BREADTH ANALYSIS 1:
ARCHITECTURAL ALTERATIONS FROM CONCRETE SYSTEM

Floorplan

Existing Architecture. The focus of the existing layout is both parking orientation and office area efficiency. In the parking area, columns, elevators, and stairwells are situated around driveway areas that are a minimum of 17'-6" wide. Upstairs, the central core housing the elevators, stairwells, and service rooms is centered so it is wide enough between the exterior wall and central core to accommodate offices and internal corridors. Office areas were calculated and assessed using the Building Owners and Managers Association (BOMA) industry standard, where Rentable Area is most affected by Common Areas and Unusable Areas.

Problem. The most significant impact of the new concrete system and column layout would be the location of columns directly over a driveway in the underground parking area; expanding the span from column line 1 to 2 by 2'-6" shifted columns 2'-6" into an already constricted area. Therefore, the central core area will need to be altered and shifted to allow for a minimal 17'-6" wide driveway in the basement.

Proposed Solutions. Though the central core could simply be moved 2'-6" to accommodate a suitable underground parking area layout, three alternate layouts were produced to represent floorplans that maximize rentable office area while minimizing common areas. See Figures 13, 14, 15 and 16.

Based on the given layout, the following requirements were established for each floor:

- Two Stairwells (232 square feet)
- Two Elevators (130 square feet)
- Men's Room (130 square feet) and Women's Room (160 square feet)
- Janitor's Closet (60 square feet) and Tech Room (70 square feet)
- Pump Room (125 square feet) / Electrical Room (275 square feet) in basement
- Three exterior entrances, first floor
- At least two entrances to office areas on Floors 2-4

Floorplans created primarily for the concrete structural system tried to place floor penetrations in the middle strip of each concrete bay, where the slab does not resist as much moment. While all must place elevator shafts and stairwells in some column strips, Alternative #3 most effectively centers these penetrations in bays. Where these openings most strongly affect slab moment resistance, concrete beams will serve as supplements.

From a purely architectural standpoint, the symmetry of Alternatives 1 and 2 are most appealing, and both of these alternatives create a central lobby room. This stands in contrast to the corridor-like spaces most prominent in the original layout. A summary of rentable area is provided in Table 8. Each floorplan presents a reduction in common area and increase in usable area for each office. Given an average annual rental value of $25 for a suburban office in Prince William County, these new floorplans may boost potential owner income by $7425 to $17750.

BOMA Measurement	Existing Layout (ft^2)	Alt #1	Alt #2	Alt #3
Floor 1				
Common Area	1615	1314	1520	1482
Unusable Area	480	480	480	480
(North Office) Rentable Area	1932	2360	2317	2490
(South Office) Rentable Area	2560	1918	1914	2030
(East Office) Rentable Area	4095	4602	4491	4252
Floors 2-4				
Common Area	872	765	840	827
Unusable Area	480	480	480	480
Rentable Area	9381	9520	9435	9448
Total				
Common Area	4231	3609	4040	3983
Unusable Area	1920	1920	1920	1920
Rentable Area	36730	37440	37027	37116
R / U Ratio	16.74%	14.77%	16.09%	15.90%
Underground Parking Spaces	44	48	46	47

Table 8. Summary of Rentable Areas for Three Alternative Floorplans

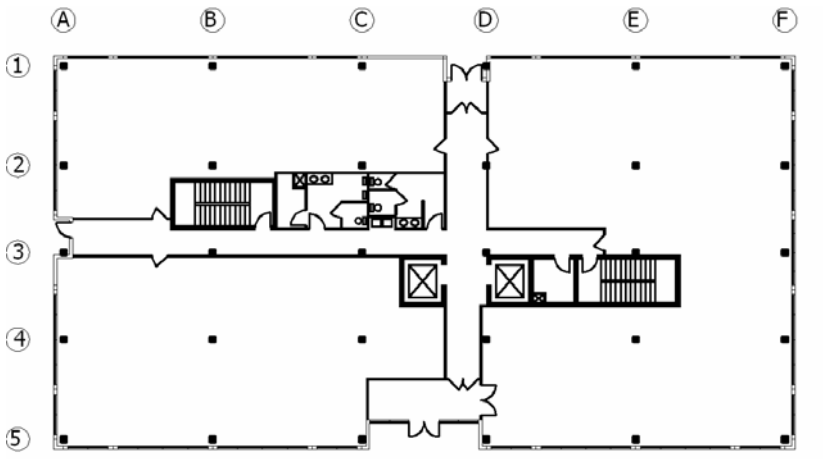

Figure 13A. Existing Layout, First Floor

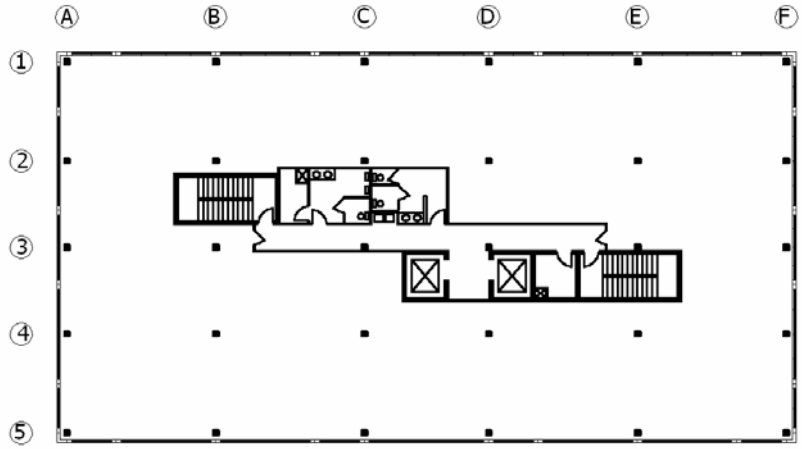

Figure 13B. Existing Layout, Floors 2-4

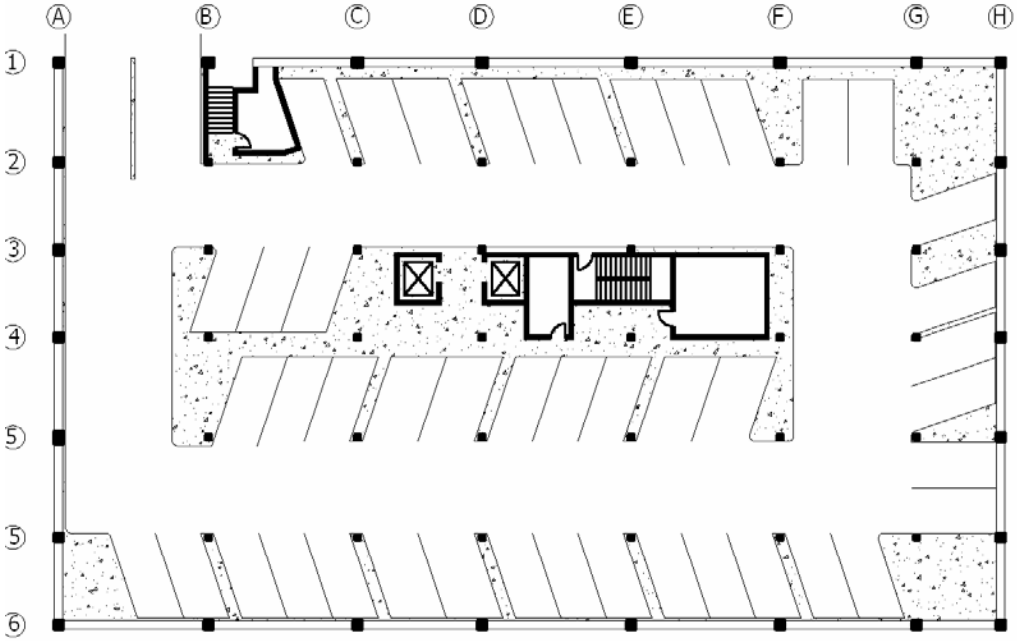

Figure 13C. Existing Layout, Underground Parking Area

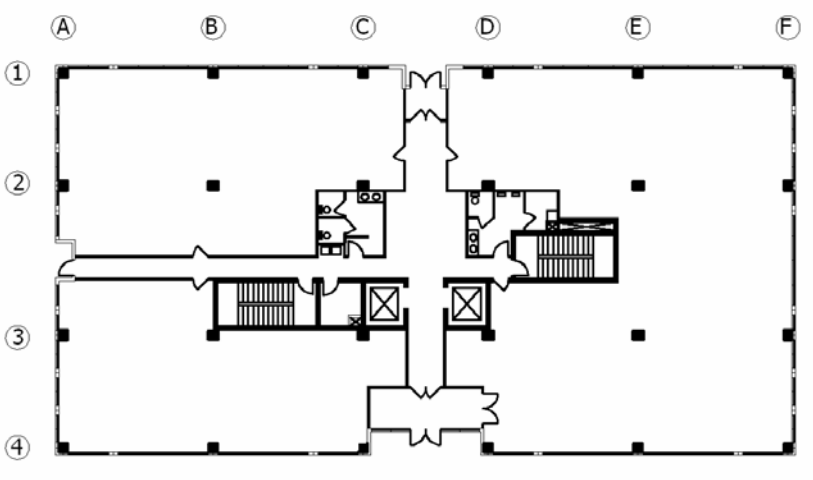

Figure 14A. Alternative #1, First Floor

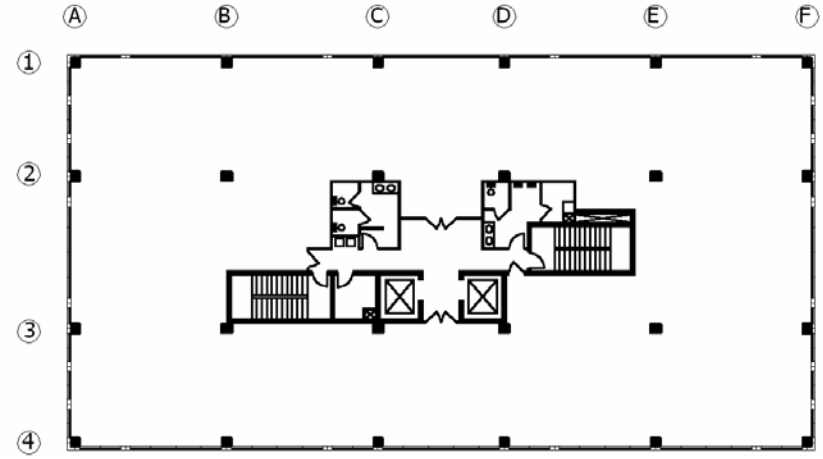

Figure 14B. Alternative #1, Floors 2-4

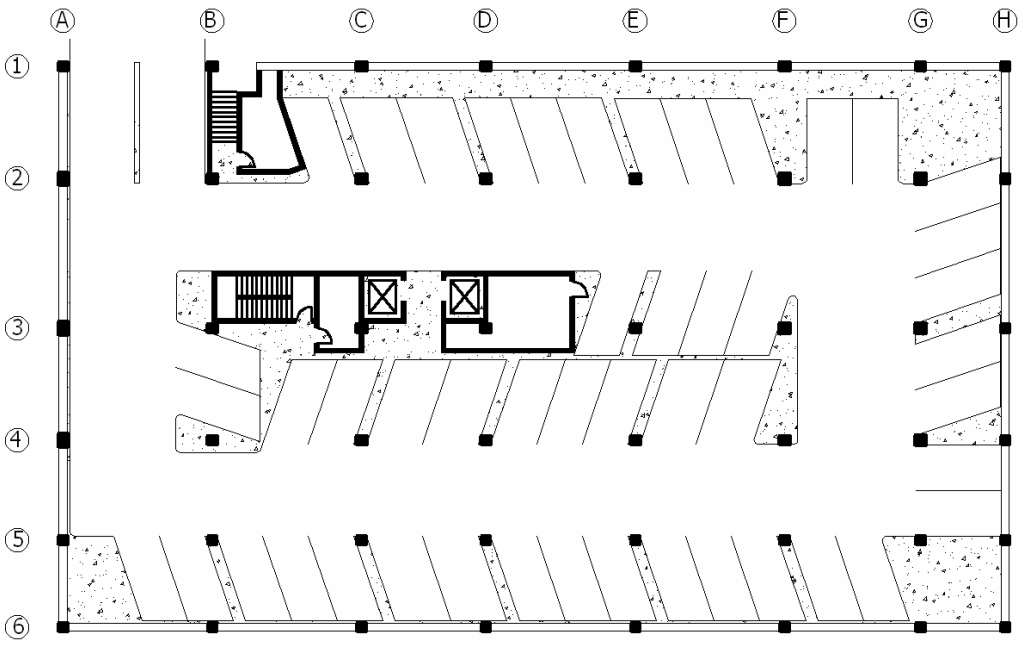

Figure 14C. Alternative #1, Underground Parking Area

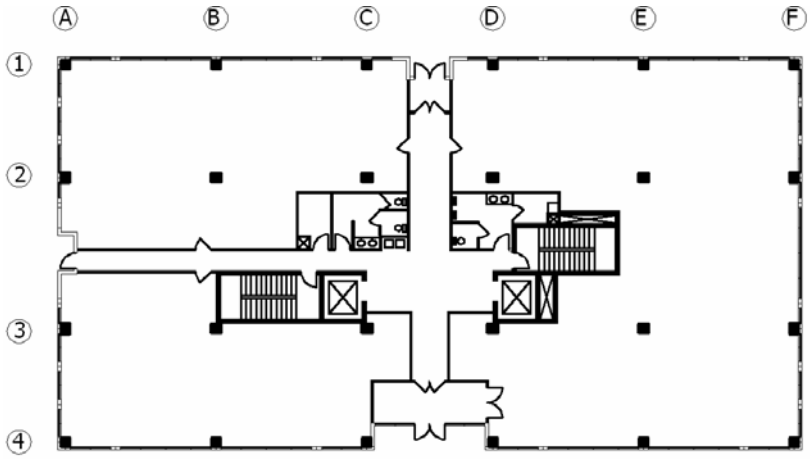

Figure 15A. Alternative #2, First Floor

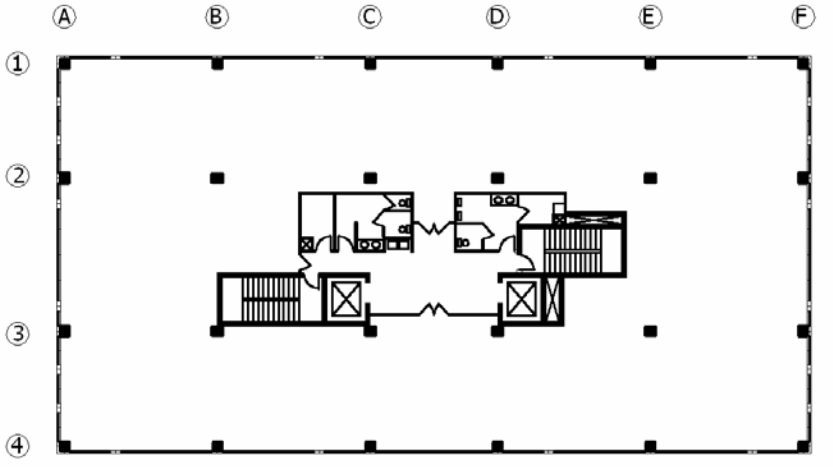

Figure 15B. Alternative #2, Floors 2-4

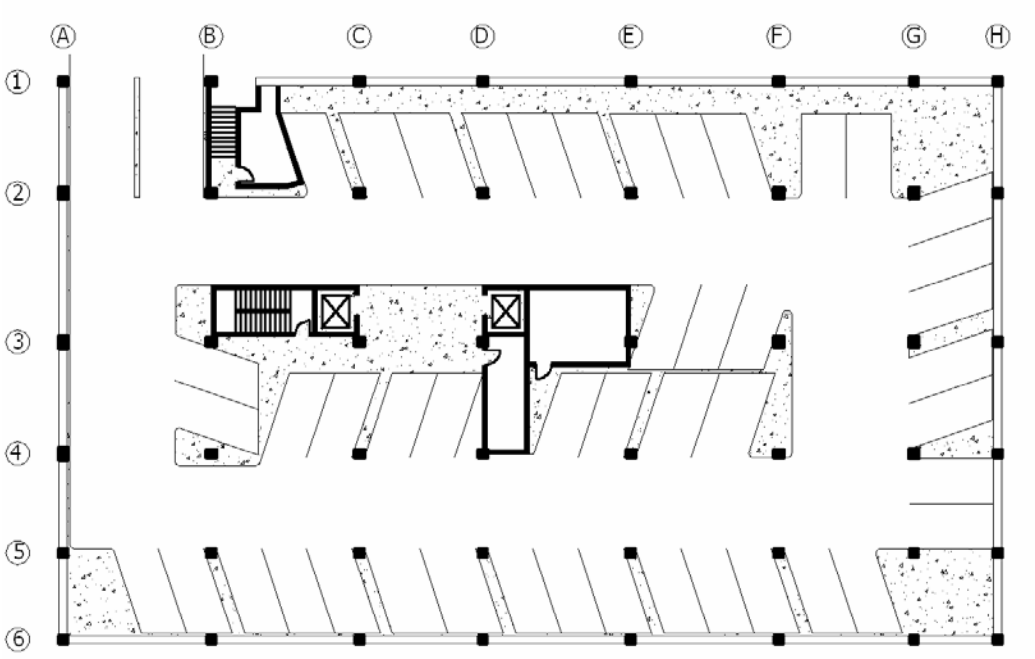

Figure 15C. Alternative #2, Underground Parking Area

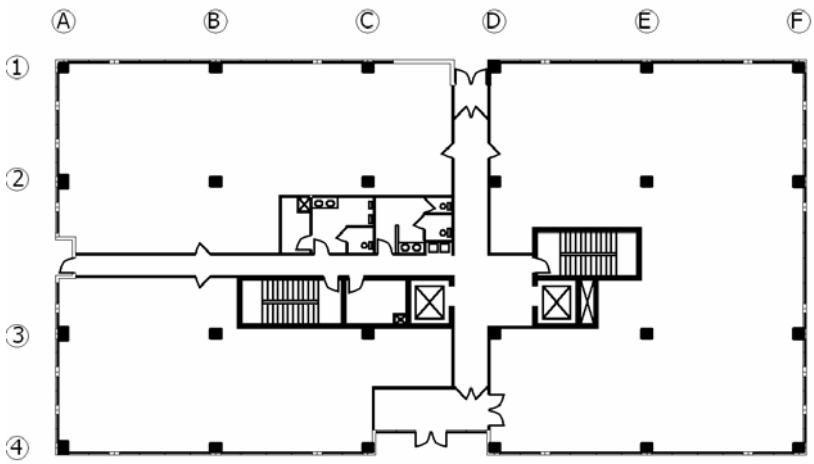

Figure 16A. Alternative #3, First Floor

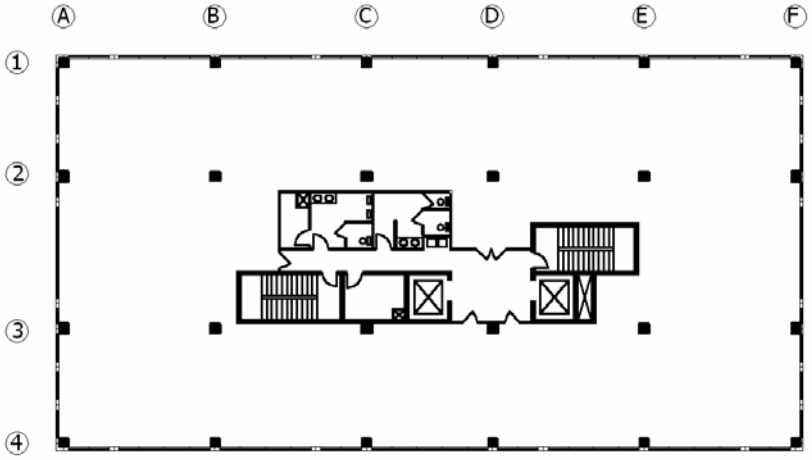

Figure 16B. Alternative #3, Floors 2-4

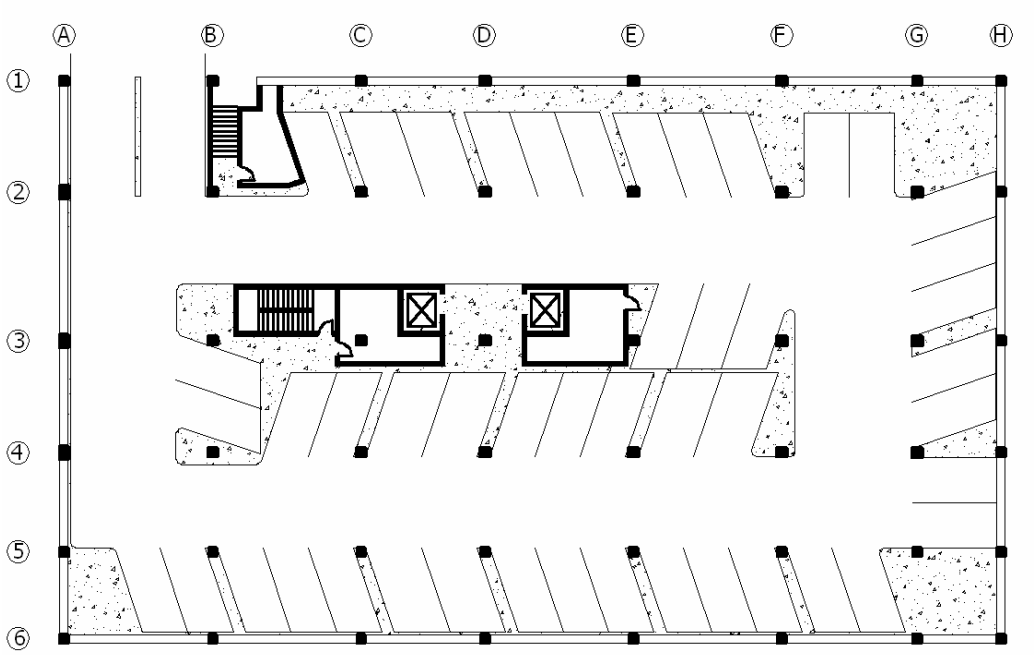

Figure 16C. Alternative #3, Underground Parking Area

Exterior Façade

Existing Architecture. Created from the Slender-Wall system by Smith-Midland, the exterior walls create a traditional Virginian brick look using concrete precast wall panels attached at the floor diaphragm. In order to simplify shipment, these are limited in length to a maximum 30' and certain panels are reused throughout.

Horizontally, the exterior façade adheres to modules that dictate window and brick placement. Used to simplify detailing the exterior façade, the north and south façade use a 5'-0" wide module while the east and west façade combine both 5'-0" and 3'-9" wide modules. Vertically, the façade adheres to the classic tall-office building icon; though modified for suburban purposes, the façade features a base, central shaft, and ornate capital, separated by cornices and differing window styles.

Problem. Though the steel structural system placed W10 columns in front of windows, the new concrete design features columns up to 24" wide. If the existing façade layout were to be used with the new column layout, 24" wide columns would be placed directly in front of windows, blocking views and sunlight. Therefore, the east and west facades must be rearranged in order to coordinate 2'-0" wide brick elements with columns.

Proposed Solutions. The new north-south column layout reflects the existing horizontal façade module; 3'-9" modules could cover the two 22'-6" spans, while 5'-0" modules could cover the 30'-0" span. The two 24x20 columns that would otherwise block the windows therefore are placed behind vertical brick elements and have less impact. See Figure 17 for an alternate facade. Similar panels between the two elevations are highlighted in red, blue and green.

Figure 17. Original Elevation on Left, Rearranged Alternate Elevation on Right

This alternate façade represents the most logical new layout because it uses many similar precast sections with the north and south elevation, it creates a rhythm of windows suited towards dividing the interior into individual offices, and it maintains the vertical distribution of window surfaces.

Though this alternate is the most convenient, the use of precast wall sections for an exterior façade presents an interesting situation: by creating a collage of exterior wall elements, drastically different elevations can be produced. Figure 18 shows a variety of elevations using both 5'-0" and 3'-9" module widths.

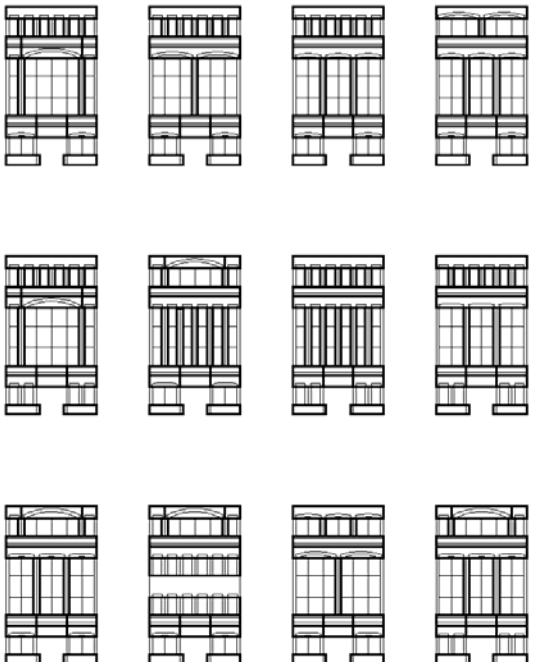

Figure 18A. Collaged 5'-0" Precast Panels

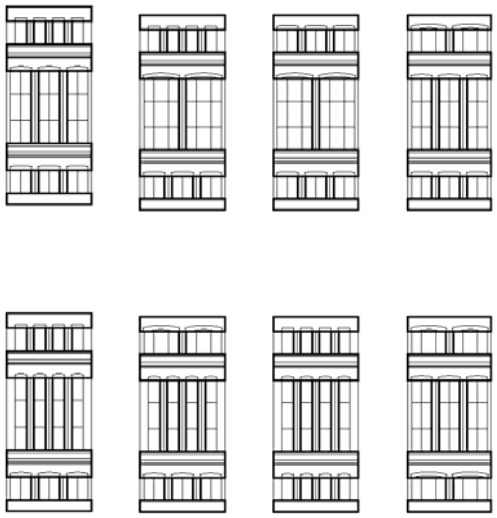

Figure 18B. Collaged 3'-9" Precast Panels

When these façades are combined, drastically different elevations are produced. See Figure 19 for possible combinations. While the first reinforces the dramatic base-shaft-capital building icon through an anonymous grid in the shaft section giving way to wide, arched windows in the capital section, the second reinforces the symmetry found in the original façade while maintaining even spacing for individual office divisions.

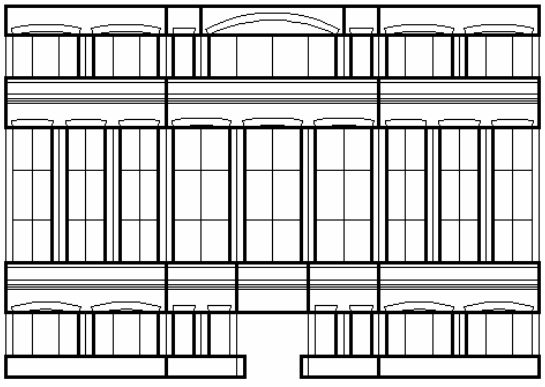

Figure 19A. Base-Shaft-Capital Façade Alternate

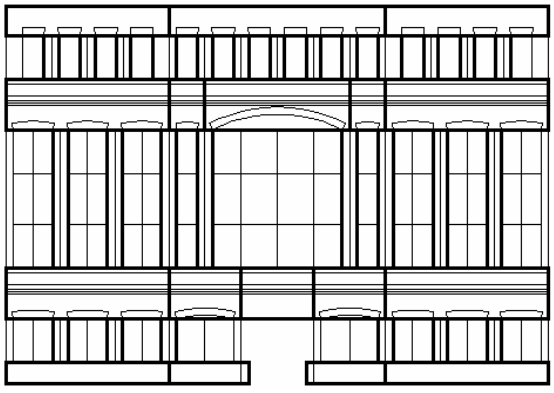

Figure 19B. Symmetrical Façade Alternate