



WK 12954 - ITEM 1

Standard Guide for Emergency Operations Center Development

To: Members of E54 & E54.02:

This standard guide is intended to provide the emergency management community with practical concepts and approaches to develop an effective Emergency Operations Center (EOC). The task group developing this guide was co-lead by three very experienced emergency managers, with a membership drawing from emergency management agencies at all levels from across the country. In preparing this guide, the intent was to draw from this depth of experience in developing and operating an EOC to provide some very practical ideas and approaches for not only designing and developing an EOC but also providing guidance on how to obtain the necessary support and backing to ensure its success.

Initially, the task group set out to develop a standard guide for the development, operation, and management of an EOC, but after a considerable effort to assemble such a standard guide, it became apparent that it would be so broad and large it would not be very useful. Thus, it was decided to produce three smaller more manageable standards. The first is this Standard Guide for Emergency Operations Center (EOC) Development. The others will follow.

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ITEM 1 – WK12954

Standard Guide for Emergency Operations Center (EOC) Development¹

This standard is issued under the fixed designation X XXXX; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide provides a general guideline for the development of an emergency operations center (EOC) or facility/location of similar purpose with a different name.

1.2 An EOC might be developed by government agencies or others who perceive a need for a facility or space designated for management to meet, collaborate, and coordinate efforts during an emergency or disaster incident.

1.3 This guide may also be applied as a basic foundation for larger operational area facilities such as a regional operations center (ROC) or state operations center (SOC) with a broader area of responsibility and more extensive needs to communicate and coordinate with others.

1.4 The values given in inch-pound units are to be regarded as the standard. The values in parentheses are for information only.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

¹ This guide is under the jurisdiction of ASTM Committee E54 on Homeland Security Applications and is the direct responsibility of Subcommittee E54.02 on Emergency Preparedness, Training, and Procedures.

2.1 *ASTM Standard:*

F 2209 Guide for Training of Level I Land Search Team Member²

2.2 *ANSI Standard:*

ANSI A58.1 Minimum Design Loads for Buildings and Other Structures³

2.3 *ASCE Standard:*

ASCE-7 Minimum Design Loads for Buildings and Other Structures⁴

2.4 *NFPA Standard:*

NFPA 1600 Standard on Disaster/Emergency Management and Business Continuity Programs⁵

3. Terminology

3.1 *Definitions Specific to This Standard:*

3.1.2 *entity, n*—governmental agency or jurisdiction, private or public company, partnership, nonprofit organization, or other organization that has emergency management and continuity of operations responsibilities.

(NFPA 1600)

3.1.3 *established EOC, n*—facility that is temporarily created to manage or coordinate emergency operations or like functions.

3.1.4 *facility, n*—something (such as a hospital) that is built, installed, or established to serve a particular purpose.

(Merriam-Webster Online

Dictionary)

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from the American National Standards Institute, 25 W. 43rd St., 4th Floor, New York, NY 10036.

⁴ Available from the American Society of Civil Engineers, 1801 Alexander Bell Dr., Reston, VA 20191.

3.1.5 *procedure*, *n*—series of steps followed in a regular definite order. (**Merriam-Webster Online Dictionary**)

3.1.6 *process*, *n* series of actions or operations conducive to an end. (**Merriam-Webster Online Dictionary**)

3.1.7 *redundancy*, *n* —the provision of additional or duplicate systems, equipment, etc., that function in case an operating part or system fails. (**Merriam-Webster Online Dictionary**)

3.1.8 *standard*, *n*—something established by authority, custom, or general consent as a model or example. (**Merriam-Webster Online Dictionary**)

3.1.9 *standing EOC*, *n* —existing fixed facility that serves as a location for entities to manage or coordinate emergency operations or like functions.

3.1.10 *system* , *n* —an assemblage or combination of things or parts forming a complex or unitary whole. (**Merriam-Webster Online Dictionary**)

3.2 *Acronyms*

ADA—American with Disabilities Act

ARC—American Red Cross

CERT—Community Emergency Response Team

COG—Continuity of Government

COOP—Continuity of Operation

COTS—Commercial Off The Shelf

EOC—Emergency Operations Center

HVAC—Heating, Ventilation, and Air Conditioning

IT—Information Technology

⁵ Available from the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269-9101.

JIC—Joint Information Center

JIS—Joint Information System

MRC—Medical Reserve Corps

NEMA—National Emergency Management Agency

PC—Personal Computer

PIO—Public Information Officer

PSAP—Public Safety Answering Point

ROC—Regional Operations Center

SAR—Search and Rescue

SOC—State Operations Center

4. Summary of Practice

4.1 It is recognized that a “one size” approach will not fit all. Emergency operation centers (EOCs) need to be developed based on the risks, vulnerabilities, capabilities, and needs of the entity. For example, many areas do not need to have seismic or hurricane protection and yet many do. At the same time, there are common functional elements such as communications, work space, and so forth that every EOC needs to a varying degree. Section 6 of this guide addresses processes and procedures in the development of an EOC, whether standing (fixed) or established (mobile).

4.2 With these considerations in mind, a tiered approach was taken that allows an entity to develop an EOC based on their needs and constraints, while providing guidelines for growth if desired. In recognizing the importance of alternative or backup facilities, this guide should be used to aid entities in developing self-sustained redundant resources. This guide is based upon current best-business practices.

5. Significance and Use

5.1 A critical part of the emergency management process involves establishing and preparing to operate an EOC. A well-designed EOC will greatly benefit the coordination of response and recovery activities. If designed and developed properly, it will serve as an effective and efficient facility for coordinating all emergency response efforts. Developed properly, it will help optimize emergency communications and information management. This guide is intended to provide the emergency management community with practical concepts and approaches to develop an effective EOC. The task group that developed this guide was co-lead by three very experienced emergency managers with a membership drawing from emergency management agencies at all levels from across the country. In preparing this guide, the intent was to draw from this depth of experience in developing and operating an EOC to provide some very practical ideas and approaches for not only designing and developing an EOC but also to provide guidance on how to obtain the necessary support and backing to ensure its success.

6. EOC Development

6.1 *Needs Assessment*--Before the development of an EOC, a needs assessment should be done that includes a hazard/threat identification and assessment, risk analysis, and capability assessment. The entity having jurisdiction needs should be based on findings of a hazard/threat identification and assessment, risk assessment of what types of incidents it can anticipate, how severe the hazards might be, and the possibility of their occurrence. Another important factor would be the size of its jurisdiction. Obviously, a highly urbanized area would require far greater resources than a small rural area. This would have an impact on the size, scope, and needs for such a facility.

6.1.1 *Hazard/Threat Identification and Assessment*--This should reflect a comprehensive analysis of the types of hazards and threats that the EOC might encounter. It should reflect not just the most likely but also those that are remotely possible.

6.1.2 *Risk Analysis*--This is a process in which the hazards and threats identified in 6.1.1 are now rated as to the chance they might occur. This can be a numeric-type rating or reflect verbiage such as likely, very likely, or less likely. The highest scored threats or hazards are addressed first and the lowest scored addressed last. A second dimension can also be added in which the degree of impact is also included in the analysis for each threat. A less likely threat may have a higher impact if it was to happen and that may affect the urgency of response to the threat.

6.1.2.1 *Vulnerability assessment*--Having now identified the hazards, threats, and risks, the vulnerability assessment is applied to determine what vulnerabilities shall be addressed. For example, the entity having jurisdiction would not want to place their EOC in an area in which routine flooding occurs when they have identified flooding as a high risk.

6.1.2.2 *Consequence management*--This is the management of the results of an incident. This is the primary function of an EOC. The entity having jurisdiction would think about how their agency would manage each incident they identified earlier and document it. This process will assist them in defining space allocation, equipment needs, facility systems, or other requirements.

6.1.3 *Capability Assessment*--The entity having jurisdiction determines what actions need to occur and to what level they can adequately address them. This will help determine the size and scope of their facility requirements.

6.1.3.1 *Legal responsibility*-- Based on applicable laws at all levels, this is the entity having jurisdiction legal responsibilities. Review any and all applicable laws, policies, and procedures that shape the framework of the entity having jurisdiction actions. Some laws specifically address what the entity having jurisdiction shall do, others address what equipment the entity having jurisdiction shall have, and yet even more address construction or facility requirements.

6.1.3.2 *Vision/mission*--This is a statement of what the entity having jurisdiction believes needs to occur in an ideal setting. Understanding that, although this is the ideal, the entity having jurisdiction shall be willing to make compromises based on issues such as cost/benefit, political, and, of course, overall financial capabilities. Typical EOC organization vision and mission statements address topics as direction and control, situational assessment, coordination, priority establishment, and resource management.

6.1.3.3 *Facility occupancy*--Occupancy can be varied. The entity having jurisdiction's facility could be in a stand-alone building. It could be in a shared facility (that is, jointly with a police or fire facility or maybe the 911 center) or just a room that has been designated in an existing facility. It can be a dedicated facility (permanently set up for immediate use) or it might be one that has had some modifications to accept equipment and personnel (that is, prewired for additional phone lines).

6.1.3.4 *Facility use*--In many cases, the EOC can be designed for multiple uses. This can include a training room, conference room, storage, and so forth. On the other hand, some facilities are dedicated and, therefore, reserved solely for use as an EOC. In addition, the EOC can be a location within a larger facility that may not only include emergency management office space but such things as their 911 center, other operations centers (that is, transportation), or other organizations/departments office space.

6.1.3.5 *Facility functionality*--The key to functionality is that it works for the organization that is using it. Whether dedicated or multi-use, the objective is to be able to meet the needs of the organization in the role of an EOC. For some, this might be a compromise between what is seen as ideal and what is actually doable. In many cases, this might mean that having some place is better than no place. The entity having jurisdiction shall ensure that all partners that will be using the facility have a chance to provide input.

6.2 *Obtain Buy-In*--In almost all cases, the entity having jurisdiction will need to justify the EOC and convince those who are funding or using the facility or both that it is needed. This may be to their bosses (often the electorate of the jurisdiction) or, in some cases, the voters themselves if a bond issue or some other financial or approval is needed directly from the public. In many cases, it is not only good but important to assemble a collaborate group that can support and encourage those who are the final decision makers that the project is important and justifiable.

6.2.1 *Internal: Obtain Executive or Administrative Level Buy-In and Support*--Unless these individuals are convinced of the need, the project is basically doomed from the start. An excellent way to convince individuals of the need is to either get them in an existing facility that the entity having jurisdiction knows is totally inadequate during either an actual incident or at least for a functional or full-scale exercise. In these types of situations, the executives may be better able to grasp what are the needs and concerns of the entity having jurisdiction.

6.2.2 *External--Obtain Support from Partners and the Community*--The entity having jurisdiction may find additional leverage by developing a collaboration of like-minded individuals and organizations that can exert pressure on the decision makers. This collaboration can included other jurisdictional departments and agencies, other disaster-related organizations

(that is, Red Cross, Fire Service, and so forth), and the community at large (civic groups, academia, and so forth). The entity having jurisdiction needs to identify some movers and shakers that are sympathetic to the cause and, of course, the support of the community in general. Always remember that nothing can generate enthusiasm such as the period following an actual incident.

6.2.3 Combined Facilities--Generate support by solving multiple facility needs in one project. Look for shared opportunities in compatible uses such as Public Safety Answering Point (PSAP), law enforcement, or emergency response station, and community center use.

6.3 Create a Design Team--The design team should be inclusive rather than exclusive. The entity having jurisdiction may want to have a core team that would include key individuals who will do most of the footwork and have final approval authority but do not limit the overall size of the team. In this case, the entity having jurisdiction should embrace “the more the merrier” concept. This type of project should not be a committee of one.

6.3.1 Identify Team Members--Team members should be comprised of those who may or will participate in operations within the EOC.

6.3.1.1 Include the public sector--Be sure to include the entity having jurisdiction’s primary agencies and departments that would operate in the facility during an exercise or incident. Even if the facility will belong to a private entity, the public sector can provide guidance, input, and sometimes, even provide a liaison to the entity’s facility. One of the most overlooked public sector representatives is legal counsel.

6.3.1.2 Include private sector--With the growing emphasis on the essential role the private sector plays in a disaster/emergency, it is critical to get them involved. The entity having jurisdiction might discover willingness by this sector to provide in-kind donations as well as

financial support for the project. In addition, the entity having jurisdiction may wish to include either a seat for a liaison or, in some cases, a separate room for a private sector operations center (this may be especially important to larger urban or state EOCs). Participation should likely be limited to those private entities that have mature EOCs and those that can provide needed support to other entities such as telecom providers, grocery chains, hospitals, and long-term care facilities.

6.3.1.3 *Include nongovernmental organizations*--Some nongovernmental organizations such as the Red Cross, Amateur Radio or other trained volunteer organizations may have a regular seat in the entity having jurisdiction's EOC. It is important that their needs be addressed to ensure that they can operate with maximum efficiency in the new facility.

6.3.1.4 *Include faith-based organizations*--Many faith-based organizations take a very active role in disaster response and preparedness. This group can also be an excellent partner in drumming up support for the entity's project.

6.3.2 *Identify Team Structure*--Again, it will probably be best to create a core team and a larger group. Play to people's strengths and responsibilities using organization mechanisms such as a steering committee, advisory board, technical committees, and so forth. This allows everyone to feel included but keeps the final decision-making process manageable.

6.3.3 *Identify Team Support Resources*--Identify what the team will need. Ensure that the entity having jurisdiction includes sufficient staff to support the team. Most of those in the core team are already stretched to their limits so maintain sufficient support to reduce burnout of those members. The entity having jurisdiction may wish to hire full-time administrative support staff.

6.3.4 *Create a Meeting Schedule*--Create a timeline for the project and then develop a meeting schedule that will support the timeline and also not become a burden to the vast majority of participants on the team. Remember to avoid last-minute and short-suspense notice meetings if at all possible. Give as much notice as possible.

6.4 *Conduct Design Team Planning Meetings*--Every meeting should have an agenda published in advance. Try to keep the meetings a reasonable length and be sure to have the right people for each meeting. If there is no action or nothing to report, then try to avoid having a meeting just for the sake of having it. One person should be designated as the facilitator, but that person should be part of a unified decision-making team. Facilitators are usually neutral and not part of the decision-making team. If the facilitator is a player, he or she may be tempted to override opposing views. The number of members with a voice should be designated in advance and the entity having jurisdiction should try to avoid having a number that will create deadlock during the decision-making process. Everyone should be aware of the process and be kept informed. It is strongly suggested that an experienced architect with proven experience in EOC design and construction be retained early in the process to be available for design team planning meetings. By including members of the community and nongovernment organizations, facilitators will encounter highly political and highly emotional discussions. Strict rules on meeting conduct shall be outlined before each meeting. For example, a member of a religious organization may not want to sit with a member of a large Planned Parenthood organization, and the meeting order may suffer from this nonproductive situation.

6.4.1 *Design the EOC Vision*--Before even moving to the design or construction phase, it is essential that a consensus vision for the project be determined. This will create the boundaries that will help resolve issues and provide a much clearer picture of what the end result should be.

6.4.2 *Continuity of Operations/Continuity of Government*--Because of the nature of the EOC, it is essential that clear continuity of operations (COOP) and continuity of government (COG) plans have been completed before the design. These plans will help delineate the boundaries and requirements of the project more clearly. In essence, the need for continuity planning for the EOC itself and for consideration of the jurisdiction's COOP plans in the design criteria are of the utmost importance.

6.4.3 *Identify What Emergency Services Will be Performed at Site*--This means the team needs to take a hard look at what exactly is to be done at the site and what is required to accomplish that. Some EOCs include a command and control area, while others provide the most traditional services of coordination. These include coordination in logistics, communications, infrastructure, emergency services, and so forth. Critical information such as number of incidents required (or would have required) activation of the EOC in the last ten years, categories of response levels, number of seats needed for the largest event, and a list of major functional activities expected to be accommodated by the new facility provides the design team with invaluable information on the scope of services to be performed.

6.4.4 *Review Hazard/Threat Identification and Assessment*--This review should aid in ruling potential sites in or out and help determine what special construction might be needed to reduce the susceptibility of the facility to the common hazards and threats for the entity's particular area.

6.4.5 *Review Risk Analysis*--This review will help determine which hazards and threats need to be addressed. Increased protection results in increased costs. Careful consideration of the risk/benefit/cost implications should be part of the design process to provide the greatest level of survivability within the means available.

6.4.6 *Space*--It is always difficult to be precise about space requirements, but the best way to proceed is to determine what the minimum and maximum space requirements the entity having jurisdiction thinks are needed and then what would be the median. This will hopefully allow the entity to have a size that will not only meet their immediate needs but provide a cushion for future growth. Understand that there is no guarantee of what the final space outcome will be. Please note that all of this paragraph should be applied to any space whether it is an empty lot and the entity is building from scratch or looking for an existing facility.⁶ In a recent survey of EOCs in the State of Florida (U.S.), over two thirds of the respondents stated that their facilities were “overcrowded” for their needs, partially because they were reused facilities, but also because of a significant increase in emergency-related functions.

6.4.6.1 *Provide space for private sector*—If the entity having jurisdiction is a governmental entity, do not forget the private sector. It is a proven fact that the private sector is a rapidly growing partner in all that entities having jurisdiction do. Ensure that some space for this important partner is set aside. The entity having jurisdiction may want to limit participation of private sector partners to those that can actually provide support and have common goals with the vision of the EOC.

6.4.6.2 *Provide space for public information office/ joint information center (PIO/JIC) and media*--The PIO/JIC is critical during an incident; however, be cognizant of the fact that it is not always advisable to have this facility located immediately within the EOC. If the entity having jurisdiction has the option, it is better to have a designated location close by but not where it might interfere with ongoing operations. Remember that it is the joint information system (JIS) that is critical; the JIC is merely a facility to perform this system.

⁶ Informal research has shown that a footprint of 50 to 200 gross ft² (5 to 19 m²) per person is adequate. No written source

6.4.6.3 *Space is available for those working in a virtual EOC environment in case they have to come to site*--As technology progresses, the virtual EOC will continue to grow in acceptance and usability. The virtual part only works as long as technology is available. If the entity having jurisdiction plans on operating a joint EOC, then they should be sure to include sufficient space to house those who would typically be part of the virtual effort should it become necessary.

6.4.6.4 *Space use*--Ensure the use of space is addressed for actual use of the site during day-to-day and activation activities (flexibility and commonality to include shifts, overlaps, and so forth). In many cases, the EOC is in a joint facility with other non-emergency operations. Be sure that the EOC has sufficient space to operate because often these non-emergency operations must remain functional even during an incident. Understand that the entity having jurisdiction may get surges of staff at shift changes depending on the nature and size of the incident. Many recent after-action reports on significant incidents indicate that lack of space for all of the agencies and department representatives have created significant problems in the ability of the response process. Planning the size anticipated for a severe or extremely large-scale incident will be very beneficial instead of just allocating sufficient space for what the entity having jurisdiction experience is from past incidents dictates.

6.4.6.5 *Identify need to reserve space for a command area*--Do not forget to include room for the policy group to meet. The noisy atmosphere of a functioning EOC environment is not conducive to high-level meetings. In addition, rooms should be considered for executive session meetings or tactical response coordination or both.

6.4.6.6 *Identify space required for equipment*--Be sure to leave sufficient room for current and future equipment when calculating space. In many EOCs, each position is now being

available at this time.

supplied with dual computer monitors and some with many more. Technology and software are dictating an ever increasing amount of equipment.

6.4.6.7 *Space maximizes workload potential*--Efficiency should be a key word in space planning and allocation. Understand that a facility that does not create an efficient work environment for the players will not be well received. Always be cognizant of size, space, sound, and lighting requirements. Because of advances in technology, hardened windows can be installed or retrofitted without loss of structural integrity in work areas to contribute to the psychological wellbeing of the EOC staff.

6.4.6.8 *Space includes break areas (including recreational)*--Because of the nature of the EOC, it is essential that personnel have adequate space for recreational breaks, smoking opportunities, and relaxation in general. Staff that is not provided with this type of space will be much more susceptible to early burnout. Colors used in the design of the break area (and shift change areas if available) should be of a calming hue, helping the EOC staff relax and decompress before and after a shift.

6.4.6.9 *Space allocations adhere to the Americans with Disabilities Act (ADA)*--It is extremely advisable that the EOC be in total compliance within the United States. More and more of the entity having jurisdiction's players have disabilities. In addition, if the space is such that it has multiple uses that include access by the general public, then compliance is mandatory. Any entity creating an EOC should design the facility to meet any physically or mentally impacted individual. Although the ADA is applicable within the United States, it is a benchmark standard for the disabled community.

6.4.6.10 *Space includes life-support systems*--With today's environment of potential terrorism and hazardous materials, the EOC should be equipped with a system to ensure that life

can be sustained. The facility may need space should injuries occur and immediate evacuation is not possible. Space should also be allocated for redundant life-support systems such as air handling, heating and cooling, electrical, water, sewer, and so forth.

6.4.6.11 *Survivability and operability requirements are addressed for space*--The survivability of the entity having jurisdiction EOC needs to be based on their hazard, threat, and risk analysis. Do not forget when allocating space to provide appropriate standoffs from the building. Avoid parking within close proximity of the facility or direct driven access to the facility. The EOC and associated property shall have space to perform security checks of people, equipment, and vehicles. Air, water, and other fuel systems should be protected from tampering as well as be designed to survive identified hazards and threats. The EOC should be isolated from other non-related uses by a minimum of a 2-h fire separation.

6.4.6.12 *All utilities needs addressed in regard to space*--This is important especially for long-term needs. With the increase in technology, requirements such as electrical are growing as an ongoing process. One overlooked facility utility need is a redundant system for sewer. It is typical for entities to build EOCs below ground. This can cause sewer systems to back up if the main utility is taken offline. Evaluate all systems for redundancy to ensure the entity having jurisdiction can continue to provide services.

6.4.6.13 *Address all functional areas needed for space*--If the EOC is in a shared facility, then ensure that all functional areas are sufficient. Each area will require different equipment. Emergency services areas will need enough room and equipment to accommodate a myriad of portable and table-based radio systems. Some thought should be given to common requirements such as telephones, dry erase boards, and computers.

6.4.6.14 *Space can accommodate additional support personnel*--Often, thought is only given to typical staffing for the entity's usual incidents. When space planning, incidents much larger than what are typically experienced and staffing that the entity having jurisdiction is unaccustomed to making should be studied. During a catastrophic incident, anticipate the space identified for personnel to double at a minimum.

6.4.6.15 *Space is allocated for security systems and security personnel*--In today's environment, it is essential to ensure that the entity's space provides for adequate security measures. This includes personnel and equipment as well as hardening efforts that might be required.

6.4.6.16 *Space includes stress relief systems or items*--Stress is one of the most debilitating things that can affect the efficiency of an EOC staff. Sufficient space for quiet areas and other stress-reducing items should be provided. Use calming hue color schemes throughout the general facility where possible. Subdued lighting can also be introduced into areas used for rest or shift changes or both (that is, break areas).

6.4.6.17 *Consider potential medical needs in regard to space*--Injuries and illnesses do occur during incidents. Be sure to include a space where an individual can be removed until they are better or can be transported. Also, leave storage space for medical supplies that might be desired such as a defibrillator and first aid kit. Access to this space should be wide enough to accommodate any incoming medical resources to include an ambulance, a wheeled litter, and so forth.

6.4.6.18 *Consider personal hygiene areas to include shower facilities in regard to space*--Some incidents may cause situations in which staff may not leave the facility for long periods of

time. Space should be identified for both men and women whether it is in the EOC or nearby at a hotel or other structure.

6.4.6.19 *Space includes sleep areas*--Again, there may be periods when individuals will not be able to leave the facility and go home. Sleep areas can be in the EOC itself or at a nearby facility such as a hotel or shelter. If the entity having jurisdiction plans on locating sleeping areas in existing rooms designed for other purposes, ensure that they have adequate storage space for the sleeping supplies as well as proper ingress and egress. Some laws require additional entrances and exits for sleeping areas.

6.4.6.20 *Adequate space is available for supplies used during continual operations for up to 30 days*--Storage is often an added on thought at the end. It should be designed into the facility from the beginning. Be sure to have space sufficient to storage enough to survive up to 30 days.

6.4.6.21 *Space allocation includes adequate briefing space*--EOCs are often very noisy places. Be sure to allocate sufficient space for briefings and meetings and sufficiently outfit them for communications and technology.

6.4.6.22 *Identify those spaces that can be mobile and those that shall be fixed*--Whenever possible, design spaces that can be adjusted. This includes rooms with movable wall partitions to provide a variety of space sizes.

6.4.6.23 *Space includes area for amateur radio*--If at all possible, be sure to designate a specific dedicated space for amateur radio as well as other communications. This will help reduce the noise level within the main area of the EOC.

6.4.6.24 *Space includes area for other trained volunteers* (American Red Cross [ARC], Community Emergency Response Team [CERT], Search and Rescue [SAR], Medical Reserve

Corps [MRC], and so forth)--With the growing use of volunteer groups, be sure to leave space for at least a liaison from these types of groups.⁷

6.4.6.25 *Space includes area for partners or other liaisons such as corporations aiding logistics*--Again, do not forget about this critical function. Most organizations now use just-in-time delivery processes that require coordination with third-party logistics. Preplan to have space for these people and adequate space for the equipment they will bring.

6.4.6.26 *Proper space is allocated for record retention*--This is another storage issue. The entity having jurisdiction's protocol should include the search of every piece of paper to ensure that it does not include critical information. This includes what might be tossed into the garbage. Also, there will be volumes of records that may need to be retained for future reference or documentation for financial reimbursement.

6.4.6.27 *Space includes facility logistics*--Planners typically overlook the need for space to perform facility logistics. This includes no space for janitorial closets, loading docks for deliveries, or garbage bins. EOCs require constant upkeep when in use during activation as compared to day-to-day operations. Anticipate the need for the space and services to at least double in size because of the high volume of people at the facility.

6.4.7 *Technology*--Technology is an exploding area and the trend is towards miniaturization and software-based applications. No matter what technology is envisioned now or in the future, it will more than likely require space and other support. The entity having jurisdiction should be sure to calculate for sufficient space and size for utilities, heating, ventilation, and air conditioning (HVAC), workspace, cabling and power chases, and so forth. It is recommended

⁷Red Cross (<http://www.redcross.org>, <http://www.redcross.int>), Community Emergency Response Team (<http://www.citizen corps.gov/cert>), Medical Reserve Corps (<http://www.medicalreservecorps.gov>), Search and Rescue (see Guide F 2209).

that the entity having jurisdiction acquire the services of a qualified communications/information technology (IT) consultant to assess and establish the equipment requirements. This will determine the space needed for technology. Remember that emergency management is a group approach and some members may have specialized technology needs that require space.

6.4.7.1 *Conduct communications needs analysis*--A complete communications analysis needs to be done. This will help to determine space and utility requirements. When reviewing communications, review all applicable laws, ordinances, standards, and procedures. Certain communications equipment such as secured communications rooms require specialized shielding.

6.4.7.2 *Conduct a technology decision tree review*--A technology decision tree (Table 1) is a job aid developed to assist emergency managers in determining what basic technology is needed. The intent is to prompt entities in developing useful systems as well as redundancy.

TABLE 1 Technology Decision Tree

Technology Decision Tree			
	YES	NO	ACTION
1. Does the entity require submission of disaster reports and requests in a particular format?	See question 2	See question 4	
2. Must our submission be through a particular computer program?	See question 3	See question 4	
3. What is the program? Who supplies the program? How much does it cost? How many computers does the	Take action based on answers to questions.		Use information to determine mandated/minimum EOC technology needs.

entity need in the EOC with the program to supply the data?			
4. Does the entity want to use a computerized reporting system?	See Table 2	See question 5	
5. Are there current paper forms that meet our reporting needs?	Take action	Create forms and take action	Acquire forms, determine copies needed, produce copies as budget allows, and stock the EOC

6.4.7.3 *Conduct a computer and software checklist*--Once the general technology needs have been identified, the entity having jurisdiction should look at computers and software in more detail. The computer and software checklist (Table 2) is a job aid developed to assist the entity in identifying more specific needs.

TABLE 2 Computer and Software Checklist

Computer and Software Checklist
The entity having jurisdiction shall answer these questions to make a decision on the software and computer hardware needs for their EOC.
For which EOC functions does the entity want computers?
Does the entity want to purchase a commercial-off-the-shelf (COTS) emergency management software package or use the software already in place in the jurisdiction?
If the entity chooses a COTS emergency management software package, what training and support does the company provide their EOC staff? How easily can staff members make the transition from the software they use daily to the special software that is used occasionally?
What are the computer hardware requirements to run the software the entity chooses?

<p>What degree of support does the entity have from the jurisdiction’s information technology staff? Are they on-call 24 h a day? Do they have EOC support duties defined in their jobs?</p>
<p>How can the entity build a backup system for their computers that will keep them operational throughout the disaster? Can the entity make the switch to backups in a few minutes themselves, or will it require an extended time for technicians to arrive?</p>
<p>What are the space requirements, environmental requirements, technical requirements, and financial requirements to implement the technology?</p>
<p>When the EOC is “locked down” as a result of disaster, civil unrest, or other similar emergencies, external IT support may be unavailable or unable to respond for an extended period of time. Keeping this in mind, will some EOC staff receive a more advanced level of IT training to provide at least a basic level of support under these conditions?</p>
<p>Will the backup system automatically activate upon power failure to ensure continuity in IT services? Can the personal computers (PCs) and servers providing IT support at the EOC be configured to switch to a “fallback” server or PC when it senses a hardware failure? An example would be using the concept of server clustering.</p>

6.4.7.4 *Identify communications oversight/control*--If left to each partner to decide what equipment they wish to bring, they will never have enough space in the end. Therefore, identify a lead entity that will establish communications and equipment oversight and control. This can be an existing organization or a newly developed subcommittee. Try to strive for a good balance that meets functionality and security.

6.4.7.5 *Develop redundant systems*--Do not forget to include space and equipment for adequate backup.

6.4.7.6 *Educate all on information management issues*--Information flows both vertically as well as horizontally. By educating everyone on the team about how information is to flow, they

can assist the entity having jurisdiction in identifying what communications mediums and equipment they will need. Information management not only includes formal communications, but informal as well. Some entities have incorporated sound-resistant rooms in which critical or secure communications can take place.

6.4.7.7 Virtual EOC concept addressed in regard to technology--In a technology enriched environment, emergency management functions can be conducted in multiple locations. Thus, build the capability to operate virtually as well as at the EOC.

6.4.7.8 Communications are interoperable and integrated--Communication systems need to work together. Interoperable is defined as the ability of a system to work with or use the parts or equipment of another system. For example, if one type of radio antenna is disabled, the entity having jurisdiction should have the capability to run the system on another existing antenna. Integration is the process of coordinating or blending items into a functioning or unified whole.

6.4.7.9 Technology is selected based upon what services the EOC will provide--If an EOC will not perform duties such as rumor control because of size constraints, then do not build in the technology to do it. Technology selected for an EOC should be directly tied to the vision and mission of the EOC.

6.4.7.10 Technology includes transportable communications capability--The entity having jurisdiction needs the ability to communicate independently of the EOC as part of continuity planning. For example, the entity may have to switch incoming calls and access records and management software from another location.

6.4.7.11 All laws, ordinances, standards, and operating procedures are reviewed for required technology--In some instances, laws, ordinances, standards, and internal operating procedures dictate that the entity shall have certain technology in their facility. An example is a

mandated legal requirement to have a direct line to the Governor's office or a nuclear power plant.

6.4.7.12 *Technology includes internal/external warning systems*--In most cases, EOCs become the main warning focal point for external warning systems such as tornado sirens, amber alerts, emergency alert systems, nuclear facilities, and so forth. Also, the entity's EOC may also house an internal warning system such as one for security, flood, earthquake, radiation, and so forth. Whatever the case may be, these systems take up space and shall be carefully planned.

6.4.7.13 *Identify vendors that can support technology needs*--Once the entity having jurisdiction technology needs are identified, look for vendors that can support them. Entities may have their own equipment, but may not have enough to co-locate their resources within the entity having jurisdiction EOC. Sometimes, other entity's equipment breaks and they may not have a service company prearranged to fix it. If the entity having jurisdiction has the attitude of anything coming into their facility is their responsibility to maintain, the entity will plan more effectively for those just-in-case scenarios.

6.4.7.14 *Equipment*--Conducting emergency management requires a lot of equipment. This can range from furniture, projection screens, and so forth to radiological monitoring devices, external automatic defibrillators, and more. The entity having jurisdiction has identified space requirements for most equipment previously. The entity having jurisdiction should take a second look to see if they need more space for items such as maps, copiers, printers, seating, radiological detectors, public address systems, and battery chargers. They should adjust space requirements now while they have the opportunity. Remember, an EOC is designed to be a self-contained facility, capable of remaining fully functional and survivable without any outside assistance or

access for days or even weeks, so it must have all necessary equipment and supplies stored on site.

6.4.7.15 *All laws, ordinances, standards, and operating procedures are reviewed for required equipment*--Various building codes require certain equipment to be installed for entrances and exits. All facilities should have emergency lighting equipment. Review all laws, ordinances, standards, and operating procedures to identify additional equipment. Remember to include a professional architect in this process.

6.4.8 *Site*--A site can be an empty lot, field, or existing structure. It may require new construction or retrofitting. The key to site selection is to identify whether or not it will meet the entity having jurisdiction's needs identified previously. No matter what, site selection is critical and the entity's decision should be based on the following factors:

6.4.8.1 Site is easily accessible, yet secure.

6.4.8.2 Site is big enough for expected incident/event needs.

6.4.8.3 Site is capable of handling growth as a result of incident/event.

6.4.8.4 Site reviews are conducted and compared to the hazard/threat assessment and risk analysis.

6.4.8.5 Conduct noise analysis to determine if noise reduction devices are needed.

6.4.8.6 Conduct utilities survey for survivability (Will the sewer system support this or will it overflow? Will we still maintain water services? and so forth).

6.4.8.7 Site has redundant life-support systems in place.

6.4.8.8 Site is accessible to emergency services personnel (law, fire, and medical) during time of need.

6.4.8.9 Site includes adequate ventilation.

6.4.8.10 Site includes ample parking that is lighted and has redundant systems to include electrical for mobile units. Site parking is secure enough to protect vital equipment such as response and command vehicles on site.

6.4.8.11 Site includes space adequate enough to address debris removal requirements such as garbage.

6.4.8.12 Site is accessible from multiple points.

6.4.8.13 Site includes a rotary wing landing zone nearby.

6.4.8.14 Site is compliant with ADA or can accommodate those that are physically or mentally impaired.

6.4.8.15 Site addresses building elements such as:

(1) Basic shelter-in-place functionality including main-floor HVAC controls and fire alarm control panel;

(2) Noncombustible construction where possible; and

(3) Has a sprinkler system that covers the entire EOC and can be shut off at multiple points segregating the system as necessary to prevent water damage to the whole.

6.4.9 *Fiscal*

6.4.9.1 *Develop budgets*--An entity having jurisdiction knowing what they have and what they need is crucial. Develop budgets that address things as construction, information technology, communications, equipment, furniture, feasibility studies, geotechnical reports, certification costs, and so forth that are focused on the needs identified previously. The entity

having jurisdiction may have to go back and revisit those requirements to scale the overall costs back to something politically viable.

6.4.9.2 *Educate all on financial needs*--Once the entity having jurisdiction has an identified budget, they should educate the EOC design team on the financial needs. If the team and outside authorities are aware of the costs for the entity's EOC and are an integral part of the design process, they will be more apt to donate or provide items needed at little to no cost.

6.4.9.3 *Obtain donations from external sources*--Seek donations for the entity's needs from external sources such as civic groups, private industry, and nonprofit groups.

6.4.9.4 *Design EOC within budget*--Once the entity having jurisdiction has a budget and their general needs, they can start to design their EOC. They shall remember to stay within their budget. If the entity cannot afford something, they should look at whether or not they truly need it by conducting a cost/benefit analysis.

6.4.9.5 *Conduct a cost/benefit analysis*--There are many models to use to conduct a cost/benefit analysis. The entity having jurisdiction basically looks at what their EOC costs, and then they weigh whether or not what they are trying to do is worth the cost. If it is not, then they should adjust what they need to do to stay within their budget. If it is, then they continue on as planned.

6.4.9.6 *Identify funding sources*--There are many funding sources available. The most important funding stream comes from the entity having jurisdiction organization. The entity shall have buy-in from their organization to fund such an important project. Where they fall short, the entity can look to external sources such as civic organizations; the private sector; nonprofit groups; voter referendums (or bonds); and grants from local, state, and national governments.

6.4.9.7 *Evaluate and select funding sources*--Once funding sources are identified, the entity having jurisdiction has to evaluate them. Evaluation should be a comparison between what they have to offer, what the entity having jurisdiction can offer them, and any conditional strings that are attached to their funding. Rank them in order from the least amount of strings to the most. Once ranked, the entity having jurisdiction selects the funding sources they want to use.

6.4.9.8 *Develop strategy to secure financial support*--When identifying funding sources, the entity having jurisdiction should document how those sources would benefit from their facility.

The entity having jurisdiction should try to regard the situation from the funding entity's viewpoint. The entity should create a marketing plan and test it internally before seeking outside funds. The entity may have to hire a marketing firm to assist them in this endeavor. Simple things such as including logos, giving special acknowledgements, and facility space sharing are ways to help secure financial support. The key is to demonstrate how the funding entity will truly benefit.

6.4.9.9 *Create a list of unmet needs and incorporate it into improvement plans*--Once the entity having jurisdiction has a budget and identified funding sources, they will most likely have some unmet needs. They should document these needs and rank them in priority of importance of their mission. Then, they should develop improvement or enhancement plans that will give them a tiered approach to meeting their end goal.

6.4.10 *Identify Existing Sites*--Once the entity having jurisdiction has an idea of what they are looking for, they need to identify those sites that can best meet their needs. Anticipate only reviewing two sites a day because of travel times. They should separately document their findings of each site. When considering sites, they should consider the impact on the neighborhood and potential acceptance or opposition of the community. Review existing

structures for ASCE-7 or ANSI A58.1-1985 certification. Without certification, such a building should not have open roof spans greater than 40 ft (12 m), not be a pre-engineered structure built before 1990, not exposed to the full force of hurricane winds, not constructed of nonreinforced masonry, and should be less than 60 ft (18 m) high. This is the common-sense criteria that the Red Cross uses.

6.4.11 *Identify Potential Sites (Mobile)*--No facility is ever guaranteed to be operational all the time. Thus, the entity having jurisdiction needs to look at potential mobile sites where they can establish an EOC for either alternate COOP/COG purposes or to place the entity closer to the incident or event. Alternate facilities should be located far enough away from each other so that they are not affected by the same event.⁸

6.4.12 *Select Primary Site*--The entity having jurisdiction shall review their findings of each site and rank them in order of how they meet their needs. Then, the entity should apply a cost/benefit analysis to their ranking. In the end, the entity will select a primary site that will meet their needs and be cost beneficial.

6.4.13 *Select Alternate Site*--Always select an alternative site. Facility and land acquisition is a fluid process. The primary site the entity having jurisdiction wishes to acquire may no longer be available. Alternate sites should be readily secured in the time of need with items such as chain link fences, guarded gates, and barriers.

6.4.14 *Conduct Physical Configuration Site Meetings*--The entity having jurisdiction should review their design team composition. They may have to add a few more partners to the team at this stage. Have the team as a whole configure the site to where it best meets the mission and

⁸ NFPA 1600 and National Emergency Management Association (NEMA), *Emergency Management Accreditation Program (EMAP)*, 2007 edition.

their needs. For example, it makes sense to put all of logistics in one area, while putting emergency services near communications.

6.4.14.1 *Layout is conducive to interoperable communications*--The entity having jurisdiction should remember their equipment and technology needs from previous steps. They should ensure that their layout will not only meet those communications needs, but also allow them to build in interoperability. The entity may have to move some EOC functions closer to places that have access to the outside for cabling purposes.

6.4.14.2 *Layout incorporates security systems and personnel*--Safety of the EOC and its occupants is paramount. During an incident or event, it is common for people to get agitated, irritated, and/or have a belief that the entity having jurisdiction is not servicing them to the best of their ability. The entity having jurisdiction should incorporate security stations and systems into their site to give them maximum security yet still being flexible.

6.5 *Identify and secure engineering/architecture firms*--Whether the entity having jurisdiction is building a new site from scratch or retrofitting an existing site, it is strongly recommended that they involve engineering and architecture firms to aid them. If the entity having jurisdiction is a typical emergency manager, they will not know all the required building codes and other requirements that come into play when developing a site. These individuals can assist the entity having jurisdiction in developing the site that meets their needs and provides the least amount of impact to the site, community, and environment.

6.6 Consult with engineers, architects, and other subject matter experts as needed to identify methods to design or retrofit the EOC to address, as possible:

6.6.1 Structure type and design and site layout to be less vulnerable to physical damage caused by hazards common to the area (fire, weather, earthquake, and so forth);

6.6.2 Structure and site layout includes devices and design to increase security and safety against human attack;

6.6.3 Reduce reliance on external sources and backup systems with energy efficient design and materials;

6.6.4 Methods to reduce potential for external eavesdropping; and

6.6.5 Consider immediate needs and the potential to expand in the future. Incremental development may offer a short-term solution affordable with the current budget, yet the long-term plan would address anticipated growth.

6.7 Bid Out Construction of EOC--To save the entity having jurisdiction money, they may wish to bid out the construction of their EOC. For public entities, bidding is almost always regulated by law. When bidding out construction, the entity having jurisdiction should ensure that the specifications they develop address their needs. Also, the entity should include a rating factor that they can apply that addresses performance. Performance-based rating may help the entity get their project finished quicker, and it also gives the entity a chance to review the bidder's previous work history. It is better to hire an experienced firm than one that is new and has never built an EOC before.

6.8 Build EOC--Once a construction vendor has been selected and funding secured, the entity having jurisdiction can begin to build the EOC. They should review the architectural design plans one last time before they break ground. The entity must be able to be flexible to achieve their end result. They may have to make adjustments to still meet their mission. For example, the entity may have to shorten a room's space to make room for a redundant life-support system such as heating and cooling.

6.9 *Test EOC*--When the EOC is completed and set up, the entity having jurisdiction shall review all of their procedures. They should develop any additional procedures that are necessary. Lastly, the entity shall test their EOC. The entity should have all of their partners come to the EOC and actually test it for at least 3 h. This will allow the entity to simulate a real activation and monitor items such as noise tolerances, temperature control, space functionality, and so forth.

6.10 *Maintain EOC*--Lastly, the entity having jurisdiction should maintain their EOC. They should perform routine preventive maintenance on equipment and systems and ensure the EOC is adequately stocked and prepared. The entity should plan to evacuate it quickly to go to an alternate EOC in the event their facility is compromised.

7. Keywords

7.1 emergency operations center; EOC; EOC design; EOC development

APPENDIX

(Nonmandatory Information)

X1. Guide for Emergency Operations Center Development

Checklist for EOC Managers

✓	STEP TO BE PERFORMED
	6.1.1 Hazard/threat identification and assessment
	6.1.2 Risk analysis
	6.1.2.1 Vulnerability assessment
	6.1.2.2 Consequence management
	6.1.3 Capability assessment
	6.1.3.1 Legal responsibility
	6.1.3.2 Vision/mission
	6.1.3.3 Facility occupancy

	6.1.3.4 Facility use
	6.1.3.5 Facility functionality
	6.2.1 Obtain internal buy-in
	6.2.2 Obtain external buy-in
	6.3.1 Identify design team members
	6.3.2 Identify design team structure
	6.3.3 Identify team support resources
	6.3.4 Create meeting schedule
	6.4 Conduct design team planning meetings
	6.4.1 Design the EOC vision
	6.4.2 Continuity of operations/continuity of government
	6.4.3 Identify what emergency services will be performed at site
	6.4.4 Review hazards/threat identification and assessment
	6.4.5 Review risk analysis
	6.4.6.1 Provide space for private sector
	6.4.6.2 Provide space for PIO/JIC and media
	6.4.6.3 Space is available for those working in virtual EOC environment in case they have to come to site
	6.4.6.4 Space use
	6.4.6.5 Identify need to reserve space for a command area
	6.4.6.6 Identify space required for equipment
	6.4.6.7 Space maximizes workload potential
	6.4.6.8 Space includes break areas
	6.4.6.9 Space allocations adhere to ADA
	6.4.6.10 Space includes life support systems
	6.4.6.11 Survivability and operability requirements are addressed for space
	6.4.6.12 All utility needs addressed in regard to space
	6.4.6.13 Address all functional areas needed for space
	6.4.6.14 Space can accommodate additional support personnel
	6.4.6.15 Space is allocated for security systems and security personnel
	6.4.6.16 Space includes stress relief systems or items
	6.4.6.17 Consider potential medical needs in regard to space
	6.4.6.18 Consider personal hygiene areas to include shower facilities in regard to space
	6.4.6.19 Space includes sleep areas

	6.4.6.20 Adequate space is available for supplies used during continual operations for up to thirty days
	6.4.6.21 Space allocation includes adequate briefing space
	6.4.6.22 Identify those spaces that can be mobile and those that must be fixed
	6.4.6.23 Space includes area for amateur radio
	6.4.6.24 Space includes area for other trained volunteers (ARC, CERT, SAR, Medical Reserves, Corps, and so forth)
	6.4.6.26 Proper space is allocated for record retention
	6.4.6.27 Space includes facility logistics
	6.4.7.1 Conduct communications needs analysis
	6.4.7.2 Conduct a technology decision tree review
	6.4.7.3 Conduct a computer and software checklist
	6.4.7.4 Identify communications oversight/control
	6.4.7.5 Develop redundant systems
	6.4.7.6 Educate all on information management issues
	6.4.7.7 Virtual EOC concept addressed in regard to technology
	6.4.7.8 Communications are interoperable and integrated
	6.4.7.9 Technology is selected based upon what services the EOC will provide
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	6.4.7.13 Identify vendors that can support technology needs
	6.4.7.14 Equipment
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	6.4.8.12 Site is accessible from multiple points
	6.4.8. 13 Site includes a rotary wing landing zone nearby
	6.4.8.14 Site is compliant with ADA or can accommodate those that are physically or mentally impaired
	6.4.9.1 Develop budgets
	6.4.9.2 Educate all on financial needs
	6.4.9.3 Obtain donations from external sources
	6.4.9.4 Design EOC within budget
	6.4.9.5 Conduct a cost/benefit analysis
	6.4.9.6 Identify funding sources
	6.4.9.7 Evaluate and select funding sources
	6.4.9.8 Develop strategy to secure financial support
	6.4.9.9 Create a list of unmet needs and incorporate into improvement plans
	6.4.10 Identify existing sites
	6.4.11 Identify potential sites (mobile)
	6.4.12 Select primary site
	6.4.13 Select alternate site
	6.4.14 Conduct site physical configuration meetings
	6.4.14.1 Layout is conducive to interoperable communications
	6.4.14.2 Layout incorporates security systems and personnel
	6.5 Identify and secure engineering/architecture firms
	6.6 Consult with engineers, architects, and other subject matter experts as needed to identify methods to design or retrofit the EOC
	6.6.1 Structure type, design, and site layout to be less vulnerable to physical damage caused by hazards common to the area
	6.6.2 Structure and site layout includes devices and design to increase security and safety against human attack
	6.6.3 Reduce reliance on external sources and backup systems with energy efficient design and materials
	6.6.4 Methods to reduce potential for external eavesdropping
	6.6.5 Consider immediate needs and the potential to expand in the future
	6.7 Bid out construction of EOC
	6.8 Build EOC

	6.9 Test EOC
	6.10 Maintain EOC

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