



Unique *Steel Framed Solution* to PARKING

Alan H. Simon, P.E.

Nortel Networks experienced the same problem faced by many corporations: prime (easily developable) real estate that is non-existent or difficult to find. The preferred solution is to expand on their existing campuses. Nortel challenged Gutierrez Construction Co. (GCC) and Hybrid Parking Solutions, LLC (HPS) to satisfy their needs for growth of two new 20,000 sq. ft. buildings to be built in phases on their existing campus. The existing surface parking capacity was utilized and expansion space was limited to the existing parking lots. The tenant was considering relocation if their expansion needs could not be met.

The owner's program for 100 Tech Park Drive/Nortel Networks in Billerica, MA, was complex and unique. The owner requested that the project be designed, detailed and constructed to allow for simple expansion of the parking facility. This requirement stemmed from the phased construction of the growing office park, which would require parking to be added quickly and economically as needed. Due to regulatory constraints, the project had to be permitted for the entire program scope at one time. The solution was a 4-level parking structure that could be constructed in phases as the office buildings were developed. Initially 640 spaces would be constructed with plans permitted for another 600 spaces.

*(Above)
Hybrid framing allowed
developer to
meet schedule and budget.*

The owner considered several other structural systems for the parking structure, including post-tensioned concrete and an entirely precast concrete solution. However, upon visiting past HPS projects, seeing their performance and talking with other owners of HPS projects, the owner became convinced that a HPS solution was their preferred approach. Dennis Bailey of (GCC) remarked, "When presented with this project, we were skeptical about steel, but we had heard about HPS. They suggested several projects to visit, which we did, and all of the structures were in very good condition."

The basic components of the HPS System are a structural steel frame combined with a pre-cast/pre-stressed concrete deck. The components are manufactured and tested off-site and delivered as a "ready-to-assemble" kit of parts. The structural steel frame is inherently stable and requires no external bracing. Steel columns and girders in the HPS "H" paired-column design provide structural support for the parking deck. Stable during erection, the steel frame resists seismic and wind loading without the use of shear walls. Because the pre-cast deck provides an impermeable and durable surface, prepared in a controlled factory environment and not compromised by variable field conditions,



Hybrid framing allowed developer to meet scheduling budget.

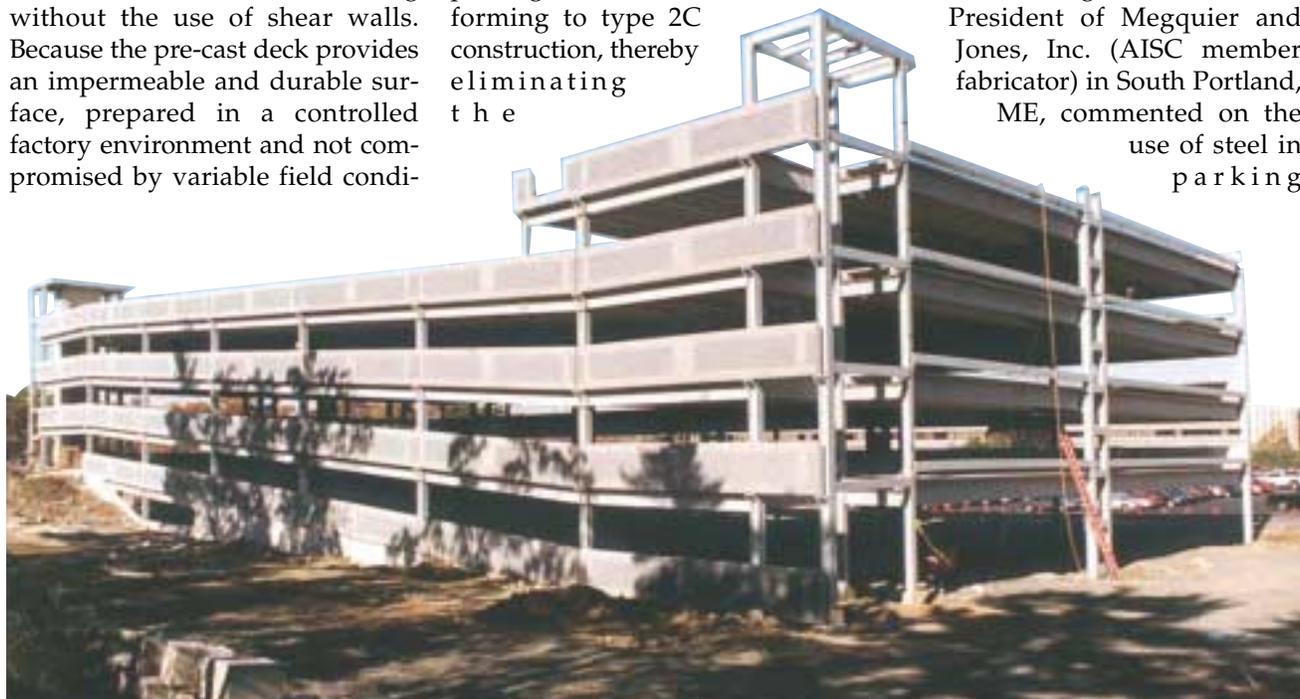
the steel frame is protected from de-icing salts.

Utilizing two of HPS's preferred vendors, the GCC was able to obtain materials quickly and efficiently. Working with HPS, the vendors prepared standardized components for ready installation without custom new fabrication technologies or details. Their familiarity with the HPS system detailing fabrication and erection technologies reduced the learning curve that ultimately resulted in significant cost savings and timely delivery to the site. Through use of preferred vendors HPS has been able to deliver parking structures directly to owners "faster, cheaper, and better." CC's parking structure is classified as an open parking structure conforming to type 2C construction, thereby eliminating the

need for fireproofing. This is typical of most free standing parking structures. The steel here was blast cleaned and coated with a TNE-MEC zinc rich primer and urethane topcoat. Galvanizing the structural steel is also considered as a coating option selection of a project coating system is based on many factors. HPS has had success with the two above approaches and final selection is dependant on the owner's requirement.

From HPS's experience and expertise in detailing coatings, HPS has been able to obtain special corrosion protection warranties for the coatings. Owners appreciate the benefits of these coatings to long-term garage structure maintenance and the resulting cost savings.

John MacGregor, Executive Vice President of Megquier and Jones, Inc. (AISC member fabricator) in South Portland, ME, commented on the use of steel in parking



Durability of steel framing enhances maintainability.

structures: "Today's steel can be prepared so that it can last for an extremely long time without experiencing corrosion, and the fact that all of the structural members are exposed means that if there is a problem, you can see it right away and deal with it before it becomes serious. Nothing is hidden to become a major surprise and expense years later."

MacGregor also remarked that erection and fabrication went extremely fast, and that "the HPS system lends itself to either erection approach: interleaved steel and pre-cast or erecting the entire steel frame and then setting the concrete." Megquier & Jones and HPS have designed, fabricated and built five projects together over the past two years.

All the steel was grade 50 and lateral stability was provided through moment frames in both directions and clip angle connections, facilitating erection and reducing fabrication costs. No splices were utilized in the columns, economies in detailing, fabricating and erection were realized through piece count reduction based on HPS past experience. These savings considerably offset the increased material costs.

Steel weight for the façade can be removed and re-used at later phases; the steel columns and pre-cast dealers are detailed for expansion. The structural weight of the HPS system varies from 6 to 10 psf. HPS used Massachusetts's state building code, 6th edition, comparable to BOCA 1996. An interesting statistic is that while office buildings are typically designed to allot 200 to 250 square feet per person, parking structures typically provide 300 to 325 square feet per car. Thus, more space is allotted for someone to park his or her car than for the person's workspace. Also, the tonnage of structural steel used in the parking structure can approach that for an office building.

MacGregor also noted, "The greatest variation in the HPS jobs we have done comes from the cladding systems chosen by the owner...the owner has all kinds of flexibility with the exterior treatments which often become the longest lead time item on the project. No two HPS projects we have done have used the same facades."

Dennis Bailey expects to see more HPS parking garages in GCC's future: "This is Gutierrez's only free standing garage, but we are working on several other developments where we may need parking facilities. They will be HPS structures. Building and owning the parking garage has been a positive experience."

Alan Simon, P.E., is Principal for Hybrid Parking Solutions, LLC, in Watertown, MA.

NAME OF PROJECT:

100 Tech Park Drive/Nortel Networks, Billerica, MA

STRUCTURAL

ENGINEER/ARCHITECT:

Hybrid Parking Solutions, LLC, Watertown, MA

GENERAL

CONTRACTOR/DEVELOPER:

Gutierrez Construction Company, Inc./Development, Burlington, MA

STEEL FABRICATOR/ERECTOR:

Megquier and Jones, Inc., South Portland, ME

STRUCTURAL CONCRETE

PRECAST FABRICATOR:

Northeast Concrete Products, Inc., Plainville, MA

SOFTWARE:

RISA, AutoCAD Micro station, DETAIL