

Emergency Coordination Center (ECC) Design Considerations

The following document provides ideas developed by personnel of the King County Office of Emergency Management (OEM) in our quest to design a facility that would be secure, survivable, redundant, flexible and have effective communications capability both with King County government and regional partners. Many of the statements below were gleaned from the experience of others whom we visited on our facility tours and some are from personal experience as we moved through the process. The perspective comes from the viewpoint of a building tenant with a focus on emergency management and does not include construction or architectural issues. We also do not address Communications Center issues except as they relate to OEM. It is being provided for you to extract relevant information that you may be able to adapt to your individual organization's needs.

We chose this opportunity to rename our Emergency Operations Center (EOC) to an Emergency Coordination Center (ECC). King County provides many regional services to the 39 cities and 126 Special Purpose Districts that reside within county boundaries. Local governments make decisions within their own jurisdictional boundaries with county, state, and federal authorities providing support. King County provides regional service in several areas including jail services, courts, transit, wastewater, health, and others. When the ECC activates, it is generally for an event that affects multiple jurisdictions. Our primary role during ECC activations is information sharing and resource coordination. Major policy decisions must be thoroughly coordinated not only within our own government, but with other political leaders affected.

Background

We began our quest in 1996, more than seven years before occupancy, by identifying that the Sheriff's Office Communications Center and the Emergency Operations Center both needed more space and shared many common facility needs. With the two primary tenants identified, management proceeded with the hiring of an architect who would become the project manager for the duration of the project.

A team of clients and the project manager toured up to a dozen facilities throughout the nation to gather ideas from those who had designed similar facilities. Team members included the Manager of the Emergency Management Division (Radio Communications Services was also one of his offices), the Manager of the Office of Emergency Management and the Operations Program Coordinator of the OEM. For the Communications Center, the Operations Manager and the Technical Services Supervisor joined the tour. All of those who participated on the original tour still work for King County and have played

significant roles in the design and occupancy of the building. By touring as a group and spending concentrated time assessing features of these facilities it helped build common ground for team members and contributed to our ability to collaborate on design features as we went through this long, complicated process. Our intent was to build a facility that promoted interoperability and coordination between the Communications Center and the Emergency Operations Center. Most major emergencies and disasters begin with the Communications Center.

Facilities Toured

We toured several facilities, some were EOCs and dispatch centers that shared one facility, others were dedicated facilities to one function or the other. Some were newer facilities and others were programs that had solid operational concepts. The use of technology varied from very sophisticated to basic. We tried to utilize as many positive attributes as possible. Locations visited included:

Clark Co. WA	City of Portland, OR	Phoenix Fire & EOC, AZ
Phoenix PD, AZ	Vancouver, BC	LA County EOC, CA
LA County Fire, CA	Alameda Co. EOC, CA	San Jose PD, CA
Chicago PD & EOC, IL	Fulton Co EOC, GA	Atlanta PD, GA
Georgia State EOC	Hillsborough Co EOC, FL	Florida State EOC
Washington State EOC		

FACILITY NEEDS

There are five primary considerations for the construction of an Emergency Operations Center (EOC): Survivability, Flexibility and Open Architecture, Communications, Redundancy and Security. As we look at specific facility needs such as displays, electronic systems etc. most will fit into one of these categories.

Survivability: When a crisis strikes our county we must have a functioning EOC. Some will say that alternate EOCs are the answer, and we should have a plan for such a facility. However, nothing can replace the systems and time lost in switching to a different building. In various case studies, jurisdictions that were slow to react failed in the mission of coordinating resources in a timely manner. The EOC must be constructed in an area free from as many hazards as possible and on the best seismically stable soils available. Either “base isolation” should be used, or the facility “hardened” to withstand maximum G forces expected in a subduction earthquake. Survivability is our number one priority.

Because base isolation was cost prohibitive, our Regional Communications and Emergency Coordination Center (RCECC) is a hardened structure with both structural and non-structural mitigation strategies in place. Located on the east

hill of Renton, this facility is away from the downtown Seattle area, major airports and railway lines. It is difficult to eliminate all hazards but we have reduced them significantly from our previous location. The AV system is braced as is shelving, file cabinets, and other furniture in an effort to prevent damage from ground movement. Servers are placed on base isolation pads and cross bracing is used to reduce rack movement in both the telecommunications room and the radio equipment room. Bracing of most building components is generally twice as much as is required by code.

Flexibility and Open Architecture: The new building will probably be the primary facility for 50 years or more. In our tours of other facilities we heard again and again how in a matter of a few months or years, organizations outgrew their facility either in general space or technology. Our building has flexibility for configuring it to meet the varied needs of different disasters and to accommodate future growth in responsibility or technology. Open architecture allows us to use the technology of today and tomorrow.

Raised floors are in place in the Coordination and Communications area of the EOC. In the Coordination Room, tables are placed in groups of four (pods), which can be modified and moved if necessary to accommodate our needs. Signage will be easily modified to provide flexibility for participating agencies. Hallways are intentionally wide with electrical and data jacks available for expansion during larger events. Windows were added to the storage room so that it could be expanded into office space in the future. Our original plan was to build an additional 3,000 square feet which would be used for meeting rooms during normal times and could become a Joint Information Center or additional coordination space during times of disaster. Financial limitations caused this additional 3,000 square feet to be eliminated from the plan early in the design phase. A 3,000 square foot concrete pad is in place at the west side of the building with electrical and data hook-ups available should we need to erect a tent during a major event.

Communications: Providing a central point of information is one key function of any EOC. Multiple methods of providing these communications and ample communications resources are a must. They include different types of telephone services, radio communications and electronic communications; all needed to coordinate resources in times of emergencies or disasters. Considering multiple redundancies in communications systems is critical. Linking the Communications Center and the EOC via communications and information display smooths the transition from a low level emergency to a full-blown disaster.

The RCECC is robust in the area of communications systems. In addition to a large PBX for the building, some direct lines not associated with the PBX are in place. A variety of telecommunications and radio systems are in place in the RCECC. With that said, the key to effective communications is not only equipment and systems but coordination and cooperation.

Redundancy: Redundancy is perhaps not a separate category. It exists under several other categories like Survivability and Communications. When it comes time to cut costs on the project, redundant systems may be the first target. The number of generators and their capacity will likely be a first target for budget cuts. In disasters there is a phenomena called confluence. This is when one bad event begets other negative events. One system failing causes others to fail etc. This is when the inconceivable or unbelievable happens. Redundant systems help to eliminate surprises occurring at the worst of times. In this building, all of our systems have redundancy including two generators, either of which will power the entire building, a 3 day fuel supply for those generators, 15,000 gallons of water reserve, two UPSs which are located throughout the building, and two HVAC systems.

Security: Security is a significant factor to consider with events such as bombings, chemical and biological threats, and even workplace violence in the headlines today. Building access, vulnerability to truck bombs, HVAC systems vulnerability to chemical or biological attack must all be addressed in design efforts.

During the design development stages of this project in the late 90's, security measures considered included protection from isolated incidents. Of more concern was protection from seismic, volcanic, and hazardous materials events. Building security includes a fenced parking lot and mechanical areas, a long drive that requires a 90 degree turn to get close to the building, protective landscaping, and some bullet resistant glass in a selected area.

Facility Needs: The following ideas were considered when designing this facility.

Outside Areas:

Issue	In Place RCECC	Comments
Lighted Helipad	No	Zoning, budget concerns – LZ possible nearby
Parking	Yes	72 secured spaces for employees, 72 overflow for activations
Vehicle barriers – entrances	Yes	Landscaping and barriers
Covered outside areas	Some	Covered walkways and smoking areas
Security lighting, cameras	Yes	14 cameras internal and external
Protection of air intakes	No	Cost prohibitive – Do have emergency closing of air intake
Media hook-up	Yes	Power and cable runs provided – Media must provide cable runs

Weather station	Yes	Mounted on small tower
Positioning of Tower	Yes	Considered carefully in the beginning of design development

General Space Issues Identified in Other Locations

Issue	In Place RCECC	Comments
Audiovisual editing & monitoring space	No	Space reduction
Warning point equip. space	Yes	In office area & Ops Comm. area
Message center – copying, distribution, routing	Yes	One pod dedicated
GIS & Plotter	Yes	2 work stations and 2 plotters
Back up EOC for other organizations	No	Budget, no space
Large undedicated meeting space	No	Budget, no space

Utilities:

Issue	In Place RCECC	Comments
Water storage	Yes	15,000 gal., 3 day supply, circulated monthly
Waste storage	No	City sewer, waste backup too costly
Backup generators	Yes	2 generators, either can run building – 3 days fuel
Pre-wired for additional generator	No	Budget
Remote facility systems monitoring	Yes	By facilities mgmt. Downtown
Dedicated facility staff	No	Part of county facility management
Separate room controls for HVAC	No	HVAC Design
HVAC sized for max. occupancy as opposed to normal occupancy	Unk	Handles moderate sized meetings but not tested with fully occupied rooms

Communications:

Issue	In Place RCECC	Comments
Touch screen phone system	No	Cost prohibitive
Multiple routing of phone lines to different central offices	Yes	PBX through county switch - some direct lines from local central office. Analog, digital, data

One PBX for building	Yes	Serves Comm. Ctr and OEM
Radio tower direct connect – no remote access	Yes	2 towers – One primary, one for amateur and other antennas – also antennas across roof.
Analog as well as digital phones	Yes	In place
T1 service to building	Yes	In place
Fiber optic service	Yes	In place
Radio Communications room	Yes	16 spaces for radio and call takers
Radios in breakout rooms	No	All radios placed in radio room
Pre-wire for FEMA MERS	No	
Antenna jacks placed in breakout rooms	No	All radios placed in radio room
Phones for citizen hotline	Yes	3 different Automatic Call Distribution systems set up for different functions including citizen hotline

Security Area:

Issue	In Place RCECC	Comments
Controlled public access that also contains intruders	Semi	Secured access both external doors and internal
Protection at reception	Semi	Window to reception in lobby
Communications at security/reception area	Yes	Telephone
Paging throughout facility	Yes	Broken into 4 zones
Access control points for direct access by employees	Yes	Three primary entrances – front, secured parking lot, overflow pkg
Tracking system of those accessing building	Yes	Proximity readers have capability when doors are locked
Proximity card system	Yes	
Increasing levels of security within building	Yes	Permission differs among staff for access to various areas

General Administrative Space:

Issue	In Place RCECC	Comments
Dual use space throughout facility	Some	Primary dual use spaces are media/briefing and policy rooms which double as meeting rooms. Coordination Room used for some large groups.
Cubicles designed for 2-4	No	Cubicles designed for one but can

people		support additional needs.
Low rise walls	Yes	
Good signage	Various	Currently being enhanced
Building directory	TBD	In process
Extra phone and electrical jacks for expansion	Some	Varies around building

Coordination Room:

Issue	In Place RCECC	Comments
High ceilings	Yes	
Large projection displays	Yes	3 rear projection
Large screen TVs	Yes	TVs located throughout building
Rheostat controlled lights	Yes	
Track/spot lighting along walls w/3-circuit capability	No	
Audiovisual control point	Yes	Moveable to three different points plus one remote unit
AV System	Yes	Requires much training and staff dedication during activations
Remotely controlled camera	Yes	Camera in Coordination Room
Window to outside world	Yes	
Raised floor	Yes	
Multiple outlets for electricity and data	Yes	16 ports per 8 person pod – still may not be enough as we move into WEB based information management
Coffee bar near Coord. Room	Yes	Coffee and coat closet area
Tackable wall surface	Yes	All wall surfaces
Headphones for TVs	Yes	Hard-wired to 4 monitors, 3 projectors, 2 radio stations
White boards and/or Wall System	Yes	Incorporated white boards, team boards, for displays

Breakout Rooms:

Issue	In Place RCECC	Comments
Multiple breakout rooms	Some	Three – already recognized as too few
Soft wall room dividers	Yes	
White board – wall system	Yes	
Pull down screens	No	
Storage in each room	Yes	Cabinets in each room
Radio communications each room	No	Restricted to radio/communications room
Monitors in each room	Yes	
Tackable wall surface	Yes	Wall and soft divider

Media Room/Training Room:

Issue	In Place RCECC	Comments
Live feed from coord. Room	Yes	Kill switch in Coord Room for audio and video kill
Telecommunications hookup	Partial	Conduit in place, final wiring responsibility of media
Monitor	Yes	
Videotape capability	Yes	
Appropriate background & lighting for Press Conference	In progress	Identified as need after move in

Storage:

Issue	In Place RCECC	Comments
Ample storage	No	Storage not adequate, supplemented by container outside
Storage incorporated into other rooms	Some	Cabinets in most spaces

Restrooms/Shower & Locker Rooms:

Issue	In Place RCECC	Comments
Restrooms sized for maximum # of people, not everyday use	Yes	Multiple stalls in each restroom
Full size lockers	Some	Lockers not located in shower area – sharing with Comm. Center- staff only
Separate showers male/female	Yes	
Multiple showers/private dressing area	Some	Two showers each sex – no private dressing area
Restroom in two different areas of facility	Yes, limited	Access is limited to one set of restrooms

Support Areas

Issue	In Place RCECC	Comments
Kitchen w/refrig, microwave, stove/oven, coffee maker	Yes	3 refrigerators, 2 microwaves
Eating and serving	Yes	Areas too small for EOC large activation

Wide hallways, 8' and 6'	Yes	
Bulletin boards	Yes	Hallway, kitchen
Bunking area	No	
Exercise room	Yes	
Quiet room	Yes	For Comm. Center only
Utility closet – stationary tub	Yes	No stationary tub
Non-structural mitigation	Yes	
Furnishings factored into facility costs up front	Most	Some gaps in this area
Large conduit – 2 to 3 times oversized	Yes	Currently some are at capacity
Multipurpose room, full large kitchen, dividers – 3,000 sf	No	Budget, space
AV system throughout building - >\$850k	Some	Allowed \$600k for AV system and it was not enough to fully meet needs
Teleconference and video-conference	Yes	System shared between policy and training rooms

COMMON MISTAKES WE WERE TOLD TO AVOID:

- Lack of storage area
- No bunking area
- No raised flooring
- Not enough conference room space
- Not enough parking
- Facility outgrown by the time constructed is completed
- Normal space planning guidelines used rather than larger expandable spaces
- Inadequate lighting controls
- Work cubicles too small
- Too few communications and electrical outlets; no radio tower
- Restrooms/showers/lockers too small
- Lack of complete kitchens and dining area too small
- Setting an arbitrary square footage limit before design development complete

Lessons Learned from Building an ECC

- ECCs are complex facilities. You need a "full time" project manager who represents the emergency management office. 100% of their time will be consumed making sure that everything is ordered and accounted for as well as installed properly. We did not do this.
- Plan for growth and organizational changes. Include in your plan additional work areas for both ECC activations and normal business. The budget pencils will come out and if you have not planned for expansion,

- you will lose much needed space and have no growth potential for when you move in.
- Consider your client design team carefully. Make sure that you have a robust group to advise the Project Manager or architectural team. Include key support players such as IT, Radio, and Telecommunications, HVAC and facilities folks early on so they can have input on the design. This will likely be a multi-year project and some people will be gone by the end of it.
 - For our facility the AV budget should have been \$850K. It was \$600K. Things will be better quality, but still more expensive by the time you build.
 - Everything needs to be oriented towards information management and display
 - You need a champion who will defend your project when the budget pencils come out
 - You need to be able to explain and defend your project to people who's only mission it is to cut your project's budget
 - Consider building separate spaces/buildings for less critical functions so as to lessen the overall cost of the project
 - Identify roles and responsibilities between the project manager and clients. Unless you have a frank discussion about who is responsibility for what, you will discover surprises as you roll down the road. This needs to be done early. We had problems with reading architectural drawings, arranging final connections, and budgeting associated costs.
 - Be careful when supplying 'preliminary' estimates. Place-holders for furniture became the 'locked in' figures for budget determination with no consideration of product cost changes. Our budget estimate in 1998 was the one we had to work with in 2003.
 - If you get to assist in selection of the project manager, choose someone who has the skills to work effectively with all types of people including the construction company, clients, and elected officials who control the money.
 - In addition to the client team of users, start early with an oversight committee that keeps the top bosses informed so there are no surprises as the project progresses. Brief council as you go so there will be no surprises.
 - Be prepared for organizational or political changes that will affect the project. A significant change in organizational structure occurred near the beginning of our process. In 1996, the Sheriff's Office was a department within the Executive structure of county government. While the process was underway, the Sheriff became a separately elected position. Politics did play a role in this project.
 - The final push that made this project happen was the Nisqually Earthquake in 2001. The Courthouse that housed the Communications Center was significantly damaged and evacuated for several days. The project had been on hold for approximately one year at that time. Within a

few months, the Council made the decision to move forward with the project.

- Technology is very complex these days and likely beyond the current capability of emergency management professionals. Bring in good AV help and make sure the design will do what you want. We had miscommunication in this area and didn't know it until it was too late. Unlike construction, you can't see the problems until the end and you go 'live'.