



# GOING GREEN

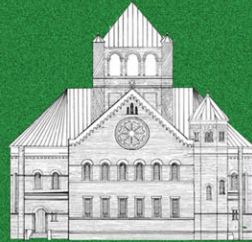


PREPARED BY LINDSEY J WILLIAMS FOR AN INDEPENDENT STUDY FOR THE HISTORIC PRESERVATION AND COMMUNITY PLANNING PROGRAM AT THE COLLEGE OF CHARLESTON WITH THE HELP AND GUIDANCE OF PROFESSOR JAMES WARD

## Bringing the Circular Congregational Church up to LEED- EB Standards While Maintaining the Historic Fabric of the Building

### WHY MAKE THE BUILDING GREEN?

GREEN BUILDING PRACTICES CAN SUBSTANTIALLY REDUCE OR ELIMINATE NEGATIVE ENVIRONMENTAL IMPACTS AND IMPROVE EXISTING UNSUSTAINABLE DESIGN, CONSTRUCTION, AND OPERATIONAL PRACTICES. AN ADDED BENEFIT IS THAT GREEN DESIGN MEASURES REDUCE OPERATING COSTS, INCREASE WORKER PRODUCTIVITY, AND REDUCE POTENTIAL LIABILITY RESULTING FROM INDOOR AIR QUALITY PROBLEMS. GREEN DESIGN HAS ENVIRONMENTAL, ECONOMIC, AND SOCIAL ELEMENTS THAT BUILDING STAKEHOLDERS, INCLUDING OWNERS, OCCUPANTS, AND THE GENERAL PUBLIC.



### WHAT IS LEED-EB?

LEED FOR EXISTING BUILDINGS MAXIMIZES OPERATIONAL EFFICIENCY WHILE MINIMIZING ENVIRONMENTAL IMPACTS. IT PROVIDES A RECOGNIZED, PERFORMANCE-BASED BENCHMARK FOR BUILDING OWNERS AND OPERATORS TO MEASURE OPERATIONS, IMPROVEMENTS AND MAINTENANCE ON A CONSISTENT SCALE. LEED FOR EXISTING BUILDINGS IS A ROAD MAP FOR DELIVERING ECONOMICALLY PROFITABLE, ENVIRONMENTALLY RESPONSIBLE, HEALTHY, PRODUCTIVE PLACES TO LIVE AND WORK.



### WHAT DOES THE LEED-EB RATING SYSTEM ADDRESS?

- \* WHOLE-BUILDING CLEANING AND MAINTENANCE ISSUES INCLUDING CHEMICAL USE
- \* ONGOING INDOOR AIR QUALITY
- \* ENERGY EFFICIENCY
- \* WATER EFFICIENCY
- \* RECYCLING PROGRAMS AND FACILITIES
- \* EXTERIOR MAINTENANCE PROGRAMS, AND
- \* SYSTEMS UPGRADES TO MEET GREEN BUILDING ENERGY, WATER, IAQ, AND LIGHTING PERFORMANCE STANDARDS

LEED-EB Project Checklist	Checklist Awards Points	LEED-EB Rating
1. Sustainable Sites	1	1 (40-49 Points)
2. Water Efficiency	1	
3. Energy & Atmosphere	1	2 (50-59 Points)
4. Materials & Resources	1	
5. Indoor Environmental Quality	1	3 (60-69 Points)
6. Innovation in Operation	1	
7. Regional Priority	1	4 (70-79 Points)
8. Innovation in Design	1	
9. Innovation in Construction	1	5 (80-89 Points)
10. Innovation in Maintenance	1	

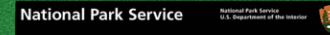
THE LEED-EB PROJECT CHECKLIST AWARDS POINTS CONCERNING SUSTAINABLE SITES, WATER EFFICIENCY, ENERGY & ATMOSPHERE, MATERIALS & RESOURCES, AND INNOVATION IN OPERATION, UPGRADES, & MAINTENANCE.

THE INNOVATION IN OPERATION, UPGRADE, AND MAINTENANCE SECTION IS UNIQUE TO THE LEED-EB RATING SYSTEM. THE OTHER CRITERIA IS STANDARD FOR LEED RATING SYSTEMS. THROUGH A FEW REGIONS, HAVE ADDITIONAL CRITERIA FOR LEED-EB SUCH AS SUSTAINABLE SITES, PREREQ 2, AGE OF BUILDING.

Innovation in Operation, Upgrade and Maintenance	Possible Points
001	1
002	1
003	1
004	1
005	1

OUT OF 80 POSSIBLE BASE POINTS AND 5 ADDITIONAL POINTS FOR IOUM A BUILDING CAN BE REGARDED AS CERTIFIED (22-29 POINTS), SILVER (40-47 POINTS), GOLD (48-63 POINTS), OR PLATINUM (64-85 POINTS)

IT IS VERY IMPORTANT THAT THESE LEED-EB CRITERIA BE MET WITH THE UNDERSTANDING THAT THE CIRCULAR CONGREGATIONAL CHURCH IS AN HISTORIC STRUCTURE. LEED-EB STANDARDS APPLY TO BUILDINGS THAT ARE AT LEAST TWO YEARS OLD AND ARE THUS DEVELOPED FOR MORE MODERN BUILDINGS. FORTUNATELY HISTORIC STRUCTURES SUCH AS THIS ONE WERE CONTRACTED TO WORK WITH THE ENVIRONMENT UNLIKE MANY MODERN BUILDINGS. THIS BUILDING'S NATURAL MATERIALS AND ADAPTABILITY TO ITS ENVIRONMENT MAKE MANY OF THESE CRITERIA UNNECESSARY. IN SEVERAL CASES ADAPTING THE BUILDING TO GREEN STANDARDS COULD HARM ITS HISTORIC FABRIC. CAREFUL CONSIDERATION SHOULD BE TAKEN TO MIX ADAPTING TO LEED-EB STANDARDS WITH PRESERVING THE BUILDING TO ENSURE THAT UNNECESSARY ACTIONS DO NOT PREVENT THE BUILDING FROM FUNCTIONING AS IT SHOULD.



SINCE 1975 THE NATIONAL PARK SERVICE HAS DEVELOPED A NUMBER OF BRIEFS REGARDING THE TECHNICAL ASPECTS OF PRESERVING HISTORIC STRUCTURES. SEVERAL OF THESE BRIEFS SHOULD BE CONSIDERED WHEN APPLYING LEED-EB STANDARDS AS THEY ADDRESS MANY OF THE PROBLEMS CONCERNING ADAPTING HISTORIC STRUCTURES TO THE MODERN DAY.

### Preservation Briefs

SPECIFICALLY, THESE PARTICULAR BRIEFS SHOULD BE CONSIDERED:

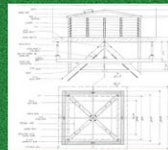
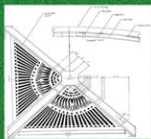
- 03: CONSERVING ENERGY IN HISTORIC BUILDINGS
- 24: HEATING, VENTILATING, AND COOLING HISTORIC BUILDINGS: PROBLEMS AND RECOMMENDED APPROACHES
- 39: HOLDING THE LINE: CONTROLLING UNWANTED MOISTURE IN HISTORIC BUILDINGS

### TPS

Technical Preservation Services

### HVAC

ORIGINALLY CIRCULAR CONGREGATIONAL CHURCH WAS VENTILATED BY COMMON SENSE MEASURES THAT MANAGED THE ENVIRONMENT ALONG WITH A PRIMITIVE VENTILATION SYSTEM THAT PULLED AIR THROUGH THE CUPOLA AND KEPT IT CIRCULATING THROUGHOUT THE BUILDING. EVIDENCE OF THIS SYSTEM IS THE SURVIVING VENT WITH ELABORATE WOODCARVING.



THE HVAC SYSTEM USED TODAY IS OF COURSE EXTREMELY DIFFERENT FROM THE ONE ORIGINALLY USED IN THE BUILDING. TO BRING THE BUILDING TO LEED-EB STANDARDS CARE MUST BE TAKEN TO ENSURE THAT THE SYSTEM IS NOT WASTEFUL OF ENERGY AS IT COOLS AND HEATS THE BUILDING. DURING MONTHS WITH STABLE, COMFORTABLE TEMPERATURES, THE CONDENSER SHOULD ONLY BE NECESSARY FOR COOLING OCCASIONALLY. HUMIDITY, HOWEVER, CAN BE EXTREMELY DISTRUCTIVE OF THE WOODWORK, PLASTER, AND DECORATIVE FEATURES OF THE CHURCH. KEEPING THE FAN ON WITHOUT THE CONDENSER KEEPS THE POSITIVE PRESSURE INSIDE THE STRUCTURE KEEPING THE OUTSIDE MOIST AIR FROM INFILTRATING THROUGH THE BUILDING FABRIC. IN FACT IT IS RECOMMENDED THAT A HUMIDISTAT BE ADDED IN THE CHURCH'S PROGRAMMABLE CONTROL SYSTEM TO MONITOR AND CONTROL THIS. IN SOME CASES, THE FAN CAN BE TURNED OFF ALTOGETHER. IN MOST CASES, THE FAN WILL NEED TO BE ACTIVATED TO AVOID THE HUMIDITY COMING THROUGH THE WALLS. SOMETIMES THE CONDENSER WILL NEED TO BE ACTIVATED EVEN DURING HEATING CYCLES TO DROP THE HUMIDITY INSIDE THE BUILDING. THIS LEVEL OF CONTROL IS NECESSARY TO MINIMIZE COSTS BUT TO MAINTAIN THE HISTORIC FABRIC.

MOST OF THE LEED-EB CRITERIA INCLUDED CHANGES THAT CAN BE MADE TO THE BUILDING THAT HAVE NO EFFECT ON IT'S HISTORIC FABRIC SUCH AS THE ADDITION OF BIKE RACKS OUTSIDE THE CHURCH TO ENCOURAGE PEOPLE WHO USE THE BUILDING TO FIND ALTERNATE FORMS OF TRANSPORTATION OTHER THAN THE CAR.



SPECIAL ATTENTION IS ALSO PAID TO LIGHT BULB TYPES THAT HAVE REDUCED MERCURY AND EVERYDAY CLEANING SUBSTANCES THAT ARE LESS HARMFUL TO THE ENVIRONMENT.



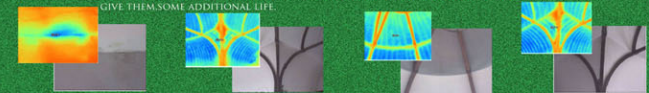
TO MEET THESE STANDARDS, THE HISTORIC FABRIC OF CIRCULAR CONGREGATIONAL CHURCH DOES NOT NEED TO BE CONSIDERED. FOR OTHER CRITERIA SUCH AS INSULATING THE BUILDING THE CONTENT OF THE PRESERVATION BRIEFS NEED TO BE CONSIDERED.

### INSULATION

PREVENTING THE WASTEFUL LOSS OF ENERGY IS OFTEN OVERCOME BY INSULATING A BUILDING. INSULATING A HISTORIC STRUCTURE CAN BE EXTREMELY HARMFUL AS THE INSULATING MATERIALS CAN CAUSE A BACK UP OF MOISTURE THAT WILL EVENTUALLY DESTROY THE STRUCTURE.



IN MANY CASES TO PREVENT HEAT LOSS, A WATERPROOF COATING IS APPLIED TO THE BRICKS OF A BUILDING. THIS IS PARTICULARLY TEMPTING HERE AS THE OUTSIDE SHELL WAS SANDBLASTED AND IS DETERIORATING. WATERPROOF COATINGS OVER THE SHELL SHOULD BE AVOIDED AS IT WOULD TRAP MOISTURE IN THE WALL WHICH CAUSES SPALLING OF THE BRICK AND TROUBLE OF THE PLASTER KEYS. SOME SEPARATE DETAILS SUCH AS THE PRECAST PILASTERS INSIDE THE WINDOWS MAY BE COMED TO GIVE THEM SOME ADDITIONAL LIFE.



IN CIRCULAR CONGREGATIONAL CHURCH MUCH OF THE HEAT IS LOST THROUGH THE CEILING AND ROOF AS CAN BE SEEN IN THE THERMAL IMAGES ABOVE. INSULATING THE ATTIC SPACE SHOULD BE A TOP PRIORITY AS IT CAN GREATLY DECREASE HEAT ENERGY LOSS AND GREATLY HELP THE CHURCH MEET LEED-EB STANDARDS WITHOUT DESTROYING THE HISTORIC FABRIC. INSULATION SUCH AS BLENDED FIBERGLASS AND MINERAL WOOL, BLOWN CELLULOSE (TREATED WITH BORIC ACID ONLY), BLOWING WOOL, VERMICULITE, OR BLOWN FIBERGLASS COULD BE USED. SINCE THE ATTIC IN THIS BUILDING IS NOT HEATED, INSULATION WITHOUT A VAPOR BARRIER MAY BE THE ONLY OPTION. IN ADDITION, SOME TECHNIQUE SHOULD BE EMPLOYED TO PREVENT THE INSULATOR FROM FALLING INTO THE WALL CAVITIES. THIS AREA LOOSES THE LEAST HEAT AND INSULATION COULD CAUSE THE MOST HARM IF IT DROPS THE TEMPERATURE TOO CLOSE TO THE EXISTING PLASTER.