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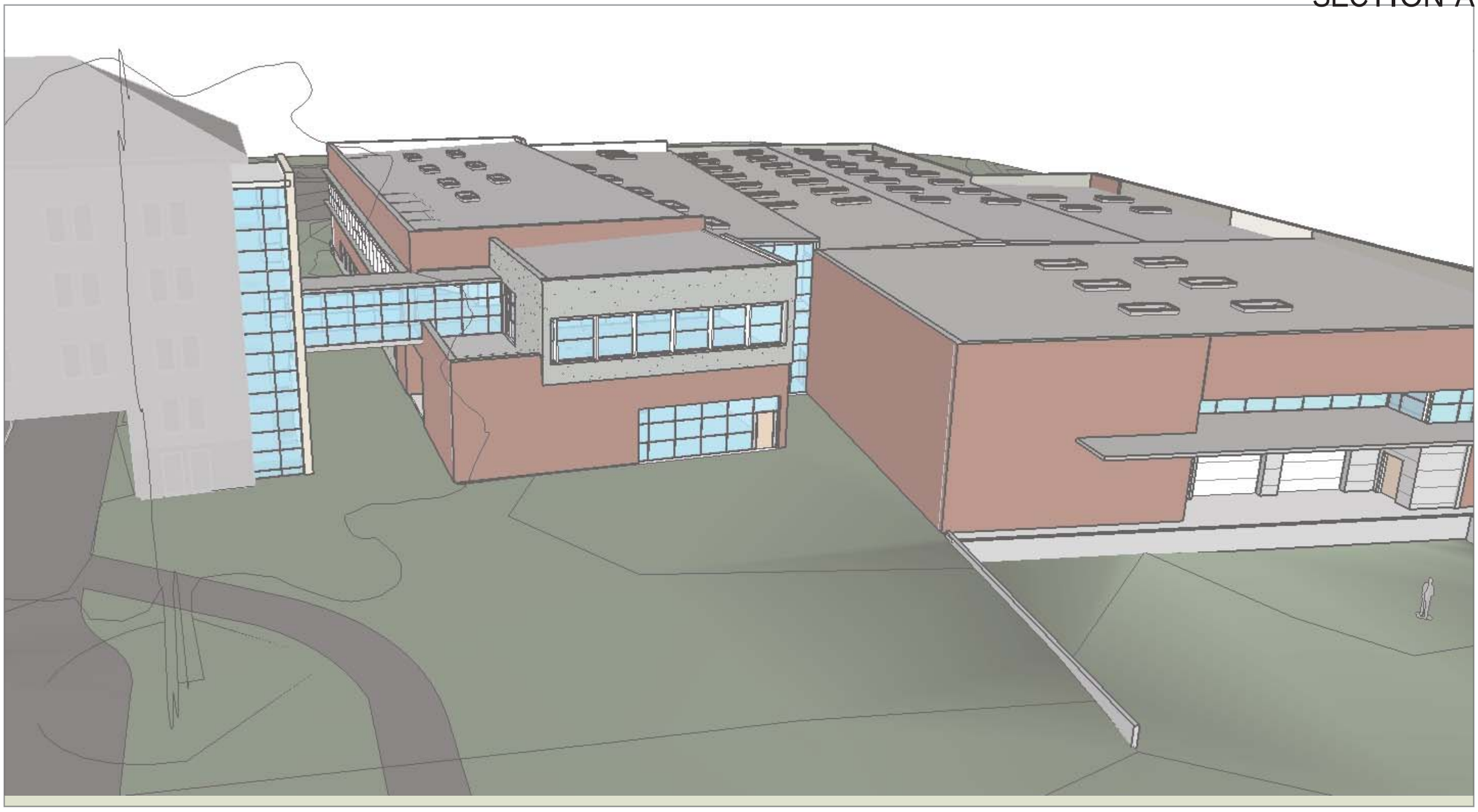
PARTICIPANTS

Owner	**Washington State Department of General Administration** Division of Engineering & Architectural Services 206 General Administration Building Olympia, WA 98504-1012 Robert Hubenthal, Capital Programs Chief Ken Rose, HRSA Facilities Coordinator Nancy Deakins, DSHS/GA Team Manager Richard Christian, DSHS/GA Project Manager Paul Temposky, DSHS/SCC Food Program Manager	phone: (360) 902-7272 fax: (360) 753-2848
Facility	**Western State Hospital** 9601 Steilacoom Boulevard SW Mail Stop W27-19 Olympia, WA 98498-7213 Jess Jamieson, Chief Executive Officer Dale Thompson, Chief Operating Officer Charm Reimer, Chief Financial Officer Rodger Jackson, Director of Medical Services Christine Campbell, Facilities Manager David Hess, Maintenance Department Gary Lyons, Dietary Services Manager Kathy Goff, Food Production Manager Katy Tomisser, Pharmacy Director Mark Underwood, Pharmacy Supervisor Carmen Mendez, Pharmacy Procurement & Supply Specialist Bruce Elrod, Commissary Supervisor Raymond Towns, Procurement & Supply Support Victoria Laverty, Central Supply Supervisor	phone: (253) 582-8900 fax: (253) 756-2879
Architect	**NAC|Architecture** 2201 Sixth Avenue, Suite 1405 Seattle, WA 98121 fax: Colin Jones, Principal Steve Shiver, Project Manager Matt Rumbaugh, Design Architect Steven Wescott, Project Architect Robert Landa, Project Architect Haluk Ceyhun, Staff Architect Erik Tremain, Staff Architect	phone: (206) 441-4522 (206) 441-7917
Landscape Architect	**Jeffrey B. Glander & Associates** 1821 4th Avenue East Olympia, WA 98506 Jeff Glander, Principal	phone: (360) 357-6972 fax: (360) 786-8073
Civil Engineer	**Coughlin Porter Lundeen** 413 Pine Street, Suite 300 Seattle, WA 98101 Stephen Porter, Principal Keith Kruger, Project Engineer	phone: (206) 343-0460 fax: (206) 343-5691
Structural Engineer	**PCS Structural Solutions** 1250 Pacific Avenue, Suite 701 Tacoma, WA 98402 James Collins, Executive Vice president Richard Oehmcke, Principal	phone: (253) 383-2797 fax: (253) 383-1557
Mechanical Engineer	**Hultz BHU** 2407 N 31st Street, Suite 200 Tacoma, WA 98407 Rick Hultz, Principal Michael Tagles, Project Engineer	phone: (253) 383-3257 fax: (253) 383-3283
Electrical Engineer	**Hultz BHU** 2407 N 31st Street, Suite 200 Tacoma, WA 98407 Tom Urquhart, Principal	phone: (253) 383-3257 fax: (253) 383-3283
Fire Alarm Design	**NAC|Engineering** 1203 West Riverside Avenue Spokane, WA 99201 Bruce Turner, Principal Jon St. Pierre, Project Engineer	phone: (509) 624-8125 fax: (509) 838-8261
Kitchen Consultant	**Ricca Newmark Design** 16622 SE 24th Street Bellevue, WA 98008 Jean-Michel Boulot, Principal	phone: (425) 562-5135 fax: (303) 221-0600
Cost Consultant	**The Robinson Company** 101 Stewart Street, Suite 925 Seattle, WA 98101 Sharon Kennedy, Principal Dan Cassady, Chief Estimator	phone: (206) 441-8872 fax: (206) 441-8991
Geotechnical Engineer	**Associated Earth Sciences** 911 5th Avenue, Suite 100 Kirkland, WA 98033 Kurt Merriman, Principal	phone: (425) 827-7701 fax: (425) 827-5424

SECTION A



ARCHITECTURAL NARRATIVE

Process

The Kitchen and Commissary Building (KCB) is envisioned as 62,000 square foot facility to co-locate the Hospital's dietary food service, central medical supply, pharmacy, and bulk commissary into a single new building. The new design is intended to serve Western State Hospital for the next 50 years. The process began with a pre-design study that was prepared for the Department of Social & Health Services in December of 2008. The State Legislature authorized NAC|Architecture to proceed with schematic design in August of 2009. The goals expressed for this Project are:

- Improve nutrition to facilitate treatment care.
- Provide flexibility of service.
- Reduce waste.
- Increase energy efficiency.
- Meet LEED certification level of silver.

On August 28, 2009, a meeting was held with the executive committee to begin the schematic design phase. Following this meeting, a series of meetings with the individual user groups were held to confirm department programs, share parameters, prioritize goals, and begin to diagram concepts for organizing the site and building components. On January 20th and 27th the executive committee met to review multiple conceptual proposals. Based on these two meetings, a schematic design direction was selected and developed into the schematic design described herein.

This project provides a significant step towards the Institution's Master plan to create a secure pedestrian patient treatment mall exclusive of motorized vehicles. Strategically sited where the North Hall once stood, the new facility will be located immediately north of the proposed treatment mall. This project will remove a majority of the off-site delivery and service traffic from the future patient mall area.

Site Context

The project site is the former location of North Hall, a patient ward building dating from the 1920's that was damaged in the Nisqually earthquake and subsequently demolished. The current Western State Hospital campus master plan has identified this site as a desirable central location for activities that require outside vehicular deliveries and minimal patient access. The project site is approximately 4.0 acres encircled by campus vehicular access drives. The north edge of the site is bounded by a forested ravine which contains a natural spring that flows west to Puget Sound; to the northeast is the Center for Forensic Services constructed in 2002; to the east is an extensive green space providing storm water control features for the east campus; to the south is the Central Campus complex with administration and patient wards constructed from 1932 through 1954; and to the west is a staff parking lot with the maintenance shops located further west along Settlers Street.

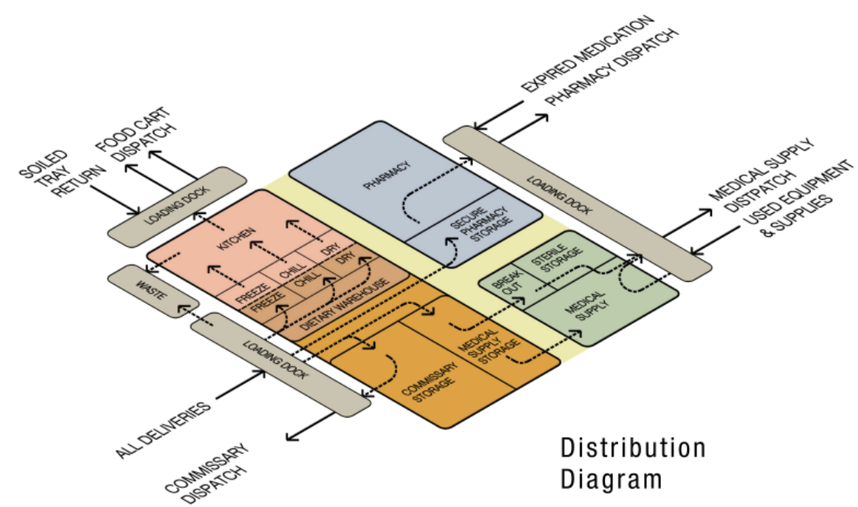
It is anticipated that the primary off campus delivery vehicles will continue to access the campus and this site from the west using Settlers Street for the foreseeable future. There is discussion of developing, in the future, an alternate delivery vehicle access from the north to provide greater separation of vehicles and pedestrian traffic.

Topographically the site is a raised plateau that is the result of infilling the North Hall basement. The site is generally level over the southern half with the north half sloping towards the northeast at a slope of approximately 16%. The view to the north offers a visual connection to the forested ravine with appealing territorial views to the north and east. The view to the south provides a visual connection to the central campus complex and the older campus architecture. The site is vegetated with scrub grass, scotch bloom and sparsely spaced mature deciduous trees along the east boundary edge.

The existing Central Campus buildings are 2 to 4 story structures with partial basements and sloping roofs over attics. The exterior facades have an exposed concrete base that terminates with a water table feature at the first floor. Above the concrete base, the wall material is primarily brick, with some precast concrete accents. The brick is a blend of 3 or 4 colors. The exterior facades have vertically aligned small steel sash windows for each of the patient rooms. The main entrances and window sills are decorated with architectural precast concrete.

Design Concept and Philosophy

The schematic design is a result of the discussions about multiple conceptual site and building organizations presented on January 20 and 27, 2010. The design is a single building that houses four departments: the bulk support oriented bulk commissary, central kitchen, central pharmacy, and central medical supply. Careful planning has resulted in a simple diagram that addresses the processes and work flow between departments. Careful attention was given to creating efficient functional adjacencies. The new building will provide a secure, state-of the-art facility that will increase the efficiency and quality through a design that accommodates a more efficient and up-to-date operation.



Distribution Diagram

The form of the building is a response to the combining of different programs and building typologies; 1) warehouse and commercial kitchen, a broad and single story industrial structure with long clear roof spans and clear internal height of 25-feet, and 2) inpatient hospital pharmacy and central medical supply, a multi-story structure with moderate clear roof span for flexibility and a clear internal height of 10-feet. These two typologies are assigned to two non-parallel bars.

The South Bar

The south bar lays into the existing campus fabric by aligning with the established central campus orthogonal grid and Sequoia Street. The pharmacy, medical supply, and shared spaces are housed in the south bar. The medical supply is located on the ground floor to provide efficient flow of bulk supplies from the commissary. The pharmacy is located on the second floor providing passive security and a potential secure transport connection to Building 9 and the central campus via a potential bridge. The main building entrance, shared conference room, restrooms, and break room are located on the east end of the south bar provide a visual connection to the green space towards the east and a pedestrian connection to the central campus via the existing accessible route of travel between Buildings 8 and 9 to the campus quadrangle.

The North Bar

The longitudinal axis of the north bar is rotated 10-degrees off the campus grid, providing for the north edge of the building to align with the site topography. The commissary warehouse and kitchen are housed in the north bar and are organized to provide immediate transferring of perishable foods and products from the delivery truck to the tempered storage. The building plan is laid out to provide a directional flow of material and goods from the receiving point, through the preparation and processing, to the dispatch. The design allows for a single loading dock delivery point for the Commissary and Kitchen. There are two additional loading docks; one to serve outgoing food and returning food carts for the kitchen and the second to serve outgoing commissary supplies and all supplies for the medical supplies.

Design Materials

As an essential facility supporting the patient treatment programs of Western State Hospital the Kitchen and Commissary Building strives to create an enduring architecture that is based on equal and consistent attention to aesthetic, context, function, and environmental aspects of the site and the program. The architecture strives to represent and reflect the character, materials and sensibilities that distinguish the Western State Hospital campus while at the same time reflecting its unique service role to the mission of the campus. Durable materials, hospital standards and consideration for ease of maintenance guided choices for the building systems.

The building is being designed as a steel framed structure with masonry veneer. The use of steel frame construction will allow the construction process to be less weather dependent. The single story kitchen and commissary will use ‘high mass’ concrete masonry shear walls as exterior infill panels and continuous R-19 rigid thermal insulation towards the exterior. The two story pharmacy and medical supply wing will be a braced frame system with light gage metal infill framing and R-19 spray applied foam insulation and R-6 continuous rigid thermal insulation exterior of the sheathing.

The exterior materials of the new building will offer continuity with the existing Central Campus buildings. The building will employ a combination of site cast concrete and architectural pre-cast concrete panels to create a base that visually grounds the building to the site similar to the existing campus buildings. Above the base will be a brick veneer of a size and a color range found on the campus buildings constructed in the 1930’s and 40’s. Architectural pre-cast elements will frame the building entrances and window systems in a thoughtful way that explains the functional use of the building and creates a dialog with the existing architecture. Metal panel system with concealed fasteners will be used on opaque exterior wall surfaces between the north and south bar.

Windows and entry storefront systems will be thermal-framed aluminum with clear, insulating glass. Operable sash windows will be provided in designated habitable areas.

Floor system will be predominately concrete slab on grade, with composite metal deck and concrete topping at elevated floors. Floor finish within the warehouse and main circulation areas will be exposed polished concrete or very hard troweled floors similar to a large warehouse style retail floor. Floor finish within the Kitchen and clean areas of the Pharmacy and Medical Supply will be a sheet vinyl with welded seams and coved base. Floor finishes within office areas will be carpet, and ceramic tile within public toilet facilities.

Roofs are predominately low-sloping with R-38 rigid thermal insulation over a metal roof deck. Roofing material will be a campus approved single ply system.

Outline Specification are contained in this report and provide additional information on the schematic building systems and materials.

CIVIL NARRATIVE

Summary

The new Kitchen and Commissary project is located within the Western State Hospital campus in Lakewood, Washington. This project consists of a two-story building and includes office, storage, food preparation, and loading docks. The scope of the site work will extend beyond the building footprint and include approximately 4.2 acres of disturbed area.

For design and budgeting purposes, the project will consist of a basic and an additional alternative scope of work. The basic site scope includes construction of the building, loading docks, and access drives on the north and west sides, parking stalls adjacent to the building and supporting utilities; the alternative scope includes a new parking lot west of the western access drive.

Site Clearing and Grading

The building will be located on the site of an existing building that was recently demolished. Existing unconsolidated fill will need to be excavated within the existing building footprint to its lower foundation level and also below the new building footprint. This fill is assumed to be suitable material for structural fill and can be placed and compacted to provide subgrade for the new building. Excess material will be hauled to another part of the campus.

Storm Water Runoff Control

There are existing dry wells within the project location, indicating that storm water was infiltrated for the previous development. The new development will also infiltrate storm water runoff.

Storm Water Conveyance

Where possible, storm water will sheet flow across paving and landscape areas to bioretention facilities for storm water treatment and infiltration. In other areas, such as the loading docks and access drive, storm water will be collected in an 8-inch or 12-inch diameter storm pipes and conveyed to water quality and infiltration facilities.

Storm Water Runoff Treatment

This site is within a well-head protection area, which requires basic water quality treatment in accordance with the 2005 Ecology Surface Water Manual (as adopted by the City of Lakewood). Basic water quality treatment is provided for the building, loading docks, access drives, and parking areas.

The roof area and western access drive will discharge to bioretention facilities consisting of water-tolerant vegetation and an amended soil mix. The amended soil mix is designed to remove 80% of the suspended solids present in the runoff. Dense planting within the rain garden further reduces runoff through root uptake.

The loading dock area and northern access drive will be collected and routed to cartridge filter systems. These systems consist of cartridges filled with engineered media that is designed to remove pollutants from storm water runoff. The cartridges are housed in a storm drain manhole.

Storm Water Runoff Control

Storm water will be infiltrated into the native subgrade downstream (or below) the water quality facility. Gravel trenches located below the bioretention facilities or cartridge filter systems will store water while it percolates through the soil. The gravel trenches below the rain gardens will be shallow (approximately 4 feet in depth) and cover the bottom surface area of the bioretention facility. The gravel trenches below the cartridge systems will be extend to a maximum depth of 20 feet below ground level with dimensions of 12-foot long by 4-foot wide; these systems are refereed to as pit drains.

Fire Service

There is an existing 8-inch fire service main extending from the southwest corner to the northeast corner of the project site. This water line will be within the limits of excavation for the improvements and will need to be relocated as part of the basic scope of work. Fire hydrants and the fire service connection for the new sprinklers will be tapped off this new water main. Backflow prevention will be located within the mechanical room of the building.

Domestic Service

The new domestic service will be tapped from the new water main previously mentioned.

Sanitary Sewer

There is an existing sewer main located within the access drive south of the project site. Sewer service for the building will connect to this sewer main through a 6-inch side sewer. The kitchen will require a grease separator vault, which will also require a side sewer connection to the existing sewer main.

Temporary Erosion and Sedimentation Control

All site development within the City of Lakewood requires a detailed erosion and sedimentation control plan. This plan shall be implemented during construction in an effort to prevent construction storm water from contaminating off-site storm water. Erosion and sedimentation control measures include construction entrances, sediment ponds, slope stability measures, perimeter protection and off-site storm water turbidity monitoring.

An NPDES permit and a Surface Water Pollution Prevention Plan (SWPPP) will be required for this development.

STRUCTURAL NARRATIVE

Design Codes

New Construction:
The structure will be designed in accordance with the 2009 edition of the International Building Code (IBC).

Live Loads (Floors)

Office Spaces	50 psf + 20 psf (partition)
Corridors, Stairs	100 psf main level; 80 psf Level 2
Storage (Light/Heavy)	125 psf/250 psf
Mechanical Mezzanine	40 psf + mechanical unit weight + housekeeping pads

Soil Bearing Pressures (See AESI Geotechnical Report)

The foundations will be supported on undisturbed native material or structural backfill with a design bearing pressure of 3,000 psf. NOTE: Fill was identified in the majority of the building footprint that extended to a depth of 5' to 15'. Assume that the fill would be removed and re-compacted and/or replaced with structural fill.

Snow Loads

Design is based on a typical snow loading of 25 psf. Snow drift loads will be taken into consideration.

Wind Loads

The wind design is based on a basic wind speed of 85 mph, Exposure "B" and an Importance factor of 1.15.

Seismic Loads

Steel Brace Frames or Pre-Cast Concrete Structural Panels or CMU Shear Walls – R=6.0, 5.0, and 5.5; Importance Factor = 1.0, Site Class "C"; Ss=1.198; S1=0.419 (per Geotechnical Report)

New Structure

1. Foundation

The foundation system will consist of conventional concrete spread footings supporting perimeter concrete stem walls and interior steel columns. The Level 1 floor structure will consist of 4" concrete slab on grade with WWF reinforcement at Office and Kitchen areas and a reinforced 6" concrete slab on grade at the Commissary/Storage areas.

2. Walls

Exterior walls at the southern area of the building will consist of light gauge metal studs at 16 inches on center with exterior sheathing with metal panels or masonry veneer. Exterior walls at the northern area will be "high-mass" wall consisting of pre-cast concrete panels or reinforced CMU. The interior walls will be non-structural light gauge metal studs.

3. Floor Structure

The floor framing of Level 2 and over the partial basement will consist of open web steel joists supported by joist girders or wide flange beams supported by steel columns. The floor system will be Type "W2" metal deck with normal weight concrete (5½" total thickness).

4. Roof Structure

The roof framing system will consist of open web steel joists supported by joist girders or wide flange beams supported by steel columns. The floor system will be Type "B" metal deck.

5. Lateral Resisting System

The lateral resisting system will consist of a metal deck roof and metal deck/concrete floor diaphragm. The northern area of the building will be non-bearing pre-cast concrete or CMU shear walls. The southern area of the building will be steel brace frames supported on grade beam foundations.

MECHANICAL NARRATIVE

Codes and Standards:

The mechanical system design will be based on the following codes and standards (as adopted and amended by the Authority Having Jurisdiction):

- International Building Code
- International Mechanical Code
- Uniform Plumbing Code
- International Fire Code
- Washington State Energy Code
- Washington State Ventilation and Indoor Air Quality Code
- National Fire Protection Association (NFPA), Codes, Standards, and Recommended Practices
- Department of Labor, OSHA, Occupational Safety and Health Standards
- Seismic Restraint Manual Guidelines for Mechanical Systems, published by the Sheet Metal and Air Conditioning Contractors National Association, Inc.
- ASHRAE Standards

Design Temperatures: The HVAC systems will be design for the following conditions:

Outdoor Temperatures:	18°F Winter 85°F D db/63°F wb Summer	
Indoor Temperatures:	Office/Pharmacy Areas	70° F Winter/75° F Summer
	Kitchen	68° F Winter/78° F Summer
	Warehouse	60° F Winter/80° F Summer
	Custodial Spaces	65° F Winter/* Summer
	Mechanical/Electrical	55° F Winter/* Summer

*High temperature is not regulated as air conditioning will not be provided (to be re viewed and confirmed with Owner).

Ventilation:

Ventilation rates will be based on applicable standards: 20 cfm/person office type occupancy, and other areas according to space usage and contaminants. Restroom exhaust will be based on no less than 10 air changes/hour, and custodial rooms on no less than 8 air changes/hour. Kitchen hood exhaust and makeup air will comply with code requirements and hood listing capabilities. Pharmacy and Central Medical Supply clean areas will comply with applicable standards.

Building Envelope Requirements:

Building envelope should include the following minimum insulation levels:

Roof/Ceiling	R-38 rigid (or R-44 batt)
Walls-Mass Type	Heat Capacity > 9.0 Btu/sf-°F with R-19 insulation (preliminarily suggest nominal 4-inch rigid, outside the 8-inch grouted CMU block)
Walls-Framed	R-25
Windows	U=0.35, SC=0.40
Doors	U=0.50
Floor Slab	R-10 rigid at perimeter
Heated Floor Slab	R-10 rigid below

We recommend that variations of the wall construction be considered as part of the life cycle cost analysis.

Building Mass:

Use of high building mass can aid in reducing building energy consumption by reducing heat transfer through building elements, by slowing the required response time of building HVAC systems, and shifting HVAC loads to non-peak times when outside air temperatures are more favorable (for cooling). At the non-peak times demand charges can be kept lower as well since other systems may not be operating, and utility rates are often lower. The use of high building mass is especially valuable in kitchen facilities where cooling is a significant issue.

Studies indicate it is best to locate the mass on the “comfort side” (i.e. inside the building), with insulation on the outdoor side for facilities in our climate with high indoor cooling loads (such as the kitchen). This allows the mass to absorb heat gains during the day, minimizing cooling loads. Cool night air can be used to purge the building and pre-cool the mass prior to occupancy.

Our experience on past projects has concluded that walls constructed of 8” thick CMU solid grouted (or 8” thick concrete), with R-19 rigid insulation (or equivalent) on the exterior, and a suitable weather-proof exterior skin, are economical and perform well.

Plumbing Systems: The design assumes adequate water pressure to the site (no less than 50 psig), adequate fire flows for a fully sprinklered building, and sufficient main sewer depth for a gravity sewer system.

PLUMBING SYSTEMS

Domestic Water Piping System:
Will use type L copper aboveground, and type K copper belowground. A backflow preventor will not be provided on the water main to the building. Valves will be rated for 125 psi-swp. Valves 2-1/2" and smaller will be of bronze construction, threaded or solder type; larger valves will have iron bodies bronze mounted, and be flanged. Water hammer arresters will be provided at cold water headers serving fixtures with flush valves. Valves will be the ball type. Dielectric unions will not be used.

Domestic Hot Water Generation:
Gas fired domestic hot water tanks are recommended, with a solar pre-heat system is recommended. In addition, a steam back-up fired water heater is proposed to allow the use of the interruptible natural gas rate, and to serve as a back-up. A circulation pump will maintain circulation through the system to ensure hot water at the most remote fixture. This pump will be controlled by a timeclock and aquastat, connected in series. A diaphragm type expansion tank will be provided on the water heater system. Water for hand washing will be provided at 120° F; water to dishwashing sinks and dishwashers will be provided at 140° F.

Sanitary Waste & Vent System:
System will use no-hub cast iron, schedule 40 galvanized steel (DWV), or copper DWV. Cleanouts will be provided per code requirements. Floor cleanouts will have round cast iron adjustable housings, with heavy duty bronze top, and be independent from the waste piping cleanout. All floor drains will have trap primers.

Plumbing Fixtures:
Water closets will be wall mounted dual flush (water conserving) siphon-jet type, vitreous china, white, with low water consumption flush valves. Urinals will be the water conserving type, wall mounted. Sinks will be of stainless steel construction, 18 gauge, with gooseneck faucets, and basket type strainers. Lavatories will be vitreous china type, with wall carriers, with dual temperature metering type faucets. Drinking fountains will be dual height type, stainless steel, with wall carriers.

Special Plumbing/Heat Recovery: A grease interceptor/trap is planned for the kitchen fixtures that generate grease. A central water filter system is anticipated to provide filtered water to selected cooking equipment fixtures. Heat recovery is also planned for high temperature waste water; system will preheat cold make-up water using coiled tube heat exchangers.

HVAC SYSTEMS

HVAC System Heat Source:
Heating will be required for the building's HVAC system (general building heat and ventilation air heating). Energy sources considered are limited to those that are cost effective, maintainable, reliable, and energy efficient. Ultimately a life cycle cost analysis will be used to select the final system. Energy sources and associated systems we would consider include:

1. Electricity Based:
   a. Air-to-air heat pumps.
   b. Water-to-air ground coupled heat pumps.
   c. Water-to-air conventional heat pump (i.e. with cooling tower and boiler).
2. Natural Gas Based:
   a. Gas fired air handlers.
   b. Gas fired boilers, with hot water pumped to heating coils.

3. Steam Based (from existing campus steam plant):
   a. Steam coils in air handlers/heaters.
   b. Steam to hot water heat exchanger, with hot water pumped to heating coils.

Generally, the most efficient and sustainable systems are those that minimize the number of energy exchanges and the associated equipment. For example, using natural gas to make high pressure steam, reducing the steam to low pressure, and then using low pressure steam to make hot water is less efficient than directly using natural gas to make hot water. This is due to the energy usage and losses that occur in the transfer and storage of the energy at each step (e.g. piping, traps, and condensate pumps in the case of steam). Such systems also typically employ more equipment, costing more initially, costing more to maintain, and having more components that can fail.

Ground coupled heat pump systems have an energy advantage over other systems in that the earth can be used as a heat sink, minimizing system equipment, avoiding the rejection of heat to the ambient air, and typically operating more efficiently due to the favorable temperature of the earth. For example, a ground coupled heat pump system would not require a cooling tower (which has integral fans, pumps, and requires chemical treatment) to reject heat; heat is instead rejected into the earth at a temperature of 50 to 60 deg F versus 80 to 90 deg F for the air. These systems can recover heat energy from the earth that has previously been rejected (and "stored"), rather than consuming new energy sources.

With the use of a ground coupled heat pump system and a common water loop, heat recovery is also immediately possible within the loop. This heat recovery occurs as units in cooling reject heat into the loop while other units that are in heating extract heat from the same loop; creating a thermal balance. Other avenues of energy recovery are also possible, as water cooled freezer/cooler units can be used which can add heat to the water loop for use by other equipment, rather than rejecting the heat into the ambient air. These heat pumps however have temperature limitations in their ability to reliably generate high temperature hot water due to the high refrigerant pressures associated with the higher temperatures. So they are well suited for heating air (typically in the 85 to 100 deg F range), and moderate temperature hot water (120 deg F), but are not as well suited for higher temperatures (140 degree or higher wash water).

Some variations of the ground coupled heating system include using a small cooling tower to reduce the number of geothermal wells, and use the cooling tower to reject the heat load for the system peak. This can often be more cost effective, as the quantity of wells is driven by the peak cooling load, but this peak load may only occur for a short time period. If the number of wells is reduced further, then a larger cooling tower is needed, and at some point a boiler would be needed to add heat as well.

With these considerations, we do not recommend use of the steam from the campus central steam plant for the HVAC systems for this facility (it is also our understanding that steam will not be used for the cooking equipment, nor will natural gas). We feel that a ground coupled heat pump system for the HVAC and freezer/cooler systems should be given primary consideration; with the final quantity of geothermal wells (and cooling tower/boiler sizing) evaluated based on the project budget and life cycle costs.

System Options - ELCCA:
The actual system type will be selected based on the results of an Energy Life Cycle Cost Analysis (ELCCA). The schematic design HVAC system assumes a water source heat pump system with a cooling tower and boiler, and with the geothermal wells as an alternate bid. This is proposed due to project budget limitations, and further design development is needed to optimize the quantity of the wells.

Proposed systems to be reviewed in the life cycle cost analysis:

No.	Name	Description
1	Ground Coupled Water Source Heat Pumps	A water source heat pump would serve each space, heat pumps would be connected on a common water loop. Water loop would be ground coupled by vertical piping ran in wells, approximately 300 feet deep. System would operate to maintain loop water temperature between 40 deg F and 85 deg F. System would include floor radiant heat at the warehouse and kitchen areas, and heat recovery for the kitchen hoods.
2	Ground Coupled Water Source Heat Pumps + VRF	Same as Option 1, but using Variable Refrigerant Flow (VRF) system for Office/Pharmacy occupancy. System would include floor radiant heat at the warehouse and kitchen areas, and heat recovery for the kitchen hoods.
3	Boiler/Chiller VAV	System would utilize a high efficiency central boiler and chiller system, with hydronic piping to variable-air-volume air handlers. System would include floor radiant heat at the warehouse and kitchen areas, and heat recovery for the kitchen hoods.

Kitchen Hood Heat Recovery Options:
In order to achieve the energy goals for this building, and to be consistent with sustainable design, the use of heat recovery on the building's exhaust hoods is highly recommended. Heat recovery is typically accomplished by the use of a heat recovery coil, which allows the transfer of the heat from the air being exhausted to the corresponding amount of fresh outdoor air being supplied (to make-up for the exhaust air). In order for the hood exhaust systems to function properly (and to comply with code), tempered make-up air (i.e. filtered and heated air from the outside) must be provided. The two air streams are kept separated by the design of the heat recovery coil and associated duct system so no contamination between the two occurs. Due to the high amounts of exhaust air for hoods, the amount of energy required to temper the outside air is a significant percentage of the HVAC system's overall energy use.

The heat recovery coils for kitchen hood applications are typically either the heat pipe or plate type. The coils are typically part of a packaged unit, which contains the hood exhaust fan, make-up air supply fan, heat recovery coil, heating/cooling coil (to add/remove heat as needed for space comfort), and a water wash system. The water wash system is required due to grease and particulate which can build up internally to the unit. The wash cycle is controlled automatically, but requires a central control panel, was water, and associated drain piping.

Acoustics:
System will be designed for a space NC of 30 or better. This will require sound traps at all units, and improved building construction to eliminate noise transfer from equipment.

Air Quality:
System will meet State standards for indoor air quality, as well as ASHRAE standards. Systems will utilize MERV 13 or better filters, 4" deep type to maximize time between filter change out. Building flush-out periods prior to occupancy will be included. CO_2 sensors will be utilized in high occupancy areas to reduce outside air quantities when spaces are not fully occupied. Pharmacy areas requiring clean room conditions will have higher level of filtration and proper pressurization relative to non-clean areas.

Air Distribution:
Ductwork will be galvanized steel, constructed per SMACNA and local code standards. Sound attenuators would be used as needed to reduce noise levels from units. Duct lining would typically be used within 30 feet of units (supply and return ducts) along with sound traps. Air outlets and inlets will be of steel or aluminum construction. Hood duct construction will be welded stainless steel as required by code.

Hydronic System:
Aboveground hydronic piping will be schedule 40 black steel or type L copper. Underground piping will be polyethylene type, with butt fused joints. Heat exchange trenches will be the horizontal type, with piping routed either in linear trenches, or in a coiled "slinky" fashion. Victaulic fittings aboveground would be allowed. Dielectric type unions are not allowed. System valves will be the ball type.

HVAC Equipment:
Will use HCFC free refrigerants. Units will be high efficiency type, exceeding code requirements.

Exhaust:
Exhaust fans will typically be the in-line type, accessible from the mechanical mezzanine (i.e. attic space). Rooftop heat recovery type units would be used for kitchen hoods.

Controls:
Will be the direct-digital control (DDC) type. System will provide timeclock, temperature, and ventilation control for all areas. System features will include optimum start/stop, night air purge cycle, economizer cycles, interlocks with space occupancy sensors for ventilation and deadband control, CO2 controls, multi-speed fan control, variable speed pump control, energy metering, trend logging, filter pressure drop monitoring, space pressurization controls, and full system graphics. Building annual to date energy usage (and previous “best” energy use to date) will be displayed to allow staff interaction with overall building energy performance. Allowed bidders will be confirmed with the Owner.

FIRE SPRINKLER SYSTEM

Water Supply:
A double-check backflow preventor will be provided on the fire line to the building. A remote located fire department connection will also be provided.

Sprinkler System:
System will be a wet type system throughout, with a dry system to serve areas subject to freezing. Area hazard class will be according to NFPA 13. System design will conform to NFPA 13 and local code requirements.

ELECTRICAL DESIGN CRITERIA

Applicable Codes (As Adopted and Amended by the Authority Having Jurisdiction):

NFPA 70, National Electrical Code
WAC 296-46B - Washington State Electrical Safety Standards, Administration, and Installation
International Building Code
International Fire Code
Washington State Energy Code

Energy Code Requirements, Lighting: Lighting design shall comply with the following:

1. Interior lighting power allowance shall be 1.00 watts/SF for the office/administration areas and 0.5 watts/SF (adjusted higher for ceiling height where applicable) in the warehouse. Exempt spaces shall include electrical/mechanical equipment rooms, food preparation areas, and medical (pharmacy) tasks. As part of achieving net zero by 2030, it will be a design goal to reduce lighting wattage 25% below the maximum allowable lighting power allowance for the building.

2. Each room shall be provided with local lighting control at the entry/exit door unless otherwise noted as an exception. (Section 1513.1)

3. The maximum lighting load controlled by a single switch or automatic control shall not exceed 16 amps. (Section 1513.2)

4. Separate control of daylight zones independent of general area lighting shall be provided. (Section 1513.3)

5. Separate control of indicated display, exhibition, and display lighting independent of general area lighting shall be provided. (Section 1513.4)

6. Automatic control of exterior lighting using combination timer and/or photocell shall be provided. (Section 1513.5)

7. The new buildings (greater than 5000 SF) shall be equipped with automatic controls to shut off interior lighting during unoccupied areas. Controls shall be central low voltage relay type controlled by timer except occupancy sensors shall be provided in conference rooms and office areas less than 300 SF to automatically turn off lights when room is unoccupied. (Section 1513.6)

LEED Credit Requirements: A goal of this project is to meet requirements for achieving a LEED Silver rating. To accomplish this goal, the following electrical design criteria shall be considered for this project.

1. Exterior lighting fixtures shall provide full cut-off photometrics.
2. Light trespass beyond boundaries shall be limited to .10 footcandles at the boundary and .01 footcandles 10 feet beyond the boundary for LZ2.
3. Controllability of Lighting Systems with individual lighting controls for 90% of building occupants shall be provided.

Utility Services - Electric: The existing campus is metered at 12470 volts (primary metered) from two Tacoma City Light sources. The customer (Western State Hospital) owns and maintains the primary distribution and transformers serving the existing buildings. The campus primary distribution was originally 4160 volts, and two 2000 KVA transformers now provide step down from 12470 volts to a 4160 volt distribution loop serving the south campus buildings.

An existing power vault on the south campus 4160 volt loop is the closest power source to the project and is located in the proposed west parking lot of the new building. Preliminary load data obtained from Tacoma City Light indicates that there should be adequate spare capacity existing to accommodate the new load. However, 30 day metering of each transformer on the 4160 volt loop will be required and an additional load study may be needed to balance the load between transformers.

An extension of the primary loop and new a pad mounted oil filled service transformers will be provided under the project contract for service to the new building.

Utility Services – Voice/Data: Telephone service is provided to the campus by with the telephone switch located in building .

Power Distribution: The new building shall have a 480/277 volt 3 phase electrical service with demand metering. Lighting, HVAC equipment, and designated kitchen equipment shall be served at 480/277 volts. A second service at 208/120 volts with demand meter shall be installed to serve convenience outlets, small power loads, and designated kitchen equipment.

Switchgear and panelboards shall be provided with copper bussing. Main and distribution switchgear rated above 150 volts to ground shall have fused switches. Branch circuit panelboards shall have bolt on circuit breakers. Sub-metering will be provided for lighting and HVAC distribution shall be provided as required to support LEED measurement and verification credit.

Provisions shall be included in the distribution design for future installation of a utility interactive (grid connected) solar photovoltaic (PV) power system.

Emergency and Stand-by Power: Each side of the campus 4160 volt loop has an existing 1500KW generator and automatic transfer equipment that is available for NEC 702 optional stand-by power. A central battery system shall be provided at the new building to comply with NEC 700 emergency power requirements for exit and egress lighting.

Basic Materials and Methods: Material and equipment shall be UL Listed and labeled where standards have been established and label service is available.

Feeders and branch circuits shall consist of conductors installed in conduit. Conduit installed

below grade shall be PVC; conduit installed above grade shall be metal. Branch circuits and feeders shall be copper conductors.

Wiring devices shall be specification grade. Convenience outlets shall be rated 20 amperes for dedicated circuits, and 15 amperes for multi-outlet circuits. Convenience outlets located outdoors and indoors near sinks and where food preparation occurs shall be GFCI protected. As a general design, there shall be no more than six convenience outlets per 20 ampere circuit and no more than 4 computer purpose outlets per 20 ampere circuit.

Floor boxes for workstations located in open office areas shall be concealed service type with cable plug-in occurs within the box below the finished floor.

Grounding: Service and equipment grounding shall be provided per Code except an equipment ground conductor shall be included in all feeder and branch circuit raceways. A single point grounding bar shall be provided in the electrical service room and in the telephone/data/server room and shall be bonded together.

Transient voltage surge suppression using UL 1449 surge protection devices (SPD's) is proposed for installation at the service entrance and at each appliance panelboard serving technology and computer purpose branch circuits.

Lighting Systems: Interior light fixtures shall primarily use T8 and T5HO 3500K fluorescent lamps and program start electronic ballasts. Automatic daylight controls and dimming ballasts shall be provided for light fixtures within the daylight zone of windowed spaces. Fixtures with integral occupancy sensors shall be provided in the warehouse aisles. Low temperature fluorescent ballasts will be provided in fixtures that are subject ambient temperatures below 50 degree F. Within food handling areas, fixtures shall be lensed.

Outdoor light fixtures shall be full cutoff type using LED lamps and drivers. Lighting shall be provided at each building entrance, at overhead doors, and at building signage. Pole mounted fixtures shall be provided in parking areas.

Automatic lighting controls for exterior lighting and for interior spaces without occupancy sensors shall be programmable low voltage relay panels. Interior lighting shall have time switch OFF control. Exterior lighting shall have photo sensor ON and time switch OFF control, except security lighting shall be controlled by photo sensor only for all night lighting.

To reduce lighting system watt density, high efficiency fixtures and lamp/ballast combinations will be specified and reduced illumination in not task areas (corridors, circulation areas, bulk storage areas) will be considered.

Fire Alarm: The fire alarm system will be fully addressable and will include speakers for audible alarm signals and strobes for visual signals. Fire alarm system circuits will be installed in metallic raceways. Smoke and/or heat detection will be installed throughout the building. Manual stations will be installed at building exits and at the top of stairs connecting adjacent floor levels. Duct smoke detectors will be installed in HVAC supply equipment with air capacities exceeding 2,000 ft3/min. The fire alarm control panel will release fire/smoke dampers, release magnetically-held doors, activate electrically-operated smoke doors and will provide elevator recall functions. The fire alarm system will also control electrical power to the elevator machines through a shut-trip device.

The fire alarm control panel will monitor the building fire sprinkling system and report alarm and supervisory conditions on the sprinkling system. The fire alarm control panel will also monitor fire protection systems in kitchen hoods and report alarm and trouble conditions related to the hood protection systems.

The new fire alarm control panel will be connected to the existing central reporting system located in Building 18.

Voice/Data Pre-wire: The existing campus telephone and network systems shall be extended to the new building from the Building 18 and shall consist of a 100 pair telephone trunk and a 6 strand fiber. A voice/data premises distribution system (PDS) using EIA/TIA Category 6 UTP station cabling shall be provided. A typical PDS outlet shall have three jacks/cable drops. The PDS shall be designed per campus standard.

Signal Pathway: Telecommunication outlets shall typically consist of 4 inch square outlet box and double gang device ring with a 1 inch conduit pathway. Flexible conduit connection(s) shall be provided to open office partitions that have wiring provisions. A telecommunications outlet shall be provided for each work station or desk. In offices, two outlets shall be provided on opposite room sides for flexibility in work station location. Conduit pathway shall be provided for building security system(s) that are installed by others.

AREA MODEL

Kitchen

	PD	SD	PD	SD	PD	SD	PD	SD
Administrative Areas	**Qty.**		**Area Each**		**Total Area**		**Subtotal Area**	
Administration	1	NA	640	NA	640			
Receptionist		1		56		56		
Kitchen Manager's Office		1		100		100		
Food Service Supervisor		1		80		80		
Workstations		4		64		256		
Employee Support	1	1	974	140	974	140		
Administrative Areas Subtotal	**2**					**632**	**1,614**	**632**
Storage	**Qty.**		**Area Each**		**Total Area**		**Subtotal Area**	
Dry Storage	1	2	880	200	880	400		
Cold Storage	1	2	1,467	225	1467	450		
Freezer Storage	1	2	587	194	587	388		
Frozen Prepared Food		1		283		283		
Blast Freezer		1		48		48		
Ready Coolers		2		133		266		
Special Diet Cooler		1		169		169		
Special Diet Dry		1		149		149		
Non-Food Storage	1	1		158		158		
Food Bank Chilled	1	NA	704	NA	704			
Equipment Storage	1	NA	150	NA	150			
Storage Subtotal	1				**3,788**	**2,311**	**3,788**	**2,311**
Production	**Qty.**		**Area Each**		**Total Area**		**Subtotal Area**	
Hot Food Preparation	1	1	500	1610	500	1610		
Cold Food Preparation	1	1	456	1475	456	1475		
Chill Area	1	NA	126	NA	126			
Finish Cooking / Rethermalization	1	NA	200	NA	200			
Tray Line	1	1	550	937	550	937		
Special Diet Preparation	1	1	200	308	200	308		
Bakery	1	NA	400	NA	400			
Meat Cutting	1	NA	200	NA	200			
Production Subtotal	**8**					**4,330**	**2,632**	**4,330**
Sanitation	**Qty.**		**Area Each**		**Total Area**		**Subtotal Area**	
Ware Washing	1	1	739	1076	739	1076		
Soiled Cart Area		1		398		398		
Cart Washing		1		64		64		
Janitor	1	1	200	50	200	50		
Chemical Storage		1		52		52		
Sanitation Subtotal	**3**				**939**	**1,588**	**939**	**1,588**
Support	**Qty.**		**Area Each**		**Total Area**		**Subtotal Area**	
Clean Cart Storage		1		296		296		
Shipping Staging	1	1	673	937	673	937		
Support Subtotal	**2**				**673**	**1,233**	**673**	**1,233**
Kitchen Total	**22**						**9,646**	**10,094**
Circulation Allowance at 25%							2,412	1424 14%
Gross Kitchen Area							**12,058**	**11,518**

Pharmacy

	PD	SD	PD	SD	PD	SD	PD	SD
Administration & Staff Support	**Qty.**		**Area Each**		**Total Area**		**Subtotal Area**	
Office	4	NA	150	NA	600			
Break Room	1	NA	225	NA	225			
Toilets	2	NA	160	NA	320			
Director of Pharmacy Office		1		150		150		
Pharmacy Supervisor Office		1		140		140		
Office Assistants		2		117		234		
Billing Office		1		73		73		
IT Manager		1		120		120		
IT Support		2		36		72		
Patient Walk Up Window		1		72		72		
Office Work Area/ Storage		1		170		170		
Unisex Restroom		1		53		53		
Patient Consult Room		1		88		88		
Admin & Staff Support Subtotal	**7**	**12**			**1,145**	**1,172**	**1,145**	**1,172**
Pharmacy Work Area	**Qty.**		**Area Each**		**Total Area**		**Subtotal Area**	
Work Room (Unit Dose Pick)	1	1	3,400	780	3400	780		
Controlled Substances		1		100		100		
IV Prep Room		1		160		160		
IV Prep Ante Room		1		120		120		
Repackaging, Extemporaneous		1		160		160		
Courier Staging		1		112		112		
Outpatient Medication Picking		1		130		130		
Custodial (Housekeeping)	1	1	150	75	150	75		
Clinical Pharmacist		10		64		640		
Pharmacy Tech		16		48		768		
Pyxis Administrator		1		36		36		
Pyxis Support		1		36		36		
Pyxis Training Support		2		36		72		
Student Workstation		2		36		72		
Resource Library		1		108		108		
Pharmacy Work Area Subtotal	**2**	**41**			**3,550**	**3,369**	**3,550**	**3,369**
Pharmacy Warehouse	**Qty.**		**Area Each**		**Total Area**		**Subtotal Area**	
Receiving / Storage	1		3,600		3600	0		
Unpacking Verification Room		1		120		120		
Inventory Supply Office		In WH						
Pharmacy Warehouse		1		947		947		
Expired Medication Storage		1		84		84		
Pharmacy Equipment Storage		1		279		279		
Pharmacy Warehouse Subtotal	**1**	**4**			**3,600**	**1,430**	**3,600**	**1,430**
Pharmacy Supply Total	**22**						**8,295**	**5,971**
Circulation Allowance at 5%							415	2542 43%
Gross Pharmacy Area							**8,710**	**8,513**

Central Medical Supply

	PD	SD	PD	SD	PD	SD	PD	SD
Administration & Staff Support	**Qty.**		**Area Each**		**Total Area**		**Subtotal Area**	
Office	2	NA	190	NA	380			
Medical Supply Supervisor Office		1		120		120		
Procurement Supply Specialist		1		80		80		
CS Tech Office, Shared		1		80		80		
Break Room	1	NA	125	NA	125			
Toilets	2	2	150	262	300	524		
Admin & Staff Support Subtotal	**14**				**805**	**804**	**805**	**804**
Soiled Work Areas	**Qty.**		**Area Each**		**Total Area**		**Subtotal Area**	
Decontamination	1	1	475	700	475	700		
Bio-Hazard Storage		1		216		216		
Housekeeping		1		76		76		
Manual Equipment Wash		1		100		100		
Soiled Work Areas Subtotal	**14**				**475**	**1,092**	**475**	**1,092**
Clean Work Areas	**Qty.**		**Area Each**		**Total Area**		**Subtotal Area**	
Gowning Area		1		96		96		
Sterilization/ Autoclave	1	1	112	108	112	108		
Processing / Work Area	1	1	1,570	1,105	1570	1105		
Housekeeping	1	1	80	64	80	64		
Supply Washing	1	NA	100	NA	100			
Detergent and Water Treatment		1		150		150		
Bio-Med Tech Office/Shop		1		192		192		
Storage Equipment & Testing		1		192		192		
Dispatch Area		1		96		96		
Clean Work Areas Subtotal	**14**				**1,862**	**2,003**	**1,862**	**2,003**
Storage Areas	**Qty.**		**Area Each**		**Total Area**		**Subtotal Area**	
Break Out and Receiving		1		294		294		
Non-Sterile Storage		1		753		753		
Sterile Storage	1	1	730	648	730	648		
Supply Storage	1	NA	135	NA	135			
Main (Bulk Medical) Storage	1	1	3,685	1,120	3685	1120		
Outside Storage	1	NA	180	NA	180			
Storage Areas Subtotal	**14**				**4,730**	**2,815**	**4,730**	**2,815**
Central Medical Supply Total	**22**						**7,872**	**6,714**
Circulation Allowance at 5%							394	925 14%
Gross Central Medical Supply Area							**8,266**	**7,639**

Commissary Warehouse

	PD	SD	PD	SD	PD	SD	PD	SD	
Admin and Miscellaneous Spaces									
Administration	**Qty.**		**Area Each**		**Total Area**		**Subtotal Area**		
Manager's Office	1	1	120	140	120	140			
Conference / Break Room	1	NA	200	NA	200				
General Office Area	1	1	1,080	170	1,080	170			
Waiting / Reception Area	1	1	100	110	100	110			
Receiving Workstation		1		64		64			
Dietary Warehouse Shared Office		1		215		215			
Computer and Printer Supplies	1	1	350	158	350	158			
Staff Restrooms	2	1	100	64	200	64			
Administration & Misc Subtotal	**6**				**2,050**	**921**	**2,050**	**921**	
Circulation Allowance at 10%							205	84	9%
Gross Administration Subtotal							**2,255**	**1,005**	
Main Warehouse	**Qty.**		**Area Each**		**Total Area**		**Subtotal Area**		
Archives	1	NA	1,550	NA	1,550				
Custodial and Cleaning Supplies	1	NA	2,600	NA	2,600				
Flat Goods	1	NA	1,400	NA	1,400				
Incontinence	1	NA	1,700	NA	1,700				
Paper Goods	1	NA	3,940	NA	3,940				
Patient Clothing	1	1	3,580	1,682	3,580	1682			
Personal Care Products	1	NA	850	NA	850				
Receiving Vestibule		1		315		315			
Pallet Rack Warehouse		1		5990		5990			
Carts/Equipment Storage		1		586		586			
DW Ingredient Room		1		579		579			
DW Freezer		1		720		720			
DW Cooler		1		733		733			
Dispatch Staging		1		985		985			
Receiving	1	1	1,450	1,428	1,450	1428			
Warehousing Subtotal	**10**				**17,070**	**13,018**	**17,070**	**13,018**	
Circulation Allowance at 25%							4,268	3799	29%
Gross Main Warehouse Subtotal							**21,338**	**16,817**	
Gross Warehousing Subtotal							**23,593**	**17,822**	

Shared Functions

Shared Functions	PD Qty.	SD Qty.	PD Area Each	SD Area Each	PD Total Area	SD Total Area	PD Subtotal Area	SD Subtotal Area
Custodial Closets	2	NA	50	NA	100			
Public Toilets	2	4	250	200	500	800		
Conference Room	1	1	150	890	150	890		
General Building Storage	2	NA	180	NA	360			
Locker Rooms		2		309		618		
Break Room		1		560		560		
MDF	1	NA	150	NA	150			
IDF	2	NA	50	NA	100			
Shared Functions Subtotal	**10**				**1,360**	**2,868**	**1,360**	**2,868**

BUILDING TOTALS	**53,985**	**48,360**	
Mechanical/Electrical @ 7% of NET	3,779	6665	14%
TOTAL GROSS SQUARE FEET	**57,764**	**55,025**	

Note: Black space names indicates the names are taken from the Pre-Design study. Red space names indicate further refinement of spaces from Pre-Design Study. In some functions a combination of SD (schematic design) spaces replace the larger PD (pre-design) space. Exterior functions, such as the loading docks and waste management spaces, have been removed from this comparison to prevent skewing of the square footages numbers. This comparison only pertains to spaces within the Gross Square Foot outline of the building.

THE ROBINSON COMPANY

WASHINGTON STATE HOSPITAL
KITCHEN/COMMISSARY BUILDING
SCHEMATIC DESIGN ESTIMATE
March 11, 2010

Base Bid MACC (No FFE)	**$14,145,050**
FFE (Fixtures, Furnishings, Equipment)	
Kitchen Equipment	$1,349,000
Kitchen Hot/Cold Carts	$420,000
Pharmacy/Medical Supply Equipment	$280,600
Warehouse Pallet Racks	$71,000
7' High Metal Shelving	$106,000
Subtotal FFE	$2,226,600
Mark-Up (6% OH&P, 7.55% Escalation)	$311,724
Total FFE	**$2,538,324**
Base Bid MACC & FFE	**$16,683,374**

Potential Additional Scope Not Included in the MACC

Alternate 1 Concrete Panels w/Concrete Veneer	($85,790)
Alternate 2 Alternate Staff Parking	$402,119
Alternate 3 Bridge and Stair Tower	$437,754
Alternate 4 Radiant/Ground Wells/Solar Pre-Heating	$508,502

Exclusions

State Sales Tax
Testing & Inspection
Construction Contingency
Architect/Engineer Fees
Utility Company Fees
Permits
Office Furnishings/Equipment

THE ROBINSON COMPANY

PROJECT: WASHINGTON STATE HOSPITAL COMMISARY - BASE ESTIMATE
LOCATION: LAKEWOOD, WA
BLDG SF: 67,000
ESTIMATE: 2010029
EST TYPE: SCHEMATIC DESIGN

DIVISION	DESCRIPTION		TOTAL	$/SF
A10	FOUNDATIONS		725,798	10.83
A20	BASEMENT CONSTRUCTION		127,863	1.91
B10	SUPERSTRUCTURE		994,269	14.84
B20	EXTERIOR CLOSURE		1,402,088	20.93
B30	ROOFING		524,250	7.82
C10	INTERIOR CONSTRUCTION		745,180	11.12
C20	STAIRS		30,000	0.45
C30	INTERIOR FINISHES		421,325	6.29
D10	CONVEYING SYSTEMS		125,000	1.87
D20	PLUMBING		383,026	5.72
D30	HVAC		2,202,379	32.87
D40	FIRE PROTECTION		214,613	3.20
D50	ELECTRICAL		1,471,060	21.96
E10	EQUIPMENT		54,000	0.81
E20	FURNISHINGS		69,800	1.04
G10	SITE PREPARATION		576,047	8.60
G20	SITE IMPROVEMENTS		345,074	5.15
G30	SITE CIVIL / MECHANICAL UTILITIES		429,826	6.42
Z10	GENERAL REQUIREMENTS		700,000	10.45
	ESTIMATE SUBTOTAL		**11,541,598**	**172.26**
	DESIGN CONTINGENCY @	7.50%	865,620	
	SUBTOTAL		12,407,217	
	GENERAL CONTRACTOR'S OH & P @	6.00%	744,433	
	SUBTOTAL		13,151,650	
	ESCALATION TO 01-SEP-12 (3.00%/YR) @	7.55%	993,400	
	TOTAL		**14,145,050**	**211.12**

EXCLUSIONS:
SEE ESTIMATE SUMMARY

PROJECT: WASHINGTON STATE HOSPITAL COMMISARY - BASE ESTIMATE
LOCATION: LAKEWOOD, WA
BLDG SF: 67,000
ESTIMATE: 2010029
EST TYPE: SCHEMATIC DESIGN

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL	$/SF
A10	**FOUNDATIONS**					
03000	6" SLAB ON GRADE	39,558	SFA	6.00	237,348	
03000	FOUNDATIONS	40,500	SFA	8.50	344,250	
03000	LOADING DOCK SLABS AND WALLS	1	LS	75,000	75,000	
03000	PREMIUM FOR RECESSED SLAB	2,400	SF	2.00	4,800	
03000	STEM WALL PREMIUM	1	LS	50,000	50,000	
03000	TOPPING SLAB	2,400	SF	3.50	8,400	
07000	RIGID INSULATION @ RECESSED SLAB	2,400	SF	2.50	6,000	
A10	**FOUNDATIONS**			**DIVISION TOTAL**	**725,798**	**10.83**
A20	**BASEMENT CONSTRUCTION**					
02000	EXCAVATE BASEMENT/HAUL	963	CY	12.00	11,556	
02000	EXCAVATE/BACKFILL BASEMENT WALLS	56	CY	8.00	448	
02000	EXCAVATE/HAUL/BACKFILL TRENCHES	567	CY	12.00	6,804	
02000	IMPORT BACKFILL @ BASEMENT WALLS	222	CY	20.00	4,440	
03000	BASEMENT WALLS	1,920	SF	32.00	61,440	
03000	CONCRETE UTILIDOR	157	LF	275	43,175	
A20	**BASEMENT CONSTRUCTION**			**DIVISION TOTAL**	**127,863**	**1.91**
B10	**SUPERSTRUCTURE**					
05000	CANOPIES	2,000	SF	45.00	90,000	
05000	FLOOR STRUCTURE	15,842	SFA	19.50	308,919	
05000	FLOOR STRUCTURE ABOVE BASEMENT	1,600	SF	21.00	33,600	
05000	MECH MEZZ STRUCTURE	3,000	SFA	18.50	55,500	
05000	ROOF STRUCTURE	40,500	SFA	12.50	506,250	
B10	**SUPERSTRUCTURE**			**DIVISION TOTAL**	**994,269**	**14.84**
B20	**EXTERIOR CLOSURE**					
03400	PRECAST CONCRETE	2,200	SF	40.00	88,000	
03400	PRECAST CONCRETE WINDOW SHADE/FINS WITH ATTACHMENTS	2,000	SF	40.00	80,000	
04220	12" CMU	17,370	SF	15.00	260,550	
04220	BRICK VENEER	16,520	SF	22.00	363,440	
07000	EXTERIOR WALL INSULATION	31,935	SF	3.00	95,805	
07000	METAL SIDING	13,215	SF	10.00	132,150	
08000	CURTAIN WALL	990	SF	75.00	74,250	
08000	EXTERIOR DOORS	13	EA	1,500	19,500	
08000	STOREFRONT/WINDOWS	3,416	SF	45.00	153,720	
08370	LOADING DOCK DOORS	5	EA	8,000	40,000	
09000	8" METAL STUDS	14,565	SF	6.50	94,673	
B20	**EXTERIOR CLOSURE**			**DIVISION TOTAL**	**1,402,088**	**20.93**

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL	$/SF
B30	**ROOFING**					
01000	ROOFING SYSTEM	40,500	SFA	10.50	425,250	
07000	SKYLIGHTS	36	EA	2,750	99,000	
B30	**ROOFING**			**DIVISION TOTAL**	**524,250**	**7.82**
C10	**INTERIOR CONSTRUCTION**					
08000	INTERIOR DOORS	76	EA	950	72,200	
08000	RELITES	300	SF	40.00	12,000	
08000	SPECIAL DOORS	1	LS	20,000	20,000	
09000	INTERIOR WALLS	57,267	SF	10.00	572,670	
09000	LOW WALLS	256	SF	15.00	3,840	
09000	PREMIUM FOR ELEVATOR WALLS	3,024	SF	5.00	15,120	
10000	LOCKERS	60	EA	175	10,500	
10000	MISC SPECIALTIES	57,000	SFA	0.25	14,250	
10000	TOILET ACCESSORIES	1	LS	7,500	7,500	
10000	TOILET PARTITIONS	18	EA	950	17,100	
C10	**INTERIOR CONSTRUCTION**			**DIVISION TOTAL**	**745,180**	**11.12**
C20	**STAIRS**					
05000	STAIRS	3	FLT	10,000	30,000	
C20	**STAIRS**			**DIVISION TOTAL**	**30,000**	**0.45**
C30	**INTERIOR FINISHES**					
09000	CARPET	4,600	SF	3.75	17,250	
09000	CEILINGS	57,000	SFA	2.50	142,500	
09000	CERAMIC TILE FLOOR	2,750	SF	9.00	24,750	
09000	POLISHED CONCRETE-GRAY	19,500	SF	4.00	78,000	
09000	SEALED CONCRETE	17,000	SF	0.75	12,750	
09000	SV WITH WELDED SEAMS	17,750	SF	5.50	97,625	
09000	WALL FINISHES	57,000	SFA	0.85	48,450	
C30	**INTERIOR FINISHES**			**DIVISION TOTAL**	**421,325**	**6.29**
D10	**CONVEYING SYSTEMS**					
14000	ELEVATOR-2 STOP	1	LS	55,000	55,000	
14000	ELEVATOR-WAREHOUSE	1	LS	70,000	70,000	
D10	**CONVEYING SYSTEMS**			**DIVISION TOTAL**	**125,000**	**1.87**
D20	**PLUMBING**					
15000	PLUMBING ALLOWANCE PER A/E	1	LS	383,026	383,026	
D20	**PLUMBING**			**DIVISION TOTAL**	**383,026**	**5.72**
D30	**HVAC**					
15000	HVAC ALLOWANCE PER A/E	1	LS	2,202,379	2,202,379	
D30	**HVAC**			**DIVISION TOTAL**	**2,202,379**	**32.87**

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL	$/SF
D40	**FIRE PROTECTION**					
15000	FIRE SPRINKLERS	1	LS	214,613	214,613	
	ALLOWANCE PER A/E					
D40	**FIRE PROTECTION**			**DIVISION TOTAL**	**214,613**	**3.20**
D50	**ELECTRICAL**					
16000	BUILDING ELECTRICAL	1	LS	1,131,760	1,131,760	
	ALLOWANCE PER A/E					
16000	CENTRAL REPORTING CIRCUIT-FIRE ALARM	1	LS	22,800	22,800	
	ALLOWANCE PER A/E					
16000	FIRE ALARM SYSTEM	1	LS	128,400	128,400	
	ALLOWANCE PER A/E					
16000	SITE ELECTRICAL	1	LS	188,100	188,100	
	ALLOWANCE PER A/E					
D50	**ELECTRICAL**			**DIVISION TOTAL**	**1,471,060**	**21.96**
E10	**EQUIPMENT**					
11000	DOCK LEVELERS	6	EA	6,500	39,000	
11000	MISC EQUIPMENT	1	LS	15,000	15,000	
E10	**EQUIPMENT**			**DIVISION TOTAL**	**54,000**	**0.81**
E20	**FURNISHINGS**					
12000	MISC CASEWORK	1	LS	25,000	25,000	
12000	MISC SHELVING	100	LF	90.00	9,000	
12000	RECEPTION DESKS	28	LF	350	9,800	
12000	UPPER CABINETS	15	LF	80.00	1,200	
12000	WORK COUNTERS	310	LF	80.00	24,800	
E20	**FURNISHINGS**			**DIVISION TOTAL**	**69,800**	**1.04**
G10	**SITE PREPARATION**					
02000	CLEAR AND GRUB	4,630	CY	10.00	46,300	
02200	SITE PREP/EROSION CONTROL	1	LS	63,107	63,107	
	ALLOWANCE PER A/E					
02220	SITE DEMOLITION	1	LS	35,131	35,131	
	ALLOWANCE PER A/E					
02300	ADDITIONAL CIVIL CONTINGENCY	1	LS	80,772	80,772	
	ALLOWANCE PER A/E					
02300	EXCAVATION AND EARTHWORK	1	LS	350,737	350,737	
	ALLOWANCE PER A/E					
G10	**SITE PREPARATION**			**DIVISION TOTAL**	**576,047**	**8.60**

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL	$/SF
G20	**SITE IMPROVEMENTS**					
02000	MISC SITE ITEMS/WALLS	1	LS	25,000	25,000	
02740	ASPHALT CONCRETE	1	LS	108,605	108,605	
	ALLOWANCE PER A/E					
02750	PORTLAND CEMENT CONCRETE	1	LS	22,250	22,250	
	ALLOWANCE PER A/E					
02900	LANDSCAPING IMPROVEMENTS	1	LS	105,644	105,644	
	ALLOWANCE PER A/E					
02900	PLANTINGS	1	LS	83,575	83,575	
	ALLOWANCE PER A/E					
G20	**SITE IMPROVEMENTS**			**DIVISION TOTAL**	**345,074**	**5.15**
G30	**SITE CIVIL / MECHANICAL UTILITIES**					
02510	ON SITE WATER DISTRIBUTION	1	LS	133,190	133,190	
	ALLOWANCE PER A/E					
02530	SANITARY SEWER SYSTEM	1	LS	55,375	55,375	
	ALLOWANCE PER A/E					
02630	STORM DRAINAGE SYSTEM	1	LS	241,261	241,261	
	ALLOWANCE PER A/E					
G30	**SITE CIVIL / MECHANICAL UTILITIES**			**DIVISION TOTAL**	**429,826**	**6.42**
Z10	**GENERAL REQUIREMENTS**					
01000	BLDG AREA	61,600	SF			
01000	GENERAL CONDITIONS	14	MO	50,000	700,000	
01000	TUNNEL AREA	942	SF			
Z10	**GENERAL REQUIREMENTS**			**DIVISION TOTAL**	**700,000**	**10.45**
				ESTIMATE SUBTOTAL	**11,541,598**	**172.26**

PROJECT: WASHINGTON STATE HOSPITAL COMMISARY
LOCATION: LAKEWOOD, WA
ESTIMATE: 2010029
EST TYPE: SCHEMATIC DESIGN

ALT # 1
CONCRETE PANELS W/CONCRETE VENEER

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
03110	SCHEDULE CREDIT	1	LS	-70,000	-70,000
		ALTERNATE SUBTOTAL			-70,000
		MARKUP @		22.6%	-15,790
		TOTAL			**-85,790**

ALT # 2
STAFF PARKING

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
02000	ADDITIONAL CIVIL CONTINGENCY	1	LS	24,304	24,304
	ALLOWANCE PER A/E				
02200	SITE PREP & EROSION CONTROL	1	LS	9,468	9,468
	ALLOWANCE PER A/E				
02210	SITE DEMOLITION	1	LS	10,233	10,233
	ALLOWANCE PER A/E				
02300	EARTHWORK	1	LS	22,754	22,754
	ALLOWANCE PER A/E				
02630	STORM DRAINAGE	1	LS	105,875	105,875
	ALLOWANCE PER A/E				
02740	ASPHALT CONCRETE	1	LS	147,623	147,623
	ALLOWANCE PER A/E				
02775	PORTLAND CEMENT CONCRETE	1	LS	7,850	7,850
	ALLOWANCE PER A/E				
		ALTERNATE SUBTOTAL			328,107
		MARKUP @		22.6%	74,012
		TOTAL			**402,119**

ALT # 3
BRIDGE AND TOWER

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
04220	BRICK VENEER @ STAIR TOWER	851	SF	22.00	18,722
05000	BRIDGE CONNECTION	1	LS	250,000	250,000
05000	ROOF STRUCTURE @ STAIR TOWER	250	SF	25.00	6,250
08000	CURTAIN WALL @ STAIR TOWER	960	SF	75.00	72,000
09000	TWO HOUR WALL @ STAIR TOWER	851	SF	12.00	10,212
		ALTERNATE SUBTOTAL			357,184
		MARKUP @		22.6%	80,570
		TOTAL			**437,754**

ALT # 4
RADIANT/GROUND WELLS/SOLAR PRE-HEATING

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
15000	RADIANT/GROUND WELLS/SOLAR PRE-HEAT	1	LS	414,910	414,910
	ALLOWANCE PER A/E				
		ALTERNATE SUBTOTAL			414,910
		MARKUP @		22.6%	93,592
		TOTAL			**508,502**

National talent,

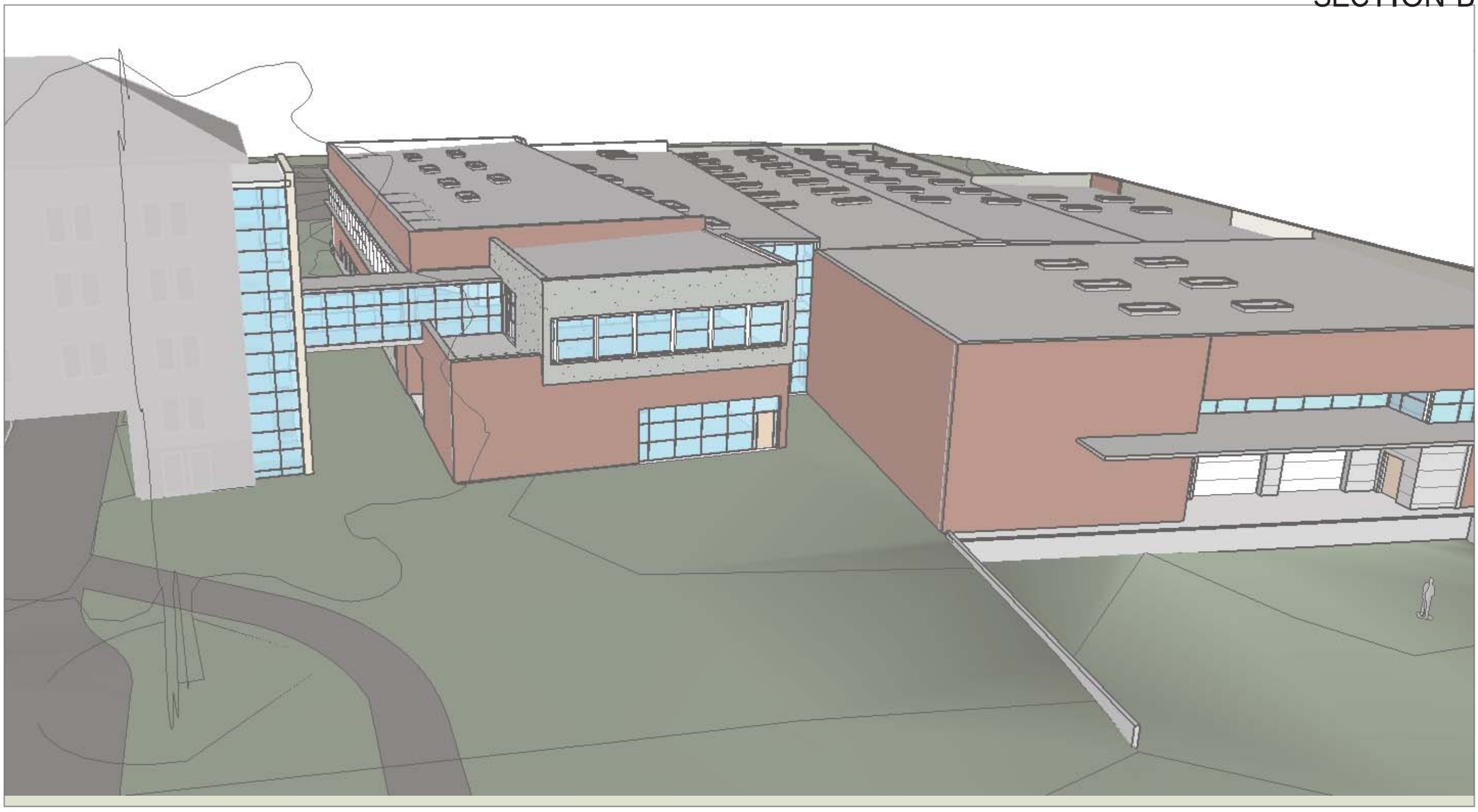
local focus

Western State Hospital Kitchen and Commissary Building

SCHEDULE

Schematic Design	Oct 2009 through mid March 2010
Design Development	mid March 2010 through May 2010
Construction Documents	June 2010 through July 2010
Submit Budget to Legislature	August 2010
Wait for Funding	Aug 2010 through July 2011
Complete Documents	August 2011 through Feb 2011
Construction	March 2012 through March 2013
Occupancy	April 2013

SECTION B



OUTLINE SPECIFICATIONS

General Background

The Kitchen and Commissary Building is envisioned as 62,000 square foot facility to colocate the Hospital's dietary food service, central medical supply, pharmacy, and bulk commissary into a single new building. The new design is intended to serve Western State Hospital for the next 50 years. This project provides a significant step towards the Institution's Master plan to create a secure pedestrian patient treatment mall exclusive of motorized vehicles. Strategically sited where the North Hall once stood, the new facility will be located immediately north of the proposed treatment mall. This project will remove a majority of the off-site delivery and service traffic from the future patient mall area. The schematic design is a result of the discussions about multiple conceptual site and building organizations presented on January 20 and 27, 2010. Careful planning has resulted in a simple diagram that addresses the processes and work flow between departments. Careful attention was given to creating efficient functional adjacencies. The new building will provide a secure, state-of the-art facility that will increase the efficiency and quality through a design that accommodates a more efficient and up-todate operation.

Division 0, Bidding and Contract Requirements

Work of this Division includes: bidding information; General and Supplementary Conditions to the contract; and Bonds and Insurance provisions. DSHS standard contract provisions will be utilized and edited as necessary for the specifics of this project.

Division 1, General Requirements

Work of this Division includes: Summary of Work; Alternates; Project Coordination; Project Phasing, Definitions and Standards; Schedules, Reports, and Payments; Submittals and Substitutions; Quality Control; Temporary Facilities; and Project Closeout.

Division 2, Site Work

Site Demolition

Existing structures to remain are to be protected from damage during demolition and construction of adjacent buildings and site work. Existing foundations possibly remaining at demolished building areas will be abandoned in place when possible, with foundation removal held to the minimum necessary to accommodate the new constructions. Some concrete walks, asphalt pavements are to be removed to accommodate the proposed building and loading ramp areas. Utilities servicing the former North Hall previously demolished are to be cut, capped, and abandoned. Utilities servicing buildings to remain are to be maintained and protected until replacement services are on line. Replaced water and fire services will be abandoned in place. Catch basins in pavements to be demolished are to be removed. Demolition debris is to be removed and disposed of off-site in accordance with regulatory agency requirements.

Earthwork

The building will be located on the site of an existing building that was recently demolished. Existing unconsolidated fill will need to be excavated within the existing building footprint to its lower foundation level and also below the new building footprint. This fill is assumed to be suitable material for structural fill and can be placed and compacted to provide subgrade for the new building. Excess material will be hauled to another part of the campus.

Erosion and Sediment Control

All site development within the City of Lakewood requires a detailed erosion and sedimentation control plan. This plan shall be implemented during construction in an effort to prevent construction storm water from contaminating off-site storm water. Erosion and sedimentation control measures include construction entrances, sediment ponds, slope stability measures, perimeter protection and off-site storm water turbidity monitoring.

An NPDES permit and a Surface Water Pollution Prevention Plan (SWPPP) will be required for this development.

Storm Water Runoff Control

Storm water will be infiltrated into the native subgrade downstream (or below) the water quality facility. Gravel trenches located below the bioretention facilities or cartridge filter systems will store water while it percolates through the soil. The gravel trenches below the rain gardens will be shallow (approximately 4 feet in depth) and cover the bottom surface area of the bioretention facility. The gravel trenches below the cartridge systems will be extend to a maximum depth of 20 feet below ground level with dimensions of 12-foot long by 4-foot wide; these systems are refereed to as pit drains.

Storm Water Runoff Treatment

This site is within a well-head protection area, which requires basic water quality treatment in accordance with the 2005 Ecology Surface Water Manual (as adopted by the City of Lakewood). Basic water quality treatment is provided for the building, loading docks, access drives, and parking areas.

The roof area and western access drive will discharge to bioretention facilities consisting of water-tolerant vegetation and an amended soil mix. The amended soil mix is designed to remove 80% of the suspended solids present in the runoff. Dense planting within the rain garden further reduces runoff through root uptake.

The loading dock area and northern access drive will be collected and routed to cartridge filter systems. These systems consist of cartridges filled with engineered media that is designed to remove pollutants from storm water runoff. The cartridges are housed in a storm drain manhole.

Asphaltic Concrete Paving

Car parking and loading ramp areas will be paved with 3-inches of Class 'B' asphaltic concrete over 4-inches of crushed surfacing over 12-inches of compacted subbase material. Heavy truck access areas will be paved with 4-inches of Class 'B' asphaltic concrete over 6-inches of crushed surfacing over 12-inches of compacted subbase material. Asphalt pavement sections will be placed over a 95 percent compacted subgrade. Existing asphalt surfaces will be saw-cut for new utility connections and replaced in kind.

Portland Cement Concrete Paving
Site walkways will meet ADA accessibility standards. Concrete walkways, ramps, and plazas will be 4-inch thick 3000 psi concrete. Concrete paving will be placed over four inches of crushed surfacing over a 95 percent compacted subgrade. In locations where new walkways meet existing, the existing concrete walk will be saw-cut at the nearest joint. Curbs will be cast-in-place concrete.

Water and Fire Systems
There is an existing 8-inch fire service main extending from the southwest corner to the northeast corner of the project site. This water line will be within the limits of excavation for the improvements and will need to be relocated as part of the basic scope of work. Fire hydrants and the fire service connection for the new sprinklers will be tapped off this new water main. Backflow prevention will be located within the mechanical room of the building. The new domestic service will be tapped from the new water main previously mentioned.

Storm Sewer
Where possible, storm water will sheet flow across paving and landscape areas to bioretention facilities for storm water treatment and infiltration. In other areas, such as the loading docks and access drive, storm water will be collected in an 8-inch or 12-inch diameter storm pipes and conveyed to water quality and infiltration facilities.

Sanitary Sewer
There is an existing sewer main located within the access drive south of the project site. Sewer service for the building will connect to this sewer main through a 6-inch side sewer. The kitchen will require a grease separator vault, which will also require a side sewer connection to the existing sewer main.

Irrigation:
All new landscape areas will be irrigated with an automatic water conserving irrigation system. Lawn areas will be watered separately from shrub areas. Planting areas will use both spray heads and rotors. Point of connection components and a clock timer will be installed.

Site Improvements:
Includes benches, bollards, tree grates, and pedestrian scale lighting along walkways and around main building entrances.

Planting and Seeding:
All developed portions of the site not being paved will receive either grass or landscape plantings, consisting of a mixture of trees, shrubs, groundcovers, and perennial accents where appropriate. The landscape and site plans will be designed to meet both water conservation and low maintenance goals.

Division 3, Concrete

The foundation system will consist of conventional concrete spread footings supporting perimeter concrete stem walls and interior steel columns. The southern area of the building will be steel brace frames supported on grade beam foundations.

The Level 1 floor structure will consist of 4” concrete slab on grade with WWF reinforcement at Office and Kitchen areas and a reinforced 6” concrete slab on grade at the Commissary/Storage areas. Slabs above ground level will be normal weight concrete fill on metal decking for upper floor construction.

Plant cast precast concrete panels will form a portion of the exterior wall and building enclosure. Panels will be hung from structural steel framing and merged with adjacent brick and metal wall siding. Thermal insulation and gypsum board finish will be applied in the field to the interior face of panels.

Division 4, Masonry

Exterior walls at the southern area of the building will consist of light gauge metal studs at 16 inches on center with exterior sheathing with metal panels or and brick masonry veneer. Brick will be selected to blend with and complement brick on existing adjacent buildings. Exterior walls at the northern area will be “high-mass” wall consisting of pre-cast concrete panels or reinforced CMU.

Division 5, Metals

The floor framing of Level 2 and over the partial basement will consist of open web steel joists supported by joist girders or wide flange beams supported by steel columns. The southern area of the building will be laterally reinforced with steel brace frames. The floor system will be Type “W2” metal deck with normal weight concrete (5½” total thickness).

The roof framing system will consist of open web steel joists supported by joist girders or wide flange beams supported by steel columns. The floor system will be Type “B” metal deck.

Exterior walls at the southern area of the building will consist of light gauge metal studs at 16 inches on center with exterior sheathing.

Miscellaneous metals will be utilized for ladders, stairway framing of new stairways, railings and handrails, and related specialties. All exterior fabrications to be hot-dipped galvanized.

Division 6, Wood and Plastics

Wood framing will be used to enhance and strengthen existing wood framed areas of Building Aw. Wood framing occurs on the upper levels of the building. Plywood will be used on some existing wood stud walls at the upper levels of Building Aw to create shear walls to resist lateral forces.

Fire treated wood blocking will be used as required, and some limited wood trim is anticipated.. Casework shall be plastic laminate faced, AWI “Custom” grade as applicable.

Division 7, Thermal and Moisture Protection

Exterior walls will be insulated in conformance with current energy and building code requirements. Exterior walls anticipate achieving the current energy code requirements through performance analysis.. Rigid insulation shall be utilized over the steel roof decking, achieving an R-38 value.

Masonry exterior walls will receive rigid insulation and GWB finish. Batt insulation installed in 6” metal stud framing will enclose the office and pharmacy spaces, generally on the south side of the building. Masonry and concrete walls will receive rigid insulation of value determined by energy modeling.

Roofing shall include a heat welded single ply membrane and rigid R-38 insulation at low-slope roofs.
Flashings, gutter systems and downspouts shall be prefinished galvanized sheet metal except that flashings imbedded in masonry shall be stainless steel.

Division 8, Doors and Windows

Windows shall be Kynar coated thermally broken aluminum with insulated glazing. Operable units will be used in selected locations for passive ventilation with fixed glazing at most other locations.

An aluminum curtainwall glazing system will be used at selected locations.

Typical exterior doors shall be hollow metal in hollow metal door and relite frames. Exterior doors and frames to be galvanized. Overhead loading dock doors at delivery and dispatch points shall be sectional insulated galvanized metal, motorized operation.

Interior doors shall be hollow metal in welded hollow metal frames, including utility and custodial areas. Interior relites shall be welded hollow metal frames. Hardware to be heavy duty commercial quality.

Rated firedoors will be used as required by code for fire protection separations. Electrically operated overhead rolling grilles may be used for after-hours separation of separately secured areas.

Division 9, Finishes

New interior surfaces shall generally be gypsum wallboard (GWB), painted, on light guage metal framing.

Veneer coat plaster shall be applied to the GWB at corridors and other high-use areas.
2’x4’ layin suspended ceilings shall be used at most offices, and general service areas. Scrubbable acoustical panel ceilings will be employed in all food handling areas. GWB ceilings will be utilized at janitors closets, toilet rooms. Structure will remain exposed at wearhouse and service/mechanical areas.

Offices and conference spaces shall generally be carpet, with vinyl composition tile (VCT) at high use rooms. Commons and corridors shall be VCT. Rubber base (4”) at all new flooring. Walk-off mats shall be provided at all entries.

Floors in janitorial and utility areas shall be concrete, sealed.

Toilet rooms shall have thin-set ceramic tile floors, with thinset ceramic tile 5’ high wainscot.

All interior paintable surfaces shall be painted. Toilets and similar rooms to receive alkyd enamel, other walls latex enamel.

Exterior concrete panels shall be naturally finished and sealed with penetrating sealer.

Division 10, Specialties

Specialties include tackboards, liquid marking surfaces at conference rooms.

Fire extinguishers and identifying devices will be provided .

Toilet rooms will include phenolic toilet partition, electric hand dryers, and miscellaneous toilet accessories.

Lockers to be single tiered, 12” wide by 12” deep.

Full height corner guards at all corridor walls and other selected locations.

Division 11, Equipment

Horizontal window blinds will be used on exterior windows and interior relites into offices and conference rooms.

Food service equipment is included in the project and will consist of both new and reused existing items.

Other equipment items include high bay storage components, load leveling equipment at loading docks and specialized shelving units.

Pharmacy equipment and specialties will consist of new and reused existing equipment.

Miscellaneous residential appliances will be provided for special requirement locations.

Division 12, Manufactured Casework

Architectural casework shall be laminated plastic finish and shall conform to AWI “Custom:” grade.

Loose furnishings and equipment shall be provided outside of the construction contract.

Division 13, (Section not used)

Division 14, Conveying Systems

One elevator, conforming to ADA requirements, will be provided for handicapped access to the various floor levels as required by code.

Division 15, Mechanical

See Mechanical Narrative above.

Division 16, Electrical

See Electrical Narrative above.

Division 17, Hazardous Materials Abatement

None is anticipated.

INTERNATIONAL BUILDING CODE REVIEW

CHAPTER 3: USE AND OCCUPANCY CLASSIFICATION:

OCCUPANCY GROUPS:

Group A-3: For spaces such as large conference room.

Group B: This is the main occupancy group; see incidental and accessory uses below.

Group S-2 (Low hazard storage): Includes all Commissary and similar functions.

INCIDENTAL USE AREAS (TABLE 302.1.1):

-Storage Rooms greater than 100SF require 1-hour separation or fire extinguishing system.

-Note that with fire extinguishing system smoke separation is still required (302.1.1.1)

PROGRAM ANALYSIS 3-45:

ACCESSORY USE AREAS (SECTION 302.2):

-Accessory use areas not in table 302.1.1 and not Group H are not required to be separated if the accessory use area is less than 10% of the area of the floor on which it is located and does not exceed Table 503 values for such use group.

-Accessory assembly areas less than 750SF are not considered separate occupancies.

OCCUPANCY SEPARATIONS (SEE SECTION 302.3AND TABLE 302.3.2):

-In general there is a 2-hour occupancy separation between type B and type A-3 occupancies with reduction to one hour permitted when sprinklers are provided. See note b. in table 302.3.2 for when occupancy separations are not required for storage areas within Group B

-Mixed Occupancy (302.3): If classified as a mixed occupancy building, the uses must be either Separated or Non-Separated and the allowable floor areas would be calculated accordingly:

-Non-Separated Uses (section 302.3.1): Required construction type shall be determined by applying height and area limitations for each use group to the entire building and the most restrictive type so determined shall apply to the entire building.

-Separated Uses (section 302.3.2): In each story, the building area shall be such that the sum of the ratios of floor areas of each use divided by the allowable area for each floor shall be less than one.

SUMMARY:

-Primary Occupancy is Group B with some accessory A-3 and A-2 use groups.

-The Commissary will be Group S-2 and it is considered a separate and distinct building for the purpose of determining area limitations, continuity of firewalls and the limitation on the number of stories.

Based on construction Type IIB (see chapter 6 summary below), we anticipate that the building will be classified as Mixed Occupancy with Separated Uses because the A-3 and A-2 spaces fill more than 10% of the area of some levels and thus cannot be called accessory use to Group B. Any other occupancy groups classified as accessory or incidental use areas to the main occupancy group do not need to be considered different occupancy and only need to be separated with a fire barrier if required as defined in incidental use areas.

CHAPTER 4: SPECIAL REQUIREMENTS BASED ON USE AND OCCUPANCY:

No unusual requirements are anticipated.

CHAPTER 5: GENERAL BUILDING HEIGHTS AND AREAS:

Building area shall include exterior areas below projections of roofs or floors above (section 502.1):

-Allowable Height and Building Area (see Table 503)

-Assuming Construction Type II-B (refer to Chapters 3 and 6):

Maximum # stories:

11 stories for Group S

Maximum height: measured to average height of highest roof surface: 160 feet above "grade plane" for type II-B construction

Grade Plane: Plane representing the average of finished ground level adjoining the building at exterior walls. With building set into hillside, the approximate average grade plane can be averaged from the southeast corner to the northeast corner of the building as those are the highest and lowest points of grade.

Height and Area Modifications (Section 504 and Section 506):

May increase maximum height by 20' and 1 additional story if protected with sprinkler system.

May increase maximum areas per calculations as part of the general area modifications (Section 506.1) if protected with sprinkler system. This includes additions due to a frontage increase (Section 506.2).

SUMMARY

For construction Type II-B:

Maximum Allowable Building area (Group B):

Unlimited SF/floor

Maximum Number of Stories: 11+1story sprinkler modification = 5 stories max.

Max building Height: 160 feet +20 feet sprinkler modification = 180 feet. The Building is within maximum allowable area, maximum number of stories and maximum allowable height for construction type I-B.

CHAPTER 6: TYPES OF CONSTRUCTION:

Anticipated Construction Type: Type II-B:

Type II construction is a type of construction in which all building elements listed in Table 601 are of non-combustible materials.

Fire resistance-rating requirements of building elements, Type II-B (see Table 601):

Structural frame: 2 hours

Bearing walls (interior and exterior): 2 hours

Nonbearing exterior walls (per table 602): 1 hour (w/ min. fire separation distance of 10')

Nonbearing interior walls: 0 hours

Floor Construction: 2 hours

Roof Construction: 1 hours

CHAPTER 7: FIRE RESISTANCE-RATED CONSTRUCTION:

This chapter describes materials and assemblies to be used when required to be built of fire-resistive rated construction by the code. Some fire rated construction to note:

Stairway Enclosures 2 hr. when greater than 4 stories (see 1019.1)

Area Separation 2 hr. (none anticipated)

Shaft Enclosures (section 707) 1 hr. if less than 4 stories, 2 hr. if greater than 4 stories

Protected Elevator Lobby Not required if building is sprinkler protected (707.14.1)

Corridors See section 10.16 (not required if sprinkled)

Occupancy Separation See chap 3 summary above

Building Elements See chap 6 summary above

Table 705.4 – Firewall fire-resistance ratings:

Groups B, and S-2 all require 3 hour rating for firewalls. Each portion of a building separated by one or more firewalls that comply with the provisions of this section shall be considered a separate building.

Table 715.3 – Fire door and fire shutter protective ratings:

Firewalls and fire barriers with 3-hour rating require 3-hour rated doors

Firewalls and fire barriers with 2-hour rating require 1.5-hour rated doors

Shaft exit enclosures and exit passageways with a 1-hour rating require 1-hour rated doors

Other fire barriers with 1-hour rating require 0.75-hour rated doors

Corridor walls requiring a 1-hour rating require 20min rated doors

Exterior walls requiring a 2-hour rating require 1.5-hour rated doors

715.3.7 Fire doors shall be self-closing in accordance with this section

715.3.7.3 Requirements for automatic closing by actuation of smoke detector apply to the cross-corridor doors at exit stairs.

CHAPTER 8: INTERIOR FINISHES:

Wall and Ceiling Finishes: see section 803.1 for Class A, B, and C requirements for flame spread and smoke developed.

Flame Spread of finish materials per Table 803.5 for sprinklered buildings by occupancy group:

Group B Group S-2

Stairways: Class B Class B Class C

Exitways: Class B Class C Class C

Rooms: Class C Class C Class C

Interior floor finishes per section 804

CHAPTER 9: FIRE PROTECTION SYSTEMS:

Complying automatic sprinkler systems are defined in this chapter, and sprinklers are used as reason for a number of height and area modifications and other exceptions throughout the code.

Sprinklers are not required for occupancy Group B (See Section 903.2).

Sprinklers are only required for occupancy Group A-3 (See Section 903.2.1.3) if the A-3 fire

area exceeds 12,000 SF or has an occupant load of 300 or is located on a floor other than level of exit discharge. This requires the buildings A-3 occupancy spaces to be sprinkled.

Sprinklers are only required for occupancy Group A-2 (See Section 903.2.1.2) if the A-2 fire area exceeds 5,000 SF or has an occupant load of 300 or is located on a floor other than level of exit discharge. This requires the buildings A-2 occupancy spaces to be sprinkled.

Sprinklers are required in occupancy Group S-2 (See Section 903.2.9)

It is our intention to equip the building with automatic sprinkler systems throughout.

CHAPTER 10: MEANS OF EGRESS:

Minimum height of egress path: 7'-0" throughout, 6'-8" minimum at stairs

Occupant Load determination (Section 1004): the largest load number calculated by both designed occupant use as well as occupant load calculated per values given by table 1004.1.2.

Occupant Load Factors (Table 1004.1.2)

Office& Business Areas: 100 gross

Kitchens, commercial: 200 gross

Storage Rooms: 300 gross

Mechanical Rooms: 300 gross

Do not sum up the floors. Each floor is independent of the other. (1004.4)

Egress width per person served (Table 1005.1)

Stairways 0.2" per person w/ sprinkler system, not less than 48" (1007.3)

Other egress components 0.15" per person w/ sprinkler system, not less than 44" at corridors

Door encroachment: no more than 7" when fully open (1005.2)

Accessible Means of Egress (1007.1): provides accessible route to an area of refuge, horizontal exit or public way (See section 1002) Accessible spaces shall have minimum of one accessible means of egress or two accessible means from a space required to have more than one exit. See also 1007.3 – an enclosed stair can be considered part of accessible means of egress and per

1007.3 exception #3, a 48" required clear width and a defined area of refuge at enlarged landings is not required if building is fully sprinklered.

Buildings with four or more stories (1007.2.1): One accessible means of egress shall be via a complying elevator when a floor is four or more stories above or below an exit discharge.

Areas of Refuge (1007.6): Sized to accommodate one wheelchair space of 30"x48" for each 200 occupants. When located within enlarged stair enclosure landings, the area of refuge shall not reduce the required exit width. A two-way communication device is required at the area of refuge (1007.6.3). Area of refuge is not required as noted in 1007.3 above.

Roof Stair: One stairway up to the roof is required in buildings 4 or more stories in height (1009.12) Roof stairway access is required through a penthouse (walls, floor and roof) complying with section 1509.2 (1009.12.1)

Egress through intervening spaces (1013.2): Only permitted when intervening space is accessory to the area served.

Common path of egress travel (1013.3): Maximum 75' travel before two means of egress are available.

Exit Access Doorways Required (Table 1014.1): Greater than 50 occupants requires two exit access doorways.

Exit Access and Travel Distance (Table 1015.1): With a sprinkler system, the maximum travel distance is 250 feet for A occupancy, 300 feet for B occupancy, and 400 feet for S-2 occupancy.

Corridors in Group B, Group A, and Group S occupancies shall be 1-hour rated without a sprinkler system or 0-hour rated with a sprinkler system (table 1016.1)

Maximum dead end corridors: 20 feet. 50 feet with a sprinkler system in Group B occupancy

Minimum Number of Exits (1018):

Room or spaces with occupant load of 1-500 require access to 2 exits (Table 1018.1)

Room or spaces with occupant load of 501-1,000 require access to 3 exits (Table 1018.1)

Room or spaces with occupant load >1,000 require access to 4 exits (Table 1018.1)

Occupied Roof shall have access to exits as required for stories (1018.1)

Vertical Exit Enclosures (1019):

2-hour rated when connecting greater than 4 stories

1-hour rated when connecting less than 4 stories

Exterior walls of vertical exit enclosures shall be rated per 704 for exterior walls. Where non-rated or unprotected openings enclose the stair and are exposed to other parts of the building by less than 180degress, the building exterior walls within 10 feet shall be rated to minimum 1-hour to a point 10 feet above top most landing or the roof line whichever is lower.

Chapter 11: Accessibility

In addition to 2003 IBC and any Washington State amendments, it is also anticipated that the design team will discuss accessibility goals with the state that meet universal design standards that may be more stringent than required by any codes or regulations.

CHAPTER 12: INTERIOR ENVIRONMENT:

Applicable ventilation, temperature, lighting and sound transmission provisions.

CHAPTER 13: ENERGY EFFICIENCY:

Refer also to mechanical and electrical systems narratives.

Applicable codes & guidelines to be reviewed with authorities having jurisdiction:

International Energy Conservation Code

Washington State Energy Code

Energy Life Cycle Cost Analysis (ELCCA)

Leadership in Energy and Environmental Design (LEED®) per RCW 39.35 D

Washington State Energy Code Minimum Building Envelope Requirements (Table 13-1)

Item Minimum Thermal Performance

Roofs R-21 or U=0.050

Opaque Walls R-19 or U=0.14

Opaque Doors U=0.60

Floors over unconditioned space R-19 or U=0.056

Slab on Grade R-10 or F=0.54

Glazing (30% to 45% of wall area) Max U=0.60 and Max SHCG=0.4

CHAPTER 29: PLUMBING SYSTEMS:

Refer also to plumbing systems narrative.

Minimum number of Required Plumbing Facilities (Table 2902.1).

Table 2902.1 has been amended by the State.

“Average” floor +/- 50,000 sf at 1 person/200 sf = 250 people

Assume 125 men – requires 5 toilets (or 3 urinals + 2 toilets)

3 lavatories

Assume 125 women – requires 5 toilets

3 lavatories

CHAPTER 30: ELEVATORS AND CONVEYING SYSTEMS

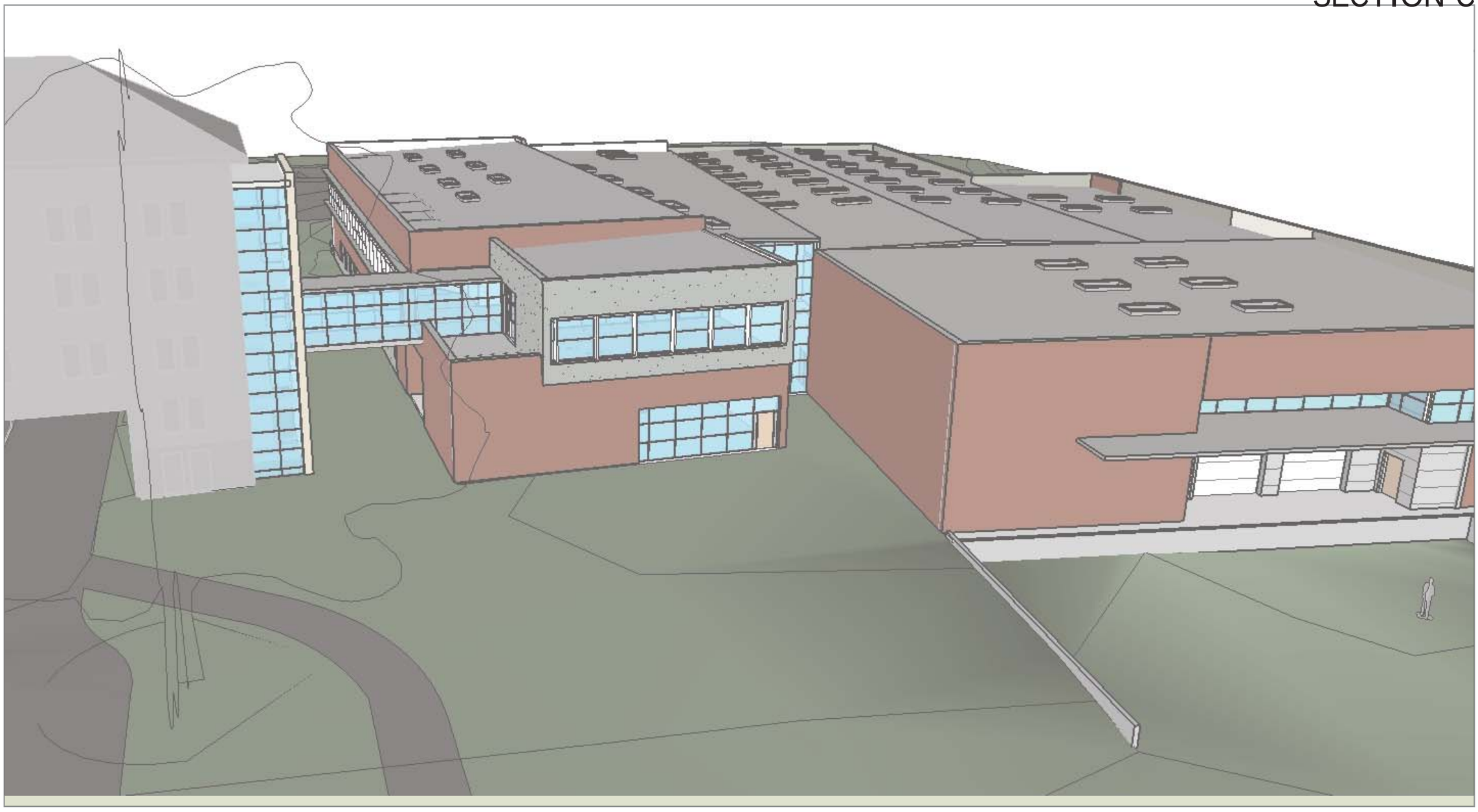
Hoistway Enclosure protection: see 3002.1.

Elevator car to accommodate ambulance stretcher required in buildings of 4 stories or more (3002.4). Emergency Operations per section 3003.

Hoistway venting required per section 3004.

Elevator Machine Rooms per section 3006.

SECTION C



NAC | ARCHITECTURE

WSH Central Kitchen/Commissary LEED® Pre-Design Meeting

JOB: Western State Hospital Central Kitchen/Commissary
JOB NUMBER: 121-07052
DATE: June 16th 2008

IN ATTENDANCE:

Searetha Kelly	GA/DSHS Team Ocp
Nancy Deakins	GA/DSHS Team Manager
Ken Rose	HRSA Facilities Coordinator
Peter Maus	GA/DSHA Project Manager
Stuart Simpson	GA Green Bldg Advisor
Rich Christian	GA DSHA Team Project Manager
Dave Hess	WSH Facilities
Bob Hubenthal	DSHS Capital Programs Chief
Blaine D Wickham	WSH Facilities
Bret Brand	WSH Facilities
Gary Lyons	Dietary Services manager
Steve Daniels	Transportation
Glenn Case	Plumbing Shop
Dave Coonan	EQTech 4 Garage
Kathy Goff	Dietary Food Manager 3
Chris Campbell	Facilities Manager
Jean-Michel Boulot	Principal Kitchen Designer
Rick Hultz	Principal Mechanical Engineer
Colin Jones	Principal Architect In Charge
Steve Shiver	Project Manager
Steve Wescott	Project Architect
Matt Rumbaugh	Project Designer
Robert Landa	Project Architect

National talent, local focus

Meeting Minutes

1. Per RCW 39.35D.030, the state requires all major facility projects of public agen receiving any funding in a state capital budget, or projects financed through a financ contract as defined in RCW 39.94.020, must be designed, constructed, and certified to at le the LEED silver standard. This subsection applies to major facility projects that have entered the design phase prior to July 24, 2005, and to the extent appropriate LEED si standards exist for that type of building or facility.

2. Colin Jones presented a LEED spreadsheet describing the achievability of ea LEED credit. Below are the responses from the attendees to each credit:

LEED Credit Summary

Sustainable Sites

Prereq 1 Construction Activity Pollution Prevention
-Post as **Y** under Yes column on spreadsheet.
-This requirement is mandatory.

Credit 1 Site Selection
-Post as **1** under Yes column on spreadsheet.
-There are no known wetlands affecting this site.
-There may be erosion issues with steep slopes.

Credit 2 Development Density & Community Connectivity
-Post as **1** under Yes column on spreadsheet.
-Credit is achievable by developing on the existing campus.

Credit 3 Brownfield Redevelopment
-Post as **?** under ? column on spreadsheet.
-Credit may be achievable by qualifying the hazardous material of the original building as a brownfield.
-Will need to confirm that original documentation of abatement supports this credit.

Credit 4.1 Alternative Transportation -Public Transportation
-Post as **1** under Yes column on spreadsheet.
-WSH already meets this requirement.

Credit 4.2 Alternative Transportation –Bicycle Transportation & Changing Rooms
-Post as **1** under Yes column on spreadsheet.
-WSH already has employees that bike to work. There is a shower facility for use in Building #9.

Credit 4.3 Alternative Transportation –Low-Emitting & Fuel Efficient Vehicles
-Post as **?** under ? column on spreadsheet.
-WSH already uses electric carts, which will contribute to this credit.
-Credit may be achievable by providing electrically powered delivery vehicles for 3% of Full-Time Equivalent (FTE) occupants and preferred parking for these vehicles.

Credit 4.4 Alternative Transportation –Parking Capacity
-Post as **1** under Yes column on spreadsheet.
-WSH currently has reserved carpool spaces on campus. This is mostly a matter of adding paint stripes and signs.

Credit 5.1 Site Development -Protect or Restore Habitat
-Post as **1** under Yes column on spreadsheet.
-The demolished morgue site to the northwest of project site should be added into project scope. This new area should be restored to native habitat. The landscaping around the new building should be composed of maintainable vegetation to discourage raccoons and other animals near the building.
-Project team to look at building siting options to make this credit happen.

Credit 5.2 Site Development -Maximize Open Space
-Post as **?** under ? column on spreadsheet.

Credit 6.1 Stormwater Design -Quantity Control
-Post as **1** under Yes column on spreadsheet.
-Good soil infiltration is anticipated.
-Vegetated roof is less desirable than using the roof area for solar collectors.

Credit 6.2 Stormwater Design -Quality Control
-Post as **1** under Yes column on spreadsheet.
-To the north east of project site and west of Building 28 there is a storm water detention pond that drains into the ravine. If infiltration rates don't meet capacity, then project team should look into a similar approach.

Credit 7.1 Heat Island Effect -Non-Roof
-Post as **?** under ? column on spreadsheet.
-Look into using trees, grasscrete or white concrete.
-LEED requires 50% minimum permeable area.
-Project Teams should find out what the City of Lakewood requirements are to determine if this credit is possible. (Post meeting, Robert Landa called the City of Lakewood and was told that WSH is in a public zoning district that does not have specific development requirements for permeability, but will be reviewed by the planning department to determine if it meets similar landscape screening requirements for a commercial building.)

Credit 7.2 Heat Island Effect -Roof
-Post as **1** under Yes column on spreadsheet.
-A design strategy to achieve this credit is to use a membrane roof. The Laundry Building will be using a similar roof.

Credit 8 Light Pollution Reduction
-Post as **1** under Yes column on spreadsheet.
-Lighting should not trespass towards Building #9.
-A lighted walking path for safety and security will be required.

Water Efficiency

Credit 1.1 Water Efficient Landscaping -Reduce by 50%
-Post as **1** under Yes column on spreadsheet.
-WSH does have existing irrigation systems that aren't always used.
-Project team should be able to reduce water use by specifying drought tolerant native plants.

Credit 1.2 Water Efficient Landscaping -No Potable Use or No Irrigation
-Post as **?** under ? column on spreadsheet.
-WSH is concerned about getting plants established if no irrigation system is installed in the project.
-Look into recycling gray water to irrigate.
-We probably won't be able to get this credit.

Credit 2 Innovative Wastewater Technologies
-Post as **1** under Yes column on spreadsheet.
-WSH is currently metered on a residential equivalent.
-Look into using "Pulper" on the dishwasher. A pulper recycles process water for its own use.
-The team should look into reducing the size of the grease interceptor.

Credit 3.1 Water Use Reduction -20% Reduction
-Post as **1** under Yes column on spreadsheet.
-We will get this credit if we get Credit 2.
-If we don't get credit 2, we can look at water efficient fixtures.
-Install water efficient spray nozzles on sinks.
-Use "nugget" ice maker instead of "clean" ice to reduce water use.

Credit 3.2 Water Use Reduction -30% Reduction
-Post as **?** under ? column on spreadsheet.
-This credit is not readily achievable based on the amount of water used in the kitchen.

Energy and Atmosphere

Prereq 1 Fundamental Commissioning of the Building Energy Systems
-Post as **Y** under Yes column on spreadsheet.
-This requirement is mandatory.

Prereq 2 Minimum Energy Performance
-Post as **Y** under Yes column on spreadsheet.
-This requirement is mandatory.

Prereq 3 Fundamental Refrigerant Management
-Post as **Y** under Yes column on spreadsheet.
-Need to add valves and gauges to verify performance.
-Look at Eastern State Hospital. They may have a system where gauges are measured and reported on EMS system.
-This requirement is mandatory.

Credit 1 Optimize Energy Performance
-Post as **3** under Yes column on spreadsheet.
-Look into a ground coupled system.
-Use different techniques for different needs.
-Separate basic building needs from specific needs such as refrigeration.
-Look into the use of a ground coupled system, cooling towers, high efficiency condensing boilers, variable refrigeration flow, and cogeneration.
-New kitchen should avoid using steam system if possible. If the kitchen does not use steam, it may balance the rest of the campus needs. The idea of free steam is a bad assumption.
-The laundry and kitchen have peak demand at nearly the same time.
-Determine which spaces could use waste heat from the kitchen.
-Look into waste heat being used to preheat hot water.
-Look into using displacement system for kitchen similar to Highline Community College.

Credit 2 On-Site Renewable Energy
-Post as **?** under ? column on spreadsheet.
-Look into solar thermal and passive ventilation strategies.

Credit 3 Enhanced Commissioning
-Post as **1** under Yes column on spreadsheet.
-Commissioning agent must be from a 3rd party, not from NAC Architecture or Hultz BHU Cross.
-Commissioning agent needs to be involved early in the project.

Credit 4 Enhanced Refrigerant Management
-Post as **?** under ? column on spreadsheet.
-Project team will consider this credit.

Credit 5 Measurement and Verification
-Post as **1** under Yes column on spreadsheet.
-Adjust building to perform to modeled performance.

Credit 6 Green Power
-Post as **?** under ? column on spreadsheet.
-This means buying 35% of the buildings baseline energy use through a green power provider.
-The City of Seattle is already 100% renewable energy, so it qualifies as a green power provider.
-Project Team needs to verify if WSH's power provider already provides 100% renewable energy or if they could in the future.

Materials and Resources

Prereq 1 Storage and Collection of Recyclables
-Post as **Y** under Yes column on spreadsheet.
-This requirement is mandatory.
-Need more discussion on how to accomplish this goal.
-Currently WSH doesn't have the storage capacity to hold recycling for pickup.
-Need to recycle at a minimum, cardboard and paper.
-Need space for food waste storage/composting.
-Look into equipment that can convert food waste into a dry matter that can be combined into a typical composting process.
-Need to check with Pierce County or City of Lakewood to see if they would be able to haul recyclables or if WSH need to haul recyclables to recycler.

Credit 1.1 Building Reuse -Maintain 75% of Existing Walls, Floor & Roof
-Not achievable. Post as **N** under No column on spreadsheet.

Credit 1.2 Building Reuse -Maintain 95% of Existing Walls, Floor & Roof
-Not achievable. Post as **N** under No column on spreadsheet.

Credit 1.3 Building Reuse -Maintain 50% of Non-Structural Elements
-Not achievable. Post as **N** under No column on spreadsheet.

Credit 2.1 Construction Waste Management -Divert 50% from Disposal
-Post as **1** under Yes column on spreadsheet.
-Look into requiring contractor to do this.

Credit 2.2 Construction Waste Management -Divert 75% from Disposal
-Post as **1** under Yes column on spreadsheet.
-Look into requiring contractor to do this.

Credit 3.1 Materials Reuse -5%
-Not available. Post as **N** under No column on spreadsheet.

Credit 3.2 Materials Reuse -10%
-Not available. Post as **N** under No column on spreadsheet.

Credit 4.1 Recycled Content -10% (post-consumer + ½ pre-consumer)
-Post as **1** under Yes column on Spreadsheet.
-Project Team needs to verify this credit with selected building materials.

Credit 4.2 Recycled Content -20% (post-consumer + ½ pre-consumer)
-Post as possible (**?**) on Spreadsheet.
-Project Team needs to verify this credit with selected building materials.

Credit 5.1 Regional Materials -10% Extracted, Processed & Mfr'd within 500 miles
-Post as **1** under Yes column on Spreadsheet.
- Project Team needs to verify this credit with selected building materials.

Credit 5.2 Regional Materials -20% Extracted, Processed & Mfr'd within 500 miles
-Post as possible (**?**) on Spreadsheet.
- Project Team needs to verify this credit with selected building materials.

Credit 6 Rapidly Renewable Materials
-Post as **N** under No column on spreadsheet.
-It is not likely that building materials will meet this requirement.

Credit 7 Certified Wood
-Post as possible (**?**) on Spreadsheet.
-There is interest in using certified wood. Need to verify this credit with building materials.

Indoor Environmental Quality

Prereq 1 Minimum IAQ Performance
-Post as **Y** under Yes column on spreadsheet.
-This requirement is mandatory.

Prereq 2 Environmental Tobacco Smoke (ETS) Control
-Post as **Y** under Yes column on spreadsheet.
-This requirement is mandatory.

Credit 1 Outdoor Air Delivery Monitoring
-Post as **1** under Yes column on spreadsheet.
-Look at using stack effect for natural ventilation with CO2 monitoring.
-This won't work for the kitchen because of the volume exhaust air required.

Credit 2 Increased Ventilation
-Post as **1** under Yes column on spreadsheet.

Credit 3.1 Construction IAQ Management Plan -During Construction
-Post as **1** under Yes column on spreadsheet.

Credit 3.2 Construction IAQ Management Plan –Before Occupancy
-Post as **1** under Yes column on spreadsheet.

Credit 4.1 Low-Emitting Materials -Adhesives & Sealants
-Post as **1** under Yes column on spreadsheet.

Credit 4.2 Low-Emitting Materials -Paints & Coatings
-Post as **1** under Yes column on spreadsheet.

Credit 4.3 Low-Emitting Materials -Carpets
-Post as **1** under Yes column on spreadsheet.
-Credit achievable with walk-off mats.

Credit 4.4 Low-Emitting Materials -Composite Wood & Agrifiber Products
-Not readily achievable. Post as **N** under No column on spreadsheet.

Credit 5 Indoor Chemical & Pollutant Source Control
-Post as **1** under Yes column on spreadsheet.
-Provide venting for copiers, custodial rooms etc.

Credit 6.1 Controllability of Systems -Lighting
-Post as **1** under Yes column on spreadsheet.
-In a group facility like a kitchen, warehouse, the controllability only needs to be controlled by the group not the individual.

Credit 6.2 Controllability of Systems -Thermal Comfort
-Post as **1** under Yes column on spreadsheet
-In a group facility like a kitchen, warehouse, the controllability only needs to be controlled by the group not the individual.

Credit 7.1 Thermal Comfort -Design
-Post as **1** under Yes column on spreadsheet.
-This should be possible.
-Conditions will be different for Staff at the cooking equipment.

Credit 7.2 Thermal Comfort -Verification
-Post as **1** under Yes column on spreadsheet.
-State will conduct survey.

Credit 8.1 Daylight & Views -Daylight 75% of Spaces
-Post as **1** under Yes column on spreadsheet.
-This should be possible.

Credit 8.2 Daylight & Views -Views for 90% of Spaces
-Post as **?** under ? column on spreadsheet.
-There may be too much equipment to accomplish this.

Innovation & Design Process

Credit 1.1 Innovation in Design
-Post as **1** under Yes column on spreadsheet.

Credit 1.2 Innovation in Design
-Post as **1** under Yes column on spreadsheet.

Credit 1.3 Innovation in Design
-Post as **1** under Yes column on spreadsheet.

Credit 1.4 Innovation in Design
-Post as **1** under Yes column on spreadsheet.

Credit 2 LEED® Accredited Professional
-Post as **1** under Yes column on spreadsheet.
-Steve Wescott LEED AP will be coordinating LEED process.

3. Rich Christian will provide information regarding the costs for using paper plates and plastic cups for serving food to make help make a case for switching to washable serving containers.

4. Design Team shouldn't proceed with the Design until the Pre-Design is approved.

End of Meeting Minutes

The preceding minutes are NAC|Architecture's interpretation of the items discussed and decisions reached at the above referenced meeting. Any persons desiring to add to or otherwise change the minutes are asked to put their comments in writing to NAC|Architecture within seven days of receipt of minutes; otherwise the minutes will stand as written. These minutes will be distributed as indicated below. It shall be the responsibility of NAC|Architecture to distribute copies to their respective consultants and subcontractors/suppliers. The preceding minutes were prepared by Robert Landa and reviewed by Steve Westcott.

		Yes	?	No
Sustainable Sites		**10 Points**		
Prereq 1	**Construction Activity Pollution Prevention**	Y		
Credit 1	**Site Selection**	1		
Credit 2	**Development Density & Community Connectivity**	1		
Credit 3	**Brownfield Redevelopment**		?	
Credit 4.1	**Alternative Transportation,** Public Transportation	1		
Credit 4.2	**Alternative Transportation,** Bicycle Transportation & Changing Rooms	1		
Credit 4.3	**Alternative Transportation,** Low-Emitting & Fuel Efficient Vehicles		?	
Credit 4.4	**Alternative Transportation,** Parking Capacity	1		
Credit 5.1	**Site Development,** Protect or Restore Habitat	1		
Credit 5.2	**Site Development,** Maximize Open Space		?	
Credit 6.1	**Stormwater Design,** Quantity Control	1		
Credit 6.2	**Stormwater Design,** Quality Control	1		
Credit 7.1	**Heat Island Effect,** Non-Roof		?	
Credit 7.2	**Heat Island Effect,** Roof	1		
Credit 8	**Light Pollution Reduction**	1		
Water Efficiency		**3 Points**		
Credit 1.1	**Water Efficient Landscaping,** Reduce by 50%	1		
Credit 1.2	**Water Efficient Landscaping,** No Potable Use or No Irrigation		?	
Credit 2	**Innovative Wastewater Technologies**	1		
Credit 3.1	**Water Use Reduction,** 20% Reduction	1		
Credit 3.2	**Water Use Reduction,** 30% Reduction		?	
Energy & Atmosphere		**5 Points**		
Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Y		
Prereq 2	**Minimum Energy Performance**	Y		
Prereq 3	**Fundamental Refrigerant Management**	Y		
Credit 1	**Optimize Energy Performance**	3		
Credit 2	**On-Site Renewable Energy**		?	
Credit 3	**Enhanced Commissioning**	1		
Credit 4	**Enhanced Refrigerant Management**		?	
Credit 5	**Measurement and Verification**	1		
Credit 6	**Green Power**		?	

Central Kitchen/Commissary
Pre-Design
Western State Hospital

LEED Credit Summary

May 2008

		Yes	?	No
Materials & Resources		**4 Points**		
Prereq 1	**Storage & Collection of Recyclables**	Y		
Credit 1.1	**Building Reuse,** Maintain 75% of Existing Walls, Floors & Roof			N
Credit 1.2	**Building Reuse,** Maintain 95% of Existing Walls, Floors & Roof			N
Credit 1.3	**Building Reuse,** Maintain 50% of Interior Non-Structural Elements			N
Credit 2.1	**Construction Waste Management,** Divert 50% from Disposal	1		
Credit 2.2	**Construction Waste Management,** Divert 75% from Disposal	1		
Credit 3.1	**Materials Reuse,** 5%			N
Credit 3.2	**Materials Reuse,** 10%			N
Credit 4.1	**Recycled Content,** 10% (post-consumer + 1/2 pre-consumer)	1		
Credit 4.2	**Recycled Content,** 20% (post-consumer + 1/2 pre-consumer)		?	
Credit 5.1	**Regional Materials,** 10% Extracted, Processed & Manufactured	1		
Credit 5.2	**Regional Materials,** 20% Extracted, Processed & Manufactured		?	
Credit 6	**Rapidly Renewable Materials**			N
Credit 7	**Certified Wood**		?	
Indoor Environmental Quality		**12 Points**		
Prereq 1	**Minimum IAQ Performance**	Y		
Prereq 2	**Environmental Tobacco Smoke (ETS) Control**	Y		
Credit 1	**Outdoor Air Delivery Monitoring**	1		
Credit 2	**Increased Ventilation**	1		
Credit 3.1	**Construction IAQ Management Plan,** During Construction	1		
Credit 3.2	**Construction IAQ Management Plan,** Before Occupancy	1		
Credit 4.1	**Low-Emitting Materials,** Adhesives & Sealants	1		
Credit 4.2	**Low-Emitting Materials,** Paints & Coatings	1		
Credit 4.3	**Low-Emitting Materials,** Carpets		?	
Credit 4.4	**Low-Emitting Materials,** Composite Wood & Agrifiber Products			N
Credit 5	**Indoor Chemical & Pollutant Source Control**	1		
Credit 6.1	**Controllability of Systems,** Lighting	1		
Credit 6.2	**Controllability of Systems,** Thermal Comfort	1		
Credit 7.1	**Thermal Comfort,** Design	1		
Credit 7.2	**Thermal Comfort,** Verification	1		
Credit 8.1	**Daylight & Views,** Daylight 75% of Spaces	1		
Credit 8.2	**Daylight & Views,** Views for 90% of Spaces		?	

Central Kitchen/Commissary
Pre-Design
Western State Hospital

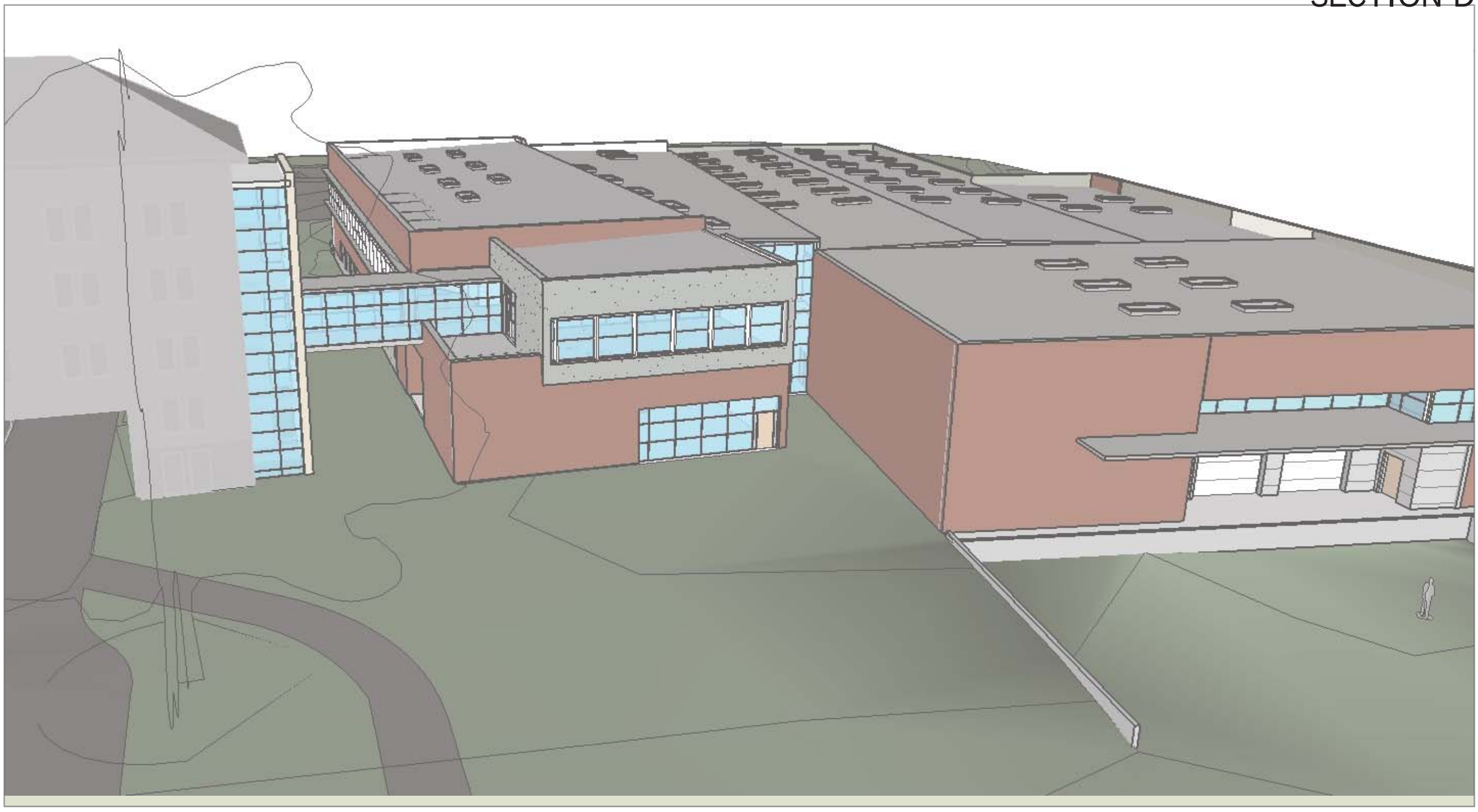
LEED Credit Summary

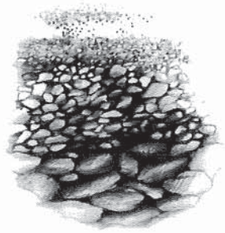
May 2008

		Yes	?	No
Innovation & Design Process		**5 Points**		
Credit 1.1	**Innovation in Design**	1		
Credit 1.2	**Innovation in Design**	1		
Credit 1.3	**Innovation in Design**	1		
Credit 1.4	**Innovation in Design**	1		
Credit 2	**LEED® Accredited Professional**	1		
Project Totals (pre-certification estimates)		**39 Points**		

Certified: 26-32 points **Silver**: 33-38 points **Gold**: 39-51 points **Platinum**: 52-69 points

SECTION D





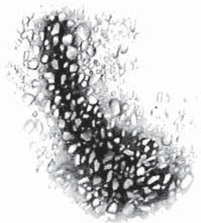
Geotechnical Engineering

Associated Earth Sciences, Inc.

Celebrating Over 25 Years of Service

Water Resources

Subsurface Exploration, Geologic Hazards, and
Preliminary Geotechnical Engineering Report



PROPOSED WESTERN STATE HOSPITAL COMMISSARY AND KITCHEN BUILDING

Lakewood, Washington

Environmental Assessments and Remediation

Prepared for

NAC | Architecture

Project No. KE040805B
January 14, 2010

Sustainable Development Services

Geologic Assessments

Associated Earth Sciences, Inc.

Celebrating Over 25 Years of Service

January 14, 2010
Project No. KE040805B

NAC | Architecture
2201 6th Avenue, Suite 1405
Seattle, Washington 98121

Attention: Mr. Steve Shiver

Subject: Subsurface Exploration, Geologic Hazards, and
Preliminary Geotechnical Engineering Report
Proposed Western State Hospital Commissary and Kitchen Building
9601 Steilacoom Boulevard Southwest
Lakewood, Washington

Dear Mr. Shiver:

We are pleased to present these copies of our preliminary report for the referenced project. This report summarizes the results of our subsurface exploration, geologic hazards, and geotechnical engineering studies, and offers preliminary recommendations for the design and development of the proposed project. Our report is based on preliminary project plans that were current at the time it was written. We should be allowed to review the recommendations presented in this report and modify them, if needed, if substantial changes are made to project plans.

We have enjoyed working with you on this study and are confident that the recommendations presented in this report will aid in the successful completion of your project. If you should have any questions regarding this report or if we can be of additional help to you, please do not hesitate to call.

Sincerely,
ASSOCIATED EARTH SCIENCES, INC.
Kirkland, Washington

Kurt D. Merriman, P.E.
Principal Engineer

copy via e-mail: SShiver@NACARCHITECTURE.com

KDM/ld - KE040805B2 - Projects\20040805\KE\WP

Kirkland ▪ Everett ▪ Tacoma
425-827-7701 425-259-0522 253-722-2992
www.aesgeo.com

SUBSURFACE EXPLORATION, GEOLOGIC HAZARDS, AND PRELIMINARY GEOTECHNICAL ENGINEERING REPORT

PROPOSED WESTERN STATE HOSPITAL COMMISSARY AND KITCHEN BUILDING

Lakewood, Washington

Prepared for:
NAC | Architecture
2201 6th Avenue, Suite 1405
Seattle, Washington 98121

Prepared by:
Associated Earth Sciences, Inc.
911 5th Avenue, Suite 100
Kirkland, Washington 98033
425-827-7701
Fax: 425-827-5424

January 14, 2010
Project No. KE040805B

I. PROJECT AND SITE CONDITIONS

1.0 INTRODUCTION

This report presents the results of our subsurface exploration, geologic hazards, and preliminary geotechnical engineering studies for the proposed new kitchen and commissary building. The site location is presented on the "Vicinity Map," Figure 1. The approximate locations of exploration borings completed for this study are shown on the "Site and Exploration Plan," Figure 2. Logs of the subsurface explorations completed for this study are included in the Appendix.

1.1 Purpose and Scope

The purpose of this study was to provide geotechnical engineering design recommendations to be utilized in the preliminary design of the project. This study included a review of selected available geologic literature, advancing five exploration borings, and performing geologic studies to assess the type, thickness, distribution, and physical properties of the subsurface sediments and shallow ground water. Geotechnical engineering studies were completed to establish recommendations for the type of suitable foundations and floors, allowable foundation soil bearing pressure, anticipated foundation and floor settlement, pavement recommendations, and drainage considerations. This report summarizes our fieldwork and offers recommendations based on our present understanding of the project. We recommend that we be allowed to review the recommendations presented in this report and revise them, if needed, when a project design has been finalized.

1.2 Authorization

Authorization to proceed with this study was granted by means of a signed copy of our scope of work and cost proposal dated November 12, 2009. This report has been prepared for the exclusive use of NAC | Architecture and its agents for specific application to this project. Within the limitations of scope, schedule, and budget, our services have been performed in accordance with generally accepted geotechnical engineering and engineering geology practices in effect in this area at the time our report was prepared. No other warranty, express or implied, is made.

2.0 PROJECT AND SITE DESCRIPTION

The project area is located on the existing Western State Hospital campus in Lakewood, Washington. The project site is located immediately north of the Wards building (Building 9), on the north-central part of the campus. Another building previously occupied the site, but was badly damaged during the Nisqually earthquake on February 28, 2001 and was later

demolished. The demolished building had a basement, which was filled after the building was demolished. The fill placed after the basement was demolished was evident in our subsurface explorations. Anecdotal information suggests that underground tunnels were also present below the former building, though no tunnels were depicted on plans available to us. The deeper existing fill encountered at the location of EB-3 coincided with the location of a reported previously existing tunnel. We were provided with two drawings showing the former building in plan view, and in two elevation/section views.

The project site is currently occupied by grass and Scotch broom, with gravel parking around the perimeter in some areas. Topography slopes generally down to the north, with overall vertical relief in the project area of approximately 6 feet. No areas on-site appear to meet City of Lakewood definitions for Erosion Hazard, Landslide Hazard, or Seismic Hazard areas, as defined in *Lakewood Municipal Code* Section 14a.146.000. Existing topography was created by regrading following demolition of the previously existing building in the area.

The project will include construction of a new building that will house a kitchen, commissary, medical work area, and warehouse space. The building will be a one-story structure with relatively light foundation loads. Structural loads were not available when this report was written, however for the purpose of preparing this report, we have assumed continuous foundation loads on the order of 1 to 2 tons per foot, and column loads of up to approximately 50 tons. The new building will have a finished floor elevation of 236 feet. The planned finished floor elevation is approximately 1 foot below existing grades within the south part of the building footprint, and approximately 5 feet above existing grades below the north part of the building footprint.

3.0 SUBSURFACE EXPLORATION

Our subsurface exploration completed for this project included advancing five exploration borings. The conclusions and recommendations presented in this report are based on the explorations completed for this study. The locations and depths of the explorations were completed within site and budget constraints.

3.1 Exploration Borings

The exploration borings were completed by advancing hollow-stem auger tools with a track-mounted drill rig. During the drilling process, samples were obtained at generally 2.5- to 5-foot-depth intervals. The exploration borings were continuously observed and logged by a representative from our firm. The exploration logs presented in the Appendix are based on the field logs, drilling action, and inspection of the samples secured.

Disturbed, but representative samples were obtained by using the Standard Penetration Test (SPT) procedure in accordance with *American Society for Testing and Materials* (ASTM):D 1586. This test and sampling method consists of driving a standard 2-inch, outside-diameter, split-barrel sampler a distance of 18 inches into the soil with a 140-pound hammer free-falling a distance of 30 inches. The number of blows for each 6-inch interval is recorded, and the number of blows required to drive the sampler the final 12 inches is known as the Standard Penetration Resistance ("N") or blow count. If a total of 50 is recorded within one 6-inch interval, the blow count is recorded as the number of blows for the corresponding number of inches of penetration. The resistance, or N-value, provides a measure of the relative density of granular soils or the relative consistency of cohesive soils; these values are plotted on the attached exploration boring logs.

The samples obtained from the split-barrel sampler were classified in the field and representative portions placed in watertight containers. The samples were then transported to our laboratory for further visual classification and laboratory testing, as necessary.

4.0 SUBSURFACE CONDITIONS

Subsurface conditions at the project site were inferred from the field explorations accomplished for this study, visual reconnaissance of the site, and review of selected applicable geologic literature. Because of the nature of exploratory work below ground, extrapolation of subsurface conditions between field explorations is necessary. It should be noted that differing subsurface conditions may sometimes be present due to the random nature of deposition and the alteration of topography by past grading and/or filling. The nature and extent of any variations between the field explorations may not become fully evident until construction.

4.1 Stratigraphy

Surficial Topsoil

Each of the borings encountered surficial topsoil on the order of 6 to 8 inches thick. Topsoil is not suitable for structural support, and should be stripped from structural areas. Excavated topsoil may be suitable for reuse in landscape areas. Topsoil should be expected to increase in volume when excavated by a swell factor on the order of 25 to 30 percent.

Fill

Existing fill was encountered in each of our explorations to maximum depths of approximately 15 feet below the existing ground surface. Existing fill consisted primarily of materials that resembled native soils, though other materials were also observed. The existing fill was observed to contain organic material in some areas. Demolition waste was also observed in existing fill, and consisted of brick, concrete, and smaller quantities of other materials. The percentage of brick and concrete rubble was typically visually estimated at 20 percent or less, though layers of pure brick rubble up to approximately 2 feet thick were observed. Existing

fill is not suitable for structural support without remedial preparation as described in the "Site Preparation" section of this report. Existing fill should be replaced below planned building areas, and should be re-worked under paving. Excavated existing fill material is suitable for reuse in structural fill applications if it is free of excessive organic material and other deleterious materials.

When the original building on-site was demolished in 2004/2005, Associated Earth Sciences, Inc. (AESI) visited the site to discuss density testing of the fill material that was placed in the excavation following building demolition. AESI was ultimately not asked to provide density testing during fill placement. To the best of our knowledge, the compaction of the existing fill was not tested when it was placed. If testing was performed, some of the existing fill may be suitable for foundation support without removal and replacement/recompaction. Without compaction documentation, however, the conservative assumption is that the existing fill is too variable in density and composition to support new foundations without the risk of greater than acceptable settlement.

Recessional Outwash

Below the surficial fill, each of our exploration borings encountered medium dense to dense gravel and sand with relatively low silt content interpreted as Vashon outwash associated with glacial lake Puyallup. These materials resemble high-energy alluvial sediments, and are suitable for support of light to moderate foundation loads with normal preparation procedures. Excavated outwash sediments at this site are expected to perform well in structural fill applications.

Advance Outwash

Exploration boring EB-1 encountered very dense sand at a depth of approximately 35 feet that is interpreted to represent Vashon advance outwash sediments. Advance outwash was deposited by meltwater streams from an advancing glacier, and was subsequently compacted by the weight of the overlying glacial ice. Advance outwash is unlikely to be used for direct foundation support or structural fill for this project due to the depth below the existing ground surface on the order of 35 feet.

Published Geologic Map

We reviewed published geologic mapping for the project (Troost, K.G., Booth, D.B., and Borden, R.K., in review, *Geologic Map of the Steilacoom 7.5-minute Quadrangle, Washington:* U.S. Geological Survey [USGS] Miscellaneous Field Investigation, scale 1:24,000). This map indicates that the site is expected to be underlain at shallow depths by recessional outwash sediments. Advance outwash is mapped at lower elevations to the northwest.

Proposed Western State Hospital Commissary and Kitchen
Lakewood, Washington
Subsurface Exploration, Geologic Hazards, and
Preliminary Geotechnical Engineering Report
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4.2 Hydrology

No free ground water was observed in any of the borings completed for this study with the exception of some thin, weak seepage zones within existing fill at the location of EB-4. Relatively high moisture contents were observed in existing fill above the native sediments in several areas. At this site, ground water seepage should be expected to develop seasonally within silty zones of the existing fill. Such perched ground water is common and is typically addressed on construction sites by use of interceptor swales or other similar methods.

II. GEOLOGIC HAZARDS AND MITIGATIONS

The following discussion of potential geologic hazards is based on the geologic, slope, and ground and surface water conditions, as observed and discussed herein. The discussion will be limited to slope stability, seismic, and erosion issues.

5.0 SLOPE HAZARDS AND MITIGATIONS

Existing slopes within and immediately adjacent to the project area appear to have been created by previous site grading. In light of the geometry and subsurface conditions of the existing site slopes, the site appears to have a low risk of substantial slope failures. No quantitative slope stability analysis was completed as part of this study, and none is warranted, in our opinion. The existing site slopes do not meet the City of Lakewood definition for Landslide Hazard Areas, as defined in *Lakewood Municipal Code* Section 14a.146.000.

Steeper slopes exist outside of the project area to the northwest, associated with an existing ravine. The side slopes of this ravine likely do meet the definition of Landslide Hazard Areas, as defined by the City of Lakewood. We do not have topographic survey data for this slope area, however the existing slopes that may be considered by the City to be Landslide Hazard Areas are approximately 275 feet from the nearest portion of the planned new building. Published regional-scale topographic maps indicate that these slopes are approximately 60 feet tall, which appears generally consistent with our visual observations. Therefore, these slopes appear to be sufficiently distant from the planned building that they would be outside of prescriptive slope setbacks and buffers.

6.0 SEISMIC HAZARDS AND MITIGATIONS

The following discussion is a general assessment of seismic hazards that is intended to be useful to the owner in terms of understanding seismic issues, and to the structural engineer for structural design. In our opinion, the site does not include areas that meet the definition of Seismic Hazards, as defined by *Lakewood Municipal Code* Section 14a.146.000.

Earthquakes occur regularly in the Puget Lowland. The majority of these events are small, and are usually not felt by people. However, large earthquakes do occur, as evidenced by the 1949, 7.2-magnitude event; the 2001, 6.8-magnitude event; and the 1965, 6.5-magnitude event. The 1949 earthquake appears to have been the largest in this region during recorded history and was centered in the Olympia area. Evaluation of earthquake return rates indicates that an earthquake of the magnitude between 5.5 and 6.0 is likely within a given 20-year period.

Generally, there are four types of potential geologic hazards associated with large seismic events: 1) surficial ground rupture, 2) seismically induced landslides, 3) liquefaction, and 4) ground motion. The potential for each of these hazards to adversely impact the proposed project is discussed below.

6.1 Surficial Ground Rupture

Generally, the largest earthquakes that have occurred in the Puget Sound area are sub-crustal events with epicenters ranging from 50 to 70 kilometers in depth. Earthquakes that are generated at such depths usually do not result in fault rupture at the ground surface. However current research indicates that surficial ground rupture is possible in the Tacoma Fault Zone. The Tacoma Fault Zone is not thoroughly mapped or well understood. We are not aware of detailed maps of active faults in the project area. The best available mapping depicts multiple traces of the Tacoma Fault, all oriented northwest-southeast and passing north of the site. We are available to discuss current research related to surface faulting in the project area.

6.2 Seismically Induced Landslides

In our opinion, the risk of seismically induced landslides at this site is low due to the moderate inclination of site slopes in the project area and the presence of medium dense to dense, unsaturated granular soils below the project. The steeper slopes to the west are sufficiently distant from the planned project that the risk for damage to the planned project as a result of failures on those slopes appears to be low, in our opinion.

6.3 Liquefaction

Liquefaction is a process through which unconsolidated soil loses strength as a result of vibrations, such as those which occur during a seismic event. During normal conditions, the weight of the soil is supported by both grain-to-grain contacts and by the fluid pressure within the pore spaces of the soil below the water table. Extreme vibratory shaking can disrupt the grain-to-grain contact, increase the pore pressure, and result in a temporary decrease in soil shear strength. The soil is said to be liquefied when nearly all of the weight of the soil is supported by pore pressure alone. Liquefaction can result in deformation of the sediment and settlement of overlying structures. Areas most susceptible to liquefaction include those areas underlain by non-cohesive silt and sand with low relative densities, accompanied by a shallow water table.

The site is underlain by medium dense to dense granular sediments, with no free ground water to the full depths explored of 40 to 45 feet. The liquefaction potential of the site is therefore low, in our opinion. We did not complete a detailed liquefaction analysis, and none is warranted, in our opinion.

6.4 Ground Motion

Structural design of the planned building should follow the current applicable building code. The applicable code at the time this report was written is the 2008 *International Building Code* (IBC). The site soils are consistent with 2008 IBC Site Class "C". The 2008 IBC seismic design parameters for short period (S_S) and 1-second period (S_1) spectral acceleration values were determined by the latitude and longitude of the project site using the USGS software utility *Seismic Hazard Curves and Uniform Response Spectra*. The USGS software interpolated ground motions at the project site as follows for periods of 0.2 and 1.0 seconds, respectively, with a 2 percent chance of exceedence in 50 years: $S_S = 1.198$, $S_1 = 0.419$.

7.0 EROSION HAZARDS AND MITIGATIONS

The following discussion addresses Washington State Department of Ecology (Ecology) erosion control regulations that will be applicable to the project. The City of Lakewood definition for Erosion Hazard Areas, as contained in *Lakewood Municipal Code* Section 14a.146.000, is linked to published mapping and soil types. The United States Department of Agriculture Soil Conservation Service map for the project area identified the site as being underlain by soil type 41a Spanaway Gravelly Sandy Loam. This unit is listed as having a low erosion potential on the published map. Therefore, in our opinion, the site does not contain areas that meet the City definition for Erosion Hazard Areas. The following recommendations are related to compliance with Ecology management of erosion on construction sites. The state requirements are detailed, and in our opinion, addressing the state requirements is likely to also comply with City of Lakewood requirements that might be applicable.

As of October 1, 2008, the Ecology Construction Storm Water General Permit (also known as the National Pollutant Discharge Elimination System [NPDES] permit) requires weekly Temporary Erosion and Sedimentation Control (TESC) inspections and turbidity monitoring for all sites 1 or more acres in size that discharge storm water to surface waters of the state. Because we anticipate that the proposed project will require disturbance of more than 1 acre, we anticipate that these inspection and reporting requirements will be triggered. The following recommendations are related to general erosion potential and mitigation.

The erosion potential of the site soils is high. The most effective erosion control measure is the maintenance of adequate ground cover. Maintaining cover measures atop disturbed ground provides the greatest reduction to the potential generation of turbid runoff and sediment transport. During the local wet season (October 1st through March 31st), exposed soil should not remain uncovered for more than 2 days unless it is actively being worked. Ground-cover measures can include erosion control matting, plastic sheeting, straw mulch, crushed rock or recycled concrete, or mature hydroseed.

Some fine-grained surface soils are the result of natural weathering processes that have broken down parent materials into their mineral components. These mineral components can have an inherent electrical charge. Electrically charged mineral fines will attract oppositely charged particles and can combine (flocculate) to form larger particles that will settle out of suspension. The sediments produced during the recent glaciation of Puget Sound are, however, most commonly the suspended soils that are carried by site storm water. The fine-grained fraction of the glacially derived soil is referred to as "rock flour," which is primarily a silt-sized particle with no electrical charge. These particles, once suspended in water, may have settling times in periods of months, not hours.

Therefore, the flow length within a temporary sediment control trap or pond has virtually no effect on the water quality of the discharge, since sediment will not settle out of suspension in the time it takes to flow from one end of the pond to the other. Reduction of turbidity from a construction site is almost entirely a function of cover measures and flow control. Temporary sediment traps and ponds are necessary to control the release rate of the runoff and to provide a catchment for sand-sized and larger soil particles, but are very ineffective at reducing the turbidity of the runoff.

To mitigate the erosion hazards and potential for off-site sediment transport, we recommend the following:

1. The winter performance of a site is dependent on a well-conceived plan for control of site erosion and storm water runoff. It is easier to keep the soil on the ground than to remove it from storm water. The owner and the design team should include adequate ground-cover measures, access roads, and staging areas in the project bid to give the selected contractor a workable site. The selected contractor needs to be prepared to implement and maintain the required measures to reduce the amount of exposed ground. A site maintenance plan should be in place in the event storm water turbidity measurements are greater than the Ecology standards.

2. All TESC measures for a given area to be graded or otherwise worked should be installed prior to any activity within that area. The recommended sequence of construction within a given area would be to install sediment traps and/or ponds and establish perimeter flow control prior to starting mass grading.

3. During the wetter months of the year, or when large storm events are predicted during the summer months, each work area should be stabilized so that if showers occur, the work area can receive the rainfall without excessive erosion or sediment transport. The required measures for an area to be "buttoned-up" will depend on the time of year and the duration the area will be left un-worked. During the winter months, areas that are to be left un-worked for more than 2 days should be mulched or covered with plastic. During the summer months, stabilization will usually consist of seal-rolling the subgrade. Such measures will aid in the contractor's ability to get back into a work

area after a storm event. The stabilization process also includes establishing temporary storm water conveyance channels through work areas to route runoff to the approved treatment facilities.

4. All disturbed areas should be revegetated as soon as possible. If it is outside of the growing season, the disturbed areas should be covered with mulch, as recommended in the erosion control plan. Straw mulch provides the most cost-effective cover measure and can be made wind-resistant with the application of a tackifier after it is placed.

5. Surface runoff and discharge should be controlled during and following development. Uncontrolled discharge may promote erosion and sediment transport. Under no circumstances should concentrated discharges be allowed to flow over significant slopes.

6. Soils that are to be reused around the site should be stored in such a manner as to reduce erosion from the stockpile. Protective measures may include, but are not limited to, covering with plastic sheeting, the use of low stockpiles in flat areas, or the use of straw bales/silt fences around pile perimeters. During the period between October 1st and March 31st, these measures are required.

7. On-site erosion control inspections and turbidity monitoring should be performed in accordance with Ecology requirements. Weekly and monthly reporting to Ecology should be performed on a regularly scheduled basis. TESC monitoring should be part of the weekly construction team meetings. Temporary and permanent erosion control and drainage measures should be adjusted and maintained, as necessary, at the time of construction.

It is our opinion that with the proper implementation of the TESC plans and by field-adjusting appropriate mitigation elements (best management practices) during construction, as recommended by the erosion control inspector, the potential adverse impacts from erosion on the project may be mitigated.

III. PRELIMINARY DESIGN RECOMMENDATIONS

8.0 INTRODUCTION

The site is underlain by native soils consisting of medium dense to dense gravel and sand. Very dense, glacially consolidated soils were observed at depth in one of the five borings completed for this study. These native materials are suitable for structural support with proper preparation. The native soils are covered by a layer of surficial existing fill that is of variable composition and density. Existing fill should be removed and recompacted where it occurs below the planned building, and warrants remedial preparation where it occurs below paving and similar lightly loaded structures.

9.0 SITE PREPARATION

Erosion and surface water control should be established around the clearing limits to satisfy local requirements. Any remaining foundations, floor slabs, paving, and buried utilities should be removed where they are located below planned construction areas. Existing vegetation and topsoil should also be removed. All disturbed soils resulting from demolition activities should be removed to expose underlying, undisturbed native sediments and replaced with structural fill, as needed. All excavations below final grade made for demolition activities should also be backfilled, as needed, with structural fill.

Once any demolition work has been completed, existing fill should be addressed. The observed fill depth was between approximately 5 and 15 feet. We anticipate that the depth of existing fill closely matches the lowest elevations of the previous structure that was demolished, and we therefore recommend that detailed foundation drawings of the former building be available in the field when removing existing fill. The foundation drawings will help identify the expected depth and lateral extent of existing fill. It appears likely that the fill depth across the footprint of the planned building is typically on the order of 5 to 8 feet, with deeper existing fill in the proximity of EB-3 where anecdotal information suggests an access tunnel formerly existed.

We recommend that existing fill be removed from below areas of planned foundations to expose underlying, undisturbed native sediments, followed by restoration of the planned foundation grade with structural fill. Removal of existing fill should extend laterally beyond the building footprint by a distance equal to the depth of overexcavation. For example, if existing fill is removed to a depth of 2 feet below a planned footing area, the excavation should also extend laterally 2 feet beyond the building footprint in that area. Where existing fill is removed and replaced with structural fill, conventional shallow foundations may be used for building support. If earthwork for the project is completed in dry site and weather conditions, we anticipate that a portion of the excavated existing fill material can be recompacted as

structural fill to restore planned elevations. Any existing fill that contains substantial organic material or demolition waste should be segregated and removed from the site or placed in non-structural areas. The remaining material will likely be suitable for reuse in structural fill applications. Reuse of on-site soils for structural fill may require aeration and drying to reduce moisture contents at the time of construction.

Below areas of planned paving, it would be possible to leave existing fill in place with some remedial preparation. We recommend that paving areas be stripped of existing topsoil, and proof-rolled and compacted as described later in this report for preparation of paving subgrades. If the resulting surface is firm and unyielding and compacted to 95 percent or more of the modified Proctor maximum dry density, no further preparation is required. If the subgrade is wet or yielding, we recommend that a portion of the existing fill be removed and replaced with material that is capable of being compacted under field conditions that are present at the time the work is completed. Decisions on appropriate preparation procedures should be made in the field at the time of construction when site, soil, and weather conditions are known. A typical scenario might include replacement of the upper 2 feet of existing fill with new structural fill. During wet site or weather conditions, select fill may be needed for this application. It should be noted that leaving existing fill in place below planned paving carries some risks of future settlement. Such risks are offset by a substantial saving in initial construction costs. We are available to answer questions regarding cost savings and risks associated with leaving the existing fill in place below planned paving. If an increased risk of future settlement is not acceptable, all existing fill should be removed and replaced with structural fill, as recommended above for building areas.

9.1 Construction Site Drainage and Surface Water Control

The site should be graded to prevent water from ponding in construction areas and/or flowing into excavations. Exposed grades should be crowned, sloped, and smooth-drum rolled at the end of each day to facilitate drainage. Accumulated water must be removed from subgrades and work areas immediately prior to performing further work in the area. Equipment access may be limited, and the amount of soil rendered unfit for use as structural fill may be greatly increased if drainage efforts are not accomplished in a timely sequence. If an effective drainage system is not utilized, project delays and increased costs could be incurred due to the greater quantities of wet and unsuitable fill, or poor access and unstable conditions.

We anticipate that perched ground water could be encountered in excavations completed during construction. We do not anticipate the need for extensive dewatering in advance of excavating. The contractor should be prepared to intercept any ground water seepage entering the excavations and route it to a suitable discharge location. Drainage recommendations are included in Section 11.1 of this report.

Final exterior grades should promote free and positive drainage away from the building at all times. Water must not be allowed to pond or collect adjacent to foundations or within the

immediate building area. We recommend that a gradient of at least 3 percent for a minimum distance of 10 feet from the building perimeter be provided, except in paved locations. In paved locations, a minimum gradient of 1 percent should be provided, unless provisions are included for collection and disposal of surface water adjacent to the structure.

9.2 Subgrade Protection

If building construction will proceed during the winter, we recommend the use of a working surface of sand and gravel, crushed rock, or quarry spalls to protect exposed soils, particularly in areas supporting concentrated equipment traffic. In winter construction staging areas and areas that will be subjected to repeated heavy loads, such as those that occur during construction of masonry walls, a minimum thickness of 12 inches of quarry spalls or 18 inches of pit run sand and gravel is recommended. If subgrade conditions are soft and silty, a geotextile separation fabric, such as Mirafi 500x or approved equivalent, should be used between the subgrade and the new fill. For building pads where floor slabs and foundation construction will be completed in the winter, a similar working surface should be used, composed of at least 6 inches of pit run sand and gravel or crushed rock. Construction of working surfaces from advancing fill pads could be used to avoid directly exposing the subgrade soils to vehicular traffic.

Foundation subgrades may require protection from foot and equipment traffic and ponding of runoff during wet weather conditions. Typically, compacted crushed rock or a lean-mix concrete mat placed over a properly prepared subgrade provides adequate subgrade protection. Foundation concrete should be placed and excavations backfilled as soon as possible to protect the bearing surface.

9.3 Proof-Rolling and Subgrade Compaction

Following the recommended demolition, site stripping, and planned excavation, the stripped subgrade within the building areas should be proof-rolled with heavy, rubber-tired construction equipment, such as a fully loaded, tandem-axle dump truck. Proof-rolling should be performed prior to structural fill placement or foundation excavation. The proof-roll should be monitored by the geotechnical engineer so that any soft or yielding subgrade soils or areas of remaining existing fill can be identified. Any soft/loose, yielding soils or existing fill should be removed to a stable subgrade. The subgrade should then be scarified, adjusted in moisture content, and recompacted to the required density. Proof-rolling should only be attempted if soil moisture contents are at or near optimum moisture content. Proof-rolling of wet subgrades could result in further degradation. Low areas and excavations may then be raised to the planned finished grade with compacted structural fill. Subgrade preparation and selection, placement, and compaction of structural fill should be performed under engineering-controlled conditions in accordance with the project specifications.

9.4 Overexcavation/Stabilization

Construction during extended wet weather periods could create the need to overexcavate exposed soils if they become disturbed and cannot be recompacted due to elevated moisture content and/or weather conditions. Even during dry weather periods, soft/wet soils, which may need to be overexcavated, may be encountered in some portions of the site. If overexcavation is necessary, it should be confirmed through continuous observation and testing by AESI. Soils that have become unstable may require remedial measures in the form of one or more of the following:

1. Drying and recompaction. Selective drying may be accomplished by scarifying or windrowing surficial material during extended periods of dry and warm weather.

2. Removal of affected soils to expose a suitable bearing subgrade and replacement with compacted structural fill.

3. Mechanical stabilization with a coarse crushed aggregate compacted into the subgrade, possibly in conjunction with a geotextile.

4. Soil/cement admixture stabilization.

9.5 Wet Weather Conditions

If construction proceeds during an extended wet weather construction period and the moisture-sensitive site soils become wet, they will become unstable. Therefore, the bids for site grading operations should be based upon the time of year that construction will proceed. It is expected that in wet conditions, additional soils may need to be removed and/or other stabilization methods used, such as a coarse crushed rock working mat to develop a stable condition if silty subgrade soils are disturbed in the presence of excess moisture. The severity of construction disturbance will be dependent, in part, on the precautions that are taken by the contractor to protect the moisture- and disturbance-sensitive site soils. If overexcavation is necessary, it should be confirmed through continuous observation and testing by a representative of our firm.

9.6 Temporary and Permanent Cut Slopes

In our opinion, stable construction slopes should be the responsibility of the contractor and should be determined during construction. For estimating purposes, however, we anticipate that temporary, unsupported cut slopes in the existing fill can be made at a maximum slope of 1.5H:1V (Horizontal:Vertical) or flatter. Temporary slopes in unsaturated recessional outwash may also be planned at 1.5H:1V. As is typical with earthwork operations, some sloughing and raveling may occur, and cut slopes may have to be adjusted in the field. If ground water seepage is encountered in cut slopes, or if surface water is not routed away from temporary cut slope faces, flatter slopes will be required. In addition, WISHA/OSHA regulations should be

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followed at all times. Permanent cut and structural fill slopes that are not intended to be exposed to surface water should be designed at inclinations of 2H:1V or flatter. All permanent cut or fill slopes should be compacted to at least 95 percent of the modified Proctor maximum dry density, as determined by ASTM:D 1557, and the slopes should be protected from erosion by sheet plastic until vegetation cover can be established during favorable weather.

9.7 Frozen Subgrades

If earthwork takes place during freezing conditions, all exposed subgrades should be allowed to thaw and then be recompacted prior to placing subsequent lifts of structural fill or foundation components. Alternatively, the frozen material could be stripped from the subgrade to reveal unfrozen soil prior to placing subsequent lifts of fill or foundation components. The frozen soil should not be reused as structural fill until allowed to thaw and adjusted to the proper moisture content, which may not be possible during winter months.

10.0 STRUCTURAL FILL

All references to structural fill in this report refer to subgrade preparation, fill type and placement, and compaction of materials, as discussed in this section. If a percentage of compaction is specified under another section of this report, the value given in that section should be used.

After stripping, planned excavation, and any required overexcavation have been performed to the satisfaction of the geotechnical engineer, the upper 12 inches of exposed ground in areas to receive fill should be recompacted to 90 percent of the modified Proctor maximum density using ASTM:D 1557 as the standard. If the subgrade contains silty soils and too much moisture, adequate recompaction may be difficult or impossible to obtain, and should probably not be attempted. In lieu of recompaction, the area to receive fill should be blanketed with washed rock or quarry spalls to act as a capillary break between the new fill and the wet subgrade. Where the exposed ground remains soft and further overexcavation is impractical, placement of an engineering stabilization fabric may be necessary to prevent contamination of the free-draining layer by silt migration from below.

After recompaction of the exposed ground is tested and approved, or a free-draining rock course is laid, structural fill may be placed to attain desired grades. Structural fill is defined as non-organic soil, acceptable to the geotechnical engineer, placed in maximum 8-inch loose lifts, with each lift being compacted to 95 percent of the modified Proctor maximum density using ASTM:D 1557 as the standard. In the case of roadway and utility trench filling, the backfill should be placed and compacted in accordance with current City of Lakewood codes and standards. The top of the compacted fill should extend horizontally outward a minimum distance of 3 feet beyond the locations of the roadway edges before sloping down at an angle of 2H:1V.

The contractor should note that any proposed fill soils must be evaluated by AESI prior to their use in fills. This would require that we have a sample of the material 72 hours in advance to perform a Proctor test and determine its field compaction standard. Soils in which the amount of fine-grained material (smaller than the No. 200 sieve) is greater than approximately 5 percent (measured on the minus No. 4 sieve size) should be considered moisture-sensitive. Use of moisture-sensitive soil in structural fills should be limited to favorable dry weather conditions. The native recessional outwash sediments are gravelly, and are expected to be suitable for use in structural fill applications under a relatively wide range of site and weather conditions. The existing fill soils present on-site contained significant amounts of silt and are considered moisture-sensitive. Existing fill soils from which excessive organic material and demolition waste have been excluded are expected to be suitable for reuse in structural fill applications during dry site and weather conditions when moisture conditions can be controlled by aeration and drying, as needed. If fill is placed during wet weather or if proper compaction cannot be obtained, a select import material consisting of a clean, free-draining gravel and/or sand should be used. Free-draining fill consists of non-organic soil with the amount of fine-grained material limited to 5 percent by weight when measured on the minus No. 4 sieve fraction with at least 25 percent retained on the No. 4 sieve.

A representative from our firm should inspect the stripped subgrade and be present during placement of structural fill to observe the work and perform a representative number of in-place density tests. In this way, the adequacy of the earthwork may be evaluated as filling progresses, and any problem areas may be corrected at that time. It is important to understand that taking random compaction tests on a part-time basis will not assure uniformity or acceptable performance of a fill. As such, we are available to aid the owner in developing a suitable monitoring and testing program.

11.0 FOUNDATIONS

Spread footings may be used for building support when founded directly on undisturbed recessional outwash sediments, or on structural fill placed above suitable native deposits, as previously discussed. We recommend that an allowable bearing pressure of 3,000 pounds per square foot (psf) be used for design purposes, including both dead and live loads. An increase of one-third may be used for short-term wind or seismic loading. If higher foundation soil bearing pressures are needed, we should be allowed to offer situation-specific recommendations.

Perimeter footings should be buried at least 18 inches into the surrounding soil for frost protection. However, all footings must penetrate to the prescribed bearing stratum, and no footing should be founded in or above organic or loose soils. All footings should have a minimum width of 18 inches.

It should be noted that the area bound by lines extending downward at 1H:1V from any footing must not intersect another footing or intersect a filled area that has not been compacted to at least 95 percent of ASTM:D 1557. In addition, a 1.5H:1V line extending down from any footing must not daylight because sloughing or raveling may eventually undermine the footing. Thus, footings should not be placed near the edge of steps or cuts in the bearing soils.

Anticipated settlement of footings founded as described above should be on the order of ¾ inch or less. However, disturbed soil not removed from footing excavations prior to footing placement could result in increased settlements. All footing areas should be inspected by AESI prior to placing concrete to verify that the design bearing capacity of the soils has been attained and that construction conforms to the recommendations contained in this report. Such inspections may be required by the governing municipality. Perimeter footing drains should be provided, as discussed under the "Drainage Considerations" section of this report.

11.1 Drainage Considerations

Foundations should be provided with foundation drains. Drains should consist of rigid, perforated, polyvinyl chloride (PVC) pipe surrounded by washed pea gravel. The drains should be constructed with sufficient gradient to allow gravity discharge away from the proposed building. Roof and surface runoff should not discharge into the footing drain system, but should be handled by a separate, rigid, tightline drain. In planning, exterior grades adjacent to walls should be sloped downward away from the proposed structure to achieve surface drainage.

12.0 FLOOR SUPPORT

Floor slabs can be supported on suitable native sediments, or on structural fill placed above suitable native sediments. Floor slabs should be cast atop a minimum of 4 inches of clean, washed, crushed rock or pea gravel to act as a capillary break. Areas of subgrade that are disturbed (loosened) during construction should be compacted to a non-yielding condition prior to placement of capillary break material. Floor slabs should also be protected from dampness by an impervious moisture barrier at least 10 mils thick. The moisture barrier should be placed between the capillary break material and the concrete slab.

13.0 FOUNDATION WALLS

All backfill behind foundation walls or around foundation units should be placed as per our recommendations for structural fill and as described in this section of the report. Horizontally backfilled walls, which are free to yield laterally at least 0.1 percent of their height, may be designed using an equivalent fluid equal to 35 pounds per cubic foot (pcf). Fully restrained, horizontally backfilled, rigid walls that cannot yield should be designed for an equivalent fluid

of 50 pcf. Walls with sloping backfill up to a maximum gradient of 2H:1V should be designed using an equivalent fluid of 55 pcf for yielding conditions or 75 pcf for fully restrained conditions. If parking areas are adjacent to walls, a surcharge equivalent to 2 feet of soil should be added to the wall height in determining lateral design forces.

As required by the 2008 IBC, retaining wall design should include a seismic surcharge pressure in addition to the equivalent fluid pressures presented above. Considering the site soils and the recommended wall backfill materials, we recommend a seismic surcharge pressure of 5H and 10H psf, where H is the wall height in feet for the active and at-rest loading conditions, respectively. The seismic surcharge should be modeled as a rectangular distribution with the resultant applied at the midpoint of the walls.

The lateral pressures presented above are based on the conditions of a uniform backfill consisting of excavated on-site soils, or imported structural fill compacted to 90 percent of ASTM:D 1557. A higher degree of compaction is not recommended, as this will increase the pressure acting on the walls. A lower compaction may result in settlement of the slab-on-grade or other structures supported above the walls. Thus, the compaction level is critical and must be tested by our firm during placement. Surcharges from adjacent footings or heavy construction equipment must be added to the above values. Perimeter footing drains should be provided for all retaining walls, as discussed under the "Drainage Considerations" section of this report.

It is imperative that proper drainage be provided so that hydrostatic pressures do not develop against the walls. This would involve installation of a minimum 1-foot-wide blanket drain to within 1 foot of finish grade for the full wall height using imported, washed gravel against the walls. The blanket drain should be continuous with and freely communicate with the footing drain.

13.1 Passive Resistance and Friction Factors

Lateral loads can be resisted by friction between the foundation and the natural outwash soils or supporting structural fill soils, and by passive earth pressure acting on the buried portions of the foundations. The foundations must be backfilled with structural fill and compacted to at least 95 percent of the maximum dry density to achieve the passive resistance provided below. We recommend the following allowable design parameters:

- Passive equivalent fluid = 250 pcf
- Coefficient of friction = 0.30

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14.0 PAVEMENT RECOMMENDATIONS

Pavement areas should be prepared in accordance with the "Site Preparation" section of this report. If the stripped native soil or existing fill pavement subgrade can be compacted to 95 percent of ASTM:D 1557 and is firm and unyielding, no additional overexcavation is required. Soft or yielding areas should be overexcavated to provide a suitable subgrade and backfilled with structural fill.

The pavement sections included in this report section are for driveway and parking areas on-site, and are not applicable to right-of-way improvements. At this time, we are not aware of any planned right-of-way improvements; however, if any new paving of public streets is required, we should be allowed to offer situation-specific recommendations.

The exposed ground should be recompacted to 95 percent of ASTM:D 1557. If required, structural fill may then be placed to achieve desired subbase grades. Upon completion of the recompaction and structural fill, a pavement section consisting of 2½ inches of asphaltic concrete pavement (ACP) underlain by 4 inches of 1¼-inch crushed surfacing base course is the recommended minimum in areas of planned passenger car driving and parking. In heavy traffic areas, a minimum pavement section consisting of 3 inches of ACP underlain by 2 inches of $^5/_8$-inch crushed surfacing top course and 4 inches of 1¼-inch crushed surfacing base course is recommended. The crushed rock courses must be compacted to 95 percent of the maximum density, as determined by ASTM:D 1557. All paving materials should meet gradation criteria contained in the current Washington State Department of Transportation (WSDOT) Standard Specifications.

Depending on construction staging and desired performance, the crushed base course material may be substituted with asphalt treated base (ATB) beneath the final asphalt surfacing. The substitution of ATB should be as follows: 4 inches of crushed rock can be substituted with 3 inches of ATB, and 6 inches of crushed rock may be substituted with 4 inches of ATB. ATB should be placed over a native or structural fill subgrade compacted to a minimum of 95 percent relative density, and a 1½- to 2-inch thickness of crushed rock to act as a working surface. If ATB is used for construction access and staging areas, some rutting and disturbance of the ATB surface should be expected. The general contractor should remove affected areas and replace them with properly compacted ATB prior to final surfacing.

15.0 PROJECT DESIGN AND CONSTRUCTION MONITORING

Our report is based on a preliminary site layout drawing which was used as the basis for Figure 2 of this report. We recommend that AESI perform a geotechnical review of the plans prior to final design completion.

We are also available to provide geotechnical engineering and monitoring services during construction. The integrity of the foundation system depends on proper site preparation and construction procedures. In addition, engineering decisions may have to be made in the field in the event that variations in subsurface conditions become apparent. Construction monitoring services are not part of our currently approved scope of work.

We have enjoyed working with you on this study and are confident that these recommendations will aid in the successful completion of your project. If you should have any questions or require further assistance, please do not hesitate to call.

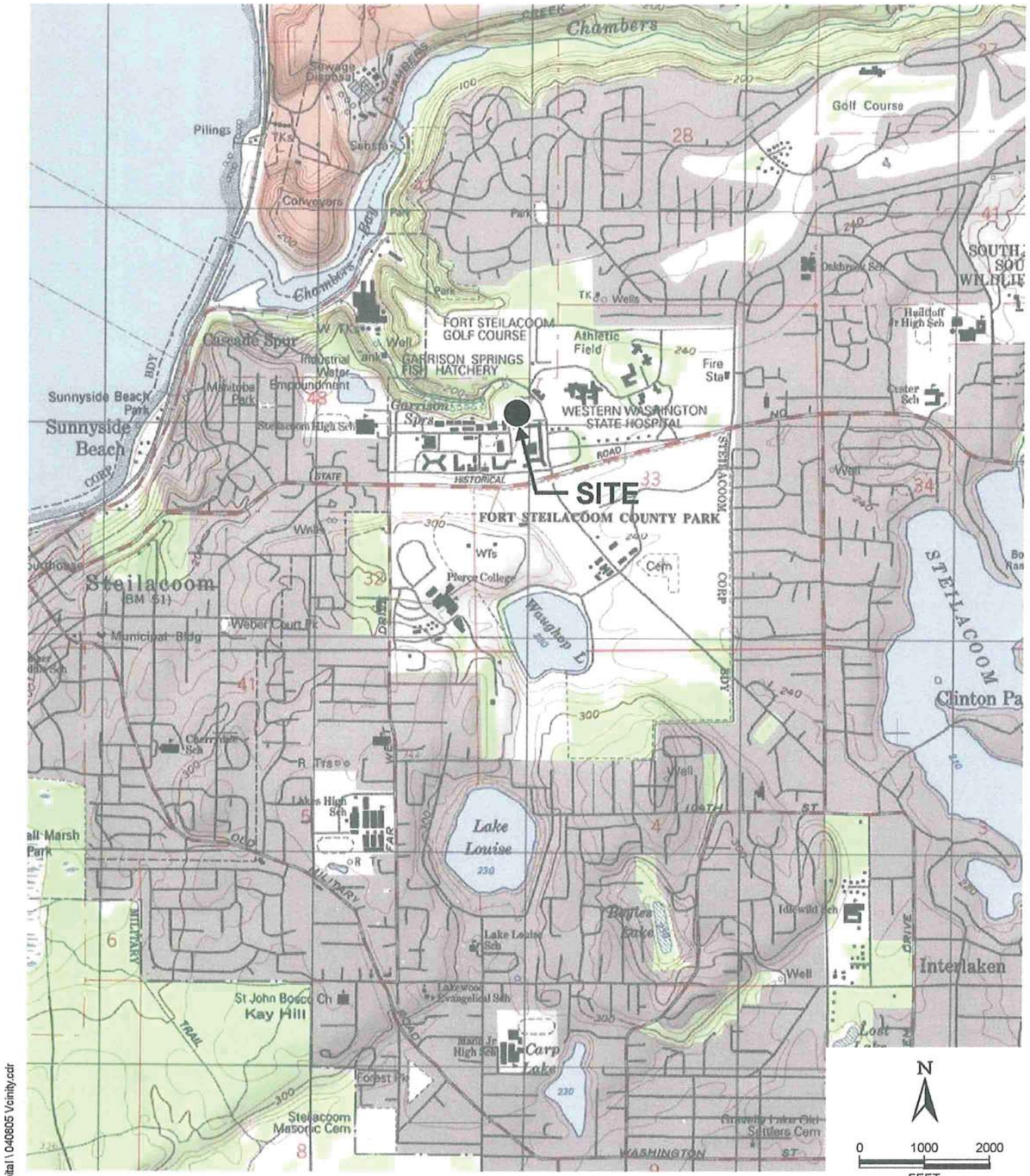
Sincerely,
ASSOCIATED EARTH SCIENCES, INC.
Kirkland, Washington

KURT D. MERRIMAN
STATE OF WASHINGTON
23580
REGISTERED
PROFESSIONAL ENGINEER
1/14/10

Bruce W. Guenzler, L.E.G.
Project Geologist

Kurt D. Merriman, P.E.
Principal Engineer

Attachments: Figure 1: Vicinity Map
Figure 2: Site and Exploration Plan
Appendix: Exploration Logs



REFERENCE: USGS TOPO!

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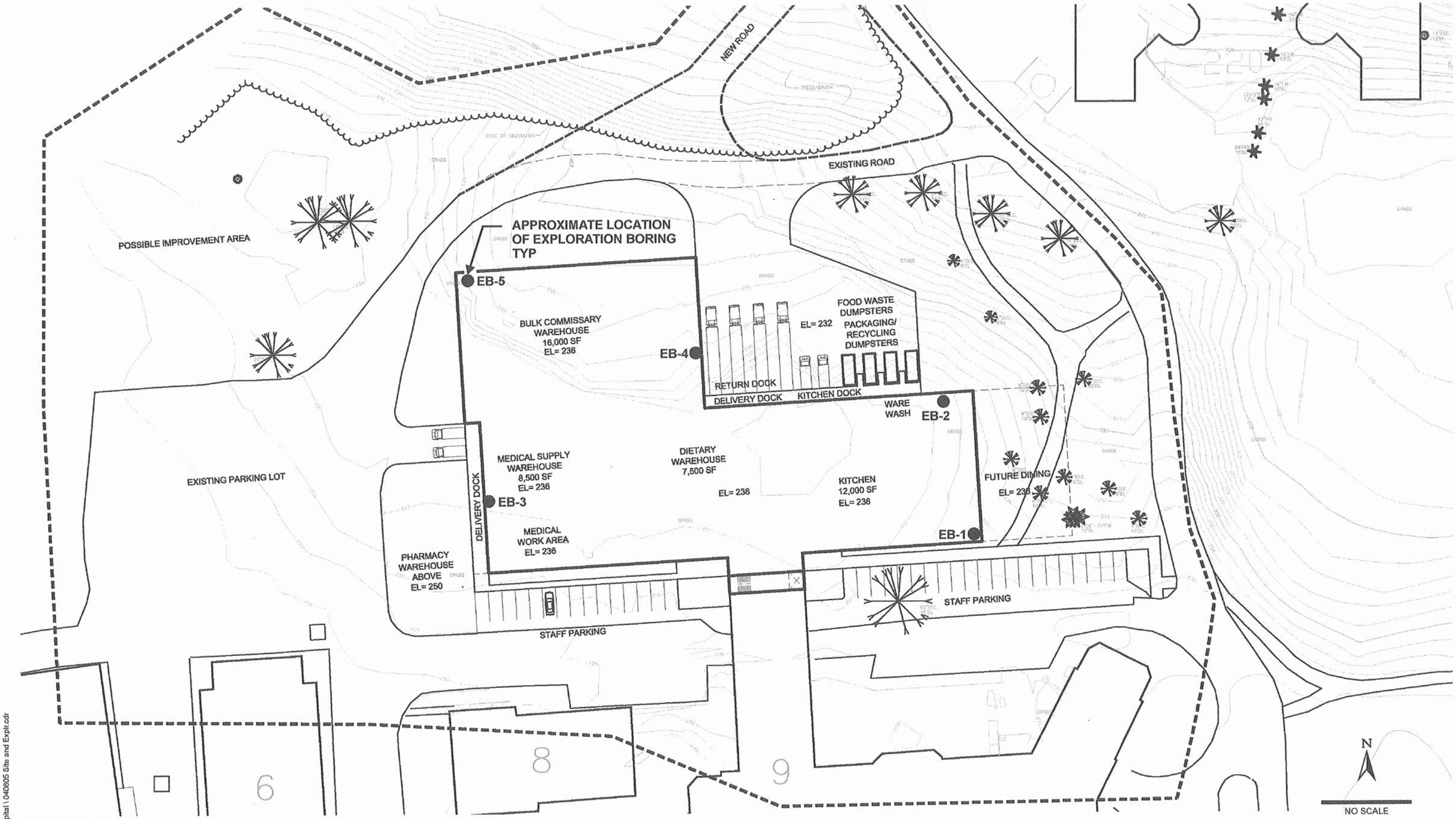
VICINITY MAP
WESTERN STATE HOSPITAL COMMISSARY
LAKEWOOD, WASHINGTON

FIGURE 1
DATE 12/09
PROJ. NO. KE040805B



REFERENCE: NAC ARCHITECTURE

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SITE AND EXPLORATION PLAN
WESTERN STATE HOSPITAL COMMISSARY
LAKEWOOD, WASHINGTON

FIGURE 2
DATE 12/09
PROJ. NO. KE040805B

APPENDIX

Coarse-Grained Soils - More than 50%[1] Retained on No. 200 Sieve	Gravels - More than 50%[1] of Coarse Fraction Retained on No. 4 Sieve	≤5% Fines[5]	GW	Well-graded gravel and gravel with sand, little to no fines
			GP	Poorly-graded gravel and gravel with sand, little to no fines
		≥15% Fines[5]	GM	Silty gravel and silty gravel with sand
			GC	Clayey gravel and clayey gravel with sand
	Sands - 50%[1] or More of Coarse Fraction Passes No. 4 Sieve	≤5% Fines[5]	SW	Well-graded sand and sand with gravel, little to no fines
			SP	Poorly-graded sand and sand with gravel, little to no fines
		≥15% Fines[5]	SM	Silty sand and silty sand with gravel
			SC	Clayey sand and clayey sand with gravel
Fine-Grained Soils - 50%[1] or More Passes No. 200 Sieve	Silts and Clays Liquid Limit Less than 50		ML	Silt, sandy silt, gravelly silt, silt with sand or gravel
			CL	Clay of low to medium plasticity; silty, sandy, or gravelly clay, lean clay
			OL	Organic clay or silt of low plasticity
	Silts and Clays Liquid Limit 50 or More		MH	Elastic silt, clayey silt, silt with micaceous or diatomaceous fine sand or silt
			CH	Clay of high plasticity, sandy or gravelly clay, fat clay with sand or gravel
			OH	Organic clay or silt of medium to high plasticity
Highly Organic Soils			PT	Peat, muck and other highly organic soils

Terms Describing Relative Density and Consistency

	Density	SPT[2] blows/foot
Coarse-Grained Soils	Very Loose	0 to 4
	Loose	4 to 10
	Medium Dense	10 to 30
	Dense	30 to 50
	Very Dense	>50

	Consistency	SPT[2] blows/foot
Fine-Grained Soils	Very Soft	0 to 2
	Soft	2 to 4
	Medium Stiff	4 to 8
	Stiff	8 to 15
	Very Stiff	15 to 30
	Hard	>30

Test Symbols

G = Grain Size
M = Moisture Content
A = Atterberg Limits
C = Chemical
DD = Dry Density
K = Permeability

Component Definitions

Descriptive Term	Size Range and Sieve Number
Boulders	Larger than 12"
Cobbles	3" to 12"
Gravel	3" to No. 4 (4.75 mm)
Coarse Gravel	3" to 3/4"
Fine Gravel	3/4" to No. 4 (4.75 mm)
Sand	No. 4 (4.75 mm) to No. 200 (0.075 mm)
Coarse Sand	No. 4 (4.75 mm) to No. 10 (2.00 mm)
Medium Sand	No. 10 (2.00 mm) to No. 40 (0.425 mm)
Fine Sand	No. 40 (0.425 mm) to No. 200 (0.075 mm)
Silt and Clay	Smaller than No. 200 (0.075 mm)

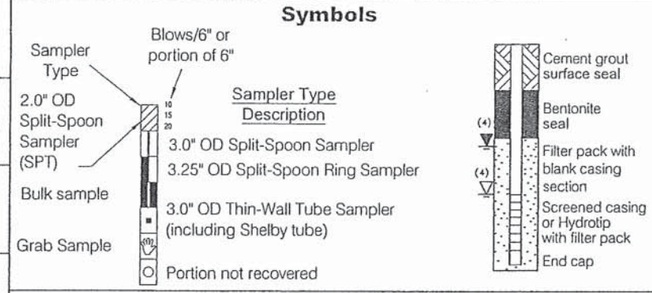
[3] Estimated Percentage

Component	Percentage by Weight
Trace	<5
Few	5 to 10
Little	15 to 25
With	- Non-primary coarse constituents: ≥ 15% - Fines content between 5% and 15%

Moisture Content

Dry - Absence of moisture, dusty, dry to the touch
Slightly Moist - Perceptible moisture
Moist - Damp but no visible water
Very Moist - Water visible but not free draining
Wet - Visible free water, usually from below water table

Symbols



(1) Percentage by dry weight
(2) (SPT) Standard Penetration Test (ASTM D-1586)
(3) In General Accordance with Standard Practice for Description and Identification of Soils (ASTM D-2488)
(4) Depth of ground water
ATD = At time of drilling
Static water level (date)
(5) Combined USCS symbols used for fines between 5% and 15%

Classifications of soils in this report are based on visual field and/or laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual and/or laboratory classification methods of ASTM D-2487 and D-2488 were used as an identification guide for the Unified Soil Classification System.

blocksklog_key.dwg LAYOUT: Layout2

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EXPLORATION LOG KEY

Associated Earth Sciences, Inc.

Exploration Log

Project Number	Exploration Number	Sheet
KE040805B	EB-1	1 of 2

Project Name: Western State Hospital Commissary
Location: Lakewood, WA
Driller/Equipment: Gregory/CME 850
Hammer Weight/Drop: 140# / 30"
Ground Surface Elevation (ft): 235'
Datum: NAC Architecture
Date Start/Finish: 12/15/09,12/15/09
Hole Diameter (in): 8"

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
				Grass and topsoil.					
				Fill					
		S-1		Loose to medium dense (blow count overstated), moist, dark brown, fine to coarse GRAVEL (brick rubble), few silt and fine sand.			4 9 9	▲18	
				Recessional Outwash					
5		S-2		Medium dense, moist, light brown, fine to coarse GRAVEL, with fine to coarse sand, few to trace silt (GW).			8 8 8	▲16	
10		S-3		Dense, moist, light brown, fine to coarse GRAVEL, with fine to coarse sand, trace to few silt (GW); no stratification or structure.			7 13 24	▲37	
15		S-4		As above, little cobbles (based on drill action).			4 15 21	▲37	
20		S-5		As above, grading to slightly finer in gravel fraction, and with fewer cobbles (GW).			11 15 18	▲33	
25		S-6		No recovery. Pushed a gravel/cobble. Blow count may be overstated.			6 13 40	▲53	
30		S-7		Dense, moist, brown, fine to coarse GRAVEL, with fine to coarse sand, few silt; no stratification or structure (GW).			6 14 22	▲36	
				Advance Outwash					
35		S-8		Very dense, moist, brown, fine SAND, few to little silt, with silt stringers to 3" (SP with ML).			13 29 38	▲67	

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: BWG
Approved by:

AESIBOR 040805B.GPJ January 4, 2010

Associated Earth Sciences, Inc.

Exploration Log

Project Number	Exploration Number	Sheet
KE040805B	EB-1	2 of 2

Project Name: Western State Hospital Commissary
Location: Lakewood, WA
Driller/Equipment: Gregory/CME 850
Hammer Weight/Drop: 140# / 30"
Ground Surface Elevation (ft): 235'
Datum: NAC Architecture
Date Start/Finish: 12/15/09,12/15/09
Hole Diameter (in): 8"

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
		S-9		Grades without silt stringers and with few fine gravel (SW).			26 37 35	▲72	
				Bottom of exploration boring at 41.5 feet					
45									
50									
55									
60									
65									
70									
75									

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: BWG
Approved by:

AESIBOR 040805B.GPJ January 4, 2010

Associated Earth Sciences, Inc.

Exploration Log

Project Number	Exploration Number	Sheet
KE040805B	EB-2	1 of 2

Project Name: Western State Hospital Commissary
Location: Lakewood, WA
Driller/Equipment: Gregory/CME 850
Hammer Weight/Drop: 140# / 30"
Ground Surface Elevation (ft): 235'
Datum: NAC Architecture
Date Start/Finish: 12/15/09,12/15/09
Hole Diameter (in): 8"

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
				Grass and topsoil.					
				Fill Brick rubble.					
5		S-1		**Recessional Outwash** Medium dense, moist, brown, fine to coarse GRAVEL, with fine to coarse sand, few silt (GW); no stratification.			10 11 13	▲24	
10		S-2		Low recovery. Blow count may be overstated. Drill action suggests cobbles.			9 14 12	▲26	
15		S-3		Same texture as S-1.			9 11 12	▲23	
20		S-4		Dense, moist, brown, fine to coarse GRAVEL, with fine to coarse sand, few silt, few cobbles (GW); no stratification.			11 16 30	▲46	
25		S-5		Medium dense, moist, brown, fine GRAVEL, with medium to coarse sand, trace fine sand and silt (GP).			5 7 13	▲20	
30		S-6		No textural change.			5 10 14	▲24	
35		S-7		No textural change: Increase in SPT driving resistance last 2".			7 7 15	▲22	

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: BWG
Approved by:

AESIBOR 040805B.GPJ January 4, 2010

Associated Earth Sciences, Inc.

Exploration Log

Project Number	Exploration Number	Sheet
KE040805B	EB-2	2 of 2

Project Name: Western State Hospital Commissary
Location: Lakewood, WA
Driller/Equipment: Gregory/CME 850
Hammer Weight/Drop: 140# / 30"
Ground Surface Elevation (ft): 235'
Datum: NAC Architecture
Date Start/Finish: 12/15/09,12/15/09
Hole Diameter (in): 8"

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
		S-8		Becomes dense. No textural change.			10 16 19	▲35	
				Bottom of exploration boring at 41.5 feet					
45									
50									
55									
60									
65									
70									
75									

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: BWG
Approved by:

AESIBOR 040805B.GPJ January 4, 2010

Associated Earth Sciences, Inc.

Exploration Log

Project Number	Exploration Number	Sheet
KE040805B	EB-3	1 of 2

Project Name: Western State Hospital Commissary
Location: Lakewood, WA
Driller/Equipment: Gregory/CME 850
Hammer Weight/Drop: 140# / 30"
Ground Surface Elevation (ft): 237'
Datum: NAC Architecture
Date Start/Finish: 12/15/09,12/15/09
Hole Diameter (in): 8"

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
		S-1		Grass and topsoil. **Fill**			7 8 8	▲16	
				Medium dense, moist, dark brown, fine to coarse GRAVEL, with brick and concrete, little fine to coarse sand and silt (GW).					
5		S-2		As above.			4 7 8	▲15	
10		S-3		Trace recovery of fill as above. Blow count may be overstated.			13 20 20	▲40	
15		S-4		No recovery - rock. Fill (slough) in shoe. Blow count overstated. **Recessional Outwash**			50/4"	▲50/4"	
		S-5		Dense, moist, brown, fine to coarse GRAVEL, with fine to coarse sand, few silt (GW); no stratification.			5 10 21	▲31	
20		S-6		Becomes dense, gradation as above.			16 20 23	▲43	
25		S-7		Dense, very moist (no free water), brown, fine to coarse GRAVEL, with medium to coarse sand, few silt; no stratification.			15 18 12	▲30	
30		S-8		Low recovery. Continues very moist. No free water.			7 22 22	▲44	
35		S-9		Becomes medium dense. Gradation as above.			6 7 9	▲16	

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: BWG
Approved by:

AESIBOR 040805B.GPJ January 4, 2010

Associated Earth Sciences, Inc.

Exploration Log

Project Number	Exploration Number	Sheet
KE040805B	EB-3	2 of 2

Project Name: Western State Hospital Commissary
Location: Lakewood, WA
Driller/Equipment: Gregory/CME 850
Hammer Weight/Drop: 140# / 30"
Ground Surface Elevation (ft): 237'
Datum: NAC Architecture
Date Start/Finish: 12/15/09,12/15/09
Hole Diameter (in): 8"

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
		S-10		Gradation as above.			10 12 15	▲27	
				Bottom of exploration boring at 41.5 feet					
45									
50									
55									
60									
65									
70									
75									

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: BWG
Approved by:

AESIBOR 040805B.GPJ January 4, 2010

Associated Earth Sciences, Inc.

Exploration Log

Project Number	Exploration Number	Sheet
KE040805B	EB-4	1 of 2

Project Name: Western State Hospital Commissary
Location: Lakewood, WA
Driller/Equipment: Gregory/CME 850
Hammer Weight/Drop: 140# / 30"
Ground Surface Elevation (ft): 234'
Datum: NAC Architecture
Date Start/Finish: 12/16/09,12/16/09
Hole Diameter (in): 8"

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
				Grass and topsoil.					
				Fill					
		S-1		Medium dense, very moist, dark brown, fine GRAVEL, with fine to coarse sand, few silt (GP); brick and concrete rubble 20%.			12 13 11	▲24	
5		S-2		Low recovery of fill as above. Fill in cuttings.			6 9 9	▲18	
				Thin zones of perched seepage.					
				Recessional Outwash					
10		S-3		Dense, moist, brown, fine to coarse GRAVEL, with fine to coarse sand, few silt, trace cobbles (GW); no stratification.			9 16 15	▲31	
15		S-4		Grades to medium dense with predominantly medium to coarse sand (GW).			7 8 10	▲18	
20		S-5		Gradation of sand fraction returns to fine to coarse.			4 14 14	▲28	
25		S-6		Dense to very dense (blow count overstated), moist, brown, fine to coarse GRAVEL, with fine to coarse sand, few silt, trace cobbles (GW); no stratification.			6 21 35	▲56	
30		S-7		Gradation as above, but medium dense.			15 13 10	▲23	
35		S-8		Grades to trace silt.			12 13 9	▲22	

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: BWG
Approved by:

AESIBOR 040805B.GPJ January 4, 2010

Associated Earth Sciences, Inc.

Exploration Log

Project Number	Exploration Number	Sheet
KE040805B	EB-4	2 of 2

Project Name: Western State Hospital Commissary
Location: Lakewood, WA
Driller/Equipment: Gregory/CME 850
Hammer Weight/Drop: 140# / 30"
Ground Surface Elevation (ft): 234'
Datum: NAC Architecture
Date Start/Finish: 12/16/09,12/16/09
Hole Diameter (in): 8"

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
		S-9		Grades to dense.			10 18 18	▲36	
				Bottom of exploration boring at 41.5 feet					
45									
50									
55									
60									
65									
70									
75									

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: BWG
Approved by:

AESIBOR 040805B.GPJ January 4, 2010

Associated Earth Sciences, Inc.

Exploration Log

Project Number	Exploration Number	Sheet
KE040805B	EB-5	1 of 2

Project Name: Western State Hospital Commissary
Location: Lakewood, WA
Driller/Equipment: Gregory/CME 850
Hammer Weight/Drop: 140# / 30"
Ground Surface Elevation (ft): 234'
Datum: NAC Architecture
Date Start/Finish: 12/16/09,12/16/09
Hole Diameter (in): 8"

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
				Grass and topsoil.					
				Fill					
		S-1		Loose, very moist, dark brown, fine to coarse SAND, with fine to coarse gravel, little silt (SM); 5% brick and concrete rubble.			4 4 6	▲10	
5		S-2		Blow count overstated.			2 10 20	▲30	
				Recessional Outwash					
10		S-3		Dense, moist, brown, fine to coarse GRAVEL, with fine to coarse sand, trace silty trace cobbles (GW); no stratification.			10 21 14	▲35	
15		S-4		As above.			12 14 19	▲33	
20		S-5		As above.			5 18 21	▲39	
25		S-6		As above.			5 20 29	▲49	
30		S-7		Very dense (blow count may be overstated), moist, brown, fine to coarse SAND, with fine to coarse gravel, trace silt (SW); no stratification.			7 40 38	▲78	
35		S-8		Gradation as above, but medium dense.			6 10 10	▲20	

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: BWG
Approved by:

AESIBOR 040805B.GPJ January 4, 2010

Associated Earth Sciences, Inc.

Exploration Log

Project Number	Exploration Number	Sheet
KE040805B	EB-5	2 of 2

Project Name: Western State Hospital Commissary
Location: Lakewood, WA
Driller/Equipment: Gregory/CME 850
Hammer Weight/Drop: 140# / 30"
Ground Surface Elevation (ft): 234'
Datum: NAC Architecture
Date Start/Finish: 12/16/09,12/16/09
Hole Diameter (in): 8"

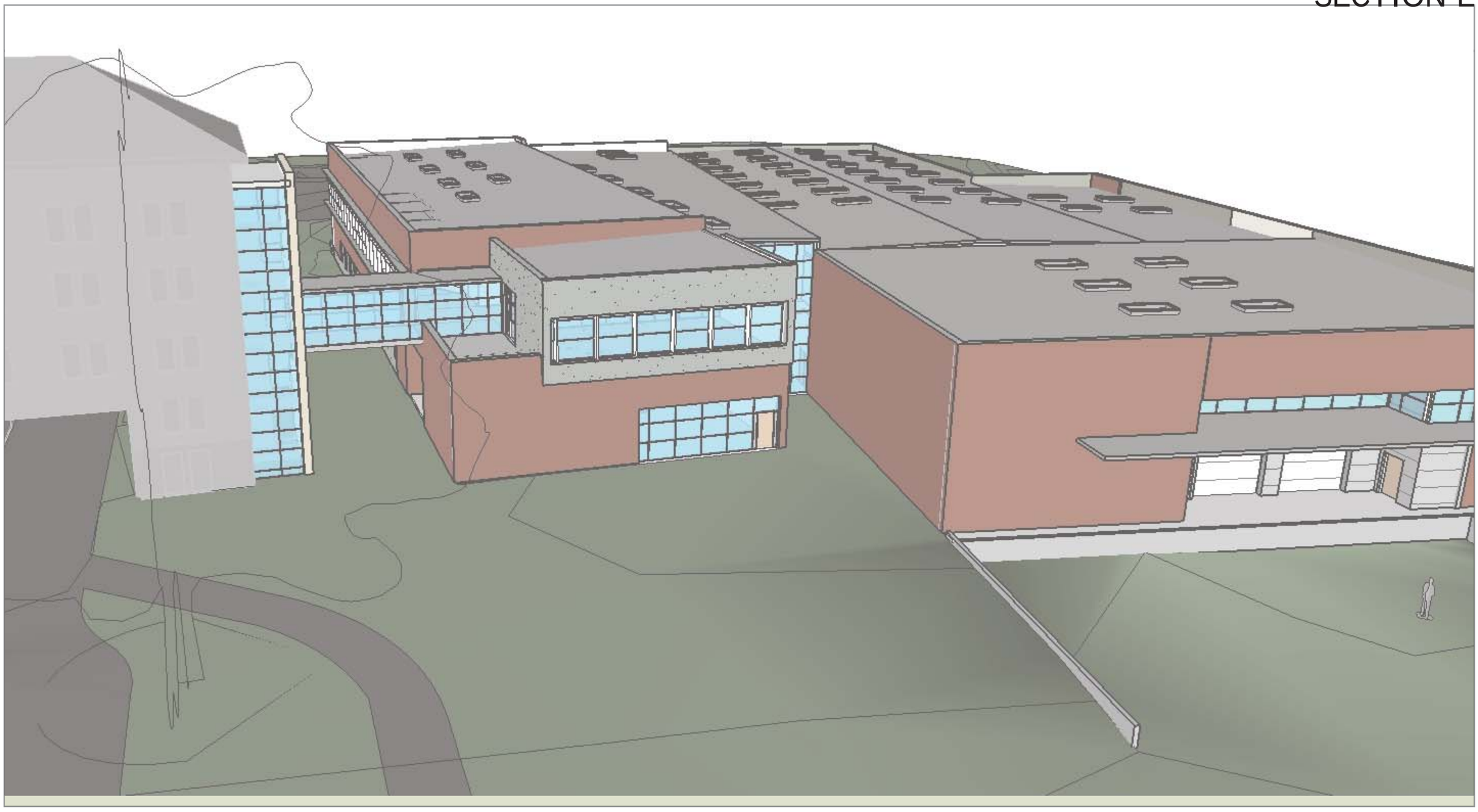
Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
		S-9		Medium dense, moist, brown, fine GRAVEL, with fine to coarse sand, trace silt (GW).			4 5 9	▲14	
45		S-10		Medium dense, moist, brown, fine SAND, trace silt, trace fine gravel (SP).			10 12 12	▲24	
				Bottom of exploration boring at 46.5 feet					
50									
55									
60									
65									
70									
75									

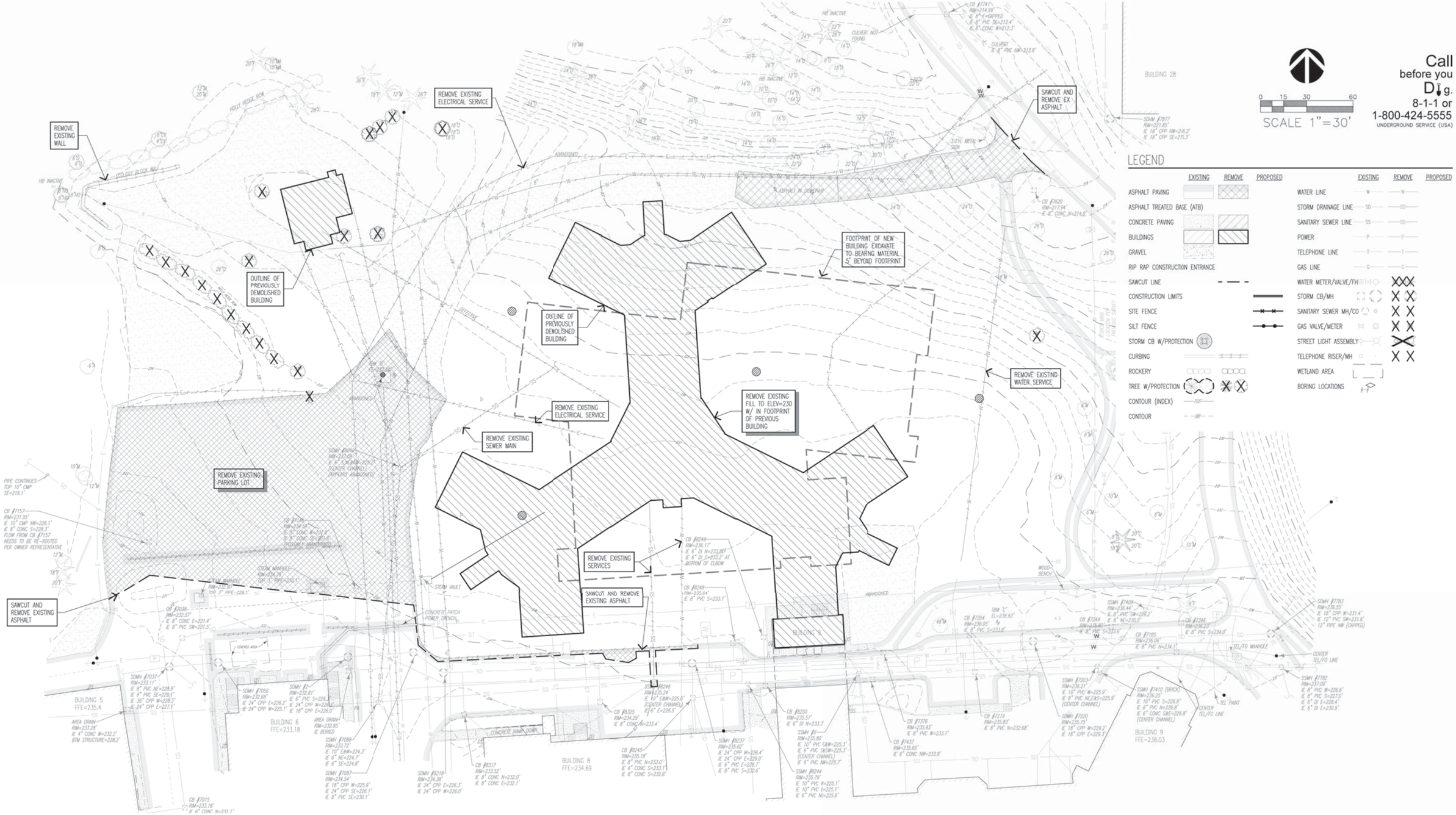
Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: BWG
Approved by:

AESIBOR 040805B.GPJ January 4, 2010

SECTION E





Civil Demolition Plan

Schematic Design

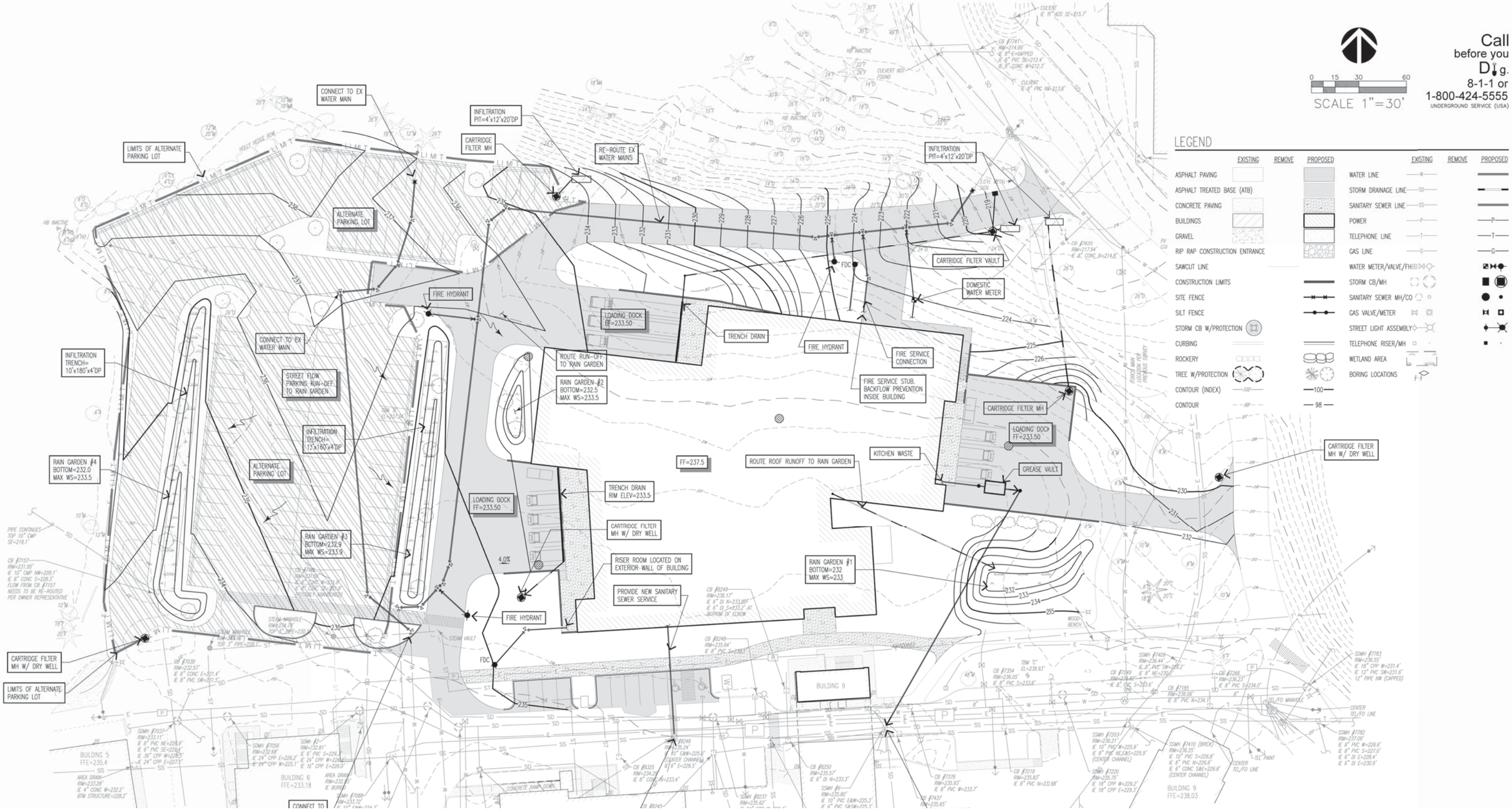
3–19–2010

Western State Hospital | **New Kitchen Commissary** | State Project # 2008-409A

COUGHLINPORTERLUNDEEN NAC ARCHITECTURE Washington State Department of Social & Health Services

sheet no.

C1.0



Civil Site Plan

Schematic Design

3–19–2010

Western State Hospital | **New Kitchen Commissary** | State Project # 2008-409A

COUGHLINPORTERLUNDEEN NAC ARCHITECTURE Washington State Department of Social & Health Services

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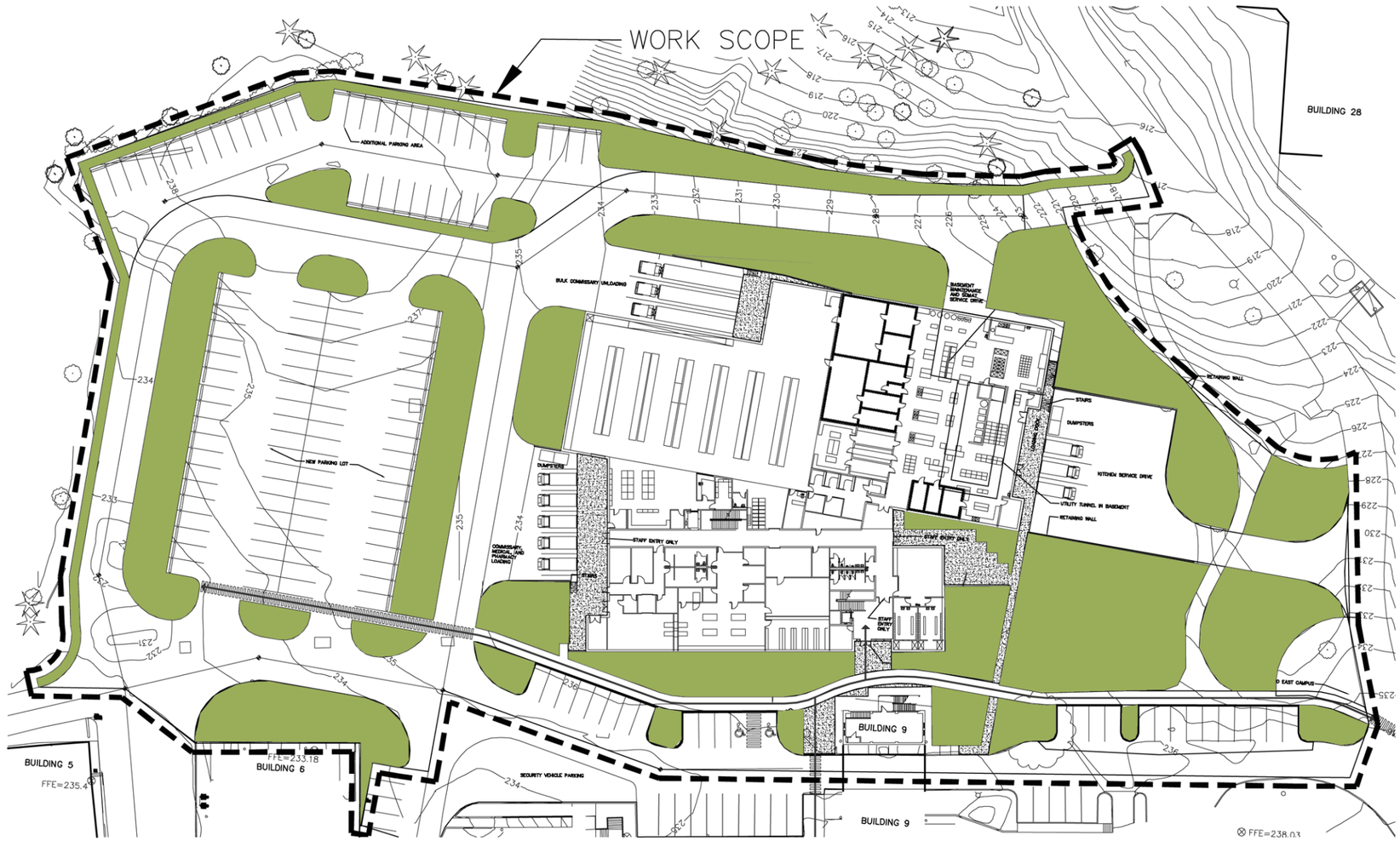


Landscape Scope Plan

GRAPHIC SCALE

0' 10' 20' 30' 60' 120'

N

Schematic Design

3–19–2010

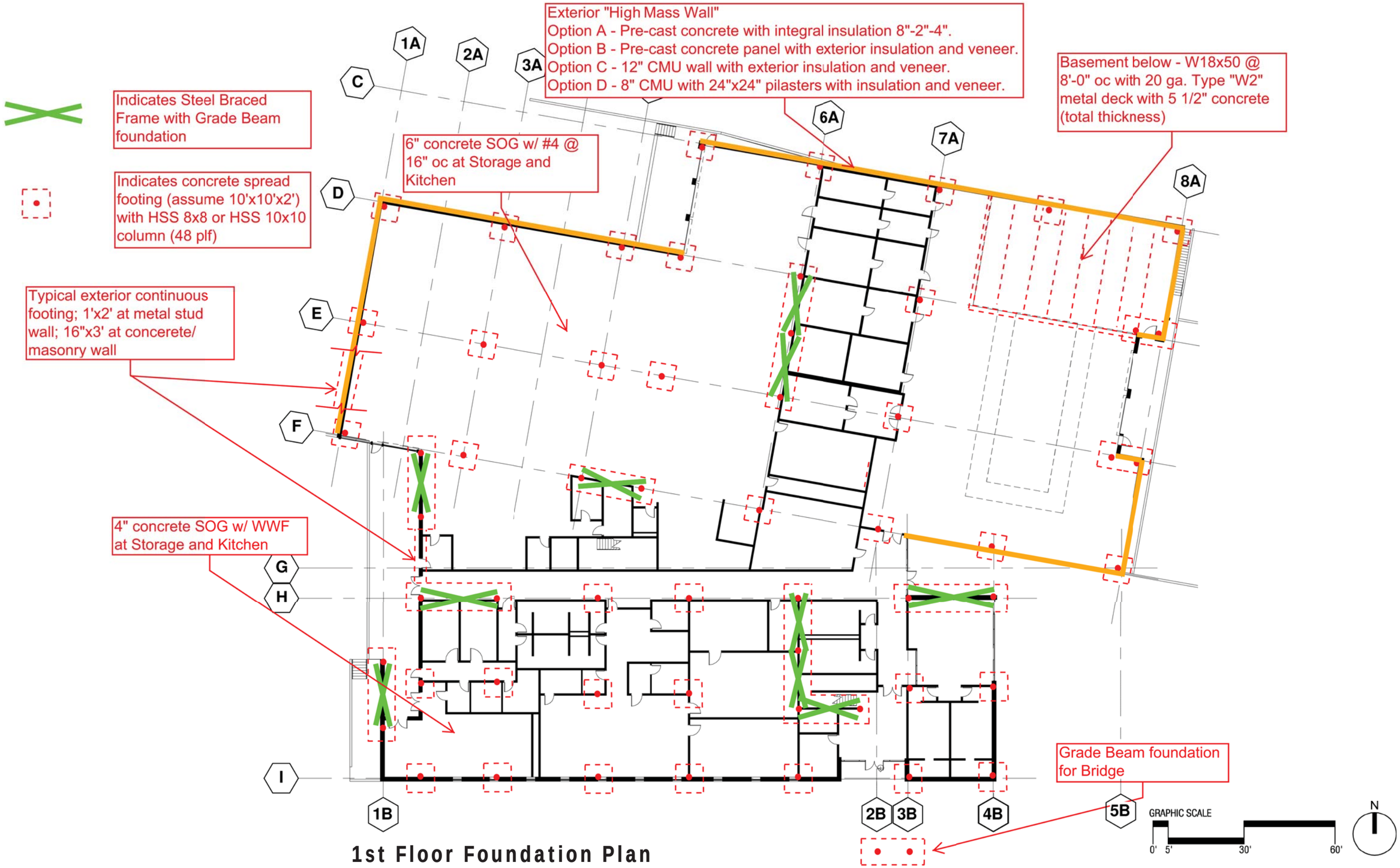
Western State Hospital | **New Kitchen Commissary** | State Project # 2008-409A

NAC ARCHITECTURE

Washington State Department of Social & Health Services

sheet no.

C2.0



1st Floor Foundation Plan

Schematic Design

3–19–2010

Indicates Steel Braced Frame

Indicates span of open web steel floor joists at 7'-6" oc with 20 ga Type "W2" metal deck w/ 5 1/2" concrete (total thickness):
Span = 30' - 32" LH (18 plf)
Span = 40' - 36" LH (28 plf)

Indicates floor girder supporting floor joists:
Span = 30' W21x103 or 34" Joist Girder (74 plf)
Span = 40' - W30x148 or 38" Joist Girder (115 plf)

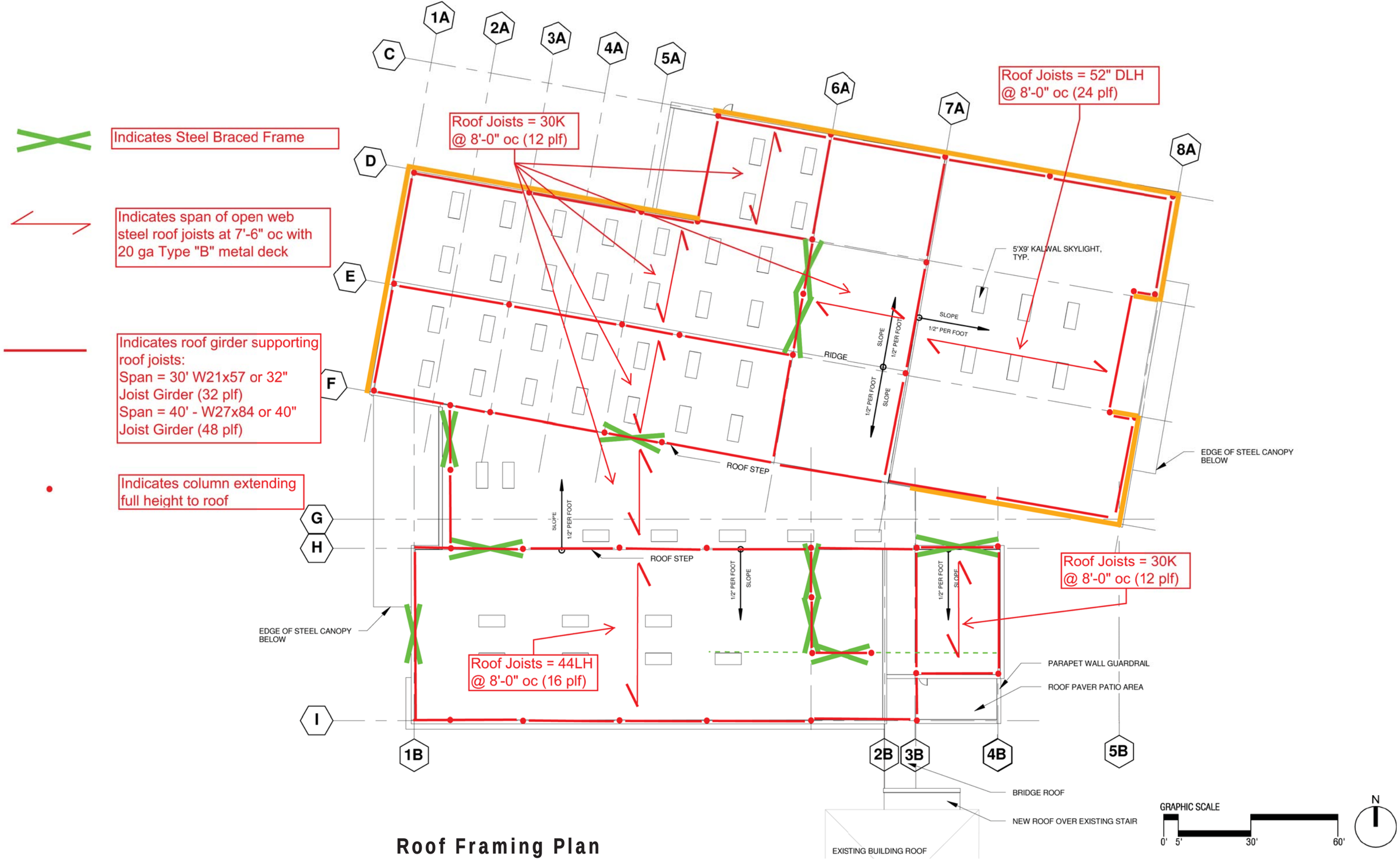
Indicates column extending full height to roof

Indicates column extending up to 2nd floor only

2nd Floor Framing Plan

Schematic Design

3–19–2010



Roof Framing Plan

Schematic Design

3–19–2010

Architectural Site Plan

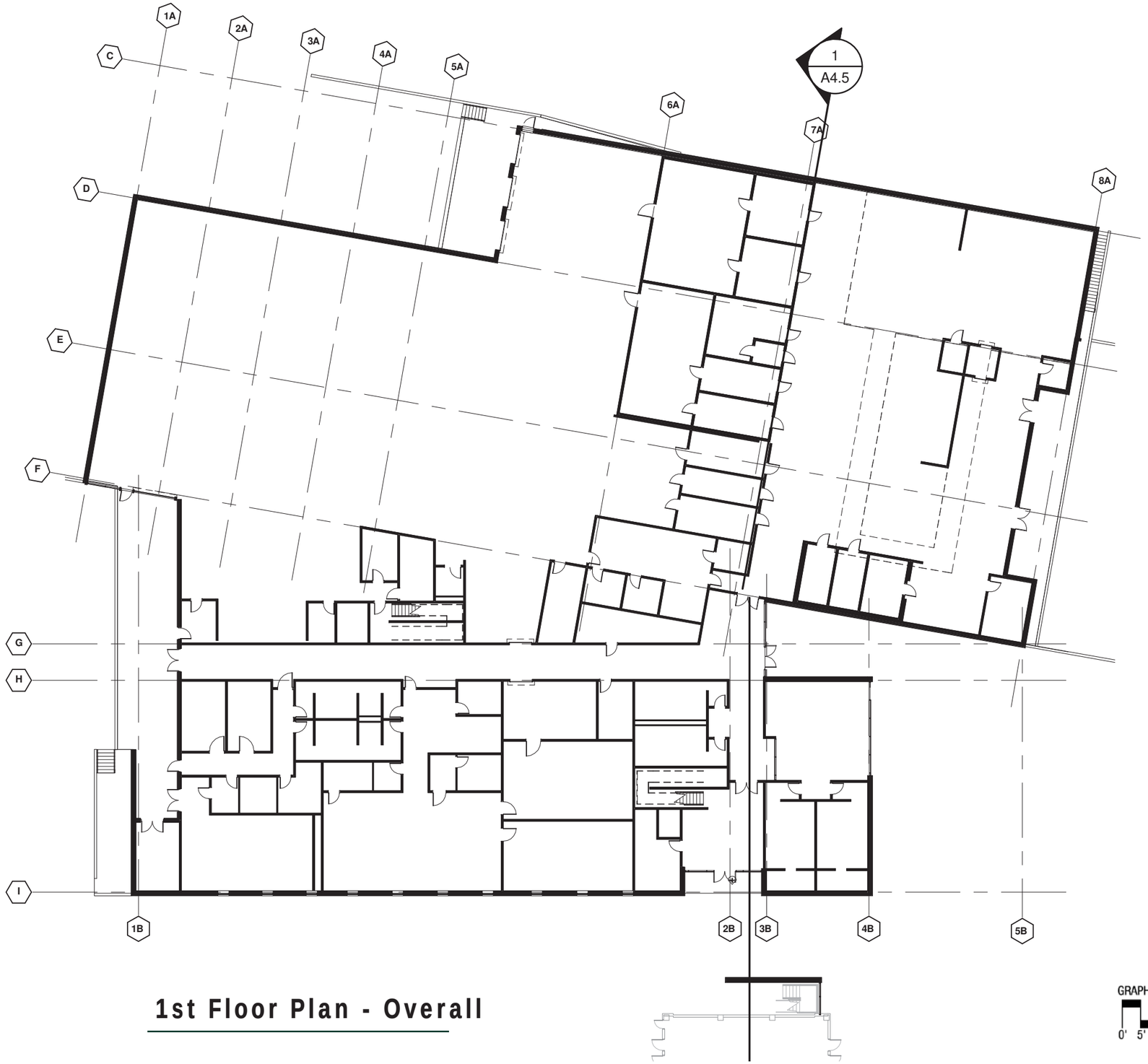
GRAPHIC SCALE

0' 10' 20' 30' 60' 120'

N

Schematic Design

3–19–2010



1st Floor Plan - Overall

GRAPHIC SCALE

0' 5' 30' 60'

N

Schematic Design

3–19–2010

Western State Hospital | **New Kitchen Commissary** | State Project # 2008-409A

NAC ARCHITECTURE

Washington State Department of Social & Health Services

sheet no.

A3.1

1st Floor Plan - Area 'A'

Schematic Design

3–19–2010

Western State Hospital | **New Kitchen Commissary** | State Project # 2008-409A

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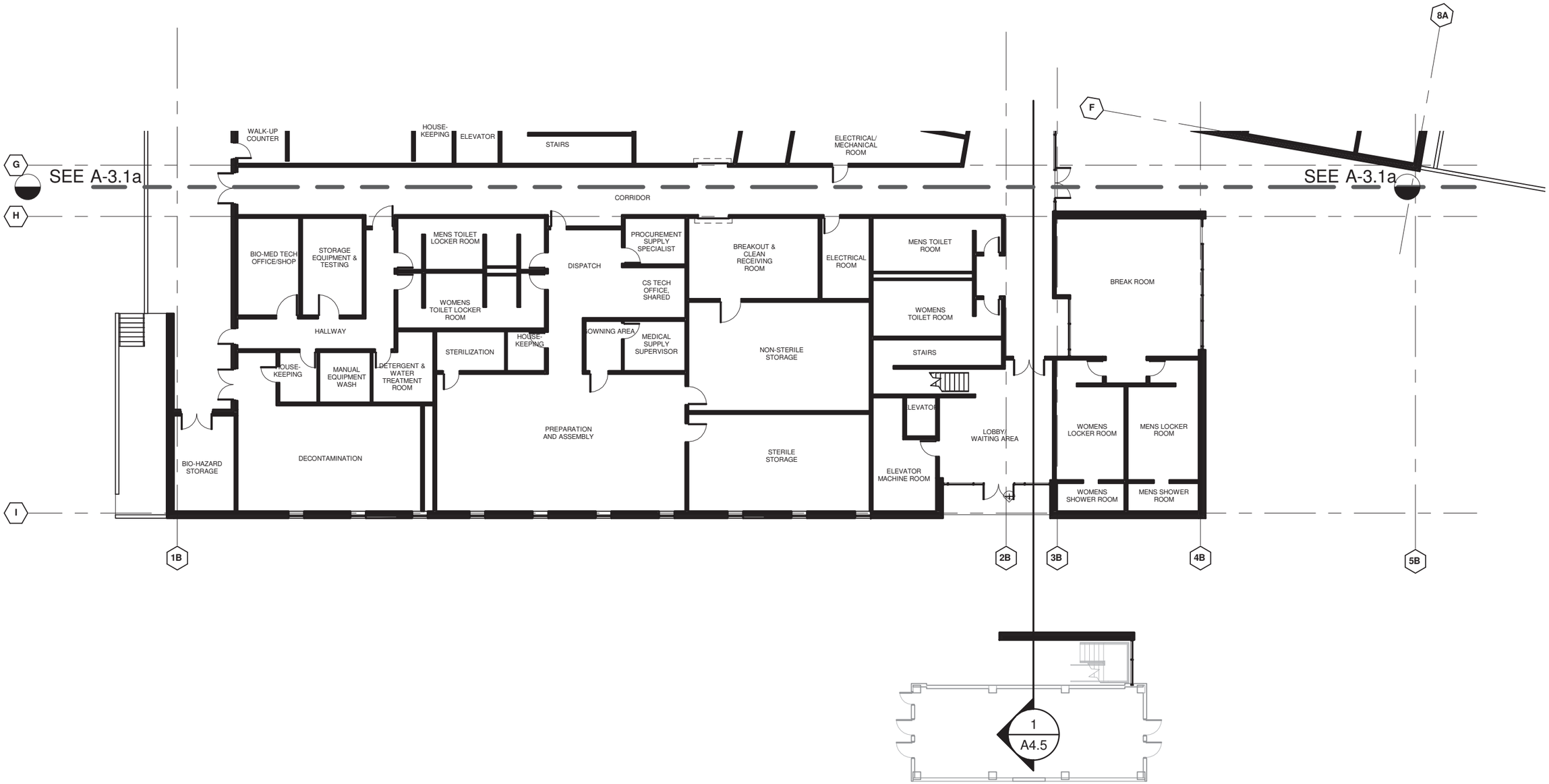
Washington State Department of Social & Health Services

sheet no.

A3.1A



1st Floor Plan - Area 'B'

GRAPHIC SCALE
0'1' 5' 10' 20' 40'

N

Schematic Design

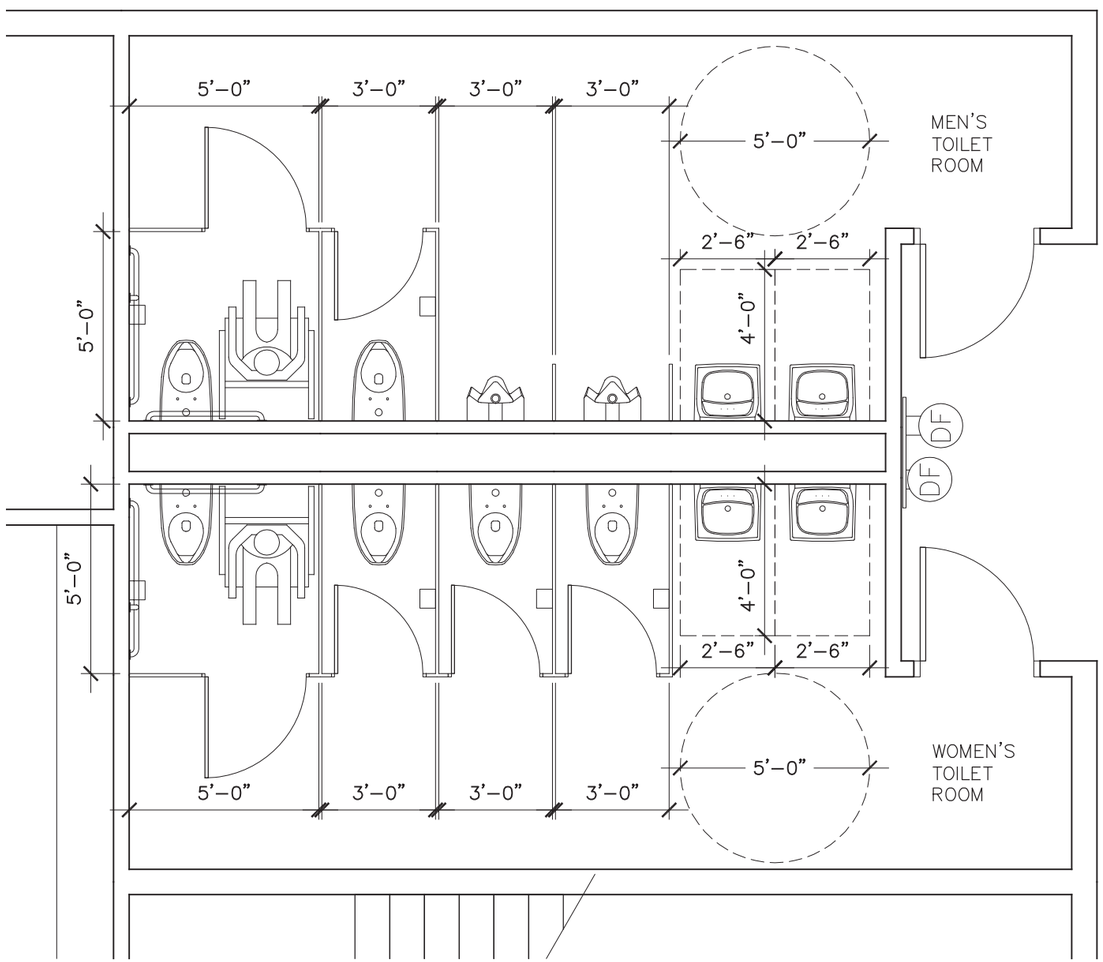
3–19–2010

Western State Hospital | **New Kitchen Commissary** | State Project # 2008-409A

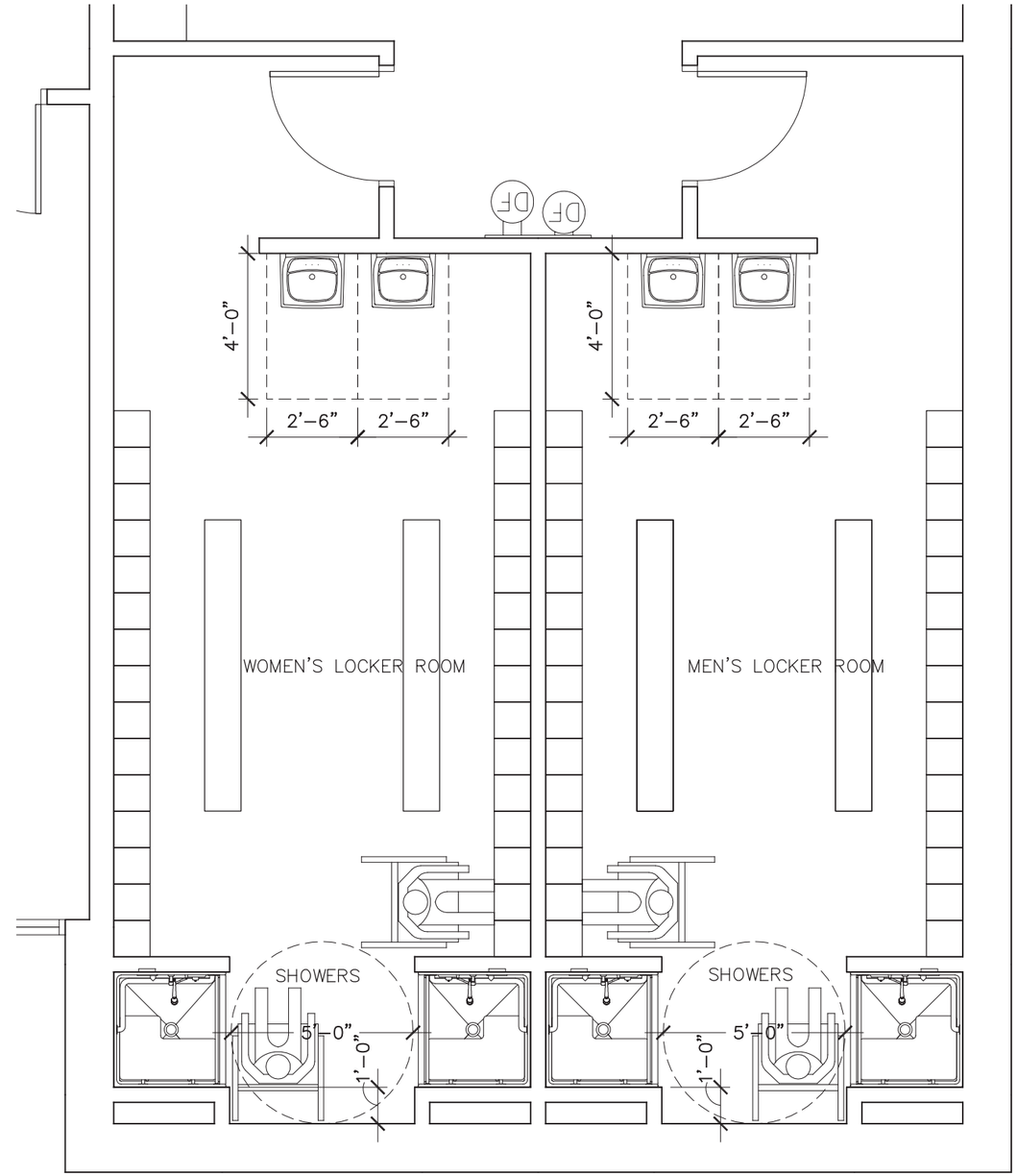
NAC ARCHITECTURE

Washington State Department of Social & Health Services

sheet no.
A3.1B



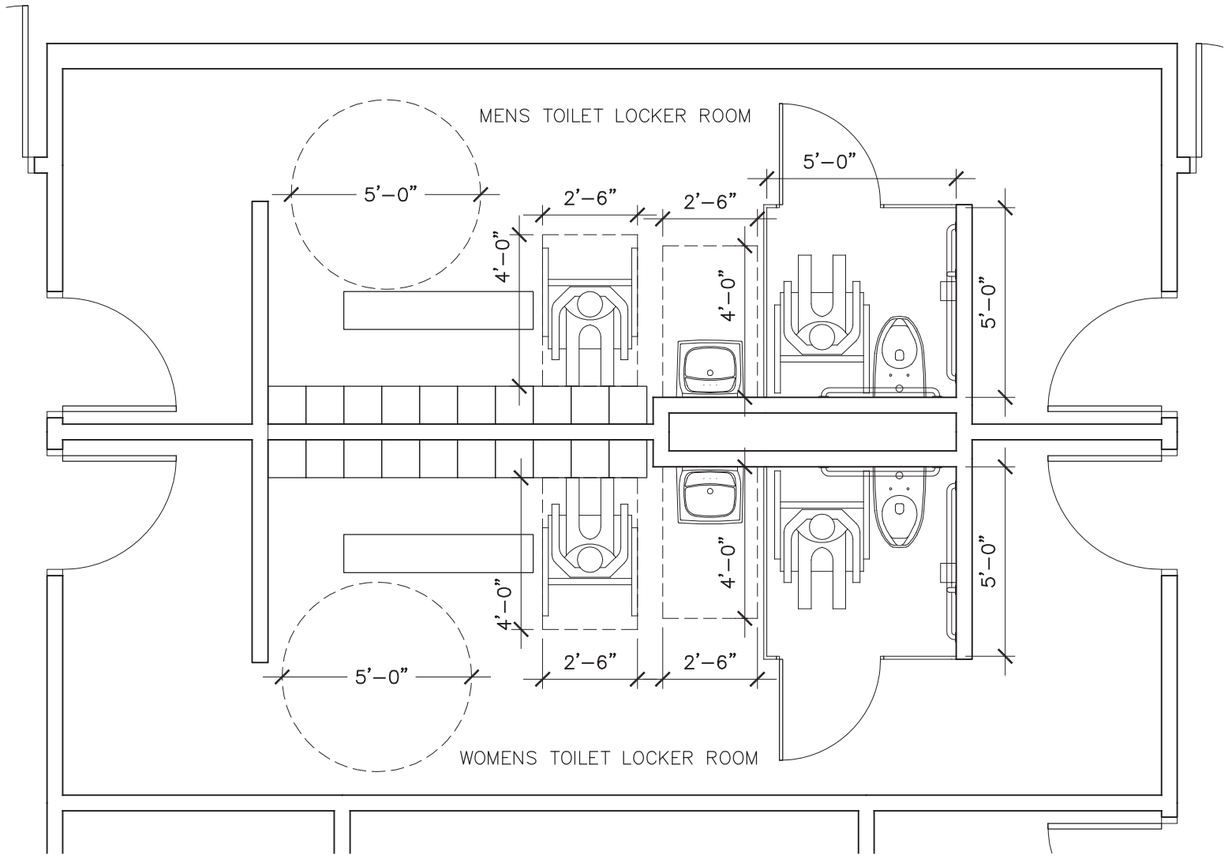
Shared Staff Restrooms



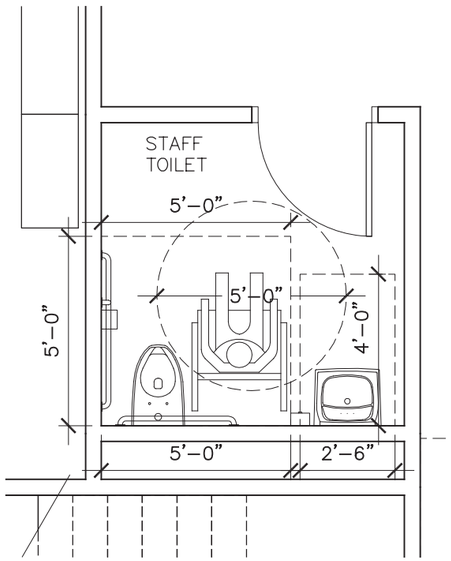
Shared Staff Locker Rooms

1st Floor Enlarged Toilet Room Plans

N



Central Medical Supply Locker & Toilet Rooms



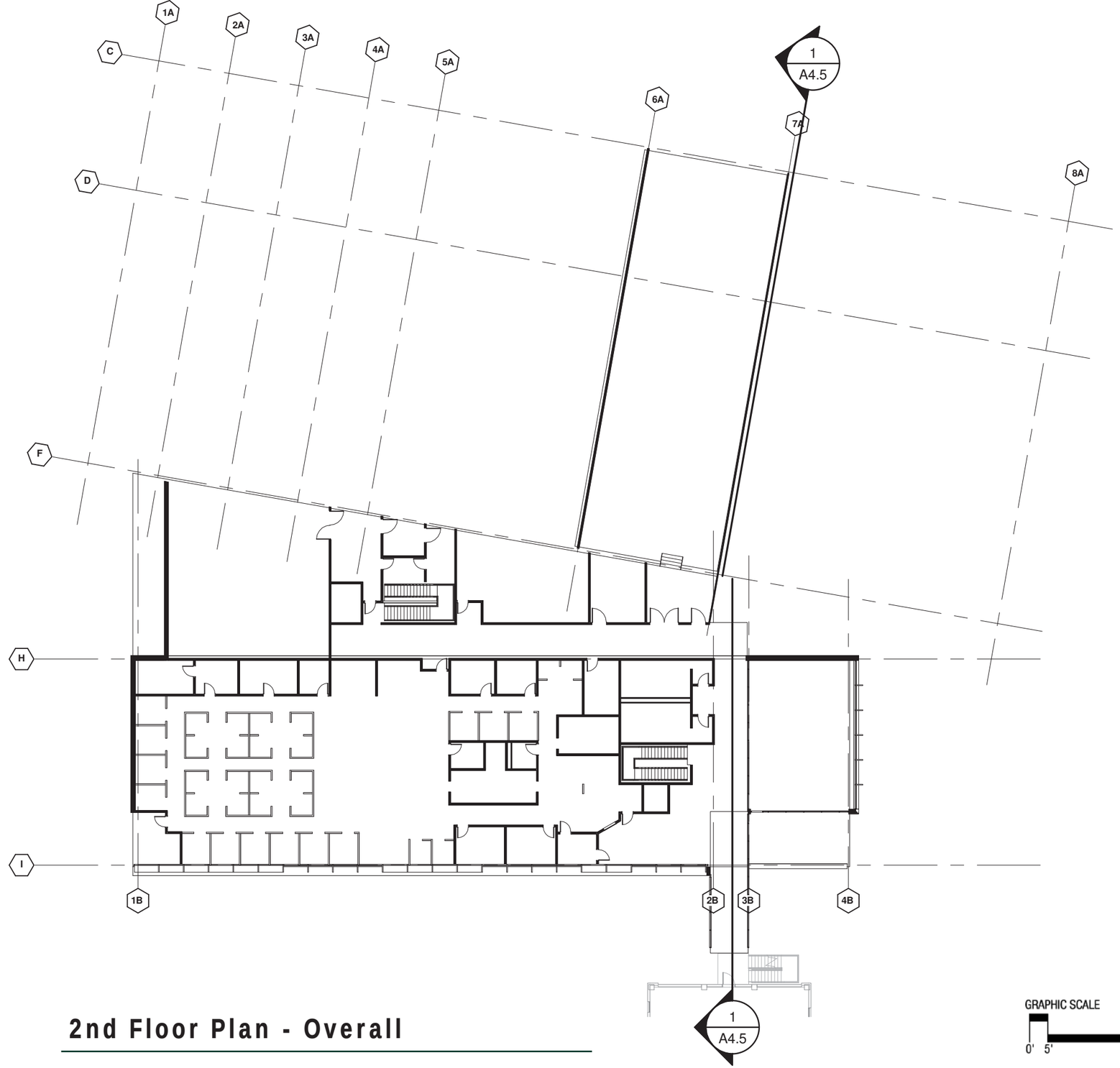
Warehouse Toilet

1st Floor Enlarged Toilet Room Plans

N

Schematic Design

3–19–2010



2nd Floor Plan - Overall

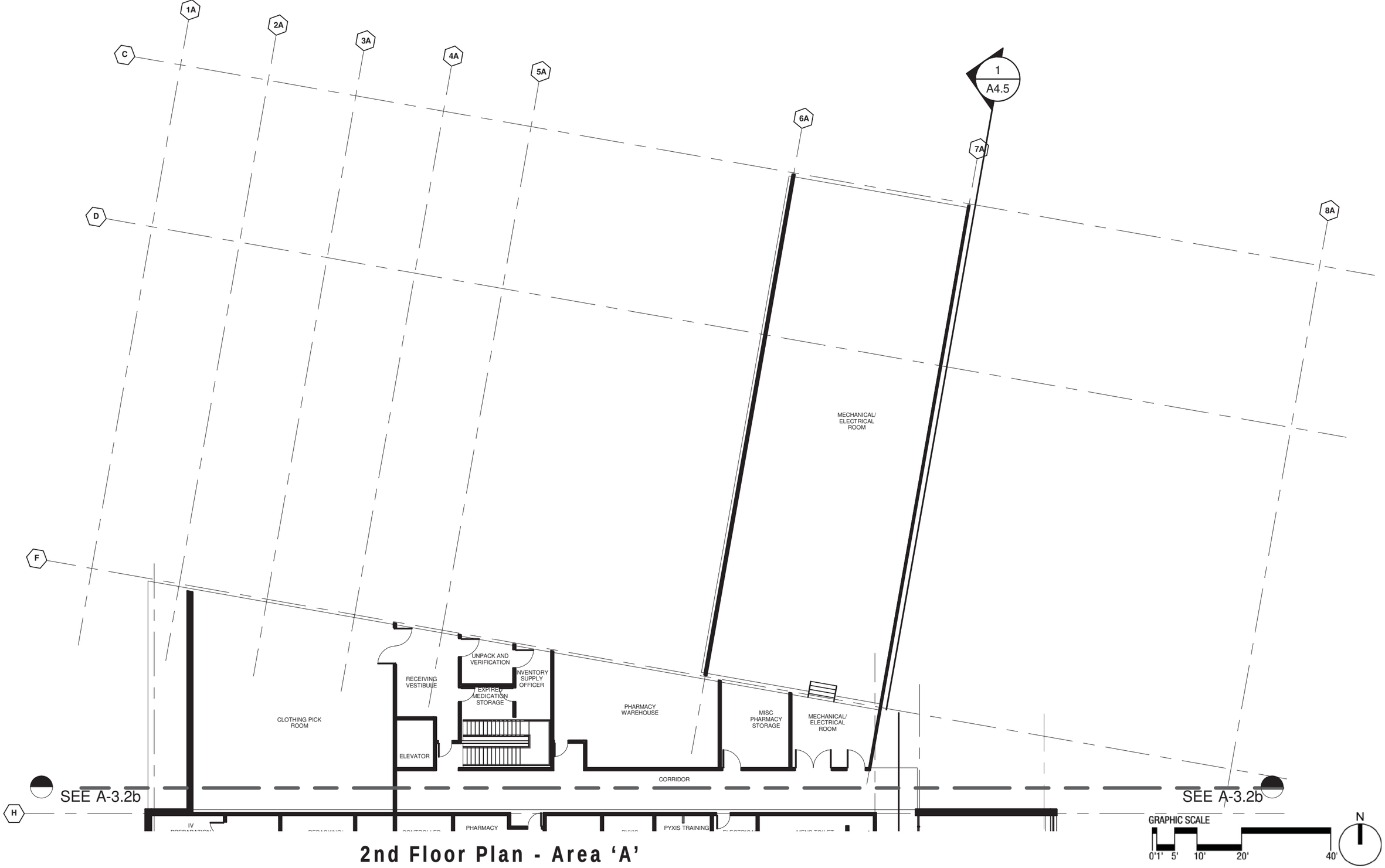
GRAPHIC SCALE

0' 5' 30' 60'

N

Schematic Design

3–19–2010



2nd Floor Plan - Area 'A'

Schematic Design

3–19–2010

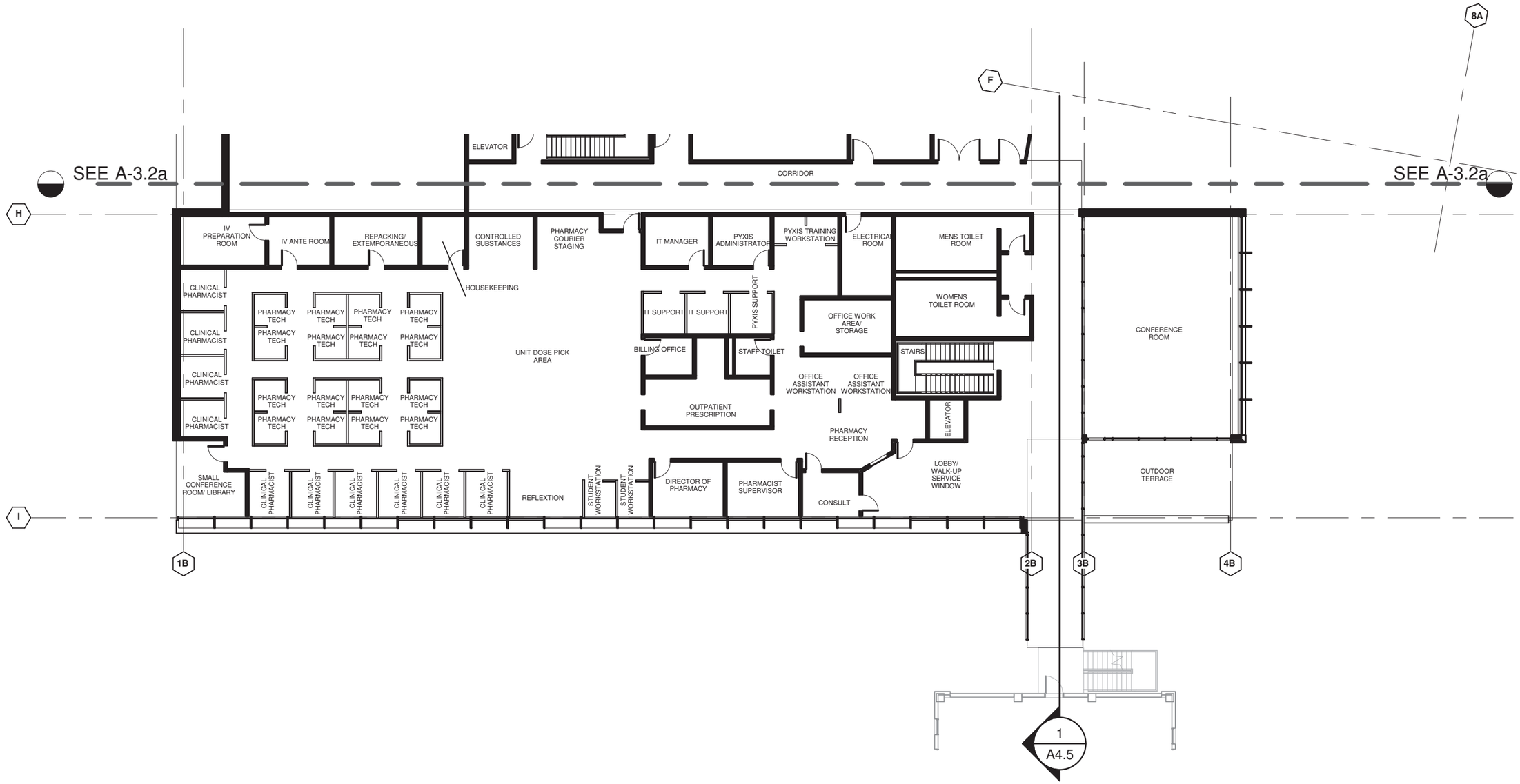
Western State Hospital | **New Kitchen Commissary** | State Project # 2008-409A

NAC ARCHITECTURE

Washington State Department of Social & Health Services

sheet no.

A3.2A



2nd Floor Plan - Area 'B'

GRAPHIC SCALE 0'1' 5' 10' 20' 40'

N

Schematic Design

3–19–2010

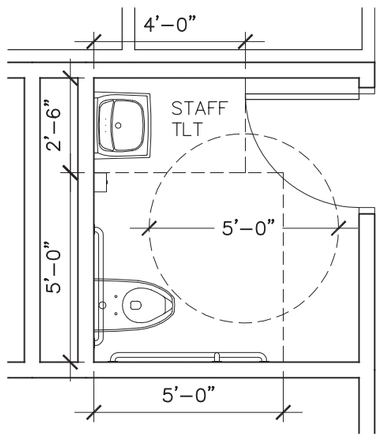
Western State Hospital | **New Kitchen Commissary** | State Project # 2008-409A

NAC ARCHITECTURE

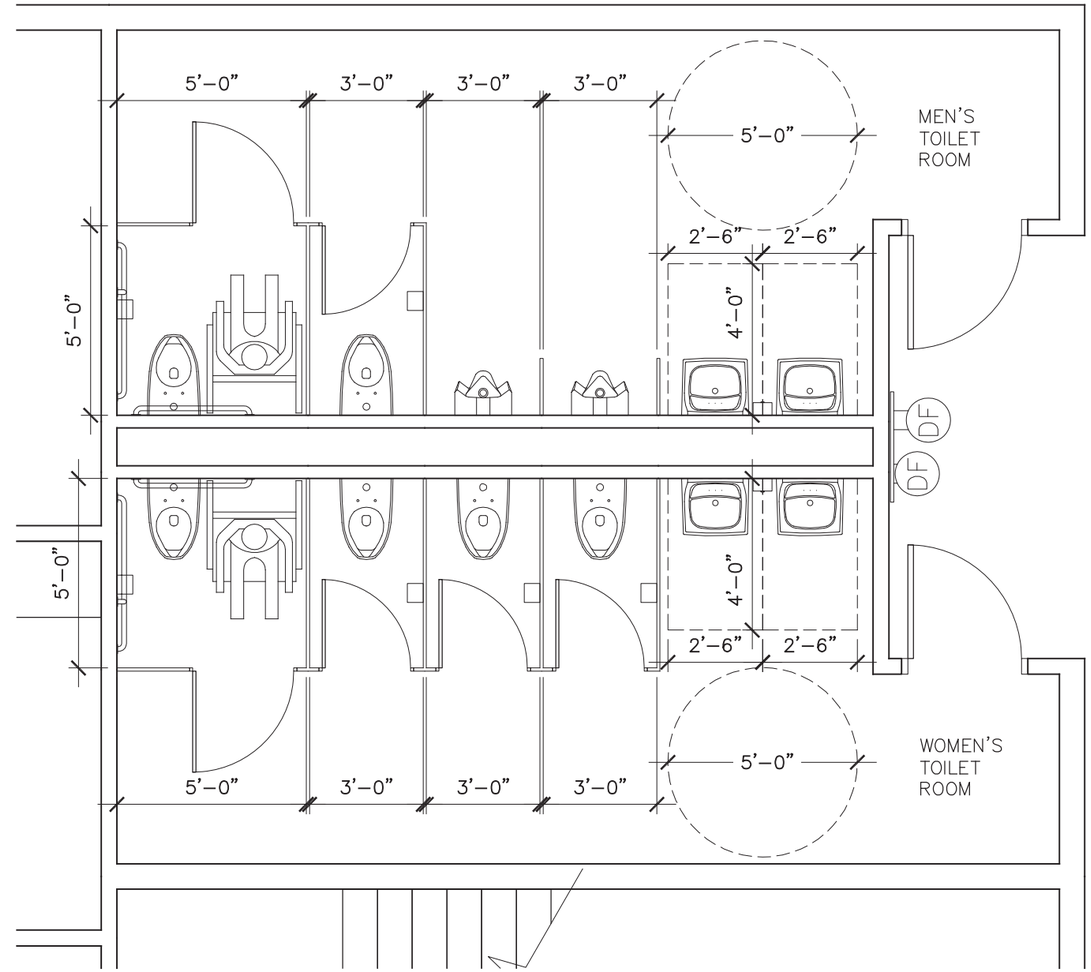
Washington State Department of Social & Health Services

sheet no.

A3.2B



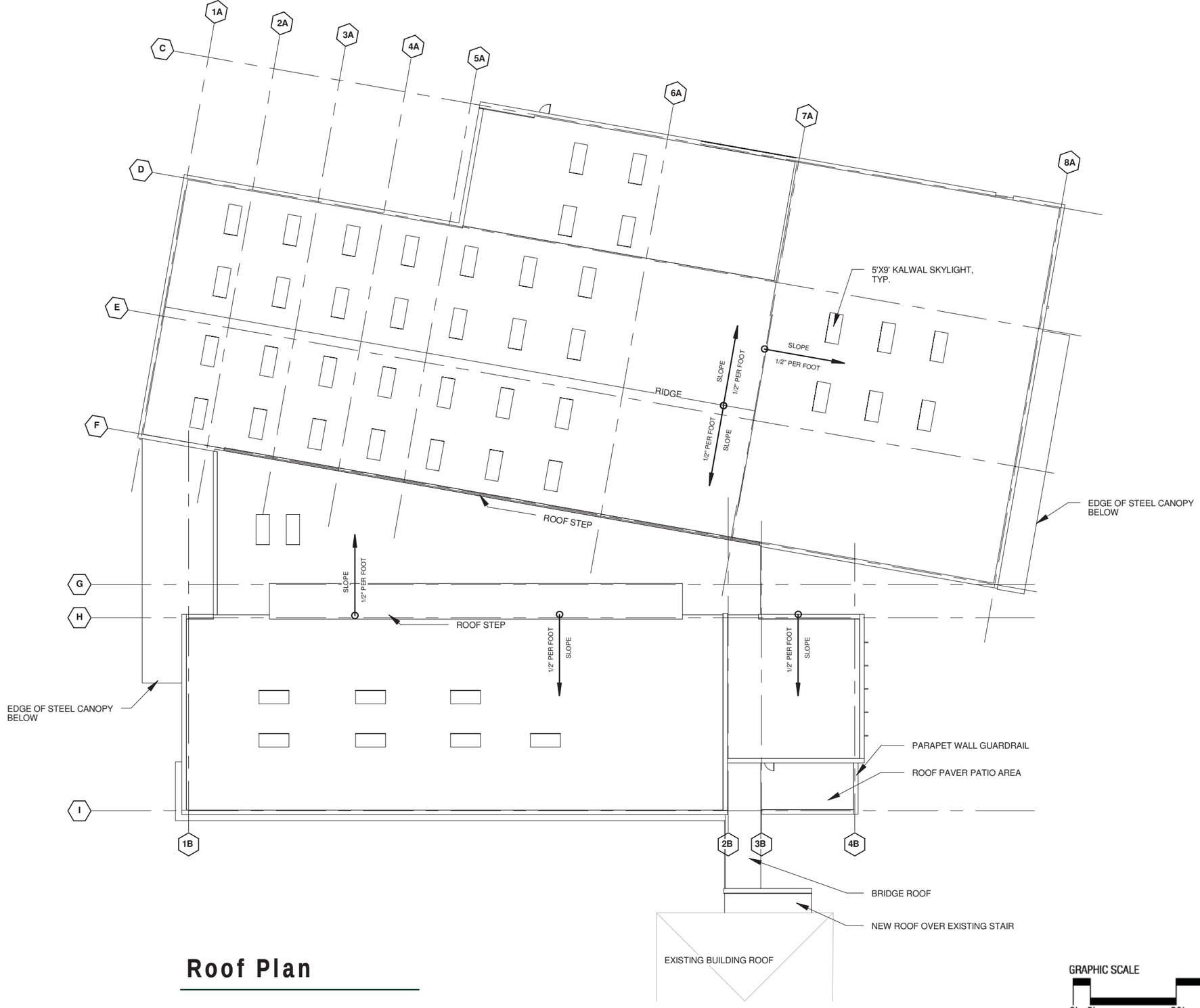
Pharmacy Unisex Toilet Room



Shared Staff Toilet Rooms

2nd Floor Enlarged Toilet Room Plans

N



Roof Plan

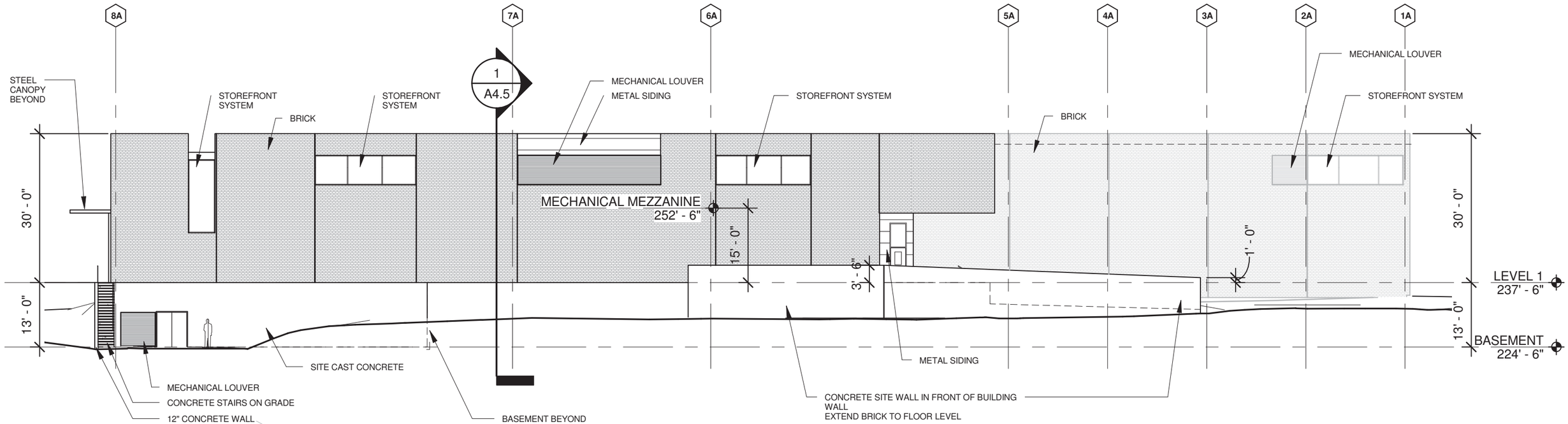
GRAPHIC SCALE

0' 5' 30' 60'

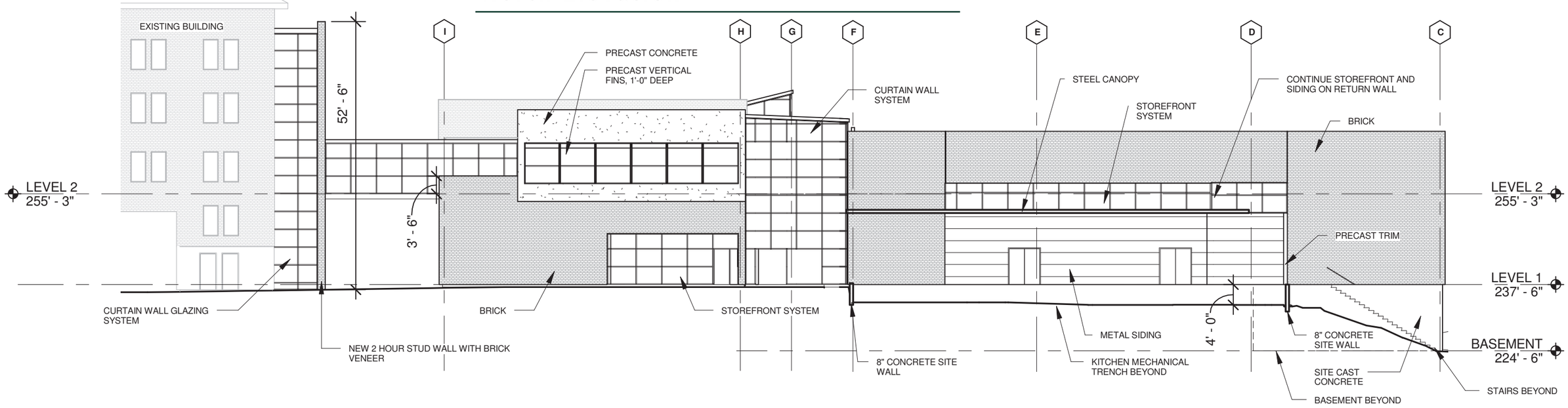
N

Schematic Design

3–19–2010



North Elevation



East Elevation

Schematic Design

3–19–2010

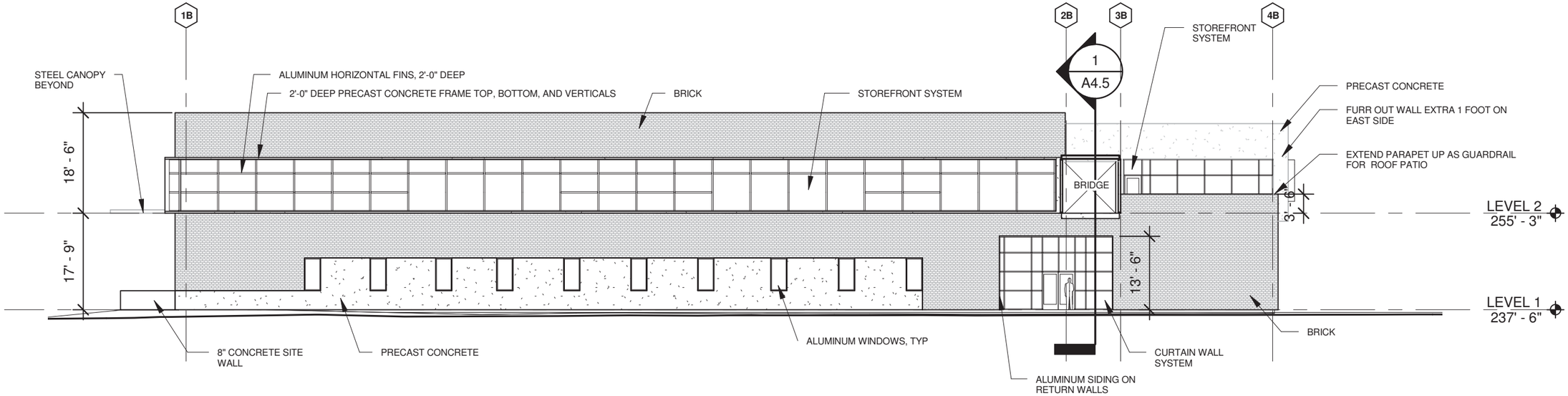
Western State Hospital | **New Kitchen Commissary** | State Project # 2008-409A

NAC ARCHITECTURE

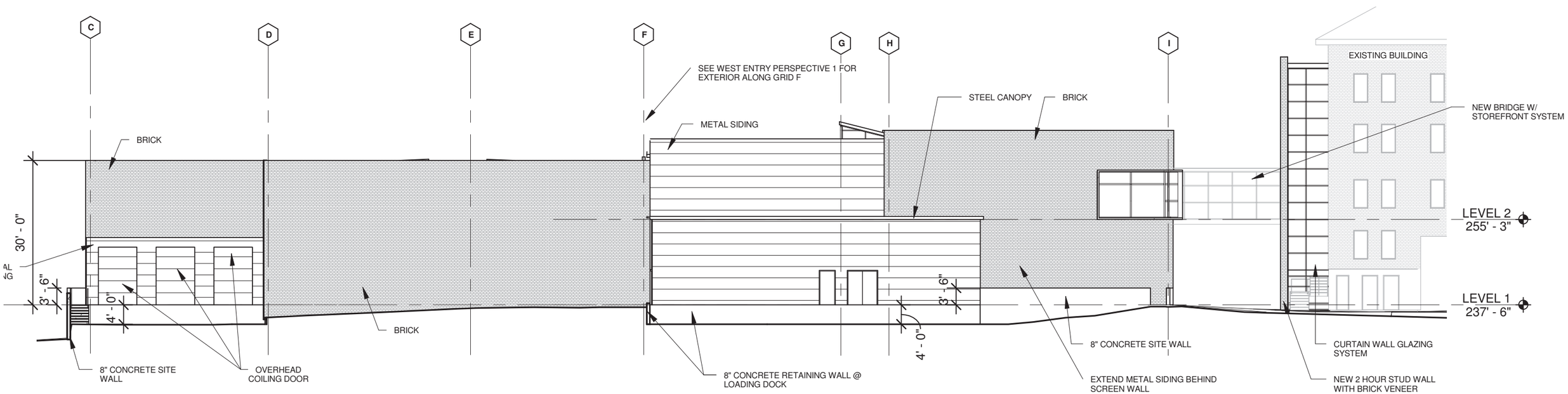
Washington State Department of Social & Health Services

sheet no.

A3.4



South Elevation



West Elevation

Schematic Design

3–19–2010

Western State Hospital | **New Kitchen Commissary** | State Project # 2008-409A

NAC ARCHITECTURE

Washington State Department of Social & Health Services

sheet no.

A3.5