“EMPAC and Curve Performing Arts Centers”

Typological Analysis and Outline Programming

AR650: Programming

Fall Quarter, 2011

Dean Sartain
Instructor: Mirkovich

November 3, 2011
The Curtis R. Priem Experimental Media and Performing Arts Center

Rensselaer Polytechnic Institute (RPI), Troy, NY
The Curtis R. Priem Experimental Media and Performing Arts Center
Rensselaer Polytechnic Institute (RPI), Troy, NY

“EMPAC is an extraordinary venue where science, research, and performance meet.”

— Shirley Ann Jackson, President, RPI

The Curtis R. Priem Experimental Media and Performing Arts Center (EMPAC) located on the western edge of Rensselaer Polytechnic Institutes campus in Troy, New York can almost be seen as a pioneer of the performing arts center typology due to its integration of performance space with music research and studio space. Architecture critic, William Morgan writes “the architects conceived the building as two parallel structures, with both traditional and experimental spaces.” This programmatic organization for the building lies along a north-south axis, the concert hall (traditional program) on one side aligned with the main entrance to the north, and the studios and theater (experimental program) on the opposite side to the south. The concert hall, the largest of the programmatic spaces, is enclosed in a steel structure clad in cedar planks which almost appears to float inside of the glass wrapped building envelope and is accessible via six separate ramps. The placement of the concert hall as a large floating mass within the center of a large glass enclosed box allows the buildings circulation to become a main organizing factor in the design, and creates a degree of transparency to a building typology that usually has very few windows.

Along with the 1,200 seat concert hall, EMPAC boasts a 400 seat theater and full fly tower, two black-box studios, resident artist studios, a dance studio, and support facilities. The building itself is situated on an intimidating 30 degree, geologically unstable slope which ultimately required the structural engineers to design a stepped foundation with over 280 foundation anchors going through layers of sand and clay into solid bedrock.

3 Minutillo p.101
Fig. 1: Foundation System

Fig. 2: Building placement and site slope

**Basic Project Information:**

Design Architect: Nicholas Grimshaw & Partners (London)

Architect of Record: Davis Brody Bond (NY, NY)

Client & Type: RPI, academic institution.

Building Size: 221,200 gross sf.

Budget: ca. $200 million.

Years Built: 2003-2008

Acoustics: Kirkegaard Associates (Chicago, IL)

Larry Kirkegaard, FASA, Hon. AIA, President and

Principal-in-Charge

**Special Features:**

- Roof: The curved roof covering the EMPAC building is laterally supported by the mass of the concert hall, which allowed the lobby to be column free.

---

- Skylights: The material selected for the expansive skylights along the roof of the building is a derivative of Teflon called EFTE, which is 1% of the equivalent area of insulated glass, which allows the skylight to span long distances with few mullions.
- Curtain Wall Mullions: A heating system runs fluid through steel mullions to prevent condensation on the building’s northern façade. A German curtain wall specialist, Gartner, was consulted for this technology.
- State of the art acoustics.
- Studio floors: are raised on noise absorbing springs.
- Concert Hall Foundations and Plenum: The concert hall rests on its own foundations to prevent acoustic interference from other spaces in the building. The mechanical room lies underneath the concert hall and has a plenum space which acts as an acoustic barrier.

**Strategies relevant to thesis:**

- Situating of the enclosed, windowless, performance spaces away from the building envelope to an interior location allows circulation to become the prominent programmatic component ultimately allowing more transparency from the exterior.

**Drawings:**

![Fig. 4: Site Plan: RPI Campus, Troy, NY. (Target building in red).]
The main concert hall is located on the 5th and 6th floors of the building’s northern half. The southern half of the plan hosts the studio and theater spaces.
Pictures:

Fig. 9: Exterior View looking NW.

Fig. 10: Exterior View looking south.
Fig. 11: Exterior View_Western Approach

Fig. 12: Interior View_Concert Hall Mass
Fig. 13: Interior View_Concert Hall

Fig. 14: Exterior View looking south.
Analysis:

A. Plan Concept & Major Programming Relationships: The plan of the EMPAC building is organized in a very simple manner; the building has a primary longitudinal East-West axis with the concert hall mass on the northern side, and the theater and the studios on the southern side. One of the rationales for this organization is that the concert hall mass has plenty of space in order to maintain the appearance of floating. A secondary, North-South axis can be seen towards the back of the building, where it sits into the landscape of the hill. The outcome is the blue “L” shape as seen in the diagram below, which maintains this programmatic organization on every level. This “L” shape hosts the theater, dance studio, and studios which are located strategically apart from one another to reduce acoustic interference from occurring. The area where the concert hall is placed slopes down with the grade of the hill, helping the concert hall form to have a “floating” effect. The primary circulation is derived from the leftover space, and can be seen as a red box in the diagram below. Social program elements are to be found under the concert hall towards the west side of the site.

Fig. 15
B. Circulation:

Fig. 16
Vertical & Horizontal Circulation: 7th Flr

Fig. 17
Vertical & Horizontal Circulation: 5th Flr
C. Public Vs Private Zoning: Since this building is intended for the use of university students and researchers, there are very few “private” zones in the overall composition of the building. Below is a typical representative floor plan; public zones are indicated in blue, and consist of the concert hall, theater, studios, and restrooms. The private zones in the building are situated in between the public zones, and are indicated in red.

D. Concept Section:
E. **Structure:** The EMPAC’s most distinguished structural systems include the concert hall floating mass, and the roof. While seemingly separate animals, both structural systems are integrated seamlessly with one another. The steel framed, cedar plank clad floating mass actually helps stabilize the roof, eliminating the need for cross bracing. The steel frame of the floating mass also provides structural support for the six access ramps leading to the concert hall.\(^5\)

---

Curve: The Leicester Performing Arts Centre

Leicester City, United Kingdom
Curve: The Leicester Performing Arts Centre
Leicester City, United Kingdom

“As an anchor for redevelopment of the St. George’s Conservation Area in downtown Leicester, the city’s new theater, named Curve, seeks to engage community life.”

—Rafael Viñoly Architects

The first building designed by Uruguayan native, Rafael Viñoly, is an experiment on the performing arts center (PAC) typology in that the design seeks to turn the traditional program of a PAC inside out. Viñoly challenges the typical organization of a theater building by upsetting the strict principle of programmatic separation typical to this building typology, to the point where the concepts of front of house and back of house dissolve leaving behind an event flexible space where the inner workings of a PAC that would usually be hidden become part of the overall experience. By locating the majority of the program, including the theater spaces on street level, Viñoly blurs the distinction between street and theater, ultimately “engaging community life” more successfully.²

Similar to the EMPAC building by Grimshaw Architects, Viñoly treats the circulation as the primary programmatic factor in the design of the building, and locates the “windowless” programs (750 and 350 seat auditoriums) on the interior thus becoming a glass cage containing performance program. Unlike EMPAC’s rigid, inflexible performance spaces, Curve features operable vertical partitions behind the stage of each theater that when opened, the theater space spills into the lobby transforming the open layout of the circulation into a performance space. This innovative use of partitions allows a significant degree of program and event flexibility.³

³ Ibid.
Basic Project Information:

Location: Leicester City, UK

Design Architect: Rafael Vinoly Architects


Building Size: ca. 140,000 gross sf.

Budget: ca. £ 61 million.

Years Built: 2008

Special Features:

- Operable vertical partitions: allow greater degree of program flexibility.
- Natural day lighted public areas.

Strategies relevant to thesis:

- Situating of the enclosed, windowless, performance spaces away from the building envelope to an interior location allows circulation to become the prominent programmatic component ultimately allowing more transparency from the exterior.
- Blurring the distinction between street and theater, front of house and back of house becomes an interesting language for this typology that challenges conventional PAC organizations.
- The idea of operable partitions to help manage and create event space.
- The structural concept of having program elements nestled under a large roof helps reinforce the notion of multiple program spaces within a single building.
Drawings:

Fig. 18: Site Plan

Fig. 19: Floor Plan
Fig. 20: Building Section

Pictures:

Fig. 21: Exterior Rendering
Fig. 22: Exterior View.
Fig. 23: Interior View

Fig. 24: View of Theater and Operable Partition (left).
Analysis:

A. Conceptual Site Plan: The building sits on a triangular site in downtown Leicester City, surrounded by a unified urban fabric. By following the curves of the street, and by building up next to existing buildings to the north and east the footprint for the project was realized. The glass curtain wall facing south is perfectly oriented for natural daylighting.

B. Plan Concept & Major Programming Relationships: Since the design team wanted to challenge the traditional PAC typology, and flip it inside out, the concept for the plan is simple; the entire floor plan save for few exceptions can be used as circulation (light blue). Bathrooms, changing rooms, offices and conference rooms are grouped together in small bands of program (dark blue) and are positioned away from the glazing and against the walls built up next to existing buildings. The two large
performance spaces are centered on the floor plan (red), while the lobby space which can be turned into a stage (purple) fits cozily in between the two performance halls.

C. Circulation:
D. Public Vs Private Zones: Since the architect’s concept for the PAC was a wide open space that eradicates the boundary between street and theater, front of house and back of house programs, there is very little resulting private space besides bathrooms, changing rooms, offices, conference rooms, etc.

E. Concept Section:

The roof of the project floats over the interior program, to create more of an open feel when entering the building.
F. **Structure:** The Curve PAC consists of four main structural elements, the 750 seat auditorium, the 350 seat auditorium, the steel framed shoulder block, and the roof. The 35,520 sf of roof expanse is supported by a 800 ton steel structure which allows the roof to cover both auditoriums and the central stage. Around each auditorium are four concrete access cores, which rise to create a footing for the truss system of the roof.\(^4\)

Building Typology: Performing Arts Center

Conclusions & Outline Program

A performing arts center is usually perceived as a sequence of interior spaces leading up to the performance area. It is a common goal to not only stimulate the user during a performance or event, but also before and after an event.

Due to the fact that much of the PAC’s program consists of performance spaces with no fenestration, the ideal implementation of circulation should be placed near the buildings edge where light can enter the space. Conversely, the performance aspects of the program should be situated so that they do not subtract from the available surface area of fenestration, ideally closer towards the center of the building. The way in which circulation navigates through the building, and how it begins to create a dialogue of interior space versus building form will be a crucial step to develop.

The way in which the building relates to its exterior surroundings is also of supreme importance. A PAC has a plethora of interior programmatic needs, however making an attempt at integrating a civic plaza or park near the building has the opportunity to transform the building typology from a self contained building envelope with isolated interior functions to a complex-like facility that develops into a community gathering space.

Another common design strategy that is incorporated into the design of many PAC’s is a long span structural roof, which allows the various programmatic components it covers to have more flexibility of placement within the building thanks to the eliminated concern of column placement.

Sustainable technologies, acoustics, and mechanical equipment need to be incorporated seamlessly into the overall design of the building. Mechanical rooms and equipment should be located so that they do not create acoustic interference with the performance spaces, the most important programmatic elements of a PAC.
Photo Index

-Fig. 1-3:

-Fig. 4:
*Google Earth Image*

-Fig. 5-9:
*Metropolis* (2009)

-Fig. 10-11:

-Fig. 12-13:
*Metropolis* (2009)

-Fig. 14-17:
*ArcSpace* (2008)

-Fig. 18:

-Fig. 19-20:

-Fig. 21-22: *DesignBoom* (2008)
Fig. 23-24:

Pearman (2008)
Bibliography

**EMPAC: (alphabetically)**


**Curve: (alphabetically)**
