Top 10 Ways Video Data Collection is Improving My Engineering
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Since 2001, my businesses, Spack Consulting and Traffic Data Inc., have provided data collection and analysis throughout the Midwest. As portable video camera systems to collect traffic volume data has become mainstream in the last five years, my colleagues and I are not only collecting more hours of traditional turning movement counts for a lot less money, we're also using this new technology to improve our engineering. Here are the Top 10 ways portable video cameras have changed and improved my engineering businesses.

1. **More for Less**
    a. **Lower Mobilization Costs.** Sending a technician out in a van with 20 camera systems to setup on a site two hours away is tremendously cheaper than sending 20-40 people out to do the manual turning movement counts on the ground.
    b. **Avoid Bad Weather.** We primarily work in "Minne-Snow'da." We've had multiple projects where we've set up camera systems on Monday to record video on Tuesday and it ended up snowing on Tuesday. We just leave the camera systems out recording and use the video from Wednesday or Thursday instead of Tuesday. No headaches with rescheduling crews to do the manual counts. We've also had similar situations to avoid rain. In recreation areas with high pedestrian crossings, we've left the cameras out and counted video from the day with the nicest weather.
    c. **Cheap to do Weekend Counts.** It's expensive to mobilize a count from 7 p.m. to 2 a.m. on a Friday night by a casino or on Sunday morning by a church. We set up cameras on Wednesday and record Thursday through Sunday to get normal weekday and special weekend conditions, counting just the hours that are needed.
    d. **Count Turns Only.** When doing a corridor study, we'll do full counts at key intersections but just count the turns at minor intersections. The full count data from the adjacent intersections are used to calculate the through volumes at the minor intersections. This is especially cost effective for signal re-timing projects.
    e. **Hone In On the Peak Hour.** Likewise, we do studies where we'll do 13 or 24 hour counts at key intersections and then do one hour peak counts at minor intersections based on the full data.
    f. **Why do we still do 2 Hour Turning Movement Counts?** Sometimes we make million dollar decisions (or even billion dollar decisions) that have a single data point at their foundation. A $900 COUNTcam MINI that can record for 50 hours combined with a $240 price to process a 48 hour count from your video using the COUNTcloud service have driven the costs so low for turning movement counts that we have no excuse to still be doing 2 hour counts as the standard.
    g. **Avoid Placing Tube Counters.** 48 hour turning movement counts provide peak hour turning movement count data, but also provide Average Daily Traffic volumes on all legs of the intersection that we would have historically been collected using tube counters.

2. **Have an Archive**
    a. **Recounts.** We all get data back that looks incorrect. Doing spot checks or even complete recounts from video you already have typically costs 90% less than the old method of sending a person out in the field to completely redo the count.
    b. **Engineer Can Scan the Video.** Scrolling through the video of the intersections helps give context to the data.
    c. **Multiple Engineers.** At Traffic Data Inc., we deliver the videos with the count data. This provides many of the benefits discussed in this paper to our consulting engineer clients. We've also provided the videos to government agency engineers when they request it. Providing the video along with the count data gives our clients along with their customers the opportunity to review and take a closer look the traffic flows for their project.

3. **Less Assumptions**
    a. **Warrant Analyses.** Historical practice in Minnesota is to place tube counters on the approaches at an intersection to get the hourly data needed for all way stop or signal warrant analyses per the MUTCD. Two hour a.m. and p.m. turning movement counts would be collected and the hourly tube volume data would be adjusted based on the turning movement count data to reduce for right turning volumes per MnDOT's estimating policy. Now, we just do a 48 hour turning movement count and take out a portion of the actual right turns out of the data.
    b. **Collect Trip Generation Data.** ITE recommends collecting current, localized trip generation data whenever possible. This has rarely happened though – the vast majority of engineers just use the average rates out of the *Trip Generation Manual.* Now that the ins/outs can be counted at access points by viewing the video at 20x speed, we've been collecting thousands of hours of trip generation data to use in our traffic impact studies. We're also sharing all of this data at TripGeneration.org under a creative commons license.
    c. **Why Guess at the Peak Hour?** We've all had two hour counts where the last 60 minutes are the peak hour. With video, you can add on 15 or 30 minutes to your count to confirm that your 60 minutes are in fact the peak hour or shift to the slightly later peak hour. This is becoming irrelevant in Minnesota though as a 6 a.m. to 7 p.m. has become the new standard.

4. **Do Research**
    a. **Drive-Through Queue Generation 1.0.** How much storage is needed in a drive through? We collected 1,200+ hours of video at banks, pharmacies, fast food restaurants, car washes and coffee shops. You can read our complete report and see all of the data/statistics in our drive-through queue article *How Many Vehicles Do you Need to Store in a Drive Through Lane?* on our blog Mike On Traffic.
    b. **Effectiveness of Travel Demand Management**. How much does a well implemented Travel Demand Management Plan reduce traffic at a business? We collected 600+ hours at nine office complexes. We use trip generation and parking generation reductions in our Traffic Impact Studies based on this data. You can read the complete report and see

all of the data/statistics in our article *Documenting the Effectiveness of Travel Demand Management Measures*.

5. **Calibration**
    a. **Micro-Simulation Calibration.** We conducted a traffic impact study for a gravel mine expansion that was complicated by an active rail line less than a hundred feet from the main access on a state highway. Read the full case study at *Trainspotting – Modelling Gravel Trucks Through a Train Crossing.*
    b. **Models vs. Real World.** How do you calibrate to something that doesn't exist? How do you take an existing all way stop sign controlled intersection and calibrate to increased traffic forecasts with traffic signal or roundabout control at an intersection? We collected hundreds of hours of video and extracted queuing and delay data at existing intersections. Then models were built using different software programs with their input defaults to determine which models best matched the real world queuing and delay data. We presented our results to both the North Central ITE section and the Oregon SimCap group. You can read more and see our presentation at *Which Traffic Simulation Software is Best? (Phase 1)* and *Which Traffic Simulation Software is Best? (Phase 2)*
    c. **Test Traffic Counting Equipment.** Video systems have been used to verify the accuracy of loop detectors, tube counters, microwave detectors, and several styles of pedestrian/bicycle counters.

6. **Parking Data**
    a. **Parking Lots.** We've had several projects where we install cameras at all of the access points to a campus. We count the vehicles entering and exiting from midnight to midnight to get the trend line of vehicle occupancy in the site. We either assume no vehicles parked at midnight or we'll do an onsite count at a certain point of the day. Either way, we can closely approximate the vehicles parked within the campus by entering the data in a spreadsheet and summing the traffic over time.
    b. **On Street.** Approximately 300 feet of a block can be viewed with a single camera. A block's parking turnover and occupancy rates can be recorded on fast forward speed watching the videos.

7. **Train Data.** Our experience in Minnesota is that train companies will not share data about their track usage. It's a matter of Homeland Security. We've had four projects in the last two years where we recorded multiple days at railroad track crossings. The videos were scrolled through and we recorded the time the crossing began, the time the crossing ended, and the number of cars in the train. This data was important for several environmental documents and traffic models.

8. **Pedestrian & Bicycle Data**
    a. Effectiveness of Rapid Flashing Beacon: The City of Maple Grove upgraded a pedestrian crossing on a four lane undivided road near a park to have a pedestrian actuated Rapid Flashing Beacon crossing system. We collected before and after video, breaking pedestrian crossing events into categories depending on whether vehicles yielded to the

pedestrians or not. We found little difference with the new system because 95% of the pedestrians didn't push the button to turn on the flashers.

b. Crossing data in St. Louis Park: We recorded approximately twenty uncontrolled pedestrian crossings in the city and counted multiple days of pedestrian crossings. The city used this data to determine where to place on-street pedestrian crossing signs.

9. **Public Hearings.** If a picture says a thousand words, a video may just say a million. Short clips of intersection operations have proven to be very helpful in presentations.

10. **Run Experiments**
    a. **Traffic Calming.** Minneapolis pioneered testing temporary traffic calming in neighborhoods about twenty years ago and most jurisdictions in Minnesota will now test out a concept before making a permanent installation. This can be done using barrels to build a traffic circle or using temporary rubber speed humps. Collecting before/after video allows the engineer to collect data related to the effectiveness of the treatments as well as get a firsthand view of how they are operating.
    b. **Bicycle Treatments.** Minneapolis has also implemented a very aggressive plan to implement bicycle friendly measures which have propelled the city to being one of the best bicycling cities in the country even though we have a northern climate. Minneapolis engineers regularly collect videos at temporary bicycle treatments, such as bump outs and temporary on street bike lanes, to see how they work before building a final design.
    c. **School Parking.** De La Salle High School is located on a restricted site on Nicollet Island in the Mississippi River on the edge of downtown Minneapolis. They are under-parked with 110 stalls for staff and 750 high school students. The 115 year old school brought us in to see if we could improve their parking system. Short of building a parking ramp, we couldn't make huge capacity gains. We did come up with a concept that converted the parking flow into a one-way system through their site and moved the pick-up drop-off zone to a side of the building. The current operations had an aisle that was used for bus parking, pick-up drop-off, and students had to cross this aisle to get to the parking lot. Not good. Our recommendations potentially improved safety on site and also allowed for parallel parking along the drive aisle, increasing parking about 10%. The changes in flow were made with orange cones and a publicity campaign. We videoed four key intersections for a week. We were concerned about queues spilling out onto the arterial road that crosses the Mississippi River. We found minimal queueing and impact to a small residential neighborhood north of the school.

What's Next? Visit my blog **Mike On Traffic** to sign up for our **FREE research briefs**. These two page documents cover the latest topics in traffic engineering and data collection. Or contact me at mspack@spacksconsulting.com. I would love to hear from you!

About the Presenter. Mr. Spack is the Founder and President of Spack Consulting, where he has successfully guided the company from a one-man shop to a small business working for a variety of private and public clients. Through his oversight and direction, he ensures projects are completed on time and on budget. He is also the Founder/President of Traffic Data Inc. and CountingCars.com,

related businesses that help provide a full gambit of traffic study services from initial counts and counting equipment to signed traffic studies.

In addition to his consulting activities, Mike has served as an Adjunct Professor in the University of Minnesota's Department of Civil Engineering. He is regularly published in the *Minnesota Real Estate Journal* as well as the University of Minnesota LTAP's *Technology Exchange,* sharing traffic study tips and tricks. His industry leading blog, MikeOnTraffic.com, has been a forum for traffic study and general traffic observations since 2007. He is also the co-author with Bryant Ficek of the *Traffic Study Manual*, a down-to-earth guide to completing traffic studies.