TMC Staffing and Scheduling Resources

The *TMC Staffing and Scheduling for Day-to-Day Operations* project included the development of a technical document and an easy-to-use scheduling tool. The purpose of the *TMC Staffing and Scheduling for Day-to-Day Operations* technical document is to provide guidance, useful strategies, and recommended practices to ensure that TMCs generate efficient schedules and use optimal staffing levels. The technical document consists of seven chapters covering the following topics:

- Chapter 1: Introduction and Overview
- Chapter 2: Work Analysis
- Chapter 3: Scheduling Practices
- Chapter 4: Introduction to Shiftwork
- Chapter 5: Strategies for Employees
- Chapter 6: Strategies for Employers
- Chapter 7: Staff Planning

The scheduling tool automates three of the scheduling procedures described in the technical document: shift scheduling, days-off scheduling, and the calculation of the relief factor.

The **shift scheduling** algorithm assigns employees to shifts to cover the forecasted demand. A demand analysis can be used to forecast the amount of demand.

The **days-off scheduling** algorithm assigns employees to a weekly schedule based on the number of employees required each day. The number of employees required each day can be derived from the output of the shift-scheduling algorithm.

The **relief factor**, or average over-coverage percentage, determines the number of employees that are required to cover a number of positions after accounting for employee absences (e.g., vacation days, sick leave) and other relief days (e.g., training days).

For More Information:

TMC Staffing and Scheduling for Day-to-Day Operations is available from the ITS Electronic Document Library at http://www.its.dot.gov and from the TMC Pooled-Fund Study website at http://tmcpfs.ops.fhwa.dot.gov

For information on the TMC Pooled-Fund Study, visit our website at http://tmcpfs.ops.fhwa.dot.gov

Call the FHWA Operations Help Line toll-free (866) 367-7487

FHWA-OP-06-???

EDL# ?????

Efficient Scheduling and Optimal Staffing

TMC Staffing and Scheduling for Day-to-Day Operations

March 2006

TMC Staffing and Scheduling for Day-to-Day Operations

Staffing and Scheduling

The efficient operation of a transportation management center (TMC) depends on the effective management of personnel. Past developments in staff planning and scheduling systems used to support the day-to-day operation of TMCs have been limited. Effective staffing and scheduling require that TMCs determine the appropriate number of employees needed to meet service demands from consumers and that the employees possess the attributes necessary to perform their work successfully.

TMCs provide a vital service to community residents by safeguarding travelers, providing cost and time savings, and decreasing pollutants released into the air by motor vehicles. In the service industry, employees are the most critical element in the delivery of the service to consumers. In addition, payroll costs of service employees typically account for the greatest percentage of the operating budget. As a result, human resource management of a service operation requires well-informed and accurate scheduling and staffing decisions.

Challenges

Generating employee schedules and staffing plans requires TMCs to overcome a variety of challenges. Often, TMCs must reconcile conflicting requirements and constraints placed on staffing and scheduling systems:

- Budget constraints
- Employee preferences
- Differences in employee skills and performance levels
- Government regulations
- Workspace constraints
- Organizational policies
- Varying consumer demand

Demands for Services

At times, a TMC may have too few employees or employees without the necessary training, causing poor service, frustrated consumers, overworked employees, and low morale. Having too many employees, on the other hand, causes financial losses and may also reduce morale if employees are not assigned enough work. Demand analysis is a technique used to translate an anticipated pattern of work (e.g., level of congestion, number of incidents, volume of calls) into work demands. Through short-term planning, the work demands can be used to determine employee scheduling requirements. Through long-term planning, the work demands can be used to determine employee staffing requirements.

Meeting Demands for Services

Employee schedules are typically constructed to meet projected levels of consumer demand during a TMC's hours of operation. The three general approaches to scheduling are dedicated shifts, rotating shifts, and flexible schedules that change over each planning horizon.

Staffing arrangements and personnel decisions increase the flexibility of using human resources to meet consumer demands for services. Common staffing arrangements include full-time employment, part-time employment, job sharing, temporary employment, and contract positions. Common personnel decisions include overtime, promotion, redeployment, and cross training.

Employee scheduling strategies may be implemented by TMC employees to adapt to demanding work schedules. Human factors principles have been applied to the hours employees work to determine optimal sleep and meal times, alertness management strategies, and other adjustment strategies that help to ensure high job performance, safety, health, and general well-being.

Employer scheduling strategies focus on aspects of work that managers and supervisors oversee, including employee recruitment and compensation practices, job and schedule design, and environmental conditions. Interventions that improve employee health and safety may also decrease accidents, sick leave, and costs, and increase employee productivity.

Staffing Plans

The number of vehicles and the average number of vehicle miles traveled per day continue to increase at a greater rate than the expansion of the transportation system. Already, interstates and highways in many major cities bear volume greater than their intended capacity. To meet these demands, TMCs are undergoing a number of fundamental changes, including the introduction of more sophisticated technologies, shifts to integrated operations, and improvements to customer service capabilities. The increased demand and changes to TMC operations have staffing implications.

Staffing plans prescribe human resource activities (e.g., training programs) to address potential environmental uncertainties (e.g., expansion of TMC services) and existing human resource needs (e.g., TMC manager retires). Two general categories of staff planning may be distinguished.

Aggregate plans focus on groups of employees in specific, typically lower-level jobs. For example, an aggregate plan may forecast the number of operators or maintenance personnel needed in the next six months to five years.

Succession plans focus on critical, typically higher-level positions that must remain filled. Often a succession plan covers specific employees in critical positions and employees who could be promoted to a critical position.