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SECTION 2 - OPERATIONS PLAN

2.1 GENERAL

RTD's objective is to operate all Commuter Rail (CR), Light Rail (LRT) and bus routes safely, reliably and efficiently and to integrate CR operations with LRT and bus service for the greatest convenience to the public. The CR system is a means by which the integration of transportation services will assist the region in meeting clean air standards, alleviating traffic congestion and improving the overall quality of life in the area. RTD has two major goals:

- Provide improved transportation choices and options to the citizens of the District;
- Establish a proactive plan that balances transit needs with future regional growth.

Commuter Rail forms an integral part of RTD's comprehensive transit program. Currently, no such service exists in the Denver metro area, and Commuter rail presents its own unique needs and challenges. Commuter Rail is the mode chosen for the North Metro, Northwest, East and Gold Line Corridors, all originating at Denver's Union Station. Transfers at Union Station will be made to the three Light Rail (LRT) corridors. The most recent addition to RTD's LRT system is the Southeast Corridor (T-REX), a 19 mile long extension of light rail originating at I-25/ Broadway Station and extending south along I-25 to Lincoln Avenue in northern Douglas County, with a spur on I-225 connecting from the light rail on I-25 to Parker Road. T-REX also includes highway and access improvements. This segment opened in November, 2006. The updated FasTracks plan assumes full build-out of proposed rail lines by 2017, with improved service levels by the 2025 horizon year.

2.2 COMMUTER RAIL LINES

Commuter Rail components of the FasTracks plan are as follows:

- The North Metro corridor is planned to be operated with EMUs, with service between SH-7/160th Avenue and DUS.
- The US 36 corridor is planned to be operated with EMUs or DMUs, with service between Longmont and DUS.
- The East Corridor will be operated with EMUs, with service between DIA and DUS.
- The Gold Line will be operated with EMUs with service from DUS to Ward Road.

Commuter Rail lines will connect to the following LRT Rail components of FasTracks:

- The West Corridor, with LRT service from Denver Union Station to the Jeffco Government Center.
- The I-225 corridor, connecting the East CR Line with the Southeast LRT line.

The development of Union Station in Lower Downtown Denver into a Multi-Modal transit hub will serve many thousands of sports and entertainment spectators attending events at Invesco Field, Pepsi Center, Coors Field, and many major hotels and businesses in between. Additional feeder and disseminator bus service in Downtown Denver will accommodate circulation between these key downtown destinations.

The Design Engineer shall coordinate with RTD specific requirements for future corridors which include pocket track, tail track, end of line geometries, maximum speed, consists, minimum headway and cross over locations. Relocation of the railroad operating facilities for each affected corridor is required prior to construction of RTD rail corridors. Right-of-Way acquisition is typically done during Final Design, but may be done earlier for specific projects.

2.3 COMMUTER RAIL STATIONS

As part of the FasTracks Project, approximately 30 Commuter Rail stations are planned to serve the north, northwest and eastern portions of metro Denver, including the Downtown Union Station (DUS) and Denver International Airport (DIA). Typically, the stations will be in one of three configurations: Center platform, Side/Center platform or Side/Side platform. The configuration chosen depends on location, contextual conditions and passenger capacity. Station platform lengths shall be in accordance with the appropriate environmental decision document, e.g. ROD or FONSI.

RTD will work closely with the public, officials and staff in each corridor during subsequent planning and engineering phases to identify and analyze specific station locations, parking and other improvements that are mutually desired and technically feasible and within budget. Final station locations and configurations for each corridor are subject to the final results of the EIS (or other environmental study) for that particular corridor. This will include the option to use DMUs as rail technology in these corridors.

2.4 COMMUTER RAIL FLEET

Presently, RTD is considering Electric Multiple Units (EMU) or Diesel Multiple Units (DMU) for the planned Commuter Rail lines. These vehicles operate on a standard railroad track gauge of 4 feet 8 1/2 inches. Some track will be used exclusively by RTD for passenger Commuter Rail operations, within or beyond private RR ROW, and other track may be shared jointly by Union Pacific, BNSF Railway and/or RTD. EMUs are powered from an overhead contact system (OCS) wire via 25 KvAC (nominal) alternating current. DMUs are powered by a diesel engine similar to that of a bus engine. See Section 2.6 for service and vehicle load standards. See Section 13 for vehicle speed parameters.

2.4.1 Capacity/Train Consist Assumptions

Train Consists are based on rail car capacities and peak hour ridership projections. Train capacities are based on RTD's rail service standards. See Section 2.6 for service and vehicle load standards. RTD's local/express fare boundaries are used to roughly determine seated vs. standing load standards. Some excess capacity is desired to provide for needs during "peak of the peak" time periods and special events. A minimum 2-car train consist is assumed for all lines in the peak periods.

2.4.2 Operations and Systems

CR Vehicles will typically be operated manually. Automatic block wayside signals, traffic signals, radio communication, operational procedures and train orders govern operators regarding all movements of the vehicles. Appropriate

street traffic signals and wayside signals assist the operator in selecting proper movement sequence and speeds. Powered switches are operated by operators via carborne equipment.

High speed crossings may include gate crossings with flashers and warning bells. Medians may be installed at crossings to prevent traffic from driving around active gates. Gated crossings shall be monitored and recorded by video equipment. Multiple crossings will be jointly used and maintained by the applicable Freight Rail owner, Amtrak and RTD.

2.4.3 Transit Integration

The system is operated by RTD as part of a fully integrated mass transit system which will add Commuter Rail to the existing mix of Light Rail, local bus routes, express bus routes, regional routes, shuttle bus routes, and demand-response service for passengers with disabilities. Future streetcar lines may also be considered. RTD provides transit services to one of the largest geographical districts in the United States. RTD has a service area of approximately 2,400 square miles and serves the City and County of Denver and Broomfield, and all or portions of Adams, Arapahoe, Boulder, Douglas, Jefferson and Weld counties. RTD serves 38 municipalities within those 8 counties and operates 176 total fixed bus routes and 11 call-n-Rides. The 2009 service area population is approximately 2.5 million. The size of the service area, population density, the nature of the roadway system and the development of suburban activity centers, has led to the creation of a system with a wide range of service types intended to most effectively serve this large and diverse region.

2.5 HOURS OF SERVICE AND TRAVEL TIME

This section will be developed after the proposed route, stations and environmental document(s) are finalized.

2.6 SERVICE AND VEHICLE LOAD STANDARDS

Commuter rail vehicles have a heavier frame and larger body than light rail vehicles. They operate over a longer distance with fewer stops than that of Light Rail. Service standards include vehicle loading standards and service frequency, and establish criteria to determine the maximum level of crowding and service frequencies that a passenger would experience on the Commuter Rail system. The load standards established for RTD's Commuter rail service will be determined once the vehicle type and capacity is selected. For purposes of preliminary design, the following values should be used, which assume 90 passenger seats, 1 operator seat and 23 square meters of usable floor area per vehicle:

- Off-peak periods – 90 passengers per vehicle + 1 operator per train consist (seated load)
- Standing load – 90 seated passengers per vehicle + 76 standing passengers per vehicle (166 passengers per vehicle) + 1 operator per train consist
- Maximum train capacity (special events) -- 206 passengers per vehicle

These values are subject to change during final vehicle selection.

2.7 STATION DWELL TIMES

Train dwell times at each passenger station will provide sufficient time for normal boarding and exiting of passengers. At Union Station, additional dwell time is required for both large passenger loading and unloading as well as the need to adhere to transfer to other modes of public transportation. Adequate layovers at terminals for operators to use the restroom and switch vehicle ends are an essential part of the operating schedules.

2.7.1 City and County of Denver (CCD) Traffic Signals

CR headways will be determined as part of the required operational plan. Traffic signal timing may be adjusted to best support the automobile traffic flows that intersect with the proposed CR tracks.

2.7.2 Other Jurisdiction Signals

The Design Engineer shall coordinate with RTD and other jurisdictions (Adams, Boulder, Broomfield and Jefferson Counties and the cities of Arvada, Aurora, Boulder, Broomfield, Commerce City, Longmont, Louisville Niwot, Northglenn, Superior and Westminster) as necessary.

2.8 FACILITIES AND EQUIPMENT

These criteria will provide an overview of the facilities and equipment required to operate and maintain RTD's CR system.

2.9 COMMUNICATIONS EQUIPMENT

The key element of the communications system is the Supervisory and Control and Data Acquisition (SCADA) system and the radio. Each CR operating cab and mobile units will have fixed mobile radios installed. In addition, all Train Operators, Commuter Rail Supervisors, Shop Supervisors and Maintenance of Way (MOW) employees working in the field will carry portable radios while on duty. Mobile and portable radios will provide two-way voice communications over channels designated for Commuter rail use. The Operations channel will provide direct two-way communications between Central Control and all train operations personnel. A separate Maintenance channel may be utilized for communications between Maintenance personnel in the course of their activities and for exclusive use by operators/supervisors/maintenance personnel in moving vehicles during abnormal operations (dead car tow, foul weather, etc.) or other situations which may present a safety hazard.

In addition to the radio channel for Commuter Rail operations, a Light Rail, Bus Operations channel, and Supervisors' channel may be utilized by Commuter Rail Operations for security or coordination with Light Rail and Bus Operations Dispatch whenever required.

Additional communication equipment includes:

- Emergency and public pay telephones are provided on some platforms for passenger use. Telephones will also be used in Central Control for emergency

contact of Fire/Police and emergency medical services. Public pay telephones shall not be included on new platforms, but may be located near them. See Section 14 for emergency telephone requirements at new stations.

- Public Address (PA) equipment will be used for announcements on the CRVs, in the yard and the Maintenance shop.
- Automatic Vehicle Locator (AVL) will be utilized on CRVs and other mobile units as required.
- Public Address (PA) systems and variable message signs (VMS) will be installed at all station platforms.

2.9.1 SCADA

The SCADA system provides for overall control and monitoring of traction power facilities, signals, station platform CCTV, ticket vending machines intrusion and fault alarms, passenger information systems and security systems. Information and signals for the SCADA system are transmitted through fiber optic cables with communications houses located at various points along the ROW.

END OF SECTION