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– CENTRAL PUGET SOUND REGIONAL TRANSIT AUTHORITY –

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Seattle is a city located on the U.S. West Coast and near the border with Canada, between Puget Sound and Lake Washington. Surrounded by waters and greenery, the city is richly endowed with the bounties of nature. It is called “Emerald City” thanks to its beautiful nature. With a population of 570,000, Seattle is the largest city in the northwestern part of the Pacific Coast. Though the city is located at high latitude, its weather is mild due to the influence of a warm ocean current. Thanks to this weather condition, as well as a rainfall stable throughout the year, the Seattle area is blessed with rich forest resources. Therefore, the city has long been home to prosperous timber, paper, pulp and shipbuilding industries using these resources. Also, it has produced such companies of worldwide renown as Boeing, Microsoft, Amazon and Starbucks. Moreover, it is the home of Seattle Mariners with Ichiro and other players from Japan.

Seattle will operate Central Link Initial Segment, a new 22.4 km line from the Downtown Seattle Transit Tunnel to the Seattle Tacoma International Airport, which will be inaugurated in 2009. In 2004, Kinki Sharyo received an order to deliver 35 low-floor LRV units for this line;



#### Vehicle Construction and Body Characteristics

The LRV is designed as an articulated car with three bodies. This LRV construction represents a standard one for Kinki Sharyo which hews to our NJT and VTA projects.

The vehicle is composed of A/B end bodies, both with an electric bogie close to their front, and a short middle C body with an accompanying bogie. The area between the front entrance of the A or B body and its respective front is a

high-floor one, and other areas are 70% (370 mm-high) low-floor ones.

The customer demanded us that the front design should express the friendliness of the LRV as daily means of transportation for citizens, and the vehicle’s potential that could drive it at a maximum speed of 55 miles (88 km). Our answer was a simple and smooth design featuring curved surfaces. This design is well suited to our low-floor LRVs because it matches the cheerful and progressive character of Seattle.

The storage for a folding coupler, the bogie and the rooftop equipment are covered with panels to provide the body with a uniform and simple look. A wave pattern is used for exterior painting, which has also been adopted for all vehicles and buses operated by the authorities of Seattle. An icon of the skies, mountains and sea of Seattle, this pattern symbolizes the city’s love of, and pride in its rich nature.

For the indoor design, a color combination of gentle, light gray and chic blue is used to create relaxation and a sense of freedom. This color scheme matches well with exterior colors, contributing to a coloring suitable for the light but chic image of Seattle.



LAHT (Low Alloy High Tensile steel) is used as the main body material to meet various load conditions from the customer. Regarding the fire resistance performance required for the basic floor and roof constructions, we conducted a fire resistance test using a full-size specimen, and confirmed that the performance level of the specimen was higher than the required one. All other adopted materials meet customer requirements on combustion resistance, and characteristics that prevent them from emitting smoke or poisonous gas. As ceiling and floor panel material, we adopted a phenol resin because it permits weight reduction, and need not be taken at a fixed size for use.

As for coupling sections, a Z-link is installed on the roof of a C body for linkage with an A/B body. This feature, along with a coupling damper installed between A and C bodies, secures a high stability in a run.

The high-floor area of an A/B body is provided with four rows of cloth seats for two, and the low-floor area (up to the entrance) with cloth seats for two and long seats for three which can be sprung up. Up to four wheelchair spaces can be secured in a train by springing up the long seats. The end portion (close to a C body) of an A/B body is provided with a space for suspending bicycles, in addition to cloth seats for two. In a C body, two rows of long seats for five are arranged so as to face each other.

#### Installation and Bogie

The main equipment design, as well as the overall equipment arrangement, hews to that for other LRVs that have been delivered to other U.S. customers and operated successfully. Efforts have been made to improve the installation method e.g. by simplifying work and reducing the number of parts. Especially, installation specifications similar to those for LRVs delivered to Phoenix (which were manufactured at about the same time as Seattle-bound ones) are used for efficient design.

Also, we manufactured a full-size mock-up to secure customer compliance regarding the arrangement of cab equipment and the shapes of equipment parts. The mock up was first assembled in Osaka for internal review, then sent to Seattle and reassembled in a customer conference room for presentation to individuals concerned. It allows the customer to review our vehicle in a real setting, e.g. by sitting on an actual operator's seat.

As a result of review, the final cab design features a pneumatically controlled operator's seat at the center; operation desks on the front of, and to the right and left of the seat; and a console unit on the front desk. The left desk is equipped with a touch screen-type monitor display to show information required for operation and maintenance. The right and left corner pillars are equipped with one 8-inch monitor display each to show images from CCTV cameras installed on vehicle sides to monitor back portions of a train. These features help ensure safe operation.

A/B bodies are equipped with one electric 2-axis bogie each, and a C body with an accompanying bogie with four independent wheels. The bogie frame is set inside wheels. Bochum elastic wheels are used to mitigate noise in a run.

Toward the opening of the LRV line in 2009, the construction of aboveground facilities has been mostly completed, and test runs have already begun. With a plan for line extension under discussion, we will keep focusing on Seattle, a city still in a growth process.