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## AN INTERNATIONAL ARRIVAL: THE COLLABORATIVE DESIGN OF AN ICONIC AIRPORT FOOTBRIDGE

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## 1. Introduction

The Port of Seattle is currently expanding the Seattle-Tacoma International Airport. To assist them in this project, they have enlisted a design-build team that includes Clark Construction; Skidmore, Owings & Merrill LLP (SOM); the Miller Hull Partnership; KPFF; and schlaich bergemann partner (sbp). SOM, KPFF, and sbp are working together to design a bridge for this site. This design effort has included collaboration and debate as the team works together to deliver a successful bridge design for the project.

## 2. Context

The airport expansion project includes the connection of buildings separated by the aircraft taxiway. To connect the buildings, the Port of Seattle decided to take advantage of the opportunity for an iconic pedestrian bridge. This bridge would fulfill the need for effective circulation while also allowing passengers to enjoy views of the site and geography beyond, including the Seattle/Tacoma region's signature mountains. A well designed pedestrian bridge would also serve as a strong visual symbol of the transformation of the facility and region.

## 3. Design Team

### 3.1 Team Structure

This project has brought together an accomplished yet distinct team of designers for the bridge. The bridge designers of the design-build team include architects from SOM, structural engineers from SOM, structural engineers from KPFF (the Engineers of Record for the bridge), and structural engineers from sbp. They are also working with construction managers and engineers from Clark on the design-build team, as well as

engineers from the Port of Seattle as the owners. There have also been, at various stages, wind engineers from Wacker Ingenieure, the wind tunnel testing facility, and structural engineers from other firms brought in as peer reviewers for the project.

### 3.2 Design, Dialog, and Debate

The bridge design team possesses a great deal of experience and histories of innovative approaches to design. The core team members from SOM, KPFF, and sbp were in frequent contact to come up with both a successful bridge as well as a shared design approach. Not surprisingly, the designers were often not in initial agreement about how to go about the design process. There were instances of healthy amounts of debate to resolve these differences. Topics of debate included: the structural system of the bridge (suspension versus cable-stayed); the connection of the cores to the bridge; the human comfort criteria; and acceptable construction tolerances. But in the end the designers were able to come to an agreement and have produced a bridge that fulfills all requirements and provides a unique, iconic structure for the site.

### 4. Design Evolution

With the ultimate goal of building an attractive, highly functioning bridge, the design team (structural engineers and architects) held design charrettes, both in person and via videoconferencing, to collaborate on the design of the bridge. With three firms and many individuals with diverse backgrounds and goals, this collaboration involved both agreement and debate. Schedule and targeted budget estimates dictated that the design needed to be rational and affordable.

Effective passenger flow was essential in the evolution of design. Passengers would ascend up the bridge, cross above the active taxilane, and then descend on the other side. This passenger movement defined the geometry of end supports that include v-piers. The bridge needed to allow for quick and comfortable movement without any “pinch points,” while remaining secure and safe. Detailed modeling of something potentially random, such as how people walk or stop is not easy. Modern design tools that consider three-dimensional space (such as Rhino and Revit) were used to model people moving quickly to their destination or pausing to enjoy the views of the bridge and site.

Early investigations looked into many bridge types. The design converged on a cable-supported bridge that provided a high-performing, efficient, aesthetically pleasing solution that incorporated a suspension cable system. This began as a suspension-type system before evolving into a cable-stayed form.

### 5. Discussion and Conclusion

The new bridge for the Seattle-Tacoma International Airport is currently in the Construction Documents (CD) phase. The construction team (steel fabricator, erector, cable supplier, etc.) has been brought on board and is now part of the collaborative process. The design process was not always easy, but has led to a successful design for a unique site.



Fig. 1. Bridge exterior