

in service. Maintenance costs include routine servicing of vehicles and maintenance of the tracks, signals, communications, and other systems needed to keep the system safe and reliable.

Chapter 2, Alternatives, describes O&M activities in detail. The Phase 1 system would operate the HSR trains on approximately 520 miles of track by 2040. Phase 1 would include 15 HSR stations serving the system, 2 of which would be located in the Bakersfield to Palmdale Project Section. Multiple facilities would be required for overnight storage, inspection, and routine maintenance of more than 78 trainsets, each 656 feet long. A heavy maintenance facility, serving the entire HSR system, would be needed and would be located between Merced and Bakersfield. The HMF would store and maintain some of the trainsets. As described in Section 6.2.2, the Bakersfield to Palmdale Project Section would include an LMF, an MOWF, and two MOIS facilities.

O&M costs include staff labor and material supplies required to run the HSR system and to perform required maintenance. O&M costs are estimated based on daily rail miles, operating speeds, travel times, HSR station configurations, maintenance and storage facilities, and operating frequencies in accordance with the 2016 Business Plan (Authority 2016).

6.3.1 Operating Speeds

The HSR system in the Bakersfield to Palmdale Project Section would operate at high speeds (up to 220 miles per hour).

6.3.2 Development of Operations and Maintenance Costs

O&M cost estimates include operations activities needed to serve and carry the forecast train service for Phase 1 in 2040 for the medium and high ridership forecasts as described in Chapter 2, the maintenance costs necessary to keep the system in a state of good repair, and administrative costs (Appendix 6-A). For consistency with the environmental impacts analysis, the estimated O&M costs in this chapter are based on the Authority's 2016 Business Plan.² The current HSR O&M model, where applicable, is based on cost categories defined in the U.S. Department of Transportation Inspector General's *High-Speed Intercity Passenger Rail Best Practices: Operating Costs Estimation* report (U.S. Department of Transportation 2011), where applicable. The report defines the general parameters for estimating the preliminary, intermediate, final, and commercial closeout stages of a program. No program falls neatly into all these parameters, and there is usually some overlap between the stages. In this context, large parts of the Authority's O&M cost model fall into the intermediate stage, while others might be classified as preliminary or have advanced to the final stage.

Unit prices were developed and applied to calculate the cost for each activity included in the operating plan. Although many of the O&M unit costs for the HSR system would be similar to the costs of U.S. conventional rail operations and can be reliably estimated from U.S. practices and costs, the unit cost to maintain high-speed trainsets and dedicated high-speed rail infrastructure has no close analogy in the U.S. Therefore, international O&M unit cost projections from comparable HSR operations were applied to planned California operations, HSR technology, and local cost levels and labor practices.

The O&M costs of HSR equipment include the cost of (1) crew, administration, and supplies to operate and dispatch the HSR services; (2) electric power for traction, onboard systems, stations, and maintenance/other facilities; and (3) cleaning, inspection, maintenance, and overhaul of the trainsets.

² The Authority released a Draft 2020 Business Plan in February 2020 for public review and comment. The plan's final adoption is expected at the April 2020 Board meeting for submittal to the Legislature by May 1, 2020. The 2020 Business Plan forecasts were developed using the same travel forecasting model as the 2016 and 2018 Business Plans, updated for population and employment forecasts. The Phase 1 medium ridership forecast for 2040 is 38.6 million, and the high is 50.0 million. The Authority's 2018 Business Plan, adopted in June 2018, includes updated O&M costs. It states that "operations and maintenance costs in all scenarios are minimally impacted by the changes made since the 2016 Business Plan" (Authority 2018, chapter 7, p. 96).

