

Case Study

City of Raleigh Transit Operations Facility



Presented by:

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Transit Administrator, City of Raleigh



Project Overview



- 23 Acre Project Site
- 200 Bus Capacity / 90,500 Square Feet
- Design-Build Project Delivery
- \$24.5 Million Project Cost
- APWA 2012 Project of the Year
- LEED Platinum Achieved



Process Overview



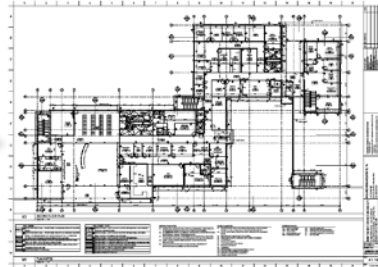
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ARCHITECTS, PA

WSP • SELLS
Transportation & Infrastructure

BRASFIELD
& GORRIE
GENERAL CONTRACTORS



Initial Planning



Completion of Bridging Documents
65% Design
100% Site Civil Design & Permits



Selection Design Build
Team



Notice to Proceed
Site Construction



Project Utilization



Building Construction



Building Permits
and Acceptance of
Construction
Drawings



- 25 month Process from Start of Design thru Utilization
- Effective Quality and Cost Control
- State of The Art Facility

Initial Planning



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New Bus Storage and Maintenance Facility
Preliminary Program Summary
Raleigh, NC

	Phase I (125 Buses)	Master Plan (200 Buses)
	Area (sf)	Area (sf)
Building Areas		
TOTAL - ADMINISTRATION AREAS	18,136	19,081
TOTAL - OPERATIONS AREA	9,920	11,950
TOTAL - MAINTENANCE AREAS	34,558	53,038
Subtotal - Building Areas	62,614	84,069
TOTAL - COVERED AREAS	10,335	16,385
TOTAL - EXTERIOR AREAS	263,808	443,932
Subtotal - All Areas	336,756	544,385
Site Circ./Landscape/Retention/Setbacks 75%	252,567	408,289
Total Site Requirements	589,323	952,674
Acres	13.53	21.87

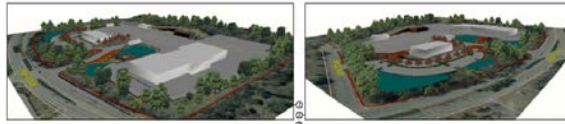
Identify Need and
Budget



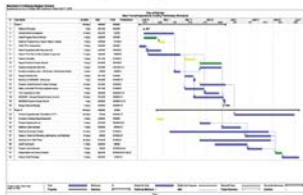
Funding Sources
Federal Requirements



Community Out Reach
Start Rezoning



Transit Operations Facility
City of Raleigh, North Carolina



Design Build Approval

The Right Team for Success...



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Selection of Initial
Design Team

- 4 Month Process
- Unanimous Community Support
- 89% Funding Participation from Outside Sources



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Space Needs Program



- 4 Week process
- Intensive User Participation
- Schedule and Cost Control

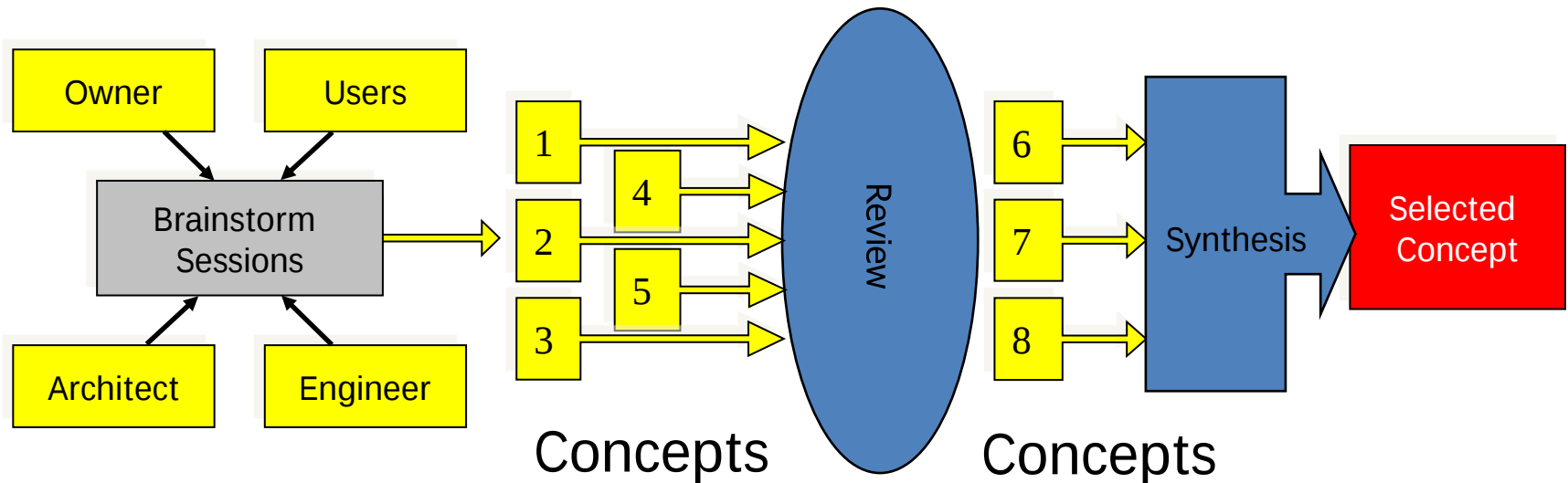
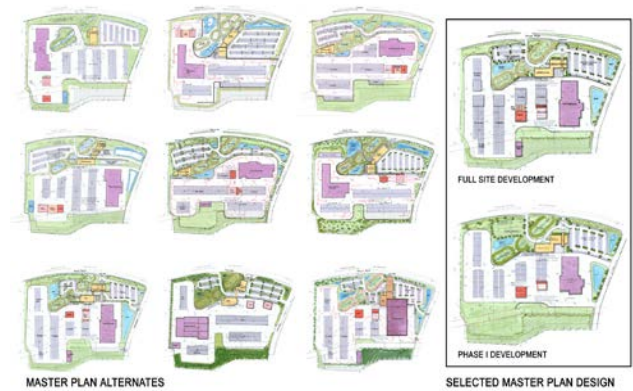


- Identify Site Constraints, before planning charrette
- Develop “working envelope”
- Partnership with Regulatory Agencies early on



- Grading Concerns
- Balanced Site
- Grading Scenarios as Charrette progressed

Integrated Design Charrette



- 5 Day Design Charrette
- End User Participation/Design Reviews
- Community Participation

Integrated Development



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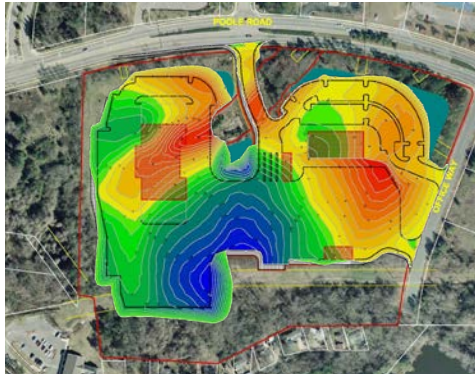
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- 3 Dimensional Development of Design Utilizing BIM
- Site and Buildings Developed Simultaneous
- Continues Cost Feed Back to Control Budget

Integration of Charette Master Plan



- Tiered Site to Provide Separation, Security, and Minimize Impact on Neighborhood Properties
- Three Dimensional Site Analysis to Provide Balanced Cut/Fill on Site
- Use of AutoTURN Software to Verify Vehicular Turning Radiuses

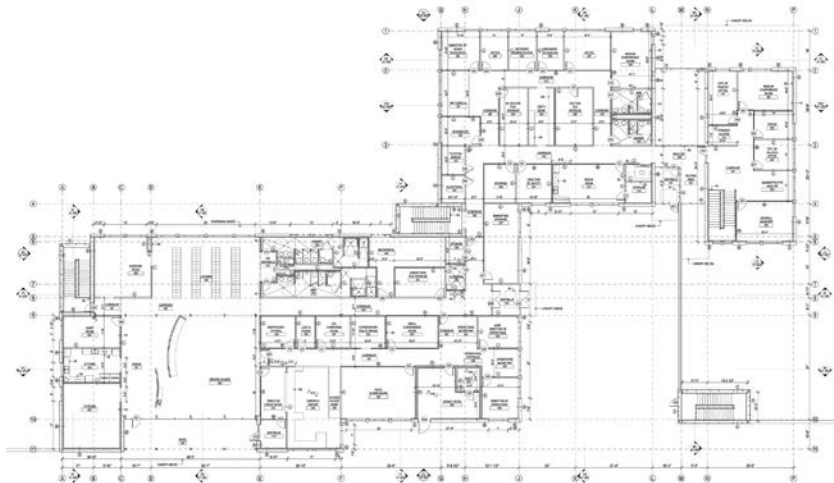
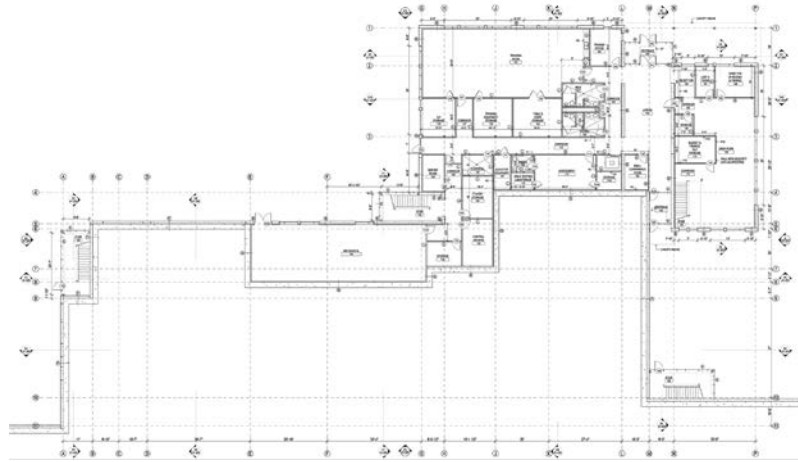
Bridging Documents



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- 65% Design with Full Length Specifications
- 100% Civil Design with Site Permits
- Complete Material and Equipment Selection

Bridging Documents



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LEED Credit Summary			
Yes	TBD	No	Credit Category
8	3	3	Sustainable Sites
5	0	0	Water Efficiency
7	3	7	Energy & Atmosphere
5	1	7	Materials & Resources
8	1	6	Indoor Environmental Quality
1	2	2	Innovation & Design Process
34	10	25	Total
LEED V2.2: Certified = 26-32, Silver = 33-38, Gold = 39-52, Platinum 53-69			



- Sustainable Requirements
- 100% Civil Design with Site Permits
- Complete Material and Equipment Selection

Risk Mitigation



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Safety:

- Partnered with OSHA/NCDOL
- Extensive pre-planning

Cost:

- Bonding
- D/B Packages
- Lien waivers

Quality:

- Running Completion List
- Weekly walks by Owner, Designers

Schedule:

- In-house
- Aggressive front end

- Site subcontractor went out of business.
- Overcame winter of '09/'10
- Zero litigation, On-Time Turnover





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LEED for New Construction v2.2 Registered Project Checklist			
Project Name: Project Address:			
Yes	No		
10	4		
Sustainable Sites			
14 Points			
Y	Prereq 1	Construction Activity Pollution Prevention	Required
	Credit 1	Site Selection	1
1	Credit 2	Development Density & Community Connectivity	1
1	Credit 3	Brownfield Redevelopment	1
1	Credit 4.1	Alternative Transportation, Public Transportation Access	1
1	Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms	1
1	Credit 4.3	Alternative Transportation, Low-Emitting & Fuel-Efficient Vehicles	1
1	Credit 4.4	Alternative Transportation, Parking Capacity	1
1	Credit 5.1	Site Development, Protect or Restore Habitat	1
1	Credit 5.2	Site Development, Maximize Open Space	1
1	Credit 6.1	Stormwater Design, Quantity Control	1
1	Credit 6.2	Stormwater Design, Quality Control	1
1	Credit 7.1	Heat Island Effect, Non-Roof	1
1	Credit 7.2	Heat Island Effect, Roof	1
1	Credit 8	Light Pollution Reduction	1
Yes	No		
5			
Water Efficiency			
5 Points			
1	Credit 1.1	Water Efficient Landscaping, Reduce by 50%	1
1	Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	1
1	Credit 2	Innovative Wastewater Technologies	1
1	Credit 3.1	Water Use Reduction, 20% Reduction	1
1	Credit 3.2	Water Use Reduction, 30% Reduction	1
12	2		
Energy & Atmosphere			
17 Points			
Y	Prereq 1	Fundamental Commissioning of the Building Energy Systems	Required
Y	Prereq 2	Minimum Energy Performance	Required
Y	Prereq 3	Fundamental Refrigerant Management	Required
Note for EAC: All LEED for New Construction projects registered after June 26 th , 2007 are required to achieve at least two (2) points under EAC.			
8	2		
Optimize Energy Performance			
	1	10.5% New Buildings or 3.5% Existing Building Renovations	1 to 10
	2	14% New Buildings or 7% Existing Building Renovations	2
	3	17.5% New Buildings or 10.5% Existing Building Renovations	3
	4	21% New Buildings or 14% Existing Building Renovations	4
	5	24.5% New Buildings or 17.5% Existing Building Renovations	5
	6	28% New Buildings or 21% Existing Building Renovations	6
	7	31.5% New Buildings or 24.5% Existing Building Renovations	7
	8	35% New Buildings or 28% Existing Building Renovations	8
	9	38.5% New Buildings or 31.5% Existing Building Renovations	9
	10	42% New Buildings or 35% Existing Building Renovations	10
1	1	On-Site Renewable Energy	1 to 3
	2	12.5% Renewable Energy	2
	3	7.5% Renewable Energy	3
	4	12.5% Renewable Energy	4
1	Credit 3	Enhanced Commissioning	1
1	Credit 4	Enhanced Refrigerant Management	1
1	Credit 5	Measurement & Verification	1
1	Credit 6	Green Power	1

DBE & MWBE Goals

- Significant reporting and tracking requirements due to funding sources and project goals



Challenge: Facility Requires Significant Amounts of Impervious Surfaces

Solution: Onsite Detention and Re-Use



- Strategies
- Rainwater Harvesting & Re-Use
 - Bioretention Stormwater BMPs
 - Cisterns for Landscaping Irrigation



Challenge: Heat Island Effect

Solution: High Albedo / Thermally Emissive Materials

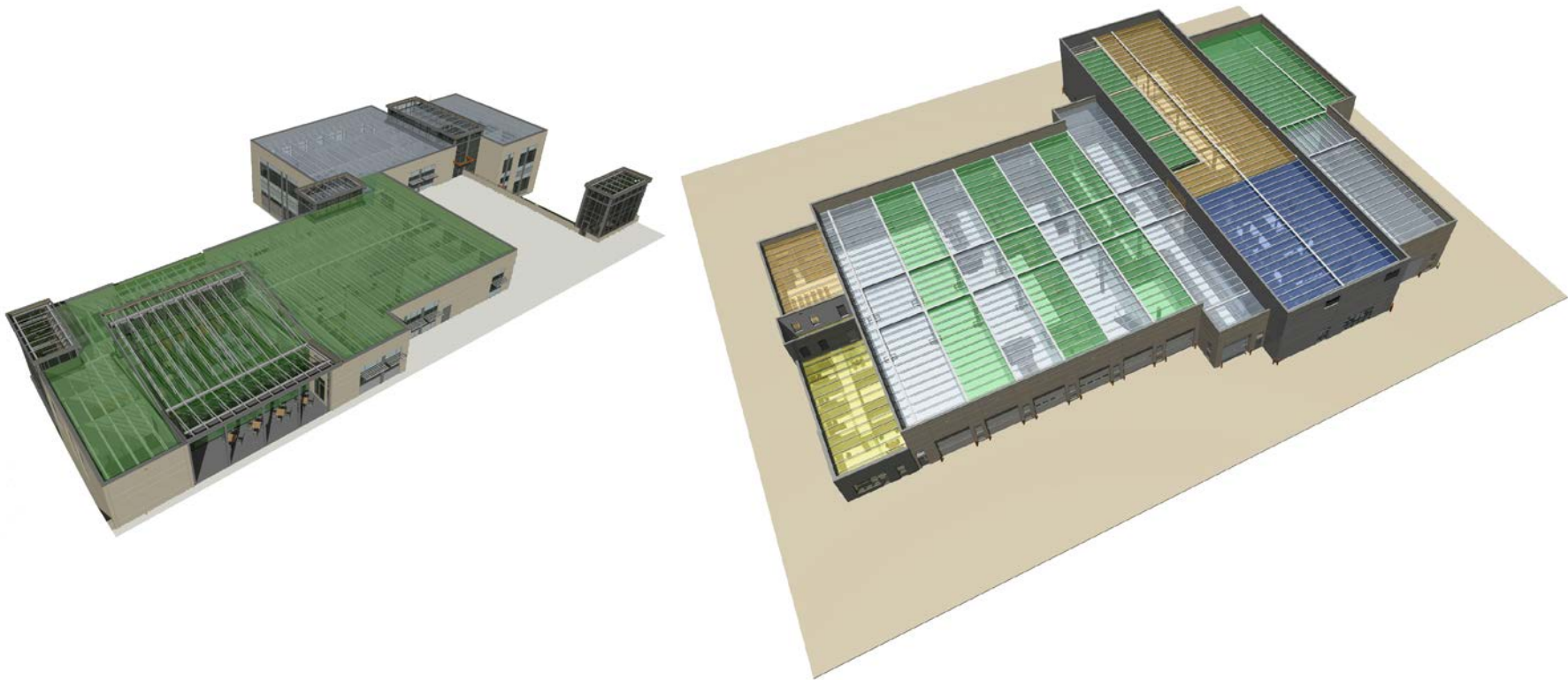


- Strategies
- Low E, Energy Star White Roofing Systems
 - Concrete Paving in Lieu of Asphalt



Challenge: Expense of Heating/Cooling Large Spaces
: Multiple Shifts / Variable Demand for Service Bays

Solution: Zoned Environmental Control



- Strategies
- Dedicated HVAC Controls for Each Work Bay
 - Separate Lighting Sensors for Work Bays
 - Zoned Radiant Flooring Heat



Challenge: Cooling Large Spaces of Maintenance Buildings

Solution: Spot Cooling in Occupied Areas

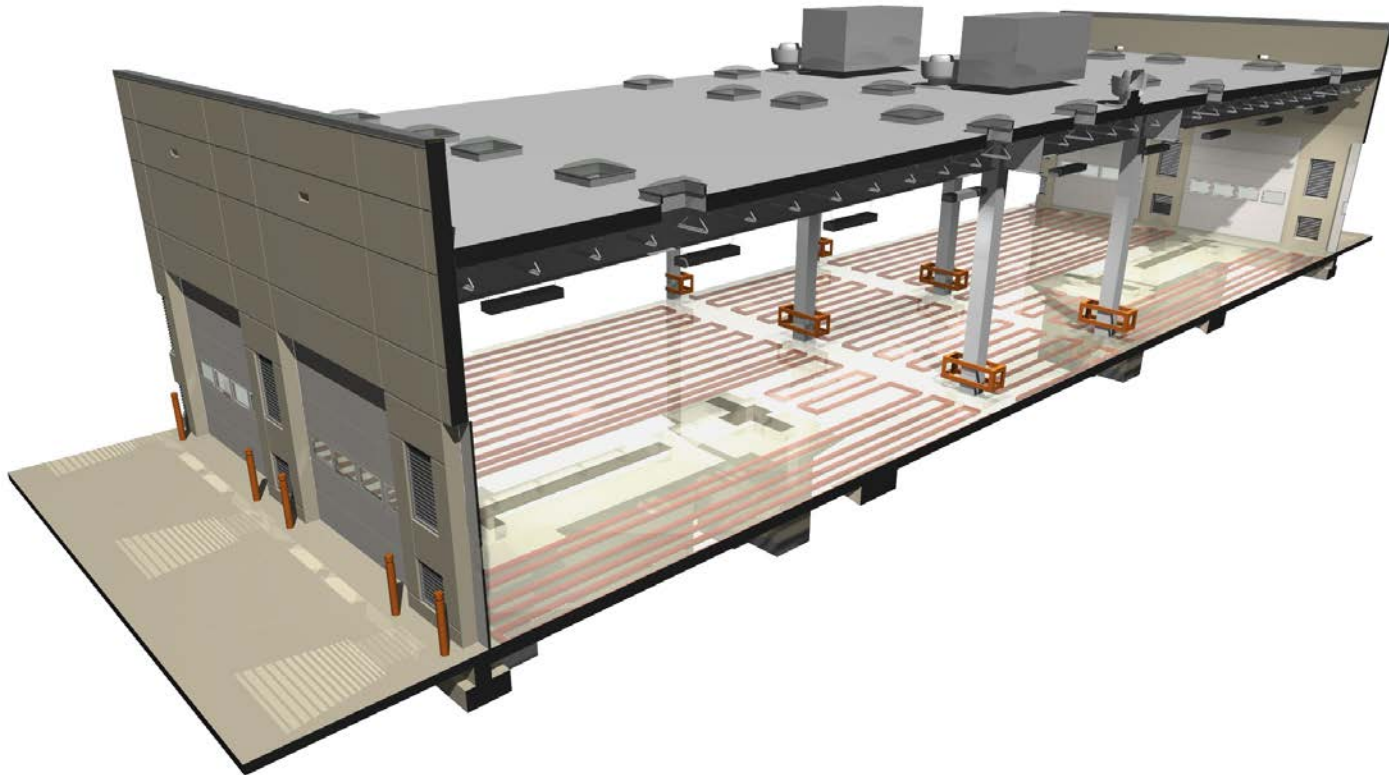


- Strategies
- Displacement Ventilation
 - Dedicated HVAC Controls for Work Bays



Challenge: 100% Fresh Air Requirements and Open Maintenance Doors Result in Loss of Conditioned Air

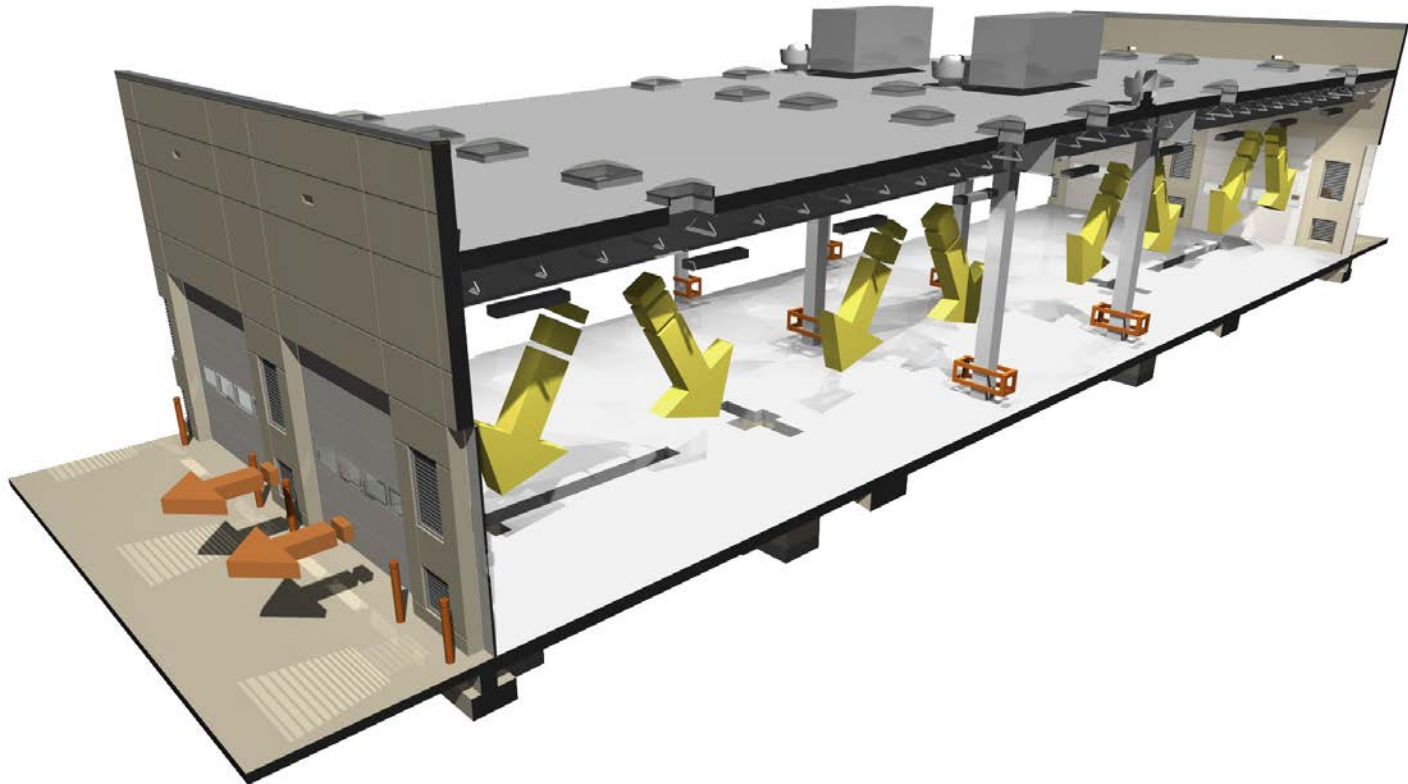
Solution: Radiant Heat in Maintenance Bays



- Strategies
- Hydronic Coils in Concrete Slabs
 - Ground Source Geothermal HVAC for Enhanced Efficiency
 - Energy Recovery System to Capture Energy from Exhaust Air Stream

Challenge: Reduce Lighting Energy Consumption

Solution: Provide Daylight & View Openings in Roof and Walls



- Strategies
- Horizontal View Panels at All Service Bay Doors
 - Daylighting at Work & Circulation Areas
 - Occupancy/Photo Sensor Controls Integrated with Daylighting

Maintenance Building Interior



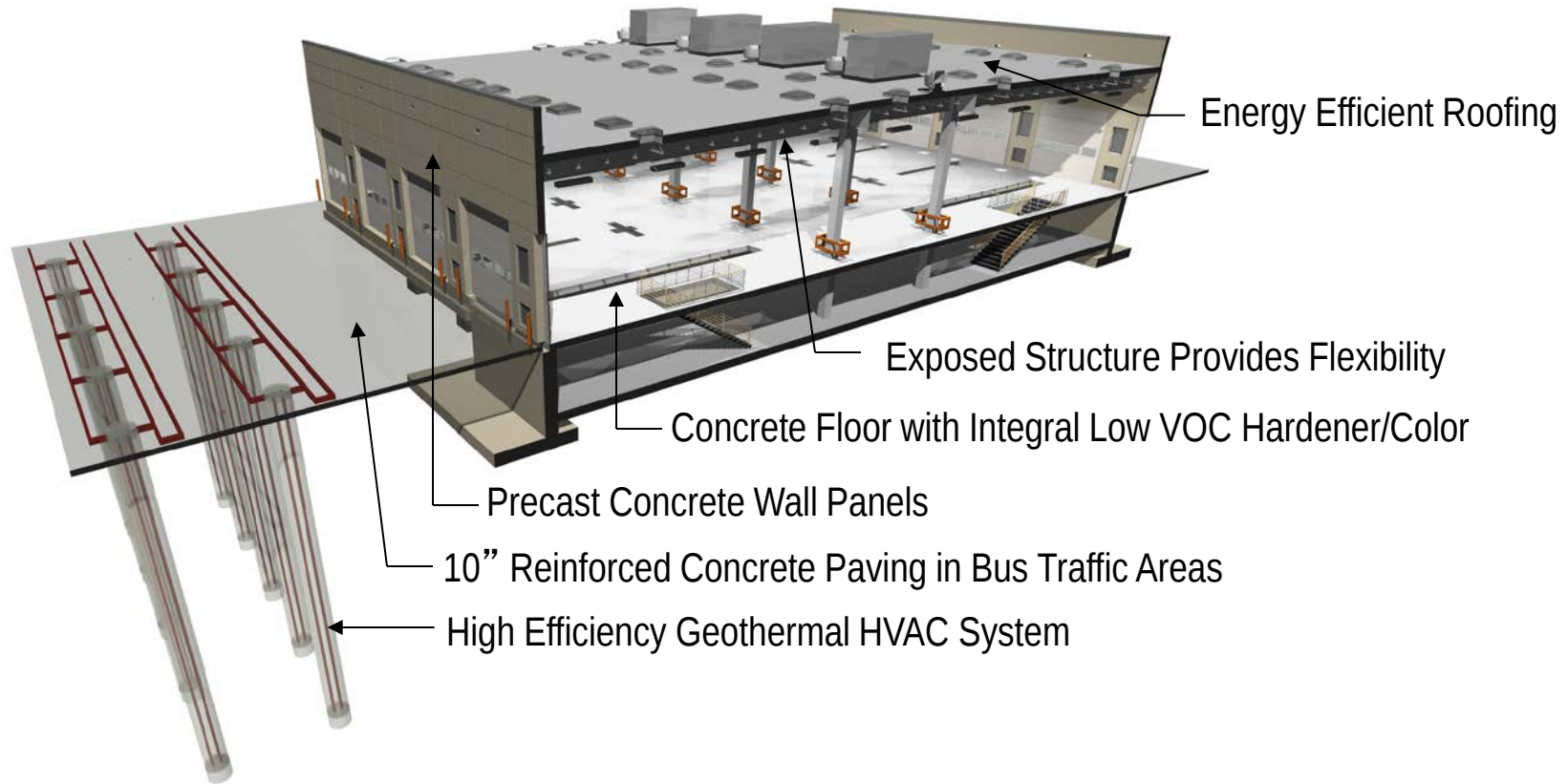
Interior Office Space





Challenge: Design for 50+ Year Facility

Solution: Durable & Reliable Materials & Equipment



- Strategies
- Regional Materials
 - Recycled and Recyclable Materials
 - Extensive Material and Equipment Evaluation

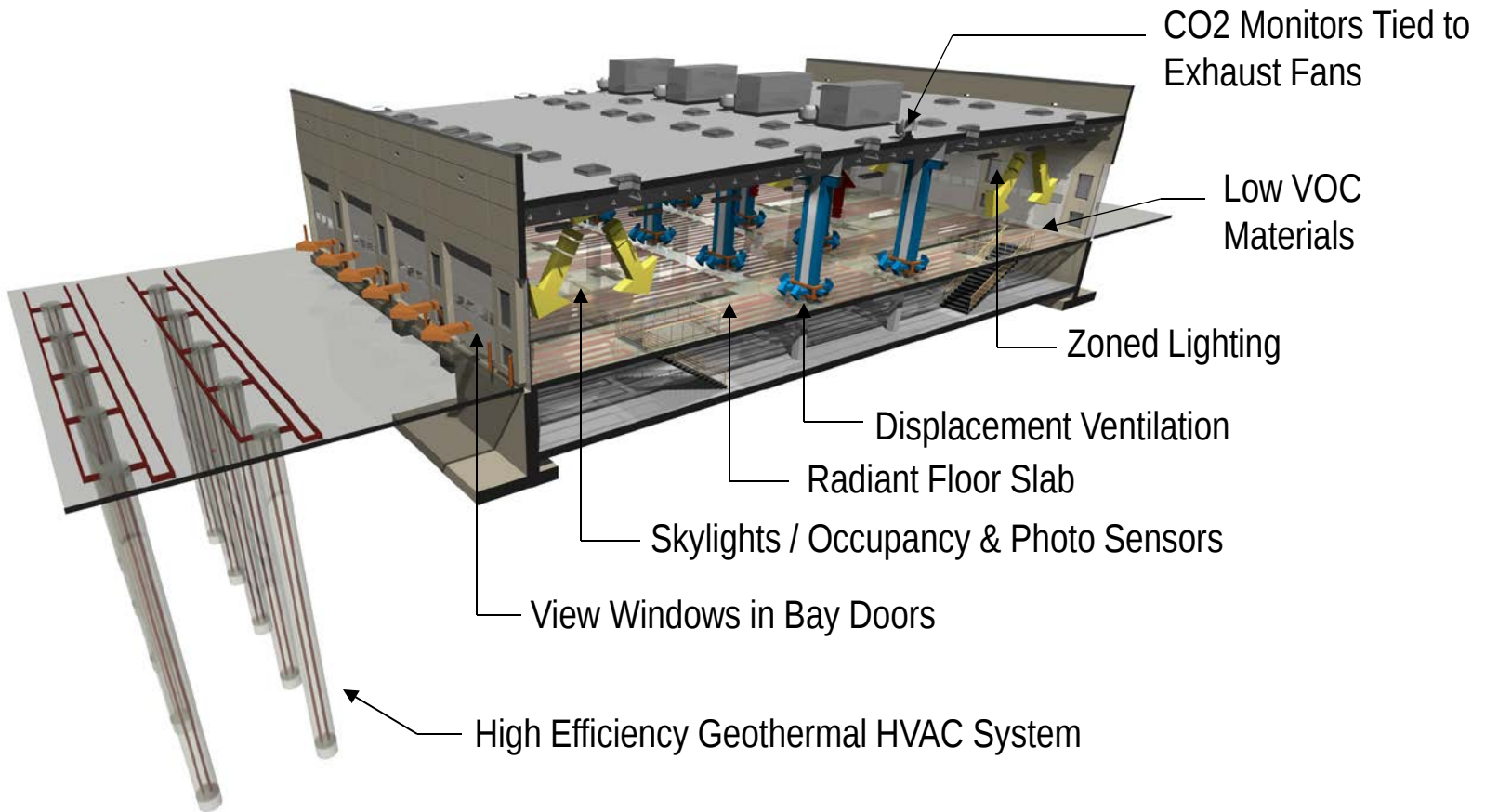
Break Room



Indoor Environmental Quality



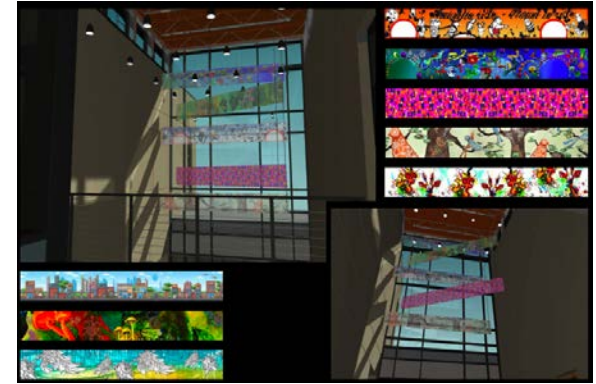
Improve Indoor Environmental Quality for Staff Health and Enhanced Productivity



- Natural Light & Views
- Spot Cooling
- Ventilate Hazardous Work & Storage Areas

- 100% Fresh Air System
- CO2 Monitoring

Integrating Community Art



- Art On The Move
- Local Artists
- Established City of Raleigh Art Initiative

Raleigh Transit Operations Facility



Questions

