Agenda Item # 4

Miami Dade County Beach Sands

What They Look Like and Where They Come From

Town of Surfside Commission Meeting
June 2, 2014

The Benefits of our Beaches

- **Storm Protection**
  - **Provides protection from winter and tropical storms and hurricanes**
    - Designed to disperse wave energy (by eroding), and protect upland and natural resources
- **Creates habitat for many species, including threatened and endangered species**
  - **sea turtles, dune plants, shore birds**
- **Creates recreational opportunities for residents.**
- **Over $300 mil. spent on beaches in Miami-Dade**

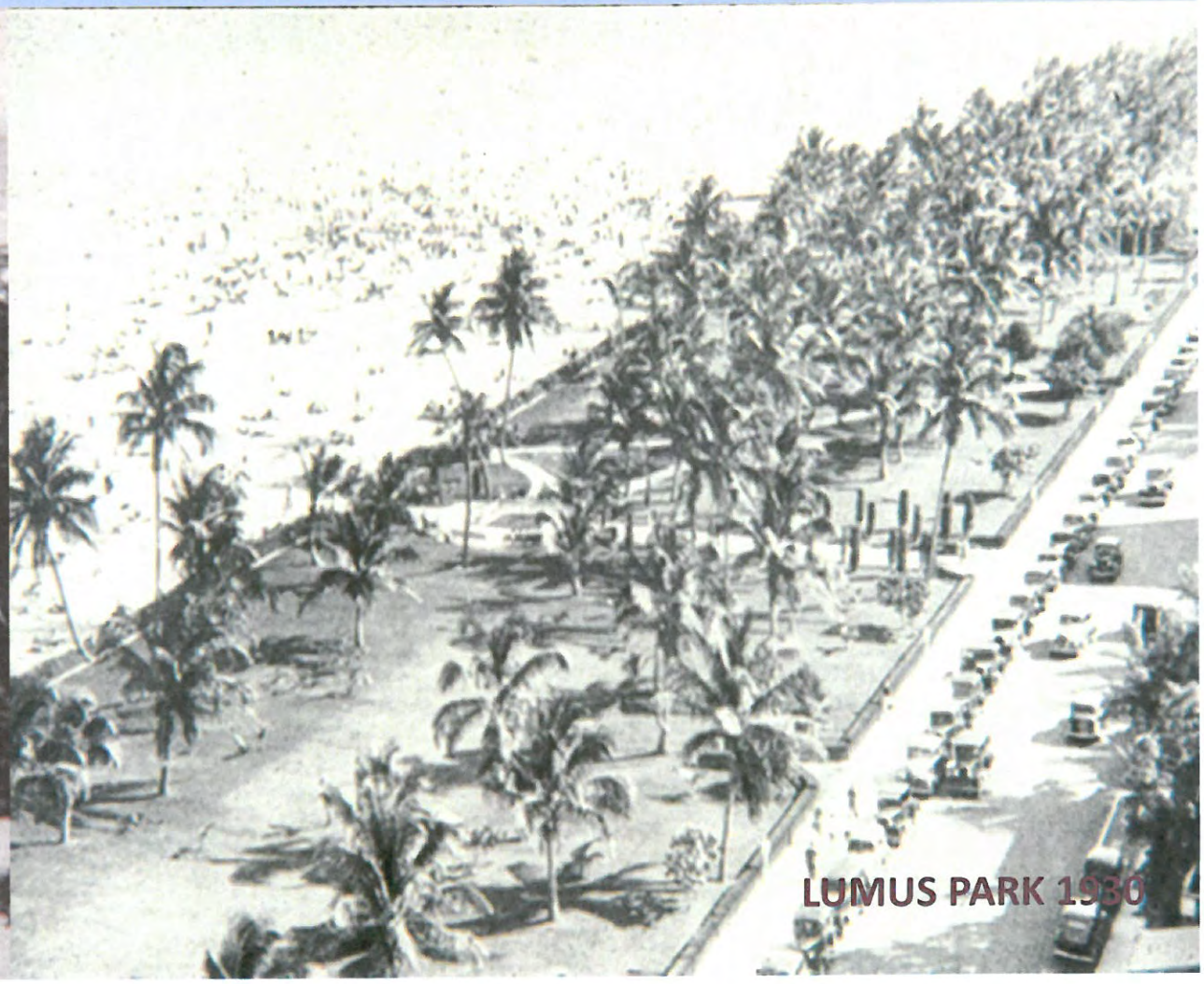
Sand Quality and Beach Concerns

1. Color & Texture
2. Beach Slopes/Cliffs/ "Escarpments"
3. Sand-dusty Residue
4. Role of Beach in Storm protection
5. Protection and benefits afforded by using natural sand deposits.

What and Where is our Beach

The beach extended west past Collins Ave.

Miami Beach 1918



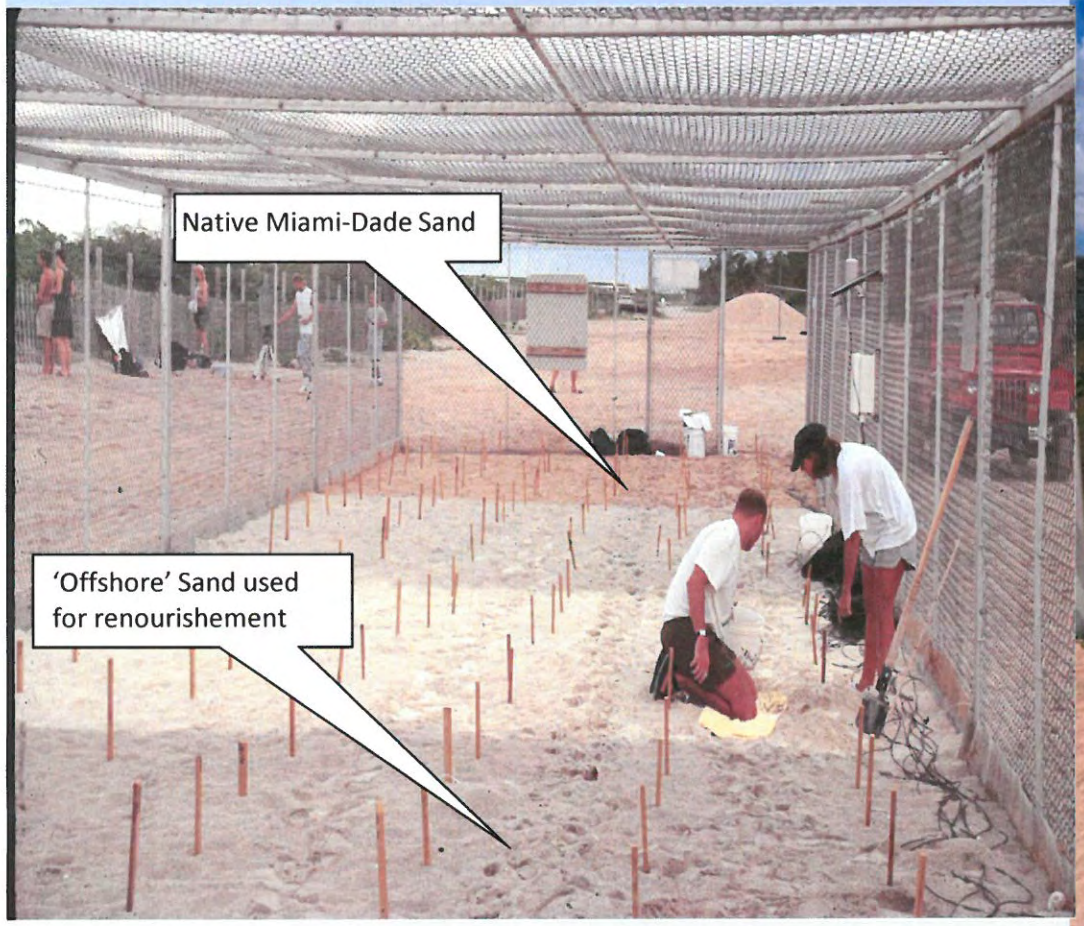
LUMUS PARK 1930

Miami Beach – early 1960's

Miami-Dade County Sea Turtle Nest Environment Study

- Sand Types in consideration for use:
  1. Native Sand (40% quartz; 60 % $CaC0_3$); Brownish orange, small deposits of this sand still remain east of Collins Ave.
  2. Renourished Sand (100% biogenic $CaC0_3$); Grayish, from offshore areas, which have been consumed. Next sand source?
  3. Aragonite Sand (100% depositional $CaC0_3$); Light colored, Bahamas and Caribbean
  4. Upland Sand (100% quartz sand); Bright-light, upland deposits in central Florida

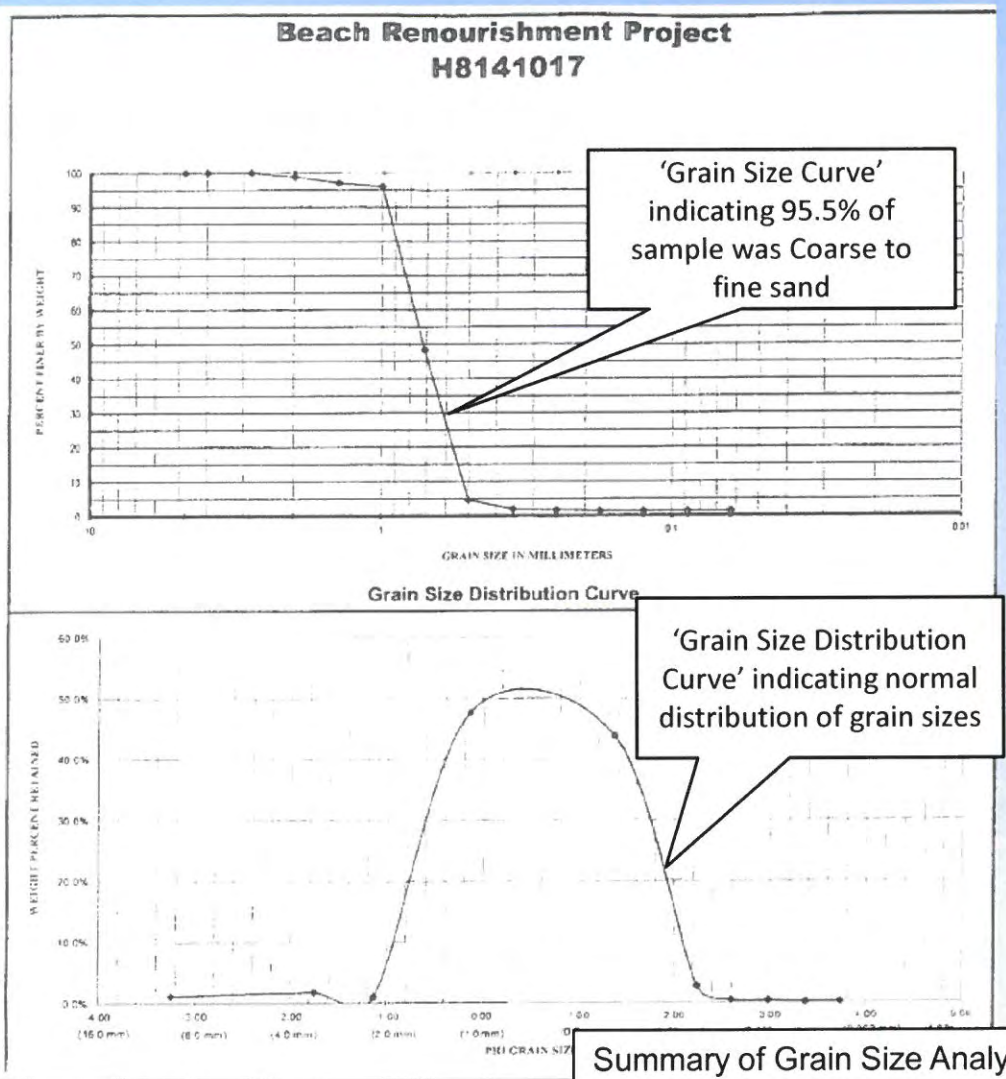
Native Miami Beach Sand



State Requirements for Beach Sand

- The State requires that sand to be placed on the beach is demonstrated to meet specific requirements prior to it being placed on the beach
- Sand sample test results (as required by the State) must be submitted and approved by the State prior to obtaining approval to place the sand on the beach
- Requirements include:
  - Sand particle size (Grain Size)
  - No more than 5% 'silts, clays & muds'
  - No more than 5% 'fine gravel'
  - The color of the material comparable to existing 'sands in the coastal system'

Sand Quality



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Summary of Grain Size Analysis

Class of material	Gravel			Sand							Muds
Grade of Class	Coarse	Fine		Coarse	Medium		Fine		Very Fine Sand		Silt/mud
Sieve #	3/4"	4	8	10	30	60	80	100	140	170	230
Sieve Size (mm)	19.00	4.75	2.36	2.00	0.600	0.250	0.180	0.150	0.106	0.090	0.063
% of material	0%	1.20%	1.7%	1.1%	47.7%	43.7%	2.7%	0.3%	0.2%	0.1%	1.2%

Sand Quality

SUMMARIZATION OF SAND GRAIN (partical) SIZE ANALYSIS BY 'TERRACON, INC'

Sample Location	Class of material	Gravel			Sand							Silts/Muds
	Grade of Class	Coarse	Fine		Coarse	Medium		Fine		Very Fine Sand		Silt/mud
	Sieve #	3/4"	4	8	10	30	60	80	100	140	170	230
	Sieve Size (mm)	19.00	4.75	2.36	2.00	0.600	0.250	0.180	0.150	0.106	0.090	0.063
	State Criteria	= to beach	< 5%									< 5%
Beach @ 96th St	% of all sand	0%	1.20%	1.7%	1.1%	47.7%	43.7%	2.7%	0.3%	0.2%	0.1%	1.2%
Beach @ 92nd St	% of all sand	0%	1.20%	1.6%	1.1%	48.5%	43.2%	2.7%	0.4%	0.2%	0.1%	0.6%
Beach @ 88th St	% of all sand	0%	1.20%	2.0%	0.9%	44.7%	42.5%	3.4%	1.1%	1.6%	0.4%	2.6%

From State of Florida Criteria (62-41.007(1)(j))

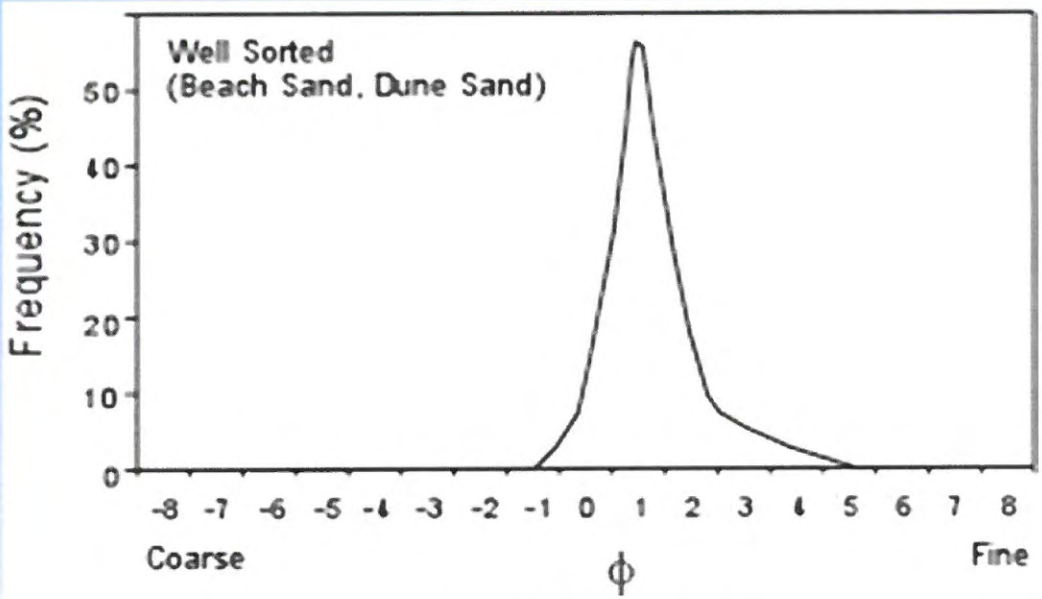
Beach compatible material **shall be predominately of carbonate, quartz or similar material** with a **particle size distribution ranging between 0.062mm and 4.76mm**

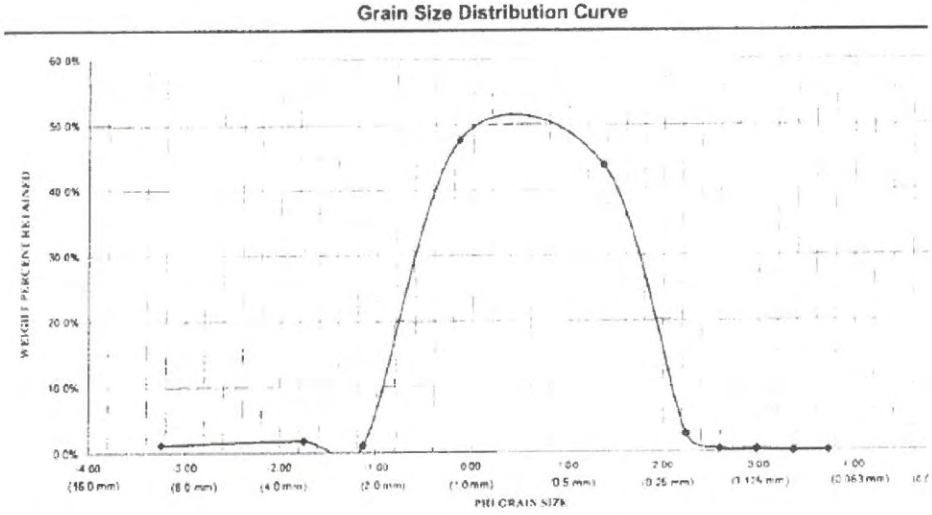
1. **Greater than 5 percent, by weight, silt**, clay or colloids passing the #230 sieve;
2. **Greater than 5 percent, by weight, fine gravel** retained on the #4 sieve;
3. **Coarse gravel, cobbles or material retained on the 3/4 inch sieve** in a percentage or size greater than found on the native beach;

The southern portion of the beach appears to contain more “fines”, but the amount is ½ of the amount allowed by State criteria.

Sand Quality

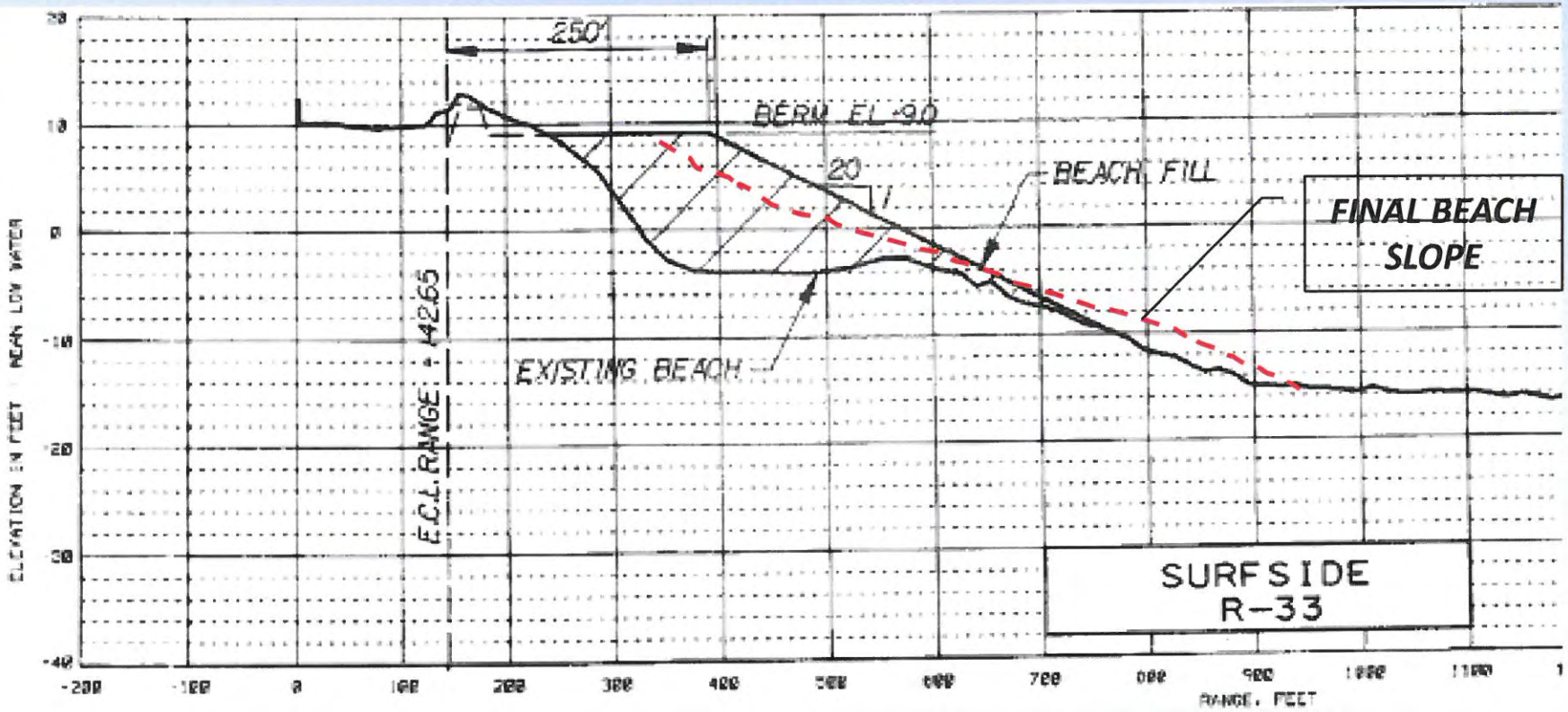
- **Mean Grain Size versus Sorting**
  - MEAN GRAIN SIZE is the average size of all the sand particles. Graphs to the left show similar 'Mean Grain Size'
  - SORTING is how 'mixed' the sizes are. The top graph is 'well sorted'. The bottom (surfside sand) is moderately to poorly sorted, meaning more fine particles are included





Surfside Beach Profile

- Beach's have 'construction' and 'final' profiles
- 100 ft of Beach, of which 50 ft was dune. Remaining 50 ft for emergency access and beach use.
  - May take 1-several months to adjust (due to weather & waves)

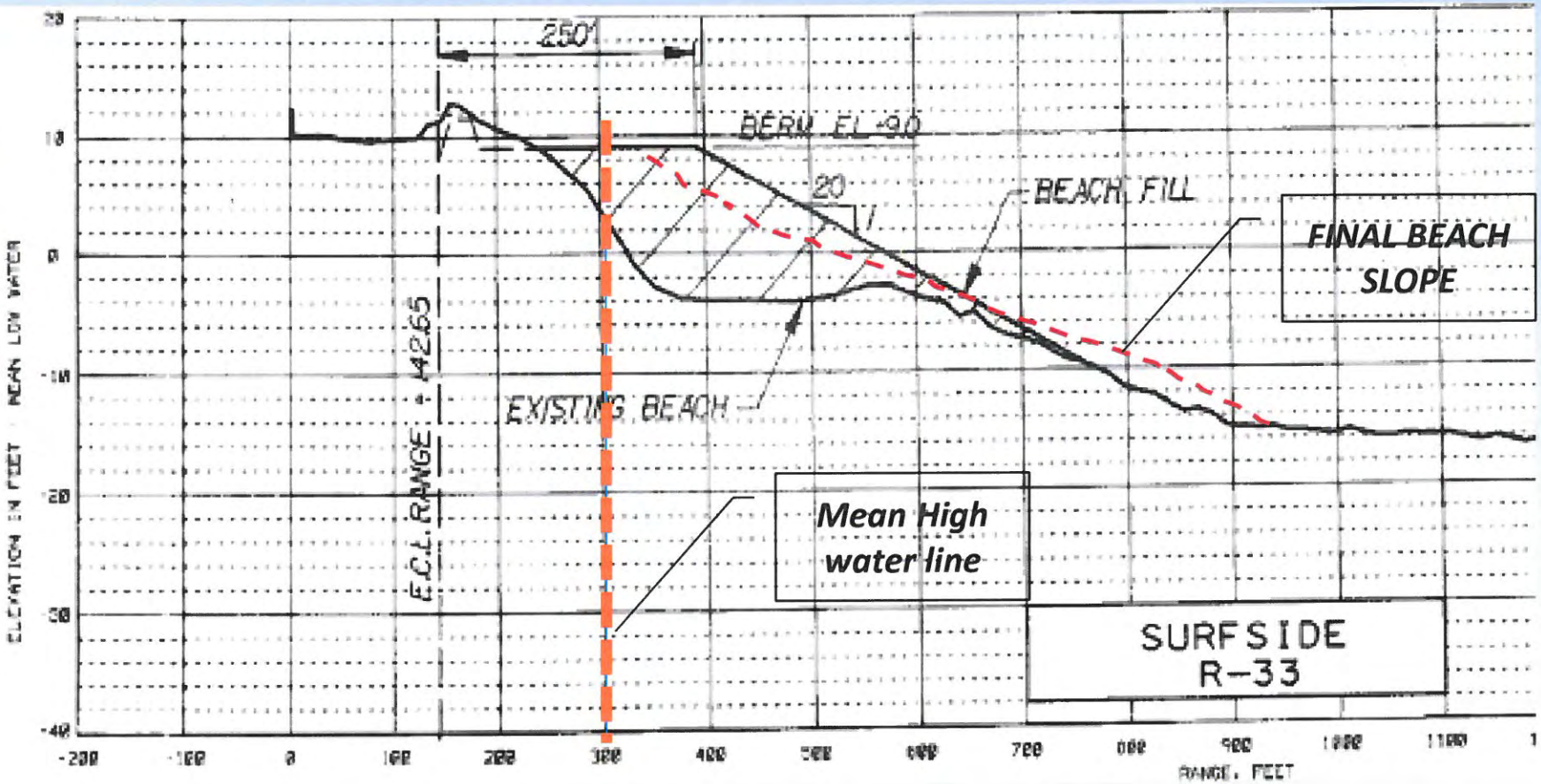


Surfside Beach Profile

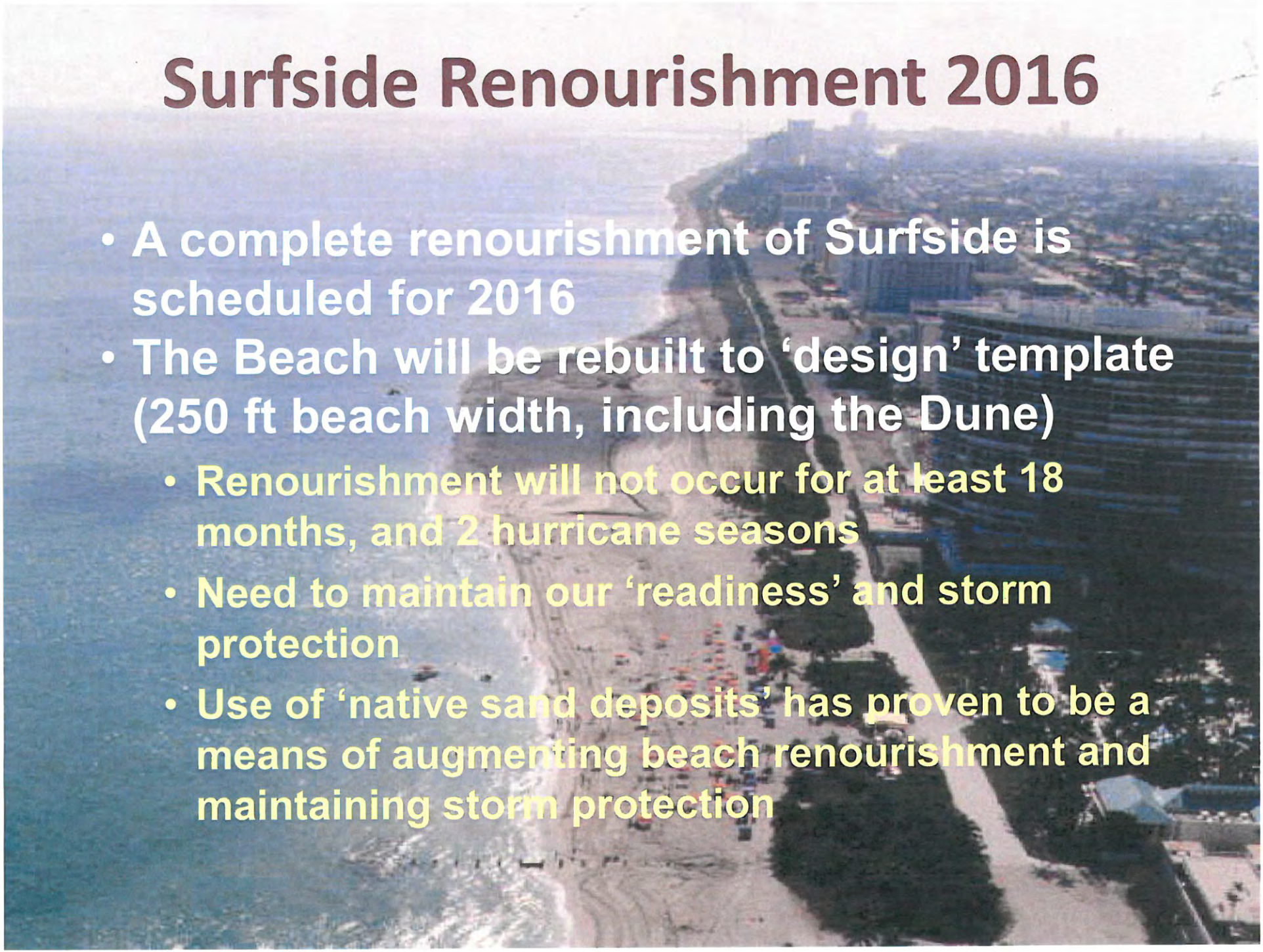
- **Sand Placement to meet permit requirements and 'construction profiles'.**
  - Slope steeper than 'final profile
  - Not unusual to have 'cliffs' or escarpments form for a period of time.
  - Wave action, weather, and reduction of the 'cliffs' will assist in achieving the 'final slope'
  - Working with FDEP to determine best approach to reducing slopes

Surfside Beach Profile - 1999

- Sand placement only allowed above Mean high Water Line



Surfside Renourishment 2016



- A complete renourishment of Surfside is scheduled for 2016
- The Beach will be rebuilt to 'design' template (250 ft beach width, including the Dune)
  - Renourishment will not occur for at least 18 months, and 2 hurricane seasons
  - Need to maintain our 'readiness' and storm protection
  - Use of 'native sand deposits' has proven to be a means of augmenting beach renourishment and maintaining storm protection

Use of Native Sand

- Use of native sand deposits does require ongoing management activities for a period after placement
  - Beach Slope and cliffs or escarpments must be managed while the beach adjusts to its final slope
  - The sand must normalize or 'sort' to allow the limited fine sands to settle or be winnowed out of the beach
    - Normally takes a few months, but depends on the weather and wave action
- Use of native sand deposits for beach has been a fiscally and environmentally sound means of augmenting beach renourishment needs

State Requirements for Beach Sand

Florida Administrative Code (FAC) Chapter 62-41.007(1)(j)

(j) To protect the environmental functions of Florida's beaches, only beach compatible fill shall be placed on the beach or in any associated dune system. Beach compatible fill is material that maintains the general character and functionality of the material occurring on the beach and in the adjacent dune and coastal system. Such material **shall be predominately of carbonate, quartz or similar material** with a **particle size distribution ranging between 0.062mm (4.0f) and 4.76mm** (-2.25f) (classified as sand by either the Unified Soils or the Wentworth classification), shall be similar in color and grain size distribution (sand grain frequency, mean and median grain size and sorting coefficient) to the material in the existing coastal system at the disposal site **and shall not contain**:

1. **Greater than 5 percent, by weight, silt**, clay or colloids passing the #230 sieve (4.0f);
2. **Greater than 5 percent, by weight, fine gravel** retained on the #4 sieve (-2.25f);
3. **Coarse gravel, cobbles or material retained on the 3/4 inch sieve** in a percentage or size greater than found on the native beach;
4. Construction debris, toxic material or other foreign matter; and
5. Not result in cementation of the beach.

If rocks or other non-specified materials appear on the surface of the filled beach in excess of 50% of background in any 10,000 square foot area, then surface rock should be removed from those areas. These areas shall also be tested for subsurface rock percentage and remediated as required.