A. Building History:

WestEnd**25** is a conversion of two six story office buildings to residential rental apartments. The project will add four post tensioned concrete stories to the top of the existing buildings, and will fully connect the two buildings. The following project history section serves as a method to familiarize readers with WestEnd**25**. Information for analysis came from actual project documentation, construction knowledge gained through course work and on the job experiences.

Project Location:

WestEnd**25** is located in Washington D.C. Washington D.C. was established in 1791 with nearly 8,000 residents. Today, Washington D.C. is a multi-cultured city with a population of about 575,000 residents. The preferred method of construction in the Washington D.C. area is concrete, specifically post tensioned concrete slab. Post tensioned concrete allows for greater floor to ceiling heights while minimizing the total height of the building. This is important because Washington, D.C. has an ordinance restricting the height of private buildings to 135 feet. The climate of Washington D.C. is one of four distinct seasons. The seasons of concern during construction are summer and winter. The summer's days are often hot, average temperature in the upper 80's, and humid which often leads to evening thunderstorms. The winter days are cold, average temperature in the low 30's.[1] Two important considerations of weather are safety and design. The climate of Washington D.C. is such that there numerous freeze/thaw cycles transitioning into and out of the winter season. These conditions create situations where dew point control and moisture barrier installation location is critical for condensation control and the prevention of mold. WestEnd**25** rests on bedrock and has a foundation system of spread footing. Because of the essence of this project is adding on to an existing structure is little excavation needed. Extra footings were installed to carry the additional loads of the building.

[1]Monthly Averages for Washington D.C. The Weather Channel Interactive, Inc. 2008 http://www.weather.com/outlook/homeandgarden/garden/wxclimatology/monthly/graph

Project Team Summary:

The following highlights the different parties involved with the development of WestEnd**25**.

Owner: Vornado - Charles E. Smith

General Contractor: James G. Davis Construction Corporation

Architects: Shalom Baranes Associates Architects

Engineers:

Structural: Tadjer Cohen Edelson Associates

MEP: GHT Limited

Civil: Bohler Engineering

Interior Designer: Forrestperkins

Landscape: Oculus

Client Information:

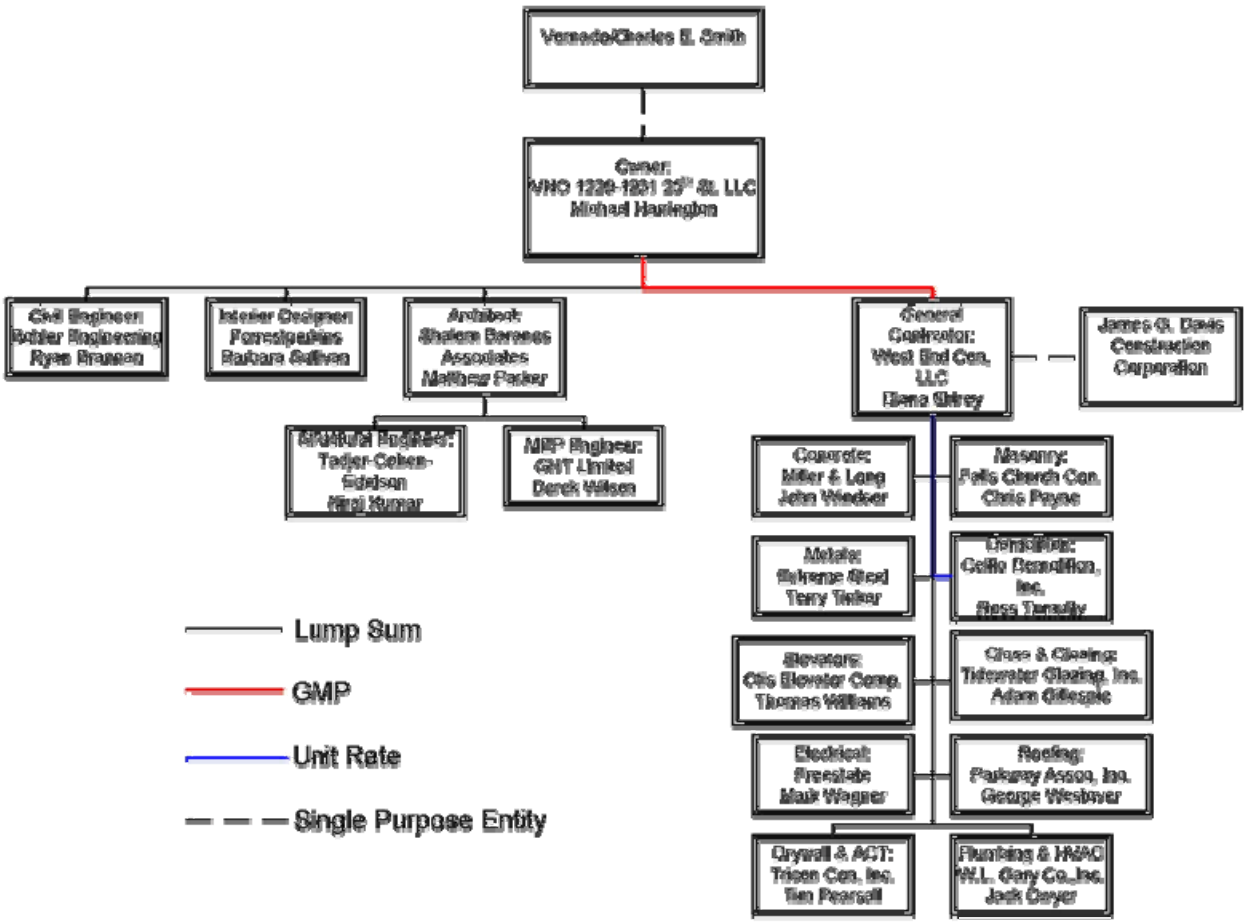
The owner of WestEnd**25** is Vornado – Charles E. Smith a division of Vornado Realty Trust and is well established in the Washington D.C. area. Vornado is an experienced and well financed realty developer. According to U.S. Securities and Exchange Commission documents the 1229 and 1231 office buildings owned by the Buena of National Affairs were purchased by Vornado for $71 million dollars.[2] To finance WestEnd**25** Vornado took out a contract loan for $ 104 million, according to Joseph Macnow of Vornado Realty Trust.[3] The purpose of WestEnd**25** is to provide apartment housing for the NW quadrant of Washington D.C. and specifically apartments for the students of George Washington University. The GMP has been negotiated between James G. Davis and Vornado to $76 million. Because of Vornado's financial plan to house students of George Washington University WestEnd**25** will be delivered in two phases, the first turned over in August 2009 and the second at the end of December 2009. This will allow for tenants to occupy WestEnd**25** for the fall 2009 semester.

Project Delivery System:

Initially, Vornado entered into contract with the design professionals to design WestEnd**25**. The general contractor was brought on board to develop preliminary budgets and to make sure the architects were designing within the owner's budget. The role of the general contractor evolved into a

[2] Exhibit 10.1 Psa for 1229-1231 25th St, 2/17/06. http://www.secinfo.com/dF1e.v5.d.htm
[3] Macnow, Joseph. Vornado Realty Trust. Reuters Business Wire. Feb28, 2008. http://www.reuters.com/article/pressRelease/idUS178195+28-Feb-2008+BW20080228

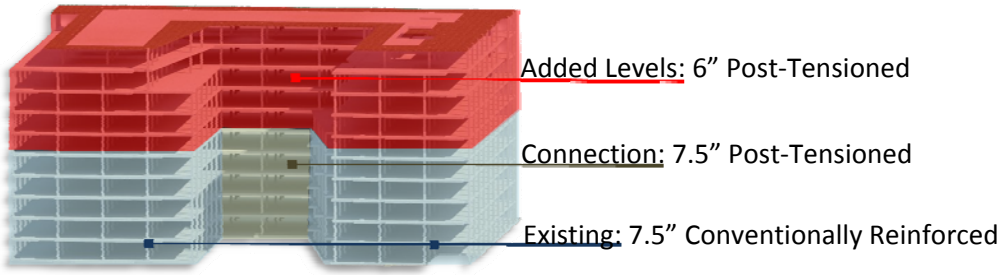
providing construction services with a negotiated GMP. The owner – general contractor agreement is an AIA A111-1997, standard form agreement with a negotiated guaranteed maximum price. Furthermore, both the owner and general contractor have entered into the agreement as a single purpose entity, LLC. The purpose of this is to protect the liability of the larger responsible firm from a lawsuit. These entities have no assets and contract employees for services. To assure the quality construction and compliance with contract price the general contractor provides a limited construction guaranty from the parent company. The general contractor is responsible for procuring worker's compensation, builder's risk insurance, commercial general liability insurance, commercial automobile liability insurance, pollution liability insurance and excess liability insurance. Furthermore, the general contractor is responsible that subcontractors obtain worker's compensation insurance, employer's liability insurance, general liability insurance, excess liability insurance, and automobile liability insurances. The owner is not requiring a bond from the general contractor but is requiring bonds from all subcontractors with contracts over $100,000 and all building envelope subcontractors. Clearly there is an established relationship between the owner and the general contractor. Because of this, in conjunction with both parties vast experience this delivery seems reasonable and appropriate for this project.



Building Systems Summary:

Cast-in-Place Concrete:

The existing structure of WestEnd**25** consists of conventionally reinforced two way concrete slabs with varies sections of waffle slabs. The typical slab thickness of the existing structure is 7.5". The project's additional four floors and six connection slabs are post-tensioned concrete. The typical slab thickness of the connection slabs is also 7.5" but the typical thickness of the additional floors is 6". The column grid of 20' by 20' is maintained throughout WestEnd**25**. Concrete will be placed via crane and bucket. The crane is located in a central position of the site, the courtyard, and concrete deliveries will come from 25th St. NW. The formwork will be traditional timber formwork and pour samples will be collected to ashore concrete reaches designed strength.



Areas of Cast-in-Place Concrete

Mechanical System:

The apartments of WestEnd**25** are conditioned by water cooled heat pump units. These units are self contained floor mounted horizontal packages with heating and cooling capabilities for each apartment. This allows for multiple independent conditioned zones. To complete the mechanical system there are four natural gas boilers to warm the condensing water during the peak heating periods and there is also a cooling tower to dissipate the heat energy from the condenser water during periods of high cooling demand. Basic considerations for this type of system are the low installation cost and the independent conditioning flexibility. Also, include as part of the public conditioning system are two enthalpy wheels that transfer heat from exhaust air and outdoor air depending on loads. Therefore, outdoor air is pre-cooled or pre-heated with exhaust air form the conditioned zones.

Electrical System:

The power for WestEnd**25** is being supplied by a main feed of 3 phase 2,500 Amp service is received from the Potomac Electric Power Company, PEPCO, from 25th street PEPCO. The main power is coming from underneath 25th street. There were two existing power vaults for each of the existing buildings. The vault at 1229 carries the 3 phase 460 voltage supply and the vault at 1231 carries the 3 phase 208 voltage supply. The switchgear rooms are located on the west side of the first level basement and distribute lines up to the first floor down the corridors to the risers on the east side of the

building. From the risers power is distributed to every apartment on each floor and each apartment is metered individually.

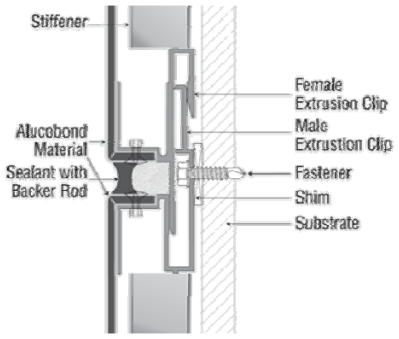
Masonry:

The façade facing the allies surrounding WestEnd**25** is called alley wrap. The ally wrap of WestEnd**25** comprises about 75% of the exterior façade. This alley wrap is a brick cavity wall with metal stud backing. A hydraulic mast climbing scaffold system will be used for the façade. The construction of the brick façade consist of face brick, concave mortar joint, airspace, masonry ties, rigid insulation, exterior gypsum board, vapor barrier and metal framing.

Hydraulic Mast Climbing Scaffold System for Masonry Installation

Curtain Wall:

The façade facing 25th St NW and the entrance courtyard is called the park wrap. The park wrap comprises about 25% of the exterior façade. The park wrap is a curtain wall is a panelized system that is installed from the interior of the building. Glazing is 1" thick insulating glass fabricated from two sheets of .25" thick low-E on #2 surface tempered glass with a .5" air space. Frames and accenting metal panels are aluminum composite material. The metal panels are fabricated with a polyethylene core and two thick aluminum skins one of with contains an anodized grey finish.



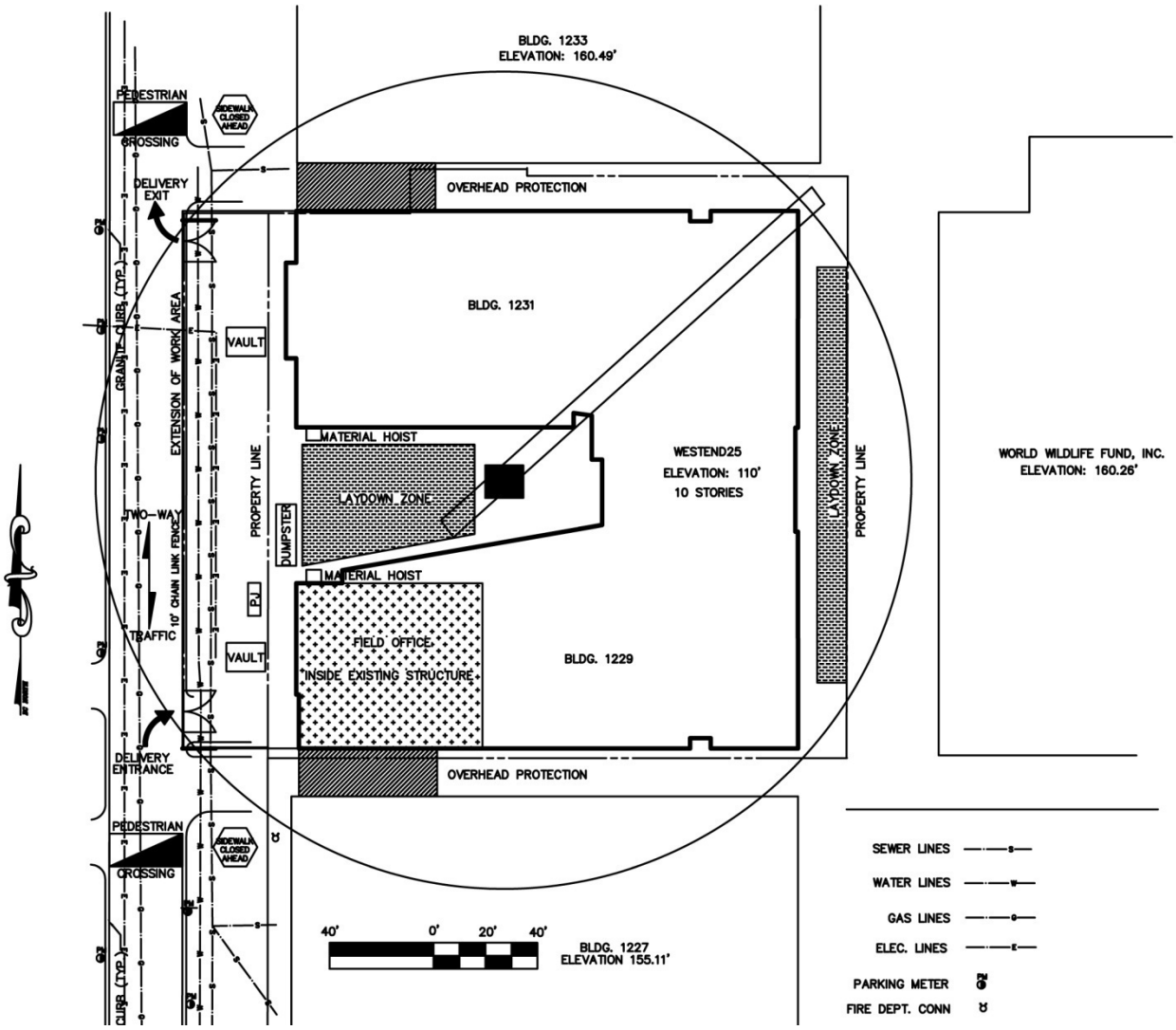
Detail of Metal Panel on Curtain Wall

Site Plan Summary:

Access to the site will be from 25th St NW. All deliveries will enter on the south end of the site and exit the north end of the site. A Peiner SK 315 tower crane with a reach of 200 feet with a max load of 8,300 lbs. will be located in the central courtyard and will primarily be used for placing concrete. The courtyard will also serve as a laydown area. Another laydown area exists on the east side of the site. The sidewalk adjacent to the site will be closed to pedestrians and the parking lane on the east side of 25th St NW will also be closed for the duration of construction. Temporary pedestrian crosswalks have been established. Furthermore, flag persons will be used to direct traffic when deliveries are expected and when there is heavy traffic during the mornings. The utilities for WestEnd**25** run from under 25th St NW and tie-in at two locations. There is one location for the north building and one location for the south building. The neighboring building to the south is also the property of the owner and will be renovated in the future, the building to the north is a residential building and the building to the east is an office building. Across 25th St NW is a public park with a softball field, soccer and lacrosse nets. This space will not be used for any storage. The footprint of WestEnd**25** extends to the alley on the north and south sides. There is overhead protection along the alleys to protect vehicles entering other building's parking garages during demolition and construction. WestEnd**25** will utilize two material hoists. The material hoists will be located on the courtyard side of both the north and south buildings and will be the primary source of vertical transportation until elevators are installed. There are two dumpsters on site which have a tipping fee of $385 per pull. The important features shown in the site plan are:

- Utilities
- Delivery Entrance/Exit
- Pedestrian Paths
- Laydown Location
- Crane Location
- Field Office Location

Site Plan:


BLDG. 1233
ELEVATION: 160.49'
PEDESTRIAN CROSSING
SIDEWALK CLOSED AHEAD
DELIVERY EXIT
OVERHEAD PROTECTION
BLDG. 1231
VAULT
GRANITE CURB (TYP.)
EXTENSION OF WORK AREA
MATERIAL HOIST
LAYDOWN ZONE
WESTEND25
ELEVATION: 110'
10 STORIES
PROPERTY LINE
DUMPSTER
TWO-WAY TRAFFIC
10' CHAIN LINK FENCE
MATERIAL HOIST
P.I.
VAULT
FIELD OFFICE
INSIDE EXISTING STRUCTURE
BLDG. 1229
LAYDOWN ZONE
PROPERTY LINE
WORLD WILDLIFE FUND, INC.
ELEVATION: 160.26'
DELIVERY ENTRANCE
PEDESTRIAN CROSSING
SIDEWALK CLOSED AHEAD
OVERHEAD PROTECTION
CURB (TYP.)
40' 0' 20' 40'
BLDG. 1227
ELEVATION 155.11'
SEWER LINES
WATER LINES
GAS LINES
ELEC. LINES
PARKING METER
FIRE DEPT. CONN

Project Schedule Summary:

WestEnd**25** is a unique project because the scope of work includes demolition of existing building systems, an early turnover of first floor and a mock up unit. The existing site contains two six story office buildings that will converted to residential rental apartments. The purpose of this schedule is to provide a summary of activities and their durations for the completion of WestEnd**25**. Work flow is created by starting at the west side of building 1231 and working in a clockwise direction. The actual summary schedule follows the section summaries. Key durations included in this schedule are:

- Demolition – 74 days
- Superstructure – 147 days
- Façade Installation – 267 days
- MEP Rough-In – 155 days
- Finishes – 186 days

Demolition:

Mobilization for WestEnd**25** began in late February, 2008. It is important to note that the existing site contains two separate office buildings and work activities are sequenced such that the north building is followed by the south building. Demolition of existing exterior façade and interior down to structural frame immediately begun and lasted until early June. This demolition also includes duration for slab cuts of existing concrete structure for slab extensions and infill.

Structure:

Work on the superstructure is sequenced by floors and starts with the first floor and continues to the roof/penthouse. For the first through the sixth floor the superstructure work includes installing supporting steel, F/R/P of the slab infills and slab extension for the existing structure. Interestingly, due to the slow non- repetitive nature of installing the supporting steel multiple locations compared to the F/R/P of an entire floor the durations per floor are about equivalent from existing structure to the added structure. The completion of the superstructure is scheduled for 11/24/08.

Façade:

The façade of WestEnd**25** is comprised of what is termed alley wrap and park wrap. The alley wrap is a brick veneer with metal stud backing and the park wrap is a curtain wall façade. For the durations per each floor the alley wrap is approximately 5 weeks per floor and the park wrap is approximately two weeks per floor. These durations spread across each floor leads to a milestone date of watertight building on 9/1/09.

Elevators:

The elevators begin to be installed in mid-January of 2009 and will assume the responsibility of transporting labor and material as of 5/28/09. To accomplish this elevators are being installed such that there will be one operational in the north building and one operational in the south building. The remaining duration of the elevators will be used to install the remaining elevators, but will not be used by construction personnel when completed.

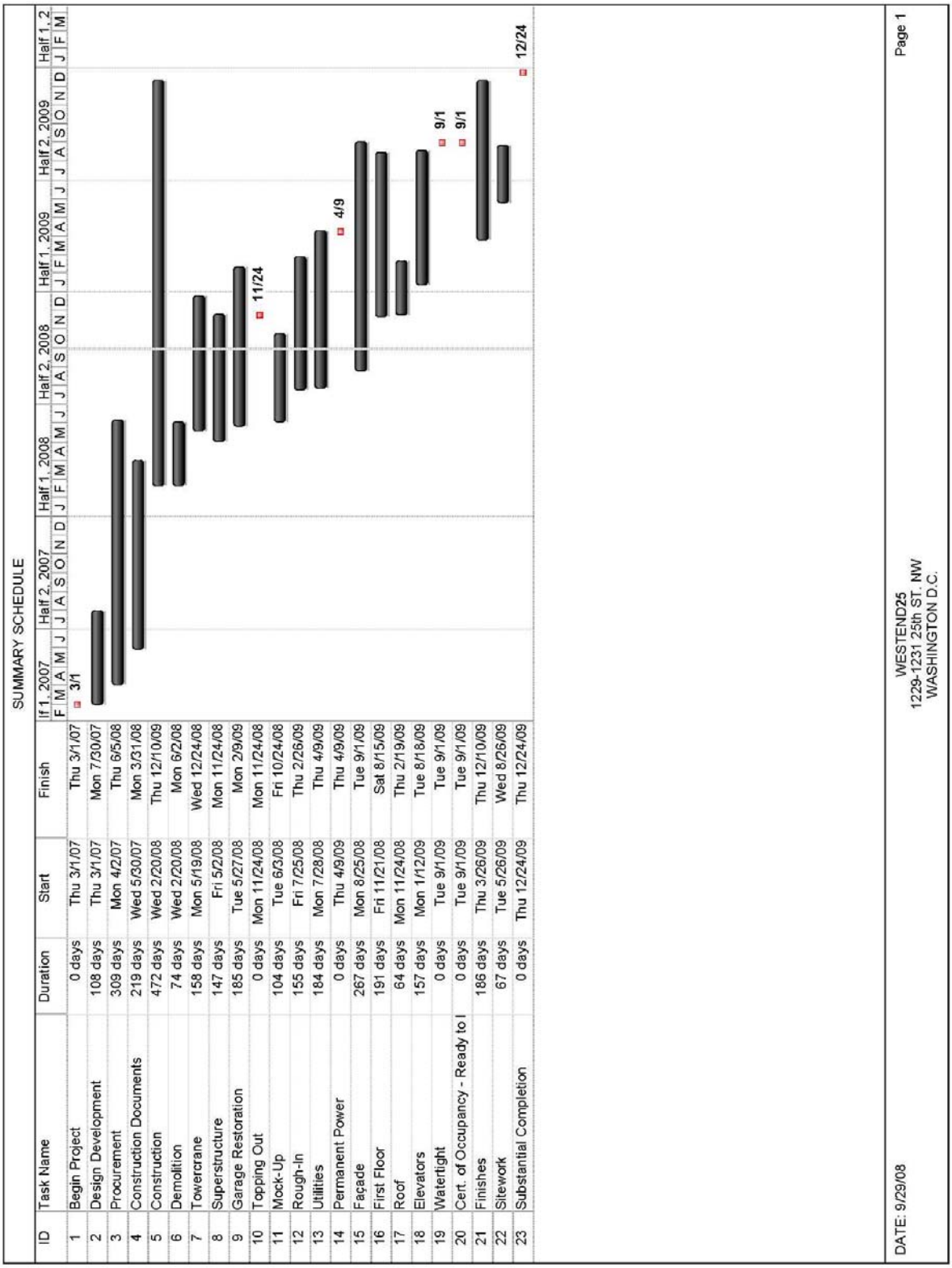
Mock Up:

An important room of WestEnd**25** is apartment 213 because that is the mock-up. Therefore, the activities of the mock-up are highlighted with their own line item. Similarly, the first floor is to be delivered and occupied earlier than the rest of the building and therefore it is also a separate line item.

Interiors:

The flow from the north building to the south building continues through MEP rough-in to finishes. The finishes of WestEnd**25** averages a duration of about 90 days per floor but can be overlapped with subsequent floors and sequenced such that trades flow up the building completing the interior finishes by 12/10/09. As previously mentioned the finishes of the first floor will be completed by 8/15/09 for turnover to owner and occupancy by 9/1/09. Substantial completion for the rest of the building will be 12/24/09.

Summary Schedule:



Project Cost Evaluation:

The project cost of WestEnd**25** is$75,881,149 at $234.65 per square foot with a construction cost of $67,241,381 at $207.93 per square foot. The table below shows the breakdown of the building systems cost.

Overall Building		
Building Construction Costs	$67,241,381	$207.93
Total:	$67,241,381	$207.93
Overall Project		
Owner's Project Cost	$75,881,149	$234.65
Total:	$75,881,149	$234.65
Building System	**Cost**	**Cost Per SF (323,380 SF)**
Structural		
Concrete	$5,622,364	$17.39
Steel	$1,982,083	$6.13
Total:	$7,604,447	$23.52
Glazing		
Glazing	$11,132,951	$34.43
Total:	$11,132,951	$34.43
Finishes		
Drywall	$5,356,540	$16.56
Ceramic Tile	$1,750,777	$5.41
Paint	$1,223,796	$3.78
Flooring	$1,046,858	$3.24
Total:	$9,377,971	$29.00
Mechanical		
HVAC/Plumbing	$12,350,000	$38.19
Sprinkler	$909,400	$2.81
Total:	$13,259,400	$41.00
Electrical		
Electrical	$7,435,850	$22.99
Total:	$7,435,850	$22.99