Summit County, CO
Data Analyses Briefing

SUMMIT COUNTY AMBULANCE & AREA FIRE SERVICES

PRELIMINARY/DRAFT CONSULTANT PRESENTATION
JUNE 2016

FITCH & ASSOCIATES, LLC

Project Objectives

- Determine the probability of “collisions” between out-of-county transports and all hazard critical priority incidents in Summit County
- Assess the consequences of these “collisions” on response times to critical priority incidents in the County

Summit County Data

- Data analyzed — Calendar Year 2015
- Raw records provided as “vehicles assigned”
- FITCH created Master Incident records from the CAD data in order to search on a per incident basis
  - See Figures 1, 2, and 3 – Sample Master Incident Tables
- Master Incident Records were then relationally linked to the Vehicle Assigned Table
- Result —
  - Master Incident Records Total: 7,220
  - Master Incident Records w/ Vehicle Arrived: 5,874

Out-of-County Transports (TROUTs)

- Conducted an exact count, with start times and durations of TROUTs with vehicles arrived
  - There were 625 Out-of-County transports and an add'l 15 with units cancelled en route
  - Some TROUTs overlapped; overlaps were subtracted from running total of TROUT durations
- Average duration of an out-of-county transport in CY2015 was 3 hours 59 minutes and 40 seconds

Hours In Year That TROUTs Occur

- An exact count and individual durations of TROUTs with vehicles were identified
- Any overlap of TROUTs was subtracted so that the running total of TROUT durations is corrected
- Result —
  - TROUTs occurred for 2,158 hrs or 25% of the hrs in CY2015

Critical Incidents (CRITs) Defined

- County provided the Critical Incidents (CRITs) list defined as Priority 0's or 1's in the CAD
  - There were 3,059 CRITs with vehicles arrived at scene
- FITCH divided CRITs into 3 broad categories:
  - Emergency Medical Call Type Codes (Table 1)
  - Fire Suppression Call Type Codes - something in process of burning (Table 2)
  - Non-Fire/Non-Medical (Table 3)

Temporal Distributions: CRITs & TROUTs

- The temporal distributions for CRITs with vehicles arrived by Month-of-Year, Day-of-Week , Hour-of-Day
  - Summarized in next slide and detailed in Tables 4, 5 and 6
- The temporal distributions for TROUTs with vehicles arrived by Month-of-Year, Day-of-Week, Hour-of-Day
  - Summarized in next slide and detailed in Tables 7, 8 and 9

Temporal Distributions: CRITs & TROUTs

CRITICAL INCIDENTS

- Month of Year
  - Greatest: Jan>Mar + Dec
- Day of Week
  - Upswing on Friday
  - Max on Saturday
- Hour of Day
  - Spike at 1300 hrs.; broad max 1000 to 1700 hrs.

OUT-OF-COUNTY TRANSPORTS

- Month of Year
  - Spikes in Mar, July, Dec
  - Pronounced min in May
- Day of Week
  - Surges Mon, Thurs, Sat
- Hour of Day
  - Broad max 1300 to 1700
  - Deep min 2300 to 0800

Determining Simultaneous TROUTs

1. Review each incident record and identify TROUTs
2. Determine duration of TROUT
3. Search this duration for subsequent TROUT incident record(s)
4. Identify any simultaneous TROUTs
5. Continue process back through data

- Result —
  - 625 Out-of-County Transports in CY2015
  - 222 or 35.5% were simultaneous with one or more Out-of-County Transports

Simultaneous TROUT Occurrences

Add'l TROUTs Simultaneous w/ this TROUT	# TROUTs Simultaneously In-Progress	Count	Percent of Total
0	1	403	64.5%
1	2	175	28.0%
2	3	42	6.7%
3	4	4	0.6%
4	5	1	0.2%
	Total	625	100.0%

- 403 or 64.5% of the 625 Out-of-County Transports occurred as singular events
- 222 or 35.5% of Out-of-County Transports occurred when there were one or more simultaneous TROUTs
- 47 TROUTs occurred when there were 3 or more TROUTs in progress.

Determining Impact On The System

- System response time is the metric used to determine the impact of simultaneous out-of-county transports and critical incidents, CRITs & TROUTs
- Identified the start time and duration of each out-of-county transport (TROUT)
  - Identified the critical incidents initiated during each TROUT
- Looked at response times for all vehicles arrived at scene for —
  - CRITs *with* simultaneous out-of-county transport(s)
  - CRITs *without* a simultaneous out-of-county transport(s)

Identify Collision of CRITs and TROUTs

- Step through the CAD for each TROUT's start-time and duration
- Search each duration for the initiation of a CRIT
- Log the TROUT Event Number into each CRIT's incident record
- Continue the process

CRIT/TROUT Collisions by Category

Category	All CRITs	CRITs *without* TROUTs	CRITs *with* TROUTs
Emergency Medical	2,803	1,941 (69%)	862 (31%)
Fire Suppression	193	123 (64%)	70 (36%)
Non-Fire/Non-Medical	63	44 (70%)	19 (30%)
Total	3,059	2,108 (69%)	951 (31%)

Defining Interference

- Initiation of critical incident is when vehicles are assigned to respond
- For an out-of-county transport to have impact on a critical incident, it would be through interference with the assignment process
- Two parameters define how TROUTs interact with CRITs —
  1. Hours per Year when there are TROUTs in progress
  2. Temporal distribution of the *initiation* of each critical priority incident

Distribution of Collisions: CRITs and TROUTs

- Month-of-Year
  - Greatest number – Jan to March + Dec; pronounced drop in May
- Day-of-Week
  - Greatest number on Saturday (178), but each day except for Tuesdays experience more than 100/day
- Hour-of-Day
  - Broad maximum 1300 to 1700 hours
  - Minimums between 0000 and 0800 hours
- Tables 10, 11 and 12 display the temporal distributions of CRITs with simultaneous out-of-county transports

Interference Metric

- Average response time for all units arrived at scene is used to determine the impact of TROUTs on CRITs
- All units arrived at scene is used to reflect complex ”package” of multiple units the must be assembled in order to constitute an effective fire suppression response compared to an emergency medical response.
- Non-Fire/Non-Medical CRITs excluded as the instances are too few to provide valid statistics

T-Test and P-Value Method for Analysis

- T-Test evaluates the 2 response time groups based on averages and standard deviations
- We expect random fluctuations or “noise” in the data as they are small data sets
- T-test: standard statistical method to assess how strong the signal (difference of the two means) is vs. how much “noise” is present in data
- P-value measures probability that difference in the 2 data sets is due to *real* systematic differences rather than *random fluctuations* within each set

Do TROUTs Interfere With Fire CRITs?

Average Response Times, All Units Arrived AtScene

Fire Suppression CRITs	Avg	± sd	t-Value	P-Value
Without TROUTs	720 sec	± 711	2.75	<0.008
With TROUTs	531 sec	± 417		

P-Value Indicates:
There is more than a *99.2% probability* that TROUTs have **NO** effect on fire suppression CRIT response times.

The averages are different because of random fluctuations in the data sets rather than anything real and systematic.

Do TROUTs Interfere with EM CRITs?

Average Response Times, All Units Arrived AtScene

Emergency Medical CRITs	Avg	± sd	t-Value	P-Value
Without TROUTs	580 sec	± 445	4.29	<0.001
With TROUTs	648 sec	± 485		

P-Value Indicates:
There is more than a *99.9% probability* that TROUTs have **NO** effect on emergency medical CRIT response times.

The averages are different because of random fluctuations in the data sets rather than anything real and systematic.

Conclusion

Based on CY2015 data, the Summit County 911 System is robust with a sufficiency of units to readily accommodate the conduct of out-of-county transports without compromising in-county operations on critical priority fire suppression or emergency medical responses

Questions

Guillermo Fuentes, Partner

gfuentes@fitchassoc.com

Dr. Erwin Stedronsky, Senior Consultant

estedronsky@fitchassoc.com

Dianne Wright, Senior Consultant

dwright@fitchassoc.com