April 25, 2022

Eagle Ventures
36 Sherwood Place
Greenwich, CT 06830

Attention: Peter Cabrera
pcabrera@eagleventuresre.com

Reference: 68-70 Seaview Avenue
Stamford, CT 06902

Dear Mr. Cabrera:

In accordance with our February 8, 2022 Agreement for the Professional Services, **RACE Coastal Engineering (RACE)**, has performed a desktop coastal analysis to assess the flood risk at 68-70 Seaview Avenue and the surrounding roads in Stamford, CT. The analysis consisted of 1-D numerical wave modeling of wave crest elevations, wave runup, overtopping and inundation for an array of storms including the "500-year" (0.2%-annual chance occurrence) through the "1-year" (expected annually) return frequency event.

The following sections provide a summary of the existing site conditions, a range of environmental settings including the total water level elevations and wave climatology associated with the various storm frequencies, and an assessment of the probability that floodwaters and/or waves will exceed the elevation of the road.

The purpose of this analysis was to determine when flood elevations would exceed the level where emergency vehicles could safely access the site, and if/how much the existing road would need to be raised such that emergency vehicles could access the site during the 100-yr event. It is **RACE**'s understanding that based on the project team's conversations with the fire chief, the site can be safely accessed when 15" of water is on the road.

1. **Existing Site Conditions & Background Information**
   The project site, 68-70 Seaview Avenue, is located in Stamford Connecticut and is adjacent to the waters of Halloween Basin, an extension of the Long Island Sound. The site is exposed to winds and waves originating from southeasterly and southerly directions. The shorefront is subject to semi-diurnal tidal fluctuations. The storm events most typically associated with this site include hurricanes and nor'easters.

   The site is located on the Federal Emergency Management Agency's (FEMA) the effective Flood Insurance Rate Map (FIRM) No. 09001C0517G dated July 8, 2013. The datum for the FIRM is the North American Vertical Datum of 1988 (NAVD88). The FIRM shows the property to be a Zone VE with a base flood elevation (BFE) of El. +15' for approximately 10' to 30' +/- beyond the face of the seawall before it transitions into a Zone AE with a BFE of El. +14'. A snapshot of the FIRM is below in Figure 1: Project FIRM. The site is located waterward of the Stamford Hurricane Barrier.

Based on **RACE**'s review of the effective FIRM, it is our professional opinion that the flood zone designations are appropriate at this site, and we do not recommend seeking a FEMA Letter of Map Revision (LOMR) in order to change the flood designations at this site.

Figure 1: Project FIRM

It should be noted that the VE Zone designates an area of 1%-annual-chance (a.k.a. the "100-year storm" event) flooding which is subject to wave action with wave heights of 3' or greater or wave runup 3' or higher than the seawall. VE Zones are typically associated with significant construction restrictions for new or substantially improved structures such as requiring all construction to be pile supported with the lowest horizontal member elevated above the 100-year base flood elevation plus applicable freeboard as described in the building code. This designation also typically requires higher insurance premiums as being exposed to wave action in excess of 3' increases the potential for damage during a flood event. Construction requirements for new or substantially improved structures in the AE Zone are somewhat less restrictive, but include requiring enclosed areas below the 100-year flood elevation, plus applicable freeboard as described in the building code, to be unfinished space with provisions for flood waters to enter and leave the enclosed area.

RACE also reviewed the topographic survey provided by RVDI and the Connecticut Statewide LiDAR – 2016 and determined that the low point in the road that could be used to access the site during a flood event is located at approximately Point A shown in Figure 2 below. The elevation of this point is about El. +9.5' NAVD 88.

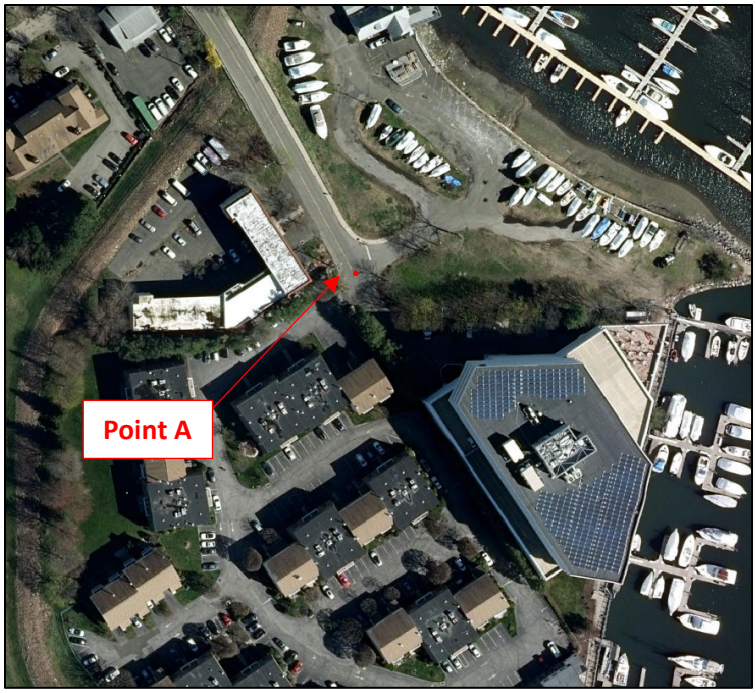

Figure 2: Aerial Photo Showing Low Point in Road, El. +9.5' +/-

2. Wave Study

For the purpose of this study, the stillwater levels, defined as the projected elevations of floodwaters in the absence of waves, from the FEMA Flood Insurance Study (FIS) No. 09001CV001C, Transect No. 16 were used as these elevations are the best available data for the site. The stillwater levels (SWL) associated with the 500-yr, 100-yr, 50-yr, 10-yr, and 1-yr return period storms are listed below in Table 1: Stillwater Levels. These storms have a 0.2%, 1%, 2%, 10%, and expected chance of being exceeded annually, respectively.

Return Period (yr)	Stillwater El (ft NAVD88)
1	5.5
10	8.4
50	10.1
100	10.8
500	12.2

Table 1: Stillwater Levels

RACE determined the wave heights and periods associated with each of the design storms and computed how high the total water level, defined as stillwater level plus wave setup, wave crest elevation and/or wave runup elevation, is anticipated to reach at the road during each of the design storm events. Wave setup is the super elevation of the stillwater level due to the presence of waves, and wave runup is defined as the maximum onshore elevation reached by waves relative to the shoreline position in the absents of waves. This information is presented below in Table 2: Wave Heights and Elevations.

Return Period (yr)	Wave Height (ft)	Wave Period (sec)	Total Water Level El. (ft NAVD88)	Max Runup or Wave Crest El. (ft NAVD88)
1	0.0	3.6	5.5	6
10	1.9	4.9	9.0	11
50	3.2	5.8	11.1	14
100	3.7	6.3	12.0	15
500	4.8	7.2	13.7	16

Table 2: Wave Heights and Elevations

These values were used to determine the annual probability that flood waters would exceed critical elevations on the road. The probability that the road is inundated with more than 0, 1', 1.25' (15") 2', and 3' of water is listed below in Table 3: Annual Probability of Road Flooding. The transformed wave heights at Point A associated with these flood events are also given in in Table 3. It is noted that the waves heights listed in Table 2 are generated from a southerly direction. The road is sheltered from these waves by high grade. As such, the maximum wave height associated with the flood depth on the road is the fetch limited wave from the northerly direction, which is protected, or depth limited wave over the high ground, whichever is less.

Flood Depth on Road (ft)	Annual Probability that Flood Depth is Exceeded (%)	Max. Wave Height Associated with Flood Depth (ft)
0	5.8	0.0
1	2.7	0.8
1.25 (15")	2.3	1.0
2	1.3	1.3
3	0.6	1.3

Table 3: Annual Probability of Road Flooding

It is **RACE**'s understanding that based on the project team's conversations with the fire chief, the site can be safely accessed when 15" of water is on the road. There is a 2.3% chance that a flood event will lead to water depths that exceed 15" of water on the road.

Tables 2 and 3 also show what would occur during the 100-yr/1% annual chance of exceedance event. During this event, there will be approximately 2.5' of water on the road, and the maximum wave height will be 1.3'. The road would need to be raised 15" to an elevation of El. +10.8' so that emergency vehicles could safely access the site during the 100-yr event.

A time series of the 100-yr event was plotted to determine how long the storm surge could be expected to last. The 100-yr event was assumed to have a 12-hr storm surge to mimic a hurricane type event. The time series of the surge is plotted in Figure 3 below.

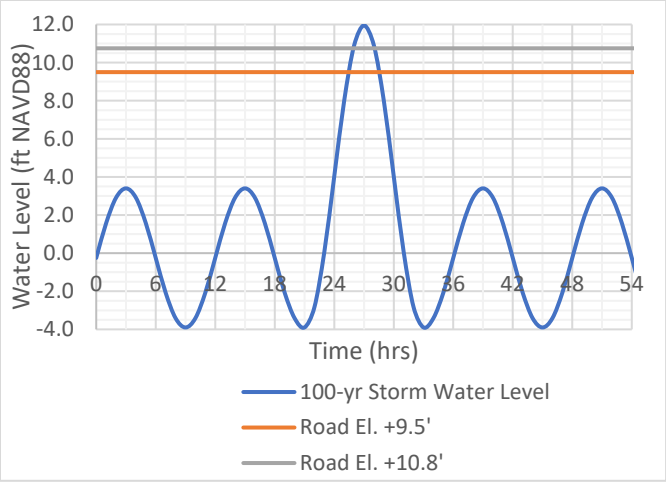

Figure 3: 100-yr Storm Surge

Figure 3 shows that during the 100-yr event, the road existing road at El. +9.5' would be inundated for about 3.1 hours. The water level would be greater than 15" for about 2.2 hours. If the road was raised to El. +10.8', the road would have water on it for 2.2 hours, but the water depth would not exceed 15" during the 100-yr event.

RACE created inundation maps to show how the total water level will inundate the site as flood waters start to rise. Maps output every 1' starting at El. +7' to El. +15'. These maps are attached to this letter. The elevation of the total water level, flood depth at Point A, wave height at Point A, and Annual Probability of Occurrence are listed below each map.

3. Conclusion

RACE reviewed water levels, waves and wind speeds to develop flood heights associated with various return period events by transforming the wave across the site to determine the probability that road will be inundated by a minimum 0, 1', 1.25' (15"), 2', and 3' during a flood event as well as what would occur during the 100-yr event. The analysis showed there will be approximately 2.5' of water on the road, and the maximum wave height will be 1.3' on the road during the 100-yr event. The analysis also showed in order to have less than 15" of water on the road during the 100-yr event, the road would need to be raised to El. 10.8'.

If the road was raised to El. +10.8', the road would have water on it for 2.2 hours, and the water depth would not exceed 15" during the 100-yr event. Based on the project team's conversations with the fire chief, the site can be safely accessed by emergency vehicles when 15" of water is on the road. As such, raising the road to El. +10.8' will allow the site to be safely accessed during the 100-yr flood event.

Please do not hesitate to contact the undersigned at 203-377-0663 if you have any questions on the information outlined in this letter report

Very truly yours,

RACE COASTAL ENGINEERING

Jill Pietropaolo
Project Manager/Senior Coastal Engineer

Enclosures: Inundation Maps

Inundation Maps:

Total Water Level = El. +7'

Water Depth @ Point A = 0.0'

Wave Height @ Point A = 0.0'

Annual Probability of Occurrence = 38%

Total Water Level = El. +8'

Water Depth @ Point A = 0.0'

Wave Height @ Point A = 0.0'

Annual Probability of Occurrence = 18%

Total Water Level = El. +9'

Water Depth @ Point A = 0.0'

Wave Height @ Point A = 0.0'

Annual Probability of Occurrence = 9%

Total Water Level = El. +10'

Water Depth @ Point A = 0.5'

Wave Height @ Point A = 0.4'

Annual Probability of Occurrence = 4%

Total Water Level = El. +10.5'

Water Depth @ Point A = 1'

Wave Height @ Point A = 0.8'

Annual Probability of Occurrence = 3%

Total Water Level = El. +11'

Water Depth @ Point A = 1.5'

Wave Height @ Point A = 1.2'

Annual Probability of Occurrence = 2%

Total Water Level = El. +12'

Water Depth @ Point A = 2.5'

Wave Height @ Point A = 1.3'

Annual Probability of Occurrence = 1%

Total Water Level = El. +13'

Water Depth @ Point A = 3.5'

Wave Height @ Point A = 1.3'

Annual Probability of Occurrence = 0.4%

Total Water Level = El. +14'

Water Depth @ Point A = 4.5'

Wave Height @ Point A = 1.6'

Annual Probability of Occurrence = 0.2%

Total Water Level - El. +15'

Water Depth @ Point A = 5.5'

Wave Height @ Point A = 2.3'

Annual Probability of Occurrence = 0.1%