

THE COMPLEX

The politics at ground zero have been painfully difficult. But its construction demands may be even worse.

BY CHRISTOPHER BONANOS

NINE YEARS INTO the rebuilding of ground zero, and we're just now getting unstuck. The stakeholders are wrapping up their arguments over who controls which slices of the site, having finally settled on a schematic plan, memorial design, timetable, and financing arrangement that everyone can more or less live with. The public spent a decade being worn down by politics and arguments: Larry Silverstein versus the Port Authority. Pataki versus the NYPD. Libeskind versus David



Childs. Bloomberg versus Paterson. Memorial designer Michael Arad versus the victims' families. All around those debates swirled the question of whether, economically, this project makes any sense at all, dumping as it does 12 million square feet of office space onto a now-deflated commercial market. Even if you did believe the whole thing should happen, it has been excruciating to watch the site get caught in the old New York snarl of permit agencies and sluggish bureaucracies and every possible variety of red tape.

Those issues, at least, are not physical realities; they're obstacles based on human nature. Yet, for a long time, they obscured the perhaps even greater problem of building on what is probably the most difficult construction site in history. The architects and engineers involved have known this all along, of course, and now that construction is roaring forward, the rest of us can see what they've been up against. Every bit of land at ground zero is crowded with supplies, workers, and ris-

more, Owings & Merrill who's going to end up spending at least a decade of his life directing his firm's chunk of the job. The buildings' foundations and underpinnings are seven levels deep, all knitted together, and in the future, as you walk around the concourse levels, you will constantly be changing jurisdictions, sometimes every few feet: in Port Authority territory here, on MTA turf there, entering privately developed space around the corner.

That's a major reason the construction has appeared even slower than it has been: A lot of significant work has taken place out of sight. One World Trade alone has 350,000 square feet of space beneath the surface. (For comparison, that's the entire size of its 25-story neighbor at 44 Wall Street.) Chris Ward, executive director of the Port Authority, puts it this way: "What people don't realize is, setting the foundations, doing the preliminary work below grade before the tower could even be visible to the public, was three years in the making."

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ing steel and concrete. One World Trade Center (the skyscraper formerly known as the Freedom Tower) is 26 stories high and beginning to poke its head into the downtown skyline. Even at quarter-height, its density and bulk are evident, and you can start to grasp how jammed up against the PATH tracks it is. Its neighbor at Four World Trade is up to about five floors, hard by the 1 train that continually rattles through the center of the site. The two memorial pools are framed out, and underground construction is moving forward on Santiago Calatrava's swoopy transportation hub. Foundation work for Towers 2 and 3 starts next month, and the contaminated Deutsche Bank building, looming over the southern end of the site, will come down later this year to make way for Tower 5. Libeskind's abiding idea—five towers standing guard around a sunken memorial—is inching toward reality.

Actually, "five towers" is a misnomer. It's really all one giant sixteen-acre megabuilding, with many zones held by many stakeholders, their structures intermingled "like metastasized synapses in the brain," says T.J. Gottesdiener, the partner at Skid-

Two tunnels run through the sixteen-acre World Trade Center site: the 1 subway line, north to south, and the PATH tubes, looping through and going directly under One World Trade. This is not an abnormal obstacle on its own; New York architects and engineers deal with subway tunnels under their buildings all the time. Consider, though, what they have to do here, since the underground memorial is bisected by the subway: prop up the "box"—the tube containing the subway tunnel, now exposed on its top and sides—and pour a new foundation under it, piecemeal. It can't move an inch during all this, of course, lest the tracks misalign or the walls crack. The MTA has movement gauges all over the site, and the limits are given in millimeters. One staffer involved with the project said flat out, and very much not for attribution: "They should've shut that train down for three years, and demolished the whole thing and started over." Why didn't they? It's the only train running to South Ferry and thus serving Staten Island's ferry commuters.

You can pile up superlatives about the new towers from here to the 102nd floor.

Two large cranes sit atop One World Trade right now, either of which can pick up 70,000 pounds in one yank. "Did you see the counterweight on the back of that thing?" Ward asks me. "It's the size of a fucking house." The immense girders at the base of the building ("Those big pieces of steel are psycho to think about," he adds) weigh 70 tons apiece, and every one came over the George Washington Bridge and down the West Side Highway, at dawn. Altogether, 45,000 tons of structural steel will go into the first tower and 22,000 tons into the transportation hub. Much of the plaza structure is (counter-intuitively) being built from the top down instead of the bottom up, because the memorial is scheduled to open before the lower concourse does. Right now, there are about 1,400 construction workers on the site, and by next year, that number will swell to 2,100. If everyone working in One World Trade were to make his way downstairs at lunch, it would take half a day, which is why there's a structure hanging inside called "the hotel": a stack of shipping containers two stories high, containing bathrooms, offices, and a Subway sandwich outlet. Every time the center of construction activity shifts, the hotel is jacked up a couple of stories.

The Port Authority is projecting an opening date of late 2013 for One World Trade and is in the process of negotiating a partial sale of the tower to a private developer. (Last week, the *Times* reported that Condé Nast is considering leasing up to a million square feet.) These days, a lot of what's coming into the site is concrete—up to 2,000 trucks per month, precisely timed so their contents don't start to harden before they're poured. As the job shifts from basic structure to fitting-out, deliveries become an even larger part of the logistics, because there are so many: glass, plumbing, air-conditioning ducts, all by the ton, daily. There is no vacant lot (or landfill, as was the case when the Twin Towers went up, 40-odd years ago) to stash materials, only a tiny sliver of a staging area, slotted in next to Greenwich Street. Supplies, therefore, have to arrive in small batches, just before they go into place, and over at 115 Broadway, there's an entire office devoted to coordinating trucks and deliveries. Every building site works with some kind of coordinator, but Ken Lewis, another SOM architect, explained the difference this way: "Usually, it's four guys who go over this once a week. Here it's twenty," all full-timers. (Consider all this good practice for managing the tour buses that will start streaming in after the memorial opens on the tenth anniversary of the attacks—two years before

the parking garage is finished. The Port Authority is projecting that the site will be the single biggest tourist destination in America, outdrawing the Vietnam Veterans Memorial.)

There's also another, larger trafficking group at work. Called the Lower Manhattan Construction Command Center, it exists to keep the whole jurisdiction circus south of Canal Street under control: forestalling clashes where, say, the Port Authority bumps into the MTA and argues with Verizon over its cables while talking to the NYPD about traffic and fielding questions from Silverstein's team. "It's certainly a challenge beyond anything the city has done before—I would say anyone has done before," says the LMCCC's executive director, Robert Harvey. "This is rebuilding a city as it operates. Everyone always says it's like doing open-heart surgery on a marathon runner in the middle of a race."

When things do go a little awry, the basic nature of these buildings makes it hard to recover. Lewis lays out, just as an example, a scenario that happens all the time on your typical construction site. Let's say, after a small miscommunication between an architect and a concrete team, a wall is poured and finished, and it turns out there was supposed to be a pipe through it to carry electrical wires. In any other building, what happens next? "The contractor usually counts on being able to cut a hole in the wall afterward," Lewis explains. "Here, we have 14,000-psi concrete"—about two and a half times denser and stronger than the usual stuff. Nobody's drilling through that. Everything has to be right the first time, and when it's not—and it sometimes isn't—undoing it is tremendously difficult.

The sparkling finial that will top off One World Trade may eventually come to define it on the skyline, but extra-dense concrete is far more suggestive of what this building really is. Every inch of the tower, from subbasements on up, is braced against an imagined future attack. Its chunky base, twenty stories tall, is dramatically armored—or "hardened," the builders say. Heavy reinforced walls at street level extend outward and underground, making even the plaza explosion-resistant. The glass outer skin of One World Trade—blast-tested, successfully, out in the New Mexico desert—will hang on extra-heavy steel. That structure surrounds an inner, slightly less hefty frame that holds up floors and the rest of the interior. That, in turn, houses an elevator core, its walls up to eight feet thick, made of that super-dense concrete and packed with steel rebar as thick as your wrist. In its current raw



A view north to One World Trade Center.

state, it looks like the containment dome over a nuclear reactor, except with slots for turnstiles. "If we hadn't had to do that," says the Port Authority's Steve Coleman, "we'd be past 50 stories by now."

In the past, the difficulty of building in New York—even on sites as challenging as downtown Manhattan—was of local origin: the density of our urban grid, the egos of our power players, the grind of our bureaucracy. But the architecture and infrastructure of fear brings a new layer of complexity, one that stems from global forces and is largely beyond our ability to resolve. While ground zero may be an es-

pecially alluring terrorist target, we have moved into an age where every part of a major building is shaped by security plans, from truck inspections at the parking garage to airport-style screening at observation-deck gates. In this sense, One World Trade is the city's future. Asked whether he went through a background check, Gottesdiener says, "Oh, yes. Everyone does." There's a lot of stuff in that building that he can't discuss, and elements of the design that even his team of architects isn't privy to. Ask him about it, and he tightens up: "When it comes to security, we take confidentiality very seriously" is all he'll say. ■