

THE DESIGN OF COMPOSITE GIRDER WITH UFC DECK (RIGID-FRAME STRUCTURE WITH UFC DECK)

Authors: Shinsuke SUEMATSU¹, Yasuhiro OTA², Hiroki IKEDA³

Affiliation: ¹ Professional Engineer, Architect, Nippon Engineering co., Ltd., Tokyo, Japan – suematsu_shinsuke@ne-con.co.jp

² Manager, Nippon Engineering co., Ltd., Tokyo, Japan – ota@ne-con.co.jp

³ Director, Nippon Engineering co., Ltd., Tokyo, Japan – ikeda@ne-con.co.jp

Summary

The footbridge was selected in the proposal and has to be designed symbolic and nimble. It also has to guide many visitors from the current city area to other areas. It is necessary to increase the number of visitors to the city and extend the sojourn time by improving the attractiveness of the city's coastal areas. The area around the main station, which has a history and charm since the opening of the port and has been the driving force of the regional economy as an area where business and commerce are concentrated, has been in the north area and south area with the relocation of the city hall in June this year. In both areas, many projects are developing in a continuous process. The location of large-scale facilities will continue, and it is expected that the area will become even more lively due to the increase in visitors.

For this background, many visitors to the main station are smoothly guided to other areas in the north area and south area, such as the famous Y-Park, Chinatown, and old town, to improve mobility. Since this will lead to the revitalization of those districts, a pedestrian deck will be constructed to connect the center buildings in front of the main station and the central Park.

We carried out preliminary bridge design and landscape design while considering future maintenance and the surrounding environment for the construction of a pedestrian deck that is safe and comfortable and is in harmony with the facilities near this one. The footbridge has a moderate presence and is not heavy-looking in the town as an entrance gate of the main road.

The local conditions and required performance were as follows;

- Because the footbridge is crossed over a city road with heavy traffic, it is necessary to consider a construction method that minimizes traffic restrictions.
- It is necessary to use a bridge type that minimizes the height of the girder from the road clearance limits, the clearance limits in the park, and the level of connection to each facility.
- A cantilever structure with no piers installed at the end of the girder on the Parkside.
- Girders and piers are rigidly connected to improve seismic resistance and reduce the effects of lateral vibration during walking.
- For the pedestrian, the dead load on the superstructure is relatively light, and the torsional rigidity of the thin structure is required.

We selected a "steel bridge" that can shorten the construction period and reduce the scale of the substructure. In addition, we selected a structure that is resistant to bending, ensuring torsional rigidity against pedestrians' unbalanced load, and having load capacity against lateral loads such as earthquakes and wind. The proportion of this footbridge can only be achieved by composite girders with a UFC deck.

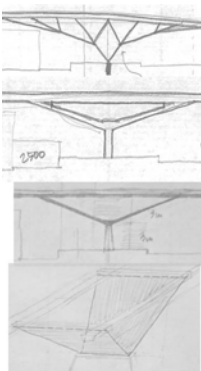


Fig. 1. First sketch

Fig. 2. Bridge image at side view

Fig. 3. Pier image

Keywords: aesthetics; structural concepts; planning; new materials