in an eggshell finish. All wood and metal surfaces will receive a primer coat and two (2) coats of semi-gloss paint.</p>
Signage	<p>Building standard interior signage will be provided by the Landlord for</p>

wayfinding purposes within the Tenant's space.

Ceiling Grid The ceiling in the Entrance Lobby, Reception Area, Security Office, Vending / Break Room and the Administrative Office spaces are to be finished with an acoustical tile and grid system. A standard heavy duty, 1 inch (1"), white grid shall be used with a 24" x 24" white tile dropped in. The typical office ceiling height shall be at 9'-6" above finished floor.

Roof The Data Center Facility roof system shall be an IRMA type roof system using hot applied rubberized asphalt (two-ply) meeting FM90 requirements with a minimum 20 year manufacturers warranty.

Mechanical Systems Design

Applicable Criteria This project has been designed to meet or exceed all applicable local, state and national building code requirements.

Cooling For total cooling requirements we calculate that with 2,730 kW @ 3.4 Btuh/Watt = 773 tons of sensible cooling will be required, for a total cooling load of 966 tons.

To provide this level of cooling for the building, we propose to provide three (3) variable frequency 500-ton chillers, three (3) 1500 GPM cooling towers, and associated chilled and condenser water pumps and connecting piping. The cooling towers will be piped to a 50,000 gallon storage tank to assure a supply of makeup water in the event of loss of city water supply.

Two (2) independent primary/secondary chilled water systems will be provided, consisting of two (2) variable speed secondary pumps and four (4) primary pumps.

Cooling and heating for the Non-Computer Room portions of the building will be provided by two (2) self-contained, rooftop air-handling units with chilled and heating water coils serving medium pressure sheet metal duct systems. Outside air will be provided at each air handling unit. VAV boxes will be provided at a maximum VAV zone size of 900 square feet in perimeter areas, and 2,000 square feet at interior zones. Perimeter zone VAV boxes will be furnished with hot water heating coils. The air handling units and VAV boxes will be provided with electronic DDC controls served by a DDC Energy Management System. The Electrical Switchgear Room will be conditioned by fan or blower coil units with heating and chilled water coils.

Conditioning for the Data/Servers Rooms and UPS/Battery Room will be provided by self-contained, floor-mounted, Liebert Computer Room units with chilled and hot water coils and steam humidifiers for humidity control. The Data/Servers Rooms will be broken into three (3) zones with (10) 20-ton A/C units per zone to accommodate the three-phase growth requirement. The UPS/Battery Room will have eight (8) 20-ton units. 65% efficient cartridge filters will be provided.

Heating & Ventilation Heating water will be provided by three (3) water tube boilers, each sized for 50% of the building load. Approximate boiler size is 50 BHP. Boilers will

	<p>be dual #2 fuel oil/natural gas fired with natural gas as the primary fuel. Oil will be supplied by an 8000 gallon above ground double wall storage tank. A heating water circulating pump and backup pump will be provided.</p> <p>Hot water unit heaters will be used to heat mechanical and storage areas, and power roof ventilators used to provide cooling ventilation and exhaust for toilet areas. Three (3) roof mounted emergency exhaust fans will be provided for the Data/Servers Rooms, each sized at six (6) air changes per hour.</p>
Gas Detection System	The Battery Room will include gas detection devices with a DDC shutoff interface with the HVAC system, and independent redundant exhaust fans.
Fire Dampers	Only UL approved Ruskin Type 1BD2 fire dampers with a 165° F fusible link should be used. Style A should be used directly behind registers, Style B used for rectangular duct, and Style LR used for round duct or equal.
Ceiling Diffusers	Perimeter air diffusers to be Titus plenum slot diffusers; Supply air diffusers to be 24" x 24" with ¾" slots and integral building standard ceiling tile; Return air diffusers to be 24" x 24" with ¾" slots and integral building standard ceiling tile.
Mechanical Redundancy	<p>For optional redundancy we propose in the Data/Servers Rooms to provide two (2) additional 20- ton units in each of the three (3) zones, which are described in the Mechanical Systems Specifications.</p> <p>To provide additional redundant cooling for the building, we propose one (1) additional 500-ton chiller, one (1) additional 1500 GPM cooling tower, and associated backup pumps and piping for the previously proposed primary/secondary chilled water system.</p>
Life Safety Equipment	A fire standpipe and base building fire alarm system are to be installed as per building code. The system shall be a complete multi-plexed intelligent, addressable system with a remote annunciator panel located in the Building Lobby. The fire alarm system will monitor and annunciate manual pull stations, smoke detectors, fire protection systems, flow and tamper switches. An automatic dialer shall notify the fire department or local monitoring service in case of trouble or alarm. The building fire alarm system shall have transponder and extender panels with a capacity for devices at a density of 500 square feet per speaker and 800 square feet per visual location.
Fire Protection Sprinkler System	<p>General occupied areas will be furnished with a standard wet pipe fire-suppression sprinkler system to meet local code and NFPA 13 requirements in coordination with the tenant layout. A packaged fire pump system will be provided including primary pump, jockey pump, and controller.</p> <p>Dual interlocked, dual alarmed pre-action sprinklers and a heat detection system will be provided to protect the Data/Servers Room, UPS/Battery Room, Communications Room and Electrical Rooms. Supplemental fire suppression be in the optional redundancies described elsewhere.</p>
Sprinkler System Piping	For sprinkler piping, black steel piping manufactured to satisfy ASTM Standards A53 or A135 shall be used. For ASTM Standard A53, use

schedule 40 pipe. For ASTM Standard A135, use schedule 10 piping for sizes through 5". For 6" through 10" sizes, use NFPA specified wall thickness. Fittings to be class 250 threaded cast iron or grooved-end type iron fittings, style 77, as manufactured by Victaulic Corporation or accepted equal.

Sprinkler System Heads Fully-recessed sprinkler heads rated at 165 degrees Fahrenheit with painted off white escutcheon plates shall be used in all sprinklered areas. Sprinkler heads will be activated only when the temperature at the head reaches 140 degrees Fahrenheit. All sprinkler heads to be located in the center of the tile when installed in areas with acoustical tile and grid ceiling systems.

Fire Protection Redundancy The fire protection system also requires additional levels of back up. We propose that FM-200 or other gaseous suppression system would be provided in the Data/Servers Rooms, utilizing the base building pre-action sprinkler with heat detection system as a back-up.

The purpose of this "belt and suspender" configuration is to protect the hardware, maintain system availability, and permit the rapid return to business after a fire. In this configuration, the first line of defense is the FM-200 gas suppression system. Activation of the FM-200 system shuts down the A/C system and opens the pre-action deluge valve. If the FM-200 system does not effectively extinguish the fire, heat detectors are used to activate the "power off" of the critical hardware loads prior to the release of the sprinkler heads. The theory of this system is to keep the hardware online and available until the last possible moment prior to the release of water into the computer room. This keeps small and containable fires from shutting down the entire electrical system and the connected computer hardware.

Electrical System Design

Applicable Criteria The electrical systems will be designed in accordance with the following applicable codes and standards organizations:

- American National Standards Institute (ANSI)
- Illumination Engineering Society of North America (IESNA)
- Institute of Electrical and Electronics Engineers (IEEE)
- National Fire Protection Association (NFPA)
- The Uptime Institute
- Underwriters Laboratories (UL)

Design Overview The electrical distribution system will be configured to achieve Tier III reliability. Tier III capability will allow for maintenance and upgrading of systems without disruption to the rest of the system. Sufficient capacity and distribution will be available to simultaneously carry the load on one path while performing maintenance and testing on the other path. This level of reliability will require redundant electrical equipment including medium voltage switchgear, emergency diesel generators, fuel tanks, Automatic Transfer Switches (ATS), Uninterruptible Power Supply (UPS) and low

Power

voltage panel boards, Motor Control Centers (MCC), Power Distribution Units (PDU) and Remote Power Panels (RPP). In addition, the electrical distribution system will be designed to provide flexibility and expandability as the equipment and power density for data centers is ever changing.

Dual incoming feeders via different routes will be provided by the utility. Each feeder will be sized to carry the entire load of the facility. Only one feeder will be active at any given time.

Medium voltage paralleling switchgear with breakers for the dual incoming feeders, tie breakers, and generator breakers will be provided. The breakers will be medium voltage electrically operated. The switchgear will be provided with surge arrestors, undervoltage relays (27), under voltage relays (59), frequency relays (81), overcurrent relays (51), ground fault relays (51N) and transfer initiating relays (83) as required. Solid state metering will be provided and connected to the building controls system to monitor power quality. The metering equipment shall also provide for remote monitoring via Ethernet protocol.

Redundant electrical generators will provide back-up power for the Computer Room, mechanical systems, security, life safety systems, communications, and other critical building functions. Four (4) generators are anticipated, two (2) to each bus with a tie breaker allowing the two to feed one or both busses. The generators will be permanent magnet excited to handle the demands of non-linear loading and be low emission rated. The emergency generators will use fuel oil, which will be stored in two (2) underground double wall insulated fuel tanks inside the secure perimeter.

Indoor unit substations will be double ended with Vapor Pressure Impregnated (VPI) ventilated dry type transformers with fans to allow increased capacity. All coils will be copper. The transformers will step down the medium voltage to a utilization voltage of 480/277V. Low Voltage Assemblies (LVA) will include draw out type circuit breakers with microprocessor based trip units.

Low voltage panel boards and MCC's will provide power to miscellaneous building loads such as lighting, mechanical loads and receptacles. Electrical panels in the administrative office areas shall provide a capacity for Tenant loads exclusive of base building HVAC system of two (2) watts of lighting load and six (6) watts of power load for a total lighting and power load of eight (8) watts per square foot. Transformers will be provided and installed to handle the required capacity of the system with 25% capacity for future growth.

A complete UPS consisting of vented wet cell 20-year batteries in lieu of individual sealed modules, in at least two large wet cell battery banks to support UPS operation will be provided. This will be provided for the entire data system and telecommunications equipment, to remain fully operational for a 15-minute period to enable electrical generators to sequence, start operation, synchronize with the building system, and to allow troubleshooting if necessary.

Clusters of 225kVA K-13 rated PDUs located on the outside perimeter of the Data/Server area will feed RPPs located inside the Data/Server area. The

PDU's will be fed from the UPS modules.

Red mushroom head pushbuttons will be located at each exit from the Computer Room to disconnect power to all electronic equipment and HVAC equipment. Clear acrylic guards shall be provided to prevent unintentional depressing of the pushbuttons.

Grounding will be accomplished by way of a ground ring and driven ground rods. The resistance to ground will be less than 5 ohms. The building will be fully lightning protected in accordance with NFPA 780 and UL 96A.

Lighting

Lighting levels will be in accordance with the latest standards established by IESNA. Specifically average lighting levels shall be as follows:

Offices	50-70 footcandles
Corridors	10-20 footcandles
Restrooms	20-30 footcandles
Computer Room	0-70 footcandles
Site lighting	1-5 footcandles

Interior Light Fixtures

General Spaces shall receive 2' x 4' Fluorescent 277V fixtures with 3" deep 18 cell parabolic lenses with a low iridescent anodized diffuse silver finish. Fixtures shall include two (2) high efficiency electronic ballasts, three (3) 32 watt 3500K T8 lamps.

Public Corridor light fixtures shall be 2' x 2' Fluorescent 277V fixtures with 3" deep 9 cell parabolic lenses with a low iridescent anodized diffuse silver finish. Fixtures shall include high efficiency electronic ballasts, two (2) 31 watt 3500K T8 U-lamps (6" leg), and air supply/return slots.

Fixtures along the path of Egress will be fed from a central inverter to maintain egress light levels at 1 footcandle while the generators are coming on-line.

Battery Room will utilize explosion-proof fixtures, outlets and switches.

Exit Lights

LED exit lights operated by building emergency generator, with a white steel housing and red letters to match the base building exit lights shall be provided.

Site Lighting

Site lighting will be provided to illuminate the adjacent parking area, pedestrian pathways and exterior doorways. Parking area lighting will be full cutoff, High Intensity Discharge (HID) luminaries mounted on 30' steel poles. Pedestrian pathways will be lit by bollard type pathway lighting with contribution from exterior building lighting and parking area lighting. Exterior doorways will be illuminated by HID wall packs. Controls will be via photoelectric cells and lighting contactors.

Security System

A Security electronics system will provide monitoring of all interior and exterior areas by way of a CCTV system. The system will be motion activated digital video recorded. All cameras will have pan/tilt/zoom capability and will be strategically located throughout the interior and exterior of the facility. Exterior and interior areas shall be access-controlled by way of biometric controls. The facility will also be protected by motion

detectors which will initiate a silent alarm which can be detected from the operations center. The security electronics will also be backed up by the UPS.

Communications

Data/Communications outlets shall be provided for general office spaces via horizontal cabling from communications racks in the communications room. A ladder type cable tray will be provided down the main corridors and centrally routed in general office areas. Communications cabling will be CAT 6 plenum rated.

Supervisory Control and Data Acquisition

A software management plan will be established to ensure total building integration through a Supervisory Control and Data Acquisition (SCADA) system. The Building Management System (BMS) will be PLC based with redundant processors, power supplies and I/O modules for remote monitoring of equipment status and alarm conditions. Monitoring will be displayed graphically either by computer monitor or graphics panel located in the operations center. Remote annunciation to the “guard house” will allow for alarms and faults to be detected when the facility is unattended. All controls and metering including generator controls, power system metering, UPS controls and PDU controls will be interfaced into the Main Building Management System (BMS) with Network Interface Cards (NIC).

A separate computer with a flat screen monitor will be located in the Operations center with power monitoring software installed to perform waveform capture, view system one-line diagrams and monitor various system variables such as voltage, current, harmonic distortion, and power.

Electrical Redundancy

For the purposes of this proposal, we have established the following design criteria:

Data Center Server Area = 30,000 SF
Assumed Capacity = 30,000 SF @ 65 Watts/SF = 1,950 kW
or 2145 kVA of connected hardware load

The proposed electrical redundancy will provide statically switched PDU's along the perimeter of the Computer Room. Each PDU will be fed from two sources. Within the Computer Room, RPP's will feed under-floor receptacles. Separate RPP's will feed two receptacles at each dual source piece of equipment. This will allow for Tier III capability. UPS modules will feed clusters of PDU's. Each UPS module will be standalone and therefore allow for N+1 redundancy.

A fire rated perimeter will surround the Battery Room. Two separate UPS/Battery Rooms are proposed for the new facility.

It is anticipated that four (4) generators will be provided. The controls to these generators will allow them to operate in any configuration of the four to supply power to either bus A or bus B. The generators will be located on the exterior of the building inside the secure perimeter.

Optional Building Specifications

Optional In-Building
Communications

Public safety (Police, Fire, and Emergency Medical) personnel rely heavily on radio communications in the performance of their day-to-day activities. This reliance becomes critical during emergency conditions, and the loss of communications can jeopardize their safety and that of the citizens they serve. Even well designed radio systems have problems operating within modern buildings where the use of steel reinforced concrete, metal walls, and even metal tinted windows impede these critical radio signals.

These problems would be mitigated in this project by the incorporation of in-building coverage enhancement systems. Signals generated within the buildings, from portable radios, use the same network of amplifiers and distribution devices to send the signals to the outside radio environment. These networks utilize customized wiring for distribution throughout the building and an external antenna, which would be implemented and made inconspicuous by incorporating the system into the construction of the building.

Optional Rooftop
Microwave Antenna

The building would provide the use of microwave to bring wide-band communications functionality, for various applications, into a building. The required rooftop microwave antennas would be masked effectively by a façade of some non-metallic material such as fiberglass. The same façade would be used to hide other antennas for satellite receivers, and for in-building coverage enhancement systems. Since these antennas are directional and placement is critical, and they could also be quite heavy, accommodations for their weight and aesthetics will be considered during building design.

Data Center Services

We will consolidate the respective agency's data centers into a data center in the **Redacted**. This new data center will be a secure, hardened facility that will be fitted with the latest technology for managing and monitoring all of the services that will be provided. We will accomplish this by:

- Hiring Commonwealth IT personnel to ensure that the institutional knowledge of the processing environment is effectively transferred to and understood by the Commonwealth Partners.
- Providing new technology that expands and enhances the capabilities currently available to the Commonwealth.

The Commonwealth Partners assume responsibility for data center infrastructure services that include full-service support for the IBM and Unisys mainframes and a variety of production midrange servers. The services that we provide are:

- Computer Operations;
- Scheduling, production and batch control;
- Technical Support (System Administration; Operating system support; Patch Management; etc.);
- Storage Management;
- Physical Database Support;

- Cross Functional Services (Change Management, Problem Management, Logical System Security, etc.);
- Remote server monitoring;
- Refresh server and disk hardware processor;
- Support automated tape libraries and drives for the mainframe and server platforms. IBM will replace the existing tape systems with LTO tape libraries to support the backup processing;
- And manage mainframe print queues.

Efficient use of facility floor space based on
proven techniques and experience

Through techniques such as server consolidation, effective racking, and server virtualization, there will be efficient, effective floor space utilization. Our solution also includes the management, operations, support and technology refresh of servers and storage devices.

The midrange servers will be consolidated according to our consolidation strategy described in Appendix 5. Our effective technology refresh approach will significantly reduce your server inventory. Our operational solution provides system monitoring, system administration, operational and problem management support and the implementation of our best practices.

As the Commonwealth Partners consolidate your servers into the Commonwealth Data Center the protection of those servers becomes essential. To ensure a higher level of IT security we provide security services from our electronic Security Operations Center (eSOC). Internet facing servers will be monitored by host intrusion detection software (HIDS) that generates real-time intrusion alerts when critical server files are updated or other potential malicious activity occurs. As added protection for the Commonwealth Data Center we include a perimeter-based security approach by employing packet-filter firewalls at the edge of the Commonwealth Data Center. Our network intrusion detection (NIDS) at the Commonwealth Data Center, Richmond Plaza. Our NIDS generate filtered alerts that are sent directly to our Security Operations Center and enable our IT staff to take the appropriate action against hacking attempts, and attacks by viruses and worms. The Commonwealth Partners have a reasonable and responsible approach to IT security that is designed to provide you protection where you need it most, at the core of your network.

Building Economic Benefits for the Commonwealth

Contributes to the economy by investment in
real estate and people

We understand the importance using this program to bring additional jobs and economic development to the Commonwealth. Our solution strikes a balance between leveraging the considerable existing infrastructure of the Commonwealth Partners while enhancing facilities within the Commonwealth that are dedicated to this project. By utilizing real estate and locating personnel in the Commonwealth, we will contribute greatly to the local economy. Our human resource solution will facilitate a successful transition

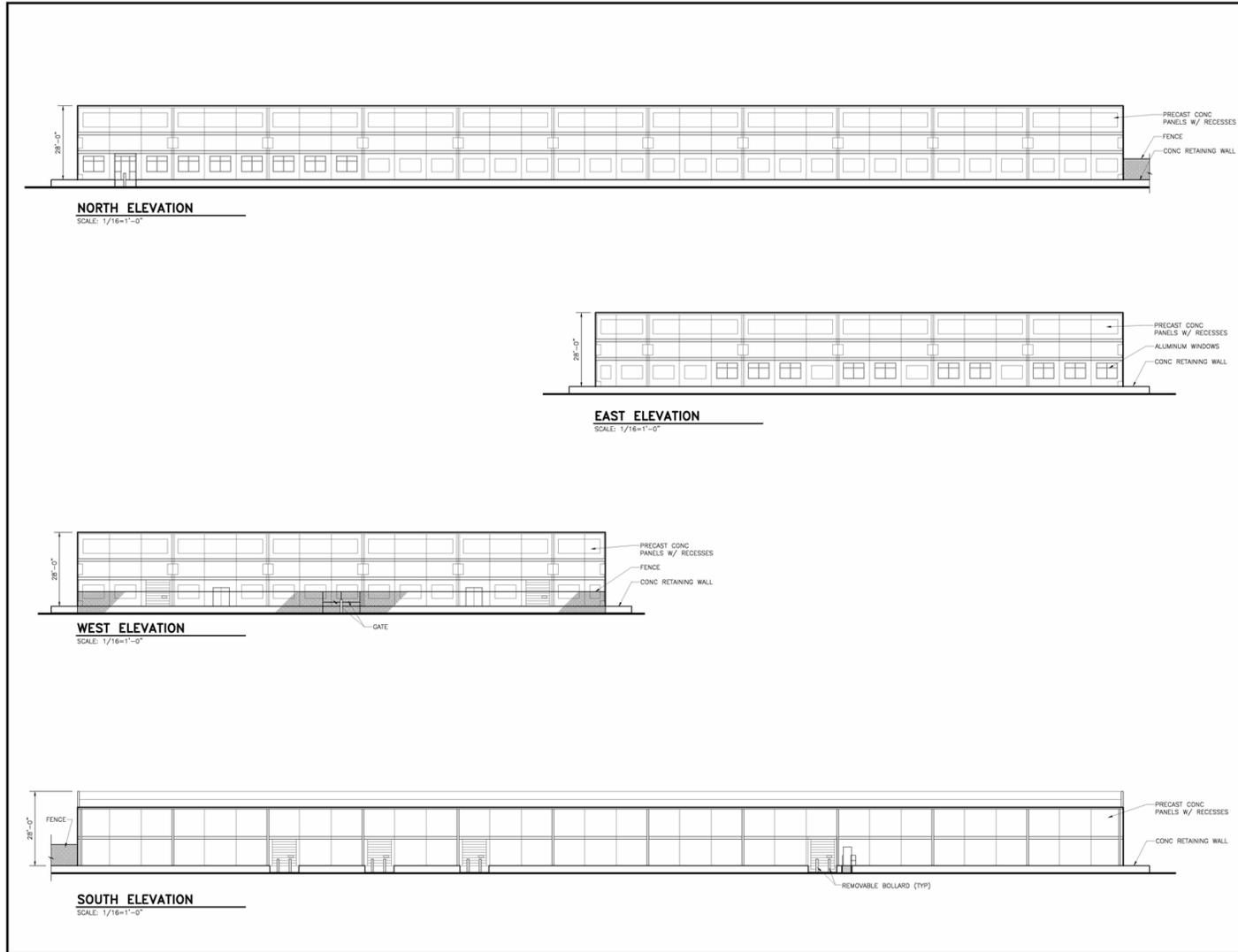
of your people, our greatest project asset, by offering every affected Commonwealth employee a job with the Commonwealth Partners.

Redacted

Figure 11.3.13-1 – Bringing Economic Development through Facilities and Jobs

Our solution uses three primary locations in the Commonwealth: the new Commonwealth Data Center, the new office building, and the Customer Care Center providing significant economic benefits to you. The Customer Care Center will create over 100 jobs in **Redacted** Our new Commonwealth Data Center and office space **Redacted** area so that we all can have easy access to the facility and in a more secure location. New building construction will also create additional jobs in the Commonwealth.

Site Plans and Floor Plan for the New Commonwealth Data Center



HSM
ARCHITECTS ENGINEERS PLANNERS

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CONSULTANT

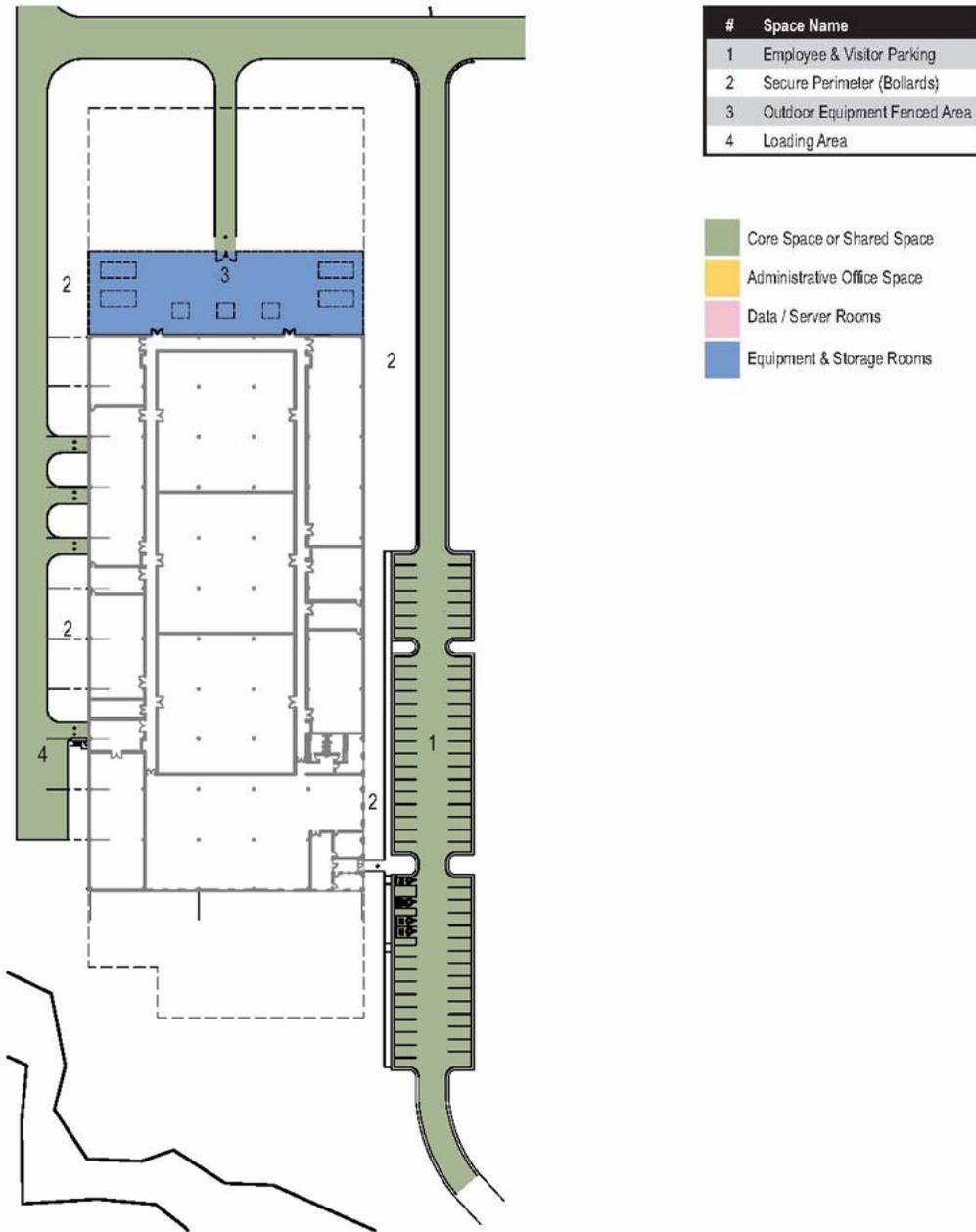
**VIRGINIA CONSOLIDATED
DATA CENTER**

REV	DATE	DESCRIPTION	APP

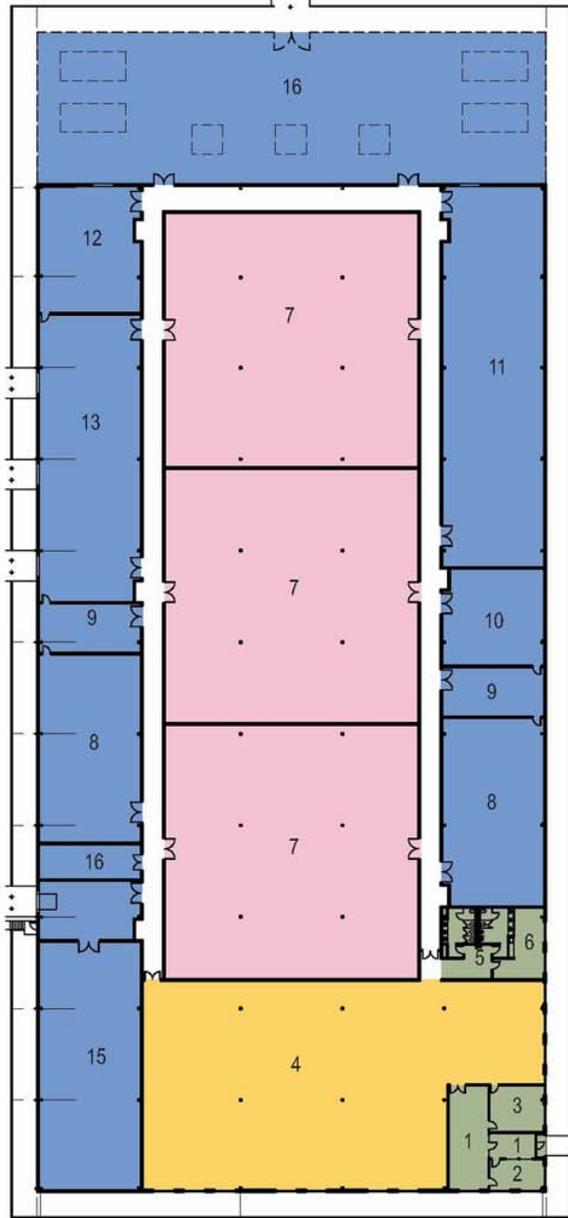
COMM NO: 81008
ISSUE DATE: MAY 25, 2005
DESIGNED BY: [] DRAWN BY: []
CHECKED BY: [] SUBMITTED BY: []
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ARCHITECTURAL
ELEVATIONS

A201



Data Center Facility
Site Plan



#	Space Name
1	Entrance Lobby & Reception Area
2	Security Office
3	Conference Room
4	Administrative Area
5	Restrooms
6	Lounge & Vending Area
7	Data / Server Room
8	Battery Storage Room
9	UPS Room
10	Communications Room
11	Mechanical Equipment Room
12	Electrical Parallel Room
13	Electrical Equipment Room
14	General Storage Room
15	Loading & Secure Storage Area
16	Outdoor Equipment Fenced Area

- Core Space or Shared Space
- Administrative Office Space
- Data / Server Rooms
- Equipment & Storage Rooms

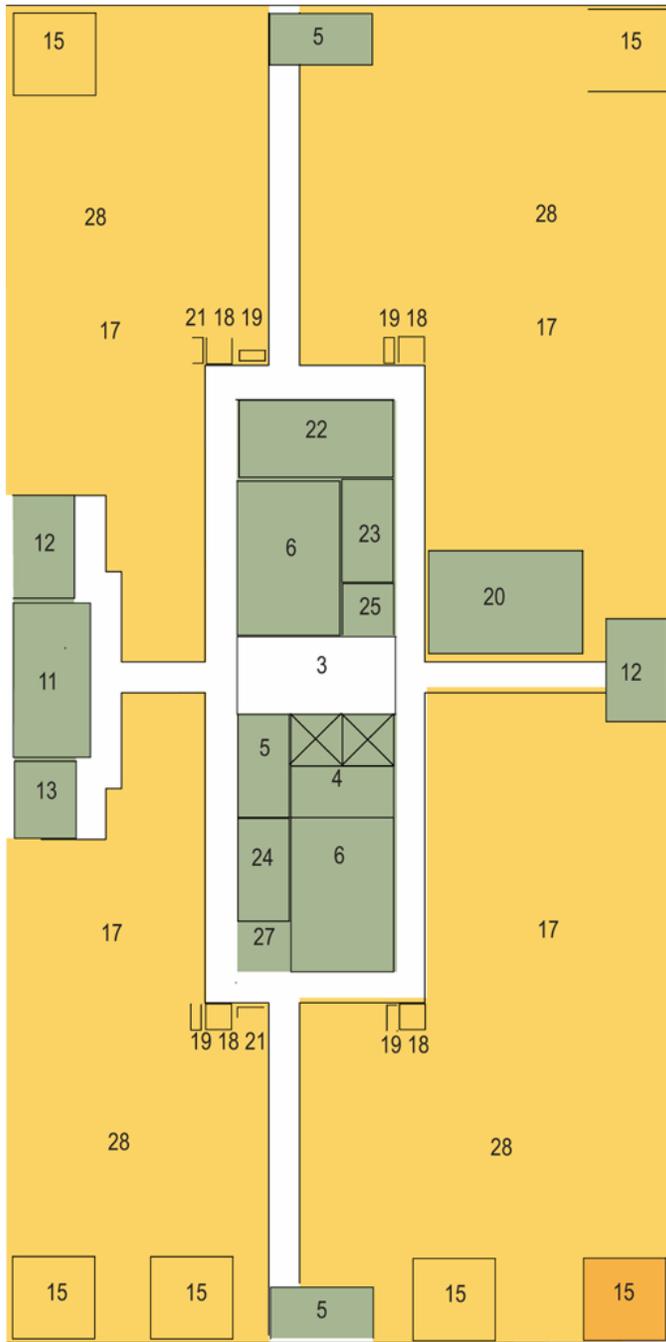
Data Center Facility
 Floor Plan

Site Plans for New Adjacent Office Facilities

Redacted



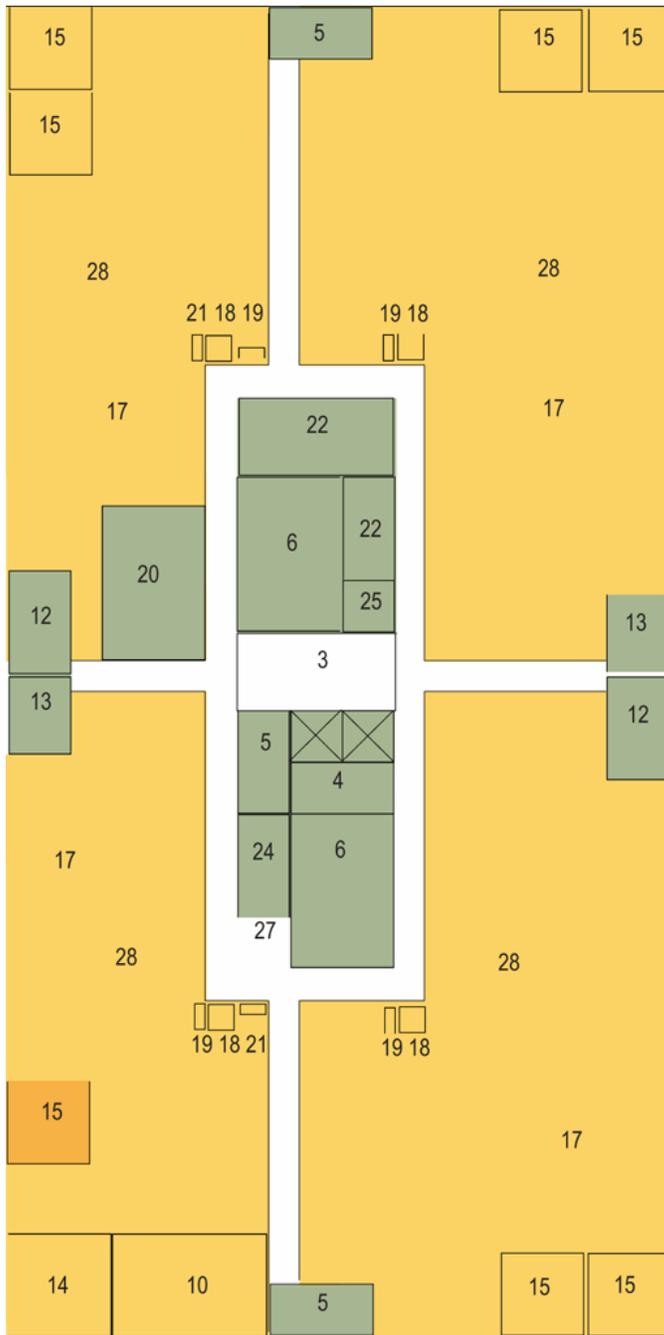
Administrative Office Building
First Floor Plan



#	Space Name
1	- Space Not Used This Floor -
2	- Space Not Used This Floor -
3	Elevator Lobby
4	Elevator Equipment Room
5	Stair
6	Restroom with Showers
7	- Space Not Used This Floor -
8	- Space Not Used This Floor -
9	- Space Not Used This Floor -
10	- Space Not Used This Floor -
11	Large Conference Room
12	Medium Conference Room
13	Small Conference Room
14	- Space Not Used This Floor -
15	Director Office
16	- Space Not Used This Floor -
17	Non-Management Office
18	Copier & Utility Room
19	Closet & Storage Room
20	Break Room & Vending Area
21	Coffee Area (1/2 Kitchen)
22	Mechanical Equipment Room
23	Electrical Equipment Room
24	Telephone Closet
25	Janitor Closet
26	- Space Not Used This Floor -
27	Building Storage Area
28	VITA Office Space
29	- Space Not Used This Floor -
30	- Space Not Used This Floor -
31	- Space Not Used This Floor -

- Core Space or Shared Space
- VITA Office Space
- Commonwealth Partner's Office Space
- Commonwealth Partner's Office Space
- Non-Designated Office Space

Administrative Office Building
Second Floor Plan

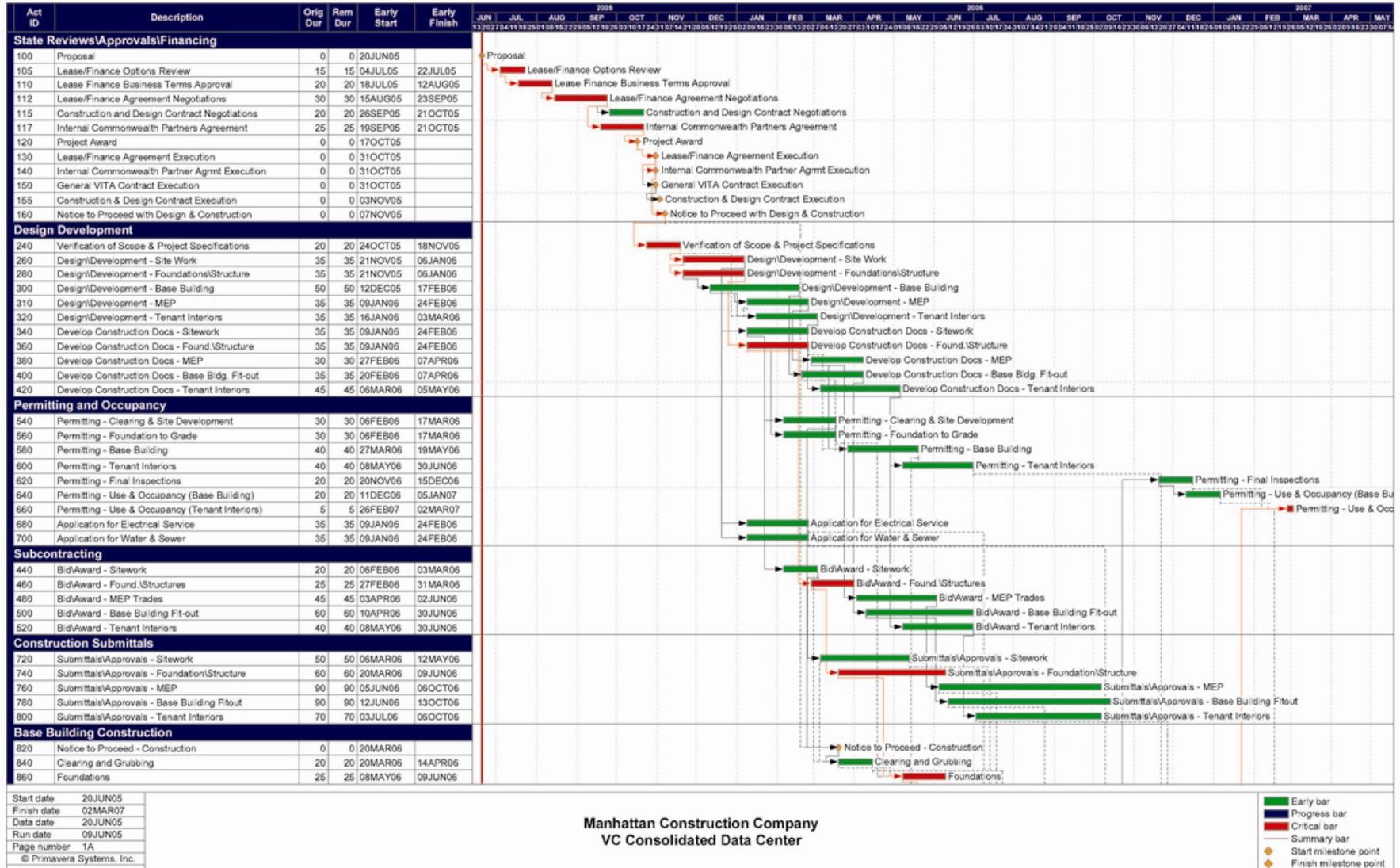


#	Space Name
1	- Space Not Used This Floor -
2	- Space Not Used This Floor -
3	Elevator Lobby
4	Elevator Equipment Room
5	Stair
6	Restroom with Showers
7	- Space Not Used This Floor -
8	- Space Not Used This Floor -
9	- Space Not Used This Floor -
10	Executive Board Room
11	- Space Not Used This Floor -
12	Medium Conference Room
13	Small Conference Room
14	CIO Office
15	Director Office
16	- Space Not Used This Floor -
17	Non-Management Office
18	Copier & Utility Room
19	Closet & Storage Room
20	Break Room & Vending Area
21	Coffee Area (1/2 Kitchen)
22	Mechanical Equipment Room
23	Electrical Equipment Room
24	Telephone Closet
25	Janitor Closet
26	- Space Not Used This Floor -
27	Building Storage Area
28	VITA Office Space
29	- Space Not Used This Floor -
30	- Space Not Used This Floor -
31	- Space Not Used This Floor -

- Core Space or Shared Space
- VITA Office Space
- Commonwealth Partner's Office Space
- Commonwealth Partner's Office Space
- Non-Designated Office Space

Administrative Office Building
Third Floor Plan

Proposed Construction Schedule for new Commonwealth Data Center



Risk Assessment Summary Report

In response to the Statement of Work, this Risk Assessment Summary Report is being provided for the new Data Center facility to be located in **Redacted**

Mixed Tenancy

Risk No Risk .

The Data Center is **not** shared with other tenants.

RISK	VENDOR COMMENTS
None	

Environment Conditions (weather, hurricane paths, earthquake statistics, flood data)

Risk No Risk

According to **Redacted** Department of Environmental Engineering, the location is not within a flood plain.

The Data Center is being constructed with double reinforced concrete walls for structural integrity.

RISK	VENDOR COMMENTS
Hurricanes	The Redacted area has occasionally been in the path of a hurricane Redacted
Seismic	Redacted.

Fuel Availability and Delivery

Risk No Risk

Contracts will be established with two fuel providers.

RISK	VENDOR COMMENTS
None	

Electrical Substation Capacity and Performance

Risk No Risk

The Data Center will have dual electrical feeds.

RISK	VENDOR COMMENTS
None	

Location & Proximity to High-Visibility Public or Private-Sector Structures, Main Railroad Line, Shipyard, Nuclear Power Plant, Military Installation, Container Storage, Hazardous Waste Dump, Airports, HAZMAT Storage Tanks, High-Crime Areas, and / or Major Highway

Risk No Risk

RISK	VENDOR COMMENTS
Nuclear Power Plants	Redacted
Major Highway	Redacted
Military Installations	Redacted
Airports	Redacted