Glenn Research Center
Centralized Office Building

Preliminary Design Review (PDR)

May 14, 2009
NASA Facilities Engineering & Real Property Symposium
Langley Research Center
Why Is Glenn Doing a PDR?

• Introduction by Mark Woodling

• GRC Centralized Office Building (COB)
  – Repair by Replacement Office Building
  – Awarded through the SII Program in FY08

• GRC advocacy for this project
  – Evaluation Factor 4: Management Approach
    “Glenn will initiate the creation of an independent, third party team to perform a Preliminary Design Review (PDR) and a Critical Design Review (CDR) during the design phase of the project. The function of this PDR/CDR Team will be to review and control the project Requirements Document and ensure that all critical requirements are addressed by the final design. Glenn will request participation from NASA Headquarters and other field centers for this team.”
Why Is Glenn Doing a PDR?

- **Multiple Centers have been awarded Repair by Replacement Buildings**
  - Conformance to newly approved Center Master Plans
  - LEED Silver (minimum) and conform to stringent Energy Usage mandates
  - Utilize Building Information Modeling (BIM)

  *Hope to draw upon lessons learned from other Centers implementing new buildings!*

- **Provide awareness to NASA Headquarters**
The Process for PDR

- **GRC Master Plan**
  Joe Morris, GRC Chief Architect
  - Overview of Approved Glenn Master Plan
  - Define the site for the Centralized Office Building

- **Preliminary Design Review Presentation**
  Eric Patton, GRC PM for the Centralized Office Building
  Michael Carter, PM from Burt, Hill (A/E Firm)
  - Identify project requirements
  - How does the preliminary design meet the requirements
  - Preliminary features of the Centralized Office Building
The Process for PDR

• **Established PDR Review Team**
  – Steve Rider, HQ/FERPD (Program Manager for GRC)
  – Rhonda Pepper, MSFC/AS21
  – Soheila Dianati, ARC/JCE
  – Ralph Allen, MSFC/xxx
  – David Larson, GSFC

• **During PDR, only PDR Team to ask formal questions**
  – Questions from the general assembly can be addressed after the presentation

• **PDR Team can ask formal questions**
  – RFA Forms provided
  – Formal answers returned at Critical Design Review

Glenn Research Center
Facilities Division
Lewis Field & Plum Brook Station
Lewis Field Campus Master Plan – Presented by Joe Morris
Lewis Field Campus Master Plan

- 12 projects over a 20 year period

MASTER PLAN PROJECTS
2 CENTRALIZED OFFICE BUILDING (COB)
Office Building, Auditorium and Conference Center
3 MAINTENANCE & WAREHOUSE FACILITIES
5 MAIN GATE SECURITY, SHIPPING & RECEIVING
8 AEROSPACE EDUCATION CENTER
9 OPERATIONS SUPPORT BUILDING

11 SPACE NAVIGATION & COMMUNICATIONS FACILITY
12 ADMINISTRATION BUILDING
13 CONSOLIDATED MATERIALS & STRUCTURES COMPLEX
15 EMPLOYEE SERVICES & CAFETERIA
16 CONSOLIDATED RESEARCH COMBUSTION LAB COMPLEX
17 CEDAR POINT ROAD AND GUERIN ROAD IMPROVEMENTS
18 CAMPUS CENTER

Glenn Research Center
Lewis Field & Plum Brook Station
**Facility Goals**

1. **Infrastructure + Cost reduction**
2. **Security**
3. **Prepare for Space Flight work**
4. **Public outreach**
5. **Improve campus image**

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**Lewis Field Campus Master Plan Concept**

Lewis Field & Plum Brook Station
New Campus Center at Lewis Field

Glenn Research Center

90,000 sq. ft. LEED Silver
400 seats, 6000 sq. ft.
7 Meeting Rooms
Displays, Events and Gatherings
300+ desks
Building Concepts similar to KSC OSB2
Project Site
This photo is cropped from Pictometry

Glenn Research Center

Lewis Field & Plum Brook Station
Planned Location for new Centralized Office Building
First step toward Glenn’s Campus Center
Campus Center Site Planning

Option 9

Existing Building

New

Existing Building

Existing Building

#21

#15

#50
2. Campus Center Site Planning Concepts

- Administration Building
- Centralized Office Building
- Employee Services Building
- Commons Area
- Future Buildings
- IRT Bldg. 11
- PSL 3+4 Bldg. 125
- Fab. Shop Bldg. 50
- SEL Bldg. 110
Building Design Concepts
Preliminary Design Review (PDR)
for the new
Centralized Office Building

Presented by Eric Patton
At the
May 14, 2009 Facilities Symposium
Project Goals and Requirements

Scope
• Provide a centralized office building to accommodate a minimum of 300+ desks in open and private offices featuring:
  – 6000 square foot 400 person flat floor auditorium
  – Conference Center with highly functional meeting rooms
  – Lobby space for displays, events, and gatherings
The project will include roadways, paved areas, underground utilities, and connection to institutional facility systems. The building area is programmed as approximately 80,000 to 90,000 gross square feet, three stories above grade, with at least 250 parking spaces.
• A warehouse is also being designed in conjunction with the COB, but will not be covered in this PDR.

Budget
• FY2008 FP&D funding for design and commissioning
• FY2010 Construction funding $25.3M ($20.5M for COB, $4.4M for Warehouse, $0.4M for project reserve)
• FY2011/12 $4.7M of outfitting/activation costs requested from CM&O split over both years

Schedule
Occupancy by Spring of 2012.

Glenn Research Center
Lewis Field & Plum Brook Station
Project Goals and Requirements

**Quality**
- Needs to be functional but not a Cadillac yet inspirational
- COB must be a high performance building
- Prefer spending budget on higher quality office vs. warehouse

**Safety**
- Design for Safety (design decision criteria)
- No lost time accident during construction

**Coordination**
- Implement construction with minimal impact to GRC operations
- Buildings 21 and 50 remain open throughout although B21 South Loading dock to be closed.
- Ares and/or follow-on manufacturing needs truck access to B50 High Bay from north end.
- Demolition of B28, B84, B137 to create open site for allowable footprint, construction layout and staging and eventually parking.

Glenn Research Center
Lewis Field & Plum Brook Station
Project Goals and Requirements

Leadership in Energy and Efficient Design (LEED)
• LEED “Silver” minimum
• A-E to balance LEED requirement with cost and quality; strive for “Gold”.
• Enhanced Commissioning

Building Information Modeling (BIM)
• Demonstrate use of technology as “pilot projects” for both COB and Warehouse.

NPR 8820
• Facility Project Management Plan (yet to be signed)
• Functional Requirements Document (signed off)
• Project Stakeholders
  – Code M, Space Flight Systems, Tim Tyburski
  – Code R, Research and Technology, Gloria Richards
  – Code D, Engineering, Bob Zalewski
• Project Definition Rating Index (PDRI)
  – First attempt scored at 456 prior to 30% design, anticipate less than 200 after 60%
• COB activation/outfitting
• Change Management

Glenn Research Center
Lewis Field & Plum Brook Station
Change Management

- Established and documented in the FPMP.
- Delegate decision-making as much as possible to the PM/Team.
- Establish Change Control Board to approve all changes that impact cost by > $100K or schedule by > 30 days.
- CCB membership consists of GRC Facilities Division Leadership Team:
  - Dallas Lauderdale, Chairman
  - Rick Danks, Alternate
  - Jim Onest, Operations Management Branch
  - Renee Palyo, Engineering Management Branch
  - Joe Morris, Facilities Planning Office
  - Joe Torri, Systems Management Branch
  - Gene Stygles, Project Management Branch
  - Mark Woodling, Program Management Office
Introduction of Burt, Hill

- Burt, Hill is a full service, international design firm with 13 offices worldwide
- Over 900 employees.
- The firm has a specialty in Science related projects.
- A strong commitment to sustainability
  - Charter member of USGBC
  - CEO Harry Gordon was the first Architect to join the USGBC
  - Harry and Sustainability Director Gina Baker serve on the USGBC committee that write the LEED standards
  - Burt, Hill was part of the team that did the “Greening of the Whitehouse” project
  - Nine LEED certified buildings and over 35 registered.
- Firm wide commitment to BIM
  - Completing a 3 year program to deploy BIM on 95% of projects
  - Beta testers for Revit software
  - Integrated design process
- Mike Carter is the Project Manger as well as the practice leader of the Cleveland office
  - 30 years experience in the practice of Architecture as a RA
  - Graduate of Miami University
    - Bachelor degree in Architecture
    - Masters Degree in Environmental Planning

Glenn Research Center
Lewis Field & Plum Brook Station
Preliminary Design Review

Presented by Mike Carter
Design Process

- Review Program prepared by NASA GRC team
- Discovery Workshop
  - Gather available data
    - Utilities
    - Environmental Information
  - Discuss adjacencies/functionality
  - Visual Listening
  - Design charrette
  - LEED workshop
- Re-visit the master plan
  - Focus on Central Quad
Pre-Design Process

- Develop design using BIM to greatest extent possible
  - Revit as design and energy modeling tool
- Begin Energy Modeling Development
  - Design is influenced by modeling of day lighting and energy usage
NASA Master Plan

Glenn Research Center
Lewis Field & Plum Brook Station
## Program

### Glenn Research Center
Lewis Field & Plum Brook Station

<table>
<thead>
<tr>
<th>Area</th>
<th>SIZE</th>
<th>UNIT</th>
<th>CIRC</th>
<th>QTY</th>
<th>TOTAL</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entry Volute</td>
<td>6 x 6</td>
<td>60</td>
<td>60</td>
<td>204</td>
<td>204</td>
<td></td>
</tr>
<tr>
<td>Lobby</td>
<td>6 x 30</td>
<td>30</td>
<td>3.00</td>
<td>26.4</td>
<td>326.4</td>
<td>Size offers more opportunities for display space and Conference Center pre-function.</td>
</tr>
<tr>
<td><strong>TOTAL Usable Square Footage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>326.4</td>
<td></td>
</tr>
<tr>
<td><strong>Office Areas</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small Workstation</td>
<td>4 x 8</td>
<td>43</td>
<td>36</td>
<td>92</td>
<td>253</td>
<td>25.04 Amount of secondary circulation provided in NASA program is not required.</td>
</tr>
<tr>
<td>Cellar Office</td>
<td>6 x 6</td>
<td>60</td>
<td>54</td>
<td>204</td>
<td>6</td>
<td>3060</td>
</tr>
<tr>
<td>Director Office</td>
<td>6 x 6</td>
<td>60</td>
<td>54</td>
<td>204</td>
<td>6</td>
<td>3060</td>
</tr>
<tr>
<td>Supervisor Office</td>
<td>6 x 6</td>
<td>60</td>
<td>54</td>
<td>204</td>
<td>6</td>
<td>3060</td>
</tr>
<tr>
<td>Division Suite Reception (Support Staff)</td>
<td>6 x 25</td>
<td>250</td>
<td>74</td>
<td>324</td>
<td>5</td>
<td>$20</td>
</tr>
<tr>
<td>Workroom</td>
<td>6 x 6</td>
<td>60</td>
<td>60</td>
<td>240</td>
<td>0</td>
<td>2400</td>
</tr>
<tr>
<td>Collaboration Room (4 Seats)</td>
<td>6 x 6</td>
<td>60</td>
<td>60</td>
<td>240</td>
<td>0</td>
<td>2400</td>
</tr>
<tr>
<td>Small Conference Room (6 Seats)</td>
<td>6 x 6</td>
<td>60</td>
<td>60</td>
<td>240</td>
<td>0</td>
<td>2400</td>
</tr>
<tr>
<td>Large Conference Room (25 Seats)</td>
<td>20 x 24</td>
<td>480</td>
<td>92</td>
<td>572</td>
<td>2860</td>
<td>Requires additional space to accommodate 25 people.</td>
</tr>
<tr>
<td>Collaboration/ Break-Out Area</td>
<td>6 x 6</td>
<td>36</td>
<td>24</td>
<td>64</td>
<td>3</td>
<td>54 As discussed during design charrettes.</td>
</tr>
<tr>
<td><strong>TOTAL Usable Square Footage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>46,880</td>
<td></td>
</tr>
<tr>
<td><strong>Conference Center</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auditorium (600 Seats)</td>
<td>60 x 60</td>
<td>6000</td>
<td>0</td>
<td>6000</td>
<td>6000</td>
<td>Assumes &quot;lecture style&quot; seating layout. Tables will require additional space.</td>
</tr>
<tr>
<td>A/V Projection Room</td>
<td>6 x 20</td>
<td>240</td>
<td>68</td>
<td>308</td>
<td>308</td>
<td></td>
</tr>
<tr>
<td>Small Conference Room</td>
<td>5 x 20</td>
<td>300</td>
<td>76</td>
<td>376</td>
<td>376</td>
<td></td>
</tr>
<tr>
<td>Medium Conference Room</td>
<td>20 x 44</td>
<td>880</td>
<td>92</td>
<td>972</td>
<td>972</td>
<td></td>
</tr>
<tr>
<td>Large Conference Room</td>
<td>20 x 86</td>
<td>1720</td>
<td>26</td>
<td>938</td>
<td>938</td>
<td></td>
</tr>
<tr>
<td>VITS Conference Room</td>
<td>6 x 34</td>
<td>408</td>
<td>90</td>
<td>504</td>
<td>504</td>
<td></td>
</tr>
<tr>
<td>Catering Kitchen</td>
<td>6 x 20</td>
<td>240</td>
<td>72</td>
<td>352</td>
<td>352</td>
<td></td>
</tr>
<tr>
<td>Coffee / Vending</td>
<td>6 x 20</td>
<td>240</td>
<td>72</td>
<td>352</td>
<td>352</td>
<td></td>
</tr>
<tr>
<td>Registration / Information</td>
<td>6 x 20</td>
<td>240</td>
<td>64</td>
<td>264</td>
<td>264</td>
<td></td>
</tr>
<tr>
<td>Business Center</td>
<td>6 x 8</td>
<td>48</td>
<td>64</td>
<td>60</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL Usable Square Footage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7,800</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- "L" refers to length, "W" refers to width, "NSF" refers to net square foot, "USF" refers to usable square foot.
- "QTY" refers to quantity.
- Comments provide additional details about the space, such as secondary circulation, layout requirements, and space usage.
- "Break-Out Areas" typically required by Conference Center occupants. May be located adjacent to Registration.
- "Business Center" typically required by Conference Center occupants. May require additional space depending on furniture size and stacking capability and cart sizes.
**Program**

<table>
<thead>
<tr>
<th>Common Spaces</th>
<th>Width</th>
<th>Depth</th>
<th>Height</th>
<th>Usable SqFt</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toilet Rooms (Men's and Women's)</td>
<td>6</td>
<td>30</td>
<td>94</td>
<td>8</td>
<td>4,352 Two per floor, with Office Area.</td>
</tr>
<tr>
<td>Shower / Dressing Room</td>
<td>6</td>
<td>0</td>
<td>64</td>
<td>94</td>
<td>288 Rooms are ADA compliant and include toilet, lavatory and shower.</td>
</tr>
<tr>
<td>Coffee / Vending</td>
<td>6</td>
<td>0</td>
<td>64</td>
<td>94</td>
<td>324 Two per floor.</td>
</tr>
<tr>
<td>Storage</td>
<td>3</td>
<td>8</td>
<td>24</td>
<td>50</td>
<td>200</td>
</tr>
<tr>
<td>Receiving</td>
<td>6</td>
<td>25</td>
<td>250</td>
<td>324</td>
<td>324 As discussed during design charrette.</td>
</tr>
<tr>
<td>Housekeeping / Janitorial</td>
<td>6</td>
<td>8</td>
<td>64</td>
<td>36</td>
<td>300 One per floor.</td>
</tr>
<tr>
<td>Mechanical Spaces and Chases</td>
<td>55</td>
<td>0</td>
<td>5,500</td>
<td>3%</td>
<td>5,584 Larger Electrical Rm, separate Generator Rm, and additional mechanical spaces may be required</td>
</tr>
<tr>
<td>Additional MEP Spaces</td>
<td>30</td>
<td>50</td>
<td>500</td>
<td>164</td>
<td>1,530 One per floor.</td>
</tr>
<tr>
<td>Elevator Machine Room</td>
<td>6</td>
<td>0</td>
<td>44</td>
<td>44</td>
<td>84 Two closets per floor.</td>
</tr>
<tr>
<td>Data / Communication Rooms</td>
<td>6</td>
<td>0</td>
<td>44</td>
<td>44</td>
<td>3 432 One per floor.</td>
</tr>
<tr>
<td>Server Room</td>
<td>5</td>
<td>0</td>
<td>36</td>
<td>96</td>
<td>3 288 One per floor.</td>
</tr>
<tr>
<td>Building Stair</td>
<td>6</td>
<td>20</td>
<td>203</td>
<td>264</td>
<td>6 584 Two per floor.</td>
</tr>
<tr>
<td>Elevators</td>
<td>6</td>
<td>30</td>
<td>300</td>
<td>84</td>
<td>3 162 One bank per floor.</td>
</tr>
</tbody>
</table>

**TOTAL Usable Square Footage:** 9,072

**Sub-total:** 8,164

**Primary Circulation Factor (10%)**

| Total | 1,908 |

**Sub-total:** 9,072

**GENERAL NOTES:**

- Primary circulation is 10% of program sub-total.
- Secondary circulation is included in Usable Square Foot Totals.
- Three floors are assumed for the time being.
- Double height space of Lobby and Auditorium may affect Program Total.
- Atrium floor space has not been accounted for in Program Total.
- Usable green roof may be added for additional Meeting and Collaboration Spaces.
Visual Listening

Glenn Research Center
Lewis Field & Plum Brook Station
Glenn Research Center
Lewis Field & Plum Brook Station
# Sustainable Design

## LEED 2.2 Checklist Summary

<table>
<thead>
<tr>
<th>Sustainable Sites</th>
<th>Possible</th>
<th>Probable</th>
<th>Potential</th>
<th>Not Possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>5</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Energy &amp; Atmosphere</td>
<td>17</td>
<td>11</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Conserving Materials &amp; Resources</td>
<td>13</td>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Enhance indoor Environmental Quality</td>
<td>15</td>
<td>11</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Innovation in Design</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Totals</th>
<th>Certified</th>
<th>26-32 points</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Silver</td>
<td>33-38 points</td>
</tr>
<tr>
<td></td>
<td>Gold</td>
<td>39-51 points</td>
</tr>
<tr>
<td></td>
<td>Platinum</td>
<td>52+ points</td>
</tr>
</tbody>
</table>

LEED Certified 26 – 32
Silver 33 – 38
Gold 39 – 51
Platinum 52 or more

Glenn Research Center
Lewis Field & Plum Brook Station
Energy Modeling Strategy

• Daylighting and Energy Efficiency should drive design
• Maximize North Lighting
• High Efficiency skin strategy
• Incorporate BIM and IES
Total Building

42,300 sf External Wall
Vertical Glazing, 49% of Wall
1st Floor
57% above 25fc

25,500 sf “regularly occupied”
(Lobbies, offices, conference)
The effect of adjusting middle window size was studied for the 2nd Floor South Open Office

Glenn Research Center

Lewis Field & Plum Brook Station
2nd Floor South Office
No middle Window (Preliminary Design)
2nd Floor South Office
56ft Window

Glenn Research Center
Lewis Field & Plum Brook Station
Summary

• **Preliminary Daylight Fenestration Design**
  – 53% occupied space above 25fc
    • Does not fulfill LEED EQ credit 8.1
  – Vertical Glazing 49% of External Wall
    • Exceeds ASHRAE Baseline

• **Focus daylight harvesting on lobby areas**
  – Lower light levels are required
  – Central light well

• **Daylight office perimeters as much as possible without exceeding 40% total glazing area**
  – Minimize East and West glazing
  – Maximize daylight harvesting on 3rd floor with Skylights
  – Slope ceilings over 15ft perimeter (13ft down to 10ft)
  – Use dimming ballasts only within 20ft perimeter
View from West

Glenn Research Center
Lewis Field & Plum Brook Station
View from East

Glenn Research Center
Lewis Field & Plum Brook Station
Questions