Bombardier, as part of the Las Vegas Monorail Team, designed and supplied its ultra modern BOMBARDIER® INNOVIA® Monorail 200 system for the Las Vegas Resort Corridor.

Linking seven stations over 4 miles, the fleet of nine INNOVIA Monorail 200 4-car trains provides a quick and comfortable ride just east of the famous Las Vegas Strip.

Designed to urban transit safety standards, this fully automated monorail integrates the two existing stations and the 0.8-mi. guideway of the MGM-Grand Bally’s monorail line. Approximately 120 ft. of the elevated, dual guideway passes through the existing third and fourth floors of the Bally’s Hotel Events Center.

The Las Vegas monorail project is the first modern public transportation system in the world that is totally funded by the private sector. Financing was generated through tax-exempt non-recourse revenue bonds tied to the farebox and advertising revenues. Bombardier has operated and maintained the system since it opened to passenger service in 2004.
Project Schedule

Contract award: September 2000
First vehicle delivery: January 2003
Revenue service: July 2004

Major Subsystems

Vehicle: INNOVIA Monorail 200

Signalling: fixed block
- 2 modes of operation
  - automatic train operation (ATO)
  - emergency manual

Power supply & distribution: 750 Vdc
Power collection: guideway-mounted power rails
Traction power substations: 5
Communications: fibre optic central transmission system, public address (PA) system, telephone (PABX), radio system, closed circuit television system (CCTV), supervisory control and data acquisition (SCADA), vehicle communication system, master clock system

System Description

System type: INNOVIA Monorail 200
Number of lines: one
System length (elevated): 4.0 mi.
  - existing system: 0.8 mi.
  - system extension: 3.2 mi.
Maximum guideway elevation: approx. 60' above grade
Average guideway elevation: 30'
Vehicle fleet: 9 four-car trains
Train control: fully automated, driverless
System design capacity:
  - first stage increase: 3,200 pphpd
  - second stage increase: 5,000 pphpd
  - third stage increase: 6,000 pphpd

Maximum grade: 6.5%
Average line speed: 17.5 mph
Intermodal connections: bus
Special Features:
- 36.6 m / 120' of guideway passes through Bally Hotel's Events Center
- Operation: pinched loop

Fixed Facilities

Guideway types: elevated, precast concrete beams, pre-stressed, post-tensioned
Typical elevated guideway span: 100'
Maximum elevated guideway span: 120'
Guideway running surface width: 26'
Switches: automatically controlled by ATC system
  - 3 beam-replacement cross-overs
  - 1 beam-replacement turnout
  - 1 pivot

Number of stations: 7 elevated
Average station spacing: 0.5 mi.
Platform loading: level boarding, fully accessible
Platform length: 243'
Beam to platform height: 7½'
Station features: platform screen door system (PSDS)
Station accessibility provisions: station elevators, level boarding
Maintenance building size: 18,000 sq.ft.
Yard operation: automatic
Yard storage capacity: four 4-car trains
Maintenance bay movement: automated and manual guidebeams within Operations, Maintenance and Storage Facility
**Vehicle Data**

Type of vehicle: **INNOVIA Monorail 200**
Quantity ordered: 36 cars
Train consist: semi-permanent 4-car trains

**Dimensions and Weight**

Length of 4-car train (over nose cone) 138' 5/4"
Length of 4-car train (over face of couplers) 136' 10"
Overall width 8' 8"
Bottom of skirt to top of A/C unit 11' 21/2"
Top of beam to top of roof 7' 10"
Top of beam to floor 7'1/4"
Doorway width (clear opening) 5' 2"
Doorway height (clear opening) 6' 41/4"
Floor width (over door thresholds) 8'
Floor to ceiling height 7' 1 3/4"
Load tire diameter 453/8"
Car wheelbase 25' 8 1/2"
Train weight (empty) 84,941 lb.

**Technical Characteristics**

Primary power 750 Vdc
Auxiliary power supply 230 Vac, 60 Hz, 3ø
Low-voltage power supply 24 Vdc
Propulsion 4 IGBT inverters per train / 4 powered axles per train
Service braking regenerative dynamic, supplemented by hydraulic disc brakes
Emergency brakes spring-applied, ventilated disc brake

**Parking brakes** spring-applied, ventilated disc brake
**Load tires** 2 heavy duty, high-mileage tires per car; nitrogen-filled; lead tires with run-flat capability
**Guidance tires** nitrogen-filled with back-up capability

**Carbody** FRP composite shell, steel structure underframe
**Fire safety design** floor rating exceeds ASTM E-119 NFPA 130 compliant
**Accessibility design** compliant to Americans with Disabilities Act (ADA)
**Side windows** tinted, single-glazed
**Doors** 8 electric bi-parting, outside sliding doors per train
**Air-conditioning** dual 3.1-ton units per car, plus emergency ventilation

**Performance and Capacity**

Acceleration rate (service) 2.24 mph/s
Braking rate (service) 2.24 mph/s
Braking rate (emergency) 2.91 mph/s
Maximum design speed 50 mph
Maximum operating speed 50 mph
Wheelchair locations 4 dedicated per train
Seated passengers 72 per train

Capacity per train (standees + seated)
- @ 2.7 sq.ft./pass. 152 + 72 = 224
- @ 1.8 sq.ft./pass. 228 + 72 = 300
- @ 1.35 sq.ft./pass. 304 + 72 = 376
The Las Vegas Monorail Team, comprised of Bombardier and MGM Grand Granite Construction Company, was responsible for the full turnkey system contract. Bombardier, as the lead member of the consortium, provided all the electrical and mechanical elements of the system including:

- 36 INNOVIA Monorail 200 cars
- overall project management
- systems engineering and integration
- automatic train control
- communications systems
- power supply and distribution system
- automatic fare collection system
- guideway guidance and switching systems
- platform doors for 7 stations
- testing and commissioning
- workshop equipment
- training and manuals
- up to 15 years of operations and maintenance services

The fully automated monorail system connects seven stations east of the Las Vegas Boulevard, linking nine major resort properties and the Las Vegas Convention Center. Each station features station/hotel connectors.

Granite Construction Company was responsible for the design, supply and installation of the civil and architectural elements for the Operations, Maintenance and Storage Facility (OMSF), all of the stations and the monorail guideway.