E911 Communications Center Evaluation
and
Five Year Plan

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Conducted by:

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INTRODUCTION

The Hendricks County Communications Center (HCCC) was established by Interlocal Agreement in 2006 to provide consolidated 9-1-1 and emergency call receiving, and public safety dispatching, for all of the public safety agencies in Hendricks County. Prior to the creation of the agency a total of four communications centers were in operation by Plainfield, Brownsburg, Danville and the Hendricks County Sheriff's Department.

While formally structured as a stand-alone organization with a seven member Governing Board and an eight member Operations Board, the organization lives within an administrative operating relationship within the Town of Plainfield and resides within the facilities of the Plainfield Police Department. Organizational and fiscal policies established by the Governing Board are effectively recommendations to the Plainfield Town Council which ultimately approves the Town's annual budget of which HCCC is a stand-alone component. HCCC personnel are employees of the Town of Plainfield and all human resources and benefits, financial transactions, facility support and many technology support functions are performed by the Town of Plainfield for the HCCC on a cost recovery basis.

Since its inception, HCCC has sought to identify a new organizational and funding structure to support their countywide consolidated communications responsibilities. In addition to striving to be able to operate as a fully free-standing quasi-governmental organization outside of Plainfield or other host entity, it is desirable to identify new funding mechanisms that recognize the unique organizational and fiscal challenges of larger consolidated communication centers. HCCC is currently funded through a combination of 9-1-1 fees collected through Hendricks County and direct charges to user agencies.

To support this initiative and to identify organizational and fiscal needs for the coming years, the HCCC Governing Board initiated a Request for Proposals to retain a consulting firm specializing in public safety communications center governance, management and operations. IXP Corporation was selected to perform this work and the results are embodied in this report.

The report is organized into five sections (Facilities; Telecommunications and Radio Equipment; Dispatch and Records Software; Staffing and Personnel; Funding) and within each section four topical issues are examined (Current State; Identification of Future Needs; Projection of Future Costs; Identification of Potential Collaborations).

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FACILITIES

CURRENT STATE

The Hendricks County Communications Center (HCCC) currently occupies approximately 3,000 square feet of space in the Town of Plainfield's Police and Municipal Court building, which represents approximately 17% of the total building area. The operational floor of the communications center is approximately 1,200 square feet and the remaining spaces includes two private offices for the Director and Assistant Director; an open office/work area used by the Accreditation Manager and a technology support desk; technology and electronic equipment rooms that also contain uninterruptable power supply (UPS) and other electrical panels; a small storage room and a small restroom.
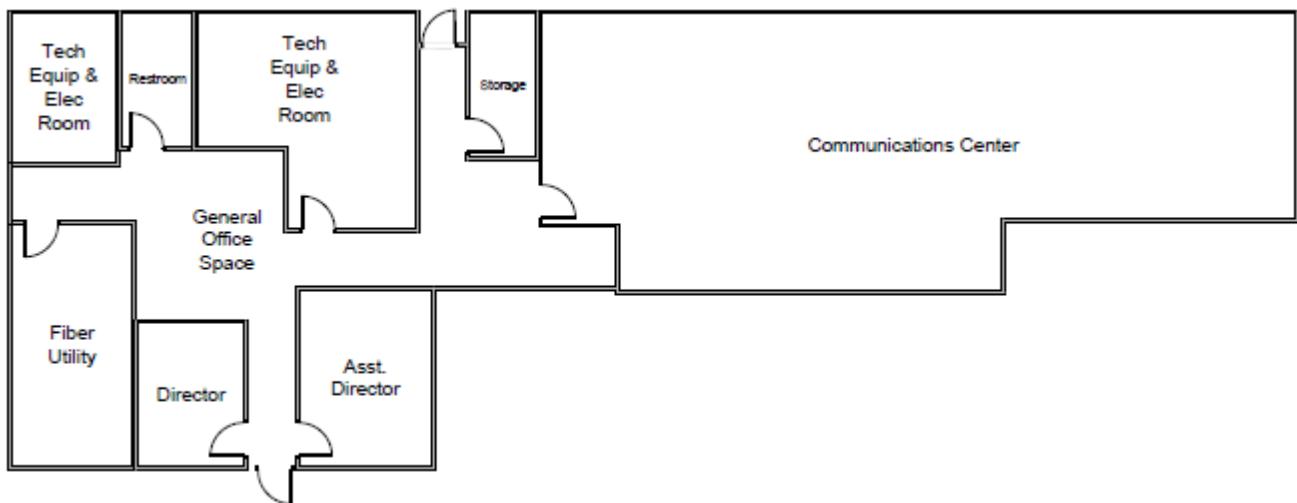
Overall, the space is very compact, with every possible space occupied by some essential function of the organization. This is most evident in the technology equipment rooms where the equipment mounted in racks and cabinets combined with equipment and electrical panels that mount on the walls results in spaces that are very difficult for tech support personnel to work in. Further, these spaces have been pressed into service as storage areas as well, resulting in a very cramped situation for the current mix of systems and equipment. There is also essentially zero space for any system expansion or lifecycle replacement activities in the racks and cabinets, making system management activities over time very challenging to support.

Several photos are provided on the following page as examples of the very compact conditions in the technology equipment spaces.

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The operational floor of the communications center contains a total of 12 operational positions including a Supervisor position, law enforcement and fire dispatch positions, data inquiry positions and call receiver positions. There is also a cubicle space for the training coordinator. While functional, this close spacing of these diverse functions can create a significant amount of background noise at each position, particularly during the busiest hours of the day. The following photos provide an example of the closely spaced communications room.

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IDENTIFICATION OF FUTURE NEEDS

The most pressing space need in the near term would be to establish a secure and environmentally controlled storage space to help alleviate the crowded conditions in the technology equipment spaces. During the onsite interviews it appeared that the Plainfield Police Department was considering adding on to their garage and storage areas and that some of this space could be made available for the Communications Center. While having tech and operational support equipment and supplies located outside of the normal work spaces will create some inconveniences, it will likely create a more functional and safe working environment in the technology equipment rooms.

But this near term solution to the most pressing space needs will only provide relief for a limited period of time. The bigger overall challenge for the organization is that the current space is already utilized to its maximum capacity, so accommodating new projects or organizational growth will only magnify the space deficiencies over time. The organization already lacks sufficient space to handle the wide variety of technology support functions, and any attempt to expand spaces available for these functions will only displace other functions. Basically, the organization has outgrown their current space, both in body count and operational responsibilities, and expanding further into the Plainfield Police spaces isn't a viable solution.

Ultimately the organization is going to need to face the challenge of planning and constructing a new purpose-build communications center facility. These projects tend to be among the most complex and costly construction projects undertaken by local government organizations. Contemporary public safety communications facilities are highly complex structures with a large number of interdependent facility and operational systems. Because of their cost and complexity, they need to be designed to meet the growth needs of the organization for at least a15 year period of time, and expansion strategies need to be integrated into the initial facility planning to meet unexpected growth impacts.

Public safety communications centers can be planned and developed as stand-alone facilities or as part of a larger facility development initiative targeted at a mix of governmental functions that share some of the communications center's needs for site and facility security; reliable utilities and power; structural survivability designed to match local environmental threats; and supporting communications systems and antennas. Regardless of whether the new facility is built as a stand-alone structure or as part of a larger development effort, there are a variety of building codes and industry standards that influence the design and construction of these facilities.

> **International Building Code (IBC)** – The International Building Code and its companion suite of Fire, Mechanical and related codes, is the formal controlling authority for design and construction requirements. Public safety communications centers are characterized as essential facilities for purposes of these codes, and this brings a variety of minimum structural requirements and construction type constraints into the design equation. All of these result in facility construction costs that can be significantly higher than comparably sized general office construction.

> **National Fire Protection Association Standard #1221** – The Standard for the Installation, Maintenance and Use of Emergency Services Communications Systems (NFPA 1221) is widely accepted as the required standards reference for public safety communications centers. Even if not adopted by ordinance, NFPA Standards typically carry comparable weight to adopted codes, and are typically the standard reference used during

insurance rating processes for fire protection insurance rates. Chapter 4 of NFPA 1221 contains a number of specific requirements for communications centers, including:

- The requirement for an alternate communications center that is separated geographically to protect against single events rendering both facilities inoperable
- The facility needs to be sized to handle peak workloads rather than just average workloads
- Design and construction techniques that protect from any collapse of adjacent structures, such as communications towers associated with the communications center
- Requirements to locate communications centers above the designated 100 year flood plain
- Enhanced requirements for fire resistive construction techniques and separation from any adjacent occupancy types
- Requirements for fire protection systems including FM200 or similar systems for electronic equipment rooms
- Requirements for mechanical and electrical systems that are separate from those serving other areas of the building
- Requirements for redundant mechanical systems for areas housing critical equipment and redundancies that allow the facility to remain operational with the largest HVAC unit out of service
- Requirements for physical site security including the ability to prevent unauthorized vehicles greater than 82 feet from the structure.
- Requirements for alternate power sources (backup generators) that are capable of supporting the continuous operation of the communications center and all of its systems

National Emergency Number Association (NENA) – NENA has published a number of Standards and Operational Information Documents (OID) that guide the development of public safety communications centers.

- The NENA Public Safety Answering Point Site Selection Criteria document (NENA OID 56-506) provides a number of useful guidelines for planning and locating new emergency communications facilities.

- The NENA PSAP Survivability document (NENA OID 53-503) provides useful guidelines on the configuration and operation of communications centers and systems.

- The APCO-NENA Service Capability Criteria Rating Scale document (APCO-NENA OID 53-505) provides useful guidelines and techniques to evaluate the performance capabilities of emergency communications centers.

Federal Emergency Management Agency (FEMA) – FEMA has published two documents that are commonly referred to during the design and site selection process for emergency communications facilities.

- The Reference Manual to Mitigate Potential Terrorist Attacks Against Buildings document (FEMA 426) provides a large volume of detailed information to assist in the assessment of risks, determining best strategies for site layout and facility design, and observations about protecting against explosive blasts or chemical, biological or radiological threats.

- The Risk Assessment: A How-to Guide to Mitigate Potential Terrorist Attacks document (FEMA 452) provides guidelines, tools and techniques to assist in conducting risk and vulnerability

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assessments. While originally developed to assist in assessing terrorist attack risks, the document is being revised to include techniques to help assess multi-hazard conditions such as earthquake, flood and high wind hazards.

Motorola Standards and Guidelines for Communications Sites – Motorola's "R-56" document is widely regarded as one of the most complete reference documents related to the protection of electronic and communications equipment at communications sites and communications centers. Since the consolidated communications center will be implementing Motorola console systems interfaced to a Motorola trunked radio system, this reference document should be used in all aspects of electrical and mechanical designs.

Based on IXP's experiences with a wide variety of public safety communications centers of all sizes, it is estimated that the Hendricks County Communications Center would need to plan a new facility with between 9,000 and 10,000 square feet of overall space. A high level space plan for such a facility would look something like the following:

High-Level Facility Space Estimate			
Space Description	**Sq Ft**	**#**	**Total Sq Ft**
General Spaces			
Entrance/Vestibule	100	1	100
Front Desk/Receptionist/Administrative Assistant	150	1	150
Director	150	1	150
Deputy Director	150	1	150
Accreditation Manager	120	1	120
Quality Assurance/Training Supervisor	120	1	120
Spare Offices (allows for growth and special projects)	120	2	240
Meeting/Training Room	400	1	400
Common copy, mail, admin files and project work room	200	1	200
Technical Staff Office & Work Area	400	1	400
Storage Room	300	1	300
Exercise and Locker Room	350	1	350
"Public" Restroom (Unisex)	100	1	100
Janitor/Maintenance Closet	100	1	100
Sub-Total General Office Spaces			**2,880**
Gross-up factor for circulation & building MEP infrastructure		35%	**1,008**
Sub-Total General Office Spaces			**3,888**
Operational Floor ("Comm Room")			
Supervisor Office/Work Room	200	1	200
Supervisor Position	175	1	175
Dispatch Positions	150	8	1,200
Call Receiver Positions	120	4	480
Training/Backup/Growth Position	150	4	600
Comm Room Files and Manuals	50	1	50
Quiet/Counseling Room	80	1	80
Break Room	250	1	250
"Comm Room" Restrooms	150	2	300
Sub-Total for Operational Staff Spaces			**3,335**
Gross-up factor for circulation & building MEP infrastructure		25%	**834**
Sub-Total for Operational Staff Spaces			**4,169**
Technology Room and Facility Infrastructure			
Technology Equipment Room	500	1	500
Electrical, UPS and Battery Room	350	1	350
Sub-Total for Tech and Infrastructure Rooms			**850**
Gross-up factor for circulation & building MEP infrastructure		25%	**213**
Sub-Total for Tech and Infrastructure Rooms			**1,063**
Combined Total of Communications Center Spaces			**9,119**

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PROJECTIONS OF FUTURE COSTS

Public safety communications centers are typically the most costly facility projects a governmental organization will undertake. As noted earlier, these facilities not only need to meet enhanced structural requirements to meet security and structural survivability requirements but they also embody a number of complex, and often redundant, facility infrastructure systems to support the intense electrical and mechanical requirements at the heart of the communications center.

Depending on the availability and cost of land, and the local construction market conditions for this more complex type of construction effort, it is not uncommon to see completed facilities range in cost between $500 and $700 per square foot. This would include the full cost of developing the facility including land costs; architectural fees; permitting and inspections; general contractor and trades costs; project management and architectural oversight; redundant electrical and mechanical systems; communications tower; allowances for furniture, fixtures and equipment (but not the specialized communications center systems such as 9-1-1, CAD and radio systems); and contingency factors to account for cost escalations or design changes. At this range of costs, a 9,000 square foot facility would potentially cost between $4,500,000 and $6,300,000. For the duration of this report, an estimate of $5,000,000 will be used for simplicity.

Planning and executing a new facility initiative will likely require 3 to 4 years from start to finish. Typically it takes about 12 to 18 months to identify a target property, develop a detailed plan and cost estimate for the facility, and secure the administrative and financial approvals to move the project forward. Often this detailed planning goes through several cycles of rethinking and the organization develops a stronger sense of the potential activities that could be anchored at the new facility and works to size the facility to match their future visions for the organization. From that point it can often take 24 to 30 months for the complete cycle of initiating the construction project, retaining contractor and oversight resources, constructing the facility and then outfitting the facility with all the necessary systems and equipment to make it operational.

While it would be possible to accomplish this within the scope of a 5 year strategic plan, it is much more likely that an initiative of this magnitude will require 1 to 2 years of preliminary discussions and work to identify the funding mechanisms that would be used to support the initiative. Therefore, it is much more likely that a facility project would be formally launched in the latter portion of this 5-year period and be completed and operational in the early portion of the next 5-year planning cycle.

IDENTIFICATION OF POTENTIAL COLLABORATIONS

Planning and constructing public safety communications centers in a collaborative effort with other similar organizations is sometimes a viable strategy, particularly when the jurisdictions considering such a collaboration are also good candidates for further integrating their operations through some form of administrative and/or operational consolidation. It is much more difficult, and uncommon, to see larger communications center operations such as HCCC bring their operations together into a shared facility model.

The most common form of collaboration seen when larger communications center facility projects are initiated is through the establishment of backup relationships with one or more communications centers in the region. Regardless of how much structural and technological resilience gets incorporated into the design and construction of a new

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communications center, there is still a need for a well-planned and equipped backup alternative to protect against circumstances that can't be designed out of existence. Typically this backup capability is established through a collaborative relationship with one or more similarly sized communications centers, allowing investments in backup capabilities to be accomplished through incremental expansion or reconfiguration of systems already operating in a fully functional communications center. This is often much less expensive and provides a higher level of functional capability compared to investing in backup capabilities placed in a 'cold' backup location that is seldom used.

Further, collaborations in technical systems such as 9-1-1 telephone systems, radio systems and CAD systems, like those already being utilized by HCCC and regional partners, create opportunities for even more robust backup and workload sharing strategies. If properly planned technologically, and with personnel appropriately trained to handle short-term backup operations, backup relationships such as these can create opportunities for seamless transitions of emergency call receiving and dispatching during the process of evacuating to a backup location.

Accomplishing backup relationships such as this typically require a level of reciprocity with the other communications center so that the backup potentials are bi-lateral. Therefore, the planning for the new HCCC facility needs to take into consideration that the HCCC facility would likely be planned as the backup for one or more of the other major communications centers in the region.

TELECOMMUNICATIONS AND RADIO EQUIPMENT

CURRENT STATE

HCCC currently operates on a shared Cassidian Vesta 4.0 9-1-1 telephone network that is operated on a regional basis by AT&T. In addition to Hendricks County, this system also serves eight other counties in the Indianapolis metropolitan area, except for Marion County (the so-called donut counties). This system utilizes a redundant core switching architecture with redundant connectivity to the communications centers, creating a highly reliable and flexible 9-1-1 environment for the region. This creates many opportunities for cross-facility support and backup among the communications centers on the network that are not practical with multiple stand-alone 9-1-1 telephone networks. It also allows the costs for this robust network to be shared across multiple jurisdictions allowing all of them to benefit from a system architecture that they would likely not be able to afford in a stand-alone system. Increasingly, regional networks such as this are the desired architecture for metropolitan regions and represent an industry best practice that HCCC and the region should be proud to have already achieved.

A shared system strategy is also used for the radio system environment utilizing the statewide radio network operated by the Integrated Public Safety Commission (IPSC). This Motorola SmartZone radio network supports a combination of analog and digital voice channels across a combination of stand-alone transmitter sites and transmitter sites arranged in a simulcast configuration. This system is approaching the end of its supportable life expectancy and Motorola typically works with existing system customers such as IPSC to establish an infrastructure migration plan to transition the system to a current generation P25 digital technology and then transition the thousands of subscriber radios over a multi-year planning cycle.

For Hendricks County, the primary coverage and capacity come from a small simulcast cell with transmitters in the western portions of the county. This simulcast cell currently operates on 8 radio frequencies and supports a total of 22 Talkgroups for HCCC agencies (10 for law enforcement and 12 for fire). Coverage from this cell meets most of the needs of the HCCC agencies but significant coverage challenges exist in the Brownsburg area. Coverage in the western portions of the county come from a small capacity site in Putnamville. This site occasionally has all voice channels busy and this creates busy conditions on HCCC Talkgroups from time to time.

The radio console system at the communications center is a Motorola Gold Elite system with a total of 13 positions. This system is also fast approaching the end of its supportable lifecycle and will need to be replaced as a part of any system-wide migration to a P25 digital architecture. Typically, the migration of the dispatch center console systems is coordinated with the migration of the radio system infrastructure so the communications centers connected to the network are capable of operating in the P25 environment as it comes on the air.

HCCC also has 6 Talkgroups on the radio system operated by the Indianapolis Division of Public Safety Communications (DPSC) that are left in an inactive status but can be activated for backup purposes when needed. HCCC user radios also have the DPSC public safety system in their radio templates to allow access to tactical and interoperability Talkgroups.

IDENTIFICATION OF FUTURE NEEDS

The 9-1-1 telephony environment is well designed and provides a robust and flexible infrastructure to support HCCC well into the future. There are no specific investments or changes that can be foreseen in a 5-year planning horizon. Significant out-year investments in 9-1-1 system upgrades or replacements would likely not be required until the end of the current 10-year contract in 2022.

The radio system environment represents the most pressing need for capital investment over a 5-year planning horizon and beyond. Investments will be needed in four specific areas:

- At a minimum, coverage deficiencies in the northeastern portions of the county should be addressed by adding an additional site to the simulcast system in the Brownsville area. It would also be advisable to add an additional simulcast site to improve in-building coverage in the eastern portions of the County, and with the right location the routine use of the Putnamville site (and its capacity constraints) could be avoided. These initiatives should be given a high priority so that funding can be identified as early in the process as possible and technology coordination and planning with IPSC can be accomplished concurrently with their planning of a system-wide upgrade. The full cost of adding this site could likely be spread over a multi-year financing mechanism, but the majority of the costs would likely fall within the 5-year planning horizon.

- Hendricks County may be asked to fund some portion of the overall upgrade of the IPSC system to a P25 architecture. The precise timing and magnitude of this investment is difficult to predict and will depend on a number of factors outside of Hendricks County's direct or even indirect control. In other situations such as this it is not uncommon for the system owner/operator of these large multi-jurisdictional systems to provide mechanisms for their local collaborators to cover their share of system upgrade costs through some sort of multi-year payment strategy. Even if this flexibility is offered, it is likely that these system upgrade costs would all fall within a 5-year planning horizon.

- The radio console system at the communications center will need to be replaced, and the radio system infrastructure needs to be networked to the Communications Center over microwave links rather than the leased T-1 circuits currently being used. These investments would very likely be bundled with the infrastructure upgrade and expansion project and a significant share of these costs would fall within the 5-year planning horizon.

- Some number of subscriber radios will need to be replaced upfront to remain functional on the upgraded P25 radio infrastructure, and then over time the entire remaining subscriber radio inventory would need to undergo lifecycle replacements. Regardless of whether the costs of subscriber radios are planned as a capital expenditure funded collectively through HCCC or as direct investments of the individual agencies, the costs for routine replacement of subscriber radios needs to be considered in the planning.

PROJECTIONS OF FUTURE COSTS

There should be very limited capital cost exposure for the shared 9-1-1 telephony environment within a 5-year planning horizon. The most likely cost would be the need to replace individual workstations or monitors if they fail during the period. A full replacement of the workstations on a 5-year cycle would likely cost approximately $26,000 per replacement cycle.

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At the time this report was assembled, cost estimates for the IPSC system upgrade initiative had been provided by Motorola but final costs are still to be negotiated after a detailed design process is undertaken. Motorola's cost estimates were used and a 10% contingency factor was applied.

- Adding transmitter sites to the existing simulcast system is estimated to cost approximately $2,340,000. Typically infrastructure investments such as these can be financed over a 7 to 10 year time period.

- It is difficult to predict how IPSC may apportion upgrade costs between the statewide organization and the local collaborator. For planning purposes an upgrade cost of $1,000,000 has been used in this plan.

- The radio console system and microwave connectivity will likely cost approximately $2,022,000. This includes the cost of the 10-year maintenance and upgrade program so the system is kept maintained and current across the full 10-year span of time.

- Migration to a P25 radio system infrastructure will likely require the initial replacement of approximately 35 radios at a unit cost of approximately $5,500 for a total cost of approximately $192,500.

- Lifecycle replacements of radios could likely be accomplished across a multi-year timeframe, replacing between 10% and 20% of the inventory in any given year. This phased approach will help get subscriber radios onto their own individual replacement cycles rather than having an entire inventory to replace once again at some time in the future. Phased replacements will also be easier to support within the user agencies and by the staff of the communications center.

IDENTIFICATION OF POTENTIAL COLLABORATIONS

HCCC is already utilizing an enviable collaborative approach to meeting its 9-1-1 telephony needs. This relationship provides a high degree of inter-PSAP functionality and cross-jurisdictional support opportunities that are difficult or impossible to establish with multiple stand-alone systems. It also creates an easier path to migrating into full Next Generation 9-1-1 functionality as it matures, and allows the operational and capital expenses for a robust network to be shared among multiple jurisdictions.

HCCC is also already using a collaborative approach to meeting the radio system needs of your agencies by partnering with the IPSC system. While the system requires upgrades and expansions to meet the needs of the HCCC agencies into the future, continuing a collaborative approach is a much more affordable proposition than establishing a stand-alone radio system exclusively for Hendricks County. Other collaboration opportunities may exist with the Marion County system, but these would have to be carefully considered from a design and cost perspective to determine if they presented a better operational or business proposition than continuing the relationship with IPSC.

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DISPATCH AND RECORDS SOFTWARE

CURRENT STATE

As in the 9-1-1 telephony and radio system environments, HCCC currently utilizes a collaborative approach for Computer Aided Dispatch (CAD) and Records Management System (RMS) capabilities. This system is operated by the DPSC and provides service to a large number of jurisdictions in the metropolitan area. The legacy Tiburon system is currently being replaced with a new system from Interact, and the final migration to the new CAD and RMS systems is scheduled to be completed in 2014. Legacy data from the Tiburon system will be moved to a data warehouse environment to allow historical searches and inquiries as needed.

HCCC is connected to this shared CAD/RMS environment via a fiber loop, assuring adequate capacity and reliability for these critical functions to be hosted at an off-site location. All HCCC agencies are also connected with fiber to allow them access to the systems, with the exception of Brownsburg which is connected via leased T-1 connectivity.

The shared system environment provides a number of advantages for HCCC and its user agencies. From the CAD perspective, shared system architectures provide a high degree of flexibility for the various PSAPs utilizing the system to share information between themselves and support inter-facility backup strategies. From the RMS perspective there are increased opportunities for information sharing and cross-jurisdictional statistical analysis which can enhance investigation and crime prevention activities. Collectively, HCCC and their user agencies gain the ability to use a contemporary and well-maintained system without having to shoulder the full financial burden for supporting such a system on their own.

Typically agencies working in shared system architectures find they end up with better system capabilities than they could afford on their own, and the occasional constraints of not being in full individual control of their own system seem like a minor inconvenience compared to enhanced functionality and fiscal economies they receive. Shared system environments also allow the more complex central system administration and maintenance tasks to be focused on a pool of technical personnel and resources well trained for this function, allowing personnel at the communications center and user agencies to focus on functional level system operations and training.

IDENTIFICATION OF FUTURE NEEDS AND COSTS

With the core CAD and RMS systems operated and supported within the rate models established by DPSC for users such as HCCC (which roll into the annual operating budget), there will be limited capital expenditure pressures for these systems. The main direct capital reinvestment needed at the communications center will be periodic replacement of PC workstations and monitors, which typically take place on about a 5-year cycle. It is estimated that a full replacement cycle would cost approximately $32,500 with one cycle falling in each 5-year planning cycle. Longer term, HCCC may be asked to contribute to a lifecycle upgrade to the CAD/RMS environment beyond what is covered in the ongoing operational cost model, but this probably would not occur until approximately 2023 or beyond.

The more complex policy issue that will need to be dealt with is how to approach the lifecycle replacement of mobile data computers (MDCs) in use by the HCCC user agencies. The operational and functional advantages of a shared,

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robust CAD and RMS environment are marginalized significantly if the end users are not able to utilize these capabilities to their maximum advantage. Further, these more robust systems require higher bandwidth connectivity to support all the features and functions available in the mobile environment. This will mean that connectivity will need to move away from legacy mobile data systems and utilize commercial "4G" cellular services or a public safety broadband system once it is in place. This can be accomplished with an "air card" in the PC attached to a vehicular antenna or by installing a mobile data router in the vehicle that connects to the commercial carrier service and then provides a wired or wireless LAN in the vehicle to connect the MDC or other data devices to external data resources such as CAD, RMS or the internet.

Historically HCCC paid for the costs of the mobile data vehicular modems and if this were to continue into the replacement mobile connectivity devices, it is estimated that the total cost would be approximately $375,000 to replace the 375 devices currently in service with vehicular routers. With the new CAD/RMS systems coming on line in 2014, these mobile connectivity changes should be tackled early in the 5-year planning cycle and a lifecycle replacement shouldn't be needed for approximately another 7 years.

Even more challenging will be deciding what to do about the individual MDC units themselves. As mobile data capability is moving away from specialized mobile computers and devices and towards PC applications that can operate on a wide variety of compatible laptop or tablet PC's, it is increasingly common for central communications centers or technology organizations to shift the responsibility for the MDCs themselves to the individual end user agencies. As long as minimum technology standards are established so that all devices can support the required end user mobile application, this strategy allows the end user agencies to select devices and replacement cycles that meet their own operational and budgetary constraints. Some may choose to use specialized mobile computers that are ruggedized for the vehicular environment and replace them on 5-7 year cycles while others may choose to use more generic PCs and replace them on shorter lifecycles or just replace them as needed if they fail in service.

If the full 375 devices currently in service were to be replaced as a single central initiative, and if ruggedized PCs were used, it is estimated that the total cost would be approximately $1,500,000.

IDENTIFICATION OF POTENTIAL COLLABORATIONS

HCCC is already fully utilizing collaborative strategies to meet the CAD and RMS needs of the organization and the user agencies. As with the other collaborative system relationships for radio systems and 9-1-1 telephony systems, this creates a regionally connected and integrated capability that would be the envy of almost any other metropolitan area in the country.

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STAFFING AND PERSONNEL

CURRENT STATE

HCCC currently operates with an authorized staffing level of 38 full time personnel and 10 part-time personnel, with only 4 of the full time personnel in administrative functions (the Director, the Deputy Director, the Accreditation Manager and the Training Coordinator). The 38 full time personnel are organized into four Squads; two staffed with 9 personnel and supporting a Tact position for 12 hours each day, and two staffed with 8 personnel and not supporting a Tact position. Of the 38 full time positions, the average staffing level for the past 3 years has been 29.5 individuals, with part time personnel filling in to cover minimum staffing requirements on individual shifts.

The current staffing patterns are allowing HCCC to maintain an acceptable level of service for their call answering responsibilities, a common measure of communications center performance. There are two industry standard reference models for determining the appropriate call processing performance for 9-1-1 and emergency communications centers.

- The National Emergency Number Association (NENA) Call Answering Standard/Model (NENA Document 56-005) identifies that 90% of incoming emergency calls (9-1-1 lines and emergency 10-digit lines) should be answered within 10 seconds during a normal busy hour of the day, and that 95% of calls should be answered within 20 seconds.

- The National Fire Protection Association (NFPA) Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems (NFPA Standard 1221, 2013 edition) identifies that 95% of emergency calls should be answered within 15 seconds and 99% answered within 40 seconds. NFPA 1221 also identifies that 90% of dispatchable events shall be dispatched within 90 seconds of call answer, and 99% dispatched within 120 seconds.

Sample telephone system statistics from 2012 and 2013 indicate that the HCCC handles a total of approximately 225,000 to 250,000 telephone calls per year, with a normal busy day experiencing between 700 and 750 calls. This includes all inbound and outbound calls on 9-1-1 and 10-digit emergency and business lines. These calls arrive at different rates throughout the day, with the busier hours between noon and 7:00 pm typically experiencing between 40 and 45 total calls per hour. The data also indicates an overall average call occupation time of 90 seconds, which is consistent with statistics seen in other communications centers. With these call volumes and call characteristics, the average ring duration across all inbound calls is 5 seconds. Since most calls will have between 1 and 2 seconds of call setup time before ringing starts, the calling party would perceive this as an average time of answer of approximately 6 to 7 seconds.

IXP has developed a telephone call processing modeling tool that allows evaluation of potential call handling performance outcomes across a range of call volumes and number of personnel available to handle calls. Using a range of hourly call volumes from 35 to 50 calls per hour and an average total occupation time of 120 seconds (the 90 seconds average call duration plus 30 seconds for offline call information processing or interactions with other communications center staff or the CAD system) the following performance ranges could be expected.

The following graphic models the percentage of calls that would experience a wait before being answered, at various hourly call volumes and different levels of staffing available to take calls. Using 45 calls per hour as an example, with only 4 personnel available to handle this call volume, approximately 8% of callers would experience a wait time. If a 5th person were available to handle calls, the percentage experiencing a wait would be reduced to approximately 3%.

Total Inbound & Outbound Call Volumes: PERCENT OF CALLS THAT WAIT
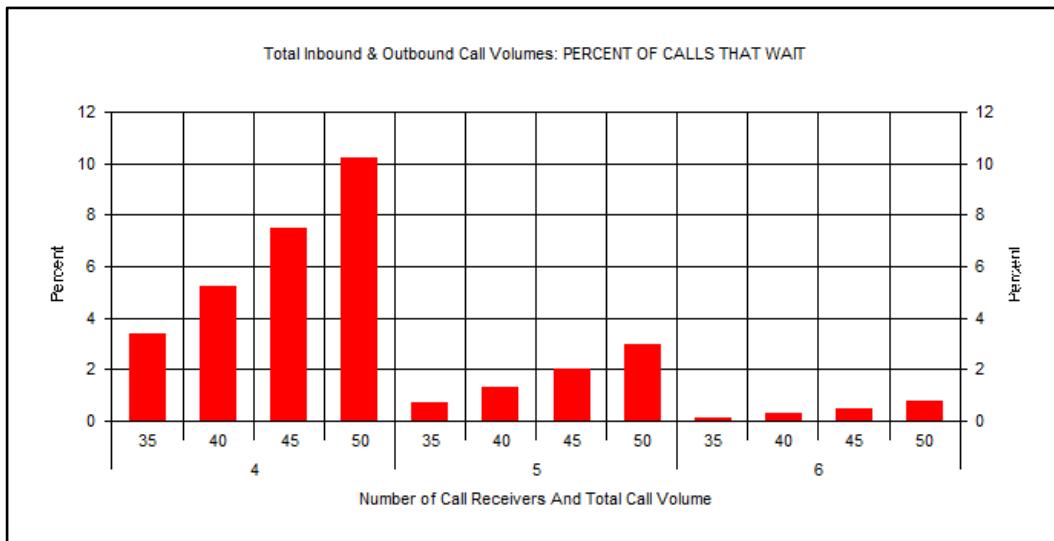
But knowing the percentage of callers that would experience a wait is only part of the picture, we also need to understand what their average wait times might be. In the graphic below, we see that at the same 45 call per hour rate, the average wait time with only 4 personnel to handle calls is slightly under 4 seconds. With a 5th person available the average drops to approximately 1 second.

Total Inbound & Outbound Call Volumes: CALL AVERAGE WAIT TIME
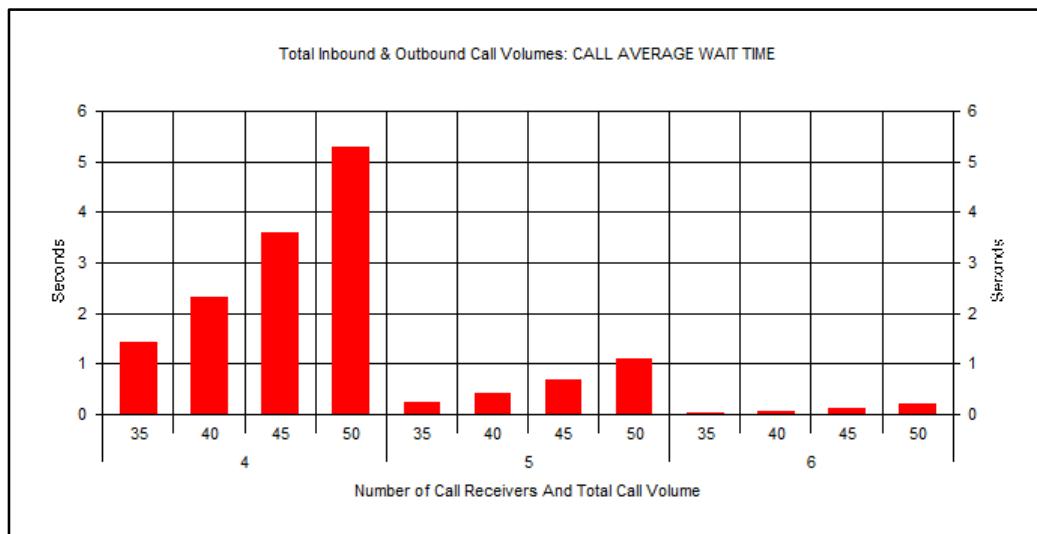
But since average wait times are made up of some callers that experience very short wait times and others experiencing longer wait times, it is important to understand what the wait time might be for those with the longer wait times as well. Again, as shown in the graphic below, with 4 personnel available to 45 calls per hour, some callers may wait approximately 48 seconds. Having a 5th person available to handle calls would bring this down to just over 30 seconds.
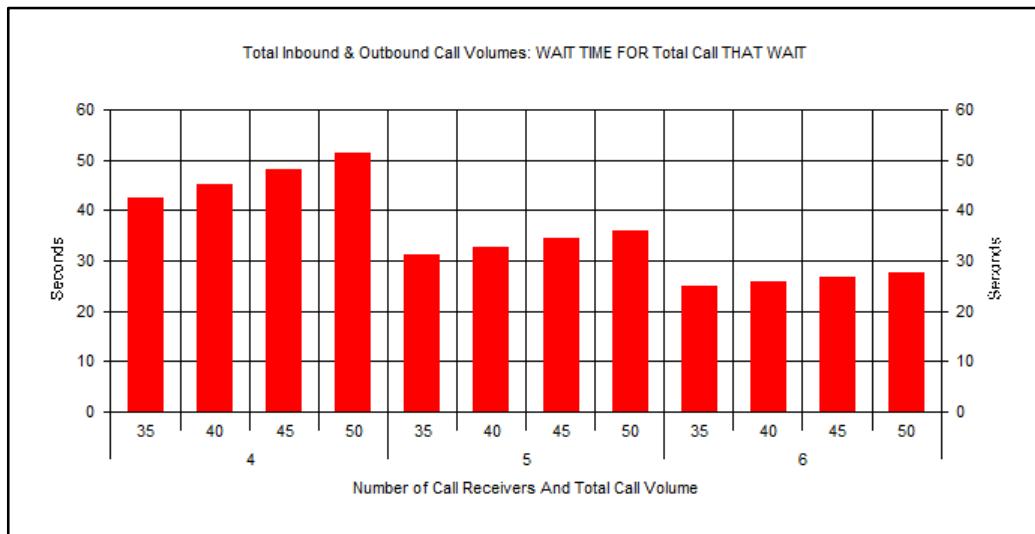
HCCC currently operates with a minimum staffing level of 6 personnel on duty across a variety of operational functions including the Supervisor, Dispatchers working Fire/EMS and Law Enforcement positions, the IDACs and Headquarters data positions, and as Call Receivers. The combination of current call handling performance data and the statistical projections of call handling performance at various call volumes and staffing levels would indicate that the current staffing levels are appropriate for the current combined call handling and dispatching responsibilities of the center. Quarterly and annual statistics should be monitored to identify any increases in call volumes or dispatching workloads and to evaluate any potentially adverse impact on call handling performance.

In addition to meeting industry standards for call handling, HCCC also excels in their overall organizational performance by maintaining their communications center accreditation with the Commission on Accreditation for Law Enforcement Agencies (CALEA). This process is increasingly becoming the recognized reference standard for multi-jurisdictional and multi-disciplinary communications centers that serve both local and county law enforcement agencies along with a mix of fire and EMS operations. Maintaining an organization within the CALEA standards and record-keeping processes demonstrates a commitment to well documented operations that are routinely monitored and measured to make sure they are meeting expectations.

Finally, the training and performance monitoring practices of the communications center reflect industry best practices. The training process is well documented and provides a structured approach for taking a new-hire individual through the process of learning the various knowledge, skills and abilities to effectively perform and progressively responsible levels in the organization. Further, formal quality assurance monitoring is conducted on emergency medical call processing and this may be expanded to law enforcement and fire/EMS call processing in the future. This level of dedication to training and performance monitoring reflects a commitment to providing a consistent and high level of service to all the agencies being served by the center.

Administrative support for the organization (accounting, payroll, human resources, and IT and facilities support) are provided by the Town of Plainfield on a fee-for-service basis. This relationship is another example of HCCC using a collaborative approach to meeting routine operational needs at the lowest possible cost. Establishing these functions for HCCC as a stand-alone organization would require the addition of core systems as well as personnel to administer these functions, all of which would require additional office and support spaces. While this may become a necessity in the future if a new dedicated funding mechanism can be established to allow HCCC to operate as a free-standing organization, the current approach appears to be the best mechanism to meet these needs within the current set of legal, organizational and funding constraints.

IDENTIFICATION OF FUTURE NEEDS

The most pressing need observed by IXP during this evaluation is the lack of dedicated staff to handle a wide variety of technology support and coordination issues. Even in the shared system environments utilized for the primary systems serving the communications center (9-1-1 telephony, CAD, RMS and radio) where central system administration and management are accomplished without direct HCCC interaction, there are a large number of administrative and end-user support activities that take place at the communications center level. With only the Director and Deputy Director to cover these responsibilities, along with their responsibilities for operational management and oversight of the organization and its personnel, none of the responsibilities can get the level of focused attention they truly deserve.

The need for additional administrative staffing will become even more pressing as the radio system and subscriber radios go through several rounds of upgrading and reprogramming as system infrastructure changes are undertaken. Further, the new CAD, RMS and Mobile Data environments will drive a variety of changes out to the end-user community, and these users will naturally turn to the communications center for assistance. There will also be a variety of new reporting and statistical tools to assist in better managing the center, as well as increased needs for periodic updates and enhancement of supporting databases, all of which will require focused attention to properly utilize and accomplish.

At a minimum it is recommended that one full time position be added to assist in filling these roles and responsibilities. It is likely that all of these responsibilities would not neatly fit within the skill and experience set of a single individual, so the most likely approach would be to add a skilled technology generalist who can master a variety of radio and mobile data end user support functions. This would relieve the Director and Deputy Director of these responsibilities allowing them to focus more attention on the higher level issues related to system administration and management.

PROJECTIONS OF FUTURE COSTS

Generalized technology support personnel in a communications center environment can be difficult to place in the overall compensation structure for the organization, particularly when much of the higher-technology support functions are being performed by system vendors or contracted support staff. Often the compensation levels seen in dedicated IT organizations in cities, towns and counties are slightly higher than what is seen in generalized technology support roles in communications centers. Depending on the mix of functions assigned to the position and the level of prior experience in public safety systems desired for the position, it is not uncommon for the compensation level for these tech support roles to be slightly under or comparable to compensation levels for supervisory level personnel in the dispatch operations of the center.

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IDENTIFICATION OF POTENTIAL COLLABORATIONS

The shared systems and collaborative relationships already in place are helping HCCC achieve a level of efficiency that is uncommon in multi-jurisdictional communications centers. Sustaining these relationships will help manage pressures for any significant growth in support staff positions beyond the addition of the technology support position recommended in this evaluation.

As discussed in the previous sections on the various shared technology systems in use by HCCC and others in the region, it would appear that the next level of inter-jurisdictional collaborations will likely be targeted at enhancing backup and workload sharing capabilities. Public safety communications centers are staffed to handle the predictable ebbs and flows of call volumes and workloads throughout a 'normal' daily cycle. Staffing levels are set to anticipate normal surges in call volumes and workloads, but can never be set to fully handle the surges that result from significant large-scale emergencies or catastrophic events.

Typically, individual communications centers living on individual system platforms struggle to identify mechanisms to allow one communications center to assist the other during these types of events. The dissimilarity of their systems and their lack of functional integration prevent all but the most rudimentary levels of support, often limited to handling overflow 9-1-1 or other telephone call volumes and then transferring information back to the impacted center for dispatching. They seldom get to even have a conversation about operational collaboration because of the barriers created by their technologies.

HCCC and the jurisdictions sharing their core systems have an opportunity to create a level of inter-agency collaboration for backup and major emergency support that is seldom seen in the emergency communications business. With appropriate planning and training, it would be entirely feasible for each center to provide overflow call processing for the other centers in the network to at least include call processing and incident entry into CAD. This would eliminate the need to relay information back to the impacted communications center and allow dispatch personnel to handle incidents for dispatch in their CAD queue almost as easily as if the call entry had been conducted in their own center. With further careful coordination of radio channel access and usage protocols, the assisting communications center could even assist in some dispatching or radio traffic management responsibilities.

While a variety of organizational and operational constraints will likely limit the levels to which collaborations such as these can be implemented, HCCC and their partner organizations are in the unique position to be able to have these conversations without first having to deal with how to bridge the various technology barriers that divide their organizations.

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FUNDING

CURRENT STATE

There are two sources of funds to support the combined capital and operational expenses of the HCCC; 9-1-1 funds collected through Hendricks County and direct charges to the law enforcement and fire/EMS agencies being dispatched.

- The 9-1-1 revenue has been predominately directed at servicing a lease obligation to AT&T for the 9-1-1 telephone system and infrastructure and a lease obligation to Motorola for the radio system infrastructure and equipment. Funds in excess of these obligations are then directed to the operational budget.

  - The annual lease service cost to AT&T is $659,676 and continue at this level through 2015 with a final lease payment of $384,811 due in 2016.

  - The annual lease service cost to Motorola is $950,621 and continues at this annual level through 2016.

  - After covering these responsibilities, the 9-1-1 revenue is able to direct approximately $500,000 towards the annual operating budget.

- Direct charges to the user agencies covers the balance of the HCCC budget, and this amount is apportioned in a two-tiered cost allocation model:

  - 20% of this amount is assigned for allocation across the fire service agencies and the agency by agency allocation is then done on a population basis.

  - 80% of this amount is assigned for allocation across the law enforcement agencies and the agency by agency allocation is then done on a population basis.

An example of this allocation model for the FY2013 budget is shown in the table on the following page.

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HCCC Operational Cost Allocation Model			
			Per Population
Example Total Amount to be Allocated		$2,500,000	Allocation Value
Fire = 20% of the allocation		$500,000	$3.44
Law Enforcement = 80% of the allocation		$2,000,000	$13.75
Total County Population (2010)		145,448	
Department		Population	Total Allocation
Clay Township		2256	$7,755.35
Franklin Township		1297	$4,458.64
Eel River Township		1662	$5,713.38
Union/Harrison(Boone Co)		1856	$6,380.29
Liberty Township		5717	$19,653.07
Middle Township		6106	$20,990.32
Center/Marion Township		13569	$46,645.54
Washington Township		41509	$142,693.61
Brown/Lincoln Township		40322	$138,613.11
Guilford Township		31154	$107,096.69
Total Allocation to Fire Agencies			$500,000.00
Jamestown Town		28	$385.02
Stilesville Town		316	$4,345.20
Amo Town		401	$5,514.00
Lizton Town		488	$6,710.30
North Salem Town		518	$7,122.82
Coatsville Town		523	$7,191.57
Clayton Town		972	$13,365.60
Pittsboro Town		2928	$40,261.81
Danville Town		9001	$123,769.32
Avon Town		12446	$171,140.20
Brownsburg Town		21285	$292,681.92
Plainfield Town		27631	$379,943.35
Unicorporated County		68911	$947,568.89
Total Allocation to Law Enforcement Agencies			$2,000,000.00

Considerable discussion has taken place about the importance of finding a new organizational construct and funding mechanisms for multi-jurisdictional consolidated communications centers such as HCCC. Even with all the actions they have already taken to limit the overall cost of doing business (e.g. countywide consolidation into a single communications center; cross-trained personnel to maximize staffing efficiencies; operating on shared systems to limit any stand-alone cost exposures) it has been clear for some time that revenues from 9-1-1 fees don't come close to meeting the full operational costs of the communications center. Further, it seems clear that increasing the levels of 9-1-1 fees is not a politically viable strategy and continuing to increase cost allocations to the local jurisdictions is placing significant strains on their already tightly constrained budgets.

HCCC is not alone in this situation. Jurisdictions across the country have found that 9-1-1 fees can't keep pace with the total costs of operating a public safety communications center, which involves far more systems and functions than the handling of 9-1-1 calls for service. Some examples of actions in other parts of the country:

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- In Washington State, legislation was put in place that allows each county to add a 1/10th of 1% local option sales tax to fund the construction and operation of emergency communications systems and facilities.
- In Oregon, special purpose local option districts can be created to support the construction and operations of communications systems and facilities, with revenue being generated through a property tax based on assessed valuation.

- In Florida, a special $3 surcharge was added to traffic citations to support the statewide radio system.

- Other 9-1-1 jurisdictions have used their monthly per-line fees of $1.50, $2.50 or higher to bring additional revenue into the overall funding mix for emergency communications operations and systems.

Even with these enhanced revenue opportunities, virtually every multi-jurisdictional communications centers that IXP has worked with still utilizes some form of user fee structure to balance their overall budget. Often these fees are established to reflect the proportional workload placed on the communications center by each agency being served. The logic behind this approach is that workload drives staffing costs, and staffing costs are typically 85% or more of a communications center annual budget. Other variations on fee structures include two-tier systems similar to HCCC's model, where an initial allocation is made between law enforcement and fire/EMS costs and then these amounts are divided by population metrics, workload metrics or combinations of the two.

IDENTIFICATION OF FUTURE NEEDS

During the evaluation process, IXP worked with the HCCC leadership and Board to examine a number of possible rate models and concepts for a new dedicated funding mechanism for consolidated communications centers like HCCC. These models were used to inform their efforts to approach the legislature to establish a pilot program to allow Hendricks County to demonstrate if a new fee structure not tied to phone line counts or population could provide a rational and sustainable model to fund all or a significant portion of the communications center capital and operating budget needs. While this effort was not successful in the current legislative session, the work that was done will help inform future efforts to solve this complex yet important public safety need.

In the absence of a new funding mechanism and to avoid significant adverse impacts on the costs being allocated to the user agencies, HCCC will most likely have to plan any major capital investments such as investments in the radio system infrastructure and the radio console system within some sort of debt restructuring of the existing Motorola lease. This lease has annual payments of $950,621 extending through 2016 and the investments in the radio system infrastructure and radio console system will probably need to commence before this debt is fully retired. Further, the $659,676 currently servicing the AT&T lease for the 9-1-1 telephony system could conceivably also be directed at funding these capital expenditures once that debt is fully retired in 2016.

Collectively, there is about $1,600,000 in current debt obligations that will be rolling off in 2016 and funded from within the 9-1-1 revenues. If the current user cost allocation model were kept in place, these funds could be directed at new long term financing obligations for the capital investments described in this report. Alternatively, some or all of those funds could be directed towards an increased contribution to the operating budget, allowing cost allocations to users to be mitigated.

PROJECTIONS OF FUTURE COSTS

The table on the following page provides an overview of the summarized capital investments discussed in this report.

Investment Description	Estimated Cost	Assumed Annual Interest Rate	Assumed Number of Years Financed	2015	2016	2017	2018	2019	2020	Notes
Sustaining Current Comm Center Systems, Infrastructures and Initiatives										
Command and Communications Vehicle	$ 975,976	4%	10	$ 89,061	$ 89,061	$ 89,061	$ 89,061	$ 89,061	$ -	One time completion of existing initiative
Additional Radio Site in the Brownsburg area	$ 1,363,591	4%	10	$ 119,375	$ 119,375	$ 119,375	$ 119,375	$ 119,375	$ 119,375	Continues through 2024
Additional Radio Site in the commercial/industrial area		4%	10	$ 166,785	$ 166,785	$ 166,785	$ 166,785	$ 166,785	$ 166,785	Continues through 2024
HCCC Share of IPSC System Upgrade	$ 1,000,000	4%	10	$ -	$ 122,313	$ 122,313	$ 122,313	$ 122,313	$ 122,313	Continues through 2025
Radio Console System and Microwave Connectivity	$ 2,022,334	4%	10	$ -	$ 247,359	$ 247,359	$ 247,359	$ 247,359	$ 247,359	Continues through 2025
9-1-1 System Workstation Refresh	$ 26,000						$ 26,000			Repeats on a ~5-year cycle
Projected annual capital expenditures for the above items				$ 375,222	$ 744,894	$ 744,894	$ 770,894	$ 744,894	$ 655,833	
Subscriber Radio Replacements	$ 375,000	4%	4	$ 192,500	$ -	$ 550,000	$ 550,000	$ 550,000	$ 550,000	Continues annually as older radios life out
Mobile Data Vehicle Modem Replacements	$ 375,000	4%	4	$ 102,382	$ 102,382	$ 102,382	$ 102,382	$ -	$ -	Repeats on a ~7-year cycle
Mobile Data Computer Replacements	$ 1,500,000	4%	4	$ 409,529	$ 409,529	$ 409,529	$ 409,529	$ -	$ 409,529	Repeats on a ~5-year cycle
Dedicated Communications Center Facility	$ 5,000,000	5%	20	$ -	$ -	$ 398,362	$ 398,362	$ 398,362	$ 398,362	Continues to 2036
Total Annual Capital Expenditures if all Initatives Funded				$ 1,079,633	$ 1,256,806	$ 2,205,168	$ 2,231,168	$ 1,693,256	$ 2,013,724	

Chart axis values: $2,500,000 · $2,000,000 · $1,500,000 · $1,000,000 · $500,000 · $-

Chart years: 2015 · 2016 · 2017 · 2018 · 2019 · 2020

Legend: Radio System and Consoles · Subscriber Radio Replacements · Mobile Data Vehicle Modems · Mobile Data Computers · Dedicated Facility

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IDENTIFICATION OF POTENTIAL COLLABORATIONS

During discussions of possible alternative organizational and funding structures it was recognized that a variety of collaborations will be needed to successfully identify and implement alternative organizational and funding mechanisms to allow consolidated communications centers to meet their operational and capital budget needs.

Most importantly, relationships and trust will need to be established with the telecommunications industry. They will need to be educated on the combined fiscal pressures that consolidated communications centers face so they understand that current 9-1-1 fee structures are only able to provide partial funding for the combined capital and operational costs of operating a consolidated communications center. Even with this increased awareness and dialog, it is likely that the carriers will seek some sort of forbearance on current 9-1-1 fee levels if new dedicated funding mechanisms are established for consolidated communications centers. It is important to help them understand how a mix of 9-1-1 fees with other funding sources may be the best overall strategy to support these kinds of organizations.

It will also be important to build relationships with other communities struggling to find mechanisms to support the consolidation of their public safety communications centers. While HCCC may offer itself as a pilot location for testing any new model that meets legislative approval, there are certainly many more communities facing exactly the same challenges and their combined support should be useful in helping decision-makers understand the appreciate the fiscal pressures consolidated communications centers face.

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CLOSING

Across the country, local governments are looking for strategies to collaborate in providing high quality public services in the most fiscally responsible manner possible. Increasingly, the consolidation of their public safety communications centers is being found to provide a number of operational and fiscal benefits to improve the level of service to their communities while also sharing in the ever increasing costs of operating these technologically sophisticated operations. Hendricks County is to be commended for accomplishing their consolidation in 2006, well in advance of most other communities across the state.

Public safety communications centers face a wide variety of operational and capital fiscal requirements that require careful planning so they can be sustained within the financial models available to them. While salary and benefit costs compose a significant share of annual operating budgets, the costs of maintaining and refreshing the wide variety of technology systems utilized by the communications center is becoming an ever-increasing portion of those budgets. Further, the capital expenditures needed to establish the technology systems as well as deal with their life-cycle replacement requires and ongoing capital investment model that is fairly significant. Consolidations help managed both of these fiscal challenges by optimizing the staffing levels needed to serve all the communities collectively rather than individually and by sharing the costs of complex technology systems across multiple jurisdictions.

To its credit, HCCC has gone beyond the levels of fiscal efficiency achievable through consolidation and established a number of collaborative relationships to share costly technology system infrastructures. These collaborations allow HCCC and its user agencies the opportunity to operate on systems that are more robust and functionally rich than they would likely be able to afford if they implemented these systems as stand-alone systems for HCCC. These relationships also create opportunities for further operational collaborations that can increase the level of sustainability and reliability of public safety communications services during times of extreme emergencies or disasters.

The citizens of Hendricks County should be proud of what has been accomplished by HCCC since its inception in 2006. You have established a high effective and efficient organization and are well poised to meet the challenges ahead as major capital investment decisions are made and alternative funding models are identified.

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