

1 itself.

2 It must be conceded that the substantial value
3 of a property lies in its use. If the right of
4 use be denied, the value of the property is
5 annihilated and the ownership is rendered a
6 barren right.

7 The constitutional prohibition against taking
8 private property for public use without just com-
9 pensation must have been intended to protect all
10 of the essential elements of ownership which
11 make property valuable, including, of course,
12 the right of user and the right of enjoyment.

13 That's still the law in the State of South Carolina,
14 Your Honor, and I think the motion for directed verdict
15 should be denied.

16 THE COURT: I'm going to deny your motion, Mr.
17 Harness.

18 CHRISTOPHER JONES, being
19 duly sworn, testified as follows:

20 DIRECT EXAMINATION BY MR. HARNESS:

21 Q. And for whom do you work right now?

22 A. Coastal Science and Engineering, Incorporated.

23 Q. According to the stipulations, we have agreed you're
24 an expert in coastal processes or coastline processes, an
25 expert in shore front management.

1 Now, for the Judge, would you explain to him what
2 it means to be an expert in coastal processes?

3 A. An expert in coastal processes is someone who under-
4 stands those natural or manmade forces that affect the shore-
5 line, including the effects of waves, tides, currents,
6 storms on structures.

7 Q. All right, sir. What structures do you mean?

8 A. We can be talking about seawalls and abutments or
9 erosion control types of devices. We can also talk about
10 jetties and other structures at tidal inlets.

11 Q. Manmade buildings?

12 A. Yes.

13 Q. Now, what does it mean to be an expert in shore front
14 management?

15 A. I think an expert in shore front management is someone
16 who first understands the natural processes that affect the
17 shore line and, secondly, is concerned with the appropriate
18 use of that shoreline so that the upland development is
19 not threatened by erosion or storms, such that we will pro-
20 tect the recreational beach.

21 Q. Okay. Does that include determination on the suita-
22 bility of land for construction purposes?

23 A. In many cases, yes.

24 Q. All right, sir, and have you had experience in both
25 of those areas in terms of your education?

1 A. Yes, sir.

2 Q. Where were you educated?

3 A. I have a Bachelor of Science Degree in engineering
4 science from the University of Florida in 1975, and a
5 Master of Science Degree in coastal and oceanographic
6 engineering from the University of Florida in 1977.

7 Q. And as part of your experience, I'd like you to tell
8 the Judge in a chronological way--tell him basically what
9 your work experience has been in terms of coastal engineer-
10 ing.

11 A. I worked for a consulting firm in Naples, Florida,
12 on the southwest coast for two years during 1978 and 1979.
13 We worked on a major beach nourishment project in Hollywood
14 and Hallandale, Florida. We did a number of tidal inlet
15 studies shoreline assessments at that time.

16 Since then--I should say after that point, I worked
17 for six and a half years for the Florida Sea Grant Program
18 as a coastal engineering specialist, advising individuals,
19 local governments and businesses as to, let's say, problems
20 associated with coastal development, both on the beaches and
21 the estuaries.

22 Since July of 1986 I have been employed with Coastal
23 Science and Engineering as a coastal engineer. I have
24 worked for clients, both public and private, on a number
25 of jobs related to setback line locations, beach nourishment

1 projects, shoreline histories, shoreline assessment, and
2 marine assessment.

3 Q. Have you--first I'll ask if you can identify this
4 document. This is marked Defendant's Exhibit 1 which has
5 previously been agreed as part of the record.

6 A. Yes, sir. That's my resume.

7 Q. Does it have in it everything the Judge needs to
8 look at?

9 A. Yes, sir.

10 Q. All right. Now, in terms of publication, have you
11 written in the capacity of an expert in the coastal pro-
12 cesses or shorefront management?

13 A. Yes.

14 Q. All right. Could you give me an example of that?

15 A. I have over fifty publications. I'll just point
16 out a few of the more relevant ones to this one. In
17 1986, I believe it was, in the fall, I did a shoreline history
18 of the south end of Isle of Palms. I have done studies and
19 completed reports for several property owners who were con-
20 cerned with trying to define more accurate positions for
21 the interim baselines that have been adopted by the State,
22 those being on Kiawah Island, the north end of Debordieu Island,
23 portions of Hilton Head.

24 I have also worked for the Coastal Council under
25 contract or I should say my firm has in helping to define the

1 interim baseline and setback lines along eleven islands in
2 the State.

3 Q. All right, sir. Have you appeared in Court as an
4 expert before?

5 A. Yes, sir.

6 Q. In coastal processes and shoreline management--about
7 how many times?

8 A. Four.

9 Q. Now, in discussing shorefront management, can you
10 tell us what sort of problems the shorefront management
11 seeks to deal with or seeks to handle?

12 A. I think we can break things down into two categories.
13 One is the problems associated with siting new development,
14 and the second would be those problems that arise from
15 existing development which might be situated too close to
16 the shoreline.

17 Q. In terms of dealing with erosion?

18 A. Yes, sir.

19 Q. Tell the Judge if you would what are the causes or
20 what are associated causes for erosion.

21 A. Okay. I would like to refer to Exhibit 2 at this
22 point and what I've done is broken down the causes of
23 erosion into four categories. Storms, tidal inlet, sea
24 level rise and coastal structures.

25 Q. If you would start with the first one, and explain

1 that component of erosion.

2 A. This is probably the aspect that is most understood
3 by people because storms are very traumatic. They can remove
4 hundreds of feet of beaches and dunes in just a matter of
5 hours.

6 I suppose a recent example of a storm that most people
7 are familiar with in the State of South Carolina was the
8 January first, 1987, storm.

9 Q. Which did what to the coast of South Carolina?

10 A. The effects varied from location to location, but by
11 and large I think it helped to raise consciousness and in
12 addition to that it eroded many areas, let's say, twenty to
13 fifty feet.

14 Q. Any particular areas of the State that were hard
15 hit by this storm?

16 A. Most of the areas that sustained extensive damage
17 were those areas where the construction was situated close
18 to the shoreline; for instance, Garden City. There were
19 a number of problems.

20 There were also some problems in Hilton Head, Folly
21 Beach. The east end of Isle of Palms sustained some damage
22 and dunes had to be reconstructed artificially.

23 Q. Okay, and the east end of Isle of Palms . .

24 A. The Wild Dunes areas.

25 Q. Were any buildings lost or any swimming pools lost

1 or any manmade structures lost in that same storm season?

2 A. There were a number of seawalls and abutments that
3 failed during the storm and a number of pool decks and pools,
4 particularly in the Grand Strand area, that were destroyed
5 during that storm.

6 Q. Was that a significant storm in terms of, say, hurri-
7 canes or major events?

8 A. I would say it could be classified as unusual, but
9 I don't think it was rare. The return period for a storm
10 like that; that is, the time that--the period of time during
11 which you might expect to see that storm once, would be on
12 the order of ten to twenty years.

13 Q. Let's move on to the next cause of erosion on your
14 sheet here, tidal inlets. If you would explain to the Judge
15 why that is a component of erosion.

16 A. Tidal inlets when they are not stablized by jetties
17 are free to move. Oftentimes the inlets themselves will
18 migrate as one end of an island will build up and the
19 corresponding end on the opposite side will erode. Often-
20 times even if the position of the banks of the inlet are
21 fairly fixed, you will see that the channels will shift and
22 that the shoals and sand bars associated with those inlets
23 will shift.

24 In South Carolina, we are probably more subject to
25 erosion caused by tidal inlets than we are in many areas

1 because of the high tide range and the size of the inlets
2 which are quite large.

3 Typically what we see with tidal inlets in the State
4 of South Carolina is that the sand will tend to pass from
5 one side of the inlet from one island, across the inlet
6 to the other. This is what happens at the east end of the
7 Isle of Palms, and when this process takes place we can find
8 accretion on the order of hundreds of feet and erosion
9 adjacent to that accretional area that can also be on the
10 order of hundreds of feet.

11 Q. What about sea level rise?

12 A. Sea level rise is something which up to now probably
13 hasn't contributed much to erosion in the State of South
14 Carolina, simply because the areas have been dominated by
15 inlets and storms, but over the next hundred years there
16 are projections that sea level will rise between two and
17 eleven feet.

18 I think there is--while there is not agreement as to
19 the exact rate of rise, there is consensus that that rate
20 will accelerate and that the present rate of rise will in-
21 crease.

22 Q. What impact could sea level rise have upon the beaches
23 of South Carolina and property owners that have property on
24 front beach?

25 A. I think you can say there are two principle problems

1 associated with sea level rise. One is the outright flood-
2 ing or inundation of coastal property, and the other is
3 that it provides a higher base upon which the storms can act.

4 Q. Is sea level rise something which coastal managers
5 are concerned about?

6 A. I think many of them are.

7 Q. Okay. Has that been your experience with the Coastal
8 Council?

9 A. Yes.

10 Q. Let's discuss the last factor or component of erosion.
11 That's coastal structures.

12 A. Okay. If we divide structures into two principle
13 groups, one would be those types of structures that extend
14 perpendicular to the shoreline. A classic example in
15 South Carolina is the jetties at Charleston Harbor which
16 interrupted movement of sand around the harbor and caused
17 extensive erosion on Morris Island and Folly Island.

18 We can also have similar effects if we have groins
19 which are shorter structures built perpendicular to the
20 shoreline.

21 We have another principle category of coastal struc-
22 tures which we might call erosion control structures, abutt-
23 ments and seawalls. These are usually built along an
24 eroding scarp or parallel to the beach with the intention
25 of keeping the shoreline from retreating any further.

1 These have two detrimental effects on the beach.
2 One, they prevent the uplands from eroding and naturally
3 supplying nourishment to the beach, and, secondly, they can
4 accelerate erosion around the ends of those structures.

5 Q. Can there be dilatorious effects in terms of erosion
6 by construction of habitable structures along the beach
7 front?

8 A. I think there can, depending upon the nature of the
9 construction itself.

10 Q. All right, sir. Now, in terms of dealing with erosion
11 from a management standpoint, what are the alternatives that
12 you have in order to deal with the problem?

13 A. I have also . .

14 MR. HOWE: Let me take that a step further. If he
15 can show a public interest in the regulation--we've never
16 contended there wasn't a public interest in the regulation.
17 We just contend they've got to pay for it like any other
18 public interest in regulation.

19 So if he's trying to show a basis for why they
20 passed the Act, we haven't raised an issue with the Act.
21 We haven't raised an issue as to its validity; only the
22 price tag associated with it.

23 BY MR. HARNESS:

24 Q. We were talking about the alternatives or what you
25 can do to handle erosion along the coast.

1 A. These are also shown on Exhibit 2. Again we have
2 categorized them and there are four categories. One is to
3 do nothing. This I guess you could call retreat philosophy.
4 This is mentioned quite frequently by Oren Pilkey and his
5 group, let the buildings or the lighthouse fall in.

6 The second would be construction of coastal struc-
7 tures such as seawalls or abutments to try to protect the
8 houses themselves. Often when these structures are built
9 though they protect the houses at least against minor
10 storms at the expense of the beach.

11 Beach nourishment which is adding sand to the beach,
12 which has been done here at Wild Dunes, and more recently
13 at Myrtle Beach with a large project.

14 Finally, you can institute building setbacks and
15 construction codes.

16 Q. Now, with the passage of the 1988 Beach Front Manage-
17 ment Act, which of the alternatives did the State choose to
18 use in terms of managing the beach?

19 A. With the passage of the Act, the emphasis has been
20 placed on building setbacks and also beach nourishment through
21 use of bond money.

22 Q. Okay. Now, you spoke earlier to the fact that you
23 have done some work for the Coastal Council concerning interin-
24 lines. Are you familiar with where the location of the
25 baselines and the twenty-foot setback line would be on this

1 property?

2 A. Yes.

3 Q. All right, sir. Now, I ask you if you can identify
4 Exhibit Number 30--Defendant's Exhibit Number 39 and tell me
5 what this demonstrates?

6 A. Those are 1988 aerial photographs flown on July first
7 and second of 1988 for the Coastal Council, showing the
8 area in question, Beechwood East, and Dunecrest Lane further
9 to the right.

10 There are two lines drawn across the drawing. The
11 seaward most of the lines is the base line. The landward most
12 twenty feet further back is the no-construction line and
13 setback line.

14 Q. Can you come down with a pencil and just mark for the
15 Judge--point to where the lines are and then show me where
16 the Lucas lots are? This will probably look a lot better.
17 Let's give you that.

18 A. This first line is the base line. The second one is
19 the setback line. The Lucas lots are here, Lot 22 and then
20 Lot 24. Lot 23 is the house we discussed previously.

21 Q. Can you basically tell me what methodology was used
22 in order to determine the location of these lines?

23 A. These lines were established last fall. It's actually
24 the second generation of interim lines at the site. They
25 were established thinking that the base line was the most

1 landward point of erosion or the most landward location of
2 the shoreline over the last forty years.

3 In this area the baseline was set along a 1963 vege-
4 tation line. I'm not saying mean high water line. I'm
5 talking about the scarp line which separates the uplands
6 from the beach on eroding property. The property was
7 eroding at that point in time and we were left with a
8 distinct line.

9 Q. That's how the baseline was drawn?

10 A. Right.

11 Q. Now, the second line behind the baseline is desig-
12 nated as what?

13 A. It's actually two lines on top of each other. The
14 twenty foot no-construction line and the forty year setback
15 line.

16 This is an area which has been considered over the
17 long term to be accretional, and as such the setback line
18 is a minimum twenty foot setback.

19 Q. If you would--if someone could start these pictures
20 here. I'd ask you to come around here and stand by the
21 screen, if you could.

22 Can you describe for me the general dynamics of
23 the coastal processes on Isle of Palms, using this diagram
24 if you would. Show me where we are and where the site is
25 again.

1 A. This is a 1987 aerial photograph of the Isle of
2 Palms. You can see Dewees Island on the far right side of
3 the slide, Dewees Inlet which separates Dewees Island and
4 the Isle of Palms, the Wild Dunes Development is at the
5 east end of Isle of Palms.

6 Then we have Breech Inlet separating Isle of Palms
7 and Sullivans Island.

8 There are two lines drawn on the slide, and what
9 these lines do is separate the Island into different zones
10 as required by the Beachfront Management Act.

11 The east end of the Island has been designated as
12 an unstablized inlet erosion zone. The center of the
13 Island has been designated as a standard erosion zone, and
14 then the west or south end has been designated as an un-
15 stablized inlet erosion zone, indicating that there are no
16 structures which stablize the position of the shore lines
17 on either end, and that in between the shore lines is un-
18 affected by the presence of these inlets and by the movement
19 of the shoals.

20 Q. Is there any difference in the characteristics of
21 the Island although you have two similar types of beach,
22 in terms of the Beachfront Management Act? Is there any
23 difference between the ends of the Island from one another?

24 A. They are both unstablized erosion zones. They are both
25 accreting, but there is one significant difference and that

1 is the rate of accretion.

2 The process by which Isle of Palms accretes is that
3 sand contained in the shoals of Dewees Inlet detaches from
4 the shoals themselves and the sand bars are driven ashore by
5 waves. We could see this happening in the 1987 photograph.

6 This is the shoal that detaches from the main shoal
7 of the inlet. Waves pushed it on shore and you can see the
8 areas behind it is building up substantially. This is
9 probably five to six hundred feet, and there is an erosional
10 arc or zone on either side.

11 So that's the process by which sand attaches to the
12 island. During that attachment process is where we see the
13 temporary erosion that has been referred to. Once the shoal
14 fully attaches the sand spreads out and eventually finds
15 its way down at the south end of the island which is also
16 an accreting zone but it has been accreting at a near uniform
17 rate of the last forty years or hundred years.

18 In other words, here it accretes but it does so
19 episodically. Around here it accretes almost uniformly.

20 Q. Where are the lines located on the south end of the
21 island--do they impact habitable structures?

22 A. I'm not sure what is impacted. I do know that the
23 lines at the south end of the island are not set on the
24 most landward shore line for the last forty years, recogniz-
25

1 ing the fact that the trend of accretion has been near con-
2 tinuous over that period of time.

3 The 1949 shore line was immediately in front of the
4 row of original cottages in that area. Now we have the road
5 with no structures in front of that.

6 Q. Let's go to the next picture. What I'd like you to
7 do is to, if you could, describe the coastal processes on
8 the east end of the island or Wild Dunes area by use of these
9 slides.

10 A. This is Exhibit 4--the last was Exhibit 3 by the way.
11 It's an April 26, 1983 aerial photograph looking toward
12 Dewees Inlet which is at the top of the slide, showing a
13 shoal attachment.

14 Now, this is a different shoal attachment than we
15 just saw in the 1987 aerial photograph. So in the 1980s
16 we've had two separate shoals that have come ashore. This
17 one happened to attach in the vicinity of Dunecrest Lane
18 and BeachClub Villas. These areas being just to the east
19 of the Lucas property.

20 What we see if we look carefully in this aerial
21 photograph right here is a condominium development called
22 Mariner's Walk which was subject to damage had no remedial
23 action been taken.

24 Further down here we see Seagrove Villas which is
25

1 also subject to erosion and possible damage had remedial
2 action not be taken.

3 Next slide, please.

4 This is a September 8, 1983 shot of Mariner's Walk,
5 Exhibit 5. This is what I referred to in the last slide
6 which is the condominium complex. You can see where sand
7 bags have been installed in an attempt to halt erosion of
8 the property.

9 You can see that the situation was such that had they
10 not done that erosion would have proceeded even further
11 beneath that structure.

12 Q. The dynamics at work here at Mariner's Walk, are they
13 similar or identical to those at work on the property we
14 are here in Court on?

15 A. The entire zone covering the Lucas property, Mariner's
16 Walk and areas on either side are subject to the same pro-
17 cesses. That is, the shoals are free to detach anywhere
18 in that inlet zone and in fact have attached throughout
19 that zone through history.

20 Next, please.

21 This is Exhibit 6. It's an August 14, 1984 slide of
22 the same area, Mariner's Walk, a year after the previous
23 slide. We can see there is a fairly wide beach in this
24 area. The reason being, one, that there was a nourishment
25

1 project in this area, and, two, that sand from the adjacent
2 shoal started to move into the area that was formerly erod-
3 ing.

4 So we can see there is substantial changes or shifts
5 in the shore line in short periods of time here.

6 Q. Can nourishment in this area give you absolute pro-
7 tection from the ravages of wind and waves?

8 A. I'm not sure nourishment anywhere can provide you
9 absolute protection. In order for nourishment project to
10 provide, let's say, protection against all but major storms
11 in a situation like this, it would have to operate almost
12 on a continuous basis during a shoal attachment.

13 Q. All right, sir.

14 A. This is Exhibit 7. It's a May 23, 1986, shot of the
15 Mariner's Walk area which is the center of the slide. By
16 this point in time a second shoal had been observed and
17 was now moving toward the shore line. You can see the
18 tremendous build up behind.

19 So three years earlier this area had been subject
20 to erosion and threatened by that erosion, and with the
21 onset of this second shoal you can see how wide the beach
22 built up.

23 Q. What does the last three slides demonstrate to you
24 in terms of coastal processes in the area?

25 A. Just that the area as a whole is very dynamic and is

1 subject to both erosion and accretion, depending upon the
2 presence of these shoals and the location where they attach
3 to the shore line.

4 Q. Is there any degree of absolute certainty when the
5 shoals will attach and which areas will be impacted?

6 A. We really can't predict with any certainty the fre-
7 quency or period that this will happen or where it will
8 occur other than to say we do expect it to happen in the
9 future and it will happen somewhere in that inlet zone.

10 Q. All right.

11 A. This is Exhibit 8, a December 3, 1984 aerial, and
12 you can see Dunecrest Lane, Beach Club Villas. Further
13 down we see Beechwood East, the Lucas lots right here on
14 the left side of the property.

15 This was the remnant of the shoal that had attached
16 earlier and the first shoal that had attached. This grey
17 sand right here was nourishment sand which was pumped onto
18 the beach and covers the rock abutment that was built in
19 front of Sea Grove Villas and the first area of Beechwood
20 East to handle the erosion problems associated with the
21 attachment of the shoal.

22 Q. Now, in terms of the impact that the Act has upon us,
23 you stated that when you look at the most landward point
24 the last forty years--do you have anything to demonstrate
25 where the shore lines have been since 1949?

1 A. I do. I have one more slide as far as this recent
2 slide. This is Exhibit 9 taken July 25th of this year.
3 Mariner's Walk is just off the slide to the right. This is
4 the Beach Club Villas area, the Lucas property down in this
5 region right here.

6 Just beyond, let's say, the most severe portion of the
7 erosion arc associated with the second shoal attachment, what
8 we see right now is that the shoal is in process of fully
9 attaching and in time the shore line will gradually straighten
10 out again.

11 Q. Do you have anything to demonstrate where the shore
12 lines have been?

13 A. I have nine slides that show the historic shore
14 lines, again vegetation lines, that are platted on a map
15 showing the Lucas property, Lots 22 and 24. This particular
16 slide which is Exhibit 10, shows the 1949 shore line in red,
17 superimposed, and you can see it is back close to the right
18 of way of Beechwood East.

19 The depth of the lot again is about a hundred and
20 forty feet.

21 The next slide shows the 1949 shore line in blue and
22 that shows a 1953 shore line so we can see in four years that
23 the shore line advanced two hundred feet. Vegetation line
24 advanced two hundred feet.

25 Q. Which demonstrates to you what . .

1 A. Again, that the area is subject to rapid accretion
2 and erosion.

3 Q. Allright.

4 A. In 1957 there was not much change between the 1953 and
5 1957 shore line. This is Exhibit 12, I believe. The next
6 slide, Exhibit 13, shows a 1963 shore line. This has been
7 adopted as the interim base line.

8 We can see between 1957 and 1963 the erosion took
9 place, driving the shore line entirely through the lots and
10 the road right of way, and this erosion was caused by a
11 shoal attachment further to the east.

12 Next slide. It shows where we believe the shore line
13 was at some time between 1963 and 1973. We estimated 1968.
14 In other words, we have 1963 aerial photographs and we have
15 1973 aerial photographs. We do not have one for this year,
16 but from examining the 1973 photograph it was obvious there
17 that the erosion had proceeded even further landward than
18 the 1963 photograph indicated.

19 In this case, back to something on the order of a
20 hundred to a hundred and fifty feet behind the landward most
21 lot line.

22 Q. Well, that is the line chosen by the State to use
23 as the interim base line?

24 A. Right. When the interim base line was established,
25 it was done so on a 1963 shore line. Since this is more

1 land with the 1973, but at some point in between we know
2 the shore line was further back.

3 Next slide shows a 1973 vegetation line up here about
4 halfway through the lots. We also see what we have indicated
5 as a pond. This was an area that was formed when the shoal
6 that attached further down collapsed onto the beach, trapping
7 water in this area.

8 In other words, this was still pretty much all active
9 beach out here.

10 Next slide please. This shows the 1977 shore line.
11 By this point in time most of this area had stablized or
12 been stablized by vegetation to some extent although it was
13 still low.

14 There was still some evidence of this older pond on
15 the 1977 photograph.

16 Next slide. This is a 1983 shore line and as we go
17 off to the left side of the slide we would run into the
18 Sea Grove Villas which were subject to problems because of
19 the shoal attachment. As we go off to this side of the
20 photograph we can see the vegetation line moved out, and this
21 is where the shoal attached further to the right.

22 Next slide, please. This is the 1988 vegetation line
23 in the area well seaward of the lot lines at this point in
24 time.

25 Q. Do you know of anything to prevent the 1988 line from

1 moving back as far as the 1963 line?

2 A. Again, I think that the entire area is subject to
3 these types of fluctuations because of the attachment of
4 shoals, and it is quite possible that the shore line could
5 recede back to this point, maybe even further.

6 Q. Are you aware of any scientific studies or any in-
7 formation that you have that counsel has at their disposal
8 that would, under the Act, require that we move the line
9 seaward of the 1963 interim base line?

10 A. I believe the language in the law states that the
11 base line shall be set on the most landward point of erosion-
12 landward shore line unless studies show that the present
13 shore line is unlikely to return.

14 I think that that likelihood appears in this case.
15 That the shore line could be expected to move landward again
16 and might move back to the 1963 line or even further. We
17 just don't know.

18 Q. Tell me what this picture demonstrates and how it
19 was done?

20 A. This is Exhibit 19. This is the 1963 aerial photo-
21 graph on which the road, Beechwood East and the Dunecrest
22 Lane, and the various lot lines have been superimposed.
23 The 1963 base line that we referred to previously set along
24 the vegetation lines runs along the road and through the
25 road right of way, and the lots at that time were all on the

1 active beach.

2 This is the shoal that attached to the east of the
3 area which caused the erosion in this area.

4 Q. Were they subject to the eb and flow of the tide at
5 that time?

6 A. Yes.

7 Q. The lots, that is.

8 A. Yes. They were on the active beach. I'm not sure
9 what the water depth would have been at the seaward point of
10 the lots but they were probably wet at all stages of the
11 tide.

12 This is a 1973 aerial photograph with all the shore
13 lines and the lot lines superimposed. It's kind of difficult
14 to make out the shore lines themselves, but the important
15 thing to recognize here is the fact that the 1963 line ran
16 through the road right of way and at some point between 1963
17 and 1973 the shore line retreated further in conjunction
18 with that shoal attachment.

19 Here we can see the pond--what we have called the
20 pond which formed when the shoal ultimately collapsed and
21 moved onto the beach.

22 Now, at this point in time, the entire road and the
23 lots at the west end of the beach, at least where the Lucas
24 lots are, was certainly all on active beach.

25 Q. Have you made any sort of calculations that can give

1 us a better picture of the dynamics in the area of the two
2 lots?

3 A. Yes, I have. If we go to the next slide which is
4 Exhibit 21. This is a graph that documents the shore line
5 position through time.

6 Time is on the horizontal axis and on the vertical
7 axis we have the distance measured in the seaward direction.
8 So as the curve moves up that implies accretion. If the
9 curve moves down, that implies erosion.

10 What we see again is that at some point in the late
11 1960s the shorelines on both Lot 22 which is in blue, and
12 on Lot 24 which is in orange, were landward of the zero
13 line which is the interim base line.

14 Since that time the areas have been largely accretional
15 although there has been some erosion associated with the
16 earlier shoal attachment and we can see where the area was
17 nourished in late 1983 or early 1984.

18 Q. Is it a steady accretion?

19 A. The area is accreting at the rate of two or two and
20 a half feet per year over the long term, but it does so in
21 a cyclic fashion and in the process it may accrete or erode,
22 based on this, I would say three hundred feet or so.

23 Q. Does the accretion give any absolute protection or
24 certainty that the lots will not be reached by the Atlantic
25 Ocean in the future?

1 A. No, it doesn't.

2 Q. If you could compare this graph to what you have on
3 the opposite end of that island . .

4 A. The opposite end or west end of Isle of Palms, which
5 has also been accretional but at a more steady rate, we would
6 have seen a line that was nearly straight and sloping up-
7 wards.

8 Q. Let's go on to the next slide and ask if you can tell
9 me what this is.

10 A. This is a way that we take that shoreline history and
11 we try to estimate where the average position of the shoreline
12 was, and what we do is look across fifty percentile region,
13 and we see the shoreline, vegetation line, in the vicinity
14 of the Lucas property has been more landward than, let's say,
15 seaward edge of that lot fifty percent of the time.

16 In other words, fifty percent of the time the beach
17 has occupied part or all of the Lucas property over the last
18 forty years.

19 Q. All right, sir.

20 A. At about, let's say, fifteen to twenty percent of
21 the time the shore line, vegetation line, has been more
22 landward than the road.

23 Q. Now, if we could sort of pause for a moment. Have--
24 aside from the work you've demonstrated you've done for the
25 Coastal Council of the State of South Carolina, have you

1 studied any reports or done anything else to make evaluations
2 as to the character of the island?

3 A. Both in terms of preparing the interim lines for the
4 Coastal Council in early 1988 and then preparing for this,
5 I have reviewed all the reports that have been written on
6 the area, both those written by my firm before I arrived
7 and other reports.

8 I have reviewed the aerial photographs and shore line
9 change maps for the area.

10 Q. At my request, did you do that in order to determine
11 what sort of vulnerability may exist on the lots in question?

12 A. Yes, sir.

13 Q. In terms of storms and tides and so forth?

14 A. Yes, I did.

15 Q. Did you reach any conclusions about suitability of
16 this land for construction purposes?

17 A. I think the bottom line for these lots is the fact
18 that even though the area is accretional, at long term the
19 area is still subject to erosion, and development or houses
20 that are placed there might still be subject to erosion
21 and would require remedial action to keep them from going
22 out on the active beach.

23 Q. In terms of remedial action, I assume you mean putting
24 something on the beach or doing something on the beach?

25 A. Right. In the past this has included construction of

1 the abutments we have seen and beach nourishment. At this
2 point in time the property owners should be limited to the
3 nourishment option only.

4 Q. Will that give them absolute certainty of protection
5 or the continued existence of the lots?

6 A. It wouldn't give them absolute certainty.

7 Q. Is there any reason to believe the lines should be
8 moved seaward based upon potential of putting nourishment
9 out there?

10 A. Without the ability to manage the shore line there
11 and to nourish the beach on, let's say, a near continuous
12 basis, I think there is a definite risk to anything that is
13 built there.

14 Based on that, you might say it is not suitable for
15 development.

16 Q. Has there been continuous nourishment out there since
17 the outset of this ~~existence~~ of Wild Dunes?

18 A. No, it hasn't.

19 Q. Now, if you would for me, I'd like you to give some
20 comparison between the east end of Isle of Palms and any
21 other similarly situated islands.

22 A. Probably the closest analogy we have to the Isle of
23 Palms on the South Carolina coastline is Kiawah Island south
24 of the Charleston Harbor entrance. Both are very long
25 barrier islands. They are bounded by large tidal inlet to

1 the east end and a small tidal inlet at the west end. Both
2 of them undergo the shoal attachment process whereby the
3 shoreline behind the shoal builds up as the shoal moves in
4 and the shoreline erodes on either side.

5 Both islands are accretional in the long term.

6 Q. Any other comparisons you could make in terms of
7 construction of manmade structures?

8 A. The big difference between those two islands at the
9 east end is the fact that Kiawah Island is presently unde-
10 veloped at the east end and Isle of Palms has development
11 which predated the designation of these lines.

12 Q. Is it your opinion that houses and structures along
13 the east end of the Isle of Palms have been threatened in the
14 past by erosion?

15 A. I think they have, and Steve Moore will address that
16 in his testimony as well.

17 Q. Is it your opinion that it will continue to be
18 threatened?

19 A. Yes.

20 A. I have one more slide.

21 Q. Let's look at it then.

22 A. This is a March first of 1983 slide showing the house
23 at Lot 20 which is two houses to the west of the Lucas prop-
24 erty. You can see this was taken, I think, during an
25 emergency shoal scraping done under permit of the Coastal

1 Council, and without the scraping and subsequent nourishment
2 this house would have been certainly threatened by erosion.

3 CROSS EXAMINATION BY MR. HOWE:

4 Q. Mr. Harness kept asking you to tell us what was going
5 to happen with absolute certainty. You can't tell us any-
6 thing with absolute certainty?

7 A. No.

8 Q. That's not usually words that are used in the Court-
9 room because we just don't ever know what's going to happen
10 with absolute certainty, do we?

11 A. No.

12 Q. You do know that this sand bar is--this is where
13 it's located now?

14 A. Yes.

15 Q. And that it is moving out in this area in front of
16 the Lucas property?

17 A. Yes.

18 Q. And Mr. Lucas' property is in fact accreting at a very
19 significant rate right now?

20 A. At the present time I think the Lucas property is,
21 let's say, stable or accreting at something near the long
22 term rate.

23 Q. Now, again, this sand bar we're talking about--with
24 a reasonable degree of certainty, this sand bar is going to
25 be sort of easing off along the front of this property and

1 will represent an accretion to his property?

2 A. I think most of the accretion will actually occur
3 further down at the east end of Dunecrest Lane in the vicinity
4 of Lots 8 and 9.

5 Q. But the way for it to get there is to go past the
6 Lucas property?

7 A. No. The Lucas property is further to the west.

8 Q. Where is the Lucas property?

9 A. The Lucas property is right in here, on either side of
10 this particular house. The erosion that is associated with
11 this shoal attachment was principally further east along
12 Beechwood East and Dunecrest Lane.

13 Q. Did you tell us on direct that you anticipated this
14 shoal evening out in this area?

15 A. What will happen is this shoal will move onshore and
16 will tend to even out the area in here which is eroding.

17 Q. Now, you said a couple of things that I liked so I'm
18 going to repeat them. You said this part of the island is
19 in fact accreting?

20 A. Yes, sir.

21 Q. And you talked about it having a long term accretional
22 effect?

23 A. Yes.

24 Q. And that means that the beach, the island itself,
25 will get larger and larger as if to project out into the

1 ocean?

2 A. Over the long term. "

3 Q. It is the opposite of erosion?

4 A. True.

5 Q. And you agree that this island generally, and this

6 portion of the island over the long term, is in fact an

7 accretional island?

8 A. Over the long term.

9 Q. Now, who is Tim Canner?

10 A. Tim Canner is President of the firm for which I work.

11 Q. He's your boss?

12 A. Yes.

13 Q. And how long has he been your boss?

14 A. Three years.

15 Q. What's the name of the firm?

16 A. Coastal Science and Engineering.

17 Q. And he's the President. Is he also a stockholder?

18 A. Yes.

19 Q. And are you a stockholder?

20 A. No.

21 Q. And within the chain of command, you are under him?

22 A. Yes.

23 Q. He's above you, but between you and him--do you

24 report directly to him?

25 A. Yes.

1 Q. What is your title?
2 A. Coastal engineer.
3 Q. And what is his title?
4 A. Coastal geologist.
5 Q. And President of . .
6 A. Of the firm.
7 Q. Now, has he had experience with this island?
8 A. Yes, he has.
9 Q. And does his experience predate yours?
10 A. Yes.
11 Q. And would you think that his experience is extensive?
12 A. Yes.
13 Q. And would you think his ability is substantial?
14 A. Yes.
15 Q. And I'm not going to ask you to disagree with the
16 boss too much on the record. It's not good for long term
17 accretion on the job.
18 Are you familiar with this document?
19 A. Yes, sir, I am.
20 Q. What is that document?
21 A. I'm not sure of its origin, but it is a pamphlet
22 put together I think about 1984, describing the shore line
23 processes at Wild Dunes for potential property owners.
24 Q. And it was written after this erosion, this short
25 term erosion problem, wasn't it?

1 A. During or after the first shoal attachment.

2 Q. If you look at the back page, it says for further
3 information please call Tim Canner, is that correct?

4 A. Yes.

5 Q. Did he in fact participate in preparation of that
6 document?

7 A. I suppose he did.

8 Q. It is your understanding he was in fact the primary
9 author of this document?

10 A. I really don't know.

11 Q. That's not your understanding that it is prepared by
12 his company?

13 A. No, I know that he assisted, but I can't attest to
14 his exact involvement in writing the final copy.

15 Q. He worked for the Research Planning Institute at that
16 time?

17 A. That's true.

18 Q. And the only name that appears in connection with
19 Research Planning Institute is whose?

20 A. Is his.

21 Q. Nobody else listed?

22 A. True.

23 Q. Do you agree with his statement that during 1982 and
24 1983 an incident of localized erosion occurred in the general
25 area of Mariner's Walk and Sea Grove Villas at Wild Dunes,

1 and while the incident temporarily affected less than ten
2 percent of the beach . . .

3 A. True.

4 Q. Okay, and do you agree that, quote-quote, interestingly
5 during the same year in which this incident of erosion
6 occurred there was a net accretion on Wild Dunes Beach; in
7 fact, the beach has grown quite steadily for fifteen hundred
8 years?

9 A. True.

10 Q. And we look over on the third page on the overall
11 accretion, and do you agree with the statement, that historical
12 information dating back to 1886, aerial photographs and
13 scientific studies help us understand the changes in the
14 shore line of the Isle of Palms; scientists believe the north
15 east end of the Isle of Palms where Wild Dunes and Beach
16 and Racquet Club is located has accreted for the past
17 fifteen hundred years; the theory is supported by visible
18 ridges viewed from the air.

19 In other words, as you fly over the Isle of Palms
20 changes in vegetation clearly outline previous shore lines.

21 A. True.

22 Q. There's a section in here on localized erosion.
23 That's what you were telling us sometimes happens in conjunc-
24 tion with the accretion?

25 A. Yes.

1 Q. Do you agree that the accretional effects of shore
2 migration at Wild Dunes gives us a very positive picture
3 of overall changes in the shore line? However, occasionally in
4 a cycle of nature we can experience localized areas of tem-
5 porary erosion which can occur even within a portion of the
6 beach which is experiencing general accretion?

7 A. True.

8 Q. The northeast end of the Isle of Palms has built
9 seaward during the past fifteen hundred years because of
10 continuous supply of sand from Dewees Inlet from the north?

11 A. True.

12 Q. The long range effect then is accretion for the entire
13 stretch of the beach. Occasionally though, the temporary
14 erosion is severe enough to require immediate action.

15 A. True.

16 Q. On the future projects, although localized erosion can
17 occur, again in the natural process of inlet and offshore
18 shoals, erosion at Wild Dunes has been a temporary process
19 and a minor occurrence when viewed beside the overall
20 accretional trends of the island; the picture is a good one
21 for Wild Dunes' future; Isle of Palms has built seaward for
22 the past few thousand years due to a surplus of sediment
23 transported by way of tidal limits; studies by RPI indicate
24 the shore line will continue to fluctuate into the future
25 but that overall Wild Dunes will have a healthy and beautiful

1 beach.

2 A. True.

3 Q. Do you know, other than the Beachfront Management
4 Act, of any other legal impediments that would keep Mr.
5 Lucas from building single family residences on Lot 22 and
6 Lot 24?

7 A. I don't know of any.

8 Q. And are there, in fact, houses on both sides and
9 a house in the middle between those lots?

10 A. I don't of any impediments.

11 Q. That's all.

12 REDIRECT EXAMINATION BY MR. HARNESS:

13 Q. Does this document change your opinion that these
14 houses will be threatened by the ocean from time to time?

15 A. It does not change my opinion. The document states
16 in several places that the island has been accretional and
17 that is over the long term a correct statement. The
18 document also states, however, that it is subject to
19 erosion, albeit temporary. Whether temporary or not, I
20 think it would have the same impact on structures that were
21 in the way.

22 Q. What is temporary?

23 A. Usually--I should say with the shoal attachment we've
24 observed in the 1980s, we may be talking about something
25 that occurs over a period of years. Maybe two years to three

1 years.

2 Q. So there is a possibility that exists that the shore
3 line would return to the 1963 point and stay there for
4 several years?

5 A. That possibility does exist.

6 MR. HOWE: I would object to that and ask that it
7 be stricken. Possibilities just aren't admissible in the
8 law.

9 THE COURT: I sustain the objection.

10 MR. HARNESS: Mr. Moore.

11 STEVEN MOORE, being duly
12 sworn, testified as follows:

13 DIRECT EXAMINATION BY MR. HARNESS:

14 Q. Mr. Moore, would you please tell me where you live?

15 A. Folly Beach, South Carolina.

16 Q. All right, sir, and by whom are you employed?

17 A. The South Carolina Coastal Council.

18 Q. And how long have you been employed by the South
19 Carolina Coastal Council?

20 A. Since July of 1979.

21 Q. And what is your job position currently?

22 A. Since July of 1984 I've been permit administrator with
23 the Coastal Council.

24 Q. And prior to that date?

25 A. I was essentially the assistant to the permit adminis-