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Fire District Fire Service Delivery Study:

CLALLAM COUNTY FIRE DISTRICT #3

CLALLAM COUNTY FIRE PROTECTION DISTRICT NO. 3

SEQUIM, WASHINGTON

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CONSULTANT REPORT

FIRE DEPARTMENT SERVICE DELIVERY STUDY
CLALLAM FIRE PROTECTION DISTRICT #3, WA

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EXECUTIVE SUMMARY

In late 2015, Clallam County Fire District 3 (CCFD3) contracted with Fitch and Associates, LLC. to provide an analysis of their current deployment and services in order to provide recommendations to address both current and future challenges. Beginning early in 2016, the Fitch team collected several years' worth of the Agency's response data for detailed analysis. Additionally, the Fitch team made several visits to the organization through which it engaged internal and external stakeholders. A series of structured interviews were conducted on several occasions with members representing all levels and functions within the organization. Through these efforts, the Fitch team was able to provide this report as the culmination of their observations supported by comprehensive GIS and data reports.

CCFD3 clearly provides an excellent level of service to its community. Throughout the project, the Fitch team, observed a remarkable level of professionalism and dedication from the executive team. The Agency has good executive leadership in place and is demonstrating its desire to be progressive and is well aligned with the industry's most current best practices. The leadership team also demonstrates a high level of self-awareness as to their challenges. There seems to be a strong focus on future planning and developing strategies ahead of foreseeable challenges. This leadership team is further strengthened by an engaged and well informed board of commissioners. In Fitch's opinion, the Agency's executive team is fully capable of managing both current and future challenges.

The challenges facing the District are not uncommon for an agency of their size and community profile. The District will continue to face challenges to sustainability if expenditures continue to exceed available revenues. There are several methods presented for the agency to leverage some cost containment or avoidance strategies that may enable them to continue to operate in a fiscally sustainable manner. Thus far, the agency has shown sound fiscal responsibility in managing the difficulties.

The Agency is faced with an increasing call volume and faces some workload challenges for its personnel. Again, the executive team has demonstrated alertness by modifying their deployment strategies from Station 34 and has already greatly improved the distribution of workload. Additional strategies are presented in this report to further support the Agency's efforts to provide workload balance for their workforce. Some strategies discussed include the addition of a Peak Load Unit or the realignment of their EMS role through strategic partnerships with third-party providers.

The community benefits greatly from the efforts of a dedicated volunteer force. The District's abundance of rural territory relies heavily on this membership for service. The Agency has struggled to maintain its volunteerism but has focused time, money, and human resources on building up the volunteer program. Their current efforts seem to be productive in helping them towards their goals, but recruitment and retention of volunteers is a nationally recognized challenge that is not unique to CCFD3.

Workload continues to impact some of the Agency's administrative and management programs. Specifically, there is a consistent strain placed upon the management of the EMS and Training programs. Solutions are provided for the agency to address these programs through a combination of technological, organizational, and deployment strategies.

The Agency has maintained a standard of cover in compliance with State requirements. The Fitch team utilized the Agency's actual historical performance along with intensive GIS modeling to help the agency identify and establish appropriate performance benchmarks. The outputs of these analyses recommend the Agency establish a two-tier performance goal at a 10-minute travel time for their Urban/Suburban area and 13 minutes for their rural areas.

DISTRICT OVERVIEW

Clallam County Fire District No. 3 (CCFD3) is a combination fire department providing full fire suppression, fire prevention, and advanced life support (ALS) EMS services to the residences, visitors and businesses located in the eastern portion of Clallam County Washington. The District also provides special operations response for Technical Rescue, Hazardous Material and Marine Rescue incidents. The District augments these capabilities as needed with standing mutual aid agreements, regional response through the Fire Resource Plan, or the Washington State Fire Resource Mobilization Plan.[1]

Clallam County Washington comprises the northern border of Washington's Olympic Peninsula in the northwestern part of the State. Founded in 1854, the County encompasses 1,738 square miles of mostly forested and mountainous land.[2] The County's western boundary is the Pacific Ocean. The Strait of Juan de Fuca lines its northern boundary separating it from Victoria, Canada. On its southern side, the County transects Olympic National Park and Jefferson County completes its boundary on its eastern side. The County seat is the City of Port Angeles, the largest of Clallam's three municipalities. The City of Sequim is the next largest ahead of the City of Forks. Clallam County has a 2015 population estimate of 73,486, a 2.9% increase from 2010.[3]

CCFD3 covers approximately 142 square miles of Clallam County and 35 miles of tidal waterfront. The District provides emergency services to the communities of Agnew, Blyn, Carlsborg, Diamond Point, Dungeness Valley, Lost Mountain, and the City of Sequim totaling just over 30,000 residents in all. The City of Sequim has seen a 3.3% increase in population over the last five years, just outpacing the County's growth. The District is primary rural accounting for 65% of its area. The remaining 35% is designated suburban by population concentration. Service is provided out of seven (7) fixed facilities, of which three (3) career staffed 24/7 and four (4) are non-staffed Volunteer stations. The department deploys with thirty-four (34) career personnel who are supported with a corps of volunteers and (13) administrative, logistics and support staff. The Fire Chief reports directly to an elected three (3) member Fire District Commission.[4]

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[1] Clallam County Fire District No. 3. (2009). Service Delivery Objectives. Clallam County Washington.

[2] Vleming, J. (2015, December). *Clallam County Profile*. Retrieved from Employment Security Department: https://fortress.wa.gov/esd/employmentdata/reports-publications/regional-reports/county-profiles/Clallam-county-profile

[3] United States Census Bureau. (2015, May 29). *State & County Quick Facts*. Retrieved from Quickfacts.census.gov: http://quickfacts.census.gov/qfd/states/51/51137.html

[4] Clallam County Fire District No. 3. (2011). 2011 Annual Report.

Legal Basis and Governance

Clallam County Fire Control District No.3 is a legally established and incorporated Fire Protection District in accordance with Title 52 of the Revised Code of Washington (RCW). Title 52 outlines the regulations applicable to fire districts, their formation, annexations, dissolution, powers, commissioners, finances, benefit charges, provisions, etc., as well as performance measures. The District is under the governance of a board of fire commissioners. Title 50 grants the board legal authority to establish the levels of service delivery for the District in addition to policymaking, appointment and discipline, and budgetary accountability. Additionally, the District is granted full authority to provide fire prevention services, fire suppression services, and emergency medical services to the community. Fire commissioners are elected by the residents within the fire district and serve terms of six years. The Fire Chief is appointed by the District's Board of Commissioners and operates under the delegated authority of the board.[5]

Brief History of the Agency[6]

The earliest efforts of fire protection and suppression in the area believed to have informally begun as far back as the 1890's with the efforts of Sequim Valley settlers. The first organized fire department in the valley was the Sequim Fire Company established in 1914. The Sequim Fire Department was officially re-organized and recognized by the Washington State Board of Firefighters in 1923. The department was renamed the Sequim Volunteer Fire Department in 1924. In 1948, residents in the eastern end of the county moved to form a fire district and the Clallam County Fire Protection District #3 was subsequently formed in June of the same year. In 1987, the Sequim Fire Department merged with Fire District No. 3 and began construction of a new headquarters facility. The facility was completed in 1988 and became the first career-staffed station in the area's history. The building is still in use today as Station 34 and the headquarters of CCFD3.

Service Milestones[7]

CCFD3 has reached the following major service delivery milestones over the last 15 years:
2001 – Opened Station 33 as District's second staffed station.
2005 – Signed automatic aid agreement with Jefferson County Fire District #5.

[5] State of Washington. (2016). *Title 52 RCW*. Retrieved from Washington State Legislature: http://app.leg.wa.gov/RCW/default.aspx?cite=52
[6] Clallam County Fire District No. 3. (2016). *Our History.* Retrieved from http://www.clallamfire3.org/about-us/history/
[7] Clallam County Fire District No. 3. (n.d.). *Annual Reports*. Retrieved from http://www.clallamfire3.org/about-us/annual-reports/

2005 – Rerated by Washington Surveying and Rating Bureau (WSRB) after the acquisition of a new Water Tender and received a PP-7 rating for all homes within 5 miles of a fire station and a PP-5 rating for homes in Sequim.

2007 – CCFD3 began construction on its own maintenance facility and fire training grounds.

2008 – In partnership with the local S'Klallam Tribe, CCFD3 opened the newly constructed Blyn Fire Station 37 making it the District's third continually staffed station addressing development in the District's east end while increasing protection for existing residents.

2009 – Rerated by the WSRB to a PP-6, the third ISO improvement since 2000.

2009 – Added live fire props to the training facility.

2009 – Annexation of Gardiner Community in Jefferson County.

2009 – Passed new EMS levy replacing the original 1982 Levy and subsequently increasing EMS funding by nearly doubling the millage.

2010 – Purchased refurbished 2000 Sutphen Mid-mount 100 foot Ladder truck.

2010 – Established and filled a Fire Code Technician position providing the district with a dedicated fire and life safety inspector.

2010 – Awarded a four-year SAFER grant to aid in the recruitment and retention of volunteers.

2011 – Transitioned to ePCR records.

2011 – Purchased property in the R-Corner for future station use.

2014 – Rerated by the WSRB to a PP-5 and PP-4 for Sequim residents.

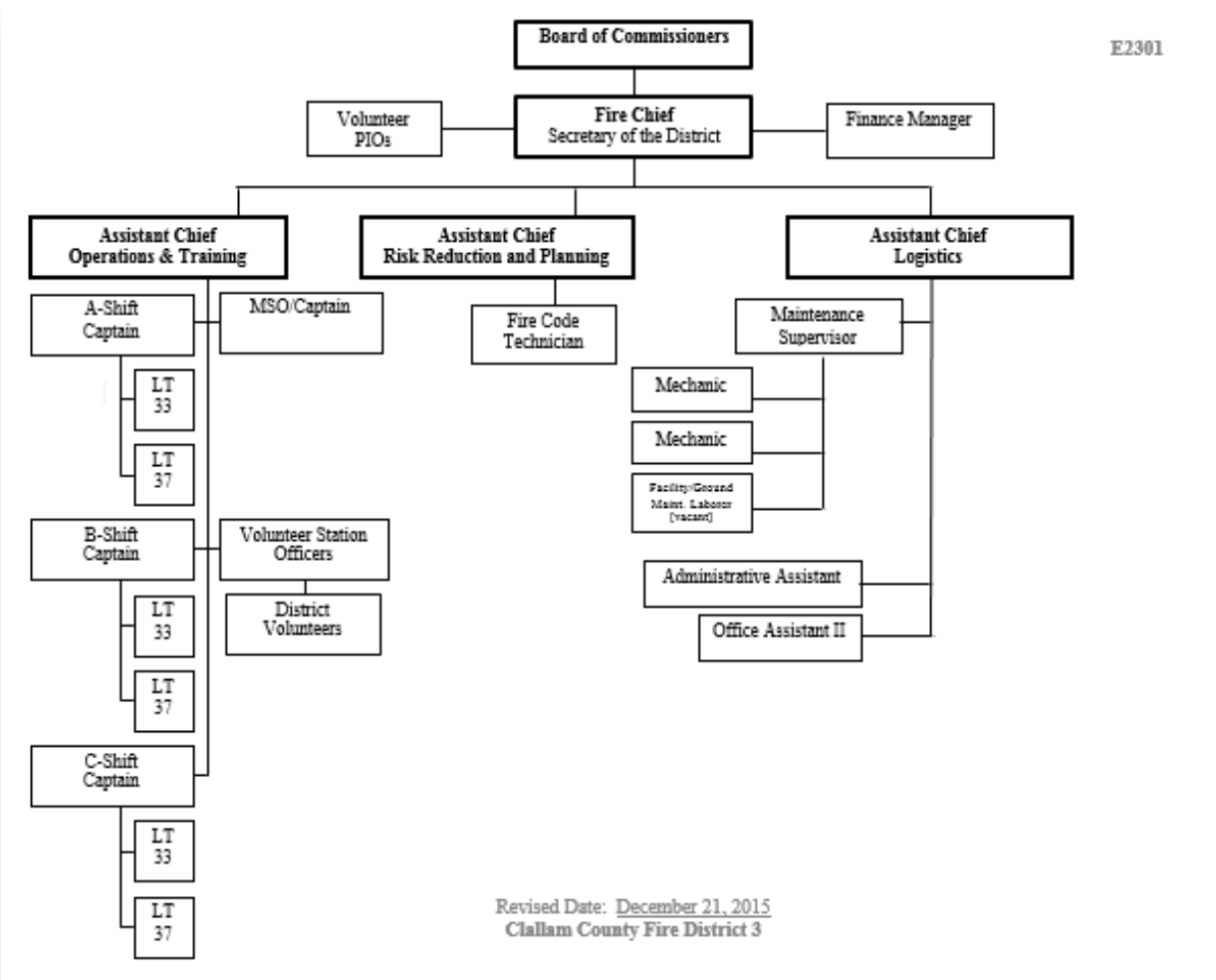
2016 – Added a third Tender in December 2016 so that a tender would be assigned to each of the staffed stations in order to maintain the WSRB protection rating.

Organizational Design

CCFD3 is a special purpose district incorporated under Tile 52 of the RCW as a Fire Control District. As such, it is governed by a three-member board of elected commissioners who are responsible for the overall compliance of the District with Title 52 and all other applicable laws of the State of Washington related to Special Purpose Districts. Under the board's direction, the organization is fashioned in a para-military structure with the Fire Chief being appointed directly by the board as the Chief Executive Officer of the District.

The Fire Chief has four direct report subordinates including the Finance Manager, the Assistant Chief of Operations and Training, the Assistant Chief of Risk Reduction and Planning, and the Assistant Chief of Logistics. Each Assistant Chief directly oversees their assigned program area and reports up to the Fire Chief. In Operations, each of the three deployed shifts is directed by the shift Captain who coordinates the daily staffing and response operations for both suppression and EMS. The Shift Captains report up to the Assistant Chief of Operations. EMS quality assurance (QA) is overseen by a dedicated Captain serving as the Medical Services Officer (MSO). This administrative position oversees all EMS logistics, training, and operational compliance. The District's current organizational chart is provided in Figure 1.

Figure 1: CCFD3 Organizational Chart



Financial Basis

The District is in compliance with financial mandates of Title 52 of the RCW. The District is funded primarily through assessments (levies) and service fees. The County Treasurer is legally tasked with receiving and distributing District tax revenues and crediting them to the appropriate fund. The District's fiscal year runs from January 1st through December 31st each year where they must, by State law, adopt and maintain a budget that is statutorily balanced such that annual expenditures do not exceed annual revenues *plus* any unencumbered prior year-end fund balances. State law also limits property tax growth to 1%.[8] Historically, the District has approved the maximum 1% property tax increase.

[8] Revised Code of Washington (RCW) 84.55 known as the One Percent Property Tax Levy Limit.

There are a number of funding mechanisms available, but as a special district, there are limits to the levies related to property and the provision of EMS services. The District's regular levy has a millage rate cap of $1.5 per $1,000 of assessed value and their EMS millage is capped at $0.5. Since 2012, the regular levy has remained rather stable with a low in the same year of 1.285 and a high in 2014 of 1.426, averaging 1.396 over the last five years. Currently the District operates just under their regular levy cap at 1.393. Similarly, the District's EMS levy has also seen very little change and is currently set just below the cap at 0.499. Accordingly, the District has averaged a 1% revenue increase with both levies since 2012 and ultimately increasing their levy assessment revenues by $520,868 since 2012.

The District has been successful in developing a number of alternative funding sources including fees for service such as wildland fire suppression services for the Department of Natural Resources as well as a portion of EMS user fees for it ALS first response.

The agency's administration has expressed growing concern over the District's budget challenges. Since 2013, revenues have failed to keep pace with expenditures. A review of the District's financial statements shows a continued reliance on fund balances for meeting annual expenditure liabilities. Some of the current budgeting practices increase the difficulty of calculating revenue and expenditure trends thereby challenging the clear identification of deficit spending. For example, beginning fund balances are shown as revenue and in so doing obscure the District's true revenue position. A review of the 2013 to 2015 fiscal years supports the administration's concern over deficit spending. Since expenditure growth nearly always outpaces revenue growth, the District will need to consider some cost containment strategies in the near future, perhaps in concert with an increase of the regular millage.

Geography

The District covers approximately 142 square miles of Clallam County's 1,738 square mile footprint. The District's eastern boundary is approximately 3.5 miles east of the Jefferson County line in the community of Gardiner in Jefferson County and it extends west to just six miles shy of Port Angeles. On its northern border is the Strait of Juan de Fuca, separating the District from Canada. The vast majority of the District's southern border is the Olympic National Forest. CCFD3's area is primarily rural accounting for about 65% of its territory while the balance is suburban.

The primary population center of the District is the City of Sequim, which has approximately 6,826 residents inside of 6.31 square miles placing its population concentration at 1,081 persons per square mile. The Districts service delivery also includes the communities of Agnew, Blyn, Carlsborg, Diamond Point, Lost Mountain, and Dungeness Valley totaling just over 30,000 residents in all.

Topography

The topography of the region is vastly diverse ranging from coastal plains to the imposing Olympic Mountains with a variable hill country in the transition making it one of the most striking ensembles of natural beauty in the nation. The Olympic Mountains reach elevations of nearly 8,000 feet and are marbled with a network of rivers. The coastline along the Strait of Juan de Fuca is dramatically rugged ranging from stony beaches to sharp cliff descents. Clallam County's elevation ranges from a low point of 23 feet below sea level to 7,782 feet above sea level while the City of Sequim sits an average 184 feet above sea level.[9]

Climate

The climate of Clallam County is moderate overall. The average temperature high year round is 57.7°F and the lowest average temperature is 41.2°F. The City of Sequim has the lowest average rainfall in the County with just 16.45" per year while Forks sets the high bar at 117.74" annually. Much of the District sits in the "rainshadow" of the Olympic Mountains. This area includes the lower elevations nestled between the eastern slope of the mountains and the Strait of Juan de Fuca. Thus, this area is shielded from the winter storms moving in off the Pacific. The belt in the "rainshadow" is the driest area in western Washington.

Population and Demographic Features

Table 1 below provides various metrics of census data for Clallam County and the City of Sequim Washington.

Table 1: Census Data for Clallam County and City of Sequim Washington[10]

U.S. Census Bureau Quick Facts	Clallam County	Sequim City
Population		
Population estimates, July 1, 2016, (V2016)	NA	NA
Population estimates, July 1, 2015, (V2015)	73486	6826
Population estimates base, April 1, 2010, (V2016)	NA	NA
Population estimates base, April 1, 2010, (V2015)	71404	6606
Population, percent change - April 1, 2010 (estimates base) to July 1, 2016, (V2016)	NA	NA
Population, percent change - April 1, 2010 (estimates base) to July 1, 2015, (V2015)	2.9	3.3
Population, Census, April 1, 2010	71404	6606
Age and Sex		
Persons under 5 years, percent, July 1, 2015, (V2015)	4.7	X
Persons under 5 years, percent, April 1, 2010	4.7	4.6
Persons under 18 years, percent, July 1, 2015, (V2015)	17.5	X
Persons under 18 years, percent, April 1, 2010	18.2	15.2

[9] Clallam Topographic Maps. Retrieved from http://www.anyplaceamerica.com/directory/wa/clallam-county-53009/

[10] US Census. Retrieved from https://www.census.gov/quickfacts/table/PST045216/53009,5363385

U.S. Census Bureau Quick Facts	Clallam County	Sequim City
Persons 65 years and over, percent, July 1, 2015, (V2015)	27.6	X
Persons 65 years and over, percent, April 1, 2010	24.1	40.4
Female persons, percent, July 1, 2015, (V2015)	50.6	X
Female persons, percent, April 1, 2010	50.4	55.6
Race and Hispanic Origin		
White alone, percent, July 1, 2015, (V2015) (a)	87.6	X
White alone, percent, April 1, 2010 (a)	87.0	91.3
Black or African American alone, percent, July 1, 2015, (V2015) (a)	1.0	X
Black or African American alone, percent, April 1, 2010 (a)	0.8	0.4
American Indian and Alaska Native alone, percent, July 1, 2015, (V2015) (a)	5.6	X
American Indian and Alaska Native alone, percent, April 1, 2010 (a)	5.1	1.2
Asian alone, percent, July 1, 2015, (V2015) (a)	1.7	X
Asian alone, percent, April 1, 2010 (a)	1.4	1.9
Native Hawaiian and Other Pacific Islander alone, percent, July 1, 2015, (V2015) (a)	0.2	X
Native Hawaiian and Other Pacific Islander alone, percent, April 1, 2010 (a)	0.1	0.1
Two or More Races, percent, July 1, 2015, (V2015)	3.8	X
Two or More Races, percent, April 1, 2010	3.8	3.2
Hispanic or Latino, percent, July 1, 2015, (V2015) (b)	6	X
Hispanic or Latino, percent, April 1, 2010 (b)	5.1	4.8
White alone, not Hispanic or Latino, percent, July 1, 2015, (V2015)	83.2	X
White alone, not Hispanic or Latino, percent, April 1, 2010	84.6	89
Population Characteristics		
Veterans, 2011-2015	9160	836
Foreign born persons, percent, 2011-2015	4.7	9.9
Housing		
Housing units, July 1, 2015, (V2015)	35868	X
Housing units, April 1, 2010	35582	3767
Owner-occupied housing unit rate, 2011-2015	69.8	56.8
Median value of owner-occupied housing units, 2011-2015	217100	212900
Median selected monthly owner costs -with a mortgage, 2011-2015	1378	1323
Median selected monthly owner costs -without a mortgage, 2011-2015	395	469
Median gross rent, 2011-2015	822	866
Building permits, 2015	217	X
Families and Living Arrangements		
Households, 2011-2015	31321	3111
Persons per household, 2011-2015	2.27	2.03
Living in same house 1 year ago, percent of persons age 1 year+, 2011-2015	85.8	82.4
Language other than English spoken at home, percent of persons age 5 years+, 2011-2015	5.4	11.5
Education		
High school graduate or higher, percent of persons age 25 years+, 2011-2015	92.3	92.6
Bachelor's degree or higher, percent of persons age 25 years+, 2011-2015	24.7	24.4
Health		
With a disability, under age 65 years, percent, 2011-2015	14.3	13.2
Persons without health insurance, under age 65 years, percent	13.3	20.6
Economy		
In civilian labor force, total, percent of population age 16 years+, 2011-2015	50.2	43.6
In civilian labor force, female, percent of population age 16 years+, 2011-2015	46.4	39.0
Total accommodation and food services sales, 2012 ($1,000) (c)	113266	33640
Total health care and social assistance receipts/revenue, 2012 ($1,000) (c)	329734	78158
Total manufacturers' shipments, 2012 ($1,000) (c)	372167	6766
Total merchant wholesaler sales, 2012 ($1,000) (c)	D	D

U.S. Census Bureau Quick Facts	Clallam County	Sequim City
Total retail sales, 2012 ($1,000) (c)	811967	314904
Total retail sales per capita, 2012 (c)	11299	47540
Transportation		
Mean travel time to work (minutes), workers age 16 years+, 2011-2015	20.9	25.1
Income and Poverty		
Median household income (in 2015 dollars), 2011-2015	47253	38761
Per capita income in past 12 months (in 2015 dollars), 2011-2015	27000	26569
Persons in poverty, percent	15.6	12.8
Businesses	**Clallam County, Washington**	**Sequim city, Washington**
Total employer establishments, 2014	2054	X
Total employment, 2014	17007	X
Total annual payroll, 2014 ($1,000)	574013	X
Total employment, percent change, 2013-2014	-0.8	X
Total non-employer establishments, 2014	4449	X
All firms, 2012	6359	915
Men-owned firms, 2012	2925	470
Women-owned firms, 2012	2236	244
Minority-owned firms, 2012	445	53
Nonminority-owned firms, 2012	5572	753
Veteran-owned firms, 2012	868	99
Nonveteran-owned firms, 2012	4995	672
Geography	**Clallam County, Washington**	**Sequim city, Washington**
Population per square mile, 2010	41.1	1046.2
Land area in square miles, 2010	1738.33	6.31

Disaster Potential[11]

In 2009, Clallam County and its strategic partners collaborated to create a multi-jurisdictional hazard mitigation plan under the leadership of Clallam County's Emergency Management Division. The plan was developed through the work of a steering committee made up of representatives from: Clallam County, Cities of Port Angeles, Sequim, and Forks, the Port of Port Angeles, Peninsula College, the Public Utility District, and Olympic Medical Center. Public meetings were also held to obtain vital external stakeholder input into the process and plan. As a result of these efforts, the team was able to assemble a comprehensive plan that both identified all associated community risk while providing a road map to mitigate the risk. The following table therefore demonstrates the disaster potential and its associate probability for Clallam County and subsequently CCFD3.

[11] Sheriff's Office Emergency Management Division. (2010, August). *Emergency Management.* Retrieved from: http://www.clallam.net/EmergencyManagement/documents/ClallamHazardMitigationFINAL10252010.pdf

Table 2: Disaster Risk and Potential for Clallam County

Disaster Risk	Probability	Impact	Hazard Strength Impact
Severe Storms	High/Moderate*	Moderate	Moderate
Drought	Moderate/High*	High	Moderate
Landslide/Erosion	High/Moderate*	Moderate	High
Flooding	High/Low*	Moderate/Low*	High/Low*
Seismic/Earthquake	Low	High	Medium
Tsunami	Low	Low	Low
Urban/Wildland Fire	Low/High*	Moderate	Moderate
Volcano	Low	High	Moderate

* Sequim rating differs because of its relatively dry climate.

DESCRIPTION OF CURRENT SERVICES

Fire Suppression

The District provides high quality fire suppression services within the jurisdiction as well as response to requests for service from adjacent municipalities and fire districts. Fire suppression services are provided from a total of seven fixed-facility fire stations distributed throughout the community. Three of the stations, considered as primary resources, are continually staffed with career personnel. The remaining four stations, considered secondary resources, house suppression apparatus and EMS aid cars, which are utilized by volunteers on a call by calls basis. All career Department members are trained to the minimum standards level as firefighters and emergency medical technicians (EMTs).

In total, the Department operates the following response units: (full staffing of 11/shift)

- 7 Engine companies
- 8 Ambulances
- 3 Tenders
- 1 Ladder company
- 3 Brush trucks
- 1 Medium Rescue
- 1 Marine Unit
- 1 Boat
- 1 Tech Rescue Trailer

The Department deploys constant emergency response coverage with its three primary stations: 33, 34, and 37. These resources are staffed with three separate shifts working a 3 / 4 schedule that averages a 49.9hr workweek. Each shift has a Captain working from Station 34 and serving as the Shift Commander. Station 34's typical staffing level is four (4) with at least two (2) paramedics. Stations 33 and 37 are both typically staffed with one (1) Lieutenant per shift and two (2) of which, one (1) is a paramedic. Thus, the District's has utilized these staffing strategies in an effort to accommodate employee leave and budget constraints. Therefore, the department will typically deploy the following: (Typical staffing of 8/shift)

- 3 Engine companies-ALS (Cross staffed)
- 4 Ambulances-ALS
- 3 Tenders (Cross staffed)
- 1 Ladder company (Cross staffed)
- 3 Brush trucks (Crossed staffed)
- 1 Medium Duty Rescue (Cross staffed)

Rescue

In 1998, the District established its Technical Rescue Team. The fully equipped team is trained to the Technician level in accordance with NFPA 1006 and 1670. As such, the team provides high quality rescue services in the areas of confined space, swiftwater, high angle rope, and trench rescue. CCFD3 also deploys the only Swiftwater Rescue Team on the Olympic Peninsula.[12]

Emergency Medical Services

The District provides emergency Advanced Life Support (ALS) level care in both a first response and transport capacity for the sick and injured throughout the District. This is accomplished through the use of ALS Medic Units for advanced care, treatment, and transport to the hospital. In total, the District operates four full-time Medic Units and all three crossed staffed fire engines are equipped for BLS and ALS first response. The District has a business agreement with Olympic Ambulance Service, Inc., which designates Olympic Ambulance as the primary transport agency. The District provides the ALS services to the transport operation when needed. The District itself only transports in the event there are no Olympic units available. At present, BLS requests for service are responded to by the District in the same fashion as ALS calls. However, BLS transports are handled solely by Olympic Ambulance.

Hazardous Materials

The District provides an operational level of response to Hazardous Material incidents. The District augments these capabilities as needed with standing mutual aid agreements, regional response through the Fire Resource Plan, or the Washington State Fire Resource Mobilization Plan.

[12] CCFD3, *Technical Rescue Team.* Retrieved from: http://www.clallamfire3.org/about-us/technical-rescue-team/

ORGANIZATION AND MANAGEMENT ASSESSMENT

Through the course of this study, the *FITCH* team has had ample opportunity to observe the organization, management and operation of the District. Through an administrative lens, the District is well run. Ultimate responsibility rests with a three-member board of commissioners. The *FITCH* team met with each member individually and universally observed a high level of dedication and commitment to the organization. Each commissioner demonstrated a remarkable level of insight into the strengths, weakness, and threats facing the District. It is clear that this level of awareness, coupled with years of emergency service experience make them well qualified to serve on the governing body of the District.

The Administrative team is comprised of an eclectic variety of personnel appointed to their positions from both within and outside of the organization. Additionally, nearly the entire executive staff has been appointed within the last three years. The Fire Chief was appointed from within having last served as the Assistant Chief of Operations. The Chief has taken a very purposeful and educated approach to building his executive team. As a result, the *FITCH* team observed a remarkable cohesiveness among the executive team that displayed both collaboration and commonality in purpose.

Members of the administrative team, including the Fire Chief, expressed concern over a growing workload and limited opportunities to expand administrative resources. It's certainly evident that the daily demands of the organization require a significant portion of the staff's time, but all matters of operational necessity and regulatory compliance are being met. Additional efforts are under way to revise and modernize items already in place in an effort to improve the organization's level of professionalism and efficiency. The Chief has also fostered a culture of innovation in his drive to be a progressive organization. While beneficial and vital to the organization's future, care must be exercised to avoid over extending resources with new initiatives and projects. The agency would benefit from a regular review of its strategic goals and priorities to ensure it does not take on more than it can accomplish, and where applicable, that what is undertaken is completed prior to the introduction of new work.

Finding #1:

The District is operated under the direction of high quality, heavily engaged, progressive leadership.

Recommendation #1:

The District should regularly review its strategic goals and priorities to ensure that it does not overtax its administrative resources or fail to fully complete the projects undertaken.

The communication pathways within the executive team seem to function effectively and efforts to communicate to the rank and file seemed to occur regularly. However, it was observed that much of

what was being considered or addressed at the staff level was unknown to the rank and file membership. In the course of our engagements with personnel, it wasn't uncommon to field questions or concerns from the company level that were already being addressed by the staff. Thus, the agency should look for opportunities to improve its methods of communication between the administration and the rank and file.

Recommendation #2:
The Agency should work to improve its method of communication with the rank and file to ensure the current status of the organization's efforts is disseminated throughout the ranks.

The executive team has demonstrated a genuine interest in cultivating a good working relationship with the Labor unit. Throughout this study, the Fire Chief has provided a tremendous level of transparency with the union. The Chief also holds regularly scheduled meetings with labor in a proactive effort to maintain a positive partnership with the unit. While not all viewpoints are aligned, labor and management do share a significant number of concerns, many of which are addressed within this report. The Agency is encouraged to continue its efforts for collaborative, working relationships with its labor unit.

Finding #2:
The Administration has made concerted efforts to cultivate collaborative labor relations and is encouraged to continue is these endeavors.

Community Risk Reduction Assessment

By virtue of RCW 19.27, Clallam County and the City of Sequim are charged with the administration and enforcement of the 2015 International Fire Code as adapted by the Washington State Building Council. Therefore, the County and the City each remain the respective Authority Having Jurisdiction (AHJ) of their territorial governance within the boundaries of CCFD3. In line with their mission, expertise and experience, CCFD3 has executed interlocal agreements with both the City and the County to act as the lead agent for the administration and enforcement of the State's adopted fire code thereby assuming the following responsibilities:

1. Inspecting all existing commercial occupancies within the boundaries of the District.
2. Follow-up inspections (re-inspections) to ascertain correction of previously noted deficiencies.
3. Provide the AHJ with copies of all commercial inspections performed to include deficiencies.
4. Notifying the AHJ forthwith of major, life threatening deficiencies.

Both respective AHJ's maintain responsibility for performing inspections on all new commercial buildings a structures prior to occupancy. The AHJs shall provide the District with one (1) set of building plans for each new commercial occupancies and the District is able to review these within

the required time frame 80 percent of the time. The District reviews approximately six plans per month. The District may also participate in all new occupancy inspections.

Internally, the principal responsibility for CCFD3's fire code enforcement resides with the Assistant Chief of Risk Reduction and Planning. This division is responsible for all fire code enforcement and community prevention efforts. However, CCFD3 does not retain enforcement authority. When voluntary compliance efforts are not successful, non-compliance is forwarded to the AHJ for ultimate enforcement. The division also employs one (1) full time Fire Code Technician who functions mainly as a fire code inspector.

Finding #3:

The District fully participates in fire inspection and code enforcement activities in partnership with the AHJ. However, the District does not retain enforcement authority and all non-compliance issues not voluntary resolved are referred to the AHJ for ultimate enforcement and resolution.

The division has demonstrated a committed and proactive approach to community risk reduction beginning with the establishment of performance goals for its program areas in the 2016 fiscal year. The adopted performance goals are annotated in the District's 2016 Program Budget Summary, Form F6010-2. They are as follows:

1. **Complete inspections of 100% of the "A", "R", and "E" Occupancy buildings in the district by December 31st, 2016.**
2. **Complete plan reviews on time 100% of the time.**
3. **Increase public education events by 10% in 2016.**
4. **Pre-Incident Planning program.**

Prior to 2015, the records of the agencies prevention efforts were unreliable. Thus, the agency was not able to provide data for the *FITCH* team to analyze and therefore no baseline could be established to monitor for improvements associated with their 2016 code enforcement program goals.

Finding #4:

The Agency has demonstrated a high level of awareness and commitment to community risk reduction with the adoption of its 2016 program goals, providing a plan for a complete program.

Finding #5:

The Agency's data collection and record keeping prior to 2015 is unable to provide data for analyzing the effectives and completeness of their prevention efforts.

The Agency does recognize the need for a program of robust data collection and tracking in association with their 2016 goals. The platform selected should provide for pre-incident planning and occupancy vulnerability assessments for all inspectable properties within the district. Additionally, it should hold a complete fire prevention history for each occupancy. The program should provide for

comprehensive reporting and analytics to include inspection rates, compliance rates, violation categories, occupancy risk categories, and incidents impacting these occupancies among other things. Given the Agency's limited personnel resources, a comprehensive tracking program will be key to their 2016 program goal successes.

Recommendation #3:
The District should acquire and implement a program/platform for the occupancy rating, planning, tracking, and reporting of all Community Risk Analyses and Reduction program areas and efforts.

The agency did report data for their 2015 public education efforts in which they held 49 events and made contact with nearly 2,900 individuals through the efforts of 27 volunteer and career personnel expending more than 387 man hours. These public education efforts were focused on six (6) specific categories including:

1. Smoke Detectors
2. Fire Prevention vent
3. Fall Prevention
4. CERT and Fire Extinguisher Training
5. Senior Adult Fire Prevention
6. CPR Training

The Public Education efforts of the Agency are commendable and the amalgamation with which they accomplish it demonstrates a genuine commitment to the program. However, the Agency reported that it has never completed a detailed program analysis. While a general public education policy exists, it does not specifically adopt initiatives that are correlated with the community's needs. Thus there is an absence of methodology associated with the program that helps ensure the limited resources available are utilized to address the most pressing needs of the community.

Finding #6:
The Agency is participating in public education with commendable effort; yet, in the absence of a quantifiable method for determining the needs of the community.

In order to focus the dedicated efforts of its members and ensure the maximum benefit from the program, the Agency needs to develop a quantifiable methodology to determine the optimal public education programs to benefit the community. Data sets germane to public education include population demographics, historical call demand by location, demographic, and determinant; hospital admission rates and causes; occupancy hazard risk categories in relation to the level of internal fire protection provided. Once the Agency has identified both the at-risk population and the risk they face, efforts can be strategically focused for maximum impact and benefit. Furthermore, efforts can be better aligned with the Agency's organizational goals and objectives.

Recommendation #4:
The District should establish a quantifiable approach to determining public risk as the guideline for

its Public Education program efforts.

Training Program Management Assessment

The District's Training program falls under the direction of the Assistant Chief of Operations. Through a series of structured interviews with administrative staff, labor, and volunteers in addition to a review of agency document submissions, the *FITCH* team analyzed the appropriateness and effectiveness of the training program. This analysis focused specifically on the agency's training efforts as they related to the fire suppression program area.

The agency has worked hard to establish benchmark standards for its personnel and training program. These benchmarks are well aligned with the risk observed, both quantitatively and qualitatively in the community. With Policy 2740P, the agency has defined the minimum training and certification requirements for each operational role within the organization. These minimum training requirements are established to ensure compliance with local, State, and Federal regulations including the WAC and the NFPA. Furthermore, in May of 2014, the District published for the first time a *Training Program Enhancement Plan*. The plan was developed by a committee of District members to compliment the agency's strategic plan. Its primary purpose was to establish operational level goals and objectives designed to guide the District's training program. The quality of this document cannot be understated. With it, the District has produced an extremely comprehensive and detailed guideline for establishing a training program based upon best practices while demonstrating that a high level of professional talent resides within the organization.

Finding #7:

CCFD3 has successfully articulated a professional development standard for its operational members.

Finding #8:

The District has successfully defined the necessary framework and components to establish an effective training program.

Although the aforementioned documents demonstrate a high level of awareness with regards to the District's training needs, stakeholder input has revealed that the agency has been challenged to implement the program as prescribed. There is commonality in the perception that the agency is not providing consistent, quality training development. Operating on a three-year plan, various components are assigned quarterly, but often without specific objectives or curriculum. The department utilizes the online learning platform Moodle to deliver some of the training and records are kept utilizing Zoll's Fire RMS. A considerable number of career and volunteer members describe the training provided as lacking depth. In fact, there is concern that a significant portion of the training being assigned is not actually being accomplished. Members described the accomplishment of training as "individualized" and "non-cohesive."

Furthermore, there was consistent frustration stemming from what is perceived to be inadequate time available for training. This perception is likely a by-product of regularly having to train while in-service. Members stated that their attempts to train are so frequently interrupted that they have failed to persist in the effort to accomplish it. These effects have also impacted the volunteer ranks to the point that the volunteer membership would rather not train with the career members due to the persistent call interruptions.

Finding #9:

Negative perceptions surrounding available time and quality has challenged the effectiveness of the Agency's training program.

Members also identified that training seemed to surge with new grant funding or the acquisition of new equip or facilities. Specific examples of a new ladder truck apparatus and live fire burn boxes were shared with the *FITCH* team. It's noteworthy that the members sharing these examples demonstrated a level of excitement as they reminisced about these training initiatives. These interactions closely mimicked experiences the *FITCH* team has had with other agencies facing similar challenges. This experience has shown that the most frequent factor contributing to dormant training culture is a failure to sustain consistent and high quality training. However, it's relevant to note that the high quality training delivered around these occurrences indicates the District's capacity to do so given the proper motivator. In other words, time was made when they were motivated to make it.

Finding #10:

The Agency has struggled to establish and cultivate a culture of training within the organization.

Analysis of historical performance does show that the District is justifiably challenged in some areas to deliver consistent training. However, a variety of approaches may be applied to overcome these barriers. For example, the Agency's administration is already laden with a significant workload. The additional burden of developing and delivering training can consequently be delayed or pushed aside over apparently more urgent matters. However, as many agencies experience the same demands, the industry has responded with solutions that help facilitate high level competency based training in a consistent fashion. The most intuitive solutions provide robust compliance tracking and credentialing services that are customized to the local requirements of the agency and its governing bodies such as the State of Washington in this instance.

To illustrate, the *FITCH* team has observed many organizations address CCFD3's challenges with a learning management system (LMS) provided by Target Solutions. The advantage of this type of service is threefold. First, the platform is designed to facilitate the following knowledge and skills based competency standards by providing a plethora of fire service developed content.

- Individual Performance Standards (IPS)

- Company Performance Standards (CPS)
- Truck Performance Standards (TPS)
- Driver Performance Standards (DPS)
- Officer Performance Standards (OPS)

The vast library of content provides substantial, quality training opportunities that do not require the organization to develop content. This also provides for consistency in the application of training assignments. Secondly, the platform facilitates full credential tracking that can be customized to the organization's needs or be aligned with the professional standards published by the NFPA. This will firm up the agencies already established professional development guidelines. Finally, the platform provides industry leading tracking and reporting capabilities that will enable the agency to achieve and demonstrate full compliance with the WSRB's training requirements with a minimal commitment of staff time. Furthermore, the platform easily provides for accountability to ensure assigned training is actually being performed.

Recommendation #4:

Obtain and implement a comprehensive LMS that provides the District with substantial content, professional credentialing, and training record management. The system should enable to District to facilitate their WSRB compliance in addition to their professional development guidelines and readily enable a three-year training plan.

Whereas a reliable and intuitive LMS can liberate staff time while providing high quality content, it has to be utilized within the scope of a comprehensive training plan. The agency has demonstrated that it has the professional talent to assemble a comprehensive and intuitive plan. Thus, not only should the *Training Program Enhancement Plan* be republished, but a committee of stakeholders should also be tasked with developing a three-year, competency based training plan that progressively builds on each of the competency standards listed above. The plan should not only assign the topic, but should also include specified objectives and content.

The training plan should be designed to reinforce the mission and deployment strategies of the agency. The agency has stated that they are currently undergoing a revision of their policies and SOPs. In this effort, special consideration should be given to aligning the agencies tactics with emerging industry research and best practice. For example, a risk-based approach to residential structure fires should include a deployable risk benefit assessment in concert with validated tactics such as transitional fire attack. All incident operations should be preplanned through the development of standing orders and functional unit assignments. This level of detail will serve to enhance firefighter safety in addition to providing consistency among all three operational shifts. Accomplishing these objectives first, will enable the committee to design a training plan that is specifically catered to the organization's operational methods and resources.

Recommendation #5:

The Agency should revise and develop detailed SOPs to include standing orders and functional

assignments that effectively standardize incident mitigation through the use of the most current research and tactics.

Recommendation #6:

The agency should assemble a committee to develop a three-year, competency based training plan that progressively builds on each of the competency standards listed above. The plan should be specifically aligned with the agencies SOPs, Training Program Enhancement Plan, and provide detailed objectives and content.

Recommendation #7:

A training coordinator should be appointed to oversee the development, implementation, and delivery of the training plan and should report through chain of command for evaluation and oversight of the program's effectiveness.

Finally, in addressing the District's barriers to training, consideration must be given to time. It's apparent that the District's workload demand is an antagonist to an effective training program. It's also important to acknowledge that creating capacity for units to train while out of service is crucial to the program's success. Capacity for training can be provided by first understanding where the District's workload is most significant. Once this is evident, the training plan can be designed so that company activities can be performed during periods of reduced demand. Additionally, in the same periods, resources can be relocated to provide additional coverage redundancy, ultimately enabling companies to train while out of service.

An analysis of historical demand indicates that 92 percent of all requests for service occur in the City of Sequim. In fact, of the 19 calls per day the Agency averages, 17.4 of them originate within the City. Thus, of the three-staffed stations, Station 34 has the highest rate of call concurrency at 55.9 percent whereas Station 33's rate is 28.7 percent and Station 37's is 11.1 percent. Therefore, Station 34 deploys two units while 33 and 37 each deploy one. As a result, all stations have a reliability of 94 percent or better. Temporal analysis adds further context by demonstrating that the demand for service is less in the first half of the year, on the weekends, and tapers off on a daily basis in the 1800hr. The data also indicates that 90% of all fire calls are handled with two units or less and the lion share of EMS responses are handled with one unit.

Finding #11:

More than 90 percent of the historical demand is concentrated within the City of Sequim. This demand follows a reliable pattern of peaks and valleys by month, day and hour.

In a conservative approach, analysis of workload by the busiest station also provides insight into the capacity for training. Accounting for all historical demand in addition to providing 10 hours per shift for rest and recovery, Station 34 has a balance of 4 hours per shift. Given the CCFD3 personnel do not

perform additional non-emergency functions such as fire hydrant testing or inspections, it is reasonable to conclude that sufficient capacity exists each day for training.

Finding #12:

A conservative workload analysis demonstrates that sufficient capacity exists within each shift to accomplish a prescribed regimen of training.

To effectively cover all the performance standards of a comprehensive training plan, training will need to include company-based training, performed in the station, and facilities based training, performed at a designated training facility. Company based training may involve online modules delivered via a LMS or skill based evolutions such as ladder raises. This type of training can often be accomplished in service as call interference is less disruptive and it's easily resumed once the unit returns. Facilities-based training is meant to accommodate more involved evolutions such as hose work or search and rescue evolutions. As such, it is best performed out of service since disruptions of these evolutions are more difficult to recover from.

In consideration of all these elements, the figure below provides a sample of how one quarter of an annual training plan may be accomplished.

Figure 2: Sample Training Plan - First Quarter

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Week 1		DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs
Week 2		DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs
Week 3		DCT - 2hrs	FBCE - 34 @ 1400-1430 FBCE - 34A @1430-1500 FBCE - 33 @ 1330-1400 FBCE - 37 @ 1300-1330	FBCE - 34 @ 1400-1430 FBCE - 34A @1430-1500 FBCE - 33 @ 1330-1400 FBCE - 37 @ 1300-1330	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs
Week 4	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	FND - 34,33 @ 1830-2030
Week 5	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	FND - 34A,37 @ 1830 -2030
Week 6	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	FND - 34,33 @ 1830-2030
Week 7		DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	FND - 34A,37 @ 1830 -2030
Week 8		DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs
Week 9	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	FND - 34,33 @ 1830-2030
Week 10		FBCE - 34 @ 1400-1430 FBCE - 34A @1430-1500 FBCE - 33 @ 1330-1400 FBCE - 37 @ 1300-1330	FBCE - 34 @ 1400-1430 FBCE - 34A @1430-1500 FBCE - 33 @ 1330-1400 FBCE - 37 @ 1300-1330	FBCE - 34 @ 1400-1430 FBCE - 34A @1430-1500 FBCE - 33 @ 1330-1400 FBCE - 37 @ 1300-1330	FBCE - 34 @ 1400-1430 FBCE - 34A @1430-1500 FBCE - 33 @ 1330-1400 FBCE - 37 @ 1300-1330	DCT - 2hrs	FND - 34A,37 @ 1830 -2030
Week 11	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs
Week 12		DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs
Week 13	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs	DCT - 2hrs

	Facilities/Day Drill	Facilites/Night Drill (FND)	Facilities/Basic Company Evolutions (FBCE)	Daily Company Training* (DCT)	Totals	
Qtr 1	0	2	1	48	51	
Qtr 2	0	2	1	48	51	
Qtr 3	0	2	1	48	51	
Qtr 4	8		1	48	57	
					210	Total Facility and DCT

*DCT
SCBA Ops/Emer.
Health and Safety
CPR/First Aid

Annually		
HazMat	6	
	216	Minimum All Personnel
Driver Training	12	
	228	Total for Drivers
Officer Development	12	
	240	Total for Officers

Daily Company Training (DCT) is facilitated via a LMS and station drills while in service. Facility based Basic Company Evolutions (FBCE), or NFPA 1410 drills, are performed by a single unit and can easily be accomplished in 30 minutes. Finally, more complex multi-company evolutions are performed with two units as weekend facility based Night Drills (FND). These facility trainings may be accomplished out of service by utilizing coverages and rotations from Stations 33 and 37 to keep two units in service at Station 34. This strategy should accommodate the sample schedule provided without significantly impacting the Agency's overall performance.

Additional strategies to accommodate facility training might include the deployment of a Peak Load Unit (discussed later in this report), backfill with volunteer personnel, or hiring back paid staff on overtime. In 2015, CCFD3 studied the feasibility of backfilling shifts to accomplish training and subsequently discovered that personnel found substantial value in the training delivery, but at a significant financial cost. Thus, while it may not be fiscally feasible to utilize this approach on a quarterly basis, the sample plan provided does include a full day training session in the fourth quarter. This might be used as the yearly live fire training session that encompasses the knowledge, skills, and abilities covered in the first three quarters.

Recommendation #8:

This District is encouraged to develop a plan and set of strategies that enables personnel to participate in consistent, quarterly facilities training while out of service.

REVIEW OF EXTERNAL AGENCIES

Olympic Ambulance Company

The Olympic Ambulance Company is a private ambulance provider that has a long history as a service provider in the area. They provide Basic Life Support (BLS) services and respond to all 911 related requests for service in conjunction with the first responder fire department agencies as well as conduct inter-facility transfers.

They are based in Sequim, WA but provide regional services, which contributes to greater depth of resources for surge capacity as they routinely move-up units from other areas such as Port Angeles to assist when necessary.

As a BLS provider, firefighter / paramedics from the Clallam Fire Protection District #3, will accompany the ambulance and ride into the hospital on all patients that require Advanced Life Support (ALS) care.

The ambulance service provides the patient transportation services for the District at no cost, but collects transport revenue through billing and cost recovery. The Olympic Ambulance Company and the Clallam Fire District #3 have a contract that allocates revenue sharing for the District's ALS services.

It has been a quality and enduring partnership between the District and Olympic Ambulance. The partnership allows the District to avoid expenditures related to patient transportation and focuses their efforts on first response ALS level treatment and patient stabilization. However, the District has transport capable apparatus and maintains the capacity to transport patients when needed. In this manner, the District's limited resources remain in service and in territory at a substantially higher rate than if they transported all patients.

Finding #13:

The District has a quality and enduring partnership with Olympic Ambulance that is fiscally advantageous to the District while continuing to meet community expectations for quality services.

Historically, there have been periods where the District and Olympic Ambulance worked more closely together. It would be advantageous for both parties to find ways to begin to work more closely together on items such as training and quality assurance that will improve interagency relations as well as improve the customer's experience.

Recommendation #9:

The District and Olympic Ambulance are encouraged to seek opportunities to work more closely together on areas of mutual benefit such as training, quality assurance, quality improvement, and coverage.

Emergency Communications Center

There are two communication centers that provide services to the region; the Peninsula Communications Center (PenCom) and the Jefferson Communications Center (JeffCom), respectively. During the course of this evaluation the two communications centers were undergoing a merger of management and administration.

The dispatch centers utilize the "King County" call prioritization platform for EMS incidents. However, the CCFD3 responds to all EMS incidents regardless of the clinical acuity.

Overall, the dispatch center performance is within one minute of NFPA or CFAI recommendations of 60 seconds at the 90th percentile and up to 80 seconds if the first call was answered by another PSAP and was transferred.[13] [14] For the purposes of this study, the dispatch interval is the time from phone ring at 911 to the dispatching and alerting of the unit. The average dispatch time in 2015 was 60 seconds, and the 90th percentile was 127 seconds (two minutes and seven seconds).

Of special note is the relative performance for Fire related incidents in comparison with EMS incidents (BLS and ALS). The dispatch intervals for fire events are nearly double the EMS performance. Through structured interviews with CCFD3, it is understood that reports of potential fires in many of the rural and mountainous regions can take considerable time to get a correct location and the relative frequency of fire calls is low which can influence the 90th percentile measurement greater than the average. Again, the overall dispatch performance is within reasonable limits, but the fire performance should be monitored closely to identify areas for improvement.

While there is some room for improvement in the dispatch performance, it is important to acknowledge that these national recommendations were created prior to the proliferation of cellular phones and medical call triage systems. The communications centers time commitment to get a correct location on cellular callers can be considerably longer than the traditional Automatic Number Identification (ANI) and Automatic Location Identification (ALI) process. In the modern environment, greater than 70% of the requests for service are cellular callers. Therefore, the overall performance by the communications centers is reasonably aligned with our national experience.

[13] National Fire Protection Association. (2010). NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments.* Boston, MA: National Fire Protection Association.

[14] CFAI. (2009). Fire & emergency service self-assessment manual, (8th ed.). Chantilly, Virginia: Author. (page 71)

Table 3: Dispatch Time by Category

Call Category	Average Dispatch Time	90th Percentile Dispatch Time
BLS	1.0	2.0
ALS	0.9	1.8
Fire	2.1	4.6
Total	**1.0**	**2.1**

Recommendation #10:

The District should work with the Communication Centers to monitor and improve performance where possible with particular attention to the Fire dispatching performance.

Access to Medical Care

The District's profile suggests a robust retirement community with an aging population that will have an ever increase demand for medical services, including EMS. However, there appears to be limited primary care providers in Clallam County to serve the community. [15] This may result in community members traveling farther distances to seek medical attention or to neglect early treatment that later progress to an emergency incident.

The fastest growing area for requests for EMS is the lower acuity incidents. This may suggest a relative problem with access to health care to where the citizens are utilizing EMS services as their entry point.

Operationally, the lack of emergency receiving facilities in the greater Sequim area requires long transport times that keep CCFD3's resources in limited capacity until the paramedic is returned from the hospital.

Several methods of dealing with the operational impact to the access to medical care is to increase paramedic capabilities within CCFD3 to account for the long transport times, work with Olympic Ambulance to upgrade to ALS capability where the CCFD3 medic would not have to ride into the hospital with such frequency, and/or work within the broad-based medical community to secure a stand-alone receiving facility that would reduce 911 generated transports. It is understood that some specialized services such as STEMI, Stroke, or Trauma related incidents would still need to be transported to a receiving facility capable of the corresponding level of care.

For a more general solution to access to healthcare is to complete community surveys on the challenges of access to healthcare and to determine the prevalent proximal causes. The Clallam

[15] Clallam County Health Collaborative. (2013). *Community Health Needs Assessment & Implementation Strategy* (p. 23). Author: Clallam County, WA.

County Community Needs Assessment[16] and the Clallam County Health and Human Services Report Card on County Health[17] is a good place to start and collaborate. While some solutions may be far outside of the influence of CCFD3, opportunities to create community centered solutions such as a FD Clinic, with a nurse practitioner or physician's assistant that is capable of delivering preventative measures such as flu shots and minor treatments, dispensing prescriptions for antibiotics, etc. may be beneficial. An opportunity may exist to deliver preventive measures that have a corresponding reduction in pre-hospital emergency requests. In other words, future expenditures could be diverted to preventative measures that serve a broader community base, rather than solely investing in additional response resources.

Recommendation #11:

The District is encouraged to explore potential solutions to the community's impact from the relative limited access to primary care providers and emergency receiving facilities in the greater Sequim area.

Adjacent Mutual/Automatic Aid Agencies

The Clallam Fire Protection District #3 encompasses the greater Sequim area. The CCFD3 deploys with a combination of career and volunteer resources and is supplemented by the capabilities of Olympic Ambulance. However, due to the geography and the development patterns over the years, the District is somewhat isolated from immediately adjacent services.

While mutual and automatic aid is available to the District, and the District has done a good job of identifying and partnering with these regional neighbors, the relative distances creates an untimely response for other than major events.

Therefore, the District must be reliant on their own services to a much higher degree than a similar agency in a metropolitan region with abundant adjacent agencies. This is a difficult balancing act for the District to have sufficient autonomous services to mitigate risks and remain within the fiscal constraints of available revenue.

Finding #14:

The District understands the geographic limitations on their reliance on mutual/automatic aid resources for routine or frequent incidents, but has developed quality partnerships for infrequent and major events that exceed the District's internal capacity.

[16] Ibid.

[17] Lipton, B. (November 14, 2012). *A Report Card on Clallam County's Health.* Presentation at Maier Hall, Peninsula College, Port Angeles. Clallam County Health and Human Services and Kitsap Public Health District: Clallam County, WA.

CAPITAL ASSETS AND CAPITAL IMPROVEMENT PROGRAMS

Fire Station Conditions and Capabilities

In 2016, the Logistics Division completed a comprehensive analysis of the District's fixed facility portfolio utilizing the Commission on Fire Service Accreditation International's (CFAI) self-assessment tool for physical resources and fixed facilities. This document provides a high quality and complete assessment of the District's physical resources and therefore should be referred to for informational requirements of this section. The service delivery and deployment configuration recommendations contained in this document should provide the necessary analysis for the District to address the planning needs articulated within their facilities self-assessment.

Finding #15:

The District has produced a comprehensive analysis of its physical resources and fixed facilities that in partnership with this report, is fully capable of guiding their future planning.

The following represents the District's current portfolio of fixed facilities.[18]

Figure 3: Station 31 - 4721 Sequim Dungeness Way

Dungeness Fire Station		
Built	1966	
Capacity	Apparatus Only	
Equipment		
Type	**Make**	**Year**
Aid Car	E350	1999
Engine	Seagrave	1995

[18] Images obtain from: http://www.clallamfire3.org/about-us/station-vehicles/

Figure 4: Station 32 - 256702 Highway 101

R-Corner Fire Station		
Built	1980	
Capacity	Apparatus Only	
Equipment		
Type	**Make**	**Year**
Aid Car	E350	1993
Engine	Freightliner	2005

Figure 5: Station 33 - 70 Carlsborg Road

Carlsborg Fire Station		
Built	1964	
Capacity	24/7 Staff	
Equipment		
Type	**Make**	**Year**
Aid Car	F450	2007
Engine	Sutphen	2008
Tender	GMC	1989
Brush	Ford	1991

Figure 6: Station 34 - 323 N. 5th Ave.

Sequim Fire Station - HQ		
Built	1984	
Capacity	24/7 Staff / Admin.	
Equipment		
Type	**Make**	**Year**
Aid Car	F450	2009
Aid Car	F450	2012
Engine	Sutphen	2008
Tender	Pierce	1992
Ladder	Sutphen	2000
Rescue	Freightliner	1999
Brush	International	1999
Marine	F350	1997
Boat	Inflatable	2004

Figure 7: Station 35 - 121 Sunshine Ave.

Diamond Point Fire Station		
Built	1970	
Capacity	Apparatus Only	
Equipment		
Type	**Make**	**Year**
Aid Car	F350	1993
Engine	E-One	1995

Figure 8: Station 36 - 40 Texas Valley Road

Lost Mountain Fire Station		
Built	1980	
Capacity	Apparatus Only	
Equipment		
Type	**Make**	**Year**
Aid Car	F350	1993
Engine	E-One	1996

Figure 9: Station 37 - 54 Sophus Road

Blyn Fire Station		
Built	2008	
Capacity	24/7 Staff	
Equipment		
Type	**Make**	**Year**
Aid Car	F450	2007
Engine	Freightliner	2005
Brush	Ford	1991

Figure 10: Maintenance and Training Facility - 255 Carlsborg Road

Carlsborg Main/Training		
Built	2007	
Capacity	Reserve Apparatus	
Equipment		
Type	**Make**	**Year**
Aid Car	E350	1999
Aid Car	E450	2003
MCI Bus	Freightliner	2001
Rehab	E350	1986
Engine	Pierce	1985
Ladder	Sutphen	1983

Analysis of Fire Apparatus and Resource Configuration

In 2007, the District completed construction of its maintenance facility. This state of the art complex gives the District nearly full capabilities for the repair, maintenance, and testing of its apparatus. A Maintenance Supervisor who oversees the work of two Maintenance Mechanics manages the facility. Personnel are required to maintain Emergency Vehicle Technician (EVT) and ASE certifications and therefore meet the industry requirements for emergency vehicle repair and maintenance. The agency employs a preventative maintenance program in which all front line apparatus receive thorough inspection quarterly with one full service per year. On an annual basis, all Engines are pump tested and all Aerials receive a UL test. Loose equipment is also thoroughly maintained as all hose, ground ladders, and SCBA are tested annually in accordance with applicable NFPA standards.

Finding #16:
The District has done an exceptional job establishing a comprehensive maintenance program for the care and longevity of is capital assets.

Finding #17:
The District's frontline apparatus and loose equipment is compliant with industry standards.

All front line apparatus are currently compliant with applicable NFPA standards for age and use. However, the Agency does not currently have a replacement plan in place to ensure that apparatus are replaced at appropriate intervals. The District recognizes this need and is currently developing a comprehensive vehicle replacement plan. The plan should include targets for desired length of frontline service and subsequent reserve service. It should also articulate what operational cost

considerations will be utilized to determine replacement priority. To enable this, the Agency should develop a means to track by vehicle the: cost per mile, rate of repair, average maintenance cost, and total cost of ownership. Not only will this data help properly prioritize replacements, but it will also enable the District to make adjustments to future apparatus replacement specifications that may reduce cost of ownership.

Recommendation #12:

The District's should establish a system for tracking and reporting on the aggregated maintenance history and cost of ownership for each vehicle.

Recommendation #13:

The District should continue with efforts to develop a comprehensive apparatus replacement plan in the form of an all-inclusive Capital Improvement Plan that includes large expenditure loose assets such as SCBA. The plan should prescribe replacement projections and associated funding strategies.

STAFFING

Optimized Staffing of Current Deployment

CCFD3 utilizes continuous staffing to cover 24 hours a day 365 days a year with a desired eight (8) personnel each shift distributed over three fire stations. Personnel work a rotating work schedule of 24-hour shifts that result in a 49.9-hour average workweek. In 2015, the number of assigned shift personnel was 33.

Utilizing the 2015 average annual leave for all shift based personnel, that includes all time away from work assignments, the optimized staffing for eight (8) personnel per shift is approximately 33 personnel. Divided evenly, this would require 11 personnel assigned to each shift to adequately cover all forms of average leave and limit overtime liabilities through a continuous staffing model. In other words, for each single position, i.e. firefighter, it will require 4.13 personnel to continuously staff the one firefighter position 24 hours per day 365 days per year assuming the average annual leave and 49.9 average workweek.

It is understood that allocated staffing numbers fluctuate across budget cycles and the number of actual personnel varies through attrition throughout each budget cycle. Therefore, the optimized staffing multiplier suggests that the District should have a minimum of 33 personnel, or eleven per shift, assigned in order to reliably provide a reliable staffing of eight personnel per shift.

Finding #18:
The District has been good stewards of the public dollar and has maintained a highly efficient ratio of employees to provide continuous coverage in the most efficient manner.

Recommendation #14:
If the District is desirous of maintaining staffing of eight personnel per shift, the optimized number of shift personnel should be a minimum of 33.

Continuity of Schedule but Alternative Workweek

If the District is desirous of creating more firefighting capacity on shift, one method to increase capacity is to incrementally adjust the workweek but maintain the overall shift schedule. Similar shift schedules may include a series of four shifts of 1-on and 1-off and then 5 days off, or the more traditional 24/48, or the 48/72 that is very popular in California that results in a 56-hour average workweek. While maintaining the current schedule, and eliminating the Kelly-Day, the District and Labor would have an opportunity to partner together to increase the available personnel by four. The advantage to the employees are that they earn additional compensation for the longer workweek and are eligible for Fair Labor Standards Act (FLSA) overtime (premium) hours above 212

hours or the 53 hour threshold.[19] Considering the District's negotiated 27-day work cycle, overtime should be compensated after surpassing 204 hours per work cycle.[20]

The advantage to the District and the Employees is that the change in workweek would create capacity for approximately 4 additional employees at a marginal or incremental increase in the budget. The premium dollars would occur at a variable rate of "sweat hours" worked in the pay cycle.

For illustrative purposes only, we utilized the step five firefighter / paramedic according to the 2015 collective bargaining agreement. If a current hourly rate of $35 per hour is assumed and the number of employees is maintained, the overall hourly rate would reconfigure to $32 per hour but the additional hours and average premium compensation would provide a net increase for each employee by approximately $73 dollars per week and $3,808 dollars per year if all hours were paid at the premium. This analysis only utilized salary not total compensation.

In addition, this would provide for four (4) more employees than needed to maintain of the current staffing of 8 personnel per shift. These employees could be distributed as one more per shift, and one more on 40-hour workweek for administrative capacity. Or these four employees could be utilized to provide a 7-day a week peak demand unit to ensure capability to cover demand for services as well as provide for increased opportunity to remove units from service to attend training opportunities. This collaborative approach would approximately cost the District an additional $125,660 per year in personnel salary costs in the illustration utilized.

Recommendation #15:

The District is encouraged to work with the Labor group to explore opportunities to increase staffing that are mutually beneficial within the context of the local environment.

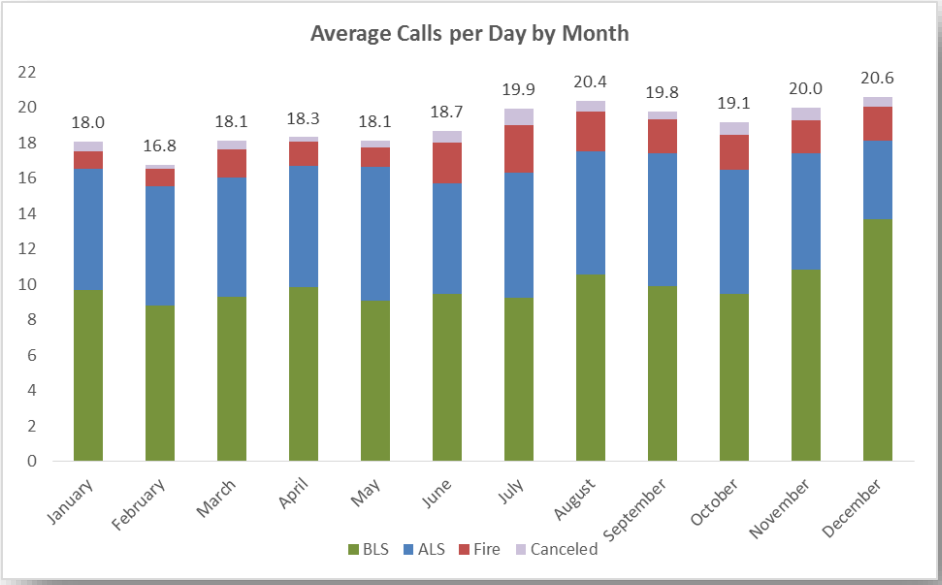
Temporal Analyses

Temporal analyses were conducted to evaluate patterns in community demands. These measures examined the frequency of requests for service in 2015 by month, day of week, and hour of day. Cancelled calls were also included.

Overall, average calls per month ranged from a low of 16.8 per day in February to a high of 20.6 per day in December. The top three months with the most demands in descending order are December (20.6 per day), August (20.4 per day) and November (20.0 per day).

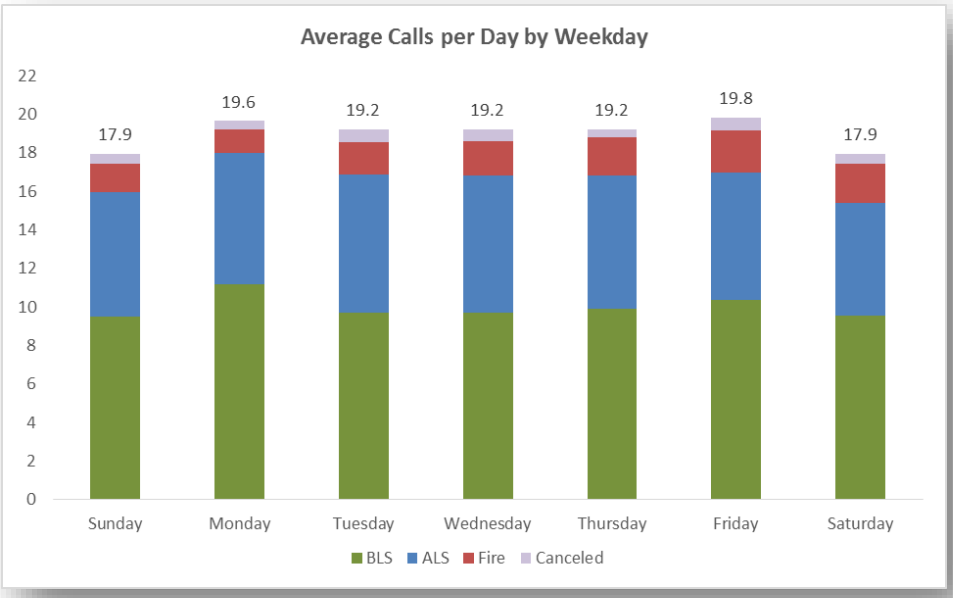
[19] U.S. Department of Labor: Wage and Hour Division. (March 2011). *Fact Sheet #8: Law Enforcement and Fire Protection Employees Under the Fair Labor Standards Act (FLSA). Author: Washington, DC.*
[20] Ibid.

Figure 11: Overall: Average Calls per Day by Month



Similar analyses were conducted for requests by day of week. The data revealed that there is variability in the demand for services by day of week. Weekend was the low for the week at 17.9 calls per day. Friday has the highest frequency of requests for services at 19.8 calls per day, followed by Monday.

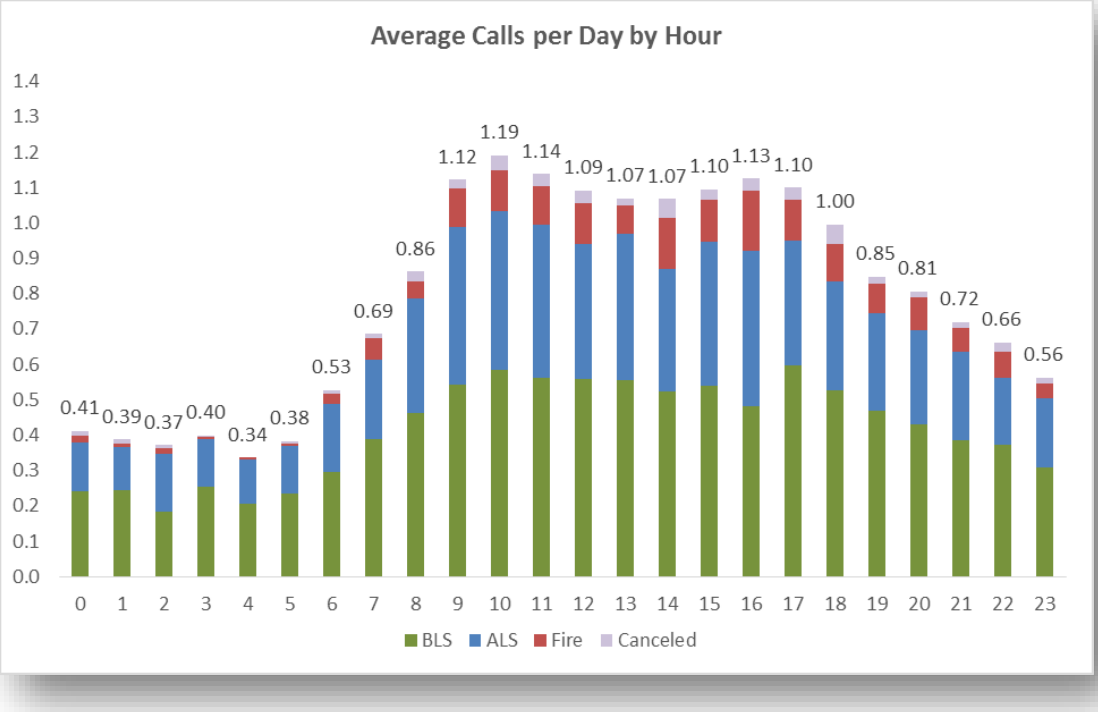
Figure 12: Overall: Average Calls per Day by Weekday



Overall demands were evaluated by the hour of the day. Considerable variability exists in the time of day that requests for emergency services are received. The middle of the day has the greatest frequency of calls with the hours that begin at 0900 and 1700 are above 390 calls in a year. The annual total number of calls in an hour is 289.

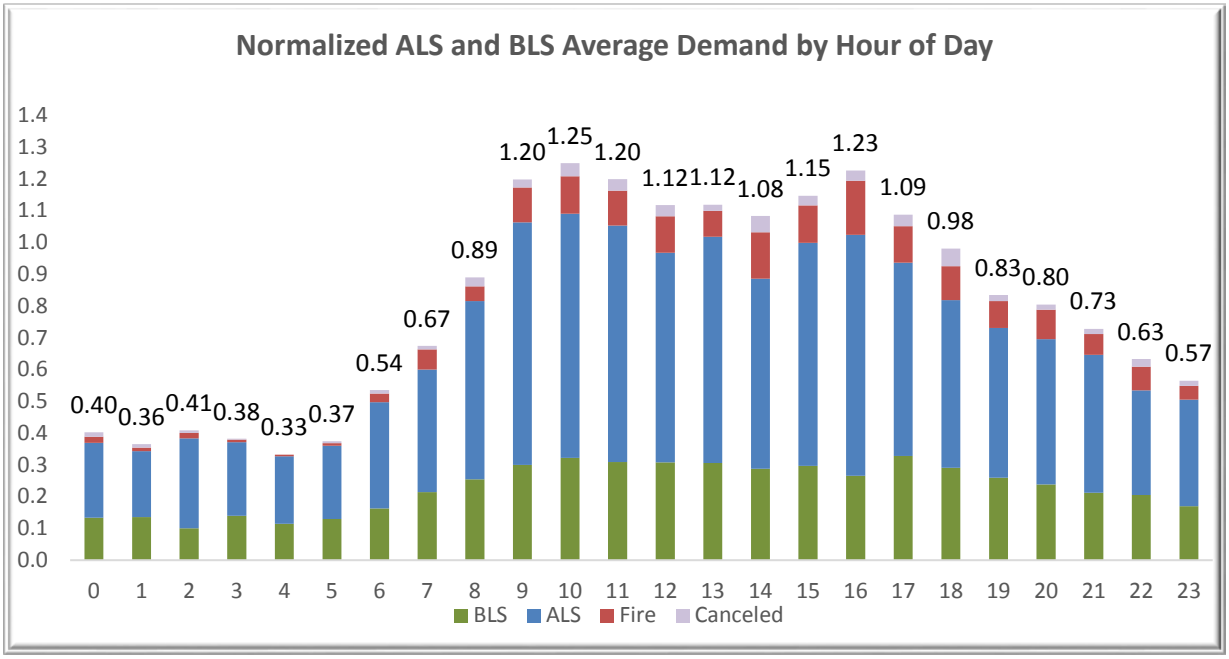
To provide a more granular understanding of the community's demand for emergency services, this temporal analysis included the average number of calls per hour. In other words, when referring to the figure below, the busiest hour is at 1000 with 450 calls during that hour in 2015. The average number of calls per hour is a daily average for those 450 calls if they were equally distributed. Therefore, the busiest hour per day would be at 1000 with an average hourly call volume at 1.19 calls per hour.

Figure 13: Overall: Average Calls per Day by Hour



However, since the average call duration for transport calls is greater than 100 minutes, and the average duration of BLS calls that the fire department typically only provides first response duties is approximately 30 minutes, the annualized demand curve is normalized to account for the proportion of workload by call type. Overall, the demand curve increases the demand for resources by 0.06 per hour at the peak. Therefore, either demand curve would require a similar allocation of resources, but both are provided for full transparency. Normalized data are provided in the figure below.

Figure 14: Normalized ALS and BLS Average Demand by Hour of Day



Distribution and Concentration

The distribution of the demand for service is certainly concentrated in and around the greater Sequim area. The following heat maps demonstrate the consistency of historical demand across risk centers within the District.

Heat maps were created to identify the concentration of the historic demand for services by program area. Therefore, the following mapping will present the relative concentration of service demands by fire, EMS, BLS and ALS, respectively. The Blue areas have the least demand and the dark red areas have the highest concentration of demand.

When reviewing the heat maps, it is clear that the relative density of service demands is generally located in Station 34s territory across all program areas.

Figure 15: Heat Map for Fire Related Incidents

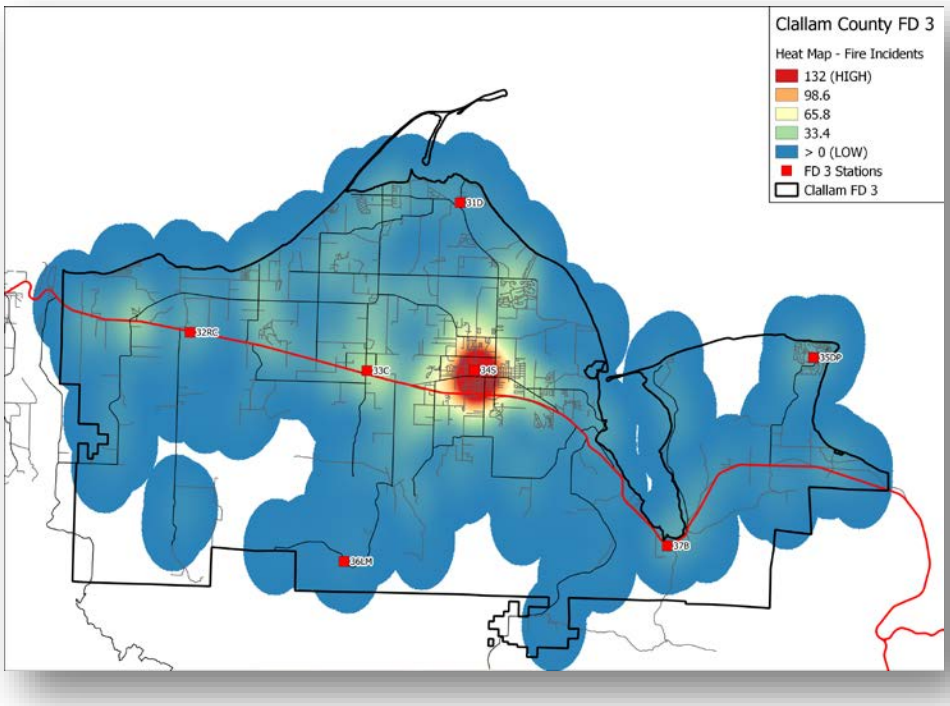


Figure 16: Heat Map for EMS Related Incidents

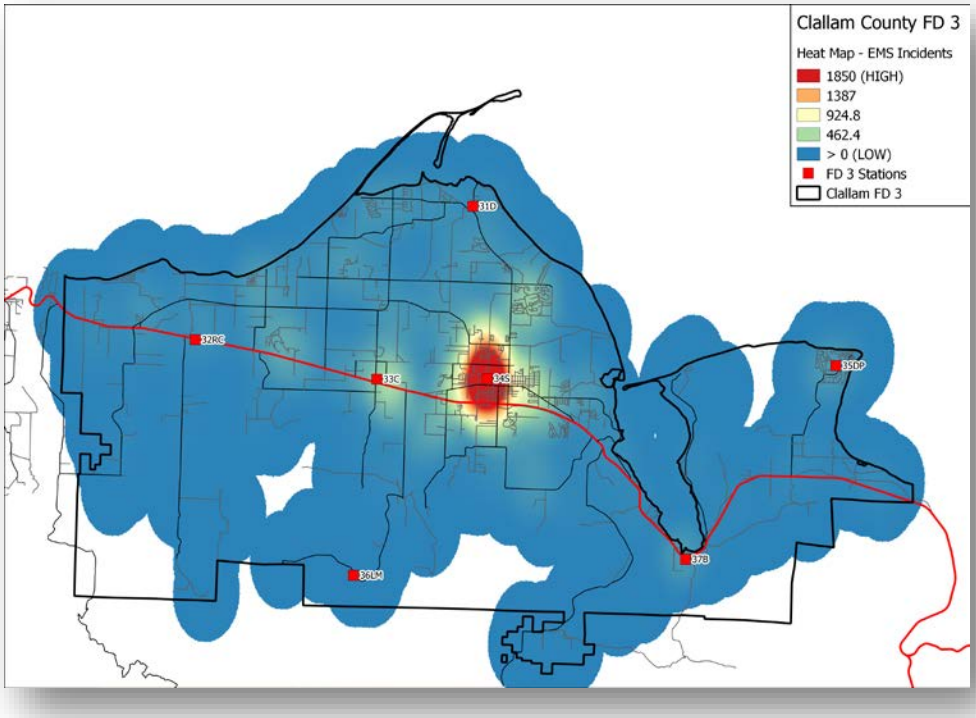


Figure 17: Heat Map for BLS Incidents

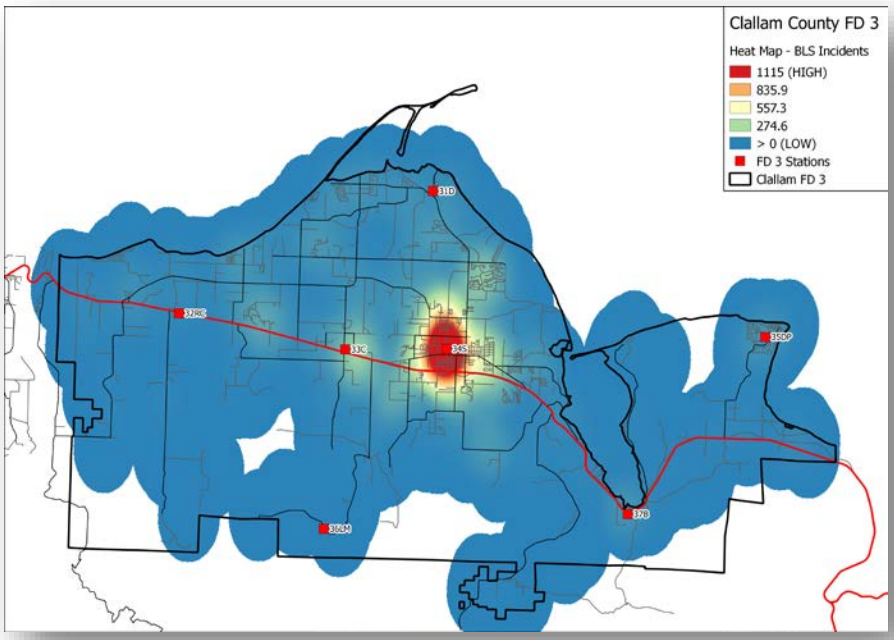
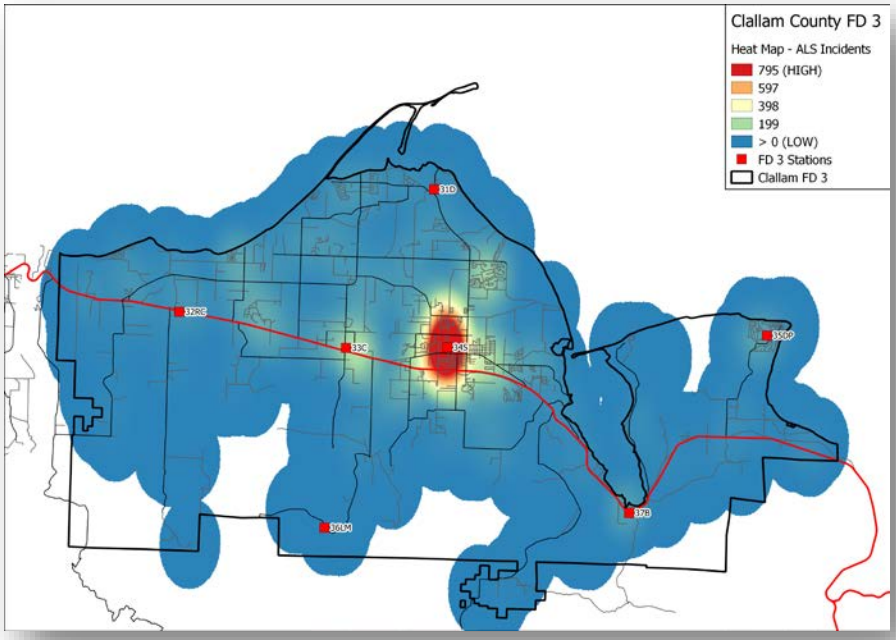


Figure 18: Heat Map for ALS Incidents

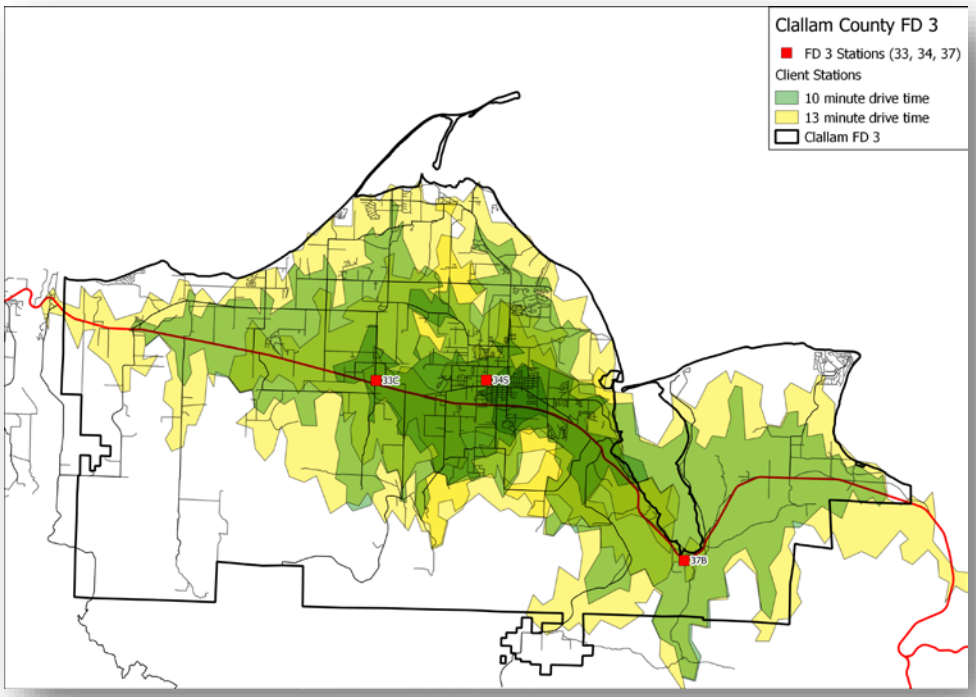


Finding #19:

The concentration and distribution of historical risk and demand is in and around Sequim regardless of the program area.

Finally, GIS analyses indicate that a 10-Minute urban and 13-minute rural coverage plan will provide coverage for 84% of the urban coverage and 96% of the rural coverage.

Figure 19: 10-Minute Urban/Suburban and 13-Minute Rural Travel Time Bleed with Career Stations



In Summary, the distribution of risk suggests that the vast majority of risk is concentrated within the greater Sequim area and that the demand for services will require two resources per hour and the geographic limitations will require a minimum of three fixed facilities.

Therefore, the combination of supply (resources) and Demand (requests for service) suggest that the District will require a minimum of five resources to cover the demand for services. In other words, three geographic units and two demand units would require a total of five units across the three fixed facilities. At the current demand for services and the distribution of demand over the 24 hour period would suggest that a peak demand unit from 0800 to 2000 would be sufficient to assist when the demand is at its highest and be economical with respect to purchasing off-demand unit hours.

Recommendation #16:
The District is encouraged to adopt a standard or response coverage that ensures both geographic and demand coverage. With the 10-minute travel time standard, it is recommended that the District implement a peak demand unit to cover the peak of the day and maintain current resources during the non-peak periods.

SERVICE DELIVERY AND PERFORMANCE

Analysis of Fire Station Locations and Development of Response Standards / Targets

The first step in completing GIS planning analyses is to establish the desired performance parameters. Measures of total response time can be significantly influenced by both internal and external influences. For example, the dispatch time, defined as the time from pick up at the 911 center to the dispatching of units, contributes to the customer's overall response time experience, but may be outside of the fire department's direct control. Another element in the total response time continuum is the turnout time, defined as the time from when the units are notified of the incident until they are actually responding. Turnout time can have a significant impact to the overall response time for the customer and is generally considered under management's control. However, the travel time, defined as the period from when the units are actually responding until arrival at the incident is a factor of the number of fire stations, the ability to travel unimpeded on the road network, the existing road network's ability to navigate the community, and the availability of the units. Largely, travel time is the most stable variable to utilize in system design regarding response time performance.

Therefore, these GIS planning analyses will focus on travel time capability as the unit of measure. The 2015 performance for travel time across programs is provided below. Overall, the travel time is 10.3 minutes or less for 90% of the incidents. However, the Fire related incidents had a travel time performance of 12.1 minutes or less for 90% of the incidents.

Table 4: 90th Percentile Turnout and Travel Time of First Arriving Units by Program

Call Category	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size
BLS	2.0	2.6	10.0	13.0	3,137
ALS	1.8	2.5	10.3	12.9	2,207
Fire	4.6	2.9	12.1	16.5	401
Total	**2.1**	**2.6**	**10.3**	**13.2**	**5,745**

Finding #20:
The current aggregate travel time performance is approximately 10.3 minutes.

Comparison to National References

There are two notable references for travel time available to the fire service in National Fire Protection Association (NFPA) 1710[21] and the Commission on Fire Accreditation International (CFAI)[22].

NFPA 1710 suggests a 4-minute travel time at the 90th percentile for first due arrival of Basic Life Support (BLS) and Fire incidents and the CFAI recommends a 5 minute and 12 seconds travel time for first due arrival in an urban population density and 13 minutes travel time in rural population densities. The arrival of an Advanced Life Support (ALS) unit is recommended at 8-minutes travel time by NFPA 1710. It is important to note that the latest edition (9th edition) of the CFAI guidelines have de-emphasized response time and only reference the legacy standards with a separately provided companion document[23].

The CFAI recommendations are more closely aligned with the department's historical performance as Fire related incidents are currently at 12.1 minutes at the 90th percentile are generally more randomly distributed across the jurisdiction. However, the department is not currently capable of meeting the more restrictive recommendation of 4 minutes travel time or less at the 90th percentile. GIS analyses were conducted to determine the requisite distribution model (fire stations) to overcome the geographic limitations within the District's jurisdiction.

When utilizing only current CCFD3 fire stations, and assuming that all stations are continuously staffed, the current configuration is capable of delivering a 6-minute travel time to 70% of the requests for service across all call types. When referring to the marginal utility analysis provided below, the ascending rank order is the station's capability to cover risk (incidents) in relation to the total historical call volume of the sample period (2015). The Station number is the current CCFD3 fire station identifier. The station capture is the number of calls the station would capture within a 6-minute travel time. The total capture is the cumulative number of calls captured with the addition of each fire station. The percent capture is the total cumulative percentage of risk covered by each station. The goal would be to achieve at least 90 percent capture.

Therefore, the station that contributed the most to the overall system's performance was Station 34S in the first column and would capture 50.57% of the risks within six minutes. Station 33C would cover an additional 10.08% of the risk bringing the cumulative total to 60.65% between Stations 34S and 33C. In total, with all seven CCFD3 fire stations, 70.27% of the incidents could be responded to

[21] National Fire Protection Association. (2010). NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments.* Boston, MA: National Fire Protection Association.

[22] CFAI. (2009). Fire & emergency service self-assessment manual, (8th ed.). Chantilly, Virginia: Author. (page 71)

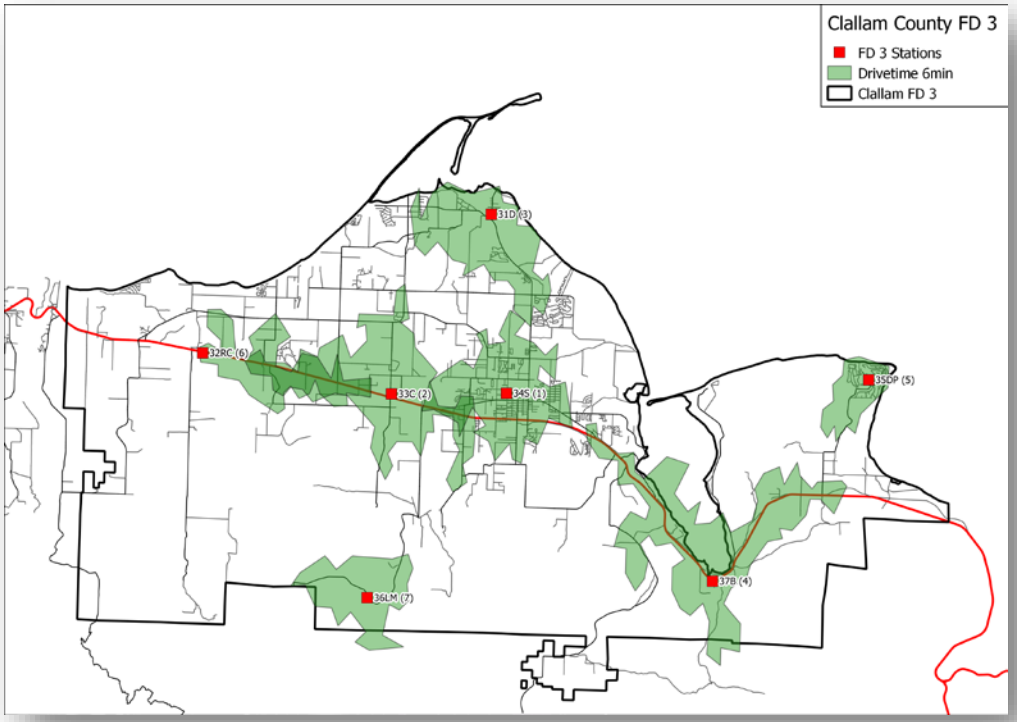
[23] CFAI. (2016). Fire & emergency service self-assessment manual, (9th ed.). Chantilly, Virginia: Author.

within six minutes travel time. Results are provided as Table 5 and in drive time mapping format as Figure 20 below.

Table 5: Marginal Fire Station Contribution with CCFD3 Fire Stations for 6-Minute Travel Time

Rank	Station Number	Station Capture	Total Capture	Percent Capture
1	34S	6735	6735	50.57%
2	33C	1342	8077	60.65%
3	31D	516	8593	64.52%
4	37B	344	8937	67.10%
5	35DP	207	9144	68.66%
6	32RC	190	9334	70.09%
7	36LM	24	9358	70.27%

Figure 20: 6-Minute Travel Time Bleed with CCFD3 Stations



Finally, because all stations included could not achieve the desired 90th percentile for a six-minute travel time, an optimized station deployment model was created to determine what the fire station distribution model would require. Results suggest that an optimally placed 10 to 11 fire station configuration (less than 1% difference in models) would achieve a six-minute travel time to 90% of the incidents. A graphic illustration of the optimized model is provided below.

Therefore, a more reasonable performance objective is needed to closely mirror current department performance and capabilities. The current overall performance is 10.3 minutes or 10 minutes and 18 seconds for 90% of the calls in 2015. However, the high density of calls in Station 34's territory considerably influences the department-wide performance. For example, Station 33 has a travel time of nearly 12 minutes and station 37 has a travel time of nearly 15 minutes at the 90th percentile. In contrast, Station 34 has a travel time performance of less than 9 minutes with the highest frequency of calls. The individual station response performance is provided below.

Figure 21: Optimized Station Deployment Plan with 6-Minute Travel Time Bleed

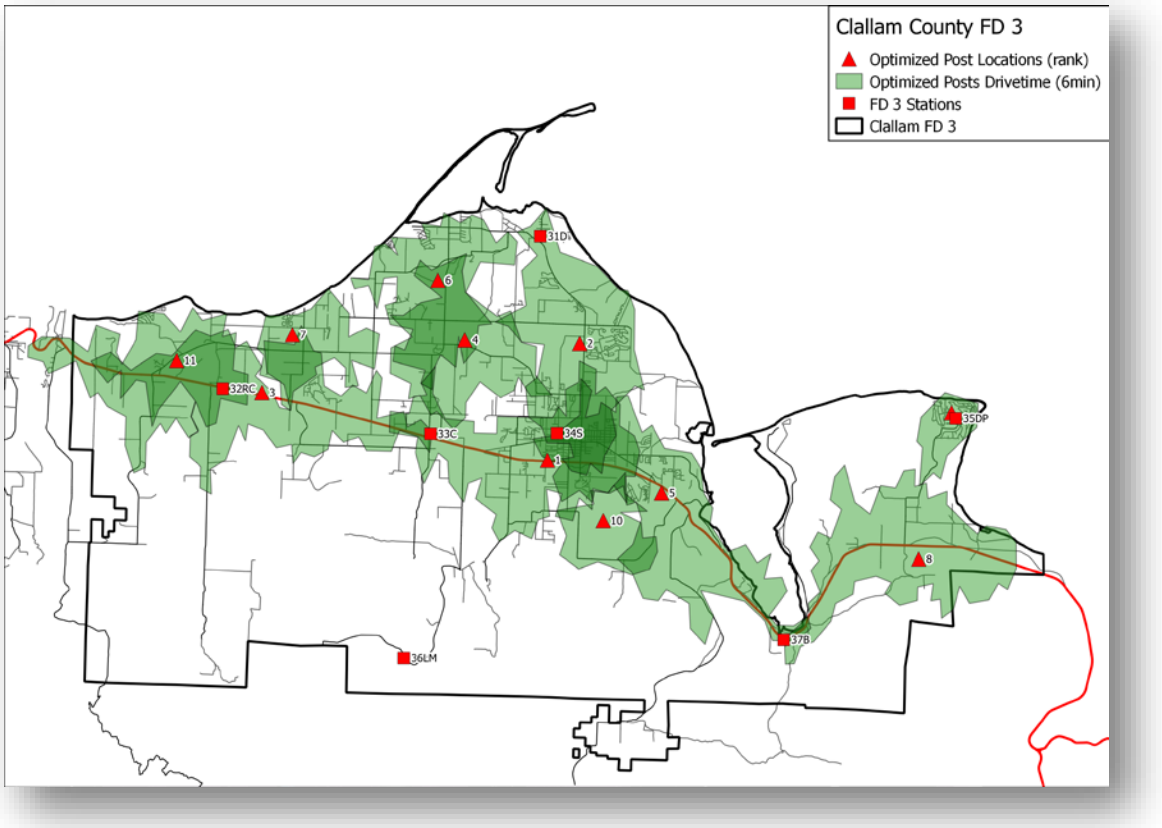


Table 6: 90th Percentile First Arrival Performance by Station FDZ

First Due Station	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size
33	2.2	2.5	11.7	14.7	1,284
34	2.1	2.6	8.6	11.3	4,086
37	2.3	3.0	14.9	17.8	375

Recommendation #17:

It is recommended that the District adopt a 10-minute travel time performance objective for 90% of all incidents.

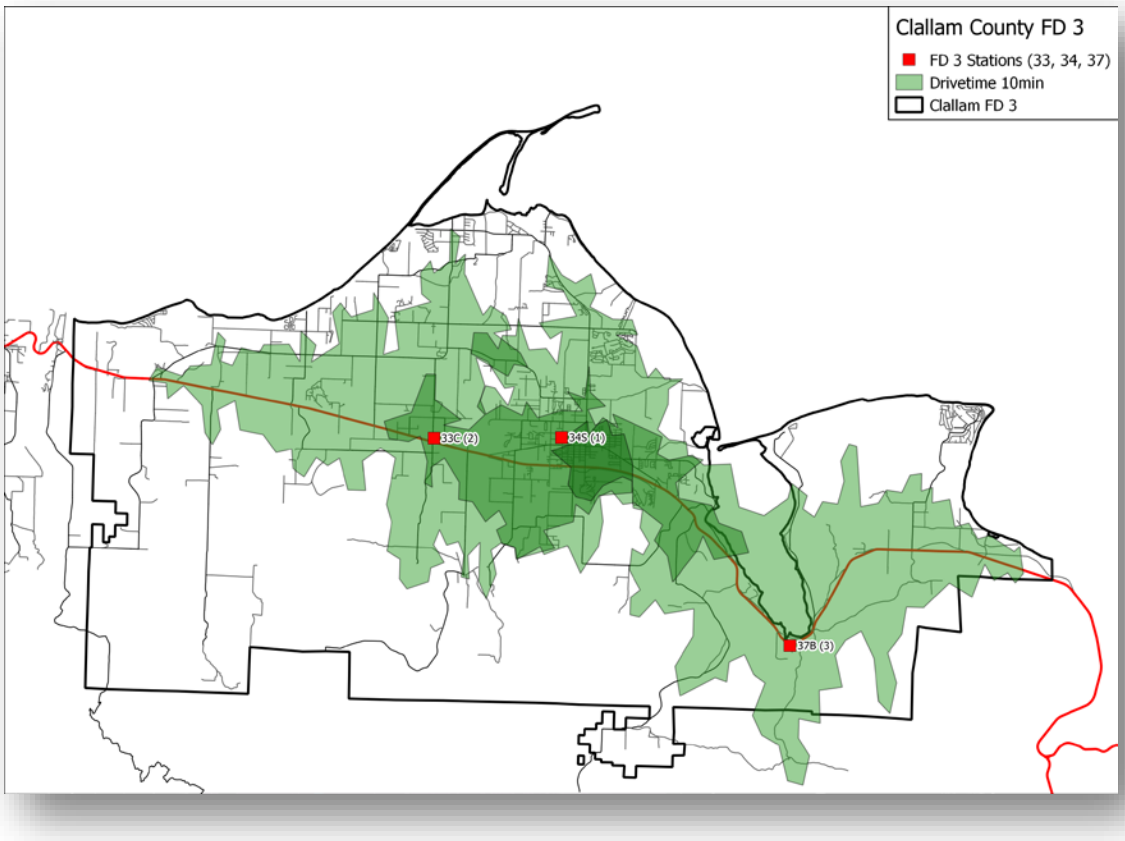
Configuration Models based on 10-Minute or less Travel Time

Results suggest that if the Department is desirous of maintaining current performance that it will require a minimum of a three-station configuration in order to most closely approximate a 10-minute travel time to 90% of the incidents. Station 34s was able to contribute 69.66% of the geographic coverage and the combination of Stations 34s and 33c can cover nearly 80% of the historical incidents. Actual historical performance outperforms this model by approximately 6%. This is not an uncommon finding in rural settings as the emergency response travel speed may exceed posted or average speeds. In addition, the relative improvement of the volunteer firefighting response may serve to improve historical performance that isn't reflected in the GIS planning restricted to the career stations. Regardless of the incremental differences, from a planning perspective, the models here are more conservative providing for more confidence in actual performance of the adopted models. Results are provided below.

Table 7: Marginal Fire Station Contribution with CCFD3 Career Stations for 10-Minute Travel Time

Rank	Station Number	Station Capture	Total Capture	Percent Capture
1	34S	9277	9277	69.66%
2	33C	1341	10618	79.73%
3	37B	586	11204	84.13%

Figure 22: 10-Minute Travel Time Bleed with CCFD3 Fire Stations

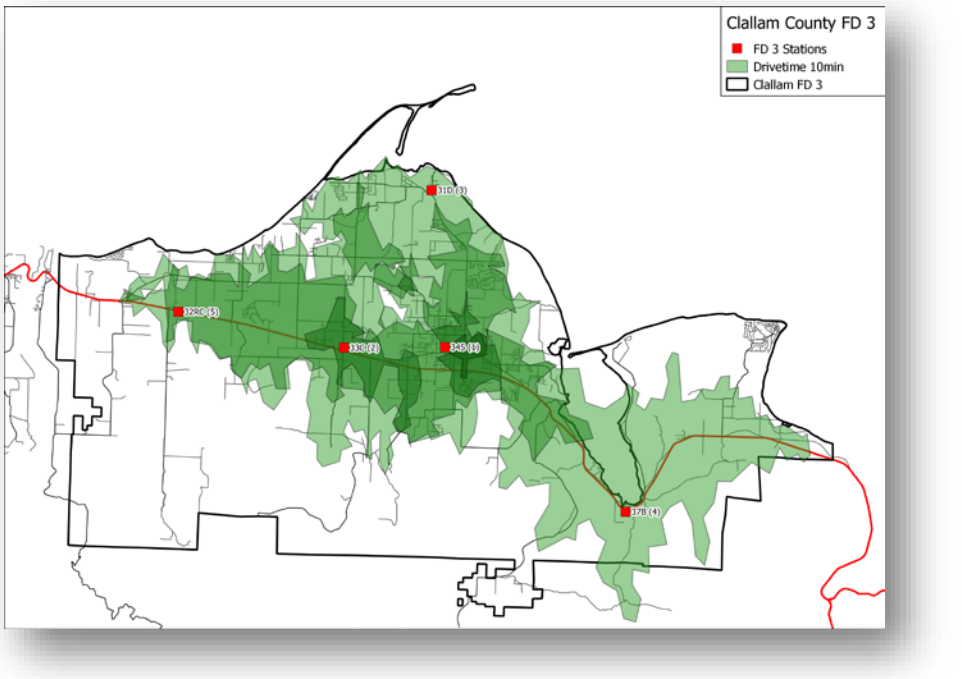


In an effort to demonstrate the impact of the volunteer capabilities on the overall system design, a 10-minute travel time was evaluated that included the volunteer facilities. This analysis demonstrated that the current configuration can perform in 10 minutes approximately 92% of the time, which is in high agreement with the actual performance of 10 minutes and 18 seconds 90% of the time. In fact, if the stations were continuously staffed, then the model would suggest that a five-station configuration could provide for a 10-minute travel time to all incidents 90% of the time.

Table 8: Marginal Fire Station Contribution with Career and Volunteer Fire Stations for 10-Minute Travel Time

Rank	Station Number	Station Capture	Total Capture	Percent Capture
1	34S	9277	9277	69.66%
2	33C	1341	10618	79.73%
3	31D	616	11234	84.35%
4	37B	586	11820	88.75%
5	32RC	241	12061	90.56%
6	35DP	205	12266	92.10%
7	36LM	45	12311	92.44%

Figure 23: 10-Minute Travel Time Bleed with Career and Volunteer Fire Stations



Potential Station Locations

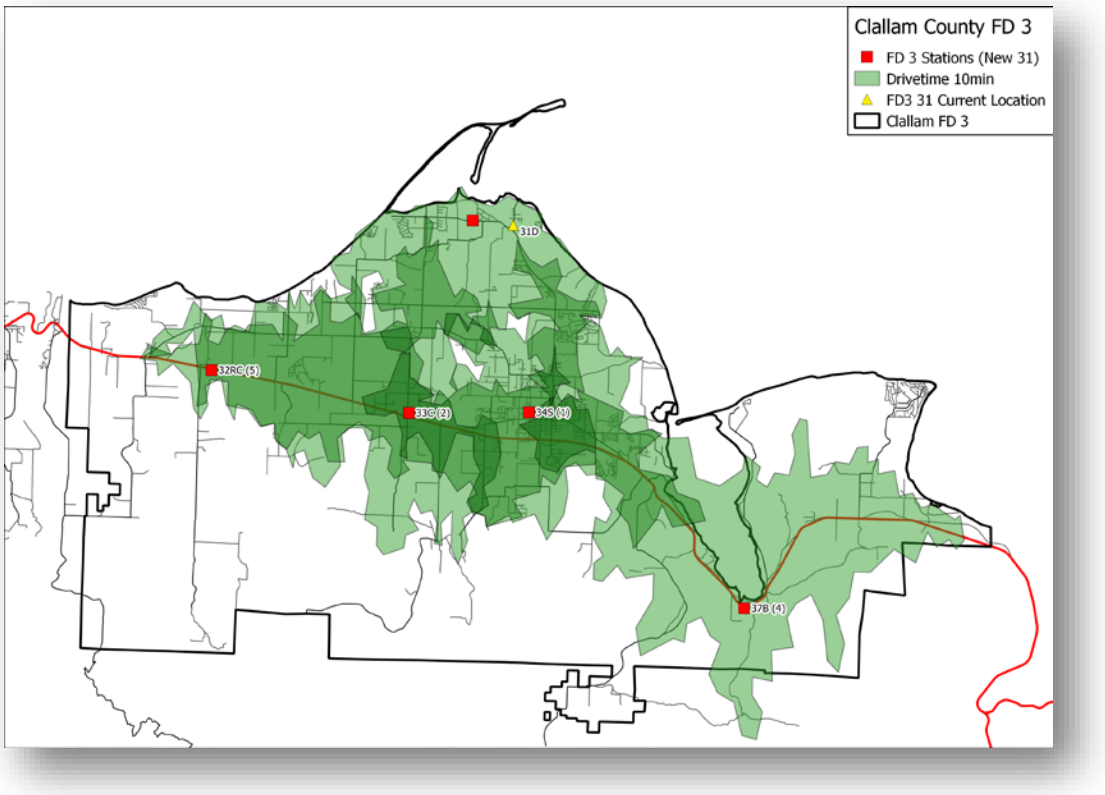
CCFD3 presented *FITCH* with two distinct station locations to evaluate the potential impact of adopting these changes. These changes are associated with new station locations for Stations 31 and 32. The desired locations of these potential station locations, or new facilities, were provided by the Department and were incorporated into the analyses as if the stations were implemented incrementally as well as together.

First, the impact of relocating Station 31 was evaluated. Results suggest that the configuration will perform very similarly to the current station locations if only Station 31 was relocated. Similar to the previous discussion, a five-station distribution model would achieve the 90th percentile with a 10-minute travel time.

Table 9: Marginal Fire Station Contribution for New Station 31 for 10-Minute Travel Time

Rank	Station Number	Station Capture	Total Capture	Percent Capture
1	34S	9277	9277	69.66%
2	33C	1341	10618	79.73%
3	31NEW	672	11290	84.77%
4	37B	586	11876	89.17%
5	32RC	241	12117	90.98%
6	35DP	205	12322	92.52%
7	36LM	45	12367	92.86%

Figure 24: 10-Minute Travel Time Bleed with New Station 31

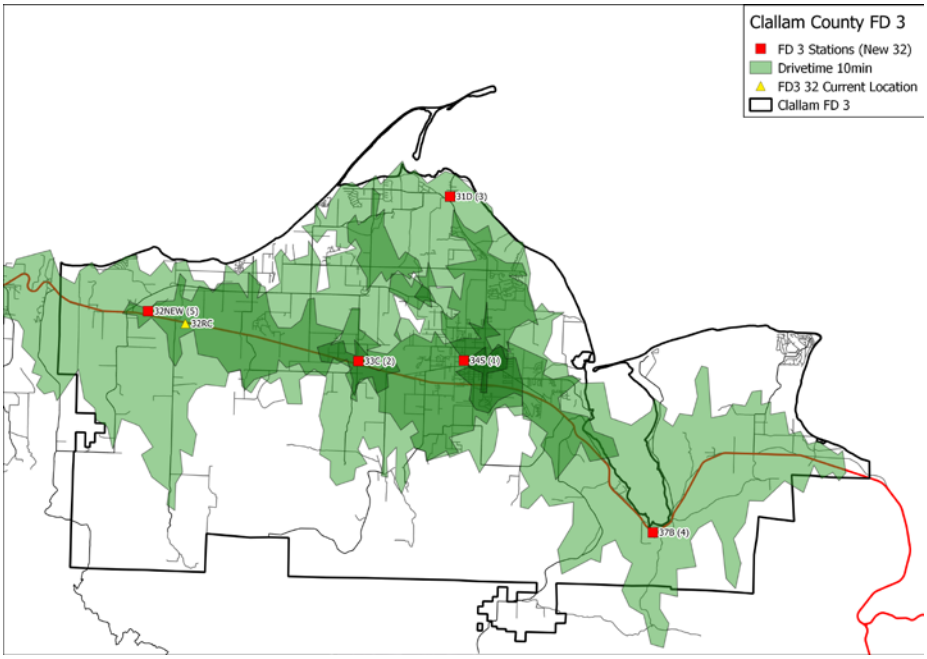


Second, the impact of relocating Station 32 was evaluated. Results suggest that the relocation of Station 32 would perform similarly as with the previous locations. However, the overall system would improve by approximately 2%. This configuration would afford a five-station distribution model that would achieve a 10-minute travel time 92.22% of the time.

Table 10: Marginal Fire Station Contribution for New Station 32 for 10-Minute Travel Time

Rank	Station Number	Station Capture	Total Capture	Percent Capture
1	34S	9277	9277	69.66%
2	33C	1341	10618	79.73%
3	31D	616	11234	84.35%
4	37B	586	11820	88.75%
5	32NEW	462	12282	92.22%
6	35DP	205	12487	93.76%
7	36LM	45	12532	94.10%

Figure 25: 10-Minute Travel Time Bleed with New Station 32

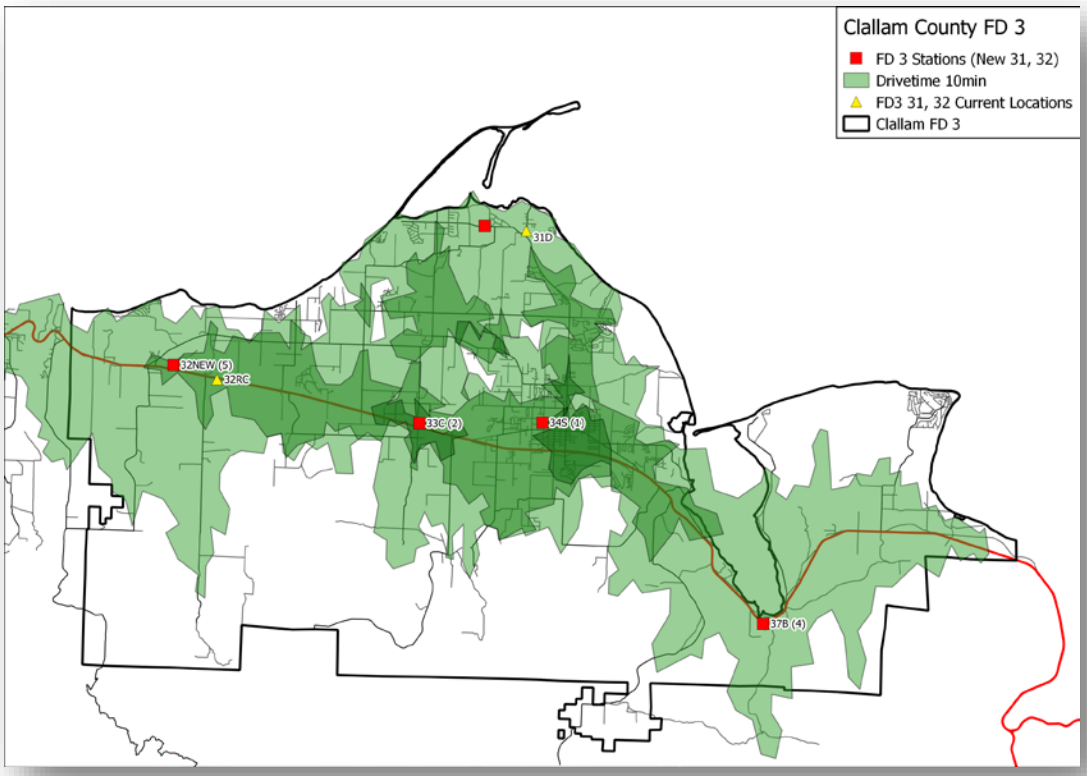


Finally, the relocation of both Stations 31 and 32 were analyzed. Results demonstrate that a five-station distribution model would be required to address the historical demand for services and the geographic limitations within the system. Similar to previous discussions, the five-station model provides 92.64% coverage at 10-minutes travel time. Overall, the data suggests that relocation of Station 32 contributes more to the model than Station 31. Results are presented in both tabular form and map output below.

Table 11: Marginal Fire Station Contribution for New Station 32 for 10-Minute Travel Time

Rank	Station Number	Station Capture	Total Capture	Percent Capture
1	34S	9277	9277	69.66%
2	33C	1341	10618	79.73%
3	31NEW	672	11290	84.77%
4	37B	586	11876	89.17%
5	32NEW	462	12338	92.64%
6	35DP	205	12543	94.18%
7	36LM	45	12588	94.52%

Figure 26: 10-Minute Travel Time Bleed with New Stations 31 and 32



Optimized Station Distribution Plan

An analysis was completed to develop an optimized station distribution model. This evaluation suggests, that an optimized three-station model can provide for greater than 90% effectiveness covering all incidents within 10-minutes or less travel time 91.85% of the time. Both the suggested station locations and the current stations are located on the map for reference. A four-station model would place an additional station near Farnsworth Place and improve all coverage to greater than 95%. Graphic illustrations are presented below.

Figure 27: Optimized Station Deployment Plan - 10-Minute Travel Time

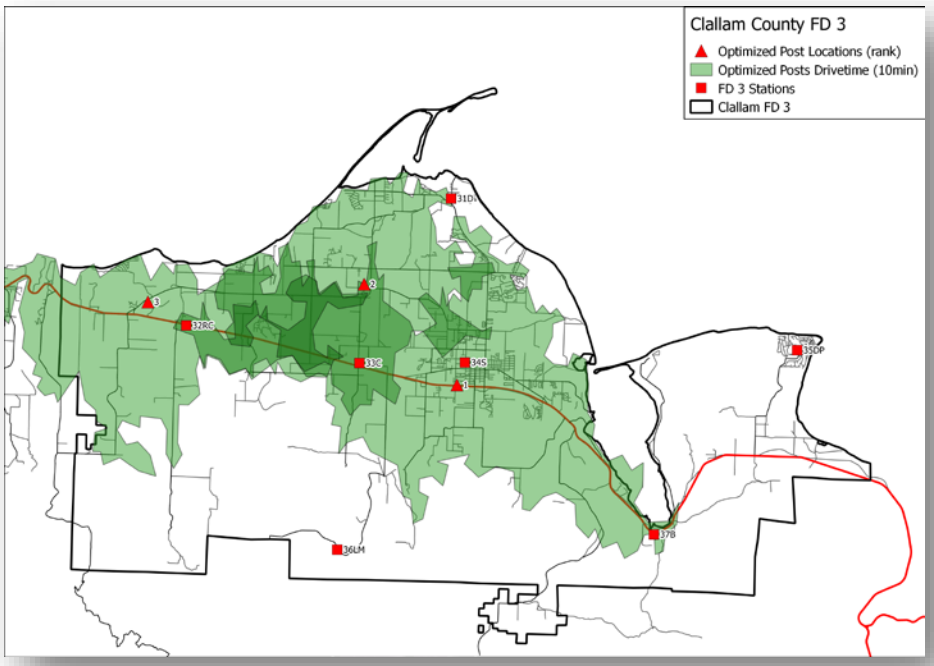
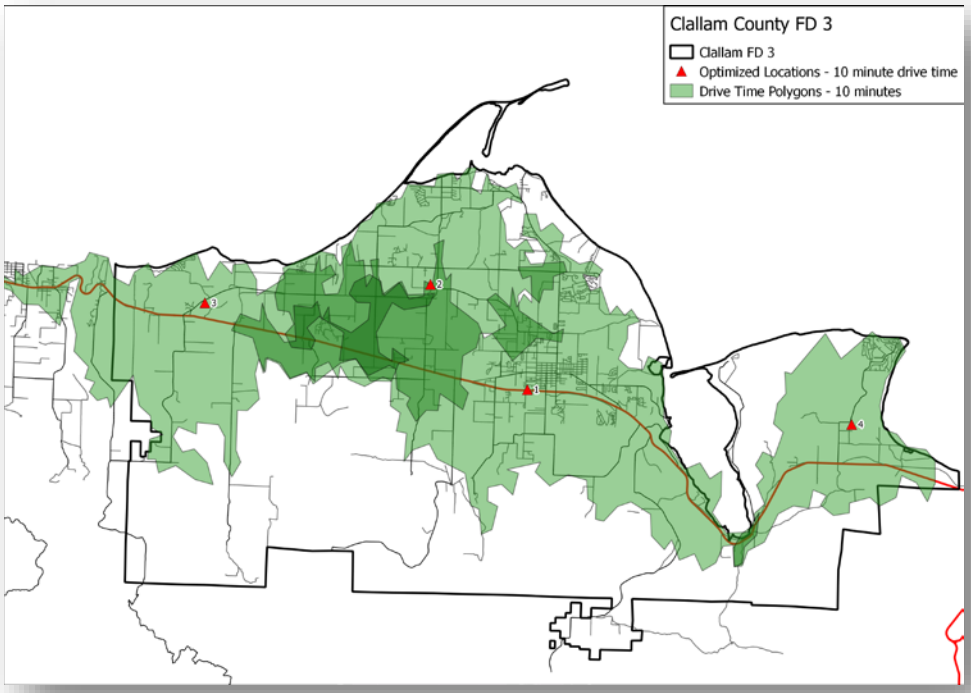


Figure 28: Optimized Station Locations - Four Station Model - 10 Minutes



Differentiated Service Models

While there are multiple deployment strategies that may be adopted, two clear policy positions emerge in communities with both urban/suburban and rural jurisdictions. First, is to provide a commensurate service level across the entire jurisdiction as has been presented previously. The advantages to this approach are that all citizens of the District receive at least a 10-minute travel time or better for the same per household revenue contribution. One disadvantage to this policy position is that it can be costly at times to provide urban level services to rural communities. A dichotomous position arises between the fairness of a per household contribution and the fiscal reality that geographic regions are not able to collectively fund full-time services in their areas. This reality contributes to the policy position of differentiated service levels based on either demand for services or population density, often a surrogate predictor of demand.

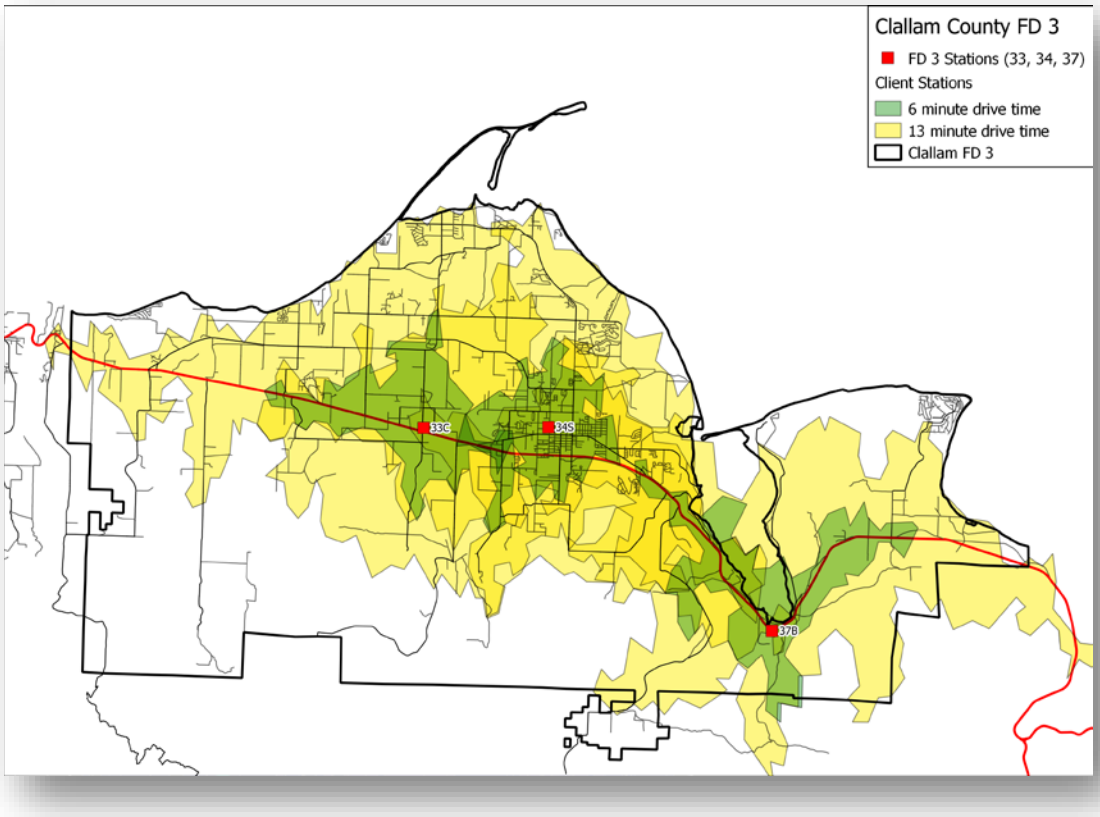
Therefore, the second strategy is to provide a differentiated service model between the urban/suburban high-density areas and the much less frequent and less populous rural areas. With many respects, the District is already employing this strategy as the rural stations are largely volunteer and supported by the career stations/staff and the urban/suburban high-density areas are largely covered by full time career staff. The District adopted a Standard of Cover policy with a 6-minute travel time for the urban/suburban areas and a 14-minute travel time for the rural areas. In 2009, the origin of the response time objectives was identified from the Commission on Fire Accreditation International (CFAI). Therefore, an evaluation with the current CFAI practices would require a 5:12 urban/suburban first due performance and a 13:00 rural travel time. However, in an effort to measure the department's capability to meet the internally adopted performance, analyses for a 6-minute urban/suburban and a 13-minute rural model is evaluated.

Consistent with the previous analysis that suggested it would require 10 or 11 stations to meet a 6-minute response time, this analysis demonstrates that the current three-station deployment model is able to capture approximately 63% of the urban call densities within 6-minutes travel time. However, utilizing the current station deployment strategy, nearly 96% of all incidents can be covered within a 13-minute travel time. In this analysis, the stations are first utilized in an attempt to meet the urban response time and then again with the much larger travel time in the rural zones. In other words, from the existing three stations, 96% of the incidents would be served within a 13-minute travel time and 63% would be served within 6 minutes.

Table 12: Marginal Fire Station Contribution for Career Stations with 6 Urban/Suburban and 13 Rural

Rank	Station Number	Station Capture	Total Capture	Percent Capture
1	34S	6735	6735	50.57%
2	33C	1342	8077	60.65%
3	37B	344	8421	63.23%
Urban/Suburban				
4	33C	3041	11462	86.06%
5	34S	1027	12489	93.78%
6	37B	245	12734	95.61%
Rural				

Figure 29: 6-Minute Urban/Suburban and 13-Minute Rural Travel Time Bleed with Career Stations



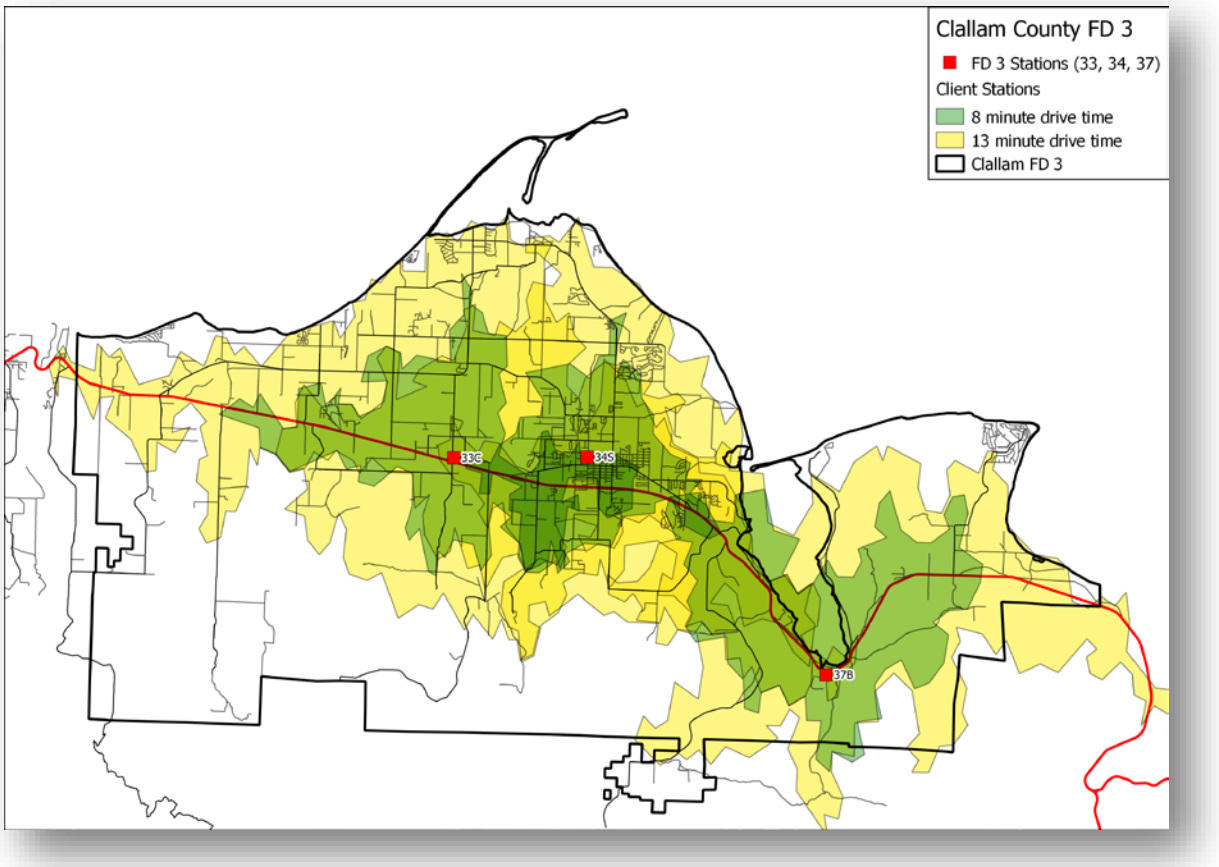
The previous analyses demonstrate that the department is challenged to meet the internally adopted performance measures for the urban/suburban areas, but are capable of meeting the rural objectives. As previously discussed, the overall travel time performance for the CCFD3 is 10.3 minutes at the 90th percentile. Therefore, two additional analyses are offered to scaffold from the 6-minute objective to a 10-minute objective that most closely mirrors actual historical performance.

First, is an 8-minute urban/suburban objective with a 13-minute rural travel time objective at the 90th percentile. Results find a 10% improvement in coverage for the urban/suburban corridor and maintain the rural performance from the previous model.

Table 13: Marginal Fire Station Contribution for Career Stations with 8 Urban/Suburban and 13-Rural

Rank	Station Number	Station Capture	Total Capture	Percent Capture
1	34S	7675	7675	57.63%
2	33C	1632	9307	69.88%
3	37B	476	9783	73.46%
Urban/Suburban				
4	33C	1855	11638	87.39%
5	34S	901	12539	94.15%
6	37B	196	12735	95.62%
Rural				

Figure 30: 8-Minute Urban/Suburban and 13-Minute Rural Travel Time Bleed with Career Stations

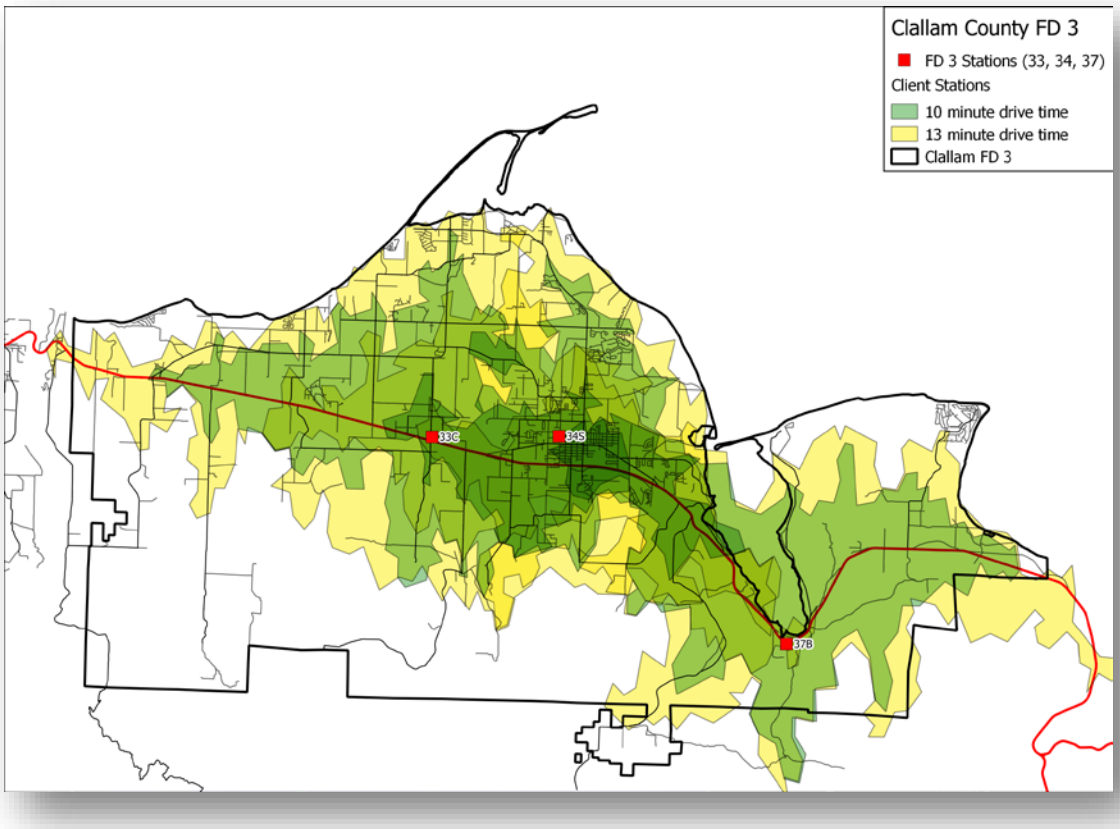


Finally, a 10-minute urban and 13 minute rural travel time deployment strategy was evaluated. This provides for 84% coverage for the urban/suburban call densities and continues to meet or exceed rural performance.

Table 14: Marginal Fire Station Contribution for Career Stations with 10 Urban/Suburban and 13-Rural

Rank	Station Number	Station Capture	Total Capture	Percent Capture
1	34S	9277	9277	69.66%
2	33C	1341	10618	79.73%
3	37B	586	11204	84.13%
Urban/Suburban				
4	33C	1123	12327	92.56%
5	34S	358	12685	95.25%
6	37B	50	12735	95.62%
Rural				

Figure 31: 10-Minute Urban/Suburban and 13-Minute Rural Travel Time Bleed with Career Stations



Recommendation #18:

The District is encouraged to adopt a 10-minute urban and 13-minute rural travel time standard at the 90th percentile for all emergency incidents.

Analysis of Historical Data by Station Response Area and Call Type

Overall, CCFD3's units made 8,013 unit responses, and the total busy hours were 5,842 hours. Ambulance M34 and M33 made the most responses.

Table 15: Overall Workload by Unit – 2015

Station	Description	Unit Report	Avg. Busy Minutes per Response	Annual Busy Hours	Annual Total Responses
33	Ambulance	M33	44.3	1,363.8	1,848
	Engine	E33	35.4	124.6	211
	Brush Engine	B33	34.5	4.6	8
	Tender	T33	64.6	4.3	4
	Station 33 Total		**43.4**	**1,497.3**	**2,071**
34	Ambulance	M34	44.5	2,580.4	3,482
	Ambulance	M34A	43.6	895.9	1,232
	Engine	E34	22.8	112.7	296
	Brush Engine	B34	33.2	1.7	3
	Rescue	R34	23.9	33.9	85
	Tender	T34	35.3	3.5	6
	Station 34 Total		**42.6**	**3,628.0**	**5,104**
37	Ambulance	M37	55.9	653.9	702
	Engine	E37	26.7	59.2	133
	Brush Engine	B37	75.5	3.8	3
	Station 37 Total		**51.3**	**716.8**	**838**
CCFD3 Total			**43.7**	**5,842.1**	**8,013**

Ninety-two (92%) percent of the BLS calls were responded to by a single CCFD3 unit. On average, 1.1 units were dispatched per BLS call. The department made a total of 3,974 responses to BLS calls. The total time on task was 2,351 hours, and the average time on task was 36 minutes. Ambulance M34 is the most utilized unit.

Table 16: Workload by Unit for BLS Calls

Station	Description	Unit Report	Avg. Busy Minutes per Response	Annual Busy Hours	Annual Total Responses
33	Ambulance	M33	37.0	514.6	835
	Engine	E33	30.7	11.8	23
	Station 33 Total		**36.8**	**526.3**	**858**
34	Ambulance	M34	34.2	1,167.0	2,047
	Ambulance	M34A	35.3	405.5	690
	Engine	E34	21.2	10.3	29
	Rescue	R34	21.5	9.3	26
	Station 34 Total		**34.2**	**1,592.0**	**2,792**
37	Ambulance	M37	44.2	223.2	303
	Engine	E37	26.5	9.3	21
	Station 37 Total		**43.0**	**232.4**	**324**
CCFD3 Total			**35.5**	**2,350.8**	**3,974**

Eighty-six (86%) percent of the ALS calls were responded to by a single CCFD3 unit. On average, 1.2 units were dispatched per ALS call. The department made a total of 2,831 responses to ALS calls. The total time on task was 3,032 hours, and the average time on task was 64 minutes. Ambulances M34 and M33 were the most utilized units.

Table 17: Workload by Unit for ALS Calls

Station	Description	Unit Report	Avg. Busy Minutes per Response	Annual Busy Hours	Annual Total Responses
33	Ambulance	M33	61.9	785.6	761
	Engine	E33	29.2	16.0	33
	Station 33 Total		**60.6**	**801.7**	**794**
34	Ambulance	M34	66.9	1,350.1	1,210
	Ambulance	M34A	64.0	463.8	435
	Engine	E34	22.5	10.5	28
	Rescue	R34	18.0	13.8	46
	Station 34 Total		**64.2**	**1,838.2**	**1,719**
37	Ambulance	M37	76.4	381.8	300
	Engine	E37	34.2	10.3	18
	Station 37 Total		**74.0**	**392.0**	**318**
CCFD3 Total			**64.3**	**3,031.9**	**2,831**

Comparison of Workloads and Historical Risk by Fire Station Demand Zone

Another method of assessing the effectiveness of the distribution model is to analyze the demand for services across the distribution model. Workload is assessed at the Fire station Demand Zone

(FDZ) level and at the individual unit level. For the purposes of this report, the station demand zone is synonymous with each station's first due response areas.

Analyses illustrate that of the three CCFD3 stations, Station 34 accounted for 66.2 percent of the total workload, station 33 accounted for 26.3 percent of the workload, and station 37 accounted for 7.5 percent of the workload. Results are presented below.

Figure 32: Unit Workload by Station Demand Zone

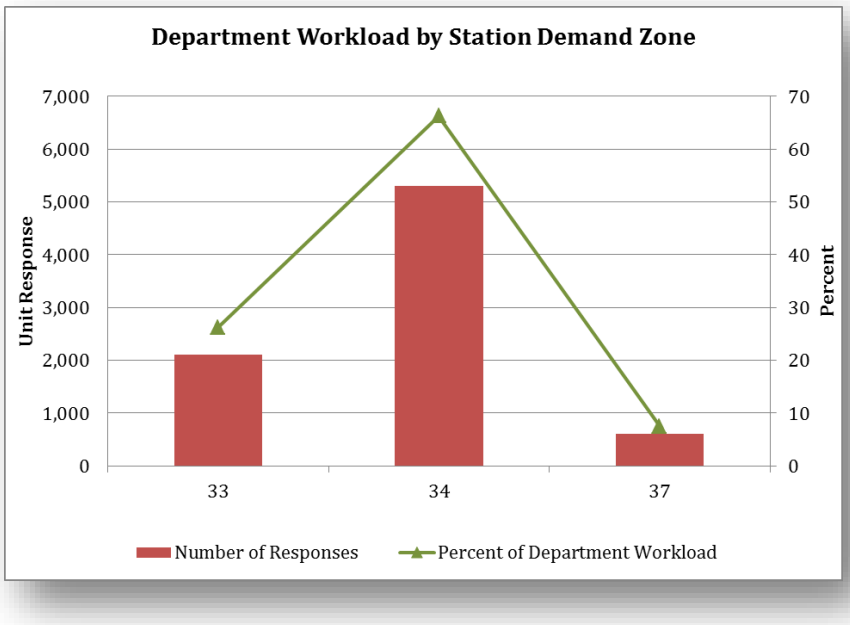


Table 18: Department Workload by Fire Station Demand Zone

First Due Station	Number of Calls	Calls per Day	Call Percentage	Number of Responses	Responses per Day	Percent of Department Workload
33	1,662	4.6	24.0	2,105	5.8	26.3
34	4,772	13.1	68.9	5,306	14.5	66.2
37	497	1.4	7.2	602	1.6	7.5
Total	**6,931**	**19.0**	**100**	**8,013**	**22.0**	**100**

Table 19: Number of Calls by Fire Station Demand Zone and Call Type

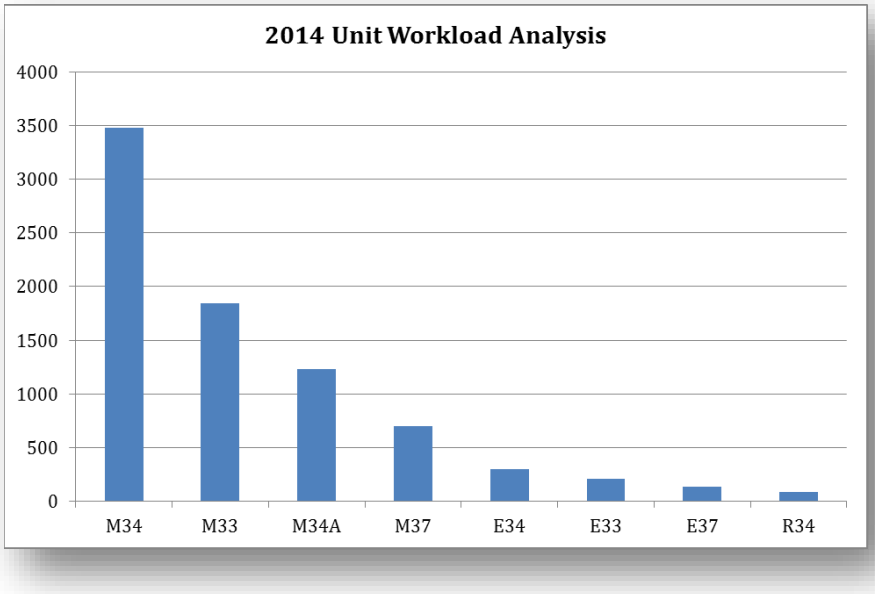
First Due Station	BLS	ALS	Fire	Canceled	Total
33	720	647	226	69	**1,662**
34	2,713	1,610	344	105	**4,772**
37	207	194	71	25	**497**
Total	**3,640**	**2,451**	**641**	**199**	**6,931**

Finally, unit workload analyses were completed for both comparative purposes as well as for introspection into potential system failures. First, this analysis utilized the summation of individual unit workload from dispatch to clear. Of all units, ambulance M34 was dispatched the most, a total of 3,482 runs in 2015, which accounted for almost 43% of the total unit responses and averaged 9.5 runs per day. The second most utilized apparatus was Ambulance M33. M33 made 1,848 runs and averaged 5.1 runs per day.

Table 20: 2015 Unit Workload Analyses by Unit and Call Category

Station	Description	Unit	BLS	ALS	Fire	Canceled	Total	Responses per day
33	Ambulance	M33	835	761	187	65	1,848	5.1
	Engine	E33	23	33	135	20	211	0.6
	Brush Engine	B33	0	0	8	0	8	0.0
	Tender	T33	0	0	4	0	4	0.0
34	Ambulance	M34	2,047	1,210	155	70	3,482	9.5
	Ambulance	M34A	690	435	87	20	1,232	3.4
	Engine	E34	29	28	207	32	296	0.8
	Brush Engine	B34	0	0	2	1	3	0.0
	Rescue	R34	26	46	9	4	85	0.2
	Tender	T34	0	0	6	0	6	0.0
37	Ambulance	M37	303	300	74	25	702	1.9
	Engine	E37	21	18	76	18	133	0.4
	Brush Engine	B37	0	0	3	0	3	0.0

Figure 33: 2015 Number of Dispatches by Unit



Note: Each tender or brush engines was utilized less than 10 times in 2015.

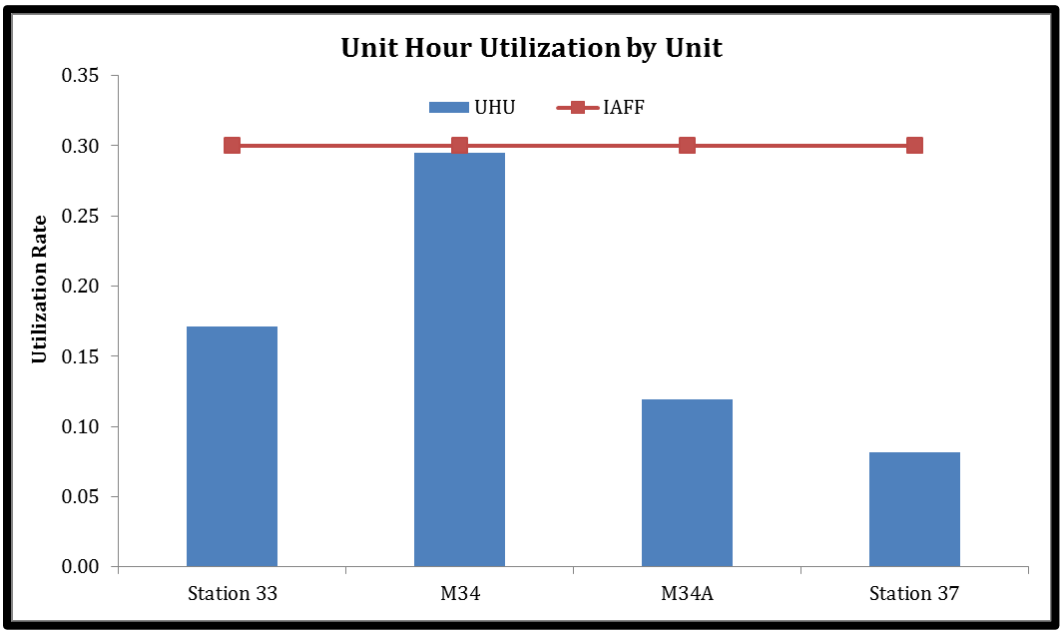
Another measure, time on task, is necessary to evaluate best practices in efficient system delivery and consider the impact workload has on personnel. Unit Hour Utilization (UHU) determinants were developed by mathematical model. This model includes both the proportion of calls handled in each major service area (Fire, EMS, Special-Ops, and Service) and total unit time on task for these service categories in 2015. The resulting UHU's represent the percentage of the work period (24 hours) that is utilized responding to requests for service. Historically, the International Association of Fire Fighters (IAFF) has recommended that 24-hour units utilize 0.30, or 30% workload as an upper threshold.[24] In other words this recommendation would have personnel spend no more than eight (8) hours per day on emergency incidents. These thresholds take into consideration the necessity to accomplish non-emergency activities such as training, health and wellness, public education, and fire inspections. The 4th edition of the IAFF EMS Guidebook no longer specifically identifies an upper threshold. However, *FITCH* recommends that an upper unit utilization threshold of approximately .30, or 30%, would be considered best practice. In other words, units and personnel should not exceed 30%, or eight (8) hours, of their workday responding to calls. These recommendations are also validated in the literature. For example, in their review of the City of Rolling Meadows, the Illinois Fire Chiefs Association utilized a UHU threshold of .30 as an indication to add additional resources.[25] Similarly, in a standards of cover study facilitated by the Center for Public Safety Excellence, the Castle Rock Fire and Rescue Department utilizes a UHU of .30 as the upper limit in their standards of cover due to the necessity to accomplish other non-emergency activities.[26]

These thresholds take into consideration the necessity to accomplish non-emergency activities such as training, health and wellness, public education, and fire inspections.

In Station 33, all units (ambulance, engine, tender and brush engine) are cross-staffed. In station 34, each shift staffs two units M34, and M34A. Engine, brush engine, rescue and tender units are cross-staffed with one of the ambulances. In station 37, all units (ambulance, engine and brush engine) are cross-staffed. The most utilized unit is M34 at approximately 29.5%, followed by cross-staffed units in station 33 at 17.1%. Redistribution of workload from station 34 to 37 or 33 should help improving the system performance.

[24] International Association of Firefighters. (1995). Emergency *Medical Services: A Guidebook for Fire-Based Systems.* Washington, DC: Author. (p. 11)
[25] Illinois Fire Chiefs Association. (2012). An *Assessment of Deployment and Station Location: Rolling Meadows Fire Department.* Rolling Meadows, Illinois: Author. (pp. 54-55)
[26] Castle Rock Fire and Rescue Department. (2011). Community *Risk Analysis and Standards of Cover.* Castle Rock, Colorado: Author. (p. 58)

Figure 34: Unit Hour Utilizations



Note: Workload of all units in Station 34 except M34 is grouped into M34A.

Reliability Factors

Percentage of First Due Compliance

The reliability of the distribution model is a factor of how often the response model is available and able to respond to the call within the assigned demand zone. If at least one unit from the first due station is able to respond to a call, we consider the station is able to respond to the call within the assigned demand zone. Utilizing the department's Fire Station Demand Zones (FDZ), analyses reveal that all three stations are capable of meeting their demand for services at the 90th percentile. In other words, when request for service is received, units in stations 33, 34 and 37 are available to answer the call 9 out of 10 times. It is considered both best practice and the most reliable measure to perform at the 90th percentile as indicated by the "blue" line in the Figure below. This analysis utilized all dispatched calls and the performance included all assigned units to the specific FDZ.

Figure 35: Percentage Reliability by Station FDZ

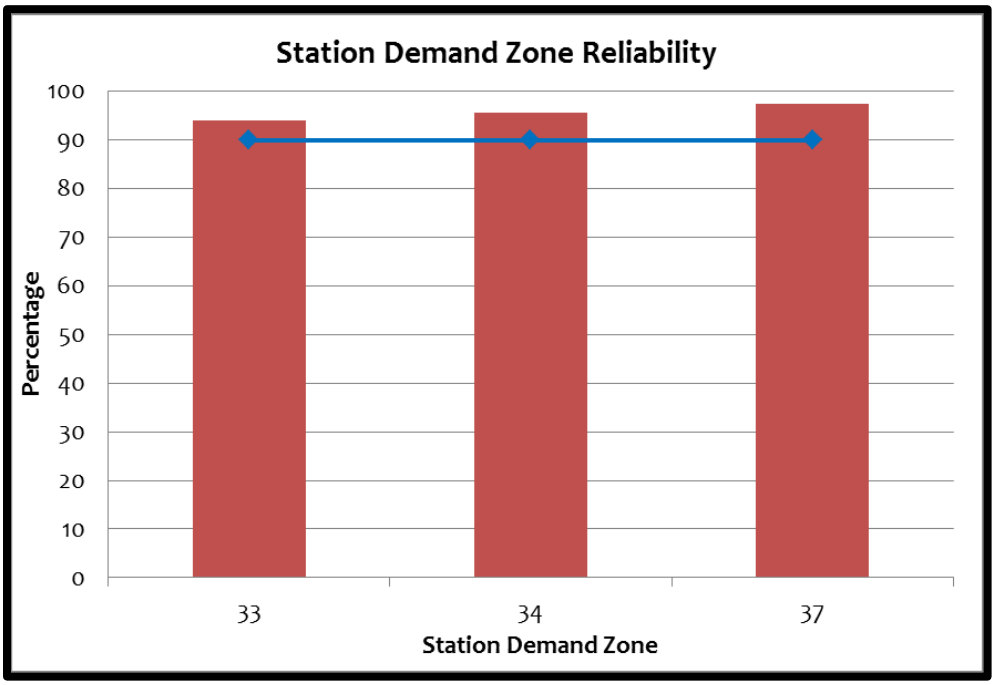


Table 21: Percentage Reliability by Station FDZ

Station Demand Zone	Reliability Percentage	Number of Calls
33	94.0	1,662
34	95.6	4,772
37	97.4	497

Overlapped or Simultaneous Call Analysis

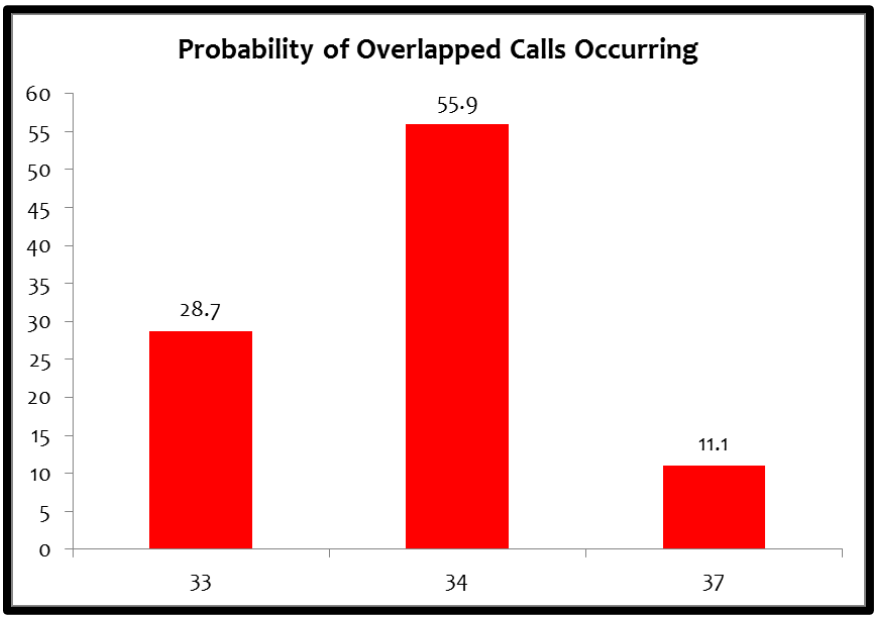
Overlapped calls are defined as the rate at which another call was received for the same first due station while there were one or more ongoing calls in the same first due station. For example, if there is one call in station 33's zone, before the call was cleared another request in station 33's zone occurred and those two calls would be captured as overlapped calls. Some studies also refer as simultaneous calls. Understanding the probability of overlapped or simultaneous calls occurring will help to determine the number of units to staff for each station. In general, the larger the call volume a first due station has, it is more likely to have overlapped or simultaneous calls. The distribution of the demand throughout the day will impact the chance of having overlapped or simultaneous calls. The duration of a call will also have major influences, since the longer time it takes to clear a request, the more likely to have an overlapped request.

Station 33 has concurrency percent at 29%, station 34 has the concurrency at 56%, and station 37 has the concurrency at 11%. Results are presented below.

Table 22: Overlapped Call by First Due Station

First Due Station	Overlapped Calls	Total Calls	Probability of Overlapped Calls Occurring
33	477	1,662	28.7
34	2,669	4,772	55.9
37	55	497	11.1

Figure 36: Probability of Overlapped Calls Occurring by First Due Station



Recommendation #22:

The District enjoys a high degree of reliability in the system and workload, in and of itself, is not a limiting factor to system performance.

EMERGENCY MEDICAL SERVICES SUPPORT AND SYSTEM OVERSIGHT

CCFD3 began delivering ALS EMS services in 1982 and today operates 4 continually staffed ALS aid cars (ambulances). In addition, all three career cross-staffed engines are ALS equipped. As a result of its lengthy EMS history, the agency has a strong EMS culture where nearly all personnel are committed to the EMS mission. All EMS providers in the County function under a single Medical Director and a common set of protocols. This serves to provide consistency in care across jurisdictional boundaries allowing the EMS system to function as a singular service. EMS operations for the District are overseen by an Administrative Captain serving as the Medical Services Officer (MSO) who reports directly to the Assistant Chief of Operations. The MSO currently works four 10-hour days and oversees EMS logistics and supplies, equipment, complaints, community outreach, billing and quality assurance. These areas seem to be adequately administered and are successfully maintaining operational continuity. Presently, 24 of the agency's 34 personnel are paramedics including five lieutenants and three captains.

In 2015, EMS incidents accounted for 88 percent of the agency's total demand. On a daily basis, BLS calls accounted for 52 percent of the daily workload and ALS calls accounted for 35 percent. CCFD3 operates in the ALS first responder role with a private provider, Olympic Ambulance, providing the transport services. However, Olympic ambulance deploys with BLS units and thus when ALS transport is required, the CCFD3 paramedic accompanies the Olympic unit to the hospital. CCFD3 only transports in the absence of an available Olympic unit.

We analyzed outcomes for the EMS requests. The number of EMS transports occurring in CCFD3's jurisdiction totaled 3,134, averaging 8.6 transports per day. Overall, 52% of the EMS calls to which CCFD3 has responded to involve patients being transported to the hospital. ALS transport percentage was 68% whereas the BLS transport percentage was 40%. On average, the duration of an EMS transport call by the fire department or a fire department paramedic riding in was 103 minutes, which is 3.1 times of a BLS transport medic evaluation only call (33 minutes) and 3.6 times all "other" EMS calls (28 minutes). Further analysis of EMS system performance is provided in the DATA report.

Through a series of structured interviews and agency document reviews, the *FITCH* team examined the administrative processes of the Agency's EMS program. At virtually every level of the organization there was agreement about the top three issues in the EMS program:

1. EMS leadership and oversight; specifically Quality Assurance (QA) and Quality Improvement (QI) efforts.
2. Appropriately aligning resources with call classification; specifically providing BLS service for BLS incidents and ALS response for ALS incidents.
3. Distribution of the EMS workload

Oversight for Paramedics starts with the company officers that report through the MSO for EMS issues. It's noteworthy, that a number of the lead clinicians are also the company officer. It's also compelling that members in every operational rank within the organization felt as though there was a lack of supervision and oversight for the paramedics; a number of paramedics shared this same sentiment. Both the current and previous MSO's expressed challenges associated with keeping clinical personnel accountable to agency and system expectations. The MSO's rank of Captain may be contributing to this challenge. As a supervisor of peers, rank authority would need to be communicated up to the Assistant Chief and back down through the chain of command to the company clinician. This manner of supervision can leave the MSO challenged from a position of authority while complicating the ability to follow through with identified issues.

Finding #22:

The MSO's ability to enforce clinical compliance and accountability is challenging, and structurally and functionally limiting, within the current rank structure.

The MSO's ability to manage agency expectations and maintain employee compliance and accountability can be enhanced with an adjustment of rank structure that clearly gives the MSO authority over all practicing clinicians in addition to the ability to manage most decisions autonomously.

Recommendation #19:

The agency should consider options for establishing a rank structure for EMS oversight that empowers the position with the necessary level of authority to fully enforce compliance and accountability.

Another responsibility of the MSO is oversight of the QA/QI process. Currently, this is delegated to a senior medic who performs QA on shift as well as on overtime for up to 16 hours a month. The QA program does not necessarily have a goal driven strategic approach. At present, the process is designed to review the ePCRs of three select paramedics for the period of a month. Under this plan, it may take up to six months before a clinician receives any QA reviews. This represents a substantial gap in oversight that could cause serious delays in identifying performance problems. Additionally, there does not appear to be redundancy in the QA process where if the senior QA medic is off, no QA occurs. The Agency stated that it can at times take three to four months to QA a report. Allowing such a significant gap to form between the execution of care and the QA review renders the process virtually useless. Immediate notifications do occur in the program for sentinel events, which are reported straight to the medical director, however the agency is unable to review these items prior to the medical director notification.

Finding #23:

The Agency presently engages in QA efforts with the dedicated commitment of a senior paramedic who operates without a defined set of guidelines and goals.

Finding #24:

The current process of administering the QA program lends itself to inconsistent paramedic evaluation and significant time gaps in clinical evaluation.

The Agency should work to develop a Medical Quality Management (MQM) plan. The MQM will serve as the primary guideline for how the agency will perform QA/QI in addition to prescribing how clinical accountability will be maintained. The plan should contain goals and measures designed to monitor the program's effectiveness. Clearly annotated expectations for minimum documentation requirements and protocol compliance will also serve as a reference tool for clinicians and provide consistency to the QA process.

Recommendation #20:

The Agency should develop a Medical Quality Management plan that clearly articulates the purpose, expectations, and goals of the QA/QI program and therefore serve as the established guidelines for its administration.

Once the agency has defined the goals and objectives of its QA/QI program, adjustments should be made to the QA process. Clinical records should be QA'd with 72 hours of completion. Furthermore, the volume of patient care records within the organization is such that all EPCR's can feasibly receive a QA review. This would greatly assist efforts to enhance clinical accountability as each paramedic is reviewed on a constant basis. The Agency can work toward this goal by first leveraging available technology to reduce the human resource time requirement. In the Zoll system currently used by the Agency, closed-call rules can be developed that would require documentation compliance before allowing the clinician to close their report. Other software solutions presently available provide automation for checking protocol compliance and are also able to provide analytics by clinician to help identify persistent habits in need of focused adjustment. These examples serve to illustrate that applying software solutions to the QA process would drastically reduce the number of records requiring human review and therefore enable the MSO to address the remaining queue, again enhancing accountability.

Recommendation #21:

The Agency should establish a goal to accomplish QA within 72hrs of the clinical care.

Recommendation #22:

The Agency should establish a goal to QA 100 percent of it ePCRs. This goal should be enabled by leveraging available technology to automate a large portion of the compliance evaluations.

Recommendation #23:

The QA program should be directly administered by the MSO or delegated to another position of commensurate authority within the organization.

It's understood that the software solutions presented herein will likely take considerable time to implement. Therefore as a stopgap measure, it is recommended that the QA process be filtered by acuity rather than clinician. This will enable the agency to monitor clinical performance in the areas of greatest liability and consistently review each clinician on a regular basis.

Recommendation #24:
Under the current process, it is recommended that the QA queue be filtered by acuity rather than clinician.

The establishment of a MQM plan and implementation of the software solutions mentioned above would enable the Agency to provide a focused QI program that is grounded in an analysis of current performance. The QI program should be designed so that it provides the necessary training and education to promote improvement in addition to monitoring for change. This would manifest itself through the development of an EMS training plan that is administered in parallel with the EMS CEU program. In the spirit of a system approach, the Agency should give consideration to including its partners in the QI training program, specifically Olympic Ambulance personnel. Once the QA process is restructured as described above, consideration should be given to managing the QI program with the same resources presently utilized for QA.

Recommendation #25:
The Agency should establish a QI program that works in tandem with the QA process as defined in through a MQM plan.

A remarkable level of commonality exists within the District from commissioners and administration down to the rank and file members related to the proper resourcing of incidents by acuity. Presently, the District does not utilize medical priority dispatch (MPD) to delineate between its BLS and ALS service requests. However, the communications center currently possess this ability utilizing the King County MPD protocols and thereby could accommodate this deployment shift. Answering the BLS demand separately from the ALS demand has the potential to address a number of challenges facing the District such as; workload, paramedic burnout, and capacity for training. To what extent a tiered service delivery can relieve these challenges will depend largely on how the District chooses to handle the BLS call load. For example, if it was delegated to another system provider, then each of the three challenges just identified will experience significant relief. For this reason, the District should consider all of its alternatives for addressing BLS service request with non-ALS resources.

Recommendation #26:
The Agency should work to fully implement the use of MPD to properly align its resource response with incident acuity.

The Agency has demonstrated that it is highly in tune with the workload challenges facing its personnel. For example, the 2015 data analysis provided by *FITCH* demonstrated a significant workload imbalance with Station 34 units. In the heart of the City, it is expected that Station 34 units

would boast the District's highest workload numbers and it did. However, there was a substantial disparity between the workloads of M34 and M34A. The primary driver was that M34 was used as a first-out unit and M34A served a backup roll. The District staff recognizes the workload problem and reconfigured the deployment strategy for Station 34's units. As a result, they not only balanced the workload, but now all district units are operating below the maximum workload threshold. Additional opportunities exist to manage down workload by considering the reassignment of BLS responses to a third party provider and considering the deployment of a Peak Load Unit (PLU), both of which are already discussed herein. A direct and immediately implementable solution to reducing workload lies with reducing the call duration for ALS and some BLS incidents. For example, the average call duration for an ALS transport is 108 minutes. It is not uncommon for EMS systems to rapidly deploy their resources only to see the time savings disappear at the receiving facilities. The time an EMS unit waits to transfer a patient to the receiving facility is referred to as "wall-time." Absent of monitoring wall-time, both the receiving facility and the EMS provider can inadvertently loose significant time in the transfer of patient care. Thus, the agency should establish a method to monitor wall-time and ensure their EMS units ability to expeditiously transfer patient care subsequently reducing their call duration.

Finding #25:

The Agency has intuitively monitored workload and effectively developed innovative strategies to balance workload throughout the organization.

Recommendation #27:

The District should consider the feasibility of placing a PLU in-service as an additional method to manage workload and create capacity for non-emergency functions.

Recommendation #28:

The District should develop a method to monitor call duration for transports with a focus on reducing the time spent at the receiving facilities.

FUTURE SYSTEM DEMAND PROJECTIONS

Changes in Community Demands from 2014 to 2015

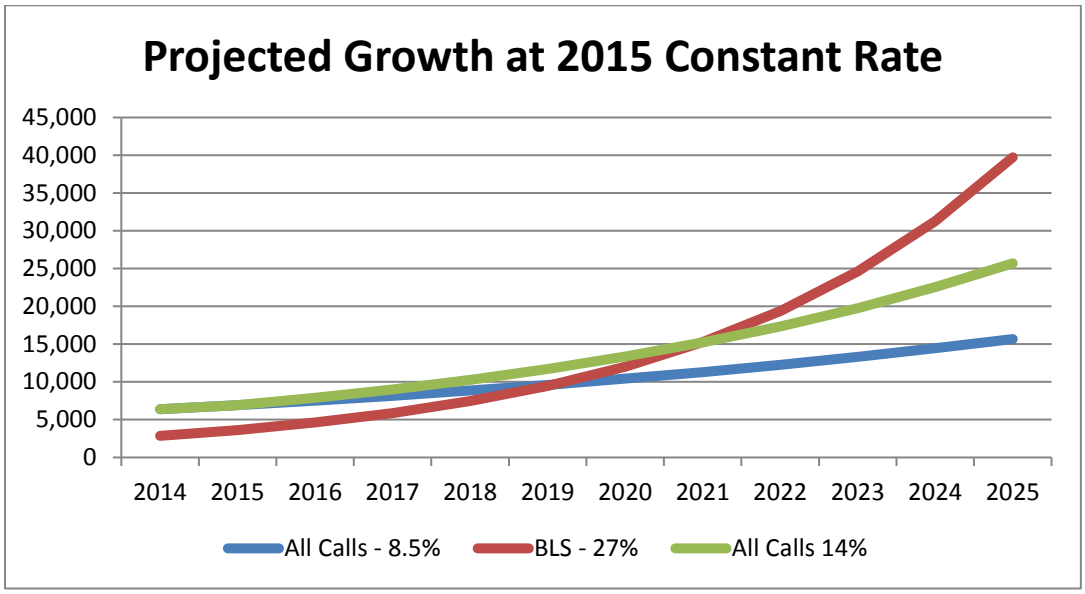
Changes in the District's demand for services by general call category reveals that the demand for services is increasing at approximately 8.5% per year over this rating period. However, further investigation demonstrates that the greatest increase in demand for services is specifically for BLS services at 27%. The demand for Advanced Life Support services decreased by approximately 13%.

With respect to fire related incidents, the total number of fire related incidents increased by nearly 7.5% between 2014 and 2015.

Table 23: Number of Calls, Number of Responses, and Total Busy Time by Year

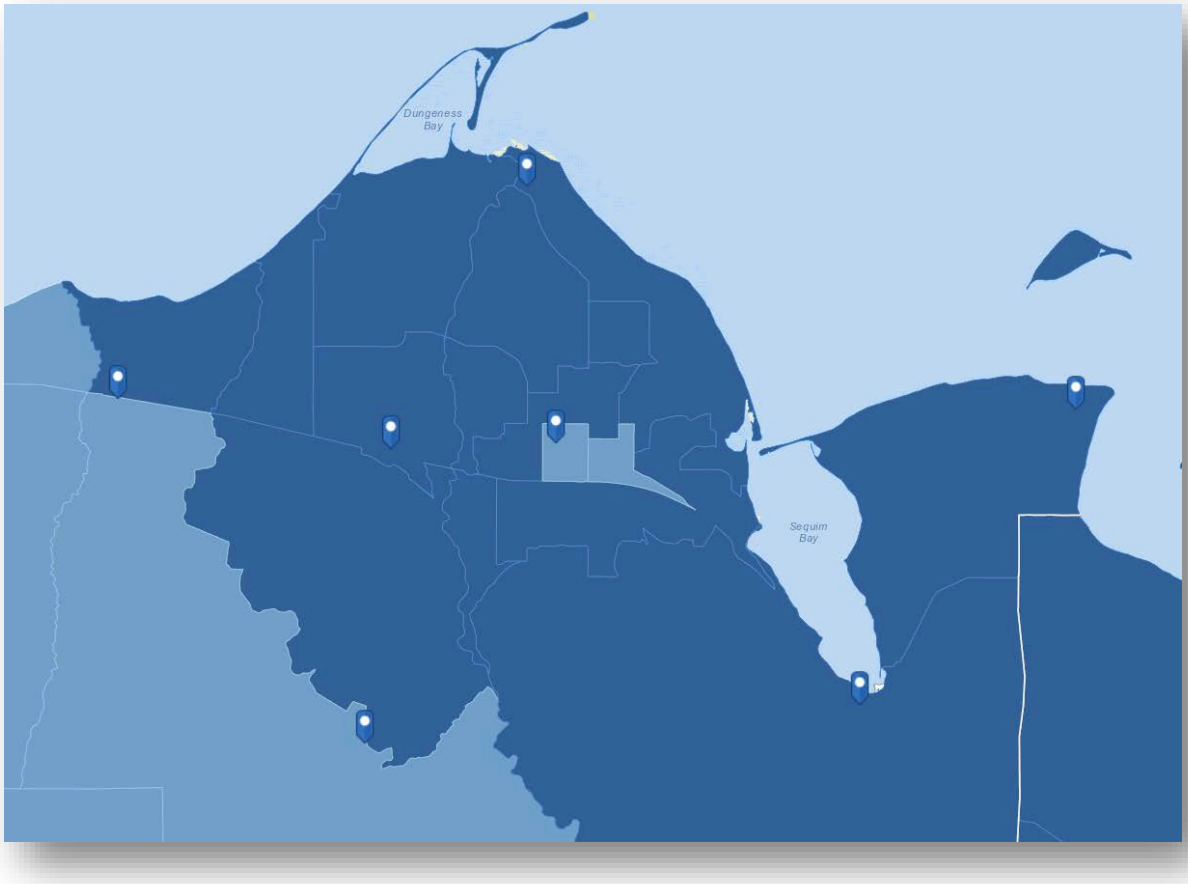
Call Category	2014	2015	Percentage Change
Basic Life Support	2,863	3,640	27.1%
Advanced Life Support	2,817	2,451	-13.0%
Fire Related Incidents	597	641	7.4%
Canceled Incidents	110	199	80.9%
Total Incidents	**6,387**	**6,931**	**8.5%**

Figure 37: Growth Projections through 2025 with Constant Average Growth



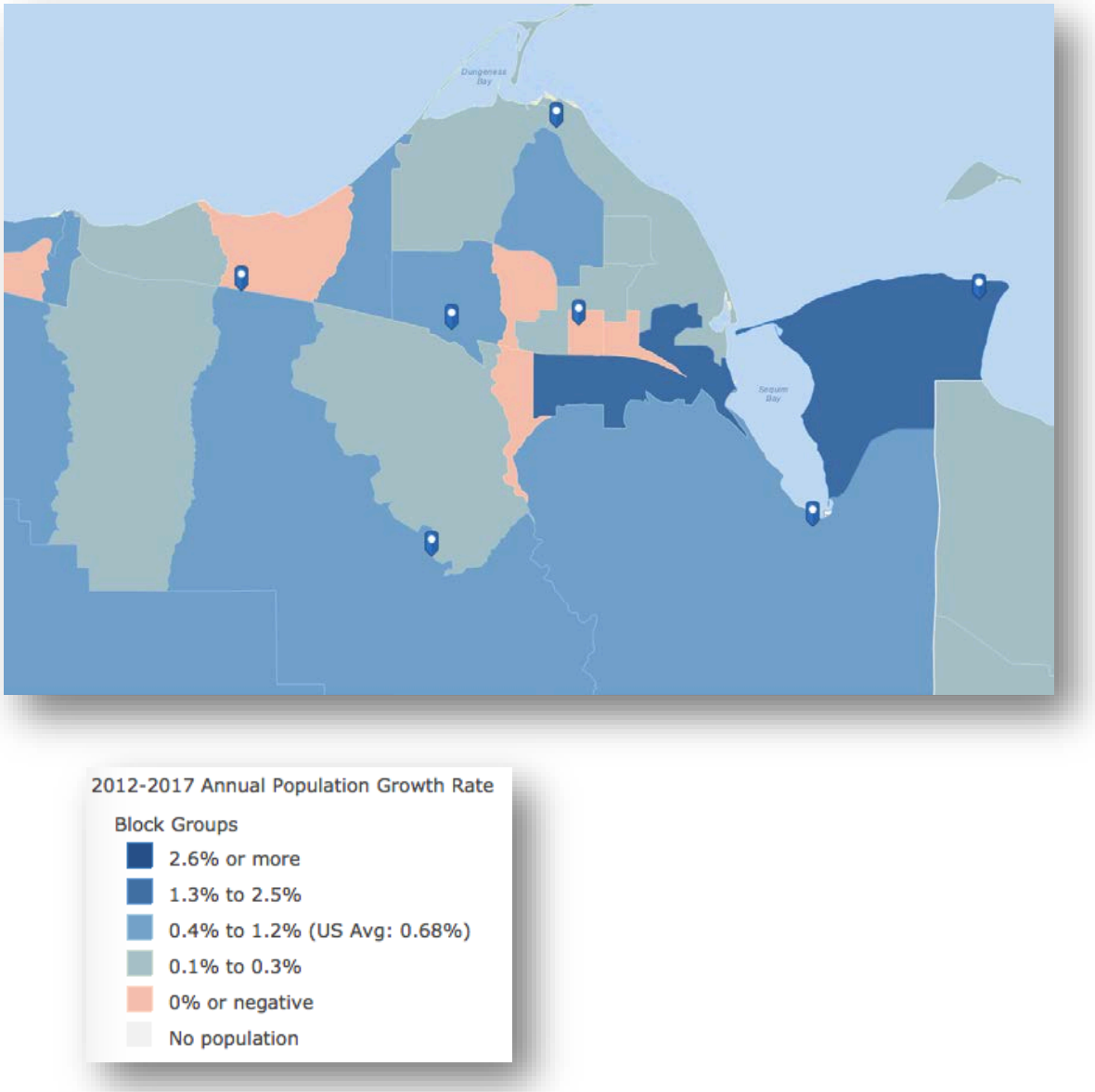
Two elements of the population's demographics are provided to accompany the evidence of change in historical demand. First, much of the District is over 52 years and older and will likely continue to utilize fire and emergency services, with the majority of requests being for medical services. Second, general change in population growth/decline is provided demonstrating that growth and/or decline in population is not uniformly experienced across the District. The mapping outputs are provided below.

Figure 38: Median Age



Note: The lighter blue is 43 years of age to 52 and the dark blue is greater than 52 years of age.

Figure 39: Annual Population Change 2012-2017



STAKEHOLDER AND PUBLIC INPUT MEETINGS

The District and the *FITCH* team worked collaboratively and transparently to discuss potential areas of inquiry. The process included multiple meetings that included the Fire Chief, fire department leadership team, union executive team, department membership (career, volunteer, and mechanics), the Board of Commission members, the Director of 911-communications, and the administration at Olympic Ambulance.

In addition, public meetings were held where *FITCH* presented the reports to the Board of Commissioners that was publicly noticed. Members from the community, press, and department were in attendance. An open period for question and answers were made available until all questions were answered.

Finding #26:

The District is to be commended for conducting an open, collaborative, and transparent process during this study period. It is clear the District is in pursuit of excellence and continuous improvement.

FUTURE DELIVERY SYSTEM OPTIONS

Internal Service Delivery Options

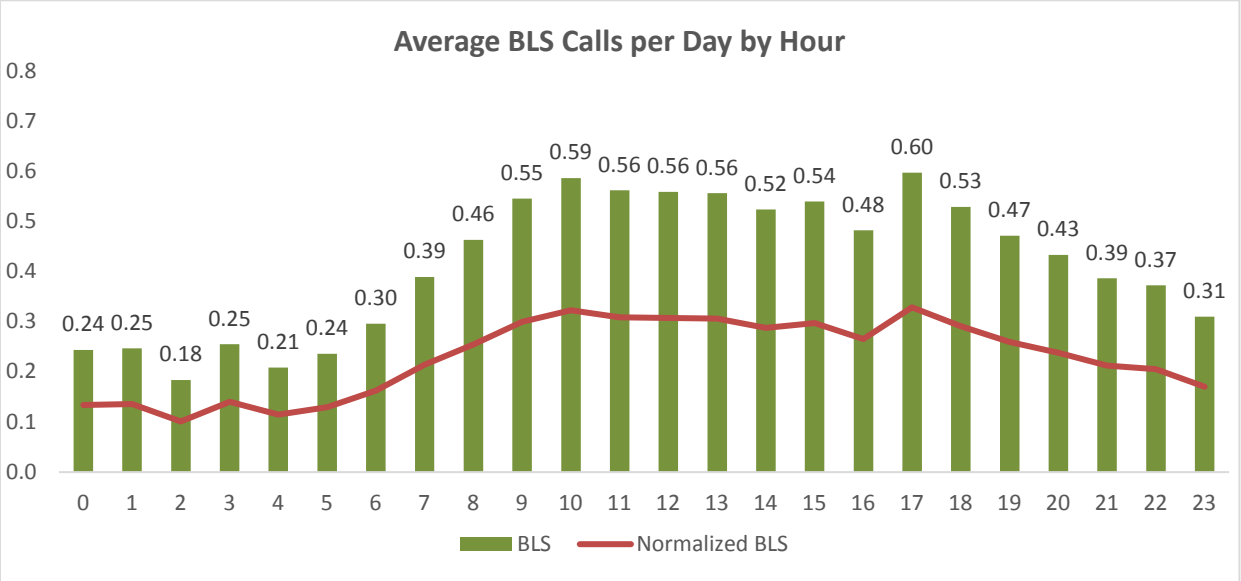
BLS Response Unit or Low Acuity Unit

If the recent trend is an accurate reflection of sustained future growth, then the low acuity or BLS incidents are the fastest growing service demand. While each community has a different profile for the percentage of growth, the general trend that low acuity and BLS incidents are the fastest growing area is most frequently observed nationally.

If all calls were assumed to occur simultaneously within each hour, the demand for BLS incidents would require one dedicated unit to handle the demand for BLS incidents, if the desire is to have a segregated service delivery model. For example, if the District were interested in having a BLS or Low Acuity unit handles these call types and severities, then it would need one unit to cover the demand for service. However, the response time performance objective would need to be adjusted sufficiently to cover the entire District from a single station.

In addition, the "red" line on the figure below indicates a normalized demand for resources at less than 0.5 per hour. In other words, one call every two hours. This normalized value is a function of the average call duration for BLS incidents at 33 minutes, providing an opportunity for a single resource to respond to approximately two calls per hour.

Figure 40: Average BLS Calls per Day by Hour



There are two challenges to implementation that must be considered. First, is the efficacy of a lengthy response time that could be longer than Olympic Ambulance. The second is to determine the remaining demand for services.

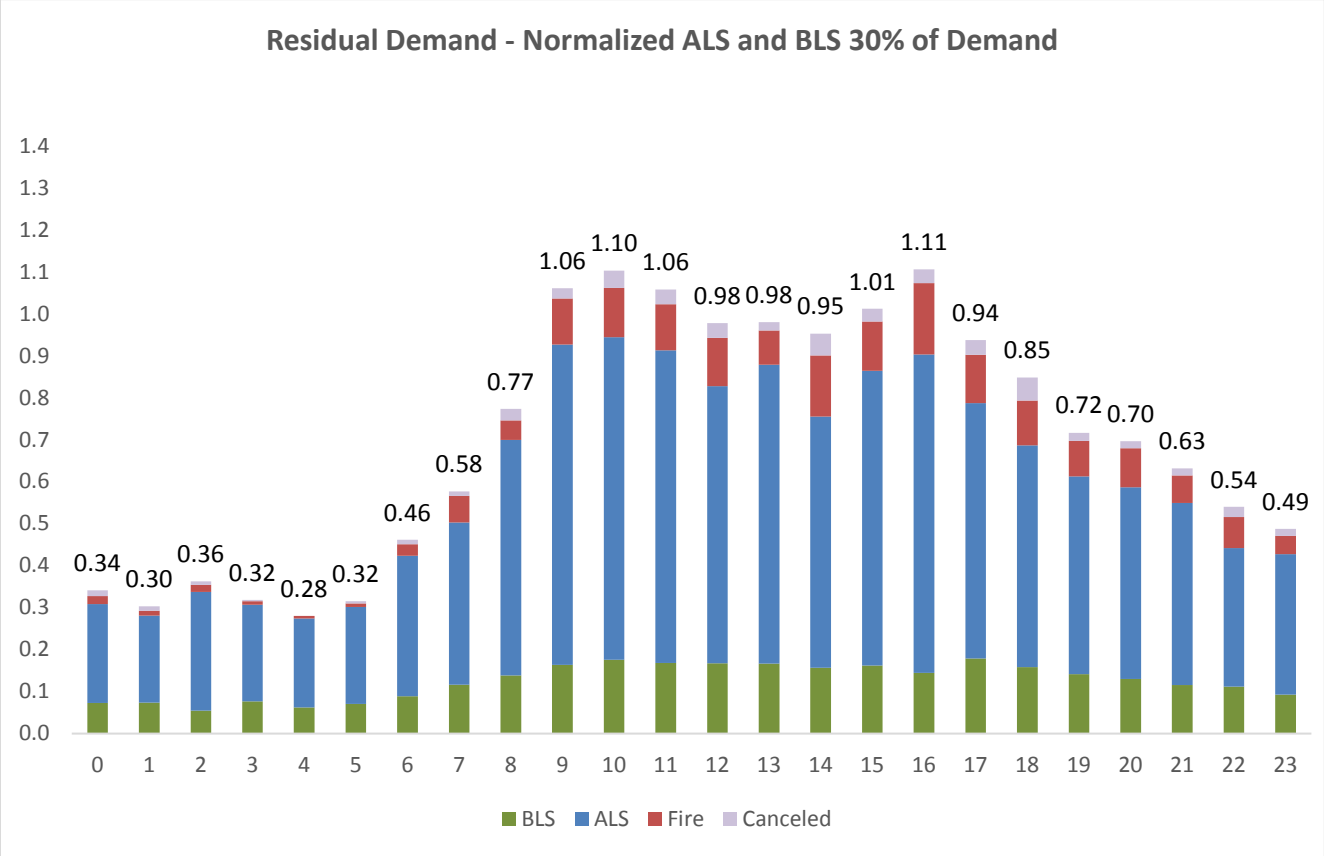
The data for this project did not include Olympic Ambulance's performance because their data is no longer captured in the CAD system. However, in evaluating the relative time on task for BLS incidents, it would appear that the response time performance of Olympic Ambulance is in reasonable proximity to the CCFD3 performance or the time on task duration would be longer than 30 minutes.

If the assumption is correct, the District may be challenged to arrive first before Olympic Ambulance with a singular BLS resource to service the entire District. Since Olympic Ambulance is the primary transport provider, they would dual respond to nearly all incidents. If the gap or interval of first responder and the ambulance provider is not sufficiently long to render care, then the District may reconsider the level of involvement in low-acuity responses.

Secondly, we utilized the normalized demand for ALS incidents and transports as well as a 30% value for BLS incidents with full duration. The full duration was estimated considering the relatively longer response times as a singular unit. The 30% is a conservative estimate for those times when the BLS unit may not be available, the Olympic Ambulance may not be available, the two-person crew needs additional assistance, etc. Therefore, considering the remaining residual demand for services, the District would still need to staff four to five units to cover the demand. In other words, this deployment strategy may require an additional unit for BLS only incidents and not relieve the residual demand sufficiently to change the current needs.

If the District considered outsourcing all BLS incidents to an external provider such as Olympic Ambulance, this analysis is identical and may not reduce the current demand for resources sufficiently. Although, this strategy would serve the District in cost avoidance for future investments as the BLS demand continued to increase. The residual demand curve is presented below.

Figure 41: Residual Demand – Normalized ALS and BLS 30% of Demand



Finding #27:

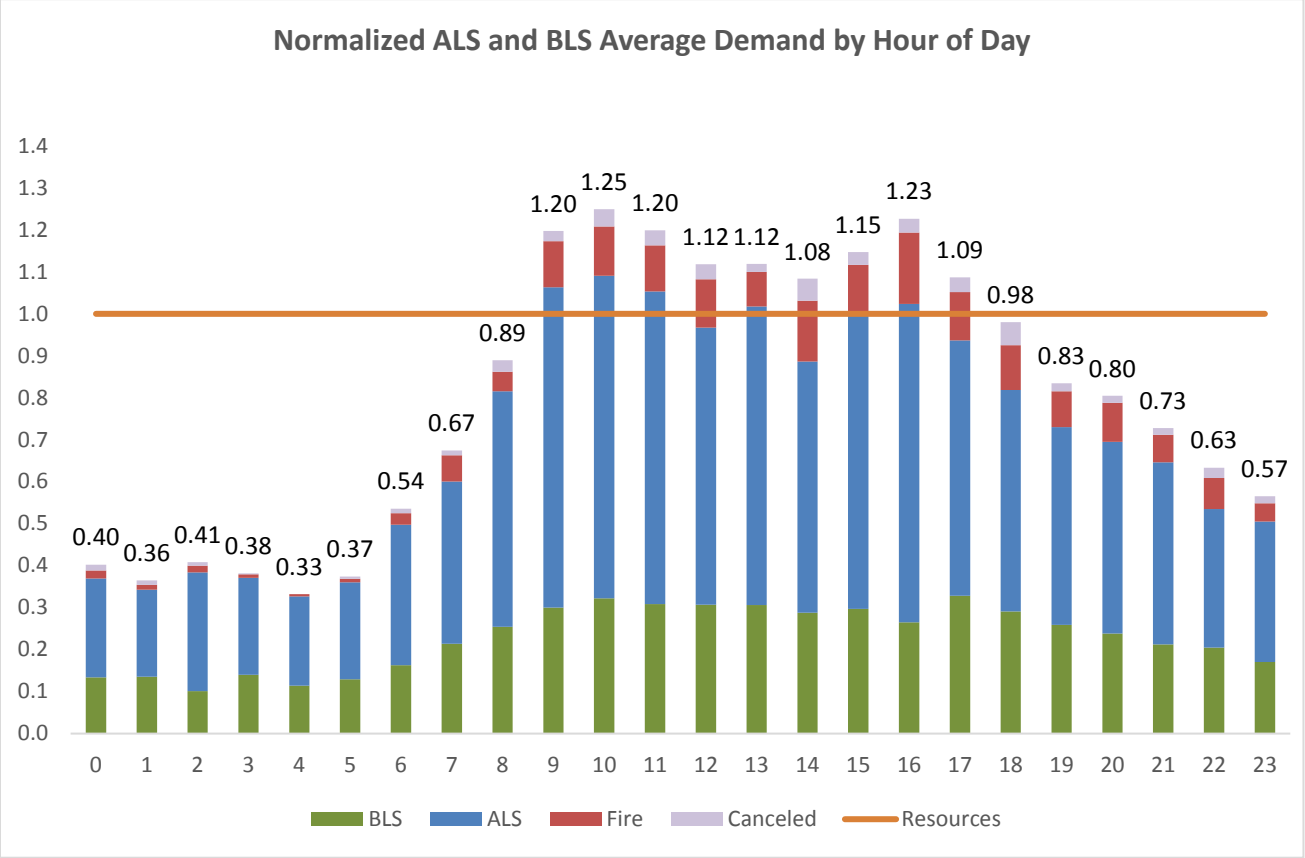
The concept of a BLS or Low Acuity unit has clinical merit, however, the BLS call rate is not sufficient to allow for an efficient utilization of a BLS-only unit and does not provide sufficient relief of the residual demand to reduce the current deployment needs. Additionally, outsourcing the BLS component may serve to cost avoid future investments as the demand continues to increase.

Peak Activity Unit

As previously discussed, if the District elected to adopt a 10-minute travel time for the urban areas and a 13-minute travel time for the rural areas, this deployment strategy would require three geographic units (one at each of three stations) and two additional units to cover the community demand. This equates to a five-unit deployment strategy. Currently the District operates with four units.

Anytime the average demand for resources exceeds the resource line at 1.0, the system will begin to pull the geographic units from their territories eventually resulting in elongated response times. The normalized demand curve for all calls is replicated below.

Figure 42: Normalized ALS and BLS Average Demand by Hour of Day



When referring to the figure above, it is evident that the District's current deployment strategy is appropriate for all of the non-peak hours, but will continue to have difficulty maintaining performance between 0900 and 1800. The district could elect to provide an additional 24-hour unit in service; however, a more efficient use of resources would be to deploy a Medic unit (5th Unit) between 0800 and 2000 each day to provide greater surge capacity during the peak of the day. The District is encouraged to continue to monitor the non-peak demand to ensure that the overnight demand did not rise sufficiently to require a 24-hour unit.

Recommendation #29:

It is recommended that the District explore placing a peak activity unit in service between 0800 and 2000 each day to ensure desired performance.

Implementation of a peak activity unit would have secondary benefits to the District and personnel as well. First, is to relieve some growing workload on the units, specifically at Station 34. Second, locating the peak activity unit at Station 34 would provide for greater insulation of pulling the Station Captain to respond on medical incidents as the driver of the ambulance allow the officer to better focus on his/her duties as shift commander. Third, the ability to have an additional crew available

during the daytime hours, provides additional capacity in the system to allow units to train with greater reliability.

Several potential peak load schedules were provided to the Fire Chief under separate cover during the study process. This schedule would generally require four personnel on "days" on mirroring shifts so that a two-person unit was always in service between 0800 and 2000. The average workweek would be similar to the current schedule and the unit could be placed in service for approximately the same cost of adding one firefighter on shift.

FD CARES or Mobile Integrated Health Unit

Continuing the previous discussion about the potential lack of access to primary care providers, the Clallam County Health Collaborative identified the "availability of primary care providers" and "chronic disease prevention and management" as primary strategies for implementation in 2014. [27] While, the Report Card on Clallam County's Health indicated that the access to health care was relatively unchanged, the overall rate was approximately 84% that had health care coverage and that had a personal healthcare provider. [28]

Generally, mobile integrated healthcare models attempt to achieve one of the following objectives at it's inception; reduction of frequent users of the EMS system, assisting in post hospital discharge consultation to reduce readmissions for the clinical conditions identified by the Affordable Care Act, and providing improved access to health care such as rural mobile medicine. Merit exists in any of these initiatives for the District. However, it should remain a policy decision on the provider model(s)the District wishes to engage in that best meets the community's needs with limited resources.

Therefore, careful consideration should be exercised into how the District would deploy said resources and to what extent there is available funding. At this time, the vast majority of successful programs are funded by federal grants as pilot programs. In other areas, the hospital district, Accountable Care Organization (ACO), or payer group (insurer) has either partnered or contracted with the local provider to provide mobile interventions that are more sustainable.

At the time of this report (January 2017) the President-Elect and the Speaker of the House have publicly announced pending action to "repeal and replace" the Affordable Care Act causing considerable uncertainty in the future of healthcare delivery and reimbursement models.

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[27] Clallam County Health Collaborative. (2013). *Community Health Needs Assessment & Implementation Strategy* (p. 23). Author: Clallam County, WA.

[28] Lipton, B. (November 14, 2012). *A Report Card on Clallam County's Health.* Presentation at Maier Hall, Peninsula College, Port Angeles. Clallam County Health and Human Services and Kitsap Public Health District: Clallam County, WA.

In the Seattle area Snohomish Fire District #1 recently won an award for innovation for its community paramedicine/mobile integrated healthcare program and would be an excellent resource for CCFD3 as strategies are developed. Similarly, the District is encouraged to partner with the Clallam County Health and Human Services Department to track progress on their 2014 initiatives to improve access to primary care providers and to explore mutual opportunities that enhanced the health and welfare of District residents and visitors.

Recommendation #30:

The District is encouraged to continue to monitor the potentially shifting environment for where best to invest time and resources that provides the greatest return on investment for the community.

Consideration of Patient Transportation Services

The first step in exploring the potentiality of the District transporting patients to the hospital is to anticipate the increased demand for services. As presented previously, the transport rate within the District is less than 0.6 transports per hour. The peak of the day has approximately 60% of the EMS responses resulting in transportation. Results are reproduced below.

Additionally, analyses were completed to anticipate the increased demand for services assuming a 100% ALS transport rate and a 51% BLS transport rate. Results indicate that a five-unit model would adequately cover the demand for services. Finally, if the increase in overall call volume continues at 8.5% annually, the District may have to invest in as soon as three years after implementation for a sixth unit. Results are provided below.

Figure 43: EMS Calls and Transport Rate Demand Curve

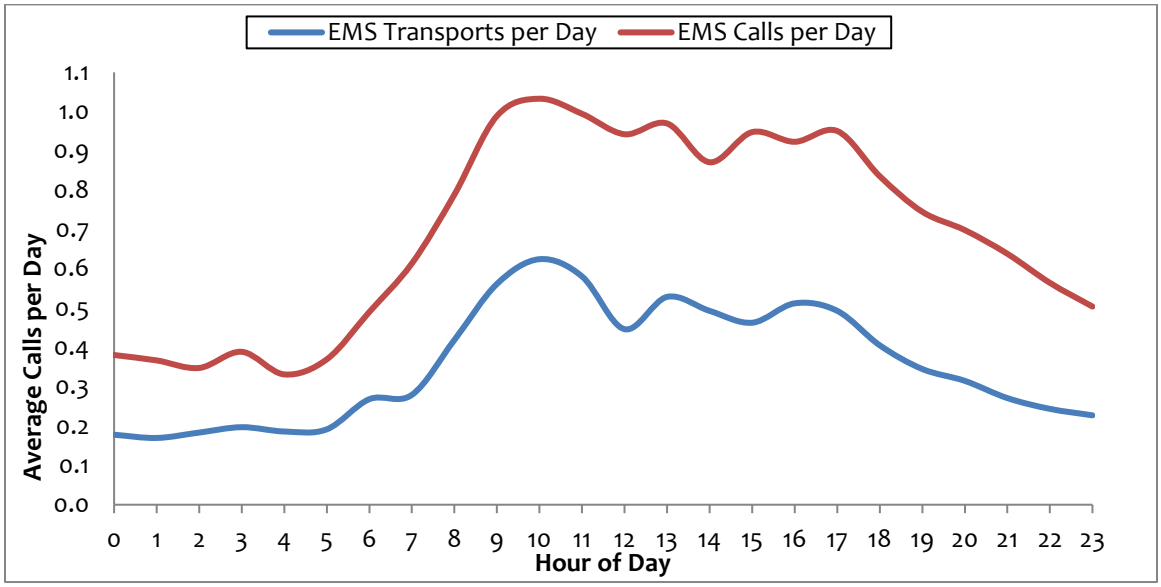
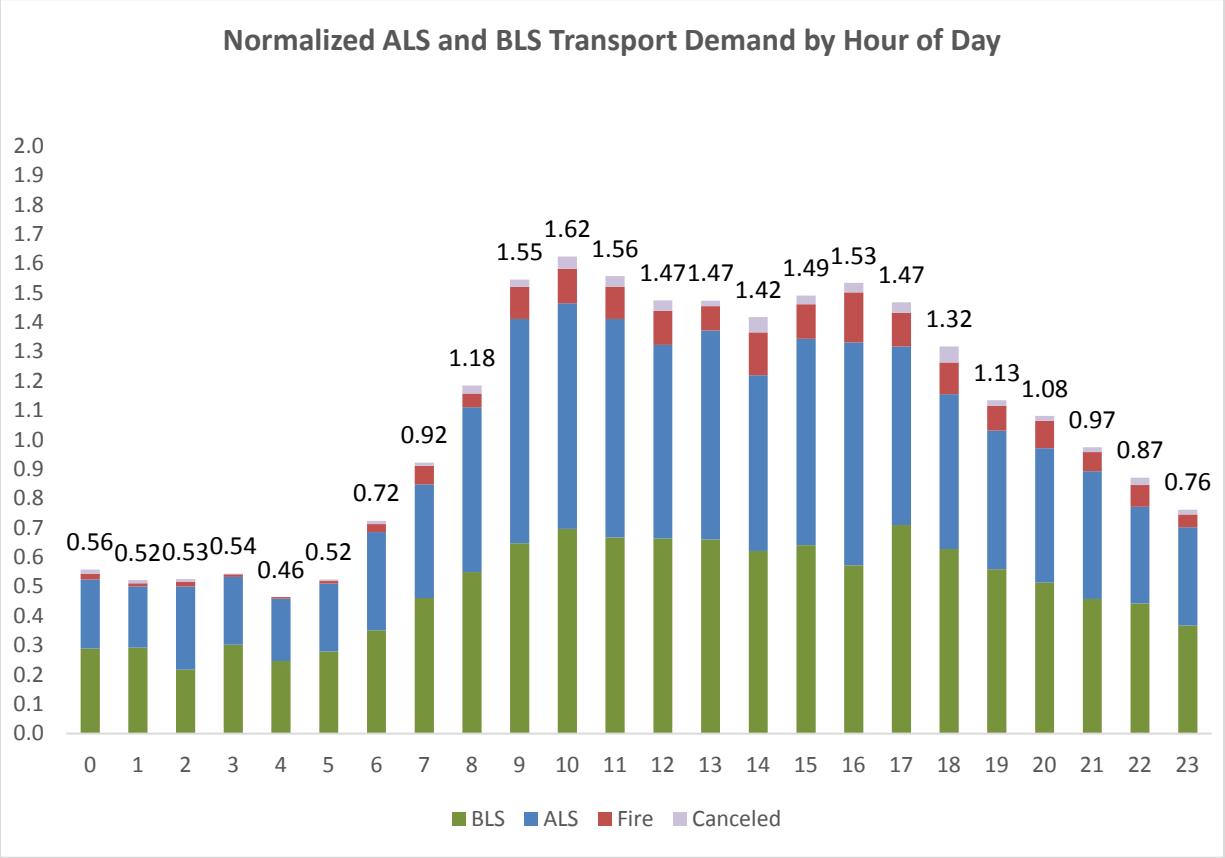
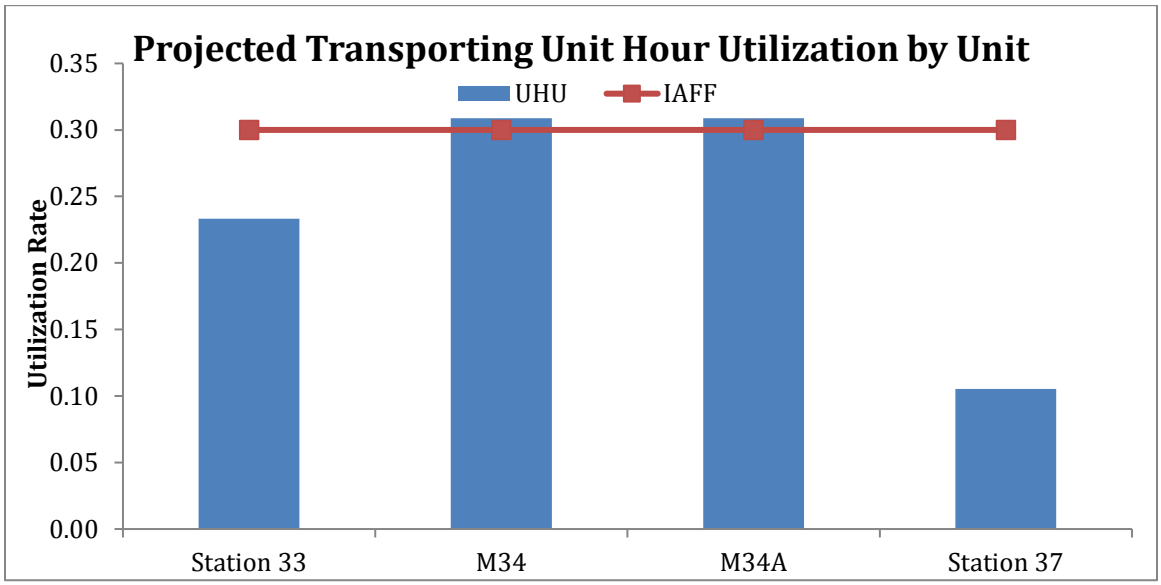


Figure 44: Normalized ALS and BLS Transport Demand by Hour of Day



The five-unit model is confirmed through the workload on a 24-hour shift as well. The combination of equally distributing workload between M34 and M34A and the increased time on task from BLS transports at an overall rate of 51%, the UHUs for both M34 and M34A exceed the upper threshold on workload. Therefore, a fifth unit is required to consider assuming transportation responsibilities. Results are presented below.

Figure 45: Projected UHU with Transporting All BLS and ALS



Finding #28:

The increased time on task results in the need for a 5th ambulance unit to meet both the resource demand and to control for appropriate workload controls.

Residual Impact to Fire Suppression Model

While a five-ambulance model will perform well for emergency medical incidents and maintain the recommended 10-minute urban and 13-minute rural response times, there may be a residual impact to the fire suppression model. At the average demand for both calls and transports, there would be three two-person units available for geographic coverage. Anytime that the demand surges greater than the average demand, the geographic units will have to respond to meet the surge.

The model will perform well for all unique incidents, but multi-unit responses for incidents such as structure fires may be limited during surging periods. In addition, the current practice of placing a single-person resource back in service during the long transports would no longer be available to the District as it would require both of the personnel on the ambulance to transport the patients at greater than 1.5 hours at a time.

The relative risk and frequency of fire incidents is low. Therefore, it is a policy decision for the District and Fire Chief as to the cost and benefit of assuming the transport role and any potential or perceived degradation of the fire suppression capabilities.

Projected Revenues and Expenditures

For comparative purposes, it is assumed that the District and the current billing performance by Olympic Ambulance would be identical. In other words, it is assumed that if the District began transporting patients, they would enjoy the same accuracy, proficiency, payer mix, and gross collections that are realized by Olympic Ambulance.

The base capitated rates, or allowable, costs from the Centers for Medicare and Medicaid Services (CMS) were utilized as a conservative revenue estimate. The billing schedule is proportioned as follows:

Table 24: Projected Billable Transports by Category and Allowable Costs

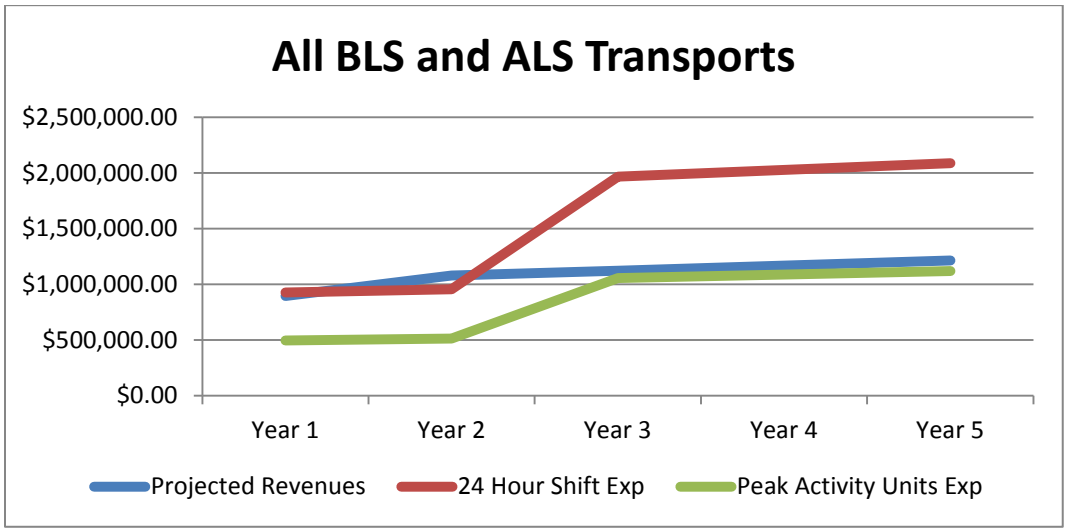
Billing Category	2015 Transports	Allowable Costs[29]	80% of Allowable Costs
BLS Emergent	1,262	$369.67	$295.74
ALS Emergent	1,760	$438.98	$351.18
ALS 2 @5%	93	$635.37	$508.30

The projected relationship between revenues and expenditures is presented below. There are several critical assumptions utilized. First, revenues were held at 80% of the capitated costs from CMS as a conservative estimate for decision-making and is not intended to serve as a pro-forma budget. Actual revenues are anticipated to be higher with other sources such as mileage, private payers, etc. Second, revenue growth was projected based on a net 4% increase in transports per year. Third, personnel costs were estimated at a step five-firefighter paramedic and step five firefighter EMT with a 3% annual increase. Fourth, the expenditures evaluated were only associated with personnel costs (including 29% fringe benefits) with the addition of a 5th unit at implementation and a 6th unit in year three. Additional expenditures would be expected for additional supplies and capital such as apparatus purchase and replacement. These estimates are conservative estimates for both revenue and expenses to drive decision-making.

Overall, the potential program adoption appears to have a reasonable assumption that it could remain sustainable if peak activity units were utilized as the 5th and 6th ambulances. Projections for 24-hour shift based personnel would most likely require additional District subsidy beginning in year three. If the transport call volume does not increase or increased less than 4%, then the related revenues will likely result in an unsustainable model for either deployment strategies into the future.

[29] Centers for Medicare and Medicaid Services. Retrieved from www.cms.gov.

Figure 46: All BLS and ALS Transports



This analysis is intended only to drive broad-based decision-making. Therefore, if the District is interested in pursuing a transport program, this analysis must be updated with actual revenue history from Olympic Ambulance. At this early stage, it was deemed unnecessary and potentially tenuous to request that level of detailed information. A more granular understanding of the actual payer mix would provide greater accuracy in anticipating changes in either reimbursement models or community profile.

It would not be recommended to only transport BLS incidents as they would have the least revenue yield, the highest demand, and lowest clinical benefit. However, analyses of both BLS only and ALS only transport programs are provided below. The ALS only transport program has the most merit of the three alternatives as the resource allocation is largely already met since the CCFD3 medic accompanies the ambulance on all ALS transports. In all cases, the peak activity units are the most efficient and effective means to cover the demand.

Finally, the District is encouraged to carefully consider any desire to transport. While there is no doubt that the District has the quality, capability, and expertise within the Department to take on this new role and provide exemplary service, unintended consequences may exist. First, the discussion should be highly transparent with Olympic Ambulance and ensure a deep understanding of the potential impact to the solvency of provider. It would not be recommended that the Department begin inter-facility transfers nor does the Department have sufficient capacity to be a regional provider if the reduction in revenue has an unintended impact on their solvency. Second, the future of the Affordable Care Act and the associated reimbursement models are unknown at this time and clear public intent exists by the President-Elect and the Speaker of the House to "repeal and replace" the Affordable Care Act within the first 100 days. It is our experience that many ambulance providers are earning only single digit profits and nearly universally fire department

expenses are higher. In both the All Transport and the BLS Transport Models, the structural deficit between shift deployment and revenues continues to widen over the next 20 years.

Figure 47: BLS Transports

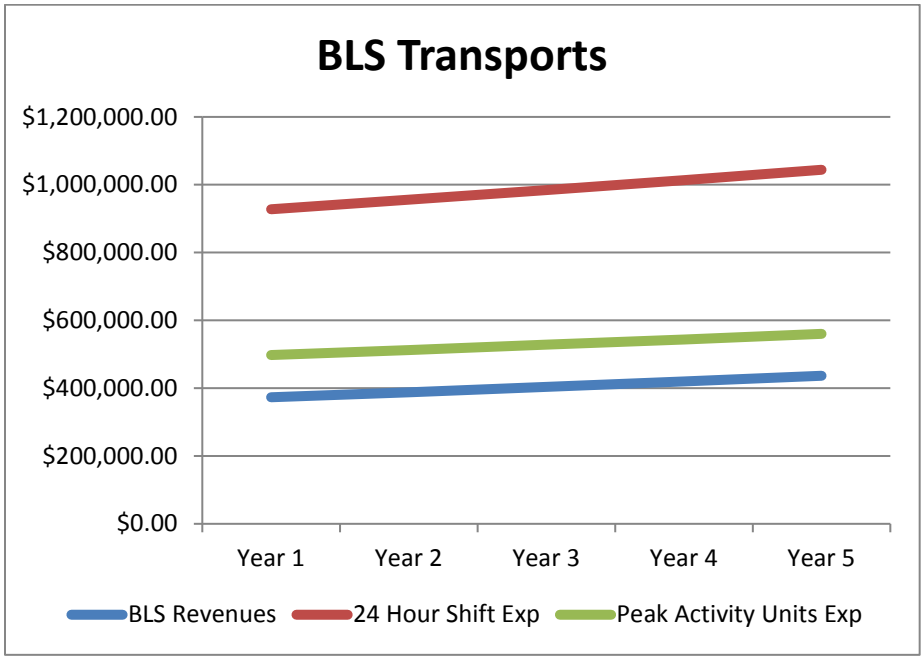
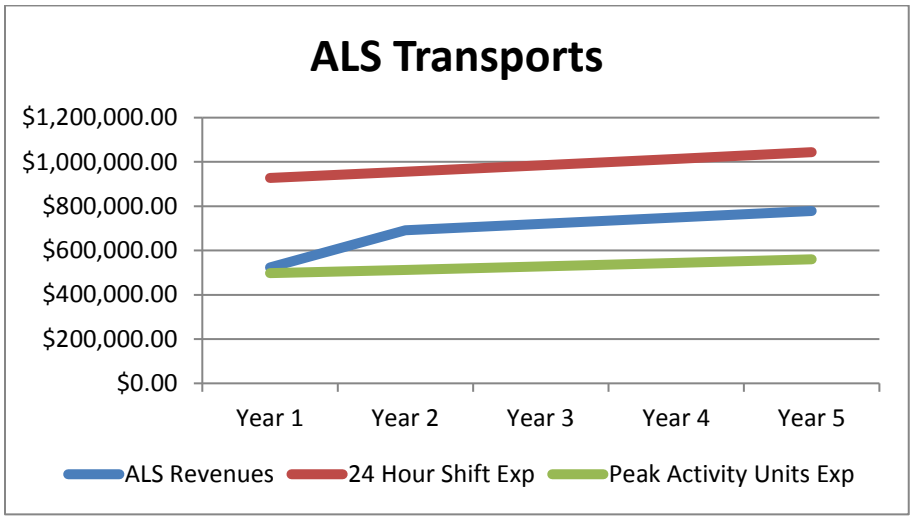


Figure 48: ALS Transports



Finding #29:

If the District is desirous of expanding their patient transport program, transporting ALS patients may be the most advantageous balance between potential revenue, resource commitment, and expenditures.

Recommendation #31:

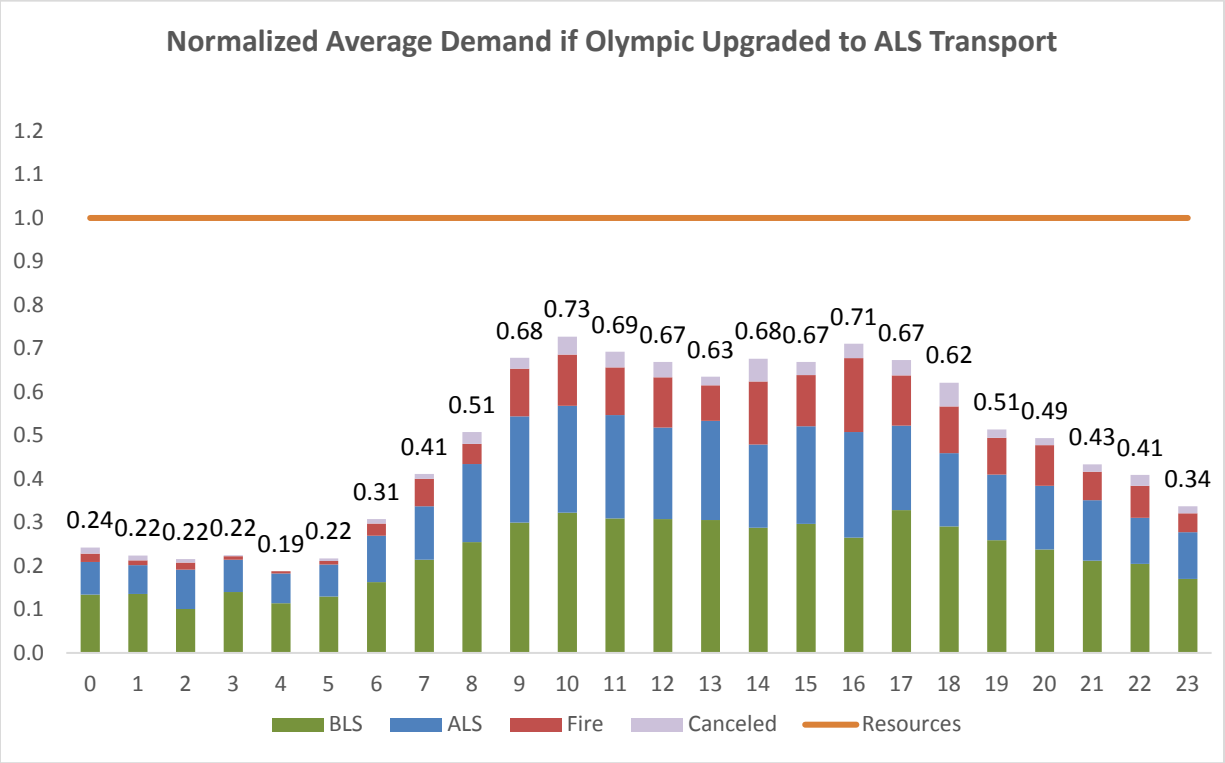
If the District is desirous of expanding their patient transportation program, it is recommended that the District request the actual billing and gross receipts from Olympic Ambulance to more accurately project the solvency and sustainability of any potential changes to the status quo.

EXTERNALITIES THAT MAY AFFECT SERVICE DEMAND

Olympic Ambulance Upgrades to ALS Capability

Continuing from the previous discussion on the potential for the District to assume some or all of the transport responsibilities within the District, another alternative is presented for consideration. If the District worked with Olympic Ambulance to upgrade their capabilities to ALS, then the District could enjoy an opportunity to either cost avoid future investments or reallocate resources to other areas of need. The figure below demonstrates the capacity introduced back into the District's system if they only provided first due ALS response.

Figure 49: Equivalent Benefit of Olympic Ambulance providing ALS Transport Service



This alternative would have several benefits for the District. First, the overall workload would be reduced allowing personnel greater opportunity for other non-emergency activities such as training. Second, the current four-unit deployment strategy would continue to be viable into the future. Third, if the District had the desire and capability to fund additional personnel, they could be utilized to open a fourth station, move towards three person engines, and/or dedicate a command officer. Fourth, the unit and crew integrity would remain intact throughout the tour and fully capable units would remain within the District.

Recommendation #29:

The District is encouraged to partner with Olympic Ambulance to enhance their capacity towards ALS transport capability.

Tiered or Priority Dispatch and Pre-Dispatch Medical Triage

As previously discussed, the dispatch center utilized the most recent "King County" priority dispatching protocols. This system is an effective tool and the District could continue to partner with the dispatch center to refine response parameters up to and including not responding to lower acuity incidents. A tiered response protocol could be developed to allow Olympic Ambulance to respond to the lower acuity BLS incidents and the District could responds to ALS incidents and BLS incidents that would fall outside of a pre-determined performance window by Olympic Ambulance.

In addition, the District could work with the regional partners to explore instituting an "omega" protocol or nurse triage line for the appropriate calls to better align resources to the clinical severity.

Recommendation #30:

The District should work their regional partners and the medical director to refine tiered responses determined by pre-dispatch call triaging.

Recommendation #31:

The District should work with the regional partners to explore instituting an "omega" protocol or nurse triage line for the appropriate calls to better align resources to the clinical severity.

Service Level Triage at Skilled Nursing Facilities

Similar to an enhanced medical triage system, best practice is to triage skilled nursing facilities at the occupancy level except for the highest acuity incidents such as unconsciousness, cardiac arrest, or difficulty breathing. Lower acuity calls such as ground level falls would not receive a first responder agency and only the ambulance provider. The reasoning behind this practice is that there is skilled medical staff at these facilities and the clinical acuity is time sensitive.

Recommendation #32:

It is recommended that the District work with the dispatch center and the medical director to establish protocols that allow the first responder agency to discontinue responding to skilled nursing facilities (SNF) for low acuity incidents.

Recommendation #33:

In both of the call triaging options presented, the District is encouraged to optimize every opportunity to respond non-emergency for lower acuity calls when responding.

Medical Destination Facility located in Sequim

This topic was previous presented in the section on the evaluation of external agencies. In summary, the absence of an emergency receiving facility in the greater Sequim area requires the District to have transport durations of greater than 1.5 hours. This occurs whether the District transports or the paramedic accompanies Olympic Ambulance. If the transport duration could be reduced by nearly half, the community would be better served by a quicker return, greater ease on family members, and a greater percentage of the time that District units would remain in District and available for other calls.

It is understood that high acuity and specialty patients such as STEMI, Stroke, and Trauma alert patients would need to be transported the closest appropriate facility. However, the vast majority of incidents are more of a routine nature and could be handled by a stand-alone emergency receiving facility.

Recommendation #34:

The District is encouraged to explore potential solutions to the community's impact from the relative limited access to primary care providers and emergency receiving facilities in the greater Sequim area.

Attachment A

Data Report

FITCH
& ASSOCIATES

September 2016

Data Analysis

CLALLAM COUNTY FIRE DISTRICT #3

CLALLAM COUNTY FPD NO. 3

SEQUIM, WASHINGTON

Prepared by:

FITCH & ASSOCIATES, LLC
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CONSULTANT FINAL REPORT

SERVICE DELIVERY STUDY
CLALLAM COUNTY FPD #3, WASHINGTON

TABLE OF CONTENTS

METHODOLOGY

We collected two years of data from CAD, NFIRS and RMS data. We linked all three data sets to leverage unique information from all three systems. We presented the total incidents and total unit responses of CCFD3 units in Table 1 and Table 2. In 2015, CCFD3 units have responded to 6,931 calls. In the major body of the report, we limit our discussions to calls to which CCFD3 units have responded to in 2015. We provide dispatch time, turnout and travel time performance benchmark using the two years of data in the last section.

In the CAD data, unit identifiers combine both unit level and personnel level indicators. Station 33 and station 37 can only staff one unit at any given time, and station 34 can staff two units. We cleaned the CAD data and only included one unit at most from each station responding to the same incident for workload analysis.

In this report, we utilized two distinct measures of call volume and workload. First, is the number of requests for service that are defined as either “dispatches” or “calls”. Dispatches/calls are the number of times a distinct incident was created for CCFD3. Conversely, “responses” are the number of times that an individual unit (or units) responded to a call. Responses will be utilized on all Unit and Station level analyses, which account for all elements of workload and performance. Calls have been categorized as BLS, ALS, Fire, and Canceled, respectively.

COMMUNITY RESPONSE HISTORY

In 2015, Clallam County Fire Department (CCFD3) responded to 6,931 requests for service, or dispatches. EMS service requests totaled 6,091, accounting for 87.9% of the total number of incidents. The number of fire related calls were 641, which accounted for 9.2% of the dispatched incidents. The other 2.9 percent of incident calls were cancelled requests. The number of individual unit responses will be more reflective of total department workload since 14 percent of the calls resulted in multiple CCFD3 units dispatched. As summarized in Table 2, all units in CCFD3 combined made 8,013 responses, and were busy on emergency calls 5,842 hours. On average, each response lasted 43.7 minutes from dispatched to clear.

Requests in the City of Sequim and the greater Sequim area accounted for 91.9 percent of the total incidents CCFD3 units have responded. Requests in Sequim averaged 17.4 per day. EMS calls totaled 5,642, which accounted for 88.6% of the total CCFD3 incidents. Fire calls totaled 551, which accounted for 8.7%. Requests in the city of Port Angeles total 556, averaging 1.5 requests per day.

Table 1: Number of Incidents Dispatched by Category – 2015

Call Category	Number of Calls	Calls per Day	Call Percentage
BLS	3,640	10.0	52.5
ALS	2,451	6.7	35.4
Fire	641	1.8	9.2
Canceled	199	0.5	2.9
Total	**6,931**	**19.0**	**100.0**

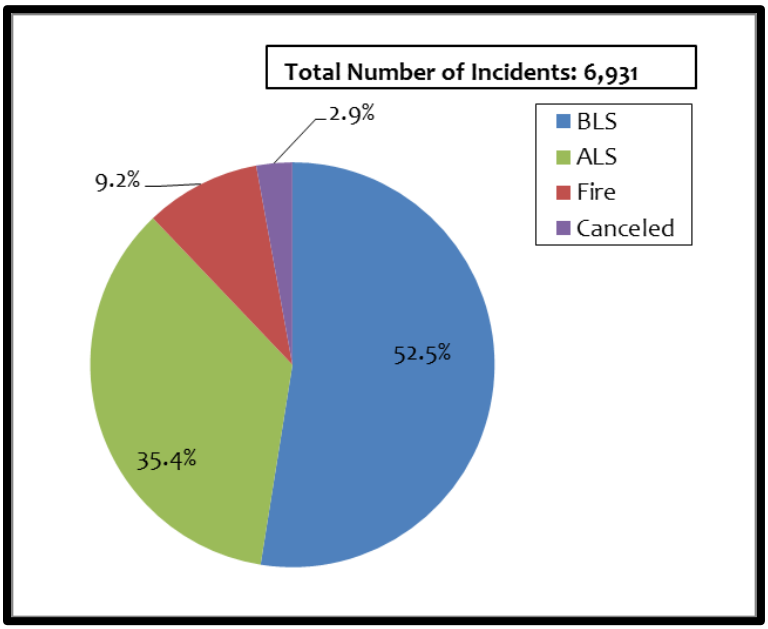
Table 2: Number of Responses, and Total Busy Time by Category – 2015

Call Category	Number of Calls	Number of Responses	Average Responses per Call	Total Busy Hours	Average Busy Minutes per Response
BLS	3,640	3,974	1.1	2,351	35.5
ALS	2,451	2,831	1.2	3,032	64.3
Fire	641	953	1.5	421	26.5
Canceled	199	255	1.3	38	9.0
Total	**6,931**	**8,013**	**1.2**	**5,842**	**43.7**

Table 3: Number of Incidents Dispatched by Zip Code – 2015

	Number of Calls	
Call Category	98382	98362
BLS	3,424	216
ALS	2,224	227
Fire	552	89
Canceled	176	23
Total	**6,376**	**555**
Average per Day	**17.5**	**1.5**
% of Total	**92.0%**	**8.0%**

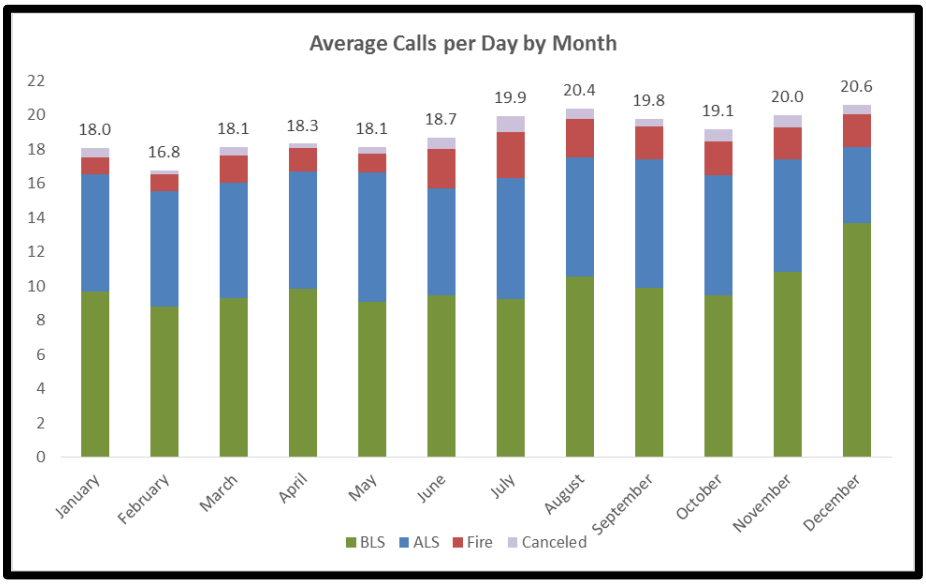
Figure 1: Percentage of Total Incidents Dispatched by Category



Temporal analyses were conducted to evaluate patterns in community demands. These measures examined the frequency of requests for service in 2015 by month, day of week, and hour of day. Cancelled calls were also included.

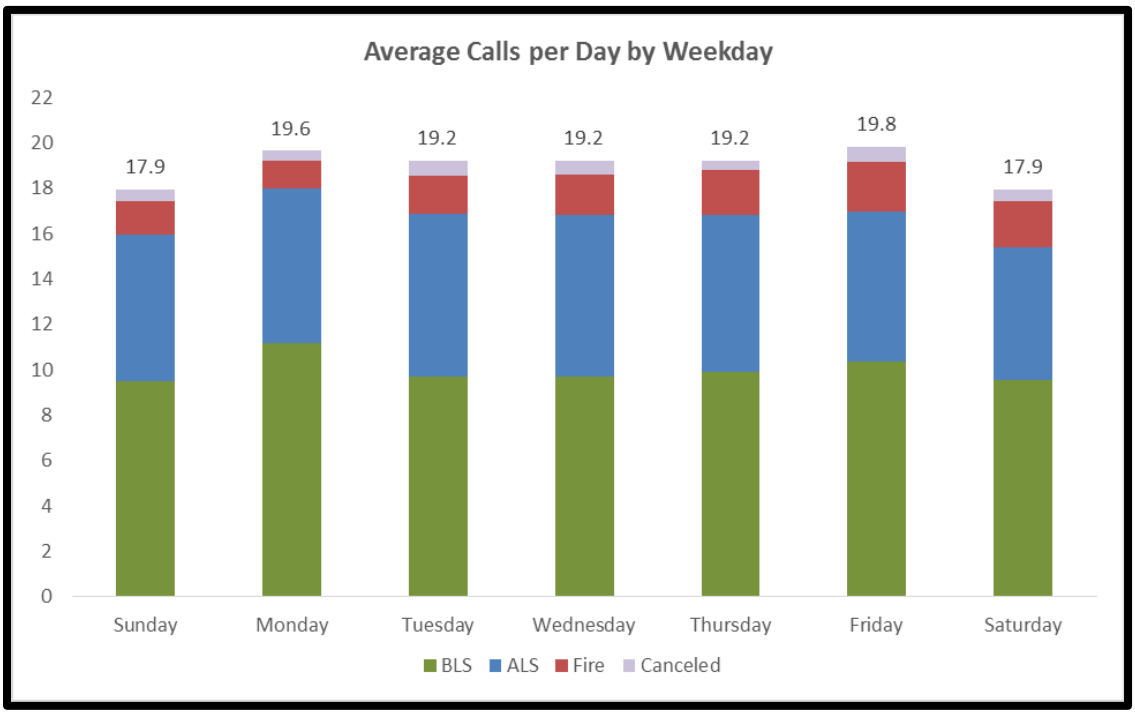
Overall, average calls per month ranged from a low of 16.8 per day in February to a high of 20.6 per day in December. The top three months with the most demands in descending order are December (20.6 per day), August (20.4 per day) and November (20.0 per day).

Figure 2: Overall: Average Calls per Day by Month



Similar analyses were conducted for requests by day of week. The data revealed that there is variability in the demand for services by day of week. Weekend was the low for the week at 17.9 calls per day. Friday has the highest frequency of requests for services at 19.8 calls per day, followed by Monday.

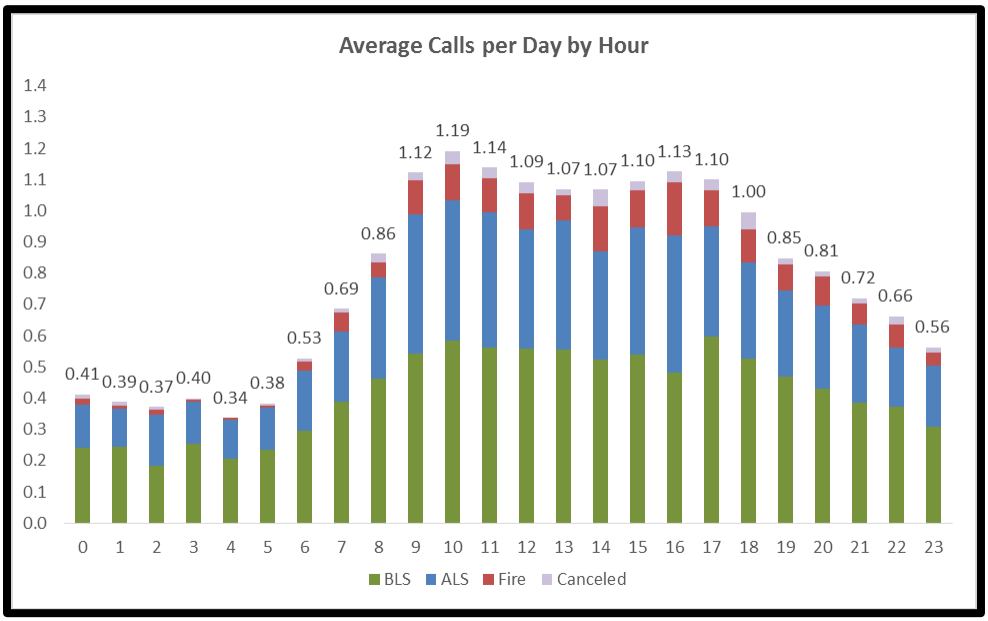
Figure 3: Overall: Average Calls per Day by Weekday



Overall demands were evaluated by the hour of the day. Considerable variability exists in the time of day that requests for emergency services are received. The hours that include midnight to 0700 are below one standard deviation for this data set. While the middle of the day has the greatest frequency of calls, specifically the hours that begin at 0900 and 1700 are above 390 calls in a year. The annual total number of calls in an hour is 289.

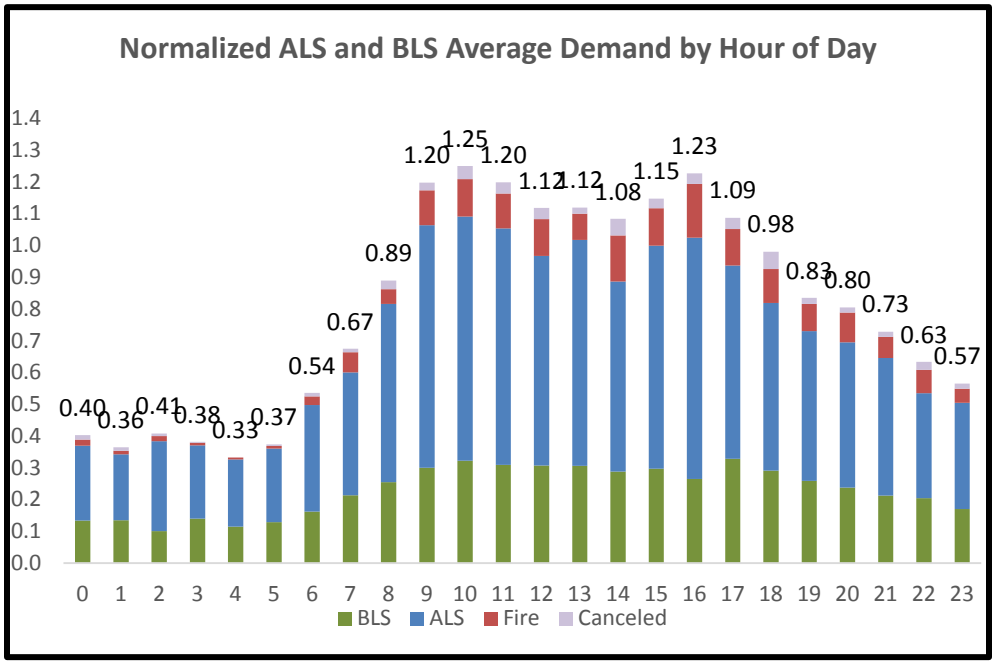
To provide a more granular understanding of the community's demand for emergency services, this temporal analysis included the average number of calls per hour. In other words, when referring to the figure below, the busiest hour is at 1000 with 450 calls during that hour in 2015. The average number of calls per hour is a daily average for those 450 calls if they were equally distributed. Therefore, the busiest hour per day would be at 1000 with an average hourly call volume at 1.19 calls per hour.

Figure 4: Overall: Average Calls per Day by Hour



However, since the average call duration for transport calls is greater than 100 minutes, and the average duration of BLS calls that the fire department typically only provides first response duties is approximately 30 minutes, the annualized demand curve is normalized to account for the proportion of workload by call type. Overall, the demand curve increases the demand for resources by 0.06 per hour at the peak. Therefore, either demand curve would require a similar allocation of resources, but both are provided for full transparency. Normalized data are provided in the figure below.

Figure 5: Normalized ALS and BLS Average Demand by Hour of Day



Overall, CCFD3's units made 8,013 unit responses, and the total busy hours were 5,842 hours. Ambulance M34 and M33 made the most responses.

Table 4: Overall Workload by Unit – 2015

Station	Description	Unit Report	Avg. Busy Minutes per Response	Annual Busy Hours	Annual Total Responses
33	Ambulance	M33	44.3	1,363.8	1,848
	Engine	E33	35.4	124.6	211
	Brush Engine	B33	34.5	4.6	8
	Tender	T33	64.6	4.3	4
	Station 33 Total		**43.4**	**1,497.3**	**2,071**
34	Ambulance	M34	44.5	2,580.4	3,482
	Ambulance	M34A	43.6	895.9	1,232
	Engine	E34	22.8	112.7	296
	Brush Engine	B34	33.2	1.7	3
	Rescue	R34	23.9	33.9	85
	Tender	T34	35.3	3.5	6
	Station 34 Total		**42.6**	**3,628.0**	**5,104**
37	Ambulance	M37	55.9	653.9	702
	Engine	E37	26.7	59.2	133
	Brush Engine	B37	75.5	3.8	3
	Station 37 Total		**51.3**	**716.8**	**838**
CCFD3 Total			**43.7**	**5,842.1**	**8,013**

For the purposes of this study, the dispatch interval is the time from phone ring at 911 to the dispatching and alerting of the unit. The average dispatch time in 2015 was 60 seconds, and the 90th percentile was 127 seconds (two minutes and seven seconds).

This analysis focused on calls responded with lights and sirens, and utilized all incidents with completed unit status time stamps of unit dispatch time, unit enroute time, and unit arriving on scene time. In 2015, the mean (average) turnout time was 90 seconds (one minute and 30 seconds), travel time was 342 seconds (five minutes 42 seconds), and response time was 492 seconds (eight minutes 12 seconds). Table 5 reports the average response performance by call category.

However, a more conservative and reliable measure of performance is the percentile. This measure is more robust, or less influenced by outliers, than measures of central tendency such as the mean. Best practice is to measure at the 90th percentile. In other words, 90% of all performance is captured expecting that 10% of the time the department may experience abnormal conditions that would typically be considered an outlier. For example, if the department were to report an average response time of six minutes, then in a normally distributed set of data, half of the responses would be longer than six minutes and half of the responses would be less than six minutes. The 90th percentile

communicates that 9 out of 10 times the department performance is predictable and thus more clearly articulated to policy makers and the community.

The performance for turnout time at the 90th percentile is 155 seconds (two minutes and 35 seconds), travel time is 615 seconds (10 minutes and 15 seconds), and response time is 793 seconds (13 minutes and 13 seconds). Table 6 below reports 90th percentile performance by call category. Please note that the summation of 90th percentile dispatch time, turnout time and travel time is not the same as 90th percentile response time.

Table 5: Average Dispatch, Turnout and Travel Time by Category

Call Category	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size
BLS	1.0	1.6	5.6	8.1	3,137
ALS	0.9	1.5	5.6	8.0	2,207
Fire	2.1	1.5	6.6	10.2	401
Total	**1.0**	**1.5**	**5.7**	**8.2**	**5,745**

Figure 6: Average Turnout and Travel Time by Call Category

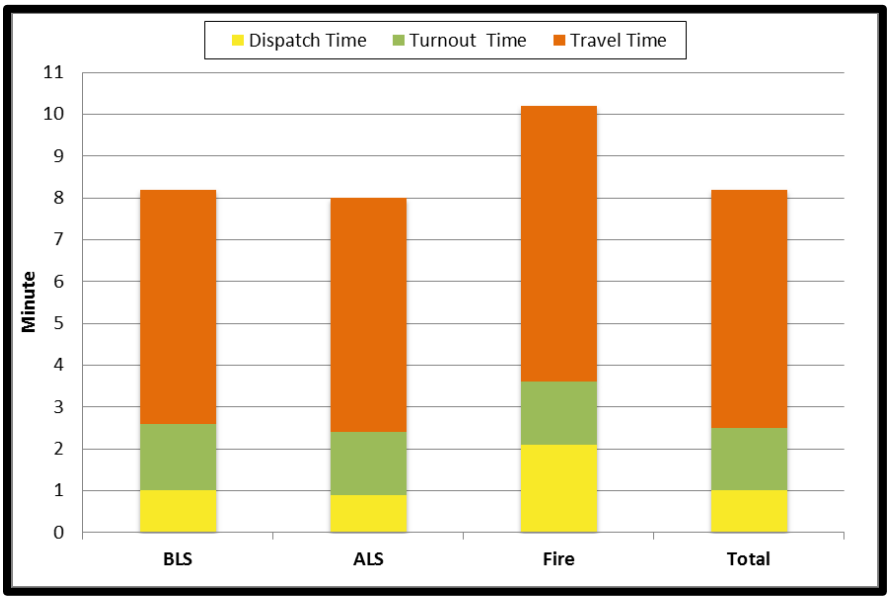
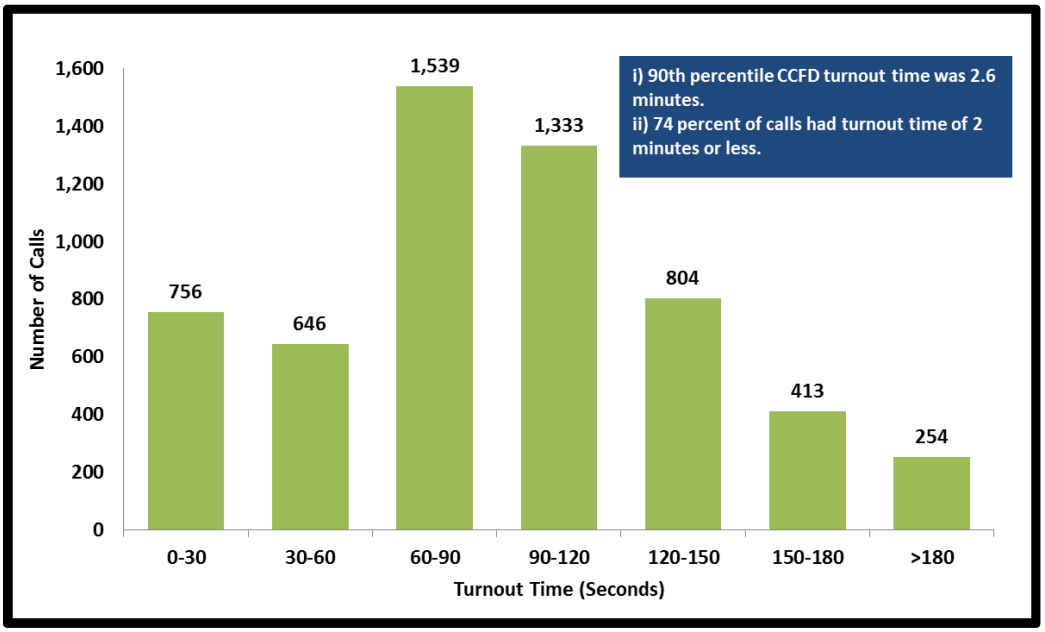


Table 6: 90th Percentile Dispatch, Turnout and Travel Time of First Arriving Units by Call Category

Call Category	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size
BLS	2.0	2.6	10.0	13.0	3,137
ALS	1.8	2.5	10.3	12.9	2,207
Fire	4.6	2.9	12.1	16.5	401
Total	**2.1**	**2.6**	**10.3**	**13.2**	**5,745**

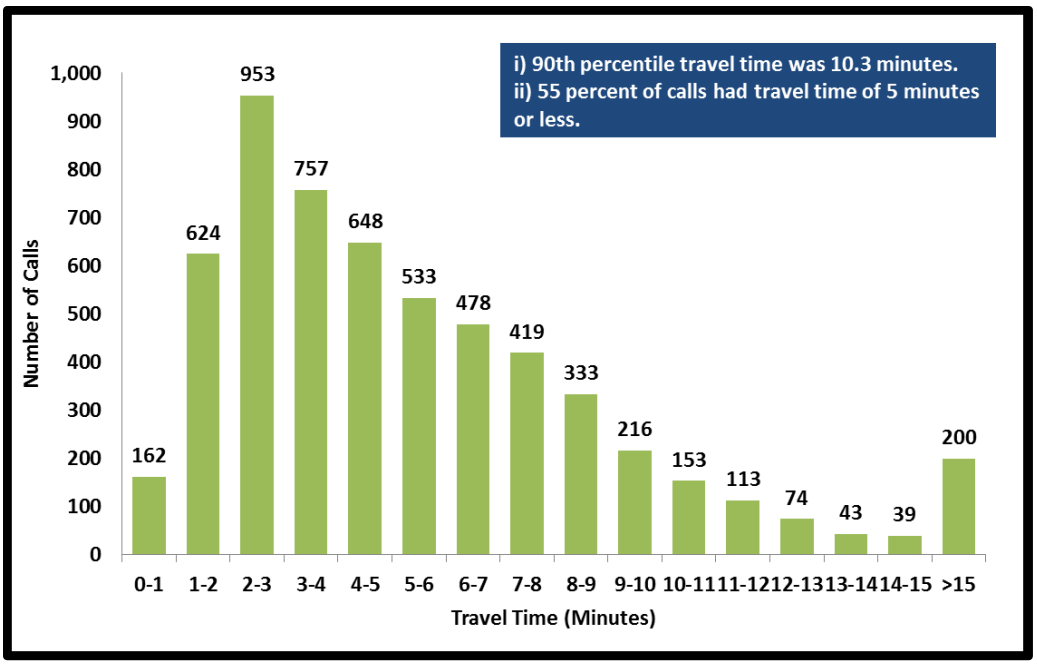
The Figure below reports the turnout time distribution of the first arriving CCFD3 unit for all calls combined. The CCFD3 first arriving unit had turnout time of 2 minutes or less for 74 percent of time.

Figure 7: Histogram of Turnout Time for the First Arriving CCFD3 Unit



The Figure below reports the travel time distribution of the first arriving CCFD3 unit for all calls combined. The CCFD3 first arriving unit had travel time of 5 minutes or less for 55 percent of time.

Figure 8: Histogram of Travel Time for the First Arriving CCFD3 Unit



Typically, performance varies across call types or categories due to a variety of reasons. For example, the turnout time may be longer for fire related calls because the crews have to dress in their personal protective ensemble (bunker gear) prior to leaving the station where as on an EMS incident they do not. Similarly, the larger fire apparatus may require longer response times due to their size and lack of maneuverability. Data does suggest mean and 90th percentile turnout time for fire calls were longer than EMS calls.

Fire Related Services

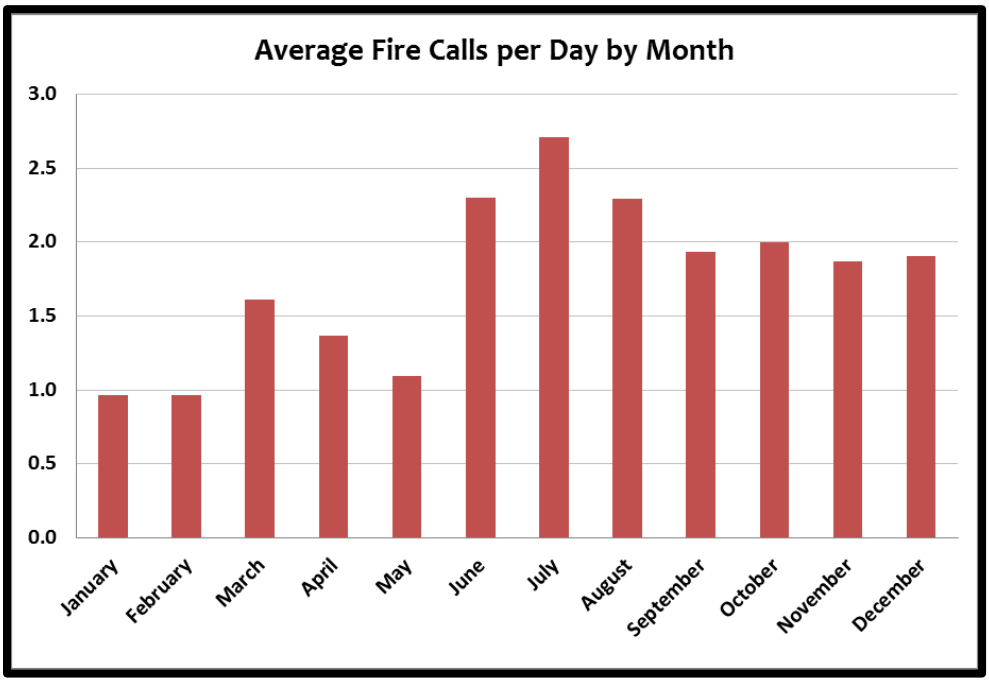
Temporal analyses were conducted to evaluate patterns in community demands for fire related services. These measures examined the frequency of requests for service in 2015 by month, day of week, and hour of day.

Results found that there were more fire related calls in the second half of the year (July to December), and peaked in July. Average calls per month ranged from a low of 1.0 in January and February to a high of 2.7 per day in July. Results are presented below in Table 7 and Figure 9.

Table 7: Total Fire Related Calls per Month of 2015

Month	Number of Calls	Calls per Day	Call Percentage
January	30	1.0	8.5
February	27	1.0	6.2
March	50	1.6	7.9
April	41	1.4	7.0
May	34	1.1	7.3
June	69	2.3	7.7
July	84	2.7	9.4
August	71	2.3	9.2
September	58	1.9	8.1
October	62	2.0	7.3
November	56	1.9	9.2
December	59	1.9	12.2
Total	**641**	**1.8**	**100.0**

Figure 9: Average Fire Related Calls per Month of 2015

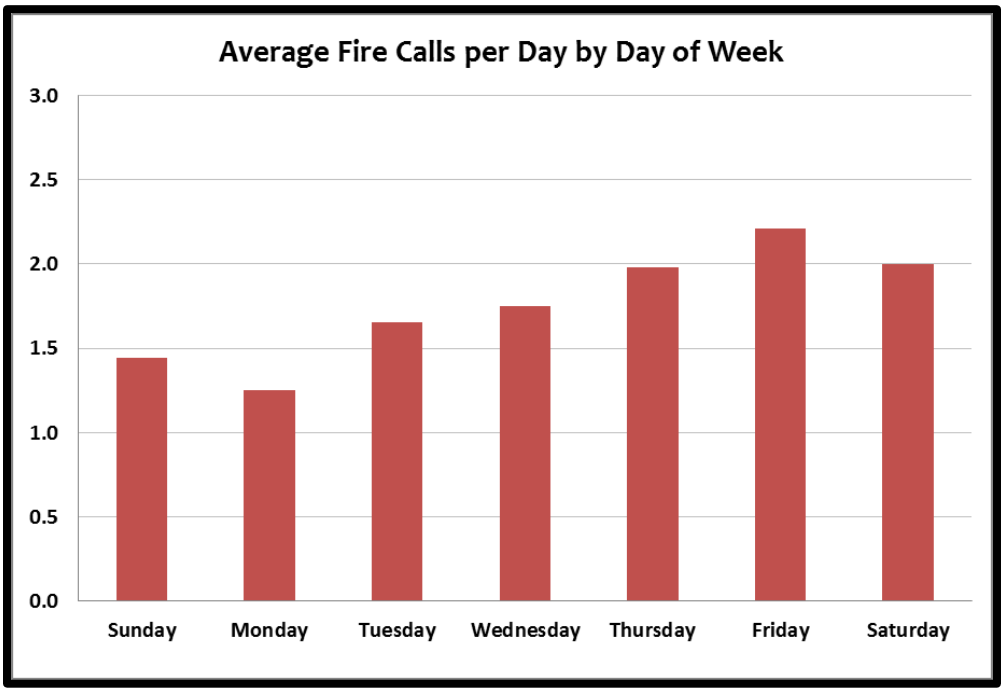


Similar analyses were conducted for fire related calls per day of week. The data revealed that there is also variability in the demand for services by day of week. Monday was the lowest for the week at 65 calls or 10.1% of the fire related calls for the week. Friday have the highest frequency of requests for fire related services at 115 calls. Results for this analysis are presented below in Table 8 and Figure 10.

Table 8: Total Fire Related Calls by Day of Week for 2015

Day of Week	Number of Calls	Calls per Day	Call Percentage
Sunday	75	1.4	11.7
Monday	65	1.3	10.1
Tuesday	86	1.7	13.4
Wednesday	91	1.8	14.2
Thursday	105	2.0	16.4
Friday	115	2.2	17.9
Saturday	104	2.0	16.2
Total	**641**	**1.8**	**100.0**

Figure 10: Average Fire Related Calls by Day of Week for 2015



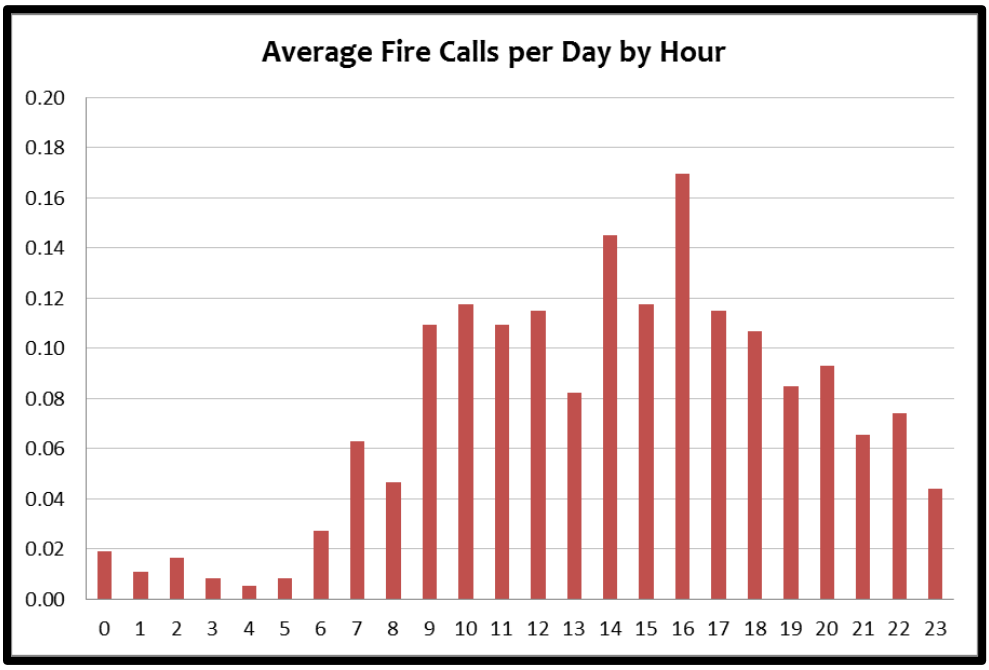
Fire related calls were evaluated by the hour of the day. Considerable variability exists in the time of day that requests for fire related services are received. While the middle of the day has the greatest frequency of calls, specifically the hours that begin at 1400 to 1600 are above 50 calls in a year. The average number of calls is 27 per hour. The data illustrates that the busiest times of the day for fire related incidents are between 0900 and 1800.

Finally, in an effort to provide a more granular understanding of the community's demand for fire related services, this temporal analysis included the average number of calls per hour. In other words, when referring to Table 9 below, the busiest hour is at 1600 with 62 calls during that hour in 2015. The average number of calls per hour is a daily average for those 62 calls if they were equally distributed. Therefore, the busiest hour per day would be at 1600 with an average hourly call volume of less than 1 at 0.17 calls each hour.

Table 9: Total and Average Fire Related Calls by Hour of Day for 2015

Hour of Day	Number of Calls	Calls per Day	Call Percentage
0	7	0.02	1.1
1	4	0.01	0.6
2	6	0.02	0.9
3	3	0.01	0.5
4	2	0.01	0.3
5	3	0.01	0.5
6	10	0.03	1.6
7	23	0.06	3.6
8	17	0.05	2.7
9	40	0.11	6.2
10	43	0.12	6.7
11	40	0.11	6.2
12	42	0.12	6.6
13	30	0.08	4.7
14	53	0.15	8.3
15	43	0.12	6.7
16	62	0.17	9.7
17	42	0.12	6.6
18	39	0.11	6.1
19	31	0.08	4.8
20	34	0.09	5.3
21	24	0.07	3.7
22	27	0.07	4.2
23	16	0.04	2.5
Total	**641**	**1.76**	**100.0**

Figure 11: Average Fire Related Calls per Day by Hour of Day in 2015



For these analyses, "Fire Related" incidents are an aggregated category of the various incident types available in the NFIRS database. The department utilizes these NFIRS incident types to accurately dispatch and categorize fire related call types. In 2015, the most frequent community demand for fire suppression services was for public service calls at 167 requests (26.1 percent of the total fire requests), followed by false alarm request for service at 145. There were 20 structure fire calls, 54 outside fire calls, and 15 vehicle fire calls.

Table 10: Fire Related Final CAD Incident Types

Granular Call Type	Number of Calls	Percentage of Total Fire Service Demands
Structure fire	20	3.1
Outside fire	54	8.4
Vehicle fire	15	2.3
False alarm	145	22.6
Good intent	117	18.3
Public service	167	26.1
Fire other	123	19.2

A single CCFD3 unit responded to sixty two percent (61.5%) of the fire requests. On average, 1.5 CCFD3 units responded to a fire call. The department made 953 unit responses to fire related calls. The total time on task was 421 hours, and the average time on task was 26.5 minutes. E34 and E33 responded to the most fire related calls.

Table 11: Number of Responding Units for Fire Calls

Number of Units	Number of Fire Calls	Percent of Total	Cumulative Percent	Average Call Duration (minutes)
1	394	61.5%	61.5%	19.9
2	181	28.2%	89.7%	29.1
3	66	10.3%	100.0%	72.8
Total	**641**			**27.9**

Table 12: Workload by Unit for Fire Calls

Station	Description	Unit Report	Avg. Busy Minutes per Response	Annual Busy Hours	Annual Total Responses
33	Ambulance	M33	17.9	55.9	187
	Engine	E33	41.6	93.7	135
	Brush Engine	B33	34.5	4.6	8
	Tender	T33	64.6	4.3	4
	Station 33 Total		28.5	158.5	334
34	Ambulance	M34	21.4	55.4	155
	Ambulance	M34A	17.1	24.8	87
	Engine	E34	25.2	87.1	207
	Brush Engine	B34	42.2	1.4	2
	Rescue	R34	61.4	9.2	9
	Tender	T34	35.3	3.5	6
	Station 34 Total		23.4	181.4	466
37	Ambulance	M37	35.1	43.3	74
	Engine	E37	27.1	34.4	76
	Brush Engine	B37	75.5	3.8	3
	Station 37 Total		31.9	81.4	153
CCFD3 Total			**26.5**	**421.3**	**953**

Basic Life Support Services

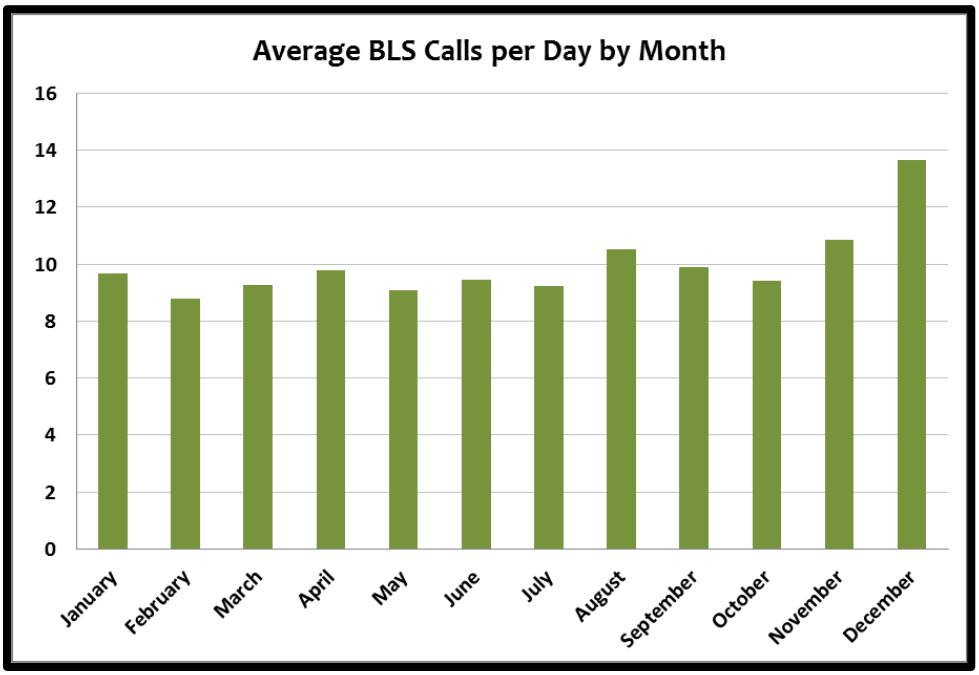
CCFD3 provides both basic life support (BLS) and advanced life support (ALS) as first responder. Temporal analyses were completed to describe the community's demands for BLS services. First, month of year, day of week, and hour of day EMS calls are presented below.

Average calls per month ranged from a low of 8.8 in February to a high of 13.6 per day in December. Results are presented in tabular form as Table 13 and Figure 12 below.

Table 13: Annual Total and Average per Day of BLS Calls by Month of Year

Month	Number of Calls	Calls per Day	Call Percentage
January	300	9.7	8.5
February	246	8.8	6.2
March	287	9.3	7.9
April	294	9.8	7.0
May	281	9.1	7.3
June	283	9.4	7.7
July	286	9.2	9.4
August	326	10.5	9.2
September	297	9.9	8.1
October	292	9.4	7.3
November	325	10.8	9.2
December	423	13.6	12.2
Total	**3,640**	**10.0**	**100.0**

Figure 12: Average BLS Calls per Day by Month of Year

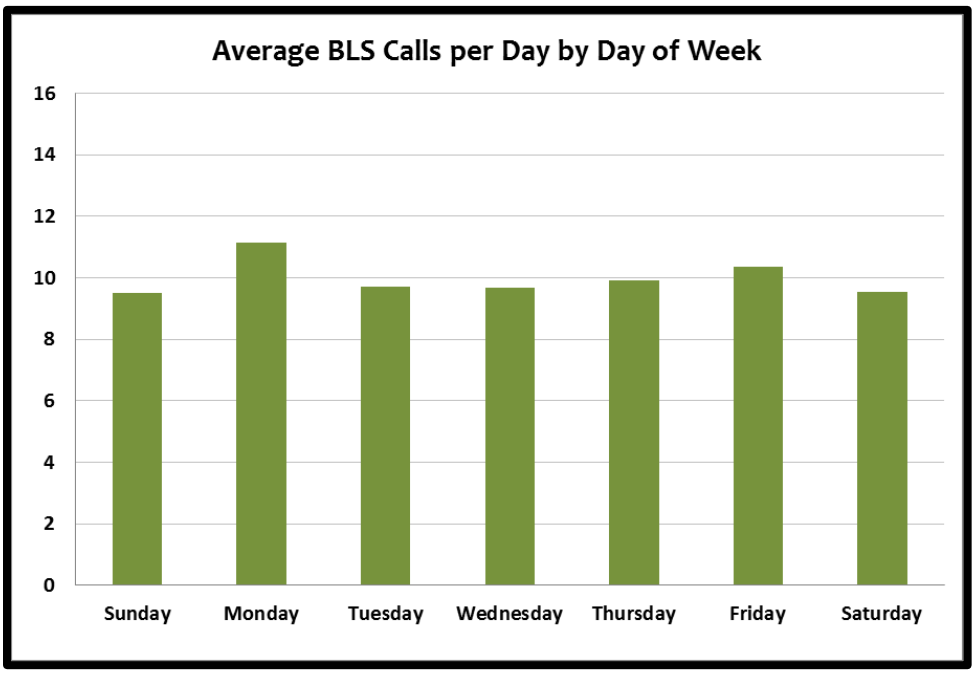


Similar analyses were conducted examining the frequency of requests for service by the day of the week. There is minor variability in the demand for services by the day of the week. Monday and Friday receive the most requests for service and Saturday and Sunday the least. Results are provided below as Table 14 and Figure 13, respectively.

Table 14: Annual Total and Average per Day of BLS Calls by Day of Week

Day of Week	Number of Calls	Calls per Day	Call Percentage
Sunday	494	9.5	13.6
Monday	580	11.2	15.9
Tuesday	504	9.7	13.8
Wednesday	503	9.7	13.8
Thursday	525	9.9	14.4
Friday	538	10.3	14.8
Saturday	496	9.5	13.6
Total	**3,640**	**10.0**	**100.0**

Figure 13: Average BLS Calls per Day by Day of Week

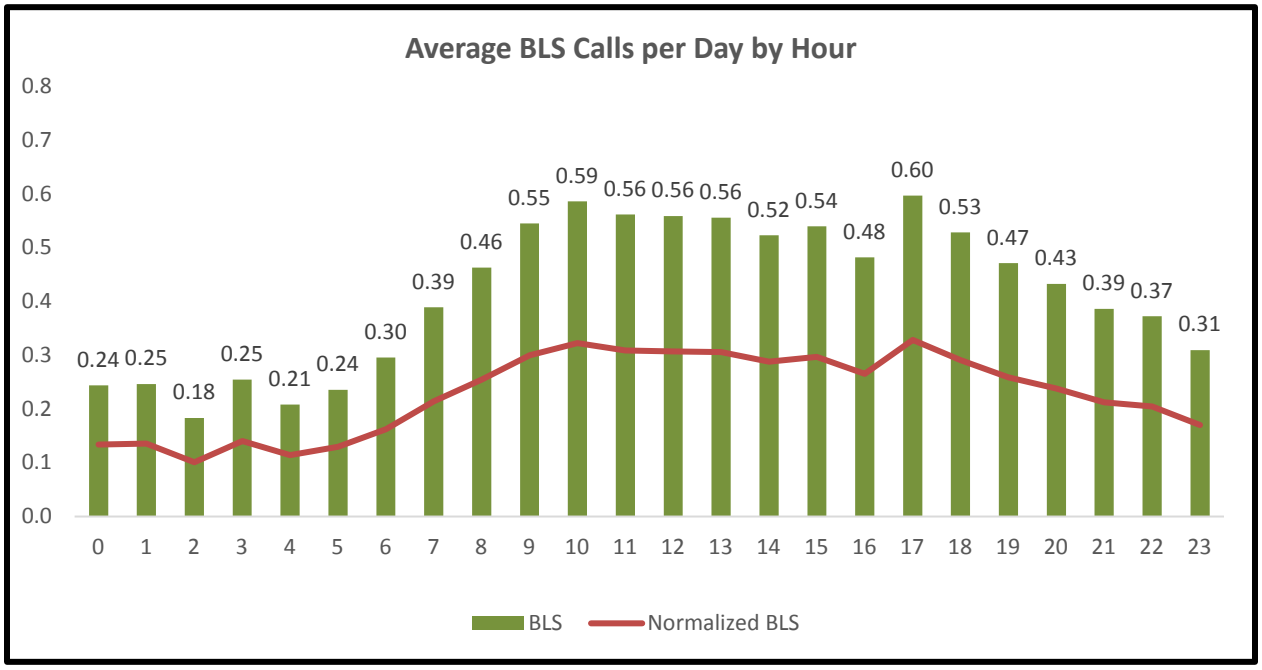


Finally, the analyses for BLS services are concluded by identifying the BLS calls by hour of day and the average hourly rate of BLS calls per hour. The demand curve for requests for BLS service follows an expected pattern experienced in similar communities across the nation. The higher frequency of service calls begins in the morning from 0900 to 1800. The average hourly rate of service requests does not exceed 0.60 for any hour during the day with the peak occurring at 1700. There are 0.42 calls on average and a low at 0200 of 0.18 calls on average during that hour. During the 8-hour period from midnight to 0700, the average per day is 2.06, which means the department on average responded to 2.06 BLS calls per day from midnight to 0700. A normalized value for BLS calls at a factor of 0.55 was applied to modify the effect of the 33-minute average call duration. Results are provided below as Table 15 and Figure 14.

Table 15: Annual Total and Average per Day of BLS Calls by Hour of Day

Hour of Day	Number of Calls	Calls per Day	Call Percentage
0	89	0.24	2.4
1	90	0.25	2.5
2	67	0.18	1.8
3	93	0.25	2.6
4	76	0.21	2.1
5	86	0.24	2.4
6	108	0.30	3.0
7	142	0.39	3.9
8	169	0.46	4.6
9	199	0.55	5.5
10	214	0.59	5.9
11	205	0.56	5.6
12	204	0.56	5.6
13	203	0.56	5.6
14	191	0.52	5.2
15	197	0.54	5.4
16	176	0.48	4.8
17	218	0.60	6.0
18	193	0.53	5.3
19	172	0.47	4.7
20	158	0.43	4.3
21	141	0.39	3.9
22	136	0.37	3.7
23	113	0.31	3.1
Total	**3,640**	**9.97**	**100.0**

Figure 14: Average BLS Calls per Day by Hour of Day



Ninety-two (92%) percent of the BLS calls were responded to by a single CCFD3 unit. On average, 1.1 units were dispatched per BLS call. The department made a total of 3,974 responses to BLS calls. The total time on task was 2,351 hours, and the average time on task was 36 minutes. Ambulance M34 is the most utilized unit.

Table 16: Workload by Unit for BLS Calls

Station	Description	Unit Report	Avg. Busy Minutes per Response	Annual Busy Hours	Annual Total Responses
33	Ambulance	M33	37.0	514.6	835
	Engine	E33	30.7	11.8	23
	Station 33 Total		**36.8**	**526.3**	**858**
34	Ambulance	M34	34.2	1,167.0	2,047
	Ambulance	M34A	35.3	405.5	690
	Engine	E34	21.2	10.3	29
	Rescue	R34	21.5	9.3	26
	Station 34 Total		**34.2**	**1,592.0**	**2,792**
37	Ambulance	M37	44.2	223.2	303
	Engine	E37	26.5	9.3	21
	Station 37 Total		**43.0**	**232.4**	**324**
CCFD3 Total			**35.5**	**2,350.8**	**3,974**

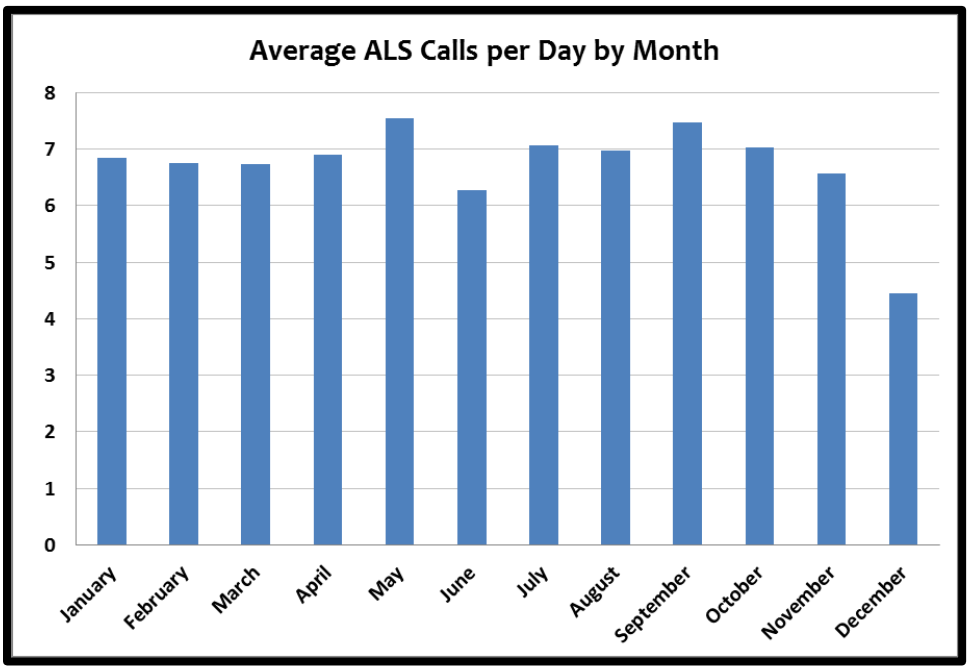
Advanced Life Support Services

Temporal analyses were completed to describe the community's demands for ALS services. First, month of year, day of week, and hour of day ALS calls are presented below. Average calls per month ranged from a low of 4.5 in December to a high of 7.5 per day in May and September. Results are presented in tabular form as Table 17 and Figure 15 below.

Table 17: Annual Total and Average per Day of ALS Calls by Month of Year

Month	Number of Calls	Calls per Day	Call Percentage
January	212	6.8	8.5
February	189	6.8	6.2
March	209	6.7	7.9
April	207	6.9	7.0
May	234	7.5	7.3
June	188	6.3	7.7
July	219	7.1	9.4
August	216	7.0	9.2
September	224	7.5	8.1
October	218	7.0	7.3
November	197	6.6	9.2
December	138	4.5	12.2
Total	**2,451**	**6.7**	**100.0**

Figure 15: Average ALS Calls per Day by Month of Year

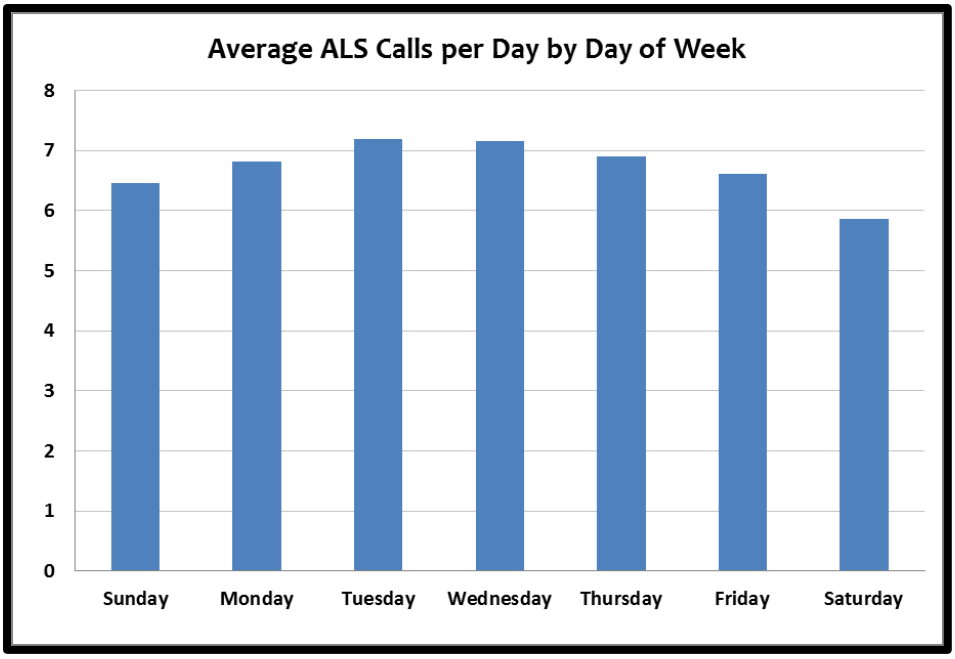


Similar analyses were conducted examining the frequency of requests for service by the day of the week. There is minor variability in the demand for services by the day of the week. Tuesday and Wednesday receive the most requests for service and Saturday the least. Results are provided below as Table 18 and Figure 16, respectively.

Table 18: Annual Total and Average per Day of ALS Calls by Day of Week

Day of Week	Number of Calls	Calls per Day	Call Percentage
Sunday	336	6.5	13.7
Monday	354	6.8	14.4
Tuesday	374	7.2	15.3
Wednesday	372	7.2	15.2
Thursday	366	6.9	14.9
Friday	344	6.6	14.0
Saturday	305	5.9	12.4
Total	**2,451**	**6.7**	**100.0**

Figure 16: Average ALS Calls per Day by Day of Week



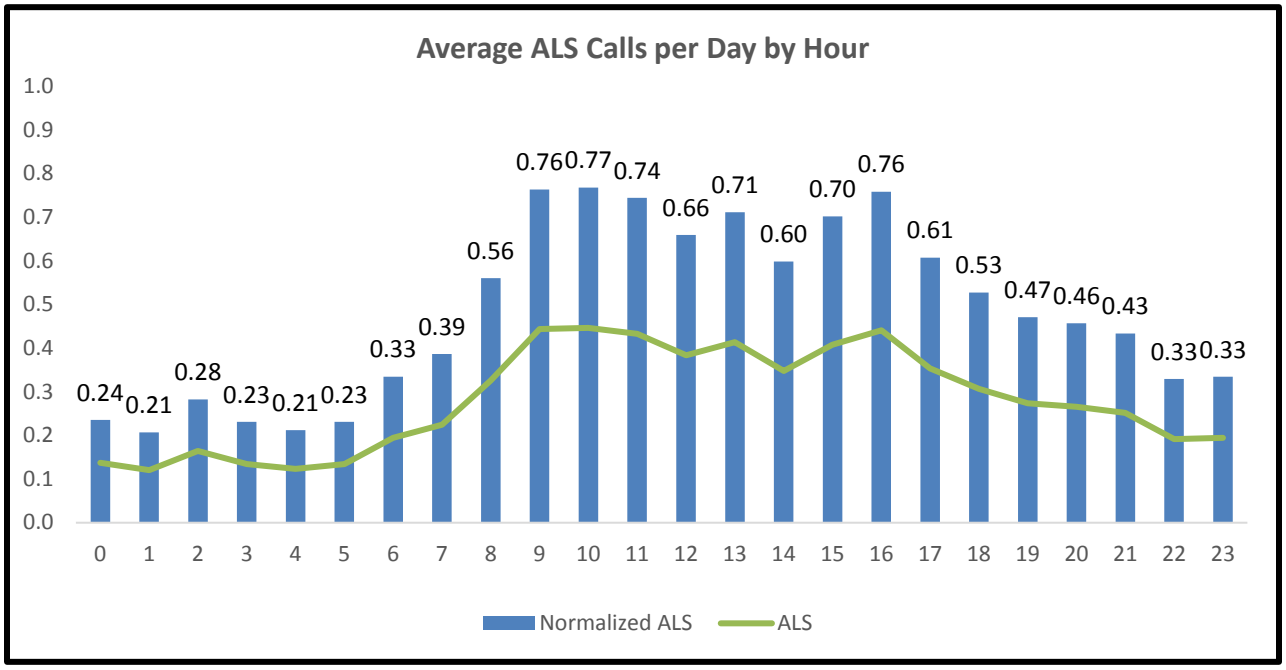
Finally, the analyses for ALS services are concluded by identifying the ALS calls by hour of day and the average hourly rate of ALS calls per hour. The demand curve for requests for ALS service follows an expected pattern experienced in similar communities across the nation. The higher frequency of service calls begins in the morning from 0900 to 1600. The average hourly rate of service requests does not exceed 0.45 for any hour during the day with the peak occurring at 1000. There are 0.28 calls on average and a low at 0100 of 0.12 calls on average during that hour. During the 8-hour period from midnight to 0700, the average per day is 1.23, which means the department on average responded to 1.23 ALS calls

per day from midnight to 0700. Similar to the BLS analysis, a normalized ALS value was created at a factor of 1.72 to account for the average call duration of an ALS transport at 103 minutes. Results are provided below as Table 19 and Figure 17.

Table 19: Annual Total and Average per Day of ALS Calls by Hour of Day

Hour of Day	Number of Calls	Calls per Hour	Call Percentage
0	50	0.14	2.0
1	44	0.12	1.8
2	60	0.16	2.4
3	49	0.13	2.0
4	45	0.12	1.8
5	49	0.13	2.0
6	71	0.19	2.9
7	82	0.22	3.3
8	119	0.33	4.9
9	162	0.44	6.6
10	163	0.45	6.7
11	158	0.43	6.4
12	140	0.38	5.7
13	151	0.41	6.2
14	127	0.35	5.2
15	149	0.41	6.1
16	161	0.44	6.6
17	129	0.35	5.3
18	112	0.31	4.6
19	100	0.27	4.1
20	97	0.27	4.0
21	92	0.25	3.8
22	70	0.19	2.9
23	71	0.19	2.9
Total	**2,451**	**6.72**	**100.0**

Figure 17: Average ALS Calls per Day by Hour of Day



Eighty-six (86%) percent of the ALS calls were responded to by a single CCFD3 unit. On average, 1.2 units were dispatched per ALS call. The department made a total of 2,831 responses to ALS calls. The total time on task was 3,032 hours, and the average time on task was 64 minutes. Ambulances M34 and M33 were the most utilized units.

Table 20: Workload by Unit for ALS Calls

Station	Description	Unit Report	Avg. Busy Minutes per Response	Annual Busy Hours	Annual Total Responses
33	Ambulance	M33	61.9	785.6	761
	Engine	E33	29.2	16.0	33
	Station 33 Total		**60.6**	**801.7**	**794**
34	Ambulance	M34	66.9	1,350.1	1,210
	Ambulance	M34A	64.0	463.8	435
	Engine	E34	22.5	10.5	28
	Rescue	R34	18.0	13.8	46
	Station 34 Total		**64.2**	**1,838.2**	**1,719**
37	Ambulance	M37	76.4	381.8	300
	Engine	E37	34.2	10.3	18
	Station 37 Total		**74.0**	**392.0**	**318**
CCFD3 Total			**64.3**	**3,031.9**	**2,831**

EMS Transports

CCFD3 provided transport services to both BLS and ALS requests. We analyzed outcomes for the EMS requests. The number of EMS transports occurring in CCFD3's jurisdiction totaled 3,134, averaging 8.6 transports per day. Overall, 52% of the EMS calls to which CCFD3 has responded to involve patients being transported to the hospital. ALS transport percentage was 68% whereas the BLS transport percentage was 40%.

However, 48 percent of the requests for EMS did not result in a transport to the hospital, an indication that the sickness/illness is of lower acuity. Duration of a call is defined as the difference between the first unit dispatch time and the last unit clear time. On average, the duration of an EMS transport call by the fire department or a fire department paramedic riding in was 103 minutes, which is 3.1 times of a BLS transport medic evaluation only call (33 minutes) and 3.6 times all "other" EMS calls (28 minutes).

Table 21: EMS Call Durations by ePCR Response Disposition

Response Disposition	Number of Calls	Duration
Treated, Tx by Oly Amb- w FD Medic Eval	1,262	33
Treated, Tx by Oly Amb w/FD Medic (ALS)	1,754	103
Treated, Tx by FD	99	108
Other EMS	2,976	28

We analyzed variation of EMS (BLS and ALS) calls and EMS transport calls by the hour of the day and the average hourly rate of requests. The variation of total EMS requests and EMS transport reports follow a similar pattern. The busiest period for EMS and EMS transport requests was between 0900 and 1700. The average hourly call rate did not exceed 1.03 calls per hour at the peak, 1000. EMS transport demand peaked at 0.62 calls per hour at 1000. This analysis is a reflection of the total patients transported by the EMS delivery system, and not specific to the number of incidents where the fire department either accompanied the ambulance to the hospital or transported the patient in a fire department vehicle. Therefore, requests and transports by hour of the day are represented below.

Figure 18: Average EMS Calls and EMS Transports per Day by Hour of Day

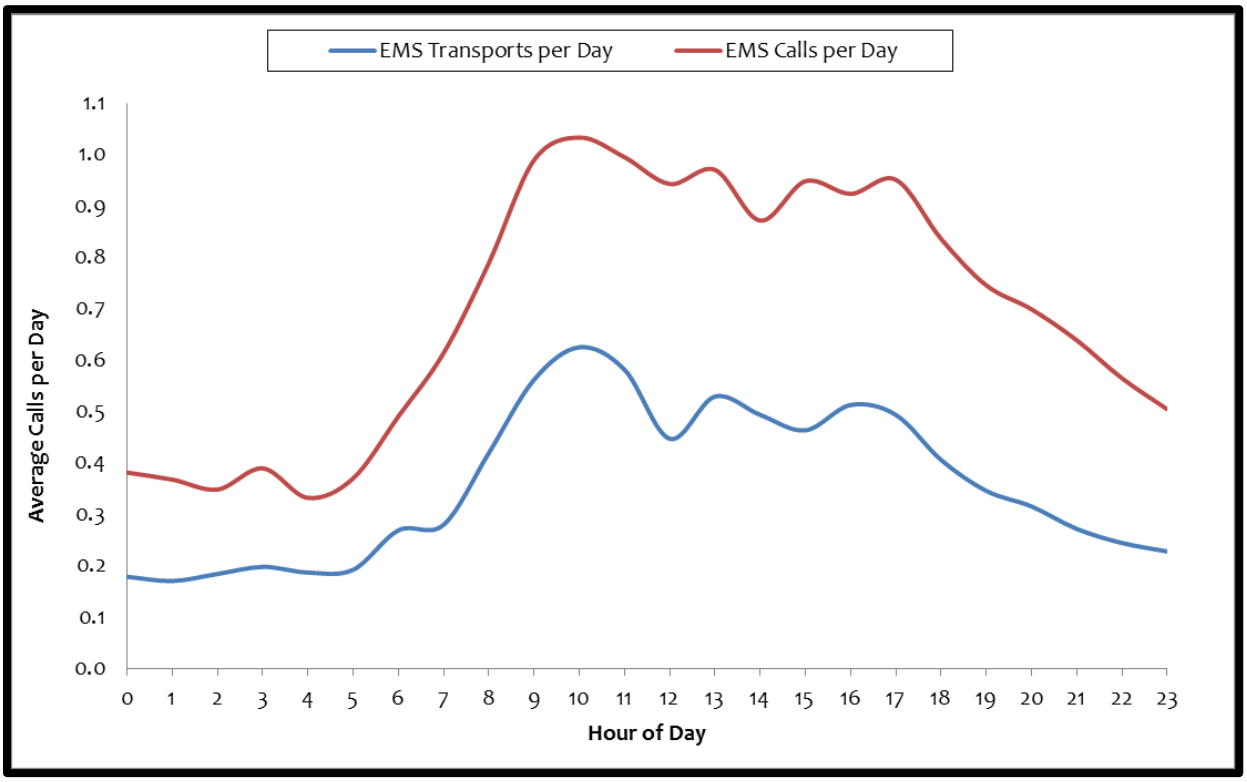


Table 22: Total EMS Calls and EMS Transports and Average per Day by Hour of Day

Hour	Number of BLS and ALS Transports	Number of BLS and ALS Calls	EMS Transports per Day	EMS Calls per Day	Transport Rate
0	65	139	0.18	0.38	46.8
1	62	134	0.17	0.37	46.3
2	67	127	0.18	0.35	52.8
3	72	142	0.20	0.39	50.7
4	68	121	0.19	0.33	56.2
5	70	135	0.19	0.37	51.9
6	98	179	0.27	0.49	54.7
7	102	224	0.28	0.61	45.5
8	153	288	0.42	0.79	53.1
9	205	361	0.56	0.99	56.8
10	228	377	0.62	1.03	60.5
11	212	363	0.58	0.99	58.4
12	163	344	0.45	0.94	47.4
13	193	354	0.53	0.97	54.5
14	180	318	0.49	0.87	56.6
15	169	346	0.46	0.95	48.8
16	187	337	0.51	0.92	55.5
17	180	347	0.49	0.95	51.9
18	148	305	0.41	0.84	48.5
19	126	272	0.35	0.75	46.3
20	115	255	0.32	0.70	45.1
21	99	233	0.27	0.64	42.5
22	89	206	0.24	0.56	43.2
23	83	184	0.23	0.50	45.1

REVIEW OF SYSTEM PERFORMANCE

The first step in determining the current state of CCFD3's deployment model is to establish baseline measures of performance. This analysis is crucial to the ability to discuss alternatives to the status quo and in identifying opportunities for improvement. This portion of the analysis will focus efforts on elements of response time and the cascade of events that lead to timely response with the appropriate apparatus and personnel to mitigate the event. Response time goals should be looked at in terms of total reflex time, or total response time, which includes the dispatch or call processing time, turnout time, and travel time, respectively.

Cascade of Events

The cascade of events is the sum of the individual elements of time beginning with a state of normalcy and continuing until normalcy is once again returned through the mitigation of the event. The elements of time that are important to the ultimate outcome of a structure fire or critical medical emergency begin with the initiation of the event. For example, the first on-set of chest pain begins the biological and scientific time clock for heart damage irrespective of when 911 is notified. Similarly, a fire may begin and burn undetected for a period of time before the fire department is notified. The emergency response system does not have control over the time interval for recognition or the choice to request assistance.

Therefore, CCFD3 utilizes quantifiable "hard" data points to measure and manage system performance. These elements include alarm processing (with updated CAD), turnout time, travel time, and the time spent on-scene. An example of the cascade of events and the elements of performance utilized by CCFD3 is provided as Figure 19 below.[1]

Detection

Is the element of time between the time an event occurs and someone detects it and the emergency response system has been notified. This is typically accomplished by calling the 911 Primary Safety Answering Point (PSAP).

Call Processing

This is the element of time measured between when communication center answers the 911 call, processes the information, and subsequently dispatches CCFD3.

[1] Olathe Fire Department. (2012). Adapted from Community Risk and Emergency Services Analysis: Standard of Cover. Olathe, Kansas: Author.

Turnout Time

This is the element of time that is measured between the time the fire department is dispatched or alerted of the emergency incident and the time when the fire apparatus or ambulance is enroute to the call.

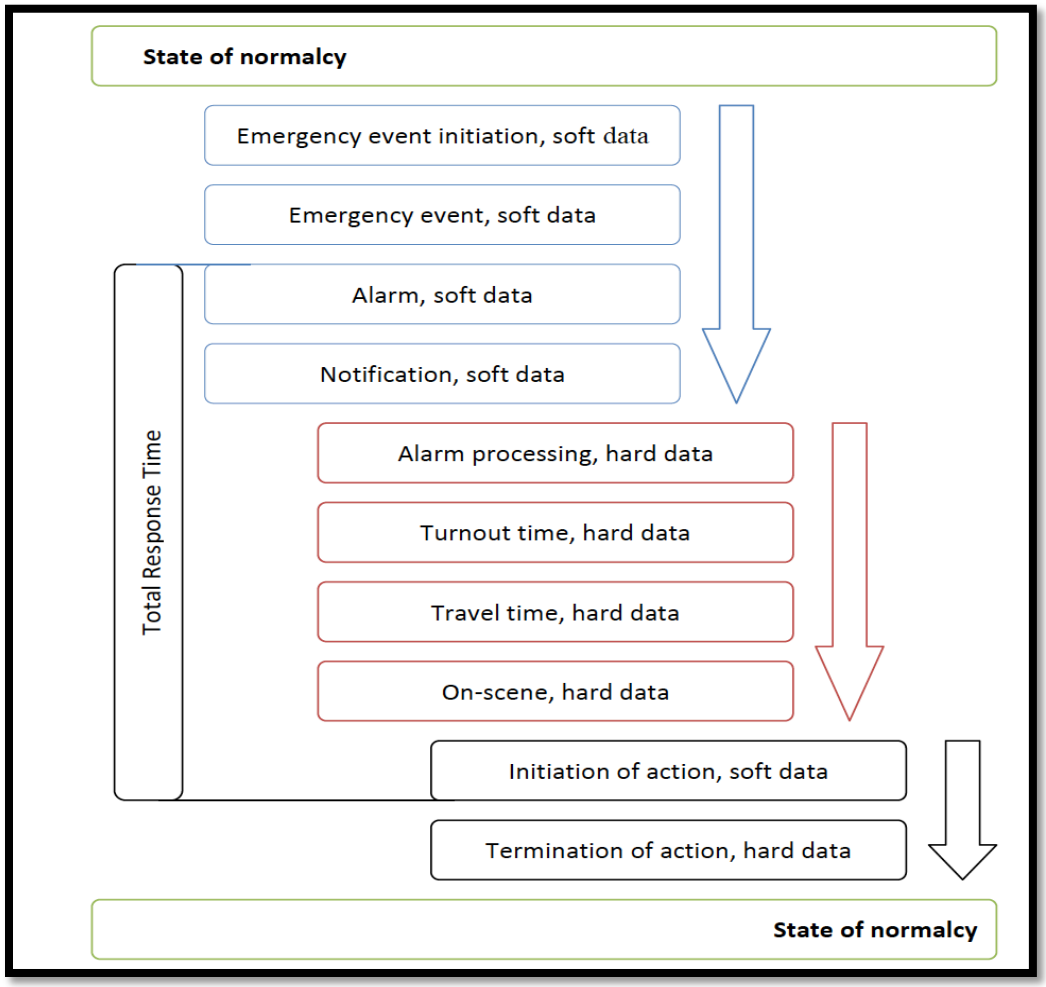
Travel Time

The travel time is the element of time between when the unit went enroute, or began to travel to the incident, and their arrival on-scene.

Total Response Time

The total response time, or total reflex time, is the total time required to arrive on-scene beginning with dispatch center answering the phone request for service and the time that the units arrive on-scene.

Figure 19: Cascade of Events



Comparison of Workloads by Fire Station Demand Zone

Another method of assessing the effectiveness of the distribution model is to analyze the demand for services across the distribution model. Workload is assessed at the Fire station Demand Zone (FDZ) level and at the individual unit level. For the purposes of this report, the station demand zone is synonymous with each station's first due response areas.

Analyses illustrate that of the three CCFD3 stations, Station 34 accounted for 66.2 percent of the total workload, station 33 accounted for 26.3 percent of the workload, and station 37 accounted for 7.5 percent of the workload. Results are presented below as Figure 20 and Table 23.

Figure 20: Unit Workload by Station Demand Zone

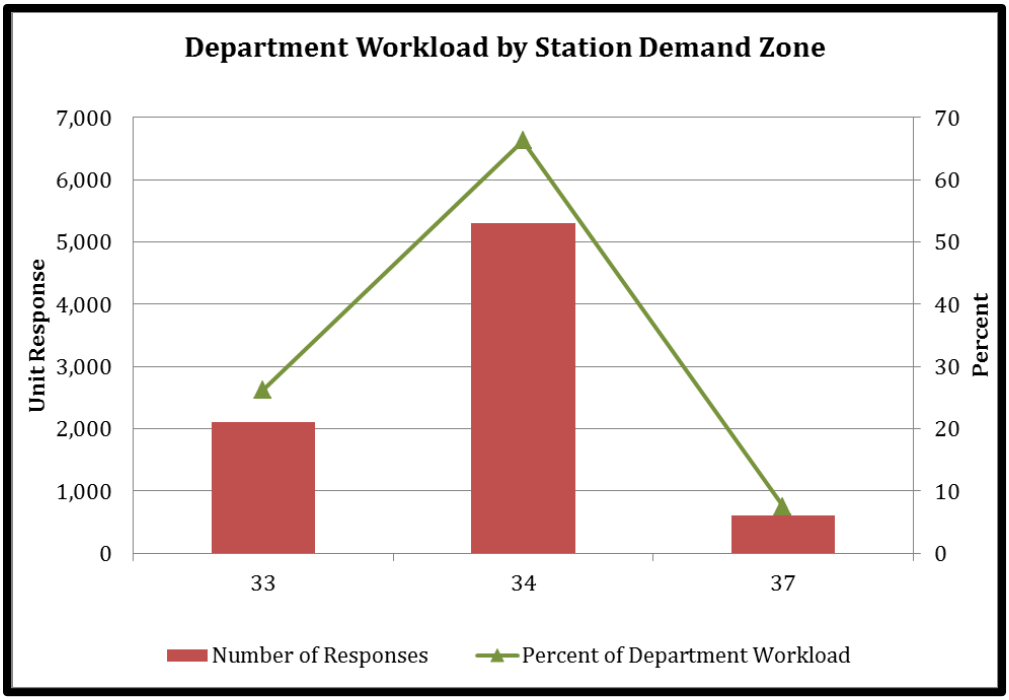


Table 23: Department Workload by Fire Station Demand Zone

First Due Station	Number of Calls	Calls per Day	Call Percentage	Number of Responses	Responses per Day	Percent of Department Workload
33	1,662	4.6	24.0	2,105	5.8	26.3
34	4,772	13.1	68.9	5,306	14.5	66.2
37	497	1.4	7.2	602	1.6	7.5
Total	**6,931**	**19.0**	**100**	**8,013**	**22.0**	**100**

Table 24: Number of Responses by Fire Station Demand Zone and Call Type

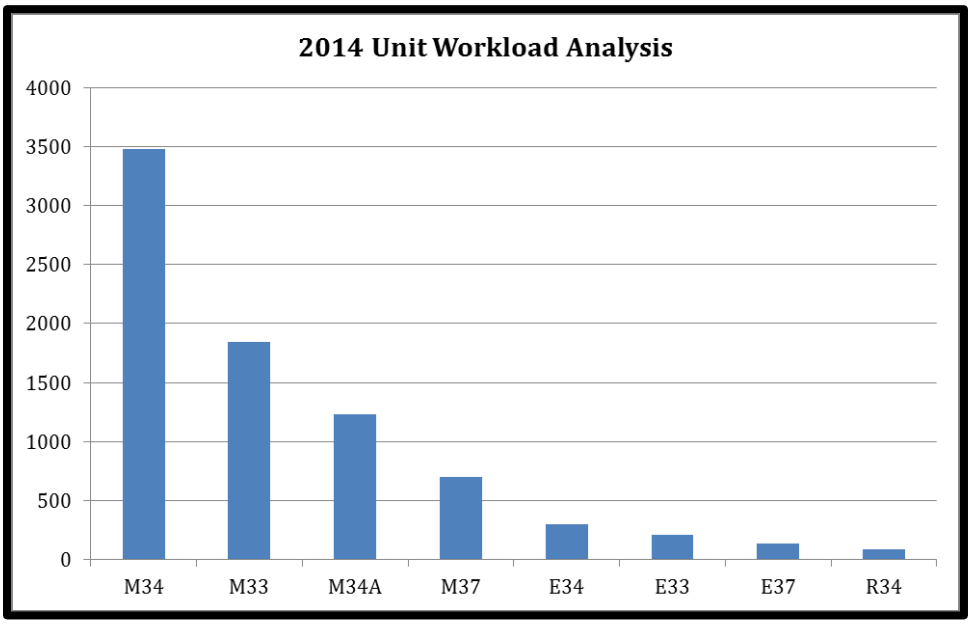
First Due Station	BLS	ALS	Fire	Canceled	Total
33	720	647	226	69	**1,662**
34	2,713	1,610	344	105	**4,772**
37	207	194	71	25	**497**
Total	**3,640**	**2,451**	**641**	**199**	**6,931**

Finally, unit workload analyses were completed for both comparative purposes as well as for introspection into potential system failures. First, this analysis utilized the summation of individual unit workload from dispatch to clear. Of all units, ambulance M34 was dispatched the most, a total of 3,482 runs in 2015, which accounted for almost 43% of the total unit responses and averaged 9.5 runs per day. The second most utilized apparatus was Ambulance M33. M33 made 1,848 run and averaged 5.1 runs per day.

Table 25: 2015 Unit Workload Analyses by Unit and Call Category

Station	Description	Unit	BLS	ALS	Fire	Canceled	Total	Responses per day
33	Ambulance	M33	835	761	187	65	1,848	5.1
	Engine	E33	23	33	135	20	211	0.6
	Brush Engine	B33	0	0	8	0	8	0.0
	Tender	T33	0	0	4	0	4	0.0
34	Ambulance	M34	2,047	1,210	155	70	3,482	9.5
	Ambulance	M34A	690	435	87	20	1,232	3.4
	Engine	E34	29	28	207	32	296	0.8
	Brush Engine	B34	0	0	2	1	3	0.0
	Rescue	R34	26	46	9	4	85	0.2
	Tender	T34	0	0	6	0	6	0.0
37	Ambulance	M37	303	300	74	25	702	1.9
	Engine	E37	21	18	76	18	133	0.4
	Brush Engine	B37	0	0	3	0	3	0.0

Figure 21: 2015 Number of Dispatches by Unit



Note: Each tender or brush engines was utilized less than 10 times in 2015.

Another measure, time on task, is necessary to evaluate best practices in efficient system delivery and consider the impact workload has on personnel. Unit Hour Utilization (UHU) determinants were developed by mathematical model. This model includes both the proportion of calls handled in each major service area (Fire, EMS, Special-Ops, and Service) and total unit time on task for these service categories in 2014. The resulting UHU's represent the percentage of the work period (24 hours) that is utilized responding to requests for service. Historically, the International Association of Fire Fighters (IAFF) has recommended that 24-hour units utilize 0.30, or 30% workload as an upper threshold.[2] In other words this recommendation would have personnel spend no more than eight (8) hours per day on emergency incidents. These thresholds take into consideration the necessity to accomplish non-emergency activities such as training, health and wellness, public education, and fire inspections. The 4th edition of the IAFF EMS Guidebook no longer specifically identifies an upper threshold. However, *FITCH* recommends that an upper unit utilization threshold of approximately .30, 0r 30%, would be considered best practice. In other words, units and personnel should not exceed 30%, or eight (8) hours, of their workday responding to calls. These recommendations are also validated in the literature. For example, in their review of the City of Rolling Meadows, the Illinois Fire Chiefs Association utilized a UHU threshold of .30 as an indication to add additional resources.[3] Similarly, in a standards of cover study facilitated by the Center for Public Safety Excellence, the Castle Rock Fire and Rescue Department

[2] International Association of Firefighters. (1995). Emergency *Medical Services: A Guidebook for Fire-Based Systems.* Washington, DC: Author. (p. 11)

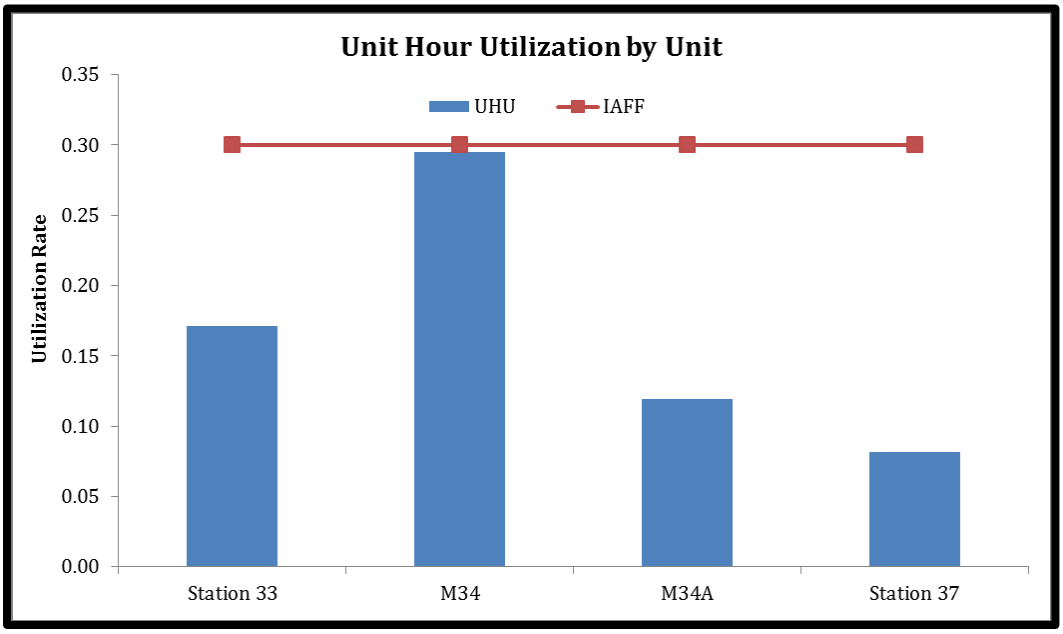
[3] Illinois Fire Chiefs Association. (2012). An *Assessment of Deployment and Station Location: Rolling Meadows Fire Department.* Rolling Meadows, Illinois: Author. (pp. 54-55)

utilizes a UHU of .30 as the upper limit in their standards of cover due to the necessity to accomplish other non-emergency activities.[4]

These thresholds take into consideration the necessity to accomplish non-emergency activities such as training, health and wellness, public education, and fire inspections.

In Station 33, all units (ambulance, engine, tender and brush engine) are cross staffed. In station 34, each shift staffs two units M34, and M34A. Engine, brush engine, rescue and tender units are cross staffed with one of the ambulances. In station 37, all units (ambulance, engine and brush engine) are cross staffed. The most utilized unit is M34 at approximately 29.5%, followed by cross staffed units in station 33 at 17.1%. Redistribution of workload from station 34 to 37 or 33 should help improving the system performance.

Figure 22: Unit Hour Utilizations



Note: Workload of all units in Station 34 except M34 is grouped into M34A.

Response Time Continuum

Fire

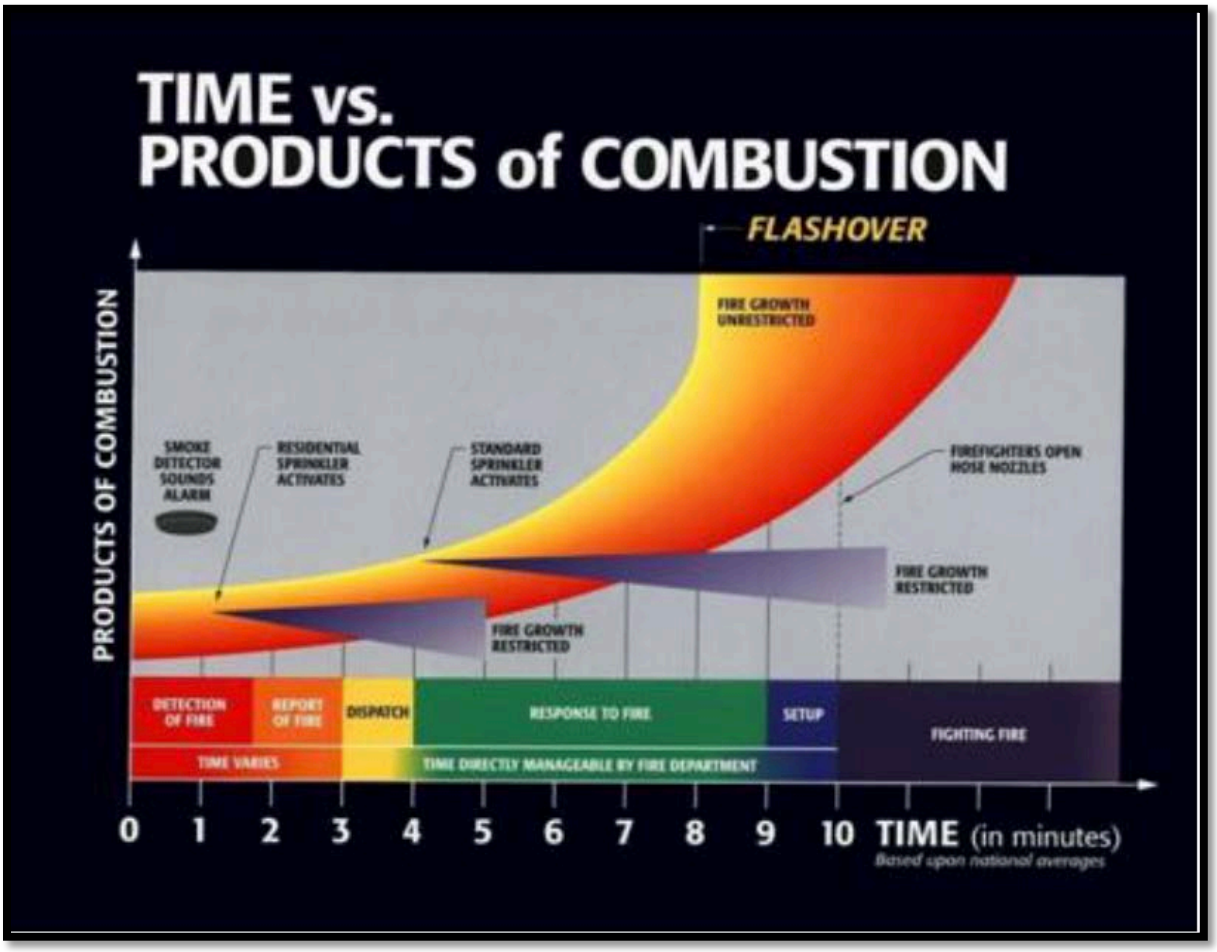
The number one priority with structural fire incidents is to save lives followed by the minimization of property damage. A direct relationship exists between the timeliness of the response and the

[4] Castle Rock Fire and Rescue Department. (2011). Community *Risk Analysis and Standards of Cover.* Castle Rock, Colorado: Author. (p. 58)

survivability of unprotected occupants and property damage. The most identifiable point of fire behavior is Flashover.

Flashover is the point in fire growth where the contents of an entire area, including the smoke, reach their ignition temperature, resulting in a rapid-fire growth rendering the area un-survivable by civilians and untenable for firefighters. Best practices would result in the fire department arriving and attacking the fire prior to the point of flashover. A representation of the traditional time temperature curve and the cascade of events is provided as Figure 23 below.[5]

Figure 23: Example of Traditional Time Temperature Curve

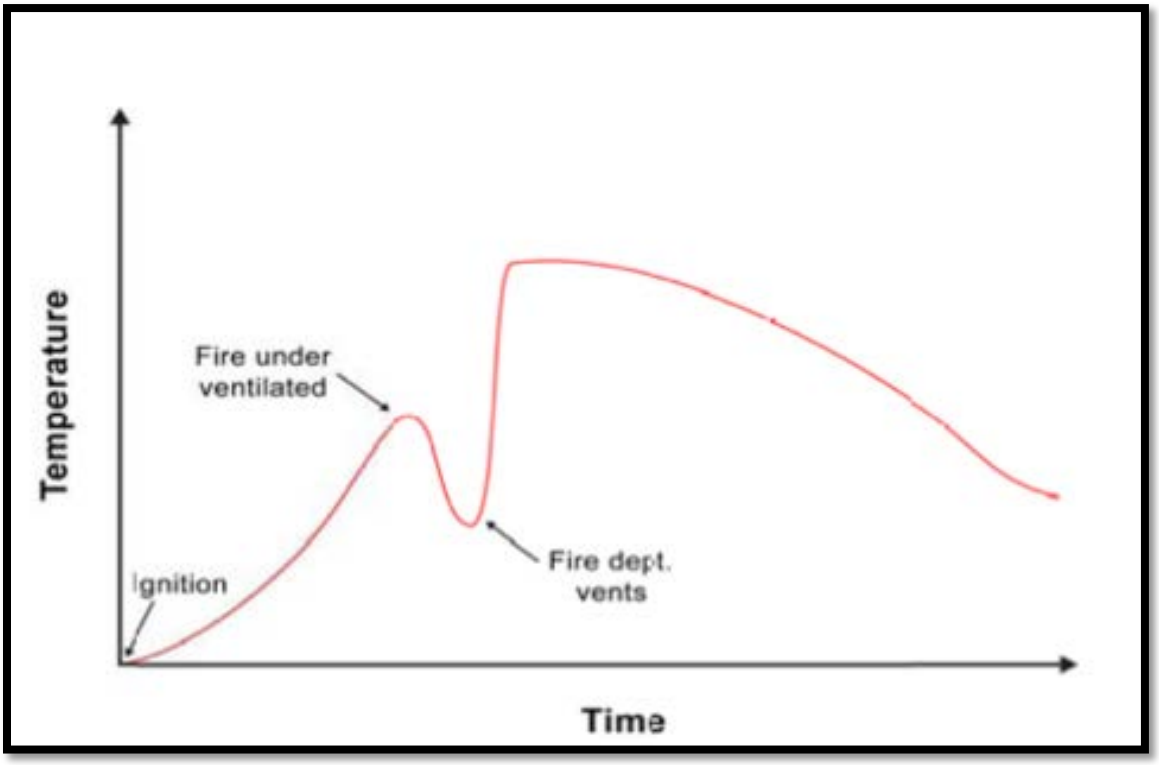


Recent studies by Underwriter's Laboratories (UL) have found that in compartment fires such as structure fires, flashover occurs within 4 minutes in modern fire environment. In addition, the UL research has identified an updated time temperature curve due to fires being ventilation controlled rather than fuel controlled as represented in the traditional time temperature curve. While this

[5] Example of Traditional Time Temperature Curve. Retrieved at http://www.usfa.fema.gov/downloads/pdf/coffee-break/time-vs-products-of-combustion.pdf

ventilation controlled environment continues to provide a high risk to unprotected occupants to smoke and high heat, it does provide some advantage to property conservation efforts as water may be applied to the fire prior to ventilation and the subsequent flashover. An example of UL's ventilation controlled time temperature curve is provided as Figure 24 below.[6]

Figure 24: Ventilation Controlled Time Temperature Curve



EMS

The effective response to Emergency Medical Service (EMS) incidents also has a direct correlation to the ability to respond within a specified period of time. However, unlike structure fires, responding to EMS incidents introduces considerable variability in the level of clinical acuity. From this perspective, the association of response time and clinical outcome varies depending on the severity of the injury or the illness. Research has demonstrated that the overwhelming majority of requests for EMS services are not time sensitive between 5 minutes and 11 minutes for emergency and 13 minutes for non-emergency responses.[7] The 12-minute upper threshold is only the upper limit of the available research and is not a

[6] UL/NIST Ventilation Controlled Time Temperature Curve. Retrieved from http://www.nist.gov/fire/fire_behavior.cfm

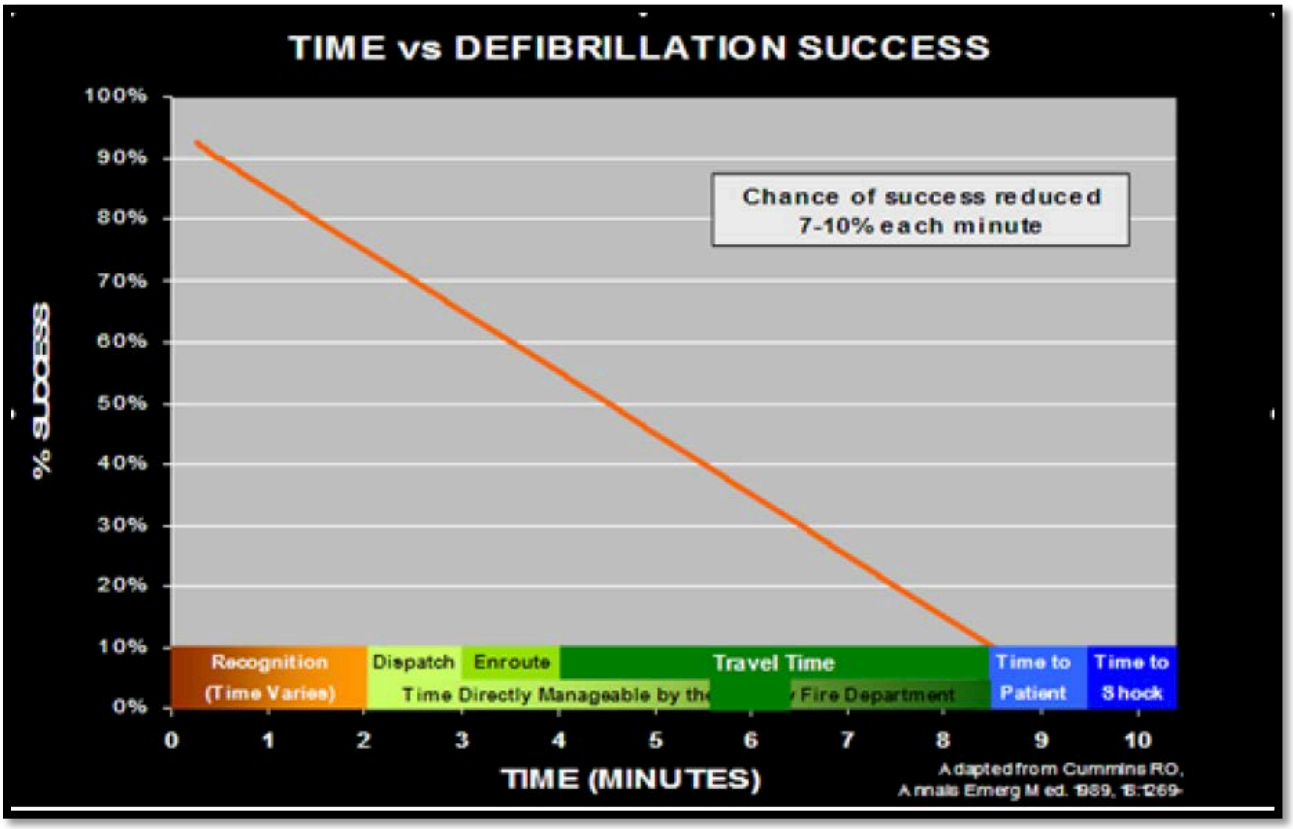
[7] Blackwell, T.H., & Kaufman, J.S. (April 2002). Response time effectiveness: Comparison of response time and survival in an urban emergency medical services system. *Academic Emergency Medicine,* 9(4): 289-295.

clinically significant time measure, as patients were not found to have a significantly different clinical outcome when the 12-minute threshold was exceeded.[8]

Out of hospital sudden cardiac arrest is the most identifiable and measured incident type for EMS. In an effort to demonstrate the relationship between response time and clinical outcome, a representation of the cascade of events and the time to defibrillation (shock) is presented as Figure 25 below. The American Heart Association (AHA) has determined that brain damage will begin to occur between four and six minutes and become irreversible after 10 minutes without intervention.

Modern sudden cardiac arrest protocols recognize that high quality Cardio-Pulmonary Resuscitation (CPR) at the Basic Life Support (BLS) level is a quality intervention until defibrillation can be delivered in shockable rhythms. Figure 24[9] below is representative of a sudden cardiac arrest that is presenting in a shockable heart rhythm such as Ventricular Fibrillation or Ventricular Tachycardia.

Figure 25: Cascade of Events for Sudden Cardiac Arrest with Shockable Rhythm



[8] Blackwell, T.H., et al. (Oct-Dec 2009). Lack of association between prehospital response times and patient outcomes. *Prehospital Emergency Care,* 13(4): 444-450.

[9] Olathe Fire Department. (2012). Adapted from Community Risk and Emergency Services Analysis: Standard of Cover. Olathe, Kansas: Author.

In general, the actual performance validates the planning assessments on potential performance. The historical travel time performance for each fire station demand zone is provided below.

Description of First Arriving Unit Performance

Analyses of the response characteristics of the first arriving units were conducted. This analysis utilized unit responses responded with lights and sirens in 2015. Overall, the department had a mean turnout time of 90 seconds, or 1 minute and 30 seconds, and 155 seconds, or 2 minutes and 35 seconds at the 90th percentile. The travel time for all first arriving unit responses were calculated irrespective of their assigned station FDZ. In other words, this analysis describes the first arriving unit to the scene. The mean travel time was 342 seconds, or 5 minutes and 42 seconds. Performance at the 90th percentile was 615 seconds, or 10 minutes and 15 seconds.

Response time is from call received through unit arriving on scene. The mean response time is 492 seconds, or 8 minutes and 12 seconds. Performance at the 90th percentile is 793 seconds, or 13 minutes and 13 seconds. Results of first arriving unit performance are presented below.

Table 26: Description of First Arriving Unit Emergency Response Performance

Measure	Average	90th Percentile
Dispatch Time	1.0	2.1
Turnout Time	1.5	2.6
Travel Time	5.7	10.3
Response Time	8.2	13.2

First Arriving Unit Response Time by Fire Station Demand Zone

Further analyses were conducted to measure the performance of the first arriving unit in each station. This analysis included all unit responses to capture only all responses within each FDZ at the first arriving unit. Response times are reported below at both the mean and 90th percentile.

Examination of the overall performance at the 90th percentile reveals that Station 34 had the fastest response time performance. Station 37 had longer mean and 90th percentile response times. An illustrative comparison of FDZ performance at the 90th percentile is provided below.

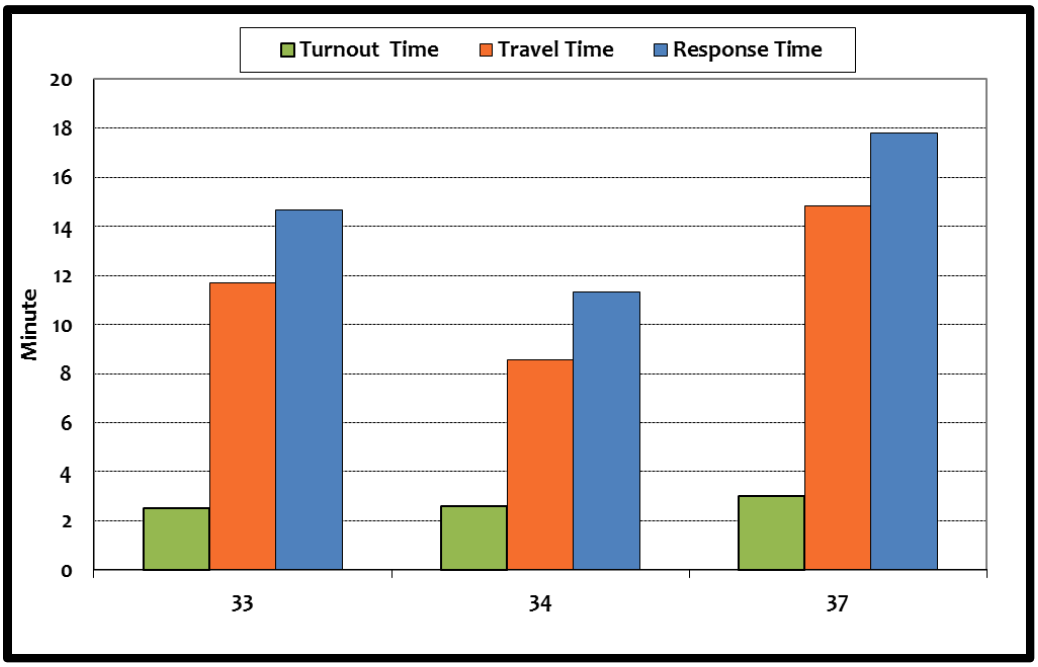
Table 27: Mean First Arrival Performance by FDZ

First Due Station	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size
33	1.1	1.5	7.2	9.8	1,284
34	1.0	1.5	4.9	7.4	4,086
37	1.1	1.8	9.1	12.1	375

Table 28: 90th Percentile First Arrival Performance by FDZ

First Due Station	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size
33	2.2	2.5	11.7	14.7	1,284
34	2.1	2.6	8.6	11.3	4,086
37	2.3	3.0	14.9	17.8	375

Figure 26: 90th Percentile First Arrival Performance by Station FDZ



The data was further analyzed to compare the individual station FDZ performances. With respect to turnout time, stations 33 and 34 are experiencing similar average and 90th percentile turnout times. Regarding travel time, station 34 has the faster average and 90th percentile travel time. Thus, station 34 has faster average and 90th percentile response time.

Figure 27: 90th Percentile Turnout Time by Station FDZ

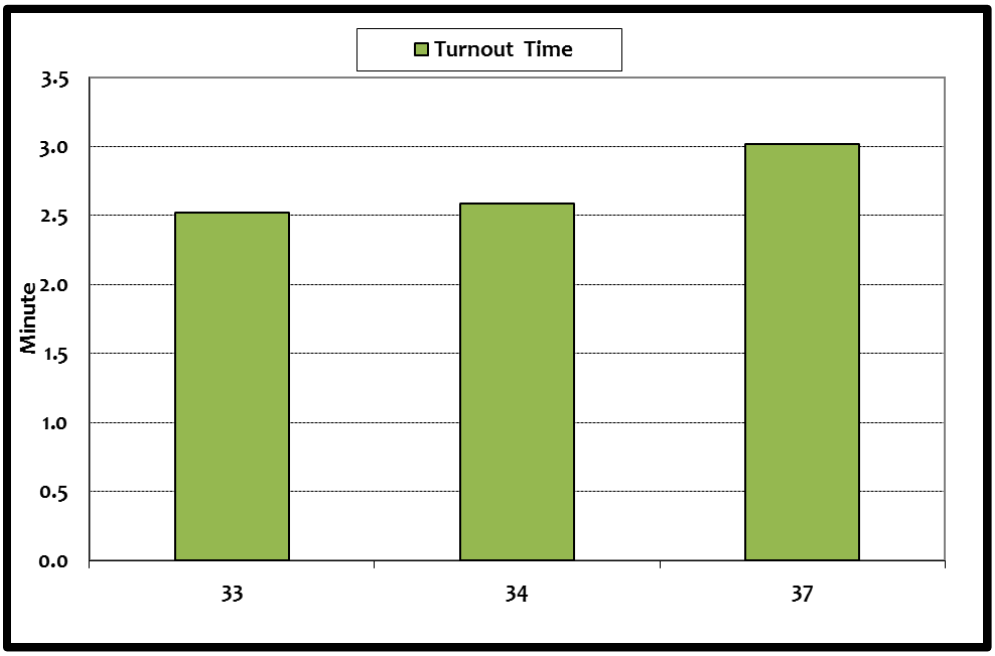


Figure 28: 90th Percentile Travel Time Performance by Station FDZ

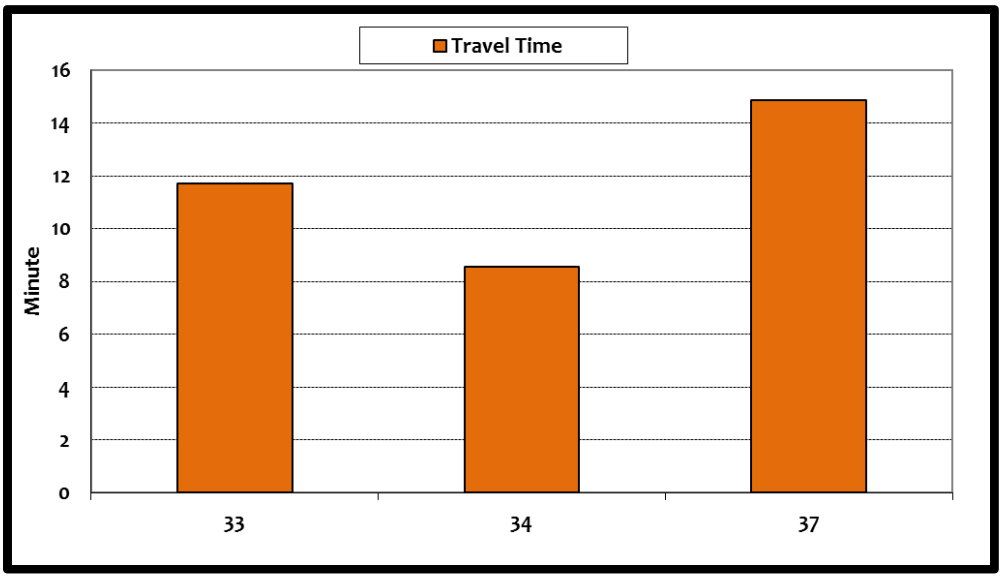
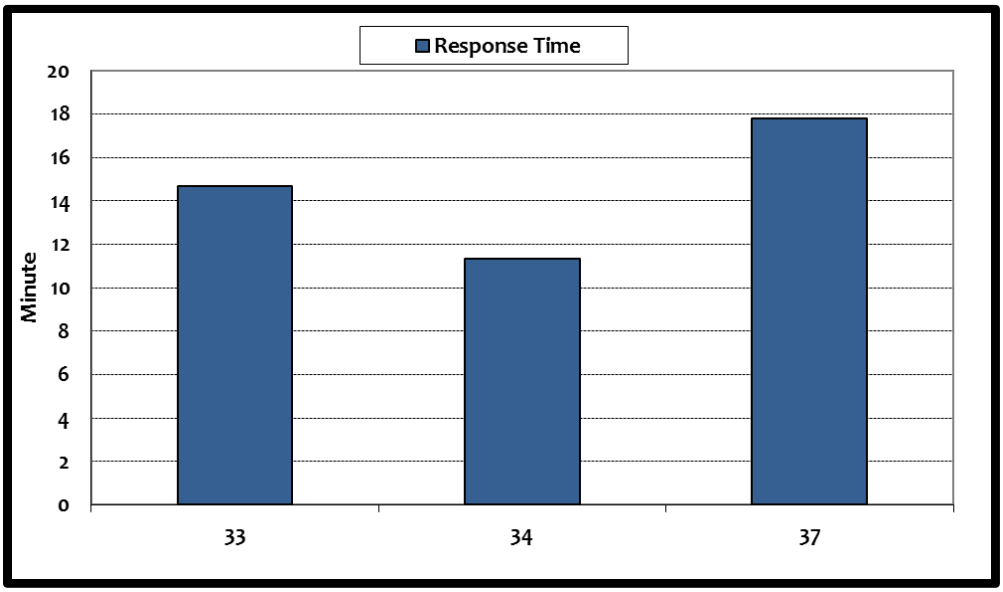


Figure 29: 90th Percentile Response Time Performance by Station FDZ



The Department has also sub-divided the first-due response districts by "Quadrants" for each area. For example, for the first due territory for Station 33, the following quadrants exist: 31W, 32, 32 –AA, and 36, respectively. Utilizing the CAD incident data provided, the response performance for the career units are provided for each of the corresponding quadrants. The mean and 90th percentile performance is provided as Tables 29 and 30 below.

Table 29: Mean Performance by First Due Career Station and Corresponding Quadrant

First Due Career Station	Quadrant	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size
33	31W	1.0	1.6	8.6	11.2	108
	32	1.1	1.5	9.7	12.3	250
	32 - AA	1.2	1.5	11.6	14.2	127
	33	1.0	1.5	5.4	7.8	768
	36	1.4	1.4	11.5	14.3	31
34	31E	1.1	1.5	8.8	11.5	209
	34E	1.0	1.5	6.1	8.6	363
	34W	1.0	1.5	4.5	7.0	3,514
37	35	1.2	1.8	13.4	16.4	96
	37E	1.4	1.9	7.9	11.3	30
	37JeffN	1.2	2.0	11.1	14.2	49
	37JeffS	1.9	0.6	9.7	12.2	2
	37W	1.0	1.8	6.8	9.6	198

Table 30: 90th Percentile Performance by First Due Career Station and Corresponding Quadrant

First Due Station	Quadrant	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size
33	31W	2.5	2.7	11.2	14.4	108
	32	2.6	2.6	13.6	16.8	250
	32 - AA	2.8	2.7	16.9	19.5	127
	33	2.1	2.5	8.9	11.6	768
	36	3.8	2.6	20.3	21.4	31
34	31E	2.3	2.7	12.0	15.2	209
	34E	1.8	2.5	8.9	11.8	363
	34W	2.1	2.6	7.9	10.7	3,514
37	35	3.0	2.8	20.4	24.1	96
	37E	3.2	3.0	11.5	15.4	30
	37JeffN	2.1	3.2	17.2	20.2	49
	37JeffS	2.9	1.3	10.3	12.4	2
	37W	2.1	3.0	12.5	15.1	198

The volunteer units and performance were not provided within the CAD data but were accessible through the Department's internal records and the National Fire Incident Reporting System (NFIRS). Therefore, self-reported data were examined by Quadrant and Unit to assess the overall performance of the volunteer companies within the District. This is an important analysis as the Department/District understands and values their reliance on the volunteer forces to be successful.

First, we examined each Quadrants performance by restricting the analysis to the volunteer units. This analysis is at the Quadrant level and reports the volunteer performance to the Quadrant regardless of

whether the arrival was from the closest station or with a personally owned vehicle (POV). Not all of the Quadrants are represented in this portion of the analysis as the volunteers did not have a documented arrival within 2015. The final column titled "Volunteer Differential" is the calculated difference between the career units and the volunteer units. Therefore, a negative value in parentheses and red, would indicate that the career staff is arriving more quickly than the volunteer staff. All positive values would indicate that the volunteer efforts arrived more quickly than their career counter parts.

This analysis would suggest that the volunteer component of the District's fire department is reducing the overall response time in the area(s) of the greatest frequency of calls, most notably Quadrant 35. However, caution should be exercised as the general sample sizes are low and can artificially influence results, especially at the 90th percentile. The mean and 90th percentile performance is provided as Tables 31 and 32 below.

Table 31: Mean Quadrant Performance by Volunteer Forces

Quadrant	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size	Volunteer Differential
32	4.5	4.1	4.3	12.9	12	(0.60)
32 - AA	5.8	5.0	7.7	18.5	18	(4.30)
33	20.2	0.5	7.0	20.0	6	(12.20)
36	0.6	0.0	8.3	8.9	1	5.40
31E	0.8	2.8	8.6	12.2	5	(0.70)
34W	14.9	0.0	11.7	23.0	6	(16.00)
35	3.3	2.3	2.7	8.3	72	8.10
37JeffN	4.4	1.0	6.9	12.2	18	2.00
37W	0.4	14.7	7.7	22.8	1	(13.20)
Total	**5.0**	**2.6**	**4.9**	**11.9**	**139**	

Table 32: 90th Percentile Quadrant Performance by Volunteer Forces

Quadrant	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size	Volunteer Differential
32	13.3	9.9	6.7	15.7	12	1.12
32 - AA	13.9	13.0	10.6	22.4	18	(2.83)
33	75.9	3.1	9.1	37.4	6	(25.77)
36	0.6	0.0	8.3	8.9	1	12.52
31E	1.5	12.6	11.6	24.6	5	(9.43)
34W	51.2	0.0	35.6	62.0	6	(51.28)
35	6.6	5.8	3.8	10.9	72	13.20
37JeffN	6.3	3.6	8.1	15.9	18	4.30
37W	0.4	14.7	7.7	22.8	1	(7.77)
Total	**11.9**	**8.9**	**9.7**	**20.7**	**139**	

An evaluation of the individual volunteer units/apparatus was examined to evaluate the overall response time performance by first arriving volunteer unit. This analysis does not restrict the jurisdiction to a first-due area, but rather measures the unit's performance. The mean and 90th percentile performances are provided as Tables 33 and 34 below.

Table 33: Mean Performance for First Arriving Volunteer Unit

Unit	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size
A31	0.7	0.0	7.3	7.9	7
A32	5.6	4.6	6.1	16.4	22
A35	1.3	4.1	3.3	8.6	36
E31	9.5	4.6	16.6	30.7	3
E32	15.4	3.0	7.4	21.0	14
E35	1.3	13.5	5.3	20.1	3
F3V	4.9	0.3	3.8	9.0	54
Total	**5.0**	**2.6**	**4.9**	**11.9**	**139**

Table 34: 90th Percentile for First Arriving Volunteer Unit

Unit	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size
A31	1.7	0.0	11.6	12.4	7
A32	13.3	10.7	9.7	20.7	22
A35	4.4	6.1	7.4	11.9	36
E31	26.4	12.6	35.6	62.0	3
E32	51.2	9.6	12.0	37.4	14
E35	3.1	18.1	7.7	26.2	3
F3V	7.2	0.0	7.8	13.4	54
Total	**11.9**	**8.9**	**9.7**	**20.7**	**139**

Effective Response Force Capabilities

The capability of an Effective Response Force (ERF) to assemble in a timely manner with the appropriate personnel, apparatus, and equipment is important to the success of a significant structural fire event. Therefore, it is important to measure the capabilities of assembling an ERF. In most fire departments, the distribution model performs satisfactorily, but it is not uncommon to be challenged to assemble an ERF in the recommended timeframes.

Several factors affect the capabilities to assemble an ERF such as the number of fire stations, number of units, and number of personnel on each unit. Each of these policy decisions should be made in relation to the community's specific risks and the willingness to assume risk.

Analyses of historical performance for each station reveal that none of the three stations can generally assemble two units on scene within a 90th percentile travel time of eight minutes[10] [11]. The graphic results for each fire station demand zone are presented in the Figures below.

Figure 30: ERF Travel Performance for Station 33

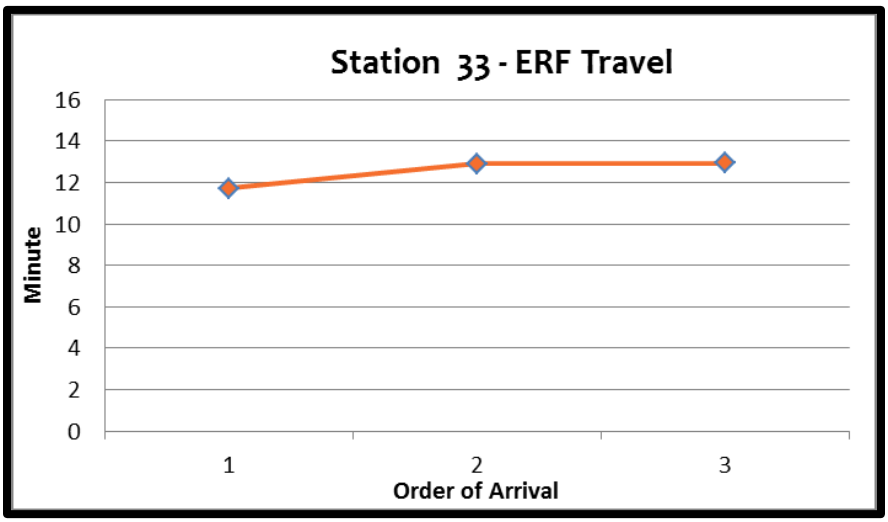
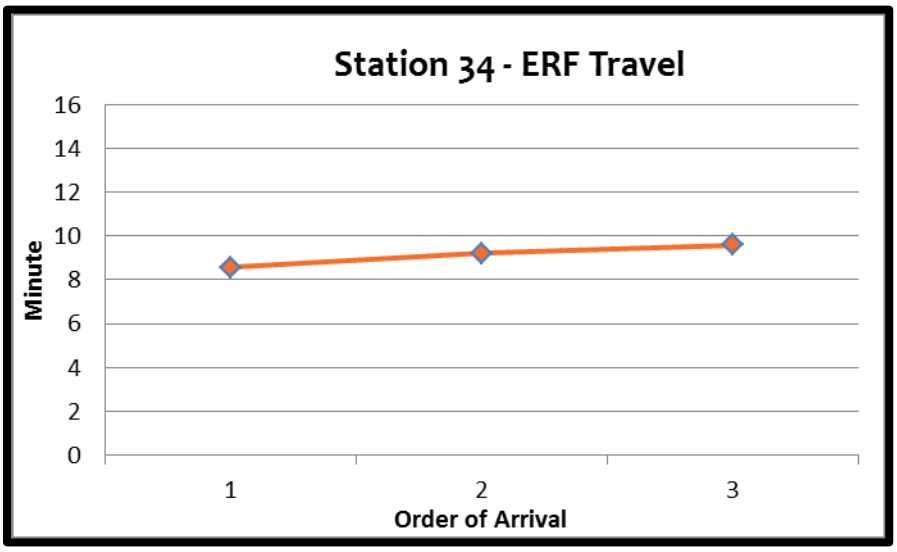


Figure 31: ERF Travel Performance for Station 34



[10] National Fire Protection Association. (2010). NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*. Boston, MA: National Fire Protection Association.

[11] CFAI. (2009). Fire & emergency service self-assessment manual, (8th ed.). Chantilly, Virginia: Author. (page 71)

In addition, the data is presented in tabular form below. The table presents the historical travel times by the order of the arriving unit. Please note the sample sizes vary by order of arrival. The sample size is 27 and 3 for station 37 calls' second and third arriving units respectively.

Table 35: Historical Mean and 90th Percentile Travel Time Performance for ERF by Station FDZ

Order of Arrival	Average			90th Percentile		
	Sta 33	Sta 34	Sta 37	Sta 33	Sta 34	Sta 37
1	7.2	7.9	7.9	11.7	8.6	14.9
2	4.9	5.4	5.5	12.9	9.2	20.0
3	9.1	9.8	NA	12.9	9.6	NA

Reliability Factors

Percentage of First Due Compliance

The reliability of the distribution model is a factor of how often the response model is available and able to respond to the call within the assigned demand zone. If at least one unit from the first due station is able to respond to a call, we consider the station is able to respond to the call within the assigned demand zone. Utilizing the department's Fire Station Demand Zones (FDZ), analyses reveal that all three stations are capable of meeting their demand for services at the 90th percentile. In other words, when request for service is received, units in stations 33, 34 and 37 are available to answer the call 9 out of 10 times. It is considered both best practice and the most reliable measure to perform at the 90th percentile as indicated by the "blue" line in the Figure below. This analysis utilized all dispatched calls and the performance included all assigned units to the specific FDZ.

Figure 32: Percentage Reliability by Station FDZ

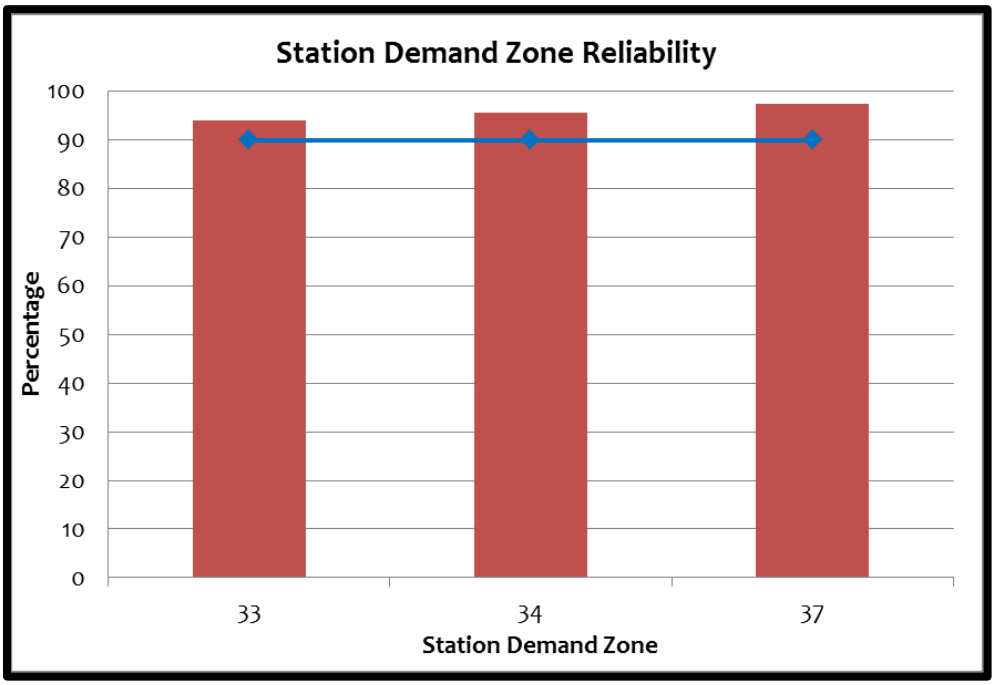


Table 36: Percentage Reliability by Station FDZ

Station Demand Zone	Reliability Percentage	Number of Calls
33	94.0	1,662
34	95.6	4,772
37	97.4	497

Overlapped or Simultaneous Call Analysis

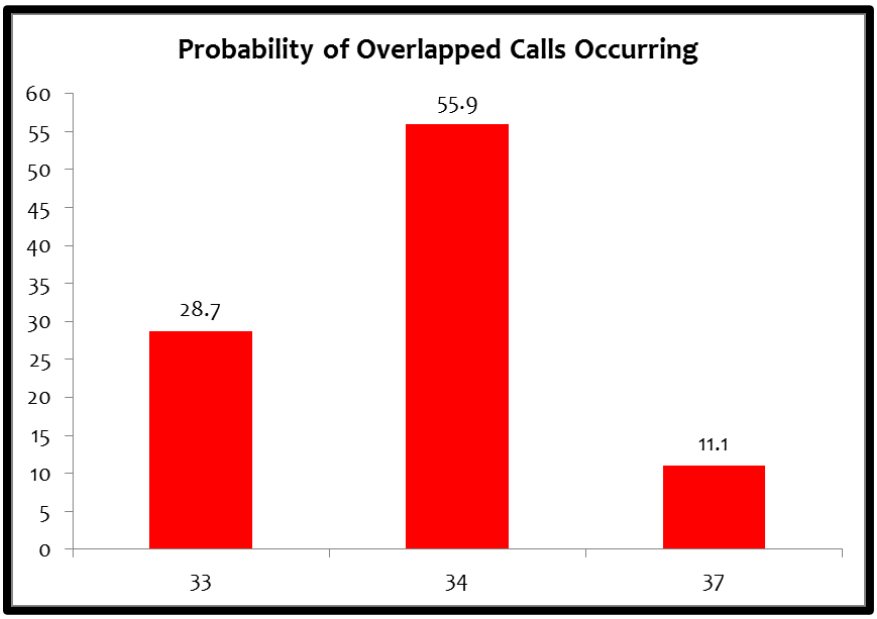
Overlapped calls are defined as the rate at which another call was received for the same first due station while there were one or more ongoing calls in the same first due station. For example, if there is one call in station 33's zone, before the call was cleared another request in station 33's zone occurred and those two calls would be captured as overlapped calls. Some studies also refer as simultaneous calls. Understanding the probability of overlapped or simultaneous calls occur will help to determine the number of units to staff for each station. In general, the larger the call volume a first due station has, it is more likely to have overlapped or simultaneous calls. The distribution of the demand throughout the day will impact the chance of having overlapped or simultaneous calls. The duration of a call will also have major influences, since the longer time it takes to clear a request, the more likely to have an overlapped request.

Station 33 has concurrency percent at 29%, station 34 has the concurrency at 56%, and station 37 has the concurrency at 11%. Results are presented below.

Table 37: Overlapped Call by First Due Station

First Due Station	Overlapped Calls	Total Calls	Probability of Overlapped Calls Occurring
33	477	1,662	28.7
34	2,669	4,772	55.9
37	55	497	11.1

Figure 33: Probability of Overlapped Calls Occurring by First Due Station



Baseline Performance Tables

The data available during the development of this Standards of Coverage document only discuss pick-up to dispatch performance in the following six tables. Tables 38-43 represent the baseline performance for BLS, ALS and fire incidents. Please note that not all fire incidents had two units responding, and that is why the sample size to calculate average time for ERF is smaller than the first arriving on scene unit. For BLS calls, the average dispatch time was 60 seconds in 2015 and 66 seconds in 2014. The average turnout and travel time was 426 seconds (7 minutes and 6 seconds). For ALS calls, the average dispatch time was 54 seconds in 2015 and 2014. The average turnout and travel time was 426 seconds (7 minutes and 6 seconds) in 2015 and 420 seconds in 2014. For fire suppression calls, the average dispatch time was 126 seconds in 2015 and 108 seconds in 2014. The average turnout and travel time of the first arriving unit was 8.1 minutes in 2015 and 7.9 minutes in 2014. The average time of the ERF unit or second arriving unit was 10.1 minutes in 2015, which is 2 minutes longer than the first arriving unit.

Table 38: Baseline Performance for BLS Incidents -2014 and 2015

BLS Average Time		2015	2014
Alarm Handling	Pick-up to Dispatch	1.0	1.1
Turnout Time	Turnout Time - 1st Unit	1.6	1.6
Travel Time	Travel Time - 1st Unit	5.6	5.5
Turnout and Travel Time	Turnout and Travel Time - 1st Unit	7.1	7.1
Sample Size	1st Unit	3,137	2,431

Table 39: Baseline Performance for ALS Incidents -2014 and 2015

ALS Average Time		2015	2014
Alarm Handling	Pick-up to Dispatch	0.9	0.9
Turnout Time	Turnout Time - 1st Unit	1.5	1.6
Travel Time	Travel Time - 1st Unit	5.6	5.4
Turnout and Travel Time	Turnout and Travel Time - 1st Unit	7.1	7.0
Sample Size	1st Unit	2,207	2,576

Table 40: Baseline Performance for Fire Incidents -2014 and 2015

Fire Average Time		2015	2014
Alarm Handling	Pick-up to Dispatch	2.1	1.8
Turnout Time	Turnout Time - 1st Unit	1.5	1.7
Travel Time	Travel Time - 1st Unit	6.6	6.2
	Travel Time - ERF (2nd Arriving Unit)	2.0	2.0
Turnout and Travel Time	Turnout and Travel Time - 1st Unit	8.1	7.9
	Turnout and Travel Time - ERF (2nd Arriving Unit)	10.1	9.6
Sample Size	1st Unit	401	376
	ERF	85	100

We also summarized 90th percentile performances for the 1st arriving for EMS and fire incidents separately. For BLS calls, in the past two years, the 90th percentile dispatch time was 2.0 minutes in 2015 and 2.2 minutes in 2014. The 90th percentile turnout and travel time was 11.8 minutes in 2015 and 11.9 minutes in 2014. For ALS calls, the 90th percentile dispatch time was 1.8 minutes in 2015 and 1.9 minutes in 2014. The 90th percentile turnout and travel time was 11.8 minutes in both 2014 and 2015.

For fire suppression calls, the 90th percentile dispatch time was 4.6 minutes in 2015 and 4.0 minutes in 2014. The 90th percentile turnout and travel time of the first arriving unit was 13.6 minutes in 2015 and 13.0 minutes in 2014. The 90th percentile time of the ERF unit or second arriving unit 14.9 minutes in 2015 and 15.5 minutes in 2014. The department can reference the historical performances and make reasonable targets to continuously improve the response process to meet recommended targets by industry standards or best practices.

Table 41: Summary of 90th Percentile Performance for BLS Incidents – 2014 and 2015

BLS 90th Percentile Time		2015	2014
Alarm Handling	Pick-up to Dispatch	2.0	2.2
Turnout Time	Turnout Time - 1st Unit	2.6	2.6
Travel Time	Travel Time - 1st Unit	10.0	10.1
Turnout and Travel Time	Turnout and Travel Time - 1st Unit	11.8	11.9
Sample Size	1st Unit	3,137	2,431

Table 42: Summary of 90th Percentile Performance for ALS Incidents – 2014 and 2015

ALS 90th Percentile Time		2015	2014
Alarm Handling	Pick-up to Dispatch	1.8	1.9
Turnout Time	Turnout Time - 1st Unit	2.5	2.6
Travel Time	Travel Time - 1st Unit	10.3	9.9
Turnout and Travel Time	Turnout and Travel Time - 1st Unit	11.8	11.8
Sample Size	1st Unit	2,207	2,576

Table 43: Summary of 90th Percentile Performance for Fire Incidents – 2014 and 2015

Fire 90th Percentile Time		2015	2014
Alarm Handling	Pick-up to Dispatch	4.6	4.0
Turnout Time	Turnout Time - 1st Unit	2.9	3.0
Travel Time	Travel Time - 1st Unit	12.1	11.8
	Travel Time - ERF (2nd Arriving Unit)	13.3	12.5
Turnout and Travel Time	Turnout and Travel Time - 1st Unit	13.6	13.0
	Turnout and Travel Time - ERF (2nd Arriving Unit)	14.9	15.5
Sample Size	1st Unit	401.0	376.0
	ERF (2nd Arriving Unit)	85	100

Changes in Community Demands from 2014 to 2015

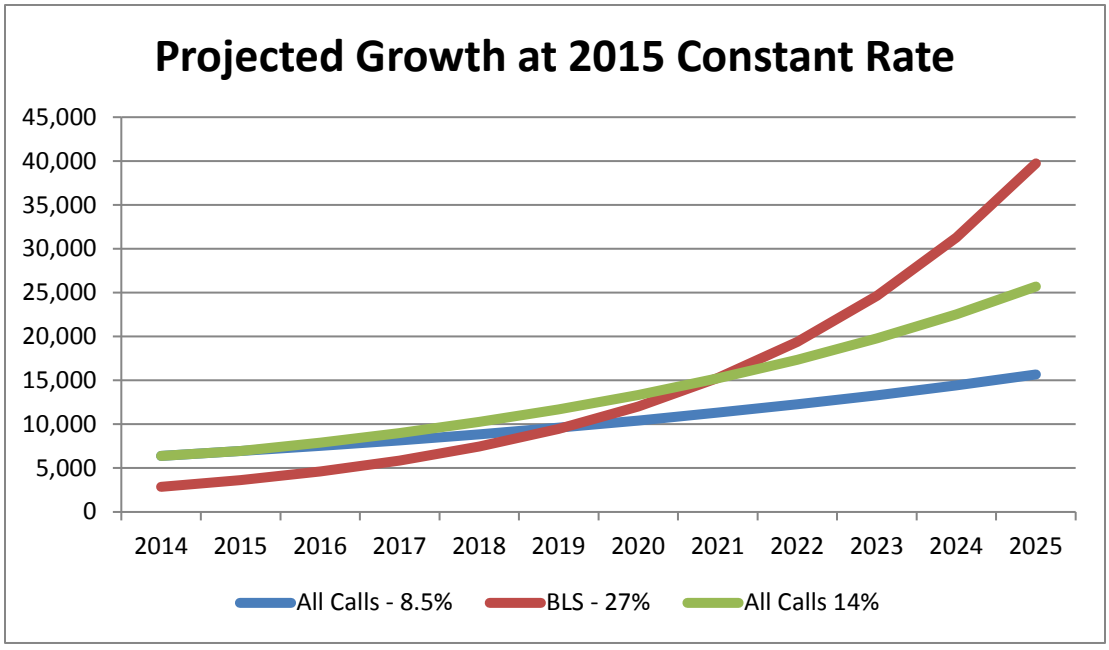
Changes in the District's demand for services by general call category reveals that the demand for services is increasing at approximately 8.5% per year over this rating period. However, further investigation demonstrates that the greatest increase in demand for services is specifically for BLS services at 27%. The demand for Advanced Life Support services decreased by approximately 13%.

With respect to fire related incidents, the total number of fire related incidents increased by nearly 7.5% between 2014 and 2015.

Table 44: Number of Calls, Number of Responses, and Total Busy Time by Year

Call Category	2014	2015	Percentage Change
Basic Life Support	2,863	3,640	27.1%
Advanced Life Support	2,817	2,451	-13.0%
Fire Related Incidents	597	641	7.4%
Canceled Incidents	110	199	80.9%
Total Incidents	**6,387**	**6,931**	**8.5%**

Figure 34: Growth Projections through 2025 with Constant Average Growth



Attachment B

GIS Report

FITCH
& ASSOCIATES

January 2017

GIS Analysis

CLALLAM COUNTY FIRE DISTRICT #3

CLALLAM COUNTY FPD NO. 3

SEQUIM, WASHINGTON

Prepared by:

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CONSULTANT REPORT

GIS Analysis
Clallam County Fire Protection District #3, WA

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ESTABLISHING BASELINE PERFORMANCE

The first step in completing GIS planning analyses is to establish the desired performance parameters. Measures of total response time can be significantly influenced by both internal and external influences. For example, the dispatch time, defined as the time from pick up at the 911 center to the dispatching of units, contributes to the customer's overall response time experience, but may be outside of the fire department's direct control. Another element in the total response time continuum is the turnout time, defined as the time from when the units are notified of the incident until they are actually responding. Turnout time can have a significant impact to the overall response time for the customer and is generally considered under management's control. However, the travel time, defined as the period from when the units are actually responding until arrival at the incident is a factor of the number of fire stations, the ability to travel unimpeded on the road network, the existing road network's ability to navigate the community, and the availability of the units. Largely, travel time is the most stable variable to utilize in system design regarding response time performance.

Therefore, these GIS planning analyses will focus on travel time capability as the unit of measure. The 2015 performance for travel time across programs is provided as Table 1. Overall, the travel time is 10.3 minutes or less for 90% of the incidents. However, the Fire related incidents had a travel time performance of 12.1 minutes or less for 90% of the incidents.

Table 1: 90th Percentile Turnout and Travel Time of First Arriving Units by Program

Call Category	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size
BLS	2.0	2.6	10.0	13.0	3,137
ALS	1.8	2.5	10.3	12.9	2,207
Fire	4.6	2.9	12.1	16.5	401
Total	**2.1**	**2.6**	**10.3**	**13.2**	**5,745**

Comparison to National References

There are two notable references for travel time available to the fire service in National Fire Protection Association (NFPA) 1710[1] and the Commission on Fire Accreditation International (CFAI)[2].

NFPA 1710 suggests a 4-minute travel time at the 90th percentile for first due arrival of Basic Life Support (BLS) and Fire incidents and the CFAI recommends a 5 minute and 21 seconds travel time for first due arrival in an urban population density and 13 minutes travel time in rural population

[1] National Fire Protection Association. (2010). NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*. Boston, MA: National Fire Protection Association.
[2] CFAI. (2009). Fire & emergency service self-assessment manual, (8th ed.). Chantilly, Virginia: Author. (page 71)

densities. The arrival of an Advanced Life Support (ALS) unit is recommended at 8-minutes travel time by NFPA 1710. It is important to note that the latest edition (9th edition) of the CFAI guidelines have de-emphasized response time and only reference the legacy standards with a separately provided companion document[3].

The CFAI recommendations are more closely aligned with the department's historical performance as Fire related incidents are currently at 12.1 minutes at the 90th percentile are generally more randomly distributed across the jurisdiction. However, the department is not currently capable of meeting the more restrictive recommendation of 4 minutes travel time or less at the 90th percentile. GIS analyses were conducted to determine the requisite distribution model (fire stations) to overcome the geographic limitations within the District's jurisdiction.

When utilizing only current CCFD3 fire stations, and assuming that all stations are continuously staffed, the current configuration is capable of delivering a 6-minute travel time to 70% of the requests for service across all call types. When referring to the marginal utility analysis provided below, the ascending rank order is the station's capability to cover risk (incidents) in relation to the total historical call volume of the sample period (2015). The Station number is the current CCFD3 fire station identifier. The station capture is the number of calls the station would capture within a 6-minute travel time. The total capture is the cumulative number of calls captured with the addition of each fire station. The percent capture is the total cumulative percentage of risk covered by each station. The goal would be to achieve at least 90 percent capture.

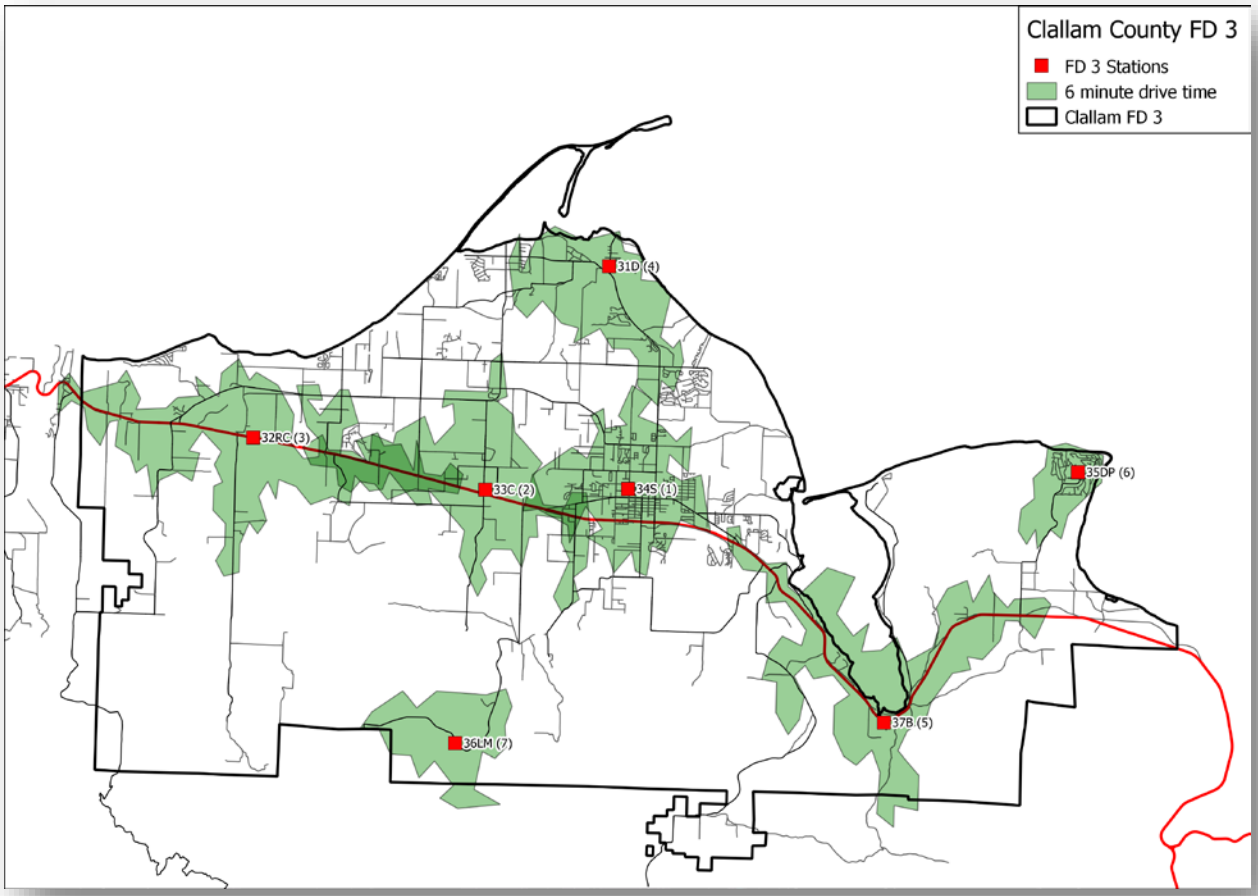
Therefore, the station that contributed the most to the overall system's performance was Station 34S in the first column and would capture 50.57% of the risks within six minutes. Station 33C would cover an additional 10.08% of the risk bringing the cumulative total to 60.65% between Stations 34S and 33C. In total, with all seven CCFD3 fire stations, 73.13% of the incidents could be responded to within six minutes travel time. Results are provided as Table 2 and in drive time mapping format as Figure 1 below.

Table 2: Marginal Fire Station Contribution with CCFD3 Fire Stations for 6-Minute Travel Time

Rank	Station Number	Station Capture	Total Capture	Percent Capture
1	34S	6735	6735	50.57%
2	33C	1342	8077	60.65%
3	32RC	572	8649	64.94%
4	31D	516	9165	68.82%
5	37B	344	9509	71.40%
6	35DP	207	9716	72.95%
7	36LM	24	9740	73.13%

[3] CFAI. (2016). Fire & emergency service self-assessment manual, (9th ed.). Chantilly, Virginia: Author.

Figure 1: 6-Minute Travel Time Bleed with CCFD3 Stations



Finally, because all stations included could not achieve the desired 90th percentile for a six-minute travel time, an optimized station deployment model was created to determine what the fire station distribution model would require. Results suggest that an optimally placed 10 to 11 fire station configuration (less than 1% difference in models) would achieve a six-minute travel time to 90% of the incidents. A graphic illustration of the optimized model is provided below.

Therefore, a more reasonable performance objective is needed to closely mirror current department performance and capabilities. The current overall performance is 10.3 minutes or 10 minutes and 18 seconds for 90% of the calls in 2015. However, the high density of calls in Station 34's territory considerably influences the department-wide performance. For example, Station 33 has a travel time of nearly 12 minutes and station 37 has a travel time of nearly 15 minutes at the 90th percentile. In contrast, Station 34 has a travel time performance of less than 9 minutes with the highest frequency of calls. The individual station response performance is provided as Table 3.

Figure 2: Optimized Station Deployment Plan with 6-Minute Travel Time Bleed

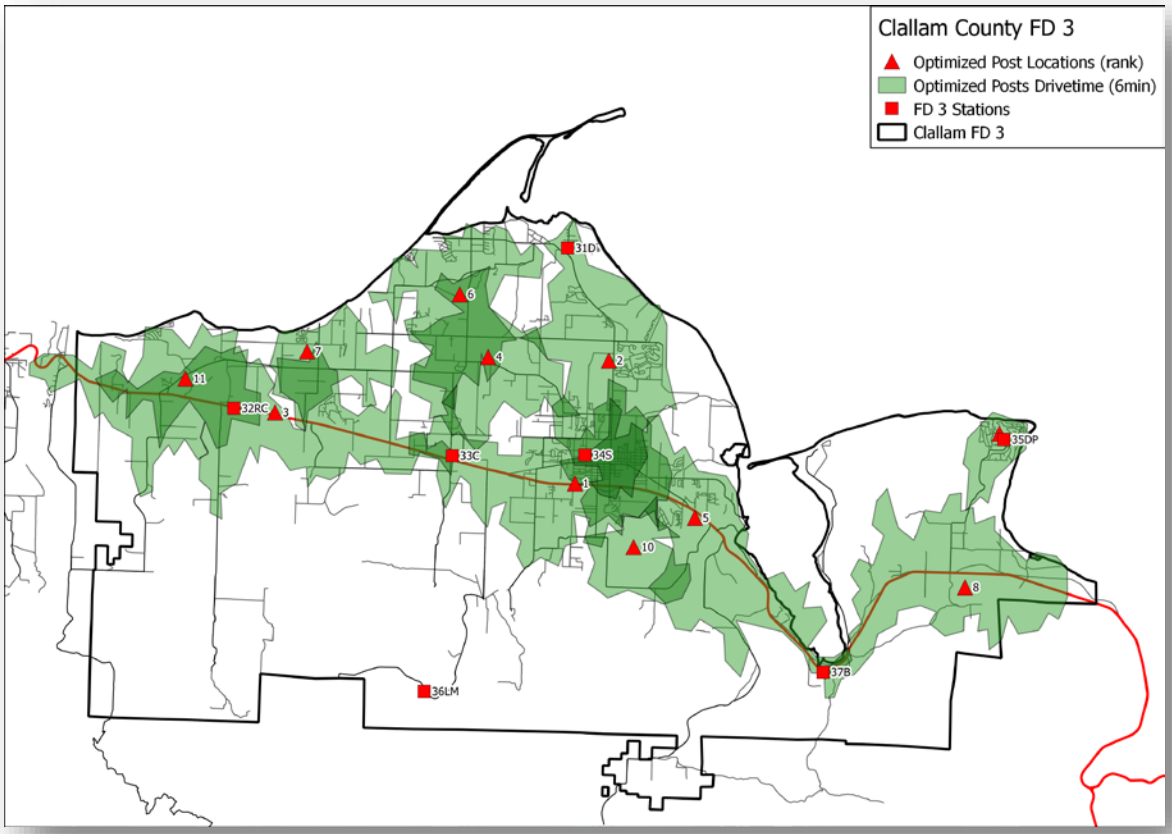


Table 3: 90th Percentile First Arrival Performance by Station FDZ

First Due Station	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size
33	2.2	2.5	11.7	14.7	1,284
34	2.1	2.6	8.6	11.3	4,086
37	2.3	3.0	14.9	17.8	375

EVALUATION OF VARIOUS DISTRIBUTION MODELS

As previously discussed, these analyses will utilize the current historical fire performance as the upper threshold for system designs. Therefore, the travel time for Fire related incidents at approximately 12-minutes was utilized for the purposes of validating the planning tools. However, a 10-minute travel time was utilized for the various system configurations.

Validation of Planning Analysis

The first step in this analysis is to utilize the historical performance to validate the planning analyses utilized by the GIS system. The historical performance demonstrated a 12.1-minute Fire travel time capability from the existing fire stations (Stations 33, 34, and 37) at the 90th percentile and the planning assessment estimated 92.58%. Therefore, there is more than 97% agreement between the planning tools and the actual historical performance.

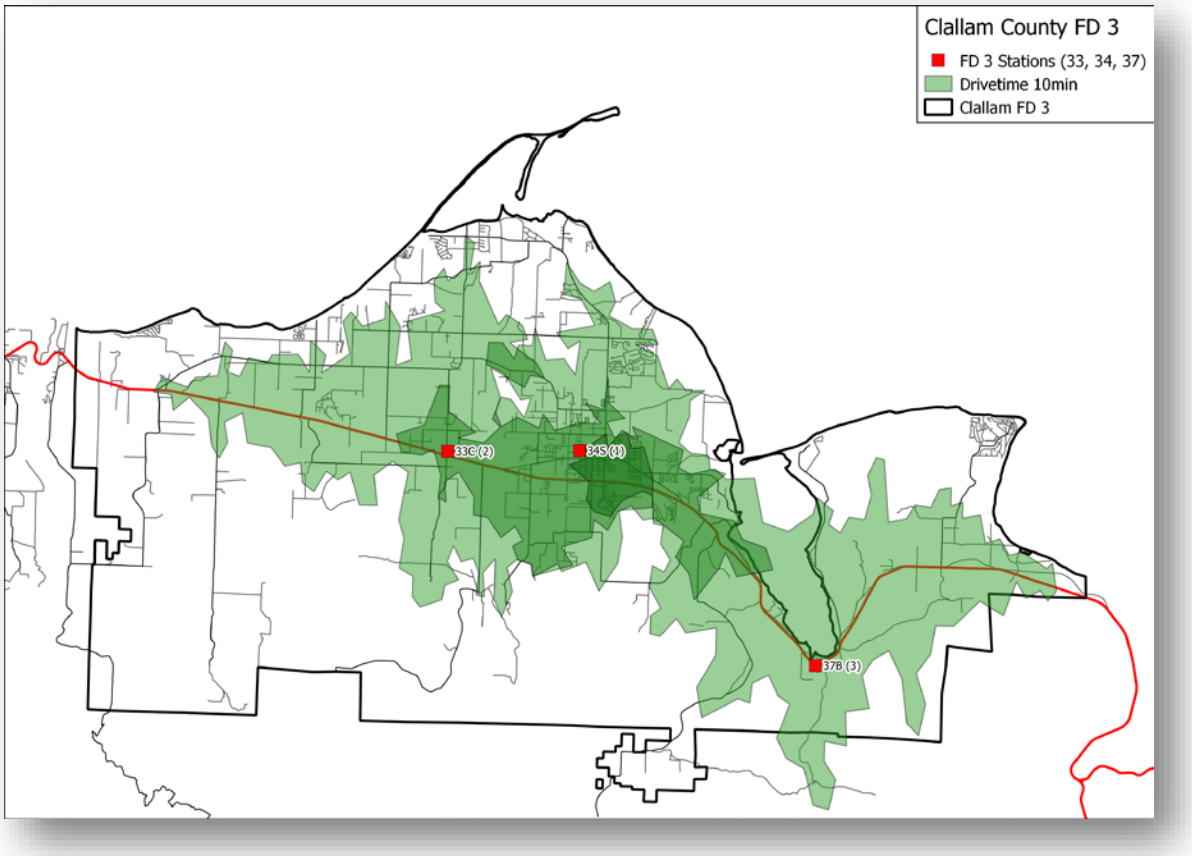
Configuration Models based on 10-Minute or less Travel Time

Results suggest that if the Department is desirous of maintaining current performance that it will require a minimum of a three-station configuration in order to most closely approximate a 10-minute travel time to 90% of the incidents. Station 34s was able to contribute 69.66% of the geographic coverage and the combination of Stations 34s and 33c can cover nearly 80% of the historical incidents. Actual historical performance outperforms this model by approximately 6%. This is not an uncommon finding in rural settings as the emergency response travel speed may exceed posted or average speeds. In addition, the relative improvement of the volunteer firefighting response may serve to improve historical performance that isn't reflected in the GIS planning restricted to the career stations. Regardless of the incremental differences, from a planning perspective, the models here are more conservative providing for more confidence in actual performance of the adopted models. Results are provided as Table 4 and Figure 3 below.

Table 4: Marginal Fire Station Contribution with CCFD3 Career Stations for 10-Minute Travel Time

Rank	Station Number	Station Capture	Total Capture	Percent Capture
1	34S	9277	9277	69.66%
2	33C	1341	10618	79.73%
3	37B	586	11204	84.13%

Figure 3: 10-Minute Travel Time Bleed with CCFD3 Fire Stations

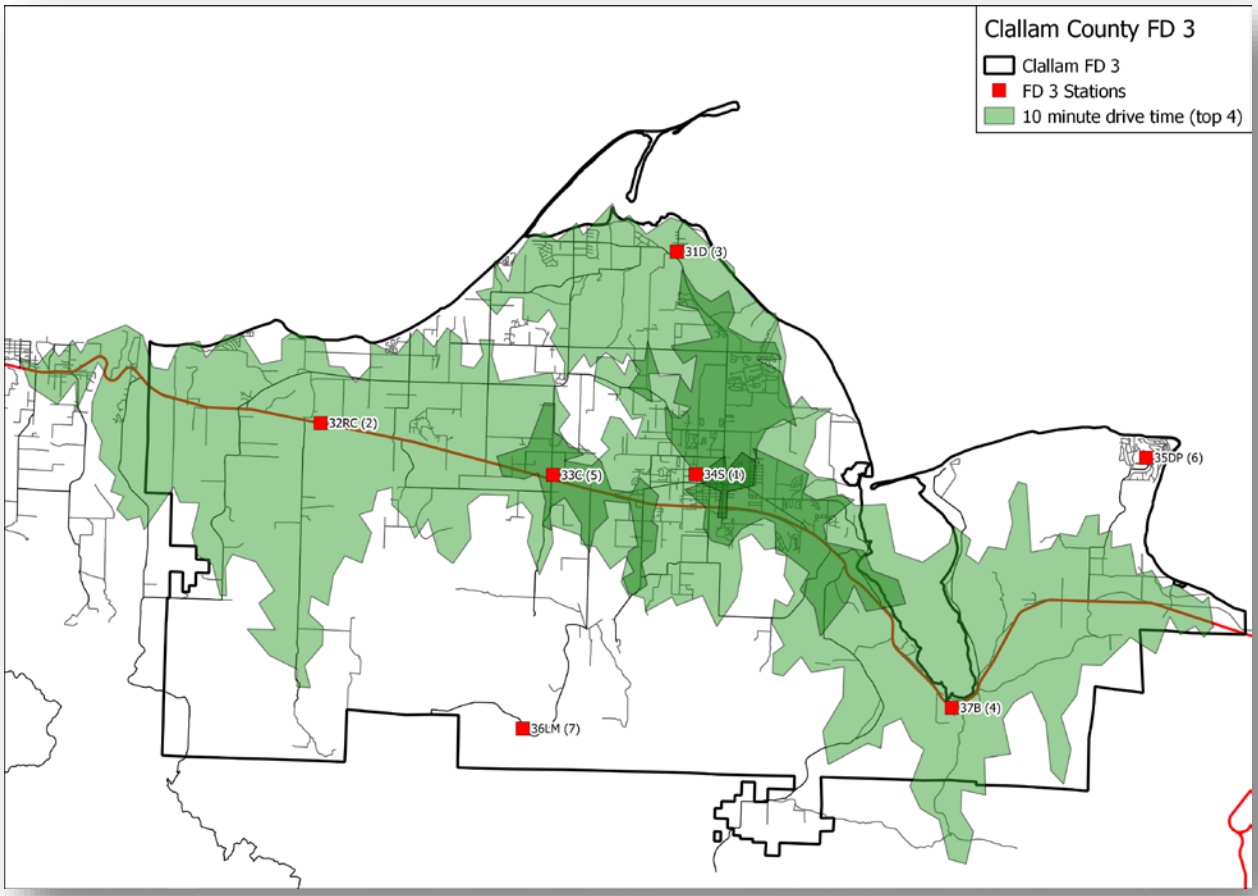


In an effort to demonstrate the impact of the volunteer capabilities on the overall system design, a 10-minute travel time was evaluated that included the volunteer facilities. This analysis demonstrated that the current configuration could perform in 10 minutes approximately 95% of the time, which is in high agreement with the actual performance of 10 minutes and 18 seconds 90% of the time. In fact, if the stations were continuously staffed, then the model would suggest that a four-station configuration could provide for a 10-minute travel time to all incidents 90% of the time.

Table 5: Marginal Fire Station Contribution with Career and Volunteer Fire Stations for 10-Minute Travel Time

Rank	Station Number	Station Capture	Total Capture	Percent Capture
1	34S	9277	9277	69.66%
2	32RC	1437	10714	80.45%
3	31D	727	11441	85.91%
4	37B	586	12027	90.31%
5	33C	332	12359	92.80%
6	35DP	205	12564	94.34%
7	36LM	45	12609	94.68%

Figure 4: 10-Minute Travel Time Bleed with Career and Volunteer Fire Stations



Potential Station Locations

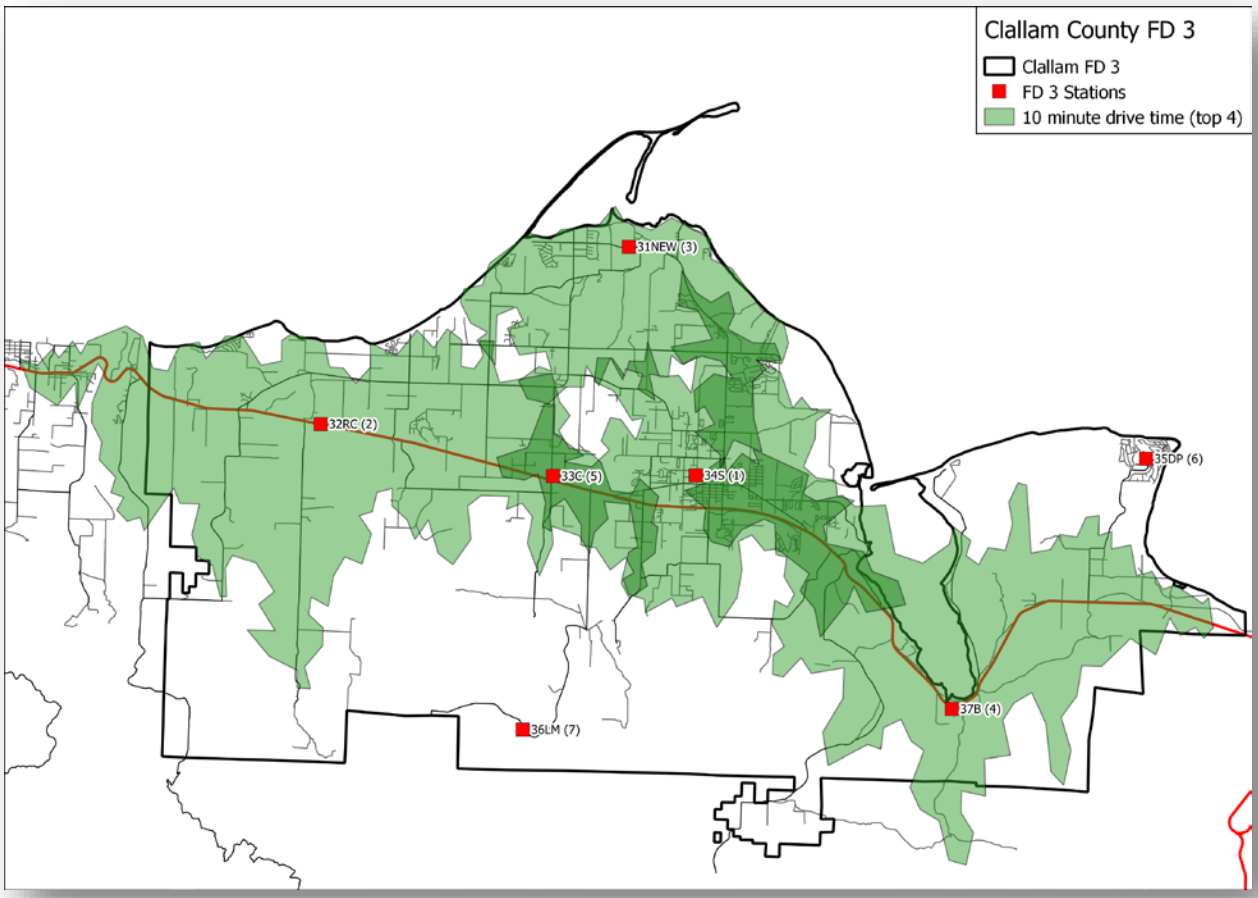
CCFD3 presented *FITCH* with two distinct station locations to evaluate the potential impact of adopting these changes. These changes are associated with new station locations for Stations 31 and 32. The desired locations of these potential station locations, or new facilities, were provided by the Department and were incorporated into the analyses as if the stations were implemented incrementally as well as together.

First, the impact of relocating Station 31 was evaluated. Results suggest that the configuration will perform very similarly to the current station locations if only Station 31 was relocated. Similar to the previous discussion, a four-station distribution model would achieve the 90th percentile with a 10-minute travel time.

Table 6: Marginal Fire Station Contribution for New Station 31 for 10-Minute Travel Time

Rank	Station Number	Station Capture	Total Capture	Percent Capture
1	34S	9277	9277	69.66%
2	32RC	1437	10714	80.45%
3	31NEW	894	11608	87.16%
4	37B	586	12194	91.56%
5	33C	221	12415	93.22%
6	35DP	205	12620	94.76%
7	36LM	45	12665	95.10%

Figure 5: 10-Minute Travel Time Bleed with New Station 31

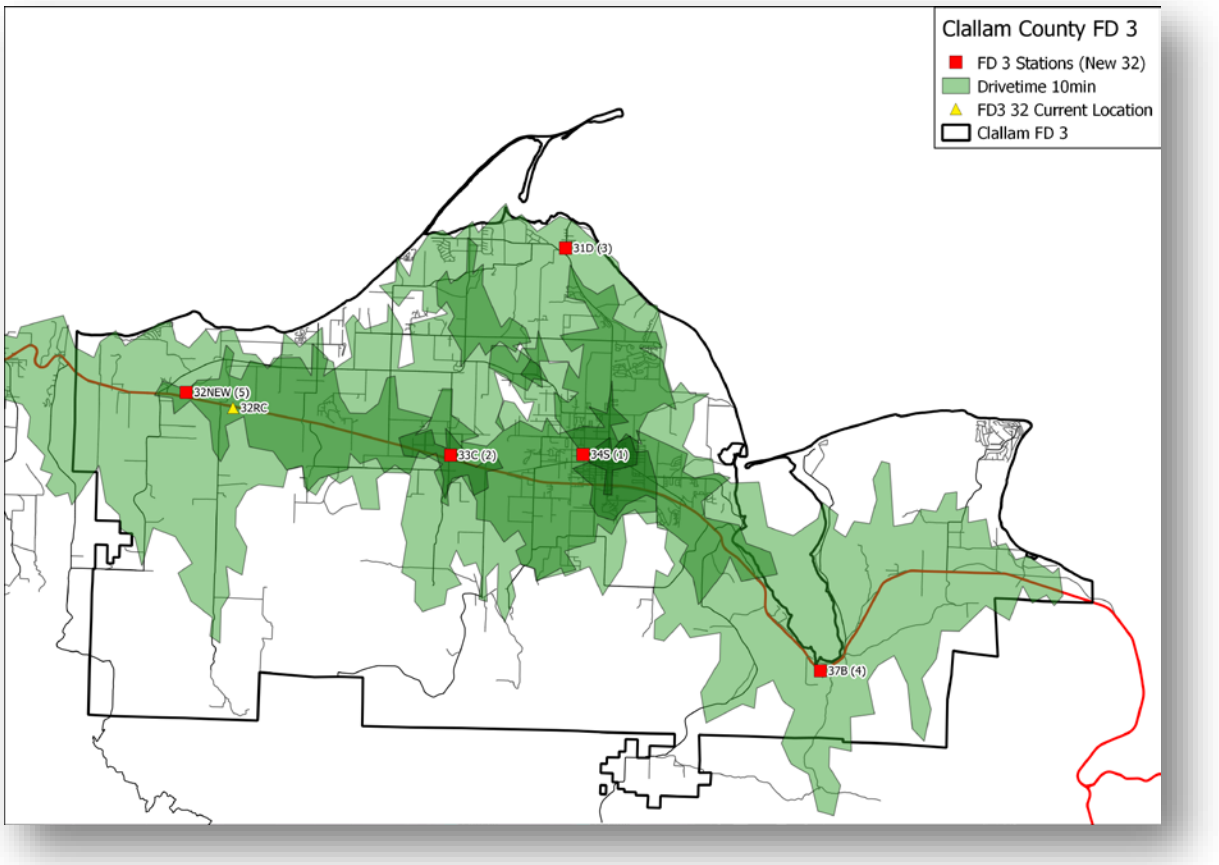


Second, the impact of relocating Station 32 was evaluated. Results suggest that the relocation of Station 32 would perform similarly as with the previous locations. However, the overall system would improve by approximately 2%. This configuration would afford a five-station distribution model that would achieve a 10-minute travel time 92.22% of the time.

Table 7: Marginal Fire Station Contribution for New Station 32 for 10-Minute Travel Time

Rank	Station Number	Station Capture	Total Capture	Percent Capture
1	34S	9277	9277	69.66%
2	33C	1341	10618	79.73%
3	31D	616	11234	84.35%
4	37B	586	11820	88.75%
5	32NEW	462	12282	92.22%
6	35DP	205	12487	93.76%
7	36LM	45	12532	94.10%

Figure 6: 10-Minute Travel Time Bleed with New Station 32

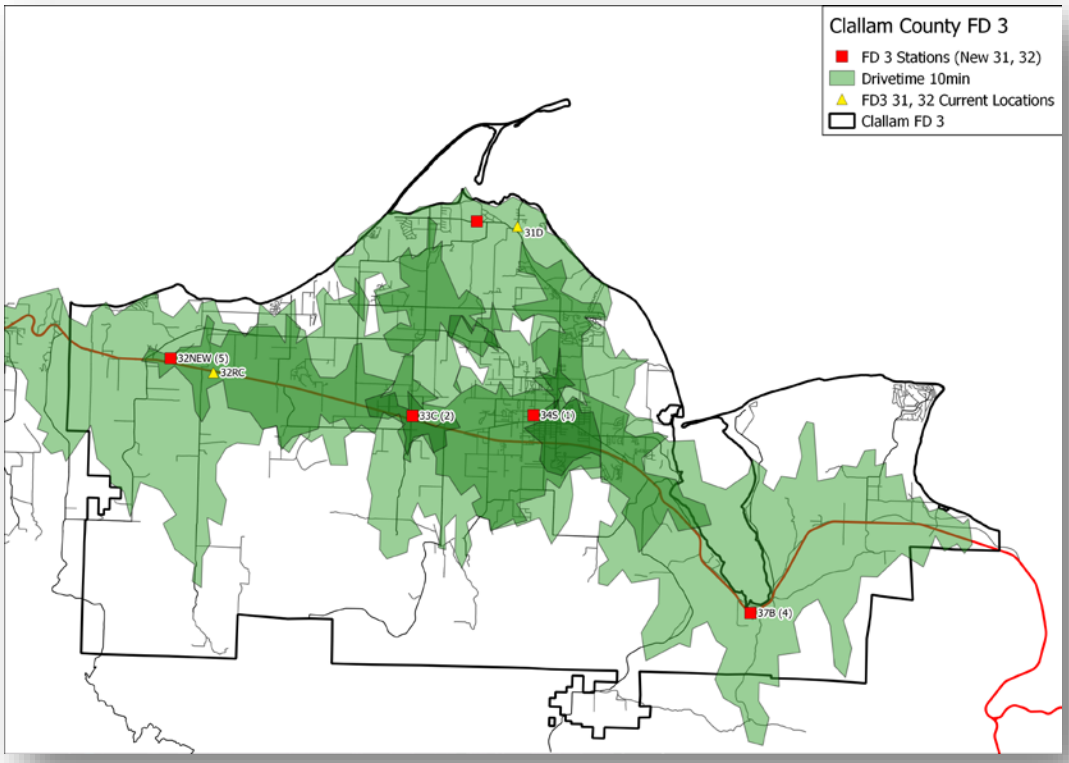


Finally, the relocation of both Stations 31 and 32 were analyzed. Results demonstrate that a five-station distribution model would be required to address the historical demand for services and the geographic limitations within the system. Similar to previous discussions, the five-station model provides 92.64% coverage at 10-minutes travel time. Overall, the data suggests that relocation of Station 32 contributes more to the model than Station 31. Results are presented in both tabular form and map output as Table 8 and Figure 7.

Table 8: Marginal Fire Station Contribution for New Station 31 and 32 for 10-Minute Travel Time

Rank	Station Number	Station Capture	Total Capture	Percent Capture
1	34S	9277	9277	69.66%
2	33C	1341	10618	79.73%
3	31NEW	672	11290	84.77%
4	37B	586	11876	89.17%
5	32NEW	462	12338	92.64%
6	35DP	205	12543	94.18%
7	36LM	45	12588	94.52%

Figure 7: 10-Minute Travel Time Bleed with New Stations 31 and 32

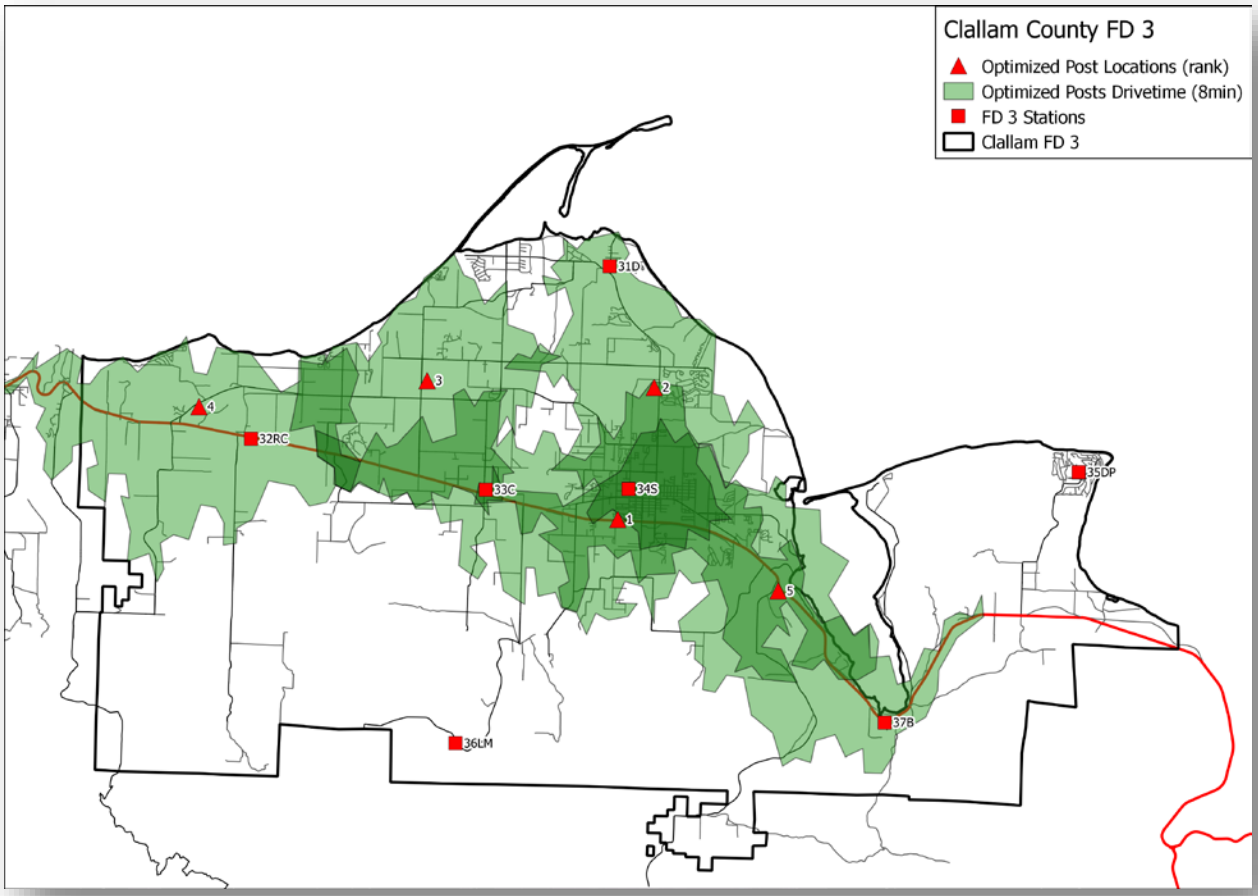


Optimized Station Distribution Plans

8-Minute Travel Time

Analyses were completed to develop an optimized station distribution model for an 8-minute travel time. This evaluation suggests, that an optimized five-station model can provide for greater than 90% effectiveness covering all incidents within 8-minutes or less travel time 90% of the time. Both the suggested station locations and the current stations are located on the map for reference. A graphic illustration is presented below.

Figure 8: Optimized Station Deployment Plan – 8–Minute Travel Time

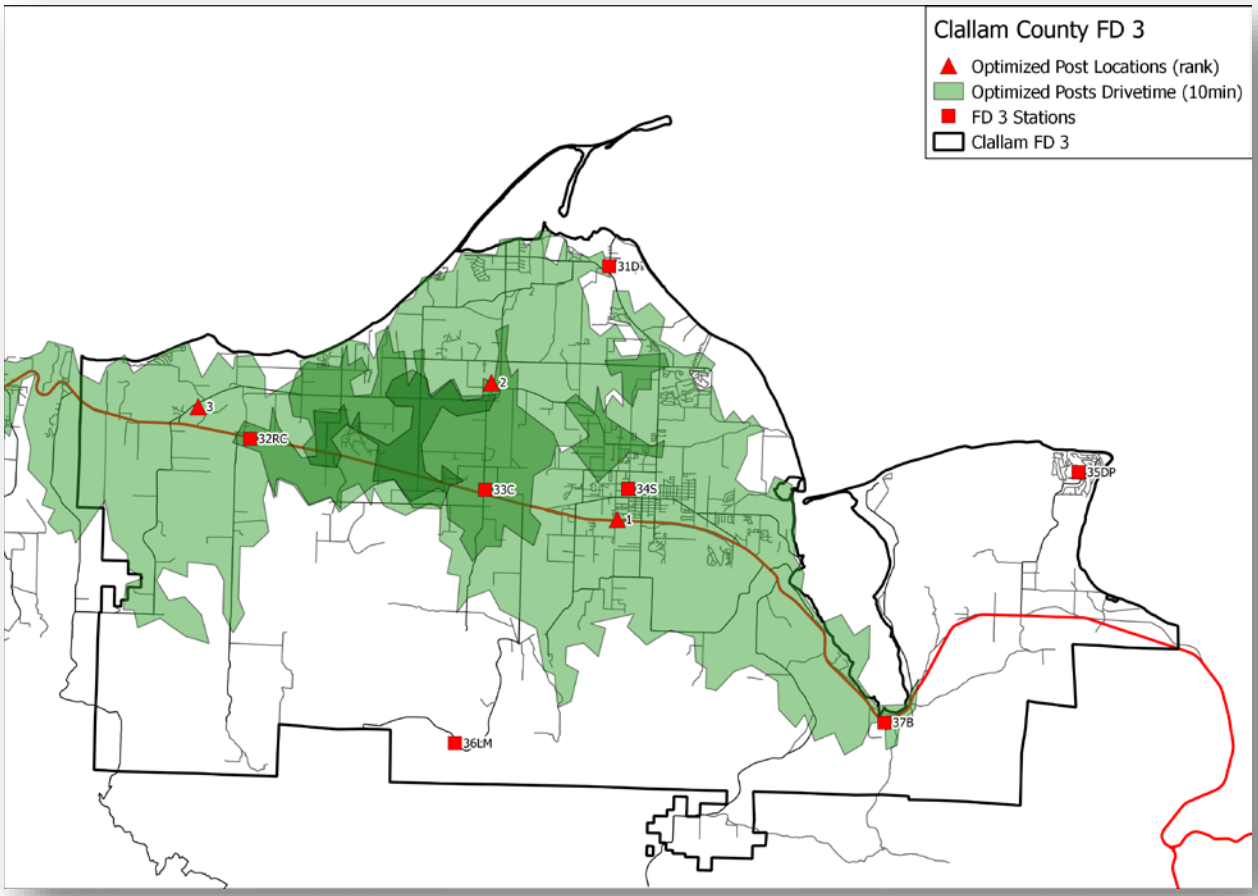


10-Minute Travel Time

Analyses were completed to develop an optimized station distribution model for a 10-minute travel time as well. This evaluation suggests, that an optimized three-station model can provide for greater than 91% effectiveness covering all incidents within 10-minutes or less travel time nearly 92% of the time. Both the suggested station locations and the current stations are located on the map for reference.

A graphic illustration is presented below.

Figure 9: Optimized Station Deployment Plan - 10-Minute Travel Time

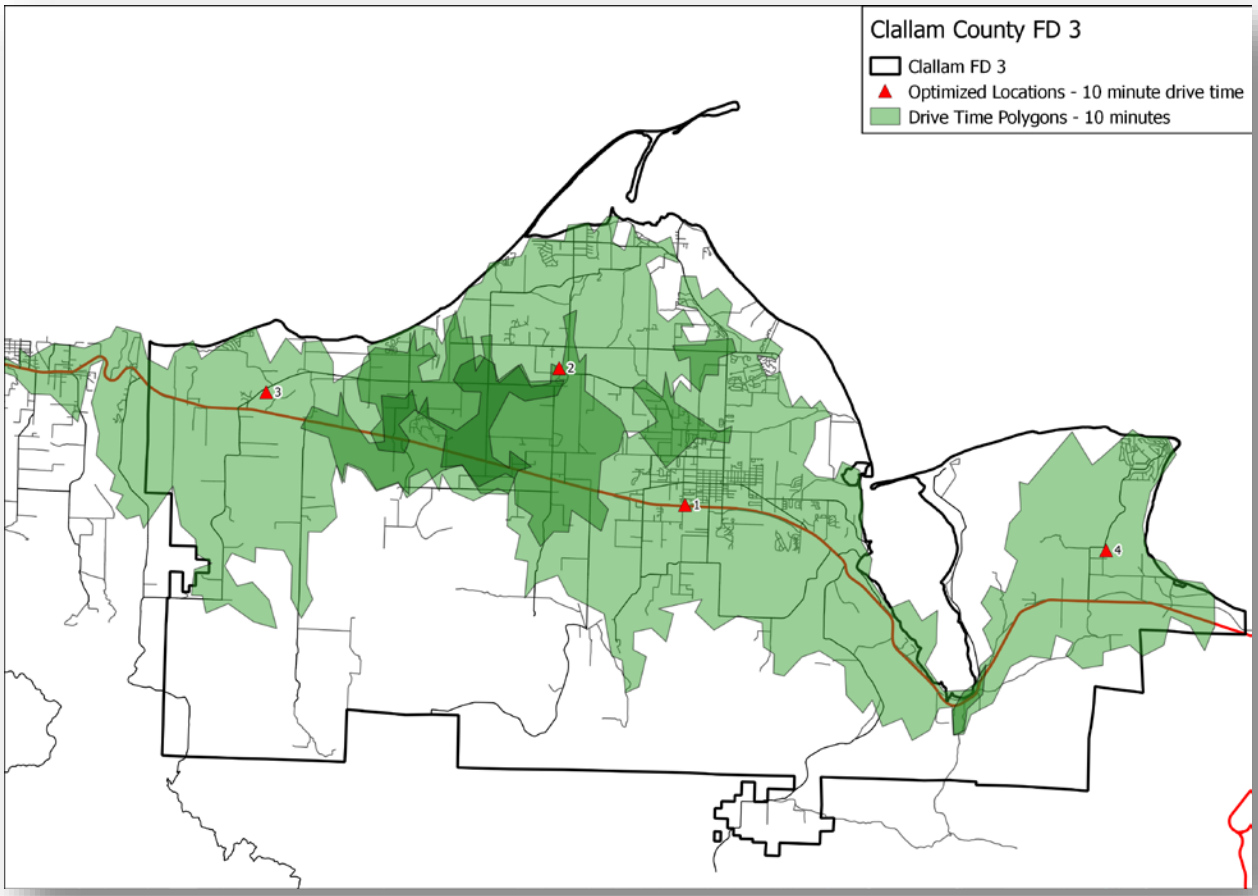


Although the three-station model will cover 90% of all of the risk in 10-minutes or less, through a lens of geographic coverage, it is evident that the Station 35 Diamond Point area is not covered within the 10-minute window. While the frequency is very low, if the District wished to place one additional station, the area could be covered well within the desired performance envelope and improve overall District performance to over 95% within 10-minutes or less.

A four-station model is provided below.

However, as evidenced with the several variations and configurations of station locations for deployment, it is important to understand that the overall improvement in the system generally varies by less than 8% overall. One of the major contributing factors is the disproportionate concentration of community demand in and around the greater Sequim area coupled with the difficulty in covering the relatively large rural area. The call history in the rural areas is both less frequent and less concentrated. It is for similar circumstances as this that differentiated service models are created across the risk and/or population boundaries.

Figure 10: Optimized Station Deployment Plan – 10–Minute Travel Time



Differentiated Service Models

While there are multiple deployment strategies that may be adopted, two clear policy positions emerge in communities with both urban/suburban and rural jurisdictions. First, is to provide a commensurate service level across the entire jurisdiction as has been presented previously. The advantages to this approach are that all citizens of the District receive at least a 10-minute travel time or better for the same per household revenue contribution. One disadvantage to this policy position is that it can be costly at times to provide urban level services to rural communities. A dichotomous position arises between the fairness of a per household contribution and the fiscal reality that geographic regions are not able to fund full-time services in their areas. This reality contributes to the policy position of differentiated service levels based on either demand for services or population density (often a driver of demand).

Therefore, the second strategy is to provide a differentiated service model between the urban/suburban high-density areas and the much less frequent and less populous rural areas. With many respects, the District is already employing this strategy as the rural stations are largely

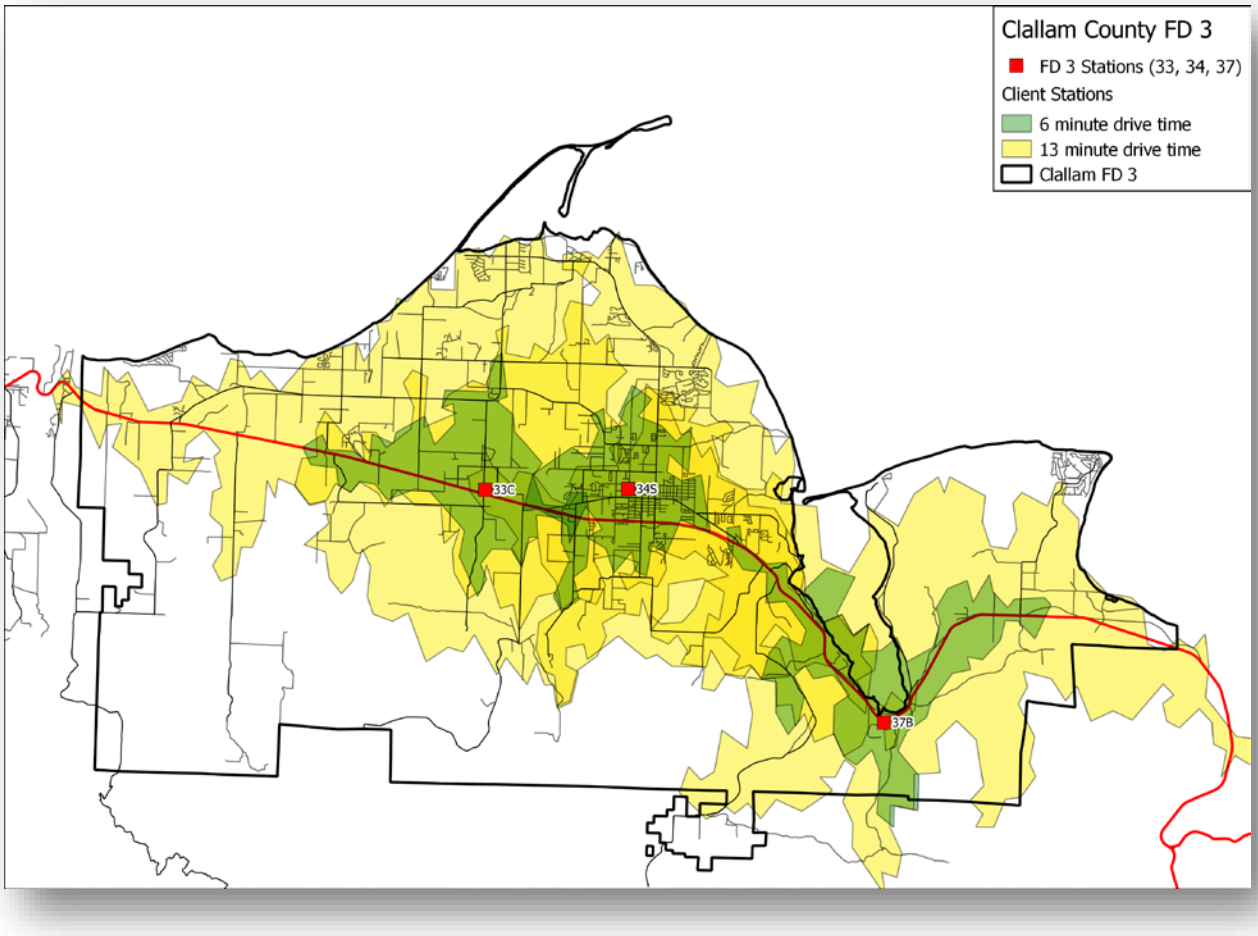
volunteer and supported by the career stations/staff and the urban/suburban high-density areas are largely covered by full time career staff. The District adopted a Standard of Cover policy with a 6-minute travel time for the urban/suburban areas and a 14-minute travel time for the rural areas. In 2009, the origin of the response time objectives were identified from the Commission on Fire Accreditation International (CFAI). Therefore, an evaluation with the current CFAI practices would require a 5:12 urban/suburban first due performance and a 13:00 rural travel time. However, in an effort to measure the department's capability to meet the internally adopted performance, analyses for a 6-minute urban/suburban and a 13-minute rural model is evaluated.

Consistent with the previous analysis that suggested it would require 10 or 11 stations to meet a 6-minute response time, this analysis demonstrates that the current three-station deployment model is able to capture approximately 63% of the urban call densities within 6-minutes travel time. However, utilizing the current station deployment strategy, nearly 96% of all incidents can be covered within a 13-minute travel time. In this analysis, the stations are first utilized in an attempt to meet the urban response time and then again with the much larger travel time in the rural zones. In other words, from the existing three stations, 96% of the incidents would be served within a 13-minute travel time and 63% would be served within 6 minutes.

Table 9: Marginal Fire Station Contribution for Career Stations with 6 Urban/Suburban and 13 Rural

Rank	Station Number	Station Capture	Total Capture	Percent Capture
1	34S	6735	6735	50.57%
2	33C	1342	8077	60.65%
3	37B	344	8421	63.23%
Urban/Suburban				
4	33C	3041	11462	86.06%
5	34S	1027	12489	93.78%
6	37B	245	12734	95.61%
Rural				

Figure 11: 6-Minute Urban/Suburban and 13-Minute Rural Travel Time Bleed with Career Stations



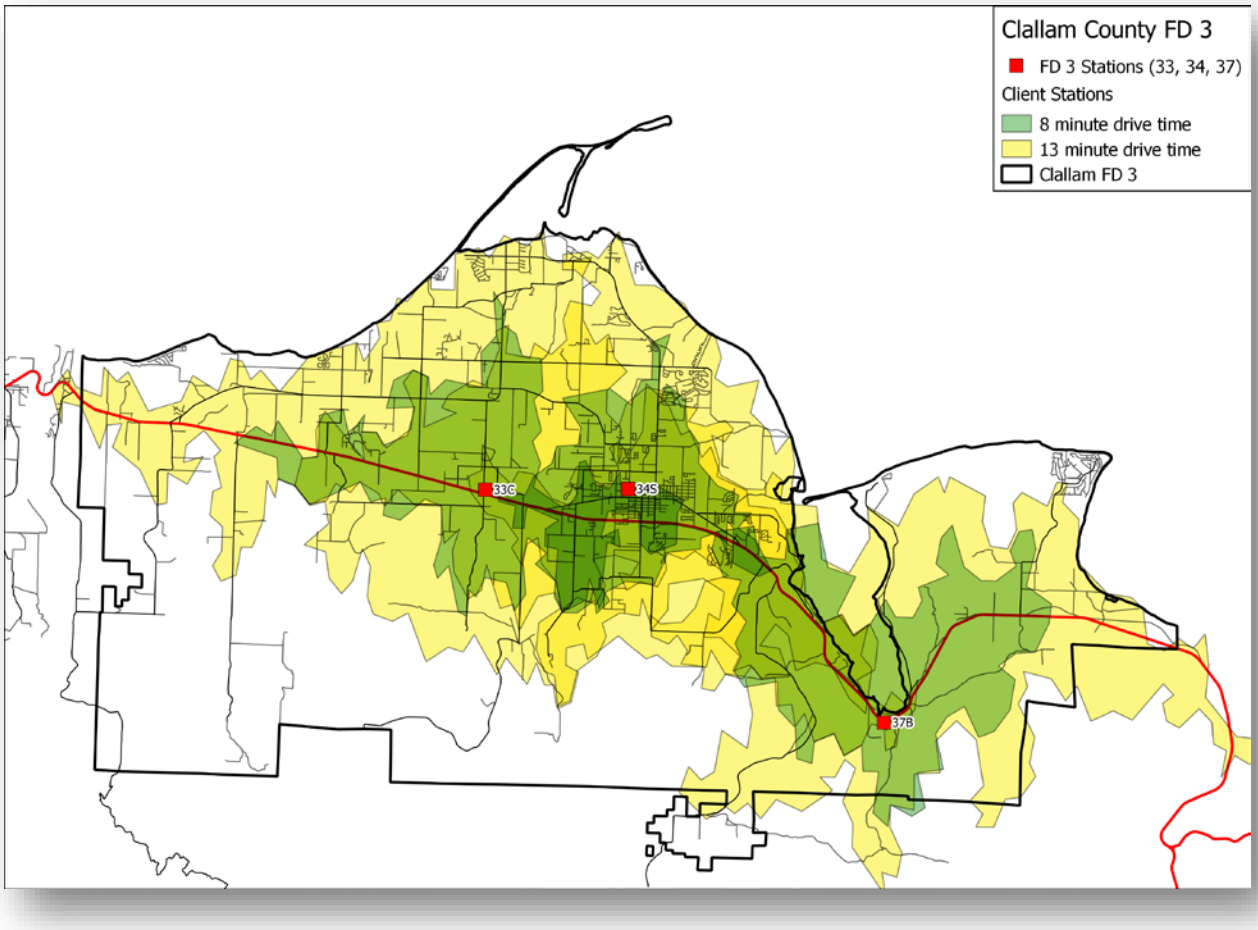
The previous analyses demonstrate that the department is challenged to meet the internally adopted performance measures for the urban/suburban areas, but are capable of meeting the rural objectives. As previously discussed, the overall travel time performance for the CCFD3 is 10.3 minutes at the 90th percentile. Therefore, two additional analyses are offered to scaffold from the 6-minute objective to a 10-minute objective that most closely mirrors actual historical performance.

First, is an 8-minute urban/suburban objective with a 13-minute rural travel time objective at the 90th percentile. Results find a 10% improvement in coverage for the urban/suburban corridor and maintain the rural performance from the previous model.

Table 10: Marginal Fire Station Contribution for Career Stations with 8 Urban/Suburban and 13-Rural

Rank	Station Number	Station Capture	Total Capture	Percent Capture
1	34S	7675	7675	57.63%
2	33C	1632	9307	69.88%
3	37B	476	9783	73.46%
Urban/Suburban				
4	33C	1855	11638	87.39%
5	34S	901	12539	94.15%
6	37B	196	12735	95.62%
Rural				

Figure 12: 8-Minute Urban/Suburban and 13-Minute Rural Travel Time Bleed with Career Stations

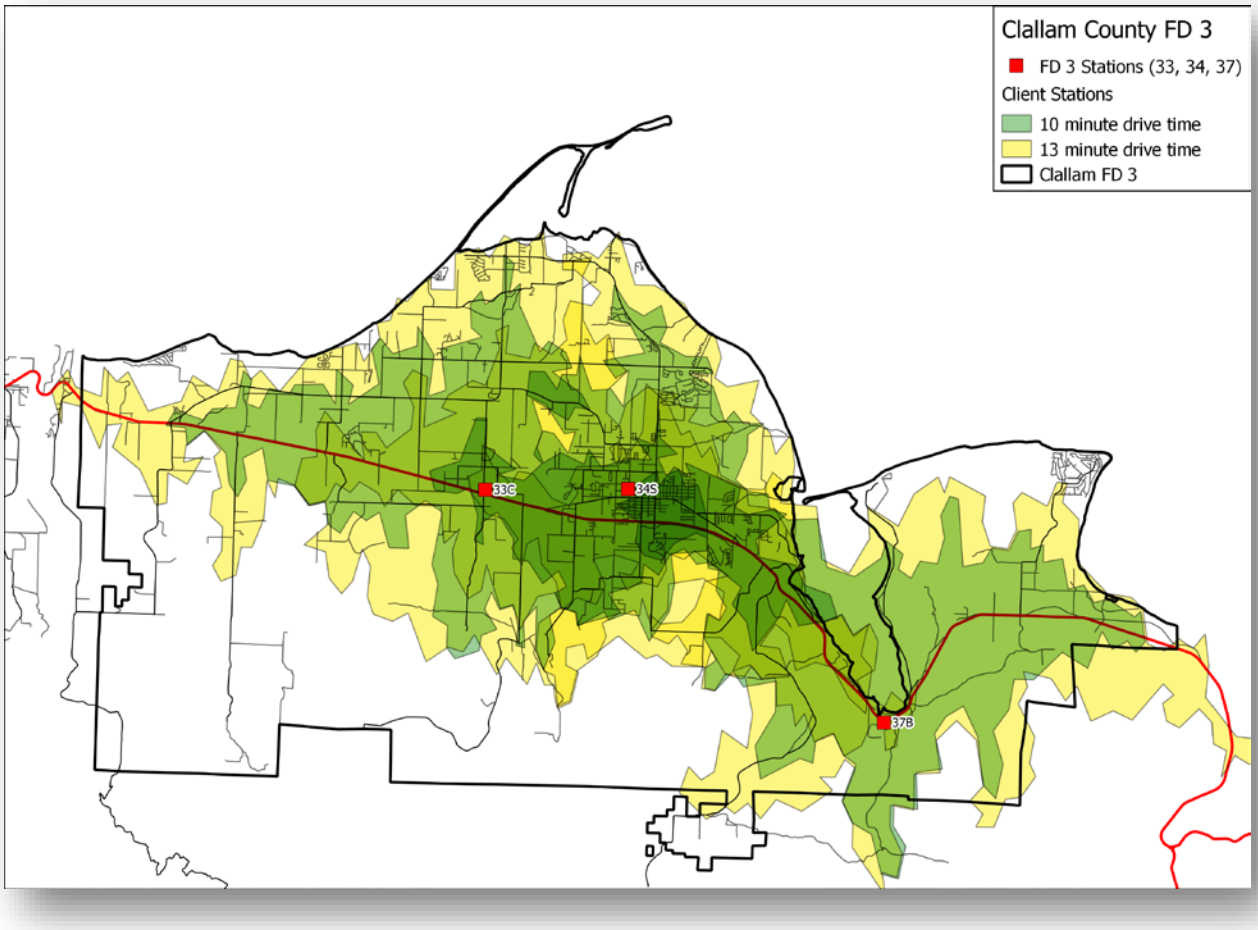


Finally, a 10-minute urban and 13 minute rural travel time deployment strategy was evaluated. This provides for 84% coverage for the urban/suburban call densities and continues to meet or exceed rural performance.

Table 11: Marginal Fire Station Contribution for Career Stations with 10 Urban/Suburban and 13-Rural

Rank	Station Number	Station Capture	Total Capture	Percent Capture
1	34S	9277	9277	69.66%
2	33C	1341	10618	79.73%
3	37B	586	11204	84.13%
Urban/Suburban				
4	33C	1123	12327	92.56%
5	34S	358	12685	95.25%
6	37B	50	12735	95.62%
Rural				

Figure 13: 10-Minute Urban/Suburban and 13-Minute Rural Travel Time Bleed with Career Stations



Long-Term Sustainability of the Models Presented

It is important to understand that the distribution models are restrictive to the geographic limitations of the jurisdiction and the historical demand for services. Therefore, the number of stations is descriptive of the number of fixed facilities required from which to deploy resources.

These analyses do not specifically describe the concentration of resources required at each fire station facility to adequately handle the demand for services. For example, some stations may require two or more units in order to handle the demand for services.

With respect to the long-term sustainability of the deployment models presented here, the models will remain accurate for as long as the jurisdictions overall coverage area has not expanded. In other words, if the District's square mileage remains, then the deployment strategy will be sustainable indefinitely with respect to the coverage area. As other variables such as population density or changes in socioeconomic status change over time, there may be a need for a higher concentration of resources necessary to meet the growing demand for services, but not additional stations. The most prominent reason that the geographic distribution model would need to be updated are for changes in traffic impedance that significantly limit the historical average travel speed. Monitoring travel time performance, system reliability, and call concurrency will provide timely feedback for changes in the environment that could impact the distribution model.

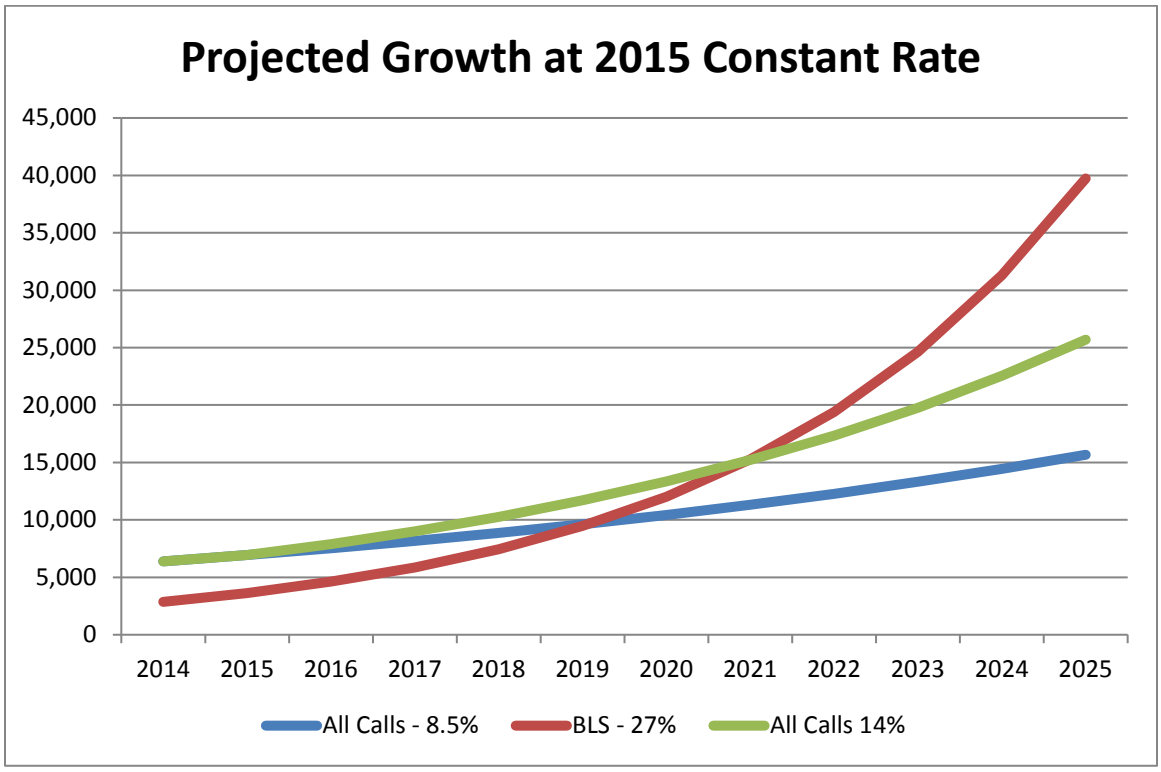
Finally, while the number of calls has increased from 2014 through 2015, BLS incidents are increasing at an astonishing rate of 27%. Interesting, the incidents that were ALS decreased by 13% somewhat moderating the impact of the BLS growth. One plausible contributing factor is the perceived workload across the department, where subconsciously members may choose to not upgrade incidents to ALS decreasing the required time on task over three fold and subsequently increasing BLS incidents at an equal rate. The Department will have to monitor quality assurance reviews on EMS incidents to rule out a behavioral influence.

Assuming that future demands will be reasonably distributed across the various stations in the system, the system will require a redistribution of workload and ultimately reinvestment in resources to meet the growing demand. An average growth of 8.5% was utilized as a constant or linear projection for future call volume. Similarly, an average growth of 27% was utilized as a linear projection for the growth in BLS call volume and a moderated rate of 14% growth was utilized assuming that the decrease in ALS incidents would stabilize over a longer rating period. If the growth remains constant over the next 10 years, there will be an exponential increase in demand. While the system should be evaluated continuously for performance and desired outcomes, the department should specifically re-evaluate workload and performance indicators for every 1,000-call increase to ensure system stability. Data are presented below.

Table 12: Number of Calls, Number of Responses, and Total Busy Time by Year

Call Category	2014	2015	Percentage Change
Basic Life Support	2,863	3,640	27.1%
Advanced Life Support	2,817	2,451	-13.0%
Fire Related Incidents	597	641	7.4%
Canceled Incidents	110	199	80.9%
Total Incidents	**6,387**	**6,931**	**8.5%**

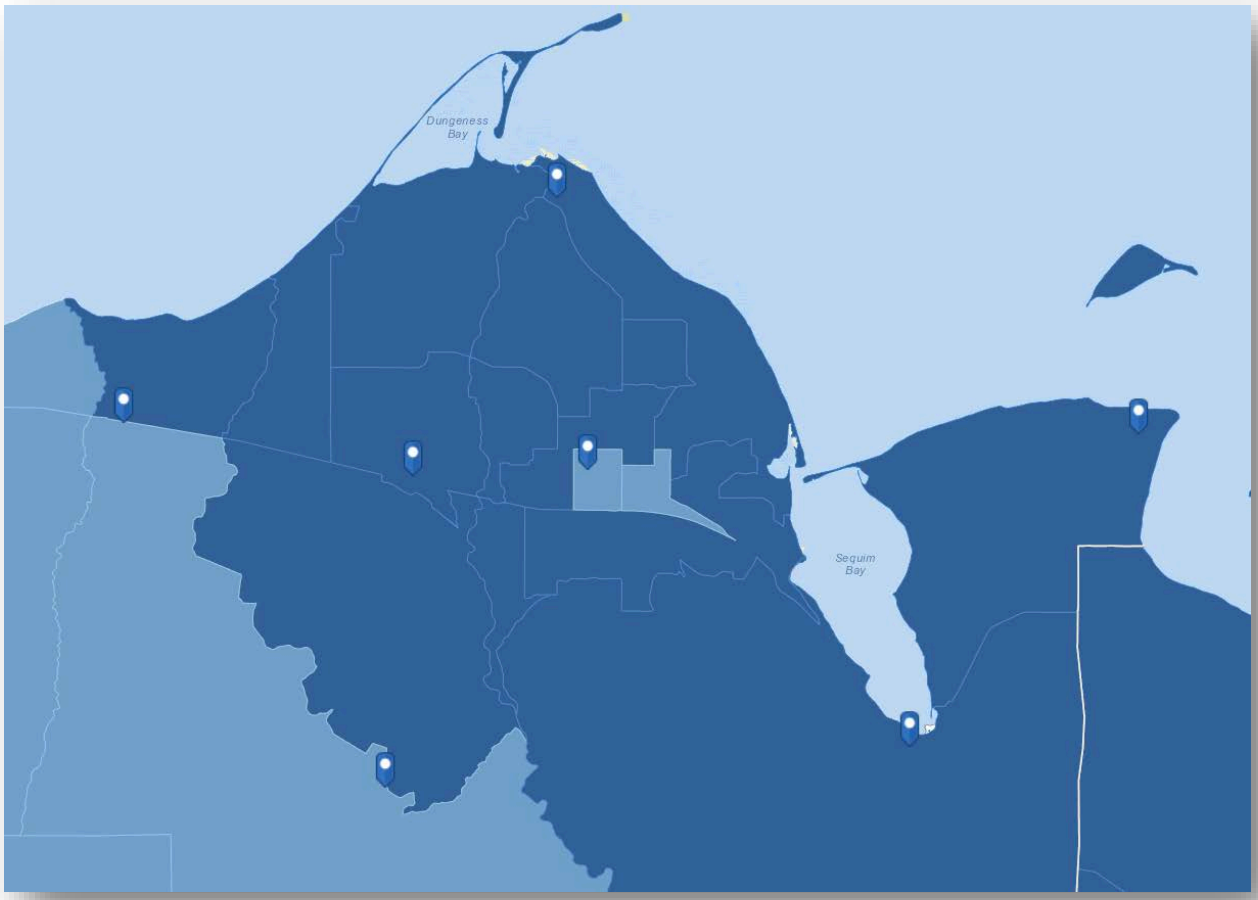
Figure 14: Growth Projections through 2025 with Constant Average Growth



Population Characteristics

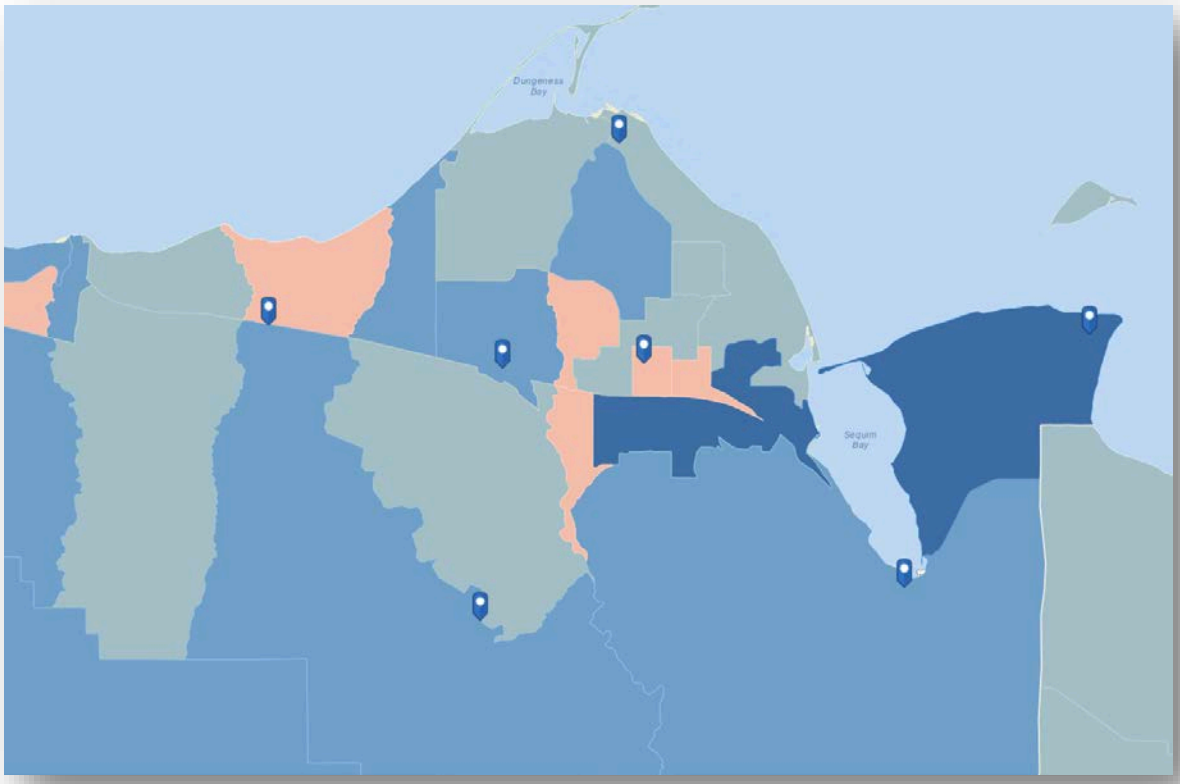
Two elements of the demographics of the population are provided to accompany the evidence of change in historical demand. First, that much of the District is over 52 years and older and will likely continue to utilize fire and emergency services, with the majority of requests for medical services. Second, general change in population growth/decline is provided that demonstrates that growth and/or decline in population is not uniformly experienced across the District. The mapping outputs are provided below.

Figure 15: Median Age



Note: The lighter blue is 43 years of age to 52 and the dark blue is greater than 52 years of age.

Figure 16: Annual Population Change 2012-2017



2012-2017 Annual Population Growth Rate

Block Groups

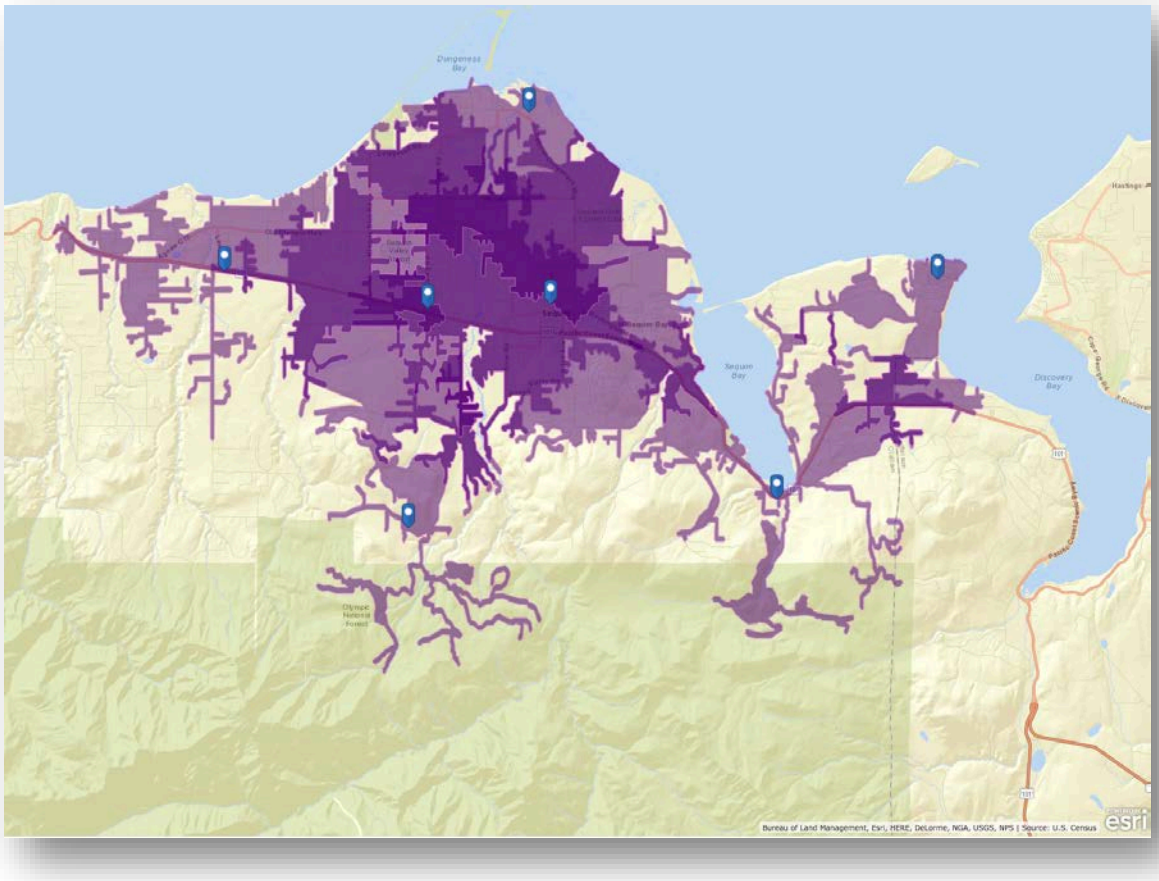
- 2.6% or more
- 1.3% to 2.5%
- 0.4% to 1.2% (US Avg: 0.68%)
- 0.1% to 0.3%
- 0% or negative
- No population

DRIVE-DISTANCE CALCULATIONS (ISO)

In contrast to the previous analyses, the following station mapping outputs are restricted to the drive-distances based on the actual road networks using the ArcGIS platform. In this manner, the current station configurations are analyzed regarding the geographic limitations without specific respect to the distribution of incident demand.

Through the lens of ISO, or their equivalent, generally each station area must have a station within 5 road miles of the adjacent service area. The mapping output demonstrates that the current configuration is meeting or exceeding these general distribution requirements.

Figure 17: All Stations- 5-Mile Drive Distances

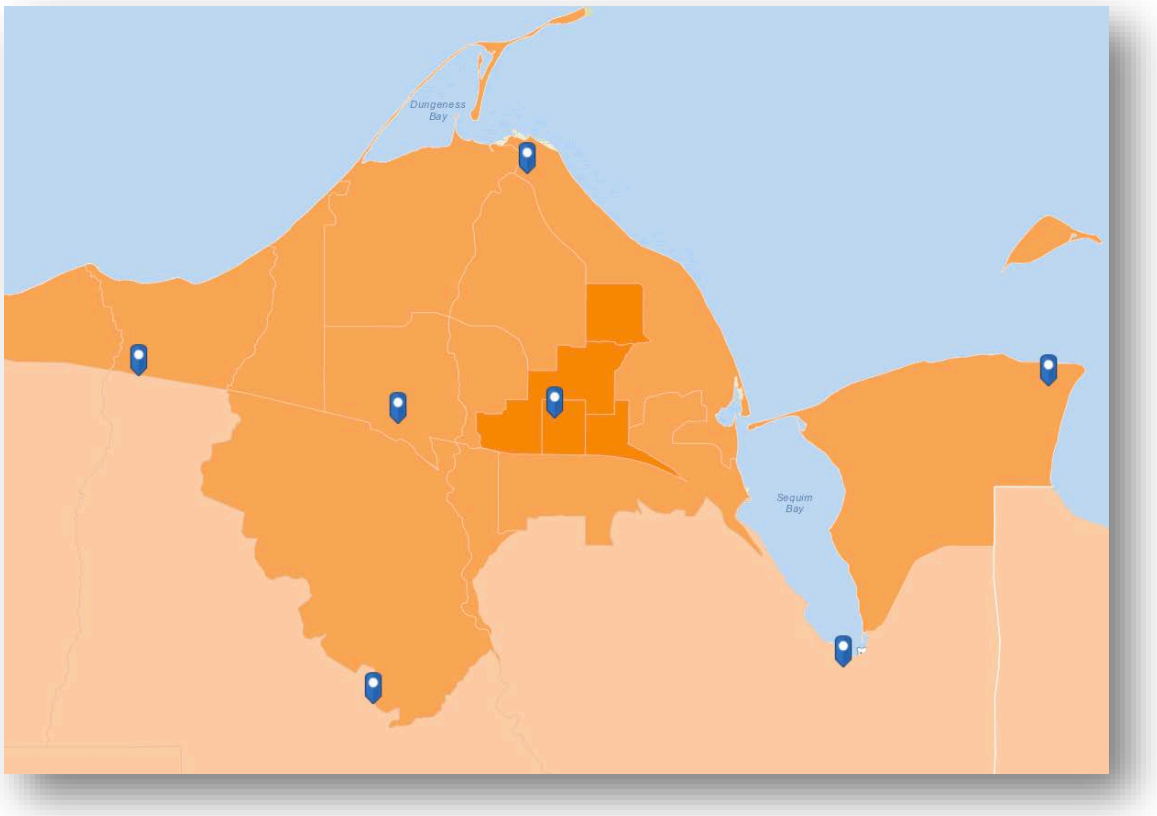


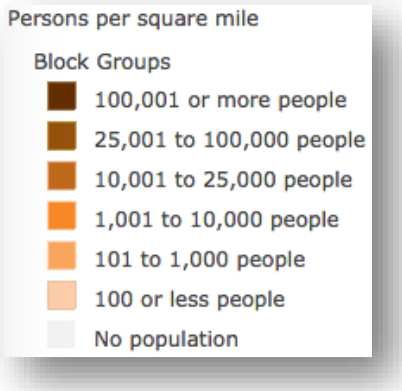
Note: Each progressively darker shading indicates duplicated service area with in the 5-Mile Drive Distances

In addition, ISO suggests that a ladder truck should be positioned for every 2.5-mile coverage areas in a similar manner as the 5-mile recommendations. However, the ladder/truck coverage is only for built-upon areas and areas that have elevated buildings. Therefore, it is important to understand where the built-upon areas are within the jurisdiction. For these purposes, population density is utilized as a surrogate measure for the built upon areas. Examining the distribution of population

density demonstrates that there is a suburban to urban mix in the darker orange area in the greater Sequim area. The data is broken down by block groups there are two main blocks with urban level density and the remaining block ranges are suburban. All of the remaining station territories would qualify for a rural designation according to the Commission on Fire Accreditation International (CFAI). Urban would be greater than 2,000 people per square mile, suburban is between 1,000 and 2,000 per square mile, and rural is less than 1,000 per square mile. A legend is provided as Figure 15 for your convenience.

Figure 18: Population Density Clallam County FPD 3

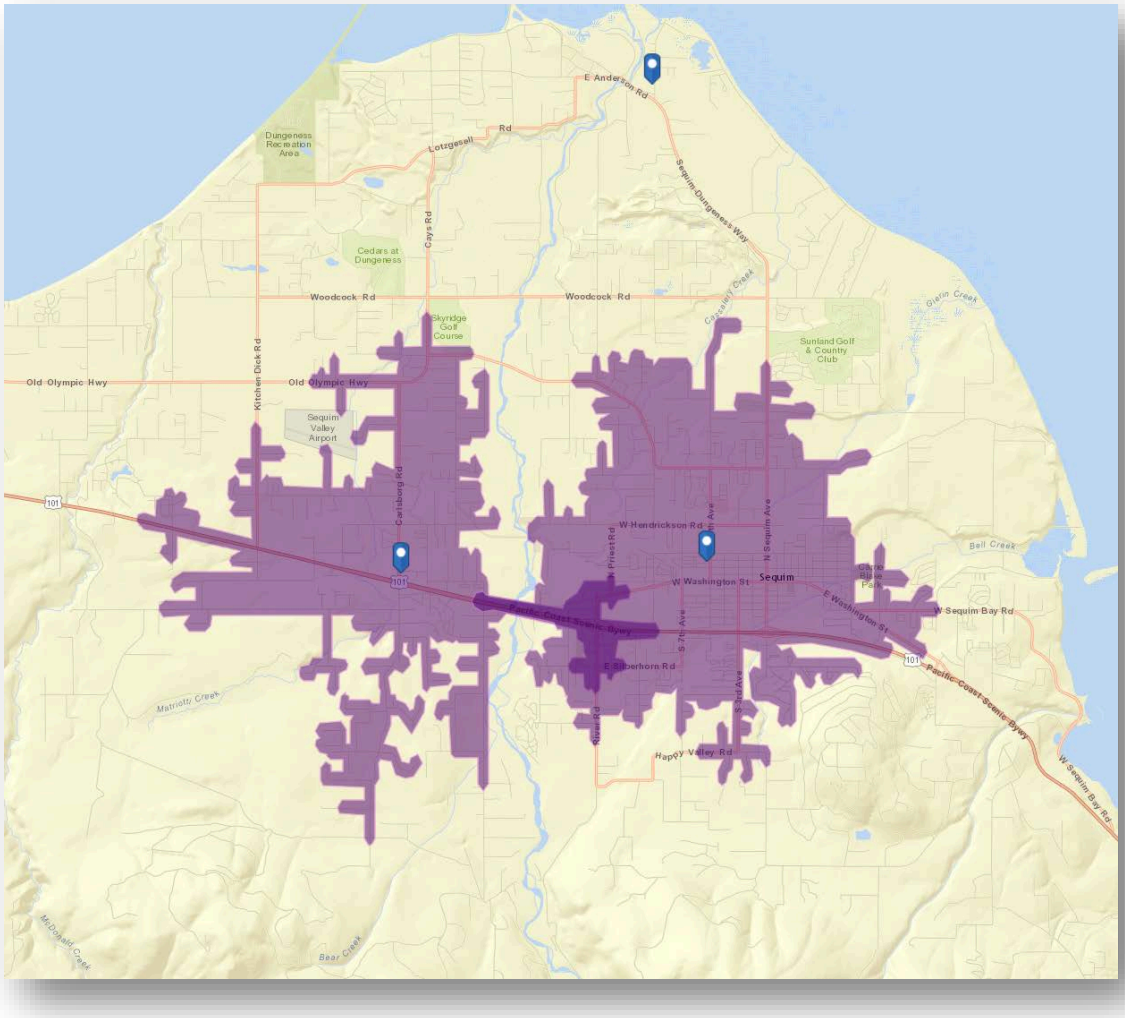




Understanding the population density and built upon areas, it is clear to see that the "urban' core is within the City of Sequim and the greater Sequim area. Therefore, the analysis for ladder truck distribution is restricted to the areas including Stations 33 and 34. Please refer to the figures below.

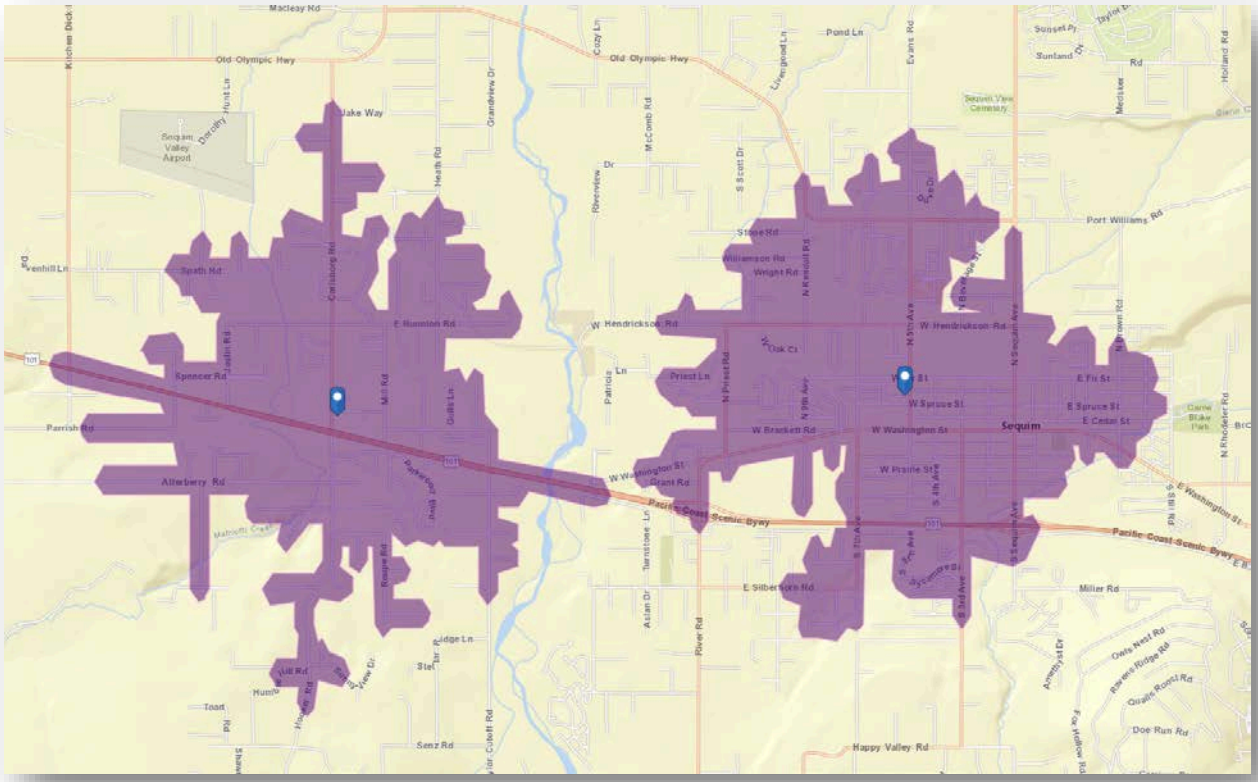
The majority of the population density is within Station 34's jurisdiction. However, the District does not have a proliferation of elevated risks within the jurisdiction necessitating the District to invest in an aerial apparatus. In the future if the District did elect to move in this direction, Station 34 would be the most appropriate location from which to deploy.

Figure 19: Stations 33 and 34 - 2.5 Mile Ladder / Truck Coverage Areas



A similar analysis was conducted to evaluate the ISO recommended 1.5 Mile coverage areas within the built-upon and populated areas. Since each of the remaining stations would fall under a rural designation the first analysis was restricted to Stations 33 and 34. Please refer to the figure below.

Figure 20: Stations 33 and 34 - 1.5-Mile Engine Coverage Area



The mapping output illustrates that the District may have an opportunity to improve the rating schema if future station placement considerations were located within the 1.5-mile coverage areas. Of course, this would be a very costly endeavor for the District since the demand for services is not correlated to the distribution model and the funding mechanisms would be fixed.

However, another measure that is typically utilized by ISO is the percentage of the community that is hydranted. In this respect, the distribution of fire hydrants acts as a surrogate for built upon area. When referring to Figure 21, it is evident that there are built-upon areas also include areas immediately adjacent to Station 32 and to the West/Southwest as well as Station 33 from the previous analysis. Therefore, a second analysis of the 1.5-mile engine coverage areas is provided. The mapping output demonstrates that generally, each of the stations is located well to cover the built-upon areas. The output suggests that the most challenged area is Station 32. Please refer to Figure 22.

Figure 21: Fire Hydrant Locations in Clallam County FPD 3

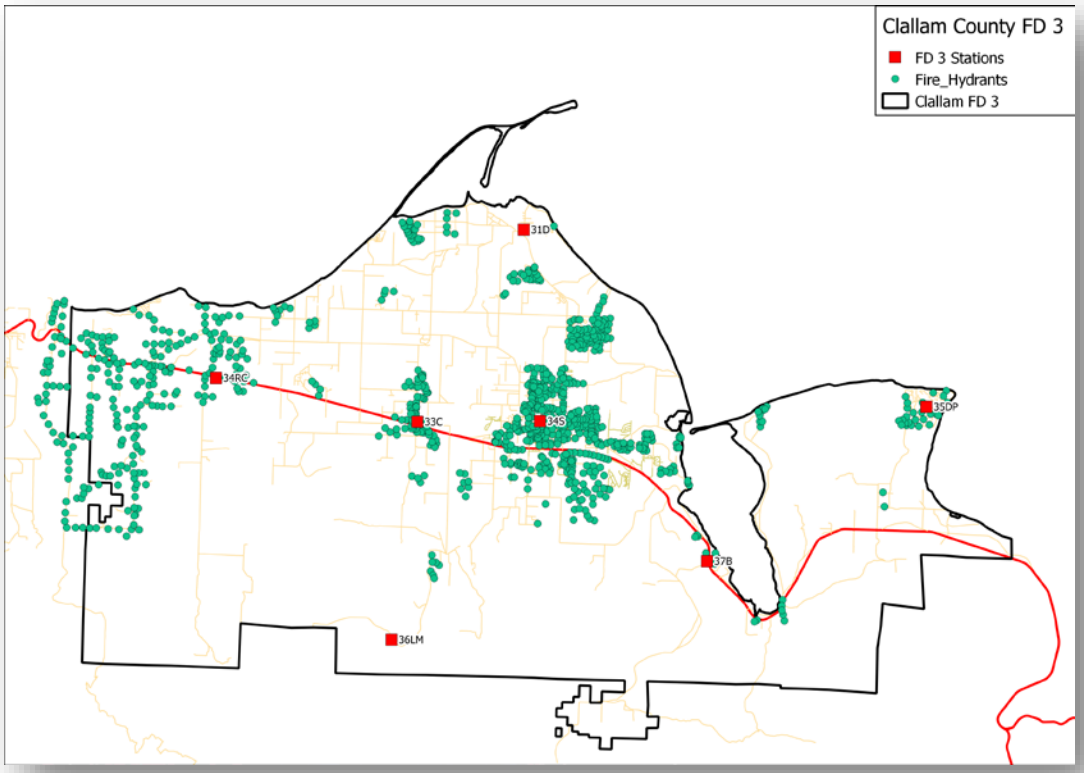
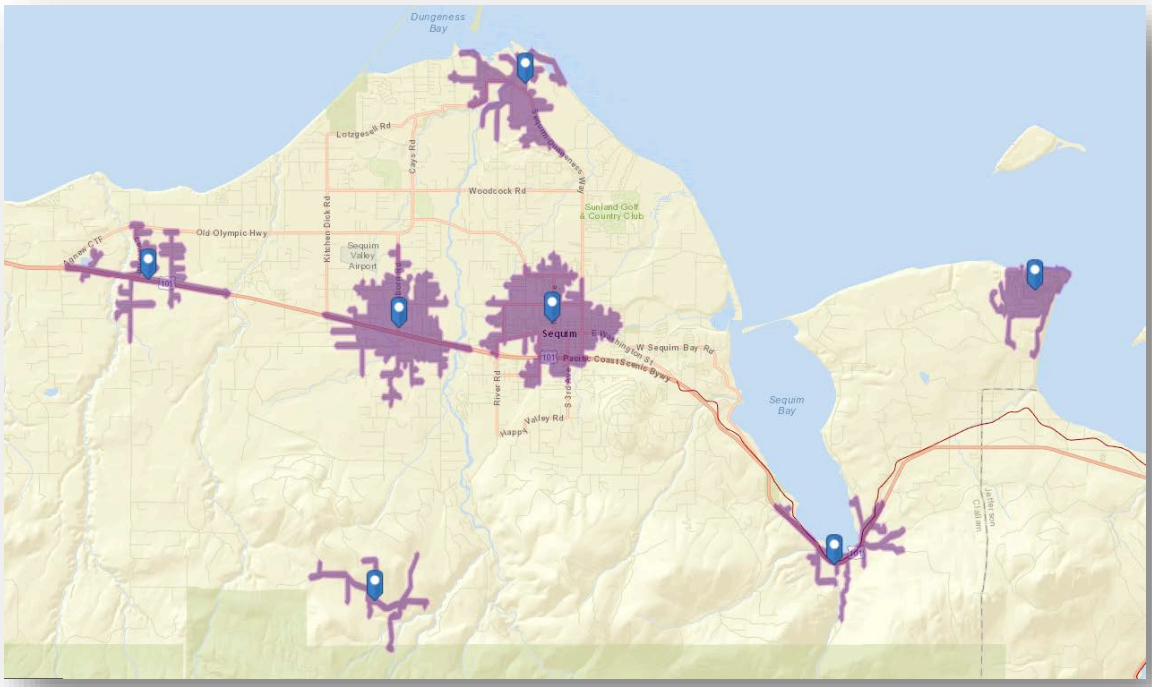


Figure 22: All Stations - 1.5-Mile Engine Coverage Areas



EFFECTIVE RESPONSE FORCE MAPPING

CFAI provides for two travel time baseline performance areas for the fire accreditation model regarding the effective response force capabilities. Within the suburban areas, the model allows for a 13-minute travel time and an 18-minute arrival of the ERF within 18 minutes travel time for the rural areas. As with most departments, the District is challenged to meet the full ERF in all areas of the jurisdiction. However, in both cases the most densely populated areas have sufficient coverage.

Figure 23: 13-Minute ERF - Stations 33, 34, and 37

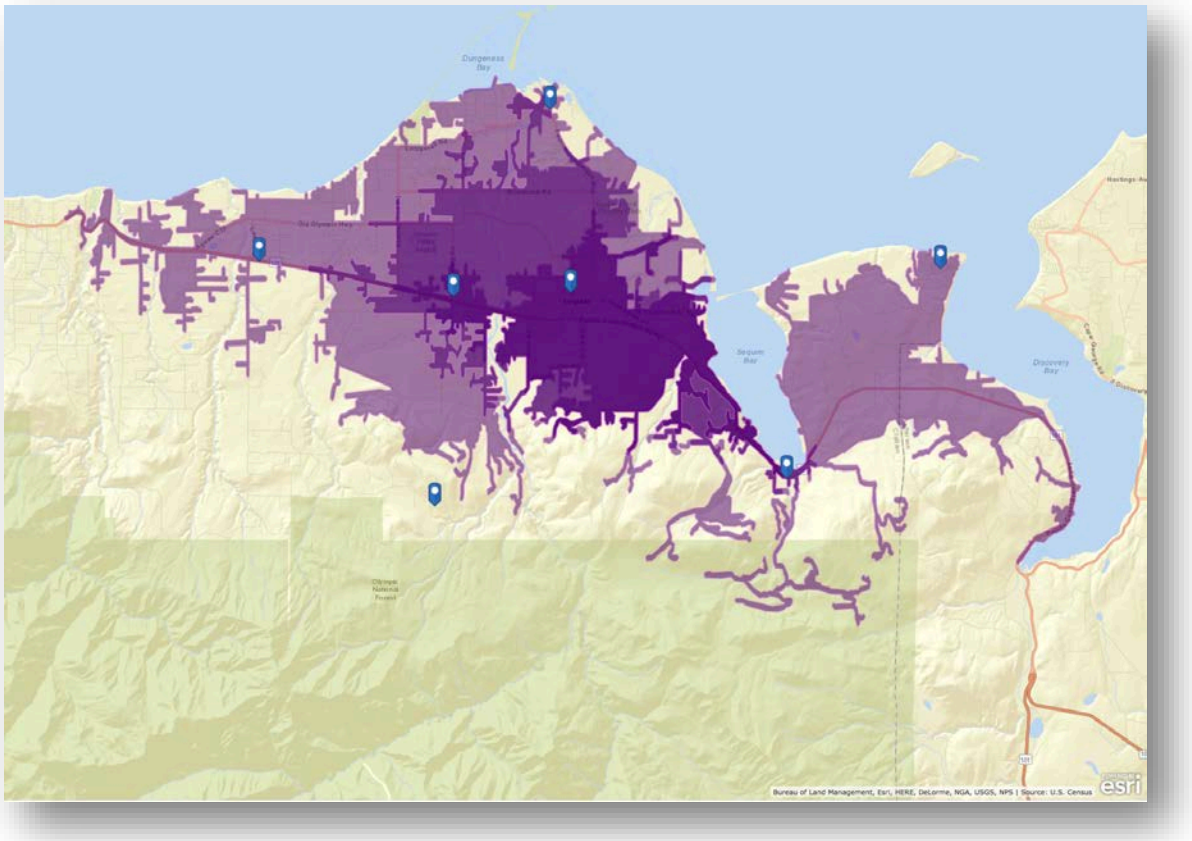
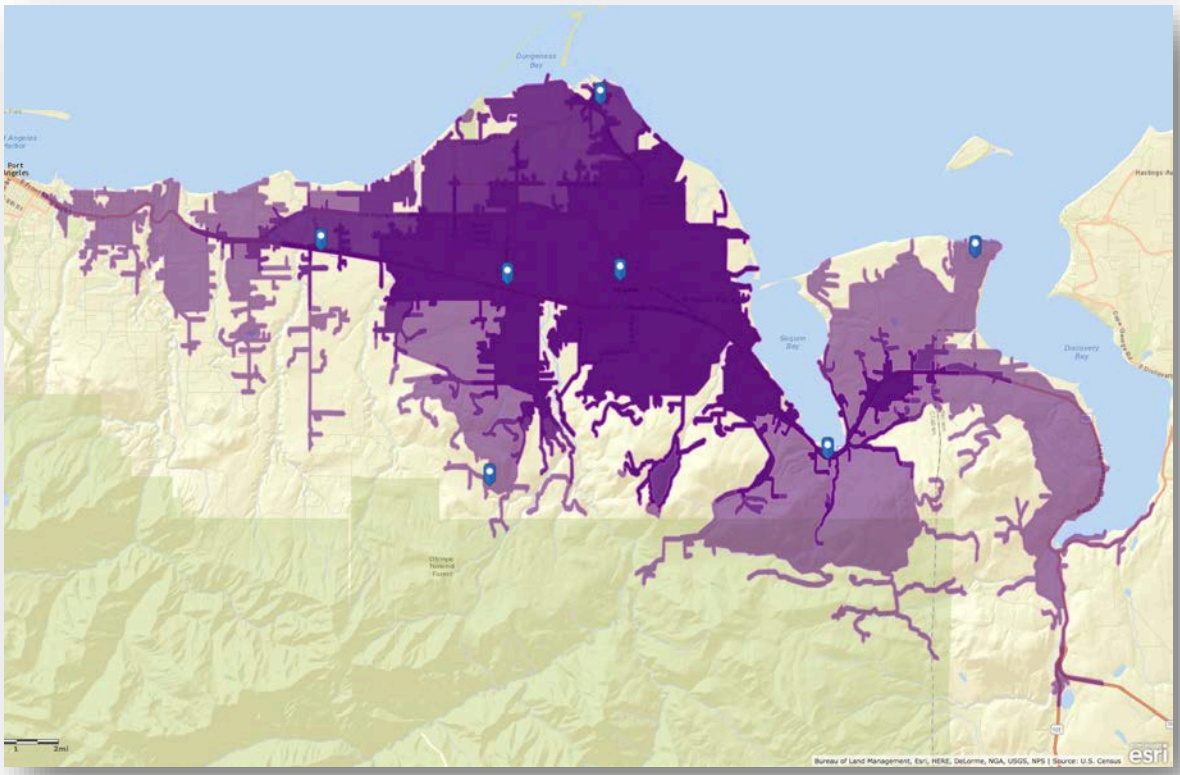


Figure 24: 18-Minute ERF from Stations 33, 34, and 37



DISTRIBUTION OF RISK ACROSS THE JURISDICTION

Distribution Of Demand By Program Areas

Heat maps were created to identify the concentration of the historic demand for services by program area. Therefore, the following mapping will present the relative concentration of service demands by fire, EMS, BLS and ALS, respectively. The Blue areas have the least demand and the dark red areas have the highest concentration of demand.

When reviewing the heat maps, it is clear that the relative density of service demands is generally located in Station 34s territory across all program areas.

Figure 25: Heat Map for Fire Related Incidents

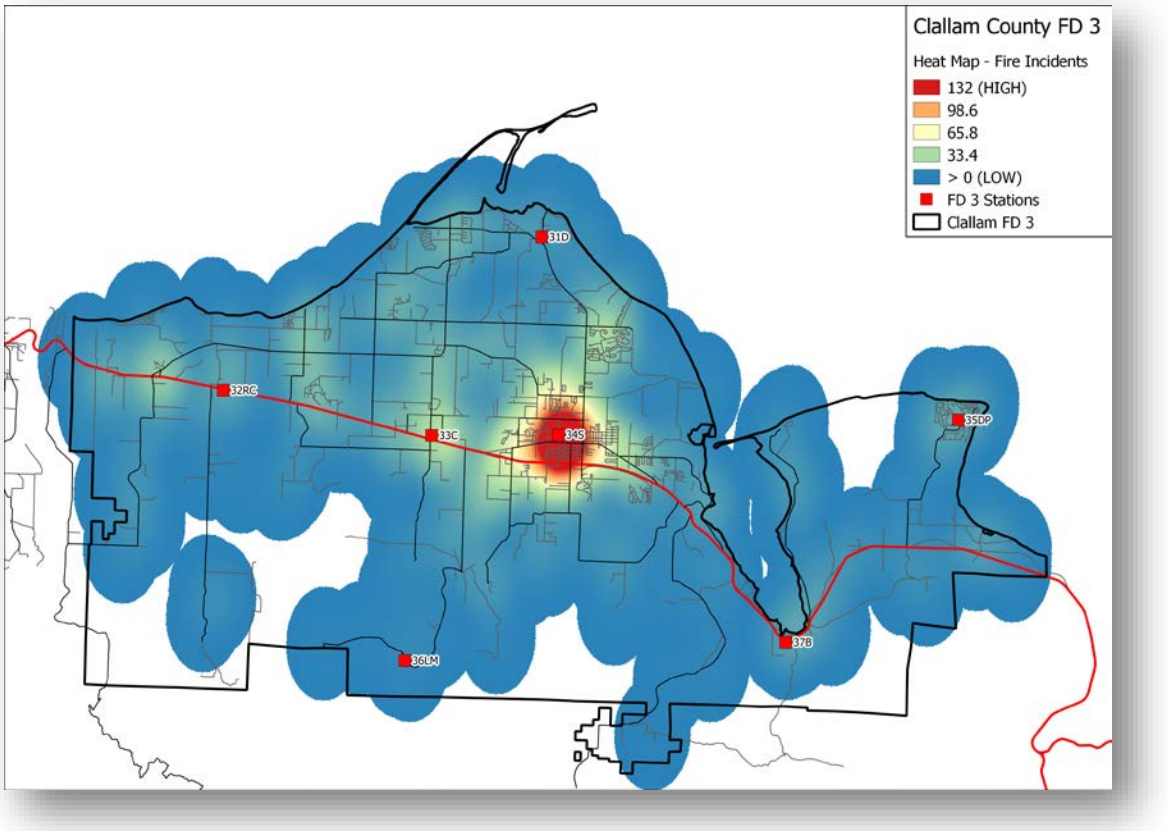


Figure 26: Heat Map for EMS Related Incidents

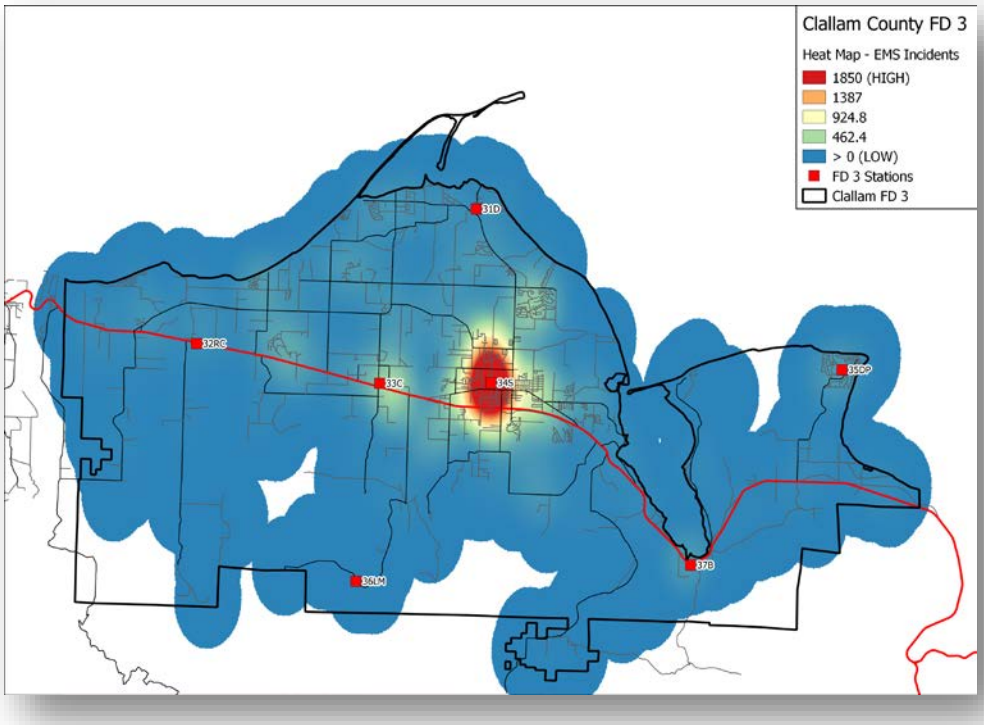


Figure 27: Heat Map for BLS Incidents

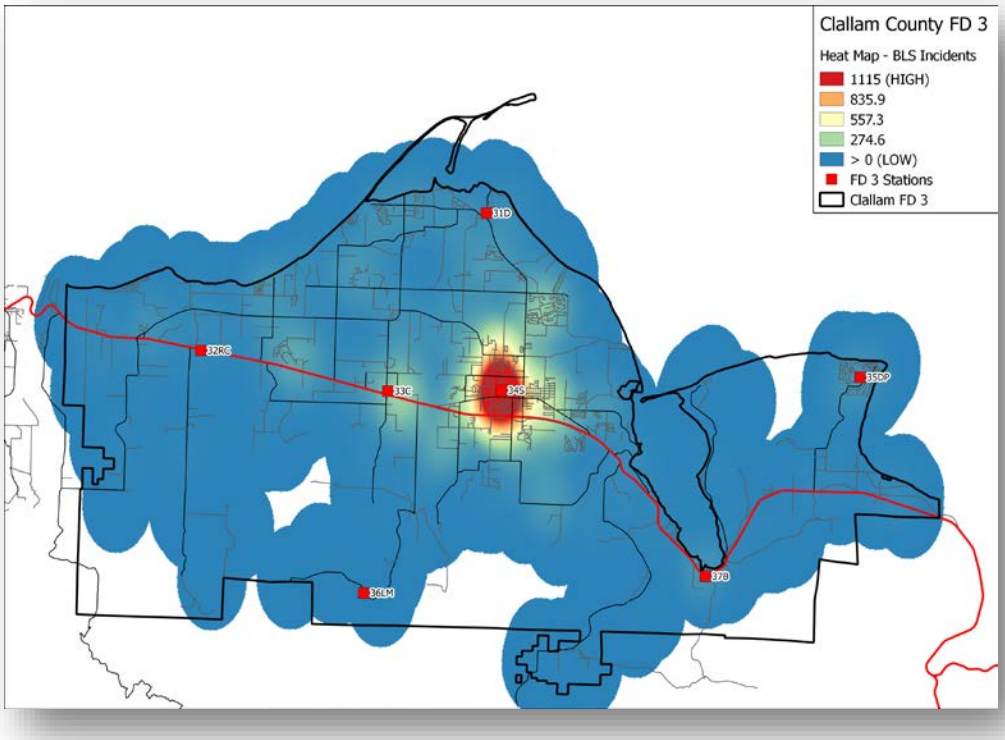
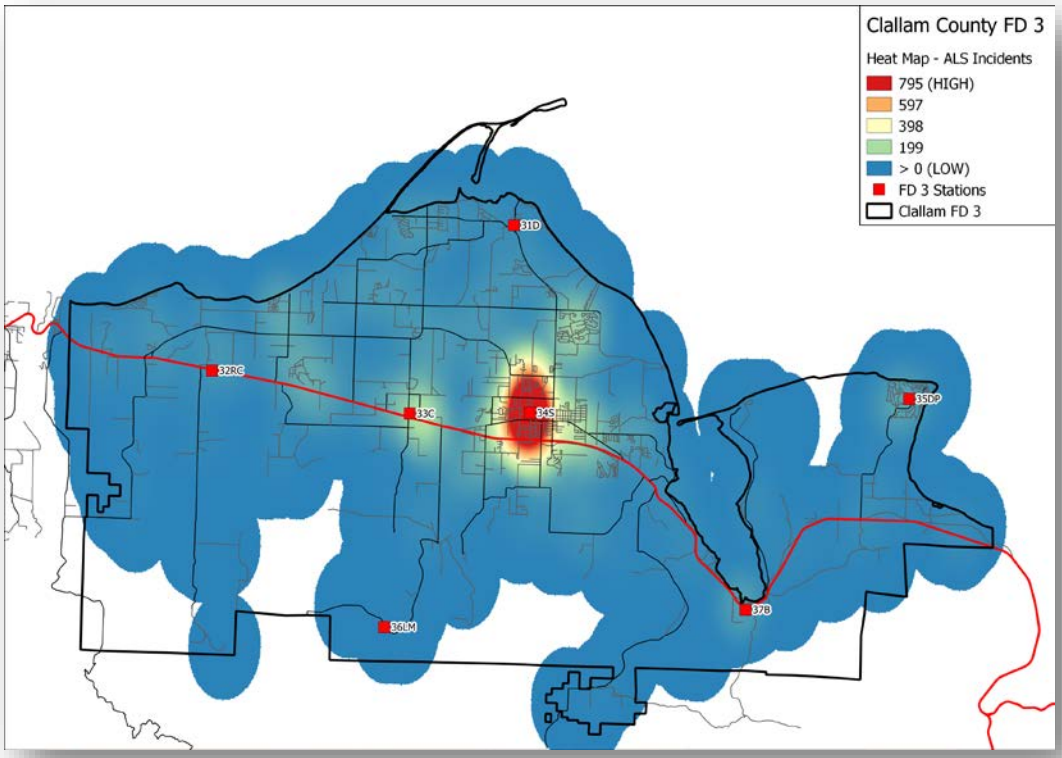


Figure 28: Heat Map for ALS Incidents



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