Mandalay Bay Seawall Repair Update

February 8, 2020
Rosemarie Gaglione
Public Works Director
Recently Completed Projects

- **2012**: Condition Assessment
- **2014**: Slope Protection & Filling Footing Gaps
- **2016**: Kingsbridge Way Wall Repair Work
Current Projects: Pilaster Jacket Repairs

PROJECT TIMELINE

OPEN FOR BIDS

BID RESULTS
Harbour Construction Co. was the low bidder at $634,000.*

COUNCIL APPROVAL
City Council approval anticipated on Feb. 18, 2020.

START CONSTRUCTION
Scheduled to begin construction in March 2020.

COMPLETE CONSTRUCTION
Estimated completion: May 2020.

Total Project Cost: $760,800
*Total Project Cost $760,800 including contingency and staff time

Current Conditions

Typical Repairs
Current Construction: Pilaster Jacket Repairs

WORK LOCATIONS

- 2301-2311 S. Victoria Ave.
- 2101-2131 S. Victoria Ave.
- 2321-2341 Monaco Dr.
- 2341-2351 S Victoria Ave.
- 2121-2131 Ravoli Dr.
- 4045 Ischia Dr.

- 4015 Ischia Dr.
- 4000-4016 Nice Ct.
- 2501-2521 S Victoria Ave.
- 2000 Peninsula Rd.
  - 4040 W Hemlock St.
- 2014-2044 Peninsula Rd.
Current Construction: Pilaster Jacket Repairs
Current Construction: Pilaster Jacket Repairs
Source of Seawall Deterioration

Alkali-Silica Reaction (ASR)

- Alkali-silica reaction (ASR) is one of the major sources of degradation in the sea walls.

- ASR is a chemical reaction between alkali in the cement paste and silica in the aggregate that creates an expansive gel, which swells in contact water.

- The swelling of the gel creates an expansive force that causes cracking of the concrete.

- The concrete cracking then creates a path for further water access leading to progression of the reaction and the cracking as well as corrosion of the reinforcing.
Photomicrographs of polished core samples showing deposits of ASR gel (indicated by arrows) [from TranSystems (2011)]
TranSystems Seawall Repairs Recommendations

- Proposed repairs to concrete seawalls include:
  - Strengthening repairs to wall panels, jacket repairs to concrete pilasters and drainage improvements

- Assumes 30-year design life

- Cost estimate: $87 Million over the next 25 years for superficial repairs

- These repairs would not meet current code-level seismic loading

- Liquefaction potential not addressed
TetraTech Seawall Repair Recommendations

- Proposed repairs consist of constructing a Cantilever Sheet Pile Wall in front of existing seawalls

- Assumes 75-year design life

- Cost estimate of $200 Million for overall repairs (goes beyond 25 years)
  - $154 Million over next 25 years

- Designed to resist current code-level seismic loading

- Liquefaction considered in the design
## Analysis Comparison

<table>
<thead>
<tr>
<th>PROPOSAL DETAILS</th>
<th>INITIAL ANALYSIS</th>
<th>ALTERNATIVE ANALYSIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed Repairs</td>
<td>Strengthening repairs to wall panels, jacket repairs to concrete pilasters and drainage improvements</td>
<td>Constructing a Cantilever Sheet Pile Wall in front of existing seawalls</td>
</tr>
<tr>
<td>Design Life</td>
<td>Assumes 30-year design life</td>
<td>Assumes 75-year design life</td>
</tr>
<tr>
<td>Cost</td>
<td>$87 Million (Over next 25 years)</td>
<td>$200 Million ($154 Million over next 25 years)</td>
</tr>
<tr>
<td>Seismic Loading</td>
<td>Repairs will not meet current code-level seismic loading</td>
<td>Designed to resist current code-level seismic loading</td>
</tr>
<tr>
<td>Liquefaction Consideration</td>
<td>Liquefaction not addressed</td>
<td>Liquefaction considered in design</td>
</tr>
</tbody>
</table>
Cantilever Sheet Pile Wall Detail (Boise Wall)
Cantilever Sheet Pile Wall Detail (Zurn Wall)
Using the proposed **TetraTech Seawall Repairs**, construction will tackle **7.6 miles** of Cantilever Sheet Pile Wall at a total cost of nearly **$200 million** and assume a **75-year design life**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Years</th>
<th>Length of Wall</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1-6</td>
<td>8,800</td>
<td>$43.5 M</td>
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<tr>
<td>2</td>
<td>7-12</td>
<td>4,200</td>
<td>$20.7 M</td>
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<tr>
<td>3</td>
<td>13-18</td>
<td>8,700</td>
<td>$43.0 M</td>
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<tr>
<td>4</td>
<td>19-25</td>
<td>9,400</td>
<td>$46.4 M</td>
</tr>
<tr>
<td>5</td>
<td>Beyond 25</td>
<td>9,300</td>
<td>$45.9 M</td>
</tr>
</tbody>
</table>

**$199.5M**
Phasing Plan

Legend:
- TRACT BOUNDARY
- ZUMP/BOSIE BOUNDARY

<table>
<thead>
<tr>
<th>GROUP</th>
<th>Size</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8,800 FT</td>
<td>22%</td>
</tr>
<tr>
<td>2</td>
<td>4,200 FT</td>
<td>10%</td>
</tr>
<tr>
<td>3</td>
<td>8,700 FT</td>
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Funding Discussion

CITY MANAGER’S COMMITMENT

1. **Pursue New Revenue Stream**
   In order to gain bonding capacity needed for a Public Works project of this size.

2. **50/50 Split of Costs**
   City Manager commits to recommending to City Council a formal agreement of a public-private partnership between City and Mandalay Bay.

3. **$100,000,000 Investment by City**
   City Manager commits to recommending to cover $100M of the $200M required for total repair.

4. **Grants**
   The City has submitted two FEMA grant applications for the seawalls retrofits:
   - Hazard Mitigation Grant Program (HMGP) application submitted on September 4, 2018
   - Pre-Disaster Mitigation Grant Program (PDM) application submitted on December 2, 2019
   - Results have not come in from FEMA
Questions?