



HIGH-FLOOR LIGHT RAIL VEHICLES

Building on the strengths of  
today with the **innovations  
of tomorrow**

**SIEMENS**



**1 light rail** has the ability to replace **= 920 cars**  
off the road



## Connecting neighborhoods

**Light rail systems move passengers to their destinations faster and in more comfort, allowing them to skip traffic congestion and reduce air pollution. Siemens Mobility's high-floor vehicles will better connect neighborhoods with city centers, making travel easy, reliable and affordable.**

The S200 high-floor light rail vehicle is electrically powered from an overhead wire system (catenary) and operates at speeds up to 65 miles per hour with the ability to operate in multiple vehicle consists. Carrying upwards of 200 passengers in each vehicle, light rail transit is an effective mode of decreasing automobiles on roadways, reducing CO2 emissions and improving commuters' experience.

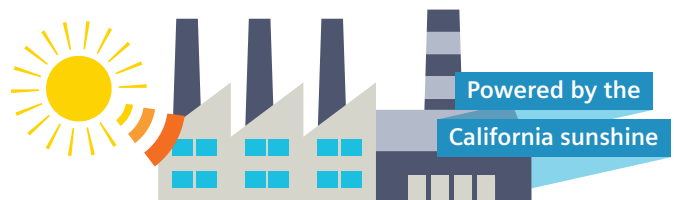
## The evolution of high-floor light rail vehicles

The S200 represents all that we have learned – throughout 40 years of manufacturing high-floor vehicles in the United States – in addition to what we have learned from our other light rail projects around the world. It is a hybrid creation combining industry leading innovations with the best elements from both of our successful SD160 high-floor and S70 low-floor light rail platforms.

## A cleaner, greener way to travel

**Reduced traffic congestion translates into lower levels of pollution and a higher quality of life.**

We are not only building lower emission transportation solutions but also using renewable energy and sustainable manufacturing processes at our Sacramento, Calif. plant. An all-round environmentally friendly design, the new high-floor light rail vehicles have a direct correlation between the light-weight design, energy consumption and operating costs.



## Offering tailored service

**Efficiency counts – everywhere in the United States.**

As an operator, you are completely focused on the business of service and transportation. You not only need easy-to-maintain vehicles, but an expert service partner.

Effective operations require maximum availability, which can only be ensured through service and maintenance, precisely tailored to your needs. Siemens Mobility Customer Services and maintenance programs will support all the operations and service plans your business requires. After all, putting great things in motion means having reliable vehicles available – at all times.

# The S200

## Facing the future with innovation

### Features & benefits that can improve on-time performance & reliability

#### Maintenance

The S200 has been designed with ease of maintenance as a prime factor intended to minimize turnaround times. Several service-proven features are included in the S200 standard design that will make maintenance, cleaning and repairs easier. Simplified truck and tire maintenance and 10-year truck overhauls reduce downtime.

#### Safety

The S200 design meets the latest crash energy management (CEM) requirements including front-end strength and a crumple zone for collision with large objects. CEM provides operators and passengers significant safety improvement. Large operator windshield and cab side windows increase outside viewing range, including visibility of nearby pedestrians and bicyclists.

#### Smart Technology

A remote diagnostic tool and rail remote service desk allows the end user remote access to view active and historic vehicle fault data. Data is sent in real time when traveling on the alignment, at station platforms or vehicle staging locations.

#### Hybrid-Battery Technology

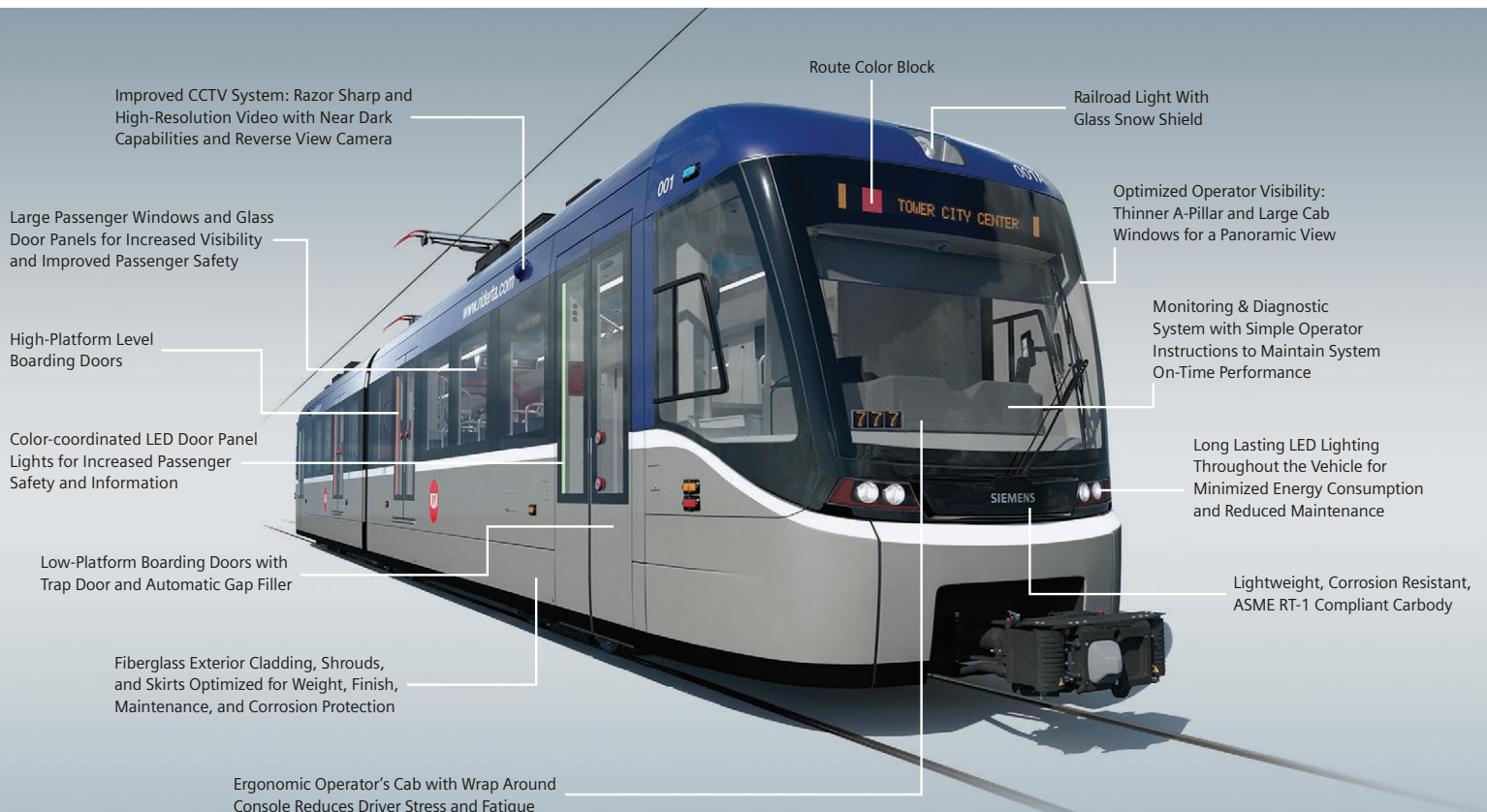
The hybrid-battery technology can be provided by an on-board energy storage system (OESS) which is mounted to the underframe. This lithium battery system provides energy to the propulsion and auxiliary systems for off-wire operation of up to five miles. The OESS system can be re-charged during regular on-wire operations, through regenerative braking or from shop power mode.

#### Enhancing the Riding Experience

The Siemens Mobility S200 design provides for a clean, spacious and well lit interior, contributing to passenger comfort. Features include large safety glass windows, improved longitudinal seating, and designed with Americans Disability Act (ADA) standards in mind.

#### Passenger Security

Transit passengers and operators ride the rails with the peace of mind in knowing that help is just a click away, if needed. A fully integrated closed-circuit television system (CCTV) acts as the eyes and ears of the S200 vehicles, with high definition, weather resistant cameras keeping watch throughout each train and passenger communication systems at the ready.



# A long history of high-floor vehicles

## **Calgary, Alta.**

Since opening in 1981, Calgary has become the second busiest light rail system in North America, transporting an average of more than 300,000 riders daily, safely and efficiently. In addition to expanding the city's fleet with over 80 S200 LRV's, the new trains will replace a portion of the fleet of current Siemens U2 vehicles provided to the city in the early 1980s, thereby continuing the strong customer relationship between the company and Calgary Transit.

## **Denver, Colo.**

The success of Denver's initial order of eight light rail vehicles and the increase in overall ridership over the years has prompted Denver to expand their system to include 59 miles of track and operate in excess of 200 Siemens Mobility light rail vehicles.

## **Cleveland, Ohio**

Cleveland was the first city to use electricity on a large scale in their public square. It will now continue that theme with Siemens Mobility's latest technology in high-floor vehicles replacing two legacy fleets with one common vehicle design. This S200 light rail vehicle has been fitted with the latest features.

## **Edmonton, Alta.**

Over the last 30 years the City of Edmonton has purchased more than 90 light rail vehicles from Siemens Mobility, making them the oldest customer in North America.

## **Los Angeles, Calif.**

The Los Angeles County Metropolitan Transportation Authority (Metro) operates four light rail lines and two heavy rail lines. Metro purchased 52 Siemens P2000 high-floor light rail vehicles in 1998 to operate on the Green, Blue & Expo lines.

## **San Francisco, Calif.**

Three unique designs were inspired by the city of San Francisco for the new Muni LRV4 contract for over 200 new and improved light rail vehicles that will improve reliability, safety and customer communications. The contract is the largest light rail contract ever to be awarded in the U.S.

## **St. Louis, Mo.**

The greater St. Louis area of Missouri and Illinois opened its light rail system with a base fleet of 31 SD400 vehicles in the summer of 1993. Since then, the system has expanded by 30 miles and operates with additional Siemens vehicles. 30 years later, the original fleet is ready to be replaced and Metro has ordered 55 of Siemens Mobility's latest hybrid-battery S200 vehicles.



We're looking for partners that we can collaborate with in terms of development, delivery, and operations. We want it to be the way the people want to travel, to get to areas of the city. We are very excited about our selection and we are looking forward to our continued relationship with all the teams within Siemens Mobility.

**Russell Davies**, Calgary Transit





## Built across North America by Siemens Mobility

In 1978, Edmonton, Alberta became the first North American city to open a light rail system with a base fleet of 37 U2 Siemens Mobility light rail vehicles. Thirty years later, a new generation of vehicle was born and the city of Edmonton expanded their network by 2.1 km and is currently operating 57 SD160 light rail vehicles.



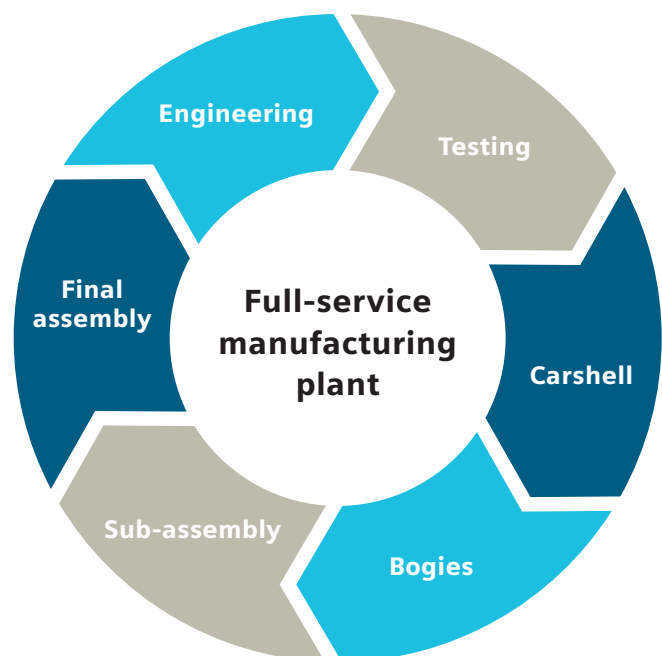
## MANUFACTURING IN NORTH AMERICA

# Moving cities forward with light rail vehicles **for more than 40 years**

Siemens Mobility has expertise in the areas of urban, commuter and long distance transportation. The Sacramento full-service manufacturing plant builds rolling stock from start to finish optimizing project management and quality.

With an industry-leading U.S. supply chain and dependable delivery, Siemens Mobility offers environmentally friendly, efficient and reliable rail vehicles.

From pre-installation to ongoing maintenance, Siemens Mobility Customer Services goes the extra mile to extend and enhance the service life of all rail vehicles.



- **218** suppliers in **26** states  
for San Francisco Muni
- **175** suppliers in **28** states  
for Denver RTD



**Services to support**  
the life of your vehicle

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CALGARY, ALBERTA

## S200 High-Floor Light Rail Vehicle

Siemens Mobility delivered the first light rail vehicle (LRV) to the City of Calgary in the late 1970's. The initial success and increased ridership over the years has prompted the city to expand their system with the addition of new lines and the extensions to existing lines. Inspired by iconic images of the area and born from a focus on reliability and innovative technologies, Siemens Mobility created the S200 specifically for the City of Calgary.

A steel carbody construction, fully bi-directional, single articulated, high-floor vehicle ideal for high platform operation, and built in the U.S. Each six-axle light rail vehicle is equipped with two power trucks (one under each end) and a non-powered center truck.

The interior of this S200 LRV has been designed to maximize passenger space, incorporating wide doorways and is equipped with transverse seating near the cab and longitudinal seating throughout the center of the car.

To provide operators a safe and comfortable work environment Siemens Mobility increased the cab size by 500 mm, allowing for larger cab side windows and includes a dedicated HVAC unit and heated windshield in the operator's cab area.

### Performance and Capacity

|                              |                                               |            |
|------------------------------|-----------------------------------------------|------------|
| Maximum operational speed    | 80 km/h                                       | 50 mph     |
| Maximum allowable speed      | 88 km/h                                       | 55 mph     |
| Service acceleration         | 0.95 m/s <sup>2</sup>                         | 2.13 mphps |
| Service deceleration         | 1.32 m/s <sup>2</sup>                         | 2.95 mphps |
| Emergency braking rate       | 2.75 m/s <sup>2</sup>                         | 6.2 mphps  |
| Passenger capacity           | 60 seats                                      |            |
|                              | 180 Passengers @ AW2                          |            |
|                              | 300 Passengers @ AW4                          |            |
|                              | 2 wheelchair spaces<br>2 multi-purpose spaces |            |
| Maximum operational gradient | 7%                                            |            |
| Motor power rating           | 145 kW x 4                                    | 194 hp x 4 |
| Catenary supply voltage      | 600 Vdc                                       |            |

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The S200 features a wrap-around console for improved ergonomics and an operator's seat positioned on the vehicle's centerline for increased visibility. A full-width glass partition provides over 300° of visibility for the operator and increased passenger safety.

Each LRV is equipped with eight glass paneled sliding plug doors, with four to each side of the vehicle. The vehicle is also equipped with two designated wheelchair spaces and two multi-purpose spaces allowing for priority seating to disabled passengers, parents with strollers, or bicyclists. The door spacing has been optimized to allow for greater passenger flow entering and exiting the vehicle, which ultimately decreases the station dwell times.

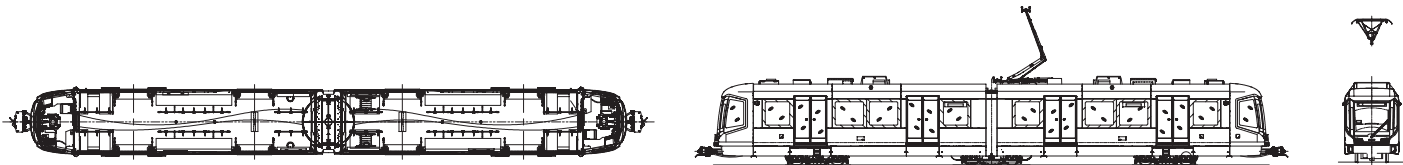
To maximize passenger comfort, each vehicle is equipped with two roof-mounted HVAC units per LRV. Also, to combat the extreme winter conditions in Calgary this vehicle features heated flooring in the passenger area, triple-pane insulated windows and increased thermal insulation throughout the vehicle.

The S200 utilizes an advanced passenger information system consisting of operator and automated



announcements, passenger-operator intercoms, interior and exterior electronic destination signs, and a surveillance system for increased passenger safety.

Each LRV is electrically powered from an overhead catenary system (OCS) and for Calgary operates at speeds up to 88 km/h, carrying over 300 passengers in each vehicle with the ability to operate in multiple vehicle consists (up to five) as the maximum operational length. These light rail vehicles remove automobiles off the road, in turn helping cities decrease their CO2 emissions.



### Vehicle Dimensions and Weight

|                                      |          |             |
|--------------------------------------|----------|-------------|
| Length over coupler                  | 25800 mm | 84.6 ft     |
| Width                                | 2654 mm  | 8.7 ft      |
| Height with pantograph (locked down) | 3854 mm  | 12.6 ft     |
| Maximum pantograph height            | 7007 mm  | up to 23 ft |
| Vehicle empty weight                 | 40800 kg | 89,950 lbs  |
| High-floor section above TOR         | 990 mm   | 3.2 ft      |
| Minimum turning radius               | 25 m     | 82 ft       |
| Vertical curve, crest                | 250 m    | 820 ft      |
| Vertical curve, sag                  | 350 m    | 1,150 ft    |
| Track gauge                          | 1435 mm  | 4.7 ft      |
| Wheel base (power trucks)            | 1800 mm  | 5.9 ft      |
| (center truck)                       | 1800 mm  | 5.9 ft      |



CLEVELAND, OHIO

## S200 High-Floor Light Rail Vehicle

Cleveland was the first city to use electricity on a large scale in its public square. It will now continue that theme with Siemens Mobility's latest technology in high-floor vehicles replacing two legacy fleets with one common vehicle design. This S200 light rail vehicle (LRV) has been fitted with the latest features, including two entry heights (high- and low-level-platform accessibility), advanced infotainment systems, snow plows, and ice-cutter pantographs.

A steel carbody construction, fully bi-directional, single articulated, ideal for both high and low platform access, and built in the U.S. Each six-axle light rail vehicle is equipped with two power trucks (one under each end) and a non-powered center truck.

The interior of this S200 LRV has been designed to maximize passenger space, incorporating wide doorways and is equipped with longitudinal seating near the cab end and transverse seating throughout the center of the car.

To provide operators a safe and comfortable work environment, Siemens Mobility includes a dedicated HVAC unit and heated windshield in the operator's cab area. The S200 features a wrap-around console for improved ergonomics and an operator's seat positioned on the vehicle's centerline for increased visibility.

### Performance and Capacity

|                              |                                                                                                          |                       |
|------------------------------|----------------------------------------------------------------------------------------------------------|-----------------------|
| Maximum operational speed    | 55 mph                                                                                                   | 88 km/h               |
| Maximum allowable speed      | 60 mph                                                                                                   | 96 km/h               |
| Service acceleration         | 3.0 mphps                                                                                                | 1.34 m/s <sup>2</sup> |
| Service deceleration         | 5.0 mphps                                                                                                | 2.25 m/s <sup>2</sup> |
| Emergency braking rate       | 5.0 mphps                                                                                                | 2.24 m/s <sup>2</sup> |
| Passenger capacity           | 52 seats<br>155 Passengers @ AW2<br>255 Passengers @ AW4<br>Up to 4 wheelchair spaces<br>4 bicycle racks |                       |
| Maximum operational gradient | 7%                                                                                                       |                       |
| Motor power rating           | 194 hp x 4                                                                                               | 145 kW x 4            |
| Catenary supply voltage      | 600 Vdc                                                                                                  |                       |

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Each LRV is equipped with eight glass paneled sliding plug doors, with four to each side of the vehicle. The vehicle is also equipped with up to four designated wheelchair spaces and four bicycle racks. The door spacing has been optimized to allow for greater passenger flow entering and exiting the vehicle, which ultimately decreases the station dwell times.

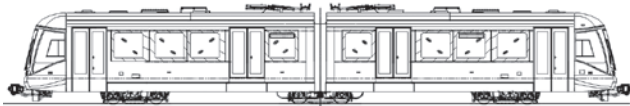
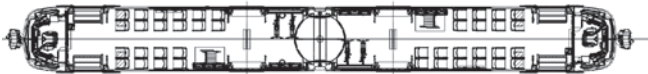
To maximize passenger comfort, each vehicle is equipped with two roof-mounted passenger HVAC units per LRV.

The S200 utilizes an advanced passenger information system consisting of operator and automated announcements, passenger-operator intercoms, interior and exterior electronic destination signs, and a surveillance system for increased passenger safety.

Each LRV is electrically powered from an overhead catenary system (OCS) and for Cleveland operates



at speeds up to 55 mph, carrying over 200 passengers in each vehicle with the ability to operate in multiple vehicle consists (up to three) as the maximum operational length. These light rail vehicles remove automobiles off the road, in turn helping cities decrease their CO2 emissions.



Vehicle Dimensions and Weight

|                                      |            |          |
|--------------------------------------|------------|----------|
| Length over coupler                  | 84.5 ft    | 25770 mm |
| Width                                | 8.7 ft     | 2650 mm  |
| Height with pantograph (locked down) | 13.5 ft    | 4115 mm  |
| Maximum pantograph height (up to)    | 23 ft      | 7010 mm  |
| Vehicle empty weight                 | 90,154 lbs | 40894 kg |
| High level entry height, above TOR   | 3.4 ft     | 1048 mm  |
| Minimum turning radius               | 82 ft      | 25 m     |
| Vertical curve, crest                | 820 ft     | 250 m    |
| Vertical curve, sag                  | 1,150 ft   | 350 m    |
| Track gauge                          | 4.7 ft     | 1435 mm  |
| Wheel base (power trucks)            | 5.9 ft     | 1800 mm  |
| (center truck)                       | 5.9 ft     | 1800 mm  |



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DENVER, COLORADO

## SD160 High-Floor Light Rail Vehicle

The Mile High City brought rail transit back to the region in 1994 when Denver opened its very own light rail system with a fleet of eight Siemens Mobility vehicles. The success of that initial order and the increase in overall ridership over the years prompted Denver to expand their system to include 59 miles of track and operate in excess of 170 Siemens Mobility light rail vehicles (LRV). Whether it's a ride to retail hot spots or perhaps a ride to the big game, Siemens Mobility LRV's are a fully-accessible friendly transportation for all.

A steel carbody construction, fully bi-directional, single articulated, high-floor vehicle with stepwell bridge plates, ideal for mini-high platform operation, and built in the U.S. The added advantage of incorporating stepwells at each doorway is to allow for street-level boarding. Each six-axle light rail vehicle is equipped with two power trucks (one under each end) and a non-powered center truck.

The interior of this next generation SD160 LRV has been designed to maximize passenger space, incorporating wide doorways and a predominately knee-to-back seating arrangement.

Each SD160 LRV is equipped with eight wide opening sliding plug doors, with four to each side of the vehicle. The vehicle is also equipped with four designated

### Performance and Capacity

|                                       |                                                                                 |                       |
|---------------------------------------|---------------------------------------------------------------------------------|-----------------------|
| Maximum operational speed             | 55 mph                                                                          | 88 km/h               |
| Maximum allowable speed               | 65 mph                                                                          | 105 km/h              |
| Service acceleration and deceleration | 3.0 mph/s                                                                       | 1.34 m/s <sup>2</sup> |
| Emergency braking rate                | 6.2 mph/s                                                                       | 2.75 m/s <sup>2</sup> |
| Passenger capacity                    | 56 seats<br>145 Passengers @ AW2<br>230 Passengers @ AW4<br>4 wheelchair spaces |                       |
| Maximum operational gradient          | 6%                                                                              |                       |
| Motor power rating                    | 194 hp x 4                                                                      | 145 kW x 4            |
| Catenary supply voltage               | 750 Vdc                                                                         |                       |

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wheelchair spaces allowing for priority seating to disabled passengers and doorway ramps to assist in the boarding and exiting of disabled passengers. An added advantage of the Denver SD160 is the incorporation of step-wells at each doorway for street-level boarding.

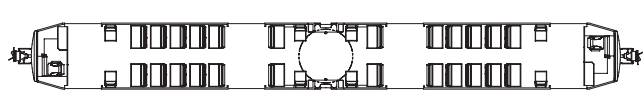
The door spacing has been optimized to allow for greater passenger flow entering and exiting the vehicle, which ultimately decreases the station dwell times.

To maximize passenger comfort, each vehicle is also equipped with two roof-mounted HVAC units per LRV. Also, to combat the extreme winter conditions in Denver, this vehicle features sidewall heaters in the passenger area, dual pane insulated windows and increased thermal insulation throughout the vehicle.

The SD160 utilizes a passenger information system consisting of operator and automated announcements, passenger-operator intercoms, interior and exterior electronic destination signs, as well as interior surveillance system for increased passenger safety.



Each LRV is electrically powered from an overhead catenary system (OCS) and for Denver operates at speeds up to 55 mph, carrying over 185 passengers in each vehicle with the ability to operate in multiple vehicle consists (up to four) as the maximum operational length. These light rail vehicles remove automobiles off the road, in turn helping cities decrease their CO2 emissions.



Vehicle Dimensions and Weight

|                                      |            |          |
|--------------------------------------|------------|----------|
| Length over coupler                  | 81.4 ft    | 24800 mm |
| Width                                | 8.7 ft     | 2654 mm  |
| Height with pantograph (locked down) | 12.4 ft    | 3786 mm  |
| Maximum pantograph height (up to)    | 23 ft      | 7010 mm  |
| Vehicle empty weight                 | 89,500 lbs | 42417 kg |
| High-floor section above TOR         | 3.2 ft     | 985 mm   |
| Minimum turning radius               | 82 ft      | 25 m     |
| Vertical curve, crest                | 820 ft     | 250 m    |
| Vertical curve, sag                  | 1,150 ft   | 350 m    |
| Track gauge                          | 4.7 ft     | 1435 mm  |
| Wheel base (power trucks)            | 5.9 ft     | 1800 mm  |
| (center truck)                       | 5.9 ft     | 1800 mm  |



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EDMONTON, ALBERTA

# SD160 High-Floor Light Rail Vehicle

In 1978, Edmonton, Alberta became the first North American city to open a light rail system with a fleet of 37 U2 Siemens Mobility light rail vehicles (LRV). Thirty years later a new generation of vehicles was born, the city of Edmonton expanded their network by 2.1 km and currently operates 94 light rail vehicles.

A steel carbody construction, fully bi-directional, single articulated, high-floor vehicle ideal for high platform operation, and built in the U.S. Each six-axle light rail vehicle is equipped with two power trucks (one under each end) and a non-powered center truck.

The interior of this next generation SD160 LRV has been designed to maximize passenger space, incorporating wide doorways and a predominately knee-to-back seating arrangement.

Each SD160 LRV is equipped with eight wide opening sliding plug doors, with four to each side of the vehicle. The vehicle is also equipped with two designated wheelchair spaces allowing for priority seating to disabled passengers and doorway ramps to assist in the boarding and exiting of disabled passengers.

## Performance and Capacity

|                              |                                                                                 |            |
|------------------------------|---------------------------------------------------------------------------------|------------|
| Maximum operational speed    | 80 km/h                                                                         | 50 mph     |
| Maximum allowable speed      | 80 km/h                                                                         | 50 mph     |
| Service acceleration         | 1.01 m/s <sup>2</sup>                                                           | 2.3 mphps  |
| Service deceleration         | 1.32 m/s <sup>2</sup>                                                           | 2.9 mphps  |
| Emergency braking rate       | 2.63 m/s <sup>2</sup>                                                           | 5.9 mphps  |
| Passenger capacity           | 60 seats<br>150 Passengers @ AW2<br>250 Passengers @ AW4<br>2 wheelchair spaces |            |
| Maximum operational gradient | 7%                                                                              |            |
| Motor power rating           | 145 kW x 4                                                                      | 194 hp x 4 |
| Catenary supply voltage      | 600 Vdc                                                                         |            |

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The door spacing has been optimized to allow for greater passenger flow entering and exiting the vehicle, which ultimately decreases the station dwell times.

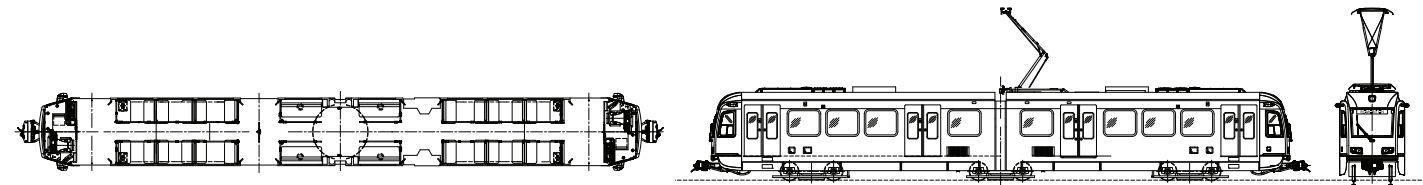
To maximize passenger comfort, each vehicle is also equipped with two roof-mounted HVAC units per LRV. Also, to combat the extreme winter conditions in Edmonton, this vehicle features sidewall heaters in the passenger area, dual pane insulated windows and increased thermal insulation throughout the vehicle.

The SD160 utilizes a passenger information system consisting of operator and automated announcements, passenger-operator intercoms, interior and exterior electronic destination signs, as well as interior surveillance system for increased passenger safety.

Each LRV is electrically powered from an overhead catenary system (OCS) and for Edmonton operates at speeds up to 80 km/h, carrying up to 190 passengers



in each vehicle with the ability to operate in multiple vehicle consists (up to five) as the maximum operational length. These light rail vehicles remove automobiles off the road, in turn helping cities decrease their CO2 emissions.



Vehicle Dimensions and Weight

|                                      |          |            |
|--------------------------------------|----------|------------|
| Length over coupler                  | 24820 mm | 81.4 ft    |
| Width                                | 2654 mm  | 8.7 ft     |
| Height with pantograph (locked down) | 3840 mm  | 12.6 ft    |
| Maximum pantograph height (up to)    | 7010 mm  | 23 ft      |
| Vehicle empty weight                 | 41500 kg | 91,500 lbs |
| High-floor section above TOR         | 985 mm   | 3.2 ft     |
| Minimum turning radius               | 25 m     | 82 ft      |
| Vertical curve, crest                | 250 m    | 820 ft     |
| Vertical curve, sag                  | 350 m    | 1,150 ft   |
| Track gauge                          | 1435 mm  | 4.7 ft     |
| Wheel base (power trucks)            | 1800 mm  | 5.9 ft     |
| (center truck)                       | 1800 mm  | 5.9 ft     |



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SAN FRANCISCO, CALIFORNIA

# Muni LRV4 High-Floor Light Rail Vehicle

Connecting San Francisco's unique neighborhoods, Siemens Mobility's high-floor light rail vehicles (LRV) make travel easy, reliable and accessible. With the capability to accommodate high and low boarding and operate in multiple vehicle consists, the Muni LRV4 is there to help connect the great places throughout San Francisco.

This vehicle is a hybrid creation, combining the best elements from both of our successful high-floor and low-floor light rail platforms – which have over 1,900 units currently in operation performing at high reliability. With an environmentally-friendly focus, these vehicles have utilized a strong lightweight design to ensure low-energy consumption and minimum operating costs.

A steel carbody construction, fully bi-directional, single articulated, high-floor vehicle ideal for high platform operation, and built in the U.S. Each six-axle

light rail vehicle is equipped with two power trucks (one under each end) and a non-powered center truck.

Each Muni LRV4 is equipped with eight wide opening sliding plug doors, with four to each side of the vehicle. The vehicle is also equipped with four designated wheelchair spaces allowing for priority seating for disabled passengers. In addition, two bicycle areas are available.

## Performance and Capacity

|                              |                                                                                                   |                       |
|------------------------------|---------------------------------------------------------------------------------------------------|-----------------------|
| Maximum operational speed    | 50 mph                                                                                            | 80.5 km/h             |
| Maximum allowable speed      | 55 mph                                                                                            | 88.5 km/h             |
| Service acceleration         | 3.0 mphps                                                                                         | 1.34 m/s <sup>2</sup> |
| Service deceleration         | 3.5 mphps                                                                                         | 1.56 m/s <sup>2</sup> |
| Emergency braking rate       | 5.0 mphps                                                                                         | 2.24 m/s <sup>2</sup> |
| Passenger capacity           | Up to 58 seats<br>145 – 150 Passengers @ AW2<br>230 – 250 Passengers @ AW4<br>4 wheelchair spaces |                       |
| Maximum operational gradient | 10%                                                                                               |                       |
| Motor power rating           | 174 hp x 4                                                                                        | 130 kW x 4            |
| Catenary supply voltage      | 600 Vdc                                                                                           |                       |

**SIEMENS**

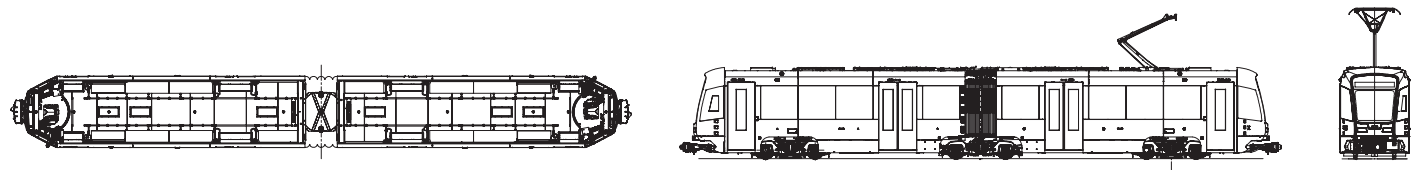
The Muni LRV4 features a wrap-around console for improved ergonomics and an operator’s seat positioned on the vehicle’s centerline for increased visibility. A full-width polycarbonate transparent cab provides over 300° of visibility for the operator and enhanced safety and protection for pedestrians and cyclists.

This vehicle is especially energy-efficient. The light-weight drive system recuperates braking energy; the electro dynamic braking to zero-speed reduces brake pad usage and life cycle cost. The LED lighting system uses up to 40 percent less electricity than standard incandescent and fluorescent lighting. In addition, the smart HVAC controls save energy and reduce operating costs.

The Muni LRV4 utilizes a passenger information system consisting of operator and automated announcements, passenger-operator intercoms, interior and exterior electronic destination signs, as well as an interior and exterior surveillance system for increased passenger safety.



Each LRV is electrically powered from an overhead catenary system (OCS) and for San Francisco operates at speeds up to 50 mph, carrying over 185 passengers in each vehicle with the ability to operate in multiple vehicle consists (up to four). These light rail vehicles remove automobiles off the road, in turn helping cities decrease their CO2 emissions.



Vehicle Dimensions and Weight

|                                      |             |          |
|--------------------------------------|-------------|----------|
| Length over coupler                  | 75 ft       | 22860 mm |
| Width                                | 8.7 ft      | 2650 mm  |
| Height with pantograph (locked down) | 11 ft 6 in  | 3505 mm  |
| Maximum pantograph height            | up to 19 ft | 5791 mm  |
| Vehicle empty weight                 | 77,864 lbs  | 35318 kg |
| High-floor section above TOR         | 2.8 ft      | 857 mm   |
| Minimum turning radius               | 43 ft       | 13 m     |
| Vertical curve, crest                | 310 ft      | 94.5 m   |
| Vertical curve, sag                  | 460 ft      | 140.2 m  |
| Track gauge                          | 4.7 ft      | 1435 mm  |
| Wheel base (power trucks)            | 6.2 ft      | 1900 mm  |
| (center truck)                       | 6.2 ft      | 1900 mm  |



ST. LOUIS, MISSOURI

## S200 High-Floor Light Rail Vehicle

The greater St. Louis area of Missouri and Illinois opened its light rail system with a base fleet of 31 SD400 vehicles in the summer of 1993. Since then, the system has expanded by 30 miles and operates with additional Siemens vehicles. Thirty years later, the original fleet is ready to be replaced and Metro has ordered 55 of Siemens Mobility's latest hybrid-battery S200 vehicles. The St. Louis Metro system now consists of 46 miles of dedicated right-of-way with additional expansions planned.

A steel carbody construction, fully bi-directional, single articulated, high-floor vehicle ideal for high platform operation, and built in the U.S. Each six-axle light rail vehicle is equipped with two power trucks (one under each end) and a non-powered center truck.

The interior of this S200 LRV has been designed to maximize passenger space, incorporating wide

doorways and is equipped with longitudinal seating near the cab and traverse seating throughout the center of the car.

To provide operators a safe and comfortable work environment Siemens Mobility includes a dedicated HVAC unit and heated windshield glazing in the operator's cab area. The S200 features a wrap-around

### Performance and Capacity

|                                       |                                                                                                           |                       |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------|-----------------------|
| Maximum operational speed             | 57 mph                                                                                                    | 92 km/h               |
| Maximum allowable speed               | 60 mph                                                                                                    | 96 km/h               |
| Service acceleration and deceleration | 3.0 mphps                                                                                                 | 1.34 m/s <sup>2</sup> |
| Emergency braking rate up to          | 5.5 mphps                                                                                                 | 2.46 m/s <sup>2</sup> |
| Passenger capacity                    | 68 seats<br>170 Passengers @ AW2<br>275 Passengers @ AW4<br>4 wheelchair spaces<br>4 multi-purpose spaces |                       |
| Maximum operational gradient          | 7%                                                                                                        |                       |
| Motor power rating                    | 194 hp x 4                                                                                                | 145 kW x 4            |
| Catenary supply voltage               | 860 Vdc                                                                                                   |                       |

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console for improved ergonomics and an operator’s seat with integrated master controller positioned on the vehicle’s centerline for increased visibility.

Each LRV is equipped with eight glass paneled sliding plug doors, with four to each side of the vehicle. The vehicle is also equipped with four designated wheelchair spaces and four multi-purpose spaces allowing for priority seating to disabled passengers, parents with strollers, or bicyclists. The door spacing has been optimized to allow for greater passenger flow entering and exiting the vehicle, which ultimately decreases the station dwell times.

To maximize passenger comfort, each vehicle is equipped with two roof-mounted HVAC units per LRV.

The S200 utilizes an advanced passenger information system consisting of operator and automated announcements, passenger-operator intercoms, interior and exterior electronic destination signs, and a surveillance system for increased passenger safety.

The hybrid-battery technology is provided by an on-board energy storage system (OESS) which is mounted to the underframe. This lithium battery system provides energy to the propulsion and



auxiliary systems for off-wire operation of up to five miles. The OESS system can be re-charged during regular on-wire operations, through regenerative braking or from shop power mode.

Each LRV is electrically powered from an overhead catenary system (OCS) and for St. Louis operates at speeds up to 57 mph on wire and up to 25 mph off wire, carrying over 235 passengers in each vehicle with the ability to operate in multiple vehicle consists (up to three) as the maximum operational length. These light rail vehicles remove automobiles off the road, in turn helping cities decrease their CO2 emissions.



### Vehicle Dimensions and Weight

|                                      |               |          |
|--------------------------------------|---------------|----------|
| Length over coupler                  | 89 ft         | 27129 mm |
| Width                                | 8.7 ft        | 2650 mm  |
| Height with pantograph (locked down) | 12.3 ft       | 3761 mm  |
| Maximum pantograph height            | up to 22.5 ft | 6858 mm  |
| Vehicle empty weight                 | 97,328 lbs    | 44240 kg |
| High-floor section above TOR         | 3.3 ft        | 1004 mm  |
| Minimum turning radius               | 25 m          | 82 ft    |
| Vertical curve, crest                | 750 ft        | 229 m    |
| Vertical curve, sag                  | 750 ft        | 229 m    |
| Track gauge                          | 4.7 ft        | 1435 mm  |
| Wheel base (power trucks)            | 5.9 ft        | 1800 mm  |
| (center truck)                       | 5.9 ft        | 1800 mm  |