
Part 11

Design Criteria for Dispatching Centers¹

— 2020 —

FOREWORD

A centralized dispatching center (CDC) houses train control and traffic management equipment and the personnel to operate and maintain it. In its broadest sense, CDC is the focal point of the operating railroad, whether it be an entire railway network or a significant regional portion of such a network. It monitors, directs, and controls all train operations, while keeping in frequent communication with every activity in the controlled territory. A CDC should be a secure, hardened facility with controlled access whether as a standalone building or a dedicated space within a railroad office building. The vital components of the signal system are located in the field and the CDC provides the facilities for the human interface with the installed technology. As such, it is possible to relocate a CDC quickly, combine workstation assignments during periods of low traffic, or temporarily shift operations to a back-up facility in an emergency. Part 11 deals with the building and facilities to support the dispatching function and not with the train control hardware or technology installed to perform the function. It is recommended that building designs incorporate flexible spaces that can be easily updated while maintaining operations as technology evolves, typically on 5-10 year cycle.

Establishing basic design parameters begins with ascertaining the proposed method of operation of the particular facility and the geographical extent of the controlled territory which will define the number of dispatcher positions. A detailed design program should be prepared with input from the Operations, Communications and Signals, and Informational Technology departments. . Other functions that support train operations may be co-located in the CDC including crew management, locomotive assignment, car distribution, railroad police, and multi-department emergency response.

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¹ References, Vol. 92, 1991, p. 55.

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SECTION 11.1 SITE CONSIDERATIONS (2020)

The facility location will be determined by the particular circumstances of the territory to be served, the signal and communication systems to be used, and the proximity to the executive offices that are responsible for the railroad operations. In many cases, a CDC will be co-located in a railroad office building or adjacent to other railroad facilities that may require separate entrances and standalone power and communications. Dedicated, secure employee parking is recommended due to the 24/7 nature of the operation.

Site selection should consider extreme weather events that regularly occur and incorporate structure hardening as appropriate for the conditions. Site conditions should consider the protection of employees and their personal property who must operate the CDC during adverse weather conditions. Evaluation of flood risk should include access to the CDC site by employees during extreme weather events for flooding potential so the CDC is not isolated and inaccessible to employees. In selecting a site, provide for adequate stand-off distance from public roadways to enable a secure, hardened perimeter to be established as the CDC building is a critical facility for the railroad.

Other concerns relative to location should include: local zoning requirements, soil stability, drainage, roadway accessibility, perimeter security, utilities availability, and proximity to alternate accommodations for employees during emergency events. Reliable commercial power with redundant sources and multiple high-speed data links are essential when siting a CDC.

SECTION 11.2 EQUIPMENT

11.2.1 DISPATCHER WORKSTATIONS (2020)

A dispatcher workstation will be typically composed of a L-shaped or U-shaped desk with arrayed LCD screens that display the controlled territory, a communications control console or screen for radio and telephone communication with train crews, and a general purpose computer for accessing company business systems with a dedicated printer. This equipment may be located in office modular furniture or enclosed rooms, the latter typically with glass walls to permit visual interaction with the adjacent dispatchers and the dispatching supervision. Overhead lighting should be low glare and adjustable supplemented with work surface task lighting. Since these workstations are often 24/7 positions, a small under counter refrigerator and/or personal property storage cabinet may be desirable.

A unique design consideration for these facilities is the supervisory control and data acquisition (SCADA) system that will be the content displayed on these screens. SCADA systems are usually proprietary and custom-built for the railroad and sufficient design lead-time and coordination with the SCADA vendor should be allowed to prevent delays in start-up and commissioning.

Fig. 11-1 Typical Dispatcher Workstation using modular furniture

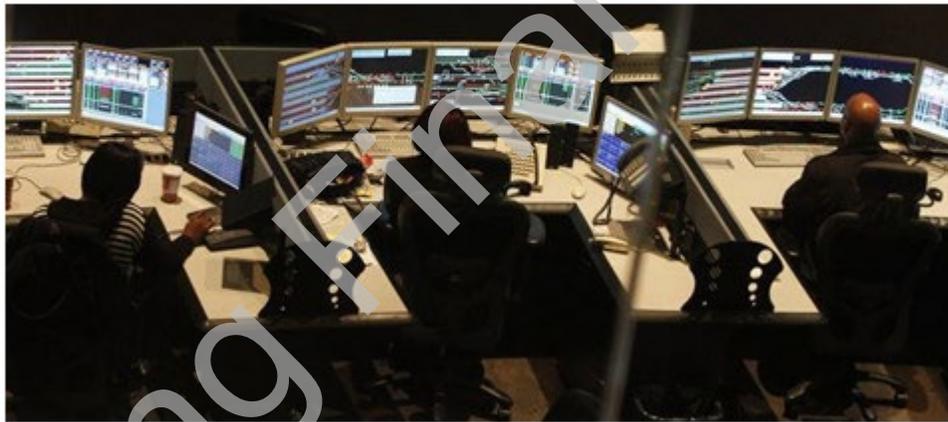
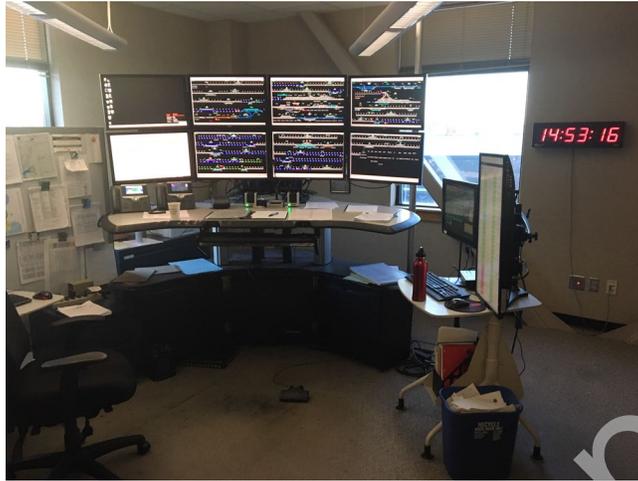


Fig 11.2 Free-standing workstation



11.2.2 OVERVIEW DISPLAYS (2020)

Overview wall displays of a CDC territory may be beneficial in high density passenger terminals to allow sharing of information amongst many dispatchers and the support staff in the center. Some freight dispatching centers use the wall displays to offer real-time weather and news, operational metrics, and other information that may affect train movements. Typically, such displays are either arrayed LCD screens or rear-view projected images. The specification of such equipment should be made by the Operations and C&S Departments in conjunction with the designers and suppliers of the train control equipment. Wall displays will require a behind the screen utility space with adequate ventilation and/or cooling.

Fig 11-3 Overview Wall Display for a passenger system dispatch center



11.2.3 AUXILIARY FUNCTIONS (2020)

Auxiliary functions which may be performed at a CDC location include the following.

- a. Crew calling/dispatching.

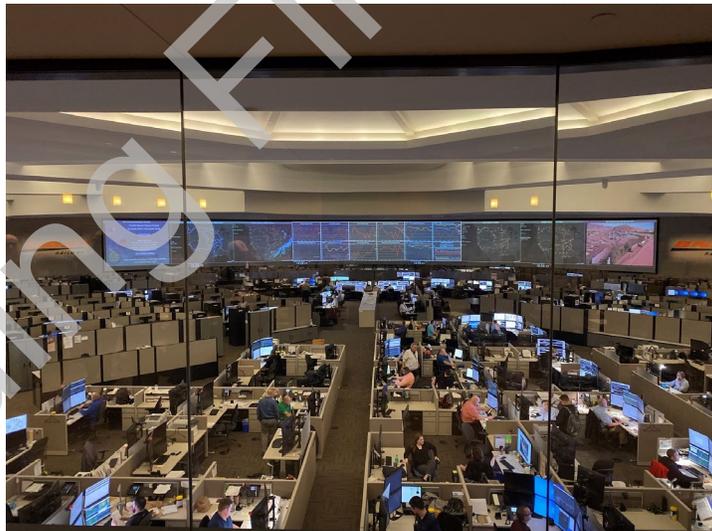
- b. MofW trouble call assignments
- c. Passenger information systems.
- d. Telecommunications control.
- e. Motive power control and assignments.
- f. Monitoring wayside detection systems
- g. Facility security
- h. Monitoring security and facility access systems of remote sites

SECTION 11.3 FUNCTIONAL REQUIREMENTS

11.3.1 TYPICAL SPATIAL RELATIONSHIPS (2020)

Refer to Table 11-1 for typical spatial relationships. The values in this table are useful for moderate sized centers of up to 15 workstations. Not all functions shown in the table are applicable to every facility. For larger facilities, a specific design program should be developed with other departments utilizing the space. Some railroads organize their large system dispatch centers into geographic clusters so all functions related to a specific portion of the railroad are co-located enabling dispatchers and work staff to interact.

Figure 11.4 Large Railroad Centralized Operation Center



Refer to Figure 11-5 for a dispatching center for a moderate size regional passenger railroad.
Refer to Figure 11-6 for a dispatching center for a moderate sized regional freight railroad.

TABLE 11-1 TYPICAL CONTROL CENTER SPATIAL REQUIREMENTS

Room or Space	Function or Activity	Area	Adjacencies
General Superintendent – Train Operations (GS-TO)	Responsible for operation of trains on mainlines	150 sf private office	
Executive Assistant	Supports GS-TO and staff	10 x 10 workstation	Near GS-TO
Executive Conference Room	Transportation Dept. meetings	300 sf	Near GS-TO
Manager of Rules	Responsible for rulebook and operating instructions	120 sf private office	Near GS-TO
Asst. Manager of Rules	Responsible for rulebook and operating instructions	120 sf private office	Manager of Rules
Supervising Road Foreman	Responsible for oversight and management of train engineers	120 sf private office	Manager of Rules
Transportation General Offices (TGO)	Support staff in 10x10 cubicles- number will be determined by size of railroad	800 sf + circulation	
Hearings/Interview Room	Private meeting space for employee meetings	200 sf private office	TGO
The following spaces are part of the Central Dispatch Center operations control center and are in a highly secure area			
Dispatcher Workstations	Number of modules or private offices with glass wall on side facing the Chief Train Dispatcher area - low glare lighting; acoustic treatment	200 sf total for each	Within vision range of Chief Train Dispatcher desk
Chief Train Dispatcher Desk	Supervises the dispatchers.	10x10 desk station in open room	Asst Chief desk and Dispatcher workstations
Asst Chief Train Dispatcher Desk	Supports Chief Dispatcher in peak hours	10x10 desk station in open room	Chief's desk and Dispatcher workstations
Chief Train Dispatcher or Supervisor office	Private meeting room	120 sf private office	Proximity to the Dispatch area
Emergency Command Center	Conference room set-up for activation in the event of service disruption	500 sf Conference room	Glass wall to Chief Dispatcher desk space or viewing window
Train Control Computer Equipment Room	Room for Train Control Equipt	400-2000 sf depending upon equipment selected	Dispatcher Workstations
Technical Support office	Separate room with workstations to develop or validate software changes	100 sf per person	Train Control Computer Room
Training Simulator Room	Provides off-line dispatcher workstation for individuals to qualify for positions and allow testing of software releases	150 sf per workstation	Train Control Computer Room and the Software Development office
Administrative Area	Copier, records preparation and retention, crew calling, timekeeping, etc.	120 sf	Use of office modular furniture depending upon the number of positons required near the Asst. Chief Dispatcher
Lunch / Kitchen area	Kitchenette for dispatcher breaks with sink, microwave and refrigerator	300 sf	Dispatchers may prepare foods for consumption at their workstations
Toilets	Male and Female toilets –accessible to mobility impaired.	Number per code and occupancy load	Lunchroom
Qualified Mechanical Person Workstation (QMP)	Supports the Chief Dispatcher for car and loco trouble reports	10x10 desk area in open room	Near the Chief Dispatcher Desk
Maintenance of Way Trouble Desk	Coordinates dispatch of signal and track maintainers when failures are reported to the dispatcher. Also coordinates scheduled track outages with dispatchers.	150 sf office with two workstations	Near Dispatcher workstations
Railroad Police / Emergency Responder Liaison Office	Liaison to support dispatchers during service disruptions and periods of peak train activity	100 sf office	Near the Chief Dispatcher Desk and the Emergency Command Center
Radio/Comms Equipt. Room		80 sf	Train Control IT Room

11.3.2 DISPATCHING OPERATIONS LOCATION (2020)

The location within the building of the dispatchers' space should be hardened without windows, environmentally conditioned with individual temperature control for each dispatcher workstation if contained in a single room, be well insulated thermally and acoustically. A common configuration places the dispatchers on a floor with electronic equipment and power conditioning equipment located directly below on another floor.

Adjacent to the dispatchers' area, a dedicated conference room with operable glass partitions or large viewing window opening onto the dispatch floor should be provided for use during emergencies and service disruptions. This room should have wall screens to display selected dispatcher controlled areas, monitors for viewing commercial and cable TV coverage of events and weather conditions, phone and company radio access, specific phone or radio communications to police and emergency responders, and for passenger services a means to effectively interact with social media and passenger information systems in stations.

11.3.3 TRAIN CONTROL COMPUTER EQUIPMENT ROOM (2020)

Relay racks and computer equipment should be housed in computer room environmentally controlled space. Close control of temperature and humidity combined with a relatively dust free atmosphere ensures optimum operation and life for electronic gear. Fire suppression system suitable for the installed equipment should be evaluated by a fire protection professional. The computer room can be located directly below the dispatch center, ceiling hung cable trays provide maximum flexibility for making upgrades and renovations. If on the same level as the dispatch center, cabling can be run in cable trays either above the ceiling or surface-mounted on the wall for ease of access and future modifications. Consideration to the fire code requirements for floor penetrations and through other fire rated construction should be evaluated for adequate flame and smoke stoppage and fire suppression.

11.3.4 TECHNICAL SUPPORT SPACES (2020)

Technical support spaces should include a technician's workshop for both Communications and Signal employees as well as for Information Technology personnel to perform minor repairs, testing of components, and management of controlled inventory of spare parts.

If the railroad develops its own software or reprograms the installed train control equipment on site, a secure office space with at least one fully equipped dispatcher workstation should be provided. This extra /dispatcher workstation can also be used for training and qualifying employees for new assignments without disrupting the real-time operations.

11.3.5 EMPLOYEE FACILITIES (2020)

If dispatcher workstations are not in enclosed rooms, lockers for the storage of employee personal property and outer garments should be provided for each individual in a space adjacent to the CDC.

11.3.6 LUNCH/KITCHEN AREA (2020)

Lunch area with microwave ovens, refrigerator, kitchen sink, coffee maker, storage cabinets and vending machines should be considered since dispatchers usually work in a 24/7 environment cannot leave their workstations for extended periods of time. For large facilities, the lunch area may also serve as a training or group meeting room and should be equipped with a large video screen for displaying training materials or general video information.

11.3.7 TOILET FACILITIES (2020)

Toilet facilities should be provided in close proximity to the dispatcher workstations to minimize the time away from the desk. Toilets should be accessible for mobility impaired as required by governing building code and may be either unisex or gender specific. Depending upon the total staffing of the CDC, additional toilet facilities may be warranted adjacent to the lunch area or outside the CDC secure perimeter.

11.3.8 (RESERVED FOR FUTURE USE)

SECTION 11.4 SUPPORT SYSTEMS

11.4.1 LIGHTING (2020)

In general, lighting should be of half the intensity of a typical office setting for general workspace area. Indirect lighting sources should be favored over direct lighting for ambient illumination to minimize reflection and glare. Dimmer control of general lighting is essential to allow for fine adjustability. Task lighting must be tightly controlled beams with dimmer control of intensity. The use of indirect lighting with long life low maintenance sources is most practical in the dispatcher's room. Lighting in the other spaces has no special requirement although use of long-life low maintenance sources is very practical to minimize security risk of frequent required service. Natural light, if present, should be mediated by shades, drapes or blinds that will allow for reduction of glare. If natural light is desired, light tubes or similar solutions that do not provide direct sunlight are encouraged provided shade options are maintained.

11.4.2 COMMUNICATIONS AND NOISE ATTENUATION (2020)

Communications by the dispatchers with trains may create a noisy atmosphere which can be mitigated with the use of headsets. Sound attenuating ceiling and wall finishes, such as acoustical tile, are effective to minimize reverberation. Carpeted floors may also be used in low traffic areas to further reduce noise. Wall and floor coverings should be evaluated for smoke and toxicity properties.

11.4.3 HVAC SYSTEMS (2020)

HVAC systems in the computer and technician spaces should be the computer room type with a downflow air distribution using the access floor space as a supply air plenum. Conditions in this space should be designed to 72 FDB and 50% relative humidity. Systems in the dispatcher area should be designed to normal office standards with zone control to permit some individual temperature control. Draft conditions in these areas must be carefully controlled since these individuals must remain at fixed positions for extended time periods. Fresh air supply should be brought in through the HVAC equipment and filtered to limit dust. Adequate exhaust and some air purification through activated carbon filters should be given consideration in the design. Redundant HVAC equipment is essential for both reliable operation and for routine maintenance of equipment during system operation since downtime is not available. This requirement may be accomplished with overlapping zones in lieu of duplicate standby equipment. All dedicated computer and server rooms should be separately designed and fitted for appropriate conditioning as these rooms can get higher heat loads due to the equipment, and sustained exposure to elevated heat can reduce the lifespan of that equipment.

11.4.4 FIRE PROTECTION (2020)

Fire protection and suppression is a requirement, the type and its activation protocols should be evaluated to suit the equipment and risk. Halon fire suppression is a best practice system for electronic equipment areas. Individual ABC extinguishers should be provided near each console and in service spaces. Water sprinkler systems should be avoided if the code permits, since the equipment being protected will usually be destroyed by the water damage. Ionization type detectors should be installed using a cross zone plan to trigger halon discharge. An annunciator panel with mimic board should be installed to indicate actual location of any sensor in alarm. Abort switches to prevent an unnecessary halon discharge should be provided in a central location. Spaces in the CDC not hosting electronic equipment may be protected by conventional water sprinklers as recommended by the railroad's risk department or by local code provided adequate drainage is provided to divert the water away from electronic equipment spaces.

11.4.5 WIRING SPACES (2020)

Wiring spaces and cable routes to workstations and displays from the computer room can be through a raised access floor system, up fed from wire trays below, or down fed from ceiling wire trays. Signal and communication cable should enter the building through a splicing chamber. If the entrance is remote from the computer room, an access floor route is preferred for cable runs. Lacking an access floor system cable horizontal runs should be in oversized cable tray run overhead. Power wiring should be shielded. In routing cabling, it may be preferable to have two separated routings so all cabling is not in a single confined area to minimize risk of damage to the entire dispatching system.

11.4.6 ALTERNATE POWER SUPPLY (2020)

In the event of loss of commercial power, alternate supply should consist of an uninterruptable power system for the computer and communications equipment with a minimum of 30-minute capacity, and an emergency generator of suitable capacity to operate the entire CDC. The generator fuel supply should be determined by historical outage patterns with adequate safety factor; 72 hours should be a minimum outage duration. In designing the alternate power supply system, care should be taken to minimize the number of single points of failure in the service and distribution equipment, such as transfer switches. Battery operated emergency light packs in key circulation areas and in rooms housing mission critical equipment should also be provided.

SECTION 11.5 ROOM FINISHES

11.5.1 DISPATCHER ROOM (2020)

The room(s) or dispatchers space should have acoustical absorption on all surfaces; e.g. anti-static carpet tiles over raised access floor, carpet or sound soak type material on walls and acoustical ceiling tile. Non-reflective colors should be consider for all surfaces to reduce glare. Use of headsets can achieve additional noise reduction, especially in open floor plans.

11.5.2 COMPUTER AND TECHNICAL SUPPORT ROOMS(2020)

The computer room and technical support room should have hard smooth non-dusting surfaces; painted or vinyl covered walls and vapor barrier ceilings. Sub floor should be sealed against dusting and vapor dispersion.

11.5.3 UPS AND BATTERY ROOM (2020)

The Uninterrupted Power Supply (UPS) and battery room should have light colored chemical resistant finishes on

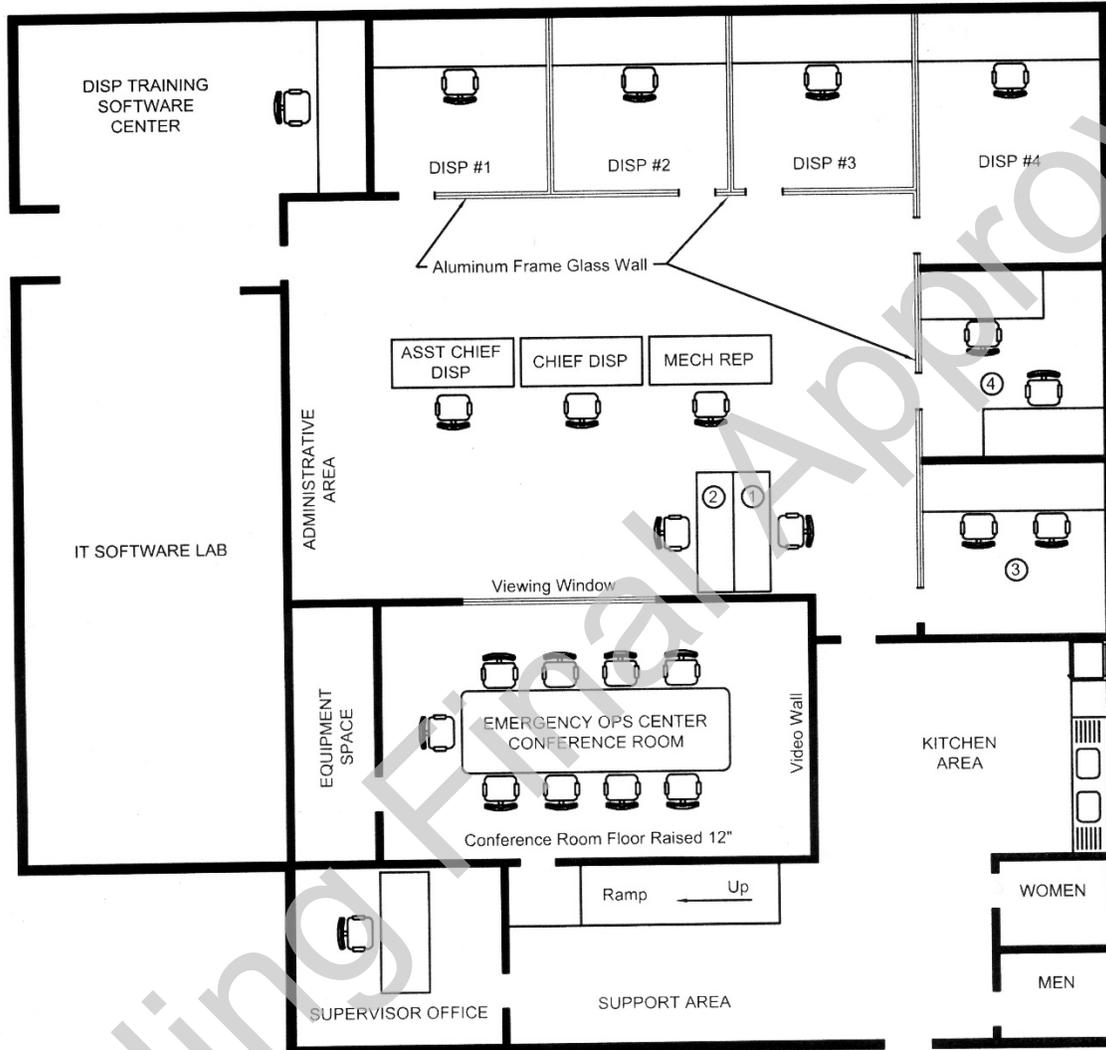
the floor and walls suitable for the type of batteries used. Fire protection and ventilation should be provided as required by code for the type of batteries installed.

11.5.4 OFFICES (2020)

The offices need no special finishes although the sound absorption wall and ceiling treatments in the dispatchers' room are frequently carried over into the offices. Refer to Chapter 6, Part 2, Design Criteria for Railway Office Buildings for additional information.

Pending Final Approval

Fig. 11-5 Dispatch Center Floor Plan for a Moderate-sized Regional Passenger Railroad



- ① Passenger Information Display Operator
- ② Social Media Desk
- ③ Police/Emergency Liaison
- ④ M of W Trouble Desk

**DISPATCH CENTER FLOOR PLAN
MODERATE-SIZED REGIONAL PASSENGER RAILROAD**

Fig. 11-6 Dispatch Center Floor Plan for a Moderate Size Regional Freight Railroad

