

Drive Time Analysis

Fire Station Proposal

Public Information Session



City of Brookfield
January 10, 2007
Revised 1/12/07



5th District Alderman Scott A. Berg

- First elected April, 2000
- Chairman of the Uniform Fire/EMS Service Task Force
- Software engineer by profession

Response Time Analysis

- Considerations for placement
- Response time components
- Analysis methodology
- Station 2 (north)
- Station 3 (south)

Considerations for Placement

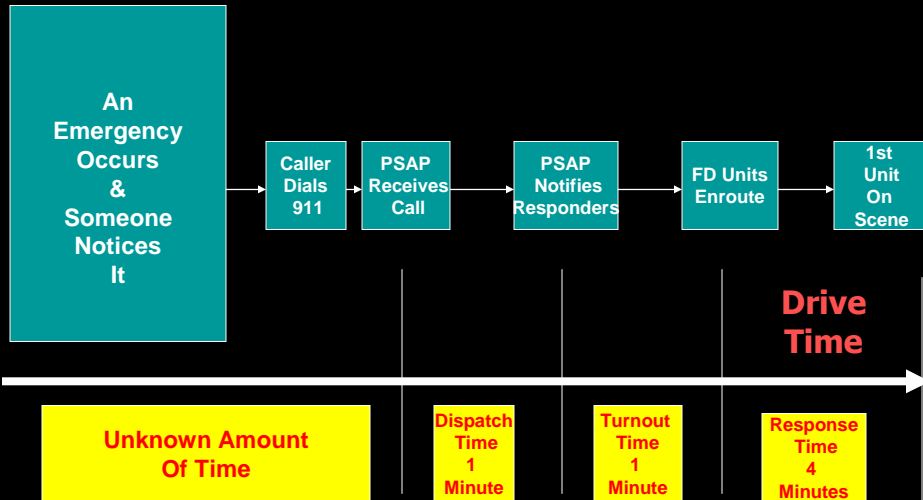
- 🚒 Service area shape and size
- 🚒 Population distribution
- 🚒 Structure distribution
- 🚒 Transportation system
- 🚒 Availability of land
- 🚒 Expense



Response Time Analysis

- Considerations for placement
- Response time components
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Response Time



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How can you reduce drive time?

- You can't control bad weather conditions
- You can't decrease traffic
- You can have traffic preemption (strobe)
- You can control station location

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Current Fire Station Location

The original 1959 Brookfield Master Plan called for **five** stations – one in each corner of the city and one in the center.

Station 2 (north) was built in 1966 and station 3 (south) in 1977 based on that plan.

The plan also called for filling in wetlands, building 3 high schools and a population of **85,000** City of Brookfield residents.

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Are 5 stations right for how Brookfield actually turned out?

Would relocating existing stations serve the less dense construction and lower population?

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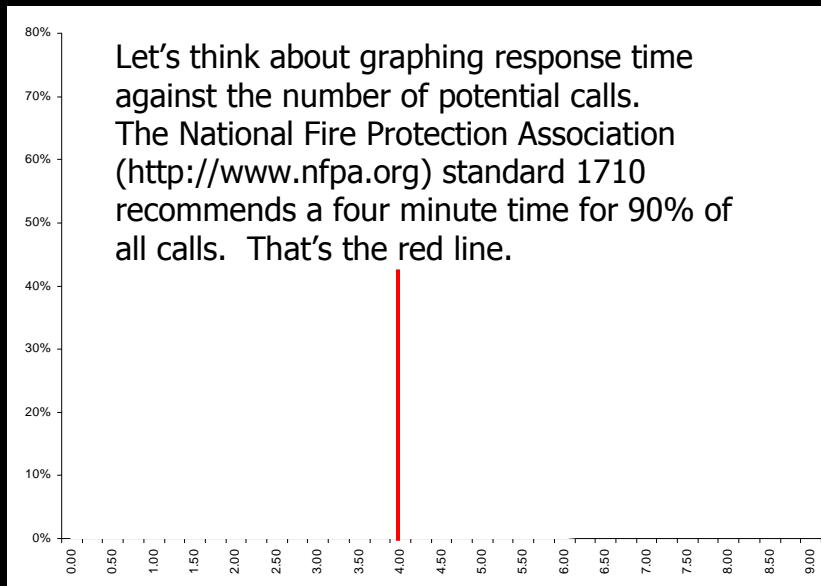
Response Time Analysis

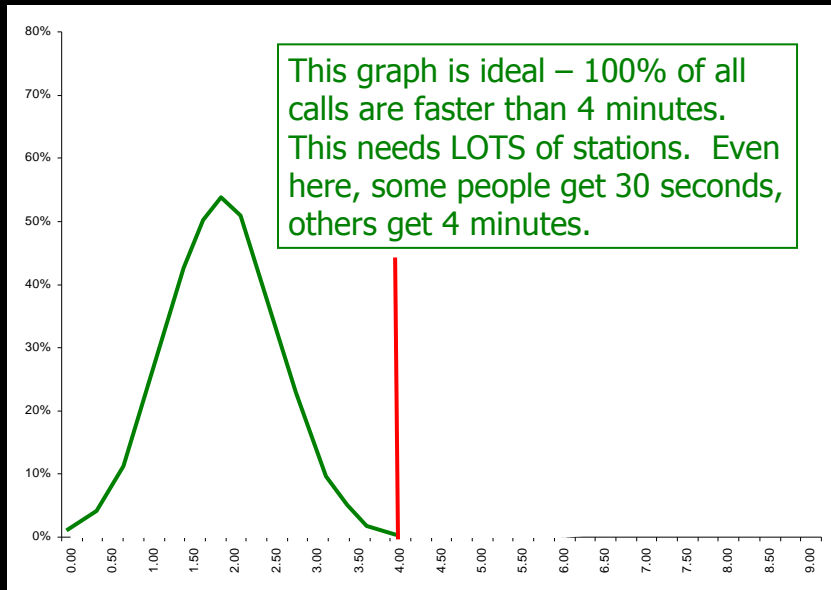
- Considerations for placement
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Estimating Drive Time

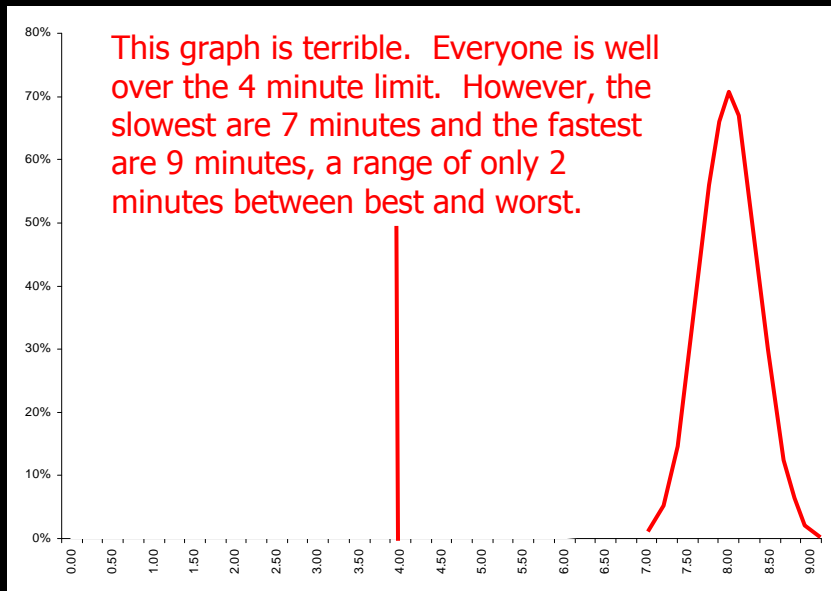
- Drive time analysis identifies general area for a new station
- Randomly select an address (house or apartment or office or store or ...)
- Start at responding station
- Drive safely from station to household
- Repeat several times & average
- Paired t-test and F-test were used, but graphs are used here. All details are in the Task Force report.

So what should a "good" response time graph look like?

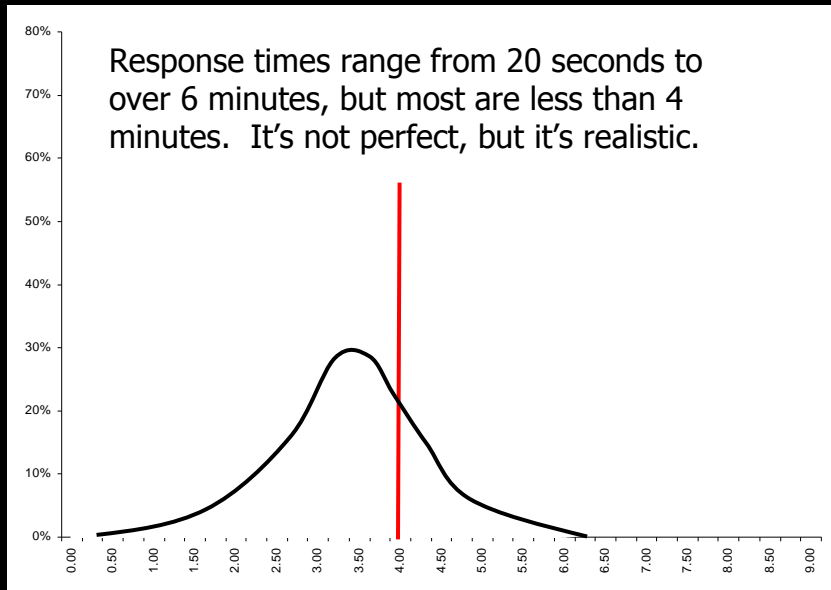




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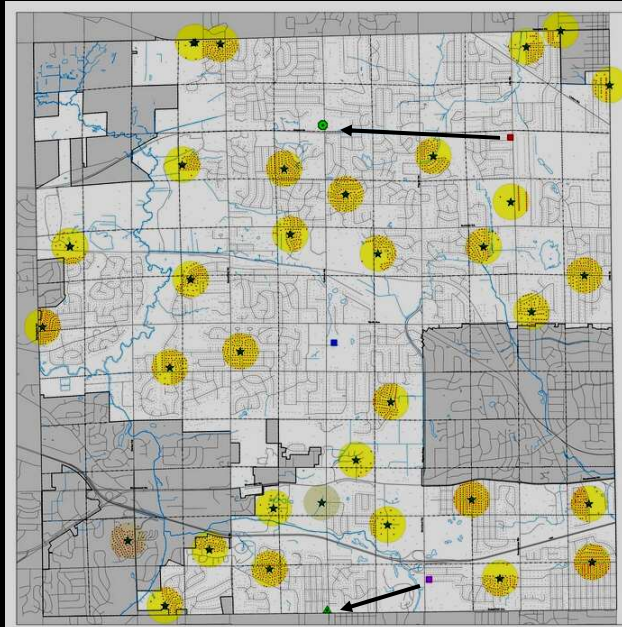


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- Black dot is specific address
- Yellow circle is 1000' area for weighted time
- Exact addresses are in the report



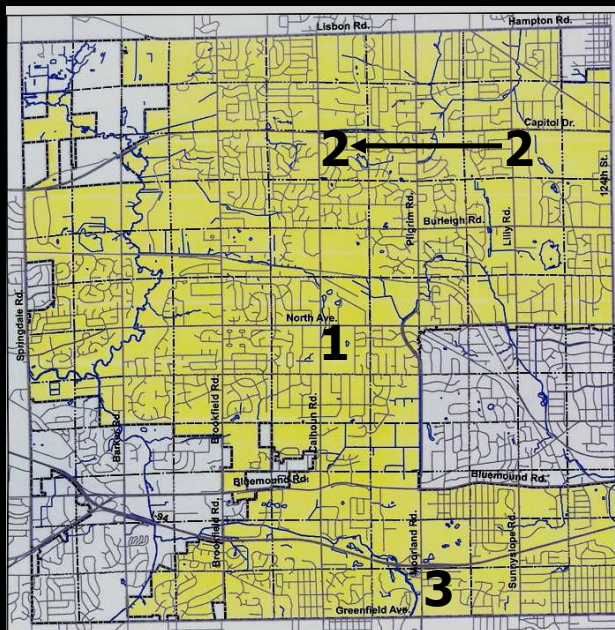
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So let's look at Station 2 (north)

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**Station 2
North
Lilly & Capitol
or
Calhoun & Capitol**



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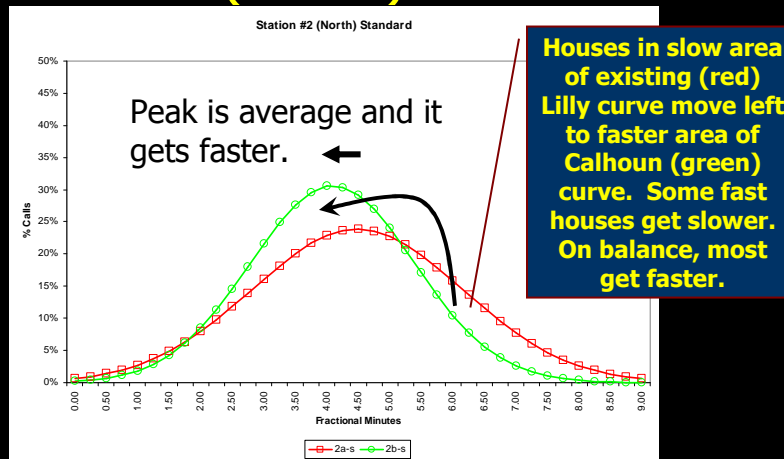
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North Side Addresses

- Congress & 124
- Captains Ct
- 13255 W. Hampton
- Fairview Ct
- Gateway Ct.
- St. Therese Blvd
- 19355 W Lisbon
- Brookfield East High
- Devon Ct
- Turtle Creek & Courtland
- Summerhill Ct

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Station 2 (North) - Standard



Red is existing Lilly Road, Green is proposed Calhoun
Average drive time is less (peak moves left)
Time is more consistent (hump is narrower)

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Which is better?

- 1 minute to an unpopulated swamp
- 4 minutes to a dense neighborhood where houses are on $\frac{1}{4}$ acre lots
- 8 minutes to a 200 unit condo

I'm not sure that there is a 'right' answer, especially if you're the one in need. The analysis uses the drive time to a specific address to estimate the drive time to all the people near that address. There is an intentional bias in the weighted times towards helping densely populated areas.

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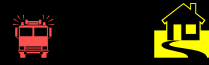
Example Station Placement by Weight

- What is fair?
- Who pays for it?
- This is an obviously simplistic example, but it brings up the factors to consider.

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- A house is built
- A fire station is built 2 minutes away
- The house gets great response time, but pays for all of it

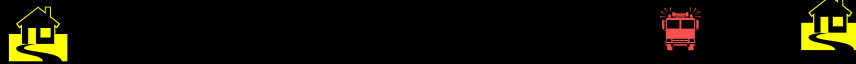


2 min

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- A second house is built far from the first
- A fire station is 8 minutes away. The response time is much slower. The new homeowners knew that when they built their house.
- Is this fair?



8 min

2 min

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- The fire station is worn out and needs to be replaced.
- You could build the new station at the existing location. After all, it's always been that way.
- You also could build the new station in a new spot in the middle. The response time is more equitable for all the people served.
- However, drive time drops below the national standard of 4 minutes for everyone.
- Is this a fair decision?
- Yes, since the new location equalizes the drive time among those paying for it. You already waited until the station had to be replaced.



5 min

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5 min

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More houses, more questions

- One neighborhood grows and has more houses and people.
- Where should the fire station be located to give the best protection to the most people?

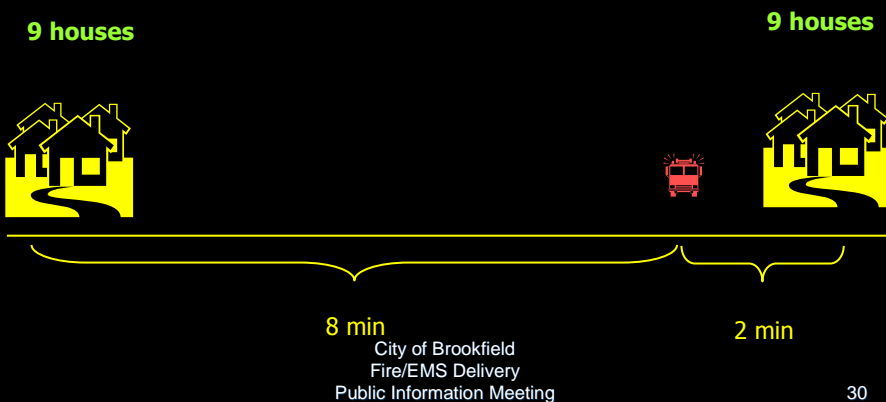
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- The first neighborhood grows.
- **Is this a fair location for a fire station?**
- **Yes.** The station is placed better than ever. It's closer to the most households.



- The second neighborhood grows.
- **Is the station location still fair?**
- **No.** The same number of houses are in the two neighborhoods, yet very different response times.



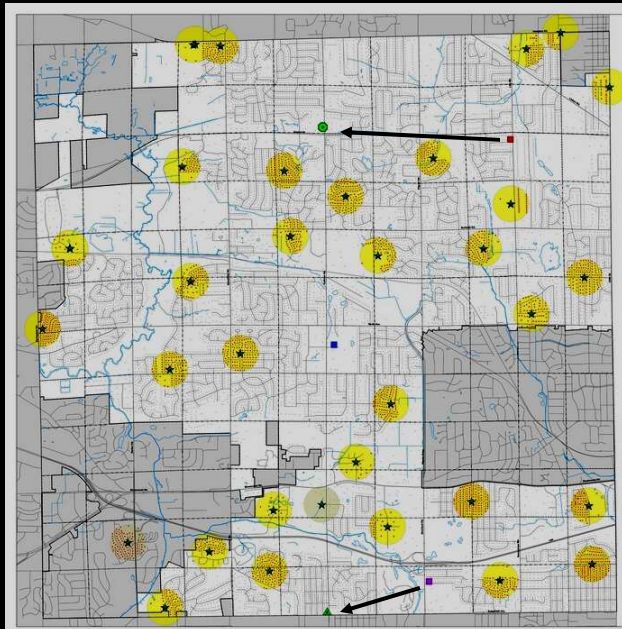
- The station wears out and must be replaced.
- You're building new anyway, so you could put it anywhere.
- **Building the new station in the middle is now the fairest location.**

The Uniform Fire/EMS Task Force did a calculation something like this to confirm that moving stations 2 and 3 west is the fairest choice for how Brookfield looks today.



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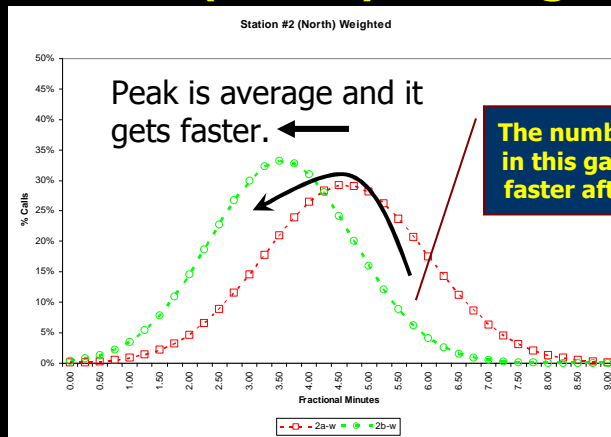
- Red dots are structures used to weight the time.
- A short time to few dots isn't such a good thing.
- A long time to many red dots is really bad.
- Use a weighting scheme based on the number of people in 1,000 ft. radius of the address.



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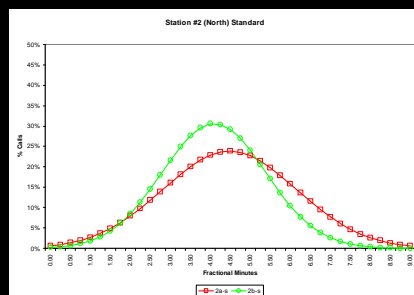
Station 2 (North) - Weighted



Red dashed is Lilly Road, Green dashed is Calhoun
 Average drive time is less (peak moves left)
 Time is more consistent (hump is narrower)

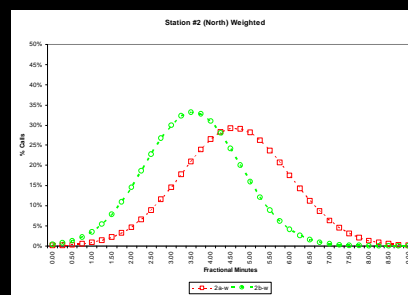
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Standard

Every address counts the same. Red is Lilly, Green is Calhoun



Weighted

More houses near an address pulls curve towards that address.

Calhoun curve is to left (faster) and skinnier (uniform) than Lilly.

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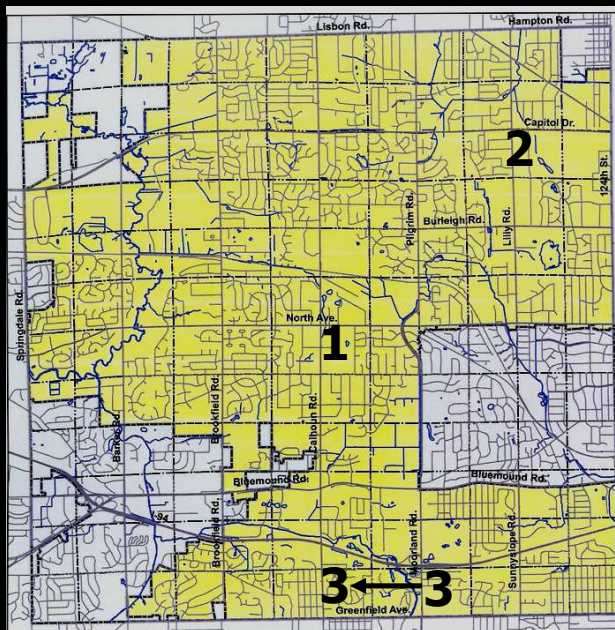
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Let's look at Station 3 (south)

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**Station 3
South
Moorland & I-94
or
Calhoun & Greenfield**



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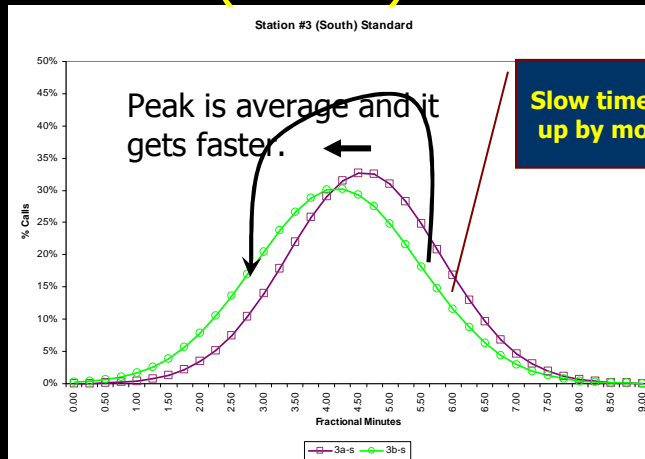
South Side Addresses

- Nelson Ave & Columbia
- Silver Mist Ct
- Executive & Brkfld Sq Dr
- Wisconsin Av & Thomas
- Corporate & Sarah
- Kestrel Ct
- Forest Ct
- Mt Vernon & Rosedale
- Robinwood & Harvey
- Keswick Ct.

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Station 3 (South) - Standard



Purple is existing Moorland Road, Green is proposed Calhoun

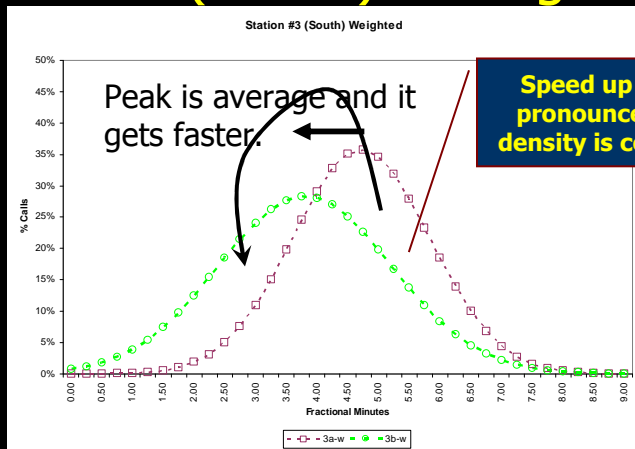
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Time is more consistent (hump is narrower)

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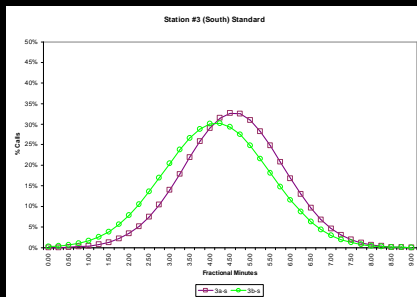
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Station 3 (South) - Weighted



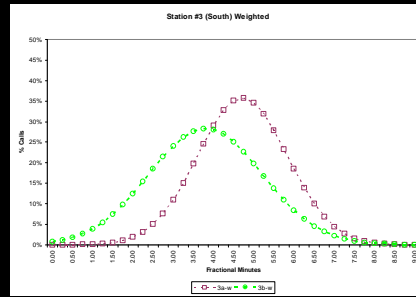
Purple dashed is Moorland Road, Green dashed is Calhoun
 Average drive time is less (peak moves left)
 Time is slightly less consistent (hump is wider)

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Standard

Every address counts the same. Purple is Moorland, Green is Calhoun



Weighted

More houses near an address pulls curve towards that address.
 Calhoun curve is to left (faster) and is wider than Moorland curve.

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Observations

- Moving north station (#2) to Calhoun Road improves drive times by making them faster
- Moving south station (#3) to Calhoun Road improves drive times by making them faster

Net Change

- Based on 2000 census numbers, moving stations 2 and 3 west would increase the number of night time residents in those station's prime 4 minute drive time zone from 24,922 to 28,119. (Report, p. 14)
- **That's 3,197 night time Brookfield residents (13% more) who are safer.**

How can you look 3,197 Brookfield residents in the eye and tell them you had a chance to make them safer, without putting others in danger, but didn't do it because it would require change?

Location Analysis

- Analysis found general area for new station.
- Land purchase costs were estimated. Purchases are negotiated.
- No deals have been made.
- No landowners have been approached.
- There's no authorization from Council.

**Drive time is one of many
factors to consider.**

**Government policy decisions are
rarely simple.**

Every resident is equally special.

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