



9-1-1 Communications Center Expansion Analyses Report

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1. Introduction

The City of Coral Springs (City) contracted Omnicom Consulting Group, Inc. (OCG) to perform an analysis of the existing Coral Springs E9-1-1 Dispatch Center to support the addition of the City of Coconut Creek and the City of Margate's Police and Fire Departments. This analysis consisted of two parts; a traffic capacity analysis and a coverage analysis. The traffic capacity analysis was performed to determine if the current system can support the consolidation without adversely affecting the ability of the center to meet public safety standards for call centers. The coverage analysis consisted of a review of the P25 radio coverage acceptance test results and comparison against the jurisdictional service areas for Coconut Creek and Margate in order to determine the suitability of the Coral Springs radio system to provide the necessary radio coverage.

1.1 Project Scope of Work

The scope of this project is to determine the City's requirements in upgrading the current communications center to provide emergency communications services to the City of Coconut Creek and the City of Margate Police and Fire Departments while providing a NENA public safety Standard P.01 Grade of Service (GOS) and radio coverage. This report does not include a full analysis and requirements for the consolidation of Coconut Creek and Margate into Coral Springs' Dispatch Center, in particular the end-to-end communications of dispatch calls.

Task1: Data Acquisition

With the City's assistance, OCG collected the background information necessary to assess the existing conditions, project information, and radio coverage and capacity requirements. OCG provided the City with survey documents to collect the required information which included:

- Work and staffing deployment schedules
- 9-1-1 and administrative telephone call data, radio dispatch call data, and radio system traffic data
- Logging recorder data, number of tracks or talk groups recorded, system capacity, etc.
- Jurisdictional service areas in shapefile format for the City of Coral Springs, City of Coconut Creek and the City of Margate

This data was the basis for the analysis of call loading and staffing requirements and helped determine the peak busy hour load on the Dispatch Center. This data was utilized to estimate the number of positions required to provide a NENA public safety Standard P.01 GOS.

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OCG worked with dispatch and technical staff before and after data was provided to ensure their completeness, consistency, and usefulness in the analyses that was conducted.

Task 2: Data Analysis

Using the data provided during Task 1, OCG conducted analyses of emergency, administrative and radio dispatch calls. Each analysis focused on modeling call volumes and call durations for call-taker and radio dispatch personnel. This served as a basis for determining operational and supervisory staffing needs for the addition of the Coconut Creek and Margate Police and Fire Departments.

Operational Characteristics: Through the survey documents and multiple phone calls with the City of Coral Springs' technical staff, OCG identified each operational position (e.g., call-taker, police dispatcher, fire dispatcher, etc.) and the activities performed by that position.

Communications and Information Systems: OCG reviewed the architecture of the current systems, including, but not limited to system components, software licenses and costs. The assessment of communications and information systems included:

- Voice Radio Systems including interoperability linkages
- Data Systems
- Information Systems: CAD, RMS, JMS, AVL, Fire Alerting, Alarm Monitoring, etc.

These systems will need to be expanded to support the addition of Coconut Creek and Margate to the City's existing communications center. A Budgetary Cost for these additions has been included in this report.

Radio Coverage: OCG utilized its wireless design toolset to perform voice coverage analysis of the existing P25 radio system, and also reviewed the P25 coverage acceptance test results provided by its current vendor during the system acceptance. Both of these results were compared against the jurisdictional service area of Coconut Creek and Margate to verify the suitability of the existing P25 radio system to provide the necessary radio coverage.

Task 3: Needs Assessment Report

OCG has prepared this report "9-1-1 Communications Center Expansion Analyses Report" as the project deliverable. This report includes a summary of our findings, recommendations for the expansion of the Dispatch Center, and budgetary cost estimates.

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1.2 Current Communications Center Operations

The City of Coral Springs' Communications Center (PSAP) currently supports 9-1-1 call processing for the City of Coral Springs and handles public safety dispatch for the City of Coral Springs Police Department, the City of Coral Springs Fire Rescue Department and Parkland Fire Department. The PSAP currently serves a population of approximately 160,000.

Total PSAP employees are 37 which consist of four call takers, 25 dispatcher/call takers, six supervisors and two technicians.

Minimum staffing at the center is six for the 2300 - 0900 shift which has five call taker/dispatchers and one supervisor on shift. The busiest shift is the 0900 - 1500 shift when there are three dedicated call takers, four dispatchers and one supervisor on shift.

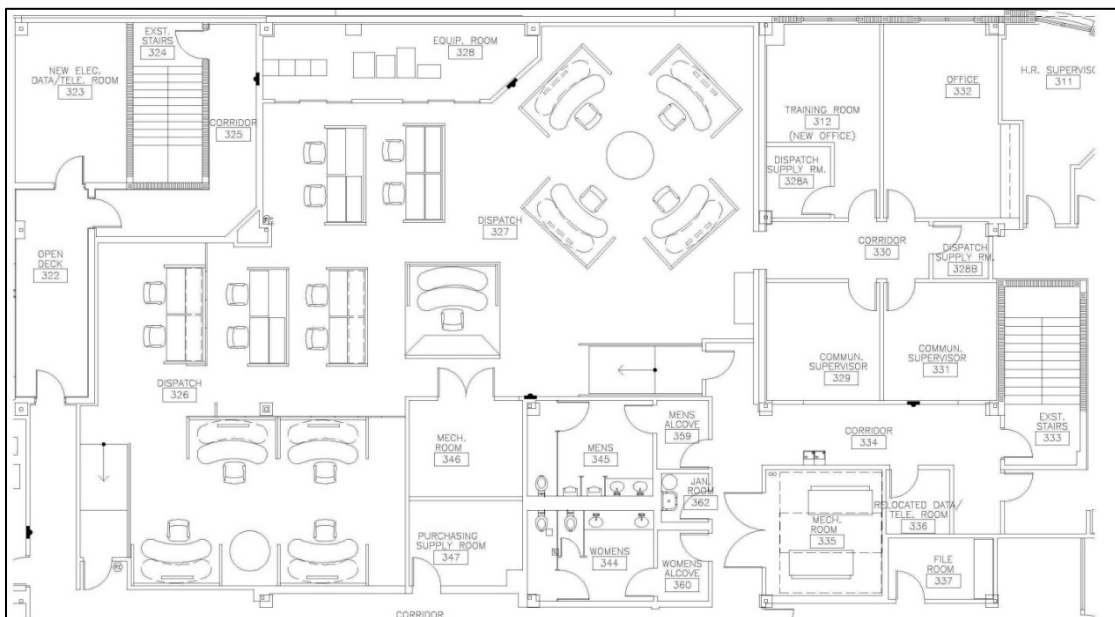


Figure 1 - City of Coral Springs Communications Center Floor Plan

1.2.1 Current Call and Dispatch Volume

The table below is a summary of the total amount and types of calls/dispatch traffic the current City of Coral Springs Communications Center processed over the past several years. This data was used as a base line in the completed analysis.

Total Annual Traffic	2014	2015	2016	2017
9-1-1 Wireline Calls Received	11,236	10,761	9,945	8,621
9-1-1 Wireless Calls Received	73,415	70,788	62,615	60,276
Incoming Admin Calls	115,260	119,353	117,458	118,732
Outgoing Admin Calls	52,620	50,599	46,083	44,818
TDD Calls	463	435	309	315
Police Calls Dispatched	141,732	134,829	139,260	138,428
Fire/EMS Calls Dispatched	16,295	15,964	16,912	18,625

Table 1 - Current Call and Dispatch Volume

On average, over the past four years, the City of Coral Springs processed nine 9-1-1 calls per hour and dispatched 16 police calls and two fire calls per hour every hour of every day. These call volumes suggest that for the average shift, the City would need three call takers, four radio dispatchers for the police department, and two radio dispatchers for the fire department.

1.3 Current Communications and Information Systems

The City of Coral Springs owns and operates a 3-site, 11-channel, 800 MHz Motorola ASTRO 25 trunked simulcast land mobile radio communications system.

The Communications Center is equipped with five Motorola MCC 7500 radio dispatch console operator positions, one of which is dedicated for TDD operations, and seven West Safety Viper 9-1-1 call taking positions. The City also utilizes a Superior OSSI computer aided dispatch (CAD) system, a mobile data system and a VPI logging recorder system.

Through this expansion process, the City does not plan to change or upgrade any of the existing systems; however, additional radio dispatch consoles and CAD work stations will be required to support the proposed expansion. The existing logging recorder will require additional capacity to support the additional dispatch positions and talk groups.

2. Traffic Study

This study is not designed to determine staffing on the various shifts, but rather to determine the required number of operator positions that must be staffed during the Peak Busy Hour in order to provide a P.01 GOS to the citizens of Coral Springs, Coconut Creek and Margate. A P.01 GOS represents that the probability of a call not being immediately answered as 1% (i.e., 1 out of 100 calls).

The data used in the analyses was provided by the cities of Coral Springs, Margate and Coconut Creek. Some entities provided more complete sets of data than others. In the event that the data provided was incomplete, average values were used to compute a busy hour based upon ratios between Coral Springs’ average and busy hour volume.

2.1 9-1-1 Traffic and Radio Dispatch Volume

OCG requested 9-1-1 historical call data from all agencies involved. The historical data along with anticipated population growth in the area of service was used to determine the anticipated 9-1-1 call volume in the proposed consolidated Communications Center that will support the cities of Coral Springs, Coconut Creek and Margate.

2.1.1 City of Coral Springs Historic 9-1-1 Traffic and Radio Dispatch Data

Total Annual Traffic	2014	2015	2016	2017
9-1-1 Wireline Calls Received	11,236	10,761	9,945	8,621
9-1-1 Wireless Calls Received	73,415	70,788	62,615	60,276
Incoming Admin Calls	115,260	119,353	117,458	118,732
Outgoing Admin Calls	52,620	50,599	46,083	44,818
TDD Calls	463	435	309	315
Police Calls Dispatched	141,732	134,829	139,260	138,428
Fire/EMS Calls Dispatched	16,295	15,964	16,912	18,625

Table 2 - Coral Springs Total Annual Traffic

ABBH Traffic	2014	2015	2016	2017
9-1-1 Calls Received	48.6	45.8	44.3	43.9
Incoming Admin Calls	3.2	3.8	3.8	3.6
Outgoing Admin Calls	0.9	0.5	0.4	0.4
Police Calls Dispatched	15	18	20	19
Fire/EMS Calls Dispatched	8	10	9	11

Table 3 - Coral Springs ABBH Traffic

2.1.2 City of Coconut Creek Historic 9-1-1 Traffic and Radio Dispatch Data

Coconut Creek provided 9-1-1 traffic and radio dispatch data for the years of 2014 - 2017; however, the Admin calls data appears to include Broward County’s countywide data¹.

Total Annual Traffic	2014	2015	2016	2017
9-1-1 Wireline Calls Received	7,804	7,250	6,107	5,523
9-1-1 Wireless Calls Received	30,776	29,482	23,733	22,299
Incoming Admin Calls	DATA IS N/A			
Outgoing Admin Calls	DATA IS N/A			
TDD Calls	951	844	949	867
Police Calls Dispatched	34,689	32,784	35,053	37,743
Fire/EMS Calls Dispatched	6,879	7,356	7705	7,791

Table 4 - Coconut Creek Total Annual Traffic

Coconut Creek did not provide the requested Average Bouncing Busy Hour (ABBH) traffic data for Fire/EMS calls. For the purpose of this analysis a ratio was developed based upon Margate’s provided data comparing average call/dispatch volume to the reported ABBH data.

ABBH Traffic	2014	2015	2016	2017
9-1-1 Calls Received	14.33	13.12	10.34	9.5
Incoming Admin Calls	DATA IS N/A			
Outgoing Admin Calls	DATA IS N/A			
Police Calls Dispatched	9.9	9.44	10.07	10.4
Fire/EMS Calls Dispatched	3.2			

Table 5 - Coconut Creek ABBH Traffic

¹ Admin calls for Coconut Creek and Margate were the same. OCG believes that these numbers are countywide, rather than corresponding to each city.

2.1.3 City of Margate Historic 9-1-1 Traffic and Radio Dispatch Data

Margate provided 9-1-1 traffic and radio dispatch data for the years of 2014 - 2017; however, the Admin calls data appears to include Broward County’s countywide data².

Total Annual Traffic	2014	2015	2016	2017
9-1-1 Wireline Calls Received	6,160	6,043	5,492	5,147
9-1-1 Wireless Calls Received	24,713	25,831	23,891	24,236
Incoming Admin Calls	DATA IS N/A			
Outgoing Admin Calls	DATA IS N/A			
TDD Calls	849	777	832	874
Police Calls Dispatched	38,792	41,927	41,927	43,619
Fire/EMS Calls Dispatched	15,184	16,274	10,100	8,954

Table 6 - Margate Total Annual Traffic

ABBH Traffic	2014	2015	2016	2017
9-1-1 Calls Received	10.9	11.3	10.5	10.1
Incoming Admin Calls	DATA IS N/A			
Outgoing Admin Calls	DATA IS N/A			
Police Calls Dispatched	10.7	11.4	11.5	11.8
Fire/EMS Calls Dispatched	5.2	5.5	4.0	3.7

Table 7 - Margate ABBH Traffic

² Admin calls for Coconut Creek and Margate were the same. OCG believes that these numbers are countywide, rather than corresponding to each city.

2.1.4 Combined Historic 9-1-1 Traffic and Radio Dispatch Data

Table 8 and Table 9 provide the combined data for the cities of City of Coral Springs, Coconut Creek and Margate. The Admin call data is for Coral Springs only.

Total Annual Traffic	2014	2015	2016	2017
9-1-1 Wireline Calls Received	25,200	24,054	21,544	19,291
9-1-1 Wireless Calls Received	128,904	126,101	110,239	106,811
Incoming Admin Calls	115,260	119,353	117,458	118,732
Outgoing Admin Calls	52,620	50,599	46,083	44,818
TDD Calls	2,263	2,056	2,090	2,056
Police Calls Dispatched	215,213	209,540	216,240	219,790
Fire/EMS Calls Dispatched	38,358	39,594	24,627	35,370

Table 8 - Combined Total Annual Traffic

ABBH Traffic	2014	2015	2016	2017
9-1-1 Calls Received	73.8	70.2	65.1	63.5
Incoming Admin Calls	3.2	3.8	3.8	3.6
Outgoing Admin Calls	0.9	0.5	0.4	0.4
Police Calls Dispatched	35.6	38.8	41.6	41.2
Fire/EMS Calls Dispatched	13.2	15.5	13.0	17.9

Table 9 - Combined ABBH Traffic

2.2 Projected 9-1-1 Traffic and Radio Dispatch Volume

OCG has projected the anticipated 9-1-1 call and dispatch volume for the cities of Coral Springs, Coconut Creek and Margate for the next 4 years based upon the historical 9-1-1 call and dispatch data provided, along with the historical population growth for the service area. As call volume is related to the population, OCG utilized population growth to project future call and dispatch volumes. OCG’s research indicates the population for the cities of Coral Springs, Coconut Creek and Margate is growing at approximately 1.2% - 2% per year. The tables below show the projected values.

2.2.1 City of Coral Springs Projected 9-1-1 Traffic and Radio Dispatch Volume

Total Annual Traffic	2019	2020	2021	2022
9-1-1 Wireline Calls Received	8,969	9,149	9,332	9,518
9-1-1 Wireless Calls Received	62,711	63,965	65,245	66,550
Incoming Admin Calls	123,529	125,999	128,519	131,090
Outgoing Admin Calls	46,629	47,561	48,512	49,483
TDD Calls	328	334	341	348
Police Calls Dispatched	144,020	146,901	149,839	152,836
Fire/EMS Calls Dispatched	19,377	19,765	20,160	20,564

Table 10 - Coral Springs Projected Total Annual Traffic

ABBH Traffic	2019	2020	2021	2022
9-1-1 Calls Received	45.7	46.6	47.5	48.5
Incoming Admin Calls	3.7	3.8	3.9	4.0
Outgoing Admin Calls	0.4	0.4	0.4	0.4
Police Calls Dispatched	19.8	20.2	20.6	21.0
Fire/EMS Calls Dispatched	11.4	11.7	11.9	12.1

Table 11 - Coral Springs Projected ABBH Traffic

2.2.2 City of Coconut Creek Projected 9-1-1 Traffic and Radio Dispatch Volume

Total Annual Traffic	2019	2020	2021	2022
9-1-1 Wireline Calls Received	5,746	5,861	5,978	6,098
9-1-1 Wireless Calls Received	23,200	23,664	24,137	24,620
Incoming Admin Calls	DATA IS N/A			
Outgoing Admin Calls	DATA IS N/A			
TDD Calls	902	920	938	957
Police Calls Dispatched	39,268	40,053	40,854	41,671
Fire/EMS Calls Dispatched	8,106	8,268	8,433	8,602

Table 12 - Coconut Creek Projected Total Annual Traffic

ABBH Traffic	2019	2020	2021	2022
9-1-1 Calls Received	9.7	9.9	10.1	10.3
Incoming Admin Calls	DATA IS N/A			
Outgoing Admin Calls	DATA IS N/A			
Police Calls Dispatched	10.6	10.8	11.0	11.2
Fire/EMS Calls Dispatched	3.3	3.3	3.4	3.5

Table 13 - Coconut Creek Projected ABBH Traffic

2.2.3 City of Margate 9-1-1 Projected Traffic and Radio Dispatch Volume

Total Annual Traffic	2019	2020	2021	2022
9-1-1 Wireline Calls Received	5,355	5,462	5,571	5,683
9-1-1 Wireless Calls Received	25,215	25,719	26,234	26,759
Incoming Admin Calls	DATA IS N/A			
Outgoing Admin Calls	DATA IS N/A			
TDD Calls	909	927	946	965
Police Calls Dispatched	45,381	46,289	47,215	48,159
Fire/EMS Calls Dispatched	9,316	9,502	9,692	9,886

Table 14 - Margate Projected Total Annual Traffic

ABBH Traffic	2019	2020	2021	2022
9-1-1 Calls Received	10.5	10.7	10.9	11.2
Incoming Admin Calls	DATA IS N/A			
Outgoing Admin Calls	DATA IS N/A			
Police Calls Dispatched	12.3	12.5	12.8	13.0
Fire/EMS Calls Dispatched	3.8	3.9	4.0	4.1

Table 15 - Margate Projected ABBH Traffic

2.2.4 Combined 9-1-1 Projected Traffic and Radio Dispatch Volume

Given that the provided Admin call data for Coconut Creek and Margate appears to be countywide data, for this analysis, OCG assumed that the Admin call traffic would be double from Coral Spring’s current volume.

Total Annual Traffic	2019	2020	2021	2022
9-1-1 Wireline Calls Received	20,070	20,472	20,881	21,299
9-1-1 Wireless Calls Received	111,126	113,349	115,616	117,928
Incoming Admin Calls	247,058	251,999	257,039	262,179
Outgoing Admin Calls	93,257	95,122	97,025	98,965
TDD Calls	2,139	2,182	2,225	2,270
Police Calls Dispatched	228,670	233,243	237,908	242,666
Fire/EMS Calls Dispatched	36,799	37,535	38,286	39,051

Table 16 - All Cities Projected Total Annual Traffic

ABBH Traffic	2019	2020	2021	2022
9-1-1 Calls Received	66.1	67.4	68.8	70.1
Incoming Admin Calls	7.3	7.5	7.6	7.8
Outgoing Admin Calls	0.8	0.8	0.8	0.9
Police Calls Dispatched	42.8	43.7	44.6	45.5
Fire/EMS Calls Dispatched	18.6	19.0	19.4	19.8

Table 17 - All Cities Projected ABBH Traffic

2.3 Projected Call Taker and Radio Dispatcher Positions Required

An Erlang C calculation was performed on each set of the above projected data to determine the minimum number of call taker and radio dispatch positions required to support the projected call volumes at the busiest hour through year 2022 based upon a P0.1 GOS. The calculations were based upon the reported Average Bouncing Busy Hour traffic where data was available.

2.3.1 City of Coral Springs Projected Call Taker and Dispatchers

Position	2019	2020	2021	2022
9-1-1 Call Taker Positions	6	6	6	6
Police Radio Dispatcher Positions	4	4	4	4
Fire/EMS Dispatcher Positions	3	3	3	3
Admin Call Handling	2	2	2	2

Table 18 - Coral Springs Projected Staff per Position

2.3.2 City of Coconut Projected Call Taker and Dispatchers

Position	2019	2020	2021	2022
9-1-1 Call Taker Positions	3	3	3	3
Police Radio Dispatcher Positions	3	3	3	3
Fire/EMS Dispatcher Positions	2	2	2	2
Admin Call Handling	1	1	1	1

Table 19 - Coconut Creek Projected Staff per Position

2.3.3 City of Margate Projected Call Taker and Dispatchers

Position	2019	2020	2021	2022
9-1-1 Call Taker Positions	3	3	3	3
Police Radio Dispatcher Positions	3	3	3	3
Fire/EMS Dispatcher Positions	2	2	2	2
Admin Call Handling	1	1	1	1

Table 20 - Margate Projected Staff per Position

2.3.4 Combined Projected Call Taker and Dispatchers

Position	2019	2020	2021	2022
9-1-1 Call Taker Positions	7	7	7	7
Police Radio Dispatcher Positions	6	6	6	6
Fire/EMS Dispatcher Positions	4	4	4	4
Admin Call Handling	3	3	3	3
Working Supervisors³	3	3	3	3

Table 21 - All Cities Projected Staff per Position

2.3.5 Estimated Number of Additional Positions Needed

Position Type	Current Number	Required for Expansion	Total New Positions Needed
9-1-1 Call Taker Positions	7	7	0
Radio Dispatcher Positions (PD and FD)	4	10	6
TDD Dispatch Positions	1	2	1

Table 22 - Estimate of New Positions Needed

Taking into consideration that Dispatch Center may more than double its current staff, it is also recommended that other administrative / management personnel, such as system manager, trainers and other support staff be increased as well.

2.4 Staffing Analysis

There are many factors to consider when determining the amount of staff needed to support a call center that operates 24/7/365 days per year. Some of these factors are:

- Shift hours worked
- Does Supervisors/Management provide overflow assistance
- Training time / Continuing Education
- Time off available to staff
 - Vacation time
 - Sick time
 - Holiday
 - Training
 - Personal Days

³ Working Supervisors may be used as overflow during busy hours.

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Table 23 below provides an example of how the total staffing for a Call Center can be determined. The sample schedule is based upon have three 8-hour shifts (1 - 3) and two 10-hour shifts (4 & 5). The schedule takes advantage of overlapping shifts to allow for maximum staffing in the call center during the peak traffic times.

Shift	Call Takers	Dispatchers	TDD	Supervisors
1st (0700-1400)	3	5	2	1
2nd (1500-2200)	3	5	2	1
3rd (2300-0600)	3	5	2	1
4th (0700-1600)	2	3	0	1
5th (1300-2200)	2	2	0	1

Table 23 - Example of Staffing per Shift

Table 24 below depicts the total staff available per block hour based on the sample schedule.

Time Range	Call Takers	Dispatchers	TDD	Supervisors	Total Staff
2300-0600	3	5	2	1	11
0700-1200	5	8	2	2	17
1300-1600	7	10	2	3	22
1700-2200	5	7	2	2	16

Table 24 - Total Staff Available per Block Hour

The actual number of staff that would be needed to fill this schedule is based upon the total number of shifts/man hours required per year and the available time each staff member can work in a calendar year.

Shifts	Total Shifts for the Year	Total Man Hours for the Year
1 - 3	3 shifts x 365 days = 1095	1095 shifts x 8 hours = 8760
4	1 shift x 365 days = 365	365 shifts x 10 hours = 3650
5	1 shift x 365 = 365	365 shifts x 10 hours = 3650

Table 25 - Total Shifts and Man Hours per Year

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In general, based upon a 40 hour work week, and not factoring any time off, each staff member provides 2080 man hours per year.

Hours Worked	Weeks/Year	Total Available Time
40	52	40 hours x 52 weeks = 2080

Table 26 - Total Man Hours per Staff

Factoring any time off, the true availability of each staff member is depicted in Table 27

Reason for Time Off	Hours Allotted
Vacation Time	80
Sick Time	40
Holidays	56
Training	40
Personal Days	24
Other	40
Total Time Off	280
Total Time Available	2080 - 280 = 1800 man hours per year

Table 27 - Total Man Hours per Staff Considering Time Off

Based upon the available time per staff member of 1800 hours, Table 28 and Table 29 depicts the number of full time employees (FTE) required to fill all the hours as determined in Table 25 above.

Shifts	Hours to Fill	Total FTEs Required
1 - 3	8760	8760 / 1800 = 4.9
4 & 5	3650	3650 / 1800 = 2.0

Table 28 - Total FTEs Required per Shift

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Shift	Call Takers	Dispatchers	TDD	Supervisors	Total Per Shift	Total FTEs
1 - 3	3	5	2	1	11	11 x 5 = 55
4	2	3	0	1	6	6 X 2 = 12
5	2	2	0	1	5	5 X 2 = 10
Total FTE Required						77

Table 29 - Total FTEs Required To Staff Call Center

2.5 Radio System Push-to-Talk Data

The City of Coral Springs P25 radio communications system has 1 control channel and 10 working channels for a total of 11 channels. To determine the suitability of the existing radio system to support the additional radio traffic, OCG requested Push-to-Talk (PTT) data from the cities of Coral Springs, Coconut Creek and Margate. Coral Springs provided PTT data for the 2017 year; however, at the time of this report, PTT data for Coconut Creek and Margate were not available.

Table 30 depicts a summary of the analysis of the PTT Data for Coral Springs by user group.

User Group	PTT	Average PTT/Hour
Busy Hour PTTs all users (20:00)	69,237	190
Total PTTs all users	1,222,223	140
Total PTTs CSPD	1,073,933	123
Total PTTs CSFD	91,695	11
Total PTTs Local Government (LG)	56,595	6

Table 30 - Coral Springs PTT Data

Based on an average of 190 PTTs/hour during the **Busy Hour** with an average radio transmission of 20 seconds, the City’s radio communications system utilizes approximately 50% of its capacity (5 working channels).

As previously indicated, PTT data for Coconut Creek and Margate was not provided. Therefore, OCG developed a ratio of busy hour PTTs versus ABBH dispatch volume from Coral Springs and used that to estimate the number of PTTs Coconut Creek and Margate would generate during their busy hours.

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User Group	Busy Hour PTTs	ABBH Dispatch Volume	Ratio
Coral Springs (PD & FD)	190	30	6.3
Coconut Creek (PD & FD)	50	8	N/A
Margate (PD & FD)	98	15.5	N/A
Total PTTs Busy Hour	338	N/A	

Table 31 - Estimated Average Busy Hour PTTs

Based upon the total **estimated average** busy hour PTTs of 338 and an average radio transmission of 20 seconds, the addition of Coconut Creek and Margate Police and Fire will utilize approximately 60% of the capacity of the City’s radio system.

OCG also completed an additional analysis of the average PTTs per dispatched call.

Using an average of 7.76 PTTs/PD call dispatched and 4.92 PTTs/FD call dispatched from the Coral Springs data, the calculated PTTs by Coconut Creek and Margate is 554,719⁴ which is approximately a 45% increase in PTTs on the radio system.

User Group	Dispatched Calls	Estimated PTTs	Average PTT/Hour
Coral Springs PD	138,428	1,073,933	123
Coral Springs FD	18,625	91,695	11
Coconut Creek PD	17,257	133,881	16
Coconut Creek FD	7,791	38,357	4
Margate PD	43,619	338,399	39
Margate FD	8,954	44,083	5
Total PTTs by all agencies		554,719	63

Table 32 - Coconut Creek and Margate Estimated Average PTT Data

⁴ $(17,257 \times 7.76) + (7,791 \times 4.92) + (43,619 \times 7.76) + (8,954 \times 4.92) = 554,719$

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User Group	PTT	Average PTT/Hour
Coral Springs	1,222,223	140
Coconut Creek	172,238	20
Margate	382,481	44
All Agencies	1,776,942	203

Table 33 - All Cites Estimated Average PTT Data

Based upon the total estimated average PTTs per hour of 203 and an average radio transmission of 20 seconds, the addition of Coconut Creek and Margate Police and Fire will utilize approximately 50% of the capacity of the City's radio system.

3. Radio Coverage

3.1 Overview

The City of Coral Springs operates a trunked digital radio communications system. The radio communications system is a Motorola 800MHz P25 Phase 1, 3-site simulcast, 11-channel radio system that provides direct inter-agency and intra-agency communications among the various public safety and local government public works agencies.

3.2 Radio Coverage Predictions

The radio system was designed to provide in-building portable radio coverage throughout the City’s jurisdictional service for buildings that attenuate signals by a factor of 15 dB. Radio coverage is defined as the ability to successfully complete inbound (field-to-dispatch), or outbound (dispatch-to-field) voice communications throughout the designated service area, while stationary or in motion, with the required delivered audio quality (DAQ) and the specified level of propagation reliability. DAQ is the perception of intelligibility of a received message.

For the purposes of this report, all coverage analyses of the existing radio system were performed for a DAQ 3.4. In the TIA/EIA Technical Service Bulletin TSB-88, the Telecommunications Industry Association (TIA) defines the delivered audio quality, which is a numeric rating of speech intelligibility, as follows:

RATING	AUDIO QUALITY
DAQ 1	Unusable. Speech present but not understandable
DAQ 2	Speech understandable with considerable effort. Requires frequent repetition due to noise/distortion
DAQ 3	Speech understandable with slight effort. Requires occasional repetition due to noise/distortion
DAQ 3.4	Speech understandable without repetition. Some noise/distortion
DAQ 4	Speech easily understood. Occasional noise/distortion present
DAQ 5	Perfect

Table 34 - Delivered Audio Quality

The radio system infrastructure tower sites are located at:

SITE NAME	SITE ADDRESS
Coral Springs PD	2801 Coral Springs Drive Coral Springs, FL 33065
Bellsouth Mobility (BSM)	5400 NW 15th Street Margate, FL 33063
Coconut Creek	5150 Regency Lakes Drive Coconut Creek, FL 33073

Table 35 - Tower Sites Name/Location

3.2.1 City of Coconut Creek and City of Margate Radio Coverage Maps

OCG utilized its wireless design toolset, ComSiteDesign™ to develop radio coverage prediction analysis of the City of Coral Springs’ existing 800 MHz system within the City of Coconut Creek and the City of Margate.

The following technical parameters were used for modeling the radio coverage of the City’s P25 Phase 1 communications system:

- Talkout and talkback radio coverage for a portable radio equipped with a ½ wave whip antenna and worn on the hip at 3.3 feet above ground level operating outdoors
- A minimum DAQ level of 3.4 for talkout and talkback for portables
- 95% Service Area Reliability for portables communicating outdoors
- At a minimum, in-building portable radio coverage with a signal attenuation of 15 dB or less

Figure 2 and Figure 3 below depict radio coverage for portable radios operating outdoors and in buildings that attenuate signals by a factor of 15 dB. The red painted areas depict the predicted radio coverage with in 15 dB buildings and the blue painted areas depict the areas of predicted radio coverage outdoors.

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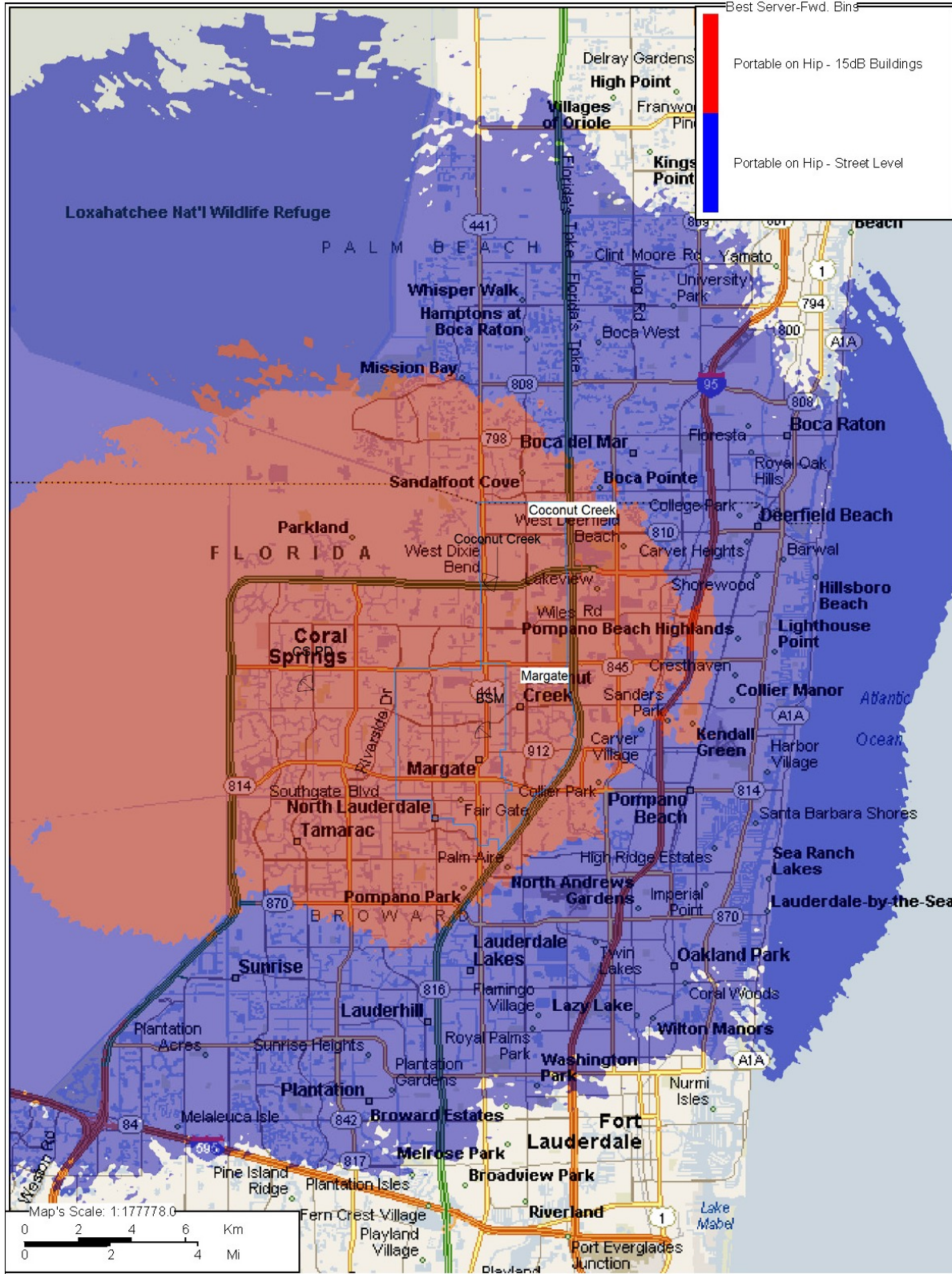


Figure 2: City of Coral Springs P25 Digital Talkout Radio Coverage

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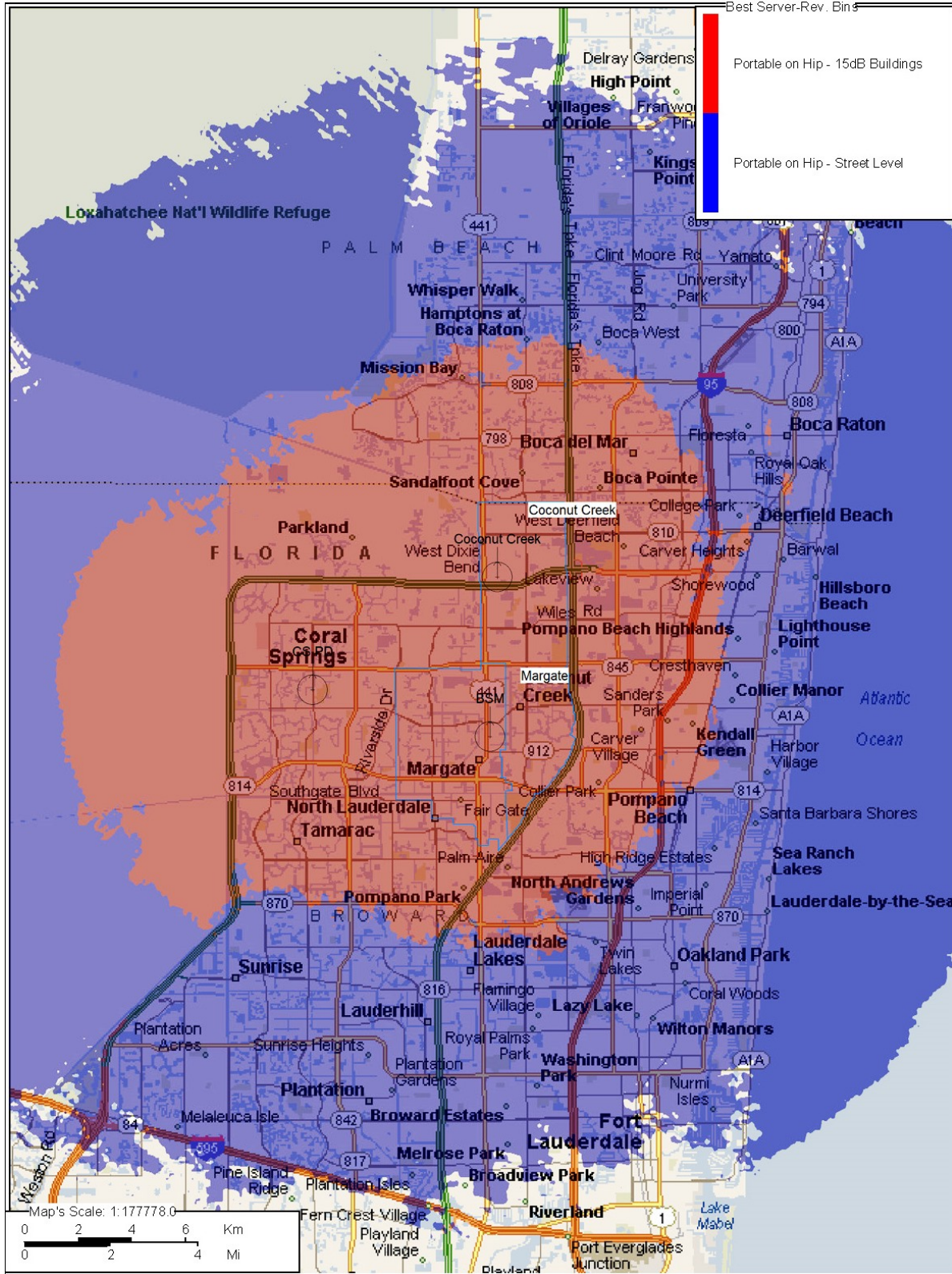


Figure 3: City of Coral Springs P25 Digital Talkback Radio Coverage

3.3 Radio Coverage Summary

The City of Coral Springs radio system as designed is very well balanced between talkout and talkback for portable operation and provides good coverage within the cities of Coconut Creek and Margate.

Table 36 shows a summary of the percent coverage per city. This provides insight into each City’s expected level of radio coverage over their service area.

Coverage Type	Percentage of Coverage in Coconut Creek	Percentage of Coverage in Margate
Portable Outdoors - Talkout	99.99% ⁵	99.99% ⁵
Portable Outdoors - Talkback	99.99% ⁵	99.99% ⁵
Portable Indoors (15 dB Building) - Talkout	99.99% ⁵	99.99% ⁵
Portable Indoors (15 dB Building) - Talkback	99.99% ⁵	99.99% ⁵

Table 36 - Percentage of Radio Coverage

While the radio coverage analysis of the City of Coral Springs radio system predicts the availability of both portable outdoors and portable indoors radio coverage within the City of Coconut Creek and the City of Margate, it is OCG’s recommendation that a radio coverage verification test be performed to validate the analysis.

⁵ All radio coverage is based on a probability theory. Radio coverage is affected by weather and atmospheric conditions on a continual basis. Because of these variables, radio systems rely on a parameter called “Fade Margin”, which is a safety factor used to determine the level of probability of successful radio communication. Radio coverage cannot be guaranteed 100% of the time.

4. Subscriber Radios Inventory

4.1 City of Coconut Creek

The City of Coconut Creek provided information on their existing radios. All of the subscriber radios used by the Coconut Creek are manufactured by Motorola.

Table 37 depicts the inventory of existing radios provided by Coconut Creek.

Model	Quantity
MTS2000	19
XTS2500	27
XTS5000	14
APX4000	20
APX6000	102
APX7000	36
APX6500	8
XTL2500	42
MCS2000	29
Unknown	33
Total:	330

Table 37 - Coconut Creek Radio Inventory

4.2 City of Margate

The City of Margate provided information on their existing radios. All of the subscriber radios used by the Coconut Creek are manufactured by Motorola.

Table 38 depicts the inventory of existing radios provided by Margate.

Model	Quantity
APX7000	74
XTL2500	1
XTL5000	6
APX7500	15
APX8500	3
MCS2000	16
Series2000	1
Total:	116

Table 38 - Margate Radio Inventory

4.3 Summary of Subscriber Equipment

The City of Coral Springs radio communications system is equipped with a Motorola feature called “Enhanced Data” which is used for the City’s Automatic Vehicle Location (AVL) system. The Enhanced Data feature is only available for the APX series radio model. Based on the radio inventory provided by Coconut Creek and Margate, any non-APX model radio, including those classified as “Unknown” will need to be replaced.

Table 39 below depicts a summary of the existing radio inventory by Coconut Creek and Margate.

Description	Coconut Creek	Margate
Replace & Program		
Portables	60	0
Mobiles	104	24
Reprogram		
Portables	158	74
Mobiles	8	18

Table 39 - Radio Inventory Summary

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5. Budgetary Cost Estimates

5.1 Dispatch Center

Furniture		
7	Console Furniture	\$122,500.00
7	Chairs	\$9,100.00
Total:		\$131,600.00

Radio Dispatch		
7	MCC7500 Console	\$210,000.00
7	APX7500 Consolette	\$42,000.00
7	MCD5000 Deskset	\$28,000.00
1	Network Equipment	\$20,000.00
1	12-Port Control Station Combiner with 2 Antenna System	\$20,000.00
1	Engineering, Installation and Project Management (@40%)	\$128,000.00
Total:		\$448,000.00

CAD		
7	ONESolution CAD Resource Monitor Display License with Maps	\$42,000.00
7	ONESolution CAD Console License	\$21,000.00
7	ONESolution CAD Client License for Message Switch	\$8,400.00
7	ONESolution CAD Client AVL License	\$63,000.00
7	ONESolution MCT Client-Digital Dispatch	\$5,600.00
7	ONESolution MCT Client AVL License	\$700.00
1	ONESolution Public Safety and Justice Map Services	\$7,000.00
1	Installation (Dispatch Center)	\$12,000.00
120	ONESolution MCT Client-Digital Dispatch	\$96,000.00
120	ONESolution MCT Client AVL License	\$12,000.00
1	Installation (Vehicles)	\$12,000.00
Total:		\$279,700.00

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5.2 Fire Station Alerting

FSA	
6 RTU ⁶	\$330,000.00
6 APX6500 (800 MHz)	\$21,000.00
6 APX6500 (UHF)	\$21,000.00
Total:	\$372,000.00

5.3 Subscriber Radios

Subscriber Radios	
<i>Reprogram Radios⁷</i>	
232 Portables	\$12,528.00
26 Mobiles	\$1,612.00
<i>Replace Radios</i>	
60 Portables	\$210,000.00
128 Mobiles	\$576,000.00
2 Programming Templates	\$1,540.00
Total:	\$787,540.00

5.4 Summary of all Budgetary Items

Description	Total Costs
Furniture	\$131,600.00
Radio Dispatch	\$448,000.00
CAD	\$279,700.00
Fire Station Alerting	\$372,000.00
Subscriber Radios	\$787,540.00
Total:	\$2,032,980.00

⁶ Coral Springs indicated DCR Engineering quoted \$55,000 per Fire Station

⁷ Assumes all existing radios have the required features enabled and requires no flash upgrades.

5.5 Staffing Cost

The salary range and benefit for each of position type, as provided by Coral Springs, is as follow:

Position Type	Salary Range	Benefits
Telecommunicator⁸	\$41,000 - \$64,000	\$22,814
Supervisor	\$48,000 - \$74,000	\$27,574

Based on each additional staff required for each position, the total salary range and benefits is as follows⁹:

Quantity Needed	Position Type	Total Salary Range	Total Benefits
40	Telecommunicator ⁸	\$1,640,000 - \$2,560,000	\$912,560
3	Supervisor	\$144,000 - \$222,000	\$82,722

⁸ A Telecommunicator serves as both a Call Taker and a Dispatcher

⁹ Does not include salaries and benefits for any administrative / management personnel, such as system managers, trainers and other support staff.