PASSENGER BOARDING BRIDGES

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AMERICAN ASSOCIATION OF PORT AUTHORITIES

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WHEN ARE BOARDING BRIDGES NECESSARY?

ENVIROMENTAL
Large tidal ranges, wave activity, other environmental factors.

SERVICING THE DESIGN FLEET
To accommodate larger ships with PAX loads in excess of 3,500. Accessing low-reach and high-reach doors. Servicing operations on apron.

HOMEPORT / PORT-OF-CALL
Homeports will likely require at least 1 PBB, with larger ships requiring 2+. More than 5-10 turnarounds per month.

IMPROVING PASSENGER EXPERIENCE
DESIGN VESSELS
IDENTIFYING THE DESIGN FLEET

Critical to the design of the SPBB’s is the fleet of vessels to be serviced. As the complexity and size of ships has evolved, designs have changed drastically. A few key factors include:

- Shell door locations (some doors in excess of +50’ awl. Overboard lifeboats, structural overhangs
- PAX count. (Some vessels nearing >7,000 passengers)
- Apron level servicing (provisioning, luggage, bunkering, etc)
- Design vs operating draft
HOMEPORT and PORT-OF-CALL

IS A BOARDING BRIDGE RIGHT FOR YOU?

All homeports will likely require at least 1 gangway. In order to service today’s class of vessels, 2+ boarding bridges will be required.

Ports-of-call experiencing more than 5-10 turnarounds per month may want to consider PBBs.
Successful first impressions are imperative. Offer convenient shore-to-ship access in comfort and style. Embark/Disembark process should not be a burden to PAX. Amenities such as ADA accessible walkways, A/C, integration into architecture, safety, etc. all make for an improved passenger experience.
HISTORY

• VERY SIMPLE SYSTEMS
  • Single planks, bridges, stairs, etc
  • Apron level

• ADA
  • Established 1:12 gradient

• EVOLUTION
  • Shell doors have gone from apron level to +50’ awl.
  • Main embarkation promenade higher.
    How many floors?
  • PAX load increased exponentially
  • Tidal ranges from 2’ to 20’
  • As ships have evolved, so have boarding bridges. Tunnels in excess of 100’ LF and ranges of more than 30’.
EVOLUTION

• RESULT
  • “Box” PBB
  • Tunnels in excess of 100’
  • Mobile along pier
  • Steel framed gantry
  • Glazed
  • Telescopic
  • Auto-leveling
  • Wheels or rail
  • Clearance for service vehicles
**PROCUREMENT APPROACH**

**ESTABLISH DESIGN BUILD PACKAGE**
Can be included w/ terminal/concourse, FF&E, etc.
Coordinate with bldg./fire.

**COMPARE SUBMITTALS**
Review all submittals and rank based on adherence/deviation from specs.

**ISSUANCE OF BID PACKAGE**
Bidders to receive bid docs no less than 18 months before anticipated commissioning.

**AWARDING CONTRACT**
Bidder selection and begin design build process.
**APPROACH**

- **PRE-DESIGN**
  SPBB has been added to pre-design scope. Separate tender from terminal, FF&E, etc.

- **BUILDING DEPARTMENT**
  Coordinate with building department, life safety, fire, etc.

- **SPECIFICATIONS**
  Creating a bid package for all invited bidders. 18 mos. in advance

- **COORDINATION**
  Coordinating final installation of PBB and integration with terminal/apron.

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- **PRE-DESIGN**
- **ENGAGE**
- **BLDG DPT**
- **BUDGET**
- **SPECS**
- **BIDS**
- **INSTALL**

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- **ENGAGE PORT AND CRUISE LINES**
  Discuss options and requirements from all parties involved.

- **BUDGET AND SCHEDULE**
  Based on specified requirements, establish a budget and schedule.

- **EVALUATE**
  Evaluate and recommend a preferred bidder based on design build bid submittal.
CASE STUDIES

TERMINAL A – RCI – MIAMI, FL
SPBB design for new terminal.
Began as single tunnel design, evolved into retrofit of existing switchback system

PIER 66 – SEATTLE, WA
Scope included addition of a new concourse and single tunnel PBB to accommodate newer vessel, tides, and PAX.

CAPE LIBERTY – BAYONNE, NJ
New terminal design, fixed point PBB's installed for centralized embarkation points and ease of apron servicing.
TERMINAL A - RCI

- **NEW FLAGSHIP BUILDING**
  - Preserve architecture
  - Concourse elevation higher than other terminals
  - Apron conditions
  - Wide fleet range
  - Board from a centralized point
  - Design fleet newer vessels, minimal ramping
  - Ships less than 3,000 PAX can operate on single boarding bridge
  - Retrofit CT-E PBB’s
TERMINAL A - RCI

• NEW FLAGSHIP BUILDING
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  • Wide fleet range
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  • Ships less than 3,000 PAX can operate on single boarding bridge
  • Retrofit CT-E PBB’s, possible
TERMINAL A - RCI

- **FIXED POINT PBB**
  - Tunnel slopes at various tidal periods
  - Narrow fleet range
  - Horizontal and vertical operational envelope
  - Interface between boarding bridge and ship

<table>
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<tr>
<th>Ship Class</th>
<th>Max Draft (mm)</th>
<th>Emb/Prom Dk abv BL (mm)</th>
<th>Max Draft (mm)</th>
<th>Emb/Prom Dk abv WL (feet)</th>
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Corridor capacity (passengers per minute) levels of service:

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<th>Los B</th>
<th>Los C</th>
<th>Los D</th>
<th>Los E</th>
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<td>192</td>
<td>220</td>
<td>244</td>
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<td>LOS E</td>
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<td>264</td>
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<td>342</td>
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<td>433</td>
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TERMINAL A - RCI

• RETROFIT EXISTING BOARDING BRIDGES
  • Mobile elevating gangway
  • Less $$$
  • Runs parallel along pier
  • Switchback perpendicular to apron, less visual impact
  • Does not interfere with servicing operations
TERMINAL A - RCI

- RETROFIT EXISTING BOARDING BRIDGES
  - Mobile elevating gangway
  - Less $$$
  - Runs parallel along pier on rail
  - Switchback perpendicular to apron, less visual impact
  - Apron 60’, more efficient layout
  - Does not interfere with servicing operations
TERMINAL A - RCI

- FUTURE SYSTEM?
  - Concourse has been designed to accept single tunnel mobile elevating gangway.
  - Potential to add in the future.
CASE STUDIES

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SPBB design for new terminal. Began as single tunnel design, evolved into retrofit of existing switchback system.

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Scope included addition of a new concourse and single tunnel PBB to accommodate newer vessel, tides, and PAX.

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### FLEET STUDY

- Evaluate need for 1 or more passenger boarding bridge
- Constrained apron conditions
- Wide fleet range
- Design fleet newer vessels
- Retrofit existing system “Big Bertha"
- Extreme weather and tidal ranges
- Seismic
- Link bridge design

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<th>Vessel Name</th>
<th>LOA (ft)</th>
<th>Beam (ft)</th>
<th>Door Side (Stbd/Port*)</th>
<th>Height Above SWL (ft)</th>
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</table>
PIER 66 – PORT OF SEATTLE

- BELL STREET CRUISE TERMINAL

- Evaluate need for 1 or more passenger boarding bridge
- Constrained apron conditions
- Wide fleet range
- Design fleet newer vessels
- Retrofit existing system “Big Bertha”
- Extreme weather and tidal ranges
- Seismic
- Link bridge design
PIER 66 – PORT OF SEATTLE

- LINK BRIDGE DESIGN

- Retrofit existing system “Big Bertha”
- Link bridge to allow existing gangway to operate further along the pier.
- Help connecting back to concourse
- Extreme weather and tidal ranges
- Seismic
PIER 66 – PORT OF SEATTLE

- **PASSENGER CON COURSE AND BOARDING BRIDGE**
  - Very narrow apron
    - Longer concourse allows for gradual ramping to board bridge
    - Necessary due to tides and door locations
  - Extreme weather and tidal ranges
  - Seismic
CASE STUDIES

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- Designed to service newer generation vessels
  - Centralized boarding location
  - Design fleet newer vessels, minimal ramping
  - Minimize LF of sterile corridor
  - Terminal not centered on pier, concourse required to extend further east.
  - 130’ apron
CAPE LIBERTY - NJ

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CAPE LIBERTY - NJ
KEY LESSONS

**PROCUREMENT**

Min. 2 bidders. 18 mos. lead time. Competition scarce at the moment.

**LEAD TIME**

For new buildings, separating PBB and building tender has typically caused a big mess.

**VESSEL DESIGN**

As vessels increase in size, so must boarding bridges. Increased flows, higher embarkation points, etc.

**COMMUNICATION**

Communication between port authorities, cruise lines, A/E, contractor, and PBB manufacturer essential.