



Fire Station Location Planning

San Marcos, TX

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Jess Neuner

Introduction

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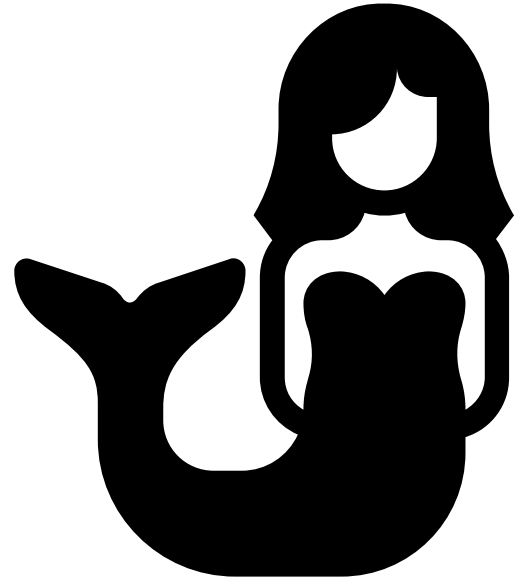
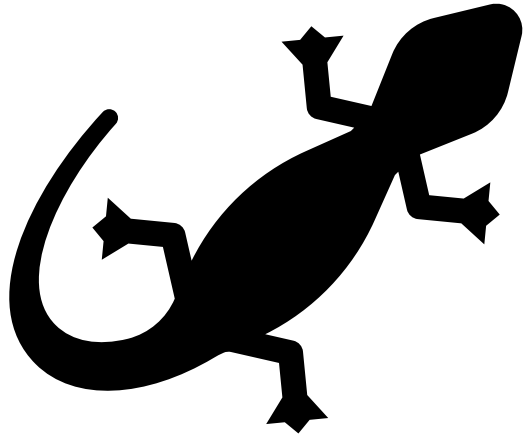
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Make It
Interactive

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What's Next?

San Marcos & Our Fire Department



A Little About Us

1.

Over 70,000 current residents, along with thousands of seasonal visitors

2.

247 multi-family properties including regular and high-rise apartments condos, etc.

3.

5,000+ new single family residences expected within the city in coming years

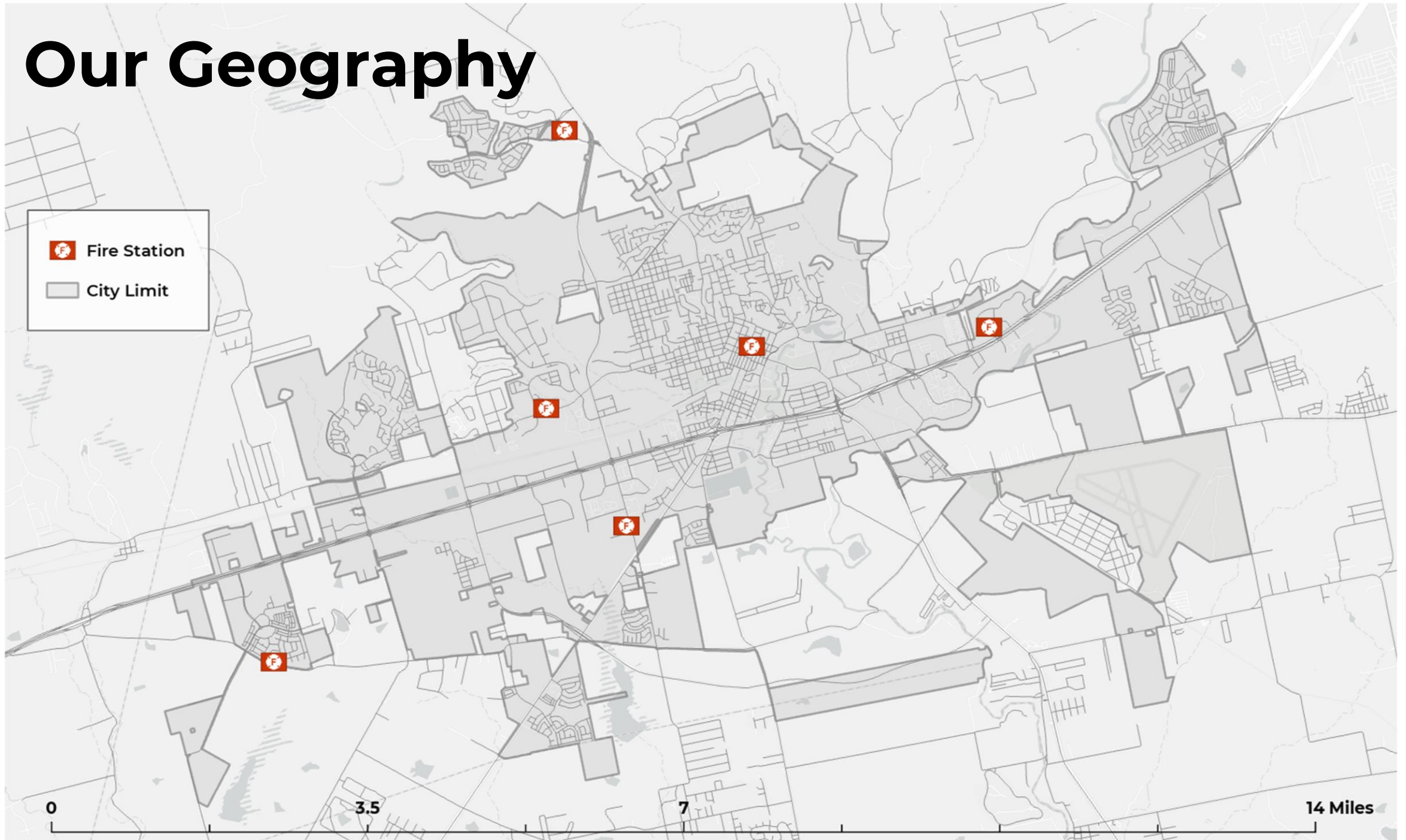
4.

188 projects identified for the FY 2023 10 Year CIP

Our Geography

 Fire Station

 City Limit

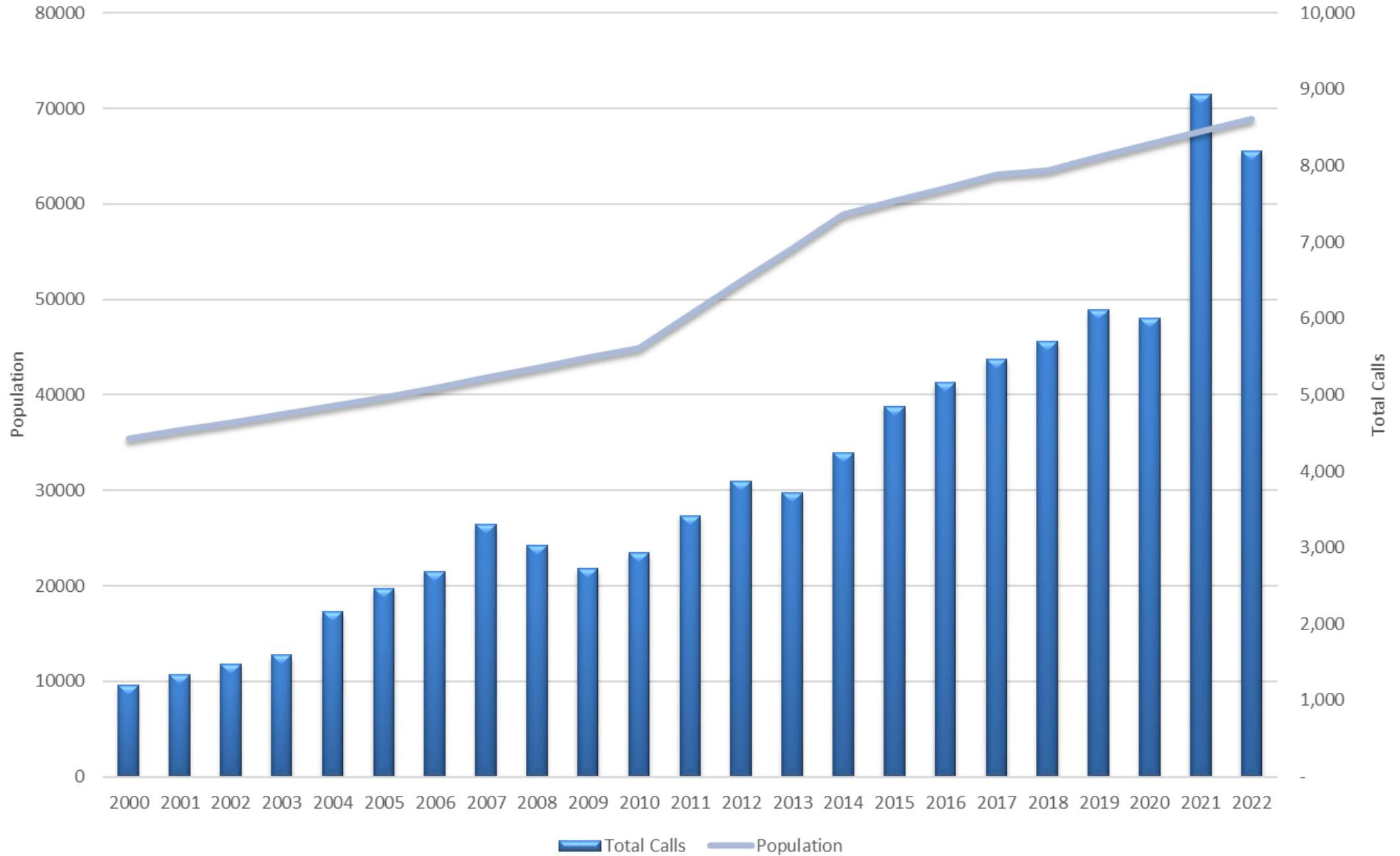


0 3.5 7 14 Miles

Growing City Limits



SMFD - Annual Call Volume: 2000 - 2022



San Marcos Fire Department

- 6 Fire Stations spread across 39.6 square miles
- 110 full-time staff members in Prevention, Operations, and Support centered roles
- 90 out of those staff members dedicated solely to operations

Fire Prevention

Fire Operations

Fire Support



SAN MARCOS FIRE DEPARTMENT

HIRING

FIREFIGHTER LATERAL ENTRY

Candidates possessing TCFP/DSHS certification are eligible to receive a yearly salary of up to \$73,785.00* based on their qualifications.

* Base salary only (excludes overtime, incentive pay, or FLSA pay)

- At least one (1) year prior full-time work experience with similar duties in a comparable fire and/or EMS agency is required.
- Not more than 180 day break in service.

JOB DETAILS AND APPLICATION HERE:
www.governmentjobs.com/careers/sanmarcosx
Lateral Firefighter

Coverage Analysis



Coverage Analysis

- Understand percentage of City covered by at least one station
- Various combinations of station locations
- With and without train present
- Fire truck average speeds
- Thoroughfare master plan

Ask an expert

Standards of Cover

1. What makes San Marcos unique?

Community Risk.....

At-Risk Populations.....

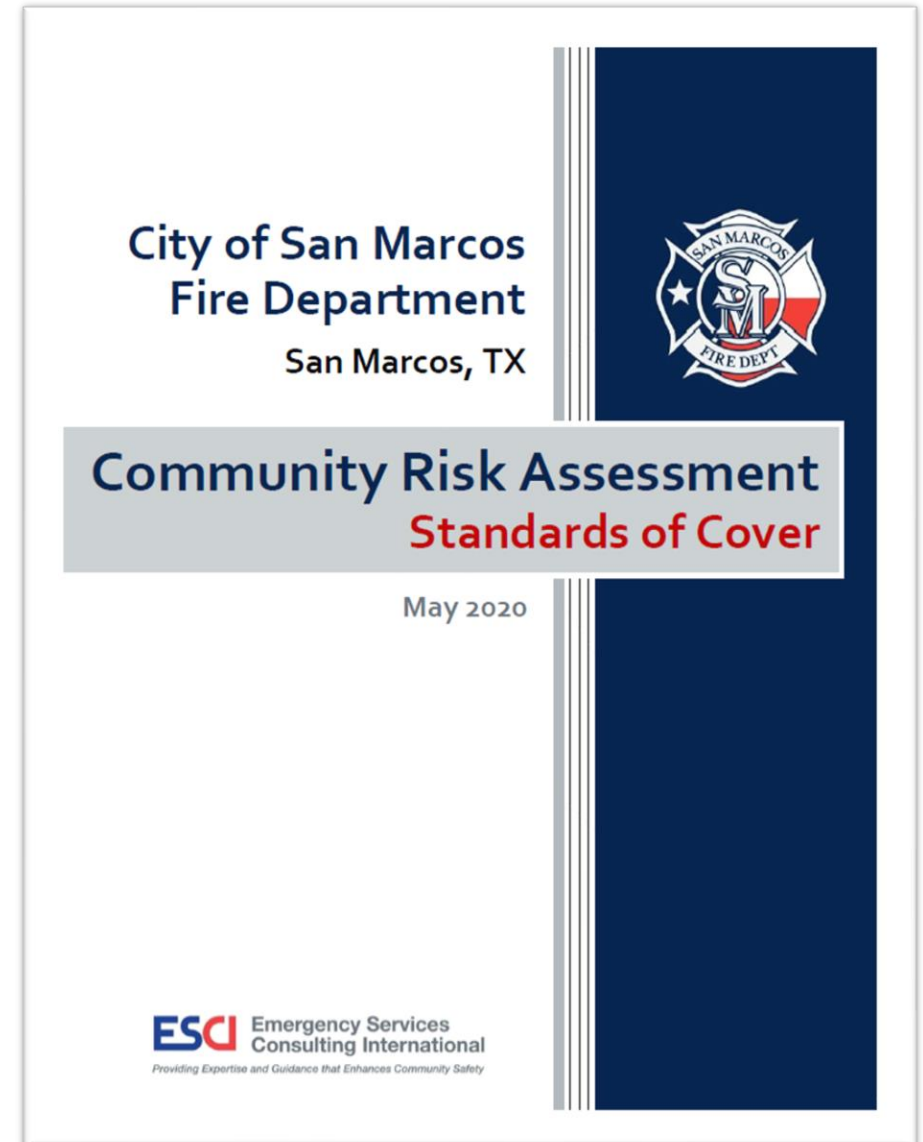
Natural Hazards

Technological Hazards

Transportation Hazards.....

Structural Fire Hazards.....

Target-Hazard Locations...



*E.1.2.1 CPSE Center for Public Safety Excellence, Inc., 4501 Singer Court, Suite 180, Chantilly, VA 20151. *Community Risk Assessment: Standards of Cover, 6th edition, 2016*

Ask an expert

Standards of Cover

1. What makes San Marcos unique?
2. Risk Assessment

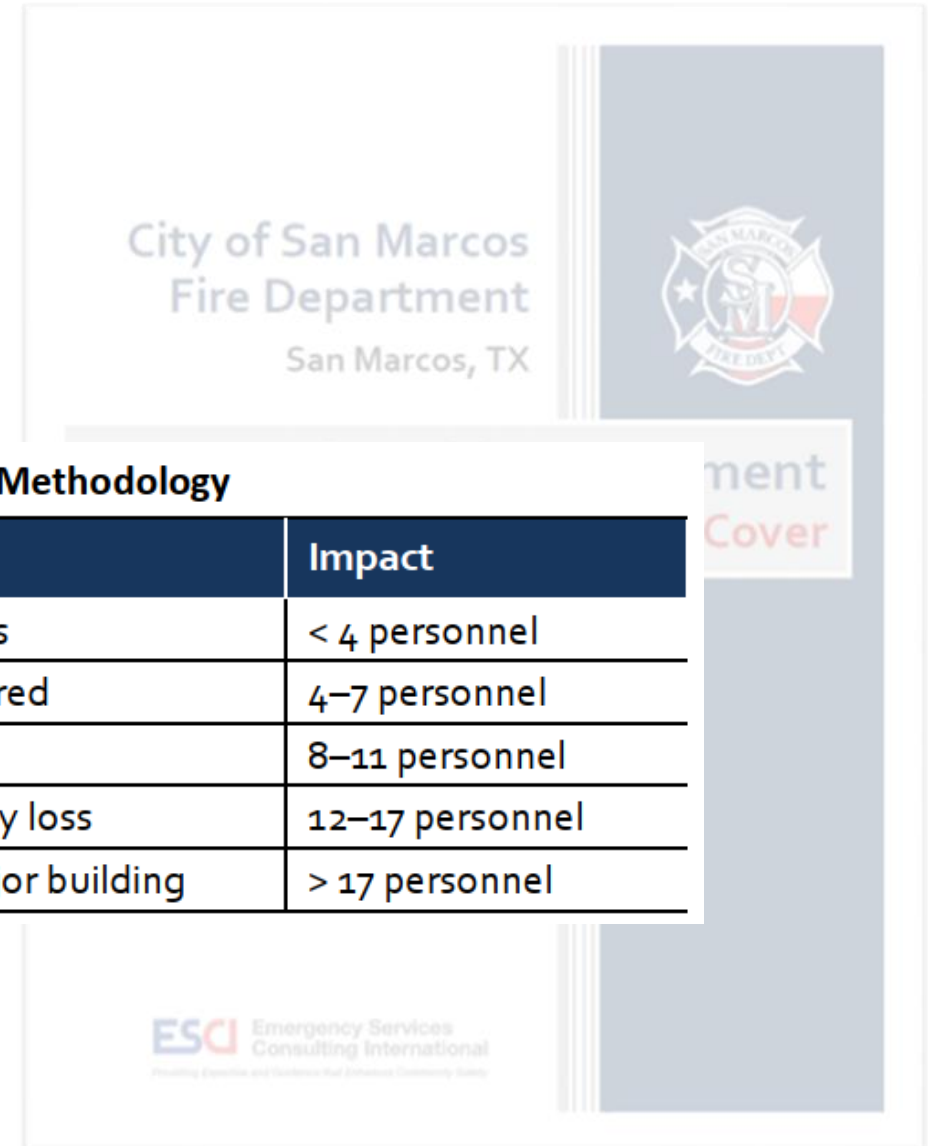


Figure 39: Risk Assessment Scoring Methodology

Score	Probability	Consequence	Impact
2	Rarely (annual or longer)	No life or property loss	< 4 personnel
4	Quarterly	Life or property impaired	4–7 personnel
6	Monthly	Life or property loss	8–11 personnel
8	Weekly	Loss > 1 life or property loss	12–17 personnel
10	Daily	Loss of > 3 lives or major building	> 17 personnel

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Ask an expert

Standards of Cover

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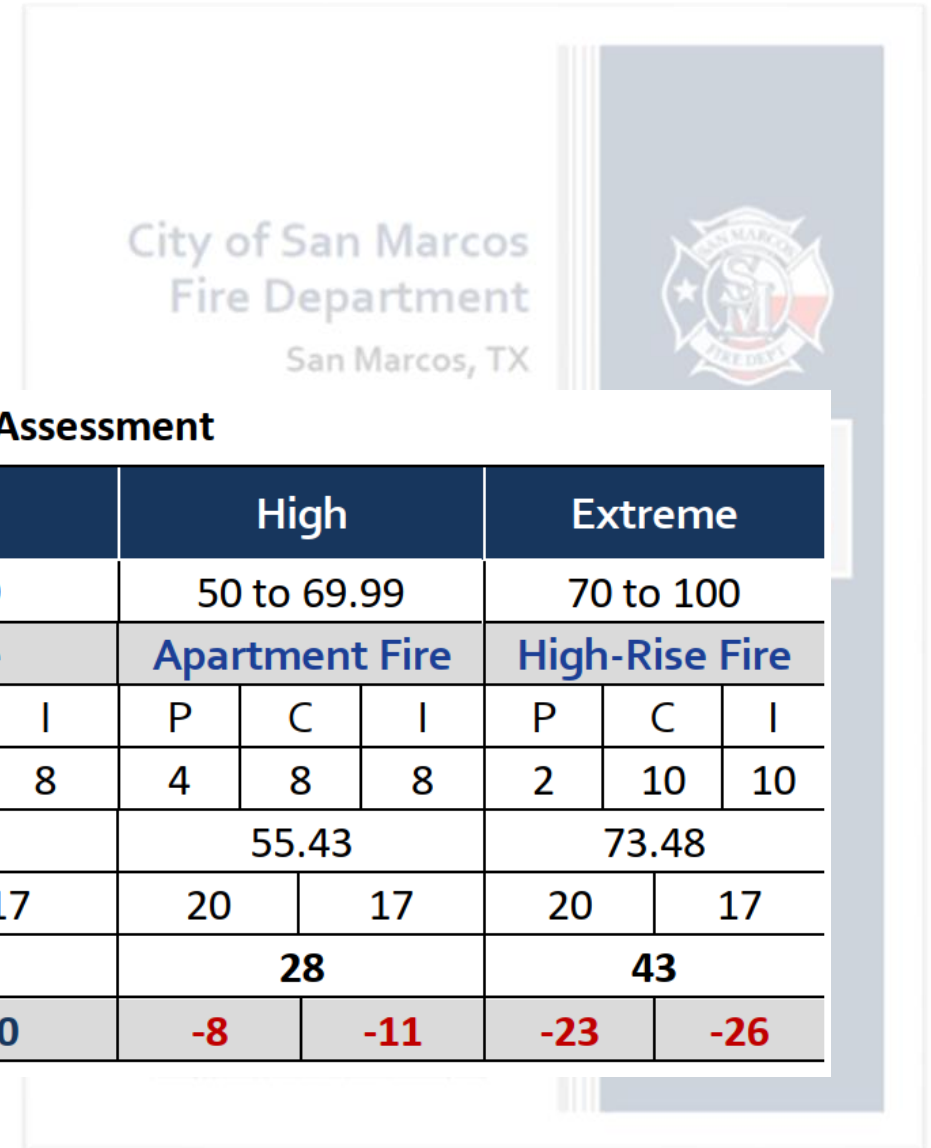


Figure 41: Fire-Incident Risk Assessment

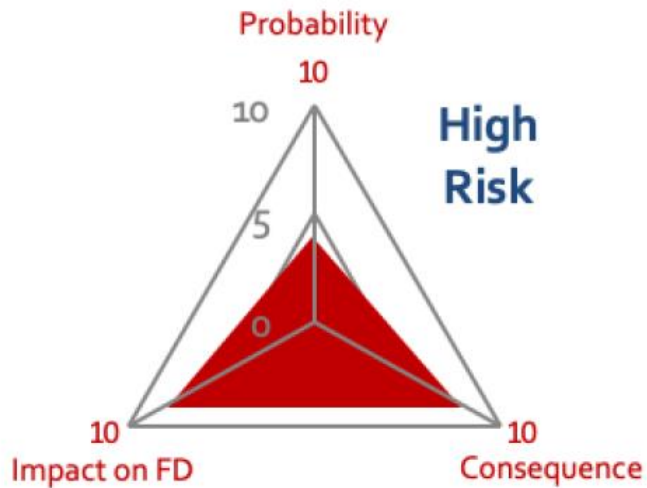
Description	Low			Moderate			High			Extreme		
Risk Score Range	0 to 24.99			25 to 49.99			50 to 69.99			70 to 100		
Incident Type:	Dumpster Fire			House Fire			Apartment Fire			High-Rise Fire		
Risk Score	P	C	I	P	C	I	P	C	I	P	C	I
	6	2	2	4	6	8	4	8	8	2	10	10
Score Assigned	12.33			44.18			55.43			73.48		
Max/Min Staffing	20	17		20	17		20	17		20	17	
ERF Assigned:	6			17			28			43		
ERF Remaining:	14	11		3	0		-8	-11		-23	-26	

*E.1.2.1 CPSE Center for Public Safety Excellence, Inc., 4501 Singer Court, Suite 180, Chantilly, VA 20151. *Community Risk Assessment: Standards of Cover, 6th edition, 2016*

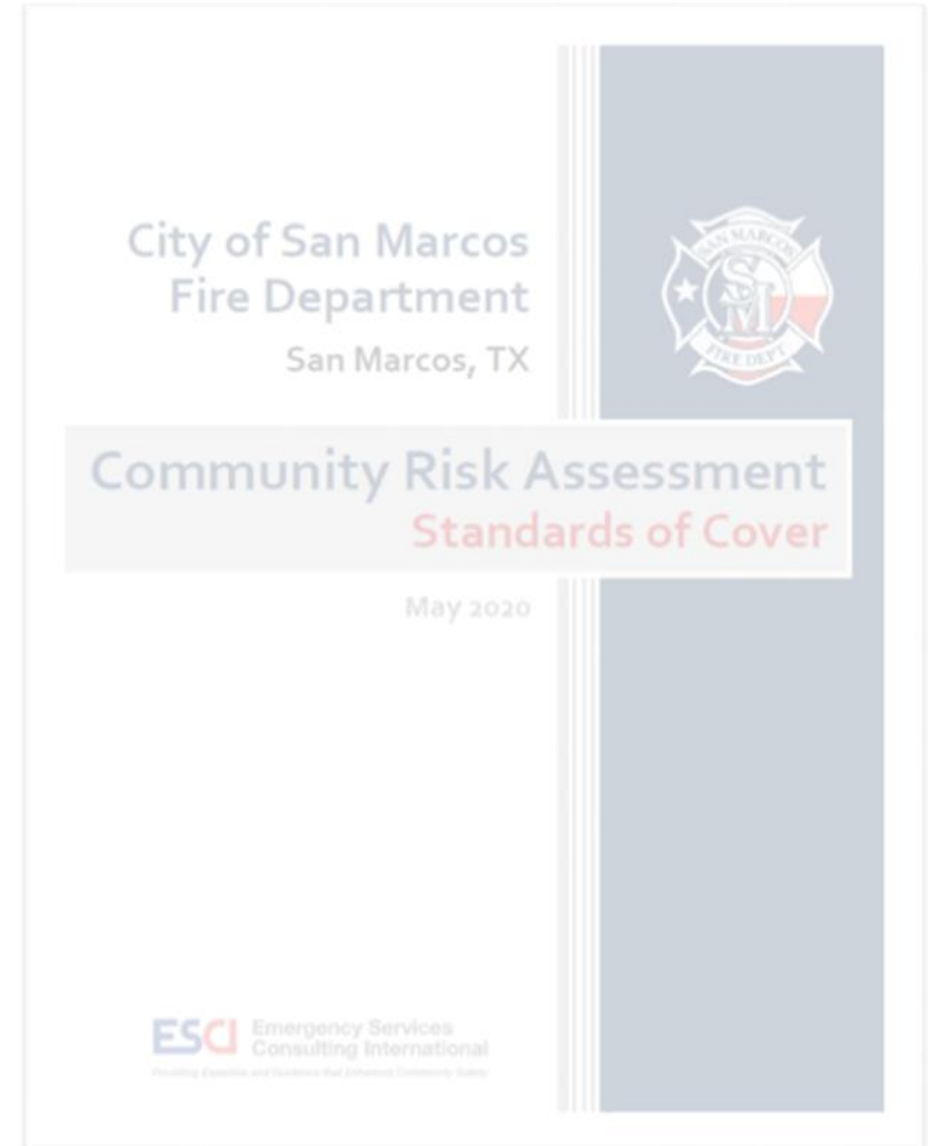
Ask an expert

Standards of Cover

1. What makes San Marcos unique?
2. Risk Assessment



High		
50 to 69.99		
Apartment Fire		
P	C	I
4	8	8
55.43		
20	17	
28		
-8	-11	

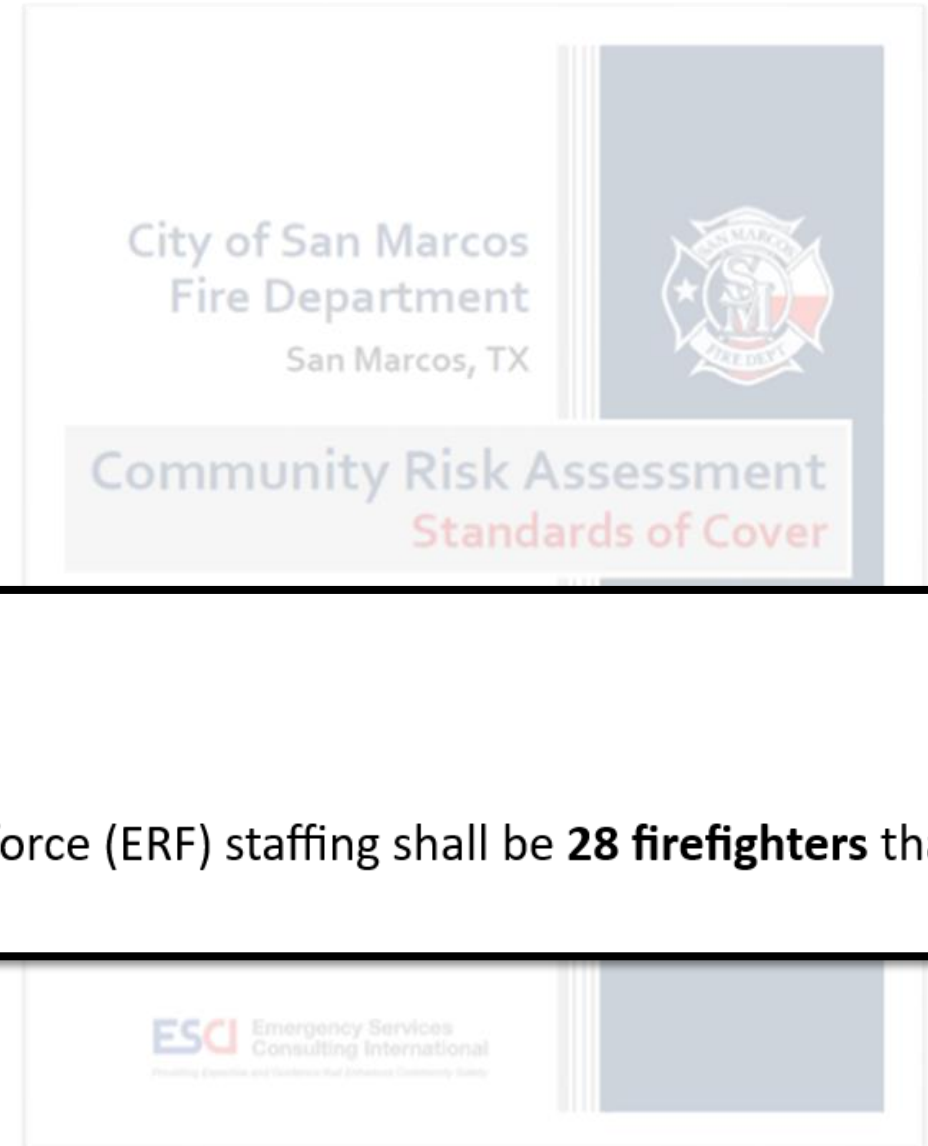


*E.1.2.1 CPSE Center for Public Safety Excellence, Inc., 4501 Singer Court, Suite 180, Chantilly, VA 20151. *Community Risk Assessment: Standards of Cover, 6th edition, 2016*

Ask an expert

Standards of Cover

1. What makes San Marcos unique?
2. Risk Assessment
3. Defines performance objectives



Benchmark Performance Objectives

Fire Suppression Benchmarks

For 90% of High-Risk fires, the minimum effective response force (ERF) staffing shall be 28 firefighters that arrive within 10 minutes, 20 seconds

Cascade of Events

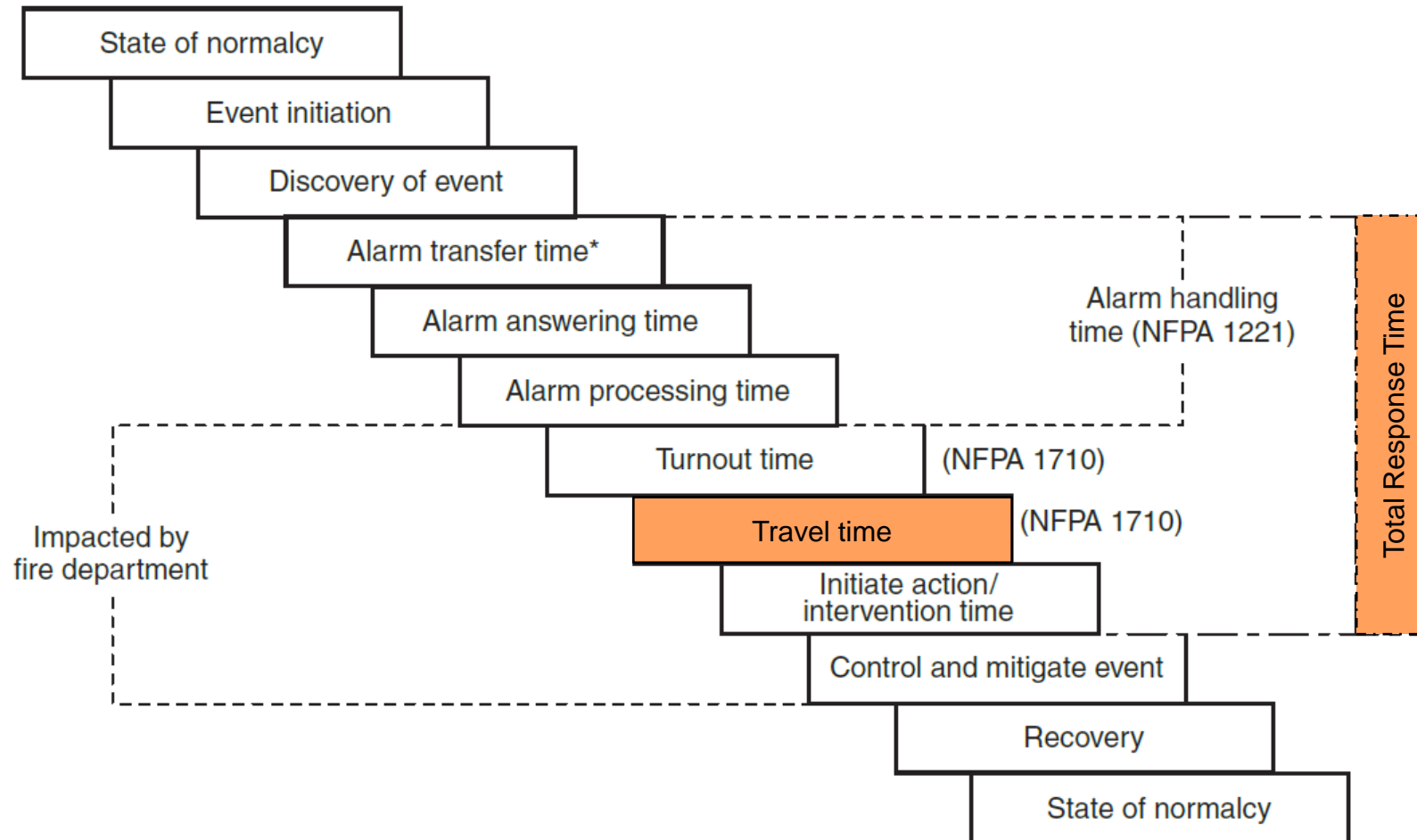
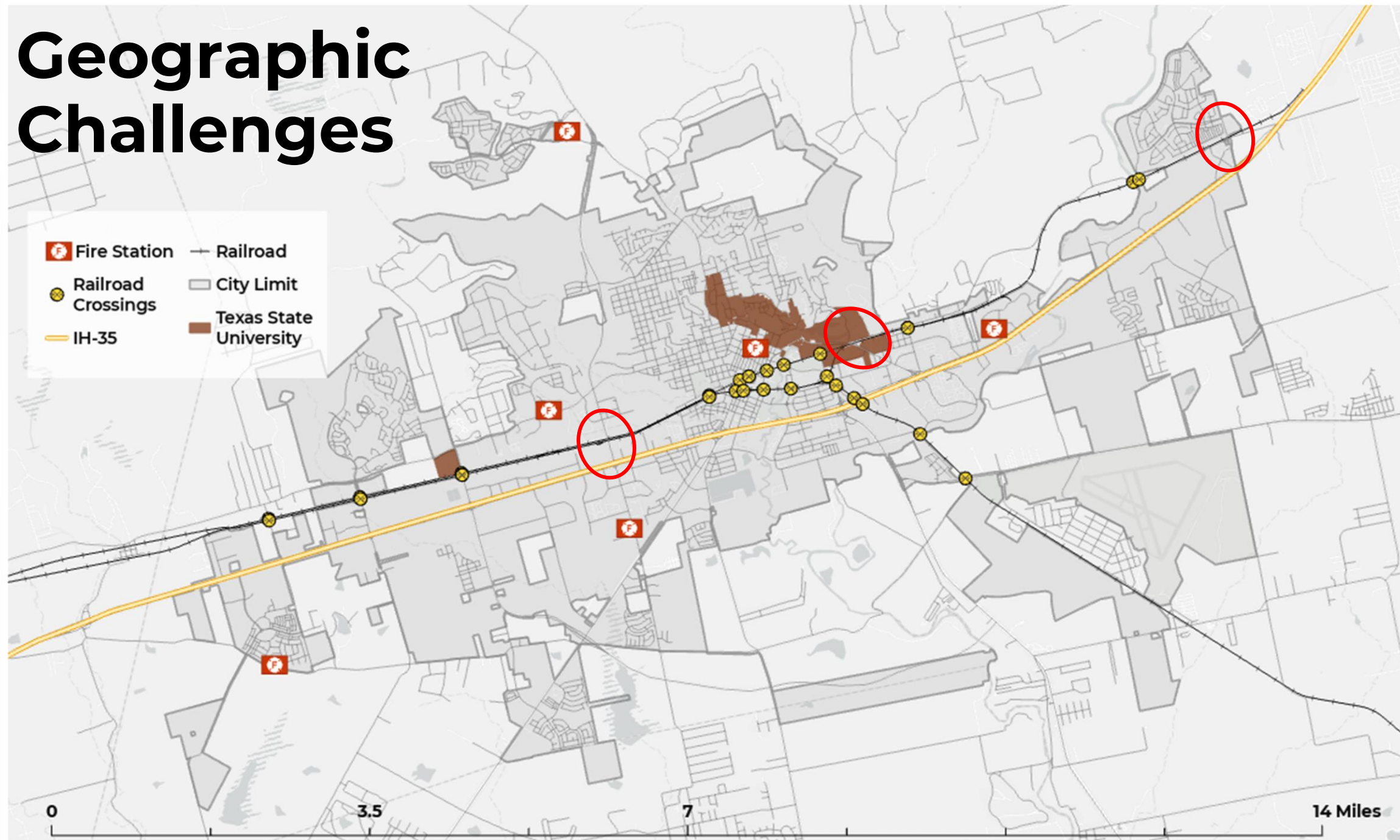


FIGURE A.3.3.64.6 Cascade of Events Chart. 1710 NFPA Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments (2020).

Geographic Challenges

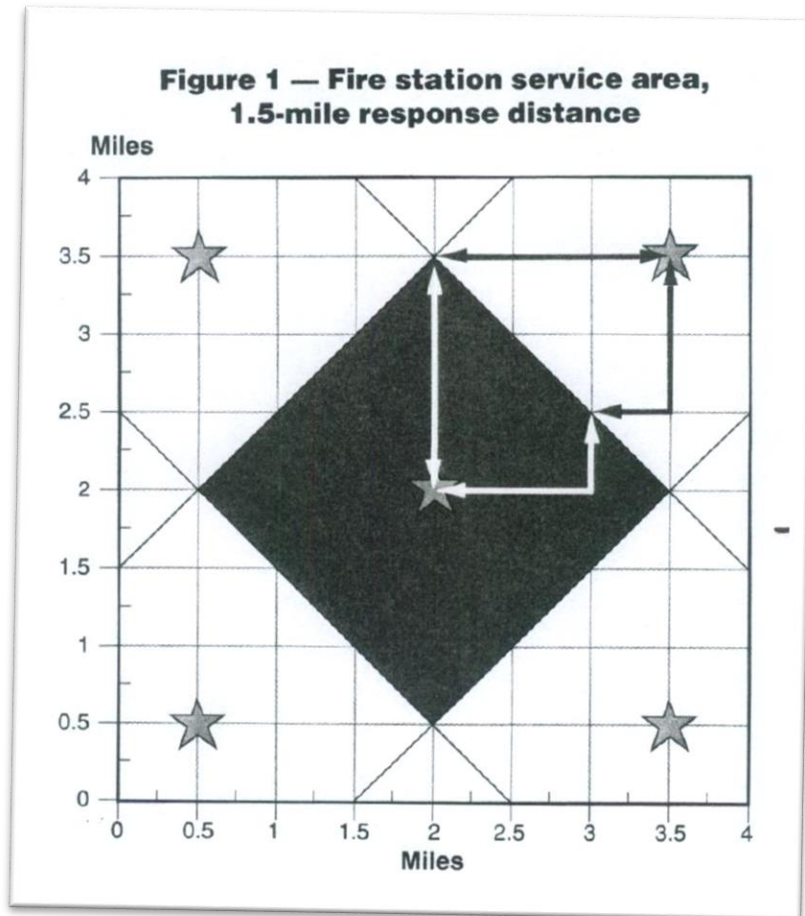
- Fire Station
- Railroad
- Railroad Crossings
- City Limit
- IH-35
- Texas State University



0 3.5 7 14 Miles

Calculating Station Service Areas

Larson Boxes



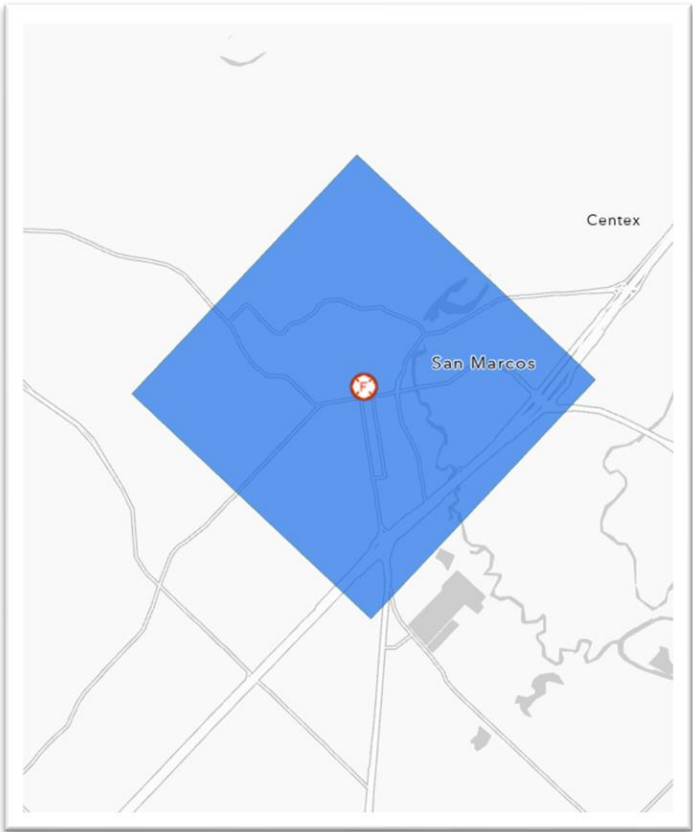
Drive Times

ArcGIS Network Analyst: Service Areas

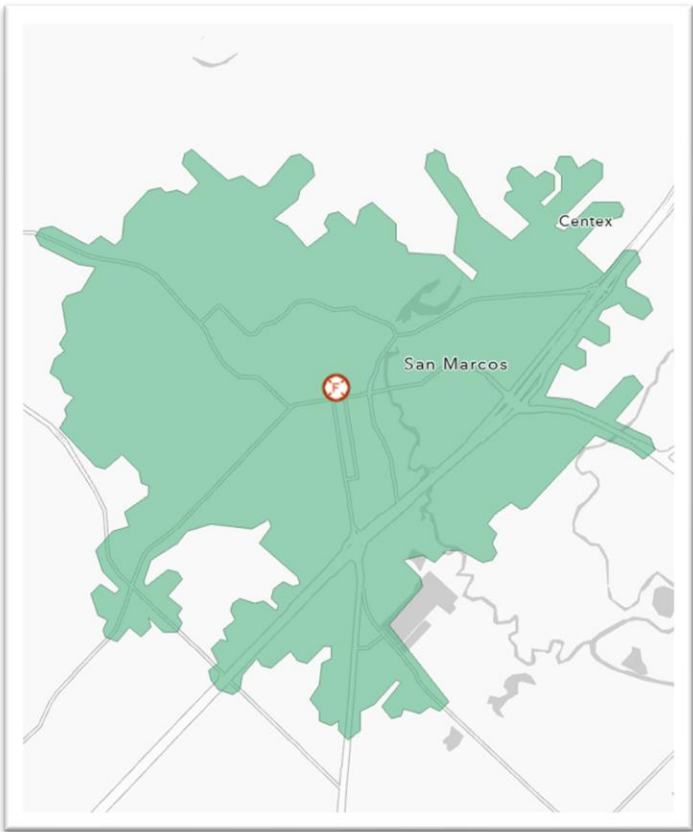
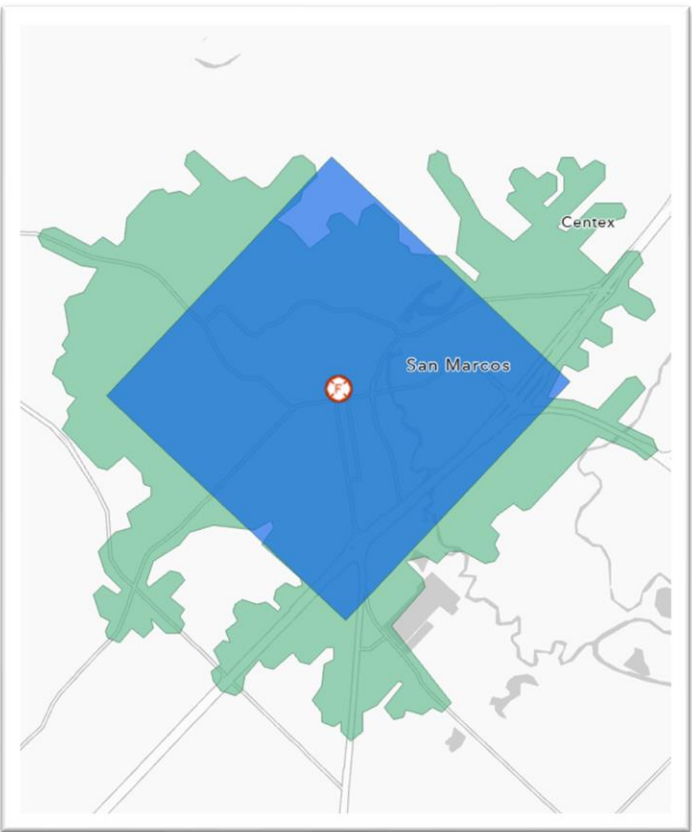


Station Service Area

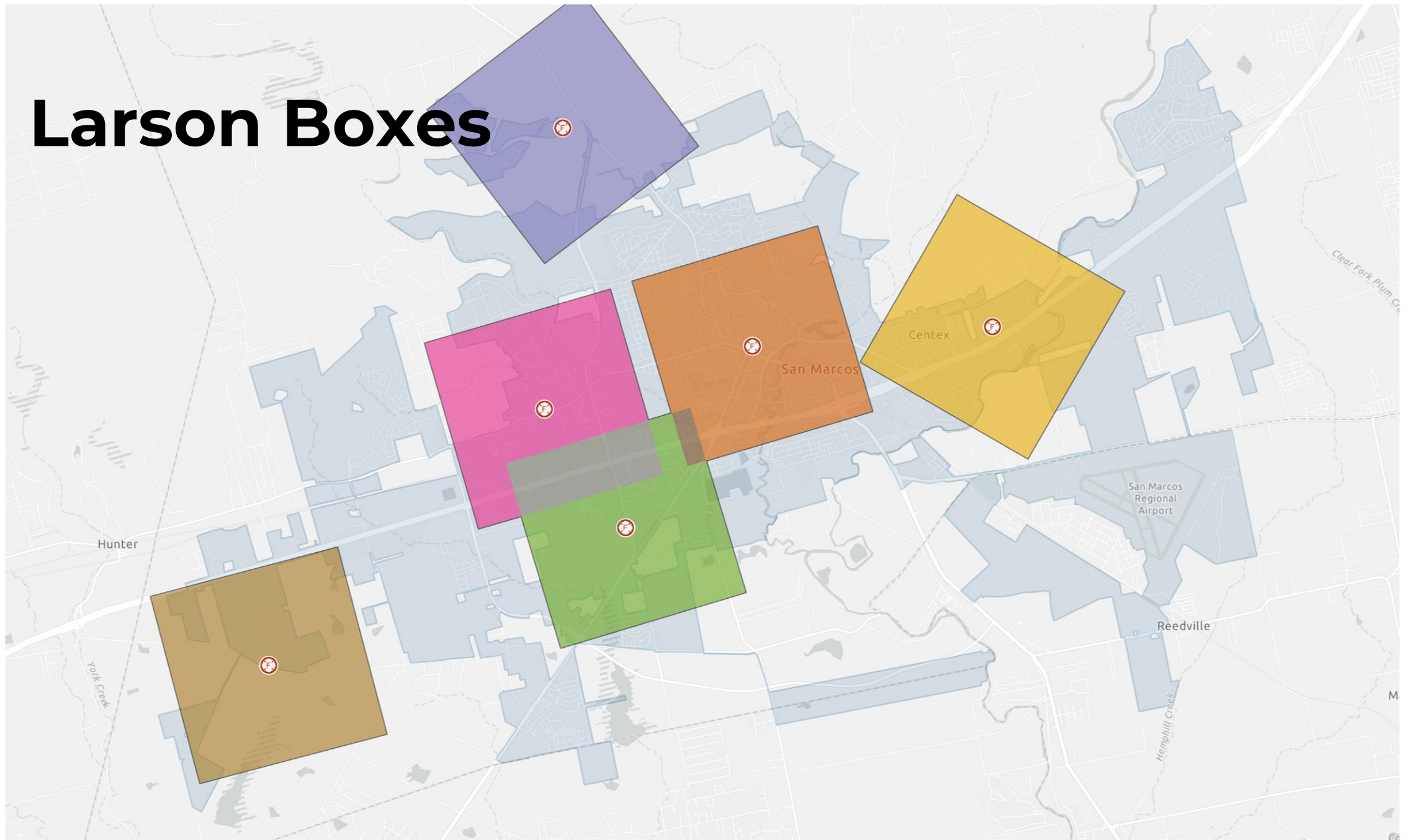
Larson Boxes



Drive Times



Larson Boxes



Building the network

Data sources

- City centerline
- County NG911 roads
- Thoroughfare masterplan

Data engineering

- Topology
- Filling null values
- Average truck speed
- Correcting elevations
- Road blocks and slow down points

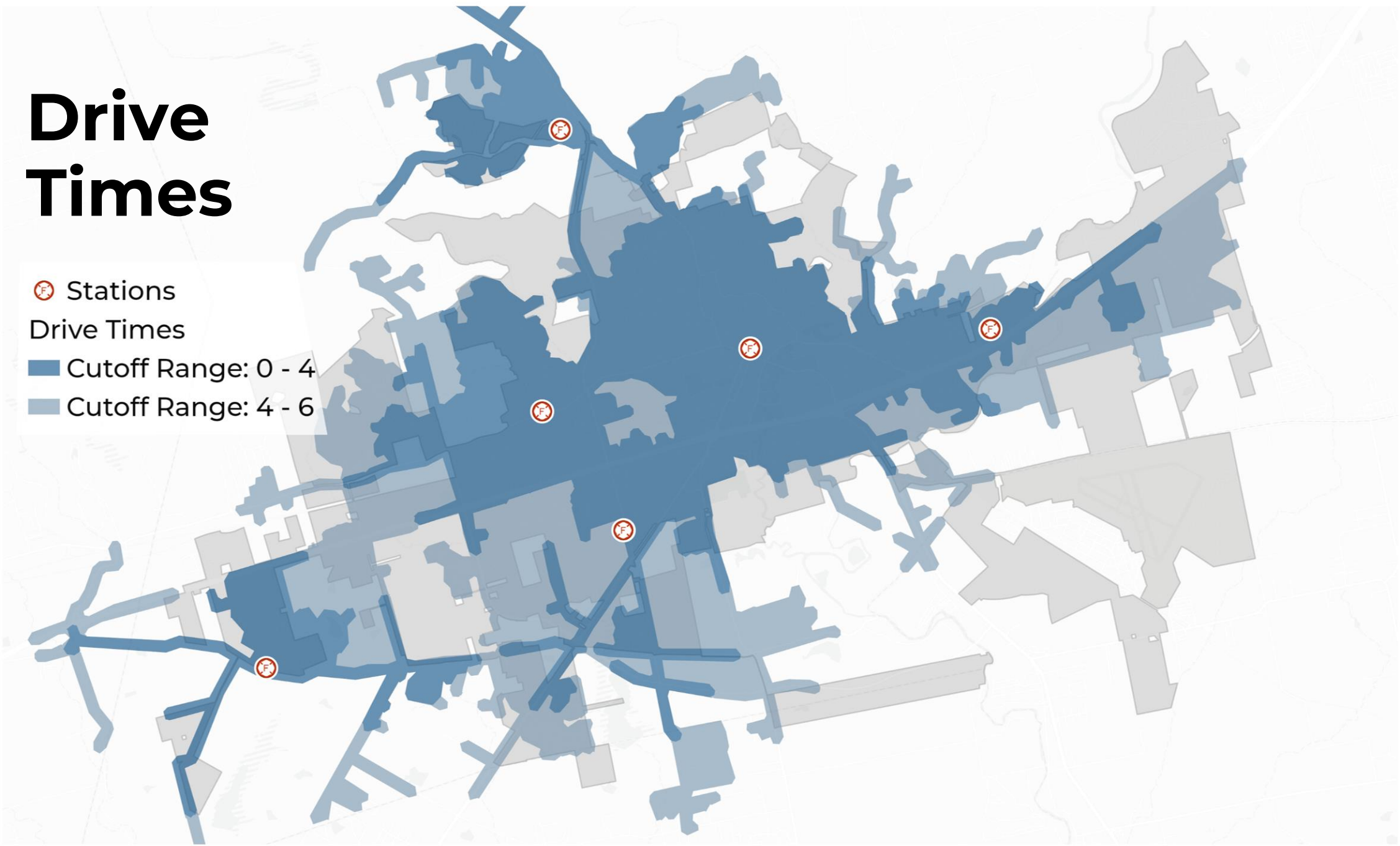
Road Network

- Network Barriers
- Master Plan Roads
- Driveways
- Roads
- Fire Stations
 - ⦿ ACTIVE
 - ⦿ PROPOSED
- City Limit

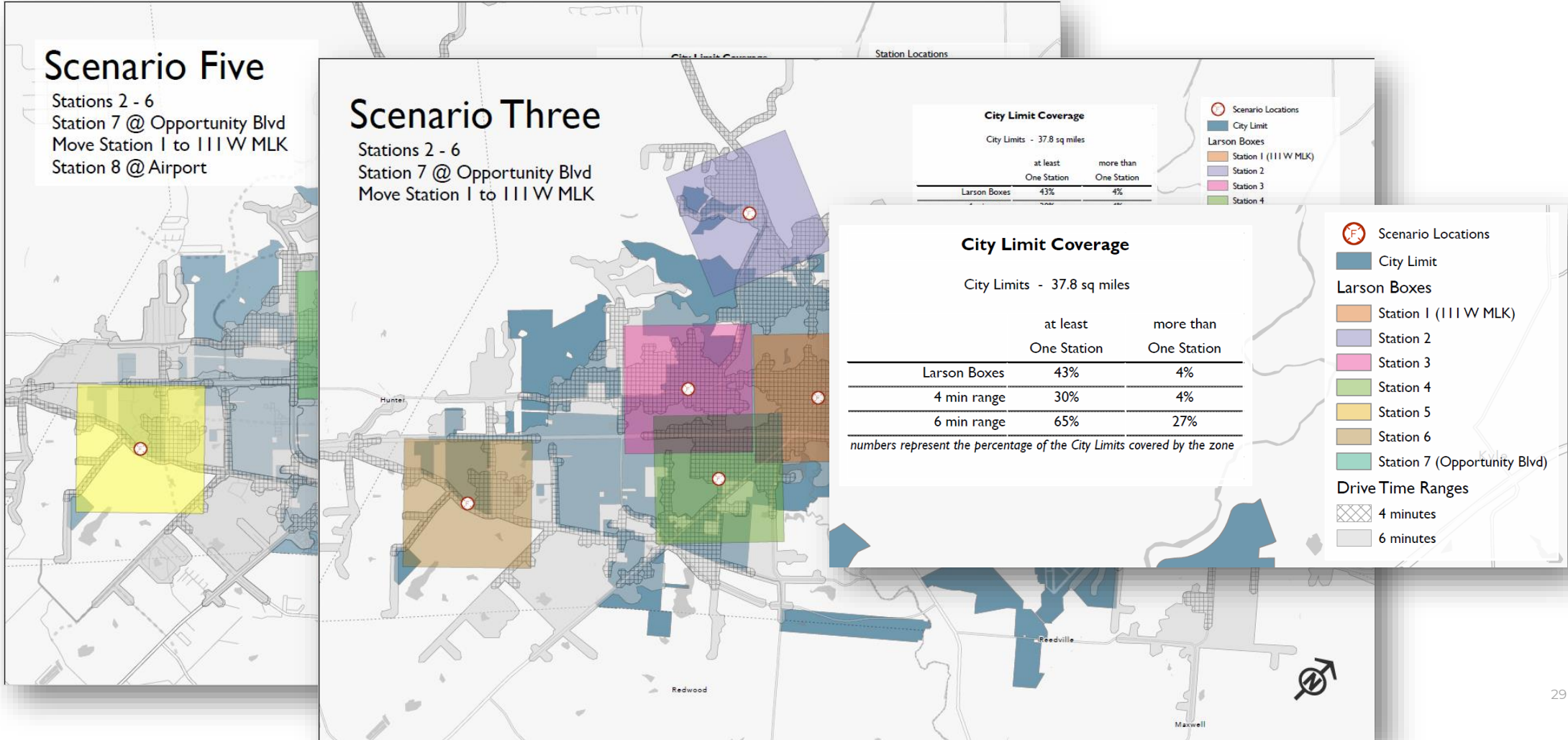


Drive Times

-  Stations
- Drive Times
 -  Cutoff Range: 0 - 4
 -  Cutoff Range: 4 - 6



The Maps



**Make It
Interactive**

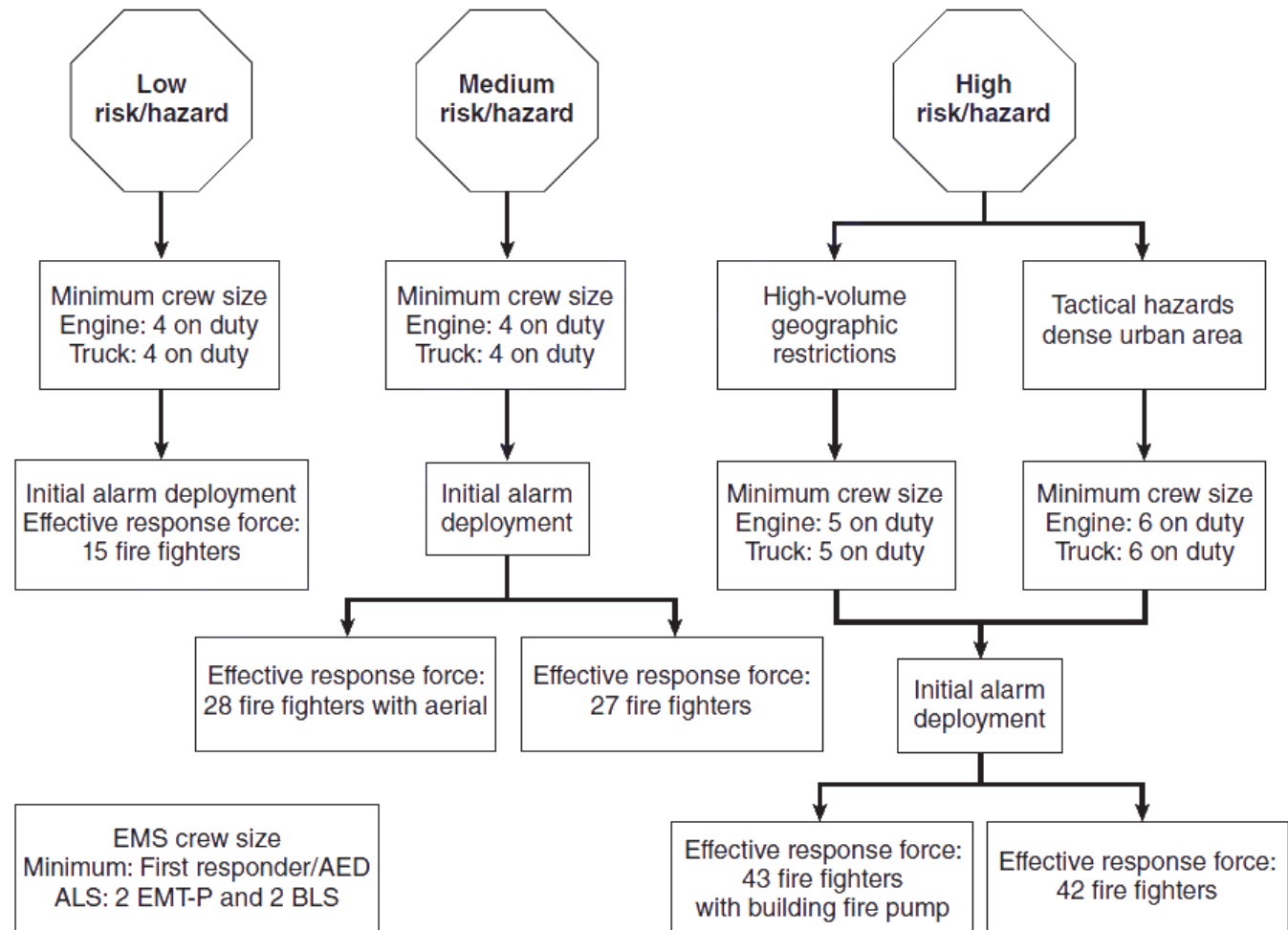


Interactive Maps

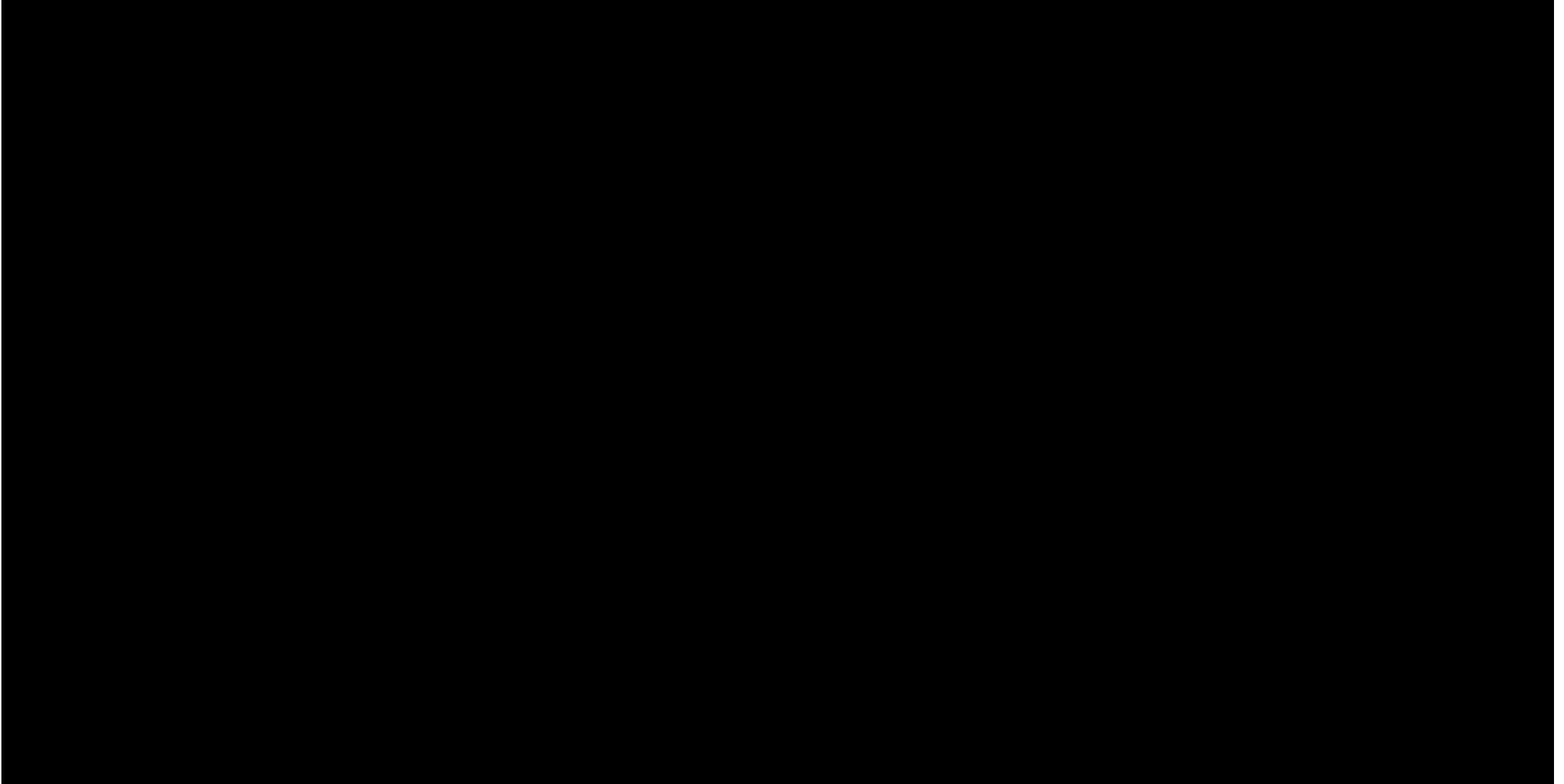
- Static maps were great for a report, but not that great for story telling
 - We could see the coverage – but how do we communicate it effectively?
- What would an interactive experience be like?
- Oh, and also include effective force scenarios?

Effective Force

An effective response force is defined as the minimum number of firefighters and equipment that must reach a specific emergency incident location within a maximum prescribed travel [driving] time.*

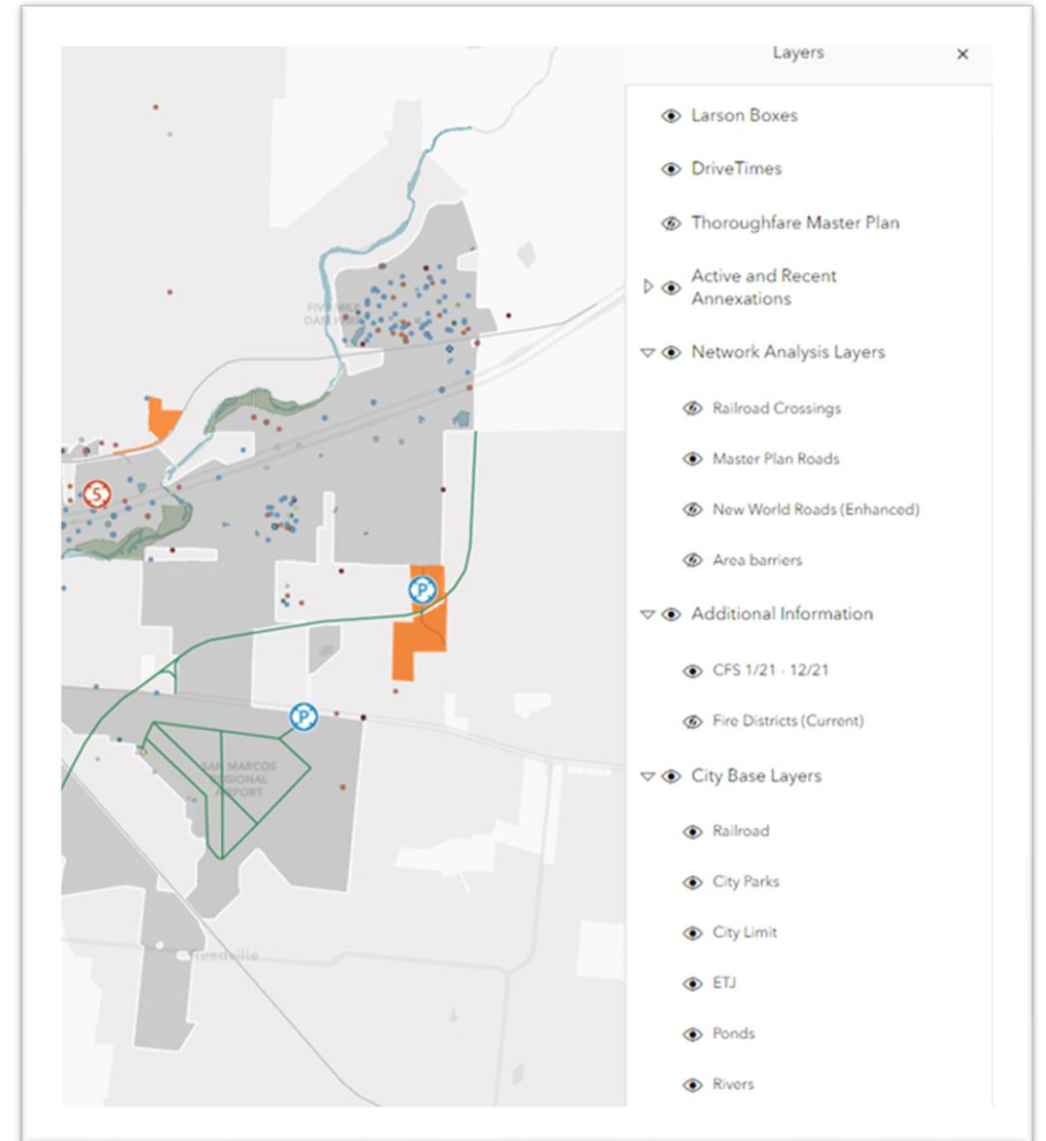


Demonstration



Reference Data

- Planned developments and annexations
- Calls for service
- Population and structure density

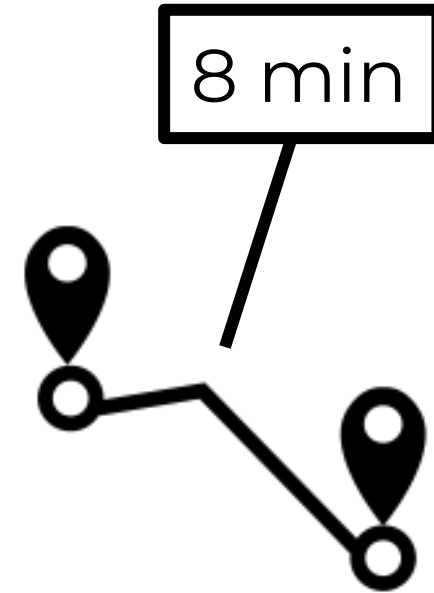


What's Next

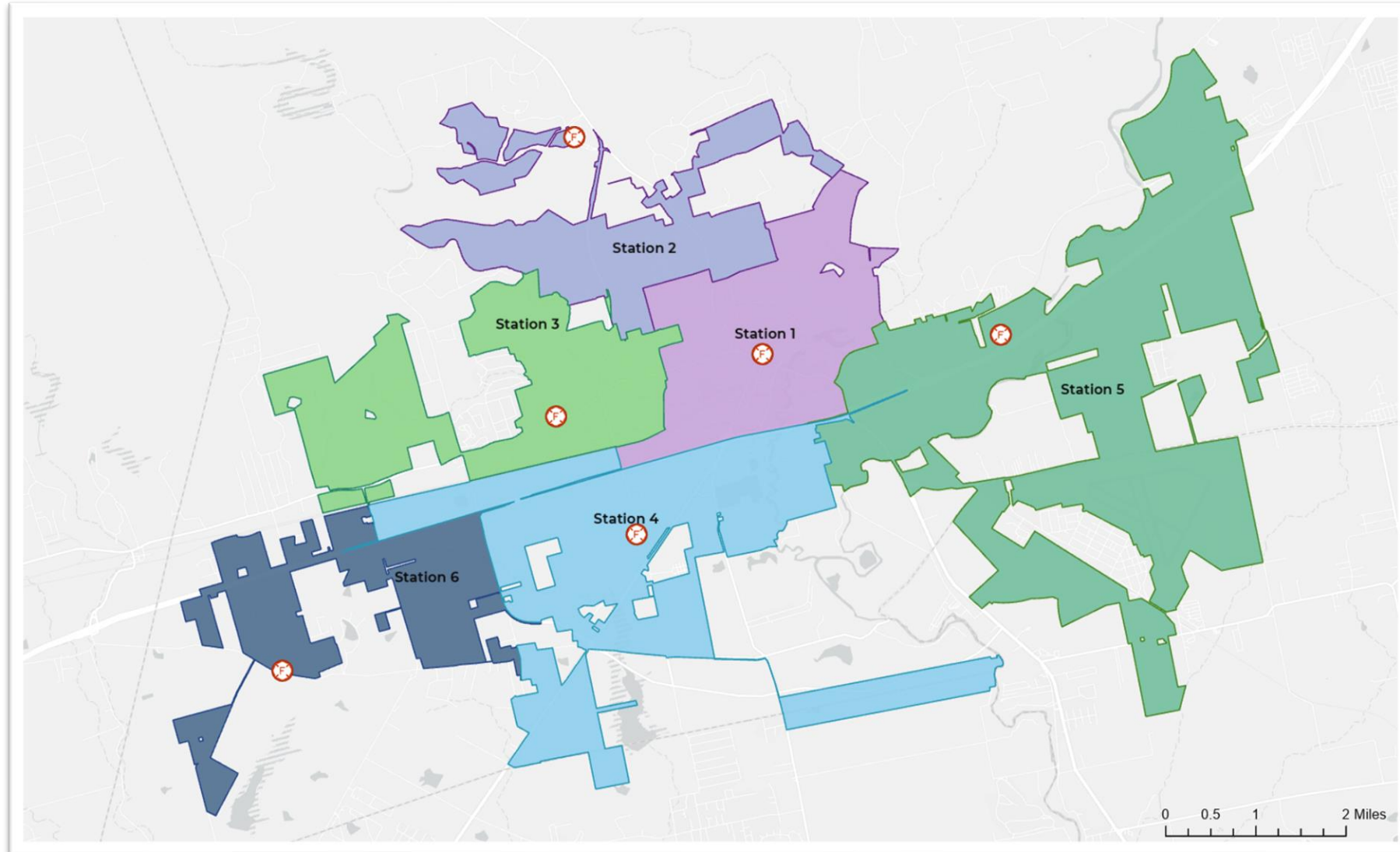


Where are we going?

- Network analysis on the fly
 - Point to point distance and drive time
 - Service area generation
- Call for Service ETL to GIS
- New information products



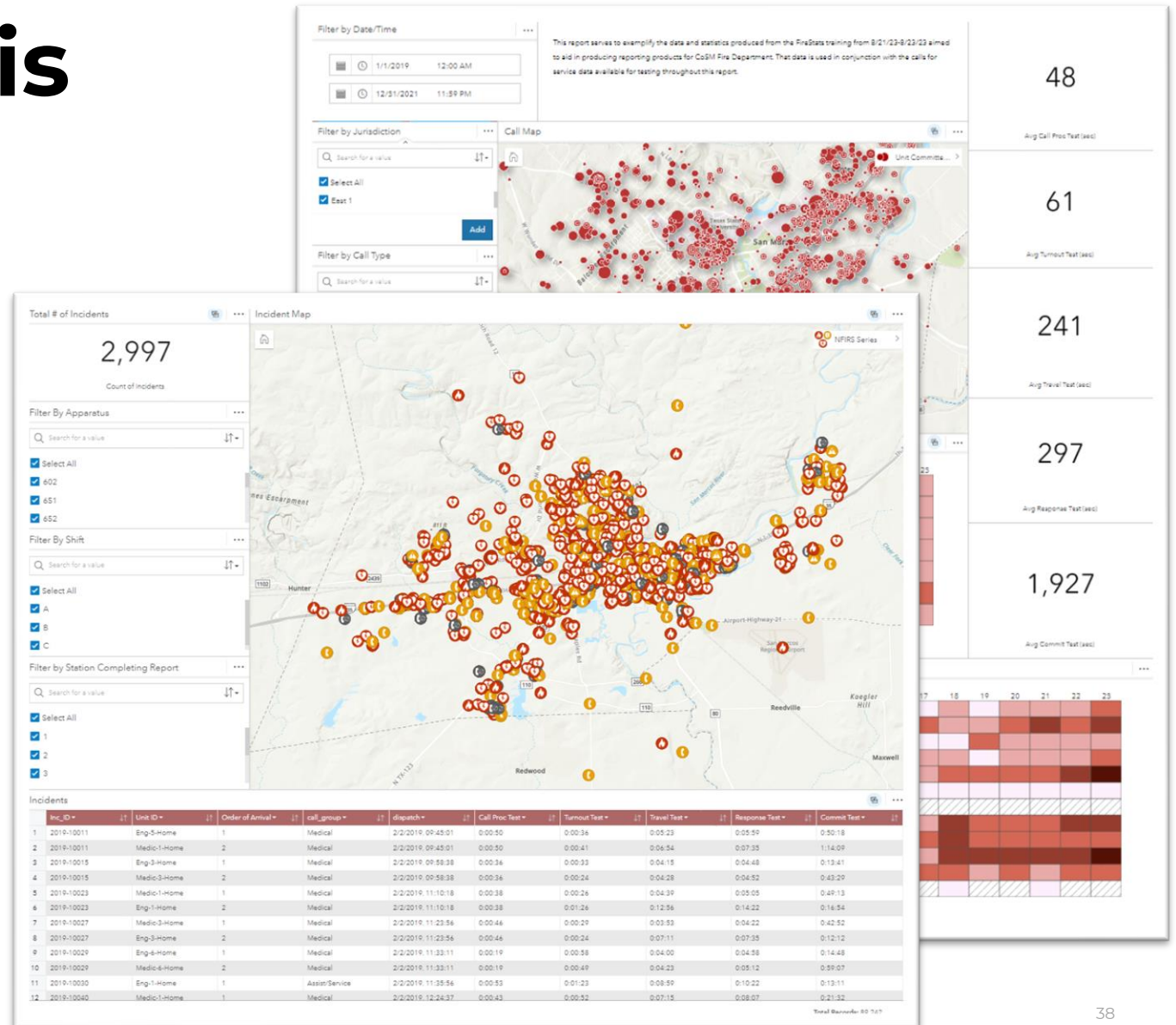
Redistricting Processes



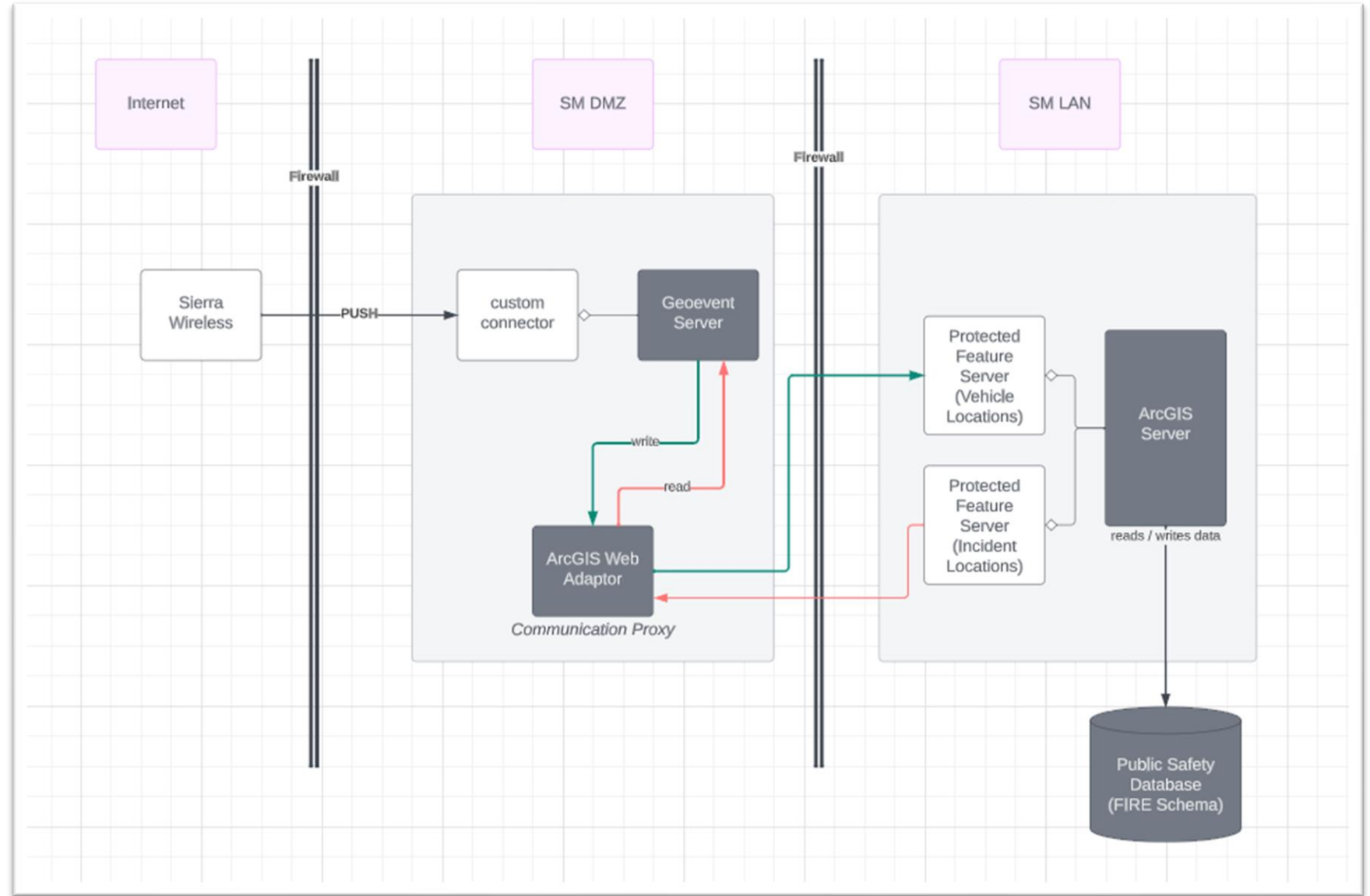
Incident Analysis

ArcGIS Insights Reports

- Provides easy to configure overview of calls for service data
- See when and where calls for service are in high or low demand
- Manipulate data for different scenarios



Fire AVL in GIS





Thank You!

Connect with us!

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