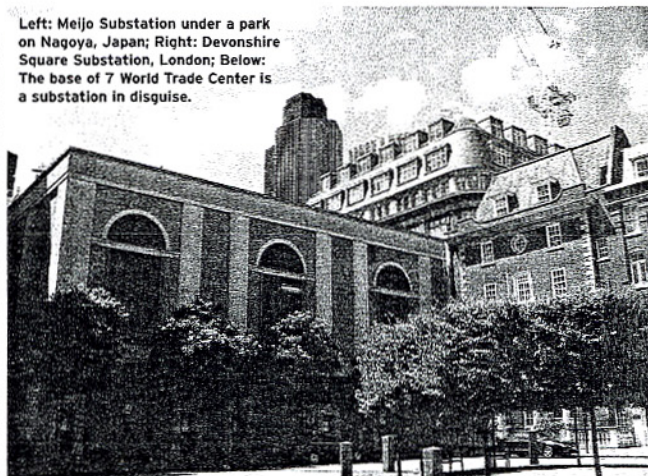


COMMENT: HOPE COHEN



Left: Meijo Substation under a park on Nagoya, Japan; Right: Devonshire Square Substation, London; Below: The base of 7 World Trade Center is a substation in disguise.



PUTTING THE SUB BACK IN SUBSTATIONS

A few days before the 2008 presidential election, Barack Obama called for the construction of a "whole new electricity grid." Such a system would draw power from the Midwest's wind-blown plains and the Southwest's sun-baked deserts and then distribute it through transmission lines to energy-hungry coastal population centers.

But moving that electricity the final few blocks requires another kind of infrastructure, the area substation, where transformers reduce the high voltages of long-distance transmission to levels usable in residences and businesses nearby. Moreover, large cities like New York require an additional level of voltage intermediation and thus also need to find locations for larger substations, housing transformers one step higher in the power path than the equipment in area substations.

Fitting In

Utility companies often encounter resistance when proposing a site for a new substation: Neighbors fear the facility will bring increased risk of fire or explosion. Some have concerns about noise made by operating machinery or the long-term health effects of exposure to high voltage. Since burying or enclosing the substation solves all of these problems, the biggest questions are about design: What will this substation look like, and what will it do to the visual and social fabric of the neighborhood?

All too often, windowless concrete or brick bunkers enclosing the substation's electrical equipment deaden the street. Even worse are unenclosed substations in less-developed areas—electrical equipment completely naked to the elements, with chain-link fence and razor wire surrounding them. Fortunately, many other design solutions are possible.

One design approach is to build a facade that harmonizes with the substation's neighborhood. For example, Dotonburi substation looks natural next to the Ermenegildo Zegna store in Osaka's fashionable Amemura district. Devonshire Square Substation, matching the scale and feel of its neighboring buildings, forms one wall of the London square for which it is named. And the substations

built to deliver third-rail power in the early days of New York's Interborough Rapid Transit, Brooklyn-Manhattan Transit, and Independent subway systems were handsome examples of civic architecture, many with fine exteriors.

Increasingly, Con Edison has been employing this approach—at Astor Substation in Manhattan and the Mott Haven Substation complex in the Bronx, for example. They feature brickwork, cornices, and false windows and doors designed to fit with neighboring buildings. But a stand-alone substation is not the only answer for cities where land is especially precious. Putting the "sub" back into "substation" by placing them beneath buildings, parks, and plazas moves them out of public view while conserving scarce land for more urbane uses.

Sub Buildings

New York's gleaming 7 World Trade Center is a stunning example of just such an approach. Though wrapped by a generous lobby and thus hidden from view, an area substation forms its base, making the office space above it that much more valuable: The views from the 11th floor, the first above the substation, are a lot better than they would have been on the second. Land-starved cities such as London and Tokyo have been combining substations with other uses for decades. Kingsway Substation has rested beneath an office building in the heart of London's theater district since 1967. The new Tooley Street Substation, opened in 2002 in Southwark, is built into the underground garage of a commercial complex abutting the Hilton Tower Bridge hotel.

Similarly, all around Tokyo, many building types—from modern office towers near the Ginza to schools to traditional Buddhist temples—have long housed transmission-level and area-level substations. The Tokyo Electric Power Company has scores of substations underground.

Sub parks and plazas

Turning the roof of a substation into a public space is another alternative to low-rise, stand-alone utility structures. Tokyo's Higashi-Uchisaiwai-cho Substation pro-

vides two such lovely, small-scale amenities in a congested area across a narrow street from the viaduct of the main Japan Rail line through Tokyo.

Japan's fourth-largest city, Nagoya, offers a much more dramatic example. Chubu Electric Company's Meijo Substation lies beneath a parking lot serving Nagoya's most famous landmark, the remains of Meijo, a castle built by Shogun Tokugawa Ieyasu in 1612. In tandem with the city's redevelopment of the castle's parking lot, Chubu Electric constructed the underground transmission-level substation. As with Tokyo's Higashi-Uchisaiwai-cho, Meijo Substation's transformers are located approximately a hundred feet below street level. One floor above them is the cable room, and one floor above that is the switch room. Above that is a level of public, subsurface parking.

Castle visitors have no way of knowing that huge electrical transformers lie beneath their feet. A large plaza surrounds the substation's handsome, stone-faced ventilation building, several equally attractive ancillary structures, and a Noh theater. High above loom the castle and its grounds. Because Meijo Substation is situated in a public park within view of a unique historical and cultural landmark, Chubu Electric had to obtain special design approvals from the city. The result is a distinguished architecture encasing a technological showplace.

In London, too, reconstruction of a key public space provided a utility with the opportunity to install a major new substation. Leicester Square's facility is so fully integrated into the park that the control panel for providing access to the substation by means of a hatch in the pavement is built into the West End's discount-theater-ticket kiosk. The substation is completely invisible and inaudible to the hordes of park users above it. On a normal day, thousands of pedestrians stroll several feet above the substation's roof. When the Leicester Square Odeon hosts a film premiere, thousands more congregate above the electrical equipment, whose existence is unknown to them.

The United States is far behind Europe

and Asia when it comes to burying substations beneath public parks. It's just over two years ago that Anaheim Public Utilities opened this country's first such facility, in the California city's East Hills neighborhood. To build Park Substation, the utility cut into the side of a sloping lot in a hilly area of eastern Anaheim. A garage door fitted into the north side of the hill is the sole indication of something going on beneath the quiet community park.

Urbane Infrastructure

These examples from three continents demonstrate the variety of ways that a substation can be designed to fit into its particular context. It may have a facade that complements its surroundings; it could, whether from ground level or below, carry a commercial structure or community facility on its shoulders; or its roof could provide open space, an amenity sought by nearly every neighborhood.

In the earliest days of electricity, substations operated near the commerce and homes that they powered without stirring protest. A century later, with an array of new technologies available, new ones can be better neighbors than ever while delivering the electricity that cities must have to grow and thrive.

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