Assumptions

	1992 Model Energy Code	Information Reference	ASHRAE 90.1 - 2007	Information Reference
HVAC Systems				
HVAC System Type	VAV with Reheat	2009 Standard Practice	VAV with Reheat	ASHRAE 90.1 - 2007 Table 11.3.2A
Fan Control	Supply/Return VFD Exhaust: CV No Fan Cycling	2009 Standard Practice AIA Standard	Supply/Return VFD Exhaust: CV No Fan Cycling	ASHRAE 90.1 - 2007 Table 11.3.2A AIA Standard
Fan Static Pressure	Supply: 8" SP Return: 4" SP System Exhaust: 2" SP	2009 Standard Practice	Supply: 6.8" SP Return: 3.35" SP System Exhaust: 1.5" SP	ASHRAE 90.1 - 2007 Table 6.5.3.1.1B
Motor Efficiencies	Supply, Return, and System Exhaust: 93.6%, 93.6%, 93% (Fan Power Limitation and Section 10)	2009 Standard Practice	Supply, Return, and System Exhaust: 93.6%, 93.6%, 93% (Fan Power Limitation and Section 10)	ASHRAE 90.1 -2007: Section 10
Economizer	Enthalpy Based	1992 Energy Code Section 503.7	Enthalpy Based	ASHRAE 90.1 - 2007 Table 6.5.1.1A
Humidifiers	30% Minimum Relative Humidity	2009 Standard Practice	30% Minimum Relative Humidity	ASHRAE 90.1 -2007: Section 6
Kitchen Exhaust	BI Centrifugal Constant Vol., 2" SP	2009 Standard Practice	BI Centrifugal Constant Vol., 1.5" SP *Due to Fan Power Limitation Pressure Drop Adjustment	ASHRAE 90.1 - 2007 Table 6.5.3.1.1B
Outdoor Requirements	Based on ASHRAE 62.1 1999	ASHRAE 62.1- 1999 (earliest version available)	Based on ASHRAE 62.1 2004 (Copy of 2007 is on order.)	ASHRAE 62.1-2004 (most current version available)
Percentage of Outdoor Air	26%	Calculated thru Trace	24%	Calculated thru Trace
VAV Minimums				
CS/Storage	3 Air Changes	AIA Standard	3 Air Changes	AIA Standard
Offices	2 Air Changes	2009 Standard Practice	2 Air Changes	2009 Standard Practice
Emergency Department	7 Air Changes	AIA Standard	7 Air Changes	AIA Standard
Support (including Kitchen area)	6 Air Changes	AIA Standard	6 Air Changes	AIA Standard
Surgical Suite	8 Air Changes	AIA Standard	8 Air Changes	AIA Standard
Radiology	6 Air Changes	AIA Standard	6 Air Changes	AIA Standard
Patient Bays	6 Air Changes	AIA Standard	6 Air Changes	AIA Standard
Core Areas	2 Air Changes	2009 Standard Practice	2 Air Changes	2009 Standard Practice
Plants				
Chiller Type, Capacity, & Efficiency	2 Centrifugal Chillers (in parallel) 4.04 Coefficient of Performance	2009 Standard Practice 1992 Energy Code:Table 503.4.6	2 Centrifugal Chillers (in parallel) 6.1 Coefficient of Performance	ASHRAE 90.1 - 2007 Table 6.8.1C
Cooling Tower	Cooling Tower w/ 2 Speed Fan	2009 Standard Practice	Cooling Tower w/ 2 Speed Fan	ASHRAE 90.1 - 2007 Table 11.3.2A
Chilled Water Loop & Pump Parameters	Variable Speed Chilled Water Pump: 75 ft. head Constant Speed Condenser Water Pump: 60 ft. head	2009 Standard Practice	Variable Speed Chilled Water Pump, 75 ft. head Constant Speed Condenser Water Pump: 60 ft. head	ASHRAE 90.1 - 2007 Table 11.3.2A
Boiler Type, Capacity & Efficiency	Gas-fired Steam Boiler, 80% efficient	2009 Standard Practice 1992 Energy Code:Table 503.4.3	Gas-fired Hot Water Boiler, 80% efficient	ASHRAE 90.1 - 2007 Table 6.8.1F
Hot Water Loop & Pump Parameters	Heating Water Circulation Pump: 60 ft. head	2009 Standard Practice	Heating Water Circulation Pump: 60 ft. head	ASHRAE 90.1 - 2007 Table 11.3.2A
Domestic Hot Water System	Hourly Demand: 116 gpm Gas-fired Hot Water Boiler: 75% Efficient Domestic Hot Water Pump: 60 ft. Head	2009 Standard Practice 1992 Energy Code:Section 5.4.2.1.2	Hourly Demand: 116 gpm Gas-fired Hot Water Boiler: 80% Efficient Domestic Hot Water Pump: 60 ft. Head Condenser Heat Recovery	ASHRAE 90.1 - 2007 Table 7.8 Section 6.5.6.2
Utilities	Electricity: $0.085/kwh Gas: $0.95/therm	Local Costs	Electricity: $0.085/kwh Gas: $0.95/therm	Local Costs

Assumptions

	1992 Model Energy Code	Information Reference	ASHRAE 90.1 - 2007	Information Reference
Weather Data	South Bend, Indiana Summer: 89 DB / 73 WB Winter: 1	ASHRAE Fundamentals	South Bend, Indiana Summer: 89 DB / 73 WB Winter: 1	ASHRAE Fundamentals
Thermostat	Cooling: 73 Heating: 70	AIA Standards	Cooling: 73 Heating: 70	AIA Standards
Supply Air	Cooling: 55 Heating: 95		Cooling: 55 Heating: 95	
Building Envelope				
Above Grade Wall Construction	U = 0.32	1992 Energy Code Table 502.3.1	Steel Framed: U=0.064	ASHRAE 90.1 - 2007 Table 5.5-5
Roof Construction	U = 0.074	1992 Energy Code Table 502.3.1	Insulation Above Deck: U = 0.048, Reflectivity = 0.3	ASHRAE 90.1 - 2007 Table 5.5-5
Slab-on-grade Construction	6" Slab, U = 0.056	1992 Energy Code Table 502.3.1 2009 Standard Practice	6" Slab, F=0.730, U=0.02	ASHRAE 90.1 - 2007 Table 5.5-5
Fenestration Type	Metal Framing (Storefront/Curtain wall)	2009 Standard Practice	Metal Framing (Storefront/Curtain wall)	ASHRAE 90.1 - 2007 Table 5.5-5
Fenestration Assembly U-Factor	U =0.45	2009 Standard Practice	U =0.45	ASHRAE 90.1 - 2007 Table 5.5-5
Fenestration Shading Coefficient	SC = 0.46	2009 Standard Practice	SC = 0.46	ASHRAE 90.1 - 2007 Table 5.5-5
Infiltration	0.66 cfm/sqft (average construction)	ASHRAE Fundamentals 1985	0.4 cfm/sqft	ASHRAE 90.1 - 2007 Section 5.4.3.2
Electrical Systems & Process Loads				
Ambient Lighting Density	1.5 W/sqft	2009 Standard Practice	1.2 W/sqft	ASHRAE 90.1 - 2007 Table 9.5.1
Parking Garage	0.3 W/sqft	2009 Standard Practice	0.3 W/sqft	ASHRAE 90.1 - 2007 Table 9.5.1
Façade Lighting	5.3 kW	1992 Energy Code	1.24 kW	ASHRAE 90.1 - 2007 Section 9.4.5
Receptacle Equipment				
CS/Storage	8 BTUH/sqft	2009 Standard Practice	8 BTUH/sqft	2009 Standard Practice
Offices	8 BTUH/sqft	2009 Standard Practice	8 BTUH/sqft	2009 Standard Practice
Emergency Department	15 BTUH/sqft	2009 Standard Practice	15 BTUH/sqft	2009 Standard Practice
Support (including Kitchen area)	25 BTUH/sqft	2009 Standard Practice	25 BTUH/sqft	2009 Standard Practice
Surgical Suite	25 BTUH/sqft	2009 Standard Practice	25 BTUH/sqft	2009 Standard Practice
Radiology	20 BTUH/sqft	2009 Standard Practice	20 BTUH/sqft	2009 Standard Practice
Patient Bays	3 BTUH/sqft	2009 Standard Practice	3 BTUH/sqft	2009 Standard Practice
Core Areas	11 BTUH/sqft	2009 Standard Practice	11 BTUH/sqft	2009 Standard Practice

Fiscal Impact Summary

Criteria	1992 Energy Code	Financial Estimate	ASHRAE 90.1 2007	Financial Estimate	Fiscal Impact
Architecture					
Above Grade Wall Construction 115,688 sqft.	U = 0.32	$20,900	Steel Framed: U=0.064	$64,800	$43,900
Roof Construction 160,000 sqft	U = 0.074	$231,600	Insulation Above Deck: U = 0.048 Reflectivity = 0.3	$334,500	$102,900
Slab-on-grade Construction 160,000 sqft.	6" Slab, U = 0.056	No significant change from ASHRAE 90.1	6" Slab, F=0.730, U=0.02	No significant change from 1992 Model Energy Code	$0
Mechanical					
Air Distribution	Supply: 8" SP; 535,258 CFM Return: 4" SP System Exhaust: 2" SP Kitchen Exhaust: 2" SP Ventilation Requirements: Based on ASHRAE 62.1-1999	$16,911,200	Supply: 6.8" SP; 458,158 CFM Return: 3.35" SP System Exhaust: 1.5" SP Kitchen Exhaust: 1.5 SP Ventilation Requirements: Based on ASHRAE 62.1-2004	$15,922,800	-$988,400
Cooling	Centrifugal Chillers (in parallel) 4.04 Coefficient of Performance Cooling Tower w/ 2 Speed Fan Cooling Load: 1,952 tons	$3,125,200	Centrifugal Chillers (in parallel) 6.1 Coefficient of Performance Cooling Tower w/ 2 Speed Fan Cooling Load: 1,581 Tons	$2,784,400	-$340,800
Heating	Gas-Fired Steam Boiler: 80% Efficiency Heating Load: 28,509 MBH	$5,748,100	Gas-Fired Hot Water Boiler: 80% Efficient Heating Load: 24,465 MBH	$5,426,000	-$322,100
Electrical					
Power	6,000 KW	$7,855,400	5,000KW	$7,200,800	-$654,600
Lighting	1.5 W/sqft	$5,478,400	1.2 W/sqft	$4,821,000	-$657,400
Lighting Control	No Occupancy Sensor Controls	$0	Occupancy Sensor Controls	$100,000	$100,000
Plumbing					
Service Heating	Gas-fired Hot Water Boiler: 75% Efficient Consumption: 77.4 Therms	$0	Gas-fired Hot Water Boiler: 80% Efficient with Condenser Heat Recovery Consumption: 72.6 Therms	$50,000	$50,000
Note: Costs are NOT representative of square foot costs or any other metric used to compare or estimate construction costs. These costs represent only the differences that are affected by the comparison of the 90.1 ASHRAE Energy Standard and the 1992 Model Energy Code.				**TOTAL**	**-$2,666,500**
				TOTAL/SQFT	**-$6.67**