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Major Restructuring of Tokyo Station:

Challenging Work in a Limited Space

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Major Restructuring of Tokyo Station —Challenging Work in a Limited Space

Tokyo Station has undergone major restructuring. Successfully handling the challenging project required special measures to ensure the continuity of dense train schedules and the safety of passengers and pedestrians, prevent excessive noise and vibration, work in a limited space, and conform to demanding timetables.

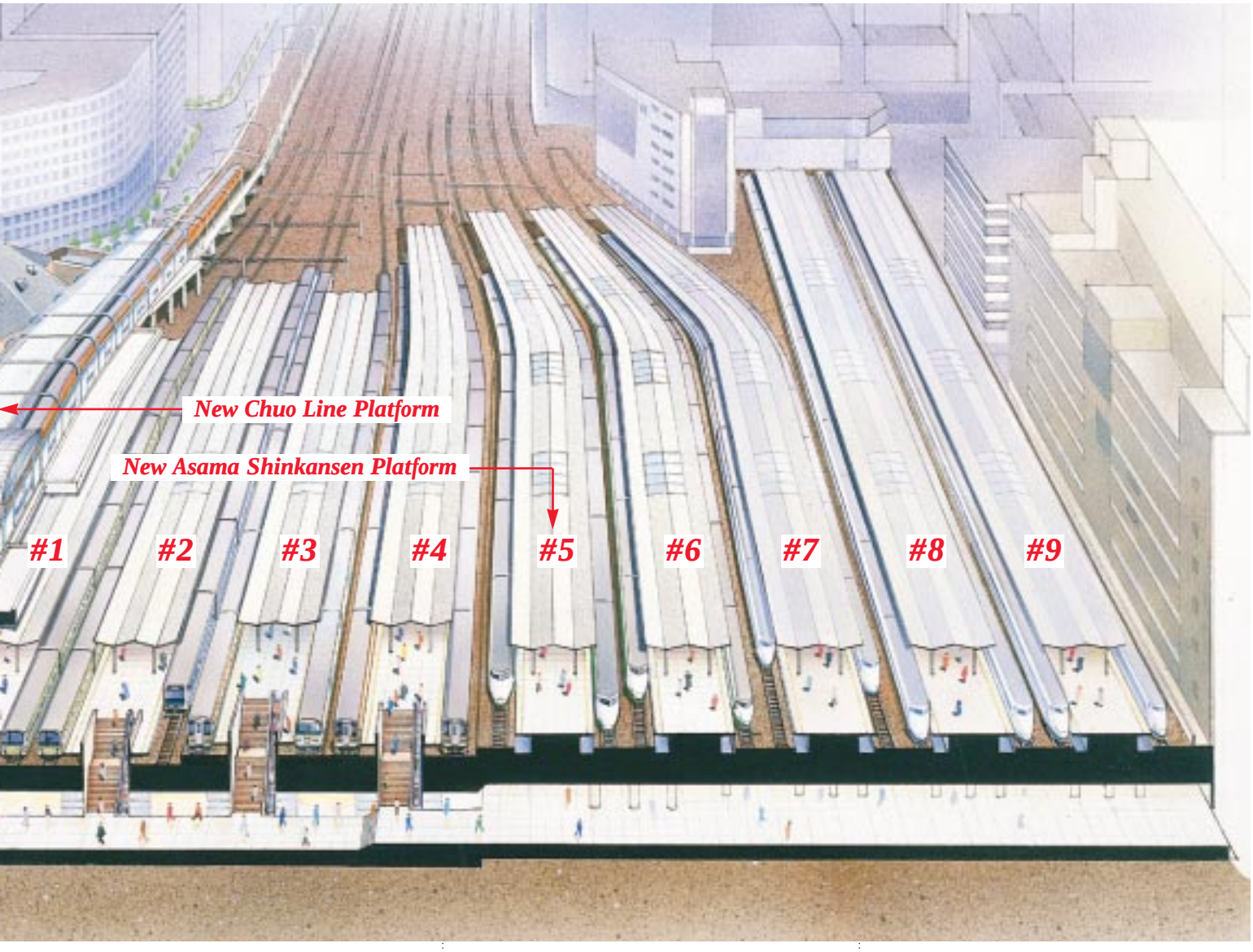
Threading Work Schedules into the Gaps in Dense Train Schedules

The Asama Shinkansen is a new super-express train line that connects Tokyo and Nagano. In 1983, it was decided to locate a terminus of the Asama Shinkansen within Tokyo Station, and plans called for the entire train line to be completed in fall 1997, well before the February 1998 start of the Nagano Winter Olympics. Work to prepare an additional platform at Tokyo Station for the Asama Shinkansen was begun in November 1990.

On a typical day, about 800,000 passengers arrive at and depart from Tokyo Station, and another one million people change trains there. Excluding subway lines, the station has nine platforms for passenger access to 18 tracks used by the approximately 4,000 daily train arrivals at and departures from the station on seven regular train lines and two Shinkansen lines. The station has a staff of 800 people, and its concessionaires employ about 3,000. Although the station is located on approximately 170,000m^2 of land, there did not appear to be any room left for an additional platform.

How has the Asama Shinkansen's platform been created? The project offered several special challenges; namely, the historic Tokyo Station building had to be preserved, train service on all the lines passing through the station had to be maintained continuously, and none of the other functions of the station could be disrupted. The response to these challenges involved unprecedented safety assurance measures as well as noise and dust countermeasures. Because of such special circumstances, the project required three times as much time and funding as an ordinary construction project of similar scale and approximately 530,000 man-days of labor.

It was decided that the Tokaido Line's No. 5 Platform would be made suitable for the Asama Shinkansen.



The Chuo Line, served by the No. 1 Platform on the west edge of the platform area, would be served by a new elevated platform built above the No. 1 Platform. Each line using Nos. 2–5 platforms would be shifted one platform to the west.

There were two main challenges related to this plan. First, in what order should the platform shifts be implemented so as not to disrupt any train service? Second, in view of the limited space and special restrictive circumstances, what kind of equipment and materials should be brought onto the work site?

Kajima was responsible for implementing the project in the southern half of the station area. Masahiko Nishimura, Kajima's project manager, recalls that, "It was felt that completing the project plan would be half the battle. After that, all that would be required would be to implement the plan steadily and accurately, which we thought would be no problem given the experience of the implementers. On the other hand, because of the importance of ensuring the safety of a constant flow of train passengers and guaranteeing the observance of precise train schedules, exceptional care and attention had to be used. Accordingly, we held daily meetings with Japan Railways representatives to discuss each day's work schedule in detail."

If You Cannot Bring in Heavy Equipment, Dig by Hand

Building the elevated platform for the Chuo Line was not an easy task. There were only 10 meters of space between the No. 1 Platform and the historically significant redbrick Tokyo Station building. In 27 spots within that space, 3-meter-thick piles had to be inserted in the ground to depths of approximately 25 meters. Bringing in large equipment to work adjacent to busy

train lines was simply impossible. Thus, the task had to be accomplished using the most basic type of manual labor. Working in two-person shifts, laborers entered the piling holes and dug them to the required depth over a period of about one month. The subsequent assembly of the platform's steel support structure had to be assembled during the few hours between the departure of the last night train and the arrival of the first morning train. Two 400-ton-class tower cranes were installed to the west of the station building, and these cranes served to pass girders over the station building to the work site.

Simultaneously, new concourses were constructed underground amid a maze-like network of existing passages. Since these passages had already been rebuilt and expanded many times since the 1914 completion of the Tokyo Station building, many large underground amalgamations of old concrete and bricks remain. Jackhammers raised a concerted din underground as they cut through obstacles. Naturally, many measures had to be taken to prevent ground subsidence due to excavation, including the installation of H-beam support pilings.

Other severe challenges faced during the underground work was the difficulty of removing excavated soil and debris as well as bringing in equipment and materials. Since the entrances to the concourses are all narrow, large trailer trucks carried girders and other essential materials directly into the domed

An Overview of the Restructuring of Tokyo Station

•The station's No. 5 Platform, which had served the Tokaido Line, was transformed into the Asama Shinkansen platform. Because this move would leave an insufficient number of platforms for use by existing train lines, an additional, elevated platform for the Chuo Line was constructed adjacent to the station building. Also, a passenger concourse was built below the No. 3 Platform.

•The construction of the Asama Shinkansen platform was ordered by East Japan Railway Company, Ltd. (JR East), on behalf of the Japan Railway Construction Authority, while the construction of the elevated platform for the Chuo Line was handled by JR East using its own funds.

area at the southern tip of the station building late at night. Then, redbrick walls along portions of infrequently used underground passages dating back to 1914 were expanded to create an access route.

Rearranging Platform Usage

After the July 1995 move of the Chuo Line to the new elevated platform, train lines using the four platforms to the east of the new platform were successively shifted one platform to the west. While this shift involved such special measures as the construction of special narrow platforms for temporary use, the rearrangement was accomplished smoothly, with no disruption of train schedules.

Plans originally called for the new Asama Shinkansen platform to be completed in October 1997, but a request was later made to advance the completion date three months. Kajima was able to comply with this extremely challenging request by employing unprecedented methods for simultaneously proceeding with civil engineering and construction work.

The Restructuring Process

- Plans called for the Asama Shinkansen to be completed well before the February 1998 start of the Nagano Winter Olympics. To meet this target, the construction of the new superexpress line's platform and the elevated platform for the Chuo Line had to proceed simultaneously.
- The start of the conversion of the No. 5 Platform required that trains on the Tokaido Line, which had previously used four tracks along two platforms, be temporarily rearranged to use three tracks along two platforms. At this time, a temporary No. 5 Platform was constructed adjacent to Line No. 9, and the width of the No. 4 Platform (serving the No. 7 and No. 8 lines) was temporarily reduced.
- After the elevated platform for the Chuo Line was completed, existing train lines were shifted to the west, and the Tokaido Line resumed the use of four tracks along two platforms (the No. 3 Platform and the No. 4 Platform).
- The temporary No. 5 Platform was removed, enabling completion of the Asama Shinkansen platform.

AAT Project

Auto Alliance Thailand (AAT) is a joint-venture company established by Ford (45% ownership), Mazda (45%), and a local Thai company (10%).

AAT's large-scale automobile production facilities are located on an approximately 569,830m^2 site in a newly developed industrial park 130km southeast of Bangkok. Consisting of seven manufacturing complexes as well as administrative buildings, the facilities, with a yearly production output capacity of 100,000 vehicles, were designed mainly for the manufacturing of one-ton pickup trucks for export.

Harmony with and Management of the Environment

The facilities were designed based on the concept of harmony with and management of the land and plant life as well as such natural phenomenon as wind, rain, and sunlight. Although simple in appearance, the buildings were designed using the most advanced tools available. Computer analysis and simulation were used in the schematic design stage to achieve the highest levels of natural ventilation and lighting. In addition, emphasis has been placed on ensuring a safe and pleasant work environment in the tropical climate of Southeast Asia, while minimizing energy usage.

A square building layout has been used in consideration of the production process flow. As a result, the facility is able to utilize a loop utility support system to ensure highly reliable production. This layout also features an open space at the middle of the site, thereby allowing maintenance of the environment mentioned above. Furthermore, the buildings can be expanded to meet future production requirements.

Four retention ponds, which are located at each corner of the site, were designed to ensure that oil and grease spilled on the surface of the roads on the site is not washed onto surrounding areas by rain. The retention ponds also control the outside discharge flow of storm drains.

Five large trees on the site were incorporated into the site layout plan from the beginning. In addition to enriching the site environment with their lush greenery, the trees now stand as AAT's symbol.

The color scheme for the exterior facilities incorporates such natural-element colors as brick and light gray, rising from a ground rich in greenery. Light blue was chosen for the interior color to impart a feeling of coolness and to maintain a pleasant working environment. A corporate blue color and selected "shop" colors are incorporated into elements of the buildings to accent the facilities' vibrancy.

Construction Schedule Strictly Observed

Thanks to the diligence and hard work of all those involved, the construction of this large-scale project was completed within the time specified. As the frames of the structures are steel, the schedule for commencing this phase of the project was strictly observed. As for the rest of the schedule, no effort was spared in ensuring that preconstruction site inspection, architectural design, logistics, and product inspection were implemented according to plan.

Despite numerous days of heavy rain during the construction phase of the project, not only were the facilities ready for the installation of equipment by the scheduled date, but the administrative complex was completed two months ahead of schedule, leaving the clients more than a little pleased.

Focus on Safety

As a result of enhanced safety education and a strengthened commitment to realizing a zero-accident work environment, the construction of the project was concluded without a single serious injury.

Site Development

Although the site is located in a newly developed industrial park, much time and effort was required to secure such utilities as water, electricity, and telephone service prior to commencing construction. Also, at the beginning of the project, the road leading from the main national highway to the site had yet to be completed. Therefore, the completion of a road inside the industrial park for use during construction in the rainy season, using funds allotted in the budget, became a top priority. The problem of constructing a road that would provide sufficient drainage without using gravel was solved by digging temporary drainage ditches on each side of the road and diligently working to maintain the slightly inclined and elevated road.

JAIC Hilton Tower

On September 1, 1997, JAIC Hilton Tower began operations. This project is the first high-rise, exclusive-service apartment building in Colombo, Sri Lanka.

The owner is Japan Asia Investment Co., Ltd. (JAIC), and the operator is Hilton International Co.

Kajima's participation in this project was the hotel's design and construction. JAIC Hilton Tower, which is 34 storeys high and has a floor area of 46,000m^2, boasts 175 luxurious residential units, a five-star class hotel, and recreational facilities. Security and privacy are the key words of the project. Ideally located in the heart of Colombo, the residents can enjoy a panoramic view of the Indian Ocean.

The hotel's grand opening is scheduled for February 1998, after the completion of tenants' work at the ground-floor level.

United States

NY Anglebrook Golf Club

Anglebrook Golf Club is situated on 240 picturesque acres of land north of New York City. The golf course has been described as one that depicts beauty and solitude. World premier golf course architect Robert Trent Jones, Sr., used the site's natural setting to create a true championship-caliber 18-hole, 6,947-yard, par-72 course. The course is challenging, yet enjoyable for players of all abilities.

The construction of the clubhouse, designed by world-leading post-modern architect Robert A. M. Stern, was completed in November 1997. After the grand opening, scheduled for April 1998, the clubhouse will offer members a warm and friendly atmosphere and a professional and caring staff.

Anglebrook was conceived when it became clear that only a few existing golf courses were suitable for use by executives from Japanese subsidiaries in New York. Many golf courses either have restrictions against corporate members or are simply outdated. Kajima International, Inc., an affiliate of Kajima, led this development project. The development approvals were issued in 1994, and the construction of the course began in the spring of 1995. Anglebrook opened for play in June 1997.

Anglebrook's golf course was designed not only with the individual golf enthusiast in mind but also international corporate clientele because, for decades, golf has been popular in the business community and is instrumental in solidifying business relationships.

Anglebrook caters to the special needs of the corporate member. Most golf clubs have numerous guest restrictions as well as large fees applicable whenever membership is transferred. Anglebrook, on the other hand, has virtually no guest restrictions and only a nominal fee when changing memberships. Anglebrook will limit membership to 300 companies, thus allowing each member to make the most of what Anglebrook has to offer.

The owner of Anglebrook Golf Club is Anglebrook Limited Partnership, whose managing partner is Witherspoon Properties, Inc., a wholly owned subsidiary of Kajima.

ENR Announces Worldwide Rankings of Construction Companies for 1996

The *Engineering News-Record (ENR)*, a leading weekly magazine, recently released its performance rankings of the world's top 225 construction companies. Kajima's rankings were as follows:

Category	Ranking	
Foreign revenues	12	(Top ranking among Japanese companies)
Total revenues	1	(Including domestic sales)
Contract awards	1	(Including domestic orders)
Building construction in general	7	(Top ranking among Japanese companies)
Manufacturing plant construction	1	
Asian region (excluding Japan)	6	(Rankings for companies not based in the region)
Americas region	5	(In rankings for companies not based in the region, Kajima ranked top among Japanese companies)

Exhibition Display Materials Moved from Paris to London

As mentioned in the last edition of this newsletter, Kajima displayed scale models and photographs of the Nagano Olympic Memorial Arena, the Izumo Dome, the Akita Sky Dome, DIB-200, and other projects at the Engineers of the Century Exhibition (L'art de l'ingénieur), which was held at the Centre Georges Pompidou in Paris from June 25 to September 29, 1997. Considered a huge success, this exhibition attracted more than 70 thousand visitors. Kajima's materials from the exhibition have subsequently been moved to the London office of Kajima Europe B.V. (see address below).

Continued Recognition of Kajima's Energetic IR Activities

In September 1997, the Japan Security Analysts Association announced the results of the third annual selection by research analysts of outstanding companies with regard to information disclosure. Kajima's full disclosure of consolidated financial information and other aspects of its energetic investor relations (IR) programs were highly evaluated by the analysts, and the Company was deemed top in its industry with regard to information disclosure. This is the third consecutive year that Kajima has been singled out for this honor.

Aiming to further strengthen its relationships with stakeholders, Kajima intends to maintain its positive stance toward information disclosure and IR activities centering around its annual report.

Cleansing and Beautifying Old Concrete Surfaces

Kajima is considering the commercialization in Japan and France of its Beautiful Face Pack technology for cleansing and beautifying old concrete building surfaces. Beautiful Face Pack technology works in a manner similar to many of the cosmetic face-pack products used by women—simply apply a special solution, allow it to dry, and then peel it off. The technology is more environment friendly than other concrete building surface cleansing methods since there is no need to spray large amounts of water, process wastewater, or undertake work that generates dust and noise pollution.

Beautiful Face Pack technology has recently been tested on precast concrete panels on the front of an apartment building in Paris as well as on buildings in Japan and others in France.

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