MEMORANDUM

To: Gina Ebanks-Petrie (Director, DoE, Cayman Islands Government)

Cc: Timothy Austin (CI DoE)
Lauren Dombowsky (CI DoE)

From: Kevin R. Bodge, Ph.D., P.E.

Date: 15 October 2022

Re: Royal Palms site seawall repairs pursuant to Tropical Storm Ian.

The following responds to your email dated 10 Oct 2022 requesting my professional coastal engineering guidance regarding proposed seawall repairs at Royal Palms on Seven Mile Beach.

It is my understanding that the owner seeks to remove the outer seawall (damaged in September 2022) and the unconsolidated rubble between the outer seawall and inner wall, and then begin to address plans to reinforce the inner wall – presumably as an engineered seawall. It is also my understanding that the resort has been closed for business since April 2020 (2.5 years), and that the overall site is quite large in area (~200 m deep with ~90 m total shorefront), and that the overall site is planned for large-scale re-development in the near future. The existing development along the inner wall comprises non-habitable structures (recreational amenities) and some are damaged. Over the last few years, the dry beach width along the seawall (~60± m long) has been mostly very narrow and often nearly negligible.

I do not recommend reinforcing and establishing a seawall at the location of the inner wall. It is anticipated that the inner wall is a landscape wall that shall require substantial structural improvements to serve as the front line against the sea – thus becoming a seawall located only about 2± meters landward of the existing seawall. This will result in continuing the existing recent eroded beach conditions, by which there is frequently minimal dry sand beach along the wall.

Instead, I recommend that a new seawall (and limit of upland hardscape) be constructed on the order of at least 14+ to 16+ meters landward of the existing inner wall, more or less. Physically, this would correspond to about the middle of the large recreation building that is west of the pool, broadly speaking; that is, on the order of about 14 m seaward of the pool. This would better ensure a reliable recreational beach along the entirety of the shorefront. Given the anticipated capacity and beach area requirements of the new future development – the greater the setback distance, the better.

These distance valuations reflect my long-term experience with Caribbean resort beaches that are similar to SMB, wherein I have observed that a *minimum* distance of at least ~16 m between the mid-tide (MSL) shoreline and upland hardscape (seawall) or vegetation line is necessary to mostly avoid "erosion" problems [i.e., compromised dry beach]. A minimum distance of 19-22 m is

preferable for a reliable dry sand beach with ample high tide recreational area for a mid to medium-large resort size. (Mathematically, this likewise reflects a dry berm elevation of about +1.1 m MSL with 1:10 to 1:11 beach slope, and 6 to 7+ m minimum high-tide dry berm width for a couple rows of chaise lounges.)

The Royal Palms site presents an excellent opportunity – probably the most ideal contemporary example along south SMB – to restore reliable sand beach at a developed property through a landward relocation of a seawall/hardscape. The site presents ample upland space to slightly retreat from the sea. The existing wall(s) need to be replaced with a new wall. The property is closed, and has been closed for 2.5 years, and so there is no disruption to service for new works along the shorefront. The overall site is being currently master-planned for a new resort, per my understanding. Factors such as these rarely co-align to allow for re-thinking the shorefront of an existing/future development in order to mitigate a chronic beach erosion problem – where the existence of a reliable and suitably wide dry sand beach is of central economic value to the development.

In my professional experience, prudent landward relocation of the existing wall is a win-win for all parties. Beach conditions along the shorefront would be improved for SMB and the owner would have a far more reliable & resilient recreational beach amenity for the future resort guests, without reliance upon some future uncertain large-scale nearshore engineering works that have yet to be identified, planned, or permitted. If the owner were my client, I would most definitely recommend the re-located wall approach (described above) for consideration and implementation.

Over the last 20+ years, I have employed this identical approach – 10 to 15+ m landward relocation of existing seawalls – at dozens of high-end resorts and residential estates throughout the Caribbean, and all have succeeded beyond expectations in terms of providing a reliable and robust sand beach with elimination of chronic beach erosion issues. Notable examples include all of Atlantis, Phases I, II, III (Paradise Island)[1], Half Moon Resort (Montego Bay), and sites at Lyford Cay (Nassau). Ongoing, identical work includes re-development at Sandals Dunns River (Jamaica), Aqualina/Cable Beach (Nassau), and Lime Acre (Jamaica). All of these works comprise demolition of existing seawalls (too far seaward) and replacement by new seawalls that are further landward; and all were implemented by elective decision of the owners to improve the shorefront. The action does not reduce the resort/residential acreage; it trades some upland terrace area for a greater amount of more valuable dry sand beach area which is critical to the economic vitality of the upland property.

In my opinion and experience, I do not see urgency in undertaking a repair and a plan that would re-instate a seawall in nearly in its identical location – except for aesthetic "clean-up" of the shorefront. But since the resort property is closed, and has been for 2.5 years, the need for immediate repair for either aesthetic or operational purposes is not indicated. Even if the existing hotel was to

[1] Pursuant to Hurricane Floyd in September 1999, Kerzner International took advantage of storm damage and employed this approach to demolish over 350 m of seawall along Phase I (c. 1968) and rebuild a new seawall / revetment about 15 to 25 m landward -- thereafter eliminating the chronic beach erosion problem that previously plagued this beach area. In 2000-2005, we subsequently demolished 100's of m of seawalls and gabions and constructed new buried seawalls further landward along the Phase II/III development, restoring a wide reliable sand beach.

be re-opened in the near future, it could still operate at the same (or better) functional level with relocation of the pool-beach recreational building from seaward of the pool (to the south) and landward relocation of the seawall, with resultant improved beach amenity. If there is immediate need to remove the damaged seawall and debris (not indicated), then the existing inner wall *might* be armored with a temporary boulder revetment until re-planning of the shorefront masterplan and new seawall are completed.

In sum, the Royal Palms site presents an ideal opportunity and example for strategic re-development of the SMB shoreline – at least along this existing 60± m long seawall – for the mutual benefit of both the Cayman Islands and the owner, through landward relocation of the seawall that was damaged by TS Ian in September 2022. It is, in my professional coastal engineering opinion and experience, an opportunity that should not be foregone, particularly because it appears potentially feasible and will result in significant beach improvement along this property irrespective of any yet uncertain plan for longer term management or renourishment of the SMB shoreline.

Please contact me at kbodge@olsen-associates.com or US (904) 387-6114 if you have questions regarding these observations.