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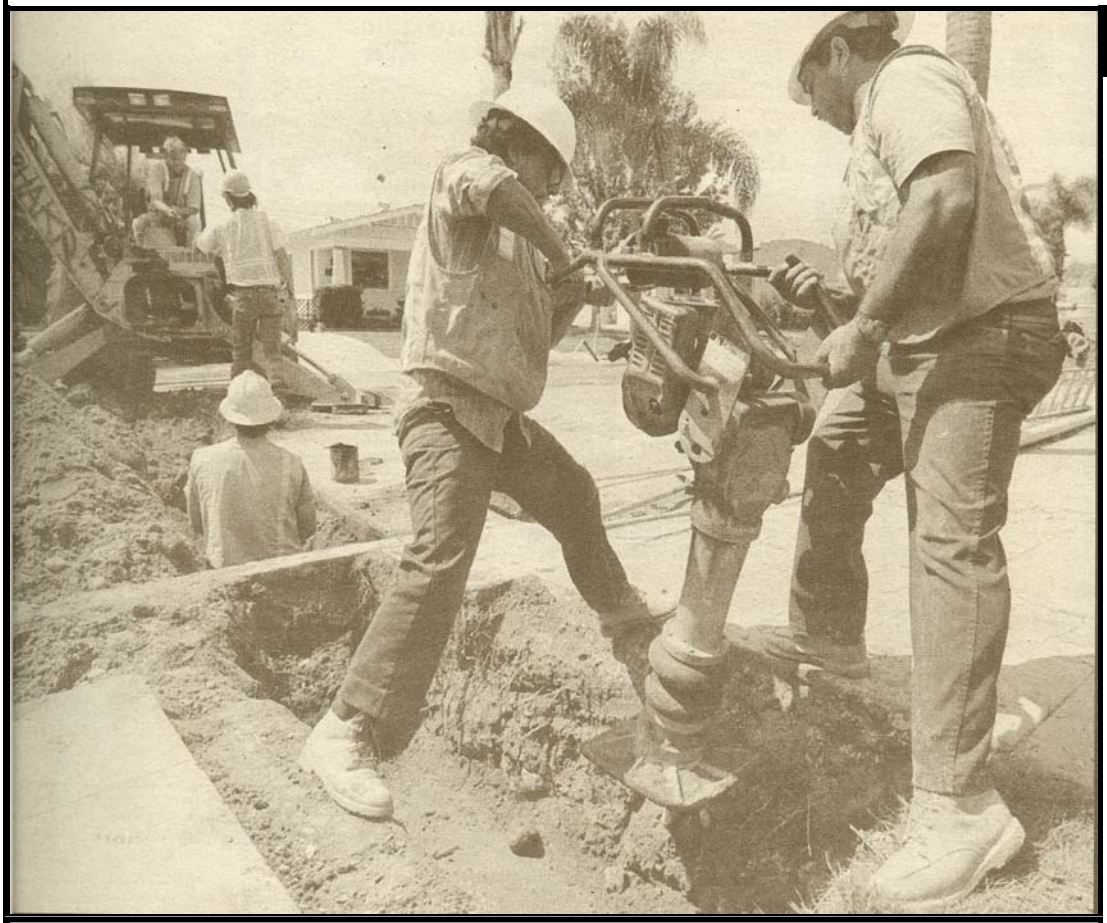


Jesse Garcia and coworker compact soil over new sewer lateral

Photography by Sandy Huffaker, Jr.

Diary of a Sewer Repair

The Coming to Burlingame of Sewer and Water Group 78

by Steven L. Shepherd

PART ONE OF TWO

For several months last year, they tore up the streets in my neighborhood, installing a new sewer. I watched this closely, for I had taken—have still—a deep interest in repairs. Repairs, it seems, had taken over my life. Cars, house, appliances, personal relations, and more. All had been falling apart around me, and amidst the ruins I had decided that a person's attitude toward repairs says a lot about his view of life.

Strictly speaking, the sewer job was not at its outset a repair—the sewer wasn't yet broken when the work began, not like the 300 miles of pipe that cracked in the Northridge earthquake. Not like the Atlanta trunk line that collapsed without warning in 1993 after a heavy rain, opening a 200-foot-wide, 50-foot-deep hole that swallowed a hotel parking lot and two hotel employees—immigrants, said the newspaper, who had come to America " seeking a better life."

All the same, I watched. Confident that as events unfolded things *would* break, repairs would be needed. Moreover, the whole project was undertaken for the very purpose of avoiding unexpected, urgent—and that is to say, expensive—repairs in the future.

We in our neighborhood were granted a glimpse of such a future in May of 1990, when a portion of the local concrete main collapsed and a milky white freshet began bubbling from a manhole in the middle of the street. The sewage flowed forth, spread over the pavement, and disappeared into a nearby storm drain—this before the city stenciled its warnings on the curb admonishing residents against the dumping of pollutants and alerting us all to the existence of dolphins downstream.

Emergency repairs were undertaken, and in the months that followed city crews implemented a more permanent fix, replacing six manholes and some 300 yards of sewer main. I was not directly affected by this—the work took place a block from my house and mostly out of sight—but still I remember it as lasting forever. There were lots of big shiny trucks, lots of guys spending lots of time standing around, lots of dirt in piles that seemed never to move, and lots of deep holes filled with sewage coursing around the ankles of men performing the most god-awful of jobs.

Memorable though it was for those of us who lived nearby, the spill that precipitated this effort was by no means unique. In 1988, the federal Environmental Protection Agency took the city of San Diego to court over a catalog of sewage-related issues and offenses. Foremost among these was a disagreement over the level of treatment needed by the city's sewage (with the EPA insisting that San Diego—like the rest of the country—had to conform to the requirements of the Clean Water Act, and San Diego arguing instead that the requirements were unnecessarily stringent and financially wasteful for a coastal city with a deep-ocean discharge pipe), but the list included as well a record of several thousand sewage spills over the immediately preceding years. Bad though this sounds, spills are a problem nationwide, and the EPA has recently estimated that fixing the situation will require more than $32 billion worth of work on the country's aging sewer pipes. (This on top of another $107 billion needed for our treatment plants and other sewage infrastructure.)

Mightily did they fight, the EPA and the city. And though ultimately the city pulled an end-around, went to Congress, and received a waiver from the letter-of-the-law requirements of the Clean Water Act, still the parties spent eight years in court, during which time it was decided that while San Diego might not need to upgrade its sewage treatment facility in the manner originally requested, it did need to do a whole lot of other things—$1.8 billion worth of other things.

In March of 1991, midway through the case, U.S. District Judge Rudi Brewster fined the city $3 million for its history of sewage spills. Furthermore, he insisted that San Diego attend to its much-neglected sewer pipes. Money was budgeted (part of that $1.8 billion), and there then began a flowering of sewer repair and replacement projects throughout the city.

One such project is Sewer and Water Replacement Group Job 78. In addition to its 45,000 manholes, San Diego is home to 700 miles of sewer trunk lines (pipes 15 inches in diameter and larger) and 1800 miles of 6- to 14-inch "mains," to which in turn are connected the quarter of a million laterals that provide sewer service to the city's homes and buildings. Since roughly the mid-'60s the most commonly used material for the city's sewer pipes has been polyvinyl chloride, or PVC—it's cheap, somewhat flexible, and resistant to corrosion. Before that, the pipe of choice was vitrified clay (good stuff, but expensive). And before that, concrete.

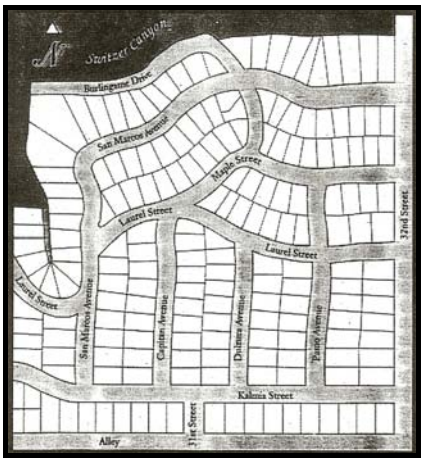
The heyday of concrete sewer pipe in San Diego lasted from the 1890s, when the city was first sewed, to the late '30s. The primary virtue of concrete is that it's cheap. But its primary disadvantage is a tendency to fall apart, for which the reason is chemistry: sewer gas contains hydrogen sulfide, which reacts with water to form sulfuric acid. Sulfuric acid is highly corrosive and readily attacks concrete; the result is ever-thinning pipe walls and a steadily increasing chance of breakage and collapse. Recognizing this, the city began replacing its concrete sewer mains in the 1960s. Only 160 miles are left, but even so, a disproportionate share of the city's remaining problem with sewage spills occurs in these 160 miles. Because of this, part of the EPA settlement requires San Diego to replace its remaining concrete pipes in the near future, and specifically to replace 60 miles over the next four years.

Of those 60 miles, two are in my neighborhood. Located just to the east of Balboa Park and the golf course, Burlingame was one of San Diego's earliest subdivisions. The streets were graded with teams of mules and paved originally with decomposed granite; the first house was built in 1912. Today there are 188 houses, with architectural styles ranging from Craftsman to Mission to Nondescript Stucco (e.g., my house). The lots are small, the blocks compact and irregular. There are palm trees in the parkways (as there should be in San Diego). And I and my neighbors are sometimes a little snobbish about the pink sidewalks that distinguish our neighborhood from those around us.

Nearly three dozen houses were built in Burlingame the first year. Even so, and for reasons unknown, the original sewers were only temporary. Not until 1924 was a permanent system installed: it consisted of 6-inch mains and 4-inch laterals; in some cases two houses shared a lateral and in a few places mains were run down alleys and between property lines—consistency then being less a concern than now. The material was concrete pipe in 4-foot lengths. This is the stuff that had collapsed in May 1990, the stuff city crews bypassed in the ensuing months, and the stuff Sewer and Water Group Job 78 would replace.

The contract called for the replacement of 11,000 feet of main and its associated laterals. Some of the specified work extended beyond Burlingame, and in these areas the water lines would be replaced as well. Total

cost: $2.1 million.



Burlingame

January 31, 1997 (Friday):

Vaguely, we knew it was coming. There had been notices in the neighborhood newsletter, announcements at homeowners' meetings, and talk among neighbors. But today the first tangible signs arrive: fleets of trucks and a hand-delivered flyer on our door. One page is from the construction company—the Ortiz Corporation, headquartered out of Chula Vista—and the other is from the city engineer who will oversee the project. Ortiz tells us the project is expected to last eight months; the engineer, that "Temporary inconveniences are likely to occur."

February 3 (Monday):

Our house sits inside a dogleg curve on Maple Street; the view out our bedroom window is of the end of Burlingame Drive, where it butts into Maple and forms a three-way intersection. From this intersection, Burlingame Drive drops gradually towards a crossing with San Marcos Street, and from there it dives steeply into Switzer Canyon. Here the road is little but a maintenance lane to the canyon and is paved only in the most rudimentary sense. Once there was a house in the bottom of the canyon at the end of Burlingame Drive, but years ago the city bought the house and razed it, leaving the area as open space. All that now remains are the twin rows of thick-trunked date palms that once flanked the driveway, a ferral stand of eucalyptus, some pepper trees, and seasonal weeds and greenery.

There are also several manholes. Indeed, there have been sewage spills here as well, with the sewage rising from the manholes and spilling into the mostly dry streambed, leaving in its wake the rocks and boulders of the canyon floor flecked with bits of paper. And here, at the confluence of the concrete main from Burlingame with the rest of the city's collection system, is where they begin—excavating today with backhoes around the manholes.

Later, the workmen tell me this is how all sewer work begins: at the deepest point. "You always lay sewer uphill," says one. You start, as it were, at the river's mouth, working your way always upstream and exploring fully each tributary as you come to it, until finally you reach the headwaters. Sewer lines, except in rare instances, are laid on a slope and gravity fed, and working uphill prevents dirt and construction debris from falling inside the open pipe.

All day I can hear this activity as the drone of equipment wafts from the canyon. Elsewhere, a worker walks the pavement of Burlingame Drive and paints colored squigglies—a blue W in the middle of a two-headed arrow indicating a buried water line, a yellow G for gas. Toward the canyon, street barricades are placed, and the curbs farther up are dense with displaced cars. Where, I wonder, will we park when it's our turn?

Perhaps this is one of the "temporary inconveniences" of which the engineer spoke. But I fear worse. It has rained heavily in Northern California this month, and there have been floods. Last week, newspaper essayist Peter King wrote of the havoc visited upon him at his home in Orinda, east of the Berkeley Hills. The storm drains there (unlike those in San Diego) empty into the sewers and the deluge has at times overwhelmed the system's capacity. The result has been spillage at low points in the system—points like houses at the bottom of a hill, points like King's house.

King's first flood occurred on New Year's Day. He and his wife awoke from a night of revelry to find the floors of their house "awash in a brown, runny substance. It looked almost like mud." It had rained that night, and "Sometime before dawn, the gunk began to splash out of the shower and tub and gurgle from the toilets. It swept across the floors, a customized indoor flood that crested at four inches."

The rains have been biblical. "And with each new storm," says King, "has come another attack from the sewer." His 5-year-old son has become sensitized to toilet sounds, and King himself has become chummy with the county clean-up workers. "Remember," they tell him, "80 percent of this stuff is just water."

He's on less friendly terms with the insurance adjusters, who seem to be of the opinion that boiling water, bleach, and a little deodorizer will cure King's problems. It's nothing, they seem to suggest, but a minor inconvenience.

February 4 (Tuesday):

I work out of my home, in an office in a front room with windows on the street. I ponder, I doodle, I gaze, I fidget. I write. But always, quiet is an asset. Quiet helps.

And so it is that I have been thinking about earplugs. I have earplugs, foam inserts that I use under duress (as when escorting my 13-year-old to a concert). But I have been thinking that perhaps I'll soon begin needing them routinely. I dislike this idea—needing earplugs in my own home in my own normally quite neighborhood—but this may be what's required if I am to maintain any semblance of productivity in the coming months.

Indeed, I have a neighbor who is both a police officer and the owner of a fabulously-equipped woodworking shop in his garage. Recently he gave me a tour of the latter, and among the myriad tools on the wall I spied a pair of ear protectors—the big bulky kind that look like ear muffs. They are, he said, the same type he wears at the shooting range.

And how well do they work? I asked.

Well, he said, they're the same thing used by Navy gun crews. And though he hadn't tried it, he supposed that if you used both ear protectors *and* earplugs, "It would be good-bye world."

Certainly there's a touch of the ridiculous in the image of a man wearing earmuffs and earplugs in his front study. And it's unfortunate to have to say "Good-bye world" in order simply to stay engaged with it. But such have been my recent thoughts.

They have been triggered today by the sounds of jackhammers rising from the canyon. And though not yet close enough to be annoying, neither are they unaccompanied. Near and far, dump trucks have begun rumbling, racing at times past my window, and elsewhere screeching to a stop with a hiss and release of air brakes and the squeal of a skewered rhinoceros. Adding to the chorus are small gasoline motors—pumps, I imagine—and the insistent screaming of a concrete saw.

Also new today are detour signs, a construction trailer parked at the top of the canyon, and a blue fiberglass porta-potty—on wheels.

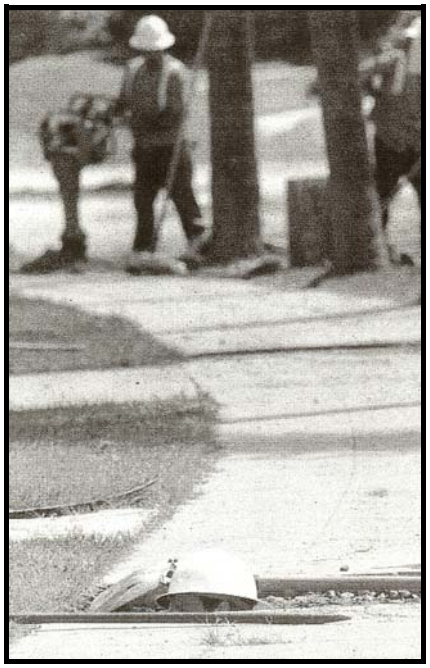
February 7 (Friday):

The concrete saw has emerged from the canyon today and begun working its way up Burlingame Drive—working its way in the general direction of my house. For the first time, then, I spend the day wearing earplugs. They help, but I've not yet coupled them with external ear protectors and by no means has it been "Good-bye world"—for the saw is piercing. Moreover, it has competition: for the boys at nearby St. Augustine's are having a party and live punk music fills the air whenever there is a lapse in the sawing and the merest threat of silence.

Other firsts today include the appearance of great heaps of gravel and asphalt near the construction trailer, and the sighting of two men up to their necks in a hole on Burlingame Drive. The two are an advance scouting party and they have dug their hole by hand, their purpose being to find a particular pipe so it's not accidentally ripped out when the equipment operators start excavating. Later they tell me the technical term for this sort of exploration is "potholing."

February 13 (Thursday):

The backhoes and excavators continue their climb out of the canyon, and as they progress I catch sight of a Roto-Rooter van parked next to the manhole at the top of the road—the very manhole toward which the crew is now working. This seems at first an unlikely coincidence, and I think that perhaps something has gone awry. But soon the van appears at the manhole in front of my house and soon thereafter at every manhole up and down the street. Its crew, I discover, is videotaping the old sewer lines. Like a doctor scoping a patient's bowels before surgery, they are sending a remote-controlled camera through the pipes, imaging the sewer.



Worker (foreground) "potholing" for sewer lateral

The video inspection of sewer lines is a routine maintenance operation of many large wastewater agencies, and the city of San Diego has its own video inspection capabilities. It even maintains a tape library of its more noteworthy findings—miles of video tape of miles of sewer pipe. But Ortiz is using the video to help it pinpoint the location under of the junction of each house's lateral with the main. Data from the recordings will be used to supplement the pages of maps and plans that govern every detail of the project and to add to the street a new set of squigglies: large white *S*'s run through with a single-headed arrow and looking almost like dollar signs.

The tapes will also be reviewed by Jesse Garcia, Ortiz's construction foreman, who tells me later that he watched them on his VCR at home. There (and perhaps with his feet up and while sipping a beer) he was looking at Burlingame's innards when his wife came in unexpectedly and caught him.

"What," she screeched, "are you watching?!!"

February 28 (Friday):

Over the past two weeks the work has been concentrated on Burlingame Drive. After the street was surveyed and squigglied, the sawman cut pairs of parallel lines through the pavement, demarcating first the long trenchline down the middle of the road for the new main and then those for the branching laterals to each house. In his wake, the main was excavated, laid, connected temporarily to the old laterals, recovered, and temporarily asphalted over; it's a short street, and all this digging and filling took but a day.

The crew next worked on the laterals. For each house they excavated the trench to the property line (just inside the sidewalk) and demolished the old pipe in the process; they laid new pipe, connected the new lateral to the new main, and reconnected the house. The trenches were filled and the road patched with concrete. The street was done. It all went fast and flawlessly.

Except that today I learn there is a problem.

At the very top of Burlingame Drive, across the street and cater-corner from our bedroom window, a house is threatening to fill with sewage. Indeed, the home's drainage has been growing steadily worse since the new main was laid, and today it seems at a threshold.

"I was afraid to take a shower," says a woman who lives in the house. "Afraid it would come bubbling up."

What "it" was, she didn't need to say. I had imagination enough, but I had visions as well of the mess in Peter King's house now recurring virtually under my nose.

Already my neighbors have hired a private plumber, who sent his snake on reconnaissance and found neither tree roots nor internal blockage—and thereby verified that the source of the trouble was downstream from the house. And now the problem has been turned over to Ortiz, whose first step is to discover its cause, and to which end a pair of workmen begin the morning by reexcavating the connection between the new sewer and the line from the house.

They dig for a while, and when finally they expose and uncouple the connection . . . nothing comes out. Nothing drains from the supposedly backed up and almost overflowing line. Which is a puzzle. For it means the new sewer has been connected to some line other than that from the besieged house, and that the house full of sewage has in turn been bypassed. And it raises too the question: Where is the true line from the house?—the hookup to the old sewer?

Because our original sewer was laid more than 70 years ago, it has more than its share of quirks and oddities. Among these is a paucity of manholes. The sewer main into which my neighbors' house drains begins at the top of a hill—theirs is the first house to empty into it. Normally, such a point of origin would have been punctuated with a manhole so the line could be accessed for service. But there was no manhole; instead, the video camera had shown two laterals coming in from the vicinity of the beleaguered house: one from the middle of the frontage and the other from farther down, near the edge of the property line. Given the lack of an initial manhole, Ortiz's men had assumed that the first, uppermost, lateral was for service and the second was for waste from the house—and it was to this second line that the new sewer was connected. But apparently this was a mistake.

Guided by the video data, one of the men now breaks open the sidewalk 20 feet uphill from the false connection. He potholes down a few feet, finds the previously ignored old first lateral, disconnects it . . . and jumps out of the way as the hole fills immediately with frothy sewage—part of the accumulation that threatened to come "gurgling out."

It is at this moment that one of the home's occupants chooses to wander out for a look. Clearly, the problem has now been diagnosed—the woman's house is still connected to the old sewer, which itself has been disconnected farther down the road—but it is not yet obvious when it is going to be fixed. The homeowner's nightmare, of course, is the contractor who comes in, takes out a few walls or a kitchen then disappears. And thinking that perhaps this is to be her fate—that it might now be days more before the situation is rectified—and noting the exposed sewage and sewer line under the very sidewalk in front of her house, she observes that, "Now things are getting personal."

Certainly, having your bodily discharge—its frequency, timing, and so forth—on public display would constitute a unique form of embarrassment, and one ardently to be avoided. But fortunately, my neighbors are not to suffer it. Almost immediately, the white Ortiz van with the concrete saw appears. The pavement is cut, and the whole sequence of trenching and laying. By nightfall the trench is backfilled and the scar in the road is covered with temporary asphalt; my neighbors are hooked up and their toilets work—again.

My neighbor woke this morning angry and frustrated. Her problem had been building for days and she'd had trouble at first getting someone to listen. The city first told her she needed a private plumber to then contact the city to contact Ortiz. But once started, the repair could not have been completed humanly faster. And as she watches, she grows visibly calm. After all, she says, she wasn't angry that a mistake had been made—"This stuff is bound to happen." Rather, it was the initial lack of a receptive audience that had driven her to frustration. For it is not perfection that marks a professional—that being impossible—but the prompt and willing redress of honest error.

* * *

Beyond the discovery that Burlingame has odd plumbing, I learn something more today. I learn that we have on Sewer and Water Group 78 an archeologist and a paleontologist. They wear hard hats and carry shovels, but it seems their job is mostly to watch. They watch the excavation and repair of my neighbors' misconnected sewer, and when the backhoe moves on, so too do they. They are looking, they say, for artifacts and fossils, and wherever the machines go, they go—by contract and by law.

The California Environmental Quality Act requires that most construction projects be evaluated during planning to determine their potential for yielding fossils or buried artifacts (which can range from prehistoric arrowheads to old tin cans). The city keeps extensive maps for this purpose, and if a site is thought to have potential for such a find the permits and contracts will require professional monitoring and the taking of appropriate measures during construction to document and preserve any important finds.

People love to badmouth the cost and "redtape" generated by laws of this kind. But the result, says Tom Deméré, Curator of Paleontology at the San Diego Natural History Museum, has been "a tremendous opportunity to collect and protect resources that would otherwise have been totally destroyed." The Museum now counts within its collection thousands of items gleaned from local construction sites, and more are added each year.

Among the more notable of these finds are the fossilized remains of a 75-million-year-old nodosaur excavated in May 1987 from a sewer trench in Carlsbad. Although the armor-plated nodosaur (a distant relative of the better-known stegosaur) lived on land, the Carlsbad specimen is thought to have washed to sea at the time of its death because its remains—now on exhibit in

the Museum's basement—are partially encrusted with fossilized seashells and a shark's tooth can be seen embedded in its flank. Three-quarters of the animal's skeleton plus a substantial portion of its segmented armor plating were recovered from the Carlsbad sewer, and the find represents the most complete dinosaur skeleton ever discovered in Southern California. It is doubly rare for being one of the few nodosaurs found anywhere in the world.

Mark Breshears is a heavy equipment operator who mostly drives the big steel-tracked excavators for Ortiz. Sewer and Water Group 78 is his first job with Ortiz, but he's been an operator for 15 years and has worked on jobs all over the county. He himself has found fossil fragments while working, and says, "I'm always looking. You never know what you'll find."

Because of the great depth of sewer trenches and the mile upon mile of earth exposed each year in their digging, Tom Deméré says they are of particular interest for their geologic revelations. Certainly Breshears would agree with this, for it was while digging a trench in Poway some years ago that he came across one of the most remarkable sights of his life. It was late in the day and the work was winding down when his bucket broke through a hard spot in the ground and came up filled with what looked like glass.

"It was crystals," he says. "Quartz crystals."

Excitedly, he replaced the soil over the crystals then came back after work to explore on his own. On his hands and knees he dug, pulling the crystals from the earth with a screwdriver; that night he took home a truckload of crystals, and he did so again for each of the next six nights.

What he had encountered is uncertain. Breshears thinks it was a geode, but he never found its hollow center. Amongst the crystals he also found green clay, and he was told that meant that if he had dug deep enough he would have found tourmaline, "and then gold."

But he found no gold. And as to the fate of the crystals themselves, he says, "I don't know. They're supposed to . . . But they didn't bring me . . ."

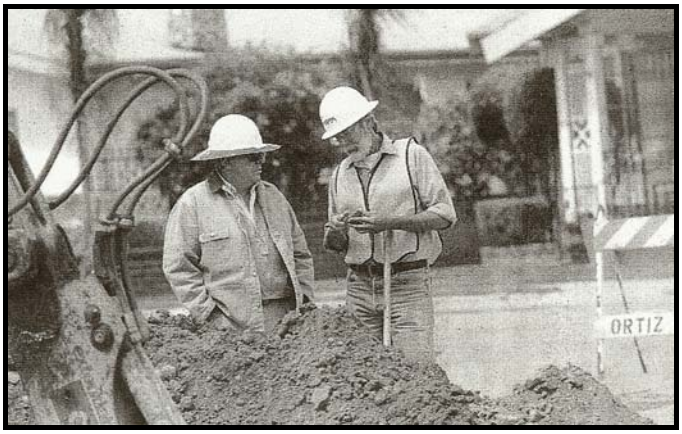
He doesn't complete these thoughts, but they're not hard to read. In New Age ideology, crystals are claimed to have magical powers and to be the instruments of good fortune. But instead, Breshears was hounded by people seeking their source, and most of the crystals were stolen from him. Still, though, he does have the memory of an excavation in Oz and a shared bit of what Tom Deméré calls "the excitement of discovering what's under your feet."

So far, Sewer and Water Group 78's paleontologist, George Kennedy, has found neither crystals nor dinosaurs in Burlingame. He has, however, collected what he characterizes as a few predictable fossils of marine mollusks from the early trenching in Switzer Canyon. In the canyon, says Kennedy, the excavation cut into what is called the San Diego Formation, a two- to three-million-year-old sea floor now composed primarily of sandstone. There, fossils were anticipated. But here on the mesa the trenching has moved into a more recent geologic layer—the million-year-old Lindavista Formation, made up of intermixed clay, sandstone, and cobbles—and a fossil find is thought unlikely. Past experience, says Tom Deméré, has shown the Lindavista Formation to be "sparsely fossiliferous," although this means paradoxically that anything found will be of increased importance by virtue of its very rarity.

Months from now, when the job is finished, Kennedy will write a report of his findings. Kennedy, who hunted fossils as a kid in La Mesa, was a curator of invertebrate paleontology at the Los Angeles County Museum of Natural History before the Museum went through a downsizing, and is now an Adjunct Professor of Geological Sciences at San Diego State. He does a lot of contract paleontology these days and has written a fair number of such reports. He is the author, for instance, of a report of findings he made during the recent replacement of the city's Sewer Pump Station Number 5, located just below the Coronado Bay Bridge. The report describes the recovery of a rich collection of fossils, primarily mollusks, but including as well the ankle bone of an extinct species of horse. Samples from the excavations were sent to museum curators in New York and California—Tom Deméré among them.

The report itself went to the appropriate city officials, and eventually a copy reached the desk of Chris Zirkle, in the Development Services Department. Zirkle is the city's keeper of reports filed in accordance with the California Environmental Quality Act, and when it is ready he will receive as well a copy of Kennedy's report for Sewer and Water Group 78. He will also receive a similar report from Brian F. Smith and Associates, the job's archeological monitor—represented today by Todd Baker, holder of a master's degree in anthropology.

Like Kennedy, Baker made a few unremarkable finds in the canyon—a few bottles and bits of trash from the house that once sat among the palms. Also like Kennedy, he expects to find little here on the mesa: There is no evidence to suggest that Native Americans or anyone else ever lived or died



Larry Pierson (left), archeologist, and George Kennedy, paleontologist, examine a rock specimen

in Burlingame before its development as a part of San Diego. Still, he too watches for the unexpected—for the find that makes you catch your breath.

In the meantime, both he and Kennedy make themselves useful by helping direct the backhoes (clenched fists for "stop"; winding forefingers for "closer") and by keeping the edge of the trench clean—they being the only men on the job with both graduate degrees and shovels.

March 1 (Saturday):

Early this morning a pair of surveyors appear in the street before our house. They wield gleaming lensed scopes mounted on tripods and work smoothly; soon the length of Maple Street is marked with dashed parallel white lines three feet apart. Off one corner of my house and near an edge of the intersection where Maple Street makes its dogleg and is abutted by Burlingame Drive, the dashes outline an 8-foot square to indicate the location of a new manhole. Another manhole will be placed 100 yards to the south, where Maple forms a Y with Laurel; these are but two of the more than 50 manholes that will be dug and built as work is completed on Sewer and Water Group 78. It takes the surveyors only a few hours to finish their task and then they are off—home, perhaps, or to breakfast.

March 5 (Wednesday):

The sawmen cometh. Since the beginning of the week, two men from Ortiz have been slicing through segments of street near and about my house, following the surveyors' white lines, and finally today they are outside my window. It is everything I had expected—loud, throbbing, incessant. And more. For it stinks, and black, oily fumes spew from the saw's presence.

The saw has a 65-horsepower motor and drives an 18-inch diamond tipped blade that takes from the road a kerf three-sixteenths of an inch wide. Each blade, says its operator, costs $700. They wear out after only five or six blocks and can't be resharpened. The saw itself is roughly a yard by a yard by a yard on edge and its sides are ornamented by a diverse assortment of belts, pulleys, and mufflers; on the front is an offset Cyclops of a headlight, and from the rear—behind the lever- and dial-filled control panel—protrude a pair of handles used by the saw's operator, Joaquin Suarez, to guide and muscle the beast.

A hardened grime encrusts the machine's surfaces. This is the result of pavement dust wetted by the spray of water that drips continually over the spinning blade; the water is provided by a hose that trails the saw and leads to a tank inside the utility van that is the saw's mother ship and is equipped with a rear lift for the purpose of launching and retrieving its offspring. Together, the water and dust form a glistening slick of reddish-brown muck that spreads from the lengthening cut. The paste, however, has little chance to dry before it is sucked away by Joaquin's co-worker, Pedro Silva, who trails a few feet behind with a wheeled shop vac and wand.

Up and down the street they work, each man wearing the hard hat and orange and yellow-stripped safety vest that is the uniform of Ortiz's crew. Joaquin also wears foam earplugs and wrap-around sunglasses—the latter combining a bit of protection with a touch of flair (this accentuated by the half-covered tatoos on his thick arms). It takes many passes of the saw because of the thickness of the road and the hardness of the concrete under the overlying asphalt—a stratification resulting from a long ago repaving that left many houses in the neighborhood with virtually no curb. Joaquin's first cut is through the top four inches of asphalt. Switching blades, he then makes two separate three-inch cuts through the concrete—cutting deeper would hasten the blade's demise.

Mark Breshears on a backhoe fitted with sheep's foot

All day the saw screams, and all day the men attend it. Occasionally, a car passes them by or a tractor laden with pipe and they stand aside.

* * *

Tonight is the night of the annual Burlingame Homeowners' Association meeting. Some 75 of us have gathered in the home of a neighbor for a yearly ritual that includes presentations, the election of a board, and the president's State of the Neighborhood address. Also in attendance is our city council representative, who, recognizing the subject of our greatest interest right now, has

brought with her a retinue of city employees involved with the sewer project: engineers, ombudsmen, managers, etc. Their purpose is to listen, answer questions, take back queries.

Since the first house was built in Burlingame in 1912, people here have been paying taxes and user fees. No doubt during all this time these same taxpayers, like those everywhere, have clamored for lower fees and taxes, and no doubt their elected politicians have done their best to oblige. But there is a cost to being cheap. And the new sewer notwithstanding, it is clear that insufficient monies have been spent on the maintenance of our neighborhood's infrastructure. The roads are potholed and riven with faults. The curbs are near gone, due either to burial or slow disintegration. And our sidewalks are crumbling.

The sidewalks are of special concern in Burlingame, for it is they that define our neighborhood, both physically and psychologically. Indeed, there are those who know this as "the neighborhood of pink sidewalks." They must have been gorgeous when new: "rose-colored" rather than pink, and scored in an elaborate pattern of squares and bordering rectangles. But all the same, they were poorly made. The concrete was thin and weak, and the walkways are now buckled and broken. Nowhere are there more than a few intact contiguous squares, and in long stretches the walks are little but a mosaic of tiny pieces. Many sections have become dangerous, and over the years have caused more than a few trips, scrapes and bruises. Someday, there will be a serious injury.

For as long as I have lived here, and well before, residents have been making efforts to have the problem addressed. Some have summoned municipal crews for the repair of a particularly hazardous fracture or uplift, and been rewarded with the application to the rift of a black asphalt Band-Aid. Some have taken it upon themselves to fix or replace their own section of sidewalk—with varying degrees of technical and artistic proficiency. And some have sought to organize.

The purpose of these latter efforts has been either to induce the city to recognize its responsibility to maintain its infrastructure, or to try and band together such that we might do it ourselves—taxing the neighborhood and using the proceeds to replace the sidewalks wholesale. Efforts in the first direction have failed because they have been obfuscated and outlived by the city bureaucracy; sidewalks, they say, are the city's property but the homeowners' responsibility, an Alice-In-Wonderland contention with as much realism as an expectation that homeowners keep the bulbs changed in city street lights. Efforts in the second direction have failed because we all bring slightly different competing interests to our recognition of the need for new sidewalks. Neighbors who have paid once to replace their own sidewalks want nothing to do with a duplicative effort to benefit the whole neighborhood; neighbors with ample resources or narrow lots and short sidewalks are willing to consider shared by-the-foot payment options with the city; and those like my next-door neighbor Albert, who is elderly and lives most likely on a fixed income—and whose lot is small but the shape of Florida, with hundreds of feet of frontage—can in their own interest only be opposed to any new expense. And so we are Balkanized. And being Balkanized, we can never pull together and can forever be fended off.

These issues—streets and sidewalks—dominate our exchange with the councilwoman. Will the streets be repaved when the sewer is finished? And what of the curbs? Will the sections of sidewalk demolished to access the sewer laterals be replaced in pink or white or black asphalt? And why can't the money now being used to patch the streets and sidewalks piecemeal be used instead as part of a larger effort to fix everything properly?

The councilwoman acknowledges the worthiness of all comments. Some questions she answers ("The pink sidewalks," she says, "will be maintained"). Some she deflects or defers. But in the main she makes no promises. The truth she avoids is that other than the sewer, the other things will not be fixed—seemingly cannot be fixed.

The reason, of course, is political rather than technical. It was the EPA who compelled the city to fix the sewers, and the EPA has more clout than we. We lacking clout, the city lacks will, and in the absence of will most repairs can be put off indefinitely. Unless and until they fail catastrophically, the streets will continue to deteriorate, the sidewalks to crumble.

March 7 (Friday):

It is, perhaps, appropriate that I am in the bathroom this morning when I learn that today is moving day for the men of Sewer and Water Group 78. They have finished their work on the streets near the canyon and are preparing for the next stage of the work. They begin early and while I am still ensconced and reading the paper—they begin, that is, while I am unsuspecting. Nor do I have an inkling until the house begins shaking and rumbling and a great clanking staccato sound arises from outside the door, as if a jackhammer had been unleashed in our kitchen.

"What," I yell to my wife, "is that?!!"

The excavator, she says, the steel-treaded trackhoe. And when finally I emerge to see for myself, I find in the street two parallel rows of fresh, striated gouges where the machine has passed by.

There follows an endless back and forth of backhoes, front-end loaders, trucks large and small, and all laden with matériel: pipes, sand, slabs of steel plating, orange road barriers, and more. It being Friday, a trash truck slips occasionally into the procession, and in its volume, variety, and intensity I am put in mind of an armored column hastening to battle.

March 12 (Wednesday):

From Lindbergh Field, Laurel Street runs to the east for nearly six miles, broken all the way into disconnected bits and pieces by parks, canyons, and freeways. Most of the way it runs straight, and most of the way it is paralleled a block to the north by Maple Street—except in Burlingame, where

both streets twist and turn and where, on the block I live on, Maple Street is revived from an earlier termination by branching off from Laurel, the streets in their dividing forming a Y. After its revival, Maple runs briefly to the northeast, makes the dogleg around my house, then continues on to the east.

For the last two days Ortiz's crew has been working eastward on Laurel, laying 8-inch main in a steady approach to the fork of the Y. This junction will mark the site of a new manhole, and to me it is not yet clear where they will next proceed from there: On up Laurel? Or to Maple—and hence to my house? The question seems resolved this morning when I and my neighbors rise to find the street before us planted with "No Parking" signs. And it seems absolutely confirmed by midmorning, when, after having excavated the site for the manhole, the trenching equipment begins to lay open Maple Street.

But just after lunch the digging stops. Maple, it turns out, is for now only to be opened only far enough to facilitate a temporary connection to the old sewer; once accomplished, the budding trench will be temporarily refilled. The actual plan, I learn, is to first complete a short run up Laurel to a dead-end at midblock; laterals from four houses will be connected to this stub, and this and the rest of the work on Laurel will be finished before Maple is begun in earnest.

Looking at a roadmap, or indeed, from walking the streets of Burlingame, one might easily conclude that Laurel is a street more dominant than Maple. Laurel, after all, transects the neighborhood, whereas Maple runs only halfway through. Yet neither roadmap nor casual walk would reveal the most critical of features to sewer layout: topography—for sewage flows always and only downhill. Away from the canyon, Burlingame has in my mind always seemed mostly flat. But now when I look more carefully, I discover that I live instead in a neighborhood of the most gentle peaks and valleys. The highest point—foot-high Mount Burlingame, if you will—lies on Laurel Street near the geographic center of the neighborhood and just beyond the stubbed end of the sewer's Y. Because sewer is laid uphill and this is the high point, here this branch of the sewer must stop. This is our continental divide and from here the sewage of two next-door neighbors flows in opposite directions; the spot is also the site of a three-way intersection and as such sewage flows from here in a third direction as well, all of it draining—like spokes from the hub of a wheel—outward to the perimeter of the neighborhood, there to be collected in the ever-deepening encircling main that eventually makes its way into the canyon.

At times the route is circuitous, and indeed from the innermost houses it approximates a great spiral. But sometimes it happens that what seems on the surface simple or haphazard can be found both elegant and logical when viewed more deeply.

March 13 (Thursday):

I am brushing my teeth this morning when I hear in my subconscious the sound of a metal lid pried loose and cast aside on the street outside our window, then the squeaking of a valve rapidly turned. I identify this sound consciously a moment later when the water in our bathroom stops.

Outside, at the intersection of Laurel and Maple, I find the trench that the sewer crew has just started work on filled with water and a pump furiously splashing its contents onto the pavement. The excavator has snagged a home's water line and ripped it free from the buried main; to quell the ensuing gusher water service has been shut off to the entire block—thereby explaining the noise outside our window.

It is for the purpose of avoiding such occurrences that each phase of Sewer and Water Group 78 has begun with a burst of squigglie painting. Some of the squigglies are marked by Ortiz's men and some by representatives of the relevant utilities: gas, telephone, or water. For the longest time, I was under the impression that the marks were the work of a mystery company that subcontracted to Ortiz—and to every other utility and construction company in town; a company called USA. Wherever I went, the writing on the road would read "USA: Ortiz" or "USA: Pac Bell" or "USA: Whomever," and there would be the squigglies—done, I had supposed, by USA on behalf of their client, Ortiz or Pacific Bell or Whomever. It was, I thought, an interesting company, and seemingly without competition.

But then I learned that USA is an acronym for *underground service alert*. A company intent on digging up the street paints its intentions at the site—"USA: Ortiz"—then calls an 800-central-clearinghouse number and registers its plan verbally. Utilities check the register to find out who's digging where, then dispatch a squigglie painter to mark their territory. The marks are warranted accurate to within three feet, and if they are wrong—if the blue W is farther than three feet from the physical water pipe—the company can bill the utility for the cost of repairs and associated expenses—the cost, for instance, of idling a crew and its equipment for a day.

These expenses can add up quickly. It costs Ortiz nearly a thousand dollars a day just to run its excavator and pay its operator, not to mention the cost of the dozen other men and their equipment. But it isn't always in a company's best interest to seek such compensation. Some number of mishaps are bound to occur, and it can just as easily happen (if, for instance, the squigglies get covered by dirt) that a construction company damages a line that *is* properly marked—in which case it can be the utility seeking reimbursement.

Mostly, though, forbearance is a matter of street savvy. Ortiz's men perform some repairs themselves, but most they defer to specialized crews from the utilities. Getting a timely response from such crews can be important, and for this reason good relations are imperative. It makes sense, in other words, to minimize antagonism.

Not knowing their backlog or schedule, I can't say if the response is fast or slow, but it's not until five hours later that a crew from the Water Department arrives to fix the broken water line, and not until 3 p.m. that

running water is restored. During this time, Ortiz's men busy themselves with tasks that don't involve trenching—such as potholing with a jackhammer outside my window. There is no talk of a chargeback.

* * *

In 1990 when the Burlingame sewer main collapsed and I watched as city crews executed their repair, I was struck with not only the unsavory but also the hazardous nature of the job. The men were in deep trenches and awash in sewage. "My God," I had thought, "they must have to vaccinate these guys against every disease known." I thought of dysentery and typhoid and cholera, and it seemed to me a wonder they weren't constantly sick.

A few years later I worked for a time analyzing occupational injuries and illnesses among civilians who worked for the U.S. Navy. Many of these people worked in places like shipyards and aircraft maintenance depots and were exposed to the nastiest of chemicals—solvents with invisible fumes that could rot your liver. These chemicals and the diseases they caused spooked a lot of people. But by far the most hurtful thing to most workers was injuries. No matter how unnerving the exotic dangers were, it was the day-in, day-out stuff—the fall from a scaffold, the lifting of a too-heavy object—that caused the greatest harm. For every one weird-fume disease there were 13 injuries.

Alden Tansey, who manages employee health and safety activities for San Diego's Metropolitan Wastewater Department, is familiar with such numbers and their implications. Among the Department's 800 employees are some 200 "collection workers" who clean manholes and sewer pipes—people who work in direct contact with sewage and often have health concerns related to sewage exposure. Tansey works hard to stay apprised of and to address these concerns. His office organizes several programs a year to provide collection workers with health information. Employees are encouraged to talk with their personal physicians about specific health worries, and if—in the case of hepatitis—a doctor recommends immunization, the Department will pay the cost. But routine monitoring and vaccinations are neither offered nor required. The reason, says Tansey, is that sewage is so dilute and diseases like typhoid and cholera so rare, that the risk of infection is probably outweighed by the small risks of routine vaccination. Instead, the main defenses provided against infectious disease are appropriate protective clothing and the exhortation to sewer workers that they keep their hands as clean as possible—though this is a message that doesn't take a lot of reinforcement. "You learn," says Larry Pierson, one of Sewer and Water Group 78's archeological monitors and a man who has participated in many a sewer job, "to *always* wash your hands before you eat, and never bite your fingernails."

Less yucky than sewage but more dangerous to workers are the equipment they work with and the spaces they work in. Tansey knows this and so do the men from Ortiz, virtually all of whom have stories of being injured or of having seen men injured on the job—stories of exploding fingers crushed by slipped wrenches, of men diving into pits full of sewage to save a co-worker dragged under by an entangling hose ("Just like in the movies"), and of excavators snagging overhead high-voltage lines and of the resulting crackling blue flash that engulfed the steel machine and turned the surrounding earth to glass ("The operator, I guess he was okay—he was grounded—but he was not right in the head afterwards"). These are the true hazards of their job, and Ortiz's men have been reminded of them again by the death yesterday of a construction worker in Pacific Beach who was buried by the collapse of a trench. Amid the pumping of the flood and the myriad other tasks in progress, the death is today a constant subject of conversation among the Ortiz crew—that and the reported finding by CalOSHA inspectors who examined the fatal jobsite of 13 safety violations, including an absence of shoring in the collapsed trench.

The trenches on Sewer and Water Group 78 have so far been as deep as 12½ feet, and at all depths the use and installation of proper shoring has been a fundamental safety concern. According to Don Gingrich, Ortiz's second-in-command foreman, soils can be classified for safety purposes as type A, B, or C. The least stable is C, the most is A—"Though some people say you should never classify any soil as A"—and each type, says Gingrich, "takes a different kind of shoring. Most treacherous are sandy beach soils, like those where the man was killed yesterday, and in these soils, says Gingrich, "we use what are called coffin boxes. These are solid steel trenches that you drop in the ground and slide with you as you're laying pipe. That way you're protected by steel all the time. We call them coffins, but they save us."

There are no coffin boxes in Burlingame, but still our soil has been classified as Type C. In some places it is sandy, in some clayey; in places it is "disturbed"—meaning previously trenched, and everywhere it is unpredictable. Accordingly, Ortiz is using a shoring system that allows nearly continuous support of an open trench if conditions warrant.

Called *speed shoring*, the basic unit consists of stout aluminum twin ribs held apart by paired hydraulic struts. These units can be used alone or bolted in pairs between thick sheets of plywood, in which case the resulting assemblies are most often moved and placed using the excavator as a crane—the assembly hoisted aloft by a chain and held steady by a worker on the ground who guides the shoring into place as the excavator lowers it into the trench. There, the struts are pressurized with hand pumps and the plywood forced outward against the trench walls; so placed, the units are strong enough for men to climb freely about on. The less stable the soil, the closer the shoring. But always the shoring is in constant use, with up to ten pairs engaged in an ever-revolving cycle in which the trench's steady progress is punctuated by the removal of the pair to the rear and its smooth rotation to the

front.

March 19 (Wednesday, 7 to 10 a.m.):

This is it. Today they are beginning on Maple Street, in front of our house, outside my window. For the last week they have been working on Laurel. But this morning the traffic and commotion bear a new and unmistakable intensity and nearness. I step outside for a look and almost immediately a passing equipment operator catches my eye and signals me to move our cars, parked as they always are on the street not 20 feet from our front door.

My neighbors also scurry to evacuate, and those who don't find later they must negotiate broken pavement, piles of dirt and gravel, and large pieces of equipment whose drivers seem only temporarily restrained. Across the street, the word appears not to have reached two of my neighbors. John and Rose are from Sicily and they have lived in Burlingame almost from the time of their first arrival in this country nearly 40 years ago. I cross the street to tell them they may want to move their van, but after a conference they decide they'll leave it in the driveway—they're not planning to go out. Still we talk, and as we do I mention the project's noise and distraction.

Yes, nods Rose, she's noticed. But more troublesome is the dust. "The dust," she says, "is so bad!"

Minutes after I move my cars, a huge John Deere front-end loader assumes their parking place, virtually filling the field of view out my window with black tires, plate glass, and heavy-equipment yellow. This is an impressive machine, hinged in the middle for tight turns, with 5-foot diameter tires, a driver's seat seven feet off the ground, and a bucket capacity of four tons. But the Deere is a mere product of Lilliput compared to the orange Hitachi excavator. Later, when it parks in front of my house for the night and I sit in its cab (and my wife takes my picture) then crawl all over it with a tape measure, taking notes and remembering earlier romps over the machinery that carved the streets of my childhood, I find that each of its looped steel tracks is 2½ feet wide, 14 feet from front to back, and made of 53 linked plates; from the tracks' outside edges the excavator is 10½ feet wide. The arm (which properly speaking has three parts: *boom* (upper arm), *stick* (forearm), and *bucket*) has a reach of over 33 feet. Later, a dealer tells me the model I ask about weighs 29 tons. Nor is this a particularly big one. There are excavators in excess of 90 tons and with reaches of more than 50 feet. The buckets, too, can be enormous; the one I measure is six feet from wrist to claw, but I once saw, on a bigger project with bigger equipment, an operator in the middle of a busy thoroughfare standing neck-high inside his bucket while gazing serenely at the passing traffic—his true activity betrayed only by a growing puddle on the ground beneath the great steel scoop.

Not long after the loader parks, the excavator clanks into place to begin the day's work. Tracks straddling the trenchline, it takes a position just beyond the point where last week's digging stopped. Gingerly, the operator, Mark Breshears, begins picking with his bucket at the temporary covering of soft asphalt and soon he is reopening the trench—extending the boom forward and down, then drawing the bucket back toward the body of the machine. As dirt is removed and the trench advances, the excavator backs up to expose a fresh working area. And so it progresses by moving backward.

Other machines work similarly, and quickly there forms behind the excavator a procession of like-moving equipment. Immediately to the rear of the excavator is a backhoe. Backhoes, which feature a scoop on front and bucket on back and combine in a smaller version the functions of both loader and excavator, offer tremendous versatility. Forever are they scurrying about, tails raised like scorpions, and they are used for an immense variety of tasks, including, at the moment, helping to remove the ribbon of pavement between the sawcuts that define the trenchline—a process called *stripping*.

The stripping this morning begins underneath the excavator—literally—with the removal of the remaining few feet of temporary asphalt from last week. To reach this spot, the backhoe nuzzles up behind the big machine like an animal sniffing another's rear and extends its bucket under the excavator's body. Once this last bit of soft covering has been removed, the backhoe encounters the ten-inch-thick paving that form the true substance of the street. Elsewhere on Sewer and Water Group 78 I have seen the backhoe operators break through this material—hyperextending their buckets so the steel teeth pointed down then striking repeatedly at the layered asphalt and concrete to cleave free a chunk. But today a third machine is brought in to pulverize the road and render it rubble, and it takes a position at the head of the procession and aft of the backhoe.

This new beast is a *hydrohammer*. "Why it's called that," says Don Gingrich, "I've got no idea. It's got nothing to do with water." Regardless of its name, it is unquestionably primitive, with an antique, tractor-style motor and hood on one end, a seat and controls in the middle, and at the business end a huge, upright frame like that of a forklift. This frame consists of twin, parallel siderails within which rides a massive steel weight with a blunt tip. The weight is attached to and raised by a heavy steel cable, and the unending sequence of the hammer's operation consists of a rev of the engine as the weight is lifted, a slap and rattle of the cable as tension is released and the weight falls, a crushing thud as the weight hits the pavement, and an immediate revving of the motor as a new repetition begins—overlaid on which cycle is a slower rhythm as the machine lurches backward a few inches every two or three repetitions. This is not a quiet activity.

It takes about half an hour for the hydrohammer to crush a strip of pavement extending just past my front door—a stretch, perhaps, of 60 yards. Close behind is the backhoe, whose operator scoops the rubble and transfers it to an attendant dump truck—raising, swinging, and extending the boom in a seamless motion that lifts the bucket over the sides of the truck by the merest of inches and ends in a forward

uncurling that drops the load, raises a cloud of dust, and leaves the truck rocking with the added weight.

And so the parade that has worked its way through the neighborhood is now before my house: hydrohammer, backhoe, and excavator. About the procession swarms a supporting fleet of Bobcats, dump trucks, and more backhoes, and scattered throughout, readying shoring and carrying pipe, are the footmen—infantry to the mechanized. It seems chaotic, but all is coordinated, each task following its predecessor by mere feet and minutes.

In charge of it all—foreman, general, and parade master—is Jesse Garcia. Thirty-five years old, Jesse started in construction 12 years ago after first working as a mechanic for a Cadillac dealer. He began as a laborer, then learned to operate a backhoe. Eight years ago he was hired by Ortiz and three years later he began running jobs.

Jesse is a handsome man—short and muscular, with a neatly trimmed black moustache and dark, intelligent eyes. Depending on his audience, he switches effortlessly between English and Spanish. But it his bearing that attracts attention, his bearing that distinguishes him—for the man exudes competence. If you did not know, and were asked to point out from among the many men on the street the foreman of Sewer and Water Group 78, it would be him you would choose. He walks purposively, with the stride of one used to making decisions, and he is almost constantly in motion, moving from activity to activity, assessing progress and needs—more gravel today, concrete tomorrow—and involving himself in every aspect of the job: jumping in a trench and digging here, grabbing a gas-powered "chop saw" and preparing a length of pipe there; sometimes driving a backhoe, sometimes a Bobcat; reviewing blueprints; making phone calls; planning. He, clearly, is the boss. And to him the others defer.

Lieutenant to Jesse is Don Gingrich. A long golden ponytail flows from under his hard hat and his eyes seem always to twinkle; forever is he popping sunflower seeds in his mouth. Don is 29, and like Jesse he started in a different line of work—got into "underground" almost by accident. "Nobody," he says, "*wants* to work in sewers." After high school he worked as a pool cleaner, but a few years later he found himself unemployed and contemplating an apprenticeship program for electricians. Finishing the program would have taken two years and left him earning $6 a hour, so when he was offered immediate work for a third more, he took it. "Bottom line?" he says. "We do it for the money."

Still, he takes an evident pride in his work. He especially enjoys water projects, and says of his water work, "I've never installed a leak." As with employees, the bottom line for contractors is money, and after he'd been with Ortiz for three years it was because of money that Gingrich earned a role a year and a half ago as a sort of alternate foreman. "My first job they let me run was supposed to be a 2-month job, and I finished it a week and a half ahead of schedule. So I guess they made some money and figured I could do it."

Later in the course of Sewer and Water Group 78, Jesse would be moved to a second Ortiz crew working to install a portion of the $65 million in piping for the new North City Water Reclamation Plant, and Don would be put in charge in Burlingame. The transition, to all outward appearances, would be seamless.

* * *

The Tale of the Palm (Prologue):

In the midst of all else, there arrives this morning the gardener of my neighbor directly across the street. The gardener is a determined man, and despite the heaps of earth, blocked roads, and pulsing machinery, he and his crew pick their way in for their weekly rendezvous with the yard opposite my front door. For today is gardening day and they will not be dissuaded.

My neighbor's gardener is a firm adherent of the attack school of gardening. The moment he and his men come to a stop, they leap from their trucks and grab a power tool, commando-style—mower or blower, hedger or edger. They yank the starter cords in unison, each man revving his engine determinedly, and swarm forth. The sewer men are fierce competitors, but still the gardeners make themselves heard. The edger is the first to finish, and as a little freebie he engages in a bit of machete work before preparing to leave.

This style of gardening seems an unavoidable consequence of a competitive, low-price, high-volume business, and my wife and I have had our own experiences with the oxymoron of "affordable gardeners." The most recent came a few years ago when we had been driven to despair by a lack of time and a yardful of overly-healthy plants. We hired our own leaflet-distributing gardener to trim and haul away an excess of growth from the trees and shrubs around our house, and this he and a helper did in just a few hours—with weed-whackers and chain saws, and leaving all our plants one of two uniform heights: short or tall. Later, the man's limited English left him immune to my wife's telephone-delivered diatribe.

When Linda, my neighbor, began some time ago to speak of hiring a gardener, I related to her our experiences. She listened, but decided nonetheless that her own shortage of time left her little practical alternative. And so she hired Federico—resolving at the same time to insist that he do as she wanted.

Their first clash came after his first visit. Previously, Linda had shown him around and told him what she wanted: mow and edge the front lawn, clear and weed the flower beds, trim the Bird of Paradise, etc., etc. That night she came home excitedly, expecting to find the work finished and her yard pristine. But she was greeted instead with disappointment: the Bird of Paradise and most of the flower beds were untouched, and in the one bed that had been tended at least part of her landscaping had gone the way of the weeds. I was not surprised by this. Nor was I surprised upon learning that she had called the gardener, made known her displeasure, and insisted that he perform as expected.

"Would you like me not to come

back?" asked Federico.

"No," Linda had said. "I want you to come back and do the work we discussed.

"Oh, we will," he said. "It's just that when there's a lot to do, we do it a little bit at a time."

This is not exactly what she had in mind, but given the price she resigned herself to the necessity of waiting. She did, however, insist that Federico replace the plant his men had weeded, to which he agreed.

But Federico had no idea what the plant was—and neither did Linda. Plants, like everything else, go in and out of fashion, and as she started trekking from nursery to nursery it soon began to appear that the plant she sought not only dated to the 1920s and the home's original owner but had also gone out of vogue. No one had it or knew what it was. Not until she described it to an older nurseryman, who led her to an out-of-print text on Hawaiian exotics, did she discover the plant's identity, the reason for its fall from favor, and the explanation for a curious incident that occurred not long after she had moved in and before the gardener's visit.

"Could you come over," she had asked me one day, "and see if you smell what I smell?"

I went, and noted as she had an unpleasant odor that seemed to emanate from a foundation vent near one corner of her living room. It smelled of dead animals—skunks or opossums, perhaps—but neither of us could locate its source. Later, she enticed yet another neighbor to go scouting under her house, and when he too found nothing she then began to contemplate tearing open a wall to search for entombed rats. But then came her gardener, and when he came, the smell went.

According to the out-of-print tome, the gardener had removed a voodoo lily, *Sauromatum guttatum*. Its most prominent feature, said the text, was a purplish phallic-shaped flower that gave off a smell like carrion. This explained both the odor suffusing Linda's living room, and the plant's disappearance from the marketplace. Who would want one? The plant was irreplaceable, and despite her gardener's willingness to make good on his error, Linda was forced to drop her quest for his rectitude. Score one to the gardener.

This episode set the tenor for their subsequent relationship and Linda and Federico have since had numerous repeat encounters—each trying to shape the other to his or her habits. The most recent occurred just weeks ago and involved not only the gardener but also indirectly the sewer project—and it helped set the stage for an even greater conflagration in the days to come.

When Linda first moved in, the trees within her parkways consisted of a pair of stunted King palms that had shown no signs of growth in the ten years I had been watching them. There are in Burlingame many kinds of palms. But the official, city-sanctified street tree is the Queen palm, *Arecastrum romanzoffianum*, with its great, wispy, feather-like fronds, and deciding she wanted to replace her nonconforming nonperformers, Linda obtained the necessary permits to take out and replace her old trees (which, like sidewalks, are the city's property but a homeowner's responsibility). She then found a nonprofit organization that would provide new trees at a discount and plunked down the requisite $300 for a pair of Queens. These were sizable plants, a foot in diameter at the base and five or six feet tall before the fronds began to diverge.

On the first of this month, volunteers from the tree-planting outfit delivered the new trees. They and a handful of neighbors (myself included) helped Linda dig out the old trees, enlarge the holes, work in soil amenders, lay down a bed of sand, and wrestle in the new occupants. Once in place, Linda put in deep-watering pipes, tamped the soil, and dressed her new Queens with a surrounding layer of peat moss. They made a fine addition to the street, and I enjoyed looking at them from my office window.

It was just days later that she returned from work one evening to find some shards of white plastic sprinkler pipe on her lawn and clumps of uprooted turf in the parkway near her new palms. She found this both irritating and perplexing.

"Do you know anything about this?" she asked me.

"I believe," I said, "I saw your gardener's truck here and two men who did some quick digging."

"My gardener? But he comes on Wednesday. Today is Thursday."

"I believe," I repeated, "I saw your gardener."

"But why would he dig up my lawn?"

"I don't know," I said. "I also saw some of the sewer guys digging in the parkways down the street, looking for pipes. But"—repeating myself for the third time—"I believe it was your gardener."

Clearly, she was puzzled by my observation. But the next morning she confirmed what I had seen. "It was the gardener," she said. "I asked him if he dug up my lawn, and he said `Yes.'

"`Why did you do that?' I asked him. `Because,' he said, `your sprinkler was broken. The man who planted your trees must have broken it.'

"`Federico,' I said, `I planted those trees myself. The sprinkler wasn't broken. I think your crew must have broken it when they came to mow the lawn. And I want you to come out today and put the grass back.'

"`Do you want me to replace it?' he said.

"`I don't care what you do,' I said. But I want you to fix it like it was. And let's get one more thing straight. When you break something, tell me. And then we'll decide together how we're going to fix it. Is that understood?'"

Yes, he said, he understood. But it wasn't long afterwards that Linda decided it was more trouble than it was worth to reform Federico as a gardener and she fired him.

March 19 (Wednesday, 10 a.m. to 12 noon):

At 10 a.m. they lay the first length of pipe—a 20-foot section of 8-inch main. Though awkward, the long PVC tube can be carried by one man, who balances it on his shoulder like a giant turquoise bazooka then threads it into the trench through the shoring struts to two companions waiting below. He follows

this by tossing down a tub of *duck butter* brand pipe lubricant—a petroleum jelly-like substance "For the assembly of push-on pipe joints with rubber or synthetic rubber type gaskets." In the tub is a heavy rubber glove, and the down-stream man in the trench proceeds to don the glove, grab a great gob of lubricant, and slather it on the male end of the newly introduced length of pipe. Built into the exposed female end of the pipe laid last week is a black, neoprene O-ring, and this too is heavily lubricated. The pieces are aligned and, when all is ready, the upstream man drives a heavy metal stake into the ground across the mouth of the new pipe and pushes on it to lever the new piece into the old; properly seated, the male end will slip four inches into the receiving female sleeve and the neoprene ring will form a watertight seal.

Less than 20 minutes after the pipe segment is lowered into the trench, the men begin to cover it. The pipe rests on a bed of gravel—cushion against shifting earth—and the burial's beginning is marked by the dumping of yet more gravel. The trench here is more than 12 feet deep, and because the operator of the Deere can't see its bottom, he is aided by hand signals relayed from inside the trench to the man topside and thence to the cab of the front-loader.

When the gravel layer over the pipe is a foot thick, the Deere then begins scooping piled dirt from the street and returning it to the trench. In this, the loader is assisted by yet another addition to the train of men and equipment: a backhoe whose bucket has been replaced with a device consisting of three massive, steel-toothed wheels mounted in parallel. Known properly as a compaction wheel, the device is also called a sheep's foot, presumably because its fist-sized teeth are oval in cross-section and have a slightly concave flat end—a shape supposedly similar to that of a sheep's hooves. To use the sheep's foot, the backhoe's operator straddles the end of the trench, lowers his horizontal stabilizers (the hydraulic "outriggers" that extend outward from the vehicle's side) and scoop for support, drops the wheel into the trench, and—like a baker with a rolling pin—begins vigorously to roll the device back and forth over the loose dirt therein. So great is the downward pressure exerted by the wheel that at times all four of the backhoe's tires are lifted off the ground, and later, when she sees the risen machine, my wife will be moved to exclaim, "It's levitating!" And so the trench progresses, a continuity of excavation, pipe laying, and refilling.

* * *

The soil of Burlingame, like that atop most of San Diego's downtown mesas, belongs geologically to the Lindavista Formation. Practically speaking, this is a jumble of sediments tossed, turned, and laid down by ancient surf, streams, and rivers. As the trench of Sewer and Water Group 78 has wound its way through the neighborhood, I have often been impressed with the diversity of the deposits. There have been seams of clay, red or chocolaty, so rich and pure you could set up a pottery factory; patches of sandy dirt so blood-red and laden with iron that the sight of it took me unexpectedly back to the rusted hills and roads of Oklahoma, where my father grew up and we visited as kids and the ground was strewn with rosestones—petaled sandstone rocks the size, shape, and hue of a florist's rose; but mostly the excavation has been through a more heterogeneous mixture that George Kennedy calls conglomerate: mixed dirt, clay, and sand laced with cobbles.

One notable feature of the conglomerate is that much of it has begun fusing together, its particles bound tightly with water-borne natural cements—among them the minerals that form scale on a bathroom faucet. So hard is the conglomerate in places that even for a machine as powerful as the excavator, it slows the rate of digging. Such is the case as the trench begins to penetrate Maple Street, and where Breshears now says "I have to work for every bucket."

Working for a bucket mostly means having to use a ripper. This is a 2-foot long steel shank, 2 inches wide by 4 inches deep, that slips through a shoe on the backside of the excavator bucket and whose business end is covered with a wedge-shaped "tooth" of tempered steel. To use the ripper, Breshears curls the bucket to expose the tooth, then drags the tooth along the bottom of the trench like a plow. Depending on the hardness of the conglomerate, he may have to do this repeatedly before he has loosened enough material to fill the bucket.

The tooth is affixed to the ripper by a cigar-sized metal pin, and it is about the time the sheep's foot is covering the first segment of pipe at the other end of the trench that the pin comes free and the tooth falls from the ripper. The tooth is quickly recovered, but the whereabouts of the pin is a mystery. Several workmen and the archeologist begin scouring the bottom of the trench and the accumulated piles of dirt on the street, but after a few minutes it's apparent that the pin is lost and the search is abandoned. Perhaps one day, tens, or hundreds, or thousands of years from now, a future colleague of the archeologist will find the pin and speculate on its origin, possibly then sending it to a museum for cataloging and display—an artifact from the 20th century. A time capsule.

In the meantime, though, something must be done. There are no spare pins onsite and it falls to Jesse to decide what to do—call for a replacement (and wait), use the ripper without its protective cover (which would quickly destroy it), or improvise. While Jesse ponders, Breshears takes the opportunity to grease the bucket of the idling excavator. Routine lubrication is a part of every operator's job, and several times a day Breshears and the other operators can be seen attaching a grease gun to their charges' nipples and pumping full their joints and bearings.

As Breshears finishes, Jesse appears with a two-foot length of steel rebar—his decision made. He inserts the rebar in one end of the hole through the reunited tooth and ripper and begins driving it home with a small hand sledge and full-force, two-handed body swings—a street smithy swinging for the fences. Over the course of the morning I

have been lured by the sewer project from my manuscripts and not-quiet office and out into the street, seduced into spending the day gazing into the trench and watching the thrum of men and machines. ("It's a guy thing," says my wife—all that power and sweat, the camaraderie. "You can't resist it." But it's a writer thing too; I can stand around and watch—do nothing—and still claim I'm working. Because, Who knows? maybe someday I'll write about it.) And so complete has been this seduction, so thoroughly have I been mesmerized, that as I watch Jesse swing his hammer it takes me a moment before I realize that I am standing in a direct line with the rebar he is pounding on and that I should move, lest the rebar become a flying projectile and I an unhappy pincushion.

When the rebar is through the hole, Jesse bends its two ends to right angles with the hammer. He then calls for a hacksaw, but none is quickly forthcoming and he instead leaves a one-foot tail dangling from one side of the rebar-now-temporary-pin. The whole repair takes less than 10 minutes, and the moment it's done the excavator is back in action. It's efficient, but decidedly makeshift, and within 20 minutes the rebar tail has broken off; within an hour the whole assembly comes apart again. Eventually, Jesse will have to call for the proper part.

* * *

The cobbles, says George Kennedy, are the defining feature of the conglomerate. No cobbles, no conglomerate. They're the fruit and nuts in the Jell-O that make it a salad.

Cobbles have long fascinated San Diegans. When on September 28, 1542, Juan Cabrillo became the first European to set foot in California, he most likely stepped ashore on a cobble. Cabrillo landed on a small bayside Point Loma spit that was given the Spanish name of *La Punta de los Guijarros*—literally, "The Point of Small Rounded Stones," though in a more eloquent rendering the place came for a time to be known as "Cobblestone Point." Tradition has it that many of the point's cobbles were used eventually to pave the streets of Boston, having been carried there as ballast aboard home-bound Yankee sailing ships, and that practice engendered the name by which we know the spot today: Ballast Point. Later, cobbles became a favorite indigenous building material and were widely incorporated into local Craftsman-era retaining walls, porches, pillars, foundations, and fireplaces. On Adams Avenue west of Kensington there stands today an entire house made of cobbles.

More so than in any other place so far in Burlingame, the earth below Maple Street is rich with cobbles, every scoop of the excavator now yielding dozens of football-sized rocks. It is not surprising, therefore, when shortly after the rebar repair a cobble gets stuck between two of the bucket's front teeth. Trying to knock it loose, Breshears first taps the bucket gently against the pavement in such a way as to make the wedged cobble the point of contact. When that doesn't work, he then taps the cobble against another, larger stone lying on the pavement so as to further concentrate the force. But that doesn't work either, and finally George Kennedy, who is standing nearby, watching, smashes the cobble with a hand sledge. Chips fly, fractures radiate, and out it falls. The excavator's teeth are clean.

Geology, like all sciences, depends on the precise use of language for accurate communication. Also like other sciences, it has partly acquired its lexicon by appropriating ordinary words and giving them technical meanings. A cobble, then, isn't just anything you'd pick up at Ballast Point; rather, it is a rounded fragment of rock between 2.5 and 10 inches in diameter. (A rock of this sort bigger than 10 inches is a boulder, and, according to *Geology Underfoot in Southern California*, by Robert Sharp and Allen Glazner, a version between .17 and 2.5 inches is a pebble. Rocks themselves are, "Any consolidated aggregation of minerals or natural glasses.")

A broken cobble, with its flat surfaces and angular edges, is a cobble no more. But Kennedy, the professional, shows no remorse. Rather, he picks up a shard and examines it briefly. The rock is hard and dense. Stained a dull ocher on the outside, it is on the inside a beautiful pale lavender, flecked with tiny white, clear, and black crystals. "Rhyolite," he says. The rock came from a volcano. And then he tells me the story of the cobbles. Or rather, he outlines it and then tells me where to go for the details.

Perhaps few San Diegans have had as deep or long-standing a fascination with cobbles as Pat Abbott. A colleague of Kennedy's at San Diego State, Abbott has spent a good portion of his professional career piecing together clues to answer the question: Where did San Diego's cobbles come from and how did they get here?

Of particular interest to Abbott are the rhyolitic cobbles like the one broken by Kennedy. At varying depths, these cobbles are spread over a giant triangle stretching from the western end of Highway 94 to Rancho Santa Fe to the San Vicente Reservoir, north of Lakeside. The shape of this area corresponds to that of an alluvial fan, and in fact it was an ancient river—the Ballena—that laid the rocks in this triangle. Beginning 57 million years ago, the Ballena began carrying silt and volcanic rocks from farther inland during great seasonal floods—tumbling and rounding the rocks on their way, and at the end of the journey dropping them at the river's mouth. It was, says Abbott, a big river, and he likens it to the Rio Colorado and similar rivers in today's Argentina that drain the Andes and carry their sediment to the Atlantic. When the Ballena stopped flowing, some 40 million years ago, the rocks began a career of washing back and forth, becoming covered and uncovered and ever rounder as the ocean level rose and fell and the seashore moved in and out.

Abbott has traced the origin of the rocks to the Late Jurassic Period in northern Sonora. Using laboratory methods and the gleanings of many a field expedition, he has identified an outcropping of bedrock eight miles west of the Mexican town of El Plomo that he says is the remnant of "the mother mountain." Rhyolite specimens from here and the Nelson & Sloan quarry

north of Lakeside match exactly. The mother mountain was one of a string of ancient volcanos that dotted the continent's edge from Mexico to Canada, and 155 million years ago the volcano erupted, releasing rhyolitic lava —probably explosively.

For 75 million years the lava lay on the ground and weathered, breaking into pieces. Then, says Abbott, the land around El Plomo began to rise. Then as now the western edge of the continent was an area of great geologic activity. This is where two of the earth's great floating slabs of crust meet and where the North American tectonic plate rides up and over its western neighbor—and where the edge of that neighbor is driven slowly back into the earth's interior, its substance to melt and perhaps one day reemerge as molten lava (precisely as happened on May 18, 1980, when magma from the subducting Juan de Fuca plate found a path to the surface and erupted at Mount St. Helens). Eighty million years ago the angle of override between the plates changed and the edge of the North American plate rose, the mother mountain and her companions were uplifted, and the Ballena began to flow, carrying sediment from the mountains to the sea. This, notes Abbott, was before the Gulf of California had opened and when Southern and Baja California were farther south —and so the river from Sonora flowed west to the area that eventually became San Diego.

Abbott tells me this story with breathless enthusiasm. The earth he describes is dynamic, with colliding masses and shape-shifting terrain; rocks have many lives and time is a concept with little relation to a watch or calendar. Bringing his account to the present, he tells me the last time the cobbles were affected by a change in the ocean level was a million years ago—plus or minus a few hundred thousand years. This is how long they have lain undisturbed in the ground before they were dug up this morning by the excavator.

* * *

Some months ago a nearby house in Burlingame changed hands. For decades its previous owner had chosen not to live in the house, and effectively the house —a Craftsman bungalow—was unoccupied. During this time it fell into disrepair, its paint flaking, roof leaking, foundation crumbling, and plaster falling from the lathwork. The home's problems are such that nothing can be tackled directly, for to fix one thing requires first fixing another, and that another.

The home's new owners are brave ("Though sometimes," he says, "I wonder what I've got myself into"). They are also energetic and resourceful. And so it is that as the excavator begins disgorging its troves of cobbles, Bruce appears with a wheelbarrow, followed shortly thereafter by his wife, Renee, in the couple's old VW van. Together, they begin collecting cobbles: the two of them climbing over the moguls of earth to pick out the rocks they want; they lugging their selections to the wheelbarrow; he wheeling the load to the van; she driving back to their home; there in the front yard a mound beginning to grow. They will use the stones to build a fireplace. The house has one now, but it's in such bad shape, says Bruce, that "It makes more sense to tear it down and replace it than to repair it."

They wear only boots, gloves, and swim suits as they work, but even so they are soon bathed in perspiration; it is 80 degrees and still the temperature is rising. Nor are they alone in this. In the excavator, Breshears is sweating visibly; periodically, he wipes his forehead on his sleeve and takes great draughts of water from a jug on the floor. The excavator's cab is like a hothouse; it has no air conditioning, is glass-enclosed on three sides, and has a glass-paneled roof —this now a standard feature to permit the viewing of overhead power lines.

March 19 (Wednesday, 12 noon to 12:30 p.m.):

At noon the street falls silent. Most of the workers gather on the sidewalk under a shade tree where they've been eating for the last few days; they set down their coolers and water jugs, but most do nothing at first except to sit or lie motionless—the first time they've rested all day. Two of the men find a new place—a grassy patch under some trees in my front lawn. When first we catch sight of each other they make quickly to rise—a gesture at once polite, deferential, and apprehensive, as if I would think they were taking liberties —but I wave them down and they too lie back then to collect themselves.

While the men rest, Bruce and Renee continue collecting cobbles. But now they begin loading the rocks into the front of a backhoe, for Jesse has had the machine parked next to a pile of leavings from the excavator and after lunch an operator will carry the load to their yard—an enormous savings in work for my neighbors and for which they are no doubt greatly appreciative.

March 19 (Wednesday, 12:30 p.m. to 2 p.m.):

Exactly at 12:30 the work resumes. The machines restart, the noise returns, the men pick up where they left off. The transition is seamless and immediate, but soon the inevitable delays and disruptions begin. It isn't long, for instance, before the excavator hits a large cast-iron pipe. The pipe's identity is a mystery for it has not been marked with squigglies, and to further confuse things it first gushes liquid then emits a strong smell of gas.

A ruptured gas line is not a good thing. Mark Breshears tells of a photograph he once saw of the remains of a bulldozer that had hit a buried gas main with its rippers. After breaking the pipe open, the dozer had somehow ignited the pressurized flow and was then caught in the ensuing inferno, pinned at the mouth of a gargantuan blowtorch. All that remained, says an awed Breshears, was a pile of blackened char. (Nor are sewers devoid of such risk. In April 1992 a sewer main in downtown Guadalajara blew up, hurtling trees and cars through the air, blasting chasms 15 feet deep in the road, flattening 26 city blocks, and killing over 200 people—the result of gasoline that had leaked from a buried Pemex pipeline, infiltrated its way into the sewer, volatilized, and ignited. Tijuana

has suffered similar, though less dramatic explosions. And there exists at least a possibility of such an event in San Diego, where two years ago slicks of aviation fuel were found in sewer mains not far from the Navy's Point Loma fuel depot, and where, just blocks from my home, a gasoline line is buried under 28th Street—this just marked with its own set of squigglies in preparation for some future excavation. "Ten inch high-pressure fuel," say the marks.)

No, you don't want these things to go off. And at the first whiff of gas, Don Gingrich, who is the first to examine the pipe, calls out loudly to everyone nearby: "No smoking!"

Momentarily he is puzzled by the pipe. What is it? Nor does it help when I—watching from above and now acting as kibitzer—mention the nearby gasoline line. But soon he has made an identification: the pipe is an abandoned natural gas line. It contains some residual gas, which explains the smell, and the liquid proves to be water. All abandoned pipes, says Gingrich, eventually leak and fill with groundwater. Despite the pipe's abandonment, however, he decides to apply a patch, wrapping a rubber sleeve around the damaged pipe and holding this in place with a pair of screw-tightened stainless steel straps—an adaptation of what's called a Fernco coupling. This is a decidedly temporary repair, but it's an expediency that will stop the further flow of water into the trench.

Some months ago *National Geographic* ran an article on the underground infrastructure of New York City. Included was an elaborate illustration showing the myriad systems that help keep the city alive: subways and lines for power, water, steam, sewer, telephone, and on and on. It was all very complex and impressive, but from watching the progress of Sewer and Water Group 78 I have come to realize that the picture was nowhere near as complicated as the reality. It ignored what are essentially multiple ghost images for each of the systems shown; that is, the generation upon generation of abandoned gas lines, sewer lines, water lines, and more. Most of these systems are simply left in the ground when they are retired, and their proliferation greatly complicates the task of each new installation.

And so it is that shortly after the excavator hits the abandoned gas main it then hits the water line to a house across the street, though fortunately the pipe is only kinked and not broken. This line had been properly marked, but the problem was that about a foot before the line the workers had found another water line which they took to be the one referred to by the blue squigglie. After finding the first line they weren't expecting a second, although it turns out the second is active and the first abandoned.

There is, I have discovered, an entire abandoned water system under the streets of Burlingame. Moreover, and this I absorb only slowly and with a mixture of disbelief and astonishment, these earlier lines were made of lead. Indeed, I would scarcely have thought it true had I not seen and touched for myself the pipes' soft whitish metal. Lead pipes, I had thought, went out with the Romans. Or at least before the turn of the century, by which time the effects of lead toxicity and chronic exposure were well known: fatigue, irritability, anemia, brain, kidney, and liver disease, mental retardation, and, in extreme cases, death, to all of which children are the most vulnerable. It's bad enough that we put this stuff in the paint. But the water too? When did this start? When did it end?

According to Kurt Kidman, a spokesman for the city, San Diego began laying water pipes in the 1890s. The first mains (the big central pipes down the middle of the street) were cast iron. At least one such pipe from 1890 is still in use downtown under A Street, and overall there are some 250 miles of cast-iron mains in use throughout the city.

After World War II, the city began switching to water mains made of asbestos-reinforced concrete, called ACP. Asbestos doesn't sound like a great improvement over lead, but Kidman assures me "It's safe to drink asbestos" (a statement confirmed by epidemiologic studies) and that it's used in water systems throughout the country. In fact, the only hazard posed by asbestos pipes would be if they were sawn into or hauled out and crumbled, thereby releasing breathable dust. Beginning in the 1980s, the city began using PVC for its water mains; this is the material Sewer and Water Group 78 will use later in the job when they install new water lines east of Burlingame.

In a water system, the connection from main to house is called a service line. According to Kidman, the city's preferred material for services lines has always been copper. Throughout the city there are copper service lines connecting homes and buildings to all three generations of main: cast iron, ACP, and plastic. But early on, says Kidman, there were times when copper was scarce and expensive and the city chose instead to use lead for its service lines. One such period was the early '20s.

Along with its sewer, Burlingame's first permanent water pipes were laid in 1924. They consisted of 4-inch cast-iron mains with lead service lines. This system served the neighborhood until 1959, when it was superseded by the current ACP and copper. For 35 years, then, the neighborhood's water was delivered through lead. It was about this same time, says Kidman, that the city began routinely replacing its lead service lines with copper anytime streets were opened and pipes exposed. Eventually most of the lines were replaced in this manner, and in anticipation of the strict limits on lead levels imposed in 1991 by the Safe Drinking Water Act, the city in 1988 performed a survey to find all its remaining lead water services. Nine hundred were located, and by 1992 all had been replaced. Today there are no municipal lead water pipes in San Diego.

Kidman is upbeat and cheerful as he tells me all this. It's a great success story and no doubt it beats talking about the city's other problems with its infrastructure. (It will be Kidman, for instance, who fields inquiries in the wake of a front page story that will run in tomorrow's *Union-Tribune*. Headlined "City Water System Crumbling," the story will detail how years of neglect

have resulted in rusting water towers, covered reservoirs on the verge of collapse, aging pumps and treatment plants, and corroded and leaking pipes—foremost among them those remaining cast-iron mains. So bad has the situation become that the state has stepped in and imposed a mandated schedule of repairs (shades of the EPA) and the total bill to fix things is estimated at close to a billion dollars. "Ah," he might say, "but haven't we had cheap water these many years, and haven't we liked that?") And just so that I might better appreciate the magnitude of San Diego's accomplishment with respect to its lead pipes, Kidman lets slip a counterexample. Boston, he says, was once plumbed entirely in lead.

And indeed, though Boston has also moved to purge itself, the problem there is huge and the going slow. The city still supplies consumers with such pamphlets as "Lead in Drinking Water: Facts About Your Water System," the entire water supply is chemically treated to reduce the rate at which it leaches lead, and more than a quarter of the city's homes and buildings are thought to have lead water pipes inside their walls. This nearly two thousand years after the cream of Roman society—who not only enjoyed lead plumbing but also such luxuries as lead-based cosmetics, lead-sweetened wine, and lead tableware—began poisoning themselves into extinction.

March 19 (Wednesday, 2 to 5 p.m.):

At midafternoon the digging stops. They've gone as far as they're going today—not as far as the stripping extended this morning, and not quite to the southern end of our property line. They didn't reach our house.

Kennedy and Baker leave as soon as the excavating stops, there being no further chance today of a scientific find, paleontologic or otherwise. Breshears moves the excavator temporarily out of the way and surrounds it with orange safety standards. And the remainder of the day is spent laying and covering pipe and then cleaning up.

Already intense, the pace of the work becomes even more so as the cleanup commences. Once the trench is refilled and compacted, the backhoes begin a flurry of gathering and piling excess dirt for removal. One pairs off with the front-loader and the two begin working in tandem, the loader with its bigger scoop driving into one side of a pile and coming to a stop, while the backhoe from the opposite direction plunges head-first toward the loader, scooping a swath of dirt as it goes then feeding its gatherings to the Deere, the machines kissing at the scoops as the load is transferred. When the piles are gone, the Deere then hyperextends its bucket downward and begins scraping dirt from the pavement, its blade pressed so tightly to the road that arcs of smoke and dust trail behind as the operator works the vehicle back and forth.

Swirls of dust fill the air as the Deere and the other machines work. I can see it, feel it, taste it. I wash my hands and face, drink a glass of water, but still I feel cloaked in dust. Inside and out, our porch, windows, furniture are coated, and everywhere is dust. What misery, I think, must have been the Dust Bowl, when the great windstorms blew and the air filled with dust and people cleaned their houses with shovels. My father, born in Oklahoma in 1930, was too young to remember those unholy Depression-era storms, when the prairie had been broken and there was drought and the red earth dried up and blew all the way to Washington, to Congress. But in 1955, in the last summer he lived at home, there was a lesser storm, and after the dust was raised it rained, and what came down, says my father, was mud. Red mud, as if the sky were weeping bloody tears for the damage done to the land. So it could be worse. And besides, there is nothing to do now but bear it, for tomorrow there will be more.

Equipment is parked or put away for the night as it is no longer needed. First to be stored is the shoring, six pairs of which are plopped in a row in front of our house. First to be parked is the excavator, which Breshears moves from the middle of the street and parks next to the shoring, its tracks touching one end of the row and its arm and bucket stretched up and over to the other, like a mother cradling her young.

Toward the end, Ortiz's street sweeper begins working, its brush wheels turning and raising more dust. Workers, too, begin pushing brooms, and the closing minutes are marked by a growing body of sweepers, as each man who finishes his earlier work grabs a broom. Everyone wants to go home. The last tasks are the covering with temporary asphalt of the dirt-filled strip down the middle of the street—a backhoe driver packing the mix in place by running his machine rapidly back and forth over the covered strip—and the placing of steel plates over the few remaining feet of open trench. Then, finally, the road barricades and detour signs are removed.

March 19 (Wednesday, 5 p.m.):

Quiet is on the street. The diesel fumes have cleared. The workers have gone home, tired and spent. I too am hot and grimy and in need of a shower. All I did was watch, but still I feel as though I've spent the day in the desert.

Jesse is the last to leave. "See you tomorrow," he says. Tomorrow it will begin again. Tomorrow, when the paper will say the high today at Lindbergh Field was 86 degrees and set a record for this date—the last day of winter.

March 20 (Thursday, 7:30 a.m. to 12 noon):

The morning is still and quiet, and the workers arrive slowly. Ten minutes before starting time, Breshears turns on the excavator and begins warming it up. He and a co-worker greet me in front of my house and briefly we chat. Both are smoking. They like Burlingame—"The people here seem friendly"—and I in turn tell them of my surprise at discovering the lead piping. The pipes of course are no news to them, and they dismiss with a shrug the hazards they once posed. Their health concerns are far more immediate—not getting buried or maimed—and after all, says Breshears, "Life causes cancer, right?" Then, sheepishly acknowledging his cigarette, he tells me a joke: "You know the major cause of cancer among laboratory rats is scientists."

Breshears' companion is Greg Weber. In contrast to Breshears, who rarely strays from the excavator, Weber performs an endless variety of tasks. "We don't really have job titles here," he tells me. "But if you have to call me something, call me a laborer- pipe-layer-operator. I'm not really an operator, but we all do a little of everything. If you don't, you don't stay on the job long. And besides, the more you do, the more you're worth."

Weber started his working life as a glass contractor. For nine years he had his own business. And though he doesn't say how he switched to underground, he does seem a man who knows himself. "I've got to be outdoors," he says. "I've got the grades to go to college, but I can't work in an office."

People follow different paths and arrive at different conclusions, and days later when I talk to Mike Corio, he tells me a story that is many things Weber's is not. Corio drives a backhoe and the Deere on Sewer and Water Group 78. But there's no doubt he could drive almost anything else; he has been an equipment operator for more than 20 years, and unlike Weber, this was his first choice of occupations. But it's a choice he now seems to lament:

"I shoulda went to college," he says. "My old man, he wanted me to go to college—woulda paid my way. He wanted me to be an orthodontist, or something—whatever I wanted. But I wanted that paycheck on Friday, couldn't wait. I wanted to hang out, be one of the guys. I wanted the glory; being an operator—you know. Now I'm paying the price."

Part of that price is job insecurity. Corio has been with Ortiz less than two months, having come from a firm that just went broke. Erratic wages are a problem too; an operator, says Corio, can make up to $60,000 a year if he works year-round and receives the union wages mandated on federally-funded jobs—"But you never do." And there is the toll on a person's body.

"In this business," says Corio, "you're either breaking your back or you're sitting. It's one of the two." Mostly he sits, and the result is a paunch he now must fight continually, rising each day at 4:15 for an hour-and-a-half of exercise that includes weight-lifting and an abdominal program. It's a schedule forced on no orthodontist. And despite the effort, says Corio, patting his belly with both hands, "you can't tell."

The work begins this morning with the undoing of the last things done last night. Breshears maneuvers the excavator to the front of the trench and begins lifting away the steel plates that cover the opening below. He is aided in this by a laborer who threads a chain through holes in the center of each plate and then around a hook on the back of the excavator bucket, the chain draped as if over the back of someone's knuckles. Slowly, the bucket lifts and the plates rise and Breshears sets them aside; later, they'll be picked up by the Deere and stacked out of the way. These are big pieces of steel—the biggest is 8 feet by 15 feet and over an inch thick; two and a half tons—and to see them dangling and spinning slowly at the end of a chain is to know trepidation. As with most things, there's a right and a wrong way to lift the plates and doing it wrong can have serious repercussions; chains can come loose or get pinched and cut by bucket blades and the plates can go crashing. Gingrich has seen this happen. So too perhaps has the author of a red-lettered warning tag I later see affixed to a thick stack of plates delivered *en masse*:

> WARNING: NOT APPROVED FOR OVERHEAD LIFTING. STAND CLEAR OF PLATES. DO NOT PUT ANY PART OF BODY UNDER OR NEAR PLATES.

While Breshears uncovers the trench, Weber makes ready the shoring, inspecting and cleaning each unit with a brush. As with countless other tasks on the job (the mens' constant sweeping of dirt from the lip of the trench, for instance—an activity meant both to keep the workspace clear and to minimize the risk of falling debris), the cleaning of the shoring is motivated equally by concerns for safety and efficiency. "At the beginning of the day," says Weber, "you want them working as good as possible. Rocks and dirt and stuff gets in the hinges, and at the end of the day you're fighting with them." So why make a hard job harder?

Once the plates are out of the way, the excavator begins digging, a backhoe snugs up behind, and yesterday's parade reassembles. By 8:15 the first section of shoring is in place.

As work's tempo increases, neighbors begin emerging among the rising piles of dirt. Some come for cobbles. A neighbor begins hauling stones to his front yard one by one; Bruce and Renee arrive with wheelbarrow and van; and a woman from outside the neighborhood begins filling the trunk of a car so new it lacks license plates.

From across the street, Linda steps out. Her interest, though, is not in rocks; rather, she looks for Jesse and repeats to him a message she has already delivered by phone to the Ortiz front office. The two palm trees in her parkway, she tells him, are new, planted just weeks ago. She believes her sewer line may be directly underneath one of the trees, and if so, what does he intend to do about it? And in any case, will he please be careful?

Yes, Jesse assures her, they'll be careful. And even if the line runs under the tree, they can trench or tunnel beneath it. There'll be no problem.

(Unlike a modern subdivision, in which the utilities are installed before the sidewalks and whose locations are then stamped in concrete (*S* for sewer), our pink sidewalks preceded the utilities and no such markings were used. The path of each home's sewer from foundation to street is therefore a mystery, and one recent result of this has been an intense neighborly interest in the subject—many a sociable conversation over the last few days beginning with, "Where's your sewer line? Do you know where your sewer is?")

Other neighbors, and the group that is by far the largest and among whom I must include myself, are interested in nothing but watching—for we have discovered that it is a great and shared pleasure to watch other people work. There are those who set up chairs on

their front porch and prepare for a lengthy stay, the sewer being vastly preferable to daytime television. There are those like the soils engineer (he whose water line was nicked yesterday and who lives across the street from me and two doors down from Linda), who make their way to the trench and peer intently inside for a few minutes before they themselves leave for work. (Like me, he can at least partly claim a professional interest, and he asks the workers a few questions and makes a few observations about use of the sheep's foot and soil compaction techniques. But mostly, as he and I stand together and gaze into the depths below, I suspect my wife is right: "It's a guy thing.") And there are those, like my neighbor John across the street, and Albert next-door, who are retired and are likely today to do as they did yesterday, spending the bulk of the day simply prowling about, eager to see whatever there is to see.

Like John, Albert is from Italy. Unlike John, however, Albert speaks virtually no English and more than once I've been invited into his house, shown a broken TV or other appliance, and been asked to help make phone calls to arrange for repairs. Also unlike John—who spends many an hour gardening in his yard or making repairs to his house, Albert is growing frail. He is 83 and has a varied and growing list of physical ailments, among which are hip disease and for which he now walks with a cane. He's a kindly and handsome man, and makes a dapper figure as he walks the block with his cane and an English touring cap over his white hair. But his steps are short and slow, and it is not hard to imagine Jesse's unease as Albert begins to pick his way around the piles of dirt and to stand unsteadily at the lip of the trench, its bottom 12 feet down and the precipice inducing even in me an unpredictable bit of vertigo now and then. "If one of you guys falls in," Jesse tells me, "I'll get in a lot of trouble."

It makes Jesse feel no better when I tell him that more than once I have seen Albert walking about on his roof, inspecting a patch of shingles or somesuch—and all the while leaning on his cane. Nor is Albert the morning's only source of worry. For as the face of the trench is pushed forward, Jesse's crew begins encountering large pockets of unstable soil—soil with a propensity to cave in with each pass of the excavator bucket. Because of the resulting uneven trench walls, the paired shoring assemblies are in places proving unsuitable and the men are increasingly having to resort to bare single units placed ad hoc. This slows things considerably, but they will proceed no faster than is safe.

Still, there are incidents. Around 9:30, a section of wall comes loose and a shower of rocks and dirt falls on the lone man in the trench. Immediately, the men topside inquire anxiously about his well-being—"Rafael, are you all right?"—and just as quickly he reassures them. His hard hat has done its job. The work continues.

Directly in front of our house are several areas where the cave-ins are so large that the road surface has become undermined by several feet—the concrete and asphalt becoming a ledge over empty space. If the pavement here later breaks, as it likely will do, there will be added costs to fill and cover the enlarged opening, and to document this eventuality Jesse calls for a camera, with which he spends several minutes taking pictures. With the photographs, Ortiz will argue that the unstable soil and cave-ins were unforeseeable, that fixing them exceeds the scope of the contract, and that the city should therefore bear the expense. The city, in contrast, will argue that Ortiz is an experienced contractor, that such events are individually unpredictable but their general occurrence is not, and that Ortiz should therefore have included a sufficient margin in its bid to recoup such costs—if it hasn't already.

The person who will decide this issue, and the others like it that occur almost daily, is Samir Abuqaoud, the city's Resident Engineer. Abuqaoud is the city's enforcer—its eyes, ears, and onsite repository of expertise. It is his job to ensure that the city's design and contract are adhered to and the proper codes and specifications are followed—that there always be four-tenths of a foot of gravel below the pipe, that the pipe have at least a foot of fall for every hundred feet traversed, that the ground is properly compacted and the concrete sufficiently strong. It is his job, too, to approve changes. A myriad details are his province (forever is he checking plans and making notes), and in the end it will be he who attests that the work has been satisfactory and Ortiz should be paid.

He wears a blue hard hat. This is standard city issue. But somehow he wears it to special effect, for together the man and the hat create an air of experience and authority, an air of politeness mixed with a dash of detachment, an air of someone who has seen much—the air one imagines accrues with time to a blue-helmeted U.N. observer stationed in one of the world's trouble spots: Bosnia, perhaps, or Rwanda. He is a native of Jordan. For the last three and a half years he has been an engineer with the city of San Diego, and before that, he says, softly and with a wan smile, elsewhere and "for so long." Elsewhere turns out mostly to have been Kuwait, where he worked for Kuwait Oil and from whence he came in the wake of the Gulf War. "I saw the whole episode," he says, including the fires that left the oil fields aflame and caused him to leave. "They made," he says, "for a drastic situation."

March 20 (Thursday, 12:30 to 5 p.m.):

Patently, sewers invite scatology. When I mention the work on our street to someone outside the neighborhood, there follows invariably a string of off-color jokes and observations. Nonetheless, the men of Sewer and Water Group 78 seem remarkably uninterested in such commentary, finding it perhaps obvious or simply something of which they've had enough. Not until this morning did I hear from any of them a potty remark.

All morning the trench was pushed past the front of my house. The new sewer is being laid at nearly twice the depth of the old, and one result is that as the excavator crosses the paths of the existing laterals, the severed ends of

these pipes are left open midway up the trench wall. Later, they will be connected to the new main via a temporary riser, and later still the old laterals will be replaced with new, deeper laterals that feed directly into the new main. But before all this happens, the old laterals are left for a time to empty into thin air.

It was just after this moment, when the open end of the pipe from our house lay newly flush with the wall of the trench, that I wandered by for a look. Greg Weber was inside the trench; the pipe's orifice was just over his head and he was just beginning to dig out from around it a dimple of earth to provide clearance for the fittings that would follow. I stood above him and looked down.

"So that's it?" I asked. "That's our sewer pipe?"

"That's it," he said, followed by silence, interrupted only by the sounds of digging.

Then, "You're not going to take a pooh and run out here and chase it, are you?"

No, I told him, I wasn't going to do that. Though I suppose it's happened.

* * *

It is just after lunch that Weber makes the temporary connection between our lateral and the new main. I miss the act itself, but its completion is marked by the heaving out of the trench of unneeded pieces of pipe and fittings. Peering over the edge, I see that the connection consists of a white PVC 8-inch to 4-inch Y fit into the new main, a green plastic riser perhaps 5 feet in length, a bevy of short pipes and "elbows" sufficient to negotiate the necessary angles, and, at the point of connection, a rubber sleeve slipped over the exposed end of our old concrete lateral and held in place by stainless steel clamps—a Fernco coupling. We are hooked up.

There is, though, no celebration. Rather, the men begin covering their work almost immediately. This is the nature of what they do: there is no admiring of one's handiwork, no opportunity for kudos. If the work is done properly, it is buried and forgotten—no one ever says, "Great sewer job!" Only if there are mistakes or failures will anybody ever again pay attention.

* * *

This morning, after spending more time than he cared to watching Albert amongst the dirt and machines, Jesse asked me if there was anyone in the neighborhood who could "communicate with the old guy?" He noted that Albert can't move very fast, and he wanted to warn him to stay away from the edge of the trench. "'Cause if my boss comes out here and sees him, I'll get in a lot of trouble."

Yes, I said, my neighbor John can talk with Albert—they are *paesani*. And so it is that shortly after we are hooked up, John appears in his front yard to water plants and Jesse walks over to talk with him. Later, John related to me their conversation:

Jesse: "I understand you speak a little Italian."

John: "I think I speak a lot of Italian."

Jesse: "But you understand English?"

John: "I understand a little English"

"He said," John told me, "he ask me for a favor. And I don't blame him. He said he was going to have the call the police if he couldn't commu… How you say? Communications with him. And he didn't want to do that. But he 'xplain that if a 'spector came out, he could get a $10,000 fine, himself. So I don't blame him. I tell him I will help him."

And he does. Later, when the men have left and the street is empty and I am sitting alone on my porch, watching, John crosses the street—throwing a bemused glance my way—and approaches Albert in his yard. They talk. And on his way back, he gives me a report: Albert will keep his distance, honoring the request to assure his safety. But we both wonder: how now to repair his pride?

* * *

The men quit early today, earlier at least than yesterday. By four o'clock, they have gone and quiet is on the street. Quiet and dust. Now there is a second layer, on the porch, on the windows, on the screens, and—only a little less thickly—on everything in the house. It is discouraging to be so awash in grim, but still there is no point in cleaning it up, for tomorrow there will be more.

Of progress, they trenched today almost to the site of the new manhole that will lie in the crook of the dogleg on Maple, just off the corner of my house. In addition to my house, Albert's was also temporarily connected to the new main, and across the street so was Linda's and that of her downstream next-door neighbor. Of plans, Jesse says tomorrow they'll dig the new manhole and start replacing laterals, mine included. There will be more dust.

We have no excavator in front of our house tonight. But in its place are a half-dozen pairs of shoring, a huge steel plate, a backhoe, and a Bobcat.

* * *

The Tale of the Palm (Act I; Eventide):

Early this evening, while the silence is still palpable and before the brilliant and fuzzy Hale-Bopp has appeared in the western sky, I find Linda in the parkway next to one of her new palms. The tree is slightly askew.

"They dug up my tree," she says.

She is livid. Her face is beyond red. It is white and her eyes are bulging. (Later, my wife tells me, "I've seen you with that same expression.")

"They dug up my tree," she repeats.

"Why would they do that?" I ask.

"They wanted to find my sewer line. It runs right under my tree, and they wanted to find it. They were looking for the sewer and they took out my tree."

"I am so angry. I talked to Jesse this morning and I asked him to be careful. I explicitly forbade them to touch my tree, and they have defied my wishes. I am so angry."

"Are you sure of that?" I ask. "How can you be sure?"

"What other explanation is there? I've already called my gardener"—(he

of the last tree incident)—"and it wasn't him. So who else could it have been? The soil's been disturbed, the tree's cock-eyed, and they needed to get in here? Who else could it have been?"

"Well," I suggest, "the tree could simply have settled. It makes no sense that they'd dig up your tree." And I tell her that I was watching everything that went on out here for virtually the entire day. The only time I was gone was from 1:30 to 2:30, when I went for a walk.

"So that's when it happened," she says.

This seems to me a narrow window of time in which to have dug up a tree, probed for an elusive sewer, and replanted the tree. It seems, too, rather farfetched that Jesse and his men would have selected just this bit of time when I was gone but there were other neighbors still around to do something so nefarious, and that they would so carefully have covered up the deed but then left a bit of disturbed earth and a slightly leaning tree as evidence. But she is insistent.

We go back and forth on this—she saying there's no other viable explanation, me saying it's premature to draw a conclusion and why not simply talk to Jesse in the morning, see what he's got to say. And unavoidably it seems I am drawn into her drama. I like my neighbor. She comes often to our house for dinner and helps often to look after our cat; more important, she is a strong and principled woman and treats others as she expects them to treat her. But somehow this evening I have become proxy and apologist for those who have defied her wishes and tried to cover it up, and I feel helpless to extricate myself.

She is fuming when last we speak, as the comet makes itself plain and bright over her house, and she tells me I would be just as mad if it were my tree and that she can't understand why I can't see why she's upset. There are, I counter, an infinite number of screw-ups with which a person could take issue and you simply can't chase them all. Moreover, the contractors seem to have shown themselves conscientious—if they were responsible for a problem, I assume they'll make it right. But our words are to no avail. We have fixed ourselves into positions.

She owns a Fiat. It's old and temperamental and rarely runs and Linda has now superseded it with a newer vehicle; accordingly, she parks the Fiat at the end of her driveway in a spot from which it hasn't moved for months. All the same, her last fiery words to me are a vow to resurrect the dead car: "I'll park the goddamn Fiat in front of that tree and I won't let them touch a goddamn thing on this street until they've taken that tree out by hand and replanted it in sand, just like it was."

And so we part for the evening—I hoping for a less confrontational resolution in the morning, while pondering too the thought that perhaps my reluctance to see the situation as she does is symptomatic of some more general failure to stand up for myself or to insist on the accountability of others—a deficiency or sign of weakness. And I wait too for the gasping sounds of the Fiat underway. The sound of a call to battle. ■

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SAN DIEGO WEEKLY
Reader

Jesse Garcia looks down at Genaro Tapia during Wayne ball and mandrel test

Photography by Sandy Huffaker, Jr.

PART TWO OF TWO

Diary of a Sewer Repair

The Coming to Burlingame of Sewer and Water Group 78

by Steven L. Shepherd

March 21 (Friday, 7 a.m. to 3 p.m.) . . . and including,

The Tale of the Palm (Act II):

The Fiat is not to be seen when first I peek this morning. It remains in the driveway and the tree unprotected. In contrast, Linda appears in her yard while I am taking out my trash, and I

call out a greeting. She responds, but our exchange is tinged with strain, and in truth I am a little fearful of reigniting her wrath.

As the early morning unfolds I remain both curious and apprehensive, not having yet discerned my neighbor's strategy. Finally, I see Jesse knocking on her porch and the two of them together venturing out to her tree. He appears calm, receptive to what she has to say. She, determined, though absent last night's fury. She builds her case with a multiplicity of gestures, and several times pushes vigorously on the tree. "It's loose," she seems to indicate, "and it wasn't like that before—I know, because I'm the one that planted it." He listens and nods, is patient.

After a time, and several more pushes on the tree, she goes inside to make a phone call. He takes the opportunity to talk with several of his men, and when she returns, they talk again. Finally, they part. She inside. He to his crew. The exchange has been, if not amicable, respectful.

Later, she shows me a scrape mark on the side of the tree. A piece of equipment hit it, they decided. Whatever it was, the operator probably didn't even realize it—probably just barely tapped the tree. Later, someone else may have noticed the disrupted soil and tidied it up. The tree itself, she thinks —after talking with the folks who sold it to her—may have suffered a broken or damaged crown, meaning the plane of connection between trunk and rootball. At three o'clock this afternoon, she says —"The earliest I could get off work" —Jesse will have the tree dug up so they can examine it. If the crown is damaged or the rootball broken, Ortiz will replace the tree. If not, they'll replant it. In sand.

* * *

Plans change, and the work this morning proves to involve neither the digging of the new manhole nor the installation of our new lateral. Rather, Jesse seems to have decided to address the laterals by starting from the point where last he left off—that is, with houses nearer the Y—and working upstream along the new main. Our house will wait.

An exception to this new plan appears to involve Linda's house. Due probably to a desire on Jesse's part to have her sewer located and replaced by the time they meet again this afternoon, a pair of men begin working in front of her house as soon as she leaves for work this morning.

They begin with shovels, potholing a few feet to the side of the aggrieved palm. When the hole is several feet deep and the pipe is still not found, the men switch to a jackhammer, its use accompanied by earth-rattling noise, rising plumes of dust, and white jets of vented air. Soon the hammer is lost from sight inside the deepening hole. But still the sewer remains hidden.

A conference ensues and the men change tactics, painting on the street next to the curb a rectangle encompassing an area of perhaps 2 feet by 6, and stretching in length from the center of the palm to a point just past Linda's water box. Using the jackhammer they cut around the rectangle and with a backhoe they then attempt to break the pavement into chunks. But the concrete here is harder than the backhoe is strong, and next they summon the hydrohammer, which arrives attended by a Bobcat to help clear the debris.

The job escalates. Dirt and equipment accumulate. The sewer hides. And all this is replicated elsewhere down the street, where other laterals are also in hiding. All for want of some *S*'s.

Eventually, though, the laterals are found. Linda's turns out to be just beyond her water box, more than six feet from the palm. Once found, there follows the digging up of the old line and the laying of the new, the tying into the new main, and the refilling of the trench—the routine complicated somewhat in Linda's case by the need to work around her water line and by the necessary removal of the parkway grass between palm and water box.

There is no doubt that the men who remove Linda's grass (and who know nothing of the fire leveled recently at the gardener who dug up her lawn) fully intend to replace the grass once their work is finished. This they have done in every similar instance so far. But later in the day when it comes time to do so, two things become readily apparent: 1) that this will be a less than straight-forward task, and 2) that Linda has already succeeded at least partially in intimidating Ortiz's crew. For as they begin returning the grass, several pieces are found to be missing—tossed in with the fill dirt over the new lateral. The prospect of facing Linda's ire over some lost real estate is seemingly more than the men can deal with, and to avoid the problem they soon arrive with several replacement chunks of turf—these cannibalized from less problematic neighbors down the street.

March 21 (Friday, 3 to 5 p.m.)
. . . consisting entirely of
The Tale of the Palm (Act III):

Linda arrives home exactly at three. Jesse is there, along with four workmen who are busying themselves with putting the finishing touches on the patch of asphalt laid temporarily in place of the section of pink sidewalk removed to access her sewer. John is watching from next-door. Three bags of sand lie at the base of the palm—these delivered at noon by a man from the Ortiz front office.

When she gets out of her car, Linda examines the missing sidewalk, then the tree. She talks to Jesse. She pushes the tree. She goes inside to make a phone call. The men stand and wait, looking at the tree. It is the first time in two months I have seen any of them idle.

All is now quiet. The street is swept, the equipment put away, the soft asphalt laid, and the men ready to go home for the weekend. They begin to fidget, and soon—while Linda is still on the phone—they start digging. (Later, she tells me they were "hacking" at the roots, showing none of the care she'd used in planting the tree.) She reappears and the men stop digging, step back and look at the tree, while Linda again circles, pushes, and repeats that it had been perfectly upright.

"I'm afraid," she says, "that something was snapped under there."

Still the men stand. The tree is worth $150, and, at the standing-around price

of five men, I imagine it won't be long before Ortiz could buy her a new tree and still count himself ahead. Moreover, it is payday and the gathering is growing quickly. Eventually, Jesse and Donnie walk off and confer, and when they return Jesse hands out paychecks, apparently along with the instruction to most of the men to go home—although he does tell one to first park a backhoe in front of our house, where already we have a Bobcat and a row of shoring.

Three men with shovels remain as Linda and Jesse resume their negotiations. "If you can get it good and level,…" I hear her say. And soon she steps back and begins motioning with her hands—a little this way, a little that—while the men push and throw shovels of dirt under the tree.

They seem to have come to an agreement. "Where do you want the sand?" asks Jesse. And after she shows them exactly where by the side of the house she wants the bags, the men sweep up while she checks yet once again on the tree's plumbness. Within minutes, the workers leave and Jesse and Linda talk a final time—he walking to her porch to ask if she's satisfied.

* * *

The Tale of the Palm (Its Conclusion):

"I'm not happy," Linda tells me later. "But I'm satisfied we've reached an agreement that they'll make good on the tree if it turns out to have been damaged." Specifically, Jesse will give her a written statement that Ortiz will replace the tree if, within a year of the end of the project, the tree appears not to be doing as well as its partner.

She also says—small nugget of consolation for me—that she no longer believes the men deceitfully dug up her tree at the outset. The excavator, she thinks, was the culprit. The act was not intentional. But lest I misunderstand. . . .

"I'm still not happy about it."

March 24 (Monday, 7:30 to 11:30 a.m.):

The weekend has been blissful, but all starts anew this morning. The street is blocked off, equipment moved into place, steel is hoisted, a jackhammer lets rip, rock harvesters appear, and a neighborly multitude begins pacing the sidewalks, asking each other—again—"Do you know where your sewer is?"

Soon, laterals are being excavated. Down the street, preparations get under way for the arrival of concrete trucks and the pouring of pavement and sidewalk. And at our house, a young laborer appears and begins digging chunks out of my lawn. He works in a long strip next to the sidewalk and over the presumed location of our sewer pipe—the path of which as been guessed at by eyeballing a line from the last visible location of the sewer under our house to the spot in the street where last week the riser was joined to the main. This should give a good idea of where the pipe is, but still it takes half an hour with shovel and pry bar to find it. Lines are then painted to indicate where the street should be sawn, and soon Joaquin comes with the saw. And then . . . nothing. The rest will wait till tomorrow; a pile of dirt and rocks sits on the sidewalk, and on my lawn are several squares of upturned turf—on which I keep an eye so as to prevent their possible migration.

Instead, the morning's principal activity is the excavation of the last few feet of trench before the new manhole off the corner of my house and of the space for the manhole itself. The latter represents a sizeable void: 8 feet by 8 feet by 12 feet deep; nearly 30 cubic yards—and Breshears sculpts it perfectly, with straight sides, square corners, and a flat bottom sloped to continue the grade of the pipes that will enter and exit the manhole. The neatness and accuracy of the hole are of more than cosmetic significance, for they have the effect of minimizing the need for additional manual labor and materials. On the main trench, says Breshears, he is expected to come within an inch of grade. If he digs too deeply, money will be wasted on extra gravel; too shallow and the pipe will be inadequately cushioned—and Samir could make the crew redo its work.

It is economics that impel the operators to develop their skills. But still, they are good. In the backhoes they levitate. They crabwalk—using outriggers and boom to move the machines sideways. And they never waste a motion, never lift a bucket higher or extend a boom farther than is necessary. They could probably, said one neighbor to a grandson, "give you a shave."

Amazing to watch is their hands. On the backhoes are a row of long-stemmed black-knobbed levers (one each for the up and down of boom, stick, sleeve, and bucket; foot pedals control left and right), and the operators grasp and work all four knobs simultaneously, as if manipulating an undulating serpent. In the excavator, Breshears controls the digging with a pair of joysticks that sit just off each arm rest; all day he guides the huge machine with the merest twists and flicks of the wrists. "I couldn't really tell you how it works," he says. "But when I get in it, my hands know what to do."

True, pragmatics drive these abilities. But the opportunity to transform the mundane is ever present, and so it seems something more that informs a maneuver I see performed by Breshears weeks later. He was parking the excavator for the night, alone and on a side street; boom and cab were forward as he rumbled toward his destination—a spot parallel to the curb and under a powerline. But as he got closer, he began simultaneously swiveling the cab to the rear, lowering the boom to clear the powerline, and tucking the bucket for its overnight stay. All was motion. Then, just as the machine reached its berth, all was complete. Breshears climbed from the cab and walked away. Whether he'd planned the move or even thought of it consciously, I don't know, but momentarily he'd given the beast the grace of a dancer.

March 24 (Monday, 11:30 a.m. to 4:30 p.m.):

As soon as Breshears pulls the excavator out of the way, other men begin spreading gravel across the bottom of the hole, and at noon a worker arrives from B&W Precast Construction, Inc., out of San Marcos. "Manufacturers & Installers of Precast Concrete Manholes," says the card of Pat Senteno. A

concrete truck appears as well, and at the direction of Senteno, the truck's driver begins pouring concrete into the bottom of the hole, piling it atop the gravel in a loose mound, like a dish of soft-frozen ice cream. The concrete, says the driver, is mixed at seven sacks of cement per cubic yard, an unusually high concentration that will not only give the finished product exceptional strength but will also cause the mix to "go off fast." Meaning it will set quickly.

When the chute is clear and the truck waved off, Senteno props a ladder inside the hole and climbs in. The truck has poured 1½ cubic yards of concrete, and with a shovel Senteno rapidly begins flattening the pile into a circular pad some 6 feet in diameter and 1½ feet thick. In the center of the disc he then places a 4-foot diameter metal ring, which he tamps flat using a pocket-size spirit level for guidance. This is the only form he will use in shaping the pad.

In the dogleg that Maple Street takes through our neighborhood, the manhole Senteno is building sits in the hock of the turn. Embedded in one edge of the wet concrete pad is the end of the just-laid main past the front of my house; its mouth now forms the outlet from the manhole-in-the-making. Coming in from the upstream, east-running portion of Maple will be the inlet pipe—which has not yet been trenched or laid. Using his shovel, Senteno begins shaping a foot-wide concrete ledge around the outside of the ring; before the ledge is completed, and at a spot some 120 degrees from the outlet, he scoops from below the ring enough concrete to accommodate a short length of new sewer pipe. The male end of this stub is girdled by a fat rubber O-ring that Senteno sets within the wet concrete and covers to form a seal; the female end points toward the eastward portion of Maple Street. The manhole now has an inlet.

Having created inlet, outlet, and perimeter, Senteno next takes up a pair of hand trowels and begins smoothing the flat inside surface of the pad. At the same time, he crafts the channel that will connect inlet and outlet across the bottom of the manhole—first scooping out a trough, then working the trowels one against the other and building edges. Seamlessly, he blends the sides and bottom of the channel so they form a deep U in cross-section, and to the path of the whole he gives a gentle curve so the sewage will flow unimpeded.

The concrete is by now sufficiently stiff that all the curves and edges will hold their place, and once the channel is formed, Senteno lifts out the metal ring and hands it up top to a man from Ortiz. He then climbs from the hole, gathers materials from the back of his truck, and mixes a two-gallon bucket of sand, water, and cement. He carries the resulting "slurry" back into the hole and with a trowel slathers it thinly atop the surface of pad and channel. The result is a smooth, almost slick finish.

Finally, he checks one last time with the level that the manhole will sit flat on the pad and the sewage will have the proper fall as it courses through the channel. All is well and out he climbs, withdrawing the ladder behind him. Tomorrow the manhole will be "stacked"—topped, that is, with the precast components whose combined height will total 10 feet, 7 inches, the measured height from street level to the bottom of the new pad. At 1:25, less than 90 minutes after he started, Senteno leaves for another job. Generally he works with a partner, and they make, says the partner, an average of five manhole pads a day—though they've done as many as twelve.

Worker carries 20-foot length of 4-inch PVC

* * *

Five minutes after the pad is finished, Ortiz's crew begins filling the trench on the outlet side. By 3:00 pm, the hole has been covered with steel, and on the street clean-up is beginning. The day is winding down.

March 25 (Tuesday, 7:30 a.m. to 12 noon):

I use the toilet early this morning, worried that I might otherwise need to do so later when our sewer line is disconnected and exposed. My wife and son are on vacation for a few days and I am alone in the house. And so it is that when I am done, I flush a half dozen times to ensure the line is clear. This seems a peculiar form of social propriety—making sure the inside of your sewer is clean—but having made pals with the sewer guys over the last few days, I would be mortified if there were untoward contents in the pipe when they went to break it open—and particularly if I were standing there watching.

At a quarter to eight, two laborers appear before my house and begin removing the sidewalk over the lateral. The old concrete is so weak that they succeed in breaking it out with nothing more than a manual pry bar. I've seen this happen elsewhere in the neighborhood, and indeed, it seems the dirt in Burlingame—which often yields only to a jackhammer—is tougher than its pink sidewalks.

Also stronger—and considerably so—is the many-layered road. In a replay of last week's scenario at Linda's, the backhoe that arrives to begin stripping the pavement from between Joaquin's sawcuts is soon thwarted. As before, the backhoe's failure prompts a

call for the hydrohammer. But now the old and aging hydrohammer is a few days older still, and after a few revs and thumps it begins to back up, and . . . goes nowhere. The transmission has failed.

Jesse could fiddle with it. He could have someone else fiddle with it. He could call Ortiz's mechanic. But mostly he wants to get our lateral done, and because it's only 30 feet from curb to main, he decides instead to chain the hydrohammer to the backhoe and tow it backwards every few feet as the road is crushed. Then, when the task is done, the backhoe pulls the hydrohammer out of the way and leaves it.

As was also true at Linda's, our sewer and water lines appear to be quite close —the concrete service box housing our water meter, for example, borders the section of sidewalk just removed. No doubt the lines were laid close to avoid the work of digging two trenches, but the practice is now frowned upon for sanitary reasons. It has other disadvantages as well, and one becomes apparent the minute the backhoe begins digging the trench for our lateral.

It is 9:00 a.m. and I am right there as the backhoe reaches to remove a first scoop of earth from the exposed passage through our sidewalk, as it curls and retracts the bucket—as it yanks out our water line, a great dangling length of -tubing flopping awkwardly from a tooth on the bucket. This to the accompaniment of a great spray of water and an immediate flood. Normally, the line would enter the box from the street, pass through the meter, exit out the other end of the box, and continue on in roughly the same direction. So who would have expected my water line to instead make an immediate right turn and cross directly over the top of the sewer?

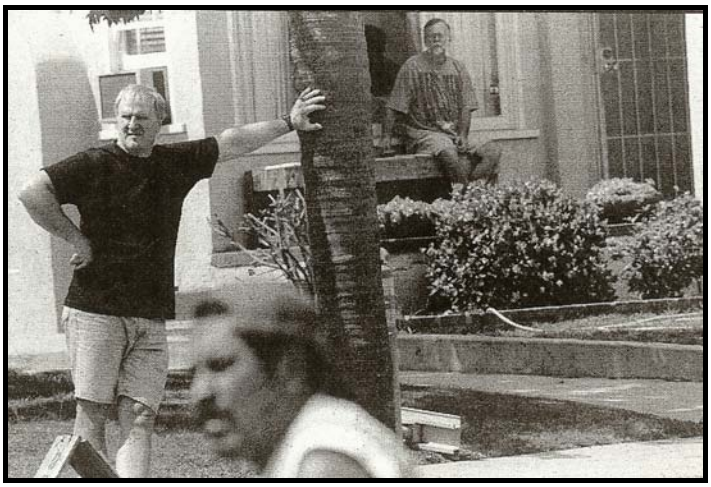
One of the men shuts off the flow of water, leaving me for the moment without water or sewer. And for the next hour, while the backhoe and laborers resume their work, Don Gingrich gathers tools and materials and sets about fixing our water line. He does this using flexible copper tubing (which eliminates the need for soldered, jointed turns) and what he calls compression couplings —brass devices that screw together after first slipping over the joining pipe ends in such a manner that the ends are grasped and sealed as the coupling is tightened. I've never seen such things and at first am a little dubious as to their durability.

"How long will these last?" I ask Don.

"Longer than you will," he says. Which I guess is long enough.

* * *

At 10:15, while the work on our water and sewer continues, a truck from B&W arrives at the site of the new manhole. Senteno is inside, though today's driver is Robert Lara, his partner. Buckets, shovels, rolls of white plastic, and assorted other tools and supplies festoon their truck's overhead racks, while about its flat bed are arrayed steel chests, bags of cement, bins of sand bin, and a mixing tub. Immediately, the men set to work—Senteno mixing mortar while Lara throws supplies from the truck, including coiled rolls of black mastic, a tarlike material an inch square in cross-section and stuck on one side with waxed paper.



Neighbors watch the work

Within minutes a second B&W flatbed arrives, this one larger and mounted with a crane. On its back sit two immense concrete cylinders and a concrete cone of similar dimensions; also on board are a 5-inch-thick concrete spacer ring, and a cast-iron manhole lid and frame. The truck stops directly abreast of the manhole-to-be, and its driver too begins immediately to work.

The vulnerability of concrete to sewer gas is the very reason our old sewer main is being replaced: sewage creates sewer gas, which contains hydrogen sulfide, which reacts with water to form sulfuric acid, which attacks and destroys concrete. None of this chemistry has changed recently, but there have been innovations enabling the continued use of concrete. Each of the concrete parts just delivered is completely lined on the inside with a thick layer of white PVC. Molded every few inches to the backside of the lining are protruding T-shaped ribs that are embedded into the concrete and hold the liner in place; these ribs give the whole protective system its name: T-Lock. And it is to further enhance the T-Lock's abilities that the men of B&W now devote themselves.

When Senteno finishes mixing the mortar, he climbs into the manhole and cleans the pad's surface with a brush. He then pulls off long pieces of mastic —the wax paper separating with the ripping sound of tape stripped from a roll—and lays these just inside the pad's circular rim. A bucket of mortar is lowered by crane, and this Senteno pours in a smaller concentric circle just inside the mastic. Above him, the driver of the big flatbed duplicates these same preparations on the top edge of one of the big cylinders.

Meanwhile, Lara begins attaching a strip of thick white vinyl to the inside of the spacer ring that will sit at the top of the concrete stack. He does this with what amounts to a $1,000, industrial-strength hair dryer, fusing the spacer's

plastic liner and the vinyl strip while at the same time positioning the strip so as to overlap with the piece below when the spacer is set in place. Later, when the manhole has been stacked and the surrounding earth and street restored, Lara will return and place similar vinyl strips over every interior joint; the edges of these wide strips will then be covered with thinner strips, so that every joint is doubly sealed. Inside, the manhole will gleam hospital white. Later still, when the concrete of the pad has fully cured, another B&W crew will return to apply a thick epoxy coating to the bottom of the manhole.

Aesthetically, Lara dislikes this last step. The newest designs, he says, call for precast pads already surfaced with PVC. "It's a nicer product," he says, referring to the resulting manhole, "if it's all T-Lock. It's more uniform. Looks nicer."

It also lasts longer. According to Samir, Sewer and Water Group 78 has been designed with a 60-year life span; the city's engineers expect our new sewer to be functioning well into the second half of the 21st century. In Lara's opinion, however, the prelined bases —which are more expensive—might last that long, but a manhole with an epoxy-covered base, like the one he is now building with Senteno, will have to be rehabbed long before then. "But I'm not complaining. It's job security if I have to come back in 15 or 20 years and replace it."

When all is ready, the driver of the flatbed slips a cradle around the first section of manhole, hooks cradle to crane, and begins to lift—the cradle's grip tightening as it rises. The crane is controlled with a hand-held push-button remote, and the operator has the zoned-in concentration of a Nintendo player as he swings the crane's load out over the hole then lowers it toward the pad, Senteno providing guidance the last few inches as it plops down on mastic and mortar. Quickly, Senteno flips off the cradle, hops inside the ring, and begins beveling the extruded bead of mortar. The crane returns for the next section. And so the manhole is stacked: cylinders, cone, spacer, and cast-iron frame and lid—the latter marked in a great circle of letters,

CITY OF SAN DIEGO
SEWER

and, in smaller letters on the periphery, the lid's birthplace:

MEXICO

Cast-iron manhole lids are apparently an international commodity, and elsewhere in Burlingame we now have lids from India and China.

At 11:00, the manhole is stacked and the flatbed leaves. So too in a few minutes will Senteno and Lara. But first, Senteno takes a long-handled paint roller and applies the final touches to the coating of waterproof tar on the manhole's exterior. When he finishes, the manhole—black, with pointed nose —stands like an ICBM in its silo, reaching for the heavens and ready for launch.

* * *

By the time I wander back to my own lateral, the work there has advanced considerably. The old pipe has been excavated and removed, a bed of gravel laid, the new line installed—two 20-foot lengths of 4-inch turquoise PVC—and the joints duck-buttered, glued, and Ferncoed, as appropriate. Now, a backhoe is dumping in the last scoops of gravel for the topping; only a few feet of exposed lateral remain, above which Samir is standing and watching. He is thoughtful. Almost pensive.

"You should take a picture," he says. "It only happens once every 60 years."

I refrain from this (not knowing where in our photo albums my wife would have me file it), but I join him in watching. Soon, there arrives a second backhoe fitted with a sheep's foot. With the wheel and boom pointed our way, the operator straddles the deep end of the trench, lowers his outriggers, and begins compacting the soil, piled in heaps to the side of the trench and now pushed back in by the other backhoe, the two machines working at right angles to each other and progressing steadily towards me, Samir, the sidewalk, and my lawn.

In minutes, the trench has been filled and compacted. I can flush. Supposedly, I won't be similarly discommoded for another 60 years.

March 25 (Tuesday, 12:30 to 4:30 p.m.):

After lunch the laborers who yesterday dug up my lawn return to replace it, dropping the squares of turf into the approximate places from whence they came and stomping them home with their boots. The squares are noticeably uplifted at the edges and sagging in the middle.

Next, the men rake and spread flat the compacted dirt over which my sidewalk lay this morning. They stake as a form a length of two-by-four across the opening between lawn and sidewalk, and a backhoe then dumps in a scoop of soft asphalt. The black, oily mix sags and settles as it falls; the men rake and shovel it smooth. And temporarily our sidewalk is whole again. But you can't walk on it. Not even on the loose, tiny bits scattered nearby that stick to the bottoms of your shoes and leave numerous and hard-to-clean marks all over your carpet wherever you've been; marks that multiply as you scrub feverishly to remove them and that you know your wife won't like when she gets home from vacation—marks that you don't even particularly like yourself. No, you can't even walk on these.

Though of course you do.

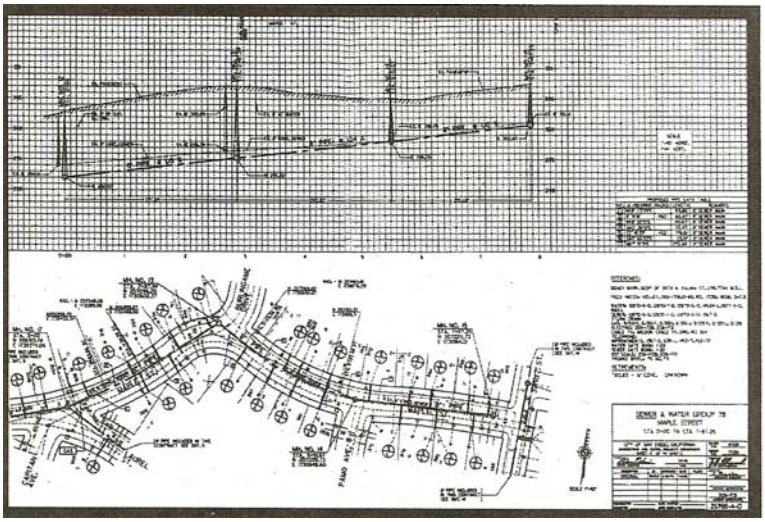
March 26 (Wednesday, 7:30 a.m. to 12 noon):

Oritz's main force begins a great wheeling maneuver this morning. It begins with a logistic move, as at 7:30 two men come huffing down the street towing the porta-potty. For the past two weeks it has resided under an overhanging tree near the Laurel and Maple Street Y—a shady spot, if not secluded—but now they are bringing it toward me, towards my house. Bypassing me on my porch, they come to a stop near the curb just around the corner. Another shady spot, and this one just outside our bedroom window. Under the circumstances, I suppose one has to share this

sort of thing, so there's no point in complaining. It'll be a surprise for my wife and son when they return home tonight.

Soon nearly all the equipment is moving in this same direction: trucks, backhoes, Bobcat, shoring—the works. Yesterday, with the replacement of my lateral and Albert's, the trenches and pipe laying for the entire the stretch of Maple in front of my house was completed; today they'll begin on the portion of the street running east.

They start at the new manhole. Yesterday, when Senteno and Lara drove away, Jesse had the stack and surrounding space covered with steel, and today Breshears begins by removing the plates. He then strips enough pavement to allow him to start excavating, while about him gathers the usual procession. The immediate object of this activity is to lay a full length of 8-inch pipe east of the manhole. This will allow backfilling of the space around the stack, which in turn will allow preparations to proceed for a performance, or "proof," test of the just-laid main in front of my house.



Engineering drawing for Sewer and Water Group 78

Like a builder of custom homes, Ortiz's contract with the city calls for a staggered schedule of partial payments, each contingent in a given section of the project upon the satisfactory completion of some phase of the work: 90 percent after the proof test, the last 10 percent after a final walk-through and approval by the Resident Engineer. Because of the relative size of the first payment, a certain urgency accrues to the test. And although ultimately in this instance the test would be postponed because of Samir's unavailability for several days, by 9:00 the trench is nonetheless excavated, the shoring set, a ladder ready, and Greg Weber readied himself ready to climb in, singing as he does, "Oh, it's time, time, time to go down."

With a shovel Weber cleans around the stub of pipe set earlier by Senteno and now protruding from the base of the manhole, and within an hour he and a coworker have fit a 20-foot length of main end-to-end with the stub, male to female. Gingrich arrives in the Deere, and after first dumping gravel over the newly fitted pipe he then proceeds to cover the rest of the area around the base of the manhole. Then he starts pushing in dirt, while Jesse begins the compaction.

The stacked manhole, rising in its earthen vault, is a round peg in a square hole. And where the manhole comes closest to the walls of the vault there is little clearance for the sheep's foot. In order to reach the accumulating soil, therefore, Jesse must use the full range of operator's tricks: lifting high the machine from the ground, crabwalking round and round, and corkscrewing the compacted dirt higher and higher. And so the space is filled.

So too does Sewer and Water Group 78 begin its turning. For the next two weeks Jesse's men will devote themselves to pushing the face of the sewer to the east and away from my house. I will watch, and because I have been watching already I will know better then what I am seeing.

I will know that the concentration of cobbles in the earth below Maple Street is lower in its eastward running portion than in the stretch before my house, and I will wonder if this is due to a change of course in some ancient stream or river.

I will know that the dirt there is redder than elsewhere in Burlingame, that it has more iron oxide. And knowing that will help me better to appreciate Mike Corio's observation that, "You guys got some weird dirt here. You go to a place like Arizona, it's all brown and hard and rocky, or else it's all farm dirt. But here, it's weird. I was working on a job in Cardiff and they had this dirt like clay, it was purple and lime green and turquoise, all swirled together. It was really beautiful. I took some of it home to show my wife."

I will know that cave-ins are to be avoided, but do occur. I will know that squigglies get covered and that gas lines, even active ones, get excavated. ("No smoking!" they will yell.) And I will know better how to read the hieroglyphs of the squigglies, know that when Jesse writes on the road with a white Super Stripe Traffic Power Paint Cartridge

— 3^{50} 6" A/C W

it means "At this point, 3½ feet deep, is buried a 6-inch diameter asbestos and concrete water pipe." And that the additional implied message is, "Don't break or disturb."

I will know that it can take a long time with a shovel to pothole for an unmarked lateral, but that a full 8-hour day is nonetheless a *very* long time, and that the resulting 20-foot ditch across a neighbor's lawn is a very long gash in one's yard. I will know why on a Thursday Mike Corio pleads "Come on, Friday!" What a neighbor means when he says, "You have to break a few eggs to make an omelet." And that Mark Breshears—who, with his aviator sunglasses and chronic stubble, looks a lot like Harrison Ford—has in him a touch of the choreographer.

I will know the wonder my wife feels when she finally comes home and sees Jesse in his backhoe suspended on scoop and boom in midair and says, "He's levitating!" And I will know, or I will learn, that though Sewer and Water Group 78 has turned the corner, they have merely moved a bit down the road. For still I will hear them. The hydro-hammer, the excavator, the horns, the saws, the diesels that idle; still I will hear them all. For they are a rolling tempest, and for weeks I will hear them all.

* * *

But not everyone swings in the great rotation. There is much yet to do on the street before me, and left this morning to continue the work is a backhoe and operator, a dump truck and driver, two men with shovels, and a man on the Vibra-Plate. The latter is a 1000-pound machine of roughly the same dimensions as the concrete saw and consisting primarily of an engine atop a thick steel plate some 2 by 2½ feet in size. The engine vibrates the plate, which in turn smooths and compacts the ground below.

These men have been given the task of preparing the street for the new concrete that will suture the road after its disemboweling. This process and actual pouring of the concrete over the compacted trench is called "capping," and it begins with the stripping and removal of the temporary asphalt and all excess fill dirt from the area within the trench cap. This is the backhoe's purview, and after the backhoe come the shovel men, who scrape clean the surrounding pavement and the vertical sawn edges where weeks ago Joaquin made his saw cuts. They are followed by the Vibra-Plate, which in turn is followed by the shovel men again, now converted to brooms.

The plan today is to begin where last the capping left off—just upstream from the Y—and to pour over the main to a convenient stopping point downstream from the manhole-in-progress off the corner of my house. They'll also cap over five laterals, including mine. The combined linear footage of the planned pour equals some 330 feet; the distance between Joaquin's sawcuts—the width of the trench covering—is three feet, meaning the total area to be covered is close to a 1000 square feet. By specification, the trench cap will be seven inches thick. (Samir will check this in several places this morning with a flick of his tape measure.) All told, the pour will require approximately 22 cubic yards of concrete. Because concrete is delivered in trucks with a capacity just shy of 10 yards, Jesse will order three trucks—the first two full, the third with an amount he'll call in later.

The uncertainty regarding the last truck stems from the area in the street between my house and Linda's, where the soil was unstable and the trench walls collapsed during last week's excavation. The cave-ins undermined the pavement and as the work progressed much of that pavement crumbled or broke loose, and to these areas the men this morning apply a jackhammer, debriding until they are sure both the ground below and the road around is sound. When they are finished, what should look like a straight, clean-cut channel through the pavement looks instead like the ragged and meandering path of an icebreaker through a flow. How much concrete this will take is merely a guess.

Just before lunch, all is ready. The dirt floor of the cap is smooth and tightly packed. The edges are free of debris. The bordering road surface is immaculate. And lain in the channels is the green and silver mylar strip that endlessly advises future inquisitors:

CAUTION
BURIED SEWER LINE BELOW

March 26 (Wednesday, 12:20 to 4:30 p.m.):

After high school I worked for a time in construction. I had a friend whose father was a contractor and built new homes. We had another friend who worked with us, and together the three of us formed the laboring, gofer nucleus of the company's small work force. We did a little of everything: framing, painting, ditch-digging, fetching, and hauling. We also poured concrete. Lots of concrete—slabs, patios, sidewalks, and driveways.

The days we poured were filled with buzz and anticipation. First was the scurry to get ready, then the frenzy of the arriving trucks, they arriving steadily and nonstop, like transports landing troops for an operation. The only lull in the activity was the interval between last preparation and first arrival.

We were young then, and fancied ourselves adventurers in life's unfolding saga. And so it was that we invented games and dramas to enliven these periods of waiting. Of the trucks owned by the company that supplied us with concrete all but one were orange, and all were huge. It was easy then, while we waited, waited and watched for the first glimpse between houses of the first lumbering leviathan wending its way in through the burb, to imagine ourselves men of New Bedford—whalers, with our eyes on the seas looking for spouts.

The one truck not orange was white, and to this we attached a name. Moby Truck, we called it, and if by chance it should be the first vehicle of the day, it's sighting would infuse with a special vigor the heralding cry that went up. . . .

("What do ye do when ye see a whale, men?"

"Sing out for him!" . . .

"Good!" cried Ahab. . . . "And what do ye next, men?"

"Lower away, and after him!"

"And what tune is it ye pull to, men?"

"A dead whale or a stove boat!"

. . . Ahab, now half-revolving in his pivot-hole, with one hand reaching high up a shroud, and tightly, . . . addressed them thus:—

"All ye mast-headers have before now heard me give orders about a white whale. Look ye! d'ye see this Spanish ounce of gold? . . . It is a sixteen dollar piece, men,—a doubloon. D'ye see it? . . .

"Whosoever of ye raises me a white-headed whale with a wrinkled brow and a crooked jaw; whosoever of ye raises me that white-headed whale, with three holes punctured in his starboard fluke—look ye, whosoever of ye raises me that same white whale, he shall have

this gold ounce, my boys! . . .

"It's a white whale, I say. A white whale. Skin your eyes for him, men; look sharp for white water; if ye see but a bubble, sing out."

. . . "Mud!"

"Mud!" would he sing who spied the first truck.

"Mud!"

And so were we summoned to the pour. Summoned and enjoined, like peasants to the harvest, to make ready our implements—rakes and trowels, shovels and gloves.

Ah, 'twas glorious then! Glorious to be young.

* * *

Whether the men of Ortiz have conjured for themselves a Moby Truck I do not know. All the trucks that bring them concrete are white and therefore indistinct. But even so, their lunch is cut short by the arrival of the first behemoth. Its driver finds a staging area and begins assembling his chute, and while he does so Jesse and five other men rise from the grass of my lawn and collect their tools.

When all are ready, Jesse dons his gloves and begins backing the truck into position, he walking behind the truck, steadying the chute with one hand, and keeping eye contact with the driver in the side mirror. He backs the truck along one side of the street and over steel-plated laterals, and when he reaches his starting point he raises a clenched fist, signalling the driver to stop. Glancing in the mirror to verify that he still has eye contact, he twirls his forefinger. The driver reverses the direction of the truck's slowly spinning drum; its internal spiral fins begin catching mixed concrete and pushing it uphill; concrete begins to fall out the back; the funnel catches it; the chute carries it, sliding like a mass of gray porridge—this proceeded by the tumbling of a few loose pebbles—and in moments the mud spills to the ground. The pour has begun.

Pouring concrete is an act of teamwork. Team leader is the man on the chute, pacing both the work and the truck, and so, smoothly, Jesse begins arcing his chute back and forth over the area to be filled. Occasionally, he pushes a handful of concrete down the chute where a little extra is needed. And when he's poured enough, he tips his finger and the driver moves a few feet forward.

Behind Jesse on either side of the trench are two men with shovels. Their job is to push, pull, and coax the concrete into place, filling in pockets, eliminating air bubbles, and roughly rendering the surface flat. They are busy, but no more so than necessary. This is the sign of a good chuteman —that your laborers aren't working frantically—and like all else I've seen him do, Jesse is good at this. He keeps the flow steady and judges well how much he's poured and how much is required. But then, you get good at this fast, for a chuteman who creates unnecessary work is informed quickly of the fact and usually encouraged strongly by his laborers to seek another career.

Following the shovellers are two men on a screed—a length of two-by-four they saw back and forth across the pavement surface to level the wet concrete. And behind them walks a man with a tamper: a rectangular frame with upright handles and fitted at the bottom with steel mesh. The tamper is used in a patty-cake fashion to press down rocks from the concrete's surface and to raise in their place a workable paste. The concrete sucks at the mesh on the uplift, and the repeated up, down, and sideways is both exhausting and hell on your back.

Forward they move. The men know their jobs and when and where they will next be needed, and they work as if in a ballet, the blocking and orchestration seamless. "They are," says John, "so comfortable." There is to their work a rhythm. And a song. For there rises an aural soup whose elements I suddenly remember well, and at the remembering of which I am surprised. Ever present are the hum and rumble of the diesel and the whine of the turning drum, concrete sloshing in steel. Periodically, the air-brakes release and the truck lurches forward: shhh-kraBRONnnng, they go. Shhh-kraBRONnnng. The shovellers scrape, chop, and jostle, their blades slicing in and out of the wet mixture. The tamper tamps. And at 12:40 comes an echoing rattle of loose rocks; the engine races, the drum spins fast, and the truck is purged; the beast is empty and the driver pulls away to hose off his chute.

With the truck's departure, so too do the men begin peeling away, hieing themselves to other jobs in the waiting. One hops on a backhoe. One gathers a hose and nozzle and begins wetting the next section to be capped. Two grab hand floats and begin smoothing the tamped concrete, leaving in their wake a flowing swirl of rough whorls and half-moons; they make no effort to remove these patterns, for this is a road and possibly to be repaved when all is done.

Twenty minutes later the second truck arrives and the men reconvene. They work steadily towards my house, interrupted only briefly by a train of children on bicycles racing pell-mell towards a wet square of concrete on the sidewalk and Jesse's need emphatically to yell, "Whoa, Whoa, Whoa!" At 1:20 the Bobcat pushes aside the steel plate covering my lateral. At 1:24 a laborer sprinkles the lateral's dirt surface. At 1:25 Jesse twirls his finger. At 1:27 the last of the mix spills from the truck and wet concrete covers my lateral.

A third truck soon arrives, and by 2:20 it too is emptied. The afternoon's pour has totaled 26½ yards. It ends at a point in the street just past Linda's driveway and with the covering of all the areas prepared this morning, including four sections of pink sidewalk on the streetside opposite me. Still patched with black asphalt are the squares of sidewalk over my and Albert's laterals; these will wail till tomorrow.

* * *

This afternoon's cleanup includes the washing of Laurel. Days ago, and once that street's main and laterals had been capped, Jesse had had Laurel scoured with a fire hose. This had turned the dust to mud, which flowed in torrents toward the storm drain (there mostly to be caught behind a dam of sandbags and hauled away), and this had seemed the last critical step in restoring the street to

habitability. We on Maple watched and were envious.

Still, though, the dust has raged. It rises and swirls behind every passing truck and backhoe. The excavator sends it aloft in great clouds, from whence it falls on the whole neighborhood. And so today Jesse has the Ortiz water truck rinse Laurel Street yet again. The water truck, working in swaths from the center of the street toward the edges, is less effective than the fire hose, but still and again we on Maple are envious. For they are cleaned while we are dirty and becoming dirtier still. And when it will end we know not yet.

March 27 (Thursday):

The city's contract with Ortiz calls for items removed or destroyed during the sewer work to be restored in a fashion that will "match existing." Because black asphalt does not match pink concrete, today my sidewalk is to be restored to its former condition.

It's an interesting phrase, "match existing," because the city itself does no such thing. On those rare occasions when it deigns to fix a broken sidewalk, the city throws on its own permanent asphalt or else pours standard-issue white concrete with none of the elegant scoring of 1912. It holds, in other words, its contractors to a higher standard than itself.

All the same, amidst the ruins of my neighborhood's sidewalks, we are now to have patches of new. Five such patches are to be installed today, and consist of the toppings over laterals for a line of neighbors snaking from my house around the block and back to Laurel Street. The morning's preparatory work follows the usual sequence, and as usual the activities are scrutinized by a representative of the city. Samir, however, is gone today, and in his stead are a pair of young engineers, these also in orange safety vests and blue hard hats.

The two men split their wanderings between the trenching and pipe-laying around the corner of my house and the sidewalk preparations out front, and late in the morning they are taking a turn around the Floridian tip of my neighbor Albert's lot when they are approached by Albert and his wife, Giacoma. This is unusual, for Albert and Giacoma are reticent about contact with such persons as city officials. Moreover, Giacoma's English is as nonexistent as Albert's, and their conversations with non-Italian speakers generally devolve quickly to a flurry of gestures and mutual efforts to make volume and repetition do the work of shared language. Because I myself have been party to many such conversations, and have in this case a fair idea of the likely subject, I join them.

As the conference begins, we are standing midway between a small crater that has begun growing at the sidewalk's peninsular apex and a stretch of crumbled curb whose pieces recently fell loose and had lain for months in the gutter until thrown away in an Ortiz cleanup.

Look, says Giacoma in Italian and pointing with both hands outstretched, supplicating, it is falling apart.

Yes, say the men from the city, we can see that.

Can you fix it? asks Giacoma. And she gestures to the nearby sections of sidewalk that lie open and waiting for concrete. The men are here, I imagine she says, and the trucks are coming. It would be easy. It would be obvious. Can't you fix it?

The men from the city are sincere. They have the faces of cherubs. They turn to me and I repeat what I imagine my neighbor has said. Their sidewalks are falling apart, I say, and she wants to know if you can't do something about it. Her husband, I add,—there with his cane—is handicapped. Shouldn't there be a handicapped ramp here?

Yes, say the men, they can see that Albert is handicapped. And yes, they can see the sidewalk is in need of repair. But no, just because it needs it and the men and materials are here doesn't mean it can be fixed; first the sidewalk must be surveyed and certified, written up and placed in queue. Papers must be filed. And—the clincher—this work is being paid for with sewer and water money; the sidewalks belong to the street division. It's a problem, they say. But not ours.

Yes, I say, I know. And I turn to Giacoma and Albert. No, I tell them, they can't help you. They can't fix your sidewalks. I shake my head and explain as best I can: It's complicated.

The men from the city walk on, and later I see Giacoma holding the same conversation with three laborers from Ortiz—hoping perhaps that her Italian will fare better on Spanish than on English.

* * *

The concrete for my new bit of sidewalk arrives just after noon, the truck having just come from Albert's and the three laterals preceding. All afternoon the men doing the pouring and finishing will rotate among these five patches of concrete, performing first a task at the first square around the block, then repeating the same task at each successive square until finally ending at my house, from whence they will return to start a new task—the concrete growing harder all the while.

Among the three men on the pour, one is Joaquin, who earlier made the sawcuts that freed the old sections of sidewalk. On the chute is Miguel Pilar, who has worked six years for Ortiz as both truck driver and laborer. And third is Pedro Silva. Pedro has been finishing concrete for many years, though this is his first job with Ortiz. He is lean and muscled, with a moustache going gray; he is from Mexico and speaks little English. Spanish is the language of today's pour.

The concrete Miguel empties into my sidewalk is standard gray; were it left alone it would dry as white. It takes just minutes to pour the half yard of wet mix, and by 1:00 the void in my sidewalk has been filled, screeded, tamped, floated, and rough troweled, the latter by Joaquin. Fifteen minutes later, Pedro comes by with an edger—a small metal trowel with a down-turned lip on one side. Working on hands and knees, he guides the trowel around the perimeter of the square, giving to its edges a smooth, pleasing bevel.

The issue of what is the standard color of Burlingame's sidewalks has long been debated in my neighborhood

—and never resolved. The original developer left no formula and we now have as many shades of pink (or "rose") as there have been repairs over the years. How then to "match existing"?

Early in the course of Sewer and Water Group 78, Jesse and his men experimented to see what available coloring agent would most closely reproduce our original sidewalks, and at 2:30 Miguel arrives at my house bearing a large and heavy-looking paper bag on whose label is printed the results of this inquiry:

A-26 Brick Red
Lithochrome Color
Hardener

Inside is a fine, reddish-brown powder —brick red, actually. Given our neighborhood's years of competing pinks, it would seem a considerable feat to have now determined a standard. But the accomplishment is put in some perspective by the observation of a neighbor made after watching the coloring of his own sidewalk: the final outcome, he noted, depended on whether from the powder in his bag Miguel "sprinkles on a big handful or a little handful."

I wait, then, in suspense as Miguel makes ready his magic. The concrete by now has become fairly hard, and before he begins Miguel first sprinkles on a little water. This he works into a paste with a hand float, and when the entire surface is roughened and receptive, he dips into his bag, draws out a handful, and begins dusting the wet concrete with powder. Whether these handfuls are large or small I do not know, but he uses several.

After another sprinkling of water, he sets to work with his hand float. His object is to incorporate the wetted powder into the underlying paste, and toward this end he bears down heavily on the float, rocking and rolling his wrist as he sweeps his arm round and round in tight, looping circles. When the surface is an even, rusty red, he places a two-by-four across the wet square of concrete, aligns its ends with two corresponding line segments in the bordering sections of old sidewalk, and uses the board as a guide while he runs a metal scoring trowel from side to side. He repeats this procedure with other lines and marks, and when he has finished Miguel has reestablished the pattern first set in our concrete more than three generations ago and we have in our sidewalk nine fresh squares.

After Miguel comes Pedro, who brings with him a bucketful of trowels and extracts from it first his edger. With it he works around each of the nine new squares. The muscles on his forearms bulge as he rocks and presses the edger front to back, applying all the force he can against the ever hardening surface. When each square has been circumscribed he switches to a rectangular finish trowel and shifts his attention to the squares' insides, pressing on the trowel's front edge with two fingers and expressing from the surface a bead of reddish cream he works intently into every imperfection. He concentrates as if polishing a lens, and he leaves each square smooth and shiny.

Finishing, Pedro puts his trowels in his bucket and heads back to the front of the line to begin a new round. As he does so, he passes the tip of Albert's peninsular lot. Here he puts down his bucket, withdraws a trowel, and applies a few strokes to a small patch of concrete he and his companions have shovelled in my neighbors' cratered sidewalk. The spot is small, but the three men are tinting and finishing it with the same care shown the larger patches over the laterals; later in the job they will fix Albert and Giacoma's curb as well. They will do what the city would not—though neither was it their problem.

At 3:45 Pedro returns to put the last touches on my sidewalk. With a pointed trowel and whisk broom he cleans the smears and leavings from the edges of the old sidewalk where now they border the new. Next, he dips a soft, long-handled broom in a bucket of water. From the bucket he flings a few sprinkles of water, and he then commences gently to pull the broom across the concrete, drawing in the handle with a steady hand-over-hand. The direction of the broom's travel across the sidewalk is from lawn to street, and it leaves behind a textured, fine-grained surface that matches beautifully the existing sidewalk—the contract here is fulfilled.

Finally, he sweeps clean the surrounding sidewalk. Around his work he places a quartet of orange safety standards, then hoists bucket in hand, props broom on shoulder, and walks away. It is 4:00.

March 28 (Friday):

With the pouring of yesterday's patches of sidewalk, and with the exception of capping the last few feet to the new manhole, the physical restoration of this portion of Maple Street is now complete. And so it is time to clean.

For this, Joaquin, Miguel, and Pedro are joined this morning by another longtime Ortiz employee, Paul Anguiano. Yesterday, Anguiano made a brave attempt to begin the cleaning alone. His specialty is the street sweeper —a retired municipal vehicle bought at auction; old and temperamental, painted a fading chartreuse and besplotched with rust. Because initially he couldn't get the sweeper to start, he at first took to the street with a broom; then, after enough time had passed to permit a comparison of the length of the street with the pace of his progress, he retried the sweeper and finally got it going.

Anguiano cuts a dashing figure. He has a great, bushy pirate's moustache, and long locks of graying black hair he ties in a ponytail. The sweeper has two steering wheels and when cleaning to the right Anguiano uses the right-hand wheel; this he holds with his left hand while he stands halfway in and halfway out the right-hand door, head outside and held high, left foot inside on the gas, right foot outside on the running board, right hand gripping the forward door pillar for support. All is reversed when he cleans to the left. Right or left, his ponytail whiffles behind as he makes his forward runs at high speed, brushes down and turning. In reverse, he drives just as fast, but with the brushes raised and stopped.

All this is picturesque. It is entertaining. I could watch it for hours. But the sweeper is as ineffectual as it is old, and behind it rise billowing contrails of dust.

Despite its driver's élan, the machine accomplishes nothing but a massive redistribution of dirt, much of which adds itself to the deepening layers inside our house.

Perhaps the sweeper is broken and this accounts for its poor performance. Perhaps Paul and Jesse have finally acknowledged the obvious. Or perhaps this morning it simply won't start. But whatever the reason, the cleanup detail starts without it. They begin by going up and down the street attending to odds and ends—removing, for instance, the casually replaced squares of my lawn, spreading a layer of fill dirt, and refitting the pieces like tiles in a mosaic. For this I thank Pedro.

Next, they spread themselves in a phalanx across the width of the street, beginning at the Y and working my way. They work with brooms and shovels, scraping loose mud that has stuck to the pavement, sweeping the dirt into piles, and transferring these to the Bobcat. They work hard and they work well. But still there is dust, and fervently do I hope they will bring out the fire hose this afternoon and scour the road. Blast it clean and thoroughly.

But they don't. Nor do they ever.

The reason, I later learn from Jesse, is a call from a misguided neighbor. Someone in the neighborhood— someone undoubtedly whose street has already been cleaned—has seen the stenciled signs on the storm drains noting there are dolphins downstream. They have seen that there are flows of mud when the streets are washed and that the mud flows to the storm drains. They have seen that not all the mud is trapped by the sandbag dams. They have seen the telephone number on the storm drain signs. And they have called. Called the city—the same city that let the contract for Sewer and Water Group 78, hired Ortiz, and stipulated in its contract that the contractor keep the streets clean; and from this branch of the city has come an edict. Its form is a nasty letter to Jesse that says he must cease and desist all street washing. That or prepare himself for court.

Eventually, the city relents and again allows Jesse to wash the streets. But by then the job has moved on and we are forgotten. Never are we washed.

Rain, of course, would have washed the streets and carried its load to the storm drain whether the city or my vigilant neighbor liked it or not. But when Sewer and Water Group 78 came to Burlingame, San Diego had just begun the longest dry spell in its recorded history. Not for seven months would it rain.

April 1 (Tuesday):

Samir has been gone for several days now. He is due back today, however, and in honor of his return Jesse has a crew begin preparing for the test that will demonstrate the integrity of their pipe—and after which Ortiz can send the city a bill.

The test has been a subject of much recent conversation among the men and several are eager for me to see it. Variously, they have called it the *Wayne ball* test, the *mandrel* test, and the *Wayne ball and mandrel test*. No one knows exactly how to spell mandrel or where the Wayne ball got its name.

Mandrel, I am assured by Allen Thomas, Executive Director of the National Association of Sewer Service Companies (NASSCO), is not spelled like the homophonically named blue-faced primate. Nor is there a double *l* on the end as I am told by a sales representative for a local pipe supply company. (The dictionary is not much help in the matter, for I can find none that describe a device like that to be put to use in our sewer.) The objects about which I am asking, says Thomas, are properly called *test mandrels* and are commonly used in the drilling of water and oil wells to ensure the straightness of long lengths of pipe and for which purpose they are available in a variety of sizes.

Ortiz's mandrel is about a foot and a half long; it looks like a heavy-duty cylindrical steel cage, with a spindle through the center and cone-shaped ends fitted with rings to which a rope can be tied. The mandrel's critical dimension, however, is its diameter: a fraction under eight inches. The internal diameter of the new sewer main is eight inches and if the mandrel can be passed through the pipe from manhole to manhole it means the intervening section of pipe is free of deformations. "It's a simple test," says Samir. "If the mandrel gets through, the pipe passes."

The Wayne ball presents its own mystery. "It was named after its inventor," says the supply company representative. "It was invented by a guy named Wayne." But there's a tone in his voice that inspires less than complete confidence, and an ensuing series of phone calls leads me higher and higher up the supply chain until I finally find myself on the phone with an executive of the Sidu Company, in Los Alamitos, California. Sidu is the maker and seller of Wayne balls; the company's name, says the executive, is an amalgam of the words Sidney and Duke.

Sidney Preen, says my informant, was the inventor of the Wayne ball, which is a brand name for what is generically called a cleaning ball. Preen worked for the Long Beach sanitation department in the 1940s and he invented the cleaning ball out of necessity: Long Beach was so flat, and its sewer system had so little fall, that sediment would accumulate in the lines and the pipes would periodically become blocked. Preen sought to address the problem by developing a routine way of cleaning the sewer pipes. For this, he invented the cleaning ball, which can be pushed or pulled through a sewer pipe and carries before it any and all accumulated debris.

Like mandrels, Wayne balls are matched to pipe size. The balls (which are more ellipsoid than spherical) are made of heavy black rubber and inflate to size; Ortiz's will fit a pipe 6 to 10 inches in diameter. Metal D-rings are fitted to either end of the ball, and raised spiral ribs cause it to spin when propelled. Most Wayne balls, says the man from Sidu, are between 4 and 12 inches in diameter, making Ortiz's a midrange model. The company does make and stock balls up to 30 inches in diameter, but beyond that there's not much call for the product because big pipes tend to be self-cleaning. There are exceptions, however, and the biggest Wayne ball ever made was a custom job seven feet in diameter.

The Duke in Sidu's name is none other than *The* Duke—John Wayne. Preen was Wayne's stepfather and after Preen invented the cleaning ball, Wayne put up the money to get him started in business. In thanks, Preen named his ball after him. Which means John Wayne is most likely the only person ever to have been honored by the naming after him of both an airport and a device for cleaning sewers.

Many of the guys on Sewer and Water Group 78 have a hard time believing this story when I tell it to them, but I swear to them it's true. As Dave Barry says, I am not making this up.

* * *

The crew Jesse assembles to prepare for the test consists of Paul Anguiano, Rafael Morfin, and Genaro Tapia. Three sections of sewer main will be tested: one corresponding to each of the arms extending from the Laurel and Maple Street Y. Ours will be first, and the men begin by flushing the pipe.

"We'll flush it out," says Paul, "and it will be perfect."

The flushing begins with the setting of a trap in the downstream manhole—in this case, the manhole at the Y. The trap consists of an L-shaped piece of pipe fitted on one end with a rubber collar. The collar is stuffed inside the mouth of the manhole's egress pipe and once placed has the effect of preventing water from leaving the manhole until the water level has risen to the top of the trap. As the water rises, rocks and other sediment washed from inside the upstream pipe will settle in the bottom of the manhole, where they can be removed by hand. This preliminary cleaning, says Jesse, "makes it a lot easier to do the Wayne ball."

Once the trap is set, the men move upstream to the manhole near my house. Genaro climbs inside, and after him the other men drop in a fire hose, which Genaro feeds into the mouth of the pipe leading back to the Y. They turn on the fire hose and water begins blasting downstream.

As they would at the bottom of a slow-running pool in a mountain stream, mud and gravel soon begin accumulating in front of the trap. Eventually the buildup slows, and Genaro descends into the manhole and begins shovelling the collected lees into a five-gallon bucket lowered from above. Live sewage is flowing in the manhole as well as water from the fire hose, and when he is done Genaro climbs the ladder and sits for several minutes on the cast-iron rim of the hole, legs dangling, hands to the side and behind for support, and chest drawing great breaths of fresh air.

When he has recovered, Genaro and Rafael make ready the Wayne ball, placing it inside a short length of pipe and pumping it to size. They then tie the back of the ball to the end of a great spool of nylon rope and carry the assembly to the upstream manhole. From the street, they reposition the fire hose so it hangs loose in the manhole's shaft, they restart the water flow, and into the rushing stream Rafael drops the Wayne ball and rope, paying out the yellow cord as if it were a handline with hook and bobber. And indeed, he once caught an alligator with this very setup.

"I was working the Wayne ball alone," he says. "And there was a lot of dirt in the line, so I was working it slow." He was upstream, and the procedure is to let the water push the ball a few feet, then pull it back. "Let the water push, then pull back. Slow, so you get everything cleaned out."

There he was, standing on the street, tugging and letting go—tugging and letting go—his rope down the sewer, when a couple of kids came over to see what he was doing.

"'What you got?' they ask me.

"'Alligator,' I says.

"'Oh!' they says. 'Oh!'" And, with his hands held wide, he shows me that their eyes were big as plates.

"Next day they see me again and they ask me, 'You catch him?'

"'Yeah,' I says, 'I catch him.'

"'Oh!' they says. 'Oh!'"

And his eyes twinkle at the memory.

Today, however, it's doubtful he'll have such luck. Instead, his hope now is that the gushing flow of water will carry the Wayne ball into the mouth of the pipe and thence downstream. But the clearance is tight, the ball shows no signs of entering the orifice anytime soon, and within a few minutes the men revise their plan.

Retrieving from their truck a small plastic bag, they improvise a balloon. To this they attach a second rope, then drop the rope-cum-balloon into the torrent of water and watch as both are swept into the pipe and begin floating downstream towards the manhole at the Y—there to be extracted by Anguiano. Having threaded the pipe, they tie the new rope to the front of the Wayne ball, which is now affixed on either end with more than 300 feet of rope and can be pulled directly through the pipe—or, if need be, worked back and forth like a shuttle.

At 11:30 Samir appears, ready for the test. Rather than make him wait, or perhaps because he himself wishes to wait no longer, Jesse orders a change in the rigging of the Wayne ball: he has the men temporarily untie the rear rope then splice in the mandrel behind the ball. They will pull both through together.

At 11:50 Rafael lowers the entrained Wayne ball and mandrel into the upstream manhole. Downstream at the Y, Genaro stands on the street over the manhole and begins pulling on his end of the rope. Kneeling beside him, Jesse and Samir peer into the manhole, craning their heads inside for a better look. The resistance of the ball in the pipe appears considerable and Genaro pulls hard, drawing with both hands and bending his back to the work. Coils of yellow nylon pile on the road beside him.

Genaro strains harder and harder, until for a moment there is no movement at all—the rope appears snagged. To free it, Jesse first tries dropping a ladder into the manhole, routing the rope over the ladder's bottom rung, then working the ladder like a giant lever, using the lip of the manhole as fulcrum.

After a few such maneuvers and making little progress, he says, "Maybe we're pulling too many rocks through"—although the thought on everyone's mind is that perhaps the mandrel is stuck and there's a problem in the pipe. Tension builds.

Rethinking, Jesse sends Genaro

down inside the manhole to get a straighter pull. There, Genaro resumes hauling, and now slowly the rope comes.

"Close?" asks Samir.

"Yes," says Jesse. "It should be real close."

Moments later rocks begin emerging from the end of the pipe. Genaro shovels the material into a bucket, which Jesse hauls to the top and dumps on the road, and at 12:07 the front of the Wayne ball appears at the end of the pipe. With a final tug, it and the mandrel come free—like a cork popped from a bottle.

Behind them comes a great gush of water, and Genaro at the bottom of the manhole hops quickly into his bucket as refuge from the flood. While waiting for the waters to drain, Jesse hauls the Wayne ball and mandrel up out of the manhole and tosses them unceremoniously on the pavement; Genaro then cleans the last of the rocks and debris from the manhole, and this too Jesse lifts out in the bucket. At 12:14 Genaro climbs from the manhole for the last time. He is greeted at the top by the sight of a rather considerable pile of dirt, gravel, and large pebbles—the fruit of his effort.

"I ought to save this," says Jesse—laughing now—"for when the guys tell me they don't knock no dirt into the laterals. This is what you call construction debris." Because it is lunchtime, several men from elsewhere on the job have gathered around the manhole and among them is Breshears; glancing at the pile of rocks Jesse says to him, "So it was you who dug these laterals wasn't it?"

"You're not happy with me are you?" says Breshears, unsure whether he's being ribbed or reprimanded.

"The guys I'm not happy with," Jesse replies, "aren't here no more." And the foreman joins the operator for lunch.

* * *

Later, I ask Samir if he has ever seen a test fail. No, he says, never. "Although I've heard about it." And later still, in another part of Burlingame, the test would fail—the mandrel would become stuck and have to be pulled out backwards. There, the crew would have to reopen the trench and dig down to the newly laid sewer, where they would find the pipe compressed and made oblong from too much compaction pressure.

But today, on the street where I live, the pipe has passed the test. The city will buy it.

April 7 (Monday):

The plan today is to finish the last few pick-up jobs on the stretch of Maple before my house—the sewer equivalent of dotting your *i*'s and crossing your *t*'s. Foremost among these chores are capping the last bit of trench to and around the new manhole and deactivating the old, brick manhole that once served in its stead. These are relatively small tasks, and Jesse assigns to the job a three-man detail consisting of Mark Breshears, Greg Weber, and Don Gingrich. Around the corner, another crew is similarly occupied on the east-running portion of Maple.

The purpose of deactivating a manhole instead of simply abandoning it is to prevent the leaving of an empty space below the road which could eventually fill with water and collapse. It's also important, says Gingrich, to discourage the potential future use of the manholes by anyone else. "You don't want some company laying cable through the old sewer," he says. Many of the old manholes in Burlingame occupied positions that were needed for new manholes, and these were therefore removed completely in the course of construction. But the angle taken by the old sewer around the dogleg in Maple was more obtuse than the new, so the two systems diverged as they made their turns, leaving the old manhole stranded in the middle of the street and connected to nothing but two short runs of pipe going to and coming from nowhere—a Tinker Toy hub attached to two lone connecting rods.

The decommissioning of the manhole actually began late last week when the pipes in and out were plugged with concrete, and the action resumes this morning when Weber climbs inside with a jackhammer. The fit is tight because the old, chimney-like manholes are considerably more confining than the new. But even so, Weber finds room to work and soon reduces the bottom few feet of walls to a heap of rubble. He climbs out, and onto the pile Breshears dumps gravel until the space is filled.

Additional tasks occupy the men, until finally Breshears trades his backhoe for the Vibra-Plate (looking, as he does so, a little displaced on the ground and out of the cockpit) and together the three men make ready the last of the trench for capping. They smooth and compact the dirt, clean the sawcut's edges and environs, and lay flat their mylar strip:

CAUTION . . . CAUTION . . . CAUTION . . . .

All soon is ready for concrete. But none arrives.

Down the street, trucks have been pouring throughout the morning and early afternoon. But not until midafternoon do the men there send a truck our way, and when it comes it is naught but a phantom and a tease. Chute down, the truck backs to the waiting trench and begins turning its drum, but all to emerge is a damp trickle and a muffled clatter. The motor races and the drum spins, but still there is nothing. The truck is empty. And it's too late for another.

One more day the end will be postponed. Everyone, though, is impatient to finish and move on. And rather than undo the day's work—rather than fill the holes they've cleaned and readied—they decide instead to cover them with steel. Nor do they even bother to bevel the plates' edges with asphalt. And in the large, irregular area around the top of the manhole, they simply park two backhoes—leaving the road safe by virtue of occupying it.

Tomorrow the trucks will come. Tomorrow they will finish.

April 8 (Tuesday):

The men have moved on. They've taken their equipment—most of it—and begun a new excavation in a new part of Burlingame. The remnant of capping left from yesterday is but a small job, and not until late morning do Joaquin, Pedro, and a third man show up to prepare for

the pour.

With the Bobcat they push aside the steel plates. They tidy the sawn edges of the pavement. They straighten the mylar strip—time capsule for future excavators. They sprinkle the dirt. They sweep. They wait. And as they wait, they get themselves in trouble.

The principal area to be capped is the square in the road below which the space was dug for the new manhole. Originally eight feet on a side, the square has been nicked and dinged to the point of irregularity and forms now a great, jagged-edged basin. Within this basin the top of the manhole sits like an island protruding from an ocean of dirt. This exposed tip consists of three layered elements: the apex of the concrete cone perched atop the manhole's subterranean stack, the concrete spacer ring, and the cast-iron lid and supporting frame—the only parts that will ultimately show.

The purpose of the spacer ring is to raise the manhole cover to the proper level, which in this case is supposed to be half an inch above street level (the half inch meant to allow for the possibility of future repaving). The spacer is five inches thick, but as Joaquin and his colleagues wait for the concrete truck they get to looking at the spacer, and after a while it begins to seem to them that the spacer is too thick. They push aside the cast-iron cover assembly, lift one edge of the concrete ring, roll it onto the pavement, lay it down, retrieve a hand sledge and chisel, and begin chiseling away at the ring's underside.

After they have been whittling for a while in this fashion, an important looking man from the Ortiz front office happens to drive by. I can tell he's important because he's in a new truck and talking on a cell phone. When he sees what's happening, he stops the truck and leaps out to inspect. He paces. He barks; barks in Spanish. He jumps on a nearby backhoe. He drives to the chiseled ring, has the men chain it to the backhoe, lifts it back in place, then does the same with the cast-iron frame.

He then springs from the backhoe and instructs the men to run a string across the basin from pavement edge to pavement edge. The string shows that the manhole is about an inch higher than the road, and in English he tells them harshly, "You're trying to make it too perfect. An extra half inch is nothing." There is plenty of road surface around the manhole, he notes, and "In ten feet you can feather that out with asphalt and it will make no difference. You're working twice." And with that he gets in his truck and drives away.

"He's a bit touchy," I say to Joaquin.

"Yes," he says. "But you should see him when he's in a bad mood."

Perfect, goes the old saying, is the enemy of good enough. My wife might even add that perfect is the enemy of anything at all, for around our house we have no end of needed repairs that I've postponed until the necessary combination of time, money, and know-how permits me to do them "right." Many of these jobs could no doubt be usefully performed in a less-than-perfect manner, but for me just "making do" won't do, and so I don't. It's a problem.

Still, in those for whom it exists, the impulse to strive for perfection is hard to resist. And once the man from the front office has gone, Joaquin and the other two remove the frame and spacer and make a last adjustment on the fit.

For reasons unknown, the concrete does not arrive until 4:00. For hours the three men sweep and pace, the work having moved away and they having little else they can do here. It is the first time I have seen any of the men from Sewer and Water Group 78 killing time. When the truck finally does arrives, the pour itself takes less than twenty minutes. By 5:30 the men have finished tamping, screeding, and rough floating the surface and are ready to go home. But the concrete is not dry. And because it is so late, they simply slide the steel plates back over their work for protection. These they top with warning standards. And then they leave. It is 6:00.

Watching, my neighbor John tells me he has been told that tomorrow they will finally wash the street. "Then," he says, "we will be free again."

April 9 (Wednesday):

First thing this morning, two men from Sewer and Water Group 78 come to retrieve their blue outhouse. In tow, they take it a block away to San Marcos Street. Later in the day they come for the steel plates. And with that, all that is vital to the work is gone.

The washing of which John spoke so hopefully does not happen. Jesse is still in the clutches of the city's conflicted bureaucracy, and it is days before he is able to send so much as a water truck. But unlike the fire hose, the truck merely dampens the dust and does not remove it. And when the truck leaves and the street again dries, the clouds of dust are again given new life with every passing vehicle, and in their daily rebirth they prolong the cleanup inside our house.

For the dust has taken residence. On every surface it falls. On windows, on screens, and on window ledges; on books, on tables, and on vases; on my computer screen it falls. Falls unendingly. And everywhere it leaves a film, and in the film are trails and silhouettes as objects are moved and removed and fingers trace their tracks. In the kitchen and in the garage the grit gives a crunch and a slide to trips across the floor.

It takes weeks to rid ourselves of this blight. At times during this period I am put in mind of the fate of the mythical town of Macondo, whose citizens were consumed in a whirlwind of dust at the end of one hundred years of solitude. Other times, though, I am moved to think of the great circularity of which our cleanup becomes a part. For we wipe the dust from our house with rags we wash in our washing machine. There, the dust is transferred to the wash water, which is discharged down the drain and into the very sewer from whose birthing it rose.

Through the sewer, the dust will travel under the street before my house—Maple Street—and from there to Laurel. From Laurel it will go to San Marcos, then to Burlingame Drive, and then down to Switzer Canyon, out of the million-year-old Lindavista Formation and into the still-older sandstone of the San Diego Formation. In Switzer Canyon, says Charles Yackly, Deputy

Director of the city's Wastewater Collection Division of the Water Utilities Department, who one day met with me and drew from his shelves book after book of intricately detailed maps showing every sewer and manhole in the city, the 8-inch main from Burlingame joins those from the surrounding neighborhoods and runs into a 10-inch main that makes its way through the canyons of the golf course at Morley Field.

Downstream from the Navy hospital, that 10-inch main joins the 18-inch main from Powerhouse Canyon and the two merge into a 24-inch trunk line. That line crosses under Interstate 5 and heads south, skirting the edge of downtown and growing all the while. By the time it crosses Market Street the line is 39 inches in diameter; buried beneath Harbor Drive, it is four feet when it passes under the Coronado Bay Bridge, and five feet by the time it enters Pump Station Number 1, in the middle of the 32nd Street Naval Station.

All this way the dust will have traveled downhill. It goes to the Navy base because that's where San Diego's first sewage treatment plant was built, in 1943. Before then, the city's sewage flowed through nearly a score of pipes directly into the ocean and bay—untreated. But when the plant was built the collection system was consolidated, with the result that all the sewage in the city was directed to this one point. It was drawn by gravity and all the fall available was used to get it here; practically speaking, there is no more downhill from sea level.

Once you've directed a large quantity of sewage to a given low spot it's pretty much going to keep going there. So when the city's treatment facilities were moved in 1963 to the far side of Point Loma (peak elevation 428 feet), the old plant was replaced with PS1—the engineers gave gravity a boost.

At the Pump Station, sewage that goes in headed south makes a 180-degree turn and comes out heading north, still under Harbor Drive. The pipe too emerges with a new name. Now it's a force main—pressurized and christened the South Interceptor, a grand sounding name for a pipe six feet across. The South Interceptor follows a course downtown that parallels in reverse the path much of its contents took on the way south; at Island Street the Interceptor passes directly below the southbound pipe with contributions from Burlingame, the dust from my home having here traveled a great loop. Through downtown the Interceptor gains both girth and brawn—accommodated by a tunnel, it slices through one eight-block stretch diagonally, and elsewhere it passes in plain view through the basement of one of downtown's toniest high rises.

By the time the South Interceptor reaches Pump Station Number 2, just west of Lindbergh Field, the pipe has grown to nine feet in diameter. At PS2 the South Interceptor meets the North Interceptor, a similarly large pipe carrying effluent from the north of the city and communities as far away as Del Mar and Poway. From Pump Station Number 2 there emerge two 87-inch steel pipes; you can see them from Harbor Drive. They're painted a pale aqua. Together, says Yackly, they constitute a "two-barrel force main."

For historical reasons, the pipes from PS2 follow different routes to the Point Loma treatment plant. One continues overland, buried under streets, rounding the bay then turning south toward La Playa. The other goes underwater, taking the plunge at Spanish Landing, swinging around the southern tip of Shelter Island, then coming ashore under the beach at the foot of Kellogg Street. Amidst the million-dollar-plus homes of La Playa, the barrels reconverge, head uphill, then enter a tunnel bored through the spine of Point Loma—bored, in part, through the Late Cretaceous shale and yellow sandstone of the Point Loma Formation, sedimentary rocks laid down about the same time the Natural History Museum's nodosaur was walking early Carlsbad.

From the tunnel, the dust from my home will be carried a mile or so south along the sage-covered and windblown coast of Point Loma to the Wastewater Treatment Plant. Here, along with the sewage of 1.8 million people—190 million gallons a day—it will be screened, digested, flocculated, and settled out. Eighty-five percent will be removed. (This is an important number, 85 percent. It's the percentage of solid removal obtained from the more advanced, "secondary" treatment methods specified as necessary by the federal Clean Water Act. At one point San Diego was only removing 60 percent of its solids, and its refusal to institute secondary treatment was a major reason the EPA sued in 1988. San Diego argued that secondary treatment was unnecessary for a coastal city with a deep water discharge, and ultimately it received a waiver enabling the avoidance of a multi-billion dollar facility upgrade. Nonetheless, under court pressure the city worked to refine its methods, and in 1996 it achieved an 85 percent removal rate using aggressive primary treatment.) For now, the solids removed at Point Loma are piped to Fiesta Island as "sludge," which is then dried and trucked to a landfill. Soon though, it will be sent to the new Metro Biosolids Center in Miramar, where it will be further digested, spin-dried, composted, and made available for return to Mother Earth as a commercial soil amender.

The 15 percent of my dust that escapes this fate will be piped 4½ miles out to sea, at trip that will take it first through the city's original 9-foot diameter concrete outfall pipe and then through the 12-foot diameter extension added in 1993—an extension that made San Diego's the longest such pipe in the world. This is the end of the line; here, the dust from my home will have journeyed some 22 miles through ever bigger mains, trunks, and interceptors before finally leaving the outfall pipe through vents in the big Y diffuser that spreads across the floor of the Pacific Ocean at a depth of 320 feet.

From the diffuser, much of the dust will be caught in ocean currents and diluted—rising in plumes and spread far and wide. Some of it though will settle into the mud, and probably not far away. With time, that mud will be buried by more mud, and with even more time it might become rock. It might, in the language of geologists, lithify. With more time still—lots more time—that rock, riding, as it would be, on the edge

of the Pacific plate, might be driven downward as the earth's crust slides one piece over the other and it might then liquefy to form magma—rising with time through volcanoes as yet unborn and making new rhyolitic stone, which might tumble down new rivers making new cobbles and new dust as the grand cycle repeats itself yet once again. By which time our new sewer will long be gone.■