WESTINGHOUSE ELECTRIC NUCLEAR ENGINEERING HEADQUARTERS

DANIEL AUGHENBAUGH - MECHANICAL OPTION

Daniel Aughenbaugh
Mechanical Option

Westinghouse Nuclear Engineering Headquarters

PRESENTATION OUTLINE

INTRODUCTION

EXISTING MECHANICAL SYSTEM

MYDESIGN ANALYSES

DEDICATED OUTDOOR AIR SYSTEM
GROUND SOURCE HEAT PUMP PLANT
CENTRAL PLANT
PLANT INITIAL COST
PLANT LIFECYCLE COST

ARCHITECTURAL STUDY- FAÇADE REDESIGN

CONCLUSIONS

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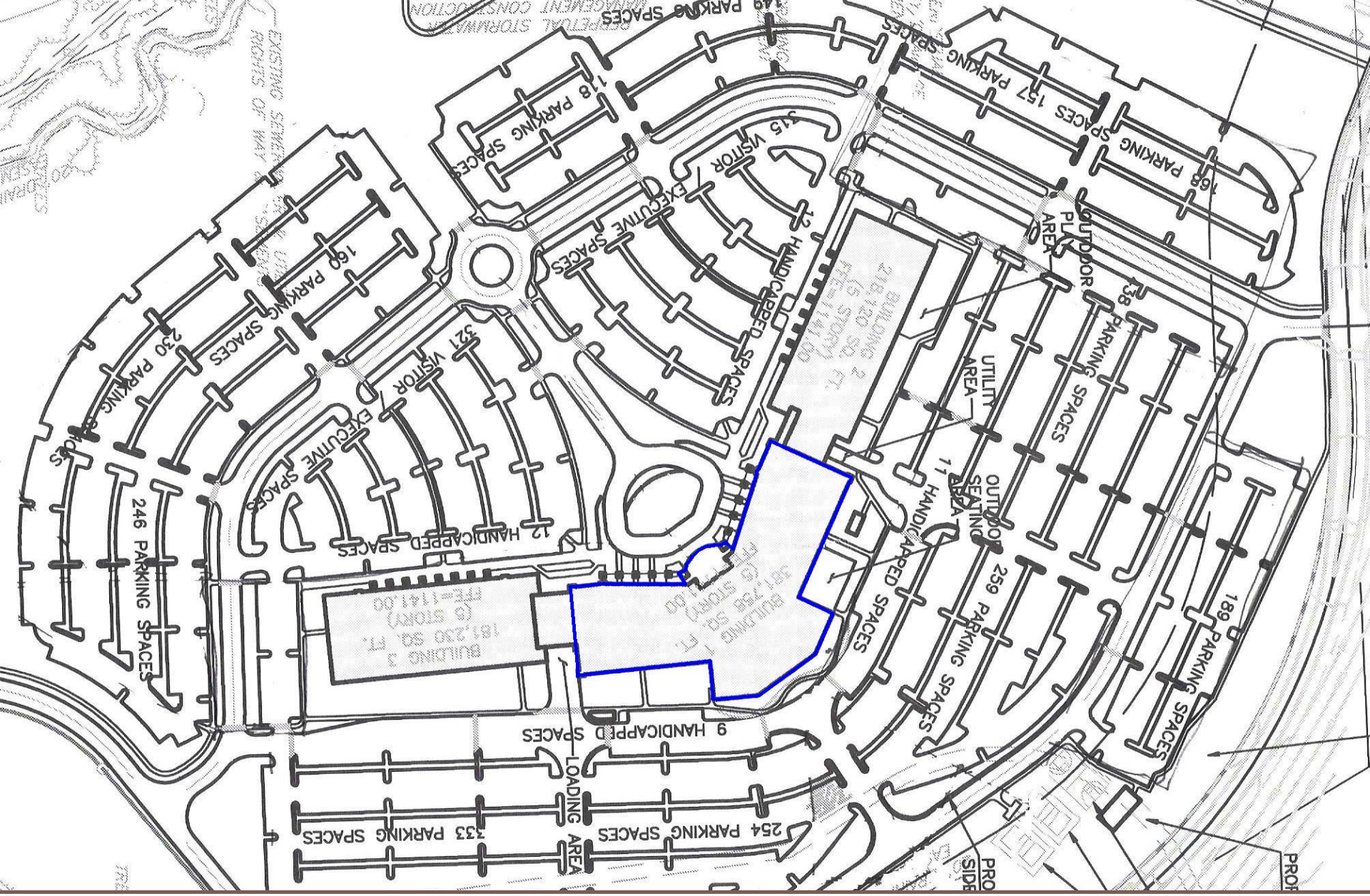
FACILITY INFORMATION

LOCATION:	PITTSBURGH AREA
PROJECT COST:	$240 MILLION
COMPLEX SIZE:	3 BUILDINGS (4-5 LOORS)
	844,600 SF
OCCUPANCY TYPE:	OPEN OFFICE
DELIVERY METHOD:	DESIGN-BID-BUILD JOINT VENTURE
CONSTRUCTION PERIOD:	2/2008 - 5/2010



Introduction

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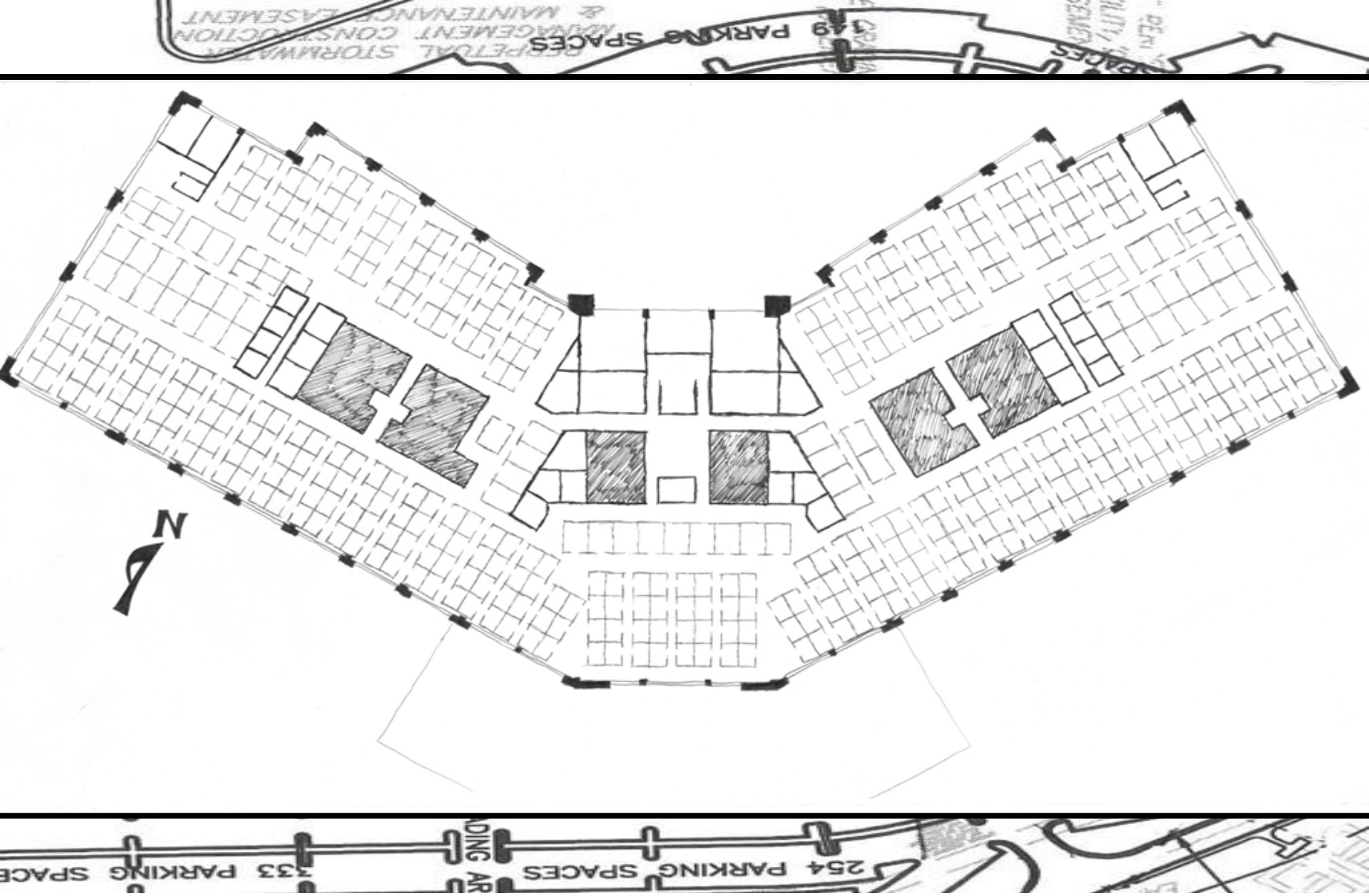

Introduction

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Facility Mechanical Information

Program is largely open office space with a Cafeteria, Data Center, and Fitness Center

Façade is approximately 40% glazing for all orientations

VAV system conditions the Office Spaces

CRAC Units condition the Data Center

Four Air Handling Units supply 293,600 CFM and 40% OA

Three 450 Ton Chillers and Cooling Towers

Electric Resistance Re-heat

Redesign Analyses

Redesign Analyses

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Redesign Analyses

1. Reduce Plant Loads with a Dedicated Outdoor Air System
2. Investigate a Hybrid Ground Source Heat Pump Plant
3. Investigate a Central Plant

Redesign Analyses

Energy Use

Initial Cost

Lifecycle Cost

Indoor Air Quality

Environmental Impact

Construction Impact

Operation and Maintenance

Dedicated Outdoor Air System

DOAS

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Dedicated Outdoor Air System

1. Less Ventilation Air
2. Indoor Air Quality
3. Sensible and Latent Loads are decoupled

DOAS

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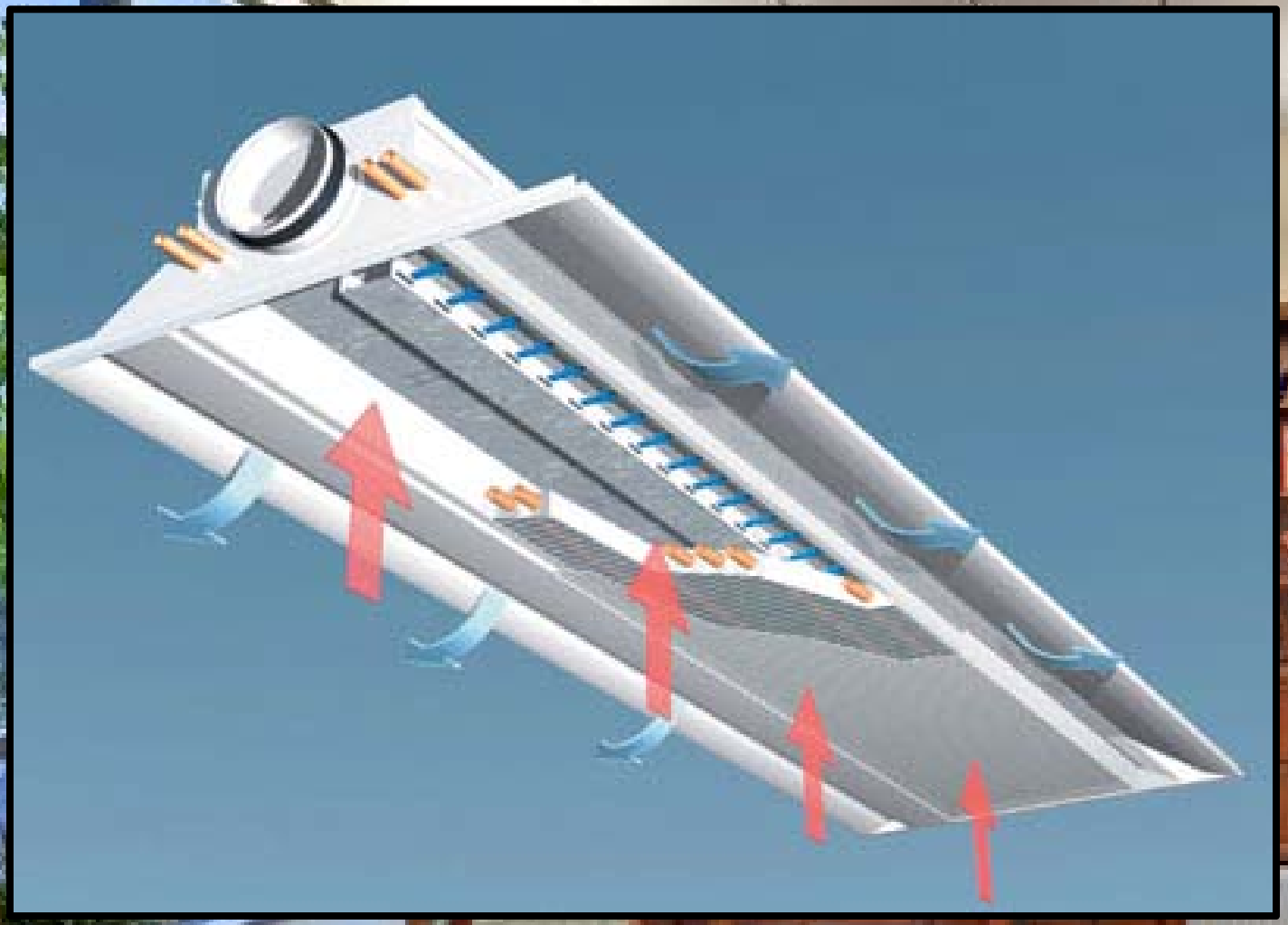
Plant Load Reduction

Proposed:

1. Active Chilled Beams (ACB)
2. DOAS Fan Powered Terminal Units (FPT)
3. ACBs to condition Core Office Areas, DOAS FPTs to condition Perimeter Office Areas

Active Chilled Beams



DOAS

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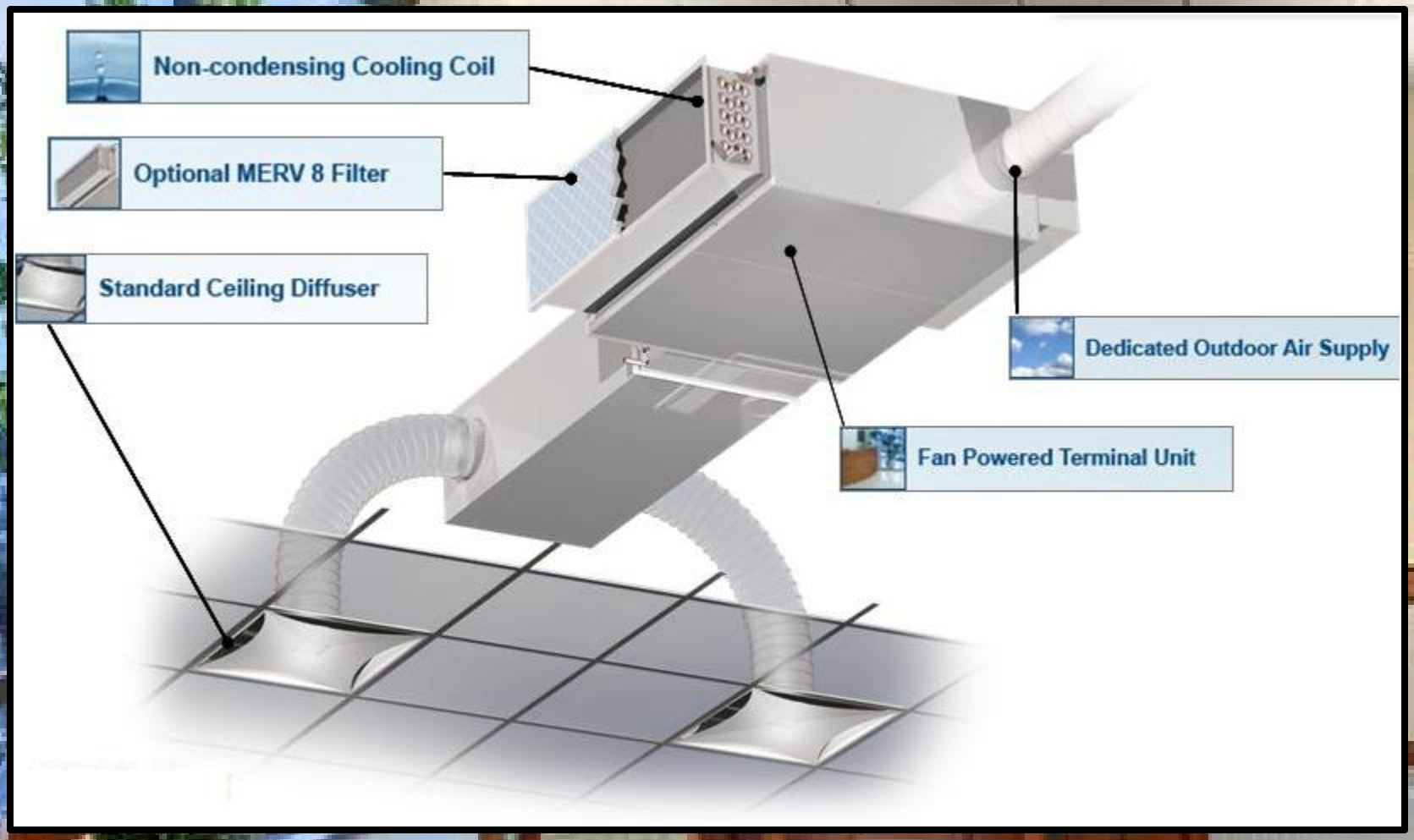
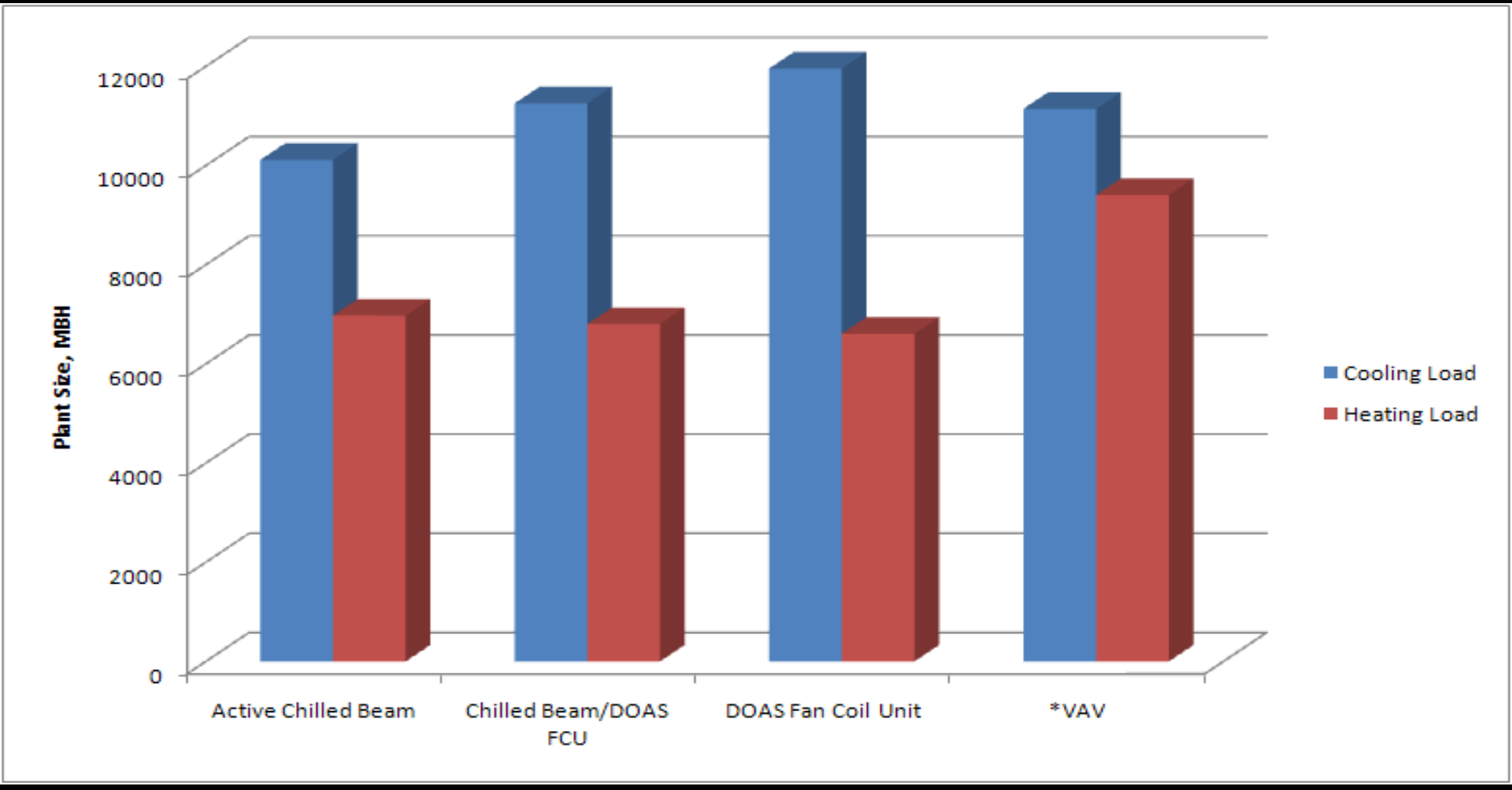
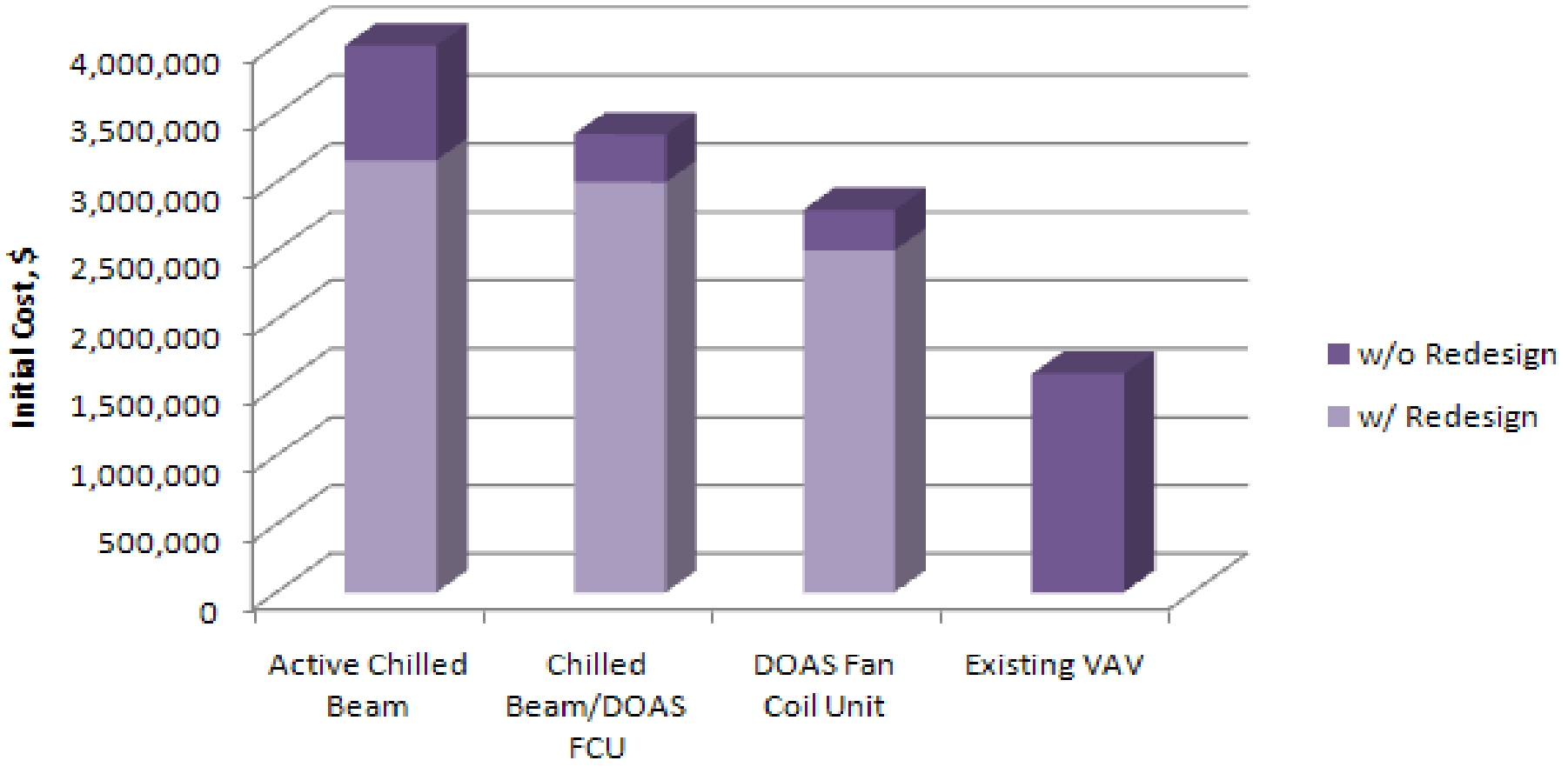
DOAS Fan Powered Terminal Units



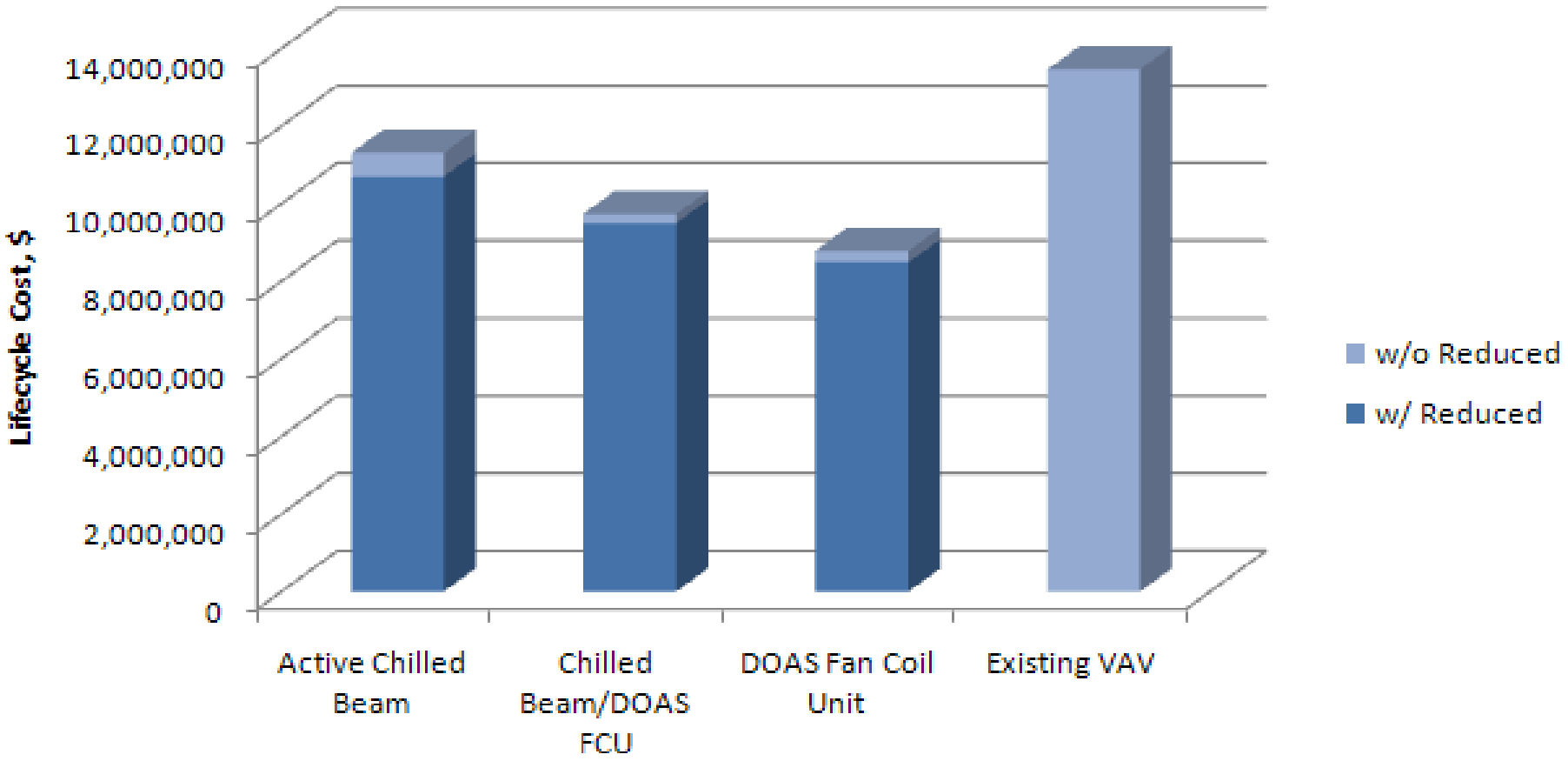
Plant Loading



System Initial Cost



System Life Cycle Cost



Hybrid Ground Source Heat Pump Plant

Hybrid GSHP

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Hybrid GSHP Plant Schematic

Hybrid GSHP

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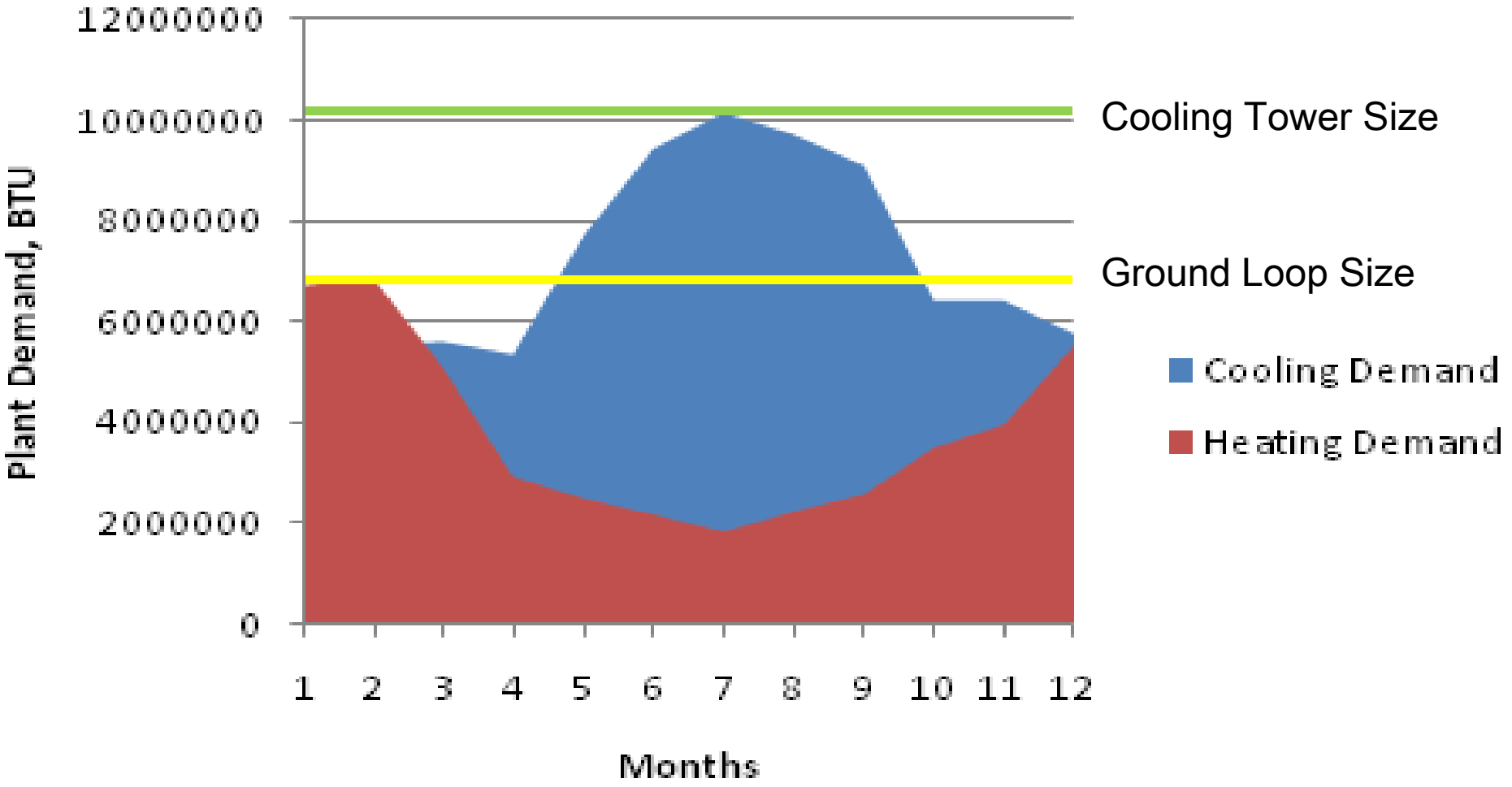
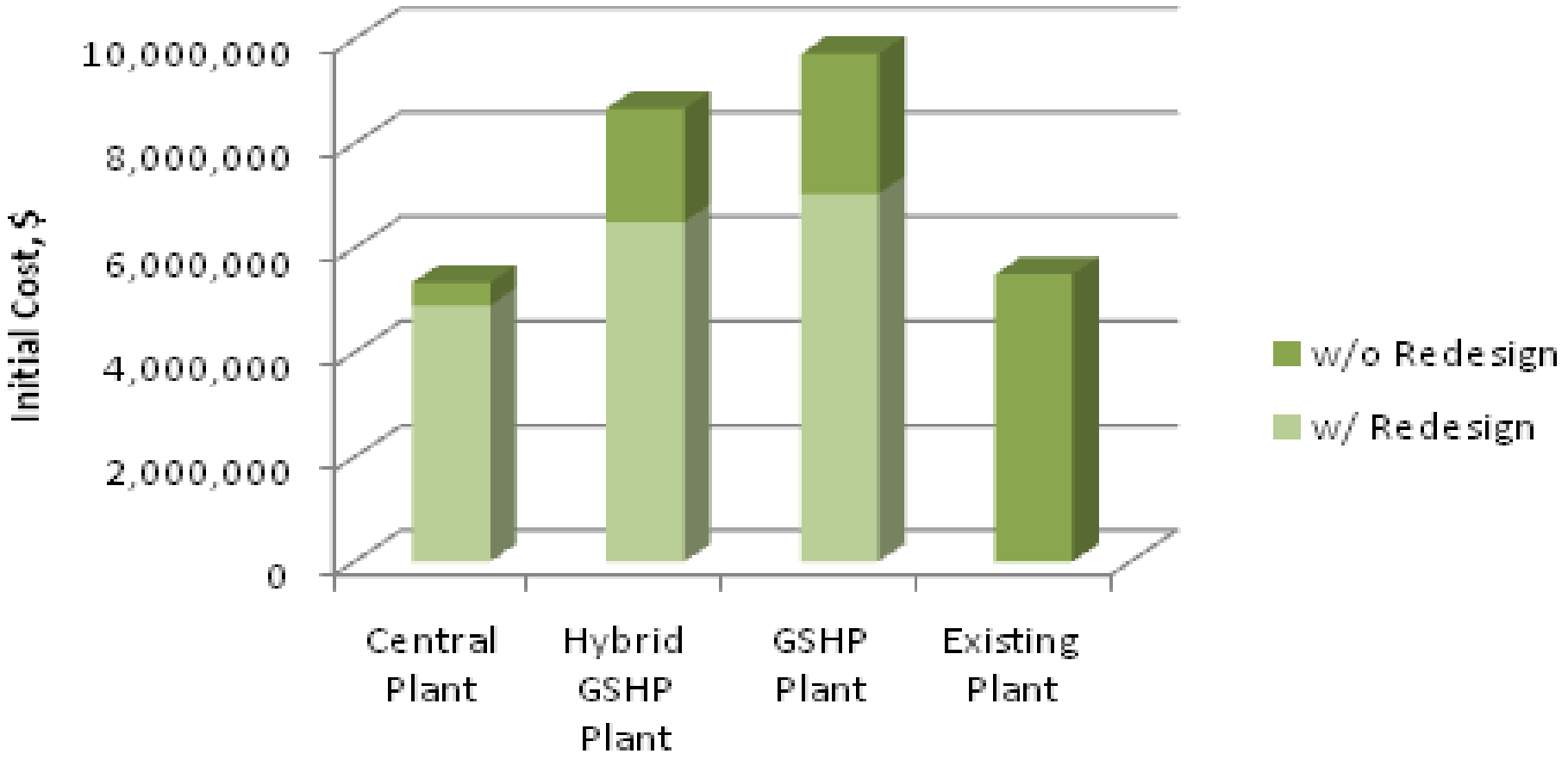
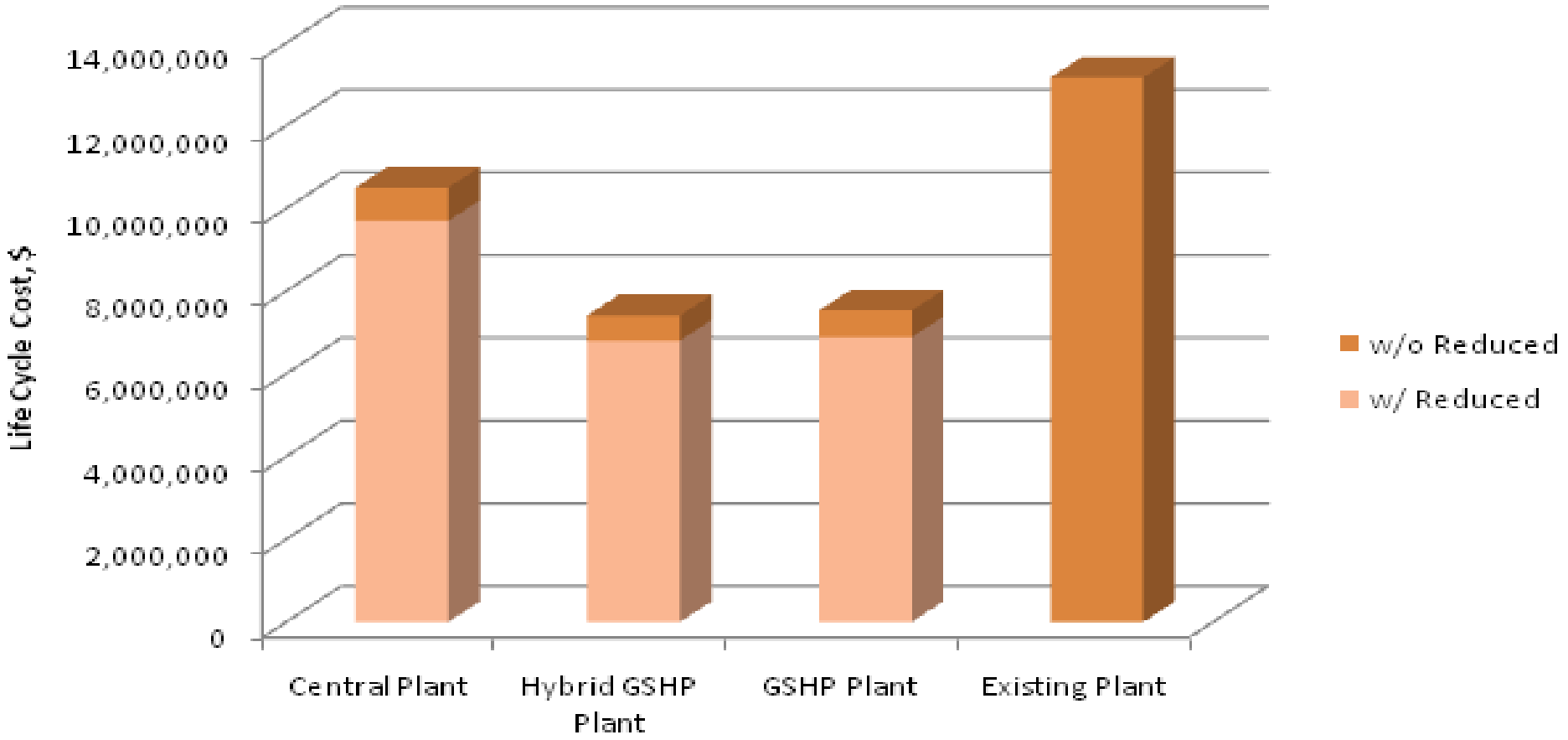
Hybrid GSHP Sizing



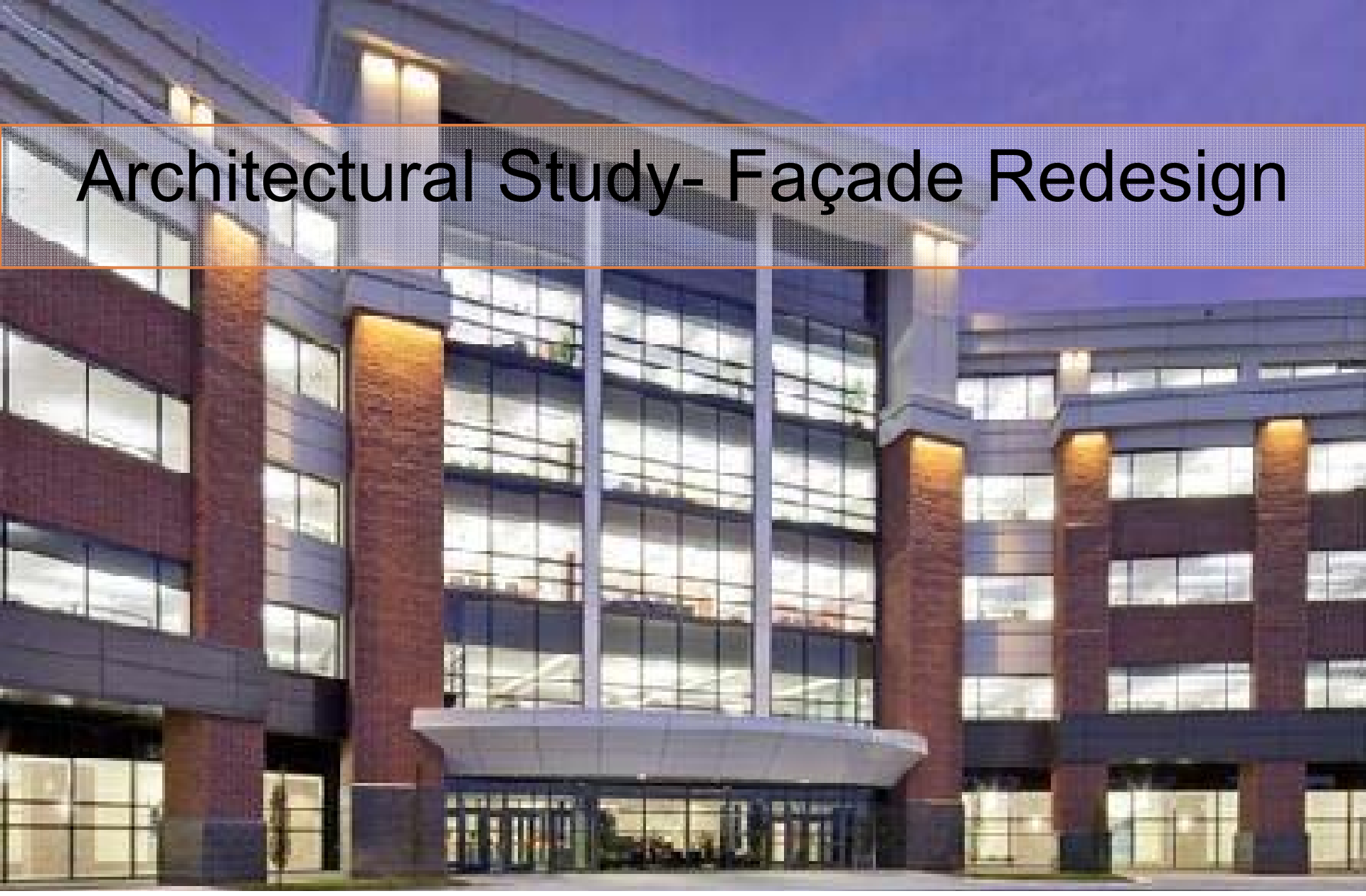
Plant Initial Cost



Plant Lifecycle Cost



Architectural Study- Façade Redesign



Architecture

Westinghouse Nuclear Engineering Headquarters

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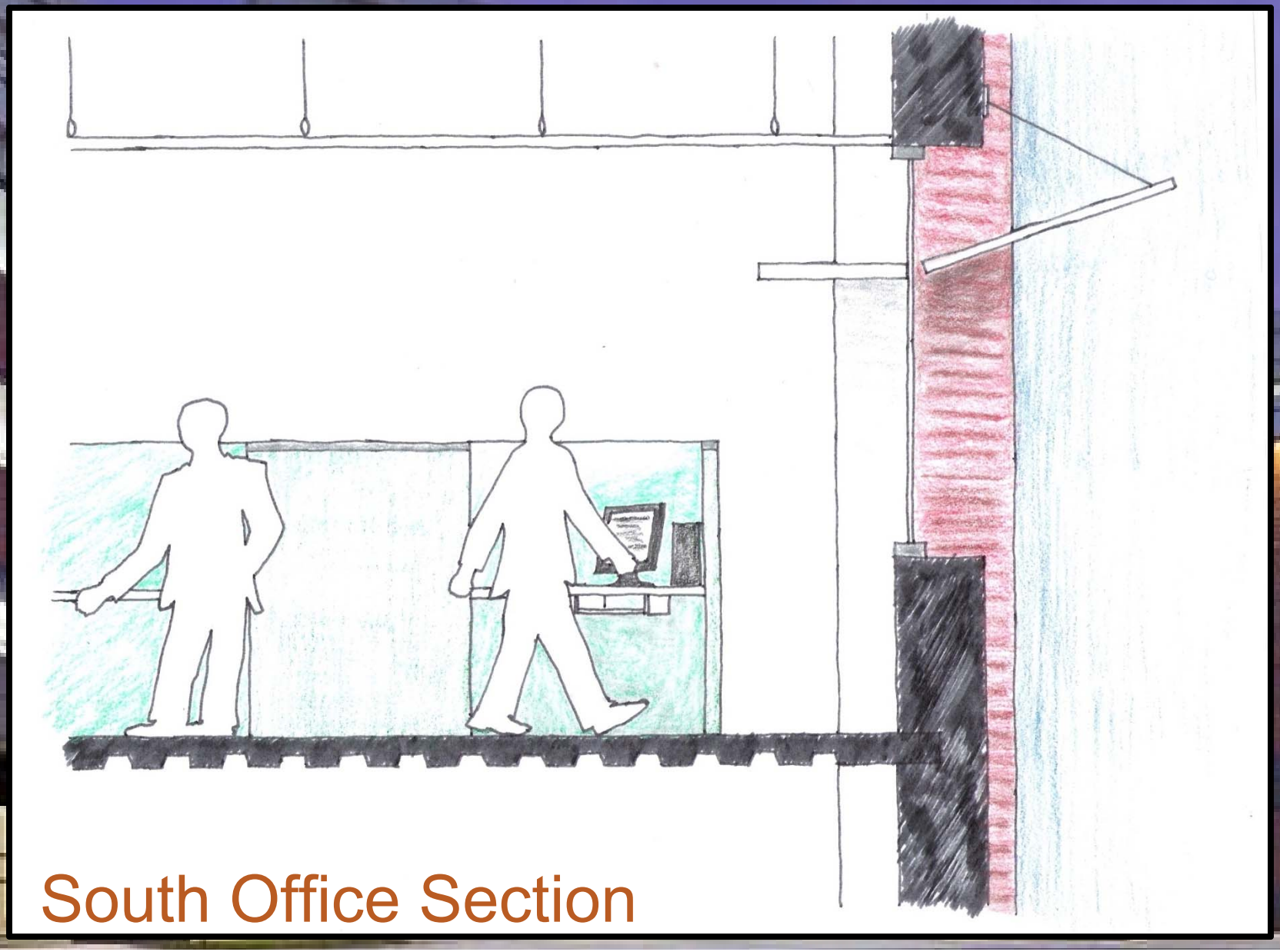

South Office Section

North Office Redesign

Architecture

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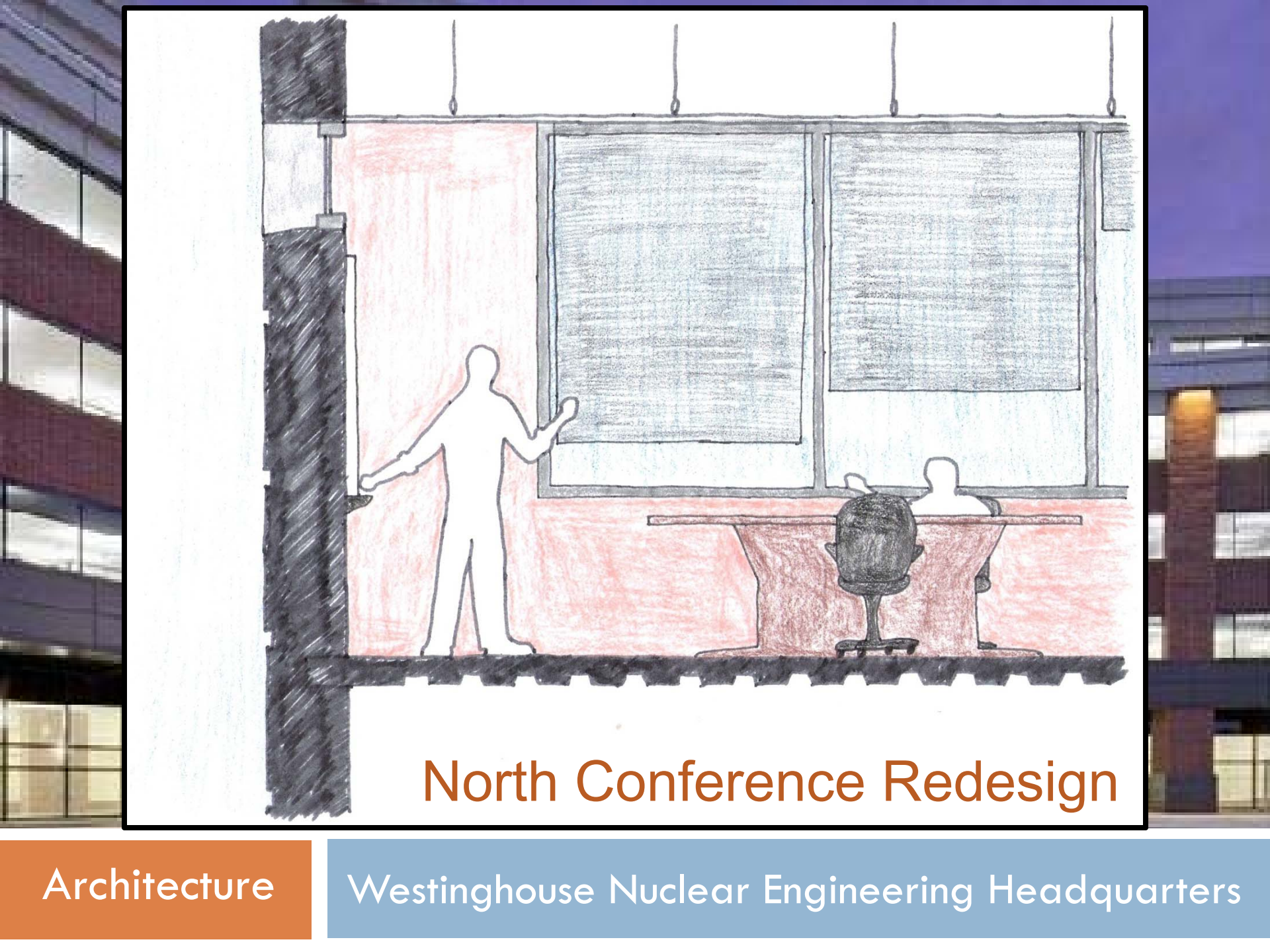

Architecture

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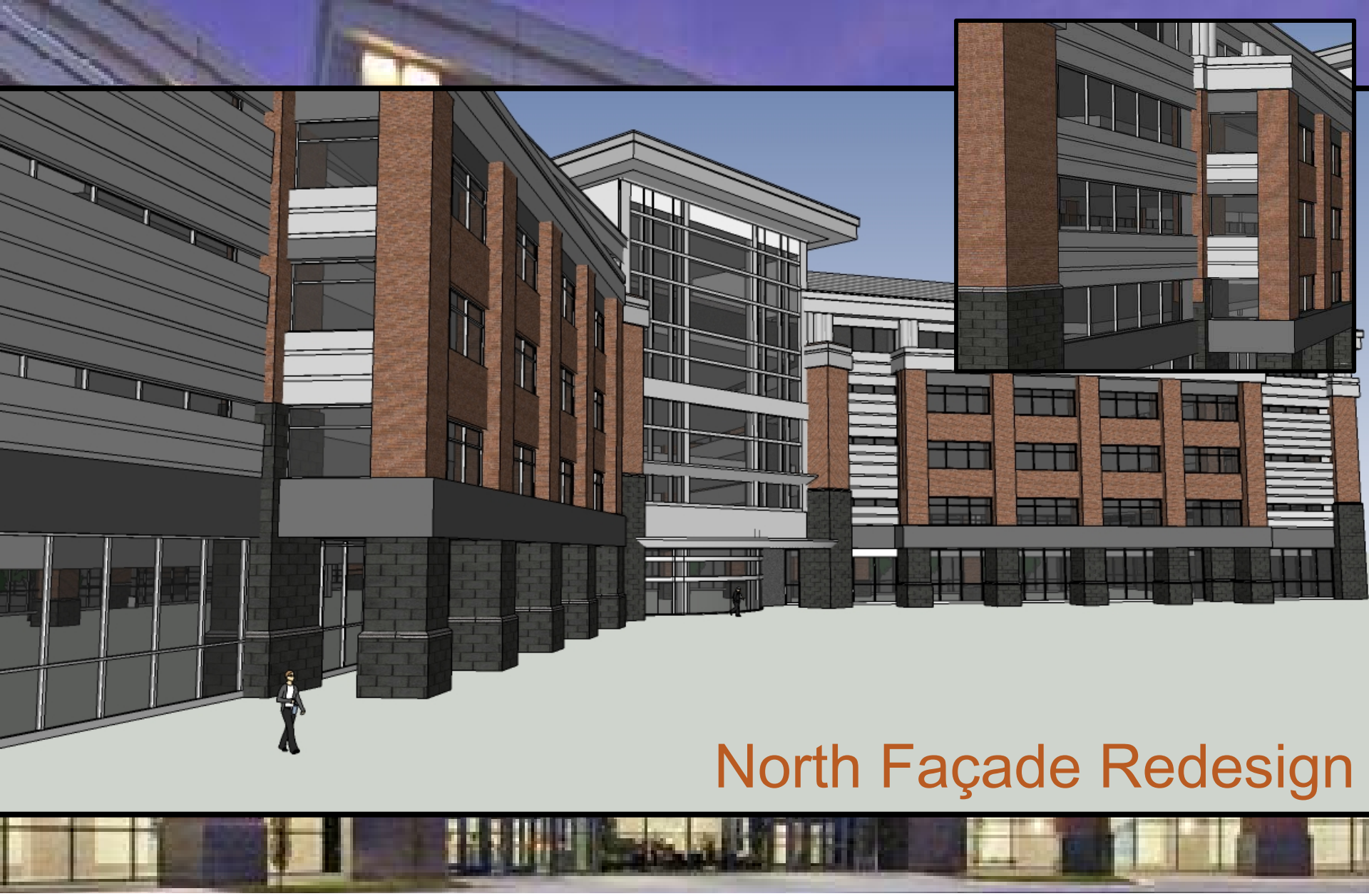

North Façade Redesign

Architecture

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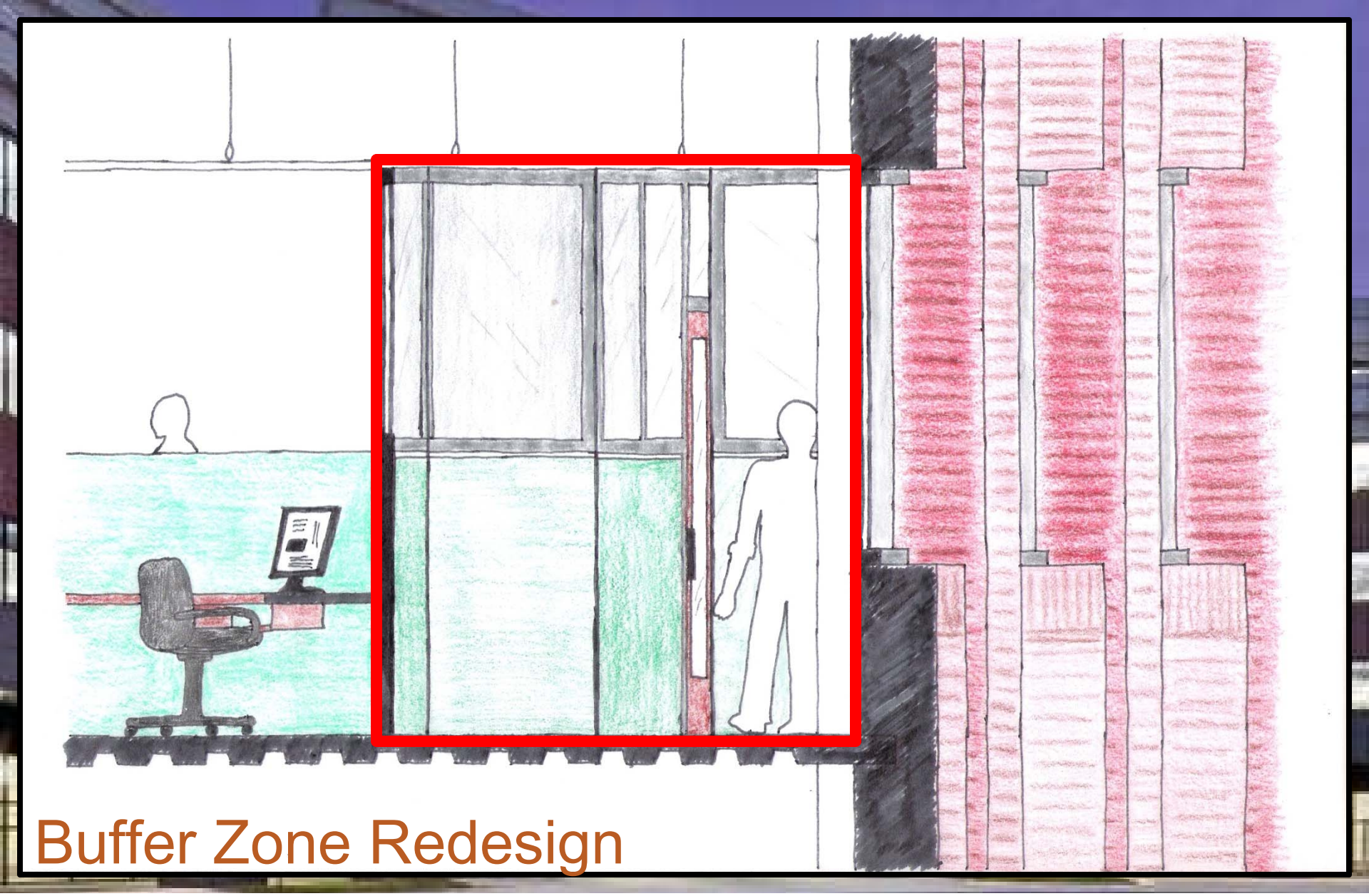

Buffer Zone Redesign

Architecture

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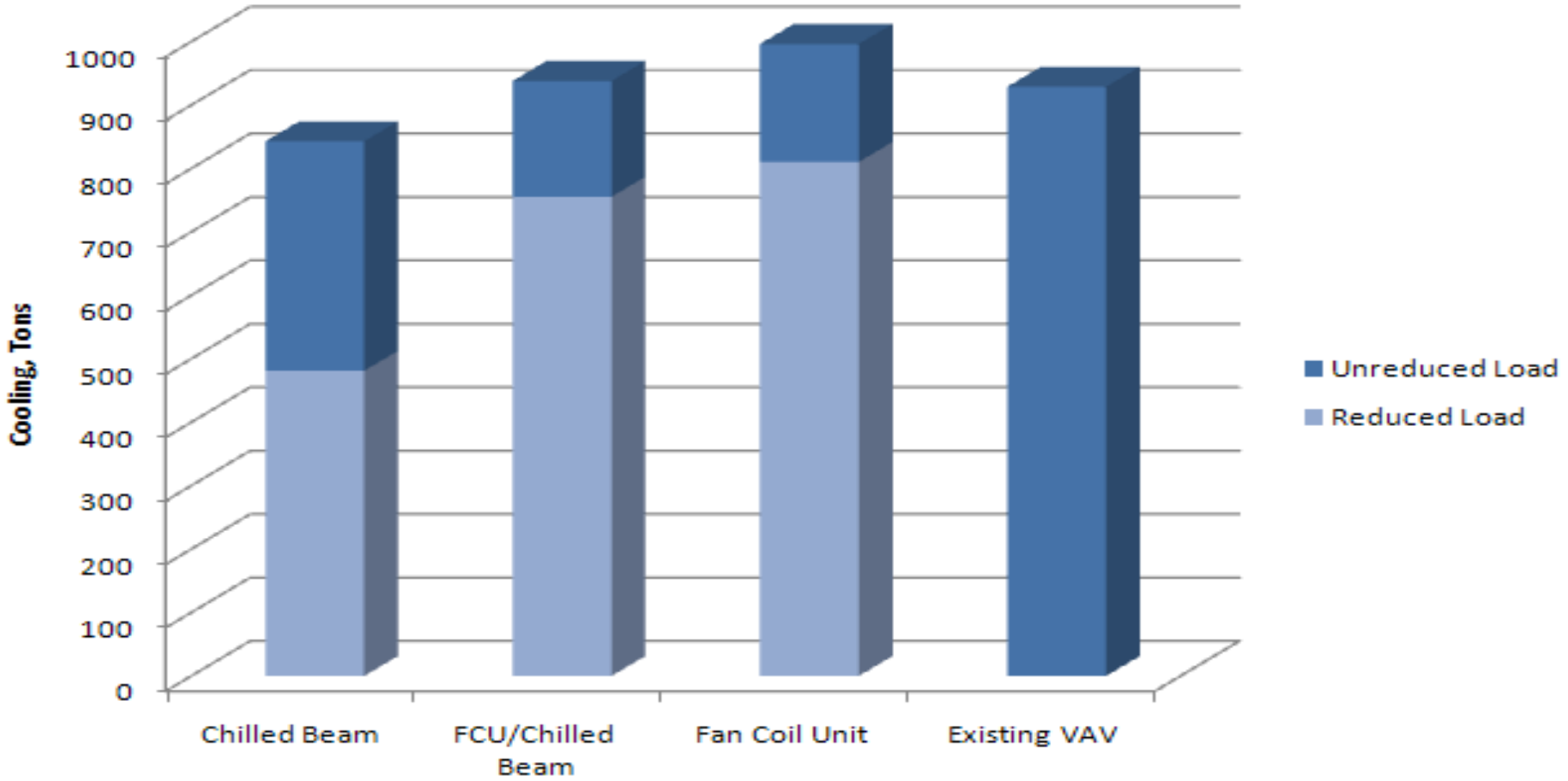
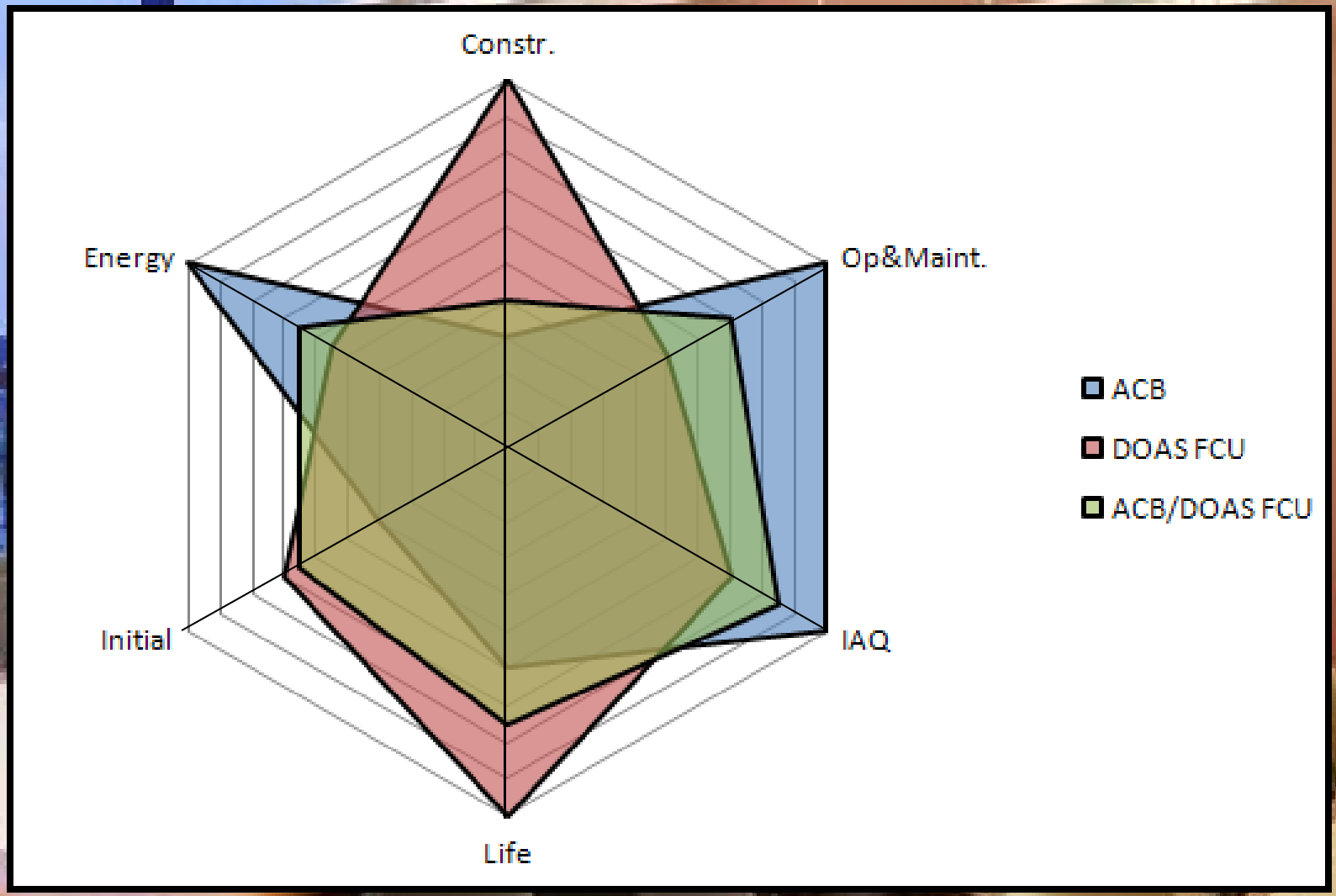
Plant Impact

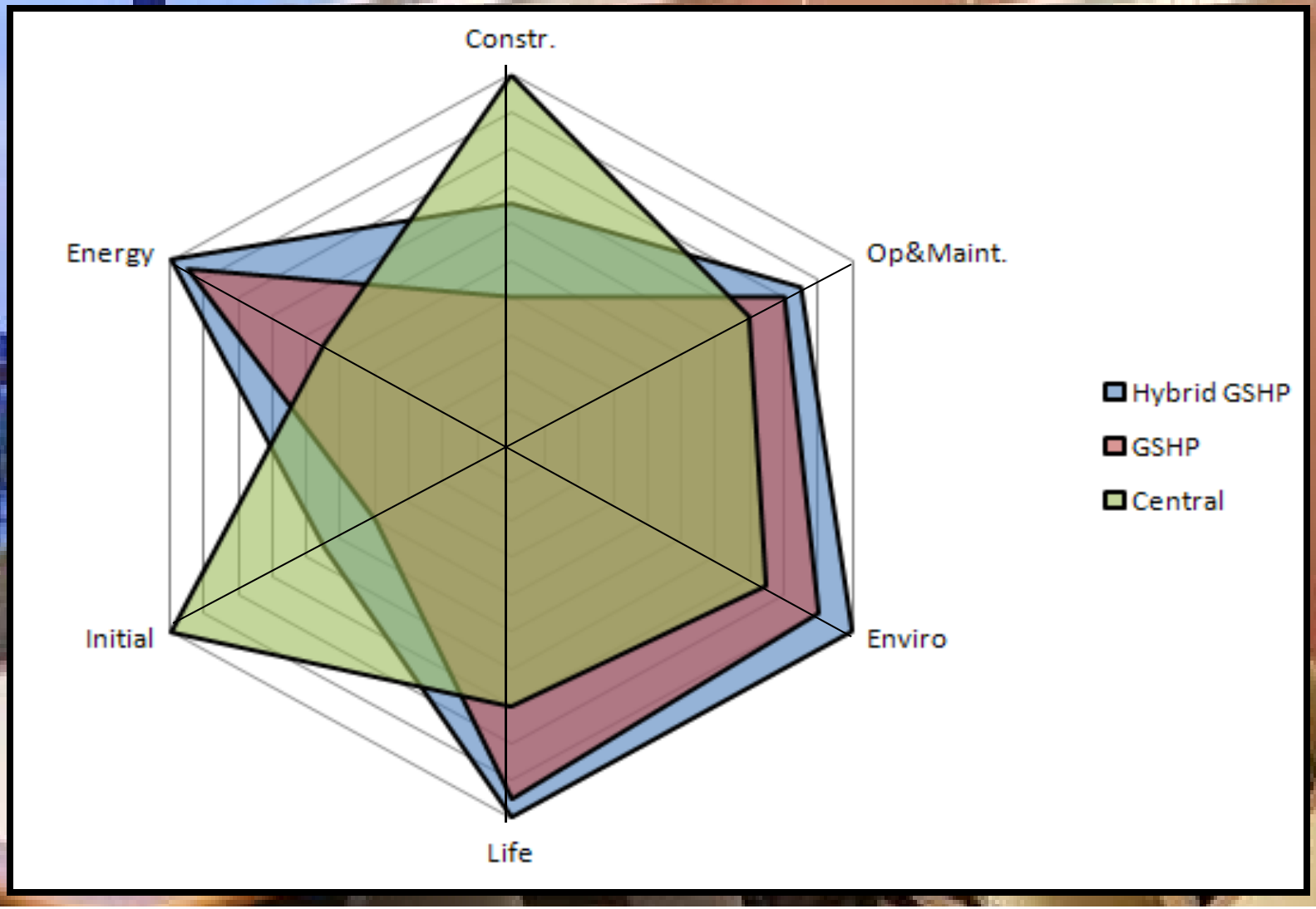


Conclusions

Conclusions: Air Systems



Conclusions: Mechanical Plant



Conclusions

The best alternate Air System for the Westinghouse Headquarters is a Dedicated Outdoor Air System coupled with an all DOAS Fan Powered Terminal configuration to condition the office space.

The best alternate Plant for the Westinghouse Headquarters is a Hybrid Ground Source Heat Pump Plant.

Thank You...

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Special Thanks to all my friends and family for their support!

Questions ?

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