2

GUTHRIE GARVER, known as Gus, was a small, quiet, knotty man. He and Carolyn had been the first couple to move into Golden Sands. They had moved into 1-C two days after the building was given a certificate of occupancy, when the land around it was still raw, with no swimming pool, tennis courts, or surfaced parking areas behind the building. One year ago last month, April.

He was a sallow man with a white brush cut. He looked like a bleached Indian. When he swam in the pool, he revealed a spare, heavy-boned body, with nicks and slices and welts of scar tissue on tough hide which slid across the strings and slabs and lumps of lifelong muscle. He had spent his life on construction jobs, most of them very large and in very far places. He liked solid structure, well specified, well planned, competently built.

Consequently he despised Golden Sands, but having spent six months looking at condominiums up and down Florida's southwest coastline, he admitted to himself that he had not yet seen one he could not learn to despise. Carolyn had loved her bright clean shiny apartment. To her it was the symbol of the end of travel, a place for roots without the ever-present fear Gus would be sent somewhere else.

After long deliberation Gus had told her one evening that if he couldn't put up a better building using only toad shit and wax paper, he'd resign from the profession. But this upset her so badly and so obviously, he convinced her he was only kidding and vowed to himself not to mention his doubts to her again.

They had their first Christmas together in the apartment, and a week later over at Beach Mall Shopping Plaza, only a quarter mile south, Carrie had slipped on a banana skin and broken her hip. That was the old comedy routine. Banana skin. She had been pushing the loaded cart as they walked toward their car. When she fell she shoved

it out ahead into the path of a tourist Cadillac. Most of the groceries went up in the air and fell onto the hood and windshield. As Gus knelt by Carrie trying to figure out how badly she was hurt, he was bothered by the stout florid man from the Cadillac who was bending over Gus yammering about who would pay to have his car repaired. At last Gus lost patience and stood up and said, “Hush!” At the same time he pushed two rigid fingers into the fellow’s belly, two inches above the belt buckle. The man bent over and lowered himself to the asphalt pavement and sat like a fat baby, gray-faced and quiet.

They operated on Carrie and pinned her hip. A week later she went into pneumonia, and they moved her into Intensive Care and then had to perform a tracheotomy. Just as she was finally recovering from the pneumonia, she had a stroke which paralyzed her whole right side. In mid-February he was able to move her into a nursing home. He had medical disaster insurance through an ASCE group policy, so his out-of-pocket expenses were 25 percent of her $9,000 hospital bill, less that portion covered by Medicare.

In early April the doctor told Gus Garver that he could make a reasonable guess as to the permanent disability to be expected. There was some return of function to the large muscles of the right side, but he doubted it would ever be possible for her even to sit up without help, much less walk. Regarding communication, the stroke had destroyed that part of the left lobe of the brain which deals with the comprehension of speech and writing.

“The condition is called aphasia. Sometimes, in younger patients, the right side of the brain can be trained to take over communication. But one could not hope for such a result in the case of your wife, sir. Yes, to a certain extent she is aware of her surroundings. And she would recognize you, yes. As you may have noted, she attempts to communicate on a subverbal level, to make simple wants known with … those sounds. Words are essential to the processes of thought, we now believe. Much of our thinking is in word forms. Deprived of the tools of words, the processes become more primitive and simplified: hot, cold, hungry, thirsty. No, I wouldn’t say her life expectancy is seriously impaired. At sixty-three she is quite a healthy

woman, aside from her traumatic infirmities."

By mid-April Gus Garver had adjusted his needs to his resources. There was Social Security, the pension, the savings, the investments, the insurance and Medicare. The logical thing to do would be sell the apartment and find something to rent near the nursing home. But that seemed, somehow, to be letting go of life, even though he knew Carrie would probably never come home again. She seemed to be more present, the Carrie of memories, in the bright clean apartment than in her small shadowy room in the home. He sensed that it was good for him to take care of the apartment, serve as a member of the five-man board of directors of the Association, cook for himself, go grocery shopping, take the laundry down to the bank of coin machines at ground level. It created the subconscious feeling that she would one day return unimpaired, and he could not sustain that myth were he to move out.

He saw Carrie for two hours each day, from three until five. He would sit at the left side of the bed, her good side, or at the left side of her chair and hold her hand and they would watch the small screen of the television set he had gotten for her. It did not matter to her whether the sound was off or on. She watched the movement and the color. He sat and thought back to a flood-control project in Assam, a highway in Peru, an airfield in Fiji, thought of dead friends and jungle mountains, village cantinas and village maidens, rock slides and typhoons, while in the silent room on the back street of this small city of Athens, Florida, he watched without comprehension the prancings and grimacings of the gameshow masters.

Whenever he had any free time, he examined the structure of Golden Sands. It stood upon pilings which reached an unknown distance down into the native marl. He estimated there would have to be over three hundred of them. From the ones he could inspect he saw that they were set to a minimum of fourteen inches diameter. Reasonable safety factor would call for a working capacity of fifty tons each.

Sure, the architect and the project engineer could call for any specifics they wanted. Fifty tons apiece. Forty-foot depth. ASTM

standards. Minimum compressive strength of four thousand psi after four weeks. You could call for independent testing lab reports. You could watch them like eagles.

But these were uncased auger-drilled poured pilings, with the grout in direct contact with the native materials. All concrete was supposed to be pumped into the hole under steady positive pressure as the auger was pulled. And the grout had to be first class. Good cement up to federal specs, commercial-grade fly ash, fresh clean water, some Pozzolith #8 retarder or equivalent, and fine aggregate, all measured and mixed in spanking clean equipment.

To do it right you had to have men who knew what they were doing and were committed to doing it according to the book. Gus Garver couldn't inspect the underground pilings, but he could inspect the visible cast-in-place concrete and make a judgment of the piling work from that.

Over a period of weeks he had made notes of the defects he had found. He found construction joints badly located, impairing the strength of the structure. He found one where the bond at the joint was faulty. Where one pour stops, after the concrete has set, it is necessary to sandblast the face of it, scouring away the cement down to the exposed coarse aggregate solidly embedded in mortar. Then, before the new pour is made against that face, all the debris and dried drippings have to be blown out by compressed air. He found a hairline crack in a joint, and when he found two places along the crack too deep for the blade of his penknife, he had returned with a two-foot length of stiff leader wire and satisfied himself that the joint had been carelessly prepared in addition to being badly located.

He found joint marks and fins, surface voids and stone pockets, irregularities and leakage stains. In a bearing surface area where he knew that the specifications had called for class-A concrete, he found a wall in the garage portion where the pour had been skimpy, where he estimated cement content at four sacks per yard instead of six. He could tell by the look of it, by the sandy feel, by the way he could scrape it away with his pocket knife. He found a stone pocket in that wall and stuck the blade of his knife into it and worked the stones

loose easier than he should have been able to. In earthquake country, he thought, the damned wall would come down like a giant Nabisco.

All the finish work seemed to be good enough. He did not pay much attention to it. It was all cosmetics. He was concerned with stress, with the ability of the materials, as used, to withstand all anticipated stress. Put something up and you want it to stay.

He could not make as informative an inspection of the pre-stressed concrete work. He knew only that it was more complicated and there were thus more things which could be done badly or not at all. The forms could lack the rigidity to prevent displacement by an external vibrator. The inserts could be installed a little bit off. The hidden tubes, ducts, spacer bars, anchorages and so on could have been improperly secured in place before the pour. Some congenital damned fool could have attached imbedded inserts to the main stressed steel. They could have skimped on the shoring during construction and gotten too much deflection in the stressed members. Some could even have been repaired after chipping or cracking, rather than replaced. The wires, strands and bars could be underspecified in some instances, and random sampling couldn't hope to catch it all.

The structure seemed to Gus to have been properly designed and engineered. It had that look. The elements and components were of sufficient size and apparent sturdiness. And he knew that good engineering adds a sufficient safety factor to overcome the minor goofs and oversights during normal construction, the ones not caught by inspectors and specialists. But in genuinely sloppy concrete work, as this seemed to him to be, there comes a point where the accumulated goofs eat up all the safety factor, and then if there is enough stress on any portion, enough to crumble it or crack it, the deflection is transmitted to other portions of the structure. They in turn crack or twist or crumble, and the whole thing comes down.

He remembered—what year was it, 1957?—going into Mexico City from the south after the earthquake. Mike had parked the Rover on the east side of Insurgentes, and they had put on their hard hats and walked across to take a look at what was left of the apartment house which had come down two nights previously. It would be impossible

to determine just where the first failure occurred, but once it started, all the slab floors came down, one atop the other, so that something almost a hundred feet high was transmuted into a rubbly pile about sixteen feet high. The slab floor had remained curiously intact, forming a horrid sandwich, ten slices of bread with thin dollops of meat between them. Mike had picked up a piece of concrete as big as a walnut and had kneaded it between his powerful fingers until it crumbled to dust. He slapped the dust off his hands and gestured toward the work crews and said, “The folks were in bed when the jolt brought it down. Some Mexican comedian owned it.” They did not have to discuss the problems of mixing good structural concrete. Or the penalty for not doing it right.

But, of course, Florida is not earthquake country.

He kept wondering about the underground pilings, and finally he checked and found out that the piling contractor on the job had been Romez Foundations. He found out they were down on Riley Key, putting in pilings. In dark pants and white shirt, wearing an aluminum hard hat and carrying a clipboard, Gus Garver went onto the job and roamed, unimpeded. Once he was asked what he wanted, and he said he was with the State Bureau of Regulatory Services, and was told that if he wanted anything, just ask.

The equipment looked overworked and undermaintained. The crew was slow and slovenly. Gus tasted the water they were using. It was salty, brackish. He was there an hour. He saw two interrupted pours. In each case the reason was the same. The auger evidently bit into some underground cavity in the underlying limestone, and then the pour used more yards of concrete than was immediately available. So they stopped and, after ten minutes, resumed pouring into the same auger hole, brought it up to the surface form, shoved in the reinforcing bars and poured the cap.

Checking the foundation work stimulated his curiosity about how these narrow islands so close offshore had been formed. He made his guess and proved it correct at the Athens Public Library. A very long time ago Florida had been under the sea. As the seas receded and the land rose, great rivers had come roaring off the mainland into the

Gulf of Mexico, fed by continuing cloudbursts. When the seas retreated farther and the rivers shrank, these offshore islands appeared, composed of the materials the rivers had carried down to the sea and deposited in their delta areas. Thus they were quite unlike the true Florida keys, from Key Largo down to Key West, a long huge dead reef, composed of the googols of skeletal remains of tiny dead sea creatures.

Googol was one of the words which pleased him. It was easier than trying to say the figure one followed by one hundred zeros. And it pleased him to be right about the geological history of these false keys, which were alluvial deposits, long windrows of marl, of shell washed down the rivers and deposited and compacted over the centuries, slowly acquiring the living plants and the top-soil and the white ribbons of seaward beach.

It accounted for the narrowness of the bays which separated these islands from the Florida west coast mainland, and their similarities in structure, elevation and flora.

At night, alone in Apartment 1-C, in the dark bedroom silence, Gus Garver could feel the tangible weight of the six stories over him. And he could see, quite vividly and specifically, one of the underground pilings at the Riley Key project where the pour had been interrupted. During the ten-minute wait, there had been water seepage from the rough sides of the augered hole, bringing down with it bits of shell and marl and soil to form a thin layer atop the wet concrete. The new pour had not displaced this debris. It remained, like a form of insulation, weakening the bond between the two pours, creating the future fracture line, the place where it would go in the event lateral stress was ever placed upon it.

Wouldn’t have to be lateral, he thought. Assume the mix was heavy and during the ten-minute wait it set up at a fifteen-degree tilt from the horizontal. Then, if the native materials in the side wall are soft enough, sufficient vertical stress could force slippage. On the other hand, during the ten-minute wait, a couple of bushels of dry shell could have tumbled onto the old pour and there could be no damn bond at all between the bottom of the piling and the top of the piling.

And they wouldn't know it.

Okay, smart-ass engineer, how would you handle it if you had to pour right in that spot, and for some reason you ran out of grout? Hmmm. Pull the auger and the pressure pipe and shine a good light down the hole and make visual inspection. Drop a length of number-six reinforcing bar down and see how much sticks up out of the first pour. Ideal would be a twelve-foot length, with six in and six up. Drop about five of them, and on the new pour make it a little wetter, less aggregate, so the bar would help make a solid joint. They might end up too close together or too close to the exterior of the piling, but it was a lot better answer than nothing at all.

Thinking of the bars made him think of all the reinforcing steel in the building around him, under him and over him. All the marginal bars with their dowels and splices, the deformed bars and the melded wire fabric, all the supports and spacers and mesh.

He made a mental list of the things which could go wrong with all the reinforcing steel. Too long a wait—over an hour—before the tension reinforcing of the pilings. Steel with grease on it, or too much rust, or with mill scale on it. Bad welds. Too few dowels from footings to walls. Undersized bars. Brittle tie wire. Unstaggered splices in adjoining bars. Bending and field cutting of bars around openings and sleeves. Fast sloppy pours that left voids under and around the reinforcing, or knocked the bars off the chairs, unnoticed.

No, this was not earthquake country, but it was waterfront, and this was a low island indeed, and there was a great warm shallow sea out there, where the big storms come a-roving in season.

At night he began to think of structure in relation to the sea and the tides, and he began to think of Sam Harrison, who, as a green tough kid, had worked for him not too many years ago. They come on the job and you size them up. There are three kinds. The first kind can't hack it, for all the reasons known to man, and so you ease them out before they kill themselves or, worse, kill somebody else who is worth their wages. The second type you look for, because you can keep them a long time. They are competent, loyal, diligent and quite happy to have somebody else take the career risks and the money risks. Sam

Harrison was of the third variety. At first you think they belong in number-two class. But then you slowly learn that they are doing just a little bit more than you asked for, and doing it a little better than you thought possible. Then, feet on solid ground, they start coming to you with innovative ways of doing things more easily and quickly, and some you approve and some you don't. Then you know what you have on your hands. So you make an extra effort to keep them on the team as long as you can, knowing you are going to lose them. The Sam Harrisons always get restive. They have to run their own store. It is the only way for them. So, when the highway and the bridges were finished in the Peruvian mountains, Sam went his own way.

Sam had gone to follow his own most intense area of interest, man's efforts to tame the sea. In lonely places when work is done there is time for talk. Sam had said that you can't tame it, you can't overwhelm it by force. You have to comprehend the way the sea uses its power, and use its own strength to make it defeat itself. Gus had heard later how Sam Harrison, in his first job, had devised a new kind of dog-bone groin which, laid in rail-fence fashion and laced with cable, had rebuilt a Spanish beach without causing the usual deep erosion down-current from the groin.

This was the sort of problem Sam Harrison would like to tackle. Relate the remaining safety factor in the construction of Golden Sands to the possible and probable impact of hurricane tides this far from the actual beach front of Fiddler Key, and recommend measures to be taken. It would be no great feat finding him. But paying his fee would be. There are too few Sam Harrisons in the world at any one time, and they are in demand.

And so, thinking again about his list of defects, he drifted into sleep, where he stood on the lip of a deep river gorge in Peru watching his survey crew work out the precise dimensions of the span he had calculated from the aerials.…